ORDINARY COUNCIL - 12 December 2024 Attachments

18 Wyett Street and 44 Hill Street, West Launceston - Residential - Construction of an additional dwelling with access over 44 Hill Street

FILE NO: DA0472/2024

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ATTACHMENT ONE:

PLANNING APPLICATION INFORMATION:

Applicant:	S. Group
Property:	18 Wyett Street and 44 Hill Street, West Launceston
Zoning:	General Residential
Receipt Date:	25/10/2024
Validity Date:	28/10/2024
Further Information Request:	01/11/2024
Further Information Received:	11/11/2024
Deemed Approval:	18/12/2024
Representations:	115

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3. PLANNING SCHEME REQUIREMENTS

3.1 Zone Purpose

8.0 General Residential Zone

The purpose of the General Residential Zone is:

8.0.1 To provide for residential use or development that accommodates a range of dwelling types where full infrastructure services are available or can be provided.

8.0.2 To provide for the efficient utilisation of available social, transport and other service infrastructure.

8.0.3 To provide for non-residential use that:

(a) primarily serves the local community; and

(b) does not cause an unreasonable loss of amenity through scale, intensity, noise, activity outside of business hours, traffic generation and movement, or other off site impacts.

8.0.4 To provide for Visitor Accommodation that is compatible with residential character.

Consistent The proposal is for a new dwelling on a lot connected to reticulated services. The additional of this dwelling supports a broader range of housing types within the area, meeting the purpose of the zone.

8.4.1 Residential density for multiple dwellings

That the density of multiple dwellings: (a)makes efficient use of land for housing; and (b)optimises the use of infrastructure and community services.
Consistent
A1 Multiple dwellings must have a site area per dwelling of not less than 325m2.
Complies The proposal will result in a density of one dwelling per 498.5sqm per site area.
P1 Multiple dwellings must only have a site area per dwelling that is less than 325m2, if the development will not exceed the capacity of infrastructure services and: (a)is compatible with the density of existing development on established properties in the area; or (b)provides for a significant social or community benefit and is: (i)wholly or partly within 400m walking distance of a public transport stop; or (ii)wholly or partly within 400m walking distance of an Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone, General Business Zone, Central Business Zone or Commercial Zone.
Not Applicable

8.4.2 Setbacks and building envelope for all dwellings

The siting and scale of dwellings:

(a)provides reasonably consistent separation between dwellings and their frontage within a street; (b)provides consistency in the apparent scale, bulk, massing and proportion of dwellings; (c)provides separation between dwellings on adjoining properties to allow reasonable opportunity for daylight and sunlight to enter habitable rooms and private open space; and (d)provides reasonable access to sunlight for existing solar energy installations.
Consistent The proposal provides reasonably consistent separation between dwellings and their frontage in the street, noting the dwelling is setback 35.40m to the frontage, and located to the rear of the existing dwelling. Consistency in terms of apparent scale, bulk and massing of the dwelling is maintained, noting the surrounding area contains dwellings on varying sizes and types, including two storey dwellings due to topography. This is particular evident noting the adjoining property to the north which contains a dwelling two storey's in height in close proximity to the northern side boundary. Separation distances between dwellings on adjoining properties is appropriate as to not interfere with sunlight to habitable rooms and areas of private open space. The proposal therefore meets the objective of the clause .
A1 Unless within a building area on a sealed plan, a dwelling, excluding garages, carports and protrusions that extend not more than 0.9m into the frontage setback, must have a setback from a frontage that is: (a)if the frontage is a primary frontage, not less than 4.5m, or, if the setback from the primary frontage is less than 4.5m, not less than the setback, from the primary frontage, of any existing dwelling on the site; (b)if the frontage is not a primary frontage, not less than 3m, or, if the setback from the frontage is less than 3m, not less than the setback, from a frontage that is not a primary frontage, of any existing dwelling on the site; (c)if for a vacant site and there are existing dwellings on adjoining properties on the same street, not more than the greater, or less than the lesser, setback for the equivalent frontage of the dwellings on the adjoining sites on the same street; or (d)if located above a non-residential use at ground floor level, not less than the setback from the frontage of the ground floor level.
Complies

The dwelling is setback 35.40m to the frontage, meeting A1(a).
P1 A dwelling must have a setback from a frontage that is compatible with the streetscape, having regard to any topographical constraints.
Not Applicable
A2 A garage or carport for a dwelling must have a setback from a primary frontage of not less than: (a)5.5m, or alternatively 1m behind the building line; (b)the same as the building line, if a portion of the dwelling gross floor area is located above the garage or carport; or (c)1m, if the existing ground level slopes up or down at a gradient steeper than 1 in 5 for a distance of 10m from the frontage.
Complies The garage is setback 39.50m from the frontage, meeting A1(a).
P2 A garage or carport for a dwelling must have a setback from a primary frontage that is compatible with the setbacks of existing garages or carports in the street, having regard to any topographical constraints.
Not Applicable
A3 A dwelling, excluding outbuildings with a building height of not more than 2.4m and protrusions that extend not more than 0.9m horizontally beyond the building envelope, must: (a)be contained within a building envelope (refer to Figures 8.1, 8.2 and 8.3) determined by: (i)a distance equal to the frontage setback or, for an internal lot, a distance of 4.5m from the rear boundary of a property with an adjoining frontage; and (ii)projecting a line at an angle of 45 degrees from the horizontal at a height of 3m above existing ground level at the side and rear boundaries to a building height of not more than 8.5m above existing ground level; and (b)only have a setback of less than 1.5m from a side or rear boundary if the dwelling: (i)does not extend beyond an existing building built on or within 0.2m of the boundary of the adjoining property; or (ii)does not exceed a total length of 9m or one third the length of the side boundary (whichever is the lesser).
Relies on Performance Criteria

The southern section of the dwelling is located outside of the building envelope as prescribed by Figure 8.1, and therefore reliance on the performance criteria is required.
P3 The siting and scale of a dwelling must: (a)not cause an unreasonable loss of amenity to adjoining properties, having regard to: (i)reduction in sunlight to a habitable room (other than a bedroom) of a dwelling on an adjoining property; (ii)overshadowing the private open space of a dwelling on an adjoining property; (iii)overshadowing of an adjoining vacant property; and (iv) visual impacts caused by the apparent scale, bulk or proportions of the dwelling when viewed from an adjoining property; (b)provide separation between dwellings on adjoining properties that is consistent with that existing on established properties in the area; and (c)not cause an unreasonable reduction in sunlight to an existing solar energy installation on: (i)an adjoining property; or (ii)another dwelling on the same site.
Complies The provided documentation clearly illustrates the sections of the dwelling outside of the building envelope. These areas of the dwelling include the southern facing portion of the dwelling, including the southern facing windows, a section of the roof, and a portion of deck. The remainder of the dwelling is wholly within the envelope as prescribed by the Acceptable Solution. The performance criteria requires that determination of whether or not the proposed dwelling will cause an unreasonable loss of amenity to adjoining properties. Adjoining is defined within the scheme as: *'means next to, or having a common boundary with'* Amenity is also defined: *'means, in relation to a locality, place or building, any quality, condition or factor that makes or contributes to making the locality, place or building harmonious, pleasant or enjoyable'* Unreasonable is not defined within the Planning Scheme, however it relates to something being immoderate or exorbitant. The scheme and this assessment notes that development does not have to ensure there is no loss of amenity, only that any change to the amenity is not unreasonable.

The assessment needs to consider the development as proposed, and to ensure compliance, that the proposal will not cause an unreasonable loss of amenity to adjoining properties. Noting this, consideration can only be given to the impact the dwelling will have on adjoining properties. In this instance, the only properties adjoining the site are 42 and 44 Hill Street. There are no other adjoining properties.

When determining compliance, the clause requires assessment have regard to the criteria set. Each criteria will be discussed in reference to the adjoining properties.

P3(a)(i) - Reduction in sunlight to a habitable room (other than a bedroom) of a dwelling on an adjoining property,

42 Hill Street
The dwelling at 42 Hill Street is located to the north of the subject site. Due to its location, no overshadowing will occur on the adjoining property.

44 Hill Street
The only overshadowing of 44 Hill Street will be the access strip. There will be no overshadowing of habitable rooms due to the dwelling being located to the north-east.

P3(a)(ii) - Overshadowing the private open space of a dwelling on an adjoining property.

42 Hill Street
The dwelling at 42 Hill Street is located to the north of the subject site. Due to its location, no overshadowing will occur on the adjoining property.

44 Hill Street
The only overshadowing of 44 Hill Street will be the access strip. There will be no overshadowing of areas of private open space due to the dwelling being located to the north-east.

P3(a)(ii) - Overshadowing of an adjoining vacant property.

There are no vacant adjoining properties.

P3(a)(iv) - Visual impacts cause by the apparent scale, bulk or proportions of the dwelling when viewed from an adjoining property.

The Acceptable Solution provides a building envelope that is acceptable without any further consideration. The Performance Criteria allows for consideration of the areas protruding outside of that envelope, and whether those protrusions are considered to be unreasonable. This means that assessment has to consider that the areas of the dwelling within the envelope as prescribed as reasonable, and then consider the visual impact caused by the dwellings protrusions. The fact that that Performance Criteria

exists means that development can occur outside of the prescribed envelope and still be compliant with the Scheme. The test is then whether or not the protrusions are excessive in nature and cause an unreasonable loss of amenity due to their visual impacts from adjoining properties.

42 Hill Street
The protrusions outside of the envelope exist on the southern side of the proposal dwelling, some 16m from the northern common boundary. These protrusions will be scarcely visible when viewed from the adjoining property at 42 Hill Street. The adjoining property will be able to see some of these areas however, mainly:

a. A portion of the south-western facing wall when viewed from the adjoining yard;
b. A small section of the deck and roof when viewed from the kitchen and living room windows, and lower floor bedroom window; and
c. A small section of the deck when viewed from the adjoining deck.

The visual impact has been exacerbated and compounded by the design choices of 42 Hill Street which undertook an extension to their dwelling in 2013. Their development extends some 17m in length, over 6m high, located within 1m of the boundary, with kitchen and living room windows that directly look into the back yard of 18 Wyett Street.

The proposed dwelling has ensured the majority of the built form is located within the prescribed building envelope through excavation and lowering the dwelling into the slope, greatly reducing its scale and bulk. The dwelling has also reduced its window proportions facing north.

Accordingly, when considering the visual impact of the proposed dwelling from the adjoining dwelling, the extent of impact will not be exorbitant to unreasonably impact on their amenity. In essence, the occupiers of 42 Hill Street will be looking over the new dwelling, not blocked by it, and their view of the protrusions will be minimal. This is consistent with the type of development in the surrounding area, noting overlooking of dwellings is common due to the topography of the land. In a suburban location, it cannot be seen as unreasonable that a dwelling can be seen from an adjoining property.

Whilst the existing amenity will change, the visual impacts produced by the protrusions outside of the envelope are considered appropriate and not so excessive in nature that there is an unreasonable change to amenity.

44 Hill Street
The visual impact apparent from 44 Hill Street will be minimal. This is primarily due to the property being a battle-axe lot, with the built form and useable private areas located to the north-east facing Hill Street. Whilst the dwelling will be located at a higher AHD level than 44 Hill Street, large trees exist along the common boundary between the two properties providing sufficient screening to reduce any visual impact.

P3(b) - Provide separation between dwellings on adjoining properties that is consistent with that existing on established properties in the area; and

42 Hill Street
The proposal will result in a separation between the proposed dwelling and the existing dwelling of approximately 6.21m. Separation distances between dwellings in the surrounding area differ greatly, noting 3.8m between the properties at 14 and 16 Wyett Street, to 25.65m between 40 and 42 Hill Street. Accordingly, there is no uniform repetitive separation. This can be attributed to the mix of dwelling types and lots of varying size and shape, along with topography. Accordingly, having a 6.21m separation distance is not unusual, and is consistent with the diverse separation distances that exist within the surrounding area.

44 Hill Street
The proposal will result in a separation between the proposed dwelling and the existing dwelling (the carport) of approximately 23.81m. Having a 23.81m separative distance is not unusual and is consistent with the setbacks between dwellings within the surrounding area.

P3(c) - Not cause an unreasonable reduction in sunlight to an existing solar energy installation on:
(i) An adjoining property; or
(ii) Another dwelling on the same site.

There will be no overshadowing of any existing solar energy installations on adjoining properties or the subject site.

Overall, the development will utilise excavation to allow the dwelling to sit lower on the site, as well a small footprint and design choices to reduce bulk. Whilst there will be a change to the amenity of the adjoining neighbours, it is not considered so excessive that it might be considered unreasonable.

The proposal complies with the performance criteria.

8.4.3 Site coverage and private open space for all dwellings

That dwellings are compatible with the amenity and character of the area and provide:
(a)for outdoor recreation and the operational needs of the residents;
(b)opportunities for the planting of gardens and landscaping; and
(c)private open space that is conveniently located and has access to sunlight.

Consistent

A1 Dwellings must have: (a)a site coverage of not more than 50% (excluding eaves up to 0.6m wide); and (b)for multiple dwellings, a total area of private open space of not less than 60m2 associated with each dwelling, unless the dwelling has a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer).
Complies The proposal will have a site coverage of 142m². Including the existing buildings on site that contribute to site coverage, being the 31.5m² carport, 10.0m² shed, and 216m² dwelling, there will be a 40% site coverage. Further, the existing dwelling is proposed to have 240m² of private open space, and the proposed dwelling 160m² of private open space.
P1 Dwellings must have: (a)site coverage consistent with that existing on established properties in the area; (b)private open space that is of a size and with dimensions that are appropriate for the size of the dwelling and is able to accommodate: (i)outdoor recreational space consistent with the projected requirements of the occupants and, for multiple dwellings, take into account any common open space provided for this purpose within the development; and (ii)operational needs, such as clothes drying and storage; and (iii)reasonable space for the planting of gardens and landscaping.
Not Applicable
A2 A dwelling must have private open space that: (a)is in one location and is not less than: (i)24m2; or (ii)12m2, if the dwelling is a multiple dwelling with a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer); (b)has a minimum horizontal dimension of not less than: (i)4m; or (ii)2m, if the dwelling is a multiple dwelling with a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer); (c)is located between the dwelling and the frontage only if the frontage is orientated between 30 degrees west of true north and 30 degrees east of true north; and (d)has a gradient not steeper than 1 in 10.

Complies Each dwelling has at least 24m² of private open space in a single location with a horizontal dimension of 4m, on a flat surface. The existing dwellings space will be located on an existing paved area, whilst the new dwelling will have a covered paved area under the deck.

8.4.6 Privacy for all dwellings

To provide a reasonable opportunity for privacy for dwellings.
Consistent The proposal ensures there is reasonable opportunity for privacy for all dwellings.
A1 A balcony, deck, roof terrace, parking space, or carport for a dwelling (whether freestanding or part of the dwelling), that has a finished surface or floor level more than 1m above existing ground level must have a permanently fixed screen to a height of not less than 1.7m above the finished surface or floor level, with a uniform transparency of not more than 25%, along the sides facing a: (a)side boundary, unless the balcony, deck, roof terrace, parking space, or carport has a setback of not less than 3m from the side boundary; (b)rear boundary, unless the balcony, deck, roof terrace, parking space, or carport has a setback of not less than 4m from the rear boundary; and (c)dwelling on the same site, unless the balcony, deck, roof terrace, parking space, or carport is not less than 6m: (i)from a window or glazed door, to a habitable room of the other dwelling on the same site; or (ii)from a balcony, deck, roof terrace or the private open space of the other dwelling on the same site.
Relies on Performance Criteria The southern facing portion of the deck has a floor level of 2.8m above ground level, and is setback 1.56m from the southern adjoining boundary at 44 Hill Street. All other setbacks for the deck, including the rear and northern side setbacks, and setbacks to the existing dwelling on site, meet A1(a), (b), and (c). Importantly, the deck is setback 9.53m from the shared side boundary with the adjoining property at 42 Hill Street, meeting the Acceptable Solution. Due to the proximity of the deck to the adjoining property at 44 Hill Street, it is unable to meet the Acceptable Solutions and is reliant on the Performance Criteria.

P1 A balcony, deck, roof terrace, parking space or carport for a dwelling (whether freestanding or part of the dwelling) that has a finished surface or floor level more than 1m above existing ground level, must be screened, or otherwise designed, to minimise overlooking of: (a)a dwelling on an adjoining property or its private open space; or (b)another dwelling on the same site or its private open space.
Complies The Performance Criteria requires that the deck must be screened or otherwise designed to minimise overlooking of a dwelling on an adjoining property or its private open space, or another dwelling on the same site or its private open space. The deck will primarily look over the access strip of 44 Hill Street, and will be visibly screened via existing tall vegetation along the rear boundary when facing the dwelling. This means there will be minimal overlooking of private open space. This ensures there is reasonable opportunity for 44 Hill Street to retain its current privacy. The deck will not be visible from the existing dwelling on site. The proposal meets the Performance Criteria.
A2 A window or glazed door to a habitable room of a dwelling, that has a floor level more than 1m above existing ground level, must satisfy (a), unless it satisfies (b): (a)the window or glazed door: (i)is to have a setback of not less than 3m from a side boundary; (ii)is to have a setback of not less than 4m from a rear boundary; (iii)if the dwelling is a multiple dwelling, is to be not less than 6m from a window or glazed door, to a habitable room, of another dwelling on the same site; and (iv)if the dwelling is a multiple dwelling, is to be not less than 6m from the private open space of another dwelling on the same site. (b)the window or glazed door: (i)is to be offset, in the horizontal plane, not less than 1.5m from the edge of a window or glazed door, to a habitable room of another dwelling; (ii)is to have a sill height of not less than 1.7m above the floor level or have fixed obscure glazing extending to a height of not less than 1.7m above the floor level; or (iii)is to have a permanently fixed external screen for the full length of the window or glazed door, to a height of not less than 1.7m above floor level, with a uniform transparency of not more than 25%.
Relies on Performance Criteria The two southern facing windows of the kitchen and dining room have a floor height of 2.8m above ground level, and are setback 900mm from the

southern side boundary. All other windows with a floor height exceeding 1m above ground level meet all relevant setbacks to boundaries and the existing dwelling on site in accordance with A2(a)(i), (a)(ii), (a)(iii), and (a)(iv). As such, the proposal relies on the Performance Criteria.
P2 A window or glazed door to a habitable room of a dwelling that has a floor level more than 1m above existing ground level, must be screened, or otherwise located or designed, to minimise direct views to: (a)a window or glazed door, to a habitable room of another dwelling; and (b)the private open space of another dwelling.
Complies The adjoining properties are located at 42 and 44 Hill Street. The windows do not face 42 Hill Street. They will look out over the access strip of 44 Hill Street. Their location will ensure they do not look into a window to a habitable room or private open space of another adjoining dwelling, meeting the Performance Criteria.
A3 A shared driveway or parking space (excluding a parking space allocated to that dwelling) must be separated from a window, or glazed door, to a habitable room of a multiple dwelling by a horizontal distance of not less than: (a)2.5m; or (b)1m if: (i)it is separated by a screen of not less than 1.7m in height; or (ii)the window, or glazed door, to a habitable room has a sill height of not less than 1.7m above the shared driveway or parking space, or has fixed obscure glazing extending to a height of not less than 1.7m above the floor level.
Complies The access strip is considered to be a shared driveway for the purpose of this assessment. The windows located 900mm from this driveway have a minimum sill height of 3.70m.

8.4.8 Waste storage for multiple dwellings

To provide for the storage of waste and recycling bins for multiple dwellings.
Consistent
A1 A multiple dwelling must have a storage area, for waste and recycling bins, that is not less than 1.5m2 per dwelling and is within one of the following locations:

(a)an area for the exclusive use of each dwelling, excluding the area in front of the dwelling; or (b)a common storage area with an impervious surface that: (i)has a setback of not less than 4.5m from a frontage; (ii)is not less than 5.5m from any dwelling; and (iii)is screened from the frontage and any dwelling by a wall to a height not less than 1.2m above the finished surface level of the storage area.
Complies A 4.5m² screened storage area for waste, recycle, and green bins has been provided to the rear of the dwelling.

C2.0 Parking and Sustainable Transport Code

The purpose of the Parking and Sustainable Transport Code is: C2.1.1To ensure that an appropriate level of parking facilities is provided to service use and development. C2.1.2To ensure that cycling, walking and public transport are encouraged as a means of transport in urban areas. C2.1.3To ensure that access for pedestrians, vehicles and cyclists is safe and adequate. C2.1.4To ensure that parking does not cause an unreasonable loss of amenity to the surrounding area. C2.1.5To ensure that parking spaces and accesses meet appropriate standards. C2.1.6To provide for parking precincts and pedestrian priority streets.
Consistent The proposal has demonstrated that there is an appropriate level of parking to service the use, with two parking spaces for each dwelling, and appropriate provisions for on-street parking for visitors. Safety considerations have been made for pedestrians and vehicles, noted they are able to adequately and safely share the right of way. Noting the car parking spaces for the new dwelling are located within a garage, there will be no loss of amenity to the surrounding area. It has been demonstrated that parking and accesses are able to meet appropriate standards, and the design and layout of these areas are convenient and safe. This compliance has been supported through a Traffic Impact Assessment (TIA), prepared by a qualified traffic consultant. It is with this supporting document and assessment of the code, that the purpose of the code has been met.

C2.5.1 Car parking numbers

That an appropriate level of car parking spaces are provided to meet the needs of the use
Consistent The provided car parking spaces meet the needs of this residential use.
A1 The number of on-site car parking spaces must be no less than the number specified in Table C2.1, less the number of car parking spaces that cannot be provided due to the site including container refund scheme space, excluding if: (a)the site is subject to a parking plan for the area adopted by council, in which case parking provision (spaces or cash-in-lieu) must be in accordance with that plan; (b)the site is contained within a parking precinct plan and subject to Clause C2.7; (c)the site is subject to Clause C2.5.5; or (d)it relates to an intensification of an existing use or development or a change of use where: (i)the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is greater than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case no additional on-site car parking is required; or (ii)the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is less than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case on-site car parking must be calculated as follows: N = A + (C- B) N = Number of on-site car parking spaces required A = Number of existing on site car parking spaces B = Number of on-site car parking spaces required for the existing use or development specified in Table C2.1 C= Number of on-site car parking spaces required for the proposed use or development specified in Table C2.1.
Relies on Performance Criteria Table C2.1 requires that if proposing a 2 or more bedroom dwelling in the General Residential Zone (including all rooms capable of being used as a bedroom), two spaces per dwelling are required. Further, for visitor parking spaces, 1 dedicated space per 4 dwellings (rounded up to the nearest whole number. Based on the requirement of Table C2.1, two car parking spaces for each dwelling are required, and one visitor space. As only 4 spaces have been provided (two for each dwelling), the application is reliant on the Performance Criteria.

P1.2 The number of car parking spaces for dwellings must meet the reasonable needs of the use, having regard to: (a)the nature and intensity of the use and car parking required; (b)the size of the dwelling and the number of bedrooms; and (c)the pattern of parking in the surrounding area.
Complies The qualified traffic expert addressed the performance criteria within the Traffic Impact Assessment (TIA). The report noted that the proposed use is unlikely to attract a high visitor parking demand, and noting the un-restricted on-street parking on Wyett Street, there is the capacity for users of the site and visitors alike to park on the street. It is noted that a representor provided a Traffic and Transport Review of the submitted TIA. The report concluded that to meet the needs of the use, a visitor space should be provided. This view was supported by multiple vehicles mounting the footpath and parking on both sides of the street. Their photographic evidence provided showed this to be the case, but only focused on the areas immediately around the entrance to the site. Whilst this is acknowledged, multiple site visits to the site have occurred, and there has always been on-street parking availability. The consideration of the review report has not considered any walkable distance along the street, noting there is availability, and as such the evidence provided in the submitted Traffic Report is considered acceptable, noting there is the ability to visitors to park on the street. Based on this, the proposal is able to provide sufficient parking that meets the needs of the use, complying with the Performance Criteria.

C2.6.1 Construction of parking areas

That parking areas are constructed to an appropriate standard.
Consistent
A1 All parking, access ways, manoeuvring and circulation spaces must: (a)be constructed with a durable all weather pavement; (b)be drained to the public stormwater system, or contain stormwater on the site; and (c)excluding all uses in the Rural Zone, Agriculture Zone, Landscape Conservation Zone, Environmental Management Zone, Recreation Zone and Open Space Zone, be surfaced by a spray seal, asphalt, concrete, pavers or equivalent material to restrict abrasion from traffic and minimise entry of water to the pavement.
Complies

All parking, access ways, manoeuvring, and circulation spaces will be sealed and able to drain to the reticulated stormwater system.

C2.6.2 Design and layout of parking areas

That parking areas are designed and laid out to provide convenient, safe and efficient parking.

Consistent

It has been demonstrated that the parking areas will be designed and laid out to provide convenient, safe and efficient parking, meeting the objective of the clause.

A1.1 Parking, access ways, manoeuvring and circulation spaces must either:

(a)comply with the following:

(i)have a gradient in accordance with *Australian Standard AS 2890 - Parking facilities, Parts 1-6*;

(ii)provide for vehicles to enter and exit the site in a forward direction where providing for more than 4 parking spaces;

(iii)have an access width not less than the requirements in Table C2.2;

(iv)have car parking space dimensions which satisfy the requirements in Table C2.3;

(v)have a combined access and manoeuvring width adjacent to parking spaces not less than the requirements in Table C2.3 where there are 3 or more car parking spaces;

(vi)have a vertical clearance of not less than 2.1m above the parking surface level; and

(vii)excluding a single dwelling, be delineated by line marking or other clear physical means; or

(b) comply with *Australian Standard AS 2890- Parking facilities, Parts 1-6*.

Relies on Performance Criteria

The qualified traffic expert addressed the provision within the Traffic Impact Assessment. All parking spaces will have a fall in both directions no steeper than 1:33, meeting Australian Standard AS2890 Parking facilities, Parts 1-6. The gradient of the driveway is existing, but from the entryway off Wyett Street to the entrance into the new dwelling garage, the access will have a gradient of be 9.5%. This meets standard by being less than the maximum gradient of 25% allowable under the Australian Standard.

Again, the representor provided Traffic and Transport Review of the submitted TIA challenged some aspects of the assessment. The review report has stated that submitted TIA has incorrectly stated that the ROW provides access to 4 properties (including the development site), when in

fact it should be 5 (including 48 Hill Street). Due to this error, the calculation of users is not accurate. This is no correct. No information has been provided that demonstrates that 48 Hill Street has legal access over the Right of Way. Title documents demonstrate the following:

Address	Easements	ROW Legal Access
18 Wyett Street	Benefiting Easement	Yes
16 Wyett Street	Benefiting Easement	Yes
44 Hill Street	Burdening Easement	Yes
46 Hill Street	Benefiting Easement	Yes
48 Hill Street	No	No

As such, the assessment and consideration of number of properties, and in turn, number of vehicles which has legal access to the right of way is correct in the submitted TIA.

It was argued that the report failed to assess access ways, manoeuvring, and circulation spaces. However, it was confirmed by the Traffic Consultant that gradients were checked, and as per their report, comply with A1.1(a). It is further noted that the right of way is existing, and no changes to the right of way are proposed, noting it meets the Australian Standard at 9.5% gradient (less than 25%).

All vehicles utilising the right of way will be able to enter and exit the site in a forward direction. The double garage is 6.06m wide and 6.04m long, allowing two car parking spaces 3.0m wide and 5.4m long to fit, meeting the car parking dimensions satisfy the requirements of Table C2.3. Vertical clearance for garage access is 2.4m. As such, the proposal meets relevant Acceptable Solutions A1.1 ((a)(i), (a)(ii), (a)(iii), (a)(vi).

However, the proposal is unable to meet A1.1(a)(iii). The provision requires that the access width is no less than the requirements set out in Table C2.2. The table requires that when an internal access width is servicing 6 o 20 vehicles, it has a width not less than 4.5m for the first 7m from the road carriageway and 3m thereafter, and has a 2m wide by 5m long passing bay, plus entry and exit tapers every 30m.

As the right of way is 3.65m wide and no passing bay is proposed, the application relies on performance criteria.

P1 All parking, access ways, manoeuvring and circulation spaces must be designed and readily identifiable to provide convenient, safe and efficient parking, having regard to:
(a)the characteristics of the site;
(b)the proposed slope, dimensions and layout;
(c)useability in all weather conditions;

(d)vehicle and pedestrian traffic safety; (e)the nature and use of the development; (f)the expected number and type of vehicles; (g)the likely use of the parking areas by persons with a disability; (h)the nature of traffic in the surrounding area; (i)the proposed means of parking delineation; and (j)the provisions of *Australian Standard AS 2890.1:2004 - Parking facilities, Part 1: Off-street car parking* and *AS 2890.2 -2002 Parking facilities, Part 2: Off-street commercial vehicle facilities.*
Complies The Traffic Impact Assessment has provided information to assist in the assessment of the clause. The only relevant assessment is the width of the right of way and passing bays. Again, the representor provided Traffic and Transport Review of the submitted TIA challenged some aspects of the assessment, and in particular the use of an informal parking bay. The right of way provides legal access to 4 properties, with estimated traffic being 24 vehicle trips per day (vpd), up to 30 trips with the new dwleling, with a peak hour rate of 3 trips (vph). Australian Standard 2890.1:2004 nominates an accessible access width ranging between 3.0m and 5.5m wide. The report has confirmed that a 3.65m access width is reasonable for the traffic activity. The report has also confirmed that a formal passing bay is not considered necessary as the proposed access to the new dwelling is where the passing bay would be located. It was also stated that an existing driveway apron on the site can function as a passing bay if the need arises. An officer review of these comments acknowledge the informal passing bay but note that it could only be utilised by persons occupying 18 Wyett Street, and would not be formally available to other users of the right of way. As the right of way is not large enough to allow for two vehicles to pass each other, there will be instances where vehicles may have to wait in Wyett Street to turn in, or reverse back into their driveways when exiting. This is not an uncommon occurrence in inner city living areas where access is granted via narrow driveways. Broadly speaking, only the occupiers of the properties will be utilising the access on a day to day basis, and will understand the constraints of the site to ensure a reasonable and safe approach is achieved. Furthermore, both 16 and 18 Wyett Street have access onto the right of way located close to the crossover. According, there is sufficient room and siting to wait for traffic if necessary. The parking areas at both 46 and 44 Hill Street both have large parking and circulation areas of their properties. There is sufficient sight lines up to the road that would allow vehicles to reverse if necessary to ensure safe access and egress.

The report has also confirmed that the slope, dimensions, and layout of the right of way is suitable, along with the access able to be utilised in all weather conditions.

Anticipated pedestrian activity is 10 persons per day (ppd). Both the vpd and ppd are low, with a low speed environment. The driveway infrastructure is adequate for vehicles and pedestrians to share the driveway, and the situation has been assessed as low crash risk and safe. This includes the ability for pedestrians ability to access the new dwelling.

The application included a Traffic Impact Assessment (TIA) to assist in determining compliance with the scheme. It is noted that a transport review was lodged by a representor challenging aspects of the report.

An assessment on the parking, access, and safety requirements against the transport code have been undertaken, taking into consideration the submitted TIA and the review report. It is concluded that the site is capable of allowing safe access to the site, and sufficient on-sire parking has been provided to meet the needs of the use.

In response to the traffic review submitted by the representor, the author of the TIA submitted with the application has stated that the proposal is workable as existing properties can **safely** continue to access the ROW and the proposed development can as well.

Based on the above assessment, the proposal meets the Performance Criteria.

C3.0 Road and Railway Assets Code

The purpose of the Road and Railway Assets Code is: C3.1.1To protect the safety and efficiency of the road and railway networks; and C3.1.2To reduce conflicts between sensitive uses and major roads and the rail network.
Consistent The safety and efficiency of the road network will be retained, meeting the purpose of the code.

C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction

To minimise any adverse effects on the safety and efficiency of the road or rail network from vehicular traffic generated from the site at an existing or new vehicle crossing or level crossing or new junction.
Consistent
A1.1 For a category 1 road or a limited access road, vehicular traffic to and from the site will not require: (a)a new junction; (b)a new vehicle crossing; or (c)a new level crossing.
Not Applicable
A1.2 For a road, excluding a category 1 road or a limited access road, written consent for a new junction, vehicle crossing, or level crossing to serve the use and development has been issued by the road authority.
Not Applicable

A1.3 For the rail network, written consent for a new private level crossing to serve the use and development has been issued by the rail authority.
Not Applicable
A1.4 Vehicular traffic to and from the site, using an existing vehicle crossing or private level crossing, will not increase by more than: (a)the amounts in Table C3.1; or (b)allowed by a licence issued under Part IVA of the *Roads and Jetties Act 1935* in respect to a limited access road.
Complies The proposal is estimated to generate 6 vehicle movements per day over an existing crossing, less than the 40 movements specific in table C3.1.

Tiller

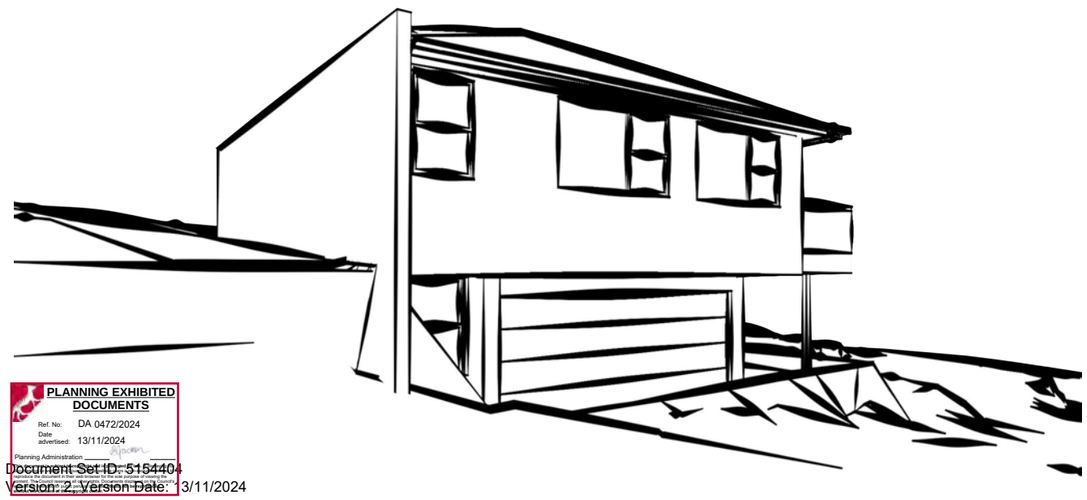
Wyett St Multiple Dwelling Development
18 Wyett Street

DRAWING SCHEDULE:

Sheet No:	Drawing	Rev:	Revision Date
A000	Cover	H	11/10/2024
A101	Site Plan	H	11/10/2024
A102	Shadow Diagrams	H	11/10/2024
A202	Proposed Floor Plan	H	11/10/2024
A301	Proposed Elevations	H	11/10/2024
A401	3D	H	11/10/2024
A402	3D with Envelope	H	11/10/2024
A403	3D	H	11/10/2024
A404	3D with Envelope	H	11/10/2024
A405	3D	H	11/10/2024
A406	3D with Envelope	H	11/10/2024
A407	View from Kitchen Window 42 Hill St	H	11/10/2024
A501	Outside Wheel Path Section 01	H	11/10/2024
A502	Outside Wheel Path Section 02	H	11/10/2024

Summary of changes from previous planning application:

- New aesthetic to be more in keeping with character of Hill St and Wyett St including hipped roof, weatherboard and some brick claddings,
- The garage door has been pushed back from the ROW to improve turning into the garage.
- Garage level has been amended to improve gradients into the garage.
- Additional information on the relationship between 18 Wyett St and the dwelling at 42 Hill St near the shared property boundary.
- A traffic impact assessment has been conducted to review the viability of using the ROW to access the proposed dwelling.



LOCATION PLAN - Scale: NTS

GENERAL INFORMATION:

Accredited Architect:	Sam Haberle
Accreditation Number:	CC5618U
Land Title Reference Number:	C.T. 78255-3 C.T. 82876-2 (ROW)
Municipality:	LCC
Planning Scheme Overlay:	SAFEGUARDING OF AIRPORTS CODE
Zoning:	GENERAL RESIDENTIAL
Building Class:	1
Soil classification:	TBC
Wind Classification:	TBC
Climate Zone:	7
Alpine Area:	N/A
Corrosion environment:	Low
Other Known site hazards:	N/A

create. wonder.

REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller			DWG # A000
DWG Cover		SCALE @ ISO A3	
		DRAWN tf	
		CHKD tf	PROJECT# J007877

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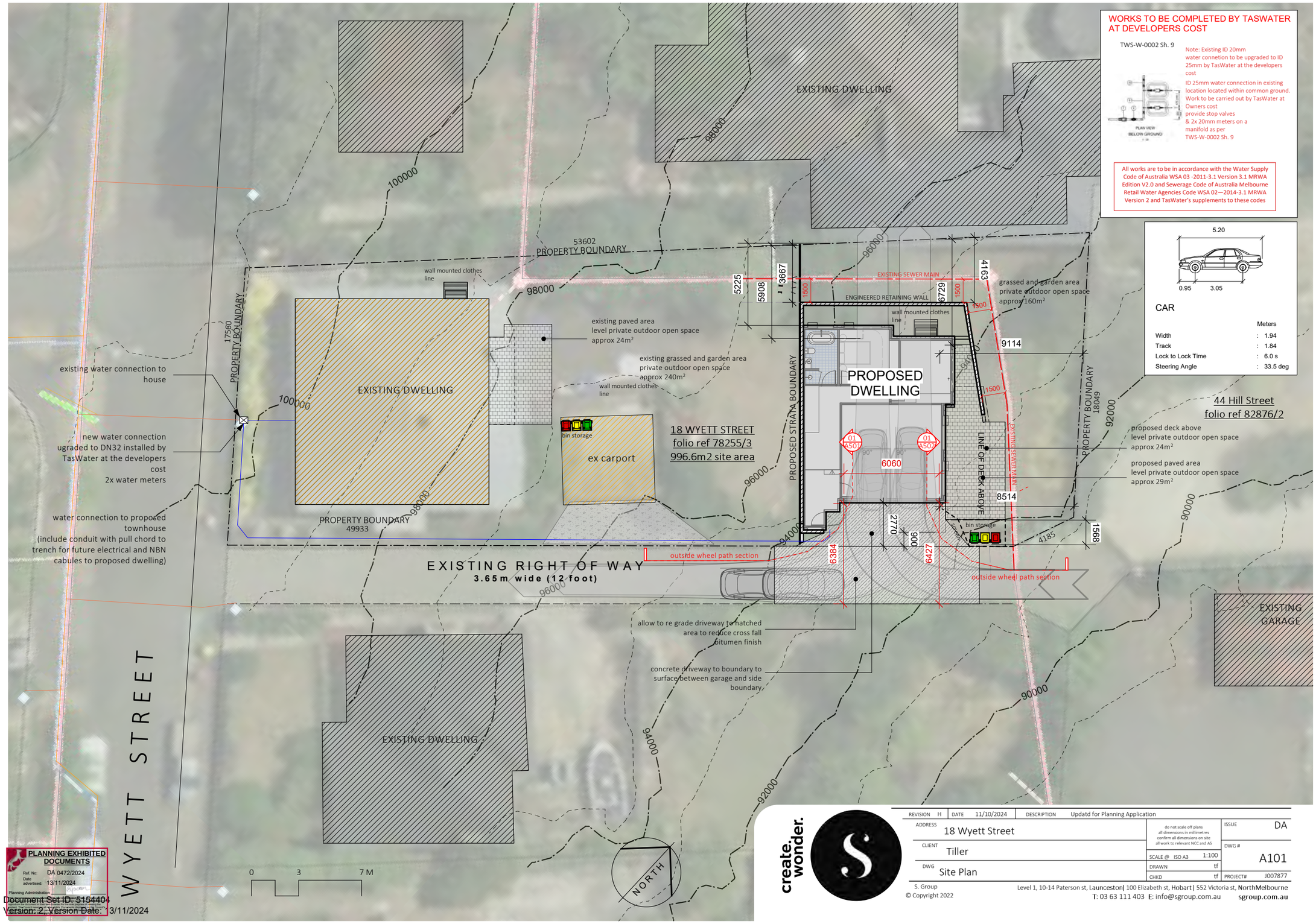
WORKS TO BE COMPLETED BY TASWATER AT DEVELOPERS COST
TWS-W-0002 Sh. 9
Note: Existing ID 20mm water connetion to be upgraded to ID 25mm by TasWater at the developers cost
ID 25mm water connection in existing location located within common ground. Work to be carried out by TasWater at Owners cost
provide stop valves
& 2x 20mm meters on a manifold as per
TWS-W-0002 Sh. 9
PLAN VIEW BELOW GROUND
All works are to be in accordance with the Water Supply Code of Australia WSA 03 -2011-3.1 Version 3.1 MRWA Edition V2.0 and Sewerage Code of Australia Melbourne Retail Water Agencies Code WSA 02—2014-3.1 MRWA Version 2 and TasWater's supplements to these codes
5.20
0.95
3.05
CAR
Meters
Width : 1.94
Track : 1.84
Lock to Lock Time : 6.0 s
Steering Angle : 33.5 deg
EXISTING DWELLING
53602
PROPERTY BOUNDARY
98000
100000
96000
wall mounted clothes line
existing paved area level private outdoor open space approx 24m²
existing grassed and garden area private outdoor open space approx 240m²
existing water connection to house
new water connection upgraded to DN32 installed by TasWater at the developers cost
2x water meters
water connection to proposed townhouse (include conduit with pull chord to trench for future electrical and NBN cabules to proposed dwelling)
17560
PROPERTY BOUNDARY
EXISTING DWELLING
bin storage
ex carport
18 WYETT STREET
folio ref 78255/3
996.6m2 site area
PROPERTY BOUNDARY
49933
EXISTING SEWER MAIN
ENGINEERED RETAINING WALL
grassed and garden area private outdoor open space approx 160m²
5225
5908
3667
1500
6279
4163
9114
PROPOSED DWELLING
PROPOSED STRATA BOUNDARY
CONSTRUCTED RETAINING WALL
LINE OF DECK ABOVE
6060
8514
2770
900
6427
6384
4185
1568
92000
90000
94000
44 Hill Street
folio ref 82876/2
proposed deck above level private outdoor open space approx 24m²
proposed paved area level private outdoor open space approx 29m²
outside wheel path section
EXISTING RIGHT OF WAY
3.65m wide (12 foot)
allow to re grade driveway to hatched area to reduce cross fall bitumen finish
concrete driveway to boundary to surface between garage and side boundary
EXISTING GARAGE
EXISTING DWELLING
WYETT STREET
NORTH
0 3 7 M
PLANNING EXHIBITED DOCUMENTS
Ref. No: DA 0472/2024
Date advertised: 13/11/2024
Planning Administration
Document Set ID: 5154404
Version: 2, Version Date: 13/11/2024
create. wonder.
REVISION H DATE 11/10/2024 DESCRIPTION Updatd for Planning Application
ADDRESS 18 Wyett Street
CLIENT Tiller
DWG Site Plan
do not scale off plans
all dimensions in millimetres
confirm all dimensions on site
all work to relevant NCC and AS
SCALE @ ISO A3 1:100
DRAWN tf
CHKD tf
ISSUE DA
DWG # A101
PROJECT# J007877
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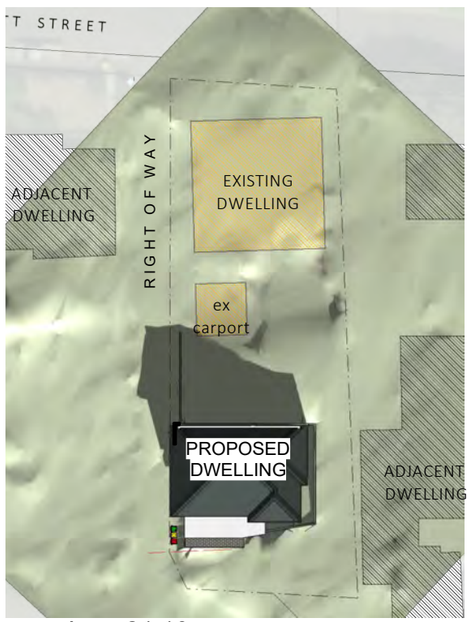
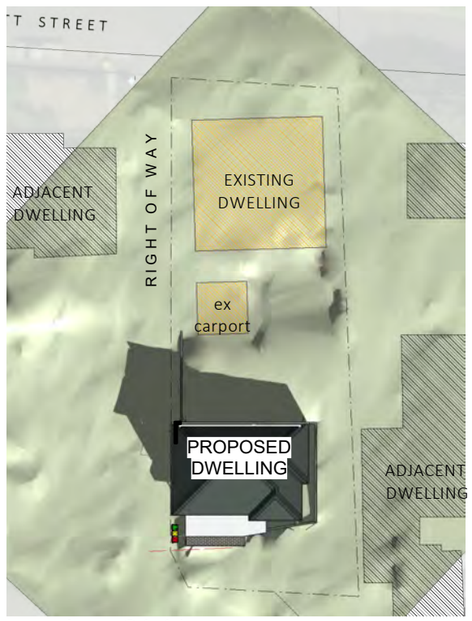
01 June 21 9am



02 June 21 10am



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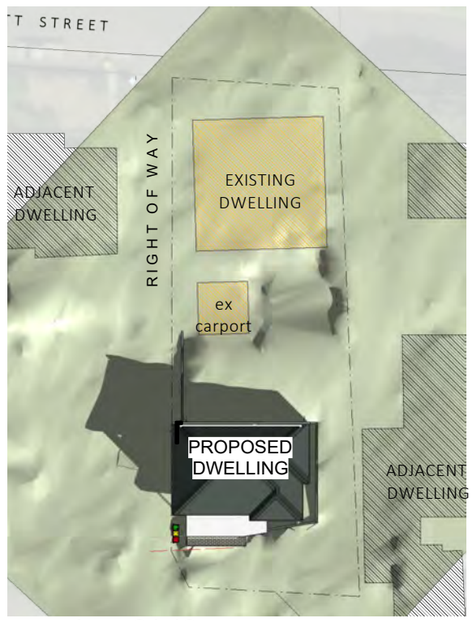

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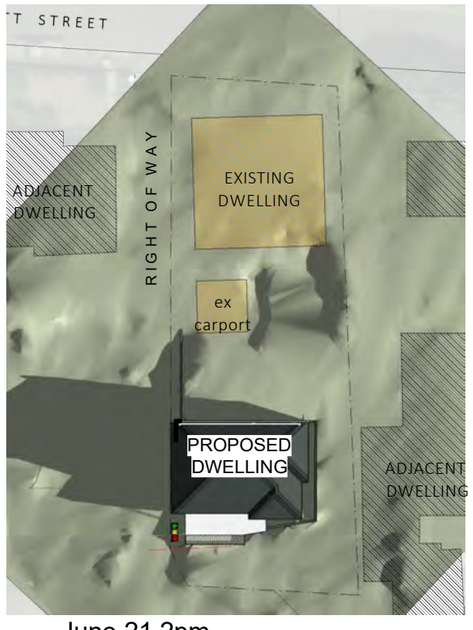
05 June 21 1pm



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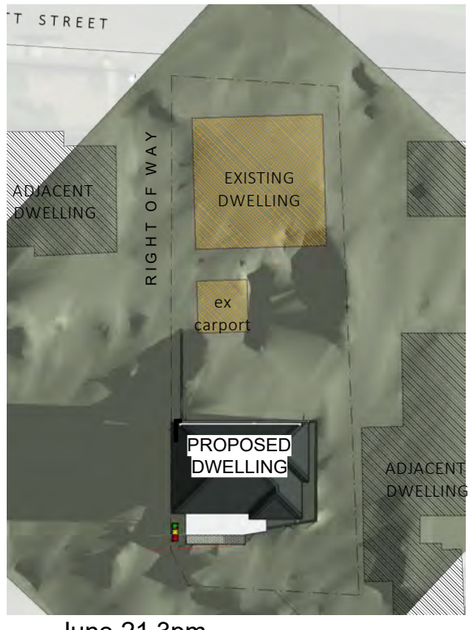

07 June 21 3pm

NORTH

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A102
DWG Shadow Diagrams		DRAWN tf	
		CHKD tf	PROJECT# J007877

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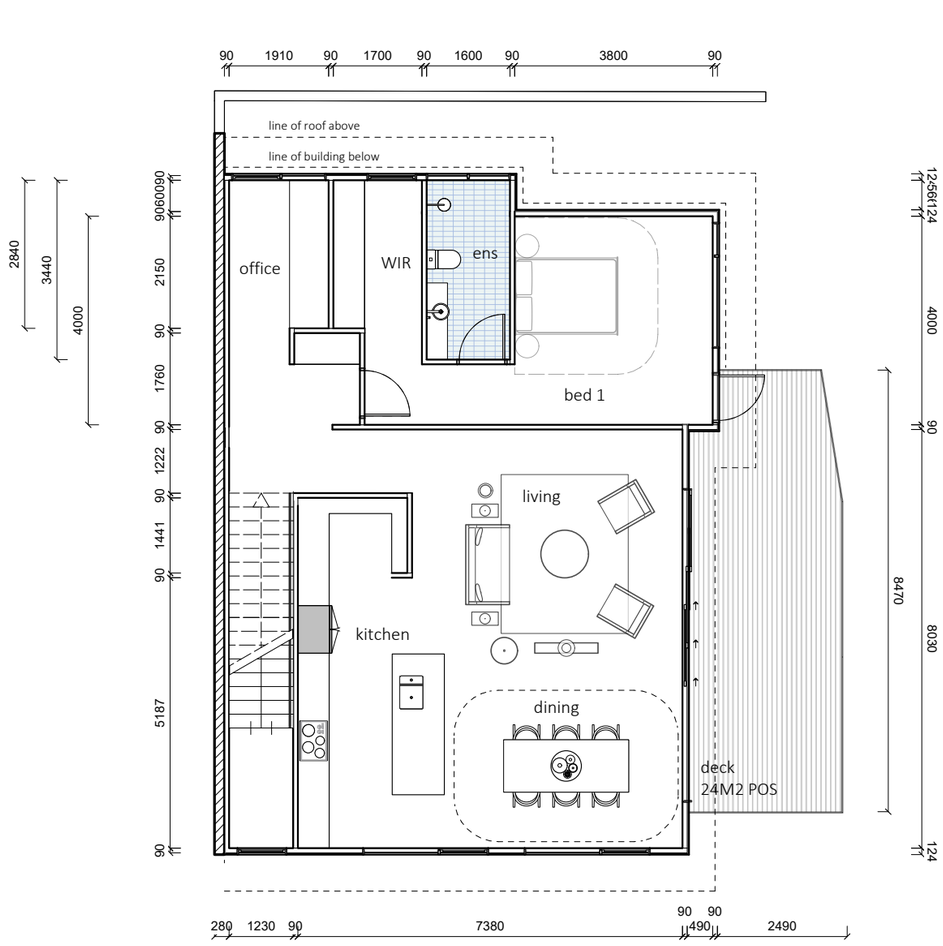
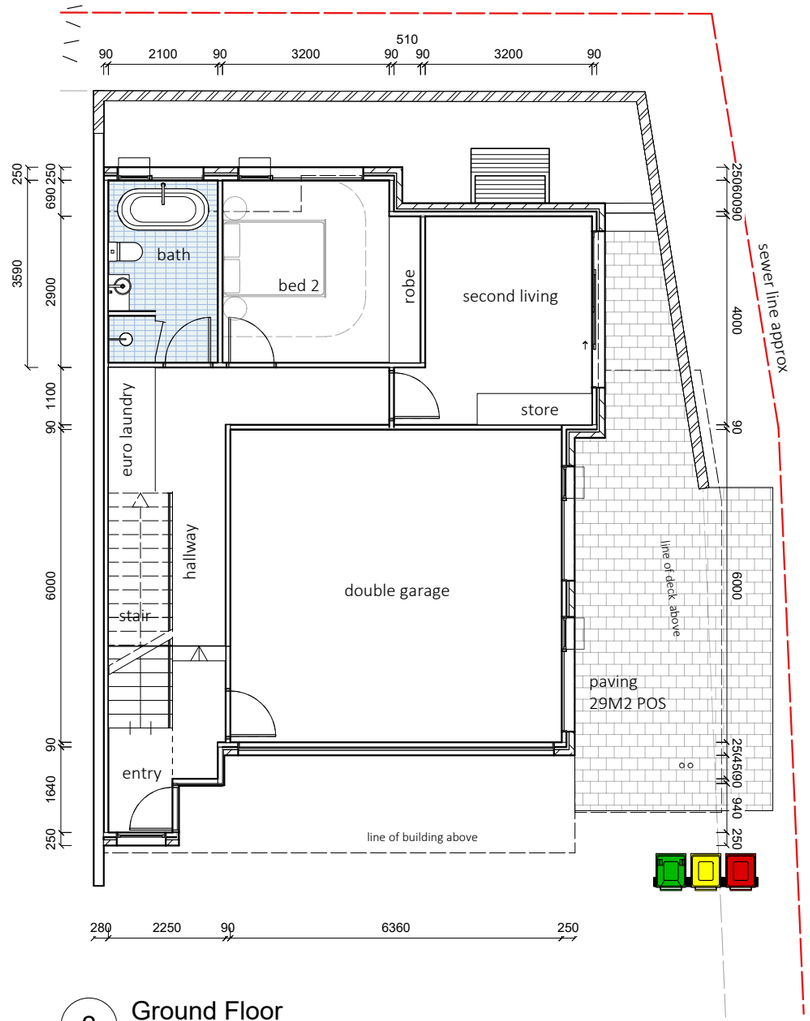


1 Upper Floor



2 Ground Floor

PLANNING EXHIBITED DOCUMENTS
Ref. No: DA 0472/2024
Date advertised: 13/11/2024
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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A202
DWG Proposed Floor Plan		DRAWN tf	
		CHKD tf	PROJECT# J007877

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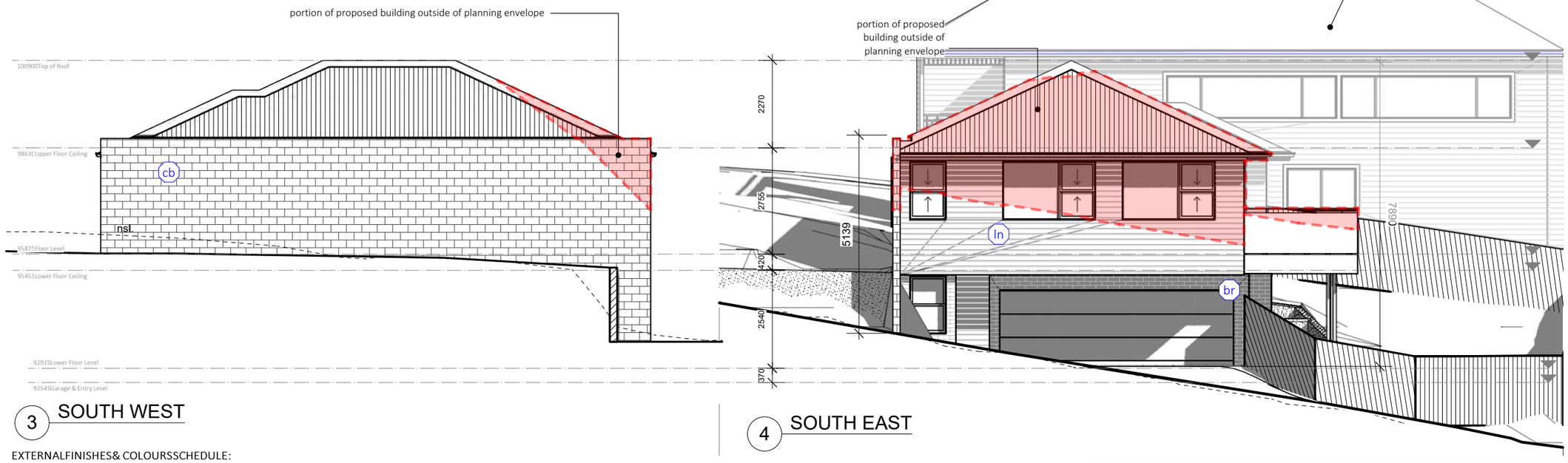
1 NORTH EAST

2 NORTH WEST



3 SOUTH WEST

4 SOUTH EAST

EXTERNALFINISHES& COLOURSSCHEDULE:

ln James Hardie LINEA cladding, paint finish

br [illegible] brick

cb Concrete block (finish as specified)

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A301
DWG Proposed Elevations		DRAWN tf	
		CHKD tf	PROJECT# J007877

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1 3d 01

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A401
DWG 3D		DRAWN tf	
		CHKD tf	PROJECT# J007877

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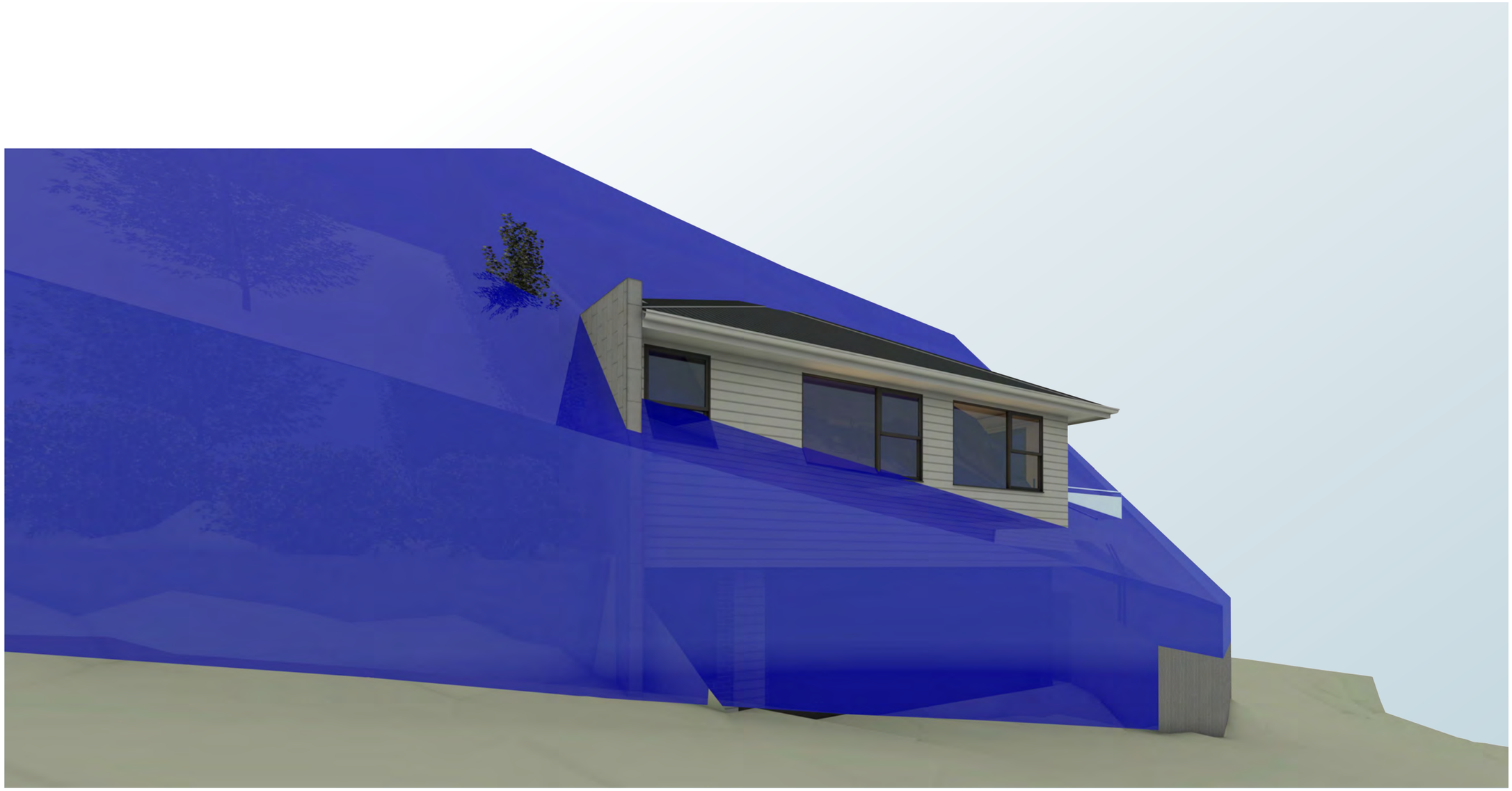

1 3d 01

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
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CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A402
DWG 3D with Envelope		DRAWN tf CHKD tf	PROJECT# J007877

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1 3d 02

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A403
DWG 3D		DRAWN tf CHKD tf	PROJECT# J007877

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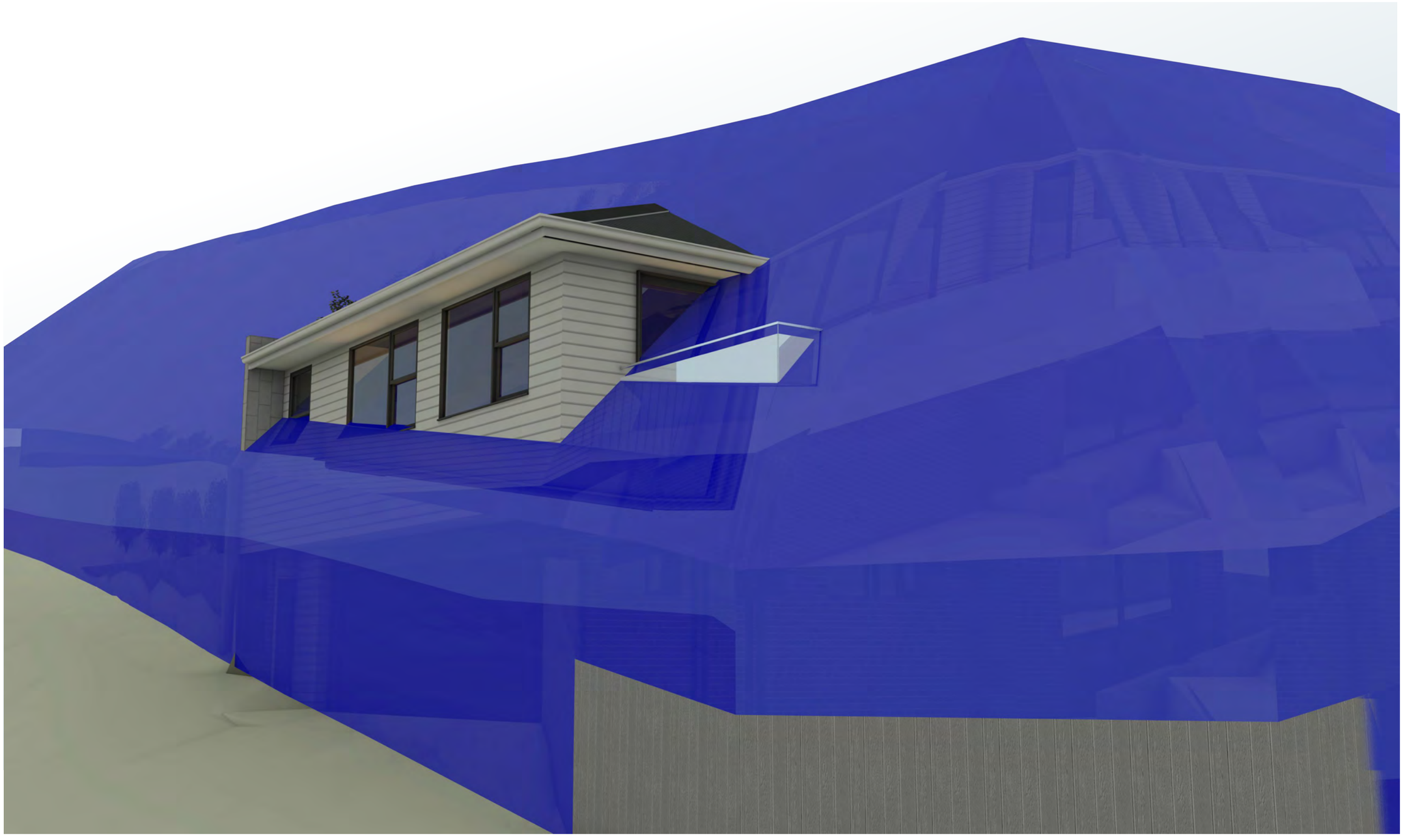

1 3d 02

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A404
DWG 3D with Envelope		DRAWN tf	
		CHKD tf	PROJECT# J007877

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A405
DWG 3D		DRAWN tf	
		CHKD tf	PROJECT# J007877

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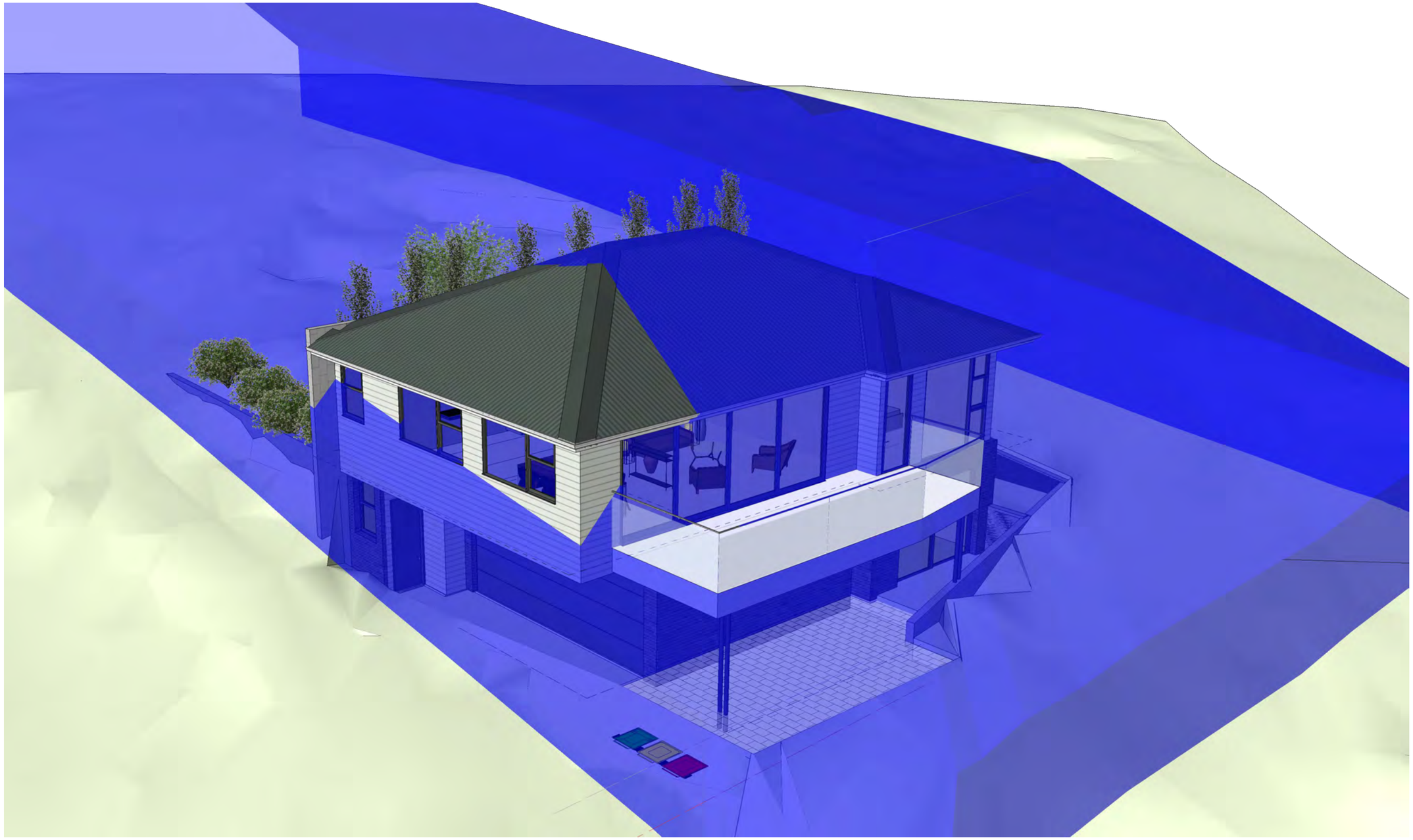

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A406
DWG 3D with Envelope		DRAWN tf CHKD tf	PROJECT# J007877

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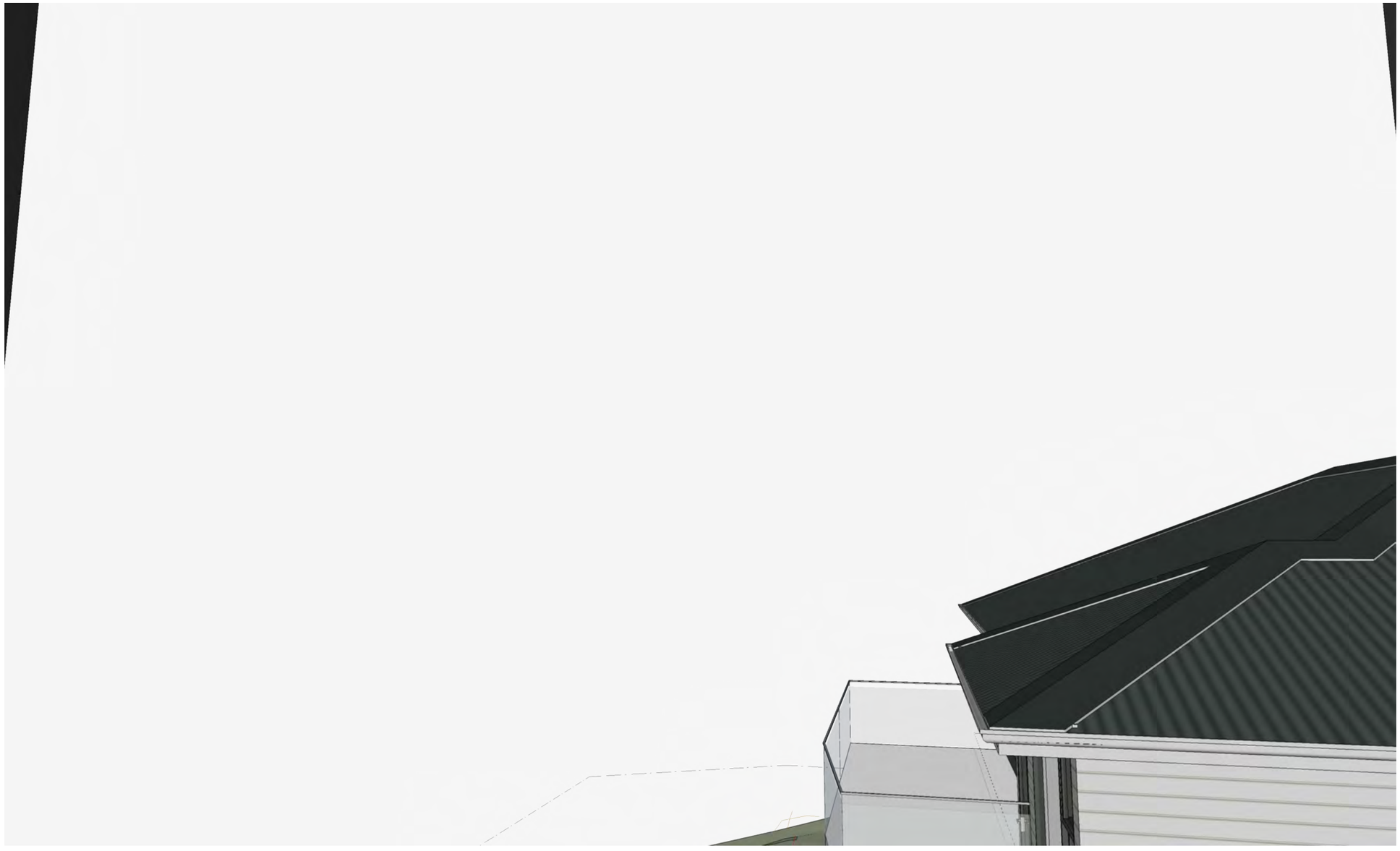

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A407
DWG View from Kitchen Window 42 Hill St		DRAWN tf CHKD tf	PROJECT# J007877

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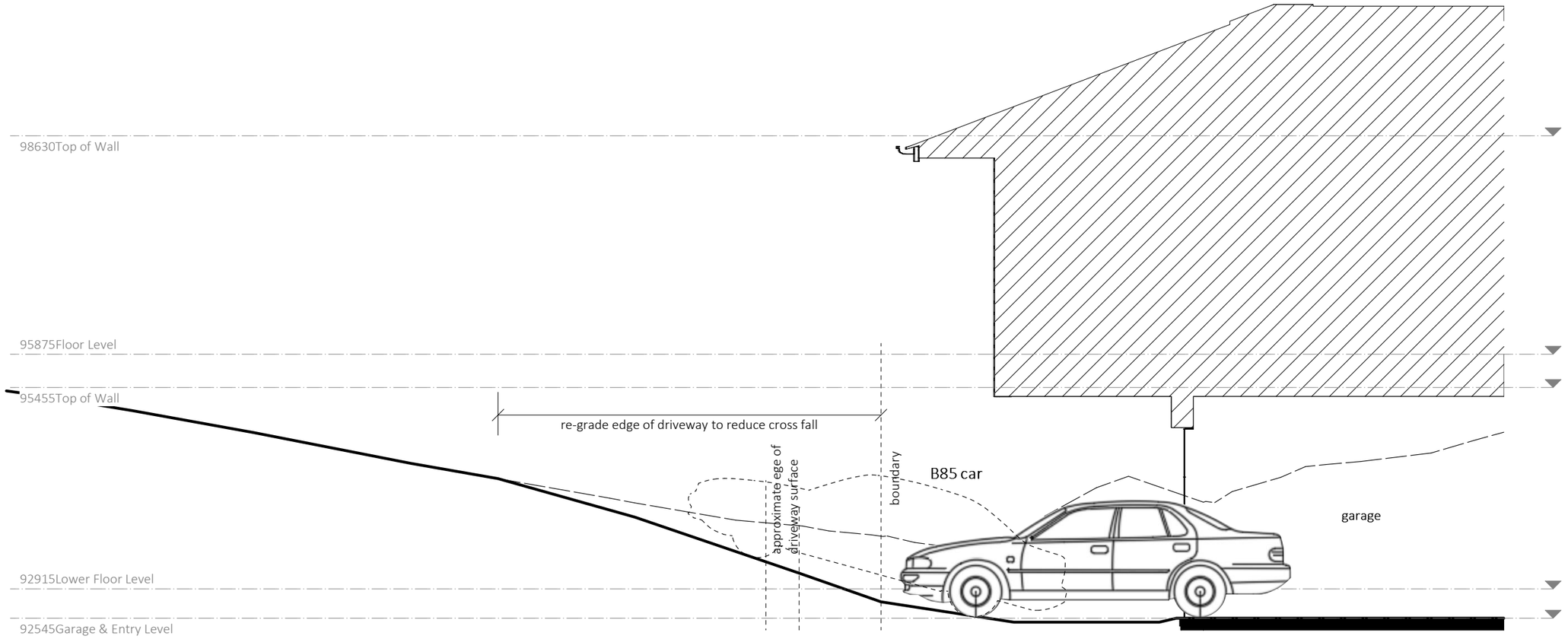

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Ref. No: DA 0472/2024
Date advertised: 13/11/2024
Planning Administration

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REVISION	H	DATE	11/10/2024	DESCRIPTION	Updatd for Planning Application

ADDRESS 18 Wyett Street
CLIENT Tiller
DWG Outside Wheel Path Section 01

do not scale off plans
all dimensions in millimetres
confirm all dimensions on site
all work to relevant NCC and AS

SCALE @ ISO A3 1:100
DRAWN tf
CHKD tf

ISSUE DA
DWG # A501
PROJECT# J007877

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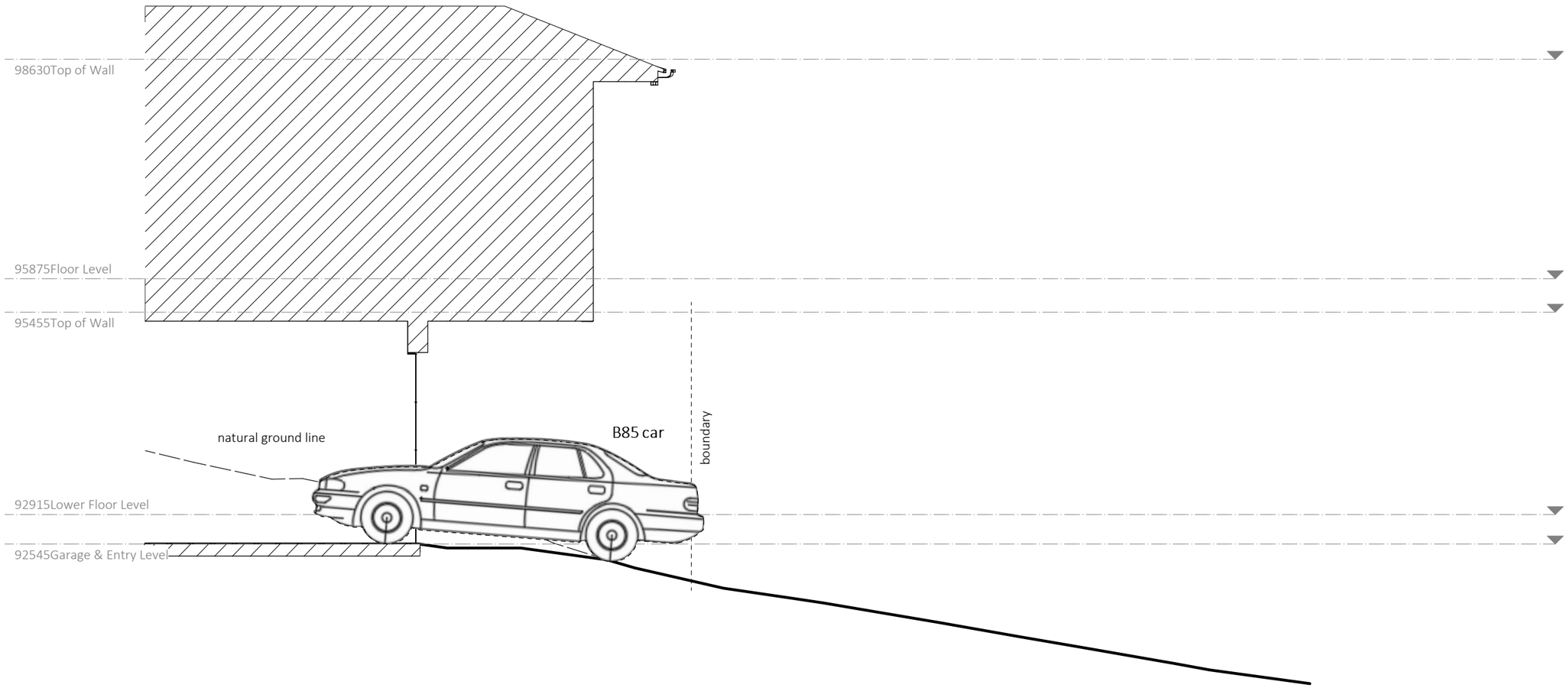

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REVISION H	DATE 11/10/2024	DESCRIPTION Updatd for Planning Application	
ADDRESS 18 Wyett Street		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE DA
CLIENT Tiller		SCALE @ ISO A3 1:100	DWG # A502
DWG Outside Wheel Path Section 02		DRAWN tf	
		CHKD tf	PROJECT# J007877

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TRAFFIC & CIVIL SERVICES

18 WYETT STREET, WEST LAUNCESTON

UNIT DEVELOPMENT

TRAFFIC IMPACT ASSESSMENT

NOVEMBER 2024

18 Wyett Street, West Launceston
Unit Development

TRAFFIC IMPACT ASSESSMENT

- Final #3
- November 2024

Traffic & Civil Services
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W: www.trafficandcivil.com.au

Contents

Traffic Impact Assessment

Document history and status

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
1	20th Sept 2024	R Burk	R Burk	20th Sept 2024	Draft
2	25th Sept 2024	R Burk	R Burk	25th Sept 2024	Draft 2
3	2nd Oct 2024	R Burk	R Burk	2nd Oct 2024	Final
4	8th Nov 2024	R Burk	R Burk	8th Nov 2024	Final #2
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1. Introduction

1.1 Background

A 2- bedroom unit dwelling development in addition to an existing dwelling is proposed at 18 Wyett Street, Launceston. This TIA provides details on:

- Anticipated additional traffic and pedestrian movements.
- The significance of the impact of these movements on the existing road network
- Any changes required to accommodate the additional traffic.

The TIA has been prepared based on Department of State Growth (DSG) guidelines.

1.2 Objectives

A Traffic Impact Assessment is a means for assisting in the planning and design of sustainable development proposals that consider:

- Safety
- Capacity
- Equity and social justice
- Economic efficiency
- The environment
- Future development

This report considers traffic projections to 10 years beyond the opening of the development.

1.3 Scope of Traffic Impact Assessment (TIA)

This TIA considers in detail the impact of the proposal on the adjacent road network, especially Wyett Street.

1.4 References

- Tasmanian Planning Scheme - Launceston - Code C3:Road & Railway Assets and Code C2:Car Parking & Sustainable Transport.
- RTA Guide to Traffic Generating Developments – 2002.
- Austroads Guidelines
  - Road Design Part 4A: Unsignalised & Signalised Intersections 2021.
  - Traffic Management Part 6: Intersections, Interchanges & Crossings 2020.

1.5 Statement of Qualifications and Experience

This TIA has been prepared by Richard Burk, an experienced and qualified traffic engineer in accordance with the requirements of the Department of State Growth's guidelines and Council's requirements.

Richard Burk is an experienced and qualified traffic engineer with:

- 37 years professional experience in road and traffic engineering industry
    - Director Traffic and Civil Service Pty Ltd since May 2017.
    - Manager Traffic Engineering at the Department of State Growth until May 2017.
    - Previous National committee membership with Austroads Traffic Management Working Group and State Road Authorities Pavement Marking Working Group
- Master of Traffic, Monash University, 2004
- Post Graduate Diploma in Management, Deakin University, 1995
- Bachelor of Civil Engineering, University of Tasmania, 1987
- Chartered Professional Engineer with Engineers Australia since 1988

Richard Burk

BE (Civil) M Traffic Dip Man. MIE Aust CPEng

Director Traffic and Civil Services Pty Ltd

1.6 Glossary of Terms

AADT	Annual Average Daily Traffic - The total number of vehicles travelling in both directions passing a point in a year divided by the number of days in a year.
Acceleration Lane	An auxiliary lane used to allow vehicles to increase speed without interfering with the main traffic stream. It is often used on the departure side of intersections.
Access	The driveway by which vehicles and/or pedestrians enter and/or leave the property adjacent to a road.
ADT	Average Daily Traffic – The average 24-hour volume being the total number of vehicles travelling in both directions passing a point in a stated period divided by the stared number of days in that period.
Austroads	The Association of Australian and New Zealand road transport and traffic authorities and includes the Australian Local Government Association.
Delay	The additional travel time experiences by a vehicle or pedestrian with reference to a vase travel time (e.g. the free flow travel time).
DSG	Department of State Growth – The Tasmanian Government Department which manages the State Road Network.
GFA	Gross Floor Area
Intersection Kerb	The place at which two or more roads meet or cross. A raised border of rigid material formed at the edge of a carriageway, pavement or bridge.
km/h	Kilometres per hour
Level of Service	An index of the operational performance of traffic on a given traffic lane, carriageway or road when accommodating various traffic volumes under different combinations of operating conditions. It is usually defined in terms of the convenience of travel and safety performance.
m	Metres
Median	A strip of road, not normally intended for use by traffic, which separates carriageways for traffic in opposite directions. Usually formed by painted lines, kerbed and paved areas grassed areas, etc.
Movement	A stream of vehicles that enters from the same approach and departs from the same exit (i.e. with the same origin and destination).
Phase	The part of a signal cycle during which one or more movements receive right-of -way subject to resolution of any vehicle or pedestrian conflicts by priority rules. A phase is identified by at least one movement gaining right-of-way at the start of it and at least one movement losing right-of-way at the end of it.

Sight Distance	The distance, measured along the road over which visibility occurs between a driver and an object or between two drivers at specific heights above the carriageway in their lane of travel.
Signal Phasing	Sequential arrangement of separately controlled groups of vehicle and pedestrian movements within a signal cycle to allow all vehicle and pedestrian movements to proceed.
SISD	Safe Intersection Sight Distance – The sight distance provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation and to decelerate to a stop before reaching the collision point.
Speed	Distance travelled per unit time.
85th Percentile	The speed at which 85% of car drivers will travel slower and 15% will travel faster.
	A control method that allows a variable sequence and variable duration of signal displays depending on vehicle and pedestrian traffic demands.
Traffic-actuated Control	A control method that allows a variable sequence and variable duration of signal displays depending on vehicle and pedestrian tragic demands.
Traffic Growth Factor	A factor used to estimate the percentage annual increase in traffic volume.
Trip	A one-way vehicular movement from one point to another excluding the return journey. Therefore, a vehicle entering and leaving a land use is counted as two trips. (RTA Guide to Traffic generating Developments).
Turning Movement	The number of vehicles observed to make a particular turning movement (left or right turn, or through movement) at an intersection over a specified period.
Turning Movement Count	A traffic count at an intersection during which all turning movements are recorded.
Vehicle Actuated Traffic Signals	Traffic signals in which the phasing varies in accordance with the detected presence of vehicles on the signal approaches.
vpd	vehicles per day – The number of vehicles travelling in both directions passing a point during a day from midnight to midnight.
vph	vehicles per hour – The number of vehicles travelling in both directions passing a point during an hour.

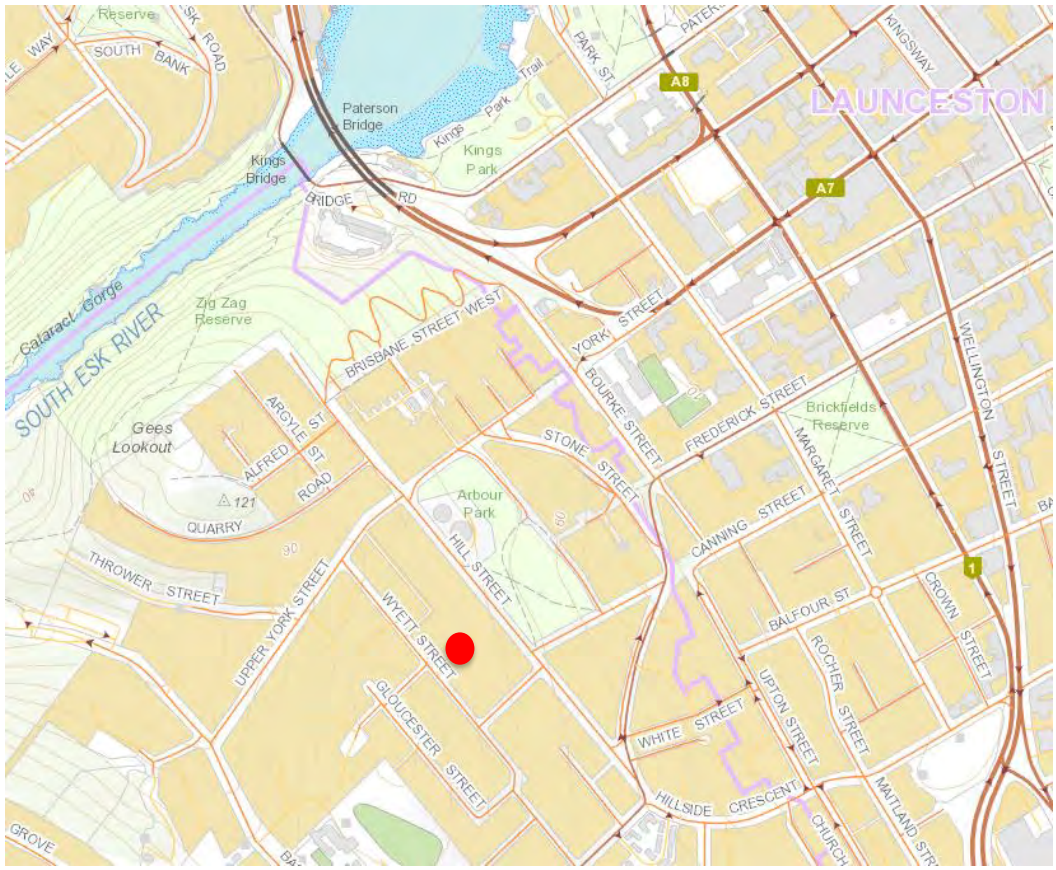
1.7 Site Specific Glossary of Terms

CoL	City of Launceston
SSA	Safe System Assessment

2. Site Description

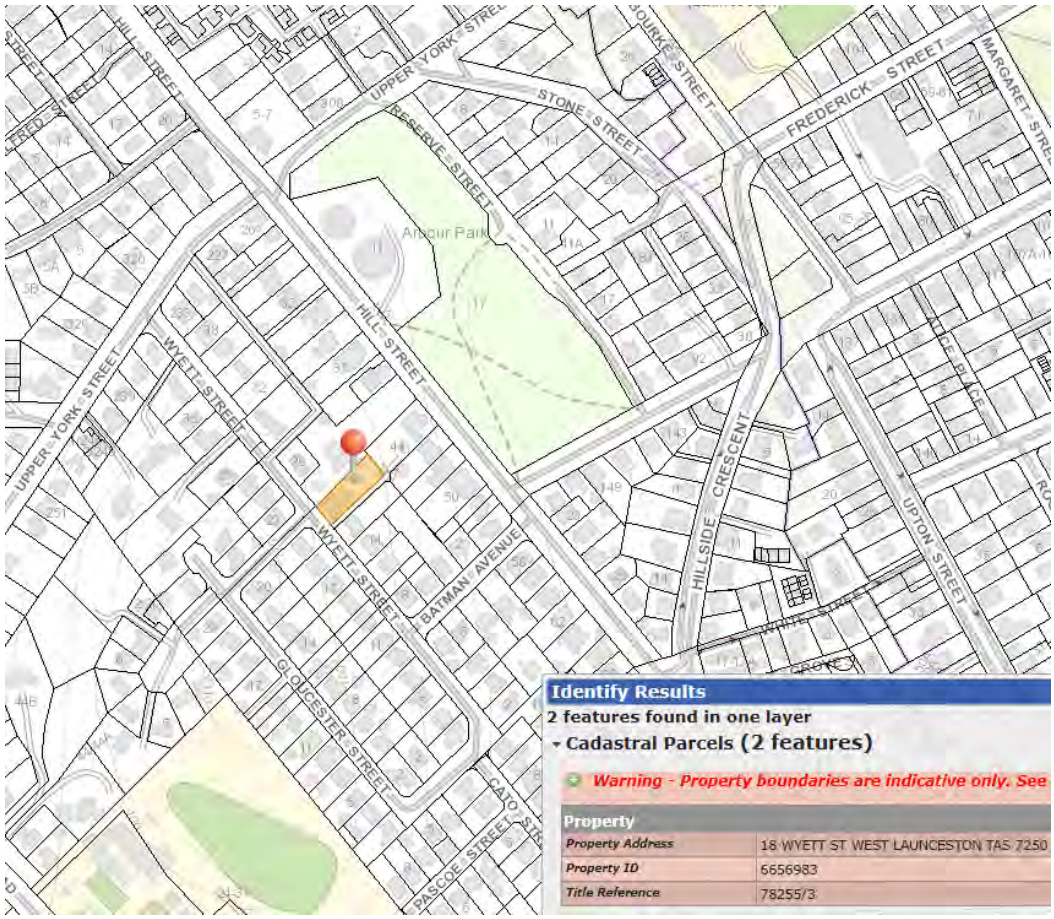
The proposed development site is on the Northern side of the ROW to 44 Hill Street, on the 18 Wyett Street title, see Appendix A. The site location, local street network and proposed layout are shown in Figures 1-3 respectively.

Figure 1 - Proposed development location.



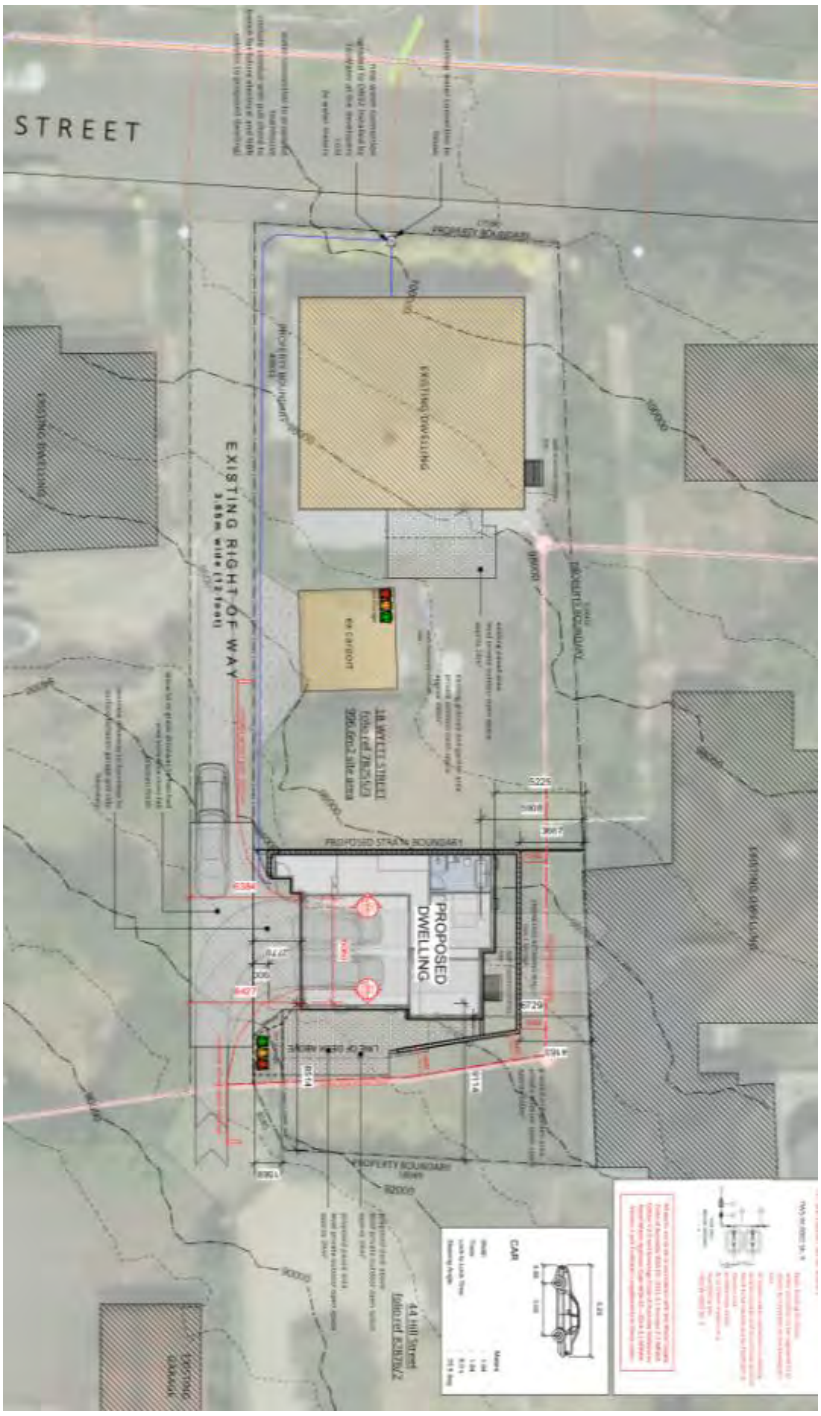
Source: The List, DPIPWE

Figure 2 – Road network surrounding 18 Wyett Street



Source: The List, DPIPWE

Figure 3 – Proposed multiple dwelling layout at 18 Wyett Street



3. Proposed Development

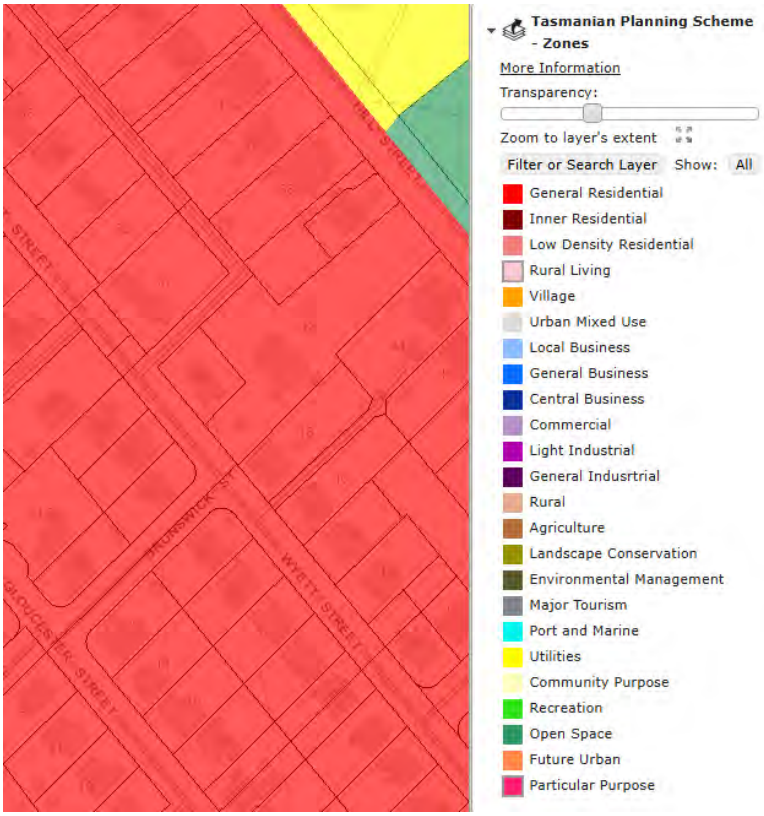
3.1 Description of Proposed Development

The multiple dwelling proposal at 18 Wyett Street consists of the existing dwelling and a 2 - bedroom unit.

3.2 Council Planning Scheme

The proposed development involves land zoned General Residential as per the Tasmanian Planning Scheme - Launceston, see Figure 4.

Figure 4 – 18 Wyett Street Rise is zoned General Residential



Source: The List, DPIPWE

3.3 Local Road Network Objectives

To maintain traffic safety and efficiency on the Council Road Network.

4. Existing Conditions

4.1 Transport Network

The transport network adjacent to the proposal consists of Wyett Street and the ROW to 44 Hill Street. The General Urban Speed Limit of 50km/h applies to the Council Roads.

4.2 Wyett Street

Wyett Street is a residential street with a trafficable width of 7.5m from face to face of kerb and footpath along the Eastern side. The road has street lighting. There are no on street parking restrictions.

4.3 Wyett Street junction with ROW to 44 Hill Street

The Wyett Street approaches to the ROW have a grade of some 5% and the ROW (3.65m wide) approach to Wyett Street has a typically 10% grade, see Figures 5 – 10.

Figure 5 – Aerial View of Wyett / ROW junction.

Source: The List, DPIPWE

Figure 6 – Elevation view of ROW from Wyett Street

Figure 7 – ROW approach to Wyett Street

ROW width 3.65m.

Figure 8 – Looking left along Wyett Street from ROW

Sight distance left is 80m.

Figure 9 – Looking right along Wyett Street from ROW

Sight distance right is 70m.

Figure 10 –Wyett Street Northern approach to ROW

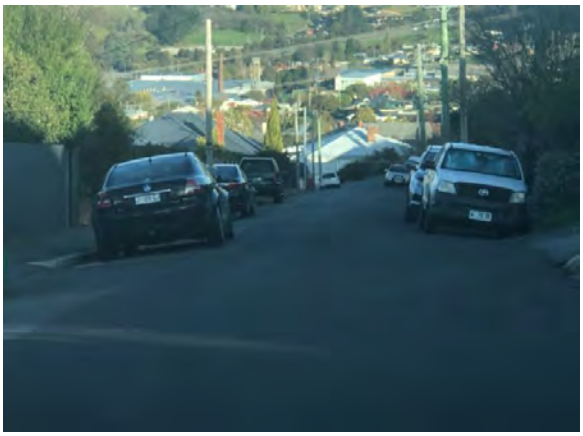


Figure 11 –Wyett Street Southern approach to ROW

4.3.1 18 Wyett Street – proposed dwelling

The proposed access and approaches are shown in Figures 12 – 17.

Figure 12 – Aerial View of proposed dwelling access.

Source: The List, DPIPWE

Figure 13 – ROW approach to proposed dwelling.

Figure 14– Looking right along ROW from proposed dwelling

Sight distance right is 47m.

Figure 15– Looking left along ROW from proposed dwelling

Accesses to 44 & 46 Hill Street.

Figure 16 – Elevation view of proposed driveway from ROW

Figure 17 – Side view of proposed driveway

Vegetation limits trafficable width of the ROW.

4.4 Traffic Activity

Current and Estimated AADTs for adjacent roads are summarised as follows:

Wyett Street

- 160 vpd (2024) – see Appendix C for survey data.
- 160 vpd (2034) assuming 1% compound annual growth without proposal.

ROW to 44 & 46 Hill Street

- 15 vpd (2024).
- 15 vpd (2034).

4.5 Crash History

The DSG is supplied with reported crashes by Tasmania Police. The DSG maintains a crash database from the crash reports which is used to monitor road safety, identify problem areas and develop improvement schemes.

The 5-year reported crash history for Wyett Street records no crashes as of 19th Sept 2024.

4.6 Services

No services appear to be affected by the proposal.

4.7 Road Safety Review

The following minor road safety issues were identified with proposed access to the development site:

- Trafficable width of ROW limited by vegetation, see Figures 15 to 18.
- ROW crossfall and difference in level to the natural surface of the building site.

Figure 18 – ROW Eastern approach to proposed 18 Wyett Street access

4.8 Austroads Safe System Assessment

Wyett Street approaches to the ROW have been assessed in accordance with the Austroads Safe System assessment framework. This framework involves consideration of exposure, likelihood and severity to yield a risk framework score. High risk crash types and vulnerable road user crash types are assessed for each site and aggregated to provide an overall crash risk. Crash risk is considered in terms of three components:

- Exposure (is low where low numbers of through and turning traffic) i.e.1 out of 4
- Likelihood (is low where the infrastructure standard is high) i.e. 1 out of 4
- Severity (is low where the speed environment is low) i.e. 1 out of 4

The Austroads Safe System Assessment process enables the relative crash risk of an intersection or road link to be assessed. Vulnerable Road users are considered along with the most common crash types.

The crash risk score an indicates how well the infrastructure satisfies the *safe system objective which is for a forgiving road system where crashes do not result in death or serious injury.*

From safe system assessment the crash risk score for Wyett St is 10/448. See Appendix C for SSA score calculation. The crash score & alignment with crash risk is indicated in Figure 19.

Figure 19 – Austroads Safe System Assessment alignment between crash score and risk

5. Traffic Generation and Assignment

This section of the report describes how traffic generated by the proposal is distributed within the adjacent road network now (2024) and in ten years (2034).

5.1 Traffic Growth

Traffic Growth on Wyett Street is estimated at 0% as the area is well developed.

5.2 Trip Generation

Traffic generation rates are sourced from the RTA Guide to Traffic Generating Developments 2002. For medium density multiple dwelling development traffic generation rates are assumed to be 6 vpd and 0.6 vph / 3-bedroom dwelling.

Accordingly, the proposed unit is estimated to generate 6vpd and 1 vph during peaks.

5.3 Trip Assignment

It is assumed that traffic generated by the proposal will travel to and from Launceston via the Southern end of Wyett Street.

6. Impact on Road Network

6.1 Traffic Capacity Review

This section considers the performance of the key road infrastructure in 2024 with estimated performance in 2034 based on assumed background traffic growth and the traffic generated by the proposed development.

The proposal will increase traffic on Wyett Street by some 6 vpd. Wyett Street traffic is estimated at 160vpd (2034) without the proposal.

There are no traffic capacity issues as the volumes of traffic are very low and the road and junctions are estimated to operate at Level of Service is A, see Appendix B for Level of Service descriptions.

6.2 Sight Distance requirements summary (Figure 20)

Figure 20 – Sight distance requirements

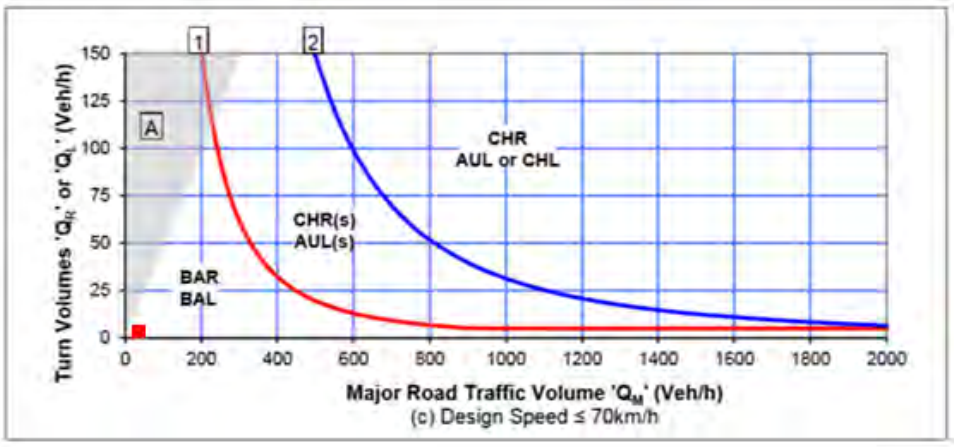
Junction Major Rd - Minor Rd	Speed Limit (km/h)	Speed Environment (km/h)	Acceptable Solution Austroads SISD(m)	Available		Performance Criteria AS/NZS 2890.1 SSD(m)
				Left(m)	Right(m)	
Wyett / ROW	50	40	73	80	70	35
#18 Wyett	30	30	52		47	30

Austroads SISD compliant AS/NZS 2890.1 compliant

6.3 Austroads Guidelines for Junction Layout

Junction layout requirements are based on Austroads Guidelines which take into account the standard of the road, speed limit and volume of through and side road traffic. Figure 21 shows that by 2034 tarffic activity at the junction will be very low. For the forecast traffic the exisitng access is adequate.

Figure 21 – Austroads Warrant for Wyett Street / ROW Junction 2034.



6.4 Impact on liveability, safety and amenity of the local area

According to Traffic Engineering and Management – KW Ogden and SY Taylor 1999, Chapter 2.2- Design of New Urban Networks:

To maximise the liveability, safety and amenity of the local area, road and street network layout should be such that:

- *A minimum of 60% of lots should abut residential streets with less than 300vpd passing traffic.*
- *A minimum of 80% of lots should abut residential streets with less than 600 vpd passing traffic.*
- *A maximum of 5% of single dwelling lots should abut residential streets with between 1,000-2,000 vpd passing traffic.*
- *A maximum of 1% of single dwelling lots should abut local streets or collectors with less than 3,000 vpd passing traffic, and*
- *No single dwelling lot should abut a route with more than 3,000 vpd passing traffic.*

By 2034 the estimated traffic on Wyett Street is 166 vpd with the proposal which satisfies all liveability, safety and amenity targets.

6.5 Tasmanian Subdivision Guideline Considerations

No issues have been identified.

6.6 Transport Planning Considerations

No issues have been identified.

6.7 Provisions for Road Users

6.7.1 Light Vehicles

Traffic safety and capacity requirements for light vehicles have been considered and the proposed access layout is considered safe and efficient for all road users.

6.7.2 Waste Management

Council's Kerbside On-Street Waste Management Service will empty bins from the development site from Wyett Street.

6.7.3 Public Transport

Public transport is not affected by the proposal.

6.7.4 Vulnerable Road Users

Pedestrians

Pedestrians are provided with footpath along Wyett Street.
Pedestrians may share the ROW as car parking at 44 & 46 Hill Street and the proposed unit amounts to less than 10 car parking spaces.

Cyclists

The proposal does not affect cyclists.

Motorcyclists

The proposal does not affect motorcyclists.

6.8 Other requirements

6.8.1 Environmental

No adverse environmental impact is anticipated in relation to:

- Noise, Vibration and Visual Impact
- Community Severance and Pedestrian Amenity
- Hazardous Loads, Air Pollution and Dust and Dirt
- Ecological Impacts and Heritage and Conservation

6.8.2 Street Lighting and Furniture

There are no street lighting of roadside furniture requirements.

7. Tas. Plan. Scheme - Launceston

7.1 Parking and Sustainable Transport Code C2

C2.5.1 Car parking numbers

Acceptable Solution A1

The number of on-site car parking spaces must be no less than the number specified in Table C2.1, excluding if:

(a) The site is subject to a parking plan for the area adopted by Council, in which case parking provision (spaces or cash in lieu) must be in accordance with that plan,

(b) The site is contained within a parking precinct plan and subject to Clause C2.7,

(c) The site is subject to Clause C2.5.5;or

(d) It relates to an intensification of an existing use or development or a change of use where:

i. The number of onsite car parking spaces for the existing use or development specified in Table C2.1 is greater than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case no additional onsite car parking is required; or

ii. The number of onsite car parking spaces for the existing use or development specified in Table C2.1 is less than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case on-site car parking must be calculated as follows:

From Table C2.1 Residential use requirements:

- 2 spaces / dwelling for 2 or more-bedroom dwelling in General Residential Zone
- 1 visitor parking space / 3 dwellings in General Residential Zone

Proposal is for:

- 2 resident parking spaces for the 2-bedroom dwelling.
- Wyett Street for visitor parking space.

A1 is not satisfied, as no off-street visitor parking space is proposed.

Performance Criteria P1.1 *The number of on-site car parking spaces for uses excluding dwellings , must meet the reasonable needs of the use, having regard to:*

(a) The availability of off-street public car parking spaces within reasonable walking distance of the site.

There is no available off street car parking spaces within reasonable walking distance of the site.

(b) The ability of multiple users to share spaces because of:
(i)variations in car parking demand over time; or
(ii) efficiencies gained by consolidation of car parking spaces

Multi user benefits are not considered likely.

(c) *The availability and frequency of public transport within reasonable walking distance of the site.*
Metro bus services operate in Brougham Street some 350m South.

(d) *The availability and frequency of other transport alternatives.*
Taxi services.

(e) *Any site constraints such as existing buildings, slope, drainage, vegetation, and landscaping.*
The site is constrained by the land area available for parking.

(f) *The availability , accessibility, and safety of on-street parking , having regard to the nature of the roads, traffic management and other uses in the vicinity*.
On street parking is available in Wyett Street.

(g) *The effect on streetscape.*
Proposal has negligibly impact on streetscape.

(h) *Any assessment by a suitably qualified person of the actual car parking demand determined having regard to the scale and nature of the use and development.*

This Traffic Impact Statement assesses the proposal to make occasional use of on street visitor parking in Wyett Street as acceptable.

P1.1 is satisfied.

Performance Criteria P1.2 *The number of car parking spaces for dwellings must meet the reasonable needs of the use, having regard to:*

a) The nature and intensity of the use and car parking required.
The proposal is not likely to attract high visitor parking demand.

b) The size of the dwelling and the number of bedrooms; and
The proposed dwelling is a 2-bedroom unit.

c) The pattern of parking in the surrounding area
On street parking is un restricted on Wyett St and some residents / visitors park on street.

P1.2 is satisfied.

C2.5.2 Bicycle parking numbers

No requirement.

C2.5.3 Motorcycle parking numbers

Acceptable Solution A1

The number of on-site motorcycle parking spaces for all uses must:
(a) Be no less no less than the number specified in Table C2.4. and
(b) if an existing use or development is extended or intensified , the number of on-site motorcycle parking spaces must be based on the proposed extension or intensification, provided the existing number of motorcycle spaces is maintained.

No requirement.

C2.5.4 Loading Bays

Acceptable Solution A1

A loading bay must be provided for uses with a floor area of more than 1000m2 in a single occupancy.

Dwelling floor areas are less than 1000m2. **A1 is not applicable.**

C2.6.1 Construction of parking areas

Acceptable Solution A1

All parking, access ways, manoeuvring and circulation spaces must:

(a) be constructed with a durable all-weather pavement,

(b) be drained to the public stormwater system, or contain stormwater on the site; and

(c) excluding all uses in the Rural Zone, Agricultural Zone, Landscape Conservation Zone, Environmental Management Zone, Recreation Zone and Public Open Space Zone, be surfaced by a spray seal, asphalt, concrete, pavers or equivalent material to restrict abrasion from traffic and minimise entry of water to the pavement.

Sealed parking spaces and driveway are proposed, see Appendix A.

Drainage to the public stormwater system is proposed.

A1 is satisfied.

C2.6.2 Design and layout of parking areas

Acceptable Solution A1.1

Parking, accessways, manoeuvring and circulation spaces must All parking, access ways, manoeuvring and circulation spaces must either:

(a) comply with the following:

i. *have a gradient in accordance with Australian Standard AS 2890 Parking facilities, Parts 1-6.* All car parking spaces between or adjacent to each unit will have a fall in both directions no steeper than 1:33. Satisfied.

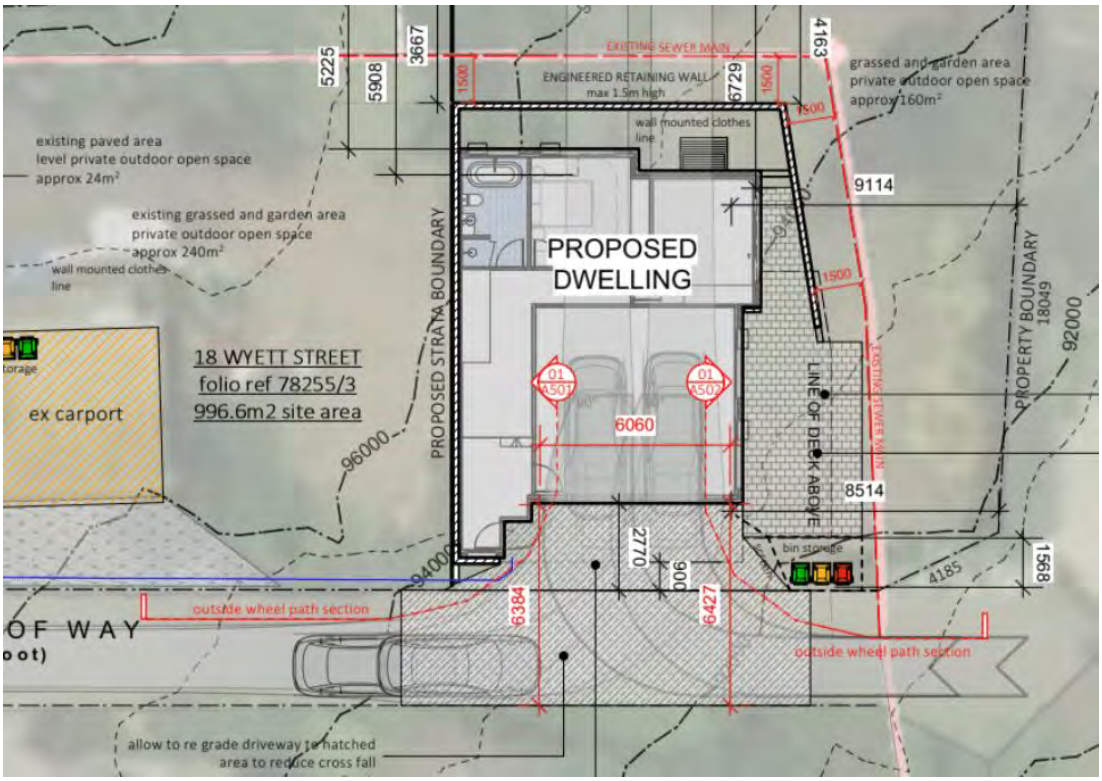
ii. *Provide for vehicles to enter and exit the site in a forward direction where providing for more than 4 parking spaces.*

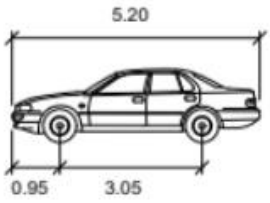
An Austroads B99 car (5.2m*1.94m) can access the garage, see Figure 22. Accordingly, an Austroads B85 car (4.91m*1.87m) can access.

An Austroads B85 car is the design vehicle and can access the proposed garage.

Available manoeuvre space is > 6.4m for spaces 3.03m wide which complies with Table C2.3 Car Parking Space Dimensions, see Figure 22. Also see Appendix A4 & A5 which show that the outside wheel paths for vehicles have ground clearance.

Figure 22 – Turning template check for Austroads B99 car access to proposed garage.





CAR

		Meters
Width	:	1.94
Track	:	1.84
Lock to Lock Time	:	6.0 s
Steering Angle	:	33.5 deg

iii. Have an access width not less than the requirements in Table C2.2.

The ROW has a width of 3.65m. and provides access to 6 or more parking spaces.

Table C2.2 requires a width of not less than 4.5m for the first 7m and 3m thereafter with 2m wide passing bays and 5m long at 30m spacings.

Technically Table C2.2 is not satisfied, see Figures 7 and 22

Performance Criteria P1

All parking, access ways, manoeuvring and circulation spaces must be designed and readily identifiable to provide convenient, safe and efficient parking , having regard to:

(a) The characteristics of the site

The ROW provides access to 4 properties including the development site. Estimated ROW traffic is 24 vpd with a peak hour rate of 3 vph.

This is a low traffic situation where a combined driveway width of 3.65m is adequate for User Class 1A (residential) parking access and Access facility category 1.

Table 3.2 of AS/NZS 2890.1:2004 nominates an acceptable access width ranging between 3.0 and 5.5m wide for Access facility category 1.

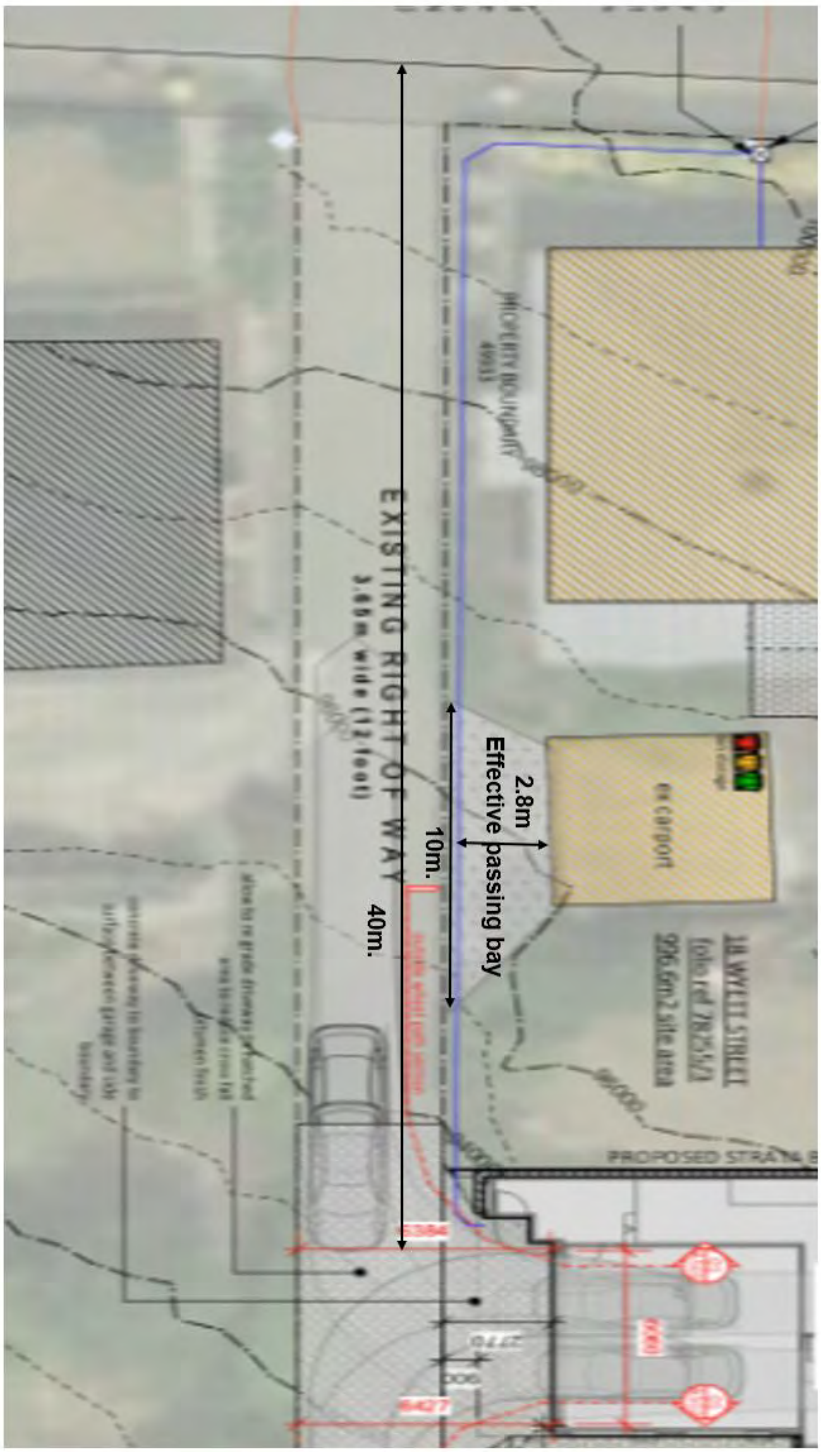
A 3.65m access width is considered reasonable where traffic activity is 24vpd & 3 vph.

The proposed access is some 40m from the edge of Wyett Street. Technically Table C2.2 specifies a passing bay at 30m intervals.

In this case a formal passing bay is not considered necessary as:

- The proposed access is where the passing bay would be located , see Figure 23.
- There is an existing driveway apron that can function as a passing bay if the need arises, see Figure 23.

Figure 23 – Turning template check for Austroads B99 car access to proposed garage.



(b) The proposed slope, dimensions and layout

The existing ROW slope, dimensions and layout are considered suitable as they currently provide for 4 properties, see Figure 23.

(c) Useability in all weather conditions

Satisfied.

(d) Vehicle and pedestrian traffic safety

The traffic (24vpd) and pedestrian activity (10ppd) is low, the speed environment is low (<30km/h) and the driveway infrastructure is adequate for vehicles and pedestrians to share the driveway. The situation is assessed as a low crash risk and safe.

(e) The nature and use of the development

The use is residential for light vehicles and vulnerable road users.

(f) The expected number and type of vehicles

The traffic (24vpd) and pedestrian activity (10ppd) is low, the speed environment is low (<30km/h) and the driveway infrastructure is adequate for vehicles and pedestrians to share the driveway. The situation is assessed as a low crash risk and safe.

(g) The likely use of the parking areas by persons with a disability

No parking within the ROW is proposed.

(h) The nature of traffic in the surrounding area

The traffic activity levels in the area are low.

(i) The proposed means of parking delineation

No parking therefore no parking delineation is proposed within the ROW.

(j) The provisions of Australian Standards
A S2890.1:2004 Parking facilities, Part 1:Off -street car parking and
AS 2890.2:2002 Parking facilities , Part 2: Off-street commercial vehicle facilities

No parking is proposed within the ROW.

Proposal provides for safe and efficient access**. P1 is satisfied.**

iv. *Have car parking space dimensions which satisfy the requirements in Table C2.3.* 90-degree parking spaces are proposed which are 3.03m wide and 6.0m long satisfying Table C2.3.

v. *Have a combined access and manoeuvring width adjacent to parking spaces not less than the requirements in Table C2.3 where there are 3 or more car parking spaces.* Manoeuvre space of > 6.4m is available satisfying Table C2.3.

vi. *Have a vertical clearance of not less than 2.1 metres above the parking surface level, Vertical clearance is 2.4m, see Figure 24.* Satisfied.

vii. *Excluding a single dwelling, be delineated by line marking or other clear physical means.* Satisfied.

A1.1 is satisfied.

Figure 24 – Elevation view of ROW access to proposed 18 Wyett Street unit

Acceptable Solution A1.2

Parking spaces provided for use by persons with a disability must satisfy the following:

(a) Be located as close as practical to the main entry point to the building. Satisfied.

(b) be incorporated into the overall car park design. Satisfied.

(c) be designed and constructed in accordance with Australian/ New Zealand Standard AS/NZS 2890.6-2009 Parking facilities - Off-street parking for people with disabilities.

Not Applicable.

C2.6.3 Number of accesses for vehicles

Acceptable Solution A1
The number of accesses provided for each frontage must:
(a) be no more that 1; or
(b) no more than the existing number of accesses whichever is greater.
There is no change to the access arrangements from the road. **A1 is satisfied.**

C2.6.5 Pedestrian access

Acceptable Solution A1.1
Applies to uses that require 10 or more car parking space must:

(a) have a 1m wide footpath that is separated from the access ways or parking aisles, excluding where crossing access ways or parking aisles, by:

i. a horizontal distance of 2.5m between the edge of the footpath and the access way or parking aisle; or
ii. protective devices such as bollards, guard rails or planters between the footpath and the access way or parking aisle; and

(b) be signed & line marked at points where pedestrians cross access ways or parking aisles.

The proposal will result in a ROW with less than 10 car parking spaces servicing 4 properties. Pedestrians may share the driveway. **A1.1 is satisfied.**

Acceptable Solution A1.2
In parking areas containing accessible car parking spaces for uses by persons with a disability, a footpath having a width not less than 1.5m and a gradient not steeper than 1 in 14 is required from those spaces to the main entry point to the building. **A1.2 not applicable.**

C2.6.6 Loading bays

Acceptable Solution A1
The area and dimensions of loading bays and access way areas must be designed in accordance with Australian Standard AS 2890.2-2002, Parking facilities, Part 2: Off-street commercial vehicle facilities, for the type of vehicles likely to use the site.

Councils on street kerbside garbage collection service will be used for emptying bins.
A1 is satisfied.

7.2 Road and Railway Assets Code C3

C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction

Acceptable Solution A1.1 *– For a category 1 road or a limited access road, vehicular traffic to and from the site will not require:*

(a) A new junction
(b) A new vehicle crossing
(c) A new level crossing

Not applicable as the roads are not Category 1.

Acceptable Solution A1.2 *– For a road, excluding a Category 1 road or a limited access road, written consent for a new junction, vehicle crossing, or level crossing to serve the use and development has been issued by the road authority.*

A1.2 is satisfied as no new vehicle crossing is proposed onto Wyett Street.

Acceptable Solution A1.3 *– For the rail network, written consent for a new private level crossing to serve the use and development has been issued by the rail authority.*

Not applicable as no rail network is involved.

Acceptable solution A1.4:

Vehicular traffic to and from the site , using and existing vehicle crossing or private level crossing will not increase by more than:

(a) The amounts in Table C3.1
(b) Allowed by a licence issued under Part IVA of the Roads and Jetties Act 1935 in respect to a limited access road; and

From Table C3.1 for vehicle crossings on other roads, the acceptable increase in AADT at the site is 20% or 40vpd whichever is greater. The proposal is estimated to generate 6 vpd.
A1.4 is satisfied.

A1.5: Vehicular traffic must be able to enter and leave a major road in a forward direction.
A1.5 is satisfied.

C3.6.1 Habitable buildings for sensitive uses within a road or railway attenuation area

Not applicable as the proposal does not involve a road or railway attenuation area.

C3.7.1 Subdivision for sensitive uses within a road or railway attenuation area

Not applicable as the proposal does not involve a road or railway attenuation area.

8. Recommendations and Conclusions

This traffic impact assessment has been prepared to assess the proposed 2-bedroom unit at 18 Wyett Street, in accordance with the Tasmanian Planning Scheme – Launceston Code 2:Car Parking & Sustainable Transport and Code C3:Road & Railway Assets requirements.

It has been prepared following a review of available traffic survey data, Wyett Street traffic & crash data, road safety review, Austroads Safe System Assessment ,traffic capacity review, amenity and liveability review and review of Austroads guidelines on access requirements.

8.1 Traffic Survey Data

TCS traffic data has been referenced to assess impact of the proposal. In this case the Wyett Street / ROW junction is the most sensitive site:

- Wyett Street has an estimated AADT of 160vpd (2024)
- The ROW has an estimated AADT of 15vpd (2024)

The proposal is estimated to generate 6vpd and 1 vph at peak times.

8.2 5 Year reported Crash History

The 5-year reported crash history reveals no crashes on Wyett Street.

8.3 Road Safety Review

From road safety review no traffic safety issues were identified on Wyett Street or the ROW.

8.4 Austroads Safe System Assessment

The Wyett Street approaches to the proposal dwelling were assessed to have very low crash risk scores and good alignment with the Safe Systems Objective.

8.5 Amenity and Liveability Review

The proposed dwelling at #18 Wyett Street will increase traffic by some 6 vpd. This level of traffic activity easily satisfies liveability, safety and amenity objectives.

8.6 Austroads Guidelines on Junction Layout

From review of Austroads junction layout guidelines the following observations are made:

- The Council Road junctions in the vicinity of the development are all low volume situations where the existing simple junction layouts are adequate.
- The Wyett Street / ROW junctions is adequate to cope with the additional traffic due to the proposal.

8.7 Suitability of proposed ROW access to 18 Wyett St.

From site inspection and review of proposed design plans the access layout is considered suitable as cars can be provided adequate vertical and horizontal clearances to enter and exit the proposed garage spaces. Sections of the outside wheel paths for the garage spaces have been plotted and demonstrate that vehicles can access without scraping or bottoming out , see Appendix A4 and A5. Figure 25 shows the sections assessed.

Figure 25 – 3D view of ROW access to proposed 18 Wyett Street unit

8.8 Tasmanian Planning Scheme – Launceston requirements

Evidence is provided demonstrating Code C2:Car Parking & Sustainable Transport and Code C3:Road & Railway Assets requirements are satisfied.

Recommendations

- *Clear the ROW of vegetation to maximise accessibility, see Figure 17*
- *Garbage collection from Wyett Street*

Summary

Overall, this report finds, subject to the above recommendations, that the Wyett Street and ROW approaches to the proposed dwelling at 18 Wyett Street will operate safely and efficiently, and the proposal is supported on traffic grounds.

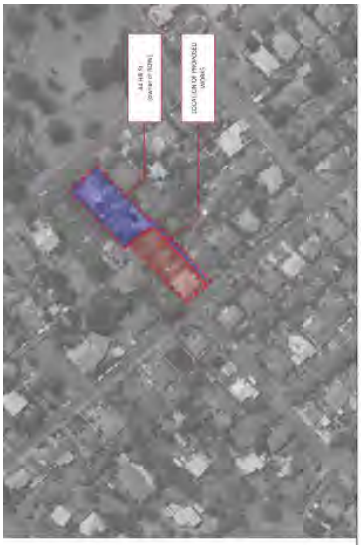
Traffic Impact Assessment

Appendices

Appendix A Development Plans

A1 - Titles

A2 – Cover Page



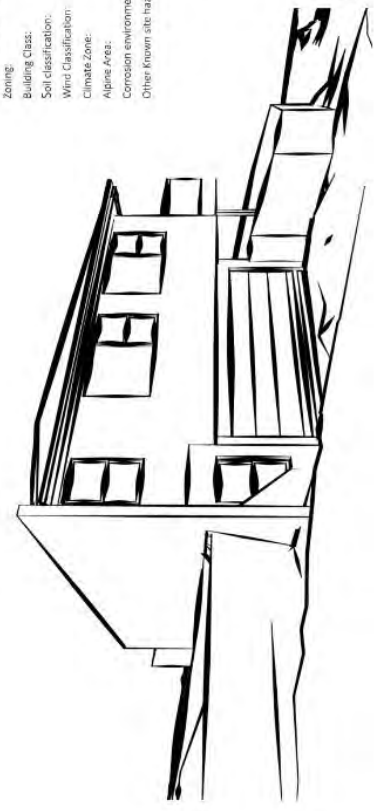
GENERAL INFORMATION:

Accredited Architect:	Sam Haberle
Accreditation Number:	CC561 8 U
Land Title Reference Number:	C.T. 78255-3
	C.T. 82876-2 (ROW)
Municipality:	LCC
Planning Scheme Overlay:	SAFEGUARDING OF AIRPORT & CODE
Zoning:	GENERAL RESIDENTIAL
Building Class:	1
Soil classification:	TBC
Wind Classification:	TBC
Climate Zone:	7
Alpine Area:	N/A
Corrosion environment:	Low
Other Known site hazards:	N/A

Wyett St Multiple Dwelling Development
18 Wyett Street

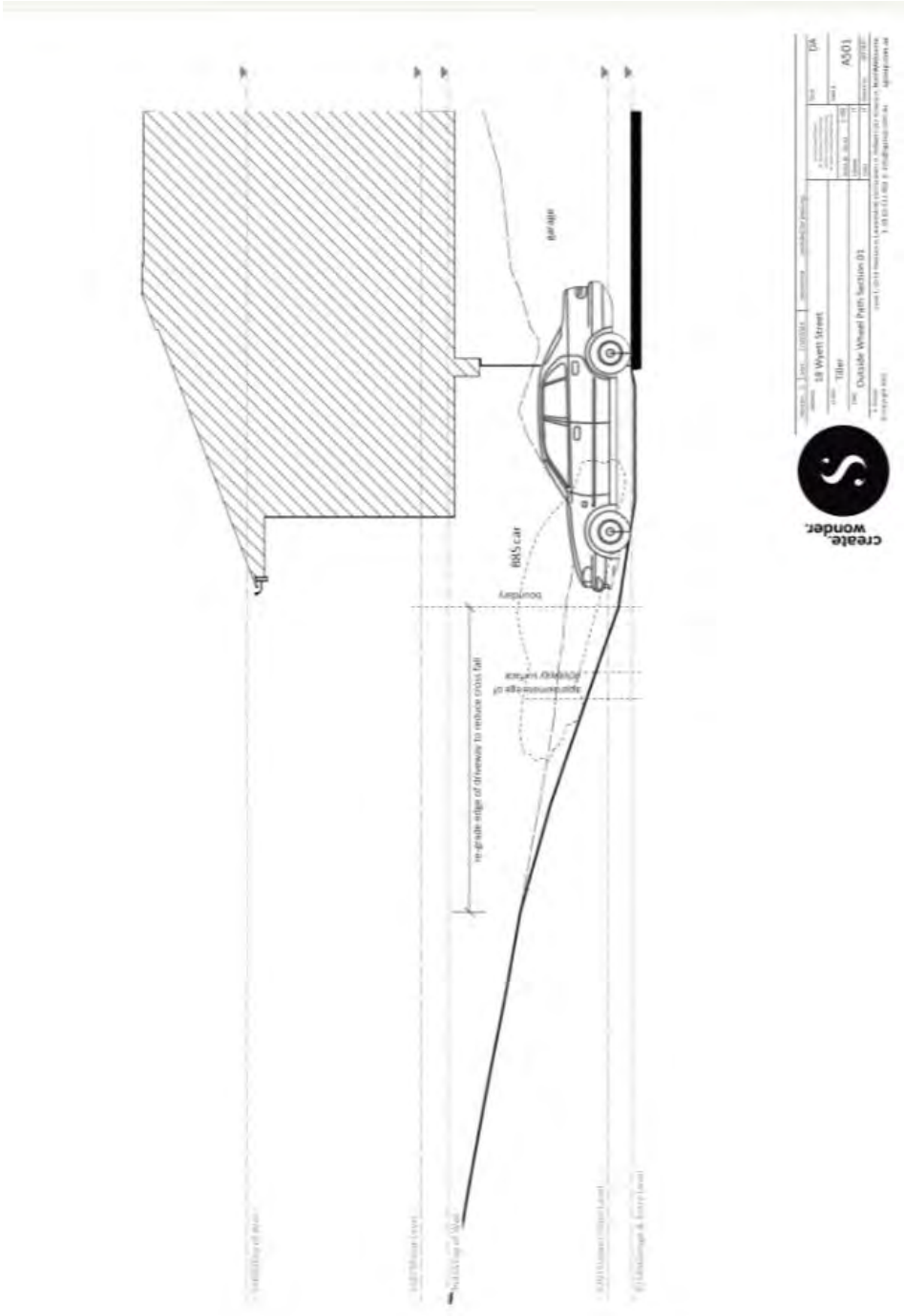
DRAWING SCHEDULE:

Sheet No:	Drawing:	Rev:	Revision Date
A000	Cover	G	23/09/2024
A101	Site Plan	G	23/09/2024
A102	Shadow Diagrams	G	23/09/2024
A202	Proposed Floor Plan	G	23/09/2024
A301	Proposed Elevations	G	23/09/2024
A401	3D	G	23/09/2024
A402	3D with Envelope	G	23/09/2024
A403	3D	G	23/09/2024
A404	3D with Envelope	G	23/09/2024
A405	3D	G	23/09/2024
A406	3D with Envelope	G	23/09/2024

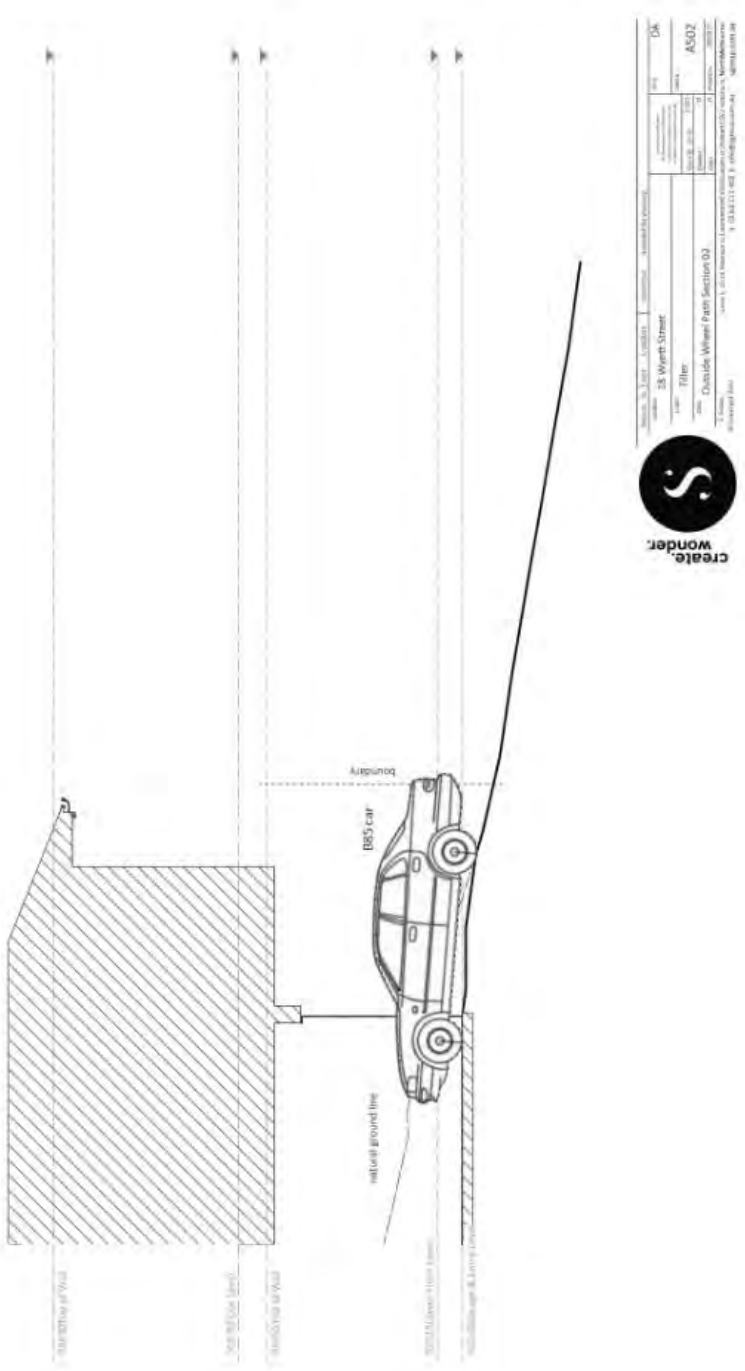


A3 – Access

A4 – Driveway Long Section – Western Garage Space



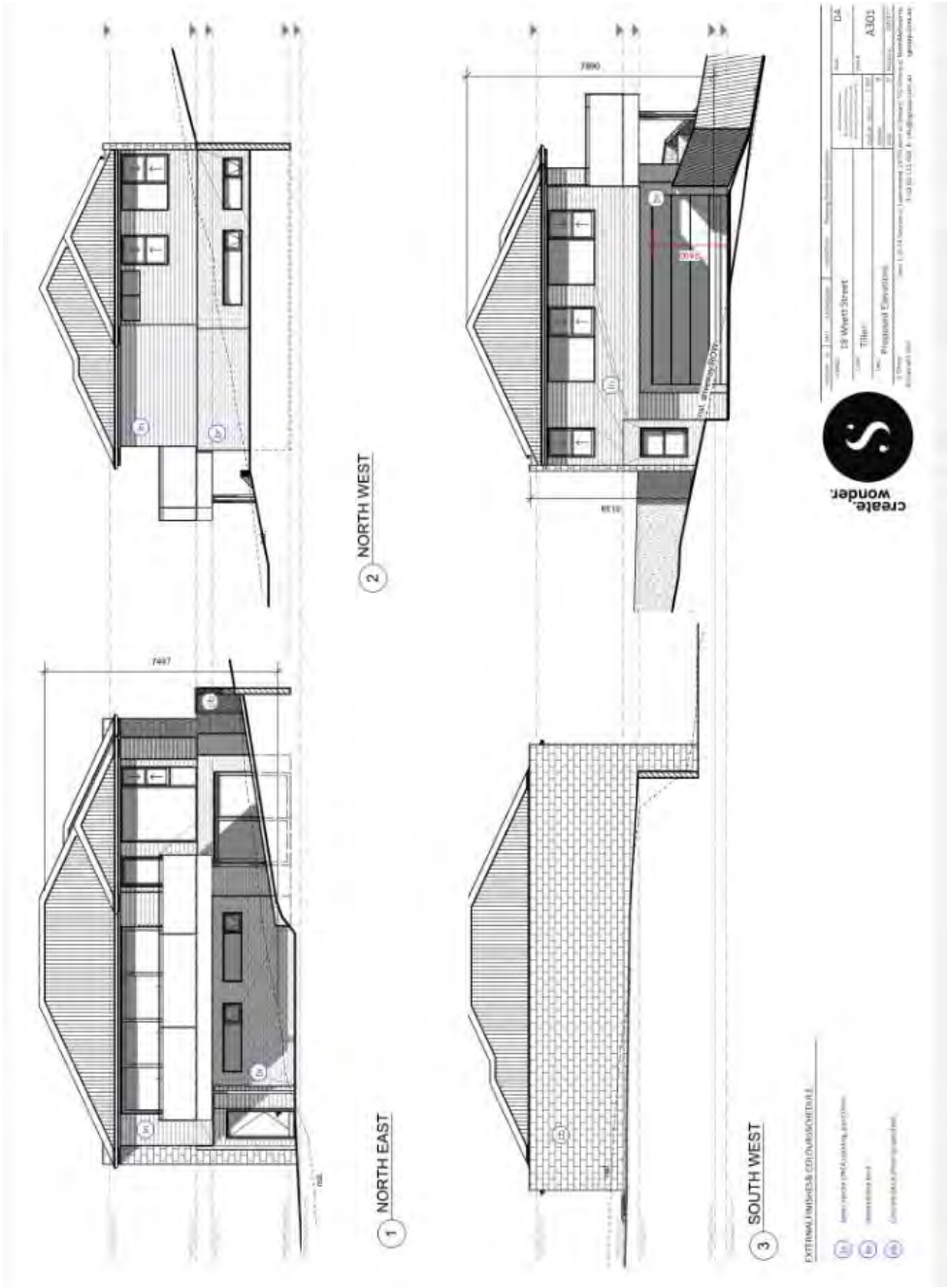
A4 – Driveway Long Section – Eastern Garage Space



A5 – Shadow Diagrams

A5 – Shadow Diagrams

A6 – Elevations



A7 – 3D View

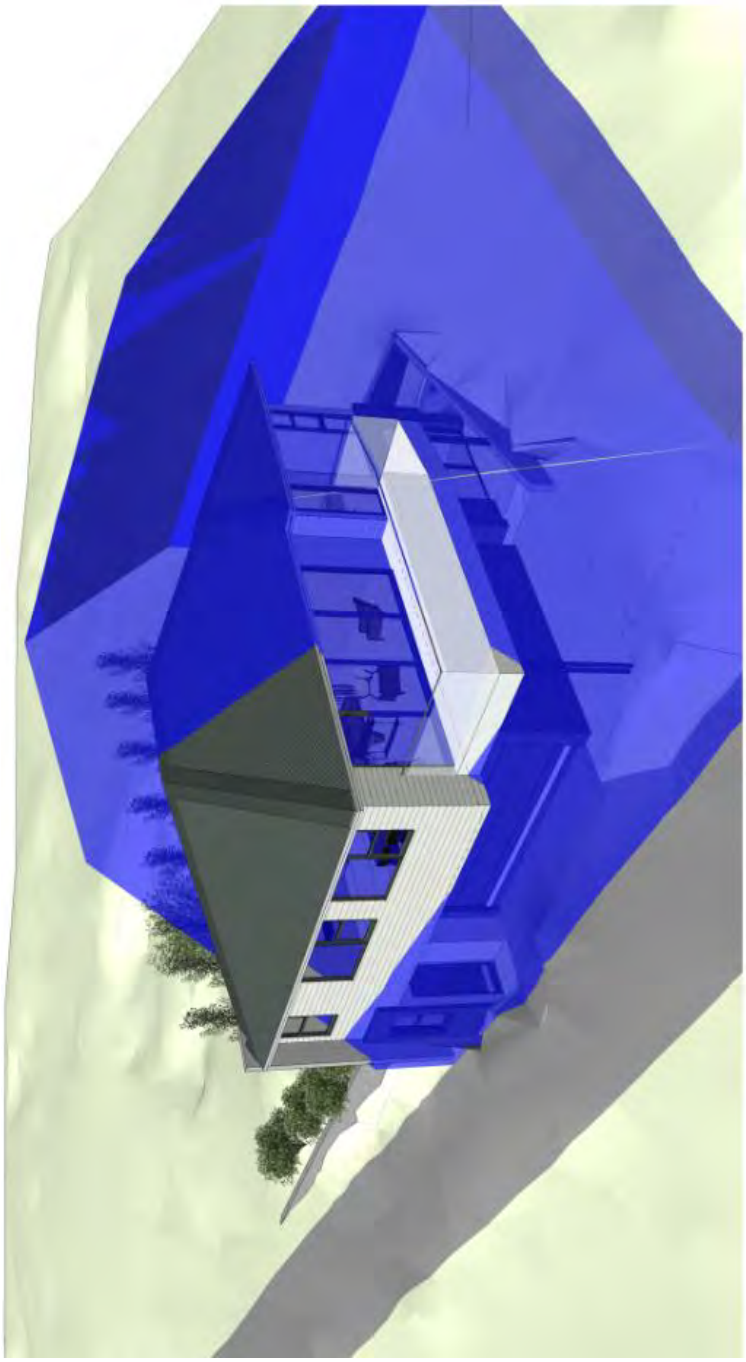
3d 01

A8 – 3D View

A9 – 3D View

A10 – 3D View

A11 – 3D View



Appendix B Level of Service Descriptions

Level of service A	A condition of free-flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
Level of service B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with level of service A.
Level of service C	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
Level of service D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
Level of service E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.
Level of service F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

Appendix C TCS Traffic Data

Wyett Street / ROW Junction Sept 2024

Location: Wyatt Street at Row, Launceston
GPS Coordinates: Lat=-41.446660, Lon=147.129438
Date: 2024-09-19
Day of week: Thursday
Weather:
Analyst: Richard Burk

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
17:05	0	2	0	0	0	0	0	0	0	0	0	0	2
17:10	0	1	0	0	0	0	0	1	0	0	0	0	2
17:15	0	1	0	0	0	0	0	1	0	0	0	0	2
17:20	0	0	0	0	0	0	0	0	0	0	0	0	0
17:25	1	0	0	0	0	0	0	0	0	0	0	0	1
17:30	0	1	0	0	0	0	0	1	0	0	0	0	2

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
17:05	0	2	0	0	0	0	0	0	0	0	0	0	2
17:10	0	1	0	0	0	0	0	1	0	0	0	0	2
17:15	0	1	0	0	0	0	0	1	0	0	0	0	2
17:20	0	0	0	0	0	0	0	0	0	0	0	0	0
17:25	1	0	0	0	0	0	0	0	0	0	0	0	1
17:30	0	1	0	0	0	0	0	1	0	0	0	0	2

Vehicle Summary

Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	1	5	0	0	0	0	0	3	0	0	0	0	9
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrians Summary

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	3	0	3	0	0	0	0	0	0	0	0	0	3

Intersection Count Summary

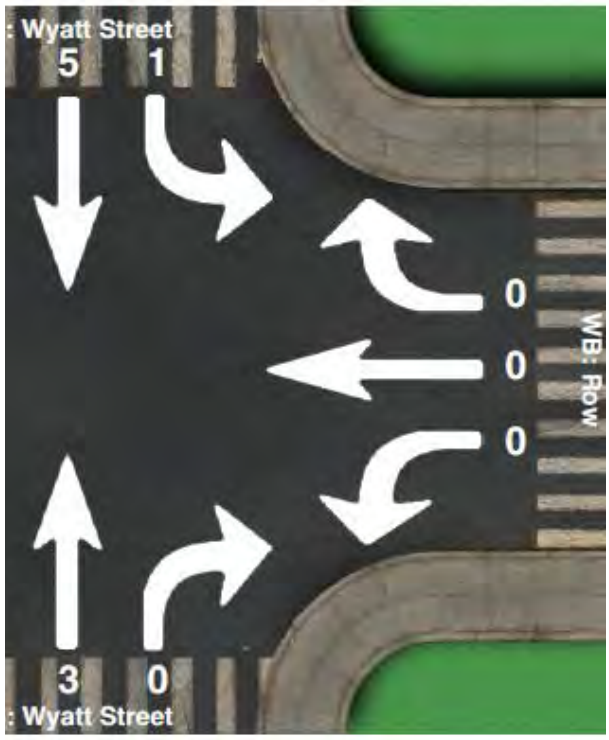
Location: Wyatt Street at Row, Launceston
GPS Coordinates: Lat=-41.446660, Lon=147.129438
Date: 2024-09-19
Day of week: Thursday
Weather:
Analyst: Richard Burk

Estimated Wyett St AADT: 160 vpd
PM Peak

- **South bound: 10 vph.**
- **North bound: 6 vph.**

Estimated ROW AADT: 15 vpd
PM Peak

- **West bound: 1 vph.**
- **East bound: 0 vph.**



Intersection Count Summary

17:05 - 17:32

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	1	5	0	0	0	0	0	3	0	0	0	0	9

Appendix D Austroads Safe System Assess.

Safe System Assessment — **Wyett Street approaches to ROW and proposed access to #18 Wyett Street**

		Run-off-road	Head-on	Intersection	On Street Parking	Pedestrian	Cyclist	Motorcyclist	
Exposure	Justification (AADT 160 vpd)	Low traffic volume, no crashes	Low traffic volume, no crashes	Low traffic volumes at ROW (estimated AADT 15vpd)	Minimal	Pedestrian activity estimated to peak at 10-20 pph during the holiday season.	Cyclist activity estimated to peak at 10-20 pph during the holiday season.	Low motorcyclist activity.	
	Score / 4	1	1	1	1	1	1	1	
Likelihood	Justification	Straight narrow road 7.5m wide from face to face of kerb with street lighting.	Straight narrow road 7.5m wide from face to face of kerb with street lighting.	Simple junction layout at ROW with adequate sight distance.	Straight narrow road 7.5m wide from face to face of kerb with on street parking either side of the street.	Footpath along Eastern side of Wyett Street	Footpath along Eastern side of Wyett Street	Straight narrow road 7.5m wide from face to face of kerb with street lighting.	
	Score / 4	1	1	1	1	1	1	1	
Severity	Justification (50km/h speed limit)	Estimated 40km/h speed environment for light vehicles	Estimated 40km/h speed environment for light vehicles	Estimated 40km/h speed environment for light vehicles	Estimated 40km/h speed environment for light vehicles	Moderate speed environment for vulnerable road users	Moderate speed environment for vulnerable road users	Moderate speed environment for vulnerable road users	
	Score / 4	1	1	1	1	2	2	2	Total /448
Product	Total Score /64	1	1	1	1	2	2	2	10

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18 Wyett St West Launceston

1 PLANNING PERMIT APPLICATION
08/11/2024

Supporting information:

The footprint to 42 Hill St has been surveyed in the area that is close to the boundary, and a site measure has been undertaken to obtain the approximate roof/eaves height above natural ground. Scaled photographs have been used to portray the windows on that side as shown in the South East Elevation of the existing dwelling at 42 Hill St on A301.
Levels on the elevations have been updated and a roof ridgeline level added.
Protrusions have been made clearer on the elevations

The below is a summarised list of changes made from the previous planning permit application for 18 Wyett St for a new town house:

- New aesthetic to be more in keeping with character of Hill St and Wyett St including hipped roof, weatherboard and some brick claddings,
- The garage door has been pushed back from the ROW to improve turning into the garage.
- Garage level has been amended to improve gradients into the garage.
- Additional information on the relationship between 18 Wyett St and the dwelling at 42 Hill St near the shared property boundary.
- A traffic impact assessment has been conducted to review the viability of using the ROW to access the proposed dwelling.

Please note that the users of the ROW have all been notified of the application.
We have added a view from close to the middle of the long window upstairs at 42 Hill St.

LAU-S17 Flood Levee Protected Areas Specific Area Plan

F17.1 Plan Purpose

F17.1.1 The purpose of this Specific Area Plan is to minimise the risk to human life and damage to property caused by flooding and ensure that use and development of land protected by levees is managed to:

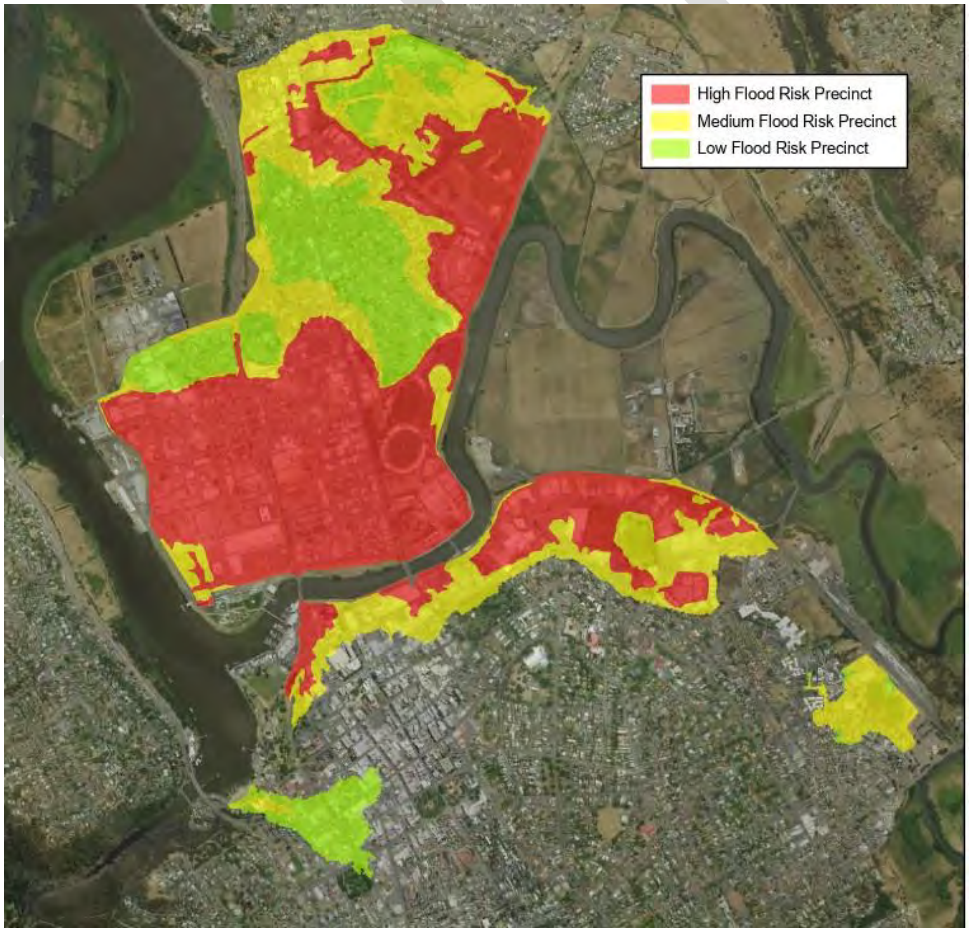
a) ensure consideration of the flood risk in the location of future land uses; and

b) require new buildings to be resilient to the impacts of flood inundation.

F17.2 Application of this Plan

F17.2.1 The specific area plan applies to the area of land designated as SAP17- Flood Levee Protected Areas Specific Area Plan shown on the planning scheme overlay maps and in Figure F17.1.

Figure F17.1



F17.2.2 Where a site the subject of an application is located within more than one flood risk precinct the controls specific to each flood risk precinct will apply if the development is capable of being divided into independently distinguishable components. Otherwise the controls applying to the highest flood risk precinct will apply.

F17.2.3 In the area of land to which this plan applies, the provisions of the specific area plan are in addition and to the provisions of the:

a) General Residential Zone;
b) Inner Residential Zone;
c) Urban Mixed Use Zone;
d) Local Business Zone;
e) Central Business Zone;
f) Commercial Zone;
g) Light Industrial Zone;
h) Rural Zone;
i) Environmental Management Zone;
j) Utilities Zone;
k) Community Purpose Zone;
l) Recreation Zone ;
m) Open Space Zone; and
n) Particular Purpose Zones.

F17.3 Use or Development exempt from this plan

F17.3.1 The following use or development is exempt from this Specific Area Plan:

a) non-habitable buildings;
b) Modifications or alterations to the internal floor space of residential buildings approved on the 1st January 2008;
c) Natural values and Cultural values management;
d) Passive recreation;
e) Port and shipping in a proclaimed wharf area;
f) Resource development excluding a habitable building; or
g) Minor utilities.

F17.4 Definition of Terms

F17.4.1 In this Specific Area Plan, unless the contrary intention appears:

Terms	**Definition**
Annual Exceedance Probability (AEP)	*means the level which has a given probability of being exceeded in any year.*
Comprehensive risk assessment	*means an assessment of flood risks prepared by a suitably qualified person that considers hazard, exposure of life and*

	property, vulnerability and resilience applying a risk-based approach that considers a range of floods up to and including extreme events greater than a 1% AEP flood and projected climate change conditions.
Dangerous Goods	*means substances that may be corrosive, flammable, explosive, spontaneously combustible, toxic, oxidising, or water-reactive.*
Flood compatible materials and methods	*means, when inundated by flood water, materials that are resistant to damage, a building design that reduces the potential for the failure of electrical and plumbing services, and building methods that reduce the potential for the structural integrity of the building to be permanently damaged.*
Flood emergency response plan	*means a plan prepared by a suitably qualified person who specialises in emergency management that demonstrates that effective warning time and reliable access is available to allow persons to move to a safe refuge area in all potential floods up to the year 2090, including extreme floods involving the overtopping or breach of levees at the closest point in the levee.*
Flood impact report	*means a report, prepared by a suitably qualified person, that assesses flood behaviour, constraints and risk to the development and its users for flood events involving a breach in the levee and provides appropriate measures to acceptably manage those risks.*
Flood Risk Precinct (FRP)	*means that part of the floodplain distinctively shown on the SAP17 overlay map and in Figure F17.1 with a identified risk level of High, Medium or Low.*
Freeboard	*means a factor of safety expressed as the height above the design flood level. Freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain, such as wave action, localised hydraulic behaviour and impacts that are specific-event related, such as levee and embankment settlement.*
Hazardous materials	*means any material, whether solid, liquid or gas, that may cause harm to human health. Materials such as asbestos, polychlorinated biphenyl compounds (PCBs), radioactive materials, nuclear materials, pathogenic microorganisms, imported biosecurity materials, genetically modified organisms (GMO), pharmaceuticals, poisons, chemicals (both hazardous and non-hazardous), and dangerous goods.*
High flood risk precinct	*means that part of the floodplain distinctively shown on the SAP17 overlay map and in Figure F17.1.*
Inveresk Cultural Precinct	*means that area generally bound by Forster Street, Invermay Road and North Esk River.*

Low flood risk precinct	*means that part of the floodplain distinctively shown on the SAP17 overlay map and in Figure F17.1.*
Medium flood risk precinct	*means that part of the floodplain distinctively shown on the SAP17 overlay map and in Figure F17.1.*
Probable Maximum Flood (PMF)	*means the largest flood likely to ever occur.*
Riveredge Industrial precinct	*means the area generally bound by the kanamaluka/River Tamar, and Lindsay, Gleadow, Montagu and Forster Streets.*
Significant community infrastructure	*means a use and development that provides hospital services, primary and secondary education, occasional care and emergency services.*

F17.5 Use Table

F17.5.1 This sub-clause is not used in this specific area plan.

F17.6 Use Standards

F17.6.1 Unacceptable uses

This clause is in addition to the:

(a) General Residential Zone - Clause 8.3 Use Standards;

(b) Inner Residential Zone - Clause 9.3 Use Standards;

(c) Urban Mixed Use Zone - Clause 13.3 Use Standards;

(d) Local Business Zone - Clause 14.3 Use Standards;

(e) Central Business Zone - Clause 16.3 Use Standards;

(f) Commercial Zone - Clause 17.3 Use Standards;

(g) Light Industrial Zone - Clause 18.3 Use Standards;

(h) Rural Zone - Clause 20.3 Use Standards;

(i) Environmental Management Zone - Clause 23.3 Use Standards;

(j) Utilities Zone - Clause 26.3 Use Standards;

(k) Community Purpose Zone - Clause 27.3 Use Standards;

(l) Recreation Zone - Clause 28.3 Use Standards;

(m) Open Space Zone - Clause 29.3 Use Standards; and

(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Use Standards.

Objective:	
To prevent the establishment of new land uses that present an unacceptable risk when subject to, or isolated by, flood inundation	
Acceptable Solution	Performance Criteria
A1 If for the establishment of new non-residential uses except for: (a) Custodial facility; (b) Storage (Liquid fuel depot), within the High or Medium FRP; (c) Significant community infrastructure within the high or Medium FRP. A2 If for the establishment of new residential uses except for: (a) Residential care facility; (b) Retirement village; (c) Respite centre (d) Assisted housing (e) residential uses in the high FRP (other than single dwellings).	P1 No Performance Criterion.

F17.6.2 Intensity of Uses

This clause is in addition to the:

(a) General Residential Zone - Clause 8.3 Use Standards;
(b) Inner Residential Zone - Clause 9.3 Use Standards;
(c) Urban Mixed Use Zone - Clause 13.3 Use Standards;
(d) Local Business Zone - Clause 14.3 Use Standards;
(e) Central Business Zone - Clause 16.3 Use Standards;
(f) Commercial Zone - Clause 17.3 Use Standards;
(g) Light Industrial Zone - Clause 18.3 Use Standards;
(h) Rural Zone - Clause 20.3 Use Standards;
(i) Environmental Management Zone - Clause 23.3 Use Standards;
(j) Utilities Zone - Clause 26.3 Use Standards;
(k) Community Purpose Zone - Clause 27.3 Use Standards;
(l) Recreation Zone - Clause 28.3 Use Standards;
(m) Open Space Zone - Clause 29.3 Use Standards; and
(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Use Standards.

Objective:	
To limit the intensity of uses subject to, or isolated by, flood inundation.	
Acceptable Solution	Performance Criteria
A1 a) if for residential use in the low FRP; or b) in the High or medium FRP: (i) Residential use up to 200m² of gross floor area on a single title; or (ii) Extensions to existing residential use of no more than 10% of the gross floor area existing or approved on the 1st January 2008.	P1 No Performance Criterion.
A2 a) if for non-residential use in the low FRP, except for: (i) Significant community infrastructure; (ii) Public art gallery; (iii) Community meeting and entertainment. b) in the High or medium FRP: (i) Non-Residential use up to 400m² of gross floor area on a single title; or (ii) Visitor accommodation use within a dwelling up to 200m² of gross floor area on a single title; or (iii) Extensions to existing non-residential use of no more than 10% of the gross floor area existing or approved on the 1st January 2008.	P2 Must be designed and located to prevent an unacceptable level of risk to life and property having regard to the advice contained within a comprehensive risk assessment report.

F17.6.4 Dangerous Goods and Hazardous Materials

This clause is in addition to the:

(a) General Residential Zone - Clause 8.3 Use Standards;
(b) Inner Residential Zone - Clause 9.3 Use Standards;
(c) Urban Mixed Use Zone - Clause 13.3 Use Standards;
(d) Local Business Zone - Clause 14.3 Use Standards;
(e) Central Business Zone - Clause 16.3 Use Standards;
(f) Commercial Zone - Clause 17.3 Use Standards;
(g) Light Industrial Zone - Clause 18.3 Use Standards;
(h) Rural Zone - Clause 20.3 Use Standards;
(i) Environmental Management Zone - Clause 23.3 Use Standards;
(j) Utilities Zone - Clause 26.3 Use Standards;
(k) Community Purpose Zone - Clause 27.3 Use Standards;
(l) Recreation Zone - Clause 28.3 Use Standards;
(m) Open Space Zone - Clause 29.3 Use Standards; and
(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Use Standards.

Objective:	
To ensure the storage of dangerous goods and hazardous materials are managed to avoid impacts on the environment during a flood.	
Acceptable Solution	Performance Criteria
A1 No Acceptable Solution.	P1 Dangerous Goods or Hazardous materials must be stored in accordance with a flood impact report and flood emergency response plan that ensures potential impacts on the environment are minimised having regard to: (a) the quantity of material stored (b) the nature of the materials stored (c) the nature and characteristics of the proposed use development; (d) the characteristics of the inundation of the land that is subject to the risk; (e) the capacity of the development to withstand flooding; and (f) the capacity of the owner or occupants to respond to or manage the flood risk.

F17.6.5 Emergency Management

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings;
(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings;
(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works;
(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works;
(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works;
(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works;
(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works;
(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works;
(i) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works;
(j) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works;
(k) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works;
(l) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works;
(m) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works; and
(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Development Standards for Buildings and Works.

Objective:	
To ensure use appropriately considers emergency management planning in the event of a flood and as part of its ongoing operations.	
Acceptable Solution	Performance Criteria
A1 If for: (a) Residential uses with less than 4 dwellings; or (b) Non-residential uses with a gross floor area of 400 m2 or less.	P1 Use must demonstrate that it is designed and would operate to minimise the impacts of inundation having regard to: (a) The advice contained within a flood emergency response plan; (b) The need for preparedness to respond in the event of possible inundation; (c) Plans for evacuation and relocation of portable property; and (d) The requirements for post event recovery.

F17.7 Development standards for Buildings and Works

F17.7.1 Floor Levels

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings;
(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings;
(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works;
(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works;
(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works;
(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works;
(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works;
(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works;
(i) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works;
(j) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works;
(k) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works;
(l) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works;
(m) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works; and
(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Development Standards for Buildings and Works.

Objective:	
To ensure building floor levels are constructed in a manner that minimises the risk to human life and damage to property caused by flooding.	
Acceptable Solutions	Performance Criteria
A1 Habitable floor levels of buildings within the Residential or Visitor Accommodation Use classes must be equal to or higher than the level shown in Table 17.7.1.	P1 No Performance criterion.

A2.1 If for new non-residential development in the low FRP, except for: (i) Significant community infrastructure; (ii) Public art gallery; or (iii) Community meeting and entertainment. which must have a floor levels equal to or higher than the level shown in Table 17.7.2.	P2 Buildings must have a floor level that demonstrates that the development will be able to manage the risk of flooding to tolerable levels, having regard to: (a) comprehensive risk assessment that demonstrates that with the proposed development there would be no increase in flood related risks for the property the subject of the application in the year 2050, compared to a building that complied with the Acceptable Solution; (b) a flood impact report; and (c) the recommendations of a flood emergency response plan.

Table 17.7.1

Location	Floor level
Invermay	5.3 m AHD
City (Eastern Portion)	5.3 m AHD
City (Western Portion)	3.5 m AHD
Newstead	5.6 m AHD

Table 17.7.2

Location	0.5% AEP including freeboard (m AHD)
Newstead	5.9 m
City East	5.9 m
City West	5.9 m
Invermay	5.8 m

F17.7.2 Effects on Others

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and Clause 8.5 Development Standards for Non-dwellings;

(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings;

(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works;

(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works;

(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works;

(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works;

(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works;

(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works;

(i) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works;

(j) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works;

(k) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works;

(l) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works;

(m) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works; and

(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Development Standards for Buildings and Works.

Objective:	
To ensure that new buildings and works do not alter the behaviour of floods in a manner that has a materially detrimental impact on property or the safety of persons external to the development site.	
Acceptable Solution	Performance Criteria
A1 If for: (a) new buildings with 400m2 or less Gross Floor Area; and (b) filling of land utilising less than 25m3 (Net) of imported material at the effective date.	P1 Development and works must not have a detrimental impact on the characteristics of the flood or cause an increase in adverse impact to human life and property having regard to the advice contained in a flood impact report.

F17.7.3 Building resilience

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings;
(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings;
(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works;
(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works;
(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works;
(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works;
(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works;
(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works;
(i) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works;
(j) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works;
(k) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works;
(l) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works;
(m) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works; and
(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Development Standards for Buildings and Works.

Objective:	
To minimise the potential for buildings to structurally fail as a consequence of flooding.	
Acceptable Solution	Performance Criteria
A1 If for buildings in a low or medium FRP.	P1 Buildings within the high FRP must be capable of withstanding the forces of flood water, debris and buoyancy for flood levels specified in Table 17.7.3 assuming no levee protection, having regard to the advice of a suitably qualified person and a flood impact report.

Table 17.7.3 - Flood levels

Location	Flood level
Invermay	5.0 m AHD
City (Eastern Portion)	5.0 m AHD
City (Western Portion)	3.2 m AHD
Newstead	5.3 m AHD

F17.7.4 Subdivision

This clause is in addition to the:

(a) General Residential Zone - 8.6 Development Standards for Subdivision;

(b) Inner Residential Zone - 9.6 Development Standards for Subdivision;

(c) Urban Mixed Use Zone - 13.5 Development Standards for Subdivision;

(d) Local Business Zone - 14.5 Development Standards for Subdivision;

(e) Central Business Zone - 16.5 Development Standards for Subdivision;

(f) Commercial Zone - 17.5 Development Standards for Subdivision;

(g) Light Industrial Zone - 18.5 Development Standards for Subdivision;

(h) Rural Zone - 20.5 Development Standards for Subdivision;

(i) Environmental Management Zone - 23.5 Development Standards for Subdivision;

(j) Utilities Zone - 26.5 Development Standards for Subdivision;

(k) Community Purpose Zone - 27.5 Development Standards for Subdivision;

(l) Recreation Zone - 28.5 Development Standards for Subdivision;

(m) Open Space Zone - 29.5 Development Standards for Subdivision; and

(n) Particular Purpose Zones (LAU-P1.0 - LAU-P10.0) - Development Standards for Subdivision.

Objective:	
To limit opportunities for the intensification of residential development and occupation of areas subject to flood risk.	
Acceptable Solution	Performance Criteria
A1 Subdivision must not create any additional lots capable of any future residential development unless: (a) it is within the Low FRP or medium FRP; or (b) it is for residential activities associated with the educational activities and within the Inveresk Cultural Precinct; or (c) it is to: i. separate existing dwelling units; or ii. separate existing residential and non-residential buildings; that have been approved by Council on a single title.	P1 No Performance Criterion.

ATTACHMENT 2
Statutory Assessment - Response to Requirements for Local Provisions Schedule under LUPAA

Section 34(2) of LUPAA requires a relevant planning instrument to meet all of the following criteria:

(a) contains all the provisions that the SPPs specify must be contained in an LPS

The proposed amendment applies to the flood levee protected areas in Launceston (as shown in the figure 1- Study Area. The proposed planning scheme amendment complies with the SPP requirements for an LPS.

(b) is in accordance with section 32

This section identifies the technical aspects of an LPS such as inclusion of zone maps and overlays, and what additional local provisions can be included if permitted to do so under the State Planning Provisions (SPPs), to add to or override the SPPs.
Section 32(4) identifies that an LPS may only include these additional local provisions where:

(a) a use or development to which the provision relates is of significant social, economic or environmental benefit to the State, a region or a municipal area; or

(b) the area of land has particular environmental, economic, social or spatial qualities that require provisions, that are unique to the area of land, to apply to the land in substitution for, or in addition to, or modification of, the provisions of the SPPs.

The proposed amendment includes:

a. *remove LAU-S10.0 from the Launceston Local Provisions Schedule;*
b. *remove LAU- S10.0 Invermay/Inveresk Flood Inundation Specific Area Plan from the overlay map;*
c. *insert LAU - S17 Flood Levee Protected Areas Specific Area Plan into the Launceston Local Provisions Schedule,;*
d. *insert LAU-S17 Flood Levee Protected Areas Specific Area Plan into overlay maps,; and*
e. *modify C12.0 Flood-Prone Areas Hazard Code overlay map by removing the mapped areas where proposed LAU - S17 Flood Levee Protected Areas Specific Area Plan applies.*

It is considered the proposed amendments will meet Section 32(4)(b) due to its spatial qualities discussed below:

Flood Risk and Topography: The proposed Specific Area Plan applies to the levee-protected areas in Launceston which are located in the lower suburbs at the confluence of the North Esk, South Esk, and kanamaluka / River Tamar Estuary. This geographical setting significantly amplifies flood risk, as the natural flow of water is concentrated in these low-lying areas. The topography of the land further increases vulnerability to inundation, as floodwaters can easily accumulate and overflow. Parts of the Launceston CBD, along with the suburbs of Invermay and Inveresk, lie on the natural floodplain, with some areas even below the high tide mark, making them especially susceptible to flooding.

Flood Risk Assessment: According to the flood study conducted by BMT (2019), the levee system currently provides protection only from flood events up to a 1% Annual Exceedance Probability (AEP) flood event, under present climate conditions. However, the study highlights that climate change will likely compromise the levees' ability to withstand such events by 2050, with substantial flooding potentially affecting areas such as Invermay, Inveresk, Newstead, and parts of the City.

The flood risk assessment by Molino Stewert (2024) further supports these findings and provides additional details:

- In 2020, the levee provides protection from a 1% AEP event but is overtopped by a 0.5% AEP event.
- By 2050, the levee may no longer provide full protection from a 1% AEP event, due to climate change impacts such as more frequent extreme rainfall events and rising sea levels.
- Under current conditions (2020), there are no properties facing intolerable flood risk, with 30% of existing lots facing tolerable risk and 70% having acceptable risk. However, without further flood risk mitigation measures, the number of lots with intolerable flood risk could rise significantly by 2050.
- The study predicts that by 2050, approximately 210 lots (8% of the total affected) could experience intolerable flood risk, with this number potentially increasing to 1,000–1,091 lots (38% of total affected) by 2090, primarily due to climate change and development pressures.
- The sensitivity analysis suggests that implementing measures to reduce vulnerability and enhance resilience could substantially decrease the number of lots at intolerable flood risk by 2050.
- Levee Protection: The levee system currently in place provides protection up to a 1% Annual Exceedance Probability (AEP) flood event. This means that, on average, there is a 1 in 100 chance of a flood of this magnitude occurring in any given year. While the levees offer some level of flood protection, they are not foolproof, and their capacity to manage floodwaters is limited to this specific scenario. It is for this reason, and noting the spatial qualities of the area, that specific provisions are required.

Therefore it is considered that the proposed amendment meets the tests under sections 32(4)(a) and (b).

(c) furthers the objectives set out in Schedule 1 of LUPAA

Assessment of the amendment against the Schedule 1 objectives is provided in the following table.

Part 1 Objectives	**Planning Assessment**
(a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity	The proposed amendment will not have direct impact on natural or physical resources nor will affect ecological processes and genetic diversity.
(b) to provide for the fair, orderly and sustainable use and development of air, land and water	The proposed amendment will not have a negative impact on the sustainable use and development of air, land and water. Potentially the SAP will encourage sustain use of the land in mitigating flood issues.
(c) to encourage public involvement in resource management and planning	The statutory process for assessment of a planning scheme amendment involves a public notification period. Any representations received will be formally considered by the Planning Authority. The Planning Authority is required to report on any representations to the Tasmanian Planning Commission, which in turn may hold public hearings into representations. Furthermore, the process included two community engagement phases and one key stakeholder engagement phase. • The first community engagement was undertaken in 2021, a community survey was sent to residents and businesses within the study area. The survey asked

	about people's perception of flood risk, their tolerance of flooding and how they would respond to a flood. This data was then used to inform the flood risk assessment. • The second community engagement, held in 2022, aimed to provide the community with an opportunity to engage directly with council staff and experts (project consultants). The primary objectives were to provide community an opportunity to discuss how survey results were integrated into the study and to get public feedback on proposed changes to the planning controls. Following the consultation phase, the draft SAP was reviewed and revised as necessary based on feedback.
(d) to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c)	By minimising flood-related damages, the SAP supports the economic health of communities, ensuring that local businesses and residences are safeguarded against future flood risks.
(e) to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State	Community, industry and other government agencies will have the opportunity to comment on the proposed planning scheme amendment during the public notification period. Furthermore, the project process included a key stakeholder engagement phase held in 2021. Consultations were conducted to gather insights and expertise from relevant parties, including emergency services such as the State Emergency Service - Tasmania, TasWater, TasFire, and other government agencies, as well as representatives from the real estate and insurance sectors.

Part 2 Objectives	
(a) to require sound strategic planning and co-ordinated action by State and local government	The proposed amendment is consistent with the objectives of the Northern Tasmania Regional Land Use Strategy and the Planning Scheme.
(b) to establish a system of planning instruments to be the principal way of setting objectives, policies and controls for the use, development and protection of land	The proposed planning scheme amendment seeks to introduce the Flood Levee Protected Areas Specific Area Plan into the Launceston Local Provisions Schedule. This SAP provides a comprehensive set of controls for land use and development, taking a risk-based approach to floodplain management. It includes provisions that address the specific characteristics and locations of different uses and types of development within levee-protected areas.
(c) to ensure that the effects on the environment are considered and provide for explicit consideration of social and economic effects when decisions are made about the use and development of land	The proposed new planning controls for the storage of dangerous goods or hazardous materials in flood-prone areas are designed to minimise potential environmental harm during flooding events, addressing gaps identified in the current Specific Area Plan *(LAU-S10.0 Invermay/Inveresk Flood Inundation Specific Area Plan).*
(d) to require land use and development planning and policy to be easily integrated with environmental, social, economic, conservation and resource management policies at State, regional and municipal levels	The proposed amendment is consistent with the local, regional, and state policies as assessed by this report.

(e) to provide for the consolidation of approvals for land use or development and related matters, and to co-ordinate planning approvals with related approvals	No combined planning application is included with the proposed planning scheme amendment. The proposed amendment will facilitate a future development application for land use and development of the land in accordance with the Tasmanian Planning Scheme - Launceston.
(f) to promote the health and wellbeing of all Tasmanians and visitors to Tasmania by ensuring a pleasant, efficient and safe environment for working, living and recreation	The proposed approach aims to establish uniform planning controls to address flood risk across all levee-protected areas in Launceston. This creates a more cohesive and effective flood management strategy that enhances safety and resilience for all affected communities. Ultimately this will provide an efficient and safe environment for working, living and recreation.
(g) to conserve those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value	The proposed amendment will not have an adverse impact on the buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value.
(h) to protect public infrastructure and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community	The proposed amendment will not have an adverse impact on the public infrastructure, public utilities or other facilities which are available for the benefit of the community.
(i) to provide a planning framework which fully considers land capability.	This objective is not directly applicable for the proposed amendment.

(d) is consistent with each State policy;

Assessment of the amendment against the various policies is provided in the following table.

State Policy	Planning Assessment
State Policy on the Protection of Agricultural Land 2000	The proposal does not involve the conversation of prime agricultural land (PAL) to a non-agricultural use.
State Policy on Water Quality Management 1997	The proposed amendment will not result in an increase in sediment transport to surface waters, and does not increase the potential extent of sediment transport from future development.
State Coastal Policy 1996	While Launceston is an inland municipality, its proximity to the Tamar River estuary places it within the scope of Tasmania's Coastal Policy, particularly regarding land use, flood risk management, and the preservation of nearby ecosystems. Further, the Tasmania State Coastal Policy provides the following relevant direction regarding coastal hazards: *"Areas subject to significant risk from natural coastal processes and hazards such as flooding, storms, erosion, landslip, littoral drift, dune mobility, and sea-level rise will be identified and managed to minimize the need for engineering or remediation works to protect land, property, and human life" (Clause 1.4.1).* In response, the proposed SAP introduces planning controls aimed at minimising the risk to human life and property caused by flooding, while ensuring that land use and development in levee protected areas are managed effectively. Specifically, the SAP will:

	a) Ensure that flood risk is considered when locating future land uses; b) Require new buildings to be resilient to the impacts of flood inundation. Furthermore, the proposed SAP introduces planning controls to minimise potential environmental harm during flooding events.
National Environmental Protection Measures The National Environment Protection Measures (NEPMs) are automatically adopted as State Policies under Section 12A of the *State Policies and Projects Act 1993* and are administered by the Environment Protection Authority. The NEPMs relate to: • ambient air quality • ambient marine, estuarine and fresh water quality	The proposed new planning controls for the storage of dangerous goods and/or hazardous materials in flood-prone areas are designed to minimise potential environmental harm during flooding events. The proposed new measures ensure that developments/use which involve dangerous goods and/or hazardous materials consider key factors such as the quantity and nature of materials, the specific inundation risks, and the potential environmental impacts during a flood. This approach reflects a strong commitment to sustainable practices, aiming not only to safeguard human lives but also to protect ecosystems, promote biodiversity, and preserve the broader natural environment.

• the protection of amenity in relation to noise (but only if differences in markets for goods and services) • general guidelines for the assessment of site contamination • environmental impacts associated with hazardous wastes • the re-use and recycling of used materials. Principle 5 of the NEPMs states that planning authorities *'that consent to developments, or changes in land use, should ensure a site that is being considered for development or a change in land use, and that the authorities ought reasonably know if it has a history of use that is indicative of potential contamination, is suitable for its intended use'.*	

(da) satisfies the relevant criteria in relation to the TPPs;
The Tasmanian Planning Policies have not yet been implemented.

(e) as far as practicable, is consistent with the regional land use strategy, if any, for the regional area in which is situated the land to which the relevant planning instrument relates;

The applicable regional land use strategy for Launceston is the Northern Tasmanian Regional Land Use Strategy. Comments against the relevant goals of the NTRLUS, as well as the relevant policies and actions are provided below:

C.4.1 Goal 1: Economic Development **To facilitate economic development and productivity through integrated land use and infrastructure planning.**
Strategic Direction G1.1 Capitalise on the region's sources of competitiveness by identifying future opportunities for sustainable competitive advantage.

Response:

The subject area is located within the Priority Consolidation Areas and Launceston Central Areas of the Regional Framework Plan.The proposed SAP aims to minimise flood risks to human life and property.

By ensuring that future land uses consider flood risk and requiring resilience in new buildings, the SAP enhances community safety, making the region more attractive for investment.

Strategic Direction G1.2 Adopt an integrated and coordinated approach to government infrastructure, transport and land use planning.

Response:

The SAP will not directly applicable for transport or government infrastructure. However, the SAP will ensure that future land uses are strategically located away from high-risk areas, thus preventing the establishment of developments that could pose unacceptable risks to human life and property.

Strategic Direction G1.3 Develop a thorough understanding of key industry needs, including future demand and location requirements.

Response:

The Specific Area Plan overlay area includes prime, high-demand locations in Launceston while addressing existing flood risks. The SAP will guide new developments to ensure they are placed in safer areas, away from potential flooding. It includes thorough flood risk assessments to identify suitable sites and establishes strong guidelines for resilient building practices, ensuring new structures can withstand floods.

This approach will help identify safe locations that can support future demand without compromising safety.

C.4.2 Goal 2: Liveability To promote liveability measures for social and community development and the betterment of healthy, strong and vibrant urban and rural settlements.

Strategic Direction G2.1 Identify Urban Growth Areas to advance a sustainable urban settlement pattern.
Response: This strategic direction is not directly applicable to the proposed SAP.
Strategic Direction G2.2 Plan for socio-demographic changes
Response: The regional framework plan identifies some parts of the proposed SAP overlay area are located within the priority consolidation areas, Launceston central area and urban areas, which means the subject area could attract more population and development although there is risk of flood inundation. Therefore, the proposed SAP will guide to more sustainable development in the area while promoting safety and resilience for flooding. Moreover, the SAP contributes to the overall resilience of the community, protecting residents from potential hazards and ensuring a safe living environment.
Strategic Direction G2.3 Promote local character values.
Response: The primary objective of the proposed SAP is to provide a framework for sustainable development that enhances community safety and resilience against flooding. By implementing the SAP there will be no adverse impact on the local character value of the area.
Strategic Direction G2.4 Enhance social inclusion.
Response: In formulating the Specific Area Plan, careful consideration has been given to vulnerable groups in the community, with provisions aiming to provide a safer environment for these populations in the event of flooding.

C.4.3 Goal 3: Sustainability To promote greater sustainability in new development and develop stronger community resilience to social and environmental change
Strategic Direction G3.1 Promote and protect the Region's unique environmental assets and values.
Response: The Tamar River is a unique natural environmental asset in Launceston, essential for biodiversity, recreation, and tourism, and it supports a variety of aquatic habitats. The Specific Area Plan aims to minimise any potential adverse impacts on the Tamar River and its branches by implementing stringent standards to ensure the storage of hazardous materials are managed to avoid impacts on the environment during a flood. By carefully regulating land use and ensuring that all new developments adhere to guidelines prioritising the health of the river ecosystem, the SAP seeks to prevent pollution and habitat degradation.
Strategic Direction G3.2 Establish planning policies to support sustainable development, address the impacts of climate change, improve energy efficiency and reduce environmental emissions and pollutants.
Response: A key objective of this study is to align flood plain management planning controls with current best practices through a robust, risk-based approach that incorporates climate change and resilience principles. Given the anticipated increases in flood hazards due to climate change, it is essential that flood planning levels are informed by the latest flood study data, which takes these factors into account. By integrating climate change considerations into floodplain management, the SAP will ensure that land use decisions not only mitigate flood risks but also promote sustainable practices that protect the environment and enhance community resilience. This proactive approach will foster safer, more resilient communities while safeguarding vital natural resources for future generations.
C.4.4 Goal 4: Governance To provide cooperative and transparent leadership and regionally supportive local governance structures to advance integrated strategic land use objectives/ outcomes, including the goals, strategies and policies of the RLUS.
Strategic Direction G34.1 Advance regional leadership

Response: This Strategic Direction is not directly relevant to the proposed SAP.

The relevant policies and actions are discussed below:

E7 Regional Environment Policy

Specific Policies and Actions		***Planning Assessment***
Policy	***Action***	
Natural Hazards		
NH–P02 Future land use and development is to minimise risk to people and property resulting from flooding. NH-P04 Where avoidance of hazards is not possible or the level of risk is deemed acceptable, best practice construction and design techniques and	NH-A02 Permit appropriate land uses and urban development in areas of susceptibility only where risk is very low or where it can be managed by prescriptive controls to avoid undue risk to persons including life of loss and damage to property. NH-A04 Include controls in planning schemes based on current best practice to manage	The SAP aims to align the Council's decision-making on the floodplain with current best practices in floodplain management. It ensures that future land use planning decisions in levee-protected areas are based on a robust, best-practice understanding of current, future, and residual flood risks, while also incorporating principles of climate change and resilience. Furthermore, the SAP seeks to accommodate future developments while ensuring that all land uses and developments are carefully considered in relation to flood risk. This framework not only seeks to minimise the potential for damage to property and loss of life but also encourages new buildings to be designed with resilience to flood impacts. By

management practices are to be implemented.	risk to persons and property resulting from inundation. NH-A07 Adopt the relevant risk management AS/NZS standard as part of core management methods for emergency, hazard and risk management	tailoring restrictions based on the vulnerability of different uses and the specific characteristics of developments, the amendment attempts to create a consistent strategy for floodplain management in Launceston that protects both community and the environment.

(f) has regard to the strategic plan, prepared under section 66 of the Local Government Act 1993, that applies in relation to the land to which the relevant planning instrument relates

The municipal strategic plan is the City of Launceston Corporate Strategic Plan 2014-2024: 2019 Review (the CSP). The CSP details the following strategic priorities:

- *Strategic Priority 1: We connect with our Community and our Region through meaningful engagement, cooperation and representation.*
- *Strategic Priority 2: We Facilitate Prosperity by seeking out and responding to opportunities for growth and renewal of our regional economy.*
- *Strategic Priority 3: We are a Progressive Leader that is accountable to our governance obligations and responsive to our community.*
- *Strategic Priority 4: We value our City's Unique Identity by celebrating our special heritage and culture, and building on our competitive advantages to be a place where people choose to live, work and visit.*
- *Strategic Priority 5: We Serve and Care for our community by providing equitable and efficient services that reflects needs and expectations of our community.*
- *Strategic Priority 6: We Protect our Environment by caring for our unique natural assets and amenity, and sensitively managing future development opportunities.*

- *Strategic Priority 7: We are a City Planning for our Future by ensuring our approach to strategic landuse, development and infrastructure investment is coordinated, progressive, and sustainable.*

The proposed draft amendment aligns Strategic Priorities 1, 3, 6 and 7 of the CSP by:

- Ensuring the public have their say through the informal community consultations and formal advertising process;
- Proactively managing flood risks, ensuring responsible governance through effective flood management strategies, and responding to the community's needs by prioritising safety, resilience, and sustainable development in flood-prone areas.
- Safeguarding our unique natural assets and amenity, sensitively managing future development opportunities, and applying planning controls to prevent environmental impacts during a flood event.
- Ensuring that future development is strategically located to be flood resilient and aligned with broader goals of environmental protection and community safety, promoting long-term, sustainable growth while minimising flood risks.

(g) as far as practicable, is consistent with and co-ordinated with any LPSs that apply to municipal areas that are adjacent to the municipal area to which the relevant planning instrument relates;

The adjacent municipal areas have adopted the Tasmanian Planning Scheme. However, the proposed Amendment to the LPS will not impact the adjacent municipal areas.

(h) has regard to the safety requirements set out in the standards prescribed under the Gas Safety Act 2019.
The Gas Pipelines Act

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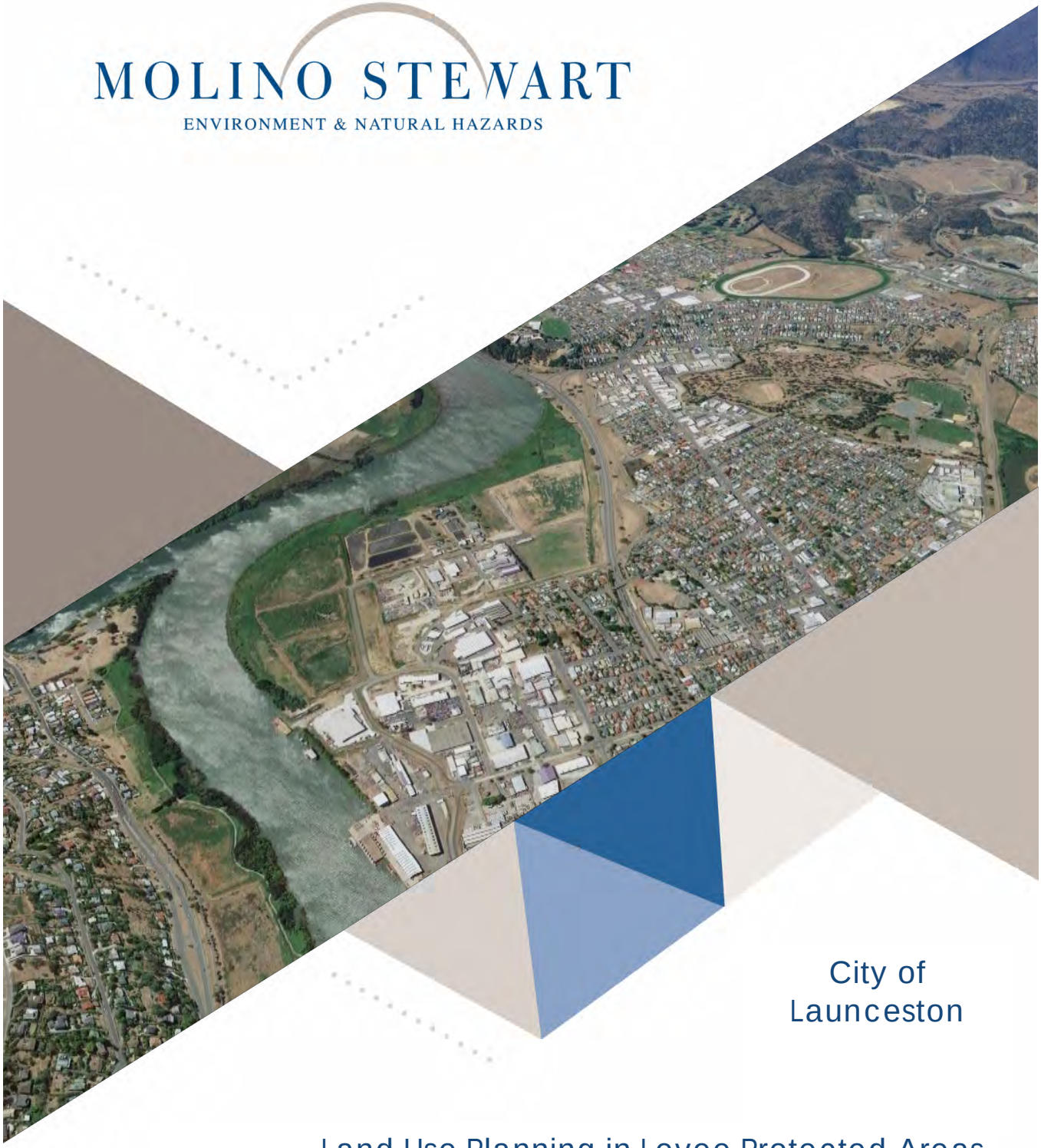

City of
Launceston

Land Use Planning in Levee Protected Areas
Flood Risk Assessment and Mapping
Final

MOLINO STEWART
ENVIRONMENT & NATURAL HAZARDS

Land Use Planning in Levee Protected Areas
Flood Risk Assessment and Mapping

Final

Client: City of Launceston

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1| Introduction

1.1 Background

The City of Launceston is located along the tidal Kanamaluka/Tamar River estuary, formed by the confluence of North and South Esk Rivers, which drains into the Bass Straight 70 km to the north. Sections of the Launceston CBD and the suburbs of Invermay and Inveresk are located on the natural floodplain, with some areas lying below the high tide mark, and are susceptible to flooding.

Launceston is currently protected from riverine flooding by a levee system built in the 1960s, updated in the 1990s, and significantly renewed in the 2010s. The portion of the levee in Newstead was built in 2018. The system was originally built to provide protection up to the 0.5% Annual Exceedance Probability (AEP) flood event. However, a flood study recently prepared by BMT (2019) for Council, shows that the levee may provide protection only from flood events up to the 1% AEP flood, under current climate conditions. The study also shows that, as a result of climate change, the levees may be compromised in a 1% AEP event in year 2050, with significant inundation possibly affecting Invermay, Inveresk, Newstead and parts of the City.

Like many places around the world which are protected by levees, there has been a perception in Launceston in the past that its levees have mostly dealt with the City's flood problem, at least for those parts of the city protected by the levee. This has been reflected in minimal and inconsistent flood planning controls in those areas behind the levees, namely:

- the areas of Invermay and Inveresk have planning controls and a defined flood level;
- the City side of the levee has no planning controls that deal with flooding; and
- the suburb of Newstead (recently levee protected) has a generic flood planning code based on the 1% AEP event, which however does not overtop the levee.

Another aspect of past floodplain risk management practice around the world has been to choose a "defined flood event"(DFE) of a given probability (usually the 1% AEP) and impose planning controls on development within the extent of that event, but accept all the consequences of larger floods by not imposing any development controls outside of the DFE extent.

Best practice, as set out in AIDR's Handbook 7 Managing the Flood Plain: A Guide to Best Practice in Flood Risk Management in Australia and other guidelines recommends a more deliberative risk-based approach to flood risk management in which the consequences of the full range of flood events are evaluated and considered before making decisions on flood mitigation measures, including planning controls. However, Handbook 7 does not include consideration of how vulnerability, resilience and tolerability contribute to risk. Other guidelines, such as the Queensland Reconstruction Authority's guidelines (2011), provide more explicit guidance in this regard.

The City of Launceston appointed Molino Stewart Pty Ltd to develop a current, best-practice, risk-based approach to land use decision making and planning controls for those areas which have a residual flood risk, although protected by levees.

The present report describes the assumptions, methods and results of the flood risk assessment and mapping exercise.

1.2 Scope of this Report

1.2.1 Geographical Scope

The geographical scope of this report includes the area shown in Figure 1. The boundaries of the study area were defined by Council and include the suburbs of Invermay, Inveresk, Newstead and parts of the City.

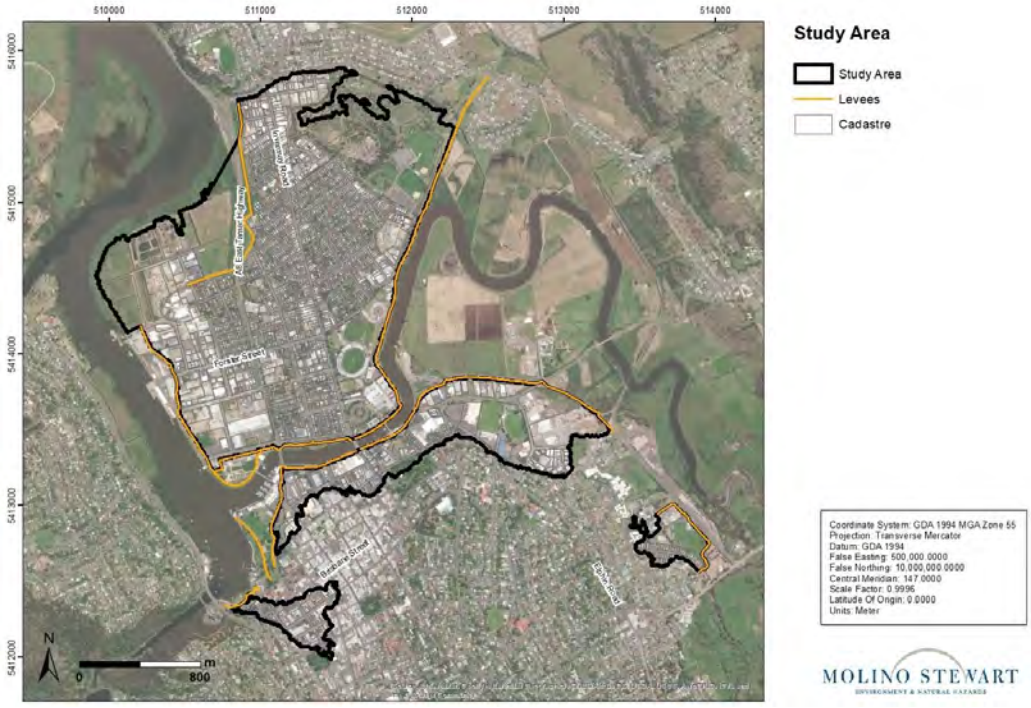

Figure 1. Study area

1.2.2 Technical Scope

The scope of the present report was to assess, map and evaluate flood risk patterns within the study area, under future predicted climate conditions (i.e. year 2050 and year 2090). The multifaceted nature of risk was assessed using an *ad-hoc* risk model, integrating the following key risk components:

- Hazard;
- Exposure;
- Vulnerability;
- Resilience.

Results were evaluated against a tolerability scale based on the best practices in floodplain risk management and direct feedback obtained from the Launceston community through a survey.

Thematic flood risk maps were generated for year 2050 and 2090, in which risk was classified as acceptable, tolerable or intolerable. These maps were designed to inform the identification of suitable and spatially consistent flood risk planning measures in the study area (i.e. the flood planning "matrix").

1.3 Structure of this Report

The report is organised as follows:

- Section 2 describes the proposed risk assessment model;
- Section 3 outlines how each of the risk components included in the selected risk model was calculated. The risk components are:
  - Hazard (Section3.1)
  - Exposure (Section 3.2)
  - Vulnerability (Section 3.3)
  - Resilience (Section 3.4)
- Section 4 presents and discusses the calculation of flood consequences, for each of the selected flood events, in year 2020, 2050 and 2090, and describes how consequences and probability were merged to obtain and map risk. It also includes considerations on risk tolerability and explains how the risk scores calculated for the study area were classified in acceptable, tolerable and intolerable.
- Section 5 includes a sensitivity analysis and a discussion of its results.
- Section 6 offers some concluding remarks and a list of the key study assumptions and limitations.

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2| The Risk Model

2.1 Literature Review

A Risk Model or Framework is a theoretical approach that identifies and defines the relationships between risk and its components. There is no single risk framework that works in all scenarios, and various methods have been developed with their own inherent advantages and disadvantages. The scope of this section of the report is to provide a concise review of what we consider to be the primary risk model options for this study.

The key risk components to be integrated into the risk frameworks are defined as follows, based on the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNIDSR, 2015):

- **Hazard:** A potentially damaging event, process, phenomenon, or human activity that may cause loss of life, injury, property damage, social and economic disruption, or environmental degradation. In the context of natural hazards, this is integrated into the framework as a measure of the natural hazard's probability and intensity. For floods, this could be based on the maximum Annual Exceedance Probability of flooding of a given depth occurring at a particular location. In risk models adopting a probability/consequence matrix, the hazard probability and intensity are usually split. While the hazard probability defines the first input of the matrix, its intensity contributes to assessing the event consequences (i.e. the second input of the matrix).
- **Exposure of life and/or property:** This is defined as, "The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas" (UNISDR, 2009). Exposure is generally assessed based on the "quantity" of elements within reach of a natural hazard, such as the number of people living in flood affected areas, the number of flood-prone buildings, or the economic value of the assets that could be affected by flooding. Exposure may include also a measure of the hazard intensity, if this is not already included under the Hazard component. This is the case of risk models based on a risk matrix, as described above.
- **Vulnerability**: Vulnerability is defined as, "The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards" (UNISDR, 2009). State of the art vulnerability assessment techniques have aggregated a number of vulnerability indicators (e.g., age, ethnicity, education, wealth, and health) to obtain a composite vulnerability index. In Australia, there are comprehensive and validated census indexes that are commonly used to assess socio-economic vulnerability of the population to the impact of disasters. These include, for instance, the IRSD (Index of Relative Socio-Economic Disadvantage).
- **Resilience:** Sometimes incorrectly referred to as "tolerability", resilience is the capability of a system or a community to absorb the impacts of a flood, learn from it and bring itself back to the pre-disaster condition in a relatively short time.

The following section describes different models that may be used to aggregate the above components of risk in a final risk score or descriptor.

2.1.1 Index-Based Methods (Relative Approach)

These methods make use of an index of risk. This is obtained by aggregating indices of the risk components, in this case hazard, exposure, vulnerability and resilience. Similarly, each index of each risk component can be obtained by aggregating specific indicators. For instance, a vulnerability index

can be obtained by aggregating indicators of demography, wealth, education, health, family status and so on.

The advantages of index-based models are that they are based on mathematical equations and as such there is no need to discretise risk and his components in classes (e.g., low, medium, high) until the very end of the process. That is, risk and each component can be scored accurately using a numerical interval (e.g., from 1 to 10, or from 1 to 100) so that even small differences in risk between different areas can be addressed. For practical applications, a final classification in an arbitrary number of risk categories (e.g., very low, low, medium, high, very high) can still be used, but there is complete flexibility in how the boundaries of these categories are defined, as this is the last step of the analysis.

On the other hand, index-based methods are inherently relative in the way they assess risk and its components. That is, any risk score does not have a stand-alone meaning, but can only be used to compare risk between different locations. For example, if Area A has a risk of 4 out of 10, it is not possible to establish if such risk is high or low in absolute terms. However, if risk in Area B is 2, we can say that risk in Area A is higher than risk in Area B. Or, if the average risk in the study area is 6, we can say that Area A has a risk lower than the average, but higher than Area B, and so on.

In index-based methods, the components of risk can be aggregated in many ways to obtain the risk index. Some of these are described below.

(a) Additive risk models

At its most basic, an additive model calculates the sum of its cumulative parts. The composite factors are numerically defined based on their individual indicator scores (i.e., Cutter et al., 2003).

Council's project brief refers to the model adopted in the Queensland Reconstruction Authority's *Planning for Stronger, More Resilient Floodplains (2011),* which choose to use an additive mathematical model to calculate risk, based on the equation:

Consequence = Exposure + Vulnerability – Tolerability

While additive risk models have been used in some studies, they have often been criticised because:

- They fail to acknowledge that there is no risk without hazard or exposure, regardless of the level of vulnerability or tolerability; and
- They fail to acknowledge the multiplicative nature of risk. That is, for instance, risk should double if exposure doubles, all other factors equal. This is intuitive when thinking that doubling the population of a given area should double its risk.

(b) Multiplicative mathematical models

Particularly in the field of physical and natural hazard risks, one of the most common approaches is a multiplicate equation (i.e., Dwyer et al., 2004; IPCC, 2012; UNISDR, 2009). A basic example of a popular multiplicative risk equation is:

Risk = Hazard x Exposure x Vulnerability/Resilience

The separate components such as exposure and vulnerability are quantitatively defined based on their separate individual indices or equations. While all components are defined separately, it is important to note that if one multiple has a value of zero, the entire score is zero. This means if, for example, there is no exposure, there is no risk.

There are several variations of this basic equation based on the specific risk scenario being examined. For example:

- Risk = (Hazard + Exposure)$^{1/3}$ × Vulnerability$^{1/3}$ × Lack of coping capacity$^{1/3}$ (European Commission Disaster Risk Management Knowledge Centre, 2020)

- World Risk Index = Exposure x ($^1/_3$ x (Susceptibility + Lack of Coping Capacity + Lack of Adaptive Capacity)) (Welle and Birkmann, 2015)

As shown in the above examples, there is virtually no limit to the number of risk components that can be considered or the way in which these can be defined.

2.1.2 Matrix-Based Approach

Matrix-based approaches are also commonly utilised to ascertain risk in Australia. A primary benefit of the matrix approach is that the methodology is straightforward and easy to apply.

A primary example is the National Emergency Risk Assessment Guidelines (NERAG; AIDR, 2020) which was developed as a nationally consistent approach to assessing emergency risks. The approach involves:

- Defining the levels of specific consequences (i.e., economic, human injury or death, or environmental consequences), via risk-specific tables of quantitative and qualitative criteria to result in a Catastrophic, Major, Moderate, Minor, or Insignificant rank;
- Quantitatively defining the likelihood through Annual Exceedance Probability (AEP) or Average Recurrence Internal (ARI) and assigning a resulting qualitative level (i.e., Almost Certain, Likely, Unlikely, Rare, Very Rare, Extremely Rare);
- Extracting the correspondent level of risk (i.e., Extreme, High, Medium, Low, Very Low) through a matrix that combines the consequence and likelihood, as per Figure 2;

Table 35: Qualitative risk matrix

	CONSEQUENCE LEVEL				
LIKELIHOOD	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
ALMOST CERTAIN	Medium	Medium	High	Extreme	Extreme
LIKELY	Low	Medium	High	Extreme	Extreme
UNLIKELY	Low	Low	Medium	High	Extreme
RARE	Very low	Low	Medium	High	High
VERY RARE	Very low	Very low	Low	Medium	High
EXTREMELY RARE	Very low	Very low	Low	Medium	High

Figure 2. Risk matrix adopted in AIDR, 2020

A combination of qualitative, quantitative and semiquantitative data can be integrated into the above assessment of likelihood, consequence, confidence, and risk level where the information exists at appropriate spatial and temporal resolutions.

The Tasmanian Emergency Risk Assessment Guidelines (TERAG, 2017) utilises a version of the NERAG tailored to the Tasmanian context. While the final likelihood/ consequence matrix is identical to the NERAG table above, there are adapted emergency-management specific inputs (focused on threat to life) such as the consequence table shown in Figure 3.

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TABLE 13: TASMANIAN STATE CONSEQUENCE TABLE

CONSEQUENCE TABLE	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
PEOPLE					
Mortality	Not Applicable	Deaths greater than 1 in 10,000,000 people for the population of interest · 0.05 persons	Deaths greater than 1 in 1,000,000 people for the population of interest · >0.5 persons	Deaths greater than 1 in 100,000 people for the population of interest · >5 persons	Deaths greater than 1 in 10,000 people for the population of interest · >50 persons
Injuries/ Illness	Less than 1 in 1,000,000 of the population seriously injured or any minor injuries	More than 1 in 10,000,000 of the population critically injured with long-term or permanent incapacitation or 1 in 1,000,000 of the population seriously injured	More than 1 in 1,000,000 of the population critically injured with long-term or permanent incapacitation or 1 in 100,000 of the population seriously injured	More than 1 in 100,000 of the population critically injured with long-term or permanent incapacitation or 1 in 10,000 of the population seriously injured	More than 1 in 10,000 of the population critically injured with long-term or permanent incapacitation

Figure 3. Risk matrix proposed by TERAG (2017)

While these models are very common and provide useful frameworks in different risk settings where a variety of information is available, their main limitation is that they can only produce limited values of risk (usually up to five risk classes), and do not provide flexibility to adjust the classes after the analysis is completed. As a result, matrices can attribute identical ratings to quantitatively very different risks, due to range compression (e.g. Area A and Area B may both be classified as being at "Medium Risk", when in fact their risk level is quite different).

The other limitation is that, if there are more than two risk components (like in this project), an approach based on several matrices or a single multidimensional matrix becomes necessary. While this may work, it defeats the main purpose of a matrix-based methods, that is its simplicity of application.

One important advantage of matrix-based approach is however that it can be used to define risk in an absolute fashion, as opposed to the prevalent relative approach of index-based methods. Because of the simplicity of the matrix-based approach, each class of probability, exposure, vulnerability or tolerability can be defined a priori using quantitative thresholds.

For instance, exposure could be Extreme if there are more than 1,000 people per hectare. Or it could be High, if there are 750 to 1,000 people, and Average if there are 500 to 750 people, and so on. If quantitative class thresholds can be defined for each component of risk, the final risk score will be absolute (i.e. each score will have a precise stand-alone meaning), and not relative like in an index based model. However, this is a very time-consuming exercise which requires several assumptions, and as such it is only recommended in relatively simple studies. These would be studies with a limited number of risk components (e.g. hazard, vulnerability, exposure…) and a limited number of sub-components (e.g. vulnerability indicators such as age, wealth, education), because each of these will have to be benchmarked against an accepted standard of what constitutes an extreme, high, average, low or very low value.

For instance, if vulnerability were to be defined only by three indicators, such as age, education level and annual income, a threshold for different vulnerability classes would have to be identified for each of these indicators, as shown in Table 1.

Table 1. Example of vulnerability thresholds

Indicator	Very Low Vulnerability	Low Vulnerability	Average Vulnerability	High Vulnerability	Very High Vulnerability
Age (years)	30 to 40	20 to 30 and 40 to 50	10 to 20 and 50 to 60	5 to 10 and 60 to 70	0 to 5 and over 70
Education	PhD	University Degree	High School	Primary School	Did not attend school
Income	>150,000	100,000 to 150,000	50,000 to 100,000	Up to 50,000	Unemployed

2.1.3 Hybrid Models

It is also possible to use hybrid approaches, mixing index-based and matrix-based models. For instance, a consequence score could be obtained using an index-based model combining indicators of exposure, vulnerability and resilience, while the probability score could use defined AEP events as thresholds.

This is the approach adopted in the Queensland Reconstruction Authority's *Planning for Stronger, More Resilient Floodplains (2011)*. While this specific hybrid model used an additive relationship to calculate a consequence score, which is limited for the reasons discussed above, it combines the advantages of index-based and matrix-based methods. Here, risk is quantitatively calculated with an index by multiplying the Consequence Index and the event probability (Figure 4), which enables the use of a relatively high number of possible consequence scores (i.e. 10, in this case) and increases the mode accuracy.

	Consequence Score										
Likelihood	0	1	2	3	4	5	6	7	8	9	10
10%	0	10	20	30	40	50	60	70	80	90	100
5%	0	5	10	15	20	25	30	35	40	45	50
2.5%	0	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25
2%	0	2	4	6	8	10	12	14	16	18	20
1%	0	1	2	3	4	5	6	7	8	9	10
0.5%	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
0.2%	0	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
0.1%	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1

Broadly Acceptable
Tolerable subject to ALARP
Generally Intolerable

Figure 4. Hybrid risk model adopted by Queensland Reconstruction Authority (2011)

2.2 The Selected Risk Model

Section 2.1 established the differences between an index-based method and a method based on the use of discrete risk matrices. It also highlighted the advantages of hybrid approaches, such as the one proposed by QRA (2011). Importantly, it concluded that the risk model must be selected to address the specific requirements and data structure of the project.

The scope of this project was to generate a risk zoning to inform the identification of tailored and spatially-consistent planning controls. Ideally this mapping would define areas in which flood risk is acceptable, tolerable and not acceptable, so that planning controls can be developed to manage risk where this is tolerable, and use strategic planning to reduce future risks where risk is not acceptable.

The QRA (2011) risk assessment guidelines provide a relatively straightforward platform to map where risk is acceptable, tolerable and not acceptable. This is done through the risk matrix shown in Figure 4.

In addition to the advantages of hybrid approaches outlines in section 2.1.3, a risk matrix like the one proposed by QRA (2011) provides a pictorial representation of risk which is simpler to communicate and, as such, more likely to be supported by the community and stakeholders. Furthermore, because the probability and consequences are disaggregated, it provides an opportunity to tailor the tolerability zone (i.e. the yellow zone) based on floodplain risk management best practices and direct feedback from the community.

On the other hand, the QRA (2011) approach has the following drawbacks:

- It uses an additive formula to combine exposure, vulnerability and resilience in the Consequence Score. The drawbacks of additive relationships to integrate risk components are discussed in section 2.1.1.
- It makes limited use of socio-economic indicators to assess vulnerability to flooding, and replaces these with indicators related to the flood affectation (i.e. floor height, warning time, isolation), that are typically considered exposure or hazard indicators (Figure 5).

Vulnerable Land Use	Built Form & Associated Safety	Flood Warning Times* for affected persons	Isolation of affected persons in urban areas via nearby roads	Score
Existing/proposed built form not affected by hazard (regardless of use), or No existing/proposed vulnerable land use or affected persons (e.g. Landscape, Open Space and Recreation)	Existing built form not affected by hazard	More than 3 days	No isolation	0
Commercial, Industrial, Rural, Rural Residential and Residential without vulnerable persons	At grade – industrial	49 hours – 72 hours	0.2%/0.1%/PMF	1
Hazardous Materials/ Warehousing	Elevated (elevated above selected flood), or Where currently vacant or underutilised, ability of zoned use(s) to be compatible with flood hazard	25 hours – 48 hours	0.5%	2
Community & Cultural with Vulnerable Property, or Minor infrastructure	At grade – commercial	13 hours – 24 hours	1%	3
Community & Cultural with Vulnerable Persons, or Residential with Vulnerable Persons	At grade - community	7 hours – 12 hours	2%	4
Evacuation Centres/Airports/ Other Critical Infrastructure or	Not elevated above selected flood – residential,			
Where currently vacant or underutilised, inability of zoned use(s) to be compatible with flood hazard	Less than 6 hours	10%	5	

Figure 5. Vulnerability Indicators and scoring adopted by QRA (2011).

For the above reasons, this study adopted a modified version of the QRA (2011) risk model, in which:

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- Risk was obtained by multiplying the probability of a flood event (e.g. 1% AEP) by its consequences. Frequent events have smaller consequences, and larger, less frequent events have greater consequences. This explains why similar risk scores sits roughly along the diagonal axis of the matrix shown in Figure 4.
- Similarly to QRA (2011), risk was assessed at the scale of individual cadastre lots.
- Any given portion cadastre lot was assigned the maximum risk score produced by all the AEP events affecting it. The risk matrix produces a different value of risk for each AEP event affecting the same lot. In most circumstances, the maximum risk score is obtained in the most frequent AEP event affecting that lot. This is the example depicted in the table below.

Probability (AEP event)	Consequences in that AEP event	Risk Score	Risk assigned to the lot
5% AEP	1	5 x 1 = 5	✓
1% AEP	4	1 x 4 = 4	
0.5 % AEP	6	0.5 x 6 = 3	

- This is the reason why, the QRA (2011) risk model assigns a risk score to each lot based on the most frequent flood event affecting that lot. However, in a levee-protected area, there may be instances in which a higher risk score is obtained in a less frequent AEP event, because of a steep jump in consequences from the largest AEP event that is contained by the levee to the smallest AEP event that overtops it. This example is represented in the table below. For this reason, in this study, the risk score assigned to a given lot was the maximum score produced by all the AEP events affecting that particular lot.

Probability (AEP event)	Consequences in that AEP event	Risk Score	Risk assigned to the lot
5% AEP	1	5 x 1 = 5	
1% AEP (levee overtopped)	6	1 x 6 = 6	✓
0.5 % AEP	10	0.5 x 10 = 5	

- The risk formula used in this model can therefore be expressed as follows:

  Risk = Maximum of (Probability x Consequence)$_i$

  where i = AEP events affecting the lot
- The QRA (2011) additive consequence score formula was replaced by the following multiplicative model:

  Consequence = Exposure x Vulnerability / Resilience
- The indicators to assess exposure, vulnerability and resilience were re-organised, and modified to include socio-economic indicators, as well as additional or alternative indicators to better reflect the data available. This is further discussed in Section 3 of this report.
- The tolerability classification of the risk matrix from QRA (2011) was adjusted to match the model assumptions used to assign scores to exposure, vulnerability and resilience (Section 3). This "model calibration" was informed by floodplain management best practices, as well as by direct feedback from the Launceston community, obtained via a direct survey.

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3| Assessing the Risk Components

3.1 Hazard

The component of risk commonly referred to as "hazard" was represented by the frequency of flooding, and it was expressed by the Annual Exceedance Probability (AEP) of a given flood event.

Specifically, six AEP flood events were considered under present and two future climate scenarios: year 2020, year 2050 and year 2090.

The selected AEP events are the 5% AEP, the 2% AEP, the 1% AEP, the 0.5% AEP, the 0.2% AEP, and the 0.05%AEP. These were chosen because they cover a comprehensive range of flood extents within the study area, from virtually no flooding in the 5% AEP event, to extensive flooding in the 0.05% AEP event, regardless of the year.

For each event, the flood modelling results produced by BMT (2018a) were used to generate GIS maps of flood extent, depth and hydraulic hazard. After extensive consultation with Council, it was agreed that the analysis was not to consider flooding scenarios with a levee breach. This is because flood events that do not reach the crest of the levee (i.e. below the 0.5% in year 2020, or below the 1% AEP in year 2050) are extremely unlikely to cause a breach, and events that produce depths high enough to cause significant overtopping of the levee are unlikely to generate flood extents significantly different with or without levee breach. However, events that reach the crest of the levee and/or cause minor overtopping have significantly higher potential to generate a breach, and, should this occur, the flood impacts beyond the levee would likely be greater.

As such, an additional scenario in year 2050 was included to investigate the potential effects of a levee breach, caused by the 1% AEP event. The flood model results for the levee breach scenario of the 1% AEP in 2050 were obtained from BMT (2018b). BMT (2018b):

- Modelled a levee breach at 23 different locations (i.e. one breach per each AEP event, resulting in a total of 23 different breach models for the 1% AEP event and any modelled AEP), and generated the relevant flood mapping by combining the output of all the 23 breaches in a single map, for each AEP event;
- Assumed that each breach would be instantaneous and 40m wide;
- Assumed that each breach would occur at the peak of the flooding in the adjacent section of the Esk River.

It should be emphasized that it was not part of the scope of the work by BMT (2018b) to assess the breach probability of either individual or multiple concomitant breaches. Furthermore, Council advised that the location of the 23 breaches was arbitrarily selected by BMT (2018b), and was not informed by a levee survey (e.g. geotechnical survey) or a failure mode analysis.

While the levee breach mapping from BMT (2018b) may represent an estimate of the "worst case scenario" of levee breach, there seems to be nothing to suggest that the levee may breach at any or all the locations selected by BMT (2018b).

It is noted that the probability of a levee breach is higher if the structure is damaged, for instance by an earthquake. However, the probability of a sufficiently large earthquake to occur during a 1% AEP flood is relatively low.

Pitt & Sherry (2010) showed that, near the Charles Street Bridge (which was identified as the levee chainage most prone to earthquake damage due to the thickness of the underlying silt deposits), a 1 in 500 AEP (equivalent to about a 0.2% AEP) earthquake may be able to bring the Factor of Safety of the levee down to 1.012, which is below the BCA requirement of 1.1. However, the annual exceedance

probability of a 1 in 500 AEP earthquake to occur during a 1 in 100 AEP (i.e. 1% AEP) is 1 in 50,000 (i.e. 0.002% AEP). This is without considering that, as discussed in Pitt & Sherry (2010), the Factor of Safety of the levee at that location would increase as a result of the ongoing flood event, making the probability of an earthquake-driven breach during a 1% AEP flood even lower that a 0.002% AEP.

Finally, the flood model results provided by BMT (2018a, b) show that the flood impacts of the largest modelled event (i.e. a 0.05% flood) without levee breach would be worse than a 1% AEP flood with multiple breach incidents along the levee, which has a combined estimated probability lower than 0.002% AEP.

In this study, a total of 19 different flood model results were used in the risk assessment exercise (Table 2). The probability of each event represents the hazard posed to the study area in that year.

Table 2. Flood events considered in the risk assessment exercise.

Hazard:	Year 2020 No levee breach	Year 2050 No levee breach	Year 2050 Levee breach in 1% AEP	Year 2090 No levee breach
5% AEP	✓	✓		✓
2% AEP	✓	✓		✓
1% AEP	✓	✓		✓
1% AEP with levee breach			✓	
0.2% AEP	✓	✓		✓
0.5% AEP	✓	✓		✓
0.05% AEP	✓	✓		✓

Figure 6, Figure 7 and Figure 8 show the flood extent of the selected AEP events in year 2020, 2050 and 2090 (without levee breach).

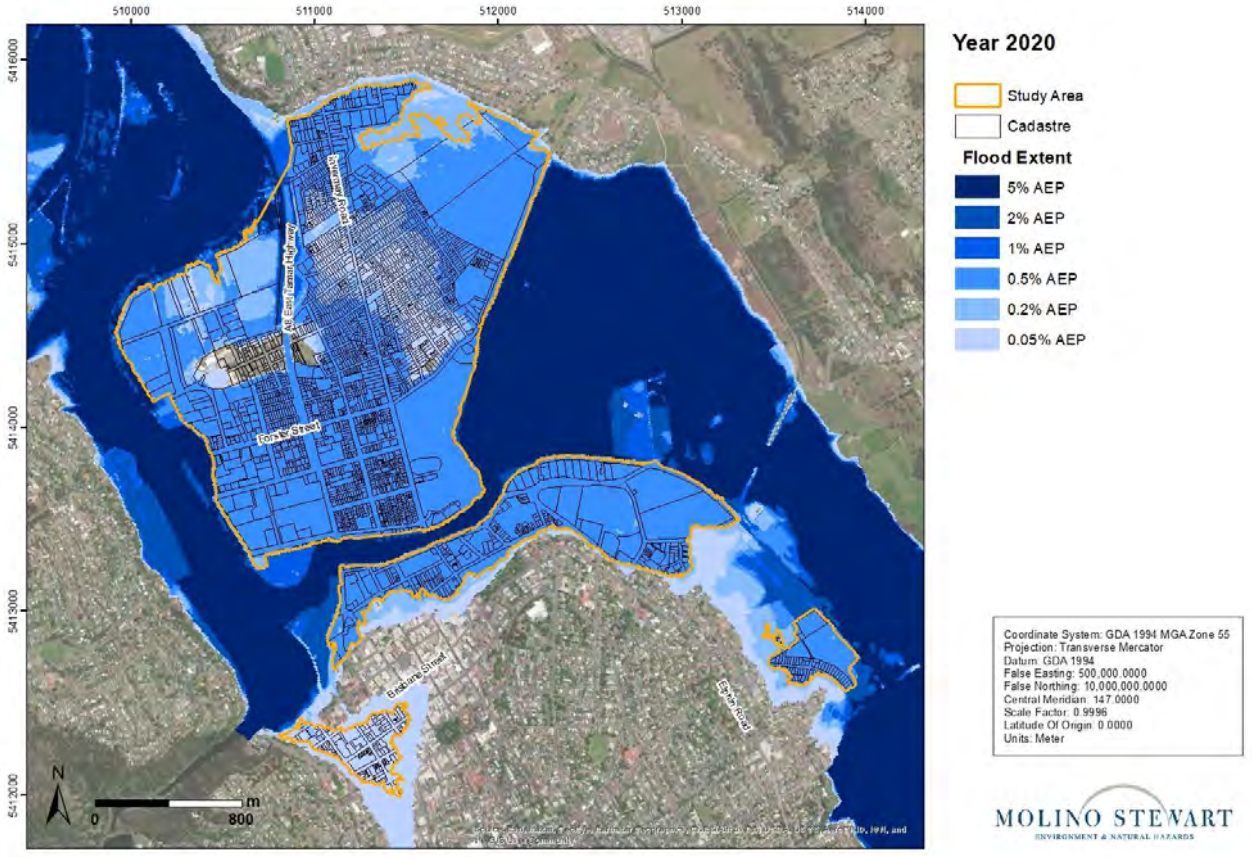

Figure 6. Flood extents in year 2020 assuming no levee breach

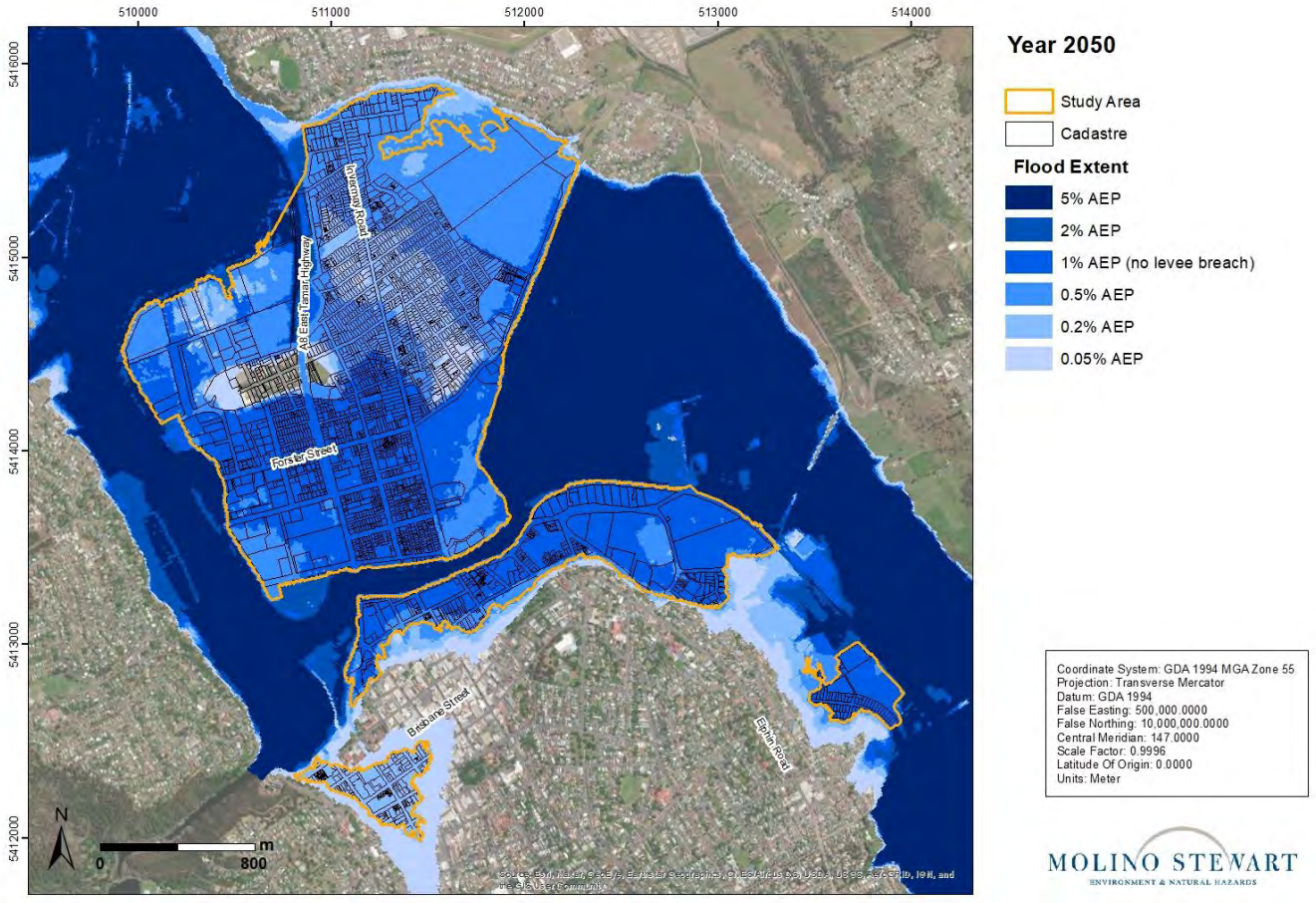

Figure 7. Flood extents in year 2050 assuming no levee breach

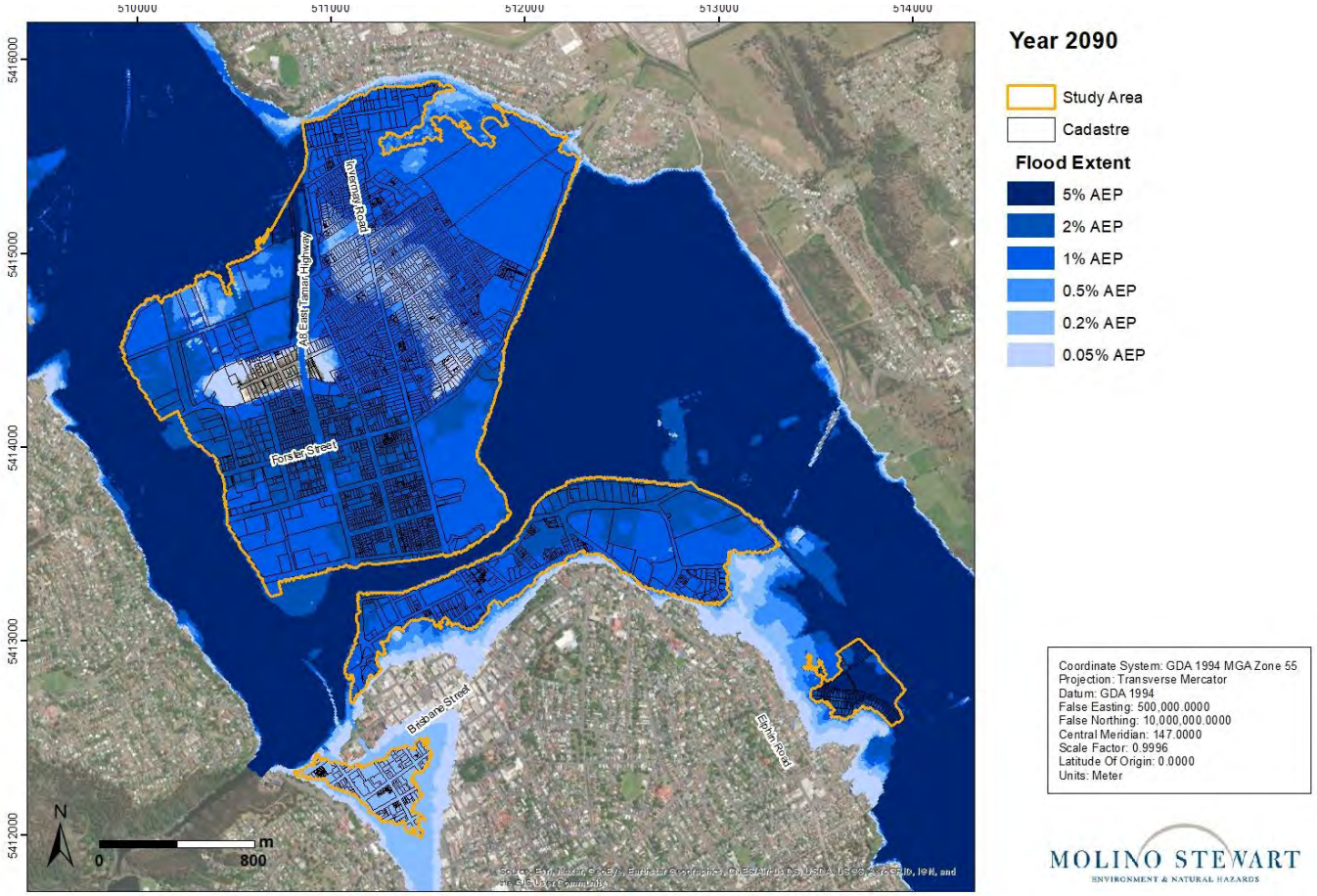

Figure 8. Flood extents in year 2090 assuming no levee breach

3.2 Exposure

In the proposed risk model, the risk component referred to as "exposure" was assessed as a combination of the following two indicators, as shown in Table 3:

- Exposure Indicator #1: Hydraulic hazard and flood isolation;
- Exposure Indicator #2: Depth of Above Floor Flooding (AFF)

3.2.1 Hydraulic Hazard

Hydraulic hazard is the product between flood depth and flow velocity, and is a known predictor of the threat posed by floodwaters to property and life. This indicator used the hydraulic hazard classification proposed by the Australian Rainfall and Runoff 2019 guidelines (Ball et al., 2019) (Figure 9). Figure 10 and Figure 11 show the peak hydraulic hazard in the 0.5% AEP in year 2020 and the 1% AEP event in year 2050 respectively, assuming no levee breach. These are the smallest modelled events in which there would be overtopping of the levee, in year 2020 and 2050 respectively. It can be seen that there would be significantly more overtopping of the levee in a 0.5% AEP in 2020 rather than in a 1% AEP event in 2050.

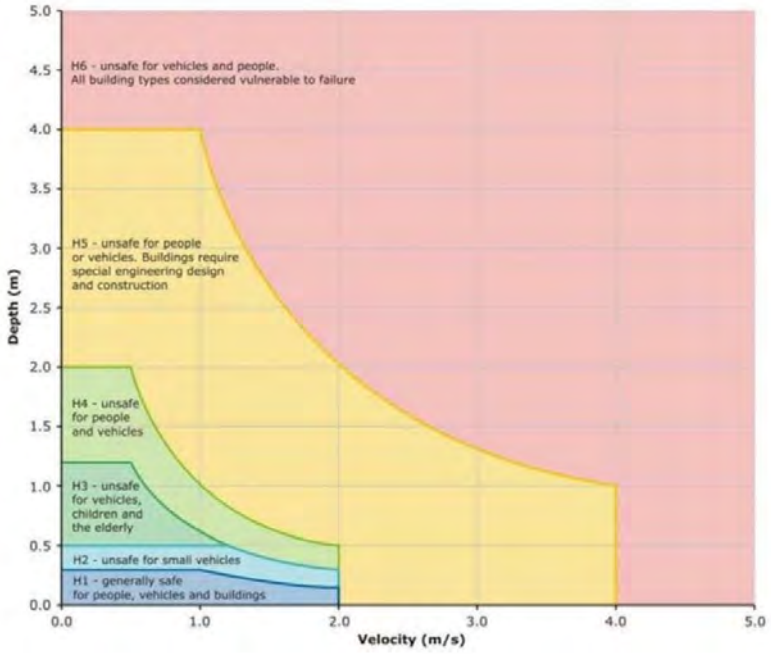

Figure 9. Flood hazard curve based on the 2019 Australian Rainfall and Runoff guidelines (Ball et al., 2019)

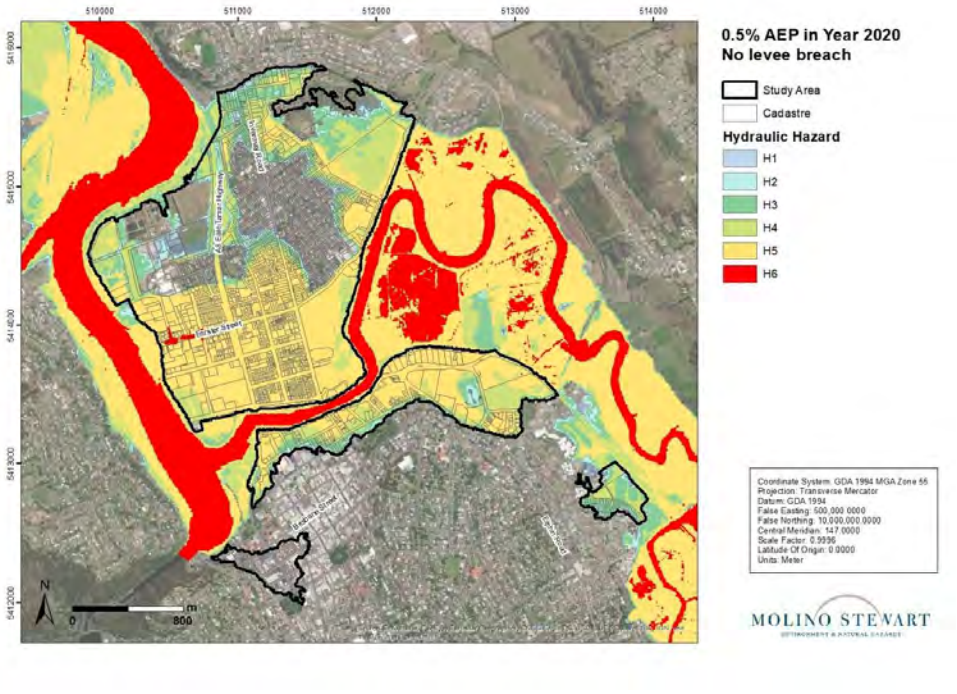

Figure 10. Hydraulic hazard in the 0.5% AEP event in year 2020, assuming no levee breach

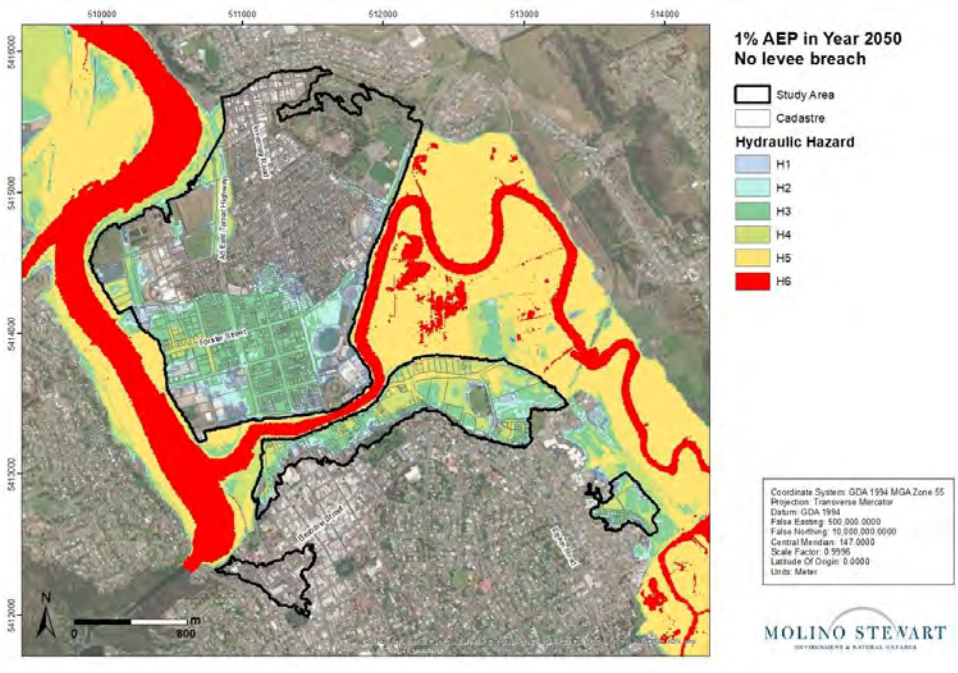

Figure 11. Hydraulic hazard in the 1% AEP event in year 2050, assuming no levee breach

For each year and AEP event, the peak hazard within the footprint of the largest building in each lot was used to obtain Exposure Indicator #1.

In addition to the information provided by hydraulic hazard, Exposure Indicator #1 accounts for lots that may be isolated by flooding without being directly affected by floodwaters. A lot was assumed to be isolated in a given AEP event if it was not directly affected by floodwaters and if all access roads to that lot were cut by a hydraulic hazard of H2 or greater.

3.2.2 Depth of Above Floor Flooding

This exposure indicator complements hydraulic hazard in assessing the flood affectation of existing buildings, and it is a well-known predictor of property damage, as well as risk to life, in floodplain management studies. It differs from hydraulic hazard because it does not depend on flow velocity, but integrates the building floor level, which is one of the key items traditionally used in floodplain management practices to set planning controls.

The depth of above floor flooding in each AEP event and for each lot was obtained as follows:

- Using a GIS, the peak flood level of each AEP event was transferred to each building's footprint. It is noted that the GIS layer of buildings provided by Council included a number of sheds, garages and other small items such as verandas or steps. These were excluded from the analysis by retaining only buildings with a footprint greater than 15 m^2.
- The depth of above floor flooding was then calculated for each building by subtracting the floor level (provided by Council) from the peak level of each AEP flood event. It is noted that in the data provided by Council, 528 buildings had no floor level information. The data gap was addressed by adopting a floor level of 300mm above ground for residential and commercial buildings, and by assuming that industrial buildings or warehouses had their ground floor at ground level.
- The depth of flooding above floor was of each building transferred to the relevant lot. Where multiple buildings were contained in a single lot, the depth of AFF of the building with the largest footprint was used for that lot, provided that this was a habitable building.
- A final Exposure Index score was given to each cadastre lot by taking the maximum score between indicator #1 and #2, in line with the QRA (2011) metodology (Table 3).

Table 3. Exposure Indicators

Exposure Indicator #1: Hydraulic Hazard and Isolation	Exposure Indicator #2: Depth of Above Floor Flooding (AFF)	Exposure Score Assigned to Indicators	Final Exposure Index
Largest building in lot not flood affected * and not isolated	No AFF	0	**Exposure Index = 0 if Indicator #1 = 0** **Otherwise:** **Exposure Index = maximum of Indicator #1 and Indicator #2**
Largest building in lot not flood affected but isolated	10mm	1	
Largest building in lot affected by H2 flooding	10mm to 300mm	2	
Largest building in lot affected by H3 flooding	300mm to 500mm	3	
Largest building in lot affected by H4 flooding	500mm to 1,500mm	4	
Largest building in lot affected by H5 or H6 flooding	>1,500mm	5	

** a lot was considered not affected by flooding if its peak hydraulic hazard is H1 or if it does not flood at all*

Figure 12 and Figure 13 show the exposure map of the 0.5% AEP event in year 2020 and the 1% AEP event in year 2050 (no levee breach). A similar map can be created for each AEP event in year 2020, 2050 and 2090 using the annotated Excel calculator and GIS data provided with this report (Annexure I and Annexure II).

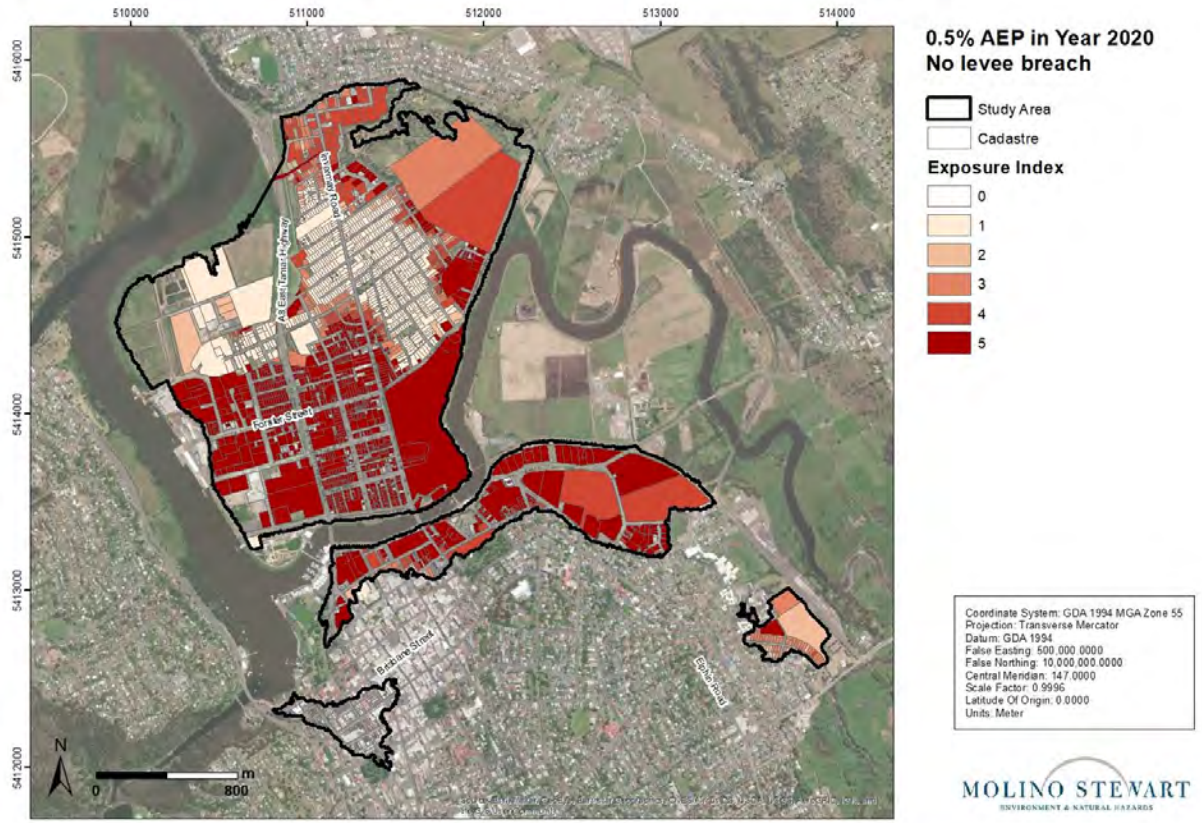

Figure 12. Map of exposure to the 0.5% AEP flood event in year 2020, assuming no levee breach (1 = low exposure, 5 = high exposure)

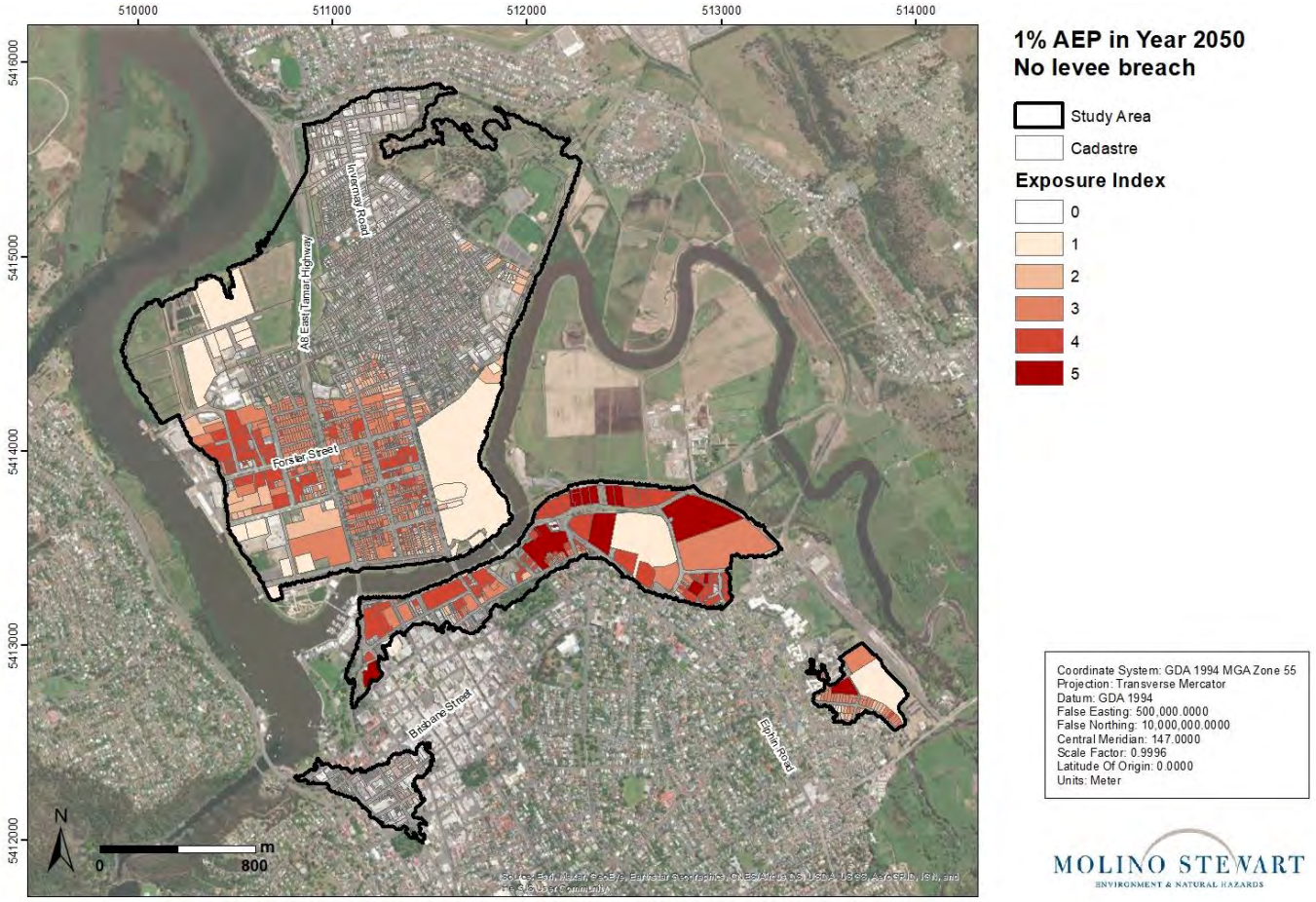

Figure 13. Map of exposure to the 1% AEP flood event in year 2050, assuming no levee breach (1 = low exposure, 5 = high exposure)

3.3 Vulnerability

Vulnerability for residential and non-residential lots was calculated with the following two different and mutually exclusive indicators as shown in Table 4. The indicators are:

- The Index of Relative Socio-Economic Disadvantage (IRSD) (residential lots); and
- Land use (non-residential lots).

3.3.1 IRSD Scores

The vulnerability of residential lots was based on the 2016 Australian Bureau of Statistics SEIFA (Socio-Economic Indexes for Areas) Index. SEIFA 2016 consists of four indices designed to reflect the relative socio-economic disadvantage of the Australian population by aggregating selected indicators from the five-yearly Census. This study utilised the Index of Relative Socio-Economic Disadvantage (IRSD), which was available at a suitable spatial scale (Statistical Area 1). The IRSD encompasses variables such as age, socioeconomic status, family status, and proficiency in English language, which were deemed pertinent to the hazard posed by flooding in the study area. The full list of socio-economic indicators considered in the IRSD score is shown in Figure 14.

Where the lot contained a residential dwelling, it was assigned a vulnerability score based on the national IRSD ranking. It is noted that IRSD scores are only available for SA1s that are classified as residential according to the 2016 Census. There were a small number of dwellings in areas that were not classed as residential. When that was the case, the lots were assigned a score of an adjacent SA1 with an IRSD score. The IRSD score was then converted into final vulnerability scores ranging between 1 (low vulnerability) and 5 (high vulnerability) using the Australian decile classification of the IRSD scores, as shown in Table 4.

IRSD variables

The variables used in the index are listed below. All variables in this index are indicators of disadvantage. INC_LOW is the strongest indicator of disadvantage.

- INC_LOW: % of people with stated household equivalised income between $1 and $25,999 per year
- CHILDJOBLESS: % of families with children under 15 years of age who live with jobless parents
- NONET: % of occupied private dwellings with no internet connection
- NOYEAR12ORHIGHER: % of people aged 15 years and over whose highest level of education is Year 11 or lower
- UNEMPLOYED: % of people (in the labour force) who are unemployed
- OCC_LABOUR: % of employed people classified as Labourers
- LOWRENT: % of occupied private dwellings paying rent less than $215 per week (excluding $0 per week)
- ONEPARENT: % of one parent families with dependent offspring only
- DISABILITYU70: % of people under the age of 70 who have a long-term health condition or disability and need assistance with core activities
- SEPDIVORCED: % of people aged 15 years and over who are separated or divorced
- OCC_DRIVERS: % of employed people classified as Machinery Operators and Drivers
- OCC_SERVICE_L: % of employed people classified as low skill Community and Personal Service workers
- NOCAR: % of occupied private dwellings with no cars
- OVERCROWD: % of occupied private dwellings requiring one or more extra bedrooms
- NOEDU: % of people aged 15 years and over who have no educational attainment
- ENGLISHPOOR: % of people who do not speak English well

Figure 14. Socio-economic factors included in the calculation of IRSD scores

3.3.2 Land Use

The vulnerability of non-residential lots was assigned on the basis on their land use, similarly to the approach of QRA (2011). The land use classification was based of the buildings layer provided by Council, which includes all study area buildings protected by the levees. Building "class" and "purpose" as assigned in this layer were used to determine the vulnerability classification of each lot, as per the Table 4. Additional land uses (i.e. utilities and emergency services) were identified via layers publicly available in the Tasmania LIST Map. Where required, the land uses were ground-truthed using aerial imagery and Google Street View.

The resulting vulnerability map for the study area is shown in Figure 15.

Table 4. Vulnerability Indicators and Vulnerability Index

For Residential Lots	For Non Residential Lots	Final Vulnerability Index
Unbuilt areas	Unbuilt areas	**0**
Very high IRSD score (national deciles 9-10)	Non-critical infrastructure (including public park facilities, toilet blocks, nurseries, greenhouses, forests, car parks, "recreational" purpose, stadium, gate, sports centres, showgrounds)	**1 (low vulnerability)**
High IRSD score (national deciles 7-8)	All commercial (everything in Council's building layer with purpose: "commercial")	**2**
Medium IRSD score (national deciles 5-6)	Hazardous Materials/ Warehousing/Industrial (including all service stations and the wastewater treatment plant)	**3**
Low IRSD score (national deciles 3-4)	Hotels and motels, university buildings, student accommodation, utilities, transport, railway, community facility, cultural or heritage, religious, government, museum, post office	**4**
Very low IRSD score (national deciles 1-2)	Critical services (schools, colleges, daycares, medical centres, emergency transport services, electrical substation facility)	**5 (High vulnerability)**

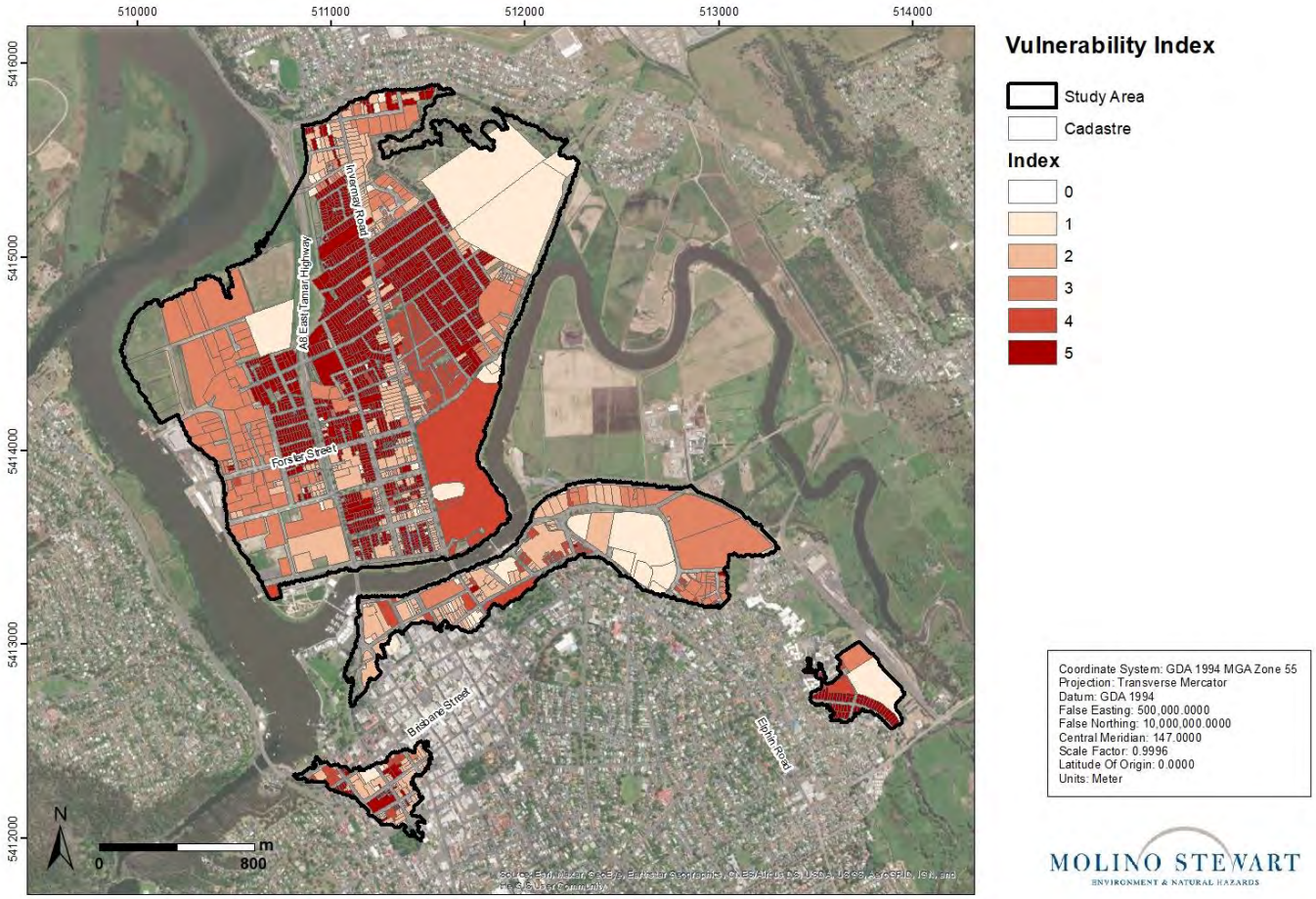

Figure 15. Vulnerability map of all lots in the study area (1 = low vulnerability, 5 = high vulnerability)

3.4 Resilience

Resilience, sometimes incorrectly referred to as "tolerability", was assessed using a community survey prepared by Molino Stewart and distributed by Council to all residential and commercial addresses on the study area. The survey (Appendix A) included 13 questions investigating the following resilience indicators:

- **Risk awareness and perception**. These questions aimed at understanding if people had a correct understanding of their flood risk. The literature shows that this is one of the key items driving the adoption of household preparedness and emergency planning.
- **Capability to absorb the impacts of flooding (i.e. tolerability)**. These questions investigated the extent to which people thought they could handle the impacts of a flood in their property without long-term, intolerable consequences. While this was self-assessed, and as such the response was affected by personal bias, the data was considered sufficiently insightful for inclusion in the resilience assessment.
- **Household/business preparedness**. This was assessed with questions about ways in which residual flood risk is managed at the household or business level (e.g. flood emergency plan, flood insurance).
- **Emergency management**, intended as the self-assessed capability of individuals and businesses to effectively respond to a flood emergency.

The answer to each question was assigned a resilience score from 1 (low resilience) to 5 (high resilience) as shown in Appendix B, and a resilience score was calculated for each indicator by averaging the scores of the relevant questions. Finally, a final Resilience Index between 1 and 5 was obtained for each returned survey by averaging the scores of the four resilience indicators.

A total of 463 survey responses were received and processed in this study. Data gaps (i.e. missing responses to individual questions) were filled by taking the average response to that question. Council felt that this approach, while not ideal, was sufficiently accurate, given the relatively low rate of unanswered questions (Table 5).

Table 5. Blank responses to questions used to calculate the Resilience Index

	Question Number												
	1	2	3	4	5	6	7	8	9	10	11	12	Years at that address
Blank responses (%)	2.04	1.85	3.33	3.33	3.52	3.70	3.70	2.78	5.56	8.33	5.74	5.93	7.96

Each returned survey was geo-located, and all lots within a given mesh block were assigned the average resilience score of the survey responses obtained from addresses within that mesh block. If a mesh block had only one or two survey responses, it was merged with a neighbouring block for the purpose of calculating a resilience score for the two blocks. The neighbouring block was usually chosen by identifying the neighbours with the same mesh block category.

The above approach was not applied to lots containing infrastructure or buildings providing critical services. These included only schools, daycares, medical facilities, sporting fields and a power station. In these instances, a resilience score based on the lot purpose, representing its ability to remain

operational during and after a flood, was considered more appropriate. Schools, daycares and medical facilities were given an average resilience score of 3, unless there was a survey response from that particular lot. Lots with sporting fields were assigned resilience score of 5, while the power station was given a resilience score of 1.

Finally, any lots belonging to mesh blocks with no responses at all were assigned the average resilience score of lots having the same land use (Table 6).

Table 6. Average and minimum resilience scores by land use.

	Commercial	Community Facility	Industrial	Residential
Number of survey responses	69	3	28	363
Average Resilience Index	3.16	3.07	3.30	2.94

Figure 16 shows the final resilience map for the study area, as well as the location of the survey responses.

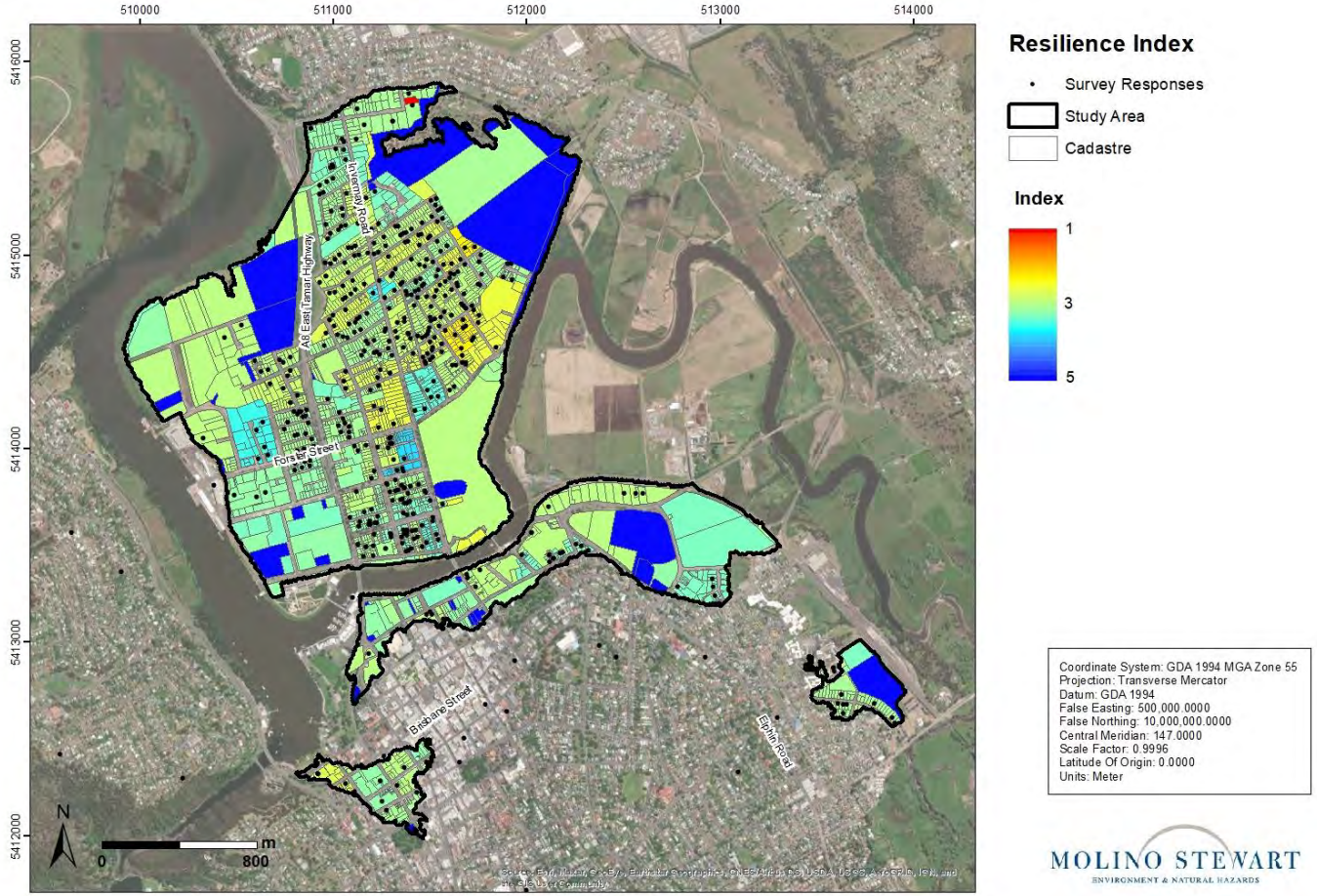

Figure 16. Resilience Index for all lots in the study area (1 = low resilience, 5 = high resilience)

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4| Assessing Risk

4.1 Consequences

Consequences were calculated for each lot by aggregating the indices of exposure, vulnerability and resilience discussed in Section 3. Namely:

Consequence Index (AEP) = Exposure Index (AEP) x Vulnerability Index / Resilience Index.

The multiplicative nature of this model, in which exposure, resilience and vulnerability have the same weight, reflects the underlying assumption that the consequences of a flood event can be controlled by reducing vulnerability or increasing resilience to the same extent as a reduction in the flood exposure (e.g. raising the levee) would do.

The multiplicative nature of the model also means that the range of possible values of the Consequence Index is expanded to a scale from zero to 25, as exposure, vulnerability and resilience range from 0 to 5. But while the numerical scale of the Consequence Index is expanded, the frequency distribution of the possible Consequence Index scores which can be obtained by mixing all combinations of exposure, vulnerability and resilience, is skewed to the lower part of the [0;25] interval. For instance, a lot with average scores of exposure, vulnerability and resilience (e.g. all equal to 2.5, in a scale 0 to 5) would be given a consequence score of 2.5, which is in the lower half of the interval [0-25].

To compensate for the skewness of the Consequence Index scores, these were re-classified as shown in Table 7. This classification was informed by the "Jenks", or "Natural Breaks" algorithm, and manually fine-tuned as part of the model calibration exercise (Section 4.2). The Jenks algorithm is typically used in GIS applications, as it generates classes based on natural groupings inherent in the data. The algorithm identifies break points by picking the class breaks that best group similar values and maximise the differences between classes. The features are divided into classes whose boundaries are set where there are relatively big jumps in the data values. In this case, ten classes of Consequence Index were used, to match the layout of the QRA (2011)'s probability/consequence matrix (Figure 4).

After re-classification of the Consequence Index scores, the previous scenario in which exposure, resilience, and vulnerability have all an average score of 2.5 (in a scale 0 to 5) generates a Consequence Index score of 5 out of 10. This is a preferable outcome for this study, as average values of exposure, resilience and vulnerability should ideally generate an average value of consequences.

Table 7. Reclassification of Consequence Index scores in ten classes

Original Consequence Index score	0	0-0.55	0.55-0.9	0.9-1.5	1.5-2.4	2.4-3.6	3.6-4.9	4.9-7.0	7.0-10	10-16	16-25
Re-classified Consequence Index score	0	1	2	3	4	5	6	7	8	9	10

Figure 17 and Figure 18 show a map of the Consequence Index in the 0.5% AEP event in 2020 and the 1% AEP event in year 2050. A similar map can be created for each AEP event in year 2020, 2050 and 2090 using the annotated Excel calculator and GIS data provided with this report (Annexure I and Annexure II).

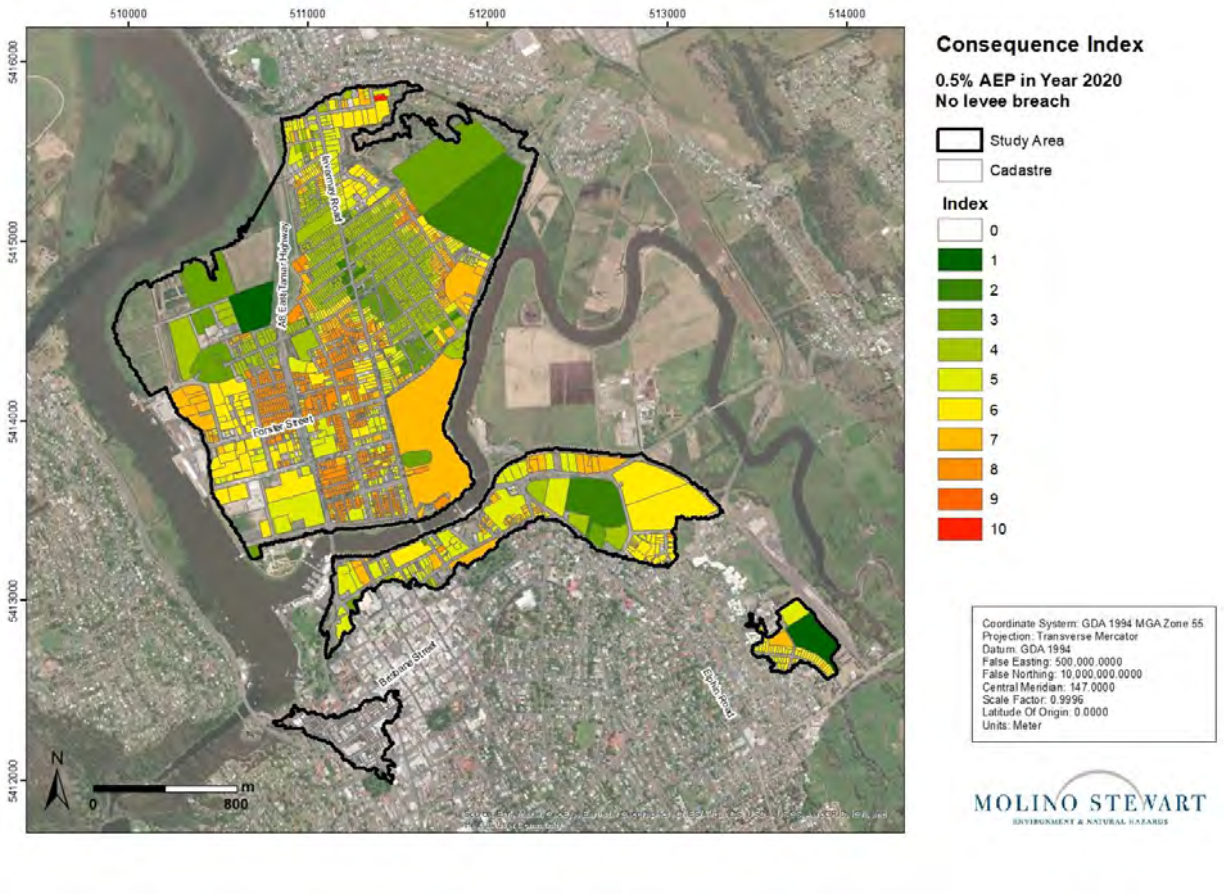

Figure 17. Consequence Index map for the 0.5% AEP event in year 2020, under the assumption of no levee breach.

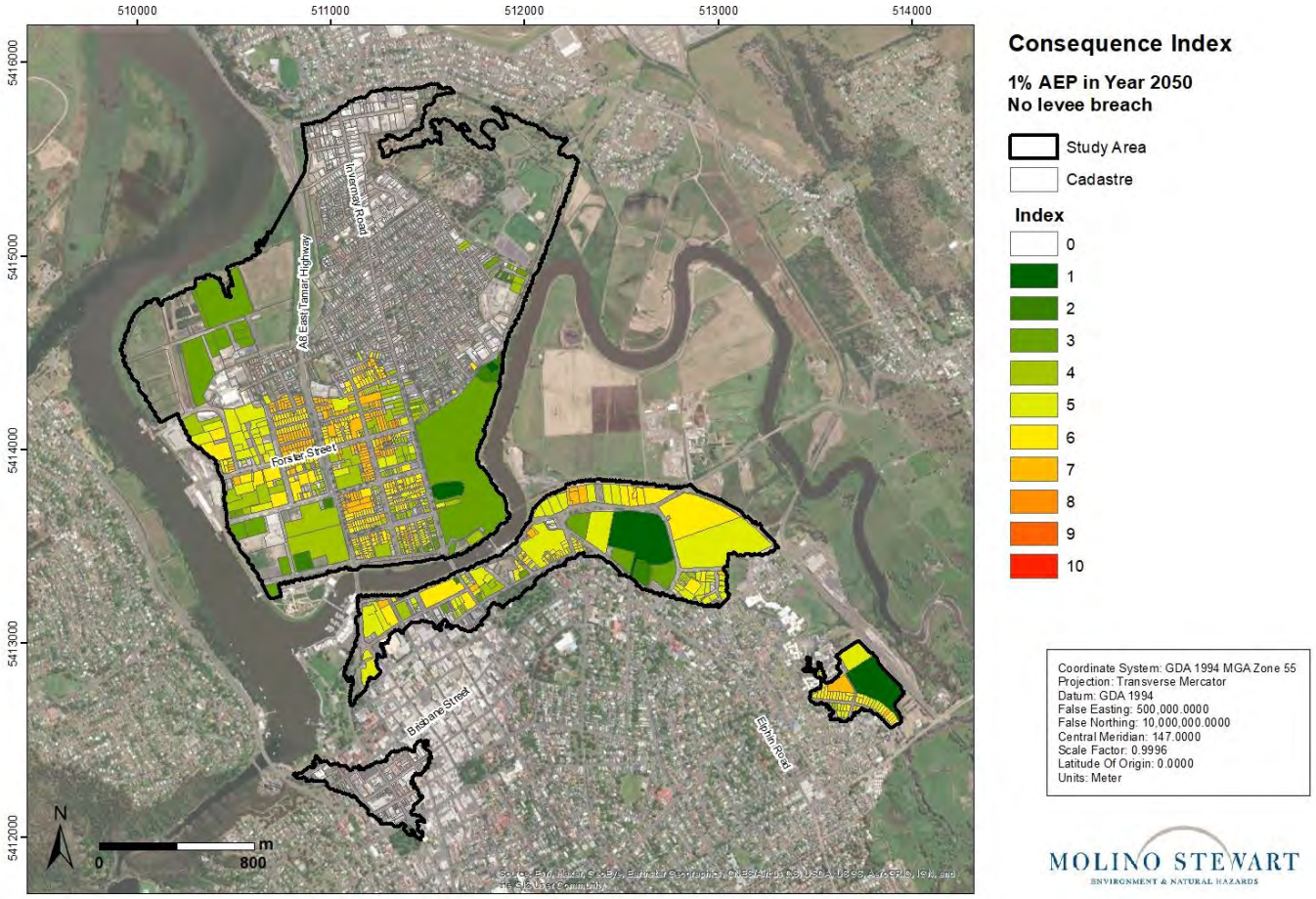

Figure 18. Consequence Index map for the 1% AEP event in year 2050, under the assumption of no levee breach.

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4.2 Risk and Tolerability

4.2.1 Risk Matrix

A flood Risk Index score for each lot in the study area was obtained by multiplying the probability and consequences of all flood events affecting that lot and taking the maximum value among all the AEP events. As proposed by QRA (2011), Risk Index scores were then classified in the following tolerability categories:

- Acceptable Risk (green area). This risk level is generally acceptable as is, without necessarily requiring risk reduction measures;
- Tolerable Risk, subject to ALARP principle (yellow area). This risk level is tolerable, provided that measures are put in place to reduce the risk to a level As Low As Reasonably Practical (ALARP). There are different tools available to establish what constitutes a level ALARP, including undertaking a cost-benefit analysis of possible risk reduction options. This is a typical exercise undertaken in floodplain risk management;
- Generally Intolerable Risk (red area). This risk level is too high and, in general, it should be reduced or eliminated regardless of the cost of doing so.

Table 8 shows the probability/consequence matrix adopted in this study.

Table 8. Probability/consequence matrix adopted in this study to classify risk scores in the three tolerability categories

		Consequence Score										
		0	1	2	3	4	5	6	7	8	9	10
AEP (%)	10.0	0	10	20	30	40	50	60	70	80	90	100
	5.0	0	5	10	15	20	25	30	35	40	45	50
	2.0	0	2	4	6	8	10	12	14	16	18	20
	1.0	0	1	2	3	4	5	6	7	8	9	10
	0.5	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	0.2	0	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
	0.1	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1

Acceptable Risk
Tolerable Risk subject to ALARP
Generally Intolerable Risk

4.2.2 Tolerability Thresholds

The matrix boundaries between tolerability zones were informed by the layout of the QRA (2011) matrix, but were adjusted to match the assumptions of the risk model adopted in this study. This was achieved as follows:

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- A set of simple, artefactual flood consequence scenarios were generated. This was achieved by assuming average levels of resilience and vulnerability (i.e. = 3) and by changing the Exposure Index from 1 to 5.
  For instance, a scenario with a Consequence Index = 7 could be generated by an Exposure Index = 5, a Vulnerability Index = 3 and a Resilience Index = 3. This would correspond to a cadastre lot with:
  - Average vulnerability and resilience, and:
  - Hydraulic Hazard of H5 or H6, or depth of flooding above floor in excess of 1,500mm.
- Each scenario was evaluated to determine in which AEP event this would be acceptable, tolerable subject to ALARP, and intolerable. This evaluation was informed by floodplain management best practices in Australia, and Molino Stewart's expertise.
  In the example above, the scenario was deemed intolerable in all the AEP events up to the 1% AEP included, tolerable in the 0.5% AEP, and acceptable in rarer events. The decision was based on the consideration that a hydraulic hazard of H5-H6, as well as a depth of above floor flooding in excess of 1,500mm, can compromise the building stability and/or cause significant risk to life. In floodplain management, planning controls have typically been put in place to achieve no AFF at all in the 1% AEP event, and any risk to life in this event is generally regarded as problematic.
- The relevant matrix cells were classified accordingly. In the example above, a Consequence Score of 7 was labelled intolerable (red cells) in all AEP events up to the 1% AEP, tolerable subject to ALARP (yellow cells) in the 0.5% AEP event, and acceptable (green cells) in less frequent events.

Following the procedure described above, the assumptions summarised in Table 9 were used as hold points to adjust the tolerability thresholds of the risk matrix from QRA (2011). It should be emphasized that these hold points were set for lots having average vulnerability and resilience levels (i.e. = 3). Different vulnerability or resilience levels would affect the Risk Index, as well as its tolerability classification. For instance, having a lot with H3 floodwaters (or AFF depth = 350mm) is deemed tolerable in the 1% AEP event (for average levels of vulnerability and resilience), but it may become intolerable if the lot's vulnerability were higher, or its resilience lower.

Table 9. Tolerability thresholds used in the risk matrix

Exposure Index	Consequence Index*	Consequence Description*	Generally Intolerable AEP*	Tolerable (subject to ALARP) AEP*	Acceptable AEPs*
5	7	H5-H6 floodwaters, or AFF depth >1,500mm	1% or greater	0.5%	0.2% or smaller
4	6	H4 flooding or AFF depth from 500mm to 1,500mm	2% or greater	1%	0.5% or smaller
3	5	H3 flooding or AFF depth from 300mm to 500mm	2% or greater	1%	0.5% or smaller
2	4	H2 flooding or AFF depth from 10mm to 300mm	2% or greater	1%	0.5% or smaller
1	3	Isolated by H2 or AFF depth < 10mm	5% or greater	2%	1% or smaller

**For lots with average resilience and vulnerability (i.e. Vulnerability Index = Resilience Index = 3)*

The tolerability thresholds used in the risk matrix were then compared with the outcomes of the community tolerability survey (Table 10). The comparison showed that, broadly speaking, the tolerability thresholds of the community were only marginally lower than those adopted in the risk matrix, and commonly used in floodplain management practice. This was an expected outcome, known to be driven by the community's limited understanding of their risk profile (especially in levee protected areas), and of the costs of floodplain risk management measures. The analysis of the survey responses showed that:

- Fifty-eight percent of the respondents would consider acceptable to have their home or business isolated by shallow flooding in the 1% AEP event. This corresponds to a Consequence Index between 2 and 3 (for a lot with average vulnerability and resilience), which the risk matrix classifies as acceptable in the 1% AEP event.
- Twenty-three percent of the respondents think it is acceptable to have shallow flooding above the floor of their house or business in a 1% AEP event. This corresponds to a Consequence Index of 4 (for a lot with average vulnerability and resilience), which the risk matrix classifies as tolerable (subject to ALARP) in the 1% AEP event.
- Only 6% and 11% of the respondents think that, in a 1% AEP event, it is acceptable to have flooding up to the ceiling of their ground floor, or flooding that could compromise the stability of their building, respectively. This corresponds to a Consequence Index of 7 (for a lot with average vulnerability and resilience), which the risk matrix classifies as intolerable in the 1% AEP event.
- When considering high vulnerability buildings such as schools, aged care, or medical centres, 37% of the respondents think that, in the 1% AEP event, it is acceptable to have these isolated by shallow flooding. This scenario corresponds to a Consequence Index of 4, which the risk matrix considers tolerable (subject to ALARP) in the 1% AEP event.

Table 10. Summary of the community survey responses about risk tolerability

Survey Questions:	Proportion of respondents considering acceptable the described flood scenario:				
	Never acceptable	up to 1% AEP	up to the 2% AEP	up to the 5% AEP	up to the 10% AEP
13. How often would you consider acceptable to have shallow floodwaters in your yard or driveway?	42%	58%	26%	17%	13%
14. How often would you consider acceptable to have ankle-deep floodwaters inside your home or business building?	74%	23%	7%	3%	1%
15. How often would you consider acceptable to have floodwaters up to the ceiling of the ground floor of your home or business building?	94%	6%	1%	0%	0%
16. How often would you consider acceptable to have a flood that could pose a threat to the stability of your house or business building?	89%	11%	3%	1%	0%
17. How often would you consider acceptable to have a flood that could cut-off access to hospitals, aged care or schools for several hours?	63%	37%	16%	13%	11%
18. How often would you consider acceptable to have floodwaters enter buildings such as hospitals, aged care or schools?	81%	19%	5%	3%	3%

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4.2.3 Results and Mapping

The final risk maps for year 2050 and year 2090, under the assumption of no levee breach, are shown in Figure 20 and Figure 21.

While these maps were created using future predicted flood extents, depth and velocities, no change was assumed in the cadastre layout or in the type and number of buildings in the study area.

An estimate of the development potential of each precinct in the study area (Figure 22) was provided by Council, and it is included in Appendix C. While this document did not provide all the information necessary to calculate and map flood risk for the predicted future development, it was used in this report to infer future development density in each precinct, and investigate how this may change the risk profile shown in Figure 20 and Figure 21.

Table 11, Table 12 and Table 13 show the number of lots affected by acceptable, tolerable and intolerable risk in year 2020, 2050 and 2090 respectively, in the following development scenarios:

- No additional development taking place between now and year 2090. These numbers reflect the lot risk depicted in Figure 19, Figure 20 and Figure 21; and
- The available development capacity, as estimated by Council in Appendix C, being used at a constant rate each year and fully exhausted by year 2090. In this case, the additional lots within each precinct were distributed across the three risk tolerability categories in the same proportions as the existing lots in that precinct. This assumes that no additional flood risk controls are put in place, and the new buildings' exposure, vulnerability and resilience will be similar to the existing building portfolio in the same precinct.

In precincts where no definite predictions of future additional lots were available, the number of lots was not inflated.

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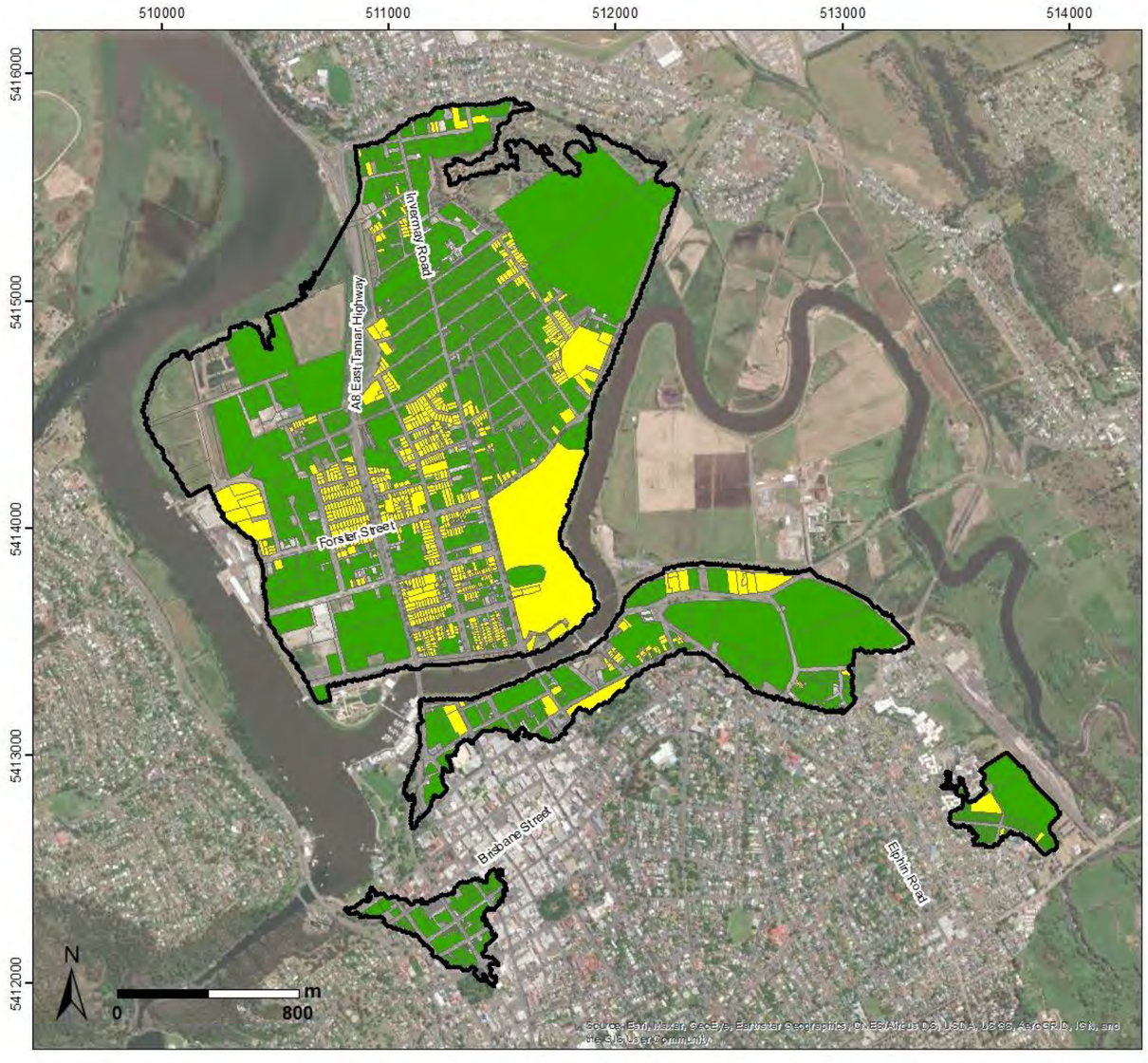

Figure 19. Risk map for year 2020, under the assumption of no levee breach

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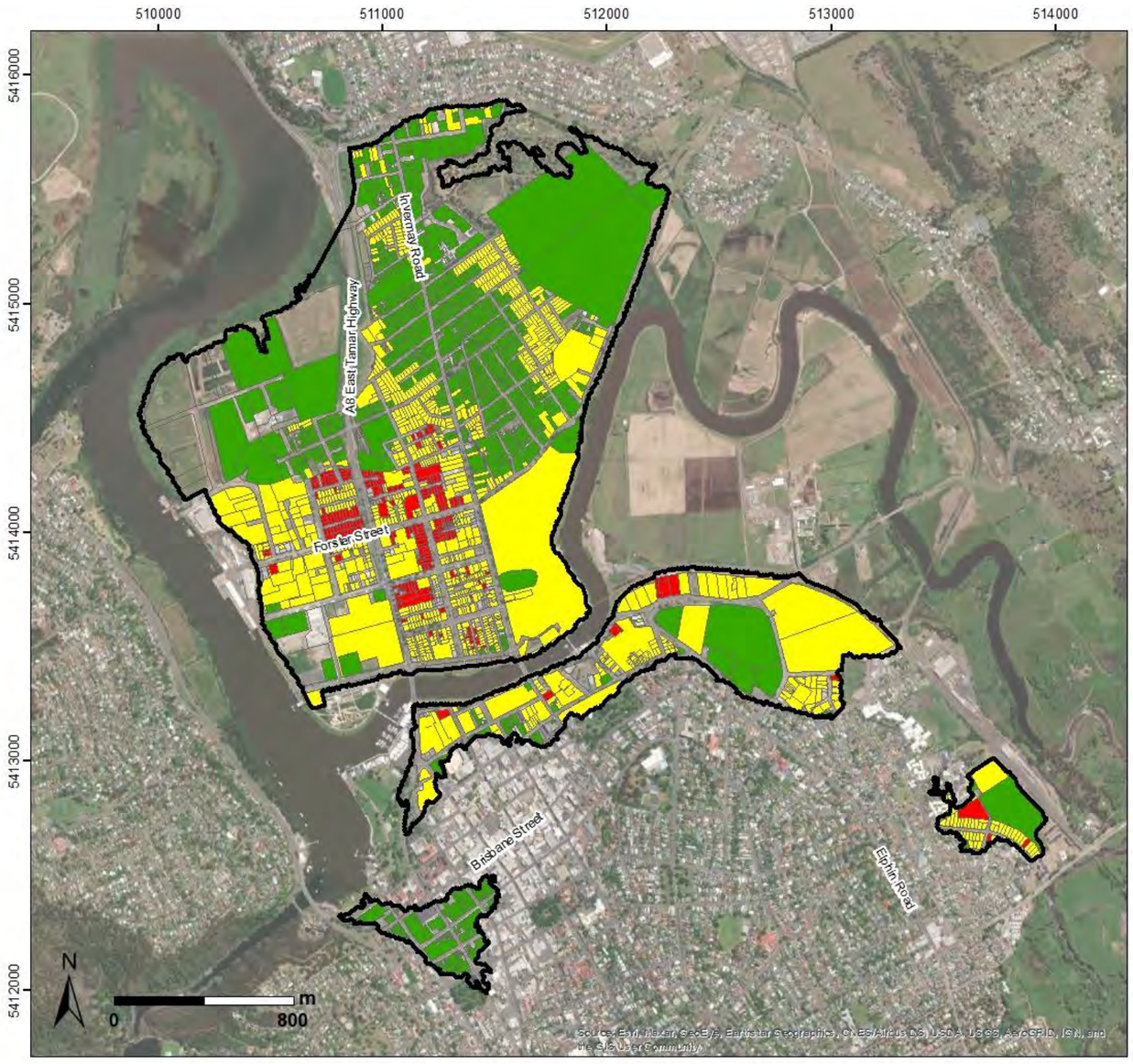

Year 2050
No levee breach

- Study Area
- Cadastre

Risk Index

0	
0.01 - 3.49	Broadly Acceptable
3.50 - 6.99	Tolerable subject to ALARP
7.00 - 35.00	Intolerable

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
False Easting: 500,000.0000
False Northing: 10,000,000.0000
Central Meridian: 147.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

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Figure 20. Risk map for year 2050, under the assumption of no levee breach

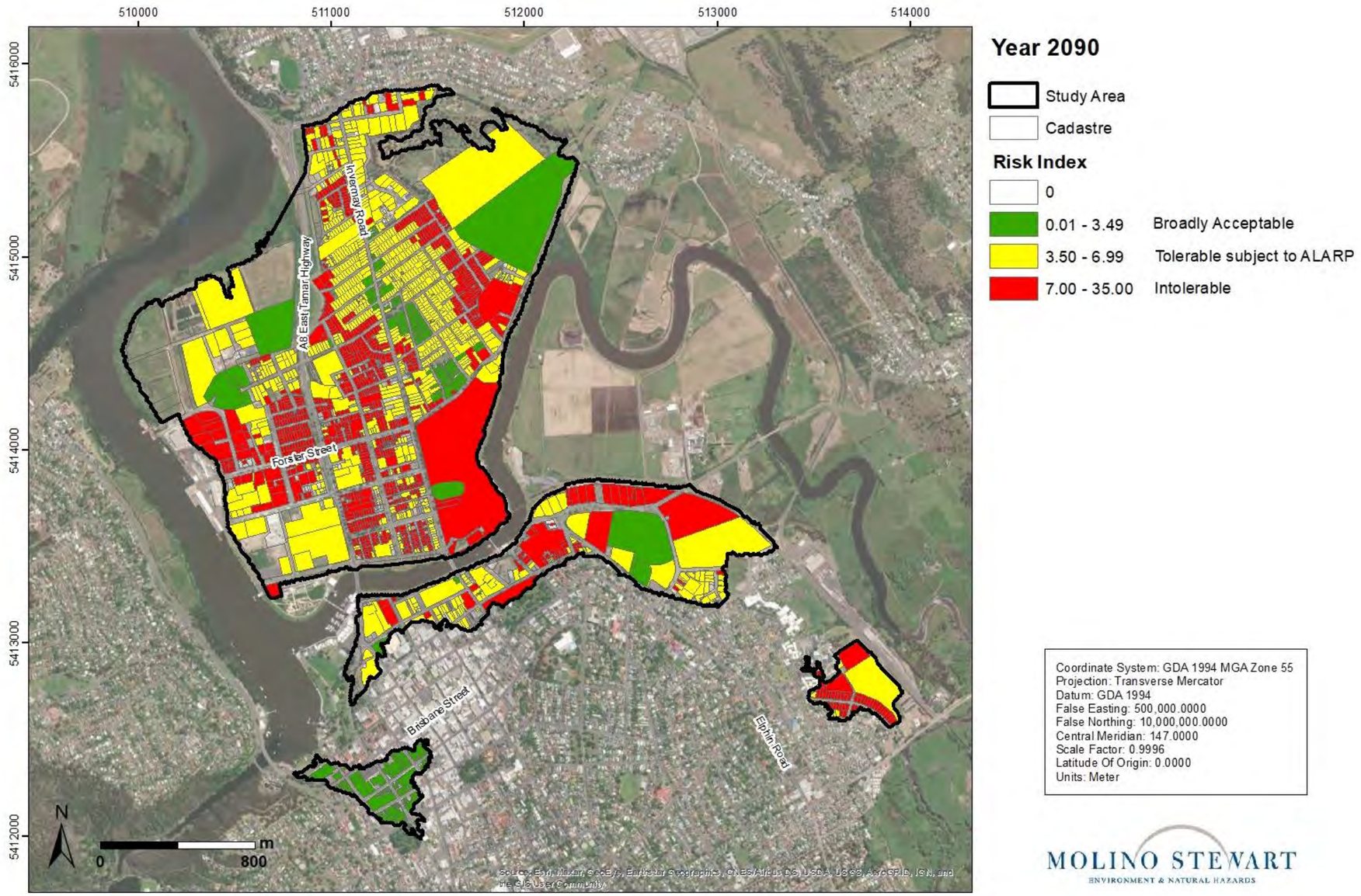

Figure 21. Risk map for year 2090, under the assumption of no levee breach

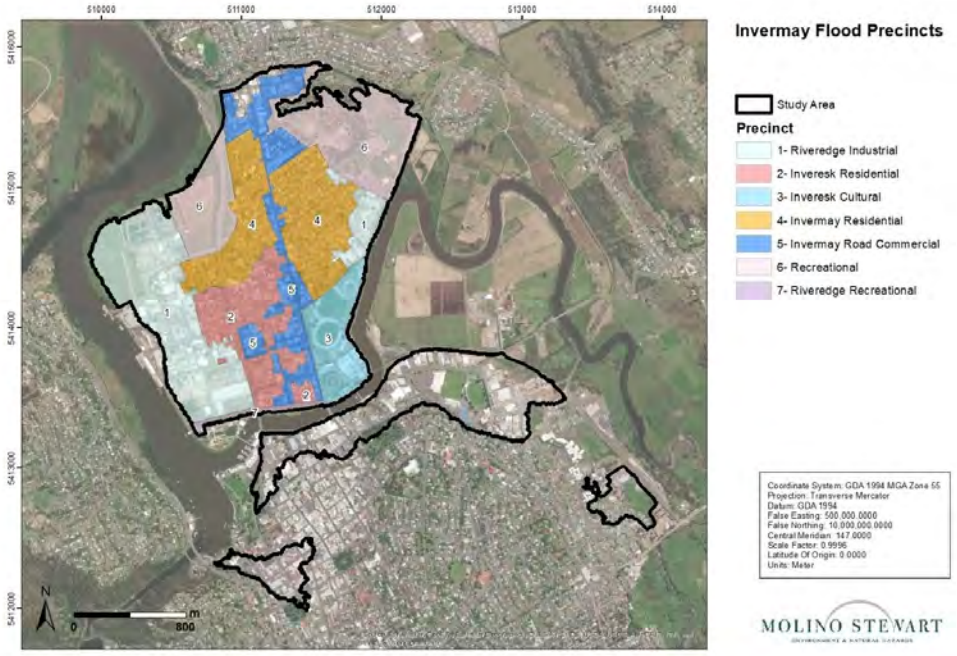

Figure 22. Precincts for which future development potential was assessed by Council

Table 11: Number of lots affected by different levels of flood risk in year 2020, under the assumption of no levee breach.

Precinct Name:	Development Scenario:	Number of Lots in Year 2020 with:		
		Acceptable Risk	Tolerable Risk (subject to ALARP)	Generally Intolerable Risk
Precinct 1 Riveredge Industrial	current development	164	20	0
Precinct 2 Inveresk Residential	current development	87	487	0
Precinct 3 Inveresk Cultural	current development	4	4	0
Precinct 4 Invermay Residential	current development	745	159	0
Precinct 5 Invermay Rd Commercial	current development	324	41	0
Precinct 6 Recreational	current development	12	0	0
Precinct 7 Riveredge Recreational	current development	15	1	0
Launceston City - Newstead	current development	421	49	0
STUDY AREA TOTAL	current development	**1,811 (70%)**	**760 (30%)**	**0 (0%)**

Table 12. Predicted number of lots affected by different levels of flood risk in year 2050, under the assumption of no levee breach.

Precinct Name:	Development Scenario:	Predicted Number of Lots in Year 2050 with:		
		Acceptable Risk	Tolerable Risk (subject to ALARP)	Generally Intolerable Risk
Precinct 1 Riveredge Industrial	no further development	110	70	4
	development capacity fulfilled by 2090	147	94	5
Precinct 2 Inveresk Residential	no further development	66	324	184
	development capacity fulfilled by 2090	66	326	185
Precinct 3 Inveresk Cultural	no further development	4	4	0
	development capacity fulfilled by 2090	4	4	0
Precinct 4 Invermay Residential	no further development	588	316	0
	development capacity fulfilled by 2090	626	337	0
Precinct 5 Invermay Rd Commercial	no further development	229	126	10
	development capacity fulfilled by 2090	229	126	10
Precinct 6 Recreational	no further development	11	1	0
	development capacity fulfilled by 2090	11	1	0
Precinct 7 Riveredge Recreational	no further development	14	1	0
	development capacity fulfilled by 2090	14	1	0
Launceston City - Newstead	no further development	294	164	12
	development capacity fulfilled by 2090	294	164	12
STUDY AREA TOTAL	no further development	**1,346 (52%)**	**1,015 (40%)**	**210 (8%)**
	development capacity fulfilled by 2090	**1,421 (53%)**	**1,062 (39%)**	**212 (8%)**

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Table 13. Predicted number of lots affected by different levels of flood risk in year 2090, under the assumption of no levee breach.

Precinct Name:	Development Scenario:	Predicted Number of Lots in Year 2090 with:		
		Acceptable Risk	Tolerable Risk (subject to ALARP)	Generally Intolerable Risk
Precinct 1 Riveredge Industrial	no further development	70	64	50
	development capacity fulfilled by 2090	126	115	90
Precinct 2 Inveresk Residential	no further development	60	27	487
	development capacity fulfilled by 2090	61	27	493
Precinct 3 Inveresk Cultural	no further development	2	2	4
	development capacity fulfilled by 2090	2	2	4
Precinct 4 Invermay Residential	no further development	126	485	293
	development capacity fulfilled by 2090	145	559	338
Precinct 5 Invermay Rd Commercial	no further development	119	195	51
	development capacity fulfilled by 2090	119	195	51
Precinct 6 Recreational	no further development	9	2	1
	development capacity fulfilled by 2090	9	2	1
Precinct 7 Riveredge Recreational	no further development	14	0	1
	development capacity fulfilled by 2090	14	0	1
Launceston City - Newstead	no further development	260	103	107
	development capacity fulfilled by 2090	260	103	107
STUDY AREA TOTAL	no further development	**669 (26%)**	**902 (35%)**	**1,000 (39%)**
	development capacity fulfilled by 2090	**745 (26%)**	**1,027 (36%)**	**1,091 (38%)**

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5| Sensitivity Analysis

5.1 Scope

A sensitivity analysis was undertaken to test the effect of:

- Variations in overall vulnerability and resilience of the study area; and
- An increase in exposure, should the levee breach in the 1% AEP event, in year 2050.

5.2 Results and Discussion

5.2.1 Variations in Vulnerability and Resilience

Risk was re-assessed and mapped in year 2050 and 2090 in the following scenarios:

- **Pessimistic scenario**: a 10% increase in vulnerability, with a 10% decrease in resilience. This may represent a future scenario in which no sufficient vulnerability reduction (or resilience building) measures are put in place;
- **Optimistic Scenario**: a 10% decrease in vulnerability, with a 10% increase in resilience. This may represent a future scenario in which effective vulnerability reduction (or resilience building) measures are put in place.

Results suggest that the model is fairly sensitive to variations in vulnerability and resilience, which reflects the original model design intent (Figure 25 to Figure 28). This aligns with extensive literature evidence suggesting that risk from natural hazards, including flooding, is driven by vulnerability and resilience to the same extent as the frequency and intensity of the event itself.

In year 2020, the optimistic scenario shows a significant reduction of the number of yellow lots (tolerable risk) in favour of green lots (acceptable risk). The pessimistic scenario has the opposite effect, and it does not generate any lots with intolerable risk.

The optimistic scenario in 2050 shows that the number of lots with intolerable risk may be significantly reduced via measures to address their socio-economic vulnerability and build community resilience. This is consistent with the observation that most of the lots with intolerable risk in 2050 have high to very high vulnerability levels (Figure 29). Importantly, as vulnerability was calculated based on the 2016 ABS Census, it is recommended that the calculations are updated once the 2021 Census results become publicly available.

In year 2090, flood risk becomes more heavily driven by flood behaviour (i.e. exposure), because flood depth and velocity in the same AEP event increase significantly with respect to year 2050. In this scenario, reducing vulnerability and increasing resilience, while certainly helpful, may not be sufficient to achieve an acceptable, or even tolerable, risk profile. The model suggests that, as the effects of climate change become more prominent, measures to change flood behaviour (e.g. raising the levee) and progressively more stringent planning controls may need to be put in place.

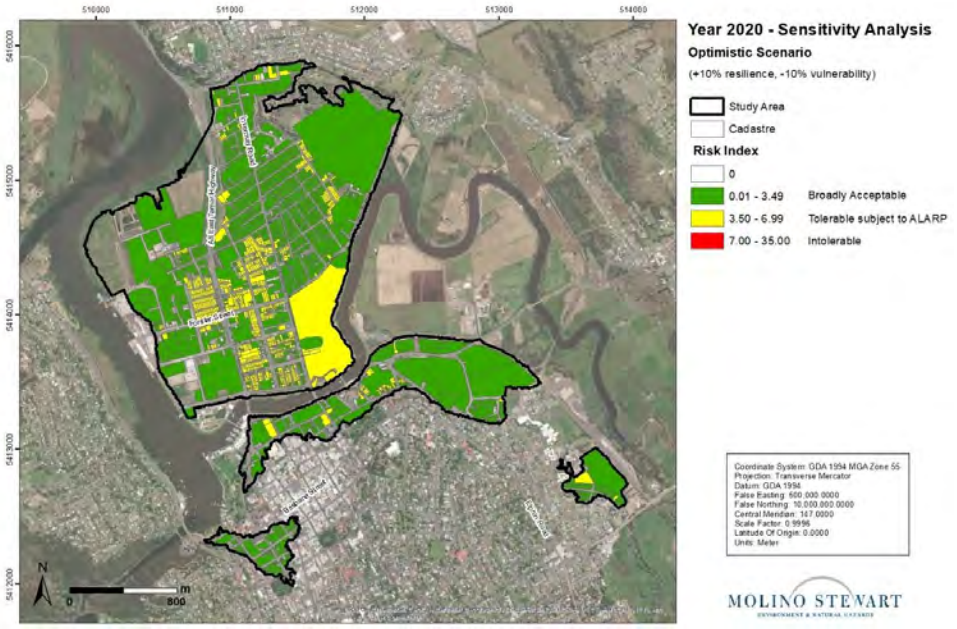

Figure 23. Sensitivity analysis: flood risk map for year 2020, optimistic scenario, without levee breach

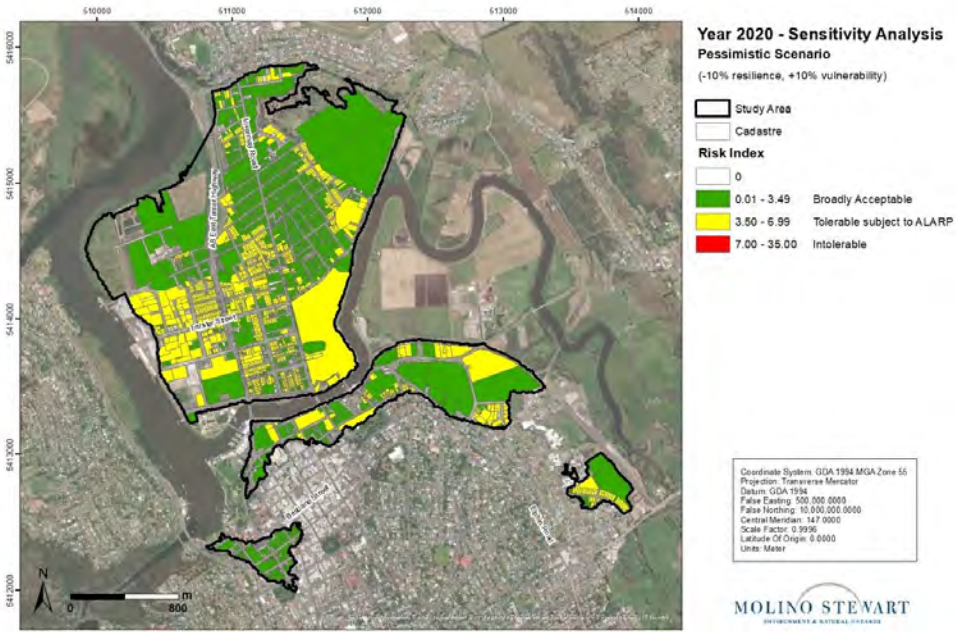

Figure 24. Sensitivity analysis: flood risk map for year 2020, pessimistic scenario, without levee breach

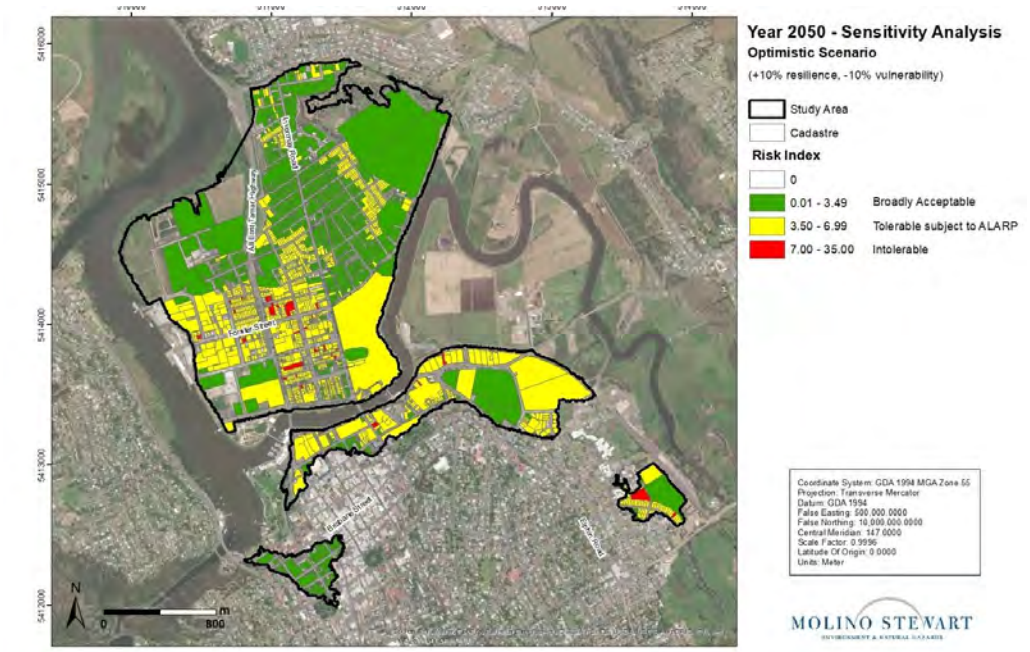

Figure 25. Sensitivity analysis: flood risk map for year 2050, optimistic scenario, without levee breach

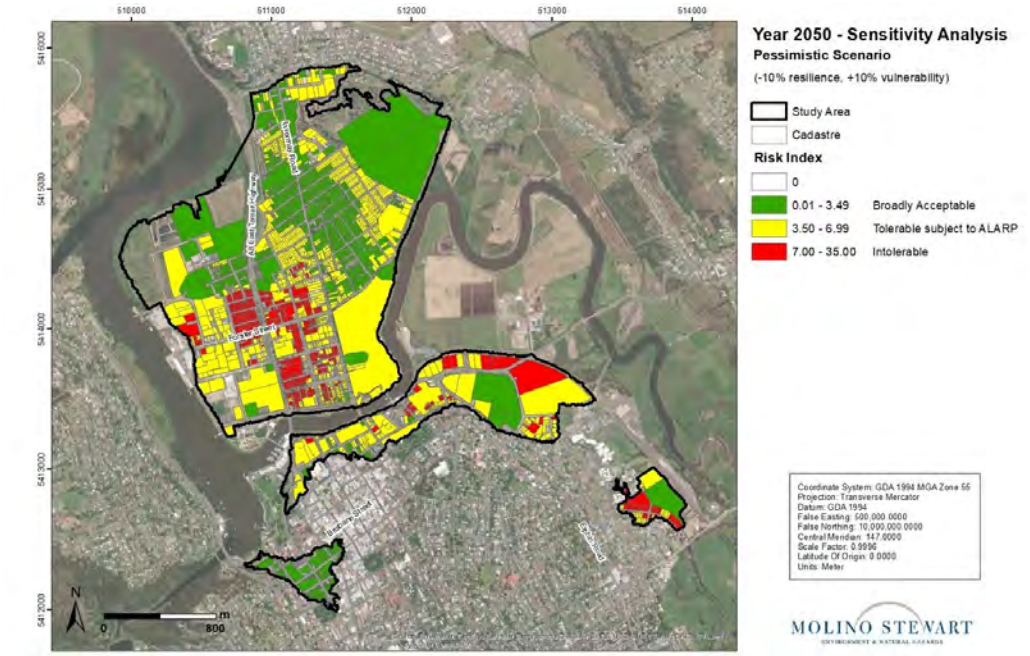

Figure 26. Sensitivity analysis: flood risk map for year 2050, pessimistic scenario, without levee breach

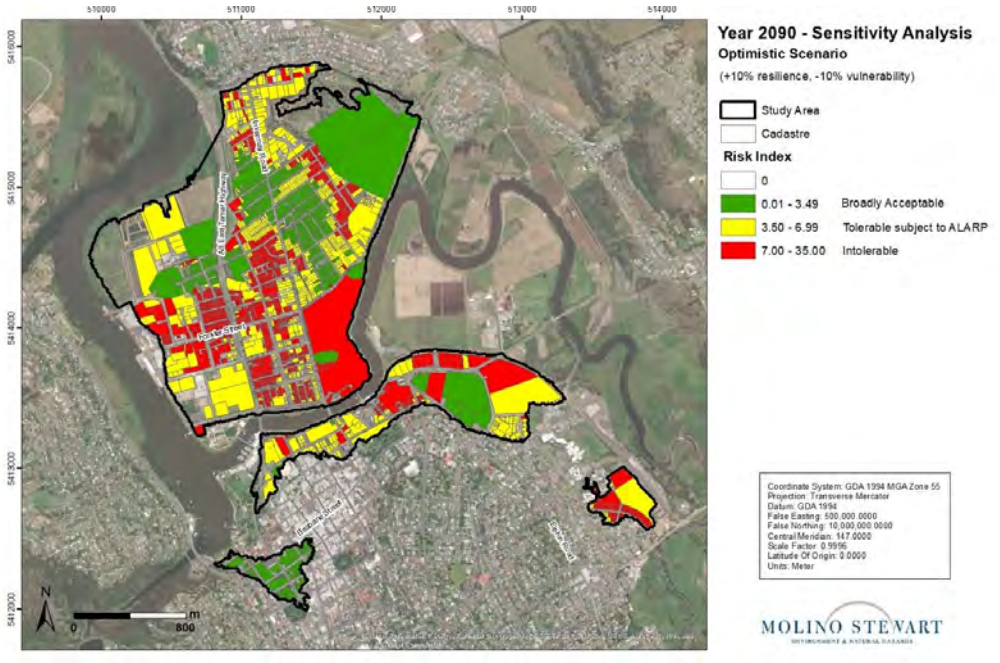

Figure 27. Sensitivity analysis: flood risk map for year 2090, optimistic scenario, without levee breach.

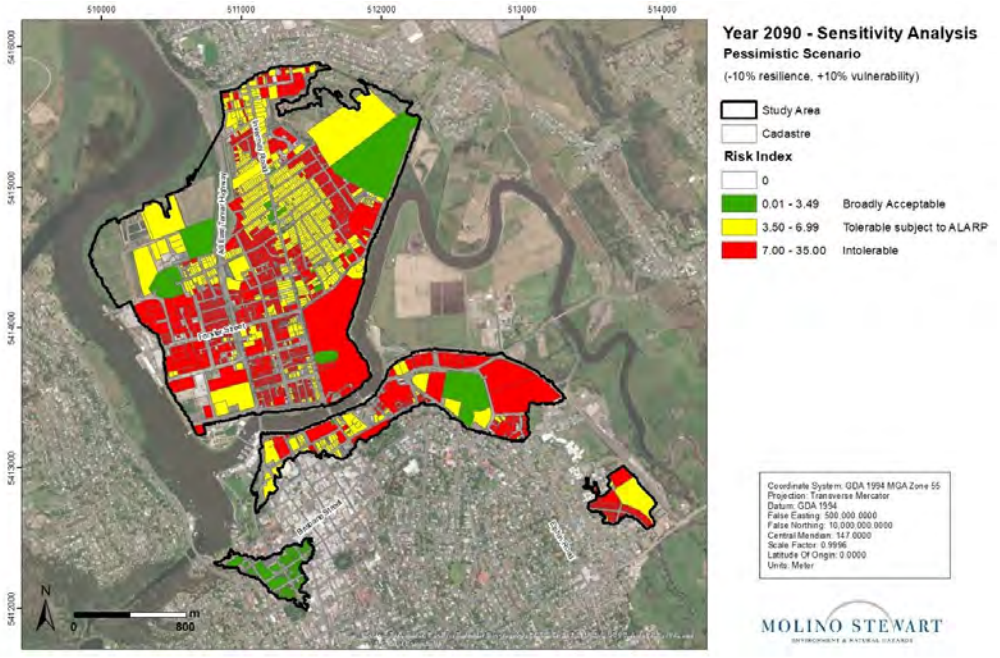

Figure 28. Sensitivity analysis: flood risk map for year 2090, pessimistic scenario, without levee breach.

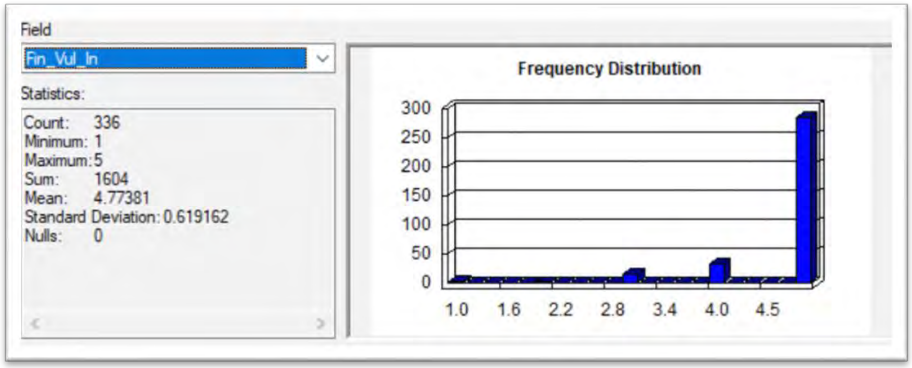

Figure 29. General statistics and histogram of Vulnerability Index scores for lots with intolerable risk in year 2050

5.2.2 Exposure Increase due to Levee Breach

As discussed in Section 3.1, a 2050 hazard scenario with levee breach in the 1% AEP event was also assessed, and the relevant risk mapped. It is reiterated that the levee breach scenario used in this study was obtained from the mapping provided by BMT (2018b), which does not represent a likely breach scenario for the Launceston levees. Instead, BMT's (2018b) mapping shows the combined effect of 23 different breach events, where each event was modelled individually, and its critical output merged to the other breach events in a single set of maps.

When the BMT (2018b) levee breach mapping for the 1% AEP event is included in the range of flood events, the risk assessment model produces significantly higher flood risk levels throughout the study area (Figure 30). This is solely due to the increase in flood depth and hydraulic hazard in the 1% AEP event (Figure 31).

While these results do confirm that the structural integrity of the levee is of critical importance, they are based on flood outputs which would likely not occur in a single flood event, because:

- A breach at all the 23 locations selected by BMT (2018b) would not occur in a single flood event, and even if it did the resulting flood extent and depth would not be as large as depicted in the BMT mapping;
- Any levee breach would reduce the probability of additional breaches at different locations, because it would reduce the downstream flood levels;
- Any breach may occur at a location different from those selected by BMT (2018b).

As such, it is recommended that this sensitivity assessment is updated once a more realistic breach scenario, ideally based on insights from a geotechnical survey and a probabilistic failure mode analysis, becomes available to Council.

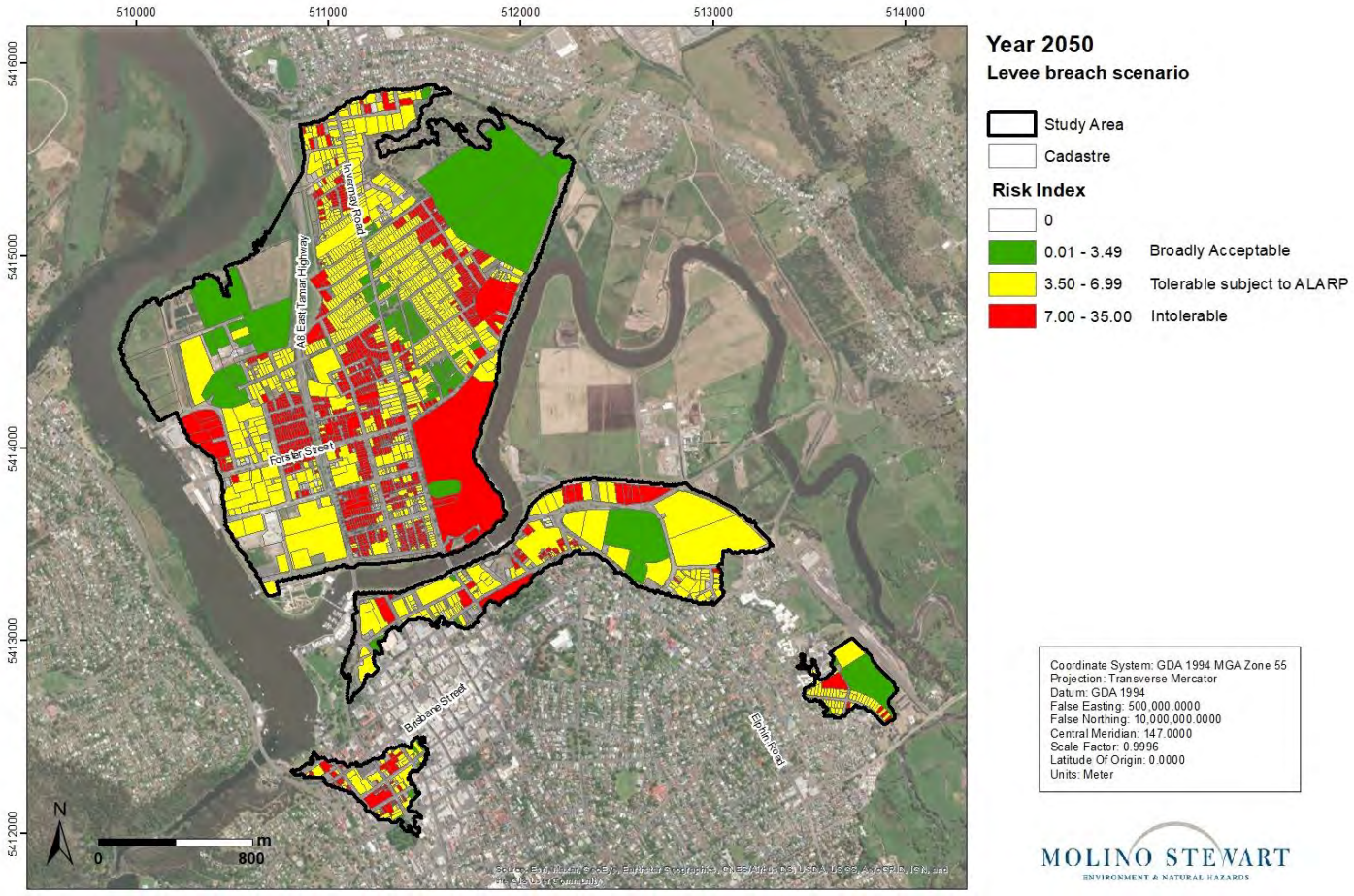

Figure 30. Sensitivity analysis: flood risk map for year 2050 assuming multiple, concomitant levee breaches in the 1% AEP event.

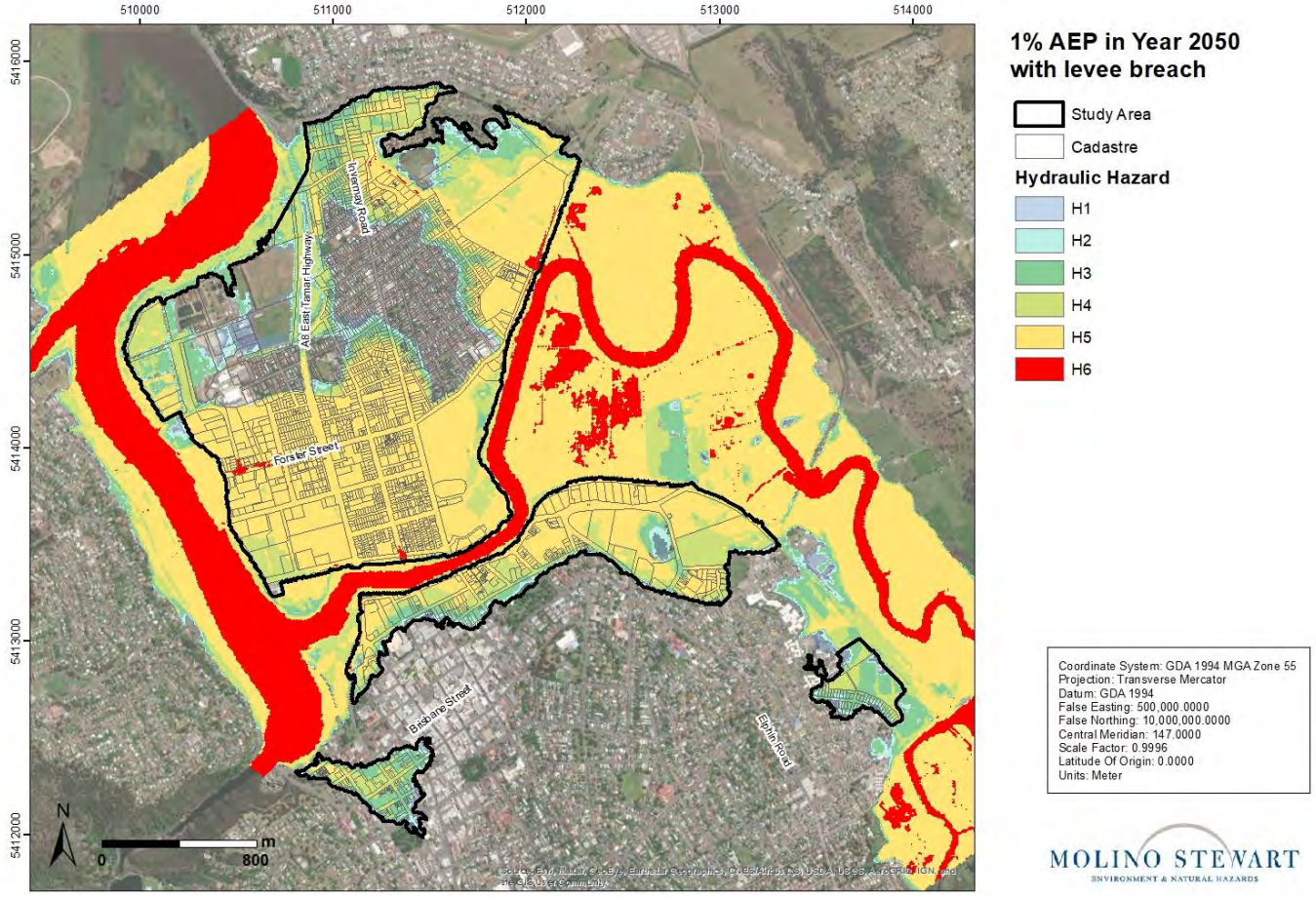

Figure 31. Hydraulic hazard in the 1% AEP event in year 2050, assuming multiple, concomitant levee breaches in the 1% AEP event.

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6| Conclusion

6.1 Summary

This report presented the assumptions, methods and results of a flood risk assessment and mapping exercise for the levee-protected areas of Launceston (TAS). The risk mapping is to inform the adoption of flood planning controls that are spatially consistent and are appropriate to manage the risk of flooding today and in the future.

The analysis assessed risk in present conditions (year 2020) and in two future time horizons (year 2050 and year 2090), and used predicted future flood extents, depths and velocities accounting for climate change effects.

An *ad-hoc* risk model based on the guidelines from QRA (2011) was developed and applied to the study area. Risk was assessed as a combination of its key components: the probability of flooding and its consequences. Consequences were obtained by aggregating the study area's exposure to flooding, as well as an estimate of the vulnerability and resilience of the community. Each of these components was assessed and mapped using validated indicators. The input data was obtained from different sources including Council's GIS repository, the 2016 ABS Census, and the results of a community tolerability survey (Appendix B).

A risk score was calculated for each cadastre lot in the study area in year 2020, 2050 and 2090. A risk matrix was designed to calculate the risk scores and classify these in three tolerability categories: acceptable risk, tolerable risk (subject to ALARP), and generally intolerable risk.

The tolerability thresholds between these categories were based on QRA (2011), but were adjusted to reflect the specific assumptions of the risk model adopted in this study. Finally, the tolerability thresholds were validated against the outcomes of the community tolerability survey. This showed that the community tolerability for flooding was only marginally lower than what was assumed in the risk matrix, which is a common and acceptable finding.

The number of lots with acceptable, tolerable (subject to ALARP) and intolerable risk levels was estimated for year 2020, 2050 and 2090, including a scenario accounting for additional lots to be developed in several precincts of the study area, based on Council's estimate of the available development potential (Appendix C).

Finally, a sensitivity analysis was undertaken to assess the extent to which risk would change as a result of variations in the community's vulnerability and resilience, and in case the levee were to breach during a major flood (i.e. the 1% AEP even in year 2050).

Results showed that:

- The levee provides protection from a 1% AEP event in year 2020, but it is severely overtopped by a 0.5% AEP event.
- In year 2050, the levee may not provide complete protection from the 1% AEP event, due to the effect of climate change on the frequency of extreme rainfall events and sea level rise.
- In current conditions (i.e. year 2020), there are no lots with intolerable flood risk, 30% of the existing lots have tolerable risk, and 70% have acceptable risk.
- If no additional flood risk reduction measures are put in place, by year 2050 there could be about 210 lots in the study area (i.e. 8% of total affected lots in 2050) with intolerable flood risk level. This figure may escalate to 1,000 – 1,091 lots in year 2090 (i.e. 38% of total affected lots in 2090), as a result of climate change (primarily) and increased development pressure.
- The sensitivity analysis suggests that measures to reduce vulnerability and increase resilience may result in a significant reduction of the number of lots with intolerable risk in year 2050.

However, in year 2090, risk will be mostly driven by the frequency of flooding, and additional risk controls will be necessary. These may include more stringent planning controls, as well as measures to change flood behaviour.

- The structural integrity of the levee is of critical importance. A catastrophic failure of the levee in the 1% AEP in year 2050 would result in a significant higher number of lots affected by flooding in that event. However, the breach scenario used in this study, obtained from BMT (2018b), is considered unlikely. BMT (2018b) assumed 23 breach incidents occurring during the same flood event, in an attempt to analyse the worst-case scenario. However, this is not the most likely scenario. It is recommended that a probabilistic failure mode assessment is undertaken to ascertain the most likely levee failure modes, and the results of this risk assessment are adjusted accordingly.
- In addition to this report, the project produced the following deliverables:
    - a series of GIS thematic maps and layers, showing patterns of risk and its components across study area (Annexure II);
    - An annotated risk calculator, in the form of an MS Excel spreadsheet. The calculator is designed to automatically update the final risk scores for each lot when the input of the model are modified. Council may use the calculator to update the risk mapping as new, updated data becomes available. This may include the outcomes of the 2021 ABS Census, new flood modelling results, or new floor levels for existing or future development (Annexure I).

6.2 Assumptions and Limitations

The results of the risk assessment exercise presented in this report are based on the following assumptions:

- The flood model results for year 2050 and 2090 use the climate change predictions and assumptions detailed in BMT (2018a) and BMT (2018b);
- The available development capacity of the study area was estimated by Council (Appendix C) and was assumed to be used at a constant rate from today to year 2090;
- Future flood risk was calculated assuming no changes in the existing development controls;
- The location and type of any future development was not known and was assumed to reflect the existing building portfolio in each precinct of the study area;
- In the data provided by Council, 528 buildings had no floor level information. The data gap was addressed by adopting a floor level of 300mm above ground for residential and commercial buildings, and by assuming that industrial buildings or warehouses had their ground floor at ground level;
- The exposure calculations for each lots were based on peak depth above floor and hydraulic hazard affecting the largest building within that lot. If the main building were to be relocated within the same lot, the relevant risk profile would likely change. This would happen to a greater extent in larger lots with a higher topographical gradient, for instance some of the lots located along the levee.
- The exposure calculations did not consider potential above floor flooding of the upper levels in multi-storey buildings, however this was estimated to have negligible accuracy implications due to the small number of multi-storey development and the fact the upper levels would only be affected in low probability flood events;
- The resilience of lots that did not respond to the community survey was inferred based on the responses from similar lots in the same mesh block, or – where no sufficient responses were available in the mesh block - across the study area, as described in Section 3.4;

- Vulnerability was assessed based on the 2016 ABS census results. The new 2021 census was not available at the time this report was prepared, and it may show different vulnerability patterns in the study area;
- The tolerability classification of risk scores was based on Molino Stewart's expertise and interpretation of floodplain risk management best practice in Australia. A different classification would result in a different number of lots affected by intolerable, tolerable and acceptable risk in all scenarios.

6.3 Updating this Study

Flood risk changes constantly though time, because the risk components are affected by climate change, development pressure and fluctuations in community vulnerability and resilience.

This study used the same climate change projections adopted in in BMT (2018a) and BMT (2018b). These were based on the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC AR5) RCP 8.5 emissions scenario. This report was superseded in 2021 by the AR6 report, which shows a faster climate change rate. Using the AR6 predictions in this study, as well as any future revisions, would likely show higher risk levels throughout the study area.

Similarly, this study used the number, location, and land use of current cadastre lots and buildings within the study area. Although a prediction of the future number and location of developed lots was made based on the best available data provided by Council, the actual future rate and pattern with which the study area will undergo development or redevelopment may differ from such a prediction.

Finally, as demonstrated by the sensitivity analysis, flood risk may change significantly as a result of fluctuations in vulnerability and resilience of the exposed communities, which are known to be rapidly evolving risk dimensions.

For the above reasons, it is recommended that this study is updated every ten years, as a minimum. The updated version should use:

- the latest climate change projections and updated flood modelling results;
- updated cadastre and building data, as well as updated development potential predictions;
- updated census data to assess vulnerability; and
- updated estimates of community resilience, to be obtained through new community surveys.

Additional triggers that may be used for a more frequent update of this study are:

- When a new ABS Census becomes available – update the vulnerability assessment component. It is noted that the 2021 Census results were not available when this study was undertaken and as such the vulnerability mapping is based on the 2016 Census;
- When a new IPCC report on climate change with predictions for Australia becomes available – update the flood modelling of future scenarios. It is noted that the AR6 report from IPCC, which was the most recent report at the time this study was undertaken, was not considered because it was not available when the flood modelling was undertaken by BMT (2018).
- When new guidelines from Australian Rainfall and Runoff become available – update the flood modelling for all scenarios. It is noted that the flood model from BMT (2018) uses the AR&R 2016 guidelines, that were the most recent guidelines at the time this study was undertaken.

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Appendix A| Community Survey

CITY OF LAUNCESTON

LEVEE LANDUSE FLOOD SURVEY

NOTE – This survey aims to find out about people's tolerability to flooding if the levee was overtopped or it failed. It is not surveying views on the impacts of local stormwater flooding after heavy rains.

Please provide the full address of your property

ADDRESS_____

Is the property? (please tick one)

Residential ☐

Business ☐

How long have you lived at or run your business at this property? _____ years

Do you own (including paying mortgage) or rent/lease the property? (please tick one)

Own ☐

Rent/lease ☐

Please then answer the following questions in relation to the impacts of flooding <u>from the river</u> on your property:

1. Do you think your yard or driveway can flood from the river?

   Yes ☐ No ☐

2. Do you think floodwaters from the river could enter your home or business?

   Yes ☐ No ☐

3. The local levee provides protection to your property in what type of flood/s? (please tick one or more)

   Small floods (1-in-5 years) ☐

   Medium floods (1-in-20 years) ☐

   Large floods (1-in-100 years) ☐

   Very large floods (1-in-200 years) ☐

   Extreme floods (1-in-500 years) ☐

   All floods ☐

4. How well do you think you would you tolerate floodwaters in your yard or driveway? (please circle a number below) 1=not tolerate, 3=cautiously tolerate, 5= tolerate

1	2	3	4	5

5. How well do you think you would you tolerate floodwaters entering your home or business building? (please circle a number below) 1=not tolerate, 3=cautiously tolerate, 5= tolerate

1	2	3	4	5

6. Are you aware of flood insurance?

   Yes ☐ No ☐

7. Do you have a flood insurance policy for your property?

   Yes ☐ No ☐ Don't know/unsure ☐

8. Have you written a flood emergency plan for your property?

   Yes ☐ No ☐

9. Would you require assistance from others in a flood?

Yes ☐ No ☐

If Yes, please explain why you would need assistance and where you would get it from

_____

_____

10. If you were asked to evacuate from your property, do you have somewhere you could go safely away from floodwaters? (please tick one)

    Yes, I would seek my own accommodation (friends / hotel / other home) ☐

    No, I would need to attend an evacuation centre ☐

11. How well do you rate your ability to keep yourself safe during a flood? (please tick one)

Excellent ☐ Good ☐ OK ☐ Not good ☐ Poor ☐

Please give reasons for your response

_____

_____

_____

12. Would you help others in a flood?

Yes ☐ No ☐

If Yes, who might you help and how?

_____

13. How often would you consider acceptable to have shallow floodwaters in your yard or driveway?
    - ☐ Never
    - ☐ Very rarely, possibly once in my lifetime
    - ☐ Once in my lifetime
    - ☐ Twice in my lifetime
    - ☐ A few times in my lifetime

14. How often would you consider acceptable to have ankle-deep floodwaters inside your home or business building?
    - ☐ Never
    - ☐ Very rarely, possibly once in my lifetime
    - ☐ Once in my lifetime
    - ☐ Twice in my lifetime
    - ☐ A few times in my lifetime

15. How often would you consider acceptable to have floodwaters up to the ceiling of the ground floor of your home or business building?
    - ☐ Never
    - ☐ Very rarely, possibly once in my lifetime
    - ☐ Once in my lifetime
    - ☐ Twice in my lifetime
    - ☐ A few times in my lifetime

16. How often would you consider acceptable to have a flood that could pose a threat to the stability of your house or business building?
    - ☐ Never
    - ☐ Very rarely, possibly once in my lifetime
    - ☐ Once in my lifetime
    - ☐ Twice in my lifetime
    - ☐ A few times in my lifetime

17. How often would you consider acceptable to have a flood that could cut-off access to hospitals, aged care or schools for several hours?
    - ☐ Never
    - ☐ Very rarely, possibly once in my lifetime
    - ☐ Once in my lifetime
    - ☐ Twice in my lifetime
    - ☐ A few times in my lifetime

18. How often would you consider acceptable to have floodwaters enter buildings such as hospitals, aged care or schools?
    - ☐ Never
    - ☐ Very rarely, possibly once in my lifetime
    - ☐ Once in my lifetime
    - ☐ Twice in my lifetime
    - ☐ A few times in my lifetime

Thank you for completing the survey. Please scan or photograph (using your smartphone) the completed survey and email it to the City of Launceston flood.survey@launceston.tas.gov.au

You can also deliver the completed survey at the community drop-in sessions (see attached letter).

Please send the survey response by 30 July 2021.

Appendix B| Resilience Indicators

Risk Awareness and Perception		Tolerability		Preparedness		Emergency Management	
Question	*Score*	*Question*	*Score*	*Question*	*Score*	*Question*	*Score*
Do you think your yard or driveway can flood?	Y = score 5 otherwise score 1	How well do you think you would you tolerate floodwaters in yard or driveway? *1=not tolerate, 3=cautiously tolerate, 5= tolerate*	use same score as responses	Have you written a flood emergency plan for your property?	Y = score 5 N = score 1	If you were asked to evacuate from your property, do you have somewhere you could go safely away from floodwaters?	Y = score 5 N = score 1
Do you think floodwaters could enter your home or business?	Y = score 5 otherwise score 1	How well do you think you would you tolerate floodwaters entering your home or business building? *1=not tolerate, 3=cautiously tolerate, 5= tolerate*	use same score as responses	Do you have a flood insurance policy?	Y = score 5 N = score 1	Would you help others in a flood?	Y = score 5 N = score 1
The local levee provides protection to your property in what type of flood/s?	small/medium = score 5 large = score 3 otherwise score 1			How long have you lived at or run your business at this property? (years)	1y or less = 1 2 to 3y = 2 3 to 5y = 3 5 to 10y = 4 over 10y = 5	Would you require assistance from others in a flood?	Y = score 1 N = score 5
Are you aware of flood insurance?	Y = score 5 N = score 1					How well do you rate your ability to keep yourself safe during a flood?	poor = 1 ... excellent = 5

The table shows the questions used to calculate each resilience indicator, and the scores assigned to each question

Appendix C | Development Potential

Potential Development Capacity Analysis -
Land Use Planning in Levee Protected Areas Study

1. Potential Development capacity Analysis

Calculations are based on the following criteria

I. Number of vacant lots in the area

Available vacant lots with future development capacity in the study area

II. Residential density for multiple dwellings

Site area per dwelling requirements in Launceston Interim Planning Scheme 2015 and the lots with capacity to cater additional dwelling/s with in the study area.

III. Lot size

Lot size requirements in zones for subdivision in Launceston Interim Planning Scheme 2015 and the lots with capacity to subdivide with in the study area.

IV. Invermay/Inveresk Flood Inundation Area Code

Each precinct's land use objectives and zone regulations in Launceston Interim Planning Scheme 2015.

V. Trend in lodging development applications for past 5 years

Past trends in lodging development applications for multiple dwellings within Invermay Residential precinct.

1.0 Study Area

Out of the total Launceston flood inundation areas, only the levee protected areas have been selected as the study area for this study.

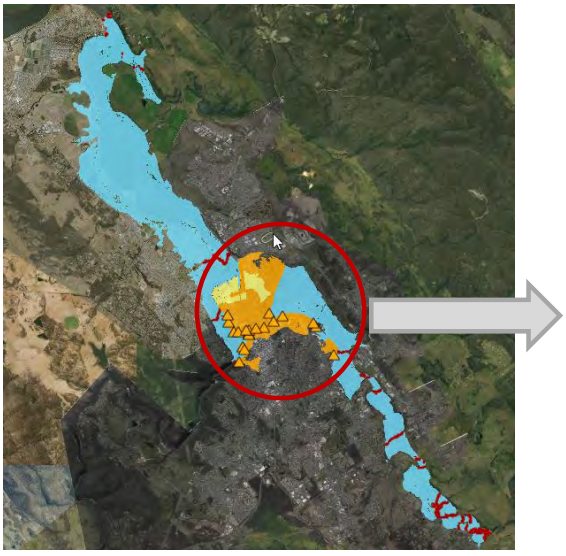


Fig 1: *1% AEP flood event; 2019 mapping*

Fig 2: *Study Area*

For this Potential Development Capacity Analysis the study area has been divided to two sections in order to facilitate the calculations.

1. Invermay/Inveresk Flood Inundation Area.
2. Launceston City, Newstead Flood Inundation Area.

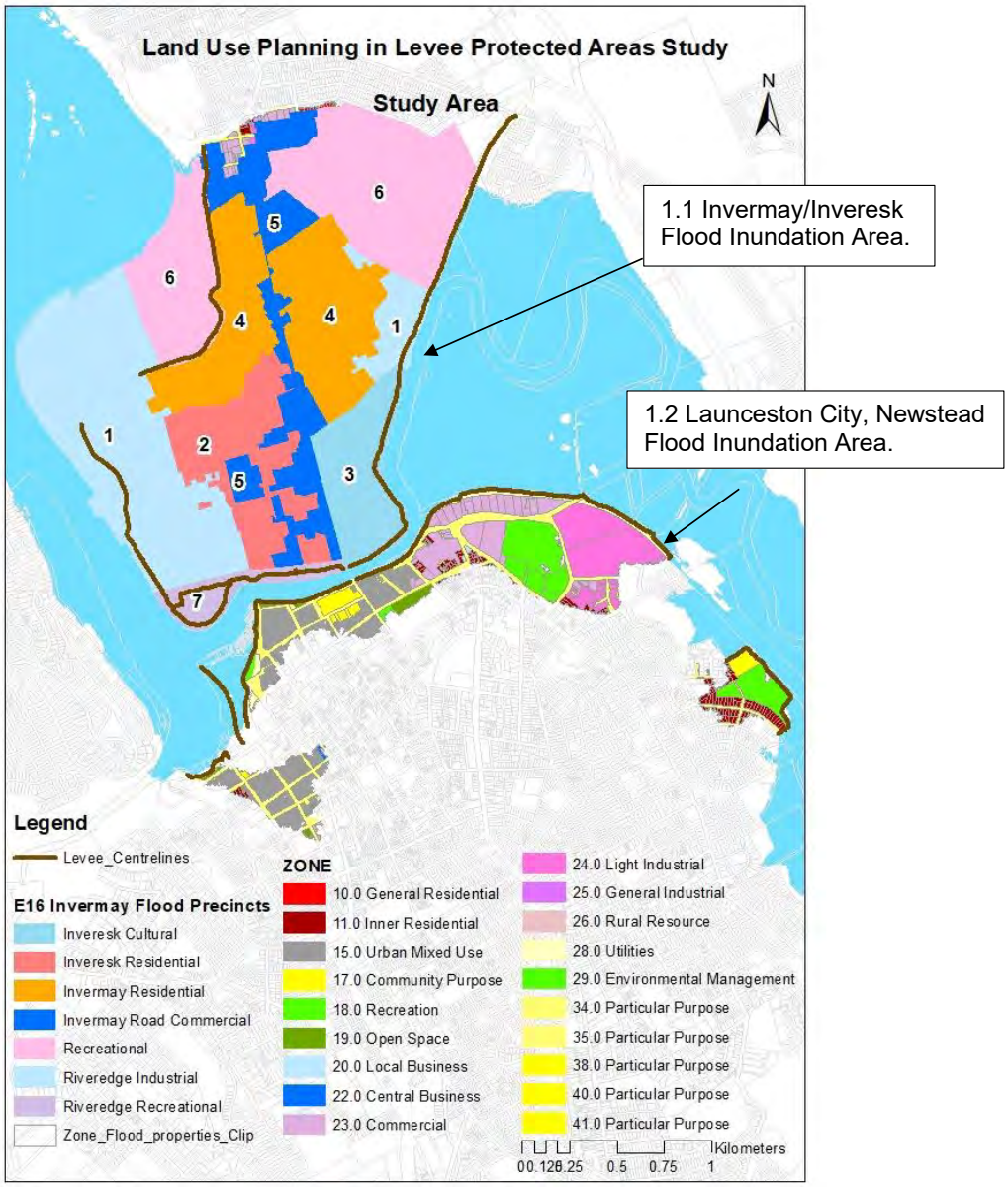


***Fig 3**: Study area with zones*

1.1 Invermay Inveresk Flood Inundation Area

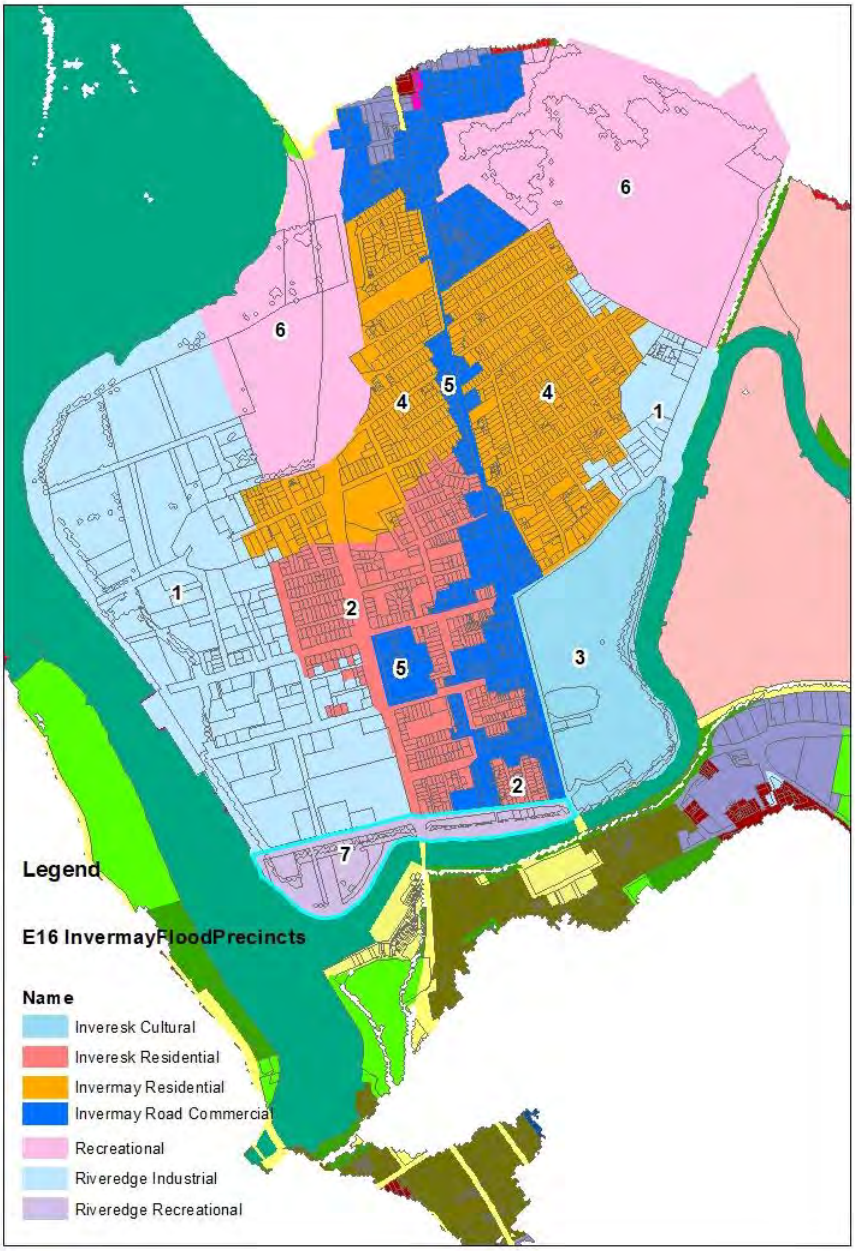


***Fig4**: Invermay Inveresk Precincts Map*

Precinct 1 - Riveredge industrial

Fig 4.1 Riveredge Industrial Precinct

Planning controls/objectives of the Riveredge Industrial Precinct under E16 Invermay/Inveresk Flood Inundation Area Code are as follows,

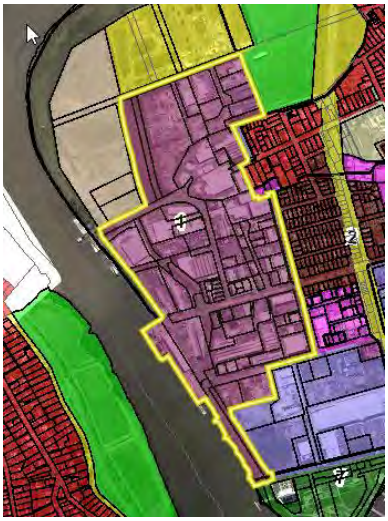
(a) Prohibit new residential uses;
(b) Prohibit significant community infrastructure;
(c) No conversion of industrial uses to residential uses.

Accordingly, non-residential developments are allowed by the provisions subject to consideration of building resilience and emergency management plans.

This precinct consist with few zones and for this study mainly following 3 zones have been identified as zones with future development potential.

I. General Industrial zone
II. Light Industrial zone
III. Commercial zone

I. General Industrial zone



This section is already in fully developed condition and redevelopment opportunities only may exist.

II. Light Industrial zone

11 Gaunt Street
Lot size: 6652m2
Zone: Commercial

11 Gaunt street lot can be identified as a lot with future development potential and other than that this section is in fully developed condition with only future redevelopment opportunities.

III. Commercial zone

Lot No.91, 81, 79, 80 and 86 can be identified as lots with future development potential and the total land extent of those lots is 44315m2. As per the zone requirements the minimum lot size is of this zone is 350m2.

Accordingly, the future development capacity of this precinct is 146 Lots.
In reality lot sizes are likely to be larger and therefore adopting site coverage of 50% over 20000m2 of new floor area may be possible or realistic.

Precinct 2 - Inveresk Residential

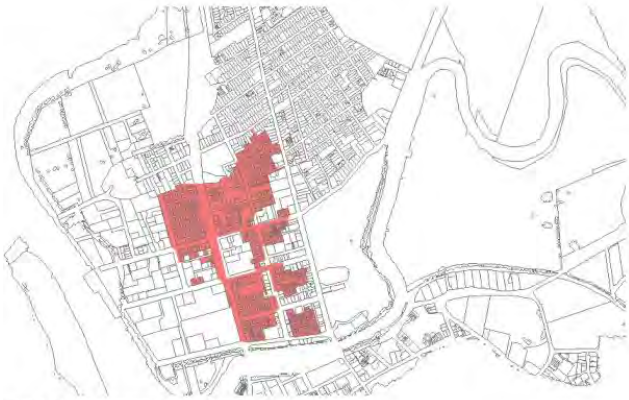


Fig 4.2 Inveresk Residential Precinct

This precinct can be identified as a precinct with limited development potential and the current planning controls under E16 Code are as follows,

(a) Long term maintenance of the residential area at the current intensity;
(b) Limitation on future increases in residential development;
(c) Prohibit significant community infrastructure.

Note: Multiple dwellings are prohibited and single dwellings on vacant lot is allowed subject to E16 code provisions, floor level conditions, etc…

When consider the availability of vacant lots in this precinct, the following lots can be identified as lots with future development potential and based on the zone controls and E16 code controls the total development potential of those lots can be quantified as 7 lots.

Lot size: 822m2
Zone: Inner Residential

Lot size: 817m2
Zone: Commercial

Lot size: 760m2
Zone: Inner Residential

Lot size: 607m2
Zone: Light Industrial

Lot size: 806m2
Zone: Inner Residential

Precinct 3 - Inveresk Cultural

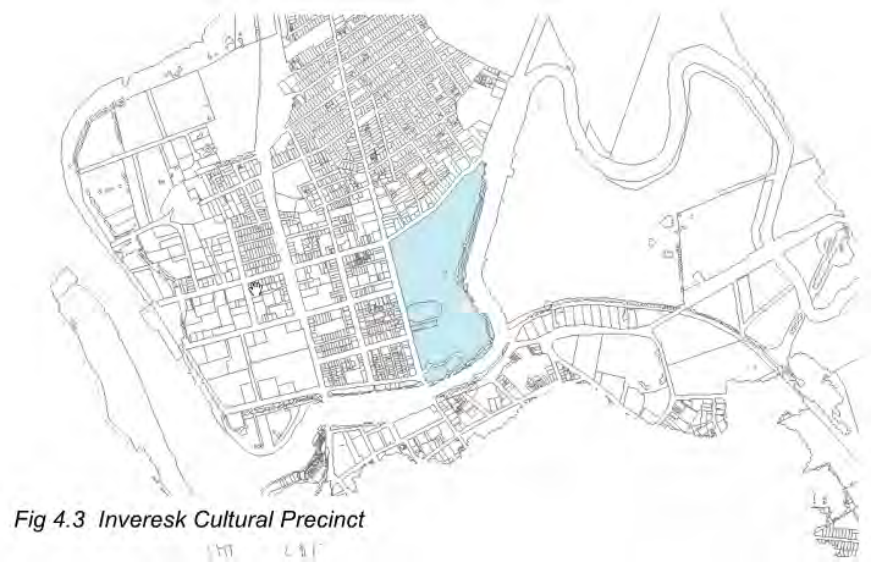


Fig 4.3 Inveresk Cultural Precinct

Current Planning controls/objectives of the Inveresk Cultural Precinct under E16 Invermay/Inveresk Flood Inundation Area Code are as follows,

(a) Maintenance of the area as a centre of cultural, recreational, entertainment and educational facilities;

(b) Limit commercial development opportunities to those uses that support the cultural, recreational, entertainment and community intent of the precinct;

(c) Residential uses must be associated with educational activities within the precinct.

This section is primarily owned by the City of Launceston and several future major projects have been proposed in this precincts by the Council. Therefore, although it cannot be stated with a definite figure, this precinct can be identified as a precinct with greater development potential.

Precinct 4 - Invermay Residential

Fig 4.4 Invermay Residential Precinct

This is the only precinct which allows both multiple dwellings and single dwellings. Therefore this precinct can be identified as a precinct with higher level of development potential.

Planning controls

I. Planning controls/objectives of the Invermay Residential Precinct under E16 Invermay/Inveresk Flood Inundation Area Code are as follows,

(a) Maintenance of the existing residential use;
(b) Prohibit significant community infrastructure.

Subdivision for residential developments and new residential developments are allowed within this precinct subject to conditions.

II. 10.0 General Residential Zone

10.4.1 Residential density for multiple dwellings

A1 - Multiple dwellings must have a site area per dwelling of not less than 325m2.

10.4.15 Lot size and dimensions

A1.1 (a) have a minimum area of no less than 500m²; and
(b) be able to contain a rectangle measuring 10m by 15m;

III. 11.0 Inner Residential Zone

11.4.24 Lot size and dimensions

A1.1 Each lot, or a lot proposed in a plan of subdivision, must:

(a) have a minimum area of no less than:
(i) 300m²; or
(ii) 500m² where the average slope of the lot is 15% or greater

When consider the availability of **vacant lots** in this precinct, the following lots can be identified as lots with future development potential their total **potential can be quantified as 20 lots**.

Lot size: 340m2
Zone: Inner Residential

Lot size: 425m2
Zone: Inner Residential

Lot size: 4352m2
Zone: General Residential

Lot size: 1192m2
Zone: General Residential

Also, when consider the past trend (last 5 years) of lodging development application for multiple dwellings developments within this precinct, it can be identified that there are 0- 5 application have been lodged per year.

Based on this figure it can be assumed that the future development potential for multiple dwellings in this precinct would be 90 for next 30 years.
Assumption: Average 3 applications per year

In addition, there are 28 large lots can be identified with future subdivision capacity within this precinct.

Accordingly, the maximum development potential in this precinct can be concluded as follows,

Development potential of vacant lots	20
Development potential for multiple dwellings for next 30 years	90
Lots with subdivision potential	28
Total number of lots with future development potential	**138**

Precinct 5 - Invermay Road Commercial

Fig 4.5 Invermay Road Commercial Precinct

Planning controls of the Invermay Road Commercial Precinct under E16 Invermay/Inveresk Flood Inundation Area Code are as follows,

(a) Prohibit residential uses;
(b) Prohibit significant community infrastructure.

This precinct is already in developed condition and only opportunities for redevelopment of existing developed sites is possible.

Precinct 6 - Recreational

Fig 4.6 Recreational Precinct

Planning controls/objectives of the Recreational Precinct under E16 Invermay/Inveresk Flood Inundation Area Code are as follows,

(a) Maintain the largely open space use of the area;
(b) Buildings only to support recreational use of land;
(c) No new commercial or industrial uses;
(d) Prohibit new residential uses;
(e) Prohibit significant community infrastructure.

No vacant lots can be identified with future development potential and this precinct can be identified as a precinct with no future development potential.
However it is important to note that this precinct may have opportunities for developments associated with existing recreational facilities such as public open spaces, play grounds, shelters etc…

Precinct 7 - Riveredge Recreational

Fig 4.7 Riveredge Recreational Precinct

Planning controls/objectives of the Riveredge Recreational Precinct under E16 Invermay/Inveresk Flood Inundation Area Code are as follows,

(a) To create an open space precinct to be used for reconstructed levees;
(b) To allow limited development consistent with the use of the area for public recreation;
(c) Prohibit new residential development;
(d) Prohibit significant community infrastructure.

No vacant lots can be identified with future development potential and this precinct can be identified as a precinct with no future development potential other than to facilitate recreational uses.

1.2 Launceston city and Newstead area section

***Fig5**: Launceston city and Newstead levee protected area*

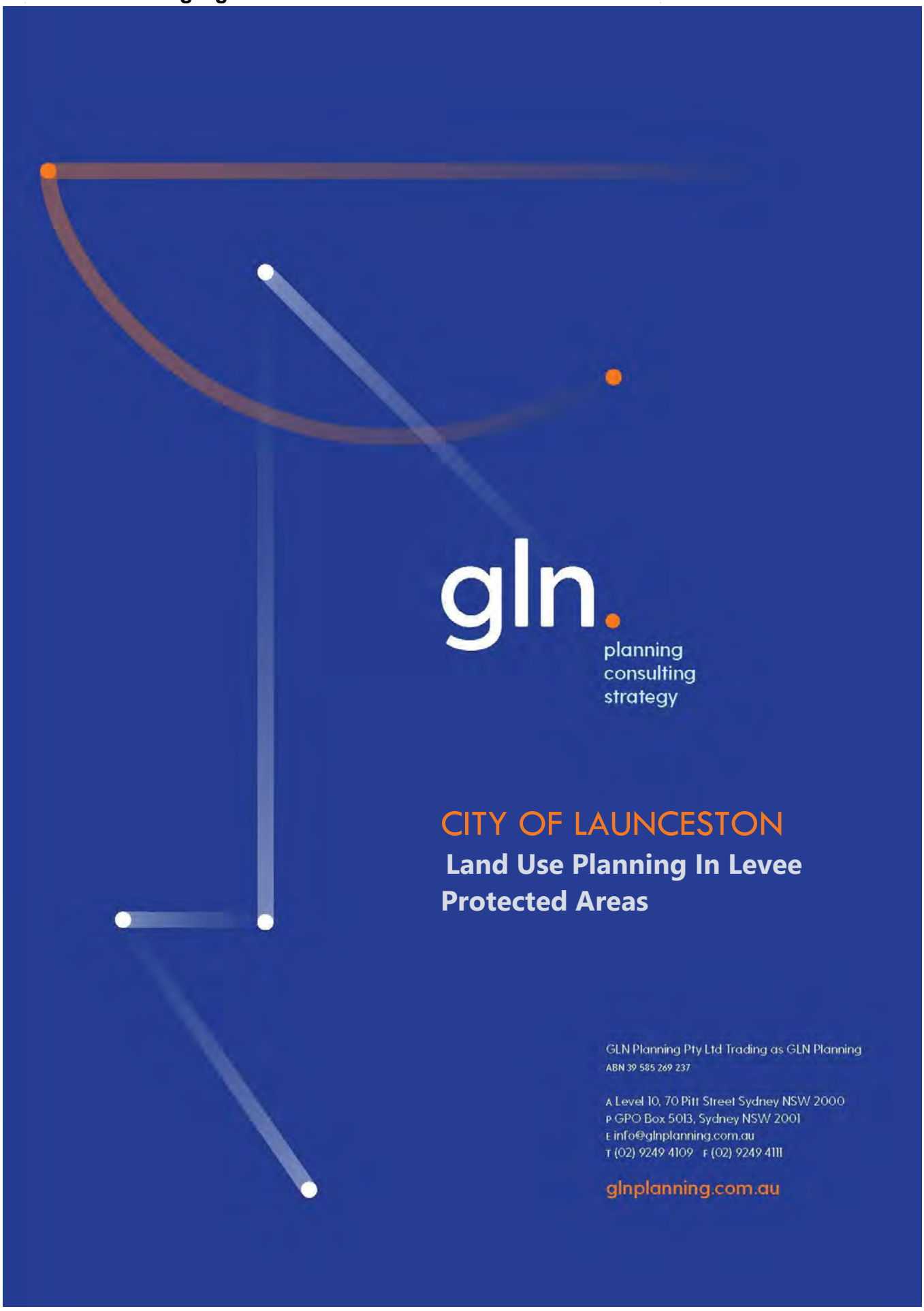
This section of the study area mainly consist with some parts of the city area and a part of inner residential section of Newstead area.

A distinctive character of the City area segment is that, it is contained with the former industrial area which is extending east/west along the North Esk river to the north of the CBD. In here, some characters of the built environment such as flexible floor plans, plainer facades and larger frontages with comparatively larger lot sizes can be identified as the fortes to accommodate possible future/current urban renewal trends and also displaying its high capacity to accept the future changes.

In generally, when consider the locational advantages with close proximity to city center and high demand for inner city living, this section of the study area can be considered as an area with higher future development potential although it cannot be quantified by a definite figure.

References

1. Launceston Interim Planning Scheme 2015
2.46/20P Statement of Evidence - Richard Jamieson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City of Launceston

Land Use Planning In Levee Protected Areas

Prepared for

Molino Stewart
on behalf of the City of Launceston

By

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Tables

Figures

Appendices

Key Abbreviated Terms

Acronym/ Abbreviation	Full Term
AHD	Australian height datum
BMT Review	North and South Esk Rivers Flood Modelling and Mapping Update Volume 1:Technical Report, BMT Eastern Australia Pty Ltd, November 2018
CBD	Central Business Directory
Council	The Council of the City of Launceston
Council Discussion Paper	Launceston's levee-protected area: Towards a risk-based approach to land use planning, City of Launceston, 19 February 2020
FERP	Flood emergency response plan
FPCC	Flood Planning Constraints Categories, as specified by Guideline 7-5 Flood Information to Support Land-use Planning (supporting Handbook 7)
FPA	Flood planning area
FPL	Flood planning level
FPAC	Flood Prone Areas Code (forms part of the Planning Scheme)
FRM	Floodplain Risk Management
FRP	Flood risk precinct
Handbook 7	Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, 2017, Australia Institute for Disaster Resilience
IIFIA Code	Flood Inundation Area Code (forms part of the Planning Scheme)
LUPAA	*Land Use Planning and Approvals Act 1993*
LFA	Launceston Flood Authority
NRAS	National Rental Affordability Scheme
Planning Scheme	*Launceston Interim Planning Scheme 2015*
PMF	Probable maximum flood
SAP	Special Area Plan (forms part of the Planning Scheme)
The Deed	Launceston Flood Risk Management Deed (Between Council and the State Government
UTAS	University of Tasmania

Executive Summary

Introduction

GLN Planning is part of the consultant team providing town planning input into the "Land Use Planning in Levee Protected Areas Study." The Study Area includes the suburbs of Invermay, Inveresk, Newstead and parts of the City CBD.

The planning related objectives of the Study seek to align Council's decision making for the levee protected areas of the floodplain with current best practice via a robust risk based approach which takes into account climate change and resilience principles. This is to be achieved by formulating guidance for strategic planning, imposing development controls and ensuring that the communication of flood risk, through planning documents, is not misleading.

Background

The Launceston flood levee system commenced construction in the mid-1960s and was augmented over time until completion in the mid-2010s when significant repair and renewal of the flood levees occurred. The Newstead levee was completed in 2018 following the June 2016 floods.

A Flood Assessment in 2006 concluded that there was a risk of failure in the levee system by being overtopped in a very large flood. As a consequence the Council and the state government entered into a Deed that outlined the arrangements for flood management in Invermay and Inveresk, including the establishment of the Launceston Flood Authority, and implementation of emergency management arrangements and new planning controls. Following this, planning controls were introduced as amendments to the 1996 Planning Scheme to constrain increases in potential future flood damages within levee protected areas. These planning controls were reviewed on several occasions and are contained with an area specific code within the *Launceston Interim Planning Scheme 2015* that applies to most, but not all, current levee protected areas.

The *Coastal State Policy* and *Northern Tasmanian Regional Land Use Strategy* require flood risk to be considered in the planning process and both are clear in requiring that planning schemes apply a comprehensive risk based approach to FRM planning.

The objectives of the current *Launceston Interim Planning Scheme 2015* recognise that managing natural hazard risks, such as flooding risks, requires a long-term planning approach. These objectives acknowledge that planning is one of the most effective ways of avoiding or mitigating the adverse impacts of a natural disaster. The Planning Scheme primarily manages flood risks through the choice of land use zone, the state generic *Flood Prone Areas Code* (FPAC) and Invermay/Inveresk Flood Inundation Area Code (IIFIA Code). The IIFAI Code is intended to apply specifically to levee protected areas, but presently does not apply to the Newstead area, and parts of the City CBD. The IIFAI Code requires extending to include all levee protected areas and updating into a Special Area Plan based on a current risk assessment.

The Molino Stewart risk analysis has concluded that substantial proportions of the Study Area will be subject to intolerable risks in the future based on a continuation of the current planning approach. By 2090 nearly half (46%) of the Study Area properties will be subject to intolerable risks. Just over a further third (37%) will be subject to tolerable risks that will need to be managed.

The increase in the number of at-risk properties is mostly due to the exposure of existing development to increases in flood hazard arising from climate change and not because of new development. Accordingly, additional decisions will need to be made over the longer term to redress this growth in intolerable risks including consideration of opportunities for transformational changes to land uses and building forms over the next 70 years.

Recommendations

Strategic Planning Guidance

1. Consider the following when undertaking broader strategic planning for the levee protected areas of Launceston City,

    a. Restrict any new development in areas where hazard and exposure risk components are projected to markedly increase.

    b. Facilitate and encourage redevelopment to improve the compatibility of development with flood hazards with measures such as increased floor levels, flood compatible materials and design, and structural soundness.

    c. Review the zoning of land with the aim of reducing the number of vulnerable land uses in areas subject to increasing levels of flood hazard and exposure.

    d. Consider opportunities for transformational change to existing development, where this aligns with broader social, economic and environmental strategic planning goals, that could reduce the flood risk profile of the Study Area in the long term.

2. Statutory Planning – Special Area Plan (SAP)

    a. Prepare a SAP for the Study Area that supersedes the existing flood related Codes in the Planning Scheme.

    b. The SAP should apply to the whole of the Study Area.

    c. Adopt an overlay map tied to the SAP that divides the area into low, medium and high flood risk precincts based on a combination flood frequency, hazard and isolation factors, for the purposes of applying a graded set of planning controls that reflect varying levels of risk.

    d. That the draft planning controls as set out in **Appendix A** be used as the basis for the preparation of a planning scheme amendment that applies a new FRM SAP for the Study Area, comprising of acceptable solutions and performance criteria.

    e. Include existing exemptions in the IIFIA Code in the new SAP.

    f. Generally, existing prohibitions on intensification of existing uses should be retained with additional prohibitions on sensitive and hazardous uses where incompatible with the flood risk.

g. Review the need for further prohibitions on uses such as dwellings houses due to the degree of flood hazard associated with current predicted flood depths in a 1% AEP flood in 2050 and 2090.

h. Flood planning levels should be based on current flood study information taking into consideration climate change.

i. Adopt a freeboard of 0.3m for minimum habitable floor levels above a 1% AEP flood planning level and no freeboard for non-habitable floor levels and other development components as appropriate. A review of appropriate freeboards should be undertaken in the future, including any consequential adjustments to other legislation that may be needed.

j. Controls that ensure adequate structural soundness standards are satisfied should be applied to buildings in hazardous flood locations.

k. Basic evacuation and emergency management controls should be included as performance criteria.

l. Environmental management measures should be included to ensure that uses such as hazardous industries do not result in unacceptable pollution impacts during a flood.

3. Other

a. Any consequential adjustments to other legislation, such as the *Building Regulations 2016* which effectively prescribes a minimum freeboard, should be reviewed.

b. That in the first instance, Council consults with the Tasmanian Planning Commission and Tasmanian State Emergency Service about considering changes to the FPAC that adopts the framework to be applied to the Study Area.

c. As part of on-going strategic planning work, Council considers whether there are any other specific floodplain localities that warrant the preparation of a SAP, that adopts the framework applied to the Study Area, as opposed to the application of the standardised FPAC in its current form.

Conclusion

Flood risk management for land protected by levees is different from conventional floodplains and needs a different approach to that provided by the FPAC. The SAP provides a package of controls for use and development that applies a risk based approach to floodplain planning within the levees protected areas of Launceston City. The restrictions vary dependent on the vulnerability of a use, the nature of the component of a development and the location of the property within the floodplain.

The SAP flood overlay map is not derived from any single risk assessment map within the Molino Stewart risk assessment but overall there is a strong correlation with the flood risk precincts adopted for the SAP. The SAP map is prepared specifically to trigger approval pathways and applicable flood related development controls while the risk assessment mapping undertaken by Molino Stewart provides a sound basis for strategic planning purposes and to inform the appropriate stringency of planning controls. The format of the SAP map is also designed to avoid miscommunicating the level of flood risk at any individual property, even if planning controls do not apply.

There will inevitably be some change to the application of the controls, particularly as a consequence of transitioning from a planning precinct to a flood risk precinct base and the incorporation of climate change factors. However, the intent was not to materially relax prohibitions but to update and augment existing controls to respond to the current flood risk analysis in a way that continues to meet the intent of the planning controls to manage and minimise flood risks to people and property.

1 Introduction

1.1 Commission

The City of Launceston Council has engaged a consultant team led by Molino Stewart to prepare the "Land Use Planning in Levee Protected Areas Study" (**the Study**).

GLN Planning (**GLN**) is part of the consultant team, providing town planning input for the Study.

1.2 Background

The low-lying suburbs within Launceston are located at the junction of the North and South Esk Rivers and the Kanamaluka/Tamar Rivers estuary, which drain 14% of the land area within Tasmania[1]. Following significant flooding in 1929, and interruptions caused by the Great Depression and Second World War, the Launceston Flood Protection Authority was established in 1956 and the construction of a 10 km earth levee system commenced in the mid-1960s. The levees were augmented over time and construction continued until the mid-2010s when significant repair and renewal of the flood levees occurred. The Newstead levee was completed in 2018 following the June 2016 floods.

The Study Area includes the Inveresk Precinct which has been changing since the closure of the Launceston Railway Workshops in 1993. The Precinct is a 30 hectare area subject to substantial existing and proposed investment by the University of Tasmania (**UTAS**). The Launceston Railway Workshops were originally established in 1868 leaving a significant 17 hectare heritage site to be managed in accordance with a Conservation Management Plan[2].

The other current key tenant of the Inveresk Precinct is Council. The range of uses within the precinct is broadly reflective of *The Launceston Better Cities Strategy* prepared in 1995. A further master plan was prepared by Council in 2005 which informed an amendment to the *Launceston Planning Scheme 1996*, and ultimately was reflected in Particular Purpose Zone 4 in the current *Launceston Interim Planning Scheme 2015.*

The state government transferred ownership of the railway yards to Council in 2001 which established the York Park and Inveresk Precinct Authority to manage the entire precinct. The original planning intent for the precinct is to foster "…heritage, arts, entertainment, sport, events, recreation, technology and tourism to create a dynamic environment where people live, work and play"[3].

Further strategies were developed overtime to guide development in the area. The *Launceston Central Area Development Strategy* was prepared in 2002 which identified several potential tourism, hospitality and residential projects for the river edge area, including hotel and motel accommodation, cafés and restaurants, conference and entertainment facilities, hospitality retailing and student accommodation, and linkages with Invermay. This was followed by the 2005 Inveresk

[1] 6ty Pty Ltd, June 2019, pg.3.

[2] The original Conservation Management Plan (Pearson, 1994) for the railway workshops was prepared for the Inner City Launceston Redevelopment Strategy Committee.

[3] Launceston Better Cities Strategy was released in 1995 by the Inner City Launceston Redevelopment Strategy Committee, as cited in 6ty Pty Ltd, June 2019, pg.5.

Master Plan which recommended minor changes to the Planning Scheme and noted that further changes may be needed following a review of the flood mitigation scheme, being the 2006 GHD Flood Assessment.

The GHD Flood Assessment concluded that there was a greater risk of failure in the levee system being overtopped in a very large flood. As a consequence the Council and the state government entered into the *Launceston Flood Risk Management Deed* (**the Deed**) in 2008. The Deed outlined the arrangements for flood management in Invermay and Inveresk, including the establishment of the Launceston Flood Authority (**LFA**), emergency management arrangements and the planning controls.

In the preparation of the 1996 Planning Scheme, Invermay and Inveresk were presumed to be adequately protected by the levee system and therefore were generally not included within the Flood Risk Area shown on the planning scheme maps[4]. However, due to the findings of the GHD Flood Assessment and the Deed, Council pursued amendments to 1996 Planning Scheme to give effect to the planning controls outlined in Section 4.2 of the Deed which aimed to constrain increases in potential future flood damages[5].

Two amendments to the 1996 Planning Scheme followed:

- Council had adopted the *Invermay Flood Level Policy* in 2006 which defined the 1 in 100 year ARI flood level as RL 3.4 m AHD and the extent of the *Flood Risk Area* in the Planning Scheme. Minimum habitable floor levels were set at this level plus 0.3m freeboard (ie RL 3.7m).

- In 2009 finer grain controls were introduced for 7 precincts within the Flood Risk Area[6] which includes the Inveresk Cultural Precinct that comprises the former railyards, York Park, Invermay Park and the Showgrounds. Potentially flood sensitive community uses such as hospitals, schools, aged care services and government offices were not prohibited in the Inveresk Cultural Precinct but they were prohibited in the other precincts. New planning controls limited the amount of additional floorspace that could be added to existing buildings below the adopted flood level.

The LFA was established in 2008 to design and construct a new levee system to provide protection against larger floods. It is also responsible for the maintenance of the levees within the Launceston Flood Protection Scheme and is a referral agency for planning decisions where discretion applies.

The 1996 Planning Scheme was translated into the *Launceston Interim Planning Scheme 2012* which was based on the standardised instrument for Tasmania. This Scheme came into force on 16 October 2012. A review of the 2012 Scheme was completed in 2014 and the *Launceston Interim Planning Scheme 2015* subsequently came into effect on 29 April 2015.

The provisions for the Invermay/Inveresk Flood Inundation Area were reviewed by the Tasmanian Planning Commission as part of the consideration of the draft 2012 Planning scheme. Council

[4] 6ty Pty Ltd, June 2019, pg.11.

[5] See 6ty Pty Ltd, June 2019, pgs 14-15.

[6] The seven precincts within the inundation area include Riverside Industrial, Riverside Residential, Inveresk Cultural, Invermay Residential, Invermay Road Commercial, Recreational and Riverside Recreational. The precinct boundaries were based on the particular land use characteristics within these separate parts of Invermay and Inveresk. See See 6ty Pty Ltd, June 2019, pgs 15-16.

commissioned a report by Pitt & Sherry (August 2012) which was provided to the Commission to address proposed changes such as removal of the prohibition on residential use in the Inveresk Cultural Precinct and the limitations on floor areas for non-residential buildings generally[7]. The changes ultimately allowed for residential development associated with and supporting the educational activities within the Inveresk Cultural Precinct, subject to a flood assessment report and flood emergency response plan (**FERP**).

The National Rental Affordability Scheme (**NRAS**) Student Housing proposed by the UTAS within the southern edge of the Inveresk Precinct was approved in 2014 under the provisions of the 2012 Planning Scheme. The proposal was accompanied by a flood assessment report and FERP which identified a reduction in flood risk since the upgrading of the levees. The FERP included recommendations for preparedness, mitigation, response and business continuity strategies.

A number of subsequent studies and strategies prepared by Council have influenced development expectations in the Study Area:

- A Memorandum of Understanding was signed by UTAS, Council, TasTAFE and the State Government on 18 May 2015 in support of the consolidation and expansion of a tertiary education precinct at Inveresk
- The UTAS Master Plan initiated in 2017 and reviewed in 2019
- The Launceston City Deal which was signed by the Commonwealth Government, Tasmanian Government and City of Launceston on 20 April 2017, which includes the $260 million university development at the Inveresk Precinct as its centrepiece
- York Park Master Plan 2016, which provides strategic direction for the stadium over the next 15 years
- The current Inveresk Precinct Plan commissioned by UTAS.

An application to amend the *Launceston Interim Planning Scheme 2015* provisions relevant to the Inveresk Precinct is to be made jointly by UTAS and Council in order to reflect the planned university expansion and undertake other updates relevant to the precinct overall. This will involve the introduction of a Specific Area Plan (**SAP**).

1.3 The Role of Planning in Floodplain Risk Management

In order to understand why planning considerations are important to the achievement of floodplain risk management (**FRM**) objectives, it is necessary to understand what planning is capable of contributing to this end, being:

- providing guidance at the strategic planning stage as to where different types of use and development should occur based on FRM considerations
- providing development controls to minimise the risk to people, private property and public infrastructure to address residual risks where development is planned to occur within the floodplain

[7] 6ty Pty Ltd, June 2019, pgs 18-19.

- ensure that the communication of flood risk, as may be interpreted by the community through planning documents, is not misleading. [8]

While FRM can be relevant to the preparation of a plan for an area or in the assessment of a specific development proposal, there will also be other non-FRM considerations that will be relevant. FRM will ultimately need to be weighed with other planning considerations to achieve balanced outcomes that meet community expectations.

Despite this, there are baseline standards or community expectations relating to safety, exposure of property and infrastructure to costly repairs and avoidance of disruption to the occupation of homes and the operation of businesses, that should be considered when making planning decisions.

1.4 Objectives of this report

The objectives of the Study are outlined below, with those most relevant to this report being bolded:

- *To gain a robust understanding of riverine flood risk in levee-protected areas (both hydraulic and non-hydraulic factors of risk);*
- *To gain an understanding of the communities exposure, vulnerability and tolerance to flooding;*
- ***To align Councils decision making on the floodplain with current best practice in floodplain management via a risk based, matrix approach; and***
- ***To ensure that future land use planning decision making in levee protected areas are based on a robust and best practice understanding of current, future, and residual flood risk, and which takes into account climate change and resilience principles***.

This report has been prepared in conjunction with the main report prepared by Molino Stewart to provide specific input regarding land use planning considerations.

1.5 Methodology

The approach adopted for the purposes of preparing this report involved:

- Review of background documents briefed to us
- Independent research
- Consideration of the Flood Risk Assessment and Mapping report prepared by Molino Stewart

Options for the structuring and content of planning controls were discussed with Council prior to finalising this report.

[8] Planning documents typically deal with where flood related planning controls apply rather than where flood risks apply. However, the community regularly refer to planning controls and can be potentially and inadvertently misinformed.

1.6 Information Reviewed

The following documents were included in our brief, referred to by Council or sourced as part of our independent research, and considered as relevant for the purposes of this report.

Table 1: Documents & Information

Description
Documents provided with our brief
North and South Esk Rivers Flood Modelling and Mapping Update Volume 1:Technical Report, BMT Eastern Australia Pty Ltd, November 2018 (**BMT Review**)
Launceston's levee-protected area: Towards a risk-based approach to land use planning, City of Launceston, 19 February 2020 (**Council Discussion Paper**)
Generally available planning documents
Planning for stronger, more resilient floodplains Part 2 – Measures to support floodplain management in future planning schemes, Queensland Reconstruction Authority, September 2012
South Rockhampton Flood Levee Vulnerability and Tolerability Assessment Report, AECOM, 29 April 2019
Planning for stronger, more resilient floodplains Part 2 – Measures to support floodplain management in future planning schemes September 2012, Queensland Reconstruction Authority
ISO 31000:2009 Risk management — Principles and guideline *PIA National Land Use Planning Guidelines for Disaster Resilient Communities* - https://www.planning.org.au/policy/national-land-use-planning-guidelines-for-disaster-resilient-communities-2
Position Policy on FRM in Land Use Planning, 27 May 2021, Floodplain Management Australia
Queensland Flood Risk Management Framework, June 2021, Queensland Reconstruction Authority
Queensland Floods Commission of Inquiry Final Report, March 2012
The Floodplain Risk Assessment Guidelines for Municipal Councils in Tasmania, 2016, University of Tasmania and Tasmanian SES
The Victorian Floodplain Management Strategy, 2016 The State of Victoria Department of Environment, Land, Water and Planning
Floodplain Development Manual, 2005, NSW Government
Serra-Llobet, Anna, Remmy Tourment, Antonon Montane and Thomas Buffin-Belanger, 6 January 2022, *Managing residual flood risk behind levees: Comparing USA France and Quebec (Canada).* Published in Chartered Institution of Water and Environmental Management Journal of Flood Risk Management
Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, 2017, Australia Institute for Disaster Resilience (**Handbook 7**)
Considering Flooding in Land-use Planning Activities 2017, Australia Institute for Disaster Resilience (Guideline 7-5)

Description
Information derived during the preparation of the study
Land Use Planning in Levee Protected Areas - Flood Risk Assessment and Mapping, Draft Report by Molino Stewart, October 2021.
Council & Related Sources
Assessment of Invermay Flood Control Measures – Draft Launceston Planning Scheme 2012, Pitt & Sherry, August 2012
Flood Risk Mitigation in the Invermay Floodplain, Frontier Economics, September 2006
Development capacity analysis report, City of Launceston,
Invermay Floodplain: A Social, Economic, Infrastructure and Risk Evaluation Study, GHD, October 2006
Launceston Planning Scheme 1996 Amendment Memo, Launceston City Council, 6 August 2009
Historical Flood Photography 1911-1966
Inveresk Precinct Chronology of Uses and Flood Management, 6ty, 13 June 2019
Risk Assessment Report – Launceston Flood Response Capability, JMG Engineers & Planners, June 2016
Launceston Flood Risk Management Deed, The Crown Solicitor of Tasmania, 29 April 2008
Launceston Flood Risk Mitigation Assessment – June 2016 Floods, Suburb of Newstead, CRC, August 2017
Launceston Flood Risk Mitigation Assessment – June 2016 Floods, CRC, October 2017
Planning Scheme 1996 Review -Flooding – A brief outline of the issues and suggestions for a way forward, 20 November 2018.
University of Tasmania Inveresk/Invermay Planning Report, Pitt & Sherry, 27 June 2019
City of Launceston Strategic Plan 2014-2024
Northern Tasmania Regional Land Use Strategy, 27 June 2018

Other technical references were also considered as are referred as relevant within the report.

2 Study Area

The Study Area comprises the area shown on **Figure 1.** The boundaries of the Study Area were defined by Council and include the suburbs of Invermay, Inveresk, Newstead and parts of the City CBD.

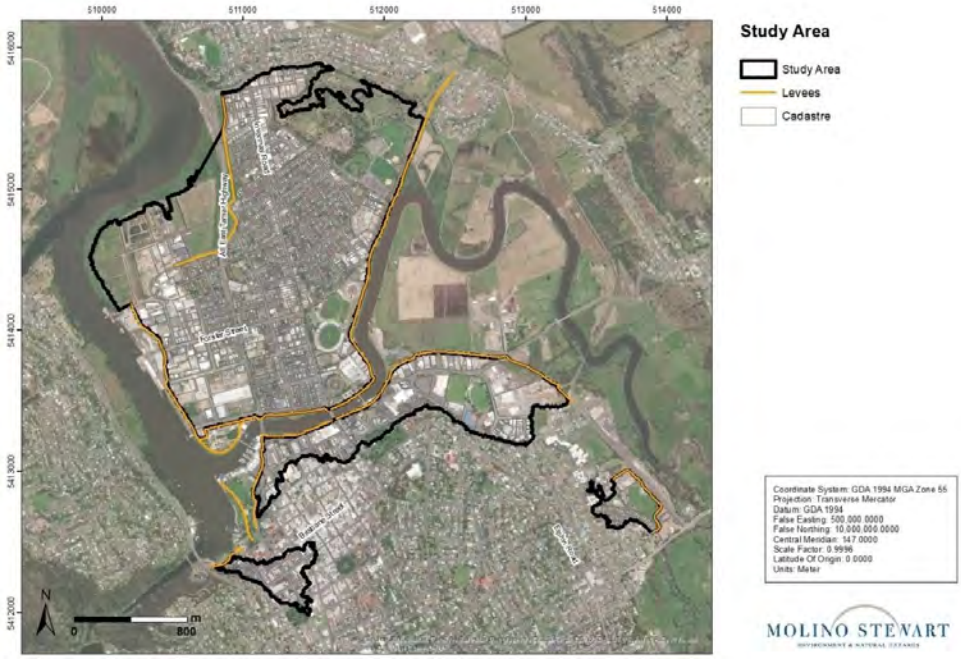

Figure 1: Study Area

2.2 Characteristics of the Study Area

Key land use characteristics of the Study Area are depicted on **Figure 2**.

The residential areas in Invermay predominantly comprise 1 storey detached housing. A substantial proportion of the residential area comprises older housing stock with a heritage character intermixed with buildings of conspicuous heritage significance. There is also a mix of non-residential uses in the residential areas that varies in its proportion of total buildings.

A large area of passive open space exists in the northeastern extent of the Study Area, in addition to scattered smaller areas of urban parkland serving various functions.

UTAS, TasTafe and an Entertainment Precinct occupy the area east of Invermay Road and north of North Esk River. The part of the Study Area south of North Esk River, is the northern part of the CBD and comprises a mix of hotels, big-box commercial, small to medium size commercial/retail outlets and light industrial uses. These areas also comprise buildings with heritage significance.

Figure 2: Study Area Land Uses

3 Statutory Policy Framework

3.1 Overview

Local councils in Tasmania can have a direct or shared role in managing flood risk. Councils are responsible for land-use planning, building controls, maintenance and construction of flood mitigation infrastructure, and promoting general community awareness of flooding within their municipality. Councils also work with the State Emergency Service and other authorities in the planning and response to natural hazards within their area. This may involve the preparation of Floodplain Risk Management Studies and Plans.

The *Floodplain Risk Assessment Guidelines for Municipal Councils in Tasmania* provide guidance to Councils and Municipal Emergency Management Committees for undertaking "flood specific risk assessments." The flood risk assessment process outlined in the Guideline is consistent with that outlined by Handbook 7.

Tasmania's Resource Management and Planning System (RMPS) sets out the overarching objectives for the use and development of the State's natural and physical resources. A number of pieces of legislation embody those aims, including the *Land Use Planning and Approvals Act 1993* (**LUPAA**) and *State Policies and Projects Act 1993*. These Acts do not specifically address FRM.

State Policies are made under the *State Policies and Projects Act 1993* to articulate the Tasmanian Government's strategic policy direction on matters of State significance related to sustainable development of natural and physical resources, land use planning, land management, environmental management and environment protection. There are currently 3 State Policies (addressing agricultural, coastal and water quality matters). The Coastal State Policy provides the following relevant direction[9]

> *Areas subject to significant risk from natural coastal processes and hazards such as flooding, storms, erosion, landslip, littoral drift, dune mobility and sea level rise will be identified and managed to minimise the need for engineering or remediation works to protect land, property and human life.*

The *Northern Tasmanian Regional Land Use Strategy* is a statutory planning document that applies through the Planning Scheme. This Strategy provides strategic direction for the northern region of Tasmania. Relevantly, Strategy (E7.3) requires addressing flood risks and climate change implications, specifying the policies and actions outlined in **Table 2**.

Table 2: FRM Policies & Actions of the Northern Regional Strategy

Policy	Action
NH–P02 Future land use and development is to minimise risk to people and property resulting from flooding.	**NH-A02** Permit appropriate land uses and urban development in areas of susceptibility only where risk is very low or where it can be managed by prescriptive controls to avoid undue risk to persons including loss of life and damage to property.

[9] Clause 1.4.1 of the *Tasmanian State Coastal Policy 1996*.

Policy	Action
NH-P04 Where avoidance of hazards is not possible, or the level of risk is deemed acceptable, best practice construction and design techniques and management practices are to be implemented	**NH-A05** Include controls in planning schemes based on current best practice to manage risk to persons and property resulting from inundation.
	NH-A07 Adopt the relevant risk management AS/NZS standard as part of core management methods for emergency, hazard and risk management.

These policies and actions are clear in requiring planning schemes to apply a comprehensive risk based approach to FRM planning.

The LUPAA was amended in 2018 to include TPPs in the hierarchy of statutory plans. TPPs are made by the Minister to guide the preparation of Regional Land Use Planning Strategies and Planning Schemes. A scoping Paper for draft TPPs has recently been on exhibition[10]. This scoping paper specifically recommends that a TPP be prepared to address hazards and risks including flooding and climate change.

3.2 Planning Scheme

General

Part A of the *Launceston Interim Planning Scheme 2015* (**the Planning Scheme**) outlines its purpose and objectives. Clause 3.10.1 provides the following objective relevant to FRM:

> *3.10.1 Managing natural hazard risk is a long-term development issue, not solely a set of actions taken before, during, and after a disaster event. Planning in advance is one of the most effective ways of avoiding or mitigating the adverse impacts of natural disasters.*
>
> *(a) The planning scheme seeks to:*
>
> - *...*
> - *avoid the impacts of flooding by controlling the nature of development in flood prone areas; and minimise the threat of bushfires to new development*

Additionally, clause 3.11 outlines Council's objectives in regard to climate change implications for flood risk, specifically stating:

> *Through appropriate zoning the planning authority can control potential development on land at risk of flooding and other possible climate change impacts. Being aware of the potential impacts of climate change will also allow Council to make appropriate determinations on infrastructure investment.*
>
> *...*
>
> *The planning scheme seeks to:*

[10] Tasmanian Planning Policies Scoping Paper for draft TPPs September 2021., Planning Policy Unit Department of Justice, Tasmanian Government. Exhibition closed 22 October 2021.

(a) identify known or foreseeable impacts, such as sea level rises, flood risk and land stability;

(b) adopt a precautionary approach to the location of new development;

...

The Scheme does not define terms such as flood prone land. However, flooding is defined as "a natural phenomenon that occurs when water covers land that is normally dry. It may result from coastal or catchment flooding, or a combination of both". Importantly, flooding is not defined as limited to any particular flood extent or frequency allowing the objectives to be relevant to all floods with any predicted recurrence interval.

Accordingly, there a clear intent is to ensure the Planning Scheme embodies appropriate controls on development that manage both existing and projected climate change related flood risks.

The Planning Scheme provides for development to be categorised to trigger either of the following approval pathways:

- Exempt Use or Development -no permit required
- Permitted Use or Development – a permit must be granted where specified criteria are met
- Discretionary Use or Development – Approval is subject to merit assessment
- Prohibited Use or Development – Approval must not be granted where certain criteria apply.

Each approval pathway can be dealt with differently within the Use Table for each zone and Code.

Land Use Zones

The Planning Scheme provides 22 standardised land use zones and 10 Particular Purpose Zones. There are no zones that specifically target flood affected land. While this does occur in some jurisdictions in Australia[11] we do not support the use of such single issue derived land use zones. Flooding is only one factor that might determine the appropriateness of a land use and flood risks can be complex, variable and change over time.

However, it is important to ensure that the delineation of land use zones has regard to FRM considerations by reflecting the vulnerability of different land uses to flood hazards. For example, less vulnerable uses such as open space and non-urban activity could be acceptable in more hazardous locations while more vulnerable uses such as hospitals, seniors housing and child care centres would be more appropriately located in areas of low or nil flood hazards. This is consistent with a best practice risk approach.

[11] For example the Victorian Planning Provisions include a standard Urban Floodway Zone.

Codes

Flood Prone Areas Code (**FPAC**)

The FPAC is as generic Code (*E5.0 Flood Prone Areas Code)* developed for the Northern Region of Tasmania. The Notice proposed in Schedule 4 of the Scheme provides that the FPAC prevails where there is a conflict with any common mandatory provision in Clause 10.0 General Residential zone.

The FPAC applies "to use or development of land"...:

> *(a) shown as flood risk areas on the planning scheme overlay maps; or*
>
> *(b) identified in a report prepared by a suitably qualified person, that is lodged with an application for a permit, or required in response to a request under section 54 of the Act, as actually or potentially subject to a 1% annual exceedance probability flood.*

This Code does not apply to the area to which the Invermay/Inveresk flood inundation area Code (E16.0) applies. It has not been developed to address the specific nature of flood risks associated with the levee protected areas of Launceston.

While the FPAC does allow for Council to request further information (if not provided) when assessing a DA that could identify a site as subject to a 1% AEP flood and therefore subject to the Code, we understand that this occurs in limited circumstances[12].

Based on the planning scheme overlay maps, the FPAC applies to only a small part of the Study area, as depicted by **Figure 3**. Figure 3 roughly overlays the Study Area boundary on a plan showing flood extents and the FPAC overlay boundary provided in the BMT *Best Practice Review* (2019)[13].

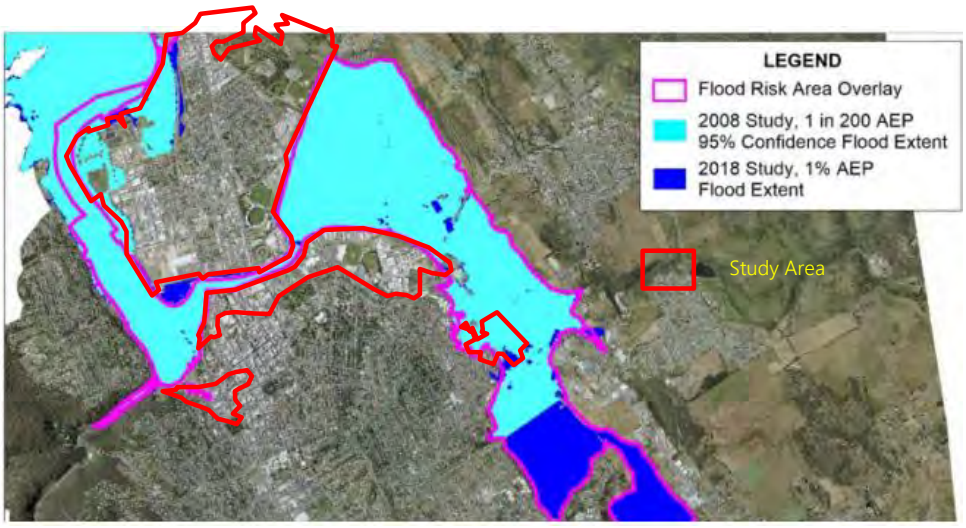

Figure 3: Area of Application of FPAC

[12] *Launceston's levee protected areas: Towards a risk based approach to land use planning,* pg.21.

[13] Cited in *Launceston's levee protected areas: Towards a risk based approach to land use planning,* pg.21.

Generally only a small area of park land in the north west extent of the Study Area, and mostly parkland and a small number of houses in Newstead in the south east extent of the Study Area, would be subject to the FPAC.

The FPAC separately defines catchment flooding, coastal flooding, flooding and the 1% AEP flood. Catchment flooding includes riverine, local overland and groundwater flooding. Coastal flooding is defined to include flooding due to tidal or storm events. Flooding is defined to include inundation from either, or both, catchment and coastal flooding. Note this definition of flooding is different to that adopted by the objectives of the Scheme.

Development exempt from the FPAC includes extensions to habitable buildings of less than 10% of existing gross floor area, outbuildings and subdivision for the purposes of boundary adjustment.

The standards in the FPAC generally impose:

- Performance criteria for the location of sensitive uses, defined as:

  means a residential use or a use involving the presence of people for extended periods except in the course of their employment, such as in a caravan park, childcare centre, dwelling, hospital or school.

- Performance criteria for ensuring the risk to life or property is minimised. The criteria are high level but could lead to more detailed assessments, for example, minimum floor levels in response to *"(h) the capacity of the development to withstand flooding"* or a flood impact assessment in response to *"(n) any works resulting in an increase in risk to other buildings, including buildings outside the boundaries of the land."* However, it is expected that such follow-on detail assessments could be difficult to obtain from applicants in practice due to a lack of specificity as to what standards must be achieved.

Coastal Code

The purpose of the Coastal Code (E14.0) includes considerations of sea level rise. This Code applies along the coastline but specifically excludes the use and development of land subject to Code E16 Invermay/Inveresk Flood Inundation Area.

Invermay/Inveresk Flood Inundation Area Code (**IIFIA Code**)

The IIFIA Code seeks to address flood risk in the levee-protected suburbs of Invermay and Inveresk as required by the Deed. The stated purpose of this Code (E16.0) is:

> *(a) reduce risks and hazards from flooding in the Invermay/Inveresk flood inundation area;*
>
> *(b) ensure that new development is sited and designed to minimise the impact of flooding; and*
>
> *(c) ensure that consideration is given in the siting, design and emergency response capability of new development on land subject to flood inundation.*

This IIFIA Code adopts the same definition of flooding as does the FPAC. The Code defines "AEP" and also "significant community infrastructure" as "a use and development that provides, hospital services, education and occasion [sic] care and emergency services."

The IIFIA Code applies to the area shown on the relevant overlay map (see **Figure 4** with the Study Area approximately overlayed). This Code applies to most of that part of the Study Area north of North Esk River.

Only development for "non-habitable buildings" is exempt from the IIFIA Code.

The Code establishes 7 management precincts based on land use (clause E16.5) as shown in **Table 3**. Clause E16.6.1 specifies the permissibility of uses for all land to which the code applies or individual precincts. For example "education" and "occasional care" are prohibited everywhere except in the Inveresk Cultural precinct while "residential" is prohibited everywhere other than for single dwellings in the Invermay Residential or Inveresk Residential precincts, multiple dwelling in the Invermay Residential Precinct, or dwellings associated with and supporting the educational activities within the Inveresk Cultural precinct.

Figure 4: IIFIA Code Application Area (shown hatched with a pale blue line)

Table 3: Invermay Flood Inundation Management Precincts

Precinct		*Description*	*Land Use Objectives*
1	*River-edge Industrial*	*Industrial area with mixed character. Includes wharf area with river related activities including ship building.*	*(a) Prohibit new residential uses;* *(b) Prohibit significant community infrastructure;* *(c) No conversion of industrial uses to residential uses.*

Precinct		Description	Land Use Objectives
2	Inveresk Residential	Residential area with higher density housing interspersed with commercial and community uses. Significant heritage and cultural values exist.	(a) Long term maintenance of the residential area at the current intensity; (b) Limitation on future increases in residential development; (c) Prohibit significant community infrastructure.
3	Inveresk Cultural	Former rail yards area redeveloped as a centre for education, culture and recreation.	(a) Maintenance of the area as a centre of cultural, recreational, entertainment and educational facilities; (b) Limit commercial development opportunities to those uses that support the cultural, recreational, entertainment and community intent of the precinct; (c) Residential uses must be associated with educational activities within the precinct.
4	Invermay Residential	Traditional residential area of mixed character. Largely not subject to inundation although would be isolated in a flood event.	(a) Maintenance of the existing residential use; (b) Prohibit significant community infrastructure.
5	Invermay Road Commercial	Commercial, retail and light industrial area fronting on or accessed primarily from Invermay Road.	(a) Prohibit residential uses; (b) Prohibit significant community infrastructure.
6	Recreational	Open Space areas including Heritage Forest and Churchill Park recreational areas. Informal and formal recreational facilities.	(a) Maintain the largely open space use of the area; (b) Buildings only to support recreational use of land; (c) No new commercial or industrial uses; (d) Prohibit new residential uses; (e) Prohibit significant community infrastructure.
7	River-edge Recreational	Land between Lindsay Street and the North Esk River from the Tamar Street Bridge to Town Point. This precinct is currently industrial in nature. As part of the flood management project this land is being acquired to be used for the re-constructed levees.	(a) To create an open space precinct to be used for reconstructed levees; (b) To allow limited development consistent with the use of the area for public recreation; (c) Prohibit new residential development; (d) Prohibit significant community infrastructure.

The location of the precincts referred to above are depicted on **Figure 5**[14].

[14] Figure E16.1, Clause E16.7.2 of Planning Scheme

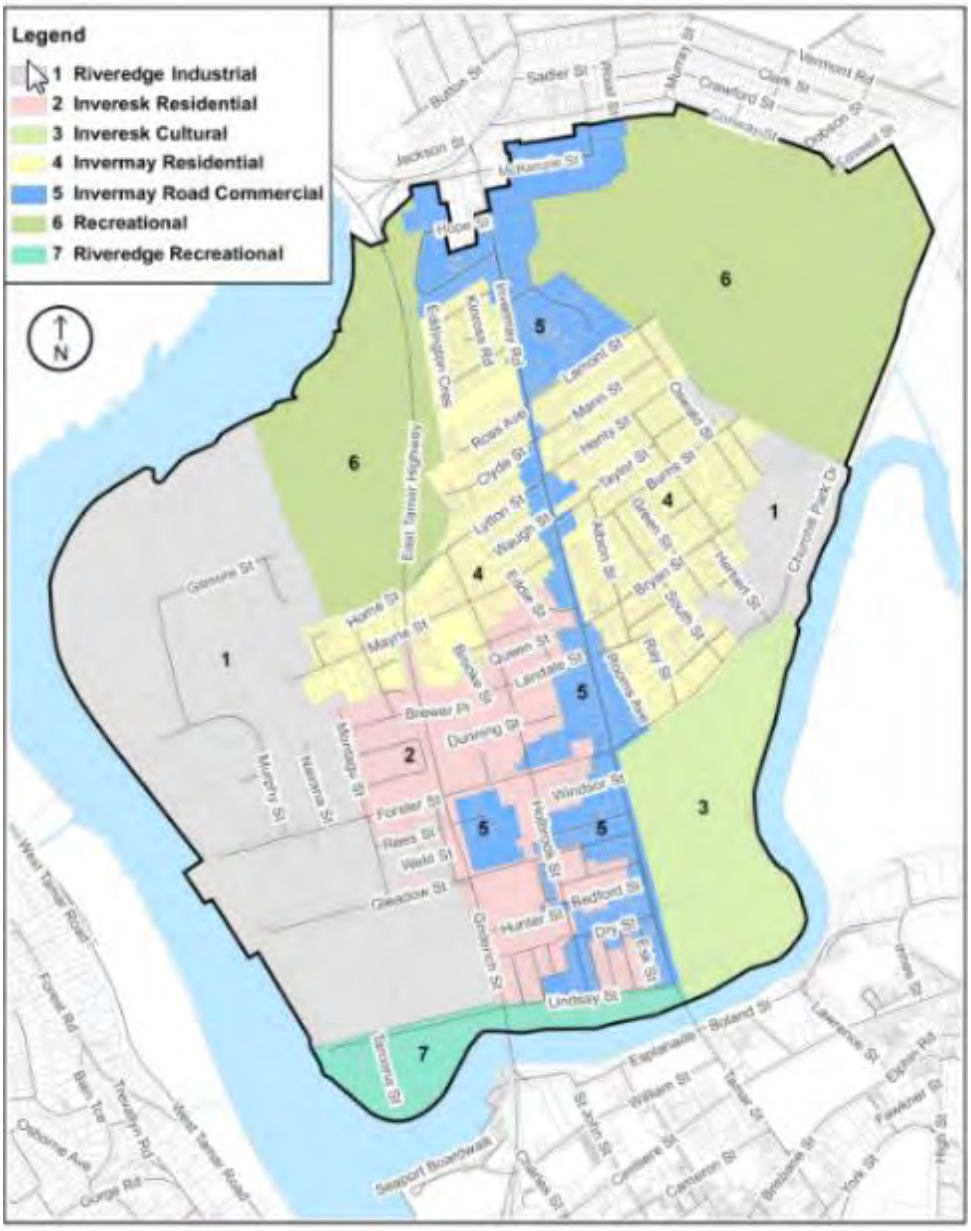

Figure 5: Precincts referred to in IIFIA Code

Clause E16.7 of the IIFIA Code provides development standards. Clause E16.7.1 specifically restricts the intensification of residential development outside of the Invermay Residential Precinct. Acceptable solution A1 (with no alternate performance solution available) provides:

> *Except within the Invermay Residential Precinct, new residential development or extensions of existing residential buildings:*

(a) must not increase the gross floor area of individual dwellings or total gross floor area by 10% more than that existing or approved on the 1st January 2008;

(b) must not result in more than 200m² of gross floor area on a single title; or

(c) must be for residential uses associated with the educational activities within the Inveresk Cultural Precinct.

Acceptable solution A2 effectively restricts any further land subdivision that creates new residential lots allowing only the subdivision of multi-dwelling or mixed use development that have been approved by Council on a single title.

Clause 16.7.2 outlines FRM development standards, which in summary are:

- Residential habitable floors to be a minimum 3.7m AHD (no performance criteria).
- Buildings with residential use in the Inveresk Cultural Precinct must be sited and designed in accordance with reports that address structural soundness, flood compatible building and emergency management procedures (performance criteria only – no acceptable solution).
- Non-residential habitable floors to be a minimum 3.4m AHD for a maximum of 400m^2 or 10% more than existing. Alternatively the performance criteria applying to residential development (as above) would need to be satisfied.

BMT found no evidence of the origins of the specified floor level heights of 3.7m and 3.4m AHD, but noted that they believed the levels were adopted prior to the 2008 flood study. Council believes that the Planning Scheme adopted this height because it was implemented as a specified floor level into the Tasmanian building regulations at the time. BMT found that they correspond approximately to their 2050 planning projections for the 5% AEP flood level of 3.5m AHD (excluding a freeboard allowance)[15].

Specific Area Plans

Part F of the Planning Scheme also contains specific area plans (**SAP**s) that provide prevailing site specific development controls. Launceston Plaza Retail Specific Area Plan (F9.0) is located within the Study Area. That SAP is primarily concerned with managing the size and nature of development so as to minimise retail impact and has no direct FRM implications.

3.3 Analysis, Options & Recommendations

3.3.1 Requirement of Brief

The requirements of the brief relevant to this report are:

TASK 3 - Apply best practice land use planning principles and policies to the identified flood risk.

· Make recommendations regarding the identified flood risk and possible land use planning treatment options, taking into account any relevant guidelines and policies;

[15] 5 BMT, Best Practice Review, (2019) pg.7

· Work collaboratively with Council officers to formulate 'risk based' land use planning principles, policies, zoning decisions/ scenarios, and use and development controls in accordance with best practice; and

· Provide reporting to Council of the recommended planning principles and policy.

The consequential outcomes of the above considerations are:

- General recommendations in regard to the acceptability of existing zonings.
- Recommendations for an appropriate flood overlay map
- Draft FRM provisions for a Specific Area Plan (**SAP**) to replace and expand existing code provisions in the Planning Scheme

Our brief was accompanied by Council's Discussion Paper, that provides an analysis of the existing policy context and current issues, and a discussion about emerging principles for improved ways to integrate FRM with planning. The Paper identifies 4 possible policy responses that Council could adopt:

1. Maintain the status quo
2. Implement controls for all land mapped for a 1% AEP event
3. Take a comprehensive risk-based approach
4. Take a modified risk assessment approach – the risk matrix

Option 4 was recommended by the Discussion Paper[16]. The Paper describes this option as follows:

> *The risk matrix would combine flood hazard maps from multiple flood events into a single map using a risk prioritisation framework.*
>
> *The framework describes and categorises various levels of flooding risk. The framework would incorporate non-hydraulic factors of risk, such as the degree of exposure of a population, and population characteristics such as vulnerability and tolerability. (This is different to the approach recommended by the Managing the floodplain handbook.)*

That approach, with refinements, has been applied by the flood risk mapping exercise undertaken by Molino Stewart. It provides a highly sophisticated tool for considering FRM issues in the Study Area for strategic planning (ie plan making) purposes. However, a targeted framework to guide the establishment of planning controls for development assessment purposes is also required.

3.3.2 General Principles

The primary objective of FRM is to minimise the chance of loss of life and damage to private property and public infrastructure, and to maximise the resilience of the community and built environment for when floods do have an impact. At the same time, this objective needs to be balanced with the benefits flowing from the use, occupation and development of flood prone land.

[16] Council Discussion Paper, pg.45.

The only way to completely remove flood risks from a development is for it to be located outside the extent of the probable maximum flood (**PMF**)[17]. That would be a very risk-averse approach to floodplain management, not normally supported by the community or practically achievable particularly for the established urban areas of the Study Area.

As a general rule, almost any development involves some risks to property or people. For example, construction of a new subdivision introduces traffic risks which may be managed (through construction of traffic lights, signage, etc) but are not completely eliminated. Rather the risks are reduced to a level which is considered acceptable to the community. Flood risks are managed in a similar fashion. Nevertheless, in some situations if the residual risks remain unacceptably high (ie intolerable), alternative safer forms of development should be pursued.

Consequently, best practice consideration of FRM in planning involves applying a risk management approach. This requires an understanding of risk management principles and their application to FRM, as discussed below.

3.3.3 Understanding Flood Risks

Within the context of this report, 'flood risk' is defined as the combination of probabilities and consequences that may occur over the full spectrum of floods that are possible at a particular location. Note a more detailed analysis of flood risk, and how it manifests within the Study Area, is provided by the main report prepared by Molino Stewart.

It is important not to confuse 'flood risk' with 'flood hazard'. The term 'hazard' is associated with the magnitude and behaviour of a specific flood. For example, a site may experience high hazard conditions in a 1:100 per year chance flood and low hazard conditions in a 1:5 per year chance flood. On the other hand, the term flood risk used in this report does not relate to a single flood, but rather to all floods. It presents a single measure of a site's exposure to all its flood threats.

As flood risk combines all the probabilities and consequences of flooding over the full spectrum of flood frequencies that might occur at a site, it can be expressed in mathematical notation as follows:

$$\textit{Flood Risk} = \int_{\textit{all floods}} \textit{Probability x Consequence}$$

where probability is the chance of a flood occurring, and consequence is the property damage and personal danger resulting from the site's flood characteristics.

General Approaches for Managing Flood Risks

In principle there are 3 ways to manage flood risks:

[17] Handbook 7, pg. 88 defines "The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from PMP and, where applicable, snow melt, coupled with the worst flood-producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood-prone land – that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event, should be addressed in a floodplain risk management study."

1. **Avoid the risk** (property modification measures) – land use zoning and prohibitions on land use are the key management options by which flood risk is avoided. Inappropriate flood risks can be avoided by ensuring that only development compatible with the flood hazard is allowed to locate in the floodplain;
2. **Reduce the likelihood** (flood modification measures) – construction of detention basins, levees and other structural measures can reduce the probability of flooding; and
3. **Reduce the consequences** (property modification and response modification measures)– applying a range of measures on development including setting floor levels and other planning controls, and educating the community about what do when there is a flood.

In every situation, avoiding the risk through effective land use planning is the preferred option, if possible. Nevertheless, due to a range of other non-flood related opportunities and constraints some use of some floodplain land may still be the preferred option for the community.

As flood risk comprises risk to property and risk to life, the management of flood risk considers options for managing both the risk to property and risks to personal safety.

3.3.4 Risks to Property

The most common method of reducing the consequences to property is by controlling the height of floor levels relative to a given probability flood. A range of flood planning levels (**FPL**s) are usually established for this purpose that relate to different land uses and different building components (e.g. habitable floors and non-habitable floors). The Molino Stewart risk assessment provides a ranking of land use resilience that reflects typical community acceptance of higher levels of property damage for recreational buildings ranging to lower levels of property damage for community uses and critical infrastructure.

Traditionally the 1:100 per year chance flood (plus freeboard) FPL has been considered to be an acceptable level of risk generally for the habitable floors of most residential, commercial and industrial properties, and also to delineate the land extent zoned for urban development in new areas. However, FPLs can vary between land uses or components of development. Ideally FPLs should be based on risk assessments such as that prepared by Molino Stewart. In some cases mitigation measures such as filling could reduce the likelihood of flooding, and consequently risk, to facilitate development at acceptable levels of risk.

In addition, other complementary controls are used to manage property risks including the use of flood compatible building materials as well as ensuring buildings are strong enough to withstand the forces of flood waters without collapse. These types of controls are discussed as part of the SAP recommendations.

3.3.5 Risks to People

Risk to life should be seen as a key flood constraint when undertaking strategic planning for potential new development. Planning can assist in managing risks to people with a range of measures including recognising evacuation and emergency management constraints, and increasing the community's awareness and preparedness for flooding.

The following are general principles for consideration for planning purposes:

- **location of new use and development** – in areas free of flood risk or where evacuation away from the flood risk, or if appropriate sheltering in place, is possible

- **use proposed** – for example developments such as seniors housing and child care centres can have limited capacity for self-evacuation and may induce risky behaviour with guardians seeking to travel into flood affected areas to retrieve seniors or children.

- **form of development** – so that it is designed to allow for pedestrian and/or vehicular evacuation, and buildings that are structurally resilient to the forces of floodwaters if required to provide a refuge for sheltering in place.

- **connections between developments and safe refuges or support facilities** – to ensure that pedestrian paths and road systems are designed to facilitate evacuation and access to safe refuges, support facilities and/or evacuation centres.

These principles are relevant considerations in regard to both strategic and statutory planning.

3.4 Strategic Planning

Principles

- Planning provides the best way of preventing an increase in flood risks.

- Planning should avoid any increase in intolerable flood risks.

- Where possible, any increase in tolerable flood risks should be avoided or minimised. In determining what is possible, consideration should be given to whether the tangible and intangible costs of actions required to avert an increase in flood risk provides the best outcome for the community when balanced with broader social, economic and environmental desired outcomes.

Existing and Projected Situation

The current FRM planning context for the Study Area has evolved from the interplay of several factors over the last 3 decades. During this time the understanding of flood risk in the Study Area has changed. As outlined above in section 1.2 of this report, the current FRM planning controls are inadequate.

The Molino Stewart risk analysis has concluded that substantial proportions of the Study Area will be subject to intolerable risks in the future based on a continuation of the current planning approach. As summarised in **Table 4,** and depicted by **Figure 6**.

Table 4: Summary of Future Study Area Risk Levels

Year	Development Scenario	Predicted Number of Lots (Properties)		
		Acceptable Risk	Tolerable Risk (subject to ALARP)	Generally Intolerable Risk
2020	Existing development	1,811 (70%)	760 (30%)	0 (0%)
2050	no further development	1,346 (52%)	1,015 (40%)	210 (8%)
	development capacity fulfilled by 2090	1,421 (53%)	1,062 (39%)	212 (8%)
2090	no further development	669 (26%)	902 (35%)	1,000 (39%)
	development capacity fulfilled by 2090	745 (26%)	1,027 (36%)	1,091 (38%)

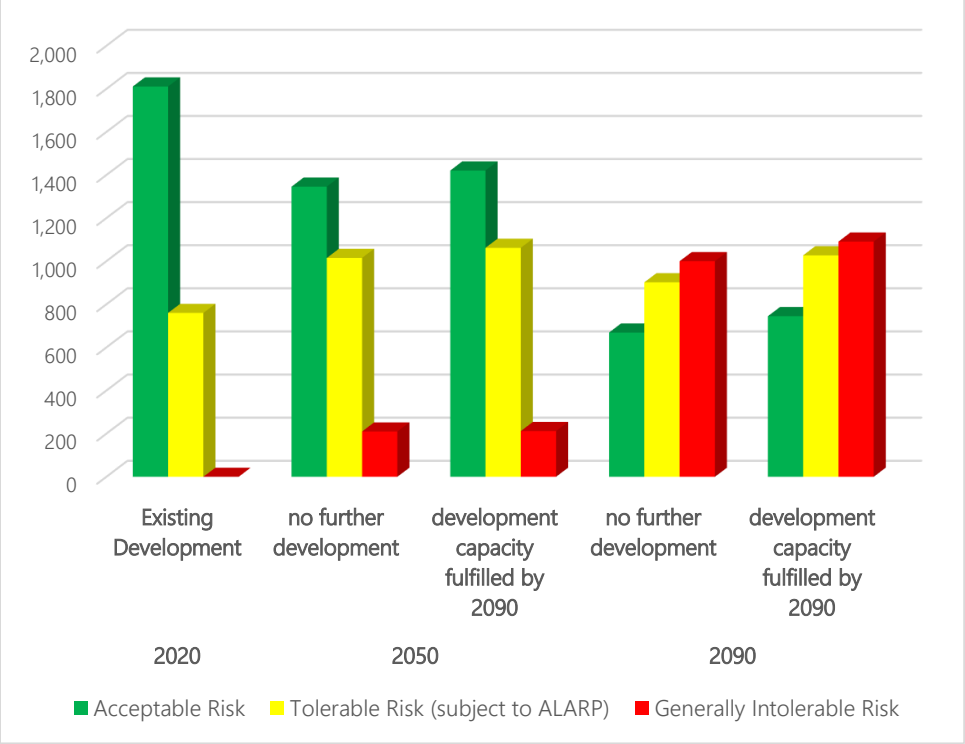

Figure 6: Summary of Future Study Area Risk Levels

The risk analysis concludes that just less than a third of the Study Area is presently (2020) subject to tolerable risks, none is subject to intolerable risks and the balance is subject to acceptable risks. This is primarily due to the protection provided by the flood levees assuming no breaches would occur. The risk profile of the Study Area increases into the future mainly due to climate change factors causing a worsening of flood levels and overtopping of the levees. As discussed further later, additional development contributes to the increasing risk profiles, albeit to only a minor extent.

The planning precincts[18] where intolerable flood risks are mostly projected to increase are outlined in **Table 5**, generally in order of greatest to least[19] compared with existing land use zonings under the Planning scheme (see **Figure 7**).

Table 5: Planning Precincts with Most Increasing Intolerable Risks

Precinct	Land Use Zoning[20]
Precinct 2 - Inveresk Residential	11.0 Inner Residential
Precinct 4 - Invermay Residential	10.0 General Residential
Launceston City – Newstead	15.0 Urban Mixed Use, 23.0 Commercial, 24.0 Light Industrial, 38.0 Particular Purpose and 11.0 Inner Residential.
Precinct 1 – River-edge Industrial	25.0 General Industrial and 24.0 Light Industrial and 23.0 Commercial
Precinct 5 - Invermay Rd Commercial	23.0 Commercial

[18] Refer to Figure 5. The Launceston City – Newstead precinct refers to that area south of the North Esk River.

[19] The projected levels of intolerable risks varies between precincts for the years 2050 and 2090. The 2090 projections have been used but this partly correlates with 2050 projections.

[20] Land uses zones such as open space and rural resource have not been listed as it is assumed that they these parts of the precincts would not significantly contribute to the projected risk levels given their low vulnerability and the likelihood that they would not materially contribute to the development growth projections.

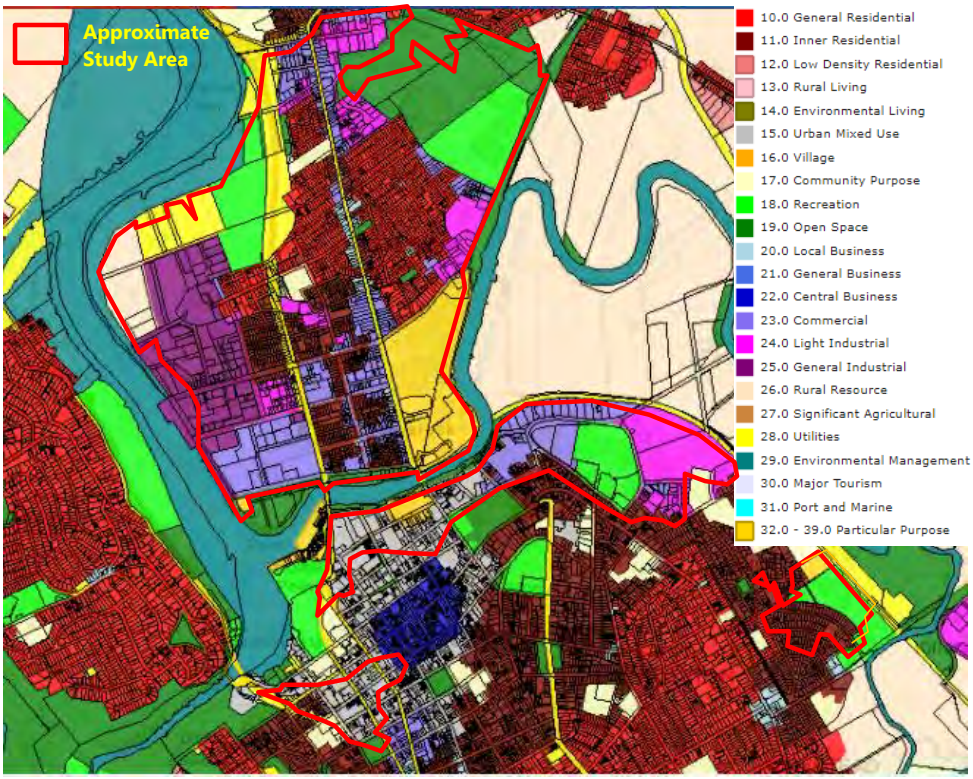

Figure 7: Existing Planning Scheme Land Use Zonings

Discussion

The Molino Stewart risk assessment model considered the following risk components:

- Hazard
- Exposure
- Vulnerability
- Resilience.

These components were combined to determine the total flood risks within the Study Area for the years 2020, 2050 and 2090. The modelled risk levels were then classified into the following tolerability categories[21]:

- ***Acceptable Risk*** *(green area). This risk level is generally acceptable as is, without necessarily requiring risk reduction measures;*

[21] Consistent with the QRA (2011) approach.

- ***Tolerable Risk**, subject to ALARP principle (yellow area). This risk level is tolerable, provided that measures are put in place to reduce the risk to a level As Low As Reasonably Practical (ALARP). There are different tools available to establish what constitutes a level ALARP, including undertaking a cost-benefit analysis of possible risk reduction options. This is a typical exercise undertaken in floodplain risk management;*

- ***Generally Intolerable Risk** (red area). This risk level is too high and, in general, it should be reduced or eliminated regardless of the cost of doing so.*

By 2090 nearly half (46%) of the Study Area properties will be subject to intolerable risks. Just over a further third (37%) will be subject to tolerable risks that will need to be managed. Based on the assumptions adopted in the Molino Stewart risk analysis, the proportion of properties subject to these risk levels does not change as consequence of planned growth but the total quantum of properties increases by about 10%-11%. The increase in at-risk properties substantially relates to an increase in hazard and exposure levels.

Consequently, there would be a significant increase in the number of at-risk properties regardless of planned growth.

Options

In order to achieve the FRM principles outlined above, action is required to prevent an increase in the number of properties that will be subject to intolerable risks and to minimise and manage the number of properties that will be subject to tolerable risks. This action needs to apply to both existing and planned future development although planning controls are limited in regard to what they can do for existing development.

In order to reduce the number of properties that will be subject to intolerable risks, the options available are effectively restricted to:

1. Reducing the exposure and vulnerability risk components through flood modification measures.

2. Reducing the hazard and exposure risk components through the imposition of planning controls on new development and possibly through the redevelopment of existing areas.

3. Increasing the resilience of the community.

If there are viable mitigation measures, Option 1 will benefit both existing and future development but will have economic and potentially environmental costs. Option 3 can be pursued irrespective of any changes to planning controls, and measures such as increasing the preparedness of the community are normally important components of any FRM strategy. The examination of these options are beyond the scope of this report.

Option 2 is the principal FRM measure relevant to planning. At the strategic planning level the potential actions that could be considered to reduce the hazard and exposure risk components affecting development include:

a. Restrict any new development in areas where hazard and exposure risk components are projected to markedly increase.

b. Facilitate and encourage redevelopment to improve the compatibility of development with flood hazards with measures such as increased floor levels, flood compatible materials and design, and structural soundness.

c. Review the zoning of land in the aim of reducing the number of vulnerable land uses in areas subject to increasing levels of flood hazard and exposure.

d. Consider opportunities for transformational change to existing development, where this aligns with broader social, economic and environmental strategic planning goals, that could reduce the flood risk profile of the Study Area in the long term.

Option 2a

Option 2a would involve restricting any further development in areas predicted to be subject to intolerable risks in 2050 and 2090. This would require planning measures that, for example, prevent a net increase in residential dwellings, an increase in commercial, industrial and community use floor spaces and any further subdivision. This would primarily relate to Inveresk Residential, River-edge Industrial and Launceston City/Newstead precincts up to 2050 and nearly every precinct up to 2090 other than parts of Invermay Residential, Invermay Commercial and Launceston City.

Additionally in this option further development would be limited and carefully managed in areas with increasing levels of tolerable risk. For example, land uses at the more vulnerable end of the spectrum such as seniors housing, hospitals and child care centres could be prohibited and appropriately stringent planning controls would be imposed on other new development (as discussed later).

Given that the projected increase in risk levels is substantially related to existing development, Option 2a would not a have a significant effect in reducing overall future risk levels in the Study Area. Further, wholescale restrictions on all future development would need to be assessed with regard to the broader planning objectives for the area and potential economic and social impacts.

The assessment of future risk levels is based on projected growth having regard to the development potential of properties under current planning controls. Over a 30 to 70 year planning horizon, development expectations and planning controls could change, and accordingly this will require regular monitoring and review. The Molino Stewart risk assessment model will provide a sound basis to review proposed planning changes into the future.

Option 2b

This option is likely to have the greatest potential to minimise an increase in future risk levels in the Study Area. This is because it would have the potential to reduce risk levels of existing properties that would otherwise unlikely change their existing exposure risk profiles based on current zoned development potential. This would be in addition to a reduction in risk levels for projected new development.

Option 2b would involve targeting areas which are projected to have increasing hazard and exposure risk levels (primarily due to climate change) and formulating planning strategies that transitioned the areas to less vulnerable land uses and/or encouraged redevelopment with building forms that were compatible with these future risk factors (eg higher habitable floor levels and flood compatible buildings materials).

Such a planning strategy would require diverting from the objectives of current zoning and planning controls and would therefore need to be considered as part of a broader planning exercise that considered the full range of standard planning considerations (such as economic demand, traffic, heritage and urban design). If found to be viable, the planning horizon for such an option would be long term in order to progressively transition the area contemporaneously with increasing flood risks (ie over a 30 to 70 year time frame).

Option 2c

This option would involve retaining existing land use zones but including additional area specific controls that prohibited land uses with high levels of vulnerability.

The 11.0 Inner Residential and 10.0 General Residential Zones relate to precincts where significant increases in risk levels are projected (see Table 5). The range of permitted uses in these zones includes uses with relatively high levels of vulnerability such as educational and occasional care, community meeting and entertainment and visitor accommodation. Prohibiting such uses could, over the long term, minimise the risk profile of the Study Area.

Option 2d

The Molino Stewart risk assessment reveals that there would be a substantial increase in the risk profile in the Study Area over the next 70 years to existing development, which cannot be managed directly with planning controls on new development. Consequently, it will be important for Council to consider opportunities for transformational change to existing development, where this aligns with broader social, economic and environmental strategic planning goals, that could reduce the flood risk profile of the Study Area in the long term.

Recommendations

All options should be considered as part of a broader strategic planning exercise for Launceston City. Particular attention should be focused on Options 2c and 2d as these are likely to have the greatest effect on reducing the risk profile for the Study Area in the long term.

3.5 Statutory Planning

3.5.1 Overview & General Principles

Various planning controls are applied through the Planning Scheme. As discussed above, the Launceston Planning Scheme includes several codes relating to flooding for different areas. These Codes may apply to land shown as flood risk areas on the planning scheme overlay maps or identified in a report submitted with a permit application. The Scheme exempts certain developments that have low vulnerability to flood hazards and outlines performance criteria for most forms of development. As noted in Council's discussion paper provided with the brief, the overlay maps do not give a true indication of Launceston's flood-prone areas, and the provisions of the Planning Scheme no longer adequately address FRM.

A risk management approach would allow the adoption of different flood planning levels (**FPL**s) to target different components of a development (e.g. habitable and non-habitable floors, carparking, private open space, etc) as well as managing different land uses with different vulnerability and exposure risk levels. Different FPLs can also be used for other purposes such as to define the standard

to which buildings need to be certified as structurally sound, the level at which flood compatible materials need to be installed, or the extent of the floodplain to be considered when assessing external flood impacts.

For statutory planning purposes, the primary use of a flood overlay map is to trigger approval pathways and what FRM considerations (if any) should apply. At the same time, such a map should communicate a message that is consistent with other sources of information and not misinform the community about actual flood risk. Overlay maps which show flood risk within 3 categories of low, medium and high flood risk is normally sufficient to achieve this aim[22].

A Planning Scheme overlay map prepared on the basis of the above would not replicate any individual risk assessment map prepared by Molino Stewart, but would broadly correlate with the risk assessment maps as a whole. A low flood risk precinct should generally reflect areas broadly determined to be subject to acceptable risks where planning controls would mainly target more vulnerable uses while emergency management is considered for all uses. A medium flood risk precinct should primarily relate to areas of tolerable risks and manage flood risks associated with all land uses through the application of planning controls. A high flood risk precinct would seek to target areas with intolerable risks to restrict new development that could contribute to an increase in properties with intolerable risks.

The above principles enable the application of a risk management approach to achieve a balanced level of control. The strictness of controls can be varied depending on the vulnerability of the land use and the hazard and exposure identified for different parts of the floodplain. This is an adaptation of the flood planning matrix approach[23] that has been used extensively in the formulation of planning controls in NSW for some time, and the principles of which are more recently being applied in Queensland.

In applying the above approach, decisions are required about the different individual parameters in the matrix, as discussed below.

3.5.2 Area of Application for the SAP

Principles

- The area to which the SAP applies should at least be sufficient to capture all possible proposed developments in all locations, in order to ensure required FRM outcomes are achieved
- Should not miscommunicate the area where flood risks exists.

Existing Situation

The IIFIA Code currently applies to all the land protected from flooding by the levees existing at that time. The FPAC does not apply to land mapped on the overlay as subject to the IIFIA Code. With the construction of new levees, there are three discrete levee protected areas to the south of North Esk River that are currently not subject to the IIFIA Code.

[22] This aspect was considered by the Queensland Commission of Inquiry (2012, pg.68) , which recommended that Councils "...should develop a flood map which shows 'zones of risk' (at least three) derived from information about the likelihood and behaviour of flooding."

[23] Bewsher & Grech, May 1997, *A New Approach to the Development of Floodplain Controls for Floodplains*, paper presented to the 37th Annual Floodplain Management Conference, Maitland

Discussion

While terminology differs between jurisdictions across the country, for the purposes of this report we refer to the area to which FRM related development controls apply as the flood planning area (**FPA**).

An important distinction between the Study Area compared to most other floodplains is that its risk profile is moderated by the protection provided by the levees. As discussed in Council's discussion paper[24] levees paradoxically reduce risk through the physical mitigation of flood waters while at the same time can increase risks by eliciting unwarranted complacency when taking into consideration the potential for overtopping or breaching. Consequently, the area of application of the SAP should have regard to levee failure. As discussed later, this is consistent with the approach adopted by existing planning controls, that for example adopt minimum floor level standards based on a no-levee situation.

An important consideration in the flood risk assessment undertaken by Molino Stewart is the projected effects of climate change. This is expected to increase the frequency and severity of flooding. Therefore, to plan for the same level of immunity expected today across a 30 to 70 year planning horizon[25], bigger and rarer floods need to be considered. The Molino Stewart risk analysis concludes that despite the protection provide by the levees, within 70 years' time, over 80% of the Study Area will be subject to either intolerable flood risks, or flood risks that warrant managing.

While the Molino Stewart identifies that a minor part of the Study Area would be subject to tolerable flood risks in 2090, these areas would still be subject to some flood risks. The Molino Stewart analysis is substantially based on current land uses, while the SAP will manage future land uses. Potential development permitted under current zoning, setting aside the added restrictions provided by the IIFIA Code can comprise a range of land uses with differing vulnerabilities to flooding. Applying a risk based approach, the more vulnerable of such uses should be managed, even where flood risks are low.

Consequently, there is no justification for retracting the FPA for the purposes of the proposed SAP in comparison to the IIFIA Code. However, it would be logical to include the levee protected areas currently not captured by the IIFIA Code, within the new SAP, to provide consistency.

While beyond the scope of this report, a separate review of the FPA to which the FPAC applies would be desirable. Ideally the rationale for defining the extent of application of the FPAC should be reviewed to be consistent with a risk based approach. Initial discussions with the Flood Policy Unit of the Tasmanian State Emergency Service indicates that this correlates with their project soon to be initiated regarding the review of land-use planning and building controls for the FPAC.

FRM related planning controls could apply to highly vulnerable development on land subject to any potential flood. For example, it would be ideal from a FRM perspective to ensure that hospital facilities are located in areas subject to no flood risks so that they would be available if needed in a flood catastrophe, despite the low likelihood of such an event.

Additionally, emergency management plans typically provide for the evacuation of an area during a flood to safe refuges, normally identified in locations outside of the floodplain, in case flood levels

[24] Launceston City Council 19.02.2020, pg.40.

[25] This relates to the 2050 and 2090 climate change planning horizons and would reasonably equate to the expected life span of most buildings.

ultimately rise to levels associated with extreme events. Consequently, emergency management awareness programs allude to extreme events such as a PMF. Planning controls do not normally impose building standards based on extreme events on development other than more vulnerable development. However, it is desirable for messaging about flood risks provided through the Planning Scheme to not confuse or misinform the community about actual flood risks, even if it does not necessarily lead to the application of FRM planning controls.

A practical approach would be to apply an FPA that encapsulates all land potentially affected by flooding. This does not mean that FRM controls would apply to all development within an extreme flood extent or that such a flood would be used to establish the FPL for elements such as minimum residential floor levels. However applying a risk based approach, the level of an extreme flood could for example be used to establish the floor level of vulnerable uses and on-site refuges if shelter in place was considered an acceptable emergency management strategy.

There is no consistent approach amongst other jurisdictions. Victorian Councils have a mandated FPA limited to the 1% AEP flood. Queensland Councils, post the Queensland Floods Commission of Inquiry, are adopting FPAs for land extending above the 1% AEP flood but typically capped at large floods such as the 0.2% AEP (a 1 in 500 per year chance) flood. The equivalent of a code/SAP in NSW (Development Control Plans) apply FRM controls to land varying from the 1% AEP flood extent plus 0.5m freeboard up to the PMF.

Options

For the purposes of specifying the area of application for the proposed FRM SAP (**FPA**), adopt the extent of:

1. The area subject to the current IIFIA Code
2. All levee protected lands (ie the Study Area)
3. All levee protected lands excluding the areas identified as being subject to tolerable risks in 2090.

Recommendations

The SAP should apply to all levee protected lands. Consequently the FPA, for the purposes of the SAP, would be the whole of the Study Area.

This FPA would allow for multiple FPLs to be applied to different types of development and components of development using a reasonably robust risk based approach to the formulation of planning controls.

3.5.3 Precincts Within the SAP

Principles

- A range of flood risk precincts should delineate areas that reflect a range in flood risks.
- The precincts should be able to trigger approval pathways and FRM controls that are commensurate with the level of risk that a development would be subject to at any particular location.

- The precincts should not conflict with general flood awareness messaging.

Existing Situation

Neither of the 2 existing codes provide flood risk precincts based on known current flood extents or composite flood risk information. However, the existing codes do provide variable FRM standards that relate to different flood levels (eg for habitable versus non-habitable minimum floor levels).

The FPAC applies to a single area that is not disaggregated into flood risk precincts. Council advises that the boundary on the overlay map was based on the 1% AEP flood extent known at the time the Code was drafted, excluding land protected by a levee.

The IIFIA Code applies to the land protected by a levee at the time the Code was drafted and divides its area of application into precincts based on land use.

Discussion

Historically FPAs have been limited to one area defined by the 1% AEP flood[26] extent. This is the approach adopted by the FPAC. But for reasons discussed above this does not allow for a framework within which a risk based approach can be proficiently applied. Additionally, this does is not an approach that can address the different flood risks that exist for land that has some protection provided by levees.

Levees such as those constructed for the Study Area reduce the frequency of flooding. As outlined in the Molino Stewart Risk Assessment, the Study Area levees provide protection up to a 1%AEP flood under current climate conditions but as a result of climate change, the levees may be compromised in a 1% AEP event from the year 2050. Floods rarer than this may breech the levees and impact upon the protected area.

When a levee is breached this can have catastrophic effects. FRM for levee protected areas has evolved significantly in the last death decade, especially due to significant catastrophic flood events around the world which have resulted in the breaching of levees, moving from an engineering focus to a more holistic risk management approach that takes into account the residual risk behind levees[27]. Such a risk management approach is consistent with that described earlier and necessitates the division of the potentially flood affected areas into precincts of differing risks in order to provide a range of planning controls that reflect the vulnerability of different land uses and the potential hazard within different locations.

Land use based precincts have the advantage of aligning precisely to areas with different planned outcomes so that FRM controls can be conspicuously tailored to marry with those outcomes. However, this approach does not reflect an understanding of the varying levels of flood risk that exist across the floodplain. This approach is not standard practice and, while that is not a reason to dismiss it, there are greater advantages with using flood risk precincts.

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[26] While floods are typically technically described in terms of probability of it occurring, expressed as a percentage (eg 1% Annual Exceedance probability – AEP) this is often misunderstood by the general community as the frequency with which the flood will occur (eg. only once in every 100 years). Consequently, it may be better understood if expressed as the chance of that flood occurring in a single year.

[27] For example the 2005 floods in New Orleans during Hurricane Katrina, the 2010 floods in La Faute-sur-Mer in France, and the 2019 floods in Sainte-Marthe-sur-le-Lac in Montreal, Quebec, see Serra-Llobet, at al.

An approach that structures FRM planning controls using flood risk precincts based on flood behaviour and frequency, has the following advantages:

- Strategic planning outcomes for an area can be considered independent of FRM strategies. Flood risk should inform planning strategies but will be only one consideration.
- As modelled flood risks can change over time (due to factors such as climate change, the effects of development, and new modelling techniques), the delineation of flood risk precincts can change independent of land use planning precincts.
- It allows for a less complicated format for the application of FRM controls that at the same time uses a risk based approach. FRM controls, such as minimum floor levels, could apply to the same land use across 3 flood risk precincts as opposed to 7+ land use planning precincts. Similarly, land uses with the same level of vulnerability could be collectively specified in the same controls (such as sensitive uses in areas of low flood risk).
- The use of flood risk precincts provides an added opportunity to inform the community about the varying flood risks in an area that is consistent with the messaging provided by flood awareness programs. While this is not a key function, planning controls inadvertently are a source of information about flood risks for the community.

Assuming the application of flood risk precincts, there remains a question as to how to define these precincts. As discussed above, the risk assessment mapping undertaken by Molino Stewart provides a sound basis for strategic planning purposes and to inform the planning controls in the SAP but does not lend itself to establishing flood risk precincts for the purposes of the SAP. The flood risk assessment mapping provides a synopsis of flood risks at different points in time, reflective of current land uses, while flood risk precincts are required to implement planning controls to minimise the flood risks that future development would be exposed to. For example one criterion for determining the exposure risk component is existing above floor flooding, while an expected purpose of the planning controls will be to set minimum floor levels. Further, the vulnerability flood risk component could decrease over time with the gentrification of an area but it would not necessarily follow that the stringency of FRM planning controls should reduce.

Where flood risk precincts are used in NSW and Queensland, they are primarily based on flood extent and behavioural information, and to some extent emergency management constraints. Noting that the principal purpose of these precincts is to trigger approval pathways and FRM considerations, a simple approach is desirable to allow for it to be easily understood and updated. We have considered 2 approaches:

- Use of Flood Planning Constraints Categories (**FPCC**s) as specified by *Guideline 7-5 Flood Information to Support Land-use Planning*[28].
- A more simplistic approach that uses easily understood nomenclature in regard to natural hazards (ie low, medium and high risk) that primarily relies on basic flood extent and behavioural information.

Guideline 7-5 provides a basis for a simplified grouping of flood risk information across a range of flood frequencies into 4 FPCCs. This information includes a single map (or map series) outlining

[28] This is a supporting document for *Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia* (Australian Institute of Disaster Resilience – AIDR, 2017)

FPCCs and information on the implications of flooding in the different FPCCs. This information can be used to inform the preparation of strategic plans and land use zone boundaries but is more complex than needed to establish flood risk precincts for the SAP.

A relatively simplistic approach to determining flood risk precincts (**FRP**s) is outlined by **Figure 8**, adopting the information currently available and applying approaches increasingly used in NSW and Queensland that are consistent with the risk based approach outlined in Figure 8. To retain consistency with the minimum floor level standards as discussed below, all the FRPs are based on flood extents projected for the year 2050.

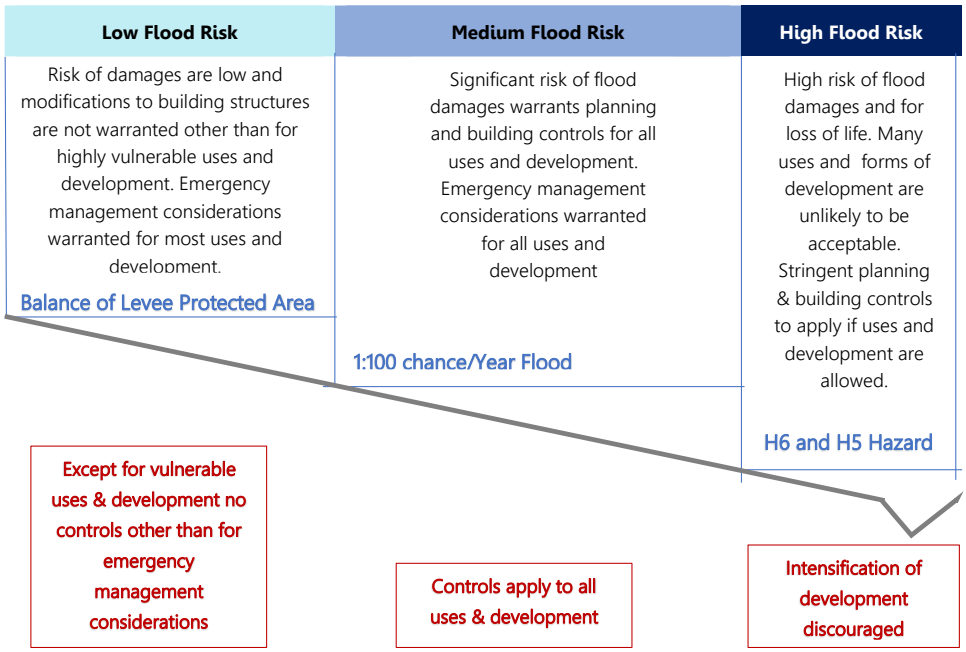


Figure 8: Criteria for Flood Risk Precincts[29]

The application of the above criteria to the Study Area is illustrated by **Figure 9**.

[29] The figure is intended to conceptually represent one side of a floodplain, which is reflected by the grey line that ends at the watercourse at the lower end of the line within the high flood risk precinct.

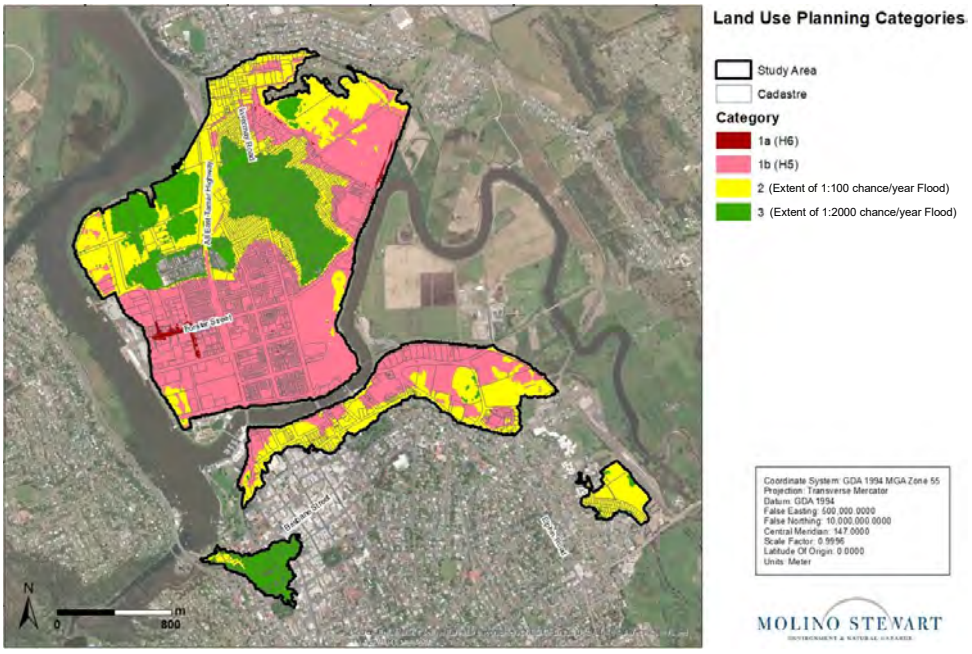


Figure 9: Mapping Criteria for SAP Overlay Map

The 1:100 chance per year flood is based on existing modelling that assumes no levees are in place. For reasons discussed above, this addresses the levee paradox conundrum.

In order to use flood modelled information to delineate the low flood risk precinct, a 1:2,000 chance per year flood was used. As shown by Figure 9 this leaves a small island in Invermay above the reach of the modelled 1:2,000 chance per year flood. Given that this area would be isolated with the potential for more extreme flooding, it is considered appropriate that this area be included within the low flood risk precinct. Further "smoothing" of the precinct boundaries should be undertaken in the preparation of the final flood risk precinct maps, such as ignoring small insignificant pockets of alternate mapped land within large expanses of land, which would otherwise be mapped within a single flood risk precinct, to provide for the more efficient application of the SAP.

As the delineation of the FRPs is based on a combination flood frequency, hazard and isolation factors, they are technically not depicting risk. The use of the word "risk" in the naming of the FRPs is to provide a term readily understood by the community and is not intended to replace the more technical understanding of the term as specified by ISO 31000:2009. However, there is a strong correlation between the FRPs and the comprehensive risk assessment undertaken by Molino Stewart.

Options

1. Do not adopt any flood risk precincts, that is do not distinguish between different parts of the Study Area.

2. Adopt flood risk precincts based on land use. The precincts currently adopted by the IIFIA codes plus a further 2 precincts for the areas south of the North Esk River could be adopted.

3. Adopt flood risk precincts based on a combination flood frequency, hazard and isolation factors. Low, medium and high flood risk precincts could be adopted based on the criteria described in Figure 8 and generally based on the information depicted by Figure 9.

Recommendations

Option 3 is recommended as this provides a reasonably simple approach that best meets the principles for flood risk precincts discussed above.

3.5.4 FRM Standards

Principles

- A spectrum of FRM controls should be adopted that provides practical measures to reduce residual flood risks to development and uses permitted on flood prone land.
- The stringency of the controls should be adjusted commensurate with the vulnerability of the development and use, and the flood hazard at its proposed location.
- The planning controls should be based on the latest most reliable information.

Existing Situation

At present only non-habitable buildings are exempt from the IIFIA Code and the following are exempt from the FPAC[30]:

a) use or development within the Resource development use class, other than habitable buildings;
b) extensions to existing habitable buildings where the gross floor area does not increase by more than 10% over the gross floor area that existed as at the effective date;
c) outbuildings;
d) use or development of land in the Passive recreation and Natural and cultural values management use classes; and
e) subdivision for boundary adjustment in accordance with clause 9.3.

The controls in the FPAC are generally limited to performance criteria for the location of sensitive uses and for ensuring the risk to life or property is minimised. It is recognised that they are general standardised controls for Tasmania and do not provide measures that are specific to the risks in any particular floodplain.

The IIFIA Code provides a range of FRM planning controls relating to minimum floor levels, structural soundness, flood compatible building and emergency management, in addition to prohibition of development and uses, but not all controls are applied in each land use precinct.

The IIFIA Code prohibits:

- education and occasional care (except in the Inveresk Cultural precinct) emergency services, hospital services

[30] See clause E5.4.1 of the FPAC

- residential development (except a single dwelling in the Invermay Residential or Inveresk Residential precinct, a multiple dwelling in the Invermay Residential Precinct or where associated with educational activities within the Inveresk Cultural precinct)

- most community meeting and entertainment uses in the River-edge Industrial or Inveresk Residential precincts

Other than in respect of approved development, no subdivision is allowed that would create additional residential development potential. The performance measures allow for potential exceptions in the Invermay Residential Precinct for land above the 1% AEP flood level that was developed at the time of preparing the Code, or where associated with the educational activities within the Inveresk Cultural Precinct.

A key FRM planning control for permitted development is setting a minimum habitable floor level. The minimum floor level FPL specified by the IIFIA Code is 3.7m AHD[31] assuming no levee protection, which is at least 1m below the current 1% AEP level mapped by BMT. This level has lost currency with the undertaking of updated flood modelling. Until the IIFIA Code is updated with a revised minimum floor level, Council has no discretion to refuse an application to develop a habitable room with a floor level at least 1m below the current 1% AEP level.

Based on existing ground levels we understand that a typical residential property in the Study Area is up to 2.5m lower than the current 1% AEP level, assuming no levee protection. With the addition of 0.3m freeboard this results in a minimum habitable floor level above ground level of 2.8m, which approximately equates to a full storey. Consequently this has led to typical residential building outcomes where the ground floor is fully occupied by non-habitable uses such as car parking (see **Figure 10**). We understand that filling of sites is limited to minor works where a site is only marginally, or in part, below the floor level FPL.

The same floor level FPL would apply to commercial development without freeboard, in recognition of the lower capital intensity and private risk profile. However, Council advises that typically performance measures, such as flood compatible building materials and plans of management providing for relocation of equipment and stock, allows for use of ground floors.

[31] Based on an historical 1%AEP flood level of 3.4m AHD plus 0.3m freeboard.

Figure 10: Typical Residential Development with Non-Habitable Ground Floor[32]
(Google Street View)

Discussion

General

The 2 FRM codes applying to the Study Area have different exemptions. As the IIFAI Code provides exemptions specific to the levee protected areas, it would be appropriate to revert to the IIFAI Code exemptions in the new SAP.

Based on our experience in preparing and reviewing FRM planning controls, they would typically fall within one of the following categories:

- Minimum Floor levels
- Flood compatible materials and methods
- Structural soundness
- Off-site flood impacts
- Evacuation and emergency management
- Environmental management.

[32] 131 Holbrook Street, Invermay.

Based on best practice commonly applied in Queensland, NSW and Victoria, and controls already applied in parts of the Study Area, all of the 6 categories of controls are considered appropriate. However, controls under these categories would not be applicable to all land uses within every flood risk precinct.

In addition to the above, the practice whereby the Tasmanian planning schemes can allow for SAPs to prohibit inappropriate uses, provides another potential layer of control. The prohibitions that are imposed under the IIFIA Code were derived as a consequence of the Deed and now form accepted FRM risk reduction measures. Consequently the introduction of new FRM controls could require further consultation with the LFA.

In consideration of the projected increase in flood risks in the Study Area as assessed by Molino Stewart, the intent of the existing prohibitions and restrictions on the intensification of existing uses should be retained at this stage, and integrated into the proposed SAP. There will inevitably be some change to the application of the controls as a consequence of transitioning from a planning precinct to a flood risk precinct base. However, any change that materially reduces prohibitions should only be considered in conjunction with a detail strategy that confirms the viability of a comprehensive redevelopment scheme that would ensure that a net reduction in flood risks would be achieved. Alternatively, applications for some uses, such as community infrastructure, can be given the opportunity to demonstrate that they have been designed to reduce risks to acceptable levels on a performance basis utilising the Molino Stewart risk assessment model.

In addition, prohibitions should be imposed on sensitive and hazardous development that could have undesirable risks associated with flooding. Such uses include for example camping and caravan parks, child care centres, retirement villages, residential aged care facilities, schools and hazardous industry or storage establishments. As above those uses that relate to community infrastructure (child care and centres schools) can be given the opportunity to demonstrate, on a performance basis, that they have been designed to reduce risks to acceptable levels.

For the purposes of applying a risk based approach multiple FPLs can be applied. The selection of appropriate FPLs in this case needs to consider additional risk factors associated with the flood levees surrounding the Study Area. At present the existing levees, under current climate conditions and assuming no breaching, would prevent any flooding of the Study Area in a 1% AEP event. However, floods larger than a 1% AEP could occur and recent modelling has shown the potential for breaching in a 1% AEP event from 2050. Consistent with the intent of the Deed various planning controls are currently imposed to reduce flood related risks to new development having regard to risk elements such as larger floods and the potential for levee breaches and failure. For example certain vulnerable land uses are prohibited and a minimum habitable floor level of 3.7m AHD is applied.

As discussed before, the basis of the 3.7m AHD level is unclear but is thought to represent the historical 1% flood level at the confluence of the rivers, which does not account for any levee protection, plus 0.3m freeboard. Based on current flood modelling, the equivalent level of flood immunity (ie the 1% AEP flood level assuming no levee protection) based on 2050 climate change would equate to a level of 4.6m AHD and of course would be higher in 2090[33].

The 3.7m (and future 4.6m) levels are the modelled surface level of a 1% AEP at one point near the rivers. As is typically the case, a flood gradient exists across the Study Area resulting in variations to this level, albeit not significantly in this case.

[33] No level is available as the exact same scenario conditions (ie no levee protection) was not modelled.

The above scenarios assume the worst case situation that the levees are completely breached and provide no protection in a 1% AEP flood. If not breached the levees would begin to overtop in isolated locations based on 2050 conditions, causing substantially lower flood levels in a 1% AEP event (equating to 2.1m AHD). As outlined within the Molino Stewart risk assessment, there is insufficient information to determine the chance of a levee breach, but it is assumed to be unlikely for floods below the 1% AEP in year 2050. The difference between flood levels within and outside of the levees progressively diminishes for larger floods, irrespective of breaching occurring.

Notwithstanding the above, the wholistic assessment as undertaken by Molino Stewart considers a range of factors, including floods larger than the 1% AEP to determine overall risk. As outlined above this shows significant increases in risk levels in 2050 and 2090. Consequently, while a levee breach scenario for floods up to the 1% AEP assumes a worse case situation, it is considered appropriate for the purpose of setting FPLs as it takes a necessary precautionary approach, and would provide further amelioration of overall risks associated with larger floods. Given these mitigating factors it is also considered reasonable that projections for the year 2050 (as opposed to 2090) be used for the setting of FPLs, which provides a reasonable planning horizon of almost 30 years. The predicted effects of climate change are likely to change over time requiring review and updating of FPLs in the future.

Applying the approach adopting the use of flood risk precincts as described by Figure 8, a range of planning controls can be applied as set out in **Appendix A.** The foundations for these controls are discussed below.

Minimum Floor Levels

Applying a risk management approach, higher FPLs should apply to more vulnerable land uses. Lower FPLs could apply to non-habitable floorspace, as is currently done. Additionally, different FPLs could apply to non-building areas such as private open space and open car parking spaces to ensure a base level of safety for these areas and to reduce the impacts of more frequent flooding.

Typically levels derived by reference to floods of specified recurrence intervals would be used as opposed to a static fixed RL level as is currently the case. For example the habitable floor level of residential development could be based on the 1% AEP 2050 flood while the habitable floor level of a sensitive use could be set as high as the 0.05% 2050 flood. This provides for floor levels that are based on the latest available flood data that relates to a specific site.

However, Council has expressed a preference for the continued use of a static level. There is minimal variation in flood levels across the Study Area and Council is unlikely to need to revise flood modelling in the near future. The use of a single static level would provide for greater administrative efficiency in the assessment of development applications and less potential for adopted flood modelling to be challenged. Given this preference, static flood levels are to be used.

A freeboard should be added to the applicable flood level. The use of a freeboard is best practice. Handbook 7[34] defines freeboard as follows:

> *The height above the DFE or design flood used, in consideration of local and design factors, to provide reasonable certainty that the risk exposure selected in deciding on a particular DFE or design flood is actually provided. It is a factor of safety typically used in relation to*

[34] AIDR, 2017, pg.86.

the setting of floor levels, levee crest levels and so on. Freeboard compensates for a range of factors, including wave action, localised hydraulic behaviour and levee settlement, all of which increase water levels or reduce the level of protection provided by levees. Freeboard should not be relied upon to provide protection for flood events larger than the relevant defined flood event of a design flood.

Freeboard is included in the flood planning level and therefore used in the derivation of the flood planning area (see also defined flood event, design flood, flood planning area and flood planning level).

Variable freeboards could be applied. Typically in other states a 0.5m freeboard is used for residential development for riverine flooding situations while a lower freeboard[35] might be used in overland flow flooding situations. Different freeboards could also be applied for different land uses of varying vulnerability. Based on the current planning controls, and to provide consistency across the Study Area, a freeboard of 0.3m for minimum habitable floor levels associated with all land uses, and no freeboard for non-habitable floor levels and other development components such as car parking and flood levels based on more extreme floods such as the 0.05% AEP, could be adopted. We understand that this could require adjustments to other legislation such as the Building Regulations 2016 which effectively prescribes a minimum freeboard[36] which should be reviewed as a recommendation of this report.

Using the typical example for a dwelling house, a habitable floor level standard based on the current 1% AEP flood level plus 0.3m freeboard would be 4.9m AHD (but may be higher in some parts of the Study Area). This could result in minimum habitable floor levels up to in the order of 3m above existing ground level. This would be marginally acceptable, assuming housing designs that utilised the ground floor level for uses such as garaging. In some cases minor site filling might also be needed. Relevant issues include potential amenity and streetscape impacts. In parts of the Study Area with higher elevations, such as the central part of Invermay, ground levels would be near to, or above, this flood level and these issues should not arise.

Additionally we note that in such circumstances the depth of flooding would represent high hazard conditions. However, the potential for this is mitigated in this case by the levees. Further review of such an issue is beyond the scope of this study.

Flood compatible materials and methods

The current controls provide the opportunity for performance solutions that can rely on the use of flood compatible materials and methods to reduce risks in place of meeting prescriptive floor level standards. We understand that these measures are currently outlined within flood reports submitted with development applications. Such measures could also be specified as Acceptable Solutions but would ideally benefit from the preparation of a specification to detail the measures to be met. The following references would assist in this regard:

- Queensland Reconstruction Authority (2019), *Flood Resilient Building Design for Queensland Homes*, Brisbane.

[35] While we do not have definite research, in our experience a freeboard of 0.3m is commonly used in overland flow flooding circumstances in NSW.

[36] See for example clause 54 of the *Building Regulations 2016*.

- Hawkesbury-Nepean Floodplain Management Steering Committee (2006) *Reducing Vulnerability of Buildings to Flood Damage, Guidance On Building Design in Flood Prone Areas*, Parramatta.[37]

These are excellent resources but are not designed as specifications that can be readily applied to preparing and assessing a development application. Preferably such documents could be used to prepare a specification in the future, that was relevant for Launceston. In the interim, the new SAP could refer to flood compatible materials and methods, in a general sense, and rely on applicants to put forward suitable solutions.

Structural soundness

Structural soundness would be a relevant consideration for some buildings, particularly due to the depth of flooding. As outlined by studies undertaken for the Hawkesbury Nepean floodplain in Sydney, hydrostatic forces (due to the depth of flood waters alone), hydrodynamic forces, and the impact of debris can contribute to putting a standard dwelling house in danger of collapse.

Additionally, should a shelter in place option be accepted as part of an emergency management strategy, then buildings that rely on this option will need to be structurally sound in an extreme flood (preferable a PMF).

Consequently, it is advisable that controls that ensure adequate structural soundness standards are satisfied. Subject to flood engineering advice, based on experience we would expect such controls would be appropriate in areas subject to flooding up to a 1% AEP event or where a building was required or expected to be used to shelter in place.

Off-site flood impacts

Offsite flood impacts could be in the form of increased flood levels or velocities. Council advises that due to the nature of flooding and development in the Study Area this has not been a concern to date.

A review of this issue is beyond our area of expertise and would require flood engineering advice. However, some basic performance controls, particularly for large scale projects, could be imposed and reviewed in the future if necessary.

Evacuation and emergency management

Evacuation and emergency management issues are normally considered as part of a broader floodplain risk management study. Consideration of such issues at a development application stage could involve assessing where site access was sufficient to allow occupants to safely reach regional evacuation routes and flood free land within available warning time, or if the building provided a safe refuge if shelter in place was considered an acceptable option.

Council advises that the current approach for the levee protected areas is for early evacuation to safe areas, rather than for sheltering in place. This is based on expected warning times and the desire to avoid follow on risks and isolation issues associated sheltering in place.

[37] Hawkesbury-Nepean Floodplain Management Steering Committee (2006) *Reducing Vulnerability of Buildings to Flood Damage, Guidance On Building Design in Flood Prone Areas*, Parramatta. Pgs 26-31.

We do not have sufficient information to review whether either, or both, evacuation and shelter in place are appropriate options. Consequently in this situation we propose that evacuation and emergency management be included as performance criteria only in the new SAP.

Environmental management

Environmental management measures are primarily concerned with ensuring that uses such as hazardous industries do not result in unacceptable pollution impacts during a flood. Such controls would be targeted and are considered reasonable.

Options

The options to consider in regard to FRM standards are limited to the following:

- The range of categories of controls
- The stringency of the controls
- The extent to which prohibitions are applied to provide for the overriding exclusion of development.

Recommendations

1. That the draft planning controls as set out in **Appendix A** be used as the basis for the preparation of a planning scheme amendment that applies a new FRM SAP for the Study Area, comprising of acceptable solutions and performance criteria.
2. Include existing exemptions in the IIFIA Code in the new SAP.
3. Generally, existing prohibitions on intensification of existing uses should be retained with additional prohibitions on sensitive and hazardous uses where incompatible with the flood risk.
4. Review the need for further prohibitions on uses such as dwellings houses due the degree of flood hazard associated with current predicted flood depths in a 1% AEP flood.
5. Flood planning levels are based on specified fixed levels based on the recurrence intervals of floods derived from current flood modelling.
6. Adopt a freeboard of 0.3m for minimum habitable floor levels above the modelled flood planning level and no freeboard for non-habitable floor levels and other development components as appropriate. A review of appropriate freeboards should be undertaken in the future, and any consequential adjustments to other legislation such should be pursued.
7. Controls that ensure adequate structural soundness standards are satisfied should be applied to buildings in hazardous flood locations.
8. Basic evacuation and emergency management controls should be included as performance criteria.
9. Environmental management measures should be included to ensure that uses such as hazardous industries do not result in unacceptable pollution impacts during a flood.

3.5.5 Other Changes

Principles

- FRM related planning controls should be based on a framework that allows for a consistent approach to decision making across the whole of an area administered by the same floodplain management entity (in this case Launceston City Council).

Existing Situation

At present, the FPAC applies outside of the Study Area and is the principal means of applying FRM planning controls in this part of the council area.

Discussion

The rationalisation of FRM planning controls within the Study Area will result in a different approach to the way FRM planning measures are applied in the balance of the Council area. This can potentially lead to different controls being imposed on development with similar flood risks, confusion in the community and different FRM outcomes. While we have not reviewed any flood risk data relating to land outside of the Study Area, the scope of the FPAC may not ensure satisfaction of the FRM policies and actions specified by the Northern Tasmanian Regional Land Use Strategy outlined in section 3.1 of this report.

Ideally, a similar framework should apply across the whole of the Council area and where different controls are applied they should be justified by a FRM study.

It is recognised that this is a matter specifically relevant to the consideration of the Commission and Tasmanian State Emergency Service, who are responsible for the provision of standard natural hazard related Codes such as the FPAC. This could be a matter discussed with the Commission, noting that the draft TPP Scoping Paper has only recently been exhibited. Further, as previously noted the Flood Policy Unit of the Tasmanian State Emergency Service such a review is consistent with the intent to initiate a review of the FPAC in the short term.

Options

1. Continue to apply the FPAC outside of the Study Area.

2. Review the FPAC as part of Councils on-going strategic planning work to determine whether a SAP, that adopts the framework applied to the

3. , is warranted for any other part of the council area.

4. Council to consult with the Tasmanian Planning Commission and Tasmanian State Emergency Service about considering changes to the FPAC that adopts the framework applied to the Study Area.

Recommendations

1. That in the first instance, Council consults with the Tasmanian Planning Commission and Tasmanian State Emergency Service about considering changes to the FPAC that adopts the framework applied to the Study Area.

2. As part of on-going strategic planning work, Council considers whether there are any other specific floodplain localities that warrant the preparation of a SAP, that adopts the framework applied to the Study Area, as opposed to the application of the standardised FPAC in its current form.

4 Conclusion

As required by the study brief, this report provides an analysis of the existing policy context and the current and projected flood risks relating to the Study Area (as assessed by Molino Stewart) to align Council's decision making on the floodplain with current best practice in floodplain management. The risk analysis applies a robust risk based matrix approach which takes into account climate change and resilience principles.

The Study Area relates to land that is protected by flood levees. Land protected by levees is different from a conventional floodplain and needs a different approach. The protection provided by a levee can foster a false sense of security ("the levee effect") that can inadvertently lead to increased flood risks for various reasons, including by allowing inappropriate development. The Study Area levees provide protection up to a 1%AEP flood under current climate conditions but as a result of climate change, the levees may be compromised in a 1% AEP event from the year 2050. Floods rarer than this may also breech the levees and impact upon the protected area. When a levee is breached this can have catastrophic effects.

Based on the above analysis various options were considered and recommendations made that:

- provide direction for strategic planning purposes
- outline new planning controls for use and development of land within all levee protected areas covered by the study.

The draft planning controls provide the basis for the preparation of a planning scheme amendment that applies a new Special Area Plan (SAP) to address flood risk management considerations within the Study Area. A draft of the recommended SAP provisions is included as **Appendix A** for finalisation and implementation by Council.

There will inevitably be some change to the application of the controls, particularly as a consequence of transitioning from a planning precinct to a flood risk precinct base and the incorporation of climate change factors. However, the intent was not to materially change prohibitions but to update and augment existing controls to respond to the current flood risk analysis in a way that continues to meet the intent of the planning controls to manage and minimise flood risks to people and property.

The SAP forms part of the recommendations outlined within the report and summarised within the Executive Summary at commencement of the document. The risk assessment reveals that there would be a substantial increase in the risk profile in the Study Area over the next 70 years to existing development which cannot be managed directly with planning controls on new development. Consequently, it will be important for Council to also consider opportunities for transformational change to existing development, where this aligns with broader social, economic and environmental strategic planning goals, that could reduce the flood risk profile of the Study Area in the long term.

APPENDIX A: DRAFT SAP PROVISIONS

11474 Rpt
August 2022

DRAFT PROVISIONS

F16.0 Flood Levee Protected Areas Specific Area Plan

F16.1 Purpose of Specific Area Plan

F16.1.1 The purpose of this specific area plan is to ensure that use and development of land protected by levees is managed to:

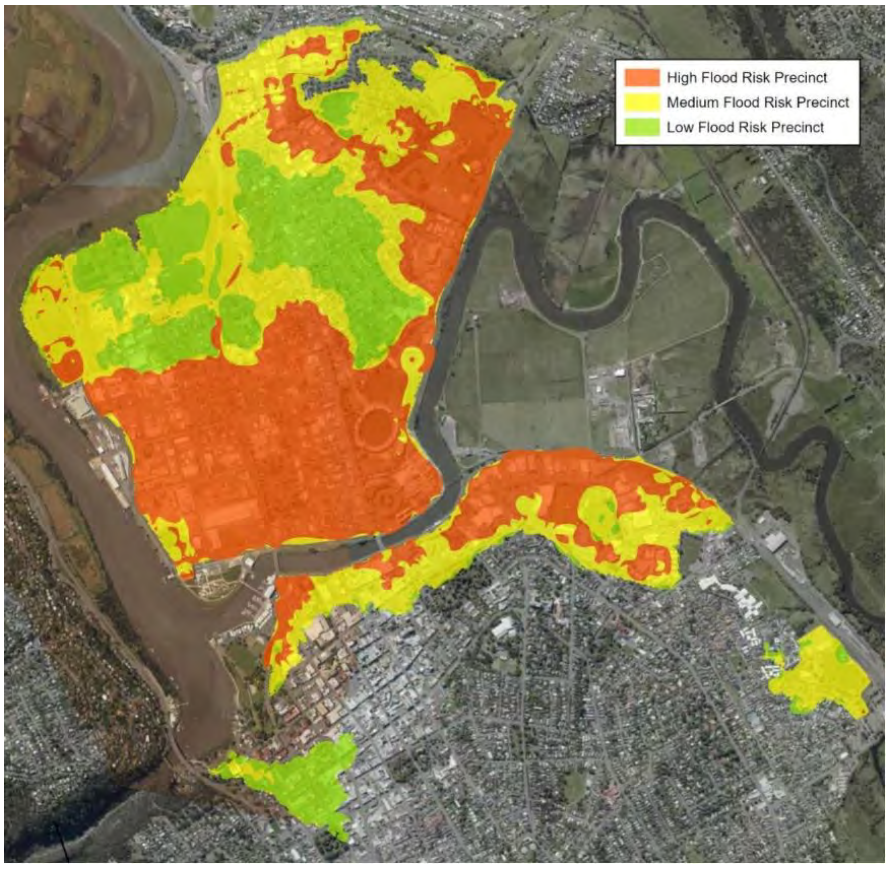
a) minimise the risk to human life and damage to property caused by flooding

b) ensure consideration of the flood risk in the location of future land uses

c) require new buildings to be resilient to the impacts of flood inundation.

F11.2 Application of Specific Area Plan

F16.2.1 The specific area plan applies to the area of land designated as SAP16- Flood Levee Protected Areas Specific Area Plan shown on the planning scheme overlay maps and as shown below in the figure to this clause.



F16.2.2 Where a site the subject of an application is located within more than one FRP the controls specific to each FRP will apply if the development is capable of being divided into distinguishable components. Otherwise the controls applying to the highest FRP will apply.

F16.2.3 In the area of land to which this plan applies, the provisions of the specific area plan are in addition to the provisions of the:

(a) General Residential Zone
(b) Inner Residential Zone
(c) Urban Mixed Use Zone
(d) Local Business Zone
(e) Central Business Zone
(f) Commercial Zone
(g) Light Industrial Zone
(h) Rural Zone
(i) Utilities Zone
(j) Community Purpose Zone
(k) Recreation Zone
(l) Open Space Zone
(m) Environmental Management Zone
(n) Particular Purpose Zone

F16.3. Use or Development exempt from this specific area plan

F16.3.1 The following use or development is exempt from this Code:

a) non-habitable buildings
b) Natural values and Cultural values management
c) Passive recreation
d) Port and shipping in a proclaimed wharf area
e) Resource development excluding a habitable building
f) Minor utilities.

F16.4. Definition of Terms

F16.4.1 In this Specific Area Plan, unless the contrary intention appears:

Annual Exceedance Probability (AEP)	means the level which has a given probability of being exceeded in any year.
Comprehensive risk assessment	means an assessment of flood risks that considers hazard, exposure of life and property, vulnerability and resilience applying a risk based approach that considers a range of floods up to an including

	extreme events greater than a 1% AEP flood and projected climate change conditions.
Flood compatible materials and methods	means, when inundated by flood water, materials that are resistant to damage, a building design that reduces the potential for the failure of electrical and plumbing services, and building methods that reduce the potential for the structural integrity of the building to be permanently damaged.
Flood emergency response plan	means a plan prepared by a suitably qualified professional who specialises in emergency management that demonstrates that effective warning time and reliable access is available to allow persons to move to a safe refuge area in all potential floods up to the year 2090, including extreme floods involving the overtopping or breach of levees at the closest point in the levee.
Flood impact report	means a report, prepared by a professional engineer specialising in hydraulic engineering, that assesses flood behaviour, constraints and risk to the development and its users for flood events involving a breach in the levee and provides appropriate measures to acceptably manage those risks.
Freeboard	means a factor of safety expressed as the height above the design flood level. Freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain, such and wave action, localised hydraulic behaviour and impacts that are specific event related, such as levee and embankment settlement.
High flood risk precinct (FRP)	means that part of the floodplain distinctively shown on the SAP16 map, generally being that area that is projected to be potentially inundated by a 1% AEP flood in the year 2050, and categorised as H5 or H6 based on the flood hazard curve in the *Australian Rainfall and Runoff Guidelines* published by the Commonwealth of Australia in 2019.
Inveresk Cultural Precinct	means that area generally bound by Forster Street, Invermay Road and North Esk River.
Low flood risk precinct (FRP)	means that part of the floodplain distinctively shown on the SAP16 map, generally being that area that is projected to be potentially inundated or surrounded by at least a 0.05% AEP flood in the year 2050, and is not within a medium or high flood risk precinct.
Medium flood risk precinct (FRP)	means that part of the floodplain distinctively shown on the SAP16 map, generally being that area that is projected to be potentially inundated by a 1% AEP flood in the year 2050, and is not within a high flood risk precinct.
Probable Maximum Flood (PMF)	*means the largest flood likely to ever occur.*

Riveredge Industrial precinct	means the area generally bound by the River Tamar, and Lindsay, Gleadow, Montagu and Forster Streets.
Significant community infrastructure	means a use and development that provides, hospital services, education and occasion care and emergency services.

F16.5 Use Table

F16.5.1 This sub-clause is not used in this specific area plan

F16.6 Unacceptable Use

F16.6.1 This clause is in addition to the:

(a) General Residential Zone - Clause 8.3 Use Standards

(b) Inner Residential Zone - Clause 9.3 Use Standards

(c) Urban Mixed Use Zone - Clause 13.3 Use Standards

(d) Local Business Zone - Clause 14.3 Use Standards

(e) Central Business Zone - Clause 16.3 Use Standards

(f) Commercial Zone - Clause 17.3 Use Standards

(g) Light Industrial Zone - Clause 18.3 Use Standards

(h) Rural Zone - Clause 20.3 Use Standards

(i) Utilities Zone - Clause 26.3 Use Standards

(j) Community Purpose Zone - Clause 27.3 Use Standards

(k) Recreation Zone - Clause 28.3 Use Standards

(l) Open Space Zone - Clause 29.3 Use Standards

(m) Environmental Management Zone - Clause 23.3 Use Standards

(n) Particular Purpose Zone - Clause XX. Use Standards.

Objective	To prevent the establishment of land uses subject to, or isolated by, flood inundation.
Acceptable Solution	**Performance Criteria**
A1 Is not for: (a) Custodial facility (b) Residential aged care facility (c) Retirement village (d) Residential uses (except single dwellings) within the High FRP	**P1** No Performance Criteria

Objective	To prevent the establishment of land uses subject to, or isolated by, flood inundation.
(e) Storage (Liquid fuel depot), within the High or Medium FRP (f) Significant community infrastructure in the High or Medium FRP unless located within the Inveresk Cultural precinct.	

F16.7 Management of Community Uses

F16.7.1 This clause is in addition to the:

(a) General Residential Zone - Clause 8.3 Use Standards
(b) Inner Residential Zone - Clause 9.3 Use Standards
(c) Urban Mixed Use Zone - Clause 13.3 Use Standards
(d) Local Business Zone - Clause 14.3 Use Standards
(e) Central Business Zone - Clause 16.3 Use Standards
(f) Commercial Zone - Clause 17.3 Use Standards
(g) Light Industrial Zone - Clause 18.3 Use Standards
(h) Rural Zone - Clause 20.3 Use Standards
(i) Utilities Zone - Clause 26.3 Use Standards
(j) Community Purpose Zone - Clause 27.3 Use Standards
(k) Recreation Zone - Clause 28.3 Use Standards
(l) Open Space Zone - Clause 29.3 Use Standards
(m) Environmental Management Zone - Clause 23.3 Use Standards
(n) Particular Purpose Zone - Clause XX. Use Standards.

Objective	To community land uses subject to, or isolated by, flood inundation manage flood risks to an acceptable level.
Acceptable Solution	**Performance Criteria**
A1 All uses within the Low FRP unless: (a) Significant community infrastructure (b) Public art gallery, (c) Community meeting and entertainment	**P1** Must be designed and located to prevent an unacceptable level of risk to life and property having regard to the advice contained within a comprehensive flood risk assessment report.

F16.8 Intensification of Uses

F16.8.1 This clause is in addition to the:

(a) General Residential Zone - Clause 8.3 Use Standards
(b) Inner Residential Zone - Clause 9.3 Use Standards
(c) Urban Mixed Use Zone - Clause 13.3 Use Standards
(d) Local Business Zone - Clause 14.3 Use Standards
(e) Central Business Zone - Clause 16.3 Use Standards
(f) Commercial Zone - Clause 17.3 Use Standards
(g) Light Industrial Zone - Clause 18.3 Use Standards
(h) Rural Zone - Clause 20.3 Use Standards
(i) Utilities Zone - Clause 26.3 Use Standards
(j) Community Purpose Zone - Clause 27.3 Use Standards
(k) Recreation Zone - Clause 28.3 Use Standards
(l) Open Space Zone - Clause 29.3 Use Standards
(m) Environmental Management Zone - Clause 23.3 Use Standards
(n) Particular Purpose Zone - Clause XX. Use Standards.

Objective:	To limit the intensification of uses subject to, or isolated by, flood inundation.
Acceptable Solution	**Performance Criteria**
A1 Is for: (a) Residential development within the Low FRP; or (b) extensions to an existing residential use up to a gross floor area of not more than 200 m²; or 10% more than that existing or approved on the 1st January 2008.	**P1** No performance criteria.
A2 Extensions to an existing non-residential use up to a gross floor area of not more than 400 m²; or 10% more than that existing or approved on the 1st January 2008	**P2** Extensions to an existing non-residential use must be sited and designed in accordance with a flood impact and flood emergency response plan.

F16.9 Hazardous Materials

F16.9.1 This clause is in addition to the:

(a) General Residential Zone - Clause 8.3 Use Standards
(b) Inner Residential Zone - Clause 9.3 Use Standards
(c) Urban Mixed Use Zone - Clause 13.3 Use Standards
(d) Local Business Zone - Clause 14.3 Use Standards
(e) Central Business Zone - Clause 16.3 Use Standards

(f) Commercial Zone - Clause 17.3 Use Standards

(g) Light Industrial Zone - Clause 18.3 Use Standards

(h) Rural Zone - Clause 20.3 Use Standards

(i) Utilities Zone - Clause 26.3 Use Standards

(j) Community Purpose Zone - Clause 27.3 Use Standards

(k) Recreation Zone - Clause 28.3 Use Standards

(l) Open Space Zone - Clause 29.3 Use Standards

(m) Environmental Management Zone - Clause 23.3 Use Standards

(n) Particular Purpose Zone - Clause XX. Use Standards.

Objective	To ensure the storage of hazardous materials are managed to avoid impacts on the environment during a flood.
Acceptable Solution	**Performance Criteria**
A1 No Acceptable Solution	**P1** Hazardous materials must be stored in accordance with a flood impact and emergency management report that ensures potential impacts on the environment are minimised having regard to: (a) the quantity of material stored (b) the nature of the materials stored (c) the nature and characteristics of the proposed use development; (d) the characteristics of the inundation of the land that is subject to the risk; (e) the capacity of the development to withstand flooding; and (f) the capacity of the owner or occupants to respond to or manage the flood risk.

F16.10 Development standards for Buildings and Works

F16.10.1 Floor Levels

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings.

(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings.

(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works.

(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works.

(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works.

(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works.

(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works.

(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works.

(i) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works.

(j) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works.

(k) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works.

(l) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works.

(m) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works.

(n) Particular Purpose Zone .....

Objective	To ensure buildings are constructed in a manner that minimises the risk to human life and damage to property caused by flooding.
Acceptable Solution	**Performance Criteria**
A1. Habitable floor levels of buildings within the Residential Use class must be located at or above the level shown in Table 16.10.1.	**P1**. No performance criteria
A2. Non habitable floor levels of buildings within the Residential Use class must located at or above the level shown in Table 16.10.1.	**P2**. The non-habitable floor levels of buildings within the Residential Use class must be located having regard to: (a) the topography of the site; and (b) flood behaviour for flood events involving a breach in the levee; (c) existing floor levels on the site; and (d) must be no lower than 2.5m below the acceptable solution floor level for habitable rooms.
A3. The surface level of open car parking spaces and principal private open space areas of residences within the Residential Use class Residential Use class must be located at or above 3m below located at or above the level shown in Table 16.10.1.	**P3**. The surface level of open car parking spaces and principal private open space areas of residences within the Residential Use class Residential Use class must be located: (a) the topography of the site; and (b) flood behaviour for flood events involving a breach in the levee; and (c) existing levels on the site.
A4. The habitable floor levels of: i. Significant community infrastructure ii. Public art gallery; or iii. Community meeting and entertainment;	**P3**. Buildings must have a floor level that demonstrates that the development will be able to manage the risk of flooding to tolerable levels, having regard to: (a) comprehensive risk assessment that demonstrates that with the proposed

within the Low FRP must be located at or above the level determined by Council for the 0.05% AEP flood plus 0.3m freeboard for the year 2050 assuming no levee protection.	development there would be no increase in flood related risks for the property the subject of the application in the year 2050, compared to a building that complied with the Acceptable Solution. (b) a flood impact report (c) the recommendations of a flood emergency response plan.

Table 16.10.1 - Flood levels

Location	Floor level
Invermay	5.3 m AHD
City (Eastern Portion)	5.3 m AHD
City (Western Portion)	3.5 m AHD
Newstead	5.6 m AHD

F16.10.2 Effects on Others

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings.

(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings.

(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works.

(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works.

(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works.

(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works.

(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works.

(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works.

(i) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works.

(j) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works.

(k) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works.

(l) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works.

(m) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works.

(n) Particular Purpose Zone .....

Objective	To ensure that new buildings and works do alter the behaviour of floods in a manner that has a materially detrimental impact on property or the safety of persons external to the development site.
Acceptable Solution	**Performance Criteria**
A1. Is for: (a) For development involving a site area of less than 2,500 square metres; or (b) filling of land utilising less than 25m^3 of imported material.	**P1**. Development and works must not have a detrimental impact on the characteristics of the flood or cause an increase in impact to human life and property having regard to the advice contained in a flood impact report.

F16.10.3 Emergency Management

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings.

(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings.

(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works.

(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works.

(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works.

(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works.

(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works.

(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works.

(i) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works.

(j) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works.

(k) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works.

(l) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works.

(m) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works.

(n) Particular Purpose Zone .....

Objective	To ensure that development is designed and managed in a manner that maximises the safety of persons.
Acceptable Solution	**Performance Criteria**
A1. Is for: (a) residential development of less than 10 dwellings; or (b) other development with less than 1,000m^2 of gross floor area.	**P1**. Capable of operation in accordance with a flood emergency response plan that that demonstrates that effective warning time and reliable access is available to allow persons to move to a safe refuge area in all potential floods up to the year 2090, including extreme floods

x

	involving the overtopping or breach of levees at the closest point in the levee.

F16.10.4 Building Materials

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings.

(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings.

(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works.

(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works.

(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works.

(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works.

(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works.

(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works.

(i) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works.

(j) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works.

(k) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works.

(l) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works.

(m) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works.

(n) Particular Purpose Zone .....

Objective	To minimise the damage caused to buildings as a consequences of flooding.
Acceptable Solution	**Performance Criteria**
A6. Is for development other than a child care centre, school, significant community infrastructure, public art gallery, residential aged care facility and retirement village that: a) is in a Low FRP; or b) incorporates flood compatible building materials and methods for all structures below the lowest habitable floor level.	**P6**. No Performance Criteria.
A7. Is for a child care centre, school, significant community infrastructure, public art gallery, residential aged care facility and retirement village incorporates flood compatible building materials and methods for all structures below the lowest habitable floor level.	**P7**. No Performance Criteria.

F16.10.5 Structural Soundness

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings.

(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings.

(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works.

(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works.

(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works.

(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works.

(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works.

(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works.

(i) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works.

(j) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works.

(k) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works.

(l) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works.

(m) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works.

(n) Particular Purpose Zone .....

Objective	To minimise the potential for buildings to structurally fail as a consequence of flooding.
Acceptable Solution	**Performance Criteria**
A8. Is for: (a) development in a low or medium FRP; or (b) a building within the high FRP certified by a professional engineer who specialises in hydraulic engineering as capable of withstanding the forces of floodwater, debris and buoyancy for the 1% AEP flood for the year 2050 assuming no levee protection.	**P8**. No Performance Criteria.

F16.10.6 Subdivision

This clause is in addition to the:

(a) General Residential Zone - Clause 8.4 Development Standards for Dwellings and clause 8.5 Development Standards for Non-dwellings.

(b) Inner Residential Zone - Clause 9.4 Development Standards for Dwellings and clause 9.5 Development Standards for Non-dwellings.

(c) Urban Mixed Use Zone - Clause 13.4 Development Standards for Buildings and Works.

(d) Local Business Zone - Clause 14.4 Development Standards for Buildings and Works.

(e) Central Business Zone - Clause 16.4 Development Standards for Buildings and Works.

(f) Commercial Zone - Clause 17.4 Development Standards for Buildings and Works.

(g) Light Industrial Zone - Clause 18.4 Development Standards for Buildings and Works.

(h) Rural Zone - Clause 20.4 Development Standards for Buildings and Works.

(i) Utilities Zone - Clause 26.4 Development Standards for Buildings and Works.

(j) Community Purpose Zone - Clause 27.4 Development Standards for Buildings and Works.

(k) Recreation Zone - Clause 28.4 Development Standards for Buildings and Works.

(l) Open Space Zone - Clause 29.4 Development Standards for Buildings and Works.

(m) Environmental Management Zone Clause 23.4 Development Standards for Buildings and Works.

(n) Particular Purpose Zone .....

Objective	To Limit opportunities for the intensification of development and occupation of areas subject to flood risk.
Acceptable Solution	**Performance Criteria**
A1. Subdivision or division of land by strata plan must not create any additional lots capable of any future residential development unless: (a) it is within a Residential zone and a Low FRP; or (b) it is for residential activities associated with the educational activities within the Inveresk Cultural Precinct; or (c) it is to: i. separate existing dwelling units; or ii. separate existing residential and non-residential buildings; that have been approved by Council on a single title.	**P1**. No Performance Criteria.

Queensland Reconstruction Authority

Planning for stronger, more resilient floodplains

Part 2 – Measures to support floodplain management in future planning schemes

Queensland Government

Planning for stronger, more resilient floodplains *is a toolkit that promotes improvements in the maturity of the flood mapping available for Queensland's floodplains and the land use planning mechanisms used to address development in these areas through a fit-for-purpose approach. The Guideline encourages all Councils, regardless of resources or capacity, to undertake the floodplain management measures that are appropriate for their local government area.*

Queensland has a unique opportunity to learn from the weather events of 2010/11 by ensuring that resilience to flooding events is built into the new generation of planning schemes, particularly those prepared under the ***Sustainable Planning Act 2009****. Given very few councils are at an advanced stage in preparing these planning schemes, now is the time to address flood resilience across the State in a consistent and coordinated manner. This approach is supported by the recommendations of the Queensland Floods Commission of Inquiry (QFCoI).*

Planning for stronger, more resilient floodplains *provides a 'roadmap' to improve floodplain management practice across Queensland, particularly in relation to the role of land use planning in managing and delivering appropriate development outcomes in floodplains.*

While the local context for each floodplain around Queensland is unique, the ultimate goal for floodplain management should be the same for all – ensuring our floodplains and the communities within them are resilient to future flooding events so that we learn to live with flooding.

This is a document for planners and policy-makers. It aims to help planners understand the investigations needed to identify flood hazard and the issues to consider in developing appropriate land use responses.

Part 2 Consultation

Part 2 – Measures to support floodplain management in future planning schemes was released for consultation on 23 January 2012. The draft Part 2 was open for non-statutory consultation for 35 business days, closing on 9 March 2012.

During the consultation period, the Authority visited and briefed 41 Councils, 9 State agencies and presented to 6 industry groups. These sessions provided an overview of Part 2, progress updates on the State-wide floodplain mapping project, and offered a discussion forum for Councils to further consider how floodplain management could be appropriately integrated into their future planning schemes.

The Authority received 19 submissions during the consultation period. Of the 19 submissions received, 3 were from industry groups, 10 from Councils and 6 from State agencies. Following the consultation period, briefings of individual councils, agencies and industry groups in relation to the whole ***Planning for stronger, more resilient floodplains*** body of work has continued.

A Consultation Report was prepared to provide an overview and analysis of the submissions and feedback received during the consultation period. The Authority duly considered the feedback received during the consultation period in the finalisation of this Guideline. A copy of the Consultation Report is available at www.qldreconstruction.org.au

This toolkit focuses on riverine flooding only. While the Guideline does not specifically relate to overland flow, stormwater drainage or flooding caused by storm tide, they remain important considerations when preparing planning schemes and assessing development.

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Front cover: Queensland Image Library. Rockhampton City Plan, Rockhampton Regional Council

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Continuing the journey towards stronger, more resilient floodplains

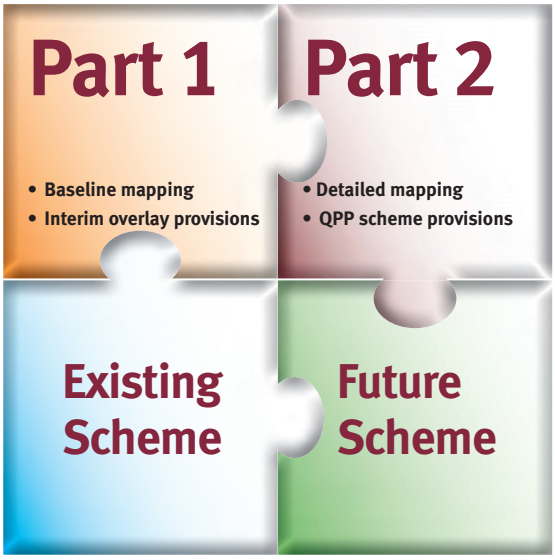
The weather events of 2010/2011 will forever be a turning point for Queensland. With more than $7.5 billion in damage to State assets and 91% of the State disaster activated as a result of flooding, improving the resilience of our floodplains is key to a more resilient future. And then again, in 2012, Mother Nature bought new record flooding to many parts of South West Queensland. Whilst rebuilding is continuing at a rapid pace around the State there is still much to be done.

Key to this rebuilding effort is ensuring that the State is more resilient to future weather events. While we won't ever eliminate flooding fully, we can ensure communities are more resilient to it. Building resilience enhances our ability to minimise the effects of future floods on our communities, economy and environment. It also means we efficiently and effectively cope with their impacts when they do occur. Resilience is a dynamic quality and is usually developed and strengthened over time - it builds upon rather than replaces existing strengths and arrangements. Bringing the floodplain management system into better alignment with the planning scheme preparation process is paramount in achieving development outcomes that exhibit this resilience.

Very simply, better floodplain management results in more resilient communities. Land use planning, as a key component of the floodplain management process, can greatly assist in improving community resilience.

As a first step in achieving this, Part 1 of the toolkit provided the initial measures to address flooding in existing planning schemes through a sub-basin wide approach to floodplain management. Part 1 provided a Guideline, floodplain mapping and development assessment provisions in the form of an Interim Floodplain Assessment Overlay and a Model Code for local verification and immediate adoption into existing planning schemes.

Part 2 builds upon this work by providing further guidance on integrating floodplain management principles and processes into future planning schemes. Across the State, Councils are currently in the process of preparing new planning schemes – either Queensland Planning Provision (QPP)-compliant Planning Schemes in accordance with the requirements of the ***Sustainable Planning Act 2009*** (SPA), or under the superseded ***Integrated Planning Act 1997***. Both planning scheme formats will benefit from the Part 2 Guideline.



Part 1 provided interim measures to support floodplain management in development assessment processes, and included floodplain mapping and a model code for inclusion in existing Planning Schemes through a minor scheme amendment process.

Floodplain Maps + Model Code Provisions

Flood Hazard Overlay – Floodplain Assessment

Part 2 provides guidance on:

1. Undertaking flood investigations, including:
   - selecting the right investigation for each sub-basin or part of sub-basin
   - how to undertake the relevant flood investigation(s)
2. Land use strategies for development in existing infill and broad hectare areas, including:
   - undertaking a planning evaluation to balance flood hazard with other land use considerations to identify planning-specific flood risk
   - land use response strategies for existing and future development
   - how a planning scheme can address the strategies
3. Example QPP-compliant planning scheme provisions developed from the land use strategies, including:
   - key considerations and example provisions for the strategic framework
   - model zone codes that deliver the intent of the strategic framework and an Overlay code with additional provisions from the Model Code presented in Part 1

About this Guideline

This Guideline is divided into four key sections:

1. Understanding

- National and State context
- Where are we now?
- A sub-basin wide approach to floodplain management
- Hazard versus risk
- The flood risk equation
- Consequence - the key element of flood risk
- What should planners know about flood?

2. Analysis

- Fit-for-purpose floodplain management system
- Flood investigation guidance

3. Implementation

- Undertaking a planning evaluation
- Land use response strategies
- Using the planning scheme to build flood resilience

4. Delivery

- Delivering Part 1 and Part 2
- Undertaking the sub-basin wide approach
- QFCoI response and key future actions
- Indicative flood investigation case study
- Preparing the planning evaluation
- Tying it all together

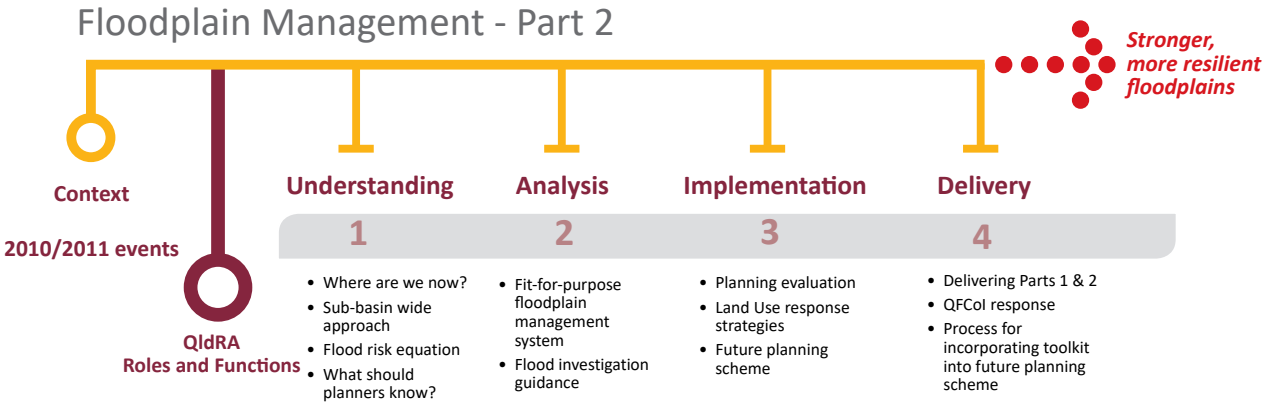
This Guideline also includes schedules with specific details on undertaking flood investigations and planning evaluations. A planning evaluation case study, checklists for planning scheme drafters and reviewers, and example planning scheme provisions are also provided.

Both Part 1 and Part 2 offer practical, fit-for-purpose measures to address pressing floodplain issues currently facing Councils across Queensland. This guidance will allow Councils to address these issues in their planning schemes, through a process that is appropriate to their circumstances. Addressing flooding issues so that practical, fit-for-purpose solutions can be adopted and implemented is an appropriate step towards better floodplain management and more resilient communities.

Floods in Mitchell, early 2012 *Source: QldRA*

A disaster resilient community is one that works together to understand and manage the risks that it confronts. Disaster resilience is the collective responsibility of all sectors of society, including all levels of government, business, the non-government sector and individuals.

National Strategy for Disaster Resilience, piii



The approach to floodplain management

A conventional integrated floodplain management process usually involves the following core elements:

- Emergency planning and management
- Structural works
- Land use planning
- Building controls
- Landscape and environment programmes
- Community awareness and communication.

This comprehensive approach usually takes around two to three years and involves significant community engagement and resources (refer to **Figure 1**).

Planning for stronger, more resilient floodplains recognises that this is the adopted 'best practice' approach to floodplain management. However, past practice has tended to focus more on the other elements such as emergency management and structural controls, rather than land use planning.

Part 1 and Part 2 have been developed with consideration to this approach focussing principally on the land use planning element of the process. This is intended to draw a greater correlation and connection between the floodplain management process and the land use planning framework.

Planning for stronger, more resilient floodplains provides a toolkit where a fit-for-purpose approach to floodplain management can be utilised to support land use planning responses and decision making, through a risk management framework.

The fit-for-purpose approach advocates selecting the appropriate level of flood investigation, undertaking a planning evaluation and preparing implementation mechanisms appropriate for local circumstances.

Figure 1: The floodplain management process provides a comprehensive suite of measures that contribute to building resilience in the floodplain.

Planning for stronger, more resilient floodplains promotes:

- **A sub-basin wide approach to floodplain management, coordinated at the regional level through Regional Planning Committees;**
- **A fit-for-purpose approach to floodplain management unique to the local circumstances, financial and capacity constraints of each responsible jurisdiction across the State; and**
- **Improved floodplain management outcomes through a risk management approach to flood hazard mapping and land use planning responses.**

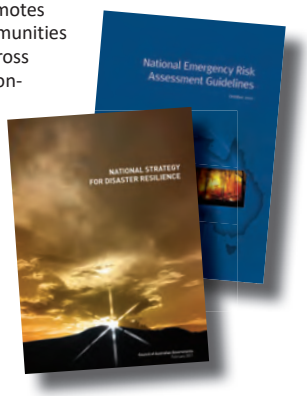
Figure 2: Summary of key elements of Part 2

1. Understanding

National context

National Strategy for Disaster Resilience

Planning for stronger, more resilient floodplains is an initial response to the Council of Australian Governments' National Strategy for Disaster Resilience (the National Strategy). The National Strategy advocates developing and implementing effective, risk-based land management and planning arrangements and other mitigation activities. The National Strategy promotes the building of resilience within communities through a collective responsibility across government, business, individuals, non-government entities and vounteers.



National Emergency Risk Assessment Guidelines

In 2007, the Australian Emergency Management Committee endorsed a National Risk Assessment Framework to support the development of an evidence base for effective risk management decisions and to foster consistent baseline information on risk.

The National Emergency Risk Assessment Guidelines (NERAG) have been developed as one of the first outputs of the framework's implementation plan. NERAG aims to improve the consistency and rigour of emergency risk assessments. NERAG acknowledges the role of urban planning as a prevention and preparedness control.

National Flood Risk Information Portal

The Commonwealth government announced in November 2011 that it will develop a nation-wide flood risk information portal. The portal, to be hosted by Geoscience Australia, will provide a single access point to existing flood mapping data for users throughout Australia. It is intended to assist in emergency management, land use planning and environmental management as well as informing the setting of insurance premiums.

To support the development of the national portal, the Authority is currently collating existing flood studies held by councils, industry and State agencies across Queensland, with the intention of launching a Queensland-specific Flood Portal by the end of 2012. Councils can submit the relevant details of studies undertaken and any electronic data (including GIS layers and/or copies of reports) to: https://qldreconstruction.org.au/floodstudies

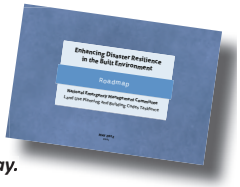
Review of SCARM 73 Report

Floodplain Management in Australia has been the principal national floodplain management guidance document since its adoption in 2000. The document is now under review, and in accordance with Recommendation 2.20 of the QFCoI, the Authority is providing assistance to the Department of State Development, Infrastructure & Planning (DSDIP) in collaborating with the drafters of the new National Guideline to ensure that it reflects recent lessons learnt in the implementation of floodplain management policy in Queensland.

Land Use Planning and Building Codes Taskforce

The Authority recently led a significant body of work on behalf of the National Land Use Planning and Building Codes Taskforce, a working group of the Standing Council on Police and Emergency Management (SCPEM) reporting to the Council of Australian Governments (COAG). The project supports the National Strategy for Disaster Resilience including a nationwide review of land use planning and building codes as they relate to natural disasters. Four reports have now been delivered including a Vision Statement, Current State Review, Gap Analysis and a Roadmap.

The document defines a built environment future state and outlines a national vision for disaster resilience through land use planning and building codes. The Built Environment Vision is: ***By 2025, I am contributing to a more resilient Australia by being informed and prepared for the natural hazards that may affect where I live, work and play.***



The Roadmap outlines the actions, including the requirement for State based Capability and Investment Plans. The reports were endorsed by the National Emergency Management Committee on 25 May 2012 and noted by SCPEM on 29 June 2012.

The Authority has prepared a National Capability and Investment Plan template for use by all jurisdictions. The Capability and Investment Plans will underpin the development of a detailed Implementation Strategy in each State and Territory. Queensland is the first jurisdiction to commence work on its capability and investment plan.

The State context

Queensland Floods Commission of Inquiry

On 16 March 2012, the QFCoI handed down its final report into the Queensland floods of 2010/2011. The final report included 177 recommendations across a number of areas including land use planning, building controls, emergency management, mining and insurance.

On 7 June 2012, the Queensland Government tabled its detailed response to the QFCoI recommendations. These recommendations are being addressed in full by the Government over time. This Guideline provides an initial response to a number of these recommendations, including some of those in chapters 2, 4, 5, 7, 10 and 11. The response to these recommendations is elaborated upon in section 4 of this Guideline.

SPP 1/03 Review

State Planning Policy 1/03 – Mitigating the adverse impacts of flood, bushfire and landslide (SPP1/03) is currently under review by DSDIP. The review will examine the manner in which flood is addressed through planning instruments and the development assessment process. The review will align with the recommendations of the QFCoI and ensure that lessons learnt from Queensland's natural disasters are taken forward to ensure improved land use outcomes that respond to natural hazards are implemented on the ground.

Where are we now?

Through the mapping project undertaken in Part 1 of this Guideline, a total of 119 of the 129 sub-basins across Queensland have now been mapped to at least Level 1 on the floodplain mapping maturity model (see **Figure 4** below). Combined with existing flood mapping in the other sub-basins, this will represent full coverage of all relevant areas of the State.

For the first time, we now have a State-wide picture of the extent of floodable areas (see **Figure 3** at right). The mapping project has identified that approximately 26.6% of Queensland's land mass falls within a floodplain. This has significant and wide ranging implications for land use policy in our State. Hence, this information is relevant to all stakeholders involved in making land use decisions throughout Queensland.

Local verification of the floodplain mapping using any available local or historic information is of critical importance to validate the mapping, which represents Level 2 on the maturity model below. Following consultation with those councils that were initially mapped following the release of Part 1, the majority of these Councils will be moving to Level 2 within the model. It is also important to note that some Councils, through their own efforts, are already at the higher level on the maturity model.

This floodplain mapping exercise, enhanced by local governments and adopted into existing planning schemes via the local verification process outlined in Part 1, will result in a significant increase in the total number of planning schemes that include flood mapping.

Part 1 outlines a streamlined adoption process for councils wanting to incorporate mapping and planning scheme provisions within their existing planning schemes. This is of particular relevance to those councils who are a number of years away from finalising their new planning scheme.

Part 2 continues to promote the improvement of floodplain mapping across Queensland by providing additional guidance on how floodplain mapping may move to Levels 3 – 5 in the mapping maturity model where appropriate.

The Interim Floodplain Assessment Overlay is now available for free download from the Queensland Government Information Service – via http://dds.information.qld.gov.au/dds/

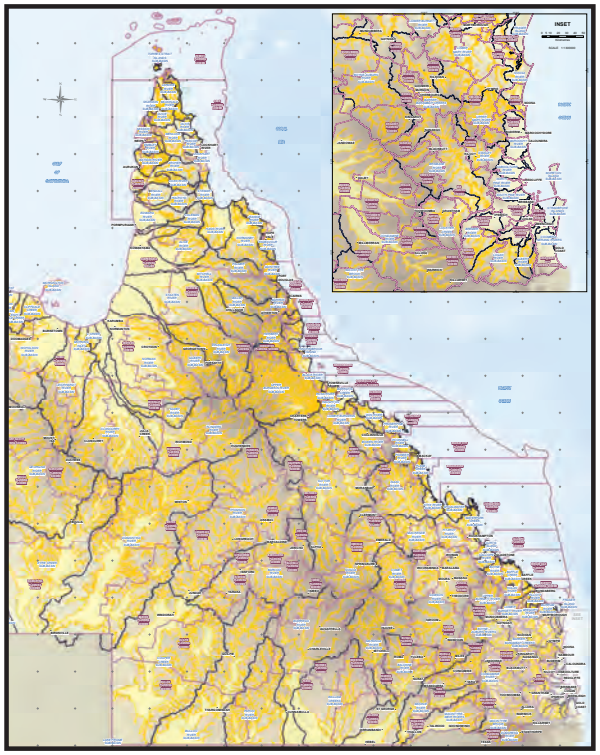


Figure 3: The State-wide picture of our floodplains, depicted in yellow. Around 26% of the State lies within a floodplain.

"Working with [the former] DERM, the QldRA has over a matter of months, created maps covering most of Queensland. The Commission acknowledges the extensive work that has gone into the interim floodplain maps."

Queensland Floods Commission of Inquiry Final Report, March 2012, p67

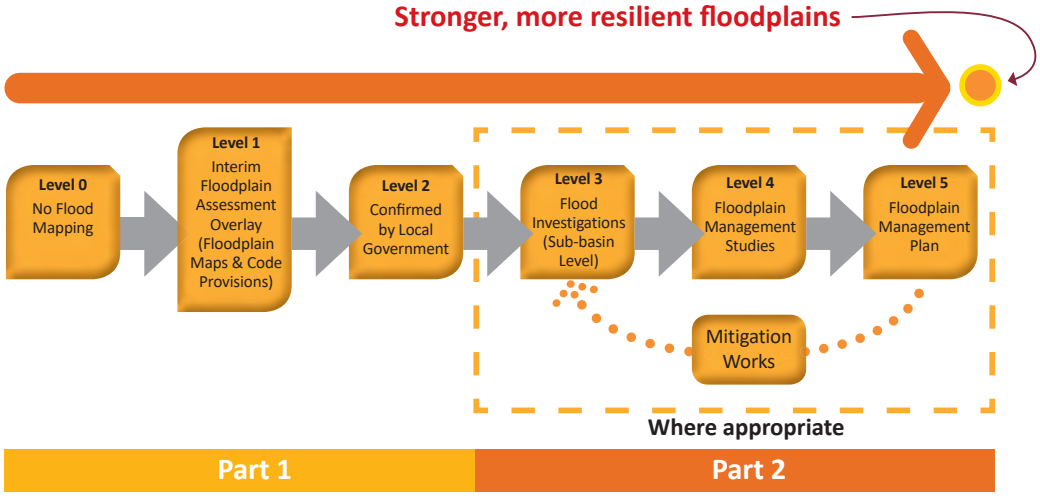


*Figure 4: The floodplain mapping maturity model, noting the application of the different parts of the **Planning for stronger, more resilient floodplains** Guideline series*

Queensland's floodplains

Queensland's floodplains are very diverse. From the steep coastal floodplains to the east, to the wide and flat floodplains of the Channel Country in the west, Queensland's floodplains differ widely in their topographic, hydrological and hydraulic characteristics. The communities who live within these floodplains are equally diverse. With this in mind, the environmental characteristics, population, development pressures, existing urban form, economic activity and community perception of risk will be different in every floodplain.

A 'one-size-fits-all' approach to floodplain management is therefore not appropriate – tailored solutions are required. The assessment of risk in each floodplain must be dependent on the likelihood of certain types of floods and the consequence of that flooding relative to those unique local circumstances.

Typically, each part of the floodplain is subject to varying levels of risk depending on the flood event, principally because the behaviour of floodwaters will differ in each part of the floodplain, and the extent of risk to life and property in each of these parts will also vary. The following images illustrate the varying characteristics of floodplains across Queensland in the context of principles derived from the Next Generation Planning Handbook.

These images depict typical examples of place types that may fall within a floodplain. The examples do not cover the full extent of place types that may exist within a floodplain, but are illustrative of the varying floodplains existing with Queensland.

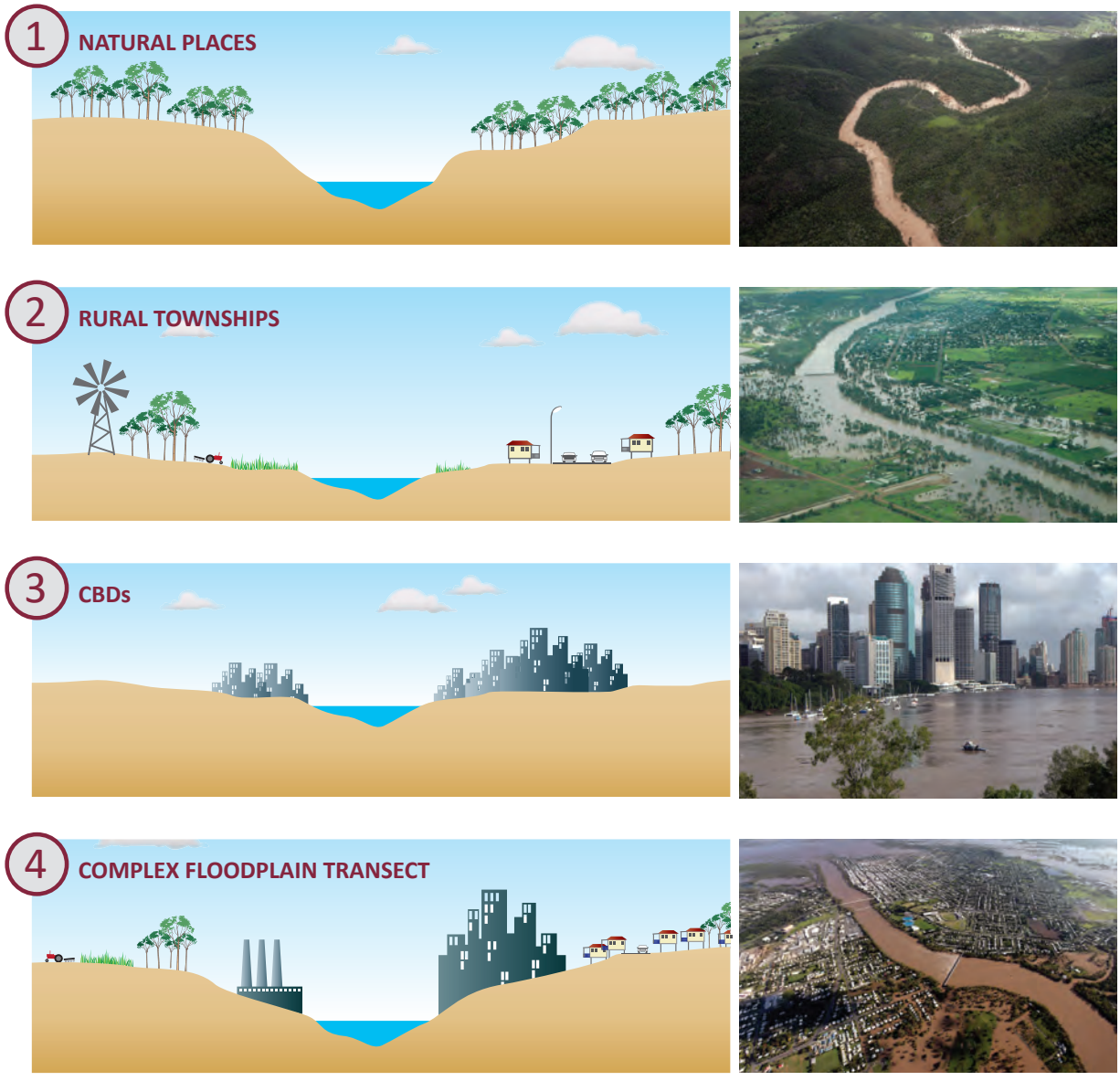


Figure 5: The topographic, hydrologic and settlement characteristics of floodplains are unique.

Source: Images provided to the Queensland Reconstruction Authority

A sub-basin wide approach to floodplain management

Historically, the responsibility for floodplain management has been borne by local governments, however not one local government boundary in the State correlates to a sub-basin boundary (refer to **Figure 6** below). This lack of correlation between local government boundaries and sub-basin catchments has resulted in challenges in coordinating flood investigations, land use planning and floodplain management programmes. Undertaking floodplain management at a regional level allows a coordinated approach to be undertaken across the whole sub-basin. This sub-basin wide approach means the responsibility for floodplain management is shared across the sub-basin by those jurisdictions whose areas lie within it.

In practice, this sub-basin wide approach means:

- When flood investigations are undertaken, a common methodology can be used to avoid problems where different methodologies result in different study results within the same sub-basin, and therefore different identified flood levels and characteristics;
- Responses to floodplain issues can be agreed and delivered across the whole floodplain, not just within certain local government areas; and
- More coordinated and consistent land use planning controls can be implemented where development pressures and population densities across the floodplain are similar.

Figure 6: Sub-basins do not correlate to local government boundaries – not one sub-basin falls within a single local government area in Queensland.

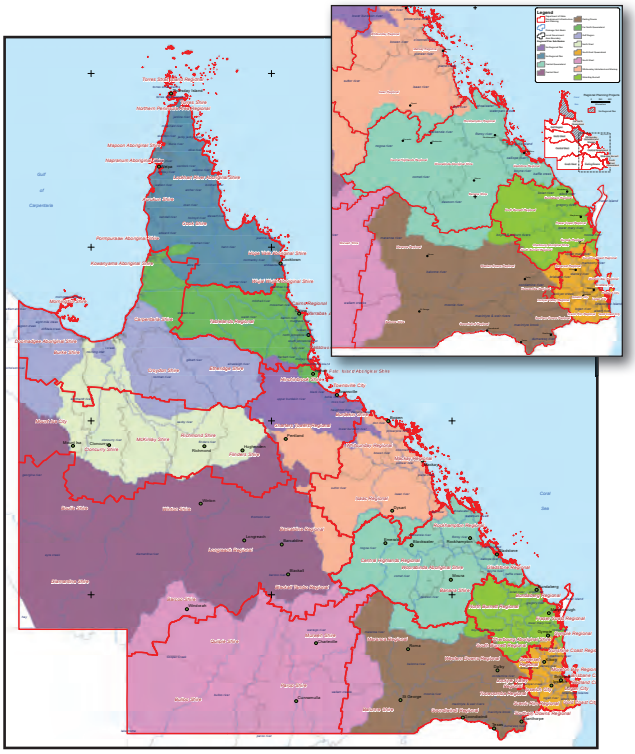


Figure 7: Regional Planning Committees (RPC) allow local governments to collaborate (in association with the State) to deal with floodplain management at the sub-basin level. 70% of sub-basins fall wholly within one RPC.

The State-endorsed position on responsibility for flood mapping is that such responsibility should vest at the local level, however there is a significant role for Regional Planning Committees (RPCs) to oversee and coordinate floodplain management at the sub-basin level, particularly through the regional planning process. By their nature, RPCs involve a partnership between the State and Councils in delivering regional outcomes that are usually articulated through the relevent Regional Plan for the RPC area - **Schedule 1** provides the list of Queensland's sub-basins and their corresponding RPCs. The extent of correlation between RPC boundaries and sub-basin boundaries is great; approximately 70% of all sub-basins fall within one RPC (see **Figure 7** above). In addition, a further 20% (approximately) of sub-basins lie within two RPC areas. Collaboration between the two relevant RPCs for the management of that sub-basin will ensure that consistent outcomes for these sub-basins can also be achieved.

There is a strong nexus between the RPC level of collaboration and floodplain management, given the existing role of regional planning instruments in driving regional settlement and development outcomes. Over three-quarters of the State is covered by statutory regional plans, with additional regional planning processes underway in some other areas. In particular, the regional planning process may assist the delivery of consistent and coordinated policy responses and land use/ development controls across the floodplain.

The role of regional natural resource management (NRM) plans is also relevant to the sub-basin wide approach to floodplain management. NRM bodies offer practical means of improving landscape and environmental resilience through various plans, guidelines and programs that are of significant value in floodplain management. Also, activities outside the floodplain can have an effect on downstream areas when runoff or flooding occurs that need consideration on a catchment-wide basis. These matters, usually captured through the NRM plans, are useful in informing the sub-basin wide approach to floodplain management.

Hazard vs risk

In understanding how floodplain management can be addressed through land use planning, it is important to note the distinction between the terms 'hazard' and 'risk'. These terms are often used interchangeably in both common and technical language, when in fact they describe separate but related matters. The difference from a planning perspective is critical, as 'hazard' relates principally to the nature of the event itself, while 'risk' relates to the possible impacts on people, property, infrastructure and the environment when that event occurs.

In terms of flood hazard, the definition of what constitutes the various levels of 'hazard' is provided in national and State-specific floodplain management literature such as *Floodplain Management in Australia*. What defines a level of flood 'risk' involves an evaluation of the consequence of a flood of a certain likelihood on a community.

Land use planners in particular must be very cognisant of the risk of a hazard, particularly when balancing competing development outcomes through strategic planning and development assessment. This is discussed further with particular reference to land use planning in **Section 3 - Implementation**.

In simple terms, a hazard will exist whether or not it poses a risk. A risk cannot exist without the presence of the hazard, and the other key elements of people, property, infrastructure and the environment. The way in which these key elements are affected by or respond to the hazard gives an indication of the extent of risk posed by the hazard.

In practical terms, a high hazard may indeed be high risk. It is also possible for a significant hazard to exist, but with little risk. **Figure 8** below demonstrates this difference. Both floodplains below are subject to the same flood event, and therefore the same extent of flood hazard. However, the first floodplain is a highly urban one, whereas the second floodplain is one where rural activities dominate. The risk to life, property and infrastructure is obviously greater in the urban example, given many more people and properties would be affected by the hazard (and those persons may also be more vulnerable and less resilient to flood than their rural counterparts). The risk to life and property in the rural example is lower, for the same reasons – not as many people and properties are likely to be affected.

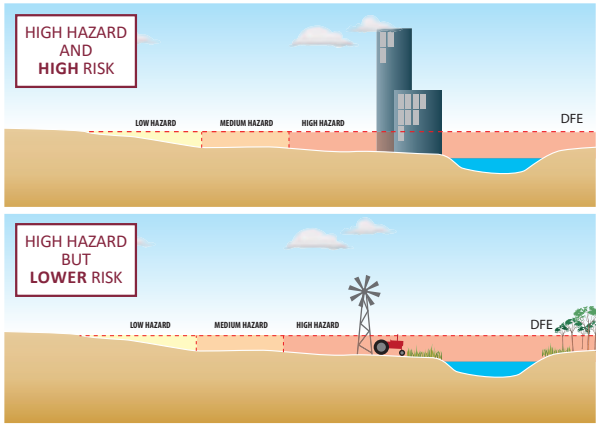


Figure 8: The difference between flood hazard and risk. The flood hazard is depicted here is the same in each example, however the risk will change depending on the land use exposed to that hazard.

Hazard maps are important for planning development and for policy development.

Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century, Jha, Bloch, Lamond p28

The flood risk equation

The Standing Committee for Agriculture and Resource Management (SCARM) describes floodplain risk management as a formal means of identifying and managing the existing, future and residual risks of flooding[1]. It is a cornerstone of floodplain management. Specifically, existing floodplain management practice[2] describes risk as a relationship between Likelihood and Consequence.

Figure 9: The flood risk equation

Likelihood is the probability of occurrence of a specific flood event, or range of events occurring, whereas consequence is an evaluation of what is affected by the event(s) and how.

An acceptable likelihood for planning and building purposes is usually defined as a Defined Flood Event (DFE), such as the 1% Annual Exceedance Probability (AEP). However, for planners, an understanding of the consequence of that event, and the range of flood events that also may occur, is paramount.

The element of consequence requires an understanding of flood behaviour (hazard) and the exposure, vulnerability and tolerability of people, property and infrastructure to a flood of that likelihood. The factors which may be relevant to determining the hazard associated with flooding, and those factors which may influence the consequences for life, buildings and infrastructure potentially affected by flooding, are specified in **Table 1** below.

Flood Hazard		Urban & Social Impacts
Depth of inundation Flood velocities Duration of Inundation Rates of Rise of floodwaters Water Volume Warning times Evacuation capabilities		Risks to life Damage to buildings/ infrastructure and contents Restoration capability/ resilience of built form Community vulnerability and resilience to economic and social impacts Community response to risk

Table 1 - The factors contributing to flood hazard and the urban and social impacts of Consequence [3]

Regardless of a community's acceptance of flood risk, people should not become complacent about the potential flood risk to themselves or their property.

1 *Floodplain Management in Australia, pg 14*
2 *Statement of Paul Grech, (October 2011), Report to Queensland Floods Commission of Inquiry Addressing Town Planning Issues, pg 7*
3 *Derived from Statement of Paul Grech (October 2011) Report to Queensland Floods Commission of Inquiry Addressing Town Planning Issues, pg 8, and SCARM Report 7.3 and NSW Floodplain Development Manual*

Consequence – the key component of flood risk

Quantifying consequence involves an evaluation of the interplay between three other key elements – Exposure, Vulnerability and Tolerability (refer to **Figure 10**). These three elements are the key considerations in making balanced development decisions in floodplains, whereby the flood hazard is understood and then evaluated in the context of competing planning interests and community preferences.

Planners need to understand that floodplains are complex. Floods are dynamic and no two floods are the same or have the same impact.

Figure 10: The key elements that make up the consequence component of the flood risk equation.

From a land use planning perspective, consequence is therefore understood through a planning evaluation – refer to **Section 3 - Implementation**. The differing consequences of flood are illustrated through the examples of Condamine and Dalby in **Figures 11 - 13** at right. In this example, the different floodplain characteristics of the Condamine River (Condamine) and the Myall Creek (Dalby) at these locations are evident. The Myall is a smaller tributary of the Condamine, though it flows through the larger town of Dalby (population approximately 12,000). While the town of Condamine is much smaller than Dalby (population approximately 400), the Condamine River at that point is much larger than the Myall.

A historical review of the Condamine River has shown that over time it rises significantly higher (and more often) than the Myall in times of flood. While this in itself indicates differing levels of hazard, the presence of differing human settlements, population levels and places of economic importance in these floodplains means that the consequences of these floods require different consideration.

The relationship of the flood height and the general height of each settlement is indicated through **Figure 13**. It can be seen that the consequence of flood in Condamine is naturally higher than in Dalby; generally speaking, the height of floodwater in the older parts of Dalby may only reach around 1m during times of flood. This height of floodwater may not be so great as to preclude development given that dwellings can be elevated (using the 'Queenslander' style of construction) and commercial properties can be constructed to be resilient to that hazard. However, in Condamine the levels of floodwater may be so great as to preclude a built form response to the hazard. Another relevant consideration is the number of properties that may be at risk in these two towns.

Assigning a specific likelihood of these events (such as identifying a 1% AEP), from a planning perspective, is of lesser importance than the consequence of these floods. The reality is that significant floods, whether or not they occur frequently, may have significant impacts for the use of flood-prone land and planners need to be aware of this. The different consequences of floods on these two floodplains therefore requires careful consideration in the land use planning process.

A `one size fits all´ approach to floodplain management is therefore not possible.

While [the 1% AEP] may be a useful general approach, it is important that policy makers should review this risk level and adopt a suitable flood probability based on an acceptable risk for different locations, land-use and infrastructure in the floodplain.

Comments on Queensland Floods Commission of Inquiry Final Report, Engineers Australia, p8

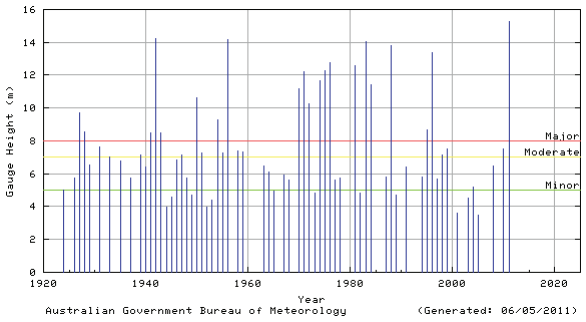


Figure 11: Highest annual flood peaks – Condamine River at Condamine *Source: BoM*

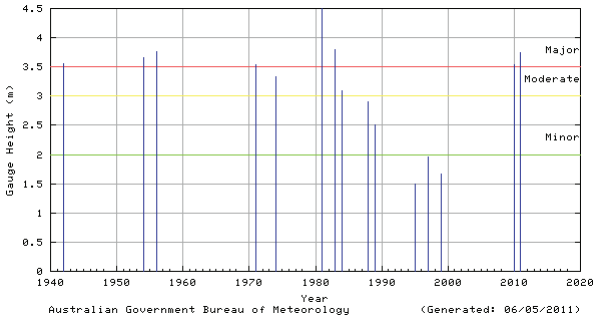


Figure 12: Highest annual flood peaks – Myall Creek at Dalby *Source: BoM*

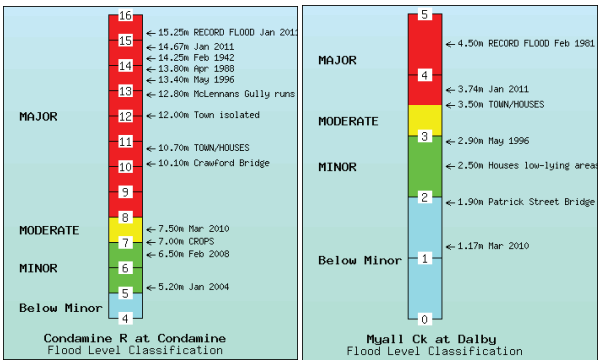


Figure 13: Flood levels at the gauges in Condamine and Dalby *Source: BoM*

What should planners know about flood?

Floods are complex hazards

In undertaking land use planning in floodplains, the approach taken within each floodplain needs to respond to the unique characteristics and conditions of that floodplain. The land uses appropriate for one floodplain may not be appropriate for another. It is critical to understand both the flood hazard and the broader considerations of economic, environmental and social impact when making land use decisions within the floodplain.

Land use planners also must be aware of, and sensitive to, the realities of development (particularly the constraints of existing, well-established communities) that exist within areas of flood risk. Often significant parts of a town or city, even the central business districts and higher density residential areas, are within the 1% AEP. In Queensland, we face the reality of our towns having historically developed over time in these locations, and we must tailor our land use responses to this existing flood risk. It is not practical or economic to sterilise or relocate all of these areas, nor would this be desirable from a community perspective given that many of these locations are chosen by members of the public as desirable places to live from an amenity perspective. The ultimate response to flood hazard through the land use planning system must balance these economic and social considerations with the reality of the hazard and the community's acceptance of the risk it presents.

1% AEP is not the only aspect of flood to consider

Currently the 1% AEP event is designated as having an 'acceptable risk' for planning purposes nearly everywhere in Australia regardless of the potential consequences of the flood. However, good planning needs to consider more than just the 1% AEP flood.

In particular, good land use planning should consider the possibility of a range of floods across the full floodplain extent, and also give greater attention to the consequences of flood. To date, the likelihood or probability part of the risk equation (usually identified as a DFE in planning policy documents) has been generally well understood by planners throughout Australia, principally because of the focus on the AEP measure. The concept of the AEP measure is, by its definition, a probability-based approach to identifying a flood event.

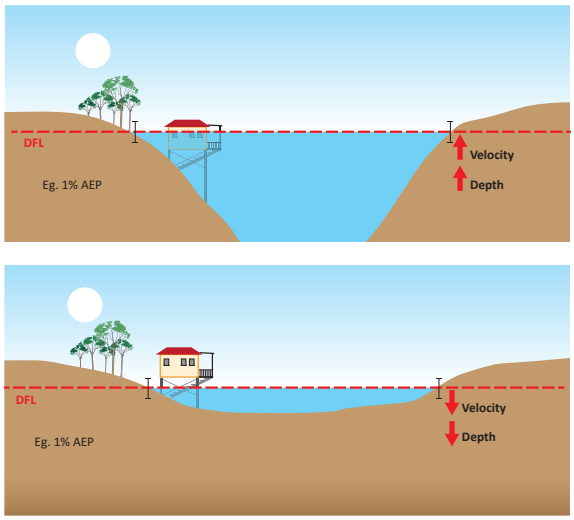


Figure 14: A 1% AEP flood for one floodplain may be significant due to the velocity and depth of that flood, while on another floodplain, the impact for that same flood event may be significantly less. The land use and built form responses to each situation should naturally be different.

Consequence is a key element of floodplain risk management that requires further consideration by land use planners in ensuring that all facets of the complex relationship between floods and human settlements are addressed. This is not as well understood by planners, given the complex array of factors that are used to determine it. The Implementation section of this Guideline promotes the consideration of consequence in land use planning through the planning evaluation process.

Community attitude to risk

A community's acceptance of flood risk will frame the local land use responses used to address risk within a local government area. For example, a North Queensland community's acceptance of flood risk (given the nearly annual incidence in some places of flooding, storm tide or other inundation) may be greater than that of another community that has little experience of significant flooding events.

In addition, a community's acceptance of risk is likely to be different in new urban areas when compared with existing areas. There is the basic expectation in many communities that new development areas should avoid areas of significant hazards. Risk acceptance in existing areas that have developed over time adjacent to waterways and that have weathered previous flooding events is likely to be higher. In these places the focus on building design, and resilience and emergency management is paramount.

The importance of strategic planning

To date in Queensland, assessment of flood risk in the land use planning process has generally been addressed through the development assessment process.

Ideally though, land use provisions including strategic frameworks and zoning plans tailored to the unique conditions of the floodplain would be included in all planning schemes relevant to that sub-basin. In particular, there is a key role for the strategic framework component of new Queensland Planning Provision (QPP) compliant planning schemes to clearly articulate the community's vision and response to flood risk, and to set land use policy and planning scheme provisions to meet that vision.

Clear planning scheme provisions are likely to reduce the reliance upon applicants to undertake site-specific flooding investigations, and the obligation of councils to make development assessment decisions that may not be uniformly consistent.

Towns and cities have grown and expanded into floodplain areas without consideration of the flood risks involved. Land use zoning and its effective enforcement is a key management tool in trying to prevent such development. Where pressure on land is too great for this, then there is a need to design and construct buildings so that they are able to cope with flood risks.

Cities and Flooding: A Guide to Integrated Urban Flood risk Management for the 21st Century, Jha, Bloch, Lamond p198

The key for planners is ensuring that the right planning tools are available to confidently promote or discourage land uses in existing urban areas relative to the present flood hazard. It is also to set a strong strategic direction for development in future urban broadhectare areas that is appropriate to minimise risk of flood and improve resilience in those new areas. The 'Place Model' principles from the Next Generation Planning Handbook (discussed on page 8) can be used to tailor land use planning to the unique characteristics of a floodplain.

Integrating strategic planning and infrastructure delivery

A key component of a Queensland Planning Provisions (QPP) compliant planning scheme is its priority infrastructure plan (PIP). The PIP sets out the local government's intentions for the provision of trunk infrastructure within the local government area. Guiding and managing the development of infrastructure that is resilient to natural hazards should be a key function of a PIP.

Consideration of natural hazards when planning for infrastructure is important. Designing and constructing infrastructure to withstand the hazard carries its own increased cost over and above that for infrastructure provided to areas of low or no hazard. In some cases repairing or replacing the infrastructure as a result of a hazard event will be unavoidable (such as the overriding need to provide infrastructure in that location) or unforeseeable (such as a severe storm), however it does increase the costs to government over and above normal routine maintenance and replacement programs, and this should be considered during the decision making process. This cost implication may prove at minimum a nuisance through an increase in maintenance costs, or it may become untenable over time if hazard events affecting the infrastructure become more frequent or severe. Both are relevant considerations when identifying areas for future settlement growth, and in planning to augment existing infrastructure in hazard areas.

The PIP must coordinate infrastructure provision with the way in which settlement growth is expected to occur over time in order to enhance the resilience of both the infrastructure and the community it supports. Planning schemes can account for the resilience of infrastructure in their PIPs by:

Planners need to know:

- That floods are complex hazards with complex relationships with our towns and cities, which require fit-for-purpose solutions
- That floodplains don't stop at local government boundaries
- That the 1% AEP floodline does not mark the boundary between safety and hazard, and that taking a whole-of-sub-basin approach to planning is more appropriate
- That flood risk is comprised of consequence in addition to likelihood or probability, and that consequence is arguably more important from a land use planning perspective
- The community's attitude to risk in formulating land use strategies that respond to flood hazard
- The importance of strategic planning tools in setting development parameters in floodplains, and not rely only on the development assessment process

1. ensuring infrastructure planning and strategic land use planning are well-coordinated, where both settlement decisions and the infrastructure planned for it consider the impact of natural hazards;
2. ensuring that where the strategic framework and zoning plan envisage future urban growth, the priority infrastructure area (PIA) and plans reflect those intentions for future growth;
3. identifying programs of mitigation work in the PIP that reduce the impact of natural hazards (for example, flood mitigation works); and
4. identifying priority areas for infrastructure decommissioning in instances where planned retreat from a particular location has been determined (such as those areas at intolerable risk of natural hazard).

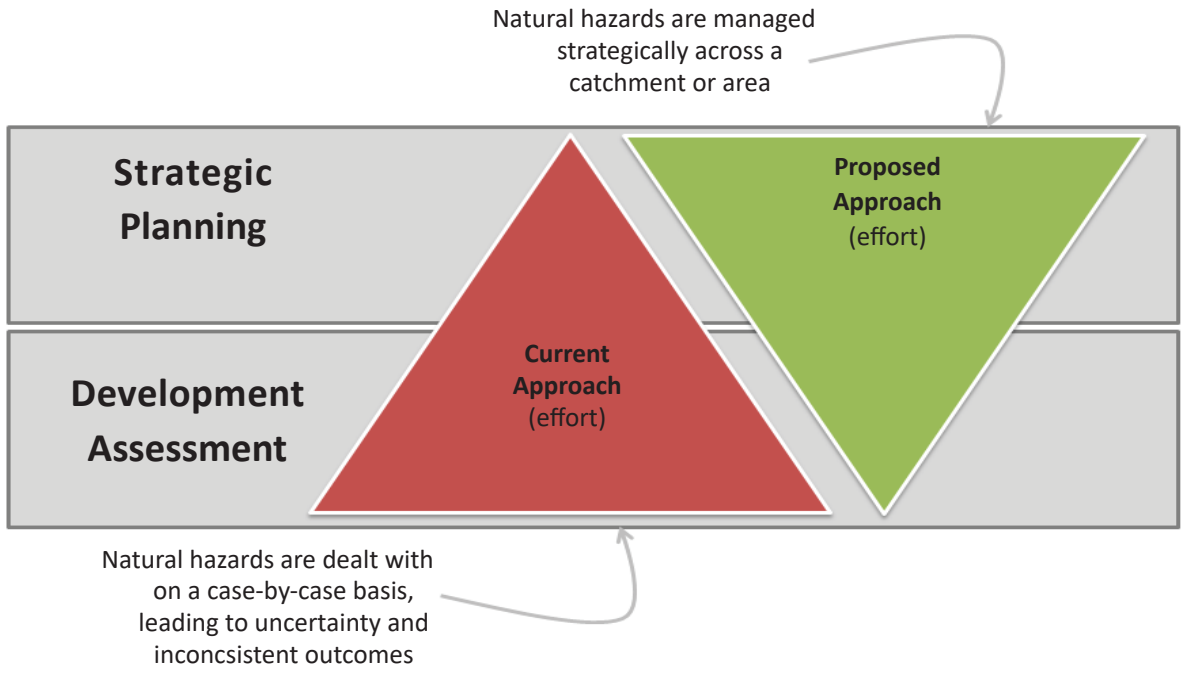


Figure 15: Changing the approach from development assessment to strategic planning

2. Analysis

The fit-for-purpose floodplain management system

Choosing the right approach for the right circumstances

This Guideline advocates a fit-for-purpose approach to floodplain management. This involves presenting both the conventional, comprehensive approach and an alternative approach for those Councils who may not have the capacity or resources to undertake a comprehensive floodplain management process.

The best practice principle for floodplain management is that a comprehensive planning process to develop a floodplain management plan is the most effective and equitable way to realise the multiple objectives of floodplain management[1]. In summary, the floodplain management process typically encompasses three sequential stages[2]:

1. **Flood Study** – a technical study to determine the nature and extent of flooding
2. **Floodplain Risk Management Study (FRMS)**– an options assessment which evaluates management measures and options for the floodplain in respect to both existing and future development
3. **Floodplain Management Plan (FMP)** – formal adoption of a plan of management for the floodplain

The floodplain management process described above is a comprehensive and robust process, usually taking around two to three years and involving significant community engagement and resources (refer to **Figure 3** on Page 3). The process results in a range of management measures, including emergency planning and management, structural works, community awareness, land use planning and building controls.

This comprehensive approach will be appropriate for use by Councils who are in the position to undertake such an investigation, such as those who have significant population and/or development pressures, significant flood hazard and/or the resources and capacity to prepare them. The comprehensive floodplain management process is the preferred approach for those councils who are in this situation.

If the comprehensive approach is adopted, it is imperative that the timeframe and resources required to complete a comprehensive process are factored into the planning scheme preparation process to ensure that a disconnect does not occur. This may mean starting a comprehensive floodplain management process well in advance of planning scheme preparation. However, it is not always possible for a comprehensive floodplain management process to be undertaken for a sub-basin, for the following reasons:

- The floodplain management process usually takes 2-3 years during which time a planning scheme may need to be prepared for a local government area. This may be the case for Queensland local governments now in the process of preparing their new planning schemes;
- Councils may not have the time, capacity or resources to undertake the full process, particularly where there are other competing local priorities; and
- A comprehensive approach may not be necessary or justifiable, particularly for councils with limited population and/or growth.

While these are challenges to the completion of a comprehensive floodplain management process, this does not mean investigations should not be undertaken in some form. It is important that investigations are still carried out, particularly for land use planning purposes given the need for such investigations to inform planning scheme preparation.

The *State Planning Policy 1/03* (SPP 1/03) Guideline[7] acknowledges the need for a fit-for-purpose solution for flood investigations, noting 'the scope of studies [for the determination of Natural Hazard Management Areas] will vary between local governments, and sometimes between different locations within the same local government area'.

It may not be cost-effective and practicable to conduct these studies for areas that are not subject to significant development pressures, especially in small and/or low-growth local governments. The SPP 1/03 Guideline goes on to note that the variation in scope should depend on:

- The size and distribution of the population;
- The degree of risk to people, property, economic activity and the environment posed by development in areas affected by natural hazards;
- The availability or difficulty of obtaining and analysing information; and
- The capacities and resources of local government.

The current drive to prepare new QPP-compliant planning schemes pursuant to the SPA, when very few councils have undertaken a recent floodplain management plan process, highlights the need to consider alternative processes for those councils who may not need to undertake the comprehensive approach. These alternative approaches are also relevant for those councils whose new scheme (that may be at an advanced stage of development) will not correlate with flood investigation outcomes.

5 *SCARM pg xv*
6 *Mark Babister, WMA Water, Natural Disaster Insurance Review August 2011*
7 ***State Planning Policy 1/03 Guideline section 7.2***

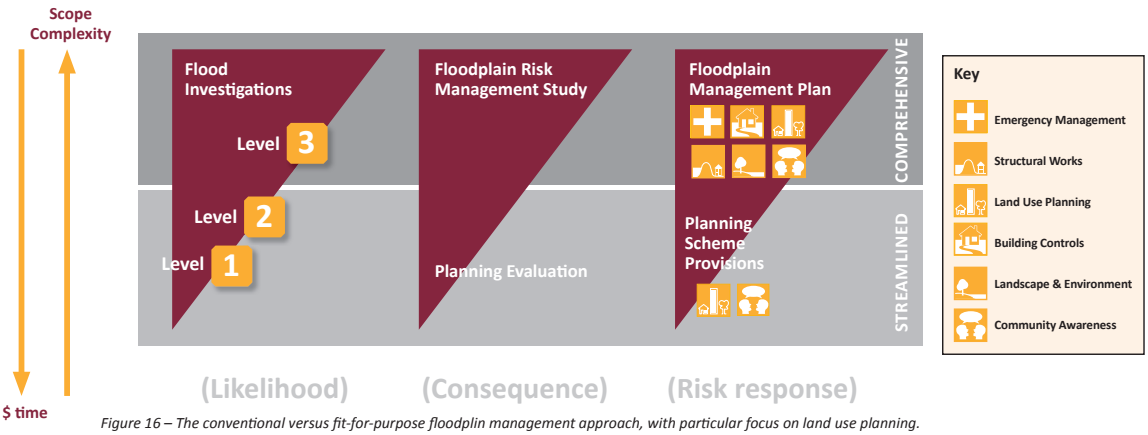


Figure 16 – The conventional versus fit-for-purpose floodplin management approach, with particular focus on land use planning.

The alternative approach

The key principles, intent and general approach of floodplain management should still be reflected in new planning schemes, given land use planning is a key element of the integrated floodplain management approach. An alternative approach, which tailors the existing floodplain management process for a specific land use purpose, involves:

- selecting a flood investigation(s) that is fit-for-purpose
- undertaking a planning evaluation to identify land uses compatible with the characteristics of the floodplain and other management measures (e.g. structural controls)
- developing land use transition strategies for at-risk existing areas; and
- preparing appropriate land use planning provisions within new planning schemes that support the transition strategies.

Flood investigations

Councils and the public may have viewed flood investigations in the past as complex and expensive, particularly in the context of drought, low rate base or other competing priorities. However, there are multiple methodologies for undertaking flood investigations that need not be costly or time/resource consuming. These different levels of flood investigation are discussed later in this section.

The planning evaluation

The FRMS is the conventional approach in which outputs of a flood study are investigated having regard to the urban and social impacts described in **Table 1**. The methodology for undertaking this type of study is well documented through national guidance and other floodplain management literature.

An alternative approach involves undertaking a planning evaluation of the issues affecting development in the floodplain.

These issues may include:

- selection of one or more defined flood events to plan for;
- the flood hazard of that event(s) identified through the flood investigation;
- the possible extent of property/infrastructure damage and risk to life from that hazard;
- the community's expectations of flood protection; and
- the impact of any existing or proposed structural controls or riparian management programmes.

The planning evaluation therefore investigates the consequence(s) of flooding, from a land use planning perspective. **Section 3 - Implementation** gives further guidance on the content and process for undertaking a planning evaluation.

Focusing on land use planning

The Floodplain Management Plan usually comprises a coordinated mix of measures that address the existing, future and residual flood problems, including land use planning. Through the planning evaluation approach described above, appropriate land use controls can be identified and tailored specifically to address the development issues affecting the floodplain without undertaking a comprehensive Floodplain Management Plan. The Implementation section of this Guideline gives further guidance on possible land use strategies and planning scheme responses to address these strategies.

8 SCARM Report 73 – Floodplain Management in Australia pg 16

Does every floodplain need to undergo a comprehensive risk management process?

"Not all parts of Queensland need a comprehensive flood study."

Queensland Floods Commission of Inquiry Final Report, March 2012, p54

While the comprehensive floodplain risk management process is the preferred approach, it may not be necessary for every sub-basin in Queensland – particularly in areas where risk to life or property is low or where there are limited development pressures.

The alternative approach may be appropriate for sub-basins where resources are limited and development pressures/ population are low, particularly those councils who are in the process of preparing their future planning scheme.

The fit-for-purpose floodplain management system focuses on:

1. Floodplain investigations that are appropriate for the population, development pressures and resources available
2. A graduated approach to the evaluation of the flooding investigations, which may involve floodplain risk management studies or more qualitative planning evaluations to develop land use strategies
3. Tailor-made land use provisions developed from the selected land use strategies

Flood investigation guidance

A graduated approach

The floodplain mapping prepared in Part 1 presented a first step in the maturity level of floodplain mapping for those parts of the State without flood mapping. Where detailed flood information is not already available, this mapping can be further refined through a range of flood investigations that identify the extent, occurrence, depth and velocity of floodwaters as required in a graduated way, relative to development pressures and population (see **Figure 17** at right). This section offers a range of flood investigation options (Levels 1 through 3) that accord with this graduation in mapping detail and complexity.

This section also presents a suggested governance framework that can progress the graduated approach to undertaking flood investigations, and outlines the purposes and characteristics of each type of investigation. It also provides guidance on how to select the approach (or combining a range of approaches) appropriate for a floodplain relative to a range of practical considerations. Finally, it provides more detailed guidance on the mapping options.

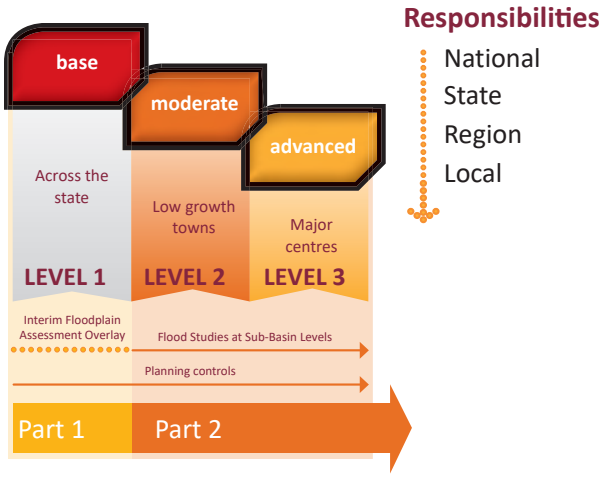


Figure 17: The different levels of flood investigation in the fit-for-purpose approach.

Flood investigation governance

A sub-basin wide approach is considered the most appropriate way to ensure that there is consistency in the delivery of flood investigations across the floodplain. As noted in the Understanding section of this Guideline, the Regional Planning Committee (RPC) may be best placed to oversee and guide the investigations and associated consultation with the community, industry and government agencies. This is particularly the case given the RPC framework is an existing statutory mechanism under SPA and there are strong linkages between RPCs and the regional planning process.

One possible process to developing a sub-basin wide approach to flood investigations is:

1. Regional Planning Committee to identify one member responsible for delivery of the flood investigation program – this member may also be advised by a Flood Advisory Panel to provide expert guidance to the RPC.
2. The member (assisted by the Flood Advisory Panel) to oversee:
    a. the initial review of exposure to flooding in the sub basin(s) and the identification of investigation areas;
    b. determine the type of flood investigation to be undertaken in the investigation areas throughout the sub basin;
    c. delivery and coordination of the respective investigations and studies in the sub basin; and
    d. the community engagement and consultation processes required to inform the community of flood risk and to ensure there is informed input to the flood investigations.
3. Relevant councils in the Sub-basin applying planning responses to identified hazard areas through their future planning schemes.

It is envisaged that the RPC would be responsible for prioritisation, coordination and management of the flood investigations. Monitoring and verification responsibilities could lie with the State. The Advisory Group could be a multi-disciplinary panel of experts (sourced from within councils, or assisted by industry) to ensure the floodplain management process is robust and fit-for-purpose.

The above process is indicative and may be reviewed as part of the Government's planning reform agenda.

Flood gauges on the Balonne River at St George, early 2012. *Source: QldRA*

As part of the Queensland Government's response to the QFCoI and specifically recommendation 2.5, the Authority (with support from the Department of Science, Information Technology, Innovation and the Arts), has committed to undertaking Level 2 flood investigations for up to 100 flood prone towns across Queensland by January 2013. When RPCs are reviewing the towns within their jurisdiction for flood exposure, please contact the Authority to check whether flood investigations for these towns have already been completed. Please refer to Section 4 – Delivery of this Guideline for further information.

Options for flood investigations

Three options for flood investigations have been identified that offer flooding information at increasingly greater levels of detail. Naturally, the methodology for each of these levels is also different, and increases in complexity. The objective for each investigation is to define the flood behaviour with an increasing level of detail and clarity. The flood investigation options are:

- **Flood Investigation Level 1 (FI1)** – the methodology already identified in Part 1. It provides details on the broad extent of floodplains and is suitable for regional landscapes that have low intensity rural production and where flood impacts and population are low, or as an interim solution.
- F**lood Investigation Level 2 (FI2)** – increases the level of detail so that general flood hazard areas and stream velocities can be identified. The approach relies on local knowledge, historic information, and a basic analysis of stream flow. As such this approach can be applied to towns when the anticipated impact of floods is generally low.
- **Flood Investigation Level 3 (FI3)** – provides the greatest level of certainty, and is commonly termed a 'flood study'. This comprehensive study approach uses more detailed hydrologic and hydraulic modelling and analysis at a more local geographic level. This approach suits situations where the impact or consequence of flooding is likely to be significant, such as a medium to high level of flooding impact which would necessitate a detailed study.

These levels of flood investigation can be used to meet the flood mapping hierarchy set out by the QFCoI in its recommendations 2.13 and 2.14:

1. Map with zones of risk derived from flood likelihood & behaviour

2. Map showing flood likelihoods (at least three)

3. Historic Flood Map with flood frequency analysis

4. Historic Flood Map without flood frequency analysis

5. QldRA Interim Floodplain Asseement (IFAO) Overlay Mapping (to identify areas requiring further studies, or as DA trigger)

Refer to **Section 4 – Delivery** of this Guideline for further information.

Level	Key Inputs	Methodology	Key Output	Cost & Delivery
Flood Investigation Level 1	Interim Floodplain Assessment Overlay provided through the Part 1 Guideline, verified with the addition of local information	Take available mapping and refine using historic data (e.g. of specific event) or anecdotal knowledge to confirm extent of floodable area Refer to Part 1 Guideline for further information	Map showing areas potentially subject to flooding	Low cost Suitably competent person (e.g. Shire Engineer or Planner, or Surveyor/GIS Operator)
Flood Investigation Level 2 a) Validated Model b) Validated GIS c) Un-validated GIS Refer to Table 4 and Figure 20 for more detailed information	LiDAR-derived Digital Elevation Model (minimum 0.25m contour intervals) Aerial imagery of subject area and aerial imagery of historic events (if available) Stream flow, heights, flood slope and velocity information (if available) Flood frequency analysis using computer model or Government assistance	Use available inputs and historic knowledge to identify historic flood levels with probabilities determined from flood frequency analysis. Use local knowledge to estimate flood velocities (for validated/ unvalidated GIS only) FI2a and 2b mapping validated against information on historic event (such as aerial imagery or recorded GPS points of flood extent) Refine initial flood hazard area through local verification	Map(s) showing flood hazard areas based on a range of flood lines and estimated velocities Estimate of the AEP for each flood line selected	Low to medium cost Suitably competent person (e.g. GIS Operator or consultant)
Flood Investigation Level 3	Builds on material collected for a Flood Investigation Level 2 Topographic information of better than 0.3 metres vertically with a grid size of typically 1-10 metres, (May be larger depending on area of interest and level of development) More detail may be required for specific areas of interest	Calibrated hydrological models are used to estimate design flood flows. A calibrated hydraulic model determines flood characteristics. Climate change is usually incorporated	Maps showing the extent of various design flood flows (at a range of AEPs), and hazard areas based on depths and velocities Computer model produced	Medium to high cost Generally highly trained council engineering staff or consultant required to undertake Level 3 investigation

Table 2: A summary of the inputs, methodology and key outputs for each flood investigation.

Selecting the appropriate flood investigation

Table 3 gives initial guidance on the minimum type of investigation that may be appropriate for the sub-basin. Most sub-basins will naturally include some or all of the areas identified in the table below.

Councils, and where relevant, their RPCs, may decide on what best describes the exposure to flooding in specific parts of their area and the level of flood investigation required in recognition of the costs and benefits of undertaking more detailed investigations. The criteria for exposure includes geographic scale, population, property and infrastructure exposed to flooding and the demand for new development, economic drivers and inherent community resilience.

The step by step guidance outlined across pages 18 and 19 below further demonstrates how a particular investigation (or number of investigations, if multiple investigation areas are within the floodplain area) may be selected.

Having determined a level of flood investigation given the likely exposure to flooding for each investigation area using **Table 3**, this level (or levels) of flood investigation should be tested against the data needs, advantages and disadvantages, scale and cost considerations. This testing will confirm whether the investigation selected is the most appropriate for the circumstances.

Indicative Terms of Reference (ToR) for a flood investigation Level 3 are available in the supporting technical document to this Guideline. Councils and/or RPCs may wish to use these ToR as a ready-made template in preparing a detailed scope of work for an investigation, or for preparing a tender document for consultant input (if required).

Flood investigations – key considerations

As a general guide, Level 1 mapping may be appropriate (with local verification) for regional landscape and rural areas, and low-density and/or very low growth areas where additional flood investigations such as Level 2 or 3 may not be required. Using Level 1 mapping in these areas will ensure that a baseline, holistic picture of the floodplain throughout the sub-basin can be obtained.

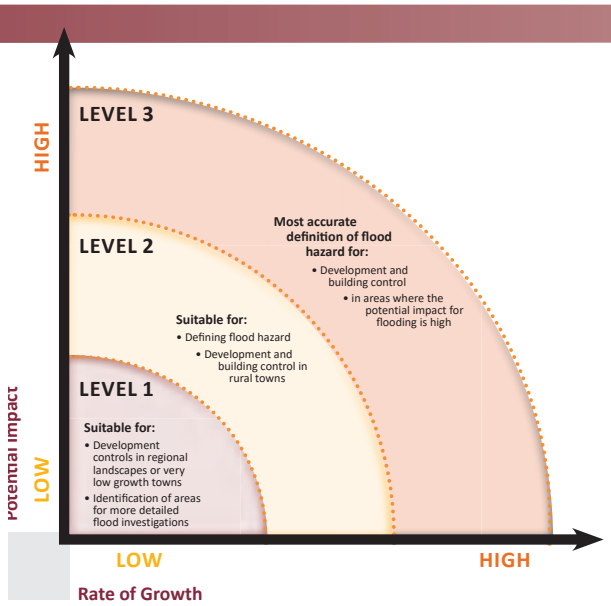


Figure 18 – The three levels of flood investigation

More commonly, Level 2 or Level 3 flood investigations may already be available for the key town(s) within a local government area, but Councils may have no further flood information for any other area, such as areas between towns. In this instance, Councils are encouraged to integrate the Level 2/3 work within the key town(s) with the existing Level 1 mapping between those towns to ensure that all parts of the floodplain within their jurisdiction are mapped.

Alternatively, the Level 1 mapping may be used as a general benchmark to inform further detailed investigation (such as a Level 2 investigation, or if needed in some areas, a Level 3 investigation) of the floodplain.

Investigation Area / Categories of Exposure	Base Mapping	Expected Rate of Growth			Community / Industry resilience	
		None/Very Low	Low	Medium - High	Resilient	Vulnerable
Regional landscape / low intensity rural production	Level 1	Level 1			Level 1	Level 2
Intensive rural production including large scale irrigation development	Level 1	Level 1			Level 2	Level 2
			Level 2	Level 2	Level 2	Level 3
Low density rural townships and settlements (e.g. discrete settlements less than 5000 persons)	Level 1	Level 1			Level 1	Level 2
			Level 2		Level 2	Level 3
				Level 3	Level 3	Level 3
Urban Areas (e.g. discrete settlements greater than 5000 persons)	Level 1	Level 2	Level 3			
Industry or Infrastructure of Regional or State significance (e.g. mines, state development areas)	Level 1	Level 3				

Table 3 – Selecting the appropriate flood investigation. The table is to be read from left to right. When a certain level of investigation is reached, another criterion cannot suggest a lower investigation is appropriate. The indicative guidance above is the minimum level of investigation that may be undertaken for the area.

Step 1 – Revise the Interim Floodplain Assessment Overlay as provided through Part 1

- Use local knowledge to update the Level 1 sub-basin map published by the Queensland Reconstruction Authority

Step 2 – Identify Investigation Areas

- Use the revised Level 1 sub-basin map to identify potential investigation areas based on the exposure of life, property and infrastructure located on the floodplain

Step 3 – Initial Determination of Level of Flood Investigation

- For each investigation area consider the rate of growth, ie low, medium or high growth
- Table 3 shows the initial recommended level for flood investigation
- If Flood Investigation Level 3 is shown, for a particular investigation area, then go to step 5

1 → 2 → 3

In terms of the preparation of new planning schemes, it is important to clearly note the outputs of each flood investigation:

- Level 1 mapping is not hazard map, and so information regarding consequence cannot be drawn from it. However it can be used to trigger development controls (such as an Overlay) as described in the Part 1 Guideline. Level 1 mapping will be also useful in identifying areas for further investigation.
- Level 2 will produce a basic flood hazard map and multiple (if required) AEP floodlines, from which a basic understanding of consequence can be drawn. Level 2 can allow the selection of zoning controls for a particular area subject to flood, based on a basic understanding of risk as it relates to planning purposes. It can also allow basic building controls to be set. Level 2 mapping is consistent with the requirements of the QFCoI.
- Level 3 will provide a detailed flood hazard map and multiple AEPs (if required). Level 3 can be used to comprehensively understand the consequence of flood impact and appopriate zoning controls can be selected with a high level of certainty.

Within their new QPP-compliant planning schemes, unless the whole local government area has been mapped using the advanced techniques of a Level 3 investigation, councils may use a combination of all of the above techniques to prepare flood overlay mapping. Councils are encouraged to use locally-verified Level 1 mapping in the rural and landscape areas between towns, Level 2 investigations in smaller towns (where appropriate), and Level 3 investigations in their larger towns. Where this has been undertaken, councils may take advantage of the suggested zoning controls outlined in **Schedule 5** that have been tailored for use where Level 2 and Level 3 investigations have been undertaken.

Available in late 2012, the Queensland Flood Portal and Database will help address recommendations of the QFCoI that relate to the availability and enhancement of flood information.

Schedule 4 contains a flood hazard definition based on latest guidance from Engineers Australia.

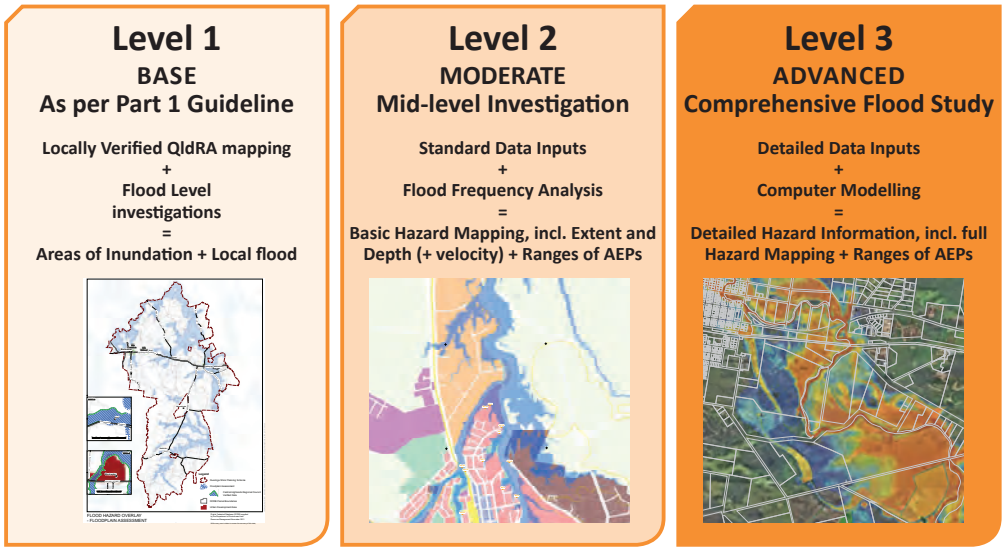


Figure 19: Basic inputs and outputs for each level of flood investigation.

Step 4 – Review Determination of Flood Investigation Level 1 or 2

- Consider the resilience of the community, industry or infrastructure in the investigation area
- If resilience is considered to be strong, then maintain the initial level of investigation. If not, then increase the level of investigation to the next level

Step 5 – Confirm the Level of Investigation

- Consider are the scale of the investigation area, the data needs, the relative complexity of any modelling, the need to able to assess the impact of future development and the relative costs
- Finalise the choice of investigation to provide a cost effective and fit-for-purpose approach to providing the basis for the subsequent planning evaluation and planning responses

4 5

Undertaking a Flood Investigation Level 2

The Level 2 investigation is a suitable tool for lower growth areas in understanding and identifying flood hazard in those areas where an advanced flood investigation is not warranted. There are three categories of Level 2 flood investigation that involve different methodologies and varying resolutions of mapping output. **Table 4** below gives a detailed overview of each approach, including the data inputs required, indicative costs, mapping outputs, accuracy, confidence and suitability.

The methodologies used for undertaking the different Level 2 flood investigations are provided in **Figure 20** on the right.

In undertaking a Level 2 investigation, the intention should be to create as many AEP maps as the data inputs can support, so that the community can understand a broad range of the hazards to which it is subject.

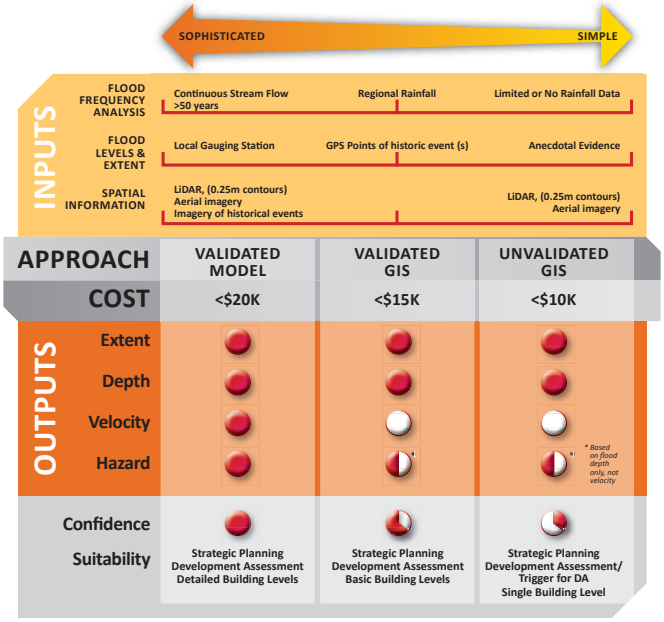
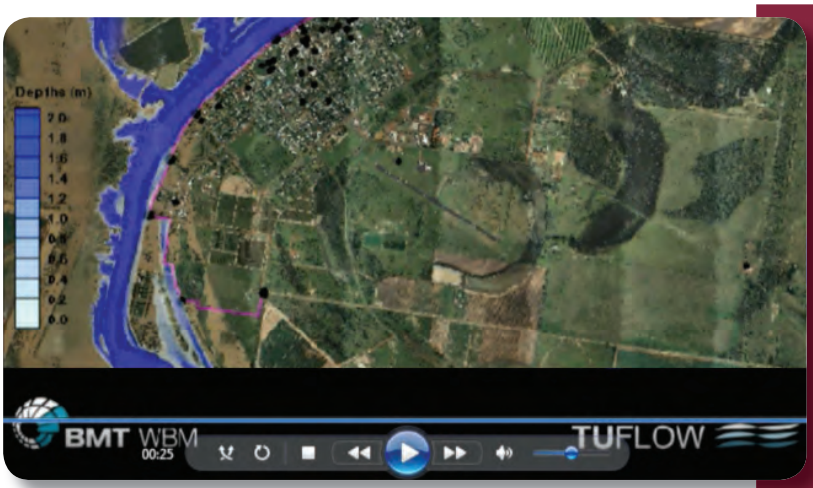


Figure 20: Inputs, approaches and outputs possible from the three types of Level 2 flood investigation.

Key steps	Validated Model	Validated GIS	Unvalidated GIS
Produce an FFA	Produce a flood frequency analysis (FFA), including 90% quantile probability limits (use AR&R as a guide).	Produce a flood frequency analysis (FFA), including 90% quantile probability limits(use AR&R as a guide).	Produce a flood frequency analysis (FFA), including 90% quantile probability limits(use AR&R as a guide).
Compile the spatial information	Compile Digital Elevation Model (with 0.25m contours derived from LiDAR capture) and GIS layers (high resolution aerial photography, QldRA level 1 base mapping, planning scheme details, Points of Interest data base, details on historic floods – ideally aerial photography capturing the peak of the highest recorded event, or GPS points / plan of record event).	Compile Digital Elevation Model (with 0.25m contours derived from LiDAR capture) and GIS layers (high resolution aerial photography, QldRA level 1 base mapping, planning scheme details, Points of Interest data base, details on historic floods – ideally aerial photography capturing the peak of the highest recorded event, or GPS points / plan of record event).	Compile Digital Elevation Model (with 0.25m contours derived from LiDAR capture) and GIS layers (high resolution aerial photography, QldRA level 1 base maping, planning scheme details, Points of Interest data base, details on historic floods – anecdotal information).
Hydrology	Develop a hydrograph for a known flood event and for which the spatial extent is available – to simulate the maximum flow for the event.	Identify the level of the "baseline" flood for which sufficient data is available (sources include Bureau of Meteorology, Qld Department of Natural Resources & Mines, SunWater etc). Calculate flood level and floodslope from available information (observed by Hydrographers, estimated from local terrain).	Identify flood level for which sufficient data is available (sources include Bureau of Meteorology, Qld Department of Natural Resources & Mines, SunWater etc). Calculate flood level and floodslope from available information (observed by Hydrographers, estimated from local terrain).
"Modelling" and "validation"	Develop a 1D or 2D hydraulic model (eg HEC-RAS, TUFLOW, MIKEFLOOD etc). Use industry standard Mannings"n" roughness coefficients for broad landuse types a high resolution DEM as the basis for the model – it may be appropriate to use 10m grid cells to manage simulation run times. Validate model against the known spatial extent and any recorded heights of the modelled "baseline" event(s).	Use GIS software to map the extent and depth of the "baseline" flood event. This may include using the software to determine the terrain slope as an indicator of floodslope. The floodslope is applied to a known flood height location (eg an observed height at a gauging station) and intersected with the DEM (typically at a 1 m grid cell) to identify the extent of the event. The extent is validated against the known extent of the events per specific spatial information (maps, GPS points). The modelled extent can be adjusted as necessary to achieve the best alignment with the known extent.	Use GIS software to map the extent and depth of the "baseline" flood event. This may include using the software to determine the terrain slope as an indicator of floodslope. The floodslope is applied to a known flood height location (eg an observed height at a gauging station) and intersected with the DEM (typically at a 1 m grid cell) to identify the extent of the event. The extent is reviewed against anecdotal information and adjusted according to the validity of the anecdotal information.
Products - hazard maps	Use the "validated" model to produce hazard maps (depth and velocity) for the "baseline" event and for a range of estimated AEPs.	Use the "validated" GIS mapping to produce hazard maps (depth only) for the "baseline" event and for a range of estimated AEPs. The identified flood surface for the 'baseline" is applied to the gauge levels as required. Note that subsequent identification of backwater and noflow areas can be used to produce a hazard map (depth and velocity).	Use the "unvalidated" GIS mapping to produce hazard maps (depth only) for the "baseline" event and for a range of estimated AEPs. The identified flood surface for the 'baseline" is applied to the gauge levels as required. Note that subsequent identification of backwater and noflow areas can be used to produce a hazard map(depth and velocity).

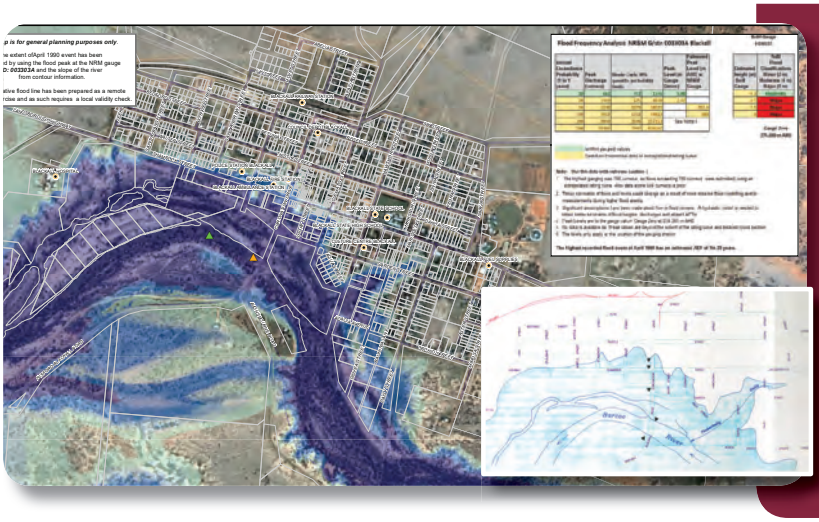
Table 4: Key steps in the methologies used to undertake each of the three types of Level 2 flood investigation.



Validated Model

Outputs:

- Range of AEP maps
- Extent, depth & velocity
- Time sequence of inundation
- Validated against historic event(s)



Validated GIS

Outputs:

- Extent and depth
- Range of AEP maps (where stream flow data permits)
- Validated against historic event(s)

Unvalidated GIS

Outputs:

- Extent and depth
- Range of AEP maps (where stream flow data permits)

Figure 21: Indicative outputs of the different three different methodologies available using the Level 2 flood investigation approach.

3. Implementation

Undertaking a planning evaluation

Bridging the gap

A planning evaluation can be used to bridge the gap between flood investigations and any risk treatment options, where a Council determines not to undertake a comprehensive Level 3 floodplain risk management study. It will assist in determining land use compatibility in the floodplain and the risk treatment options (including land use response strategies) required to achieve that compatibility.

The planning evaluation has two key stages:

1. Undertaking an evaluation of a range of planning considerations to assess the consequence of flood hazard on the built environment and assign a level of planning-specific flood risk; and
2. Developing options to treat the flood risk presented by the hazard, including possible land use response strategies, where a need to alter the existing approach to land use within the floodplain has been identified by the risk evaluation.

A basic work flow for the planning evaluation is outlined below. The flood hazard to be used in the planning evaluation is that identified by the flooding investigation (refer to **Section 2 - Analysis**). **Schedules 5 and 6** provide more detailed information than that provided in this section, and **Schedule 7** provides an indicative worked example (a case study) of how the planning evaluation process may be undertaken.

The National Emergency Risk Assessment Guidelines (NERAG) include detailed guidance for emergency managers on identifying, evaluating and treating hazard risks, and this remains the principal guidance document for these purposes. The guidance below has been derived from NERAG and applied to the context of land use planning.

Figure 22 – The process workflow for undertaking a planning evaluation using the hazards identified through the flood investigation previously selected and prepared.

Selecting flood likelihoods to evaluate

Planning evaluations should be undertaken for a range of likelihoods (such as at least the 2%, 1%, and 0.5% AEPs, but potentially more in circumstances that warrant it) in order to develop a good understanding of the flood risk to which an area may be subject. The decision to adopt a likelihood(s) of a particular probability for land use planning purposes should be undertaken in close consultation with the community. Taking this approach means that communities can choose the final likelihood(s) to regulate development based on a good understanding of the consequences and resultant risk for a range of events.

The key elements of consequence

In terms of land use planning, the consequence of a flood can be understood by assessing three important elements – the exposure of a community to the hazard, the vulnerability of that community to the hazard, and the community's tolerability of that hazard. Consequence can be described as the sum of exposure and vulnerability, minus tolerability, as identified in **Figure 23** below:

Figure 23: The key elements of consequence.

The key criteria for assessing each element of consequence are noted in **Table 5** below:

Exposure	Vulnerability	Tolerability
Hazard Severity	Personal Safety	Community Awareness & Education
Population Size	Vulnerable Persons	Community Attitudes/Experience of Flood
Settlement Pattern, Land Use and Networks	Property Impact/Built Form	Insurance Levels
	Isolation	Social Networks & Capacity
	Transport Linkages	Socioeconomic Status
	Critical Infrastructure (e.g. hospitals, emergency services)	Emergency Plans & Services
	Other infrastructure/community services	Emergency Volunteers
		Private & Public Business Continuity

Table 5: Planning evaluation checklist for urban areas.

Planning evaluation criteria

The planning evaluation checklist and calculation process in **Schedule 5** has been developed from the key criteria from **Table 5** above to guide the planning evaluation of the impact of flood hazard on land use and development. The checklist is provided in a question/ready reckoner format for ease of use and reference, and is intended to trigger the investigation of the key criteria in **Table 5** through the step-by-step calculation process. The data/information/analysis required in order to adequately address each question within the checklist is also noted in this checklist.

Identifying risk through the planning evaluation

The most effective scale at which to undertake a planning evaluation is the property level or street level. Where a wider scale understanding is required, analysis at the lower scale can be aggregated up to provide a suburb or city-wide understanding of flood risk – this is discussed further in the following section titled 'Prioritising flood risk treatment across jurisdictions'.

Once a flood likelihood is selected for evaluation, the weighting methodology provided in **Figure 24** demonstrates how to quantify the elements that make up the consequence of a flood hazard at a particular likelihood – exposure, vulnerability, and tolerability. Using this weighting, each element is assigned a score of between 0 and 5 points based on the calculation process that supports the evaluation. The analysis results in a final score out of ten (10), with ten (10) representing the highest level of consequence, and zero (0) representing no consequence.

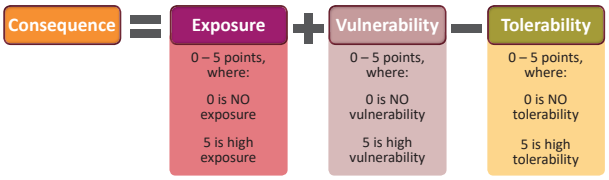


Figure 24: Quantifying consequence using a weighting approach to the key elements of exposure, vulnerability and tolerability.

Once a consequence score has been identified, the flood risk matrix (**Table 6**) demonstrates how to assign a level of risk to that score, relative to the flood likelihood against which the evaluation was undertaken. It can be seen from the matrix that the risk level identified is a product of the 'Risk = Likelihood x Consequence' formula discussed in **Section 1 – Understanding**. Therefore, the consequence assigned to a flood hazard can be compared relative to the likelihood at which it occurs. Naturally, a flood hazard that is expected to occur once every ten years less tolerable than a flood hazard of the same consequence that may occur once every thousand years. This is also demonstrated in **Figure 25.**

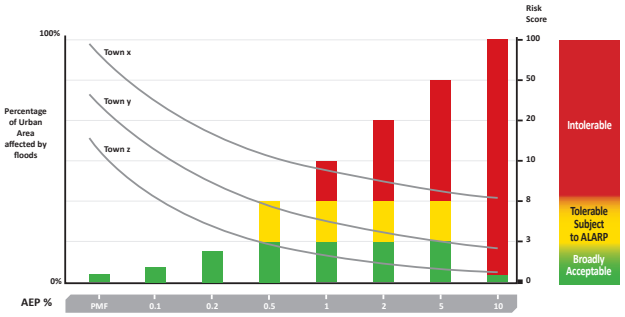


Figure 25: The risk scores possible at each level of Annual Exceedance Probability (AEP) using the Likelihood x Consequence matrix presented in Table 6 at right. Note how risks become more acceptable the lesser the likelihood of their occurrence

The planning evaluation considers the approach to evaluating risk promoted by the NERAG guidelines, principally through the application of the 'ALARP' principle. According to NERAG, the ALARP (As Low As Reasonably Practicable) Principle is applied to define boundaries between risks that are generally intolerable, tolerable or broadly acceptable. The ALARP principle will help to prioritise a risk hierarchy and determine which risks require action and which do not. Those that are broadly acceptable naturally require little, if any, action while risks that are at an intolerable level require attention to bring them to a tolerable level. According to NERAG, it is entirely appropriate and accepted practice that risks may be tolerated, provided that the risks are known and managed.

The ALARP Principle from the NERAG document gives further guidance on the approach to evaluating risk, illustrated in **Figure 26.**

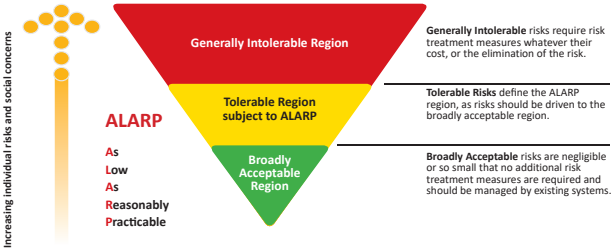


Figure 26: The ALARP Principle, derived from the National Emergency Risk Assessment Guidelines.

Through the responses to the planning evaluation checklist, the planning evaluation will divide the subject area into the three categories of risk promoted by NERAG. Risk treatment options can then be developed for each of these three categories of risk.

It is important to remember that it is the role of the planning evaluation to translate the hazard presented by the flood investigation into usable information related to risk. Therefore, as noted on page 10, while an area may be identified by the flood investigation as 'high' hazard, because of the exposure, vulnerability and tolerability factors considered through the planning evaluation, this area may be of little concern and so may be of broadly acceptable or tolerable risk for the purposes of land use planning.

An indicative case study of the planning evaluation process that includes calculations of the consequence scores and the overall risk levels for an area of flood hazard is provided in **Schedule 7.**

	Consequence Score										
Likelihood	0	1	2	3	4	5	6	7	8	9	10
10%	0	10	20	30	40	50	60	70	80	90	100
5%	0	5	10	15	20	25	30	35	40	45	50
2.5%	0	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25
2%	0	2	4	6	8	10	12	14	16	18	20
1%	0	1	2	3	4	5	6	7	8	9	10
0.5%	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
0.2%	0	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
0.1%	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1

Broadly Acceptable
Tolerable subject to ALARP
Generally Intolerable

Table 6: The likelihood x consequence risk matrix.

Prioritising flood risk treatments

The planning evaluation process provides a mechanism by which the flood risk of one suburb or town may be compared against the flood risk in another suburb or town. This is important for Councils, RPCs and other levels of government in allocating resources to treat instances of flood risk in their jurisdiction.

For each subject area, the planning evaluation can identify the amount of land area, number of lots, or population subject to the varying levels of flood risk for the likelihoods selected – refer to **Figure 27.** The relative extent of flood risk provides a means by which suburbs or towns can be prioritised for treatment. Any treatment programme should be developed with regard to available resources and the timings for undertaking the treatment options.

Knowing where the greatest extent of flood risk exists within a jurisdiction ensures the allocation of resources and the timing in undertaking the treatment is appropriate for the levels of risk identified. In taking a sub-basin wide approach to floodplain management, the regional planning process undertaken by RPCs and expressed through the relevant Regional Plan may be the most appropriate mechanism to prioritise flood risk treatment relative to planning outcomes sought and the funding/resources available to treat the risk. Treatment programmes can then be articulated or referenced in the Regional Plan, with land use planning responses in the Regional Plan and the planning schemes within that regional area reflecting those treatment programmes.

Treating flood risks

The NERAG Guidelines offer a comprehensive risk treatment process that can be applied to the context of land use planning – refer to **Figure 28.** The various components of the process relative to land use planning are also identified, and are discussed in detail below.

Fig 28: Integrating the land use planning process with the NERAG risk treatment process

Further analysis may be required for each option developed as a part of the treatment plan. For example, if a levee is proposed in addition to land use planning considerations, this option will require specific flood investigations and cost-benefit analysis. A step by step guide to undertaking the risk treatment process is provided in **Schedule 5**.

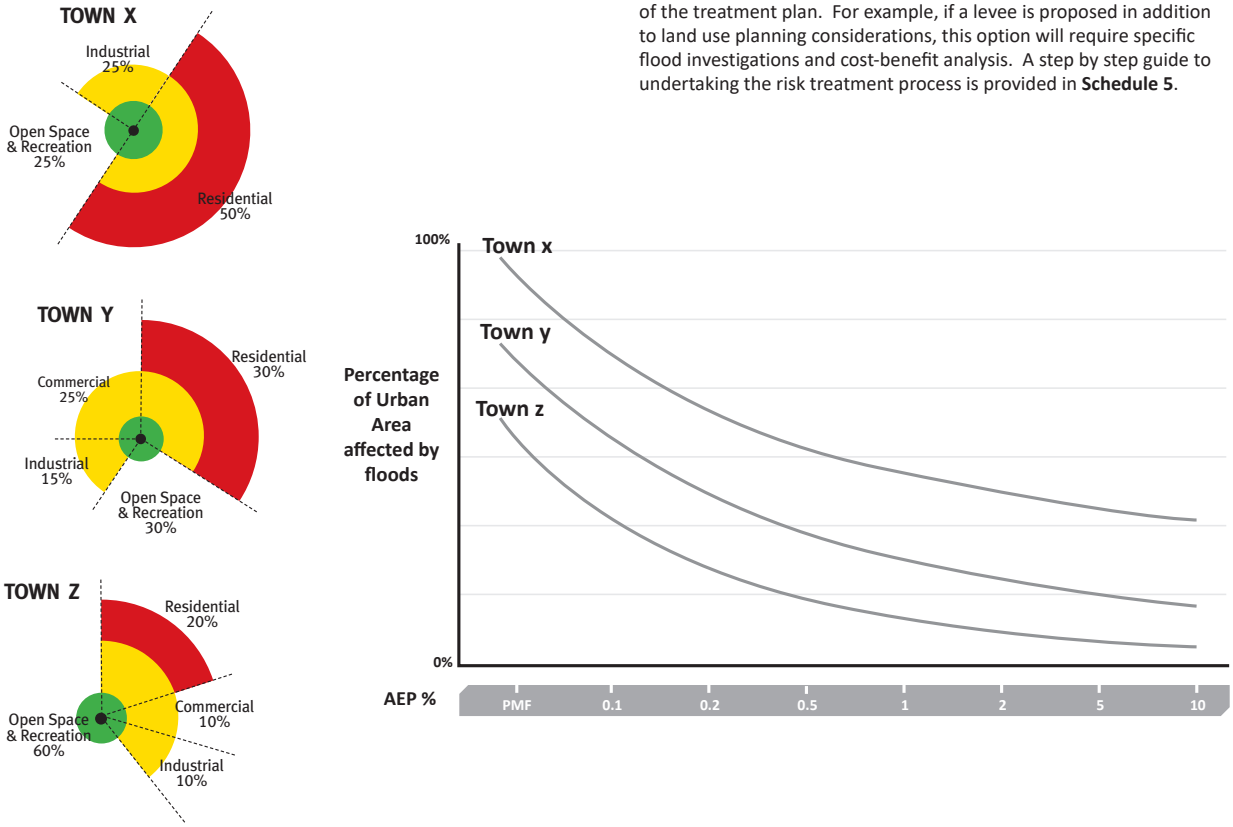


Figure 27: Understanding the different flood risks that towns or suburbs are exposed to allows prioritisation of treatment options where they are needed most

Setting the resilience target

Once the level of flood risk for areas or properties has been identified through the planning evaluation, a resilience target can be set as a 'goal' to strive for when preparing options to treat the flood risk. The target (such as percentage of urban area affected by flood) can be used as a metric to quantify the effect of those measures used to address the flood risk, when considered against the current situation. In line with the principles of NERAG, the broad intention is to set a resilience target that is lower than the current level of resilience, so that the amount of area affected by flood is reduced to as low as reasonably practicable (refer to **Figure 29**).

Setting a resilience target ensures that what is sought to be achieved by flood risk treatment measures is clear and definable; it provides an easily understandable objective to assess the appropriateness or usefulness of a certain measure (or suite of measures) in achieving that target.

It is possible that different resilience targets may be required depending on local circumstances; the target proposed might differ depending on the local flood characteristics and the local settlement context. Other possible resilience targets could be:

- Eliminating or reducing the number of lots subject to intolerable flood risk, where the priority is treating the highest level of risk only;
- Eliminating or reducing the flood risk to transport linkages between critical infrastructure (such as evacuation centres/airports) and the balance of urban areas where such a risk exists; and/or
- Reducing the number of lots subject to tolerable flood risk, to ensure these lots are then subject to broadly acceptable risk.

Therefore, a more specific resilience target relevant for some councils may be to focus on reducing the number of lots for residential and/or commercial purposes that are at intolerable flood risk. In this situation, the existing number of lots at intolerable risk can be quantified through the planning evaluation process, and the resilience target could be to eliminate or reduce as far as practicable the flood risk to these lots.

An example of such a target may be: There are 100 urban residential lots at intolerable risk of flood in Smithtown, which require treatment to reduce the risk. Over the next 20 years, the risk to all lots will be reduced to an acceptable level by a combination of back-zoning and property buy-back programs to remove persons and property from the flood hazard and some mitigation works by the Council.

The planning scheme therefore plays a strong role in achieving this resilience target, given the back-zoning required. The resilience target can be identified through the planning scheme prepared for the Council area, such as through the vision or the strategic intent of the strategic framework. The balance of the planning scheme provisions can then be calibrated against the community's level of acceptance of flood risk, and this resilience target. For example, these lots could be zoned Limited Development (constrained land), the zone code would include land use assessment criteria to avoid inappropriate development, and development generally within the zone would be impact assessable. Where a resilience target is set that also involves non-planning scheme matters (such as structural mitigation works) this can be made clear in the target outlined by the strategic framework and duly reflected in the zoning choices used in the zoning plan.

There is also a role for regional planning in setting resilience targets. Given the likely prioritisation of flood risk treatment that will occur either across a local government area or an RPC area, the regional plan also may be an appropriate place to set resilience targets, though at a broader scale than that in a planning scheme. For example, the resilience target in a regional plan may set requirements for the highest risk towns in the RPC area to reduce their flood risk to a tolerable level. Alternatively, where there is a regional interest for the largest town in the RPC to be the most resilient for the purposes of maintaining economic and social linkages during flood events, this can be quantified in the resilience target for the RPC area. The relevant Council would take the steps needed to ensure this resilience through the measures available to it, including its planning scheme and other land use measures.

It is acknowledged that the process of achieving resilience targets may either occur relatively quickly where strong interventions such as relocation programmes are undertaken, or it may take some time where the treatment options chosen involve voluntary buy-back schemes. The decision to take strong action or action over time to address the risk is a matter for councils or RPCs. In any case, fully meeting a resilience target is likely to require generational change that should be supported by successive regional plans and planning schemes over time.

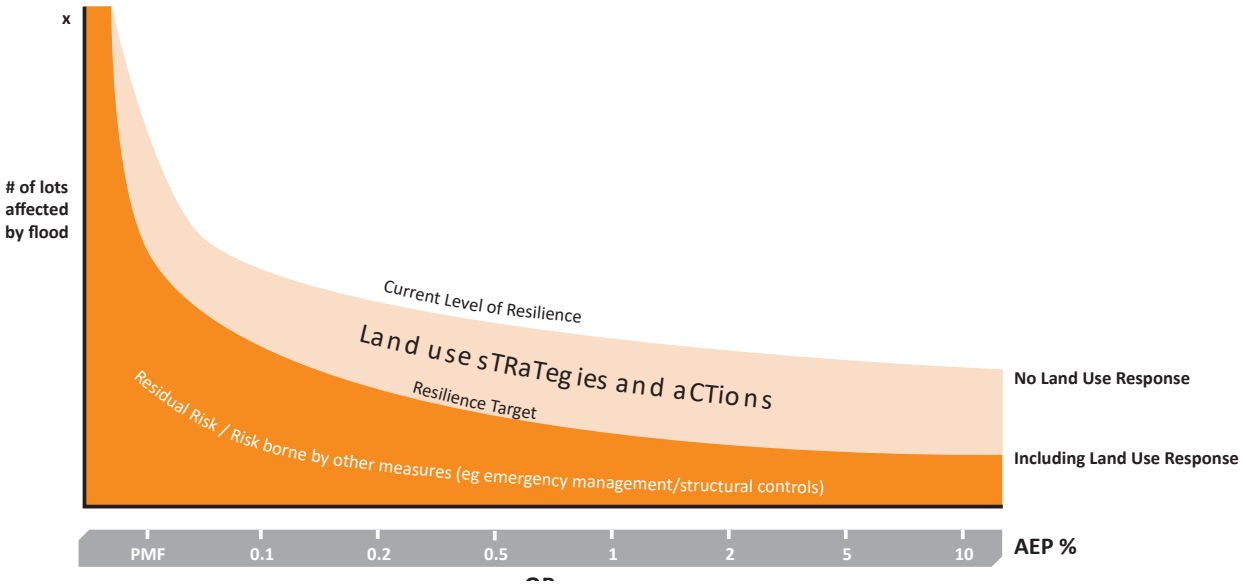


Figure 29: Setting a resilience target (for flood risk at a certain level of likelihood, or for a range of likelihoods) provides an easily identifiable goal for improving resilience to flood risk, particularly through land use responses such as planning schemes.

Treating risks through land use planning

The planning evaluation should identify options for treating the flood risk identified through the planning evaluation. **Figure 30** below elaborates upon the ALARP Principle contained in NERAG and applies possible high-level land use responses to treat the risks as described. These land use risk treatment options are elaborated upon in the following section titled 'Land Use Response Strategies'.

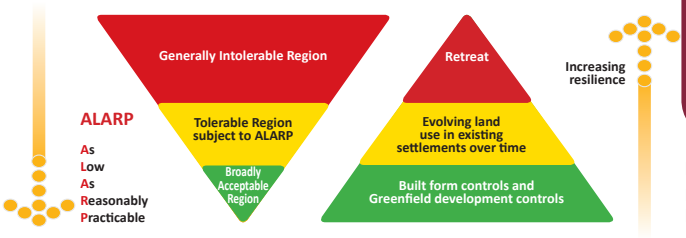


Figure 30: The land use responses that increase resilience relative to the three categories of risk prescribed by NERAG.

However, the planning evaluation may also identify that it is appropriate to treat some flood risk outside the planning system (such as through structural mitigation works or controls, or through emergency management procedures). Other possible measures to treat flood risk include those identified previously in **Figure 1**, including:

- structural or natural mitigation
- building controls
- emergency management procedures
- insurance
- community awareness/education programs.

These measures should be identified early on for investigation and assessment by the relevant experts. For example, if risk to a certain urban area was deemed intolerable, following consultation with the public, Council may deem that the appropriate response to that risk is to protect the existing community using structural works such as a levee.

Compare the options and decide suite of measures

While a land use response to retreat from an area at intolerable flood risk using back-zoning and buy-back/land swap arrangements may eliminate the risk, the community may decide to remain in the area regardless. This would necessitate consideration of risk treatment options that would rely on more than a planning scheme response and a land swap programme. It may involve non-planning considerations such as structural works.

Therefore, the views and attitudes of the community are important in testing possible options to treat flood risk. All options proposed should be presented to and considered by the community so that a preferred option or suite of measures can be identified and agreed.

Cost also may be a relevant consideration in the options used to treat the identified risk. For example, the building of a levee to protect a certain settlement or area may be more expensive than the cost of property buy-backs or land swap programmes for those areas. However, the need to treat the identified risk in a manner that reduces the risk to as low as reasonable practicable should be the paramount consideration in determining the appropriate course of action.

Critically, the outcomes of any non-land use planning investigations to treat flood risk should feed back into the land use planning process. For example, where a levee is to be constructed to protect a town, the details of the level of protection (i.e. a 2% event or a 1% event, etc) should be made available to land use planners within Council so that they may tailor land use provisions accordingly. If the levee is to be built only to protect the town up to a 2% event, land use planning provisions may still be required to treat the residual risk left by the levee in a manner that was acceptable to the community. This would ensure that in the instance that the levee is overtopped or breached, these areas are still resilient to the ensuing inundation.

Land use planning contributes to both mitigation of, and adaptation to, urban floods.

Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century – A Summary for Policy Makers, Jha, Bloch, Lamond p29

Ongoing management of residual risk through development assessment and other local responsibilities

It is important for planners to consider development assessment as a risk management exercise. While a planning scheme may address flood risk through appropriate zoning and strategic policy, development assessment decisions made pursuant to that planning scheme must also reflect that intent. Given development assessment requires professional judgment to be exercised within that decision-making process, the NERAG risk treatment principles are also relevant at this point in the planning process.

Other persons or entities involved in natural hazard risk management should also be informed of planning decisions made over time. A clear point of communication should be created between the Local Disaster Management Group personnel and the planning personnel of Council to ensure that emergency management personnel are aware of planning decisions made that may affect their emergency planning and procedures.

Emergency management procedures and ongoing maintenance of structural works also play a part in managing residual risk. In practice, the extent to which these operations are undertaken will materially affect the level of actual risk to which a settlement may be subject and so should be monitored carefully for their appropriateness relative to the evolving settlement(s) they assist in protecting.

In managing flood risk today, and in planning for the future, a balance must be struck between common sense approaches that minimize impacts through better urban management and the maintenance of existing flood mitigation infrastructure, and far-sighted approaches which anticipate and defend against future flood hazard by building new flood mitigation infrastructure or by radically reshaping the urban environment. The balance will be different for each city or town at risk...an understanding of both current and future flood risk is needed.

Cities and Flooding: A Guide to Integrated Urban Flood risk Management for the 21st Century, Jha, Bloch, Lamond p29

Land use response strategies

The risk treatment component of the planning evaluation should identify a land use response, or a number of responses, that may be used in those areas of risk that are commensurate with the level of risk identified for that area. The broad categories of land use responses include:

- adapt existing urban areas or sites;
- retreat from specific existing urban areas or sites;
- expand into new areas suitable for urban development;
- maintain agricultural and rural landscape values; and
- treat risks to linkages (e.g. transport routes) and isolated places.

The combination of land use response measures used to treat flood risk will vary depending on the level of risk identified, the scale of that level of risk (i.e. the amount of area subject to that risk), the prioritisation given to treating that risk, community expectations and the resources available to Council to treat the risk.

The suggested land use response measures are outlined in **Table 7** below. An indicative case study of the planning evaluation process that includes selection of land use responses is provided in **Schedule 7**.

Land Use Response	Land Use Strategy
Maintain the status quo	
Make no changes to existing land uses as risk is minimal	None required
Adapt existing urban areas	
Support built form change over time	– Improve built form outcomes through urban design and building code controls – Promote traditional Queensland building designs & construction methods – Set habitable floor levels – Build with resilient materials – Maintain/rehabilitate natural waterways and flowpaths – Avoid filling to minimise cumulative impacts on floodplain
Limit certain land uses that are not appropriate for the hazard	– Adjust current zonings to reflect appropriate land uses – Create flood-constrained precincts within zones, which may limit certain land use types or density increases
Retreat from specific existing urban areas	
Remove existing vulnerable land uses from areas of highest risk	– Actively transition existing at-risk land uses – Back-zone areas of highest concern – Investigate planned retreat programmes such as voluntary purchase, land swaps, compulsory acquisition to complement scheme response
Expand into new areas suitable for urban development	
Allocate future urban areas in areas of lowest or no risk	– Avoid zoning areas of medium or highest concern for future urban purposes – Site-based investigations during application stage may identify additional areas of concern. Avoid inappropriate land uses in these areas
Maintain agricultural and rural landscape values	
Support flood-appropriate land uses in non-urban areas	– Tailor rural land uses appropriate to the areas of concern, particularly intensive animal husbandry or intensive agriculture
Treat risks to linkages and isolated places	
Ensure transport and infrastructure routes are resilient to the hazard, and address isolation risks created through interruptions to such linkages	– Avoid creating additional risks by not placing key transport/infrastructure linkages in floodable areas, or by ensuring their resilience to those events – Investigate existing areas to identify possible points or areas where linkages may be impacted by flood events & consider resilience or relocation strategies to address this risk – Investigate existing settlements to identify areas that would not flood but would be isolated from balance of urban area when flood occurs, and treat linkage accordingly

Table 7: The range of potential land use responses to flood risk, and the transition strategies that are required to support those responses

Dalby in flood *Source: Western Downs Regional Council*

Oakey in flood *Source: Toowoomba Regional Council*

Using the planning scheme to build flood resilience

A planning scheme needs to have a clear line of sight in how it deals with natural hazard risks. This line of sight provides a clear linkage throughout the document to ensure that all levels of the planning scheme appropriately and consistently reflect the desired approach to dealing with flood risk in the planning scheme area.

The line of sight is based on two key elements – understanding the hazard/risk, and the community's intentions for responding to that risk. The balance of the scheme can then be calibrated to respond to these elements.

The following three components of new QPP-compliant planning schemes are considered to be the most effective tools to mitigate natural hazard risks (including floods) through a statutory planning mechanism for a local government in Queensland.

1. **Strategic framework** - sets the vision and land use direction for the planning scheme and forms the basis for ensuring that appropriate development occurs within the planning scheme area, including how a community responds to flood risk
2. **Zones (including precincts)** - ensure that development within the scheme area responds to the desired outcomes contained in the strategic framework by setting clear land use intent and calibrating levels of assessment for development that reflect the strategic intent
3. **Overlays** – provide further assessment criteria for specific constraints or opportunities (such as flood hazard) within the scheme area, such as built form controls.

Flooding across the Oakey - Pittsworth Road, 2011 *Source: Western Downs Regional Council*

Schedule 8 provides detailed guidance and examples on how Councils can utilise these components within their new QPP-compliant planning schemes to mitigate and regulate flood risk. Councils may also use other scheme mechanisms (such as planning scheme policies or planning partnerships) to also address flood risk as desired.

A key role for the strategic framework is to define the desired settlement pattern for the Council area. The settlement pattern proposed by Council will be developed taking into consideration expected population growth, economic development strategies, existing urban areas and desired built form outcomes. It should also be informed by responses to, among other things, flood hazard.

It is also the role of the strategic framework to articulate the extent to which the community accepts or tolerates natural hazard risk, what resilience target is appropriate to strive for through the life of the planning scheme and how the community wishes to address the risk of natural hazard, having regard to other factors such as population growth and economic development. This policy position then needs to filter down into the detailed planning scheme provisions, such as zones and overlays.

There is a key role for a community vision in defining the conceptual way forward for development within the planning scheme area, as the more detailed policy positions in the strategic framework will be informed by this vision. The vision as it relates to natural hazard risk will be built upon the community's acceptance of risk and the resilience target identified. The vision can then assist planners to calibrate the land use plan (e.g. zoning) and detailed assessment mechanisms such as codes within the scheme to address exactly what the community intends for the area.

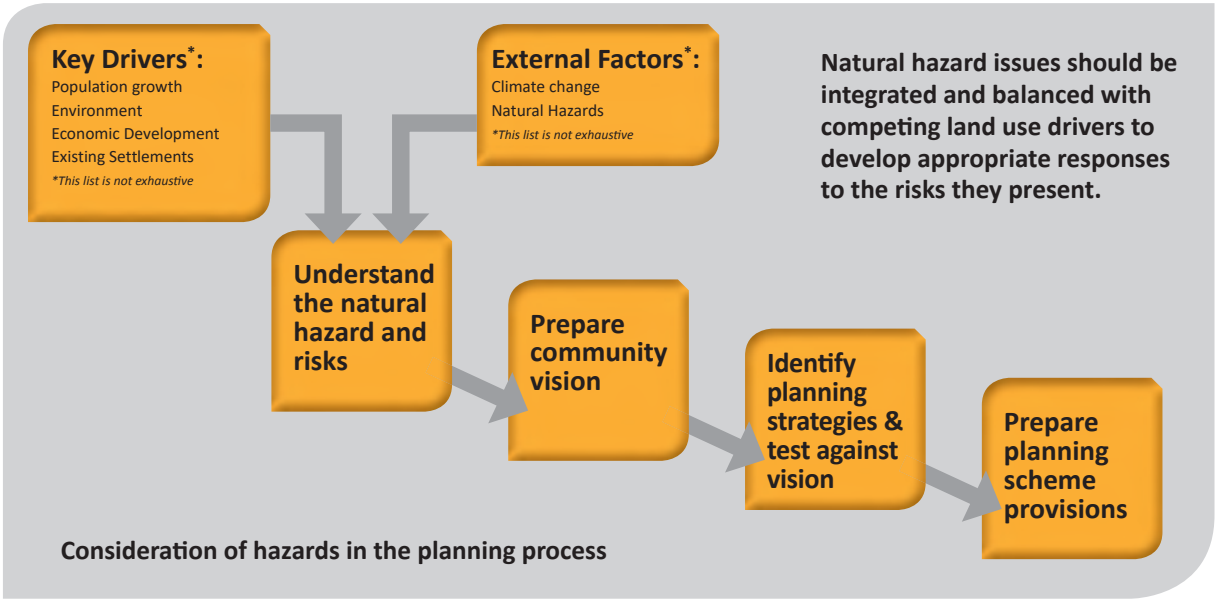


Figure 31: The line of sight in planning scheme preparation

Hazard maps vs risk maps

A key output of the planning evaluation will be maps showing the level of identified flood risk at a property or street-by-street level. This mapping will be used to inform strategic planning and to calibrate zonings for properties affected by flood where this has been identified as an appropriate risk treatment option.

However, it is important that the flood hazard map be included in any planning scheme, not the flood risk map developed from the planning evaluation. As the scheme cannot accurately predict every type of development that may be proposed within a Council area, the risks presented by future development may change. For example, a Council may identify a rural, undeveloped area at 'acceptable' risk because it is not an urban settlement and is not envisaged as such under life of the scheme. This risk level is appropriate for this current circumstance, though there may be instances where development not envisaged by the planning scheme occurs. For example, resource/mining activity that commences after the scheme is adopted triggers the need for additional urban development (a residential subdivision, for example) in that area. As it was not identified as a future urban area in the scheme, the stated 'acceptable' level of risk for the area is not appropriate to assess the development. Therefore, a risk map is not appropriate for inclusion in a planning scheme but should be used to inform the strategic land use planning process and the allocation of zonings based on the identified levels of risk.

A hazard map is the correct mechanism to assess the appropriateness of the land use though the development assessment process. This is because the hazard map will depict the actual nature of the flood – i.e. how 'hazardous' it is. Councils are encouraged to include all hazard maps (including various levels of AEP – e.g. 1%, 0.5%, 0.2%) available for their council area in their planning scheme. One specific Shire-wide map may be used as the overlay map to trigger assessment criteria, while the balance of AEP maps may be included in a planning scheme policy or similar to provide additional context for councils and applicants during the development assessment process. The case study provided in **Schedule 7** demonstrates the difference between a hazard map and a risk map.

Land use strategies and planning scheme responses

Schedule 6 provides further detailed guidance on the land use strategies and the possible planning scheme measures that will achieve these strategies. Further detailed guidance and example provisions for the strategic framework, zones and overlay code is provided in **Schedule 8.** Checklists to assist scheme drafters and scheme reviewers are also included in **Schedules 9** and **10** respectively.

The use of maps for communicating hazard and associated risks is therefore a valuable aid to decision making.

Cities and Flooding: A Guide to Integrated Urban Flood risk Management for the 21st Century, Jha, Bloch, Lamond p28

Risk Map
Use to inform strategic planning & zoning. Particularly important in the development of planning scheme strategies

Hazard Map
Use for development assessment and include in planning scheme

Bringing back the 'Queenslander' in Condamine

case study

In the recent 2010/2011 floods, the residents of Condamine in the western Darling Downs had to be evacuated twice – once on 30 December 2010 in anticipation of a record flood peak of 15.25 metres on 1 January 2011, and again on 11 January 2011.

Following these floods, in the course of rebuilding, some residents have decided to proactively address future floods by adopting the traditional 'Queenslander' style of home. In moving away from 'slab on ground' construction and raising the floor height above ground level through the use of structural posts and poles, a more resilient built form outcome has resulted.

The 'Queenslander' is a part of our cultural and architectural history. It is a resilient form of housing that has been proven over generations to be compatible with the nature of our floodplains.

The residents' rebuilding efforts in Condamine demonstrate how the community and the development industry have embraced a proven traditional approach to dwelling design, but used contemporary resilient materials and building techniques to create a modern equivalent of the traditional "Queenslander".

Source: QldRA

The Stawell River at Cambridge Crossing near Richmond, mid 2012

Source: QldRA

4. Delivery

Bringing Part 1 and Part 2 together

Planning for stronger, more resilient floodplains has been developed to help councils introduce consistent and specific planning controls to manage flood risks. Part 1 delivered state-wide floodplain mapping targetted specifically to those areas of the State where no mapping existed. Through local verification these maps together with the model code provisions enabled councils to introduce interim measures to support floodplain management in existing planning schemes through a streamlined process. Councils are encouraged to continue to use the Part 1 Guideline for implementing measures into their existing planning schemes.

The desired result for Part 2 is that future planning schemes appropriately consider and respond to flood consequence within the context of the characteristics of each local government area through a sub-basin wide approach.

Councils may use both Parts 1 and 2 in tandem to address flooding through both their existing and future schemes (see **Figure 32**).

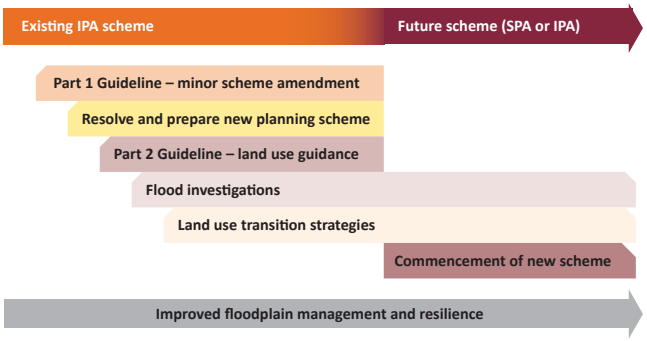


Figure 32: Part 1 and Part 2 Guidelines working together

Delivering Part 2

Figure 33 identifies the three key elements of Part 2 that a Council (and where appropriate, an RPC) should consider in the preparation of the future planning scheme.

A key consideration for Council is how it may undertake these elements in advance of/or as part of the planning scheme preparation process, to ensure that the new planning scheme can appropriately address flooding issues.

To assist in determining this workflow, **Figure 33** provides an overview of the entire process that councils (in association with their respective RPCs, if applicable) can utilise to improve floodplain management outcomes through land use planning.

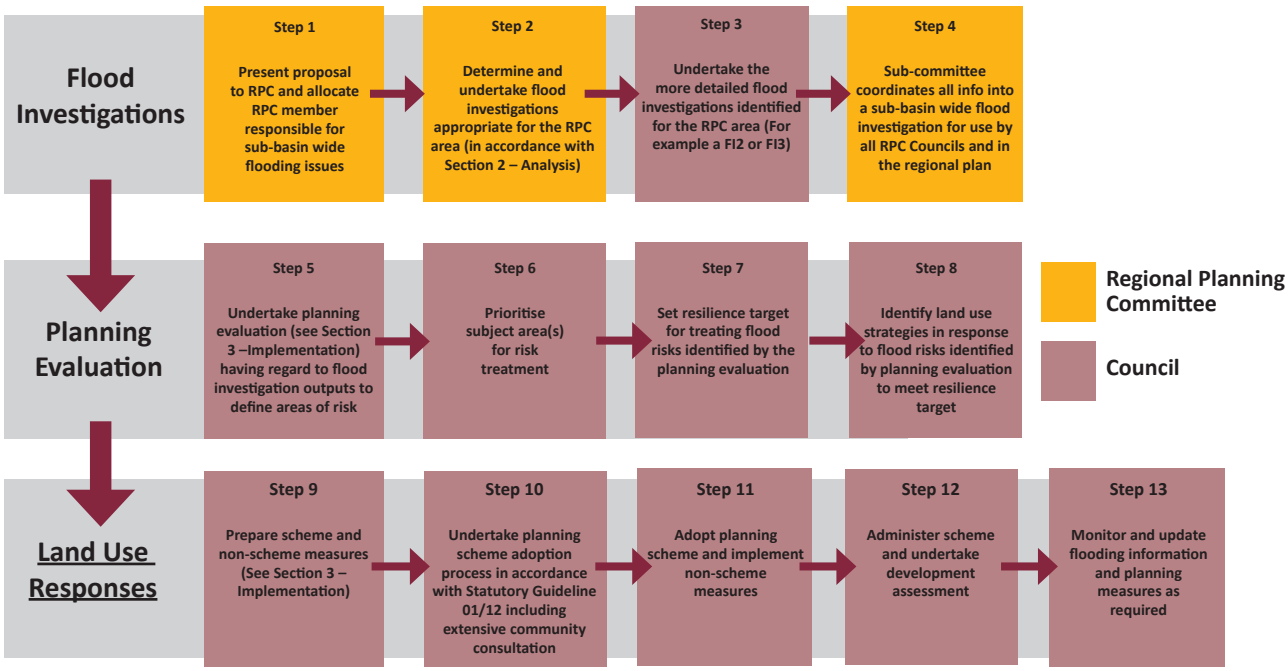


Figure 33: Process flowchart, providing step-by-step guidance on how to implement the Part 2 guidance

QFCoI response & key future actions

QFCoI and Planning for stronger, more resilient floodplains

TheQFCoI was responsible for undertaking an independent examination of the 2010/11 floods and their consequences. The QFCoI investigated a wide range of matters during this examination, and of particular relevance for the work of the Authority are those recommendations that relate to land use planning and floodplain management.

The QFCoI Final Report was released on 16 March 2012, after the non-statutory consultation period for this Guideline had closed. However, while the final report was not strictly a submission received in relation to this Guideline, it was important that the relevant recommendations of the QFCoI Final Report be addressed in the final version of this document. Importantly, the Chapters relevant to the ***Planning for stronger, more resilient floodplains*** body of work include:

- Chapter 2 – Floodplain management
- Chapter 4 – State planning instruments
- Chapter 5 – Local planning instruments
- Chapter 7 – Development and flood considerations
- Chapter 9 – Building controls
- Chapter 10 – Essential services
- Chapter 11 – Buy-backs and land-swaps.

Therefore, the ***Planning for stronger, more resilient floodplains*** body of work responds to a number of key floodplain management and land use planning recommendations set down by the QFCoI Final Report of the QFCoI, as per the following table (**Table 8**):

Key Matter raised in QFCoI Final Report	Recommend–ations	Relevant principles/section(s) of the *Planning for stronger, more resilient floodplains* Part 2 Guideline
The recommended approach to floodplain management, which involves undertaking flood investigations at a catchment (sub-basin) wide level and ensuring such investigations are fit-for-purpose, relative to population and growth pressures, historical flood risk and Council resourcing capabilities	2.4 2.11 – 2.18	Fit-for-purpose approach to floodplain management Sub-basin wide floodplain mapping completed State-wide
The roles and responsibilities of all levels of government – including how the State and Councils should undertake and administer flood mapping and floodplain management	2.5 – 2.6	Support for Regional Planning Committee (RPC) governance structure to administer floodplain management across local government boundaries at sub-basin wide level Identifying priority towns for improved flood mapping
The extent of existing flood mapping across the State, which was identified as being inadequate	2.4 – 2.6	Sub-basin wide floodplain mapping completed State-wide Guidance provided on fit-for-purpose flood investigations Government commitment to undertake up to 100 Level 2 investigations for priority towns across Queensland
The availability of best practice guidance available to government – all levels of government would benefit from access to Guidelines	2.20 – 2.22	Collaboration with drafters of the update to national floodplain management policy Completion of Queensland-specific land use policy guidance in relation to floodplain management
The purpose and operation of statutory planning mechanisms related to managing development in flood areas	4.5 – 4.7	Implementation and amendment of ***Temporary State Planning Policy: Planning for stronger, more resilient floodplains***
The availability of model flood planning controls for use by Councils – example provisions that use a similar format and structure to the Queensland Planning Provisions (QPP)	5.1 – 5.7 7.2, 7.4, 7.11, 7.16, 7.24	Example QPP-compliant planning scheme provisions, including demonstrating use of strategic framework, limited development (constrained land) zone, model assessment criteria and example planning scheme policy
The ability of government to continually update and make available flood mapping to the public – including using the minor scheme amendment process to include improved flood mapping into planning schemes quickly and efficiently, and the availability of flood mapping through interactive website portals	2.7, 2.11, 2.16 – 2.18 5.8 – 5.9	Implementation of Queensland-wide 'flood check' floodplain mapping portal (http://www.qldreconstruction.org.au/flood-check-map) Development of the 'Queensland Flood Studies Database' as a repository of all existing and future flood information Queensland-wide (https://qldreconstruction.org.au/floodstudies/)
Other findings and recommendations related to building controls, essential services and buy-backs/land swaps	10.10, 10.11, 10.16, 11.1	Example assessment criteria (model planning controls) Advice on undertaking buy-back/land swap arrangements, and the decision-making process to arrive at that risk treatment option

Table 8: QFCoI recommendations and how they have been addressed through the Planning for stronger, more resilient floodplains body of work.

Flood management in an area can be made highly effective by means of vulnerability zoning, in which areas classified from higher to lower levels of vulnerability. This further helps in the proposition of flood defence mechanisms, effective flood control measures, evacuation planning and flood warning.

Cities and Flooding: A Guide to Integrated Urban Flood risk Management for the 21st Century, Jha, Bloch, Lamond p176

Future key actions

The QFCoI recommendations have set a clear framework for advancing floodplain management practice in Queensland. Six key elements have been identified, which in themselves include a range of actions, that are needed to advance this framework:

- funding – commitment & availability
- legislation – to support floodplain management objectives
- organisational roles & responsibilities
- operation – capacity building within jurisdictions
- data - improvements in collation & availability
- strategy – evolution in floodplain management policy & strategy

Figure 34: The FLOODS institutional arrangements necessary to build on the Planning for stronger, more resilient floodplains body of work.

The actions to implement and deliver on these six key elements (**Figure 34**) are discussed below.

Flood mitigation funding

As a key element of its response to the QFCoI and in addition, the government will provide funding support for local government projects relevant to the recommendations through the following programs:

- Local Government Grants and Subsidies Program— $40 million will be allocated from this program over three years to provide financial support for local governments with limited capacity to self-fund projects to implement Commission recommendations.
- Floodplain Security Scheme—$40 million will be allocated over four years under the Royalties for the Regions initiative, with an ongoing commitment of $10 million per year, to provide funding for local government for flood mitigation infrastructure. A funding contribution is being sought from the Commonwealth Government on a 2:2:1 basis, which would provide total funding of $100 million over four years from the Queensland Government, Commonwealth Government and the relevant Council.
- Natural Disaster Resilience Program—approximately $10 million of shared Queensland and Commonwealth Government funding will be available in 2012/13 for disaster resilience projects including, for example, flood studies and mitigation works.

Legislation

A planning reform process is currently underway to examine the existing Queensland planning system to identify areas where efficiency and regulatory improvements can be made. In addition, the recommendations of the QFCoI foreshadowed the need for legislative changes to address some key roadblocks to improving floodplain management practice in Queensland.

As part of the planning reform process and in response to the QFCoI, DSDIP is leading the revisions to relevant legislation (including the *Sustainable Planning Act 2009*).

Of key relevance to this legislative reform is the power of councils to make planning decisions as a consequence of the risk of natural hazards. *The Sustainable Planning Act 2009* currently has provisions (section 706) limiting compensation for land use or zoning changes on land for development that "would have led to significant risks to persons or property from natural processes (including flooding...)" – but it is a limited exclusion as it does not apply if "the risk could not have been significantly reduced by conditions attached to a development approval". This will be particularly important where a Council wishes to 'back-zone' properties (such as through the use of the Limited Development Zone) that are subject to intolerable flood risk (as determined via the planning evaluation process). This matter will be addressed as part of the planning reform process.

Organisational and operational

In its response to the QFCoI, the Queensland Government committed to implementing all recommendations of the inquiry. The response, released on 7 June 2012, notes the recommendations contained in the final report are wide-ranging and will require focused and collaborative implementation activity across a number of state agencies and councils. To achieve this, the Queensland Government will put in place an implementation framework that clearly identifies key areas of work and allocates clear lines of responsibility to ensure that the work gets done.

Implementation groups will be established to deliver the Commission's recommendations along five key streams of delivery:

- planning
- building
- environment and mines
- emergency management
- dams.

These implementation groups will be responsible for ensuring coordinated and focused action is taken over the next 12 months in delivering the Commission's recommendations. Each group will be chaired by a Director-General and will consist of representatives of other key departments and agencies. In addition, to ensure representation of Council interests in the implementation of state responses to those recommendations affecting councils, the Local Government Association of Queensland (LGAQ) or relevant individual Councils will be invited to participate in implementation groups. The progress of these implementation groups will be monitored by a CEO committee chaired by the Director General of the Department of the Premier and Cabinet and comprising Directors-General and Chief Executives of key departments and agencies. The governance structure for oversight and implementation of the Commission's recommendations and the key areas of work to be undertaken by the implementation groups are outlined in the Government's response – refer to http://www.premiers.qld.gov.au/publications/categories/reports/assets/gov-response-floods-commission-inquiry.pdf

Data – Queensland flood portal

A key focus of the QFCoI recommendations related to the availability and accessibility of flood information for all parts of Queensland. The QFCoI noted this information should be publicly available and be readily understandable by people wanting to access that information. In response to this, and to support the implementation of the National Flood Risk Information Portal in Queensland, the Authority is creating a Queensland Flood Portal that will house all floodplain mapping (Level 1), moderate level investigations (Level 2), comprehensive investigations available from Councils and others (Level 3), and floodlines of historic events (such as the 1974 Brisbane flood and all captured 2010 - 2012 flood events). The Flood Portal will also house spatial information such as Digital Elevation Models useful for undertaking flood investigations, and will also provide links to further information and guidance at State and local levels.

Strategy - national policy and SPP1/03 reviews

A national floodplain management policy framework that promotes a risk management approach to best practice relative to local circumstances is a key component to evolving floodplain management practice over time. The existing national policy, Floodplain Management in Australia, is currently under review. This review is timely given recent events around the country, as there is the opportunity for lessons learnt from all jurisdictions to inform the improvement of best practice around the country. The Authority, in association with DSDIP, is working with the drafters to ensure that Queensland conditions are addressed in the revision, in accordance with the QFCoI recommendations.

The SPP 1/03 review, currently being undertaken by DSDIP, will also embody an evolution of floodplain management practice in Queensland that responds to the lessons learnt from recent years and focuses on the implementation of flood mapping into planning schemes to build resilience outcomes.

Bridge across the Cloncurry River Anabranch, mid 2012 *Source: QldRA*

In association with DSDIP, the Authority is working to ensure Queensland conditions are appropriately reflected in the review of national floodplain management guidelines, in accordance with recommendations 2.20 and 2.21 of the QFCoI.

Sign indicating flooding across a tributary of the Cloncurry River. *Source: QldRA*

Undertaking the sub-basin wide flood approach

The Analysis section of the Guideline introduces the concept of fit-for purpose flood investigations across the sub-basin. The RPC working with each relevant Council is encouraged to nominate the appropriate investigation for local circumstances using the step-by-step process on pages 18 and 19.

Under the fit-for-purpose framework, the sub-basin wide approach may include one or a combination of flood investigation techniques across the sub-basin, including Level 3 investigations where needed, a range of Level 2 investigations where applicable, and Level 1 base mapping in the balance of the floodplain. The combination of techniques will depend on the local circumstances of the floodplain in the RPC area. The following case study of the Balonne River sub-basin provides an example of a possible combination of techniques relevant for that sub-basin.

case study

Balonne River sub-basin

The Balonne River sub-basin in south-west Queensland includes the local governments of Balonne Shire Council, Western Downs Regional Council and Maranoa Regional Council. The sub-basin is included within the Darling Downs regional planning area.

Roma is a regional town of 8,000 people which is known to flood periodically from the nearby Bungil Creek. It is located within the gas-producing Surat Basin area, and is the terminus of the Roma to Brisbane gas pipeline hub. A 1000MW gas-powered power station is also proposed near Roma.

Resource and infrastructure development is increasing through the expansion of the coal seam gas industry in the Surat Basin. Additional development to support this industry is likely over time in the Balonne River sub-basin, particularly as resident population numbers are expected to grow significantly over the next 20 years, and non-resident worker numbers are expected to grow sharply between 2012 and 2017.

St George is a smaller town of 2,500 people located on the Balonne River. According to the Bureau of Meteorology, St George floods frequently (on average, once every two years). It is a centre for the surrounding agricultural industries of cotton, wheat and grazing. St George has been selected to demonstrate the process for undertaking a Level 2 investigation.

The sub-basin also includes a number of smaller regional settlements located along the Balonne River and its tributaries. While development in these towns may be generally low, many of these towns have been known to flood in the past, sometimes frequently. The balance of the Council area comprises rural production and regional landscape areas.

On the basis of the above, using the Part 2 Guideline, the RPC may consider the following indicative approaches to investigating flooding within the sub-basin (see Figure 35**).**

A Level 3 investigation is currently underway for Roma.

- When proposals for mining or gas operations are submitted in the sub-basin, the councils may require Level 3 investigation from the applicant(s) to properly assess the impact of the operation on the floodplain. Councils may use the Terms of Reference provided in this Guideline to outline the scope of work required for the proposal.
- Level 2 investigations may be undertaken for the other smaller towns in the sub-basin area (such as St George, Surat, Yuleba and Miles), as population and development pressures in these areas are low and Level 2 represents an appropriate, cost effective response.
- A Level 1 investigation has been undertaken for the balance of the sub-basin.

Councils, through their RPCs, may wish to undertake more detailed investigations of the rates of population growth expected in their settlements, or the extent of proposed development (such as resource, industrial or infrastructure development) in the RPC area in deciding on the appropriate investigations to undertake across the area. In addition, councils will need to consider their resource and capacity capabilities when deciding on the mix of investigations to undertake.

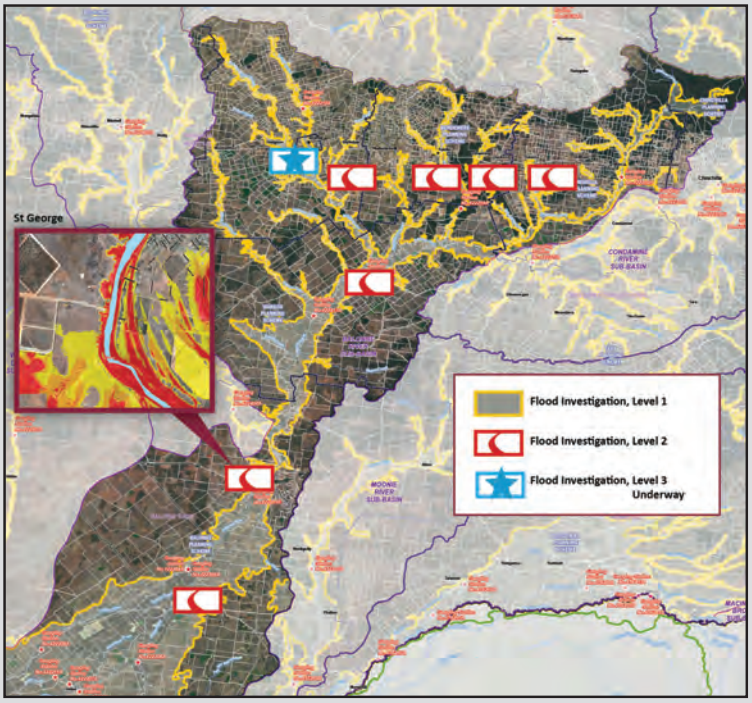


Figure 35:- Balonne River sub-basin with suggested levels of flood investigations for further investigations. Inset shows the hazard map produced for St George based on a Level 2 investigation.

Flood investigation processes

Flood investigation Level 2 rollout plan and data collation

The Authority has identified approximately 140 towns across 45 Councils where the available data, including detailed contour mapping and stream flow information, is suitably detailed to undertake at least a Flood Investigation Level 2 for each of those towns. These towns are classified by the Bureau of Meteorology as being at medium or high flood risk. The Authority has undertaken approximately 20 of these investigations to date.

As part of the Queensland Government's response to the QFCoI and specifically recommendation 2.5, the Authority (with support from the Department of Science, Information Technology, Innovation and the Arts), has committed to undertaking Level 2 flood investigations for up to 100 flood prone towns across Queensland by January 2013. Where an RPC (or Council) is considering undertaking flood investigations for towns in their area, please contact the Authority to ascertain whether a flood investigation may already have been undertaken, or is scheduled to be undertaken, for those towns.

To support this rollout of Level 2 flood investigations, the Queensland Government is continuing its current program of LiDAR (Light Detection and Ranging) data capture across the State. LiDAR systems collect positional (x,y) and elevation (z) data to create digital elevation models. From this model, contour lines can be derived and when overlaid on geometrically corrected aerial photography provide accurate contour maps as a basis for the preparation of flood investigations.

This program will greatly improve the quality of contour information available for hundreds of Queensland's cities and towns and so increase the number of Queensland's towns and cities for which flooding investigations can be undertaken.

Preparing each level of flood investigation

An RPC (or Council) may wish to undertake flood investigations in addition to, or more broadly than those being undertaken by the Authority. Therefore, the outcome of the sub-basin wide approach is that the RPC may nominate a level of investigation for each town or area of the floodplain for which further detailed assessment will be completed.

As discussed in Section 2, the type of flood investigation(s) selected for an RPC area, Council area or town will vary depending on local circumstances.

A step-by-step guide to undertaking both the Level 2 validated and un-validated GIS mapping techniques is provided in Schedule 2. Please note a flood frequency analysis needs to be undertaken in addition to the GIS mapping process in order to produce a flood map that can depict events with a corresponding AEP. If a flood frequency analysis is not undertaken, either mapping technique will only produce a map depicting the extent and depth of the historic event chosen to be mapped (e.g. the 'January 1991 event').

In addition, indicative terms of reference are provided for undertaking a Level 3 flood investigation in **Schedule 3**. These terms of reference may be useful for those RPCs/councils who have identified the need to undertake a Level 3 investigation, but have limited experience in scoping the work required.

Preparing the planning evaluation

Guidance on preparing the planning evaluation, setting flood risk levels and identifying resilience targets is provided in **Section 3 – Implementation**. An indicative planning evaluation process is provided in **Schedule 5**.

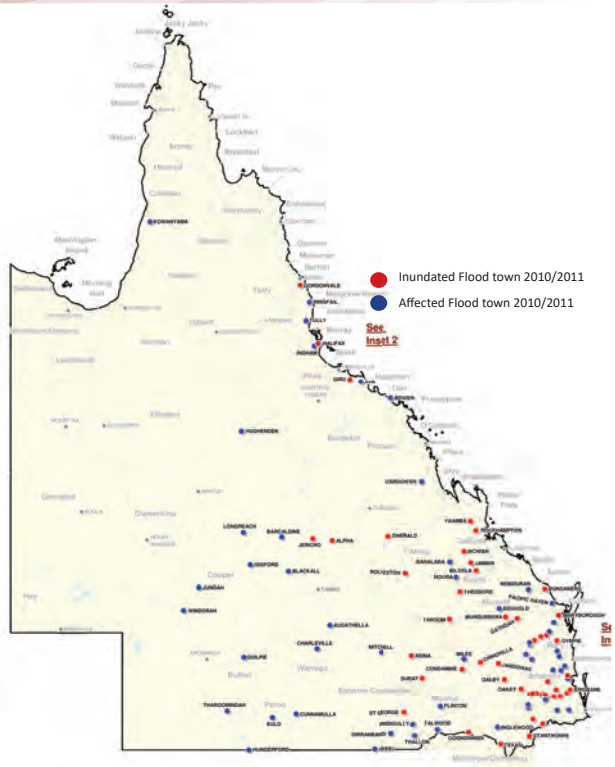


Figure 36: Flood affected cities and towns in Queensland December 2010 and January 2011
Source: BoM

The path toward improved flood maps

The National Academy of Sciences in the United States notes that there are several key considerations for the development of flood maps:

- Capture of high-quality topographic data (such as through LiDAR capture) is key to flood mapping accuracy
- Producing flood depth information, not just extent means the mapping is more useful to a wider range of stakeholders
- Linking different data depositories and creating consistency in mapping specifications improves accessibility and usability
- Communication of flood risk, not just flood hazard, can ensure the consequence of a flood is understood by the community

Level 1 Investigations

Use *Planning for stronger, more resilient floodplains* **Part 1 Guideline**

Level 2 Investigations

Use Step by Step process in Schedule 2 for GIS mapping

Level 3 Investigations

Consider the Terms of Reference provided in Schedule 3

Tying it all together

Preparing the planning scheme provisions

Schedule 8 provides detailed examples and guidance on how to write SPA compliant planning tools that have regard to flood. In addition to the guidance provided in **Schedule 8**, when drafting new schemes, planners should consider the following key drafting tips that support the overall approach advocated in this Guideline:

- Continuously use the line of sight concept to maintain focus on what is to be achieved and how throughout the drafting process;
- Use the strategic framework to articulate the outcomes desired for the area; and
- Ensure the code (zone or overlay) provisions link back to and achieve key parts of the strategic framework, specifically the specific outcomes of the Elements, the strategic outcomes of the Themes, and the Strategic Intent.
- Guidance for planning scheme drafters and for planning scheme reviewers is provided in **Schedules 9** and **10** respectively.

Non-planning scheme land use measures

Some land use planning responses to flood risk do not reside within planning schemes, but they do complement the land use intentions presented in the planning scheme. These responses tend to be more interventionist as they may seek to directly address the existing type or scale of development in key areas of risk. Such responses include:

- voluntary or compulsory purchase schemes of properties within areas that are at intolerable risk, with the intention of returning such areas to their natural state, of a more appropiate land use compatable with the flood hazard;
- programmes of planned retreat that involve phasing out of certain land uses over time based on a graduated approach; and
- land swap programmes that encourage residents in higher risk areas to relocate to other, safer locations.

A range of other non-land use planning measures are also available to councils in addressing the risk of flood. While this Guideline considers but does not specifically deal with these measures, it is important to note the possible role structural measures, emergency management and planning, building controls, landscape management programmes and community awareness will play in any response to any hazard assessment undertaken by Council.

Councils should investigate whether such non-scheme approaches are viable having regard to their local circumstances. It is critical to test these proposals against community expectations for the future development of the area affected by the proposal. In some instances, structural control options may be more appropriate to address flood risk in these areas than land use change. However, Council must weigh up the cost, both financial and to the community, of each approach and act accordingly.

Economic viability of land use transition strategies

Councils will need to consider the effects of any land use change proposed through a planning scheme (such as back-zoning) as a result of responding to the identified flood risk. There may be possible impacts on land values, insurance concern or compensation requests for loss of development rights in some circumstances.

In making this decision, Council will determine whether the risk to life and property outweighs the cost of taking such an action. The Planning Evaluation will assist Council to make this decision.

Building Provisions

Building work has not been considered through this Guideline as it is being addressed by the Department of Housing and Public Works (DHPW) through Building Codes Queensland (BCQ). As noted in the Part 1 Guideline, the State Government intends to undertake an early adoption of the Australian Building Codes Board Construction of Buildings in Flood Hazard Areas code into the Queensland Development Code.

It is important to note that the flood investigation options presented in this Guideline will facilitate the operation of these new flood hazard building provisions where councils choose to implement the provisions by following the process suggested in the Part 1 Guideline for determining a flood hazard area under the *Building Regulation 2006*.

In accordance with recommendation 4.6, this Guideline demonstrates how to use the Limited Development (constrained land) zone in future planning schemes, and provides examples of model flood planning controls compliant with QPP (recommendations 5.1 – 5.7.)

Improving Queensland's flood resilience through land use planning

Through its two-part Guideline series, ***Planning for stronger, more resilient floodplains*** has provided detailed planning guidance and a practical suite of measures to help improve the resilience of Queensland's cities and towns to the impacts of flood. While Queensland may be a state of meteorological extremes, with floods, cyclones, droughts and bushfire affecting the State in equal measure, it is intended that ***Planning for stronger, more resilient floodplains*** has furthered the journey to improving floodplain management practice in the State.

In particular, it is intended that:

1. the quality and availability of flood mapping throughout the State will be continuously improved (overtime);
2. governance of floodplains will be improved through a sub-basin wide approach that enables coordinated, fit-for-purpose flood investigations across the whole floodplain; and
3. land use practice within floodplains will benefit from the application of the planning evaluation process and the suite of measures promoted in the Guideline series.

Using this suite of tools, councils for the first time will be able to develop consistent and fit-for-purpose responses to flooding to contribute to a stronger, more resilient Queensland.

Heavily-engineered structural measures can be highly effective when used appropriately, but they share one characteristic: that they tend to transfer flood risk from one location only to increase it in another. In some circumstances this is acceptable and appropriate, while in others it may not be.

Cities and Flooding: A Guide to Integrated Urban Flood risk Management for the 21st Century, Jha, Bloch, Lamond p196

case study

Flooding in St George

Over the last three years, the town of St George (population approximately 2,500) in Queensland's South West has experienced four major floods. The town sits on the Balonne River, one of southern Queensland's largest rivers.

In March 2010 large portions of the western side of town were inundated in a flood that at the time was the highest recorded - 13.39m at the local Bureau of Meteorology (BoM) gauge. Another two floods of 13.20m and 12.49m occurred in early January and late January 2011 respectively.

While other parts of the State were spared a repeat of the 2010/2011 flood events during 2012, South West Queensland again was flooded earlier this year. In February, St George was inundated with a 13.95m flood at the BoM gauge that is now the highest on record.

Events leading up to the flood peak were dramatic and uncertain, with constantly rising predictions of floodwaters occurring every few hours in the days prior to the peak. In line with their usual emergency management practice, Council constructed a temporary earthen levee around much of the town, which was built to withstand a 14.7m flood. However, the predictions for the rising floodwaters from Balonne were as high as 15m – in this scenario, much of the town would have been inundated as the levee overtopped. Given the possibility of such a large flood, the decision was made to evacuate the town ahead of the flood peak to ensure the residents were safe.

Fortunately, this scenario did not come to pass as floodwaters broke out of the floodway north of the town, ensuring the flood peak in St George was reduced to 13.95m. However, while much of the town was spared as the temporary levee held, the western part of town was again severely inundated. This area included approximately 40 existing dwellings and a large amount of existing urban residential zoned land.

In the wake of the floods, Balonne Shire Council has taken significant steps to improve the resilience of its community. The Authority has assisted Council to work through its options to address the flood risk in this western area of town in particular. The following is a summary of how the fit-for-purpose approach to floodplain management has been applied to the specific situation of St George. This case study demonstrates how this approach can be applied in a manner that is flexible, responsive and appropriate for the circumstances to ensure that communities can be presented with options to improve their resilience.

Source: QldRA

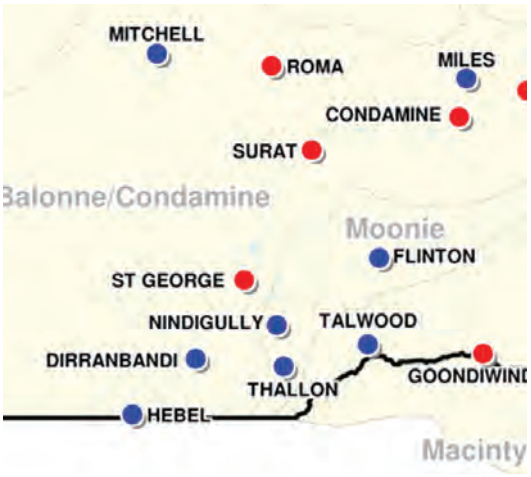


Figure 33: St George show as an affected town from the 2010/2011 event
Source: Bureau of Meteorology.

St George during flood in March 2010. *Source: Balonne Shire Council*

St George during flood in February 2012. *Source: QldRA*

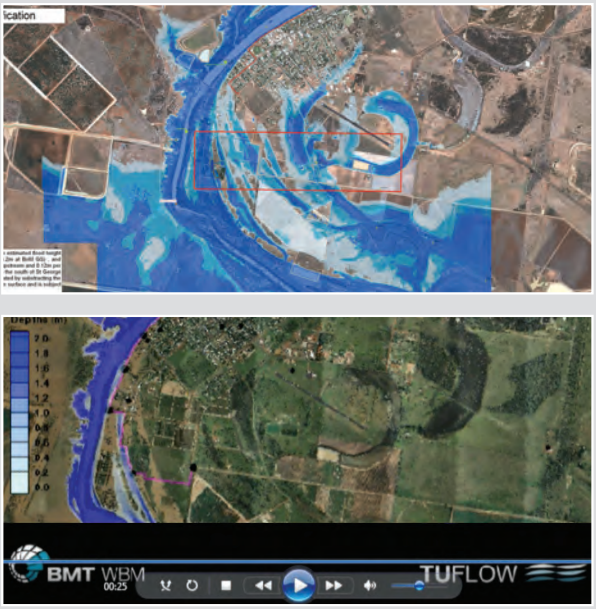
case study

Flood investigations

The Authority piloted its Level 2 GIS-based mapping methodology with Balonne Shire Council in January 2012, prior to this year's highest recorded flood. This Level 2 validated GIS approach was used to develop an initial understanding of the flood hazard affecting the town following the previous highest recorded event of 2010 (approximately a 1% AEP event), which informed initial land use planning evaluations.

As the Balonne River north of St George started to rise in early February this year, the Authority used a Level 2 unvalidated GIS approach to develop flood scenarios that gave a spatial indication of the predictions issued by BoM, which increased from 13.5metres up to 15metres over the period of a weekend. Within several hours of receiving a flood height prediction from BoM, the Authority was able to develop the corresponding flood map showing flood extent and depth and supply it to the State Disaster Management Group. This mapping helped inform emergency management decision making, including the evacuation of the town.

Following the February 2012 flood, the Authority piloted a Level 2 validated model approach with Council to help inform Council decision-making related to land use planning and structural works for the area affected. This validated model approach has confirmed Council's on-the-ground understanding of the flood hazard to which St George is subject, and also provided an indication of the behavior of the Probable Maximum Flood (PMF). Council now has a clearer understanding of the flood hazard affecting St George, from which further analysis of mitigation options can be drawn.



Example outputs of the Level 2 unvaldated GIS investigation ond a Level 2 validated model undertaken for St George. Note the outputs do not depict the same event.

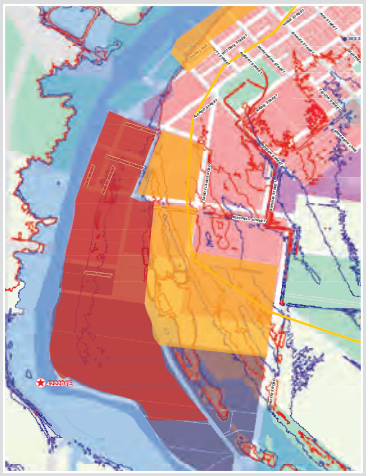
Planning evaluation

Prior to the 2012 event, an initial planning evaluation was completed for the western area of St George affected by the 2010 event. This planning evaluation reviewed the flood hazard in this area, and developed an initial understanding of areas of risk based on the relationship between this hazard and the existing land use. This planning evaluation provided an initial analysis for Council to identify its areas of risk, and to begin to consider options for mitigation, including the possible land use changes that may be required in that area.

Following the 2012 event and the delivery of the Level 2 validated model, the Authority undertook a range of more detailed assessments of the affected area to assist Council decision making, including:

- a damages assessment of the 2012 event;
- a land use assessment to identify vulnerable land uses;
- a built form assessment of property within the area, to understand the number and type structures affected; and
- an urban land supply analysis to quantify an indicative number of future lots the area could accommodate under existing planning controls.

Council, in conjunction with the community and with assistance from the Authority, is using the outputs of the Level 2 validated model and the planning assessments undertaken to develop a more detailed planning evaluation that will consider the range of flood mitigation options in the hazard area, including a levee, back-zoning, buy-back scheme and relocation. Critically, the involvement of the community will determine the level of tolerance to flood, which will assist Council to determine the appropriate response.



Key areas for consideration in the planning evaluation.

Planning response

Council is currently reviewing its options, however currently under discussion with the community is limiting development in the hazard area through the adoption of a Temporary Local Planning Instrument (TLPI), and the financial, social and environmental implications of a levee. If it is decided that a levee is the most appropriate course of action through the planning evaluation, this will necessitate a more detailed Level 3 flood investigation of the area. This because greater certainty of flood behavior is required in order to design these structural works.

The application of a TLPI can set an intended land use scenario for development in the affected area, ahead of the adoption of its future planning scheme which will provide more detailed land use policy and regulation. Using the Level 2 flood investigation approach and the results of the planning evaluation, through the TLPI Council can limit future development in the area or otherwise adopt habitable floor levels for dwellings and other planning regulations, so that development in the area can be more resilient to future events.

Importantly, by undertaking the fit-for-purpose approach in responding to its highest recorded event, Council have been using a range of tools in a short timeframe to understand, frame and resolve a solution that will be appropriate for their local circumstances.

Subject area for specific statutory planning responses.

Schedule 1 – Sub-basins by Regional Planning Committee Area

Sub-basins in one RPC

Sub-basin	RPC
Balonne River Moonie River Macintyre & Weir Rivers Macintyre Brook Dumaresq River Maranoa River	Darling Downs
Settlement River Eight Mile Creek Lagoon Creek Cliffdale Creek Morning Inlet Mornington L Creek	Gulf Region
Endeavour River Hann River Jeannie River Kendall River Holroyd River Edward River Stewart River Lockhart River Archer River Coen River Watson River Embely River Mission River Wenlock River Misc Other Islands Pascoe River Torres Strait Island Olive River Ducie River Jacky Jacky River Skardon River McDonald River Jardine River Normanby River	No Regional Plan (Cape York)
Walsh River Tully River South Johnstone River North Johnstone River Russell River Daintree River Hinchinbrook Island Mulgrave River Barron River and Freshwater Creek Mossman River Murray River	Far North Queensland
Black River Bohle River Ross River Haughton River Barratta Creek	No Regional Plan (NQ)
Proserpine River Bowen River Pioneer River Plane River Whitsunday Island Isaac River O'Connell River	Whitsunday Hinterland and Mackay
Fitzroy River Waterpark Creek Shoalwater Curtis Island Comet River Calliope River	Central Queensland
Lower Burnett River Elliott River Upper Burnett River Gregory River Isis River Burrum River Lower Mary River Barker & Barambah River Fraser Island	Wide Bay-Burnett
Bremer River Logan River Albert River Coomera & Nerang River Stanley River Caboolture River Stradbroke Island Moreton Island North Pine River South Pine River Maroochy River	South East Queensland
Paroo River Lake Frome	South West
Hay River	Central West

Sub-basins with two RPCs

Sub-basin	Applicable RPC
Cooper Creek	South West Central West
Bulloo River	South West Central West
Wallam Creeks	South West Darling Downs
Eyre Creek	Central West North West
Georgina River	Central West North West
Barcoo River	South West Central West
Boyne & Auburn Rivers	Darling Downs Wide Bay-Burnett
Lockyer Creek	SEQ Darling Downs
Upper Mary River	Wide Bay-Burnett SEQ
Noosa River	Wide Bay-Burnett South East Queensland
Mackenzie River	Central Queensland Whitsunday Hinterland and Mackay
Nicholson River	Gulf Region North West
Cloncurry River	Gulf Region North West
Norman River	Gulf Region North West
Saxby River	Gulf Region North West
Lower Burdekin River	No Regional Plan (NQ) Whitsunday Hinterland and Mackay

Sub-basin	Applicable RPC
Don River	No Regional Plan (NQ) Whitsunday Hinterland and Mackay
Herbert River	Far North Queensland No Regional Plan (NQ)
Palmer River	Far North Queensland No Regional Plan (Cape York)
Diamantina River	Central West North West
Baffle Creek	Central Queensland Wide Bay Burnett
Boyne River	Central Queensland Wide Bay Burnett
Styx River	Central Queensland Whitsunday Hinterland and Mackay
Coleman River	Gulf Region No Regional Plan (Cape York)
Staaten River	Gulf Region Far North Queensland
Kolan River	Wide Bay Burnett Central Queensland
Alice River	No Regional Plan (Cape York) Gulf Region

Sub-basins with three RPCs

Sub-basin	Applicable RPC
Suttor River	Central West No Regional Plan (NQ) Whitsunday Hinterland and Mackay
Warrego River	South West Central West Darling Downs
Nogoa River	Central West Central Queensland Whitsunday Hinterland and Mackay
Dawson River	Darling Downs Central Queensland Wide Bay Burnett
Brisbane River	South East Queensland Wide Bay Burnett Darling Downs
Leichhardt River	Gulf Region Central West South West
Mitchell River	Gulf Region Far North Queensland No Regional Plan (Cape York)
Condamine River	Darling Downs South East Queensland Wide Bay Burnett
Einasleigh River	Gulf Region Far North Queensland No Regional Plan (NQ)
Gilbert River	Far North Queensland Gulf Region North West

Sub-basins with 4 RPCs

Sub-basin	Applicable RPC
Flinders River	Gulf Region North West No Regional Plan (NQ) Central West
Thomson River	North West Central West Whitsunday Hinterland and Mackay No Regional Plan (NQ)
Upper Burdekin River	Far North Queensland North West Gulf Region No Regional Plan (NQ)
Sub-basins mapped with no IFAO - Lake Frome, Hay River	

Sub-basins not mapped

Caboolture River, Stradbroke Island, Moreton Island, Curtis Island, Fraser Island, Whitsunday Islands, Hinchinbrook Islands, South Pine River, North Pine River, Maroochy River and miscellaneous other islands

Schedule 2 – Flood investigation Level 2 step-by-step methodology

Please refer to http://www.qldra.org.au/publications-guides/land-use-planning/planning-for-stronger-more-resilient-flood-plains for the latest step-by-step methodology.

Schedule 3 – Terms of reference – Flood investigation Level 3

Flood investigation level 3
<Insert name of study area>

Project governance

The <*insert name of sub basin*> Flood Investigation sub committee has been established by the <*insert Regional Planning Committee*>. The project subcommittee oversees the project and provides advice to the <*insert the name of the Regional Planning Committee*>.

Objectives

The objective of the flood investigation level 3 is to comprehensively define the flood behaviour and hazards of the <*insert the name of the river*> and its associated sub-basin as shown on attached map <*insert map name/number*>, so that appropriate planning responses can be included in the <*insert planning scheme name*>.

The primary component of the investigation is estimation of flood discharges and Annual Exceedance Probabilities, for floods of various severities, and the estimation of water levels and velocities for those floods.

Rationale for flood investigation Level 3

This level of flood investigation has been selected because: <*insert the below options as appropriate*>

1. the study area covers developed/urban areas;
2. there is a medium to high rate of growth;
3. there is a history of repeated significant impacts of flooding in this area; and/or
4. the community resilience to floods is limited.

Data collection

The data collection phase is to compile available reports and historic information on floods in the study area, including the source of the material. This includes the QldRA mapping showing the Interim Floodplain Assessment Overlay, aerial photography, satellite imagery and other applicable local knowledge.

This will require consultation with a range of organisations including the Bureau of Meteorology, the Department of Environment and Resource Management and Department of Transport and Main Roads as well as local residents who have experienced flood events.

The digital data set provided by the Department of Environment and Resource Management for the Interim Floodplain Assessment Overlay mapping may be used as the base data.

The rationale for determining the level of topographic information collected is to be outlined. Topographic information (typically 0.1 to 0.3m vertical and 1 to 10m grid size) needs to be captured from aerial imagery and or field survey. The grid size should be determined to give a good representation of the areas of interest. Broader scale and resolution of data may be appropriate.

The specification for this topographic detail needs to be confirmed with a Registered Professional Engineer of Queensland due to the complexity of the investigations and the computer modelling to be developed.

A public consultation process is to be conducted to assist in finding all available information.
information.

Hydrologic analysis and flood frequency analysis

Determine the design discharge hydrograph and peak design discharges for a range of design floods across the <insert study area name> floodplain by undertaking hydrologic analyses. The design discharge hydrograph and peak design discharges are to be for the following design floods, 2%, 1% 0.5% and 0.2% AEPs and the PMF.

The size and nature of the study area, the availability of recorded flood and rainfall data will determine which method or combination of methods is most effective.

A calibrated hydrological model may be used to estimate design flood flows based on design rainfalls, checked by flood frequency analysis if possible.

The outcome is an estimate of design discharge hydrograph and peak design discharges.
The specification for range of design floods and the approach to be undertaken for the hydrologic analyses needs to be confirmed with an experienced flood modeller who is preferably a Registered Professional Engineer of Queensland due to the complexity of the investigations and the computer modelling to be developed.

Clearly state the rationale as determined by the Registered Professional Engineer of Queensland for the approach undertaken for the hydrologic analyses of design floods. This may include consideration of the data available, the complexity of the investigations and the computer modelling developed.

Hydraulic analysis

Determine the flood behaviour in terms of water levels, velocities and the extent of flooding for the range of design floods being considered.

This may be undertaken using a 1-dimensional (1D), 2-dimensional (2D) or 3-dimensional (3D) model hydraulic model to represent the design discharge hydrographs and peak design discharges for the design floods.

The model is to be calibrated to historical flood events.

The rationale as determined by the Registered Professional Engineer of Queensland for the approach undertaken for the hydraulic analyses should be outlined. This may include consideration of the data available, the complexity of the investigations and the computer modelling developed

Climate change

Climate change is to be incorporated using the "*Increasing Queensland's resilience to inland flooding in a changing climate: Final report on the Inland Flooding Study*", and specifically how the following climate change factors for increased rainfall intensity. The climate change factors are - a 5 per cent increase in rainfall intensity per degree of global warming. This 5 per cent increase in rainfall intensity per degree of global warming can be incorporated into the 2%, 1%, 0.5% and 0.2% Annual Exceedance Probability (AEP) flood events. For the purpose of applying this climate change factor, use the following temperature increases and planning horizons: 2°C by 2050, 3°C by 2070 and 4°C by 2100.

Accounting for uncertainty

The uncertainty related to the output from this flood investigation is to be outlined.

The degree of uncertainty in the definition of flood behaviours is dependent on the quality and the quantity of topographic, rainfall, streamflow and flood data. The uncertainty relates to the quality of this data.

The grid size and vertical accuracy of topographic information is to be outlined. This will include recognition of the type of any development to be assessed.

Outline if a sensitivity analysis was used to test the significance of errors in relevant data inputs and assumptions.

Deliverables

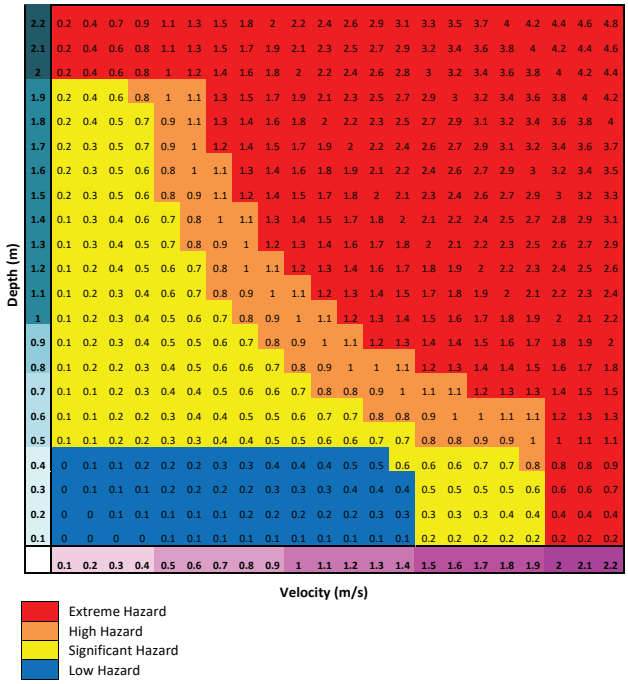
The flood study is to produce maps showing the extent of various design flood flows (at a range of AEPs – 2%, 1% 0.5% and 0.2% and the PMF), and low/medium/high hazard areas based on depths and velocities across the study area. Determination of low/medium/high hazard areas should be made with reference to the best practice categorisation of these hazard areas relative to at least flood height and velocity.

A computer model is to be made available to enable assessment of new development (where size of development is greater than the distance between cross-sections).

Schedule 4 - Flood hazard criteria

Indicative flood hazard criteria

The following indicative flood hazard criteria have been prepared for use in preparing flood investigations (level 2), and planning evaluations based on latest available engineering guidance. In the absence of other more appropriate flood hazard definitions, the criteria below may be used.



Rules

	Low	Significant	High	Extreme
Depth	<0.5	<2	<2	2+
Velocity	<1.5	<2	<2	2+
DxV Ratio	<0.6	0.6 to <0.8	0.8 to <1.2	1.2 +

Rationale

1. **Low** – self evacuation possible for adults and children, vehicle stability within tolerance for large 4WD
2. **Significant** – working limit for trained safety workers, Vehicle evac unsuitable, Building Code limitation
3. **High** – limit of uncompromised stability for adults (dangerous to most)
4. **Extreme** – in excess of known stability limits

References

1. ARR Revision Project 10: Appropriate Safety Criteria for People
   a. Children – Significant Hazard DV ≤ 0.6 & D ≤ 0.5
   b. Adult – Moderate Hazard DV ≥ 0.6
   c. Working limit for trained safety workers or experienced and well equipped persons DV < 0.8
2. ARR Revision Project 10 State 2 Report: Appropriate Safety Criteria for Vehicles (Draft)
   a. Large 4WD DV ≤ 0.6 & D ≤ 0.5
3. Dale et al. (2004) Structural flood vulnerability and the Australianisation of Black's Curves
   a. Fibro/Tile construction D < 0.5 & V < 2
   b. Draft QDC for flood hazard areas for Deemed to Satisfy provisions – V < 1.5
4. BMT WBM (2012) Newcastle City-wide Floodplain Risk management Study and Plan P.81-82
   a. Hydraulically suitable for wading by able-bodied adults V < 2 & D < 0.8
   b. Hydraulically suitable for light construction (e.g. timber frame and brick veneer) V < 2 and D < 2
5. Jonkman et al. (2008) Methods for the estimation of loss of life due to floods: A literature review and proposal for a new method Natural Hazards P. 364
   a. Level of hazard to people can be categorized as low, moderate, significant or extreme.

Schedule 5 – Planning evaluation checklist and process

Checklist – Existing Urban Areas	Considerations	Notes	Data Required	Score
1 What is the nature of the hazard in the floodplain and where does it occur?	In terms of the flood hazard affecting a Council area, it is likely that there are varying degrees of hazard depending on location relative to the main floodway. It is important to note that different land use controls may be possible in each location due to the variation in flood hazard.	Understanding of hazard derived from flood investigation output	Output of Level 2 or Level 3 investigation	Exposure
2 Where are existing settlements, infrastructure or other places of key social or economic importance located within each hazard area?	It is important to identify existing key areas and uses that may be susceptible to the flood hazard identified through the flooding investigation. The relationship of the hazard to these areas/uses will influence decisions as to the current appropriateness of that area/use in that location, and will also prompt a question of the appropriateness of future use or intensification of that existing area.	A review of the Council area to identify points of interest, critical infrastructure, services, economic drivers, and industries can be undertaken to identify the key areas for consideration located within each hazard area	Map with key places/areas of social or economic importance spatially represented relative to the hazard, with commentary on important areas/issues	
3 Are there existing development commitments in the hazard areas?	Existing development commitments may need to be considered in relation to decisions to alter zoning or avoid development in the area subject to the hazard.	A review of existing development commitments will assist in identifying additional or future risk areas for consideration	Notes on review undertaken with key commitments specified, may also be spatially represented on a map	
4 Do these exposed places include vulnerable persons, property and/or infrastructure or is the hazard (such as flood depth or velocity) when it occurs so great that living in the area is of significant concern?	Land uses may involve vulnerable persons (such as child care or aged care), or vulnerable property (such as libraries, funeral parlours or places of cultural significance. These land uses are at greater risk from the hazard, regardless of the type of the hazard. Other land uses may be more tolerant to certain instances of flood hazard		A qualitative assessment (e.g. based on historic records and community information) or formal quantitative vulnerability assessment may be undertaken to identify vulnerable persons/property, depending on local circumstances	Vulnerability
5 Is the area served by appropriate emergency management procedures?	Evacuation routes, warning systems and emergency management procedures are critical in both existing and future development areas. The effectiveness of development in particular depends on the availability of clearly identified and passable evacuation routes.	A review of existing or proposed emergency management procedures (e.g. evacuation routes and early warning systems) will assist in determining how resilient the community may be to flood hazard	Map or reporting based on existing Local Disaster Management Group procedures	
6 Is the built form resilient to the hazard?	Some existing communities respond very well to flood hazard, and this can be attributed primarily to two things – the particular nature of the hazard, and the form prevalent in the area. For example, the 'Queenslander' style of home performs far better in a flood than a slab on ground home, in terms of actual damage, cost to repair and the time required for the repairs.	A built form assessment may be used to determine built form styles in the subject area	Built form assessment (via formal site-based survey, or via desktop analysis of aerial imagery/street view information)	
7 What is the community's attitude to the hazard – are they resilient or vulnerable?	Resilience generally is an unmeasurable quality, given it relates to the 'strength' of a community to withstand and bounce back from the impacts of a natural hazard. However, it may generally be quantified to some degree by an assessment of community awareness of the hazard and its associated risk, the level of property insurance prevalent in the community, in addition to levels of employment and (to some degree) the socio-economic status of residents.	Community attitudes and resilience can be ascertained through normal community consultation methods during planning scheme preparation, and also via more formal methods such as insurance reviews and socio-economic analysis	Flood hazard-specific public consultation strategy for engagement during planning scheme preparation process (e.g. online commentary, workshops, social media etc) Analysis of insurance levels, extent of home ownership versus renting, socio-economic analysis	
8 Is there an overriding economic or social need to continue living and working in this area?	If the consequence to life or property is acceptable in an area but may not be ideal, where such areas are of significant economic or social importance, a balanced approach to the land use response for this area should be taken that considers these economic and/or social needs.		A qualitative assessment (e.g. based on Council's strategic or community plan) or formal economic analysis may be undertaken, depending on local circumstances	Tolerability
9 Are there existing or proposed structural controls for the area that will reduce the hazard?	Existing or proposed structural controls (such as levees, floodgates or dams) will have a significant impact on the land use controls proposed for an area. Such controls may allow a wider range of development types and intensities in the area.	A review of existing or proposed structural controls should be undertaken to ascertain their role in altering the hazard	Report on existing or proposed structural mitigation controls and their function, benefits and dis-benefits	
10 What are the community's expectations regarding immunity and protection?	Community expectation of roles and responsibilities will determine which land use transition strategies Council may consider. This may be a dynamic matter that is influenced (either positively or negatively) by community exposure to recent events	Community expectations of flood immunity can be ascertained through normal community consultation methods during planning scheme preparation	Flood hazard-specific public consultation strategy for engagement during planning scheme preparation process (e.g. online commentary, workshops, social media etc)	

Consequence Score (E + V – T)

Use this checklist as a 'ready reckoner' of key issues to address in the planning evaluation process. Refer to the following step by step process to determine risk levels.

Planning evaluation – determining risk levels

The following is a step-by-step guide to answering the questions in the planning evaluation checklist to identify and treat flood risk. See **Section 3 – Implementation** for more information. Evaluations should be undertaken on a lot by lot basis, but where lots are large (eg. rural properties), these may be divided into smaller areas for the purposes of evaluation.

Step 1 – Select a flood likelihood to undertake the planning evaluation and create flood map

AEP	Chance of occurrence in any 1 year period	Chance of occurrence in any 70 year period	Chance of occurring twice in any 70 year period
10%	1 in 10	99.9%	99.3%
5%	1 in 20	97%	86%
2%	1 in 50	76%	41%
1%	1 in 100	51%	16%
0.5%	1 in 200	30%	5%
0.2%	1 in 500	13%	

Note: This step is the output of a flood investigation Level 2 or Level 3, as discussed in Section 2 – Analysis. The ability to choose a flood likelihood to evaluate will be dependent on whether that likelihood was mapped as part of the flooding investigation.

Step 2 - Identify Exposure to hazard per lot

Hazard Severity* (at selected likelihood)	Land Use Type (existing and/or future)	Score
N/A	Landscape	0
N/A	Open space and recreation/Rural	1
Low Hazard	Industrial	2
Significant Hazard	Commercial	3
High Hazard	Infrastructure & Utilities/Rural Residential	4
Extreme Hazard	Residential/Community & Cultural	5

Read table from left to right and from top to bottom. The highest score assigned must be the score chosen to identify Exposure.

E.g. A low hazard affecting a landscape area will score 3, while that same hazard affecting a residential lot will score 5.

Equally, an extreme hazard will always score 5 regardless of the land use it affects.

** Derived from AR&R Project 10 (Australian Rainfall & Runoff, Revision Projects, Project 10 Appropriate Safety Criteria for People, and other references) – refer to Schedule 4 for the breakdown of flood depths and velocities*

Step 3 – Identify Vulnerability to hazard severity per lot

Vulnerable Land Use	Built Form & Associated Safety	Flood Warning Times* for affected persons	Isolation of affected persons in urban areas via nearby roads	Score
Existing/proposed built form not affected by hazard (regardless of use), or No existing/proposed vulnerable land use or affected persons (e.g. Landscape, Open Space and Recreation)	Existing built form not affected by hazard	More than 3 days	No isolation	0
Commercial, Industrial, Rural, Rural Residential and Residential without vulnerable persons	At grade – industrial	49 hours – 72 hours	0.2%/0.1%/PMF	1
Hazardous Materials/ Warehousing	Elevated (elevated above selected flood), or Where currently vacant or underutilised, ability of zoned use(s) to be compatible with flood hazard	25 hours – 48 hours	0.5%	2
Community & Cultural with Vulnerable Property, or Minor infrastructure	At grade – commercial	13 hours – 24 hours	1%	3
Community & Cultural with Vulnerable Persons, or Residential with Vulnerable Persons	At grade - community	7 hours – 12 hours	2%	4
Evacuation Centres/Airports/ Other Critical Infrastructure or	Not elevated above selected flood – residential,			
Where currently vacant or underutilised, inability of zoned use(s) to be compatible with flood hazard	Less than 6 hours	10%	5	

Read table from left to right and from top to bottom. The highest score assigned must be the score chosen to identify Vulnerability.

E.g. A residential property would score 1 where no other vulnerability considerations were present (i.e. the building on the lot may be out of the hazard). However, where this property is elevated above the selected flood, the score increases to 2. Where it is not elevated, the score increases to 5.

Equally, any land use with less than 6 hours flood warning will always score 5 regardless of the use.

** Warning times based on BoM Classification of less than 6 hours warning as a 'flash flood', with per-day metrics used for warning times greater than 6 hours.*

Step 4 – Identify Tolerability to hazard severity per lot

Community Awareness/ Understanding	Community Perception of Hazard	Community Preparedness	Emergency Management* Procedures/Evacuation	Level of Protection to Lot from Existing or Proposed Structural Works (e.g. Levee)	Ability of use to remain operational during/after selected flood event (critical infrastructure only)	Score
OVERRIDING NEED TESTS^						
Unaware	Intolerant and not resilient	No individual preparedness, business continuity & social networks	For residential/critical infrastructure - no emergency services access to lot, or For non-residential - no evacuation procedures in place on lot	None	Not able to remain operational	0
Partially Aware	Fearful and generally not resilient	Limited individual preparedness, business continuity & social networks	For residential/critical infrastructure - limited emergency services access to lot, or For non-residential – limited evacuation procedures in place on lot	Less than 2%	N/A	1
Moderately Aware	Cautious and moderately resilient	Acceptable individual preparedness, business continuity & social networks	For residential/critical infrastructure – acceptable emergency services access to lot, or For non-residential – acceptable evacuation procedures in place on lot	2% - 1%	Reduced but acceptable operations	2
Generally Aware	Generally tolerant and resilient	Strong individual preparedness, business continuity & social networks	For residential/critical infrastructure – strong emergency services access to lot, or For non-residential – strong evacuation procedures in place on lot	1%	N/A	3
Very Aware	Tolerant and Resilient	Very strong individual preparedness, business continuity & social networks	For residential/critical infrastructure – very strong emergency services access to lot, or For non-residential – very strong evacuation procedures in place on lot	Above 1%	Able to remain fully operational	4
No persons or property affected, or emergency services/evacuation procedures and structural controls unnecessary						5

Read table from left to right and from bottom to top. The lowest score assigned must be the score chosen to identify Tolerability.

E.g. A community that is aware and tolerant of the flood hazard will score more than a community that is unaware or intolerant. Tolerability therefore can include common elements such as community awareness that are not lot-specific.

Equally, critical infrastructure that is rendered inoperable by the selected flood event, regardless of community awareness or perception must score 0. This is a lot-specific criterion.

^ Overriding economic or social need to remain in a flood hazard area must balance these imperatives with community awareness/understanding of the hazard to which they are subject, the community's perception of the hazard, their preparedness to such a hazard, and the extent of responsibility placed upon emergency management.

** Advice should be sought from local disaster management coordinator in evaluating emergency management procedures/evacuation plans*

Step 5 – Calculate consequence score per lot

Calculate Consequence Score using the consequence formula:
Consequence = Exposure + Vulnerability – Tolerability
E.g. Consequence = 4 + 4 - 2

Step 6 – Apply consequence score to likelihood x consequence matrix to determine risk level per lot

	Consequence Score										
Likelihood	0	1	2	3	4	5	6	7	8	9	10
10%	0	10	20	30	40	50	60	70	80	90	100
5%	0	5	10	15	20	25	30	35	40	45	50
2.5%	0	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25
2%	0	2	4	6	8	10	12	14	16	18	20
1%	0	1	2	3	4	5	6	7	8	9	10
0.5%	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
0.2%	0	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
0.1%	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1

Broadly Acceptable
Tolerable subject to ALARP
Generally Intolerable

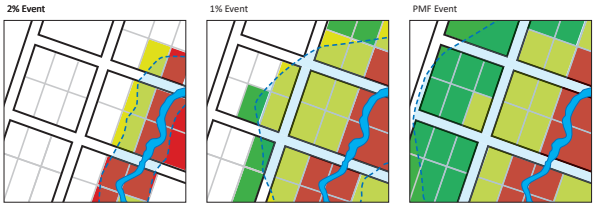
Step 7 – Map risks and calculate area (ha) at risk

Refer to Case Study in **Schedule 7** for a demonstration.

Important note: When undertaking multiple planning evaluations (i.e. of multiple event likelihoods), the approach taken to quantifying the risk should be a cumulative one. That is, once a planning evaluation has been completed for a certain event (e.g. a 2% event), subsequent planning evaluations of more infrequent events (e.g. a 1% event) should not also include those lots that were affected during the 2% event – the evaluation of the 1% event should only be undertaken on those lots that were unaffected by the 2%.

This means that where a lot is identified at intolerable risk during a lesser event, (e.g. a 2% event) this risk level should not be altered, but simply brought forward in the planning evaluation undertaken for the 1% event. This is due to the fact that if a lot is identified at intolerable risk during a 2% event, it will not be subject to lesser risk during a 1% event given the 1% would by its nature include a 2% event that is then exceeded.

Therefore, for completeness, when displaying risk levels on a map for a certain event (e.g. the 1% event), this map should display the outputs of previous evaluations (such as the 2% event) on those lots affected by those lesser events, and the risk levels identified by those additional lots only affected by the 1% event. A mapped example is provided below.



Successive evaluations should only be made for lots not affected in a more frequent event. As each planning evaluation is undertaken, the evaluation should maintain the level of risk identified on a lot by the evaluation of the more frequent event.

Step 8 - Repeat evaluation for less frequent AEP levels

In order to provide a wider understanding of the flood risk affecting an area, evaluations of at least the key AEP levels (such as the 2%, 1%, and 0.5% AEP) should be undertaken to ensure that planning responses can be developed for a wider level of risk than simply the 1% AEP event.

Definitions - Land use type classification

Land Use Type	QPP Activity Group	Additional Land Use Description
Landscape	None	National Park/State Forest, Unallocated State Land, area for environmental management, waterbody & waterway, nature conservation
Open space and recreation	Recreation Activities	Golf course, paintball
Rural	Rural Activities	N/A
Industrial	Industry Activities Waterfront Activities	N/A
Commercial	Business Activities Centre Activities Entertainment	N/A
Infrastructure & Utilities (including Critical Infrastructure and Minor Infrastructure)	None	Critical Infrastructure - Airport, power station, sewage treatment plant, water supply plant, electrical sub-station, telecommunications sub-stat on Infrastructure - mining/ resource activities, railway station/network, port Minor Infrastructure – roads, sewerage, stormwater networks, etc.
Rural Residential	None	Acreage dwellings
Residential	Accommodation Activities	N/A
Community & Cultural	Community Activities	Hospital, police station, fire station, ambulance station, museum, library

QPP Activity Groups specified are found in draft QPP V3.0.

Other definitions

Affected persons – those persons who are either impacted by floodwaters directly on their properties, or impacted by isolation due to rising floodwaters elsewhere.

Underutilised – where a lot is zoned under the existing planning scheme for a certain use, however the existing use on site is not that highest and best use possible. For example, a 2 hectare lot zoned urban residential that includes only one dwelling house on that lot. This lot could be expected to accommodate additional single dwellings through subdivision because of its urban residential zoning and is therefore underutilised.

Planning evaluation – risk treatment process

Step 1 – Set resilience target

a. Set scale for target (suburb/town/LGA/Regional Planning Area) – based on prioritisation performed in Step 8 in Planning Evaluation – Determining Risk Levels

b. Identify key risk priority through results of risk assessment and community consultation, such as:
   i. Treating intolerable risks, or treating intolerable risks to residential properties
   ii. Treating risks to linkages (e.g. links to critical infrastructure)

c. Refine target(s) over the course of the risk treatment process, if required.

Step 2 – Identify options to treat flood risk

a. Select the land use response(s) appropriate for the risk level for assessment relative to local circumstances
   i. Identify the measures needed to achieve that land use response – refer to page 27 and Schedule 6

b. Measures to achieve the land use response will include:
   i. Planning scheme responses (zoning, overlays, development requirements, etc) – refer to Schedules 6 and 8
   ii. Non-planning scheme measures such as property buy-back, relocation, resumption etc
   iii. Structural works such as levees
   iv. Building controls (setting habitable floor levels etc)
   v. Emergency management plans and procedures
   vi. Community awareness programmes

c. Identify the role each measure plays in treating risk, including function, benefit(s) and limitation(s)
   i. Where back-zoning through a planning scheme is proposed as a potential risk treatment mechanism, use the back-zoning assessment criteria in this schedule to guide this process

Step 3 – Compare options & prepare suite of measures

a. Compare measures needed to achieve desired land use response relative to the following criteria:
   ii. Flood mitigation/avoidance function
   iii. Cost/financial implications (including whole-of-life cycle costings)
   iv. Resourcing requirements
   v. Community views
   vi. Social & environmental implications
   vii. Timing

b. Prepare complementary suite of measures appropriate to local circumstances, ensuring role/function of each measure is articulated relative to achieving the resilience target set

Step 4 – Develop implementation plan

a. Agree suite of options and test with community – refine if necessary based on community feedback

b. Prepare implementation plan once options are agreed that sets works programme and timing schedule to achieve resilience target

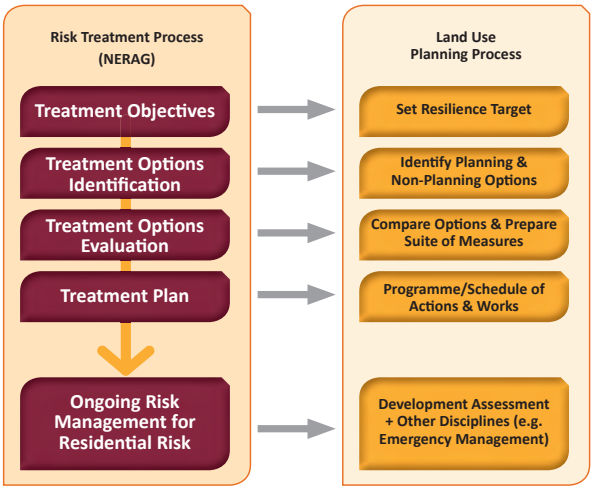
c. Deliver options as per implementation plan

Step 5 – Manage ongoing risk

a. Perform development assessment in accordance with planning scheme requirements

b. Undertake emergency management procedures as required

c. Undertake maintenance of structural works in accordance with design/operational requirements



Schedule 6 - Land use response and back zoning assessment criteria

Land use responses

Land Use Responses and Possible Scheme Measures				
Planning Evaluation Risk Category	**Land Use Response* & Description * From table 7**	**Possible Land Use Transition Strategies**	**Possible Planning Scheme Options**	**Land Uses (QPP terms) * Consider relative to urban/rural location**
Intolerable Risk	**Retreat from specific existing urban areas** **Expand into new areas suitable for urban development** *The strongest land use response required to avoid risks to life or property. This would involve limiting land uses (e.g. 'back-zoning' in existing areas) and active measures to move people or property out of harms way*	• Actively limit future development in this area that may increase risk to life or property through strong zoning controls • Promote transition of at-risk existing uses & promote low-impact, non-urban uses • Discourage further intensification of existing uses • Implement built form improvements through application of Overlay Code for remaining land uses • Consider how to maintain community connectivity in areas to be transitioned • Also investigate complementary measures (e.g. voluntary purchase) to actively reduce existing at-risk people and property in this area • Also investigate structural controls to further reduce risk to life and property	Strategic Framework: • Intents/Outcomes limits development in these areas that would create unacceptable risk as per SPP1/03 policy Zoning: • Limited Development • Environmental Management • Conservation • Sport & Recreation • Open Space • Waterfront and Marine Industry • Rural • Flood-constrained Precincts as required (e.g. Residential Living – Flood Constrained Precinct) Overlay: • Built form controls	Appropriate (subject to assessment): Aquaculture Cropping Landing Market (temporary only) Outdoor Lighting Outdoor Sport and Recreation Park Permanent Plantations Port Services Waterfront and Marine Industry
Tolerable Risk (subject to ALARP)	**Adapt existing areas** **expand into new areas suitable for urban development** **Maintain agricultural and rural landscape values** *A considered approach to land use and urban design is required where a greater range of land uses may be appropriate than in areas of highest risk, but others generally remain inappropriate*	• Discourage sensitive land uses but permit majority of land uses • Use Precincts as transition zones for land use change over time • Density increases may be appropriate in line with good planning principles (e.g. TOD or infill development) - where strong emergency management, evacuation routes & early warning systems are available • Implement built form improvements through application of Overlay Code • Investigate improvements to transport/infrastructure linkages to improve resilience through PIP	Strategic Framework: Intents/Outcomes discourages incompatible land uses in these areas as per SPP1/03 policy Zoning: • Flood-constrained Precincts within all zones as required (e.g. Residential Living – Flood Constrained Precinct) Overlay: • Built form controls	Inappropriate: Child Care Centre Community Care Centre Community Residence Correctional Facility Educational Establishment Emergency Services High Impact Industry Hospital Intensive Animal Husbandry Intensive Horticulture Major Electricity Infrastructure Major Sport, Recreation and Entertainment Facility Medium Impact Industry Non-resident Workforce Accommodation Noxious and Hazardous Industry Relocatable Home Park Residential Care Facility Retirement Facility Substation Telecommunications Facility Tourist Park Appropriate: All other uses (subject to assessment)
Broadly Acceptable Risk	**Adapt existing areas** **Expand into new areas suitable for urban development** *Minimal land use changes required to respond to flood risk - urban design controls may be implemented to improve resilience*	• Broad consideration to be given to concern of flood – no specific strategy suggested • Land uses and density increases appropriate in line with good planning principles (e.g. TOD or infill development) - where strong emergency management, evacuation routes & early warning systems are available • Implement built form improvements through application of Overlay Code • Investigate improvements to transport/infrastructure linkages to improve resilience through PIP	Strategic Framework: • Intents/Outcomes support appropriate development in these areas Zoning: • No changes based on flooding concern Overlay: • Built form controls	Appropriate: All uses subject to appropriate built form controls being achieved

Land Use Responses and Possible Scheme Measures

Assessment criteria for back zoning and other measures to address intolerable flood risk

Please refer to Section 3 – Implementation for detailed advice on how to address intolerable flood risk by back zoning the affected lots through a local planning instrument such as a planning scheme. These assessment criteria generally follow the risk treatment process outlined in S**ection 3 – Implementation**, but provide specific guidance for strategic planners to consider when preparing new planning schemes.

For the purposes of this Guideline, back zoning is defined as the planning process used to reduce the currently permissible development capability of land to a type or level that is compatible with the constraints affecting the land.

Other sections of the Guideline provide advice on how a planning scheme may treat areas of tolerable and broadly acceptable risk.

Performance Outcome	Acceptable Outcome
PO1 An analysis of the flood risk present on the site relative to a range of flood events is undertaken.	**AO1.1** Planning evaluations of at least three flood events (including the 2%, 1% and 0.5% AEP levels of likelihood) are undertaken to quantify the flood risk of the affected lots at each level of flood likelihood. *Note: Councils should use the planning evaluation process in Section 3 – Implementation, or industry standard floodplain risk management process to quantify the flood risk(s).*
PO2 Development scenarios for the highest and best use(s) allowable under the existing planning scheme are tested and evaluated for their practical ability to be compatible with the flood hazard(s). *Note: The existing land use may be the highest and best use of the land – such as an existing dwelling house on land zoned as low density residential.*	**AO2.1** Development scenarios envisaged by the existing planning scheme are tested to evaluate the practical outcome(s) of the development scenario, against at least the following: • Subdivision requirements, such as filling of lots to achieve flood immunity and creation of flood free access to the lot; • Built form requirements, such as raising of habitable floor levels to achieve flood immunity; • Operational work requirements, such as not adversely impacting upon flood flows to neighbouring properties; and • Operational requirements, such as the preparation of emergency management plans to evacuate residents. *Note: Development scenarios that result in exposing persons or property to intolerable levels of risk, or that result in unacceptable built form outcomes to make the development compatible (such as an unacceptable volume or level of fill, or unmitigated flows of floodwater onto adjacent sites) are considered incompatible with the flood hazard.*
PO3 Where the development scenarios allowable under the planning scheme are not appropriate or practical, planning and non-planning measures are developed to address the flood risk on the lot.	**AO3.1** Planning measures may include: • Planning scheme measures such as back-zoning and supporting scheme provisions (including overlays & development codes); • Voluntary purchase or resumption; • Planned retreat; • Land-swap; and/or • Other land use programme(s) as required. **AO3.3** Non-planning measures may include: • Building controls; • Structural works (e.g. levees); • Emergency management procedures; and • Community awareness/education. **AO3.2** Planning and non-planning measures are developed in combination to ensure that a comprehensive and complementary approach to building resilience is undertaken. *Note: Back-zoning may be employed as a specific planning scheme measure for lots at intolerable risk of flood, however this approach should be complemented by voluntary purchase, resumption or land swap programmes to minimize economic/social hardship for those persons at intolerable risk of flood. Non-planning measures such as structural works and emergency management should also be considered as complementary measures to address the intolerable flood risk, if appropriate.*

PO4 Planning scheme measures proposed (such as back-zoning) ensure risk to life and property presented by the events is adequately addressed, while minimising sterilization of land and economic impact of the planning scheme measures.	**AO4.1** A structure plan process is undertaken on each lot (or group of lots) classified at intolerable risk to identify part of the site (if any) that is: • Not subject to a flood hazard at the level of likelihood(s) used by Council to manage development; or • Able to accommodate development that is compatible with that specified level of flood hazard. **AO4.2** Planning scheme measures consider and address the cost/economic implications of the option for Council and the landowner, including any compensation that may be payable pursuant to the relevant legislation (refer to AO3.2 above). **AO4.3** For back-zoning options, zoning choices are drawn from the Queensland Planning Provisions (QPP) and promote the highest and best use(s) for the site that is compatible with the flood hazard presented on the site. *Note: Split zoning may be used where parts of lot(s) are not subject to the level of flood likelihood used by Council to manage development* **AO4.4** Due consideration is given to decommissioning of existing infrastructure or future infrastructure plans in the subject areas, including changes required to: • Ongoing maintenance programmes; • Existing capital works programmes; and • Future infrastructure planning
PO5 The planning measures are presented to the community for consideration and comment prior to adoption by Council.	**AO5.1** The community is consulted via: • Formal notification of affected property owners, seeking their comment on the planning measures proposed; • Community workshops to present and discuss the flood risk, the development scenarios tested and the planning measures developed; • Any formal consultation requirements pursuant to the *Sustainable Planning Act 2009* (as amended) related to compensation; and • Consultation methods used in planning scheme preparation pursuant to the *Sustainable Planning Act 2009*.
PO6 The planning measure(s) adopted by Council are included in Council's planning scheme.	**AO6.1** Where a new QPP-compliant planning scheme is due for preparation, the planning measure(s) adopted are incorporated into this new scheme. **AO6.2** Where an existing planning scheme is in place and is not likely to be renewed within a reasonable timeframe (i.e. within 1 year), the planning measure(s) are incorporated into the planning scheme via an amendment process pursuant to the relevant guidelines (such as *Statutory Guideline 1/12: Making and Amending Local Planning Instruments).* *Note: A planning scheme amendment is the preferred mechanism to address flood risk rather than a temporary local planning instrument (TLPI).*

Schedule 7 - Planning evaluation case study

The following is a worked example of how to undertake the planning evaluation process described in **Section 3 – Implementation**, using the detail provided in **Schedules 5** and **6**.

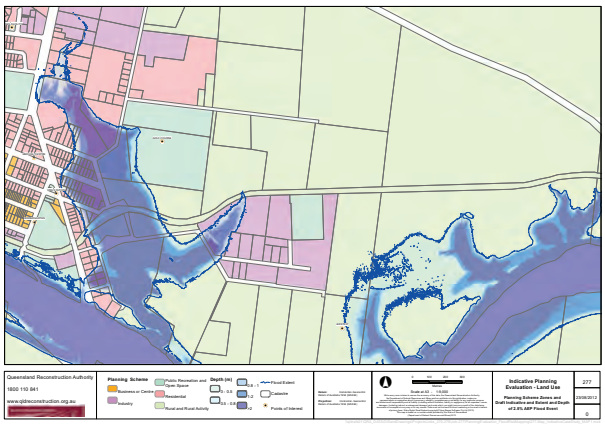
This case study is of a 'real-world' Queensland town recently affected by the recent flood events of 2010/2011. The town is at considerable flood risk, however in the past there has been limited opportunity to undertake flood investigations and evaluation of options to address this flood risk. The planning evaluation case study below demonstrates options for how this town might improve its resilience to flood events in the future through a risk-based, fit-for-purpose approach.

The case study evaluates the risk of a recent flood event, which was identified as a 2.5% AEP flood event via a Level 2 flood investigation that was undertaken to inform the evaluation process. The flood extent of this event, its hazard (expressed through depth), and the existing land use planning zones are displayed in **Map 1** below.

The flood event selected is a relatively frequent occurrence. Such an event has an approximately 80% chance of occurring at least once in 70 years, and approximately 50% chance of occurring twice in this period. The historic flood record for this town indicates that a flood of this magnitude or greater has actually occurred three times in the last 70 years.

Overview

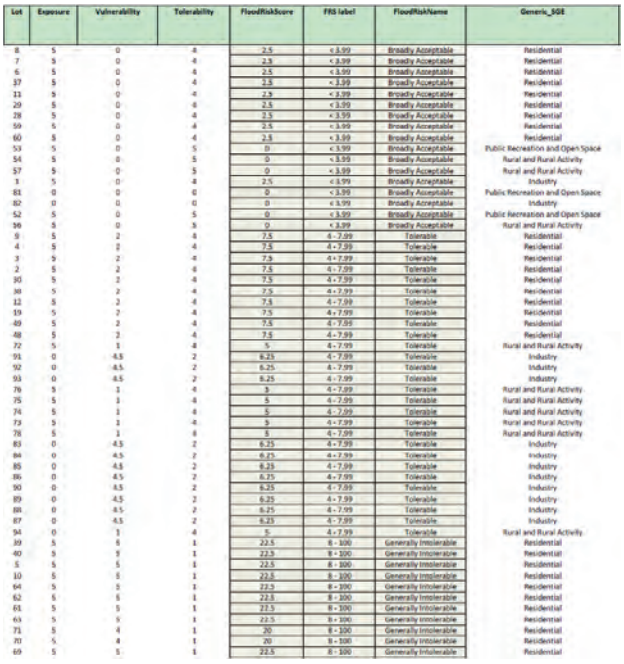
Case Study Details	
Location	Regional Queensland
Population	1100
Flood investigation undertaken	Level 2 – Validated GIS
Flood event selected for evaluation	2.5% AEP flood event – historic event
Main areas of flood hazard exposure	• Residential areas • Road links to industrial estate and airstrip • Rural areas



Map 1 – The subject area. Existing land use zonings for the town overlaid with the indicative 2.5% AEP flood event that recently affected the town. Refer to larger map at end of Schedule 7 for more detail.

Planning evaluation – determining risk levels

Using the step by step process provided in **Schedule 5**, the following suite of maps were developed to identify those properties subject to flood exposure and vulnerability, as well as the level of flood tolerability, in order to assign specific levels of flood risk to each property. A spreadsheet (**Figure 1**) was prepared so that the exposure, vulnerability and tolerability scores for each lot could be identified and risk per lot calculated. Each lot in the area of interest was assigned a simple number (1, 2, 3, etc) which was used as a unique identifier for the calculations and the mapping created from this spreadsheet. In practice, Lot/RP numbers can be used as this unique identifier.



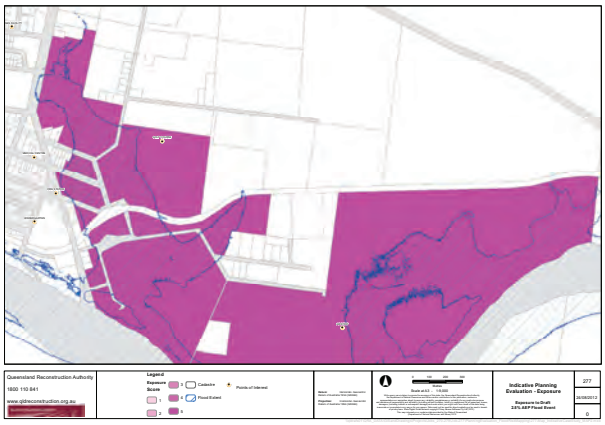
Lot	Exposure	Vulnerability	Tolerability	FloodRiskScore	FRS label	FloodRiskName	Generic_SGE
8	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
7	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
6	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
37	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
13	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
29	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
28	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
59	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
60	5	0	4	2.5	< 3.99	Broadly Acceptable	Residential
53	5	0	5	0	< 3.99	Broadly Acceptable	Public Recreation and Open Space
54	5	0	5	0	< 3.99	Broadly Acceptable	Rural and Rural Activity
57	5	0	5	0	< 3.99	Broadly Acceptable	Rural and Rural Activity
1	5	0	4	2.5	< 3.99	Broadly Acceptable	Industry
81	0	0	6	0	< 3.99	Broadly Acceptable	Public Recreation and Open Space
82	0	0	6	0	< 3.99	Broadly Acceptable	Industry
52	5	0	5	0	< 3.99	Broadly Acceptable	Public Recreation and Open Space
56	5	0	5	0	< 3.99	Broadly Acceptable	Rural and Rural Activity
9	5	2	4	7.5	4 - 7.99	Tolerable	Residential
4	5	2	4	7.5	4 - 7.99	Tolerable	Residential
3	5	2	4	7.5	4 - 7.99	Tolerable	Residential
2	5	2	4	7.5	4 - 7.99	Tolerable	Residential
10	5	2	4	7.5	4 - 7.99	Tolerable	Residential
30	5	2	4	7.5	4 - 7.99	Tolerable	Residential
12	5	2	4	7.5	4 - 7.99	Tolerable	Residential
19	5	2	4	7.5	4 - 7.99	Tolerable	Residential
49	5	2	4	7.5	4 - 7.99	Tolerable	Residential
48	5	2	4	7.5	4 - 7.99	Tolerable	Residential
72	5	1	4	5	4 - 7.99	Tolerable	Rural and Rural Activity
91	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
92	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
93	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
76	5	1	4	5	4 - 7.99	Tolerable	Rural and Rural Activity
75	5	1	4	5	4 - 7.99	Tolerable	Rural and Rural Activity
74	5	1	4	5	4 - 7.99	Tolerable	Rural and Rural Activity
73	5	1	4	5	4 - 7.99	Tolerable	Rural and Rural Activity
78	5	1	4	5	4 - 7.99	Tolerable	Rural and Rural Activity
83	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
84	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
85	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
86	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
90	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
89	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
88	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
87	0	4.5	2	6.25	4 - 7.99	Tolerable	Industry
94	0	1	4	5	4 - 7.99	Tolerable	Rural and Rural Activity
39	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
40	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
5	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
10	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
64	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
62	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
61	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
63	5	9	1	22.5	8 - 100	Generally Intolerable	Residential
71	5	4	1	20	8 - 100	Generally Intolerable	Residential
70	5	4	1	20	8 - 100	Generally Intolerable	Residential
69	5	5	1	22.5	8 - 100	Generally Intolerable	Residential

Figure 1 – a spreadsheet can be used to easily keep track of the scores allocated per lot, and to perform the basic calculations required to determine the level of risk per lot.

Determining exposure

Using the exposure scoring matrix in **Schedule 5**, **Map 2** below was developed. Each lot in the subject area was scored for its level of exposure to the flood hazard of the 2.5% AEP flood event.

Note that the levels of exposure are the same (a maximum exposure of 5 points) in both the rural area adjacent the main river channel and the residential area further north. This is even though the flood hazard (refer to Map 1) in the rural area is more significant than that in the residential area. This is due to the scoring matrix giving strong weight to both instances of higher hazard and uses of increasing sensitivity to that hazard.



Map 2 – Exposure scorings identified per lot. Note that the exposure score is applied to the whole lot, even though the hazard may affect only a portion of the lot. Refer to larger map at end of Schedule 7 for more detail.

Determining Vulnerability

Using the vulnerability scoring matrix in **Schedule 5**, **Map 3** below was developed. Each lot in the subject area was scored for its level of vulnerability to the flood hazard of the 2.5% AEP flood event. Of particular interest for the subject area is the vulnerability to:

1. the existing residential properties, caused by vulnerable built form such as slab-on-ground or low-set construction; and
2. critical infrastructure such as the airstrip caused not by flood inundation itself but by isolation created by the inundation.

Flood warning time was not considered an element that would contribute to the vulnerability of land use in the subject area, as the community has a long forewarning of floodwaters due to its position in the sub-basin and the flood warning system already in place. In addition, there were no land uses that included vulnerable persons (e.g. aged care or child care) or vulnerable property (such as museums/ libraries or electrical sub-stations) in this area.

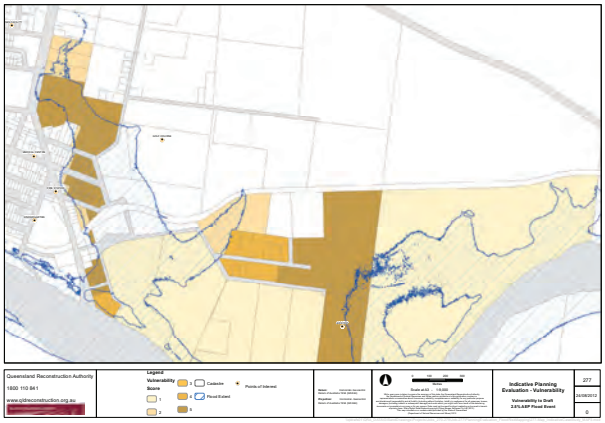
A built form assessment of all urban residential zoned land was undertaken to determine those buildings that would be inundated above their ground floor level during the 2.5% event. This was undertaken using publicly-available streetview information, and the results of the assessment are noted in **Table 1** below. Note that the majority of existing residential properties scored a maximum vulnerability score of 5, while a small number scored only 2 points. This is due to the majority of homes either being low-set/slab-on-ground construction, or where elevated, the flood depth was so high that these homes would still be inundated.

Built Form Type	Number of Lots	Vulnerability Score Assigned (per lot)
Elevated above flood height	8	2
Not elevated above flood height	22	5
Vacant lots	22	5
Other – Minor inundation not affecting built form	12	0
Total lots:	64 lots	

Table 1 – A built form assessment of existing urban residential-zoned land was undertaken to identify the number of existing properties that would be inundated above ground floor level during the 2.5% flood event.

Those residential lots that were identified as vacant also still scored a maximum 5 points for vulnerability. Given the significant depth of the floodwaters (at least 3 – 4 metres) in the area of the vacant properties, it would have been difficult for a home to be approved on that lot given it would be improbable that a house could be reasonable designed to be compatible with the depth of floodwater on those sites. In practice, this may be an indication as to why these urban residential lots are still vacant.

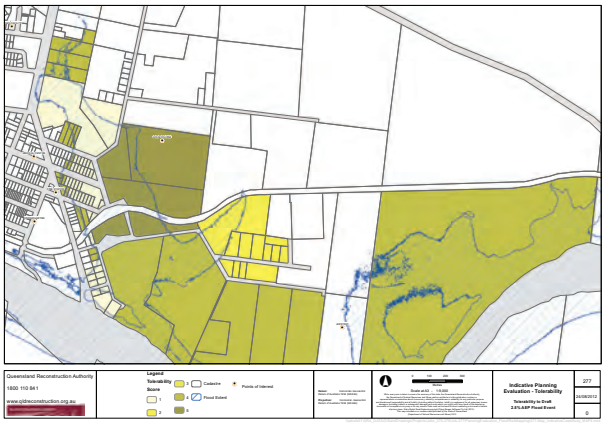
Also note that the vulnerability mapping includes some land (particularly the industrial area and parts of the airstrip land to the east) that was not actually inundated during the event. This is due to the criterion in the vulnerability scoring matrix related to isolation. During this event, the single road leading to this industrial area and the airstrip adjacent to it is cut, isolating this part of town from the balance of the urban area. The airstrip, given it is a highly vulnerable land use that should be operational during such events (particularly at a relatively high frequency of 2.5%), scored a maximum 5 points for vulnerability.



Map 3 – Vulnerability scorings identified per lot. Note that there are some lots (in the centre of the case study area) that were not exposed to the flood hazard, but are vulnerable to it nonetheless. This is due to the isolation to those lots caused by the event – the only road to these properties is cut during this event. Refer to larger map at end of Schedule 7 for more detail.

Determining Tolerability

Using the tolerability scoring matrix in **Schedule 5**, **Map 4** below was developed. Each lot in the subject area was scored for its level of tolerability to the flood hazard of the 2.5% AEP flood event.



Map 4 – Tolerability scorings per lot. Note the tolerability scores are higher for open space than residential areas. Refer to larger map at end of Schedule 7 for more detail.

The Community Awareness/Understanding criterion is a community-wide, rather than lot-specific consideration. For this criterion, it is not the intention to interview each resident on each lot, but to form a community-wide view of these matters that is then applied at the property level. The size or spatial area of a 'community' will be subjective – it should focus on a size that is representative of the persons likely to be affected by the flood hazard.

Therefore, given the historic experience of flood in this town, it was assumed that, the community' awareness and understanding of flood would be generally high. Notwithstanding, the 'Community Perception of Hazard' is an important consideration that is relative to the type of land use on the lot. The extent of flood hazard on some residential lots would be so great that it would be improbable that a community member would reasonably be able to tolerate the effects of that flood, such as the potential for impacts on personal safety and property. Therefore, residential lots where the flood hazard severity and the vulnerability to it were high were assigned a low tolerability score. In addition, the airstrip scored 0 points as it was not able to remain operational during the event (due to the isolation to the airstrip).

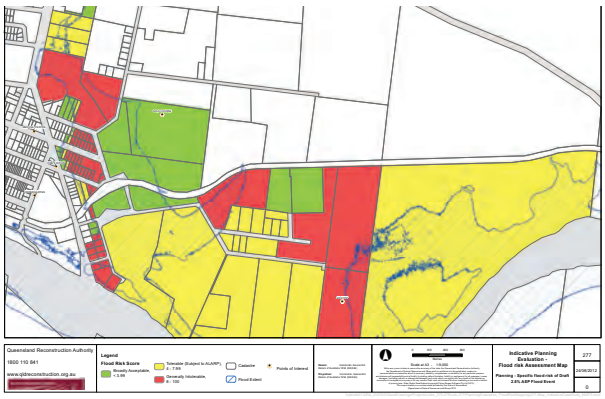
However, some residential lots where the flood hazard was not so severe that it had only minimal impact on the lot or its built form, and those lots with a non-sensitive land use such as open space and some industry were assigned high tolerability scores.

In practice, the tolerability criteria in the matrix can be used to 'weigh up' a community's tolerance of the flood hazard and therefore understand how or whether an overriding need to remain in or advance into the floodable area can be demonstrated. For example, as above a low score for 'Community Perception of Hazard' can be used where the severity of the flood is simply so great that the community affected cannot tolerate it or be resilient to it. 'Community Preparedness' can be used to rate the ability of a community to prepare for floods of certain types – i.e. if flash floods are being evaluated, the ability of individuals and businesses to be fully prepared for such an event is likely to be limited. The 'Emergency Management Procedures/Evacuation' criterion could be assigned a higher score where floods are slow, shallow and there is long warning time of the event. The key in undertaking a tolerability assessment is to assess all criteria, but the lowest score assigned must be the score chosen to identify Tolerability.

Notably, this town does not include any structural works that may protect the floodable part of town during such an event. This criterion in the tolerability matrix therefore was not used in this instance.

Flood risk mapping & initial analysis

Using the Likelihood x Consequence flood risk matrix in **Schedule 5**, the risk levels relative to the selected flood event and its consequences were translated into areas of generally intolerable, tolerable and broadly acceptable risk and mapped on **Map 5**. A breakdown of these risk levels relative to land use and area are noted in the table below.



Map 5 – Identified risk levels per lot. Note the main areas of generally intolerable risk are the residential properties in the west of the subject area, and the airstrip in the centre of the subject area. Refer to larger map at end of Schedule 7 for more detail.

Land Use Type	Risk Level	Number of Existing Lots	Total Lot Area within Risk Level	Inundated Area within Risk Level (approx.)	% of Total Lot Area Inundated	% of Land Use at Specific Risk level
Residential	Broadly Acceptable	9	2.03ha	0.40ha	20%	6.3%
	Tolerable	10	7.57ha	4.31ha	57%	23.5%
	Generally Intolerable	45	22.53ha	18.42ha	82%	70.2%
Community	Broadly Acceptable	0	N/A	N/A	N/A	N/A
	Tolerable	0	N/A	N/A	N/A	N/A
	Generally Intolerable	0	N/A	N/A	N/A	N/A
Commercial	Broadly Acceptable	0	N/A	N/A	N/A	N/A
	Tolerable	0	N/A	N/A	N/A	N/A
	Generally Intolerable	0	N/A	N/A	N/A	N/A
Industrial	Broadly Acceptable	2	4.35ha	0.13ha	3%	14%
	Tolerable	11	8.75ha	0.01ha	0.1%	28%
	Generally Intolerable	2	18.18ha	5.18ha	28%	58%
Open Space/Recreation	Broadly Acceptable	3	24.85ha	5.46ha	22%	100%
	Tolerable	0	N/A	N/A	N/A	N/A
	Generally Intolerable	0	N/A	N/A	N/A	N/A
Rural	Broadly Acceptable	3	14.76ha	8.73ha	59%	5.3%
	Tolerable	7	219.18ha	131.72ha	60%	79.2%
	Generally Intolerable	2	43.03ha	9.39ha	22%	15.5%
Totals						
	Total Lots Affected	Affected Area Per Risk Level	% of Affected Area			
Broadly Acceptable	17	14.72ha	8%			
Tolerable	28	136.04ha	74%			
Generally Intolerable	49	32.99ha	18%			

Table 2 – A breakdown of the number of lots, total lot area and area affected by the flood event relative to the assigned risk level per lot. Note that approximately 70% of residential land within the subject area has been identified at intolerable risk, while 100% of open space and recreation land (the local golf course) has been assigned a broadly acceptable risk. The levels of intolerable risk within the industrial and rural land use areas is due to the location of the airstrip on a combination of industrial and rural zoned land, rather than an actual use of the land for those purposes.

Naturally, the residential areas that are severely inundated during this 2.5% event are identified at intolerable risk, while the golf course further to the east is identified at generally acceptable risk. This is because the residential area presents a higher and therefore less tolerable risk than the nearby golf course. While the golf course may be severely inundated in parts, the risk to life, property and infrastructure is minimal in comparison to the residential area. Therefore, any flood risk treatment should focus principally on addressing the intolerable risk to the residential properties, with lesser focus on the risk to the golf course – even if the hazard to each is similar.

While not currently built upon, there are significant tracts of urban residential zoned land that are exposed to the flood hazard. A high level urban land supply analysis was undertaken to provide an initial understanding of the amount of land subject to flood hazard that could be developed based on the underlying zonings assigned to each lot, and the reconfiguration potential of those lots prescribed by the relevant planning scheme.

Land Use Type	Area affected by selected event (ha)	Number of existing lots	Number of potential future lots (as per planning scheme)
Residential	23.1267	64	~328 lots within inundated area (500m2 lots at 70% developable land)
Community	0	0	0
Commercial	0	0	0
Industrial	5.3224	4	~31 lots within inundated area (1000m2 at 60% developable land)
Open Space/ Recreation	5.4596	2	N/A
Rural	149.8426	12	N/A
Total	183.7513	82	
Other lots vulnerable but not inundated	25.3363	12	

Table 3 – This high-level urban land supply analysis demonstrates that the zonings within the planning scheme assigned to these lots could result in around an additional 328 urban residential lots in the flood hazard area. The planning scheme only provides minimal regulation for flood hazard.

The results of this analysis demonstrate that the current zoning of land, particularly residential land, presents a significant future risk, given that these areas are envisaged for future urban development. Areas that are currently vacant but zoned for urban residential development should be treated by reassessing the manner in which the planning scheme envisages that future development.

The existing location of the airstrip presents a significant risk also. While the operational components of the airstrip (such as the runway and the terminal) do not appear to be inundated during this event, the isolation caused by the only access road to the airstrip being cut during this relatively frequent event creates significant concern. This risk has been considered generally intolerable due to:

- the inability to access the airstrip during the flood event for evacuation purposes; and
- the inability for emergency services to use the airstrip as a base of operations to conduct emergency responses to outlying areas that may require such services during the event.

Flood risk prioritisation

No flood risk prioritisation relative to other suburbs or towns has been identified in this case study, given it relates only to one specific example of flood risk rather than multiple areas across a jurisdiction.

If a prioritisation was to occur, the information in Table 2 would provide a good basis to prioritise one area over another – for example, a comparison of % areas of intolerable risk, or % areas of residential land at intolerable risk may provide good metrics for prioritisation.

Risk treatment analysis

Please note this risk treatment analysis has been undertake for only one flood event. In practice, multiple events should be evaluated for risk and the treatment analysis undertaken with regard to all events. ***Refer to Section 3 – Implementation*** *for further information.*

Resilience Target

Based on the significant extent of intolerable flood risk identified through the process above, two resilience targets were set for this case study, as below:

1. Eliminate intolerable flood risk to all existing and future urban residential areas of the town; and
2. Treat the isolation risk created from the inundated road linkage between the airstrip and the balance of town.

Identification of options

Three land use responses (refer to **Section 3 – Implementation**) are relevant for consideration within the subject area. To achieve resilience target 1 above, the following land use responses could achieve that target:

1. Retreat from specific urban areas; and
2. Adapt existing urban areas.

The choice to evaluate either one or both of these land use responses should be made relative to the local circumstances – for example, due to the severity of flood and recent experience of it, there may be little tolerance to remain in the existing area, which then naturally mean a focus of investigation should be on how to retreat from that area. Conversely, if the severity of flood is not great, then investigating the options related to both land use responses would be of value to the community.

To achieve resilience target 2 above, the following land use response could achieve that target:

1. Treat risks to linkages and isolated places

The following options could achieve all three of these land use responses, to varying degrees and in varying combinations:

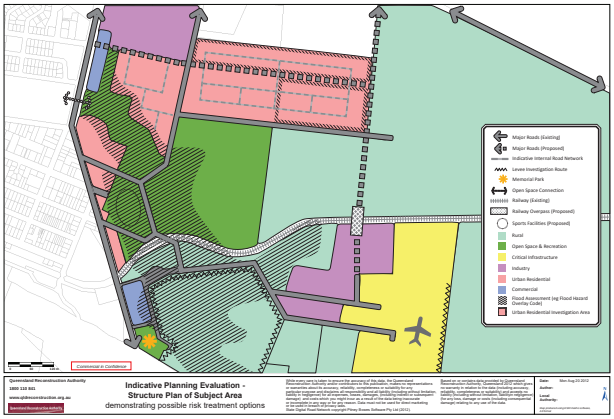
1. Planning scheme responses (zoning, overlays, development requirements, etc)
2. Non-scheme planning measures such as property buy-back, land-swap, relocation, resumption etc
3. Structural works such as levees
4. Building controls such as setting habitable floor levels
5. Emergency management plans and procedures
6. Community awareness programmes

A high level structure planning process was undertaken to help frame the options needed to achieve the resilience targets set for the subject area, and this process has been mapped on **Map 6**. Given the requirement in the resilience target to eliminate intolerable risk to residential properties, this structure plan process has been undertaken with reference to the back-zoning assessment criteria in **Schedule 6**. This process particularly investigates how the lots identified at generally intolerable risk (whether currently built upon or vacant) could be back-zoned and relocated to minimize the future possibility of that land being developed for urban (particularly residential) purposes. This approach generally accords with the land use responses of ***retreating from existing urban areas***.
The structure plan also illustrates options to treat the risk to the airstrip, which generally accords with the land use response to treat risks to linkages and isolated places.

The indicative structure plan also identifies levee investigation routes that are also relevant for consideration as an option to treat the identified flood risk.

Compare options & prepare suite of measures

The key indicative options are presented on **Map 6**, and focus principally on back-zoning and relocation of properties at intolerable risk and indicative levee investigation routes. The structure plan also identifies possible future land use patterns that complement the response to the flood risk. Therefore, options to treat the flood risk to the residential areas based on the land use response desired are likely to fall into two suites of options:



Map 6 – Indicative structure plan noting the various land use specific flood risk treatment option described below. Refer to larger map at end of Schedule 7 for more detail.

	Main Option	Supplementary Options
Option Suite 1 *Retreat from specific urban areas*	Back-zone existing properties and allocate additional flood free residential land, using a detailed structure planning process	A land-swap or purchase scheme to implement the transition to flood free land Infrastructure works to develop the new land Emergency management procedures Zoning changes to limit future development in back-zoned area
Option Suite 2 *Adapt existing urban areas*	Construction of a levee to treat the flood risk up to an acceptable level (such as the 1% AEP event + freeboard amount)	Zoning changes (such as limiting vulnerable land uses) to address residual risk left by levee Building controls to manage residual risk Emergency management procedures Community awareness of levee function and limitations

Options to address the flood risk to the airstrip are likely to fall into three suites of options, based on the available means of achieving the land use response to treat risks to linkages and isolated places:

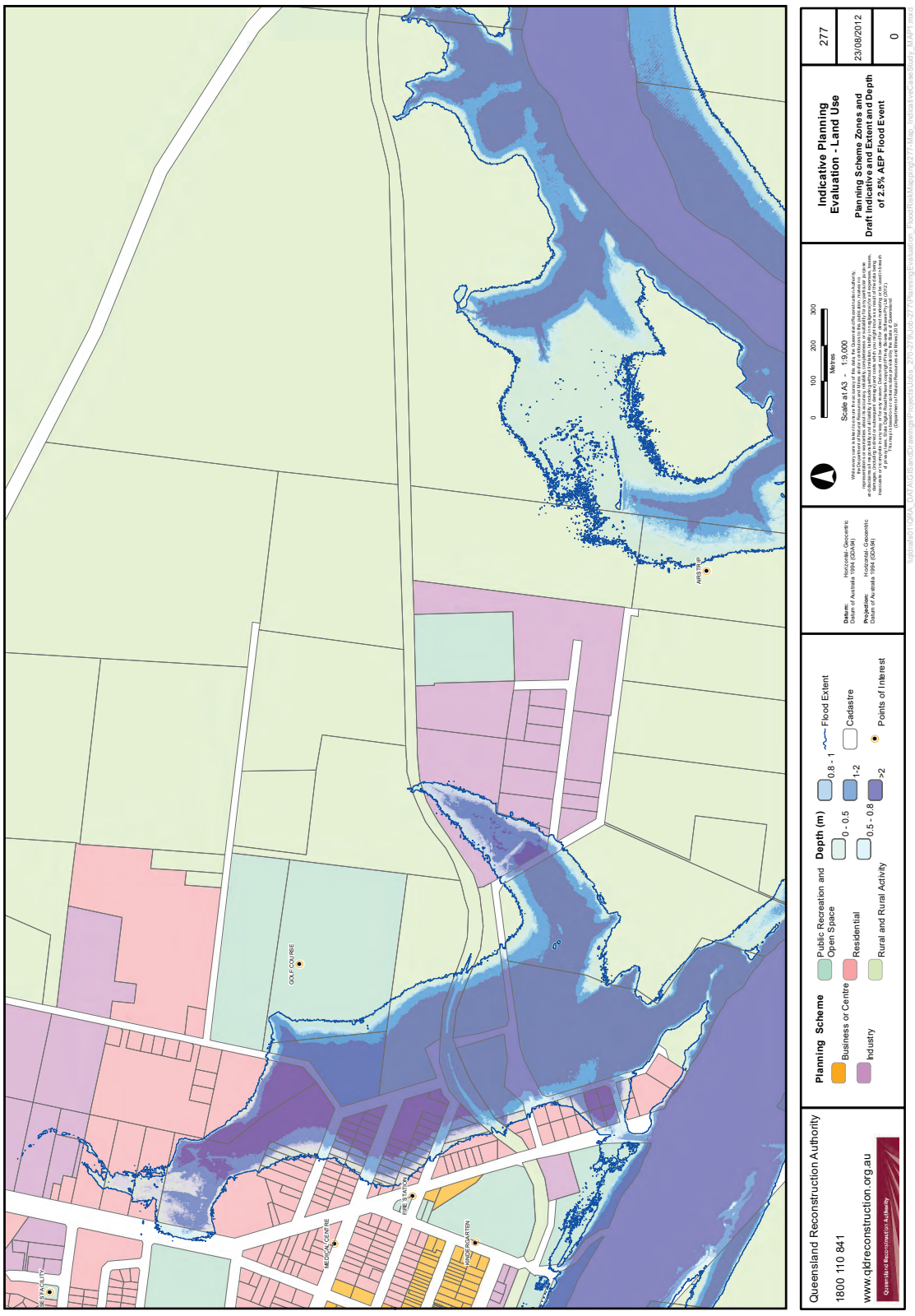
	Main Option	Supplementary Options
Option Suite 1 *Treat risk to linkages and isolated places*	Relocate the airstrip to a flood free location, where access to it cannot be cut by natural hazards (such as flood and bushfire)	Transition industrial land adjacent to old airstrip location over time to new airstrip location using zoning
Option Suite 2 *Treat risk to linkages and isolated places*	Construction of a levee to treat the flood risk up to an acceptable level (such as the 1% AEP event + freeboard amount)	Zoning changes (such as limiting vulnerable land uses) to address residual risk left by levee Building controls to manage residual risk Emergency management procedures, including airstrip operational procedures Community awareness of levee function and limitations
Option Suite 3 *Treat risk to linkages and isolated places*	Where inundation does not affect the actual operations of the airstrip during the event (and less frequent events such as the 1% AEP event), create a flood-free road access to the airstrip from the north.	Implement road access in conjunction with development of flood-free residential land created to address flood risk to existing residential properties to minimise cost & exploit common linkages Undertake minor flood mitigation works to minimise nuisance inundation of runway and other key operational points

These options suites should be assessed relative to each other in order to decide on an appropriate suite of measures that meet the resilience target, having regard to the benefits and limitation of each with regard to:

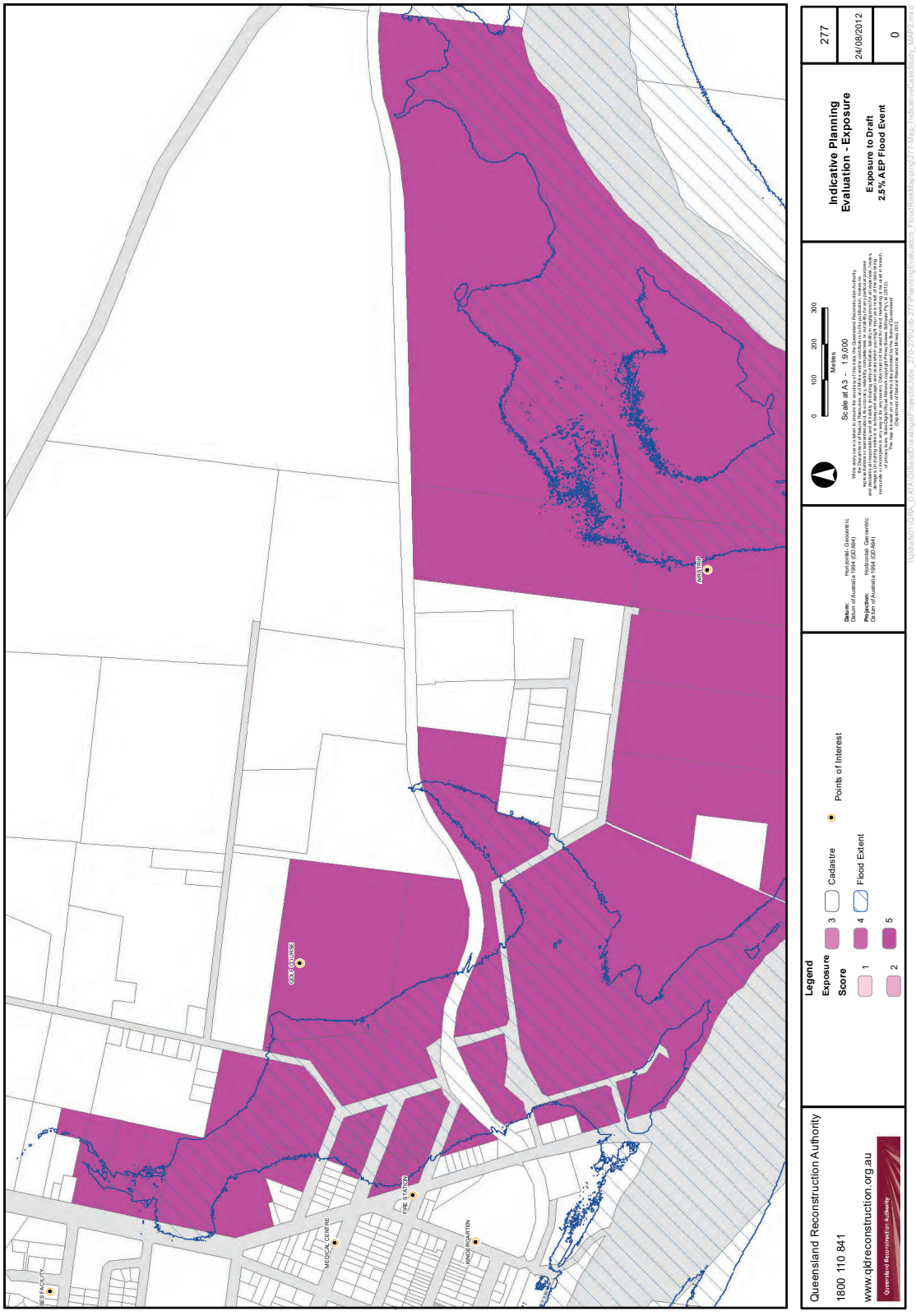
1. Flood mitigation/avoidance function
2. Cost/financial implications (including whole-of-life cycle costings)
3. Resourcing requirements
4. Community views
5. Social & environmental implications
6. Timing

Given the indicative nature of this case study and the large number of variables involved in assessing the options relative to the six points above, this analysis does not provide a definitive approach to assessing the options and deciding on the approach required to address the flood risk. However, the structure plan process provides a key way by which options can be identified and compared, when also supplemented by an assessment relative to the financial, operational, social and environmental implications noted above. Other key considerations such as improvements to the flood warning system, telecommunications, fuel supplies and infrastructure considerations (e.g water supply and sewerage) can be considered in the context of the land use options presented to treat the flood risk.

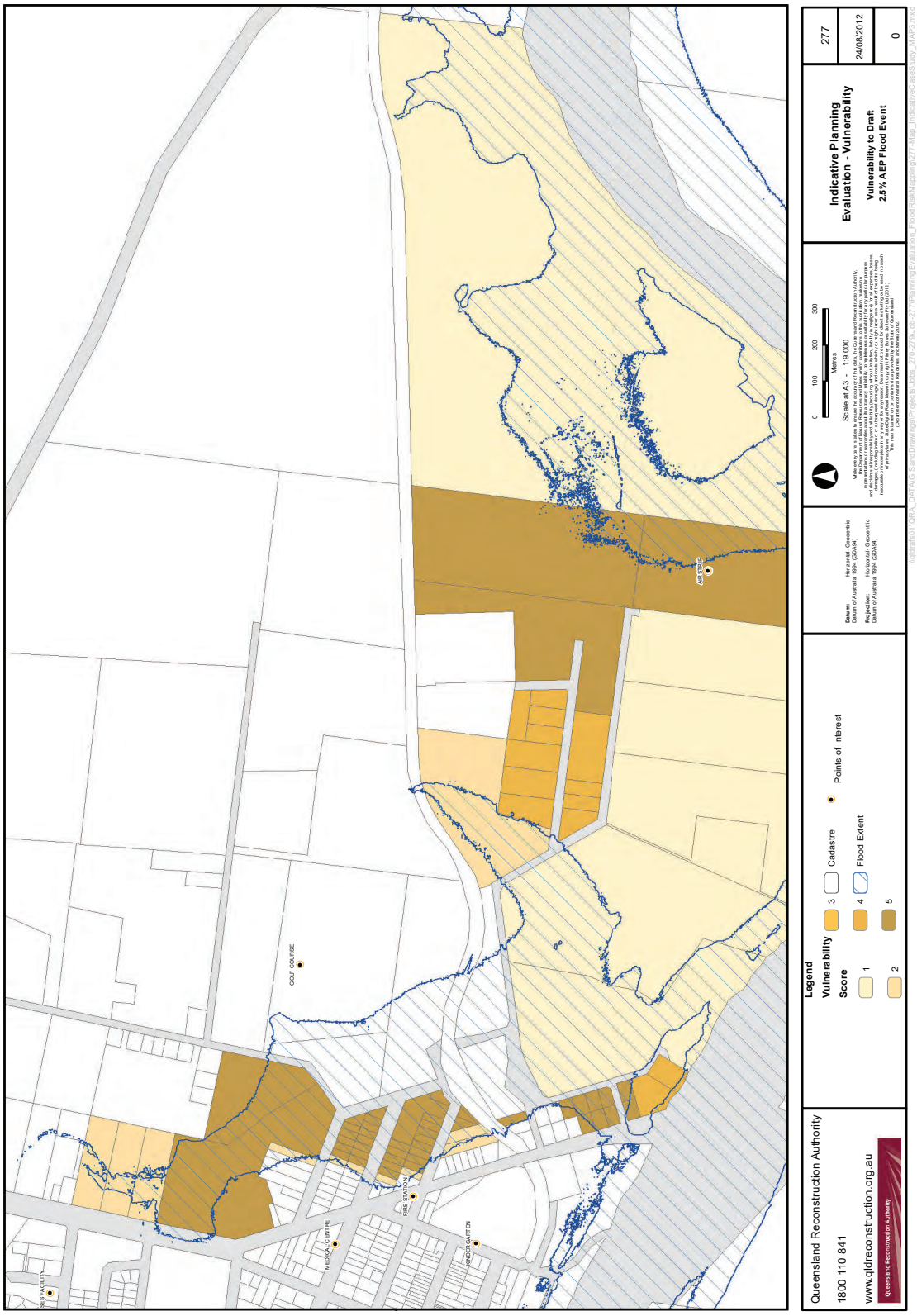
As noted above, the final suite of measures used to address the identified flood risk will likely be a suite of different measures that address different aspects of the flood risk, so that the resilience of the community to flood hazard can be improved over time.



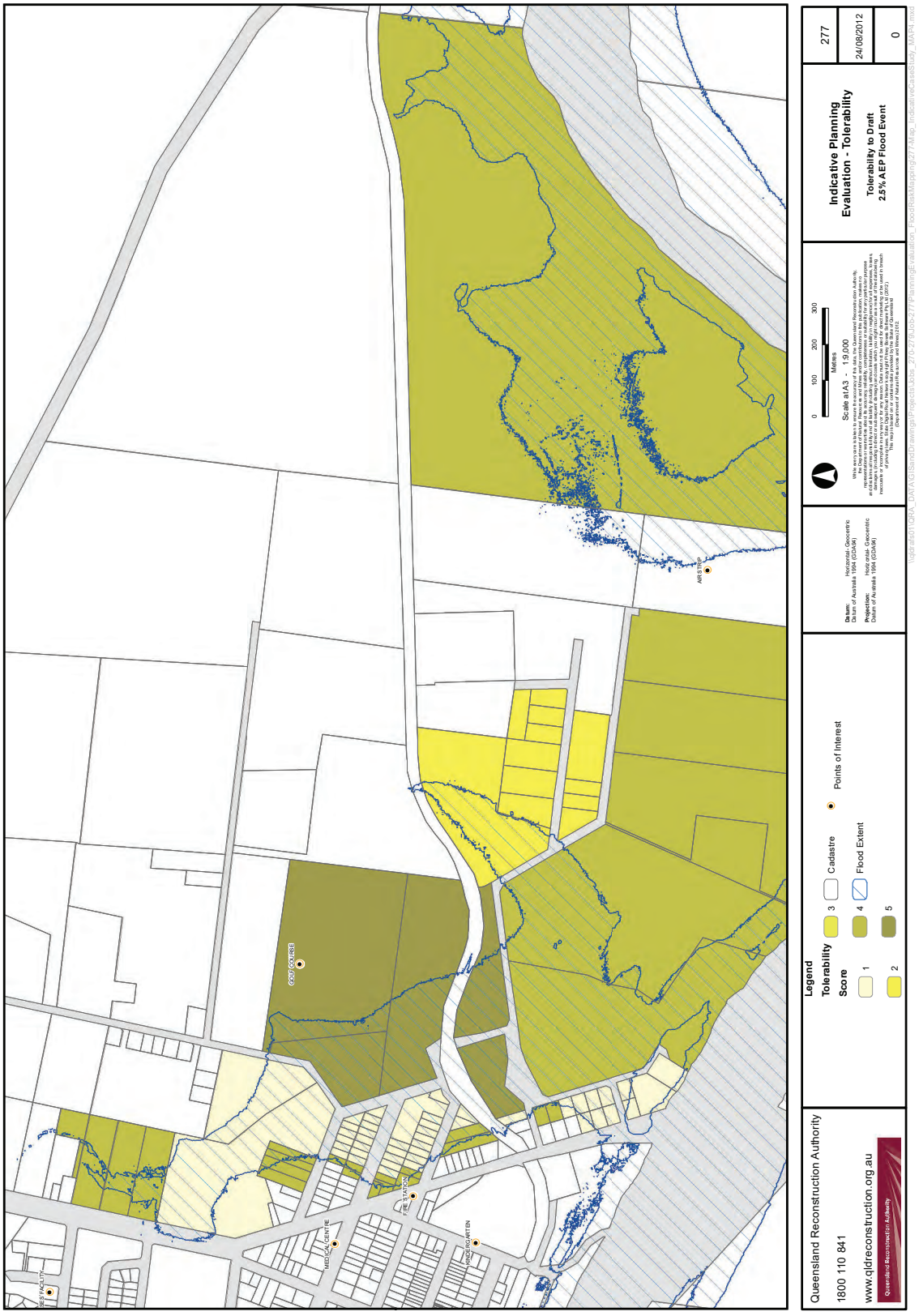
Map 1 – The subject area. Existing land use zonings for the town overlaid with the indicative 2.5% AEP flood event that recently affected the town.



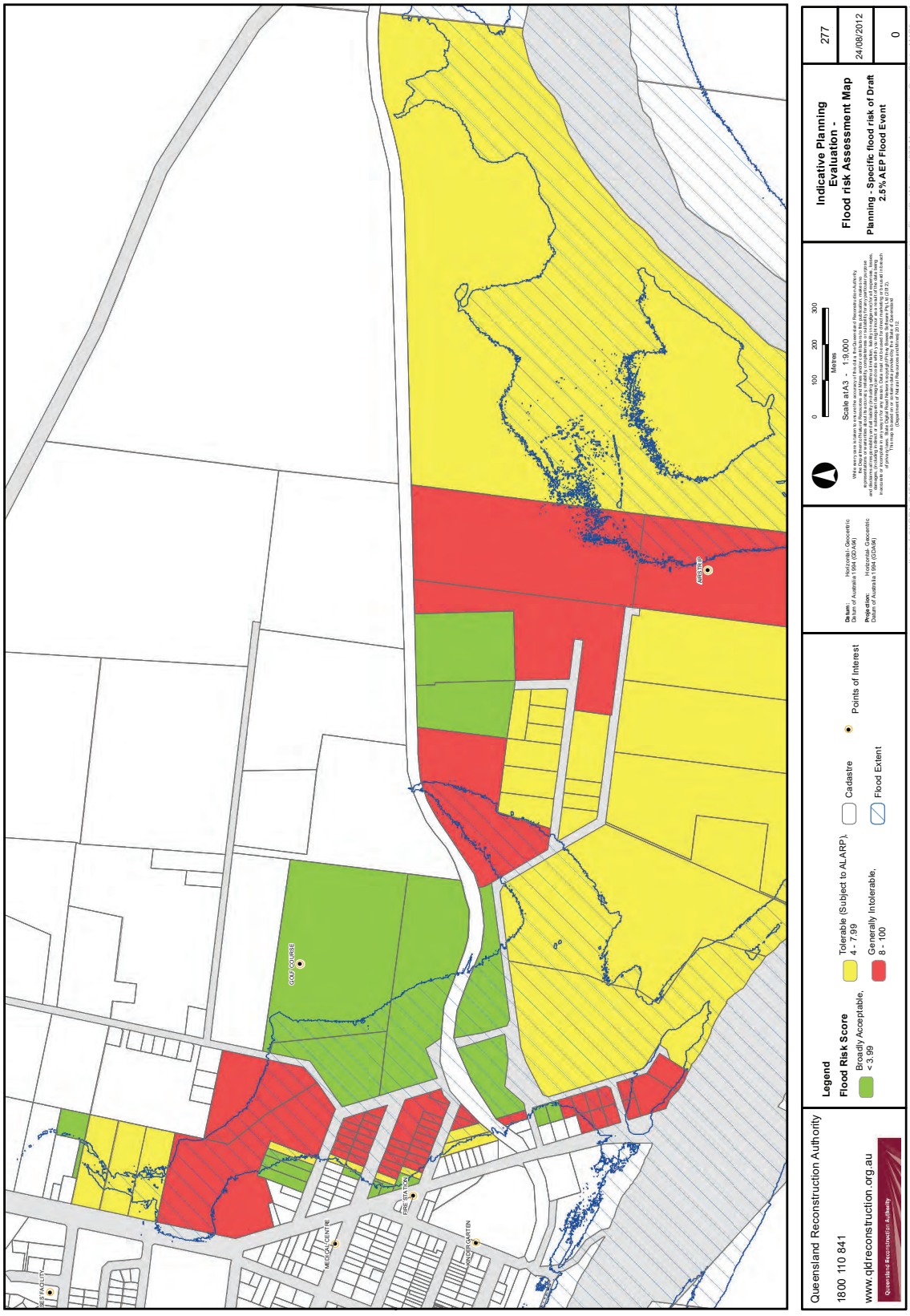
Map 2 – Exposure scorings identified per lot. Note that the exposure score is applied to the whole lot, even though the hazard may affect only a portion of the lot.



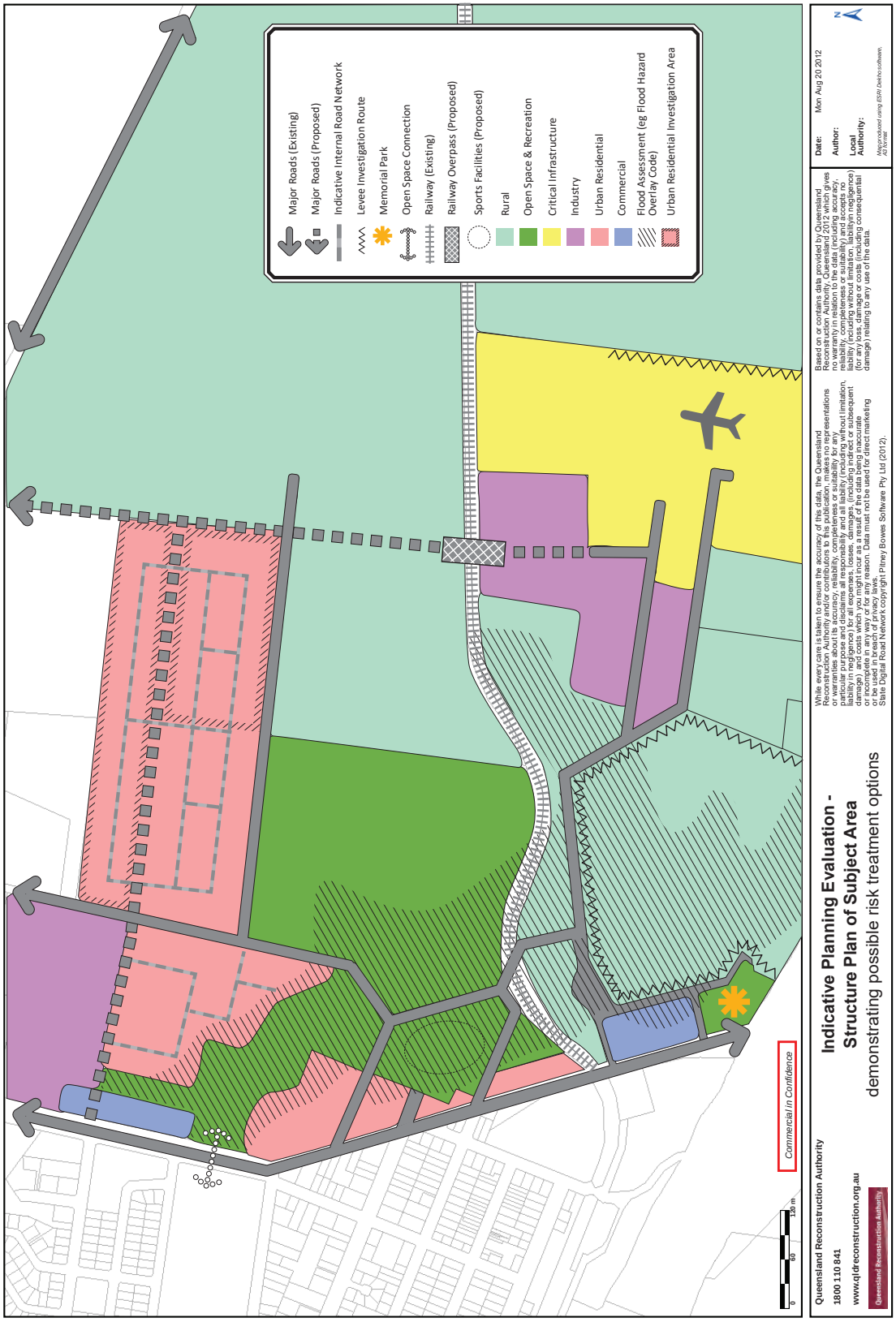
Map 3 – Vulnerability scorings identified per lot. Note that there are some lots (in the centre of the case study area) that were not exposed to the flood hazard, but are vulnerable to it nonetheless. This is due to the isolation to those lots caused by the event – the only road to these properties is cut during this event.



Map 4 – Tolerability scorings per lot. Note the tolerability scores are higher for open space than residential areas.



Map 5 – Identified risk levels per lot. Note the main areas of generally intolerable risk are the residential properties in the west of the subject area, and the airstrip in the centre of the subject area.



Map 6 – Indicative structure plan noting the various land use specific flood risk treatment options.

Schedule 8 – Example planning scheme provisions

Introduction

This Schedule provides example Queensland Planning Provision (QPP) compliant planning scheme provisions that deal with flooding for Councils to consider in the course of preparing their new planning scheme that reflect the land use responses set out in the implementation section of the Guideline. The example provisions below have been drafted in accordance with draft QPP version 3.0 and the *Sustainable Planning Act 2009*.

The examples below provide guidance on dealing with flooding through the:

1. Strategic Vision
2. Strategic Framework, via the Strategic Intent, Themes, Strategic Outcomes, Elements, Specific Outcomes and Land Use Strategies
3. Priority Infrastructure Plan
4. Zone Codes, via two key zone mechanisms, including the Limited Development (Constrained Land) Zone and the use of Precincts within other zones (such as the Residential Choice Zone)
5. Flood Hazard Overlay Code, via an enhanced version of the Model Code originally provided in the Part 1 Guideline.
6. Community Use Code
7. Planning Scheme Policy – Site Based Planning Evaluation

It is noted that the coloured text sections have been drafted by the Authority and represent an example application only. The examples represent some key components of the framework through which the treatment of flood can be demonstrated. Other parts of the QPP framework (such as the administrative provisions, and other provisions that do not relate to flood) must also still be included within the planning scheme.

Strategic Vision

The strategic vision is a non-mandatory component of the QPP which is extrinsic material to the planning scheme. The strategic vision is a narrative describing the aspirations of the community and should therefore incorporate a local governments long term goals for considering and managing flood hazard across a region. The strategic vision should also include a statement about the community's level of acceptance of flood risk. An example of how the considerations of the Guideline can be practically applied when drafting the strategic vision is found below.

Strategic Vision

It has been 20 years since I have been to <Insert location>.... I am happy to see that the community is aware and reminded of past floods by the bright flood markers on power poles and buildings as I walk through the streets... It looks like people have also accepted the frequent flooding because 20 years ago this place was full of slab on ground but now all I can see is Queenslanders... I've noticed a new development up on the hill which won't get wet any time soon... The residential places I remember flooding are now parklands that run along the river.

Strategic Framework

The strategic framework sets the policy direction and future development intent for the planning scheme area. In areas where flooding is identified as a matter of concern for a local government area, it is crucial that the below questions are considered when drafting a strategic framework and other planning scheme provisions. It is noted that the below information supports the land use transition strategies outlined in the Guideline.

Does the strategic framework:

1. represent a picture of the future development of the planning scheme area that reflects the land use transition strategies adopted by council in response to flood risk? ☑
2. incorporate the community's general broad attitude to, and acceptance of, flood risk? ☑
3. depict how the community has responded to the risk over time, including demonstrating any built form changes? ☑
4. provide strategic advice about the placement of critical infrastructure for example hospitals, evacuation centre, major electrical infrastructure and roads to ensure greater resilience of infrastructure networks in the future, particularly during natural disasters? ☑
5. if there are existing areas where Council has determined it necessary to retreat because of intolerable risk, reflect this through broad statements about limiting future development of these areas? ☑
6. outline the need for new broad hectare development to respond to flood hazard by avoiding areas at risk? ☑
7. if there are areas where Council has determined that the flood risk is tolerable or acceptable, reflect this as a future outcome through considered appropriateness of vulnerable land uses and built form responses, such as elevation and resilient materials? ☑
8. if built form responses are required in order to treat flood risk, does the strategic framework provide comment on maintaining compatibility with the existing character and identity of the planning scheme area? ☑
9. provide direction on intended density increases or decreases in certain areas in response to adopted land use transition strategies? ☑
10. have regard to maintaining the natural environment as far as practicable in new development to minimise or avoid the worsening of flood impact? ☑
11. reflect relevant regional planning policy and programs, particularly in relation to natural hazards? ☑

An example of how the considerations of the Guideline can be practically applied by a Council when drafting the strategic framework for their new planning scheme is provided below.

Part 3 Strategic framework

Editor's note – Section 3.1 – Preliminary has been removed for the purposes of these examples.

3.2 Strategic intent

Parts of <insert area> are subject to the natural hazards of flood, bushfire and landslide. The community's improved resilience to these hazards has developed from a good understanding of the hazards and the risks they present. While the flood risk for areas <insert> and <insert> has been identified as tolerable, built form outcomes and limiting vulnerable uses will further improve the resilience to the hazard. The lower-lying residential areas of <insert> at intolerable risk of flood (a total of <xx> lots) have transitioned to open space and public recreation

uses during the life of the planning scheme. All new broad hectare development occurs in areas of no or low flood hazard, thereby minimising risk to these future communities. Environmental management, open space and recreation, and water oriented development characterise all those future urban/undeveloped urban areas that are subject to medium and high flood hazard. Land uses and activities in the rural parts of the region respect and respond to the flood hazard.

3.3 Settlement pattern

3.3.1 Strategic outcome

The shape of the city/region evolves to respond to the natural hazards affecting it, including bushfire, landside and flooding <insert others as required> by ensuring that the location and intensity of development does not place people, property and infrastructure at intolerable risk of the hazard. The zoning plan in this planning scheme has been prepared with consideration to the risks posed by natural hazards.

3.3.2 Element - Broad hectare development

3.3.2.1 Specific outcome

Development on broad hectare land that includes areas of medium or high flood hazard avoids development of these hazard areas for urban purposes.

Broad hectare developments ensure the new urban form (including layout, built form and transport/communications linkages) is accessible and permeable in order to not isolate settlements from adjacent flood free urban areas in the event of a flood and supports the functioning of emergency services and evacuation response/procedures.

3.3.2.2 Land use strategy

Land that is identified as ‘new urban area’ or ‘future urban area’ on Strategic Plan Map X and X does not include areas of medium and high flood hazard.

3.3.3 Element - Infill development

3.3.3.1 Specific outcome

Infill development is promoted in locations with tolerable or acceptable natural hazard risk, and avoided where the type of infill development is incompatible with the hazard. Compatible development in these locations also employs necessary built form outcomes to further minimise risk and ensure greater resilience to flooding impacts.

3.3.3.2 Land use strategy

Land within the existing urban area that has development constraints due to intolerable risk of flood hazard is zoned as Limited Development (constrained land).

Land at tolerable risk of flood hazard is identified through flood constrained precincts within the relevant zones.

3.4 Safe communities

3.4.1 Strategic outcome

Development is compatible with, and responsive to, the known risk to life, property and infrastructure of natural hazard (including bushfire, landslide and flooding) affecting the site.

3.4.2 Element - Natural hazards

3.4.2.1 Specific outcome

Land use that is compatible with the natural hazards affecting it also employs resilient built form measures to further minimise the risk.

Residential dwellings improve their response to potential flood impacts by elevating habitable floor levels above a flood level <if no flood level then above a certain height> and adopting the resilient built form of the Queenslander style house.

3.4.2.2 Land use strategy

Further studies to identify the nature and extent of natural hazards affecting the local government area will be undertaken, particularly in Location X and Location Y. Further planning evaluation o to identify the level of risk and the possible land use responses to those hazards will be undertaken.

3.5 Infrastructure and services

3.5.1 Strategic outcome

Infrastructure provision [and decommissioning (if proposed)] programs have regard to the risk of natural hazards that the local government area is subject to by matching trunk infrastructure requirements to changes in settlement pattern and land use transitions occurring in response to the risk of hazard.

3.5.2 Element - Infrastructure planning and provision

3.5.2.1 Specific outcome

Infrastructure planning identifies any flood mitigation works proposed to mitigate risk of flood hazard as well as the decommissioning of infrastructure for those areas transitioning from urban uses to low impact uses (such as open space and outdoor recreational uses) in response to intolerable flood risk.

The planning and provision of infrastructure caters for the efficient and continued operation of critical community infrastructure and services, such as hospitals, evacuation centres and emergency services, during natural hazard events.

3.5.2.2 Land use strategy

Decommissioning of trunk infrastructure provision will occur in <Location X> and <Location Y> due to land use transition occurring in the area in response to intolerable flood risk.

Priority Infrastructure Plan

The priority infrastructure plan (PIP) identifies and describes the intentions for the provision of trunk infrastructure within the local government area. The PIP particularly identifies the:

1. Planning assumptions (type, scale location and timing of development) and growth estimates used in undertaking the planning of trunk infrastructure networks;
2. Geographic area within the LGA where local government will give priority to provide infrastructure to service development (the priority infrastructure area (PIA));
3. Desired standards of service to which the trunk infrastructure will be supplied; and
4. Plans for trunk infrastructure and schedules of work, including the network routes, systems and components of that infrastructure.

The QPP and Statutory Guideline 01/11 – Priority Infrastructure Plans set the above framework for PIPs, and the example provisions following reflect that template.

Part 4 Priority infrastructure plan

Editor's note – Section 4.1 – Preliminary, Section 4.2 Planning Assumptions and the sub-sections within all sections identified below have been removed for the purposes of these examples.

4.3 Priority infrastructure area

Infrastructure provision in natural hazard areas should be viewed in a two-fold manner:

1. Land use decisions and the provision of trunk infrastructure need to be tightly coordinated, bearing in mind the decision to allocate land for particular use(s) will naturally result in obligations to provide appropriate infrastructure, including the costs associated with repairing and maintaining that infrastructure in the face of natural hazards; and
2. Where a planning evaluation of the impact of a natural hazard (such as flood) identifies that the risk to an existing area is intolerable, along with a retreat of inappropriate land use out of the area, the planned decommissioning of infrastructure in this location may be required.

The PIP and PIA respectively should therefore account for both scenarios; it should identify all existing infrastructure that require augmentation (such that may be required through infill/densification), and those areas that will accommodate urban growth during the life of the planning scheme.

Equally, where a land use retreat strategy has been enacted in a certain location (such as through back-zoning, land-swap arrangements or other programs), and this strategy is intended to be enacted during the life of the planning scheme, the PIP can identify that the areas that will be subject to infrastructure decommissioning and exclude them from the PIA.

4.4 Desired standards of service

As the desired standards of service contained within a PIP are an indication of the preferred standard of performance for infrastructure rather than a prescriptive requirement, there is an opportunity to ensure that these desired standards are calibrated to the land use intentions for specific areas.

For example, as parks are a reasonable use to expect in floodable areas (and indeed may be the most appropriate use for such land given the characteristics of flooding in that location) it is desirable to ensure any standards of service reflect that intention. Therefore, while setting a basic level of flood immunity for parks (such as 1% AEP) generally is appropriate, there may be instances where parks are used to buffer floodable areas from other urban uses, and the standards can be drafted to reflect that reality.

4.5 Plans for trunk infrastructure

Plans for trunk infrastructure within the PIP provide details on existing and future trunk infrastructure and their catchments planned within the PIA.

These plans should include details of areas and infrastructure proposed to be decommissioned. Decommissioning of infrastructure will be a natural consequence of the decision to retreat from existing areas of settlement, and so providing clear plans on where, when and how decommissioning of existing infrastructure in areas of intolerable risk will occur provides clarity to the community and other stakeholders.

It is intended that section 4.5 of a PIP also include information regarding the plans for trunk infrastructure and schedule of works. For the provision of infrastructure, assumed time of completion relative to development, estimated costs and service catchments can all be provided in this section.

For infrastructure to be decommissioned, similar information should be provided. For example, timeframes for decommissioning that accord with the retreat program should be provided, while costs to remove and the service areas affected by the decommissioning are also important.

In terms of infrastructure works required to mitigate against natural hazards (such as flood levees, detention basins, or other waterway works), while they might not always be termed 'trunk infrastructure', these mitigation works are infrastructure regardless and do greatly affect decision making regarding land use pattern evolution and development intent for the local government area.

Including details of such planned works within a planning scheme is beneficial. It provides clarity to the community and other stakeholders regarding the commitment to address natural hazards in areas where a decision has been made to maintain a settlement in a particular location, notwithstanding the risk to which the area may be subject. It also clarifies the role mitigation works are intended to play in the achievement of the settlement pattern envisaged by the strategic framework of the planning scheme in the face of natural hazard events.

Zones

Based on the intentions outlined in the strategic framework, zones provide a more targeted delivery mechanism for the desired future outcomes for a local government area through clear and thought-out land use zoning plans. Zonings are the appropriate place to clearly articulate the land use intent desired for areas subject to that zone.

Zonings have associated levels of assessment which can be calibrated against the vision to ensure that desired development is not required to undergo unnecessary assessment and approval processes. Moreover, this means that any development not desired in the area can be subject to impact assessment. Zonings and their associated levels of assessment can therefore be considered as a highly effective statutory mechanism for ensuring development occurs in line with the vision of the community. Essentially, zones deal with land use appropriateness and include assessment criteria to support the desired land use envisaged through the zoning.

In light of this, the importance of effective and well thought out zoning in a planning scheme and how this can be applied to treat flood risk is paramount.

Under the QPP framework Councils have the opportunity to select zonings from a suite of options. Zones are able to include precincts which provide further guidance about the desired development in that area. In other words, precincts may be used to identify areas that require a considered land use/design response over the general assessment criteria of the zone itself.

To assist Councils in utilising the QPP framework to effectively regulate development in relation to flooding, two examples of zones (including precincts) that respond to flood risk in different ways are provided below. Councils may wish to consider the use of precincts for other zones (such as mixed use or commercial precincts) used in the planning scheme with regard to flood risk in those areas.

Part 5 Tables of assessment

Editor's note – Sections 5.1 – Preliminary to Section 5.4 Prescribed Levels of Assessment have been removed for the purposes of these examples.

5.5 Levels of assessment–Material Change of Use

The following tables identify the levels of assessment for development in a zone associated with a material change of use.

Table 5.5.1–Limited development (constrained land) zone

Use*	Level of assessment*	Assessment criteria*
Aquaculture	Code assessment	Limited development (constrained land) Zone code Other codes if applicable*
Cropping	Exempt	
Landing	Code assessment	Limited development (constrained land) Zone code Other codes if applicable*

Market (if temporary)	Exempt	Limited development (constrained land) Zone code Other codes if applicable*
Outdoor sport and recreation	Code assessment	Limited development (constrained land) Zone code Other codes if applicable*
Park	Exempt	Limited development (constrained land) Zone code Other codes if applicable*
Permanent plantation	Exempt	Limited development (constrained land) Zone code Other codes if applicable*
Marine industry	Code assessment	Limited development (constrained land) Zone code Other codes if applicable*
Impact assessment		
Any other use not listed in this table. Any other undefined use.		The planning scheme.

*For further consideration by Council dependent on local context.

Table 5.5.2– Residential choice zone

Use*	Level of assessment*	Assessment criteria*
Dwelling house	Self assessment	Residential choice Zone code Other codes if applicable*
Dwelling unit	Code assessment	Residential choice Zone code Other codes if applicable*
Dual occupancy	Self assessment	Residential choice Zone code Other codes if applicable*
Food and drink outlet	Self assessment	Residential choice Zone code Other codes if applicable*
Home based business	Self assessment	Residential choice Zone code Other codes if applicable*
Market	Exempt	
Multiple dwelling	Code assessment	Residential choice Zone code Other codes if applicable*
Park	Exempt	
Place of worship	Code assessment	Residential choice Zone code Other codes if applicable*
Sales office	Exempt	
Impact assessment		
Any other use within the Residential choice (flood constrained precinct) Zone		The planning scheme.

Any other use not listed in this table. Any other undefined use.	

*For further consideration by Council dependent on local context.

Editor's note – the default level of assessment is impact unless otherwise prescribed within the Act or the Regulation.

Editor's note – Section 5.6 – Levels of assessment - Local plans has been removed for the purposes of these examples.

5.7 Levels of assessment–Reconfiguring a lot

The following table identifies the levels of assessment for reconfiguring a lot.

Table 5.7.1–Reconfiguring a lot

Zone	Level of assessment	Assessment criteria
Limited development (constrained land) zone	Impact assessment	The planning scheme
Residential choice zone	Impact assessment If in flood constrained precinct and involving subdivision of land Code assessable otherwise	The planning scheme

Editor's note*** – the default level of assessment is impact unless otherwise prescribed within the Act or the Regulation.

5.8 Levels of assessment–Building work

There is no building work regulated under the planning scheme.

5.9 Levels of assessment–Operational work

The following table identified the levels of assessment for operational work.

Table 5.9.1 – Operational work

Zone	Level of assessment	Assessment criteria
Limited development (constrained land) zone	Code assessment	
	If associated with a material change of use or reconfiguring a lot.	Operational work code Reconfiguring a lot code Limited Development (Constrained Land) Zone Code Other codes if applicable*
	If involving filling or excavation.	Operational work code Limited Development (Constrained Land) Zone Code Other codes if applicable*
Residential choice zone, where located within the flood constrained precinct	If associated with a material change of use or reconfiguring a lot.	Operational work code Reconfiguring a lot code Residential Choice Zone Code Other codes if applicable*

	If involving filling or excavation.	Operational work code Residential Choice Zone Code Other codes if applicable*
Exempt		
Any other operational work not listed in this table.		

Editor's note – ***the default level of assessment is exempt unless otherwise prescribed within the Act or the Regulation.

5.10 Levels of assessment – Overlays

The following table identifies where an overlay changes the level of assessment from that stated in a zone or local plan and the relevant assessment criteria.

Table 5.10.1 – Assessment criteria for overlays

Development	Level of assessment	Assessment criteria
Flood Hazard Overlay		
All development, except Operational work for filling and excavation	As prescribed by zone code(s)	Flood Hazard Overlay Code
Operational work for filling and excavation	Code assessment	Flood Hazard Overlay Code

Part 6 Zones

Editor's note – Section 6.1 – Preliminary has been removed for the purposes of these examples.

6.2 Zone codes

6.2.1 Limited development (constrained land) zone code

6.2.1.1 Application

This code applies to assessing material change of use, reconfiguring a lot and operational work for development in the limited development (constrained land) zone.

Editor's note – These are example flood assessment criteria intended for inclusion in the zone codes. Other land use matters to be addressed in zone codes have not been included here.

6.2.1.2 Purpose for Limited development (constrained land) zone

(1) The purpose of the limited development (constrained land) zone code is to identify land known to be significantly affected by one or more development constraints (such as past or future mining activities, flooding, land contamination, defence requirements, historical subdivisions and buffer areas). Such constraints pose severe restrictions on the ability of the land to be developed for urban purposes.

(2) The local government purpose of the zone code is to:
   a. Limit future development that may increase risk to life or property to intolerable levels.
   b. Promote the transition of existing uses at intolerable risk of hazard (including flood) away from the hazard, and promote development that is generally non-urban and of low scale and intensity within the zone.

(3) The purpose of the code will be achieved through the following overall outcomes:
   a. The limited development potential of land restricts the type, scale and intensity of land uses that are appropriate.

b. Residential uses are not located in this zone and acceptable land uses are aquaculture, cropping, landing, market (if temporary), outdoor sport and recreation, park, permanent plantations and marine industry.
c. The transition of existing land uses that are incompatible with the high (flood) hazard is facilitated.
d. Where generally non-urban development is proposed it is of a low intensity and scale and must be compatible with the flooding constraints of the land.
e. Existing uses may remain however no increases in scale or density of these uses are intended.
f. No additional lots are created and amalgamation of lots is encouraged to facilitate non-urban use.

6.2.1.3 Assessment criteria

Criteria for self-assessable, compliance assessable and assessable development

Performance outcomes	Acceptable outcomes
For self assessable and assessable development	
PO1 Development for urban purposes (including increases to scale and intensity of existing urban uses) is avoided and non-urban development is compatible with the hazard. [1]	AO1.1 There is no increase in the number of people living on site. AO1.2 Additional lots are not created. *Note – residential uses are not appropriate for this zone.*
PO2 Development that does not increase the risk to life or property is compatible with the natural landscape values and character of the locality.	AO2.1 Riparian/waterway corridors and other areas of environmental significance (e.g. stands of vegetation) on site are protected.

6.2.2 Residential choice zone

6.2.2.1 Application

This code applies to assessing material change of use, reconfiguring a lot and operational work for development in the residential choice zone.

6.2.2.2 Purpose for Residential choice zone

(1) The purpose of the residential choice zone code is to provide for a range and mix of dwelling types including dwelling houses and multiple dwellings supported by community uses and small-scale services and facilities that cater for local residents.
(2) The local government purpose of the code is to:
    a. Ensure development within the zone is compatible with the natural hazards affecting properties within this zone.
(3) The purpose of the code will be achieved through the following overall outcomes:
    b. Development provides a range of residential dwelling choices including multiple dwellings and other residential development and short-term accommodation for visitors in locations clustered around or near centres and transport nodes.
    c. Development encourages and facilitates urban consolidation and the efficient use of physical and social infrastructure.

[1] A site based planning evaluation may be required in order to demonstrate compliance with this performance outcome in accordance with Planning Scheme Policy X

d. Non-residential uses that provide for the everyday needs of the residential community are facilitated.
e. Development is supported by employment nodes, community facilities and services, transport and commercial hubs where appropriate.
f. Development provides for an efficient land use pattern that is well connected to other parts of the local government area.
g. Development is designed to provide safe and walkable neighbourhoods.
h. Development facilitates other non-residential uses that integrate work and family and complement local residential amenity.
i. Development is designed to incorporate sustainable practices including maximising energy efficiency, water conservation and public/active transport use.
j. Development is supported by transport infrastructure which is designed to provide and promote safe and efficient public transport use, walking and cycling.
k. Development provides a high level of amenity and is reflective of the surrounding character of the area.
l. Development maintains a high level of residential amenity having regard to traffic, noise, dust, odour, lighting and other locally specific impacts.
m. The scale and density of development facilitates an efficient land use pattern that supports walkable neighbourhoods that are well connected to employment nodes, centres, open space and recreational areas, community services and educational opportunities.
n. Non-residential uses may be supported where such uses directly support the day to day needs of the immediate residential community, do not detract from the residential amenity of the area and do not undermine the viability of nearby centres.
o. Development responds to land constraints, including but not limited to topography, bushfire and flooding constraints.
p. Development mitigates any adverse impacts on adjoining areas of environmental significance, including creeks, gullies, waterways, wetlands, coastal areas, habitats, vegetation and bushland through location, design, operation and management.
q. Flood constrained precinct:
    i. land uses that include persons that are vulnerable to flood hazard are not located in the flood constrained precinct, including child care centre, community care centre, community residence, educational establishment, emergency services, relocatable home park, residential care facility, retirement facility and tourist park.
    ii. Additional lots are not created in the flood constrained precinct.
    iii. Built form responds to the flood hazard and is compatible with the existing character of the locality.

6.2.2.3 Assessment criteria

Criteria for self-assessable, compliance assessable and assessable development

Performance outcomes	Acceptable outcomes
For self assessable and assessable development	
Flood constrained precinct	
PO1 Uses that include persons who would be vulnerable to flood hazard are not located in the precinct. [2]	AO1.1 The number of vulnerable persons living and working in the precinct is not increased.

[2] A site based planning evaluation may be required in order to demonstrate compliance with this performance outcome in accordance with Planning Scheme Policy X

PO2 Land uses that do not include vulnerable persons are otherwise compatible with the level of flood hazard identified for the site.[2]	AO2.1 No acceptable outcome *Note – The flood hazard overlay code provides acceptable outcomes for acceptable built form in flood hazard areas.*
PO3 Development is resilient to flood events by ensuring design and built form account for the potential risks of flooding and is compatible with the predominant residential character of the area.	AO3.1 No acceptable outcome *Note - The desired built form character is prescribed by PO XX* in the general section of the residential choice zone code.* *Note – The flood hazard overlay code provides acceptable outcomes for acceptable built form in flood hazard areas.*

* Cross reference to general section of residential choice zone code dealing with character.

Flood hazard overlay

Within the QPP framework, Councils have the ability to utilise overlays to further regulate the type of development that occurs within a particular area, i.e. the flood affected land within a planning scheme area.

Overlays are an effective tool as they allow for, in relation to flood hazard, an additional set of assessment criteria to apply to assessable development to ensure greater control of built form outcomes. Overlays act as a trigger, meaning that an application for self-assessable or assessable development on land within an overlay area will trigger an additional set of assessment criteria.

Overlays should focus on site based, built form outcomes as opposed to matters of land use appropriateness (which are dealt with through zones).

While an overlay may change the level of assessment, it is recommended that Council ensure that the levels of assessment allocated in the tables for zones and local plans represent the desired outcomes which then eliminates the need to duplicate the levels of assessment in the overlay code.

The below provides an example of a Flood Hazard Overlay as permitted under the QPP framework to complement efficient land use planning by ensuring Councils can further consider development outcomes (particularly built form outcomes) within flood affected areas. The use of the Flood Hazard Overlay in new schemes provides an effective tool that supports the land use transition strategies identified in the Guideline.

Part 8 Overlays

Editor's note – Section 8.1 – Preliminary has been removed for the purposes of these examples.

8.2 Overlay codes

8.2.1 Flood Hazard Overlay Code

8.2.1.1 Application

This Code is an applicable code for self-assessable and assessable development prescribed by a level of assessment table in the planning scheme and involving land wholly or partially within the Flood Hazard Overlay as shown on **<insert overlay map title and no.>**

The Code must be considered together with other relevant planning scheme codes that are applicable to the subject development.

8.2.1.2 Purpose

(1) The purpose of the code is to manage development outcomes in the floodplain so that risk to life, property, community and the environment during future flood events is minimised, and to ensure that development does not increase the potential for flood damage on site or to other property.

(2) The purpose of the code will be achieved through the following overall outcomes:

a. Development maintains the safety of people on the development site from flood events and minimises the potential damage from flooding to property.

b. Development does not result in adverse impacts on people's safety, the environment or the capacity to use land within the floodplain.

8.2.1.3 Assessment Criteria

Criteria for assessable and self assessable development

Performance outcomes	Acceptable outcomes
PO1. Development siting and layout responds to flooding potential and maintains personal safety at all times.[3]	**For Material Change of Use** **AO1.1.** New buildings are: • not located within the overlay area, or; • located on the highest part of the site to minimise entrance of floodwaters; or • designed with elevated habitable floor levels[4]; and • provided with clear and direct pedestrian and vehicle evacuation routes off the site.[5] *Note: If part of the site is outside the Flood Hazard Overlay area, this is the preferred location for all buildings.* **For Reconfiguring a Lot** **AO1.2.** Additional lots: • are not located in the flood hazard overlay area; or • are demonstrated to be above the flood level[7] identified for the site; or • where no flood level is adopted, located on the highest part of the site to minimise entrance of floodwaters *Note: If part of the site is outside the Flood Hazard Overlay area, this is the preferred location for all lots (excluding park or other relevant open space and recreation lots).* *Note: Buildings subsequently developed on the lots created will need to comply with the relevant building assessment provisions under the Building Act 1975.* **AO1.3.** Road and/or pathway layout ensures residents are not physically isolated from the adjacent flood free urban areas[6] and provides a safe and clear evacuation route path:

[3] Council may choose to require the applicant to submit a site-based flood study that investigates the impact of the development on the floodplain and demonstrates compliance with the relevant Performance outcomes

[4] The level to which the habitable floor levels must be built may be set by Council resolution in accordance with section 13 of the *Building Regulation 2006*. Where a level is not set, habitable floors must be elevated above natural ground to a height determined by Council.

[5] Council may set appropriate water depth, distances and velocities deemed to allow for safe and clear access.

	• if a flood level is adopted[7], by locating entry points into the reconfiguration above the flood level and avoiding culs-de-sac or other non-permeable layouts; or • if a flood level is not adopted, by direct and simple routes to main carriageways.[5] **AO1.4.** Signage is provided on site (regardless of whether land is in public or private ownership): • indicating the position and path of all safe evacuation routes off the site; andif the site contains or is within 100m of a floodable waterway, hazard warning signage and depth indicators are also provided at key hazard points, such as at floodway crossings or entrances to low-lying reserves.
PO2. Development is resilient to flood events by ensuring design and built form account for the potential risks of flooding.	**For Material Change of Use (Residential Uses)** **AO2.1.** Residential dwellings are not designed as single-storey slab on ground. *Note: The highset 'Queenslander' style house is a resilient low-density housing solution in floodplain areas. Higher density residential development should ensure only non-habitable rooms (e.g. garages, laundries) are located on the ground floor.* **AO2.2.** Residential buildings: • use screening to ensure that the understorey is not visible from the street; and • orient to the street by ensuring that the stairs to the dwelling and at least one habitable room overlook the street; and • have ground floors that allow for the flow through of flood water. *Note: For higher density residential uses, commercial activities on the ground floor are acceptable where the ground floor has been specifically designed in accordance with the relevant building assessment provisions to include resilient materials and to be structurally appropriate.* *Note: The highset 'Queenslander'-style house is a resilient low-density housing solution in floodplain areas. Higher density residential development should ensure only non-habitable rooms (e.g. garages, laundries) are located on the ground floor.* **For Material Change of Use (Non-Residential Uses)** **AO2.3.** Non residential buildings and structures: • orient to the street by activating the street frontage through ground floor commercial uses or urban design treatments such as recess wall treatments, screening and or landscaping; and • allow for flow through of flood waters on the ground floor. *Note: Businesses should ensure that they have the necessary continuity plans in place to account for the potential need to relocate property prior to a flood event (e.g. allow enough time to transfer stock to the upstairs level of a building or off site).* *Note: The relevant building assessment provisions under the Building Act 1975 apply to all building work within the Flood Hazard Overlay area and must take account of the flood potential within the area.* *Note: Resilient building materials, including those required for wet and/or dry flood proofing, for use within the Flood Hazard Overlay area should be determined in consultation with Council, in accordance with the relevant building assessment provisions.*

[6] It is important to ensure that new reconfigurations are not isolated from other urban areas in the event of a flood.
[7] As resolved by Council.

	AO2.4
PO3. Development directly, indirectly and cumulatively avoids any increase in water flow velocity or flood level, and does not increase the potential for flood damage either on site or on other properties.[1]	**For Material Change of Use, Reconfiguring a Lot and Operational Works** **AO3.1.** Works in urban areas[8] associated with the proposed development do not involve: • any physical alteration to a watercourse or floodway including vegetation clearing; or • a net increase in filling (including berms/mounds). *Note: Berms/mounds are considered to be an undesirable built form outcome and are not supported.* **AO3.2.** Works (including buildings and earthworks) in rural areas either: • do not involve a net increase in filling greater than 50m^3; or • do not result in any reductions of on-site flood storage capacity and contain within the subject site any changes to depth/duration/velocity of flood waters; or • do not change flood characteristics outside the subject site in ways that result in: ○ loss of flood storage; ○ loss of/changes to flow paths; ○ acceleration or retardation of flows; **or** any reduction in flood warning times elsewhere on the floodplain. **AO3.3.** In rural areas, buildings and infrastructure are set back 50m[9] from natural riparian corridors to maintain their natural function of reducing velocity of flood waters. *Note: Fences and irrigation infrastructure (e.g. irrigation tape) in rural areas should be managed to minimise adverse impacts that they may have on downstream properties in the event of a flood.*
PO4. Development avoids the release of hazardous materials into floodwaters.	**For Material Change of Use** **AO4.1.** Materials manufactured or stored on site are not hazardous in nature; **OR** **AO4.2** If a flood level is adopted[10], hazardous materials and their manufacturing equipment are located above this level; **OR** **AO4.3.** If a flood level is not adopted, hazardous materials and their manufacturing equipment are located on the highest part of the site to enhance flood immunity. *Note: Refer to the* Work Health and Safety Act 2011 *and associated Regulation and Guidelines, the* Environmental Protection Act 1994 *and the relevant building assessment provisions under the* Building Act 1975 *for requirements related to the manufacture and storage of hazardous substances.*

[8] As defined in the *Sustainable Planning Regulation 2009*
[9] Council can determine appropriate setbacks for their local circumstances.
[10] As resolved by Council.

Community use code

QPP allows local governments to utilise development codes in the planning scheme, however these are not a mandatory part of the framework. Development codes include use codes which can be used to regulate certain land uses, for example a house code or a community use code. Use codes are effective for regulating particular uses, or groups of similar uses, that may occur across a number of different zones and have certain desired development outcomes.

Use codes are triggered either through identifying the code in the level of assessment tables or through description in the application section of the code, for example applying to self-assessable, compliance and assessable development for the listed uses, regardless of zoning.

The below provides an example of a Community Use Code as permitted under the QPP framework to ensure Councils can further consider development outcomes (particularly built form outcomes) for both community services and community infrastructure that may be within flood affected areas.

The Community Use Code below may also be used as a Zone Code where Council may deem that appropriate, i.e. the Community Facilities Zone under QPP.

Part 9 Development codes

9.3 Use codes

9.3.1 Community Use Code

9.3.1.1 Application

This code applies to self-assessable and assessable development for the community services and community infrastructure activity group (as defined in advisory note below) in all zones.

Editor's note – The example assessment criteria contained here may be used in a zone code, for example Community Facilities Zone or Special Purpose Zone codes.

9.3.1.2 Purpose

(1) The purpose of the Community Use Code is to ensure that adequate community uses, including facilities and infrastructure, are established in the local government area to provide needed services and benefit to the community.

(2) The purpose of the code will be achieved through the following overall outcomes:

a. Community services are compatible with hazard, except those uses that involve vulnerable persons or property which are located outside of the flood hazard area.

I. Uses that involve vulnerable persons include child care centre, community care centre, community residence, community use, correctional facility, health care services residential care facility, retirement facility

II. Uses that involve vulnerable property include, cemetery, club, crematorium, place of worship, and funeral parlour

b. Community infrastructure[11] is not located in hazard areas, except where an overriding need for the use is demonstrated. [12]

c. <Insert other overall outcomes as desired by Council>

[11] As derived from the *Sustainable Planning Regulation 2009* and assessable under the scheme.
[12] A site based planning evaluation may be required in order to demonstrate compliance with this performance outcome in accordance with Planning Scheme Policy X

9.3.1.3 Assessment criteria

Criteria for self-assessable, compliance assessable and assessable development

Table 9.3.1.3 (a)

Performance outcomes	Acceptable outcomes
For self assessable and assessable development	
Community services	
PO1 Community services that include vulnerable persons or property are not located in flood hazard areas.	AO1.1 The number of vulnerable persons living and working in the flood hazard area is not increased. A01.2 Land uses with property vulnerable to flood hazard are not located in the flood hazard area.
PO2 Community services that do not include vulnerable persons or property are otherwise compatible with the level of flood hazard identified for the site.[13]	AO2.1 No acceptable outcome. *Note – the flood hazard overlay code provides acceptable built form outcomes in flood hazard areas.*
Community infrastructure	
PO3 Community Infrastructure[14] is able to function effectively during and immediately after flood events.	AO3.1 Community infrastructure development is not located in an area that has been identified by flood hazard mapping as being below the Recommended Flood Level (RFL) specified for that community infrastructure in Table 9.3.1.3 (b) below[15]; or The community infrastructure is located below the RFL but can function effectively during and immediately after the RFL flood event.

Table 9.3.1.3 (b) Recommended flood levels for community infrastructure

Recommended Flood Levels for Community Infrastructure	
Type of Community Infrastructure	**Recommended Flood Levels**
Emergency services	0.2% AEP
Emergency shelters	0.5% AEP
Police facilities	0.5% AEP
Hospitals and associated facilities	0.2% AEP
Stores of valuable records or items of historic or cultural significance (e.g.	0.5% AEP

[13] A site based planning evaluation may be required in order to demonstrate compliance with this performance outcome in accordance with Planning Scheme Policy X
[14] As derived from the *Sustainable Planning Regulation 2009* and assessable under the scheme.
[15] A flood study may be required to identify the RFL for the subject site.

galleries and libraries).	
• State-controlled roads • Works of an electricity entity not otherwise listed in this table • Railway lines, stations and associated facilities • Aeronautical facilities • Communication network facilities	No specific recommended flood level but development proponents should ensure that the infrastructure is optimally located and designed to achieve suitable levels of service, having regard to the processes and policies of the administering government agency.
Power stations	0.2% AEP
Major switch yards	0.2% AEP
Substations	0.5% AEP
Sewage treatment plants	DFE
Water treatment plants	0.5% AEP

Advisory note:

The activity groups identified in the above Community Use Code, being community services and community infrastructure, include the following groups of land uses:

- Community services:
  - retirement facility, cemetery, club, child care centre, community care centre, community residence, community use, correctional facility, crematorium, place of worship, indoor and outdoor sport and recreation, major sport, recreation and entertainment facility, park, funeral parlour, health care services,
- Community infrastructure[16]:
  - education establishment, hospital, telecommunications facility, emergency services, air services, major electrical infrastructure, renewable energy facility, substation, transport depot, utility installation.

[16] As derived from the *Sustainable Planning Regulation 2009* and assessable under the scheme.

Schedule 6 Planning scheme policies

SC6.2 Site based planning evaluation – flood hazard

Evaluation Criterion	Considerations and potential applicant requirements
What is the nature of the hazard affecting the site (i.e. highest recorded flood height, velocity and other flood characteristics)?	A site based flood study may be required as part of the development application to identify the specific flood characteristics of the subject site. The outputs of the flood study will inform the assessment and decision of the application, including any conditions of approval about ensuring resilient built form and design techniques are employed.
What impacts could the proposed development have on the nature of the hazard both on the subject site and its surrounding areas?	Council will need to have a clear understanding of the layout and intensity of the proposed development on the site in order to assess the potential impacts that the development could have on the level of flood hazard (on site and in surrounding areas).
How does the development respond to the hazard? Does the development present an intolerable risk to people and property? Can the development be conditioned to result in a tolerable or acceptable level of risk?	Where the risk to life or property posed by the proposed development is intolerable, this may result in Council refusing the application or setting wide ranging and comprehensive conditions as part of an approval to ensure that the development presents a tolerable or acceptable risk (i.e. built form conditions).
Are there existing or proposed structural controls on site that will reduce the risk of the hazard to a tolerable or acceptable level? Does the structural work required result in increases to flood hazard elsewhere, or poor environmental outcomes, visual amenity or urban design outcomes?	Existing or proposed structural controls (such as levees, floodgates or dams) may mitigate the hazard affecting the site, however they may involve significant environmental or visual impact that will need to be assessed. They may also exacerbate flood hazard impacts downstream of the site, which will also need to be assessed relative to the relevant planning scheme provisions. Structural controls may be acceptable where an overriding need for the land use can be demonstrated through the planning evaluation, and adverse impacts caused by these controls can be addressed.
Is the area served by appropriate emergency management procedures? Would the development be isolated in the event of a flood?	Evacuation routes, warning systems and emergency management procedures are critical in both existing and future urban settlements. Intensification of development in particular depends on the availability of clearly identified and passable evacuation routes and therefore an application for development on land subject to flood hazard will be required to demonstrate appropriate access to emergency management procedures. Applicants should analyse existing evacuation routes and procedures in and around the subject site to identify whether the development will be isolated. Issues of isolation/evacuation must be addressed as part of the development assessment process.
Is the built form resilient to the hazard?	The type of built form largely influences a development's resilience to flood hazard. Council may request particular built form and design outcomes for development occurring in flood hazard areas to ensure improved resilience and a more appropriate response to the risk is achieved. For example, the 'Queenslander' style of home performs far better in a flood than a slab on ground home, in terms of actual damage, cost to repair and the time required for the repairs.
Can the extent of floodways (up to an acceptable flood event, such as 1% AEP) be maintained in their natural state for flood conveyance?	In broadhectare areas, it is important that development layout and design maintains existing floodways and waterways in their natural state to assist flood conveyance which may minimise risk from flood. If proposing a broadhectare development, Council may request further information to be provided which demonstrates that the natural state of the flood conveyance will be maintained and subsequent plans showing how the layout achieves this. For infill development, Councils may also require applicants to demonstrate how flood conveyance via existing waterways on-site will be achieved in

	these areas up to a certain flood event (determined by Council).
Is there an overriding economic or social need to continue living and working in this area?	If the consequence to life or property on a site is tolerable or acceptable but may not be ideal, where such areas are of significant economic or social importance, a balanced approach to considering appropriate development for the site should be taken that considers these economic and/or social needs. Council may require an applicant to prepare an analysis demonstrating that overriding need.

Schedule 9 – Guidance checklist for planning scheme drafters

The following is a step by step methodology for consideration of flood hazard when preparing and drafting new planning schemes.

1. Use the IFAO to prepare an LGA-wide overlay map in conjunction with any other available flood information for the LGA ☐ ☐

a) Locally verify the IFAO using historical information, anecdotal evidence or existing flood studies, using one or a combination of the following hierarchy: ☐ ☐

i. a map showing 'areas of hazard' derived from information about the likelihood and behaviour of flooding;
ii. a map showing the extent of floods of a range of likelihoods;
iii. a flood map based on historic flood levels that have been subjected to a flood frequency analysis to estimate the annual exceedance probability of the selected historical flood; ☐ ☐
iv. a historic flood map without flood frequency analysis;
v. the IFAO that has been locally verified and either accepted or amended by the relavent local government

2. Treat flood risk identified in the planning evaluation through the strategic framework and zonings ☐ ☐

a) Ensure the strategic framework provides clear and unambiguous statement(s) regarding: ☐ ☐

i. The community's level of acceptance of flood risk – Vision or Strategic Intent;
ii. The resilience target desired for the community – Vision or Strategic Intent;
iii. The desired evolution of the settlement pattern required over time to treat the flood risk, including land use intent for specific areas and directing future growth away from hazard areas – Strategic Intent and Settlement Pattern theme or similar; ☐ ☐
iv. More detailed policy statements related to response of development to flood hazard, including compatibility of development with hazard, resilient built form outcomes, resilience of infrastructure etc – Natural Hazards, Safe Communities or Infrastructure Services themes or similar.

b) Ensure the zonings used reflect the community's level of acceptance of flood risk and the resilience target set ☐ ☐

i. Ensure the zoning plan accords with the levels of flood risk for sites/suburbs identified through the planning evaluation;
ii. Use section 3 – Implementation for guidance on appropriate and inappropriate uses:
    i. In areas of intolerable risk – use restrictive zoning such as Limited Development (constrained land), Open Space & Recreation, & Rural;
    ii. In areas of tolerable risk – use 'flood-constrained precincts' to limit certain uses in the flood hazard area but allow others;
    iii. In areas of acceptable risk – little (if any) land use change required, built form requirements can be sufficient (through the overlay code). ☐ ☐
iii. Direct future growth away from floodable areas, or where this is not possible, identify very clearly on strategic planning maps and in the framework that some parts of the future urban growth areas are constrained by flood and will not be appropriate for development, unless those uses are compatible with the flood hazard.
iv. Remember that some land uses are flood-compatible and may be appropriate in areas identified as flood hazard (subject to appropriate built form assessment):
    i. Particularly water-oriented development such as aquaculture, landings, marine industries etc that require waterways by the nature of their use;
    ii. Parks, many sport and recreation activities (such as golf courses & paintball), many agricultural activities such as cropping are also generally compatible with flood hazard;
    iii. Develop strategies to deal with flood hazard in existing urban areas.

c) Consider articulating relocation strategies for intolerable risk areas that sit outside of the planning scheme – through the land use strategy section in the settlement pattern theme. ☐ ☐

3.	**Tailor zone outcomes and levels of assessment accordingly**	☑	☒
a)	Clearly articulate the desired intent for land use within the overall outcomes of the zone – including the desired response to flood risk. E.g If the Limited Development (Constrained Land) Zone is used in areas of intolerable flood risk, then the overall outcomes should be worded accordingly to strongly limit land uses that are incompatible with that level of risk.	☑	☒
b)	Impact assessment should be used for those land uses that are incompatible with that level of risk to discourage that form of development in that location.	☑	☒
c)	Code assessment can be used for those uses that require an assessment of flooding impact on the land use to ascertain if that development is appropriate for that location, where code drafting is sufficiently clear on land use intent for that zone	☑	☒
d)	Self-assessment or exempt can be used for land uses in low risk areas (or where that land use type would be acceptable relative to the level of hazard) where provisions are simple enough for self-assessment.	☑	☒
	i. For example, a park need not be subject to significant assessment, exempt is likely to be appropriate unless there are specific assessment criteria a Council desires such a use to address	☑	☒
4.	**Tailor the overlay code for built form outcomes**	☑	☒
a)	The overlay code should deal only with built form outcomes. It should not present policy in relation to the appropriateness of land use in that location.	☑	☒
b)	Outcomes sought by the overlay should promote built form resilience – such as the use of the 'Queenslander' style of home, or 'flow-through' building design for commercial properties. In addition, the use of fill on the floodplain should be addressed, and subdivision design should be considered closely to ensure isolation is avoided and appropriate evacuation routes are provided for residents.	☑	☒
c)	Acceptable outcomes that need a site-based flood study to identify (for example) a 1 in 100 year flood level for habitable floor levels is not a self-assessable criterion that is easily achievable. The Model Code provides example provisions that may be suitable for self-assessment.	☑	☒
d)	Acceptable outcomes that need a site-based flood study to identify (for example) a 1 in 100 year flood level for habitable floor levels is not a self-assessable criterion that is easily achievable. The Model Code provides example provisions that may be suitable for self-assessment.	☑	☒
5.	**Ensure public notification period includes specific consultation on flood hazard mapping**	☑	☒
a)	In areas where only Level 1 or Level 2 flood investigations have been completed, specific consultation (of the community broadly, and of local interest groups such as a historical society or floodplain management group) to obtain anecdotal evidence of historic floods can provide additional information necessary to enhance the flood information in these other areas.	☑	☒

Schedule 10 – Guidance checklist for planning scheme reviewers

The following is a step by step checklist for reviewing new draft planning schemes for consideration of flood hazard.

Mapping

1.	**Does the draft scheme have a flood hazard overlay map?**	☐ ☐
a)	If not, councils should use the IFAO (locally verified and amended if required) and any other available information noted in point 3 below	☐ ☐
2.	**Does the map show all floodable areas shire-wide or only for certain towns/areas?**	☐ ☐
a)	If information is available for towns only, this should be supplemented with the IFAO in between towns	☐ ☐
3.	**What information was used to create that map?**	☐ ☐
a)	Hierarchy of possible mapping techniques used to prepare the map is as follows (consistent with QFCoI recommendations 2.13 & 2.14): i. a map showing 'areas of hazard' derived from information about the likelihood and behaviour of flooding; ii. a map showing the extent of floods of a range of likelihoods; iii. a flood map based on historic flood levels that have been subjected to a flood frequency analysis to estimate the annual exceedance probability of the selected historical flood iv. a historic flood map without flood frequency analysis; v. the IFAO that has been locally verified and either accepted or amended by the relevant local government.	☐ ☐

Provisions

4.	**Has the community's views on the level of acceptable flood risk been captured?**	☐ ☐
5.	**Has a resilience target been set for the local government?**	☐ ☐
a)	The resilience target is a useful way to demonstrate how a local government intends to address floodplain resilience through its various responsibilities, including through the planning scheme.	☐ ☐
6.	**Does the scheme rely on the development assessment process to assess the compatibility of land use with flood hazard, or are flood hazard considerations 'front-loaded' into the planning scheme?**	☐ ☐
a)	Front-loading as much information and land use policy as possible is the preferred approach.	
7.	**Are the draft planning scheme provisions generally in accordance with the example planning provisions in the *Planning for stronger, more resilient floodplains Part 2 – Measures to support floodplain management in future planning schemes?***	☐ ☐
a)	The draft provisions should be consistent with the intent of the example planning scheme provisions and the broader intent of the Guideline.	☐ ☐
8.	**Does the strategic framework consider flooding/natural hazards appropriately?**	☐ ☐
a)	Is it clear the settlement pattern (e.g through the Settlement Pattern theme) will evolve over time to respond to the hazards?	☐ ☐
b)	Is there a 'Natural Hazards' or 'Safe Communities' theme that gives further detail on how flood is considered in the scheme? Are infrastructure services also addressed through the strategic framework?	☐ ☐
9.	**Does the priority infrastructure plan consider the natural hazard risks prevalent in the scheme area?**	☐ ☐
a)	Do the priority infrastructure area and plans for trunk infrastructure correspond to the settlement pattern intent articulated by the strategic framework?	☐ ☐
b)	Where back-zonings are proposed, are details of infrastructure decommissioning provided in the PIP?	☐ ☐
10.	**Do the zonings used reflect the flood risk identified for the LGA (or parts of the LGA)?**	☐ ☐
a)	Are areas at different levels of risk zoned appropriately?	☐ ☐

11.	**Is there 'horizontal' and 'vertical' integration of flood matters throughout the scheme?**	☑ ☒
12.	**Where is the flood hazard map located in the scheme?**	☑ ☒
a)	An overlay map is the preferred location for flood hazard. Floodable areas can also be identified on the relevant strategic framework map(s) where this demonstrates how the settlement pattern responds to the flood risk.	☑ ☒
13.	**How is the mapping used?**	☑ ☒
a)	Does it trigger an overlay code? An overlay code is appropriate to house built form assessment criteria primarily, rather than land use criteria.	☑ ☒
14.	**Does the overlay code deal with built form matters, or does it also include land use provisions?**	☑ ☒
a)	It is preferred that the overlay code only deals with built form matters, and that land use intent be addressed through the zone codes.	☑ ☒

Schedule 11 – Glossary and further information

Glossary

It is helpful for Planners and other development professionals to understand a number of common terms used in floodplain management. It is particularly important to understand the meaning and application of the terms identified below, which have been derived from current best practice guidance[1].

Annual Exceedance Probability (AEP) – the likelihood of a flood of a certain size or larger being exceeded in any one year.

Annual Recurrence Interval (ARI) – the average interval in years which would be expected to occur between exceedances of flood events of a given magnitude.

Community Resilience – the characteristics of a resilient community are: functioning well while under stress; successful adaptation, self-reliance; and social capacity.

Floodplain – For the purposes of this Guideline, all parts of a sub-basin potentially subject to riverine flooding.

Natural Hazard – a naturally occurring situation or condition with the potential for loss or harm to the community, property or environment.

Probable Maximum Flood (PMF) – An estimate of the largest possible flood that could occur at a particular location, under the most severe meteorological and hydrological conditions as they are currently understood.

Risk – Risk is a combination of likelihood (or chance) of an event occurring, and the consequences of that occurrence. Consequences are in turn determined by the level of exposure to the ocurrence and the vulnerability of people, property and infrastructure to the occurrence.

Sub-basin – the area of land draining to a particular site. It always relates to a specific location and includes the catchments of tributary streams as well as the main stream. The term 'sub-basin' is used in this document to denote 'catchment'.

Vulnerability – the degree of susceptibility of individual persons, the community and the environment to natural hazard.

Further Information and Guidance

Detailed information on the floodplain management system and its processes is available through:

- SCARM Report 73 – *Floodplain Management in Australia: Best Practice Principles and Guidelines*, available from the CSIRO website: www.publish.csiro.au/Books/download.cfm?ID=2260
- New South Wales *Floodplain Development Manual: the management of flood liable land*, available at www.environment.nsw.gov.au/floodplains/manual.htm
- *Australian Rainfall and Runoff* (AR&R), Engineers Australia – available at: www.arr.org.au

More general information on flooding is available via the Understanding Floods: Questions and Answers publication, produced by the Queensland Chief Scientist and available at www.chiefscientist.qld.gov.au/publications/understanding-floods.aspx

1 Including State Planning Policy 1/03,the National Strategy for Disaster Resilience and the Standing Committee for Agriculture and Resource Management (SCARM) Report 73 – Floodplain Management in Australia

Source: Western Downs Regional Council

Queensland
Government

Australian Disaster Resilience Handbook Collection

HANDBOOK 7

Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia

Australian Institute for
Disaster Resilience

Cover images, clockwise from top: An aerial view of the 2011 Brisbane River flood (photo: iStock); Lismore CBD floods due to the impact of ex-tropical cyclone Debbie (photo: NSW SES); a flooded road (photo: iStock).

AUSTRALIAN DISASTER RESILIENCE
HANDBOOK COLLECTION

Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia

Handbook 7

Australian Government
Attorney-General's Department

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History of the Australian Disaster Resilience Handbook Collection

The first publications in the original Australian Emergency Manual Series were primarily skills reference manuals produced from 1989 onwards. In August 1996, on advice from the National Emergency Management Principles and Practice Advisory Group, the Series was expanded to include a more comprehensive range of emergency management principles and practice reference publications.

In 2011, Handbooks were introduced to better align the Series with the *National Strategy for Disaster Resilience*. Compiled by practitioners with management and service-delivery experience in a range of disaster events, the handbooks comprised principles, strategies and actions to help the management and delivery of support services in a disaster context.

In 2015, the Australian Institute for Disaster Resilience (AIDR) was appointed custodian of the handbooks and manuals in the series. Now known as the Australian Disaster Resilience Handbook Collection, AIDR continues to provide guidance on the national principles supporting disaster resilience in Australia through management and publication of the Collection.

The Handbook Collection is developed and reviewed by national consultative committees representing a range of state and territory agencies, governments, organisations and individuals involved in disaster resilience. The Collection is sponsored by the Australian Government Attorney-General's Department.

Access to the Collection and further details are available at the Australian Disaster Resilience Knowledge Hub at www.knowledge.aidr.org.au.

Australian Disaster Resilience Handbook Collection (2011 –)

Handbook 1 Disaster Health

Handbook 2 Community Recovery

Handbook 3 Managing Exercises

Handbook 4 Evacuation Planning

Handbook 5 Communicating with People with a Disability: National Guidelines for Emergency Managers

Handbook 6 National Strategy for Disaster Resilience: Community Engagement Framework

Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia

- **Guideline 7-1** Using the National Generic Brief for Flood Investigations to Develop Project Specific Specifications
- **Guideline 7-2** Flood Emergency Response Classification of the Floodplain
- **Guideline 7-3** Flood Hazard
- **Template 7-4** Technical Project Brief Template
- **Guideline 7-5** Flood Information to Support Land-use Planning
- **Guideline 7-6** Assessing Options and Service Levels for Treating Existing Risk
- **Practice Note 7-7** Considering Flooding in Land-use Planning Activities

Handbook 8 Lessons Management

Handbook 9 Australian Emergency Management Arrangements

Handbook 10 National Emergency Risk Assessment Guidelines

Guideline 10-1 National Emergency Risk Assessment Guidelines: Practice Guide

Handbook 11 renamed Guideline 10-1 National Emergency Risk Assessment Guidelines: Practice Guide

Handbook 12 Spontaneous Volunteer Management

Australian Emergency Management Manual Series

The most recent list of publications in the Manuals series includes 46 titles.

The manuals have not been reviewed since 2011 or earlier and the Manual Series is undergoing a review which will see relevant Manuals move into the ADR Handbook Collection or other collections, or be archived. Current and past editions of the Manuals will remain available on the ADR Knowledge Hub at www.knowledge.aidr.org.au.

Manual Series Catalogue: 2004 - 2011

Manual 1 Emergency Management Concepts and Principles (2004)

Manual 2 Australian Emergency Management Arrangements (superseded by Handbook 9)

Manual 3 Australian Emergency Management Glossary (1998)

Manual 4 Australian Emergency Management Terms Thesaurus (1998)

Manual 5 Emergency Risk Management – Applications Guide (superseded by Handbook 10)

Manual 6 Implementing Emergency Risk Management – a Facilitator's Guide to Working with Committees and Communities (superseded by Handbook 10)

Manual 7 Planning Safer Communities – Land-use Planning for Natural Hazards (2002, currently under review)

Manual 8 Emergency Catering (2003, archived)

Manual 9 Disaster Medicine (replaced by Handbook 1)

Manual 10 Recovery (replaced by Handbook 2)

Manual 11 Evacuation Planning (replaced by Handbook 4)

Manual 12 Safe and Healthy Mass Gatherings (1999)

Manual 13 Health Aspects of Chemical, Biological and Radiological Hazards (2000)

Manual 14 Post Disaster Survey and Assessment (2001)

Manual 15 Community Emergency Planning (1992)

Manual 16 Urban Search and Rescue – Capability Guidelines for Structural Collapse (2002)

Manual 17 Multi-agency Incident Management (replaced by AIIMS)

Manual 18 Community and Personal Support Services (1998)

Manual 19 Managing the Floodplain (superseded by Handbook 7)

Manual 20 Flood Preparedness (2009)

Manual 21 Flood Warning (2009)

Manual 22 Flood Response (2009)

Manual 23 Emergency Management Planning for Floods Affected by Dams (2009)
Manual 24 Reducing the Community Impact of Landslides (2001)
Manual 25 Guidelines for Psychological Services: Emergency Managers Guide (2003)
Manual 26 Guidelines for Psychological Services: Mental Health Practitioners Guide (2003)
Manual 27 Disaster Loss Assessment Guidelines (2002)
Manual 28 Economic and Financial Aspects of Disaster Recovery (2002)
Manual 29 Community Development in Recovery from Disaster (2003)
Manual 30 Storm and Water Damage Operations (2007) (information may not be appropriate to all situations)
Manual 31 Operations Centre Management (2001)
Manual 32 Leadership (1997)
Manual 33 National Land Search Operations (2014) (refer to the Land Search Operations Manual website)
Manual 34 Road Rescue (2009)
Manual 35 General and Disaster Rescue (2006)
Manual 36 Map Reading and Navigation (2001)
Manual 37 Four-wheel-drive Vehicle Operation (1997)
Manual 38 Communications (1998)
Manual 39 Flood Rescue Boat Operation (2009)
Manual 40 Vertical Rescue (2001)
Manual 41 Small Group Training Management (1999, archived)
Manual 42 Managing Exercises (superseded by Handbook 3)
Manual 43 Emergency Planning (2004)
Manual 44 Guidelines for Emergency Management in Culturally and Linguistically Diverse Communities (2007)
Manual 45 Guidelines for the Development of Community Education, Awareness and Education Programs (2010)
Manual 46 Tsunami Emergency Planning in Australia (2010)

Acknowledgements

This handbook is the result of a review of the original *Australian Emergency Management Manual: Managing the Floodplain*, which was prepared by a team of experienced flood planners from around Australia.

The review was conducted by the National Flood Risk Advisory Group (NFRAG), a reference group of the Australian – New Zealand Emergency Management Committee (ANZEMC), which was chaired by Andrew Lea (State Emergency Service, Tasmania). Major General Hori Howard, the former chair of NFRAG, was instrumental in establishing this review.

The review was led by Duncan McLuckie (NSW Office of Environment and Heritage), as the primary author, with input from the members of NFRAG and, in particular, Michael Edwards (Victorian Department of Environment and Primary Industries).

NFRAG members consulted within their jurisdictions and with key industry groups including the Floodplain Management Association, Engineers Australia and the Planning Institute of Australia. Important contributions were made by attendees from industry and government at a national workshop on the guideline in October 2012. Assistance was also provided by Mark Babister and staff at WMAwater, and Dr Chas Keys.

The membership of NFRAG during the period of the review included:

- Tasmania—Andrew Lea, State Emergency Service, Tasmania
- Australian Capital Territory—Tony Graham, ACT Emergency Services
- New South Wales—Duncan McLuckie, Office of Environment and Heritage
- Northern Territory—Lakshman Rajaratnam, Department of Land Resource Management
- Queensland—Dean Misso, Department of State Development, Infrastructure and Planning
- South Australia—Chrissie Bloss, Department of Environment, Water and Natural Resources
- Victoria—Michael Edwards, Department of Environment and Primary Industries
- Western Australia—Richard Bretnall, Department of Water
- Australian Government —Attorney-General's Department, Bureau of Meteorology, Geoscience Australia, Treasury
- Australasian Fire & Emergency Service Authorities Council and Australian Council of Emergency Services—Steve Opper and Belinda Davies, NSW State Emergency Service
- Australian Buildings Code Board—Ron de Veer and Lam Pham
- Australian Local Government Association—Allan Ezzy and Ian Dinham
- insurance industry—Karl Sullivan, Insurance Council of Australia
- National Risk Assessment Measurement and Mitigation Subcommittee of ANZEMC—Ed Pikusa
- research community—John Handmer, RMIT University.

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Preface

Flooding is a natural phenomenon that occurs when water covers land that is usually dry. Floods can have a devastating impact upon communities.

Effective flood risk management can enable a community to become as resilient as practicable to floods. This is achieved through planning and preparing for, responding to and recovering from flooding. This requires a coordinated, multidisciplinary approach across all levels of government and between agencies with different responsibilities. It also requires the support of a range of non-government organisations and industry professionals in a wide range of activities and fields (such as land-use planning) and the active engagement of the community.

The goal of increased resilience to floods requires the management of the flood impacts on both existing developed areas of the community and areas that may be developed in the future. Generally, this involves a combination of flood mitigation, emergency management, flood forecasting and warning measures, land-use planning, and infrastructure design considering the local flood situation and the associated hazards. Decision makers in these areas, insurers and the general public require access to information on flood risk to make informed management and investment decisions.

The *National Strategy for Disaster Resilience*, adopted by the Council of Australian Governments on 13 February 2011 (COAG 2011), outlines the increasing regularity and severity of natural disasters. Australian governments recognised that a national coordinated and cooperative effort is required to enhance Australia's capacity to withstand and recover from emergencies and disasters. A disaster resilient community is one that works together to understand and manage the risks that it confronts. Disaster resilience is the collective responsibility of all sectors of society, including all levels of government, business, the non-government sector and individuals. If all these sectors work together with a united focus and a shared sense of responsibility to improve disaster resilience, they will be far more effective than the individual efforts of any one sector.

This handbook has been developed with consideration of the *National Strategy for Disaster Resilience* (COAG 2011), and the findings of state and national reviews following the multiple flood events of 2010 to 2012 that resulted in widespread flooding. It is intended to provide broad advice and guidance on all important aspects in managing flood risk in Australia.

It is supported by a series of publications on flood management whose review was instigated and managed by the National Flood Risk Advisory Group (NFRAG), a reference group of the Australian – New Zealand Emergency Management Committee (ANZEMC). These publications form part of the Australian Disaster Resilience (ADR) Handbook Collection and include:

- *ADR Manual 20 Flood Preparedness* (AIDR 2009)
- *ADR Manual 21 Flood Warning* (AIDR 2009)
- *ADR Manual 22 Flood Response* (AIDR 2009)
- *ADR Manual 23 Emergency Management Planning for Floods Affected by Dams (AIDR 2009)*

This series provides guidance on best practice principles as presently understood in Australia, rather than describing current varied practice. In this handbook, the term 'best practice principles' is taken in its broadest sense to mean the underlying principles that need to be considered when managing flood risk and formulating floodplain management plans, leading to effective, equitable and sustainable land use across Australia's floodplains.

This handbook should be used in conjunction with its companion technical guidelines and supporting documents and any relevant jurisdictional equivalents. Every attempt has been made to adopt a national approach to terminology, policy and guidance arrangements. This handbook and its supporting guidelines replace:

- *ADR Manual 19 Managing the Floodplain*, prepared in 1998–99 by a team of experienced floodplain managers from around Australia as part of the development of the original Emergency Management Australia series guidelines on managing flooding.
- *Floodplain Management in Australia: Best Practice Principles and Guidelines*, prepared for the former Standing Committee on Agriculture and Resource Management (former SCARM) of the former Agriculture and Resource Management Council of Australia and New Zealand (former ARMCANZ) (SCARM Report No. 73, 2000).

Users of this handbook and its supporting flood risk management guidelines should also refer to the technical advice provided on flood estimation in the latest version of *Australian Rainfall and Runoff: a guide to flood estimation* (Australian Rainfall & Runoff, Engineers Australia).

HOW TO USE THIS HANDBOOK

Types of flood events covered

This handbook provides advice on management of flooding within the floodplains and catchments of waterways due to the following type of flood events:

- Catchment flooding from prolonged or intense rainfall (e.g. severe thunderstorms, monsoonal rains, tropical cyclones). Sources of catchment flooding include rivers and other watercourses, local overland flow paths and groundwater systems.

Coastal flooding due to tidal- or storm-driven coastal events, including storm surge in lower coastal waterways. This can be exacerbated by wind-induced wave generation. Tsunamis are a specific type of coastal event, which are dealt with in *Australian Disaster Resilience Manual 46 - Tsunami Emergency Planning Australia* (AIDR 2010) (and are not considered in this handbook).

- Combinations of both catchment and coastal flooding in the lower portions of coastal waterways where both can be produced by the same storm or a series of storms. How these sources of flooding interact and which is dominant will vary with the location and configuration of the catchment, floodplain and waterway, and the specifics of the storm cells.

This handbook applies to the management of floods in urban and rural areas, including water flowing overland through urban areas to waterways. Its use in different locations should consider the different issues that need to be considered. For instance, in rural floodplains, the scale of flood-dependent ecosystems means that environmental issues and maintenance of flow to these areas is important and needs additional consideration. The duration of flooding is also important to many crops, and needs to be considered in addition to peak flood levels when examining changes to the floodplain. Local overland flood catchments respond quickly to rainfall and specific flood warnings are not generally possible and there may be little or no time to evacuate. Overland flow paths are often ill-defined and may follow roads, go through private property, or be inhibited by buildings and fences. Localised management measures to enable water flow or reduce the vulnerability of property may therefore be necessary to manage flood behaviour and associated risk.

Target audience

This handbook aims to provide advice to those with roles in understanding and managing flood risk and its consequences on the community. This may include emergency management practitioners, flood risk managers, land-use planners, engineers, hydrologists, infrastructure providers, and policy and decision makers, within both government and the broader industry. It aims to inform national best practice, and State and Territory guidance.

Use with jurisdictional advice, supporting guides and Australian Disaster Resilience Handbook Collection

This handbook provides a framework for the management of flood risk. It should be read and interpreted holistically in a manner consistent with the underlying philosophies outlined in the vision, principles and key objectives (Chapter 1), and with reference to its supporting guides and other relevant guides including the Australian Disaster Resilience Handbook Collection.

Guides directly supporting Handbook 7

- Guideline 7-1 Using the National Generic Brief for Flood Investigations to Develop Project Specific Specifications (see Template 7-4)
- Guideline 7-2 Flood Emergency Response Classification of the Floodplain
- Guideline 7-3 Flood Hazard
- Template 7-4 Technical Project Brief Template (for use with Guideline 7-1)
- Guideline 7-5 Flood Information to Support Land-use Planning (see Practice Note 7-7)
- Guideline 7-6 Assessing Options and Service Levels for Treating Existing Risk
- Practice Note 7-7 Considering Flooding in Land-use Planning Activities (for use with Guideline 7-5)

Relevant national guidelines include, but are not limited to the following publications in the Australian Disaster Resilience Handbook Collection:

- Manual 7 *Planning Safer Communities: land-use planning for natural hazards*
- Manual 20 *Flood Preparedness*
- Manual 21 *Flood Warning*
- Manual 22 *Flood Response*
- Manual 23 *Emergency Management Planning for Floods Affected by Dams*
- Manual 43 *Emergency Planning*
- Manual 45 *Guidelines for the Development of Community Education, Awareness and Engagement Programs*
- Handbook 2 *Community Recovery*
- Handbook 10 *National Emergency Risk Assessment Guidelines*

Users of this handbook should consult the relevant State or Territory agencies for advice on additional material that supports best practice. States and Territories are encouraged to build on this handbook with administrative and technical guidance to suit their needs. Guidance should be kept up to date and made readily available. Administrative guidance for a jurisdiction should:

- outline governance arrangements and linkages
- outline the relevant legislative and policy framework
- refer to relevant technical guidelines
- outline other material that supports best practice
- include a ready reckoner of alternate terms to those in this handbook where necessary
- outline support available to government entities with primary responsibility for managing flooding in an area, called floodplain management entities in this handbook, to understand and manage their risks.

Technical guidelines may be developed at a national, State or Territory level to provide more detailed information on technical matters to supplement the general advice contained herein.

Users of this document should also refer to the technical advice provided in the latest version of *Australian Rainfall and Runoff: a guide to flood estimation* (Australian Rainfall & Runoff, Engineers Australia).

Handbook structure

This handbook provides an outline of best practice and a vision for managing the flood threat to communities inhabiting floodplains in Australia and discusses how to apply information. It comprises four sections:

- Section A: Overview of flood risk management in Australia
  - Chapter 1 contains an introduction to best practice flood risk management
  - Chapter 2 discusses the need for and evolution of flood risk management
  - Chapter 3 outlines how holistic management can be best achieved using a fit-for-purpose risk management approach, such as the flood risk management framework
  - Chapter 4 outlines the key responsibilities of government, the non-government sector and individuals in the community for understanding and managing flood risk
- Section B: Understanding flood behaviour, flood risk, and treatment options
  - Chapter 5 discusses flood behaviour
  - Chapter 6 describes flood risk
  - Chapters 7–9 discuss treatment options for flood risk to existing and future developments
- Section C: Floodplain-specific management process
  - Chapters 10–13 outline the steps in the floodplain-specific management process
- Section D: Additional materials
  - Chapter 14 contains an abbreviations and acronyms list, and a glossary
  - Chapter 15 contains a list of references.

SECTION A

Overview of flood risk management in Australia

The multiple flood events of 2010 to 2012 provide a reminder of the devastating cost of flooding to the community. While these impacts cannot all be eliminated, understanding flooding and considering it when making decisions can reduce both the growth of risk due to new development and enable informed decisions on managing risk to existing development, where practical, feasible and cost-effective to do so.

It should also be remembered that floods can be of significant benefit to the community by delivering water to flood dependent ecosystems, improving soil moisture contents for agriculture and providing inflows to water supply dams.

Management of flood risk is essential to limiting the impacts of flooding on the community in balance with maintaining the benefits of occupying the floodplain to society and the benefits of flooding to the environment. This section provides an overview of flood risk management in Australia.

Management of the floodplain should be based on best practice. The goal is to have flood risk management that is sustainable, provides long-term benefits for the community and environment, and improves community resilience.

Chapter 1 contains an overview of best practice and Chapter 2 describes why flood risk management is necessary. Chapter 3 describes the flood risk management framework, which aims to promote strategic management of flood risk and information sharing.

Chapter 4 outlines the roles and responsibility of various community members, including government, and how they contribute to managing flood risk to the community.

CHAPTER 1

Introduction to best practice in flood risk management

In a nutshell...

This handbook aims to encourage those with responsibility for managing flood risk to work towards achieving best practice. It does this by:

- outlining a vision for best practice
- outlining key principles to consider in risk management
- providing a robust and flexible framework for managing flood risk
- outlining key objectives that support best practice.

This handbook aims to encourage practice that works towards the following vision for flood risk management in Australia.

Floodplains are strategically managed for the sustainable long-term benefit of the community and the environment, and to improve community resilience to floods.

Best practice requires the consideration and management of flood impacts to **existing** and **future** development within the community. It aims to improve community flood resilience using a broad risk management hierarchy of avoidance, minimisation and mitigation to:

- limit the health, social and financial costs of occupying the floodplain
- increase the sustainable benefits of using the floodplain
- improve or maintain floodplain ecosystems dependent on flood inundation.

Best practice promotes understanding flood behaviour so that the full range of flood risk to the community can be understood, effectively communicated and, where practical and justifiable, mitigated. It facilitates informed decisions on the management of this risk, and economic investment in development and infrastructure on the floodplain.

Neither this handbook, nor its predecessors, argues the need for a sophisticated or consistent understanding of flood behaviour across all areas of Australia, as this is neither practical nor necessary (Queensland Flood Commission of Inquiry, 2012). The degree of effort required, and approaches used, to understand flood behaviour will vary depending upon the complexity of the flood situation, and the information needs of government and the community to understand and manage flood risk. These techniques can also vary within a catchment, with more sophisticated techniques used in areas with concentrated exposure to risk (e.g. urban areas) and simpler techniques used in areas where developed is more widespread (e.g. rural areas).

Flood risk management efforts may be prioritised considering the scale of potential growth in risk, primarily due to new development in the floodplain, and the scale of existing flood risk to the community. This may promote sustainable urban and rural land-use planning practices that are fully cognisant of flood risk, and limit growth in risk to acceptable levels. It may also facilitate the treatment of risk (where practical, feasible and cost-effective) to limit the exposure of the existing community to flooding to more tolerable levels. Treatment may involve a combination of flood mitigation, emergency management, flood warning and community awareness – together with infrastructure design, and strategic and development scale land-use planning that considers the flood situation and associated hazards.

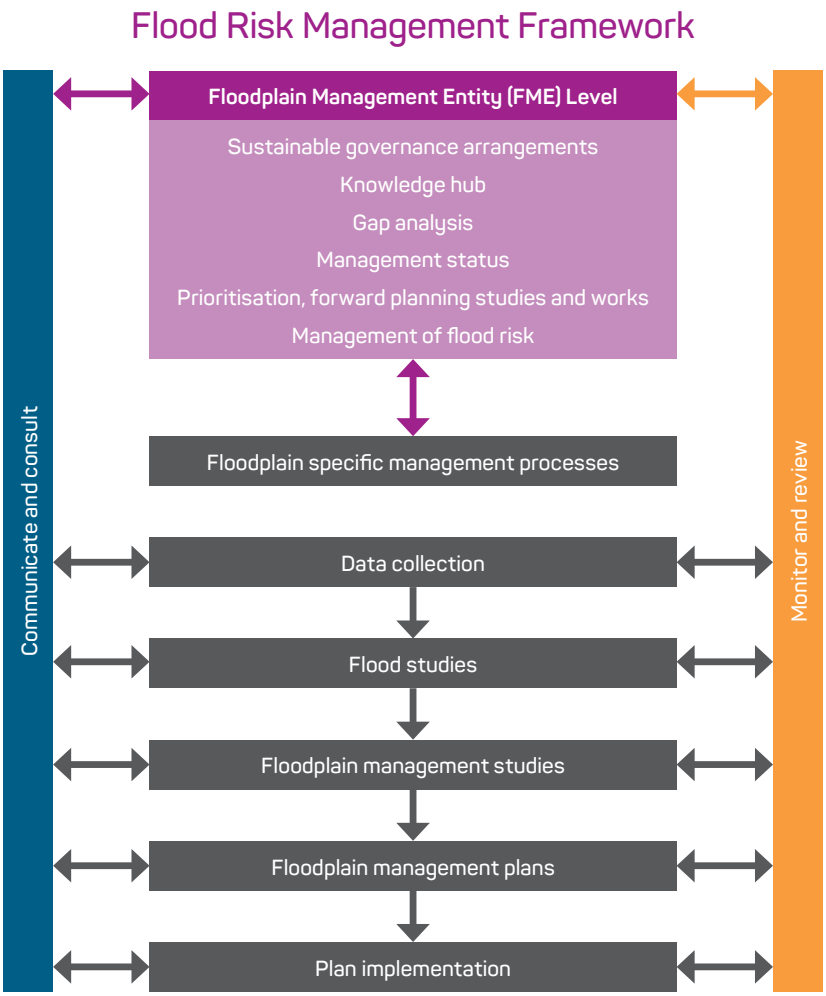


Figure 1.1 The flood risk management framework

1.1 The flood risk management framework

The flood risk management framework is outlined in Figure 1.1 and discussed in Chapter 3. It promotes a risk management approach that facilitates the effective understanding and management of flood risk within a floodplain management entity (FME) service area. An FME is the government entity with primary responsibility for managing flood risk at a location. Other agencies may have complementary responsibilities in areas such as emergency management. The framework encourages the FME to collect, improve and disseminate the best available information on flood behaviour, and associated risks to the community, decision makers and other agencies with a responsibility for managing flood risk. This information may be derived from a floodplain-specific management process and other sources (e.g. historic events and other studies), and by applying approaches of different degrees of sophistication that are fit for purpose. The framework, and its knowledge hub and communication strategy support the availability of this information so that flood risk can be better understood and managed.

The framework builds upon the floodplain management process described in *Floodplain Management in Australia: best practice principles and guidelines* (SCARM 2000) and associated practices that have proved effective and efficient for decades. It provides flexibility for FMEs, which have different levels of resources and information, to manage flood risk and work to improve their knowledge and management practices considering the scale and complexity of the flood threat faced by their communities.

1.2 Principles of a best practice approach to flood risk management

The following sections describe key principles of a best practice approach to flood risk management, upon which the framework is based.

1.2.1 A cooperative approach to manage flood risk

State and Territory governments have a shared responsibility with all levels of government for managing flood risk to local communities. This can be outlined by providing clear and continuous governance arrangements and legislative, financial, logistical and technical support to FMEs in consideration of the full range of flood risk. Each State and Territory should develop and promote a comprehensive flood risk management policy supported by appropriate legislation, regulations, standards, guidelines and planning policies that clearly and unambiguously define the responsibilities and liabilities of all involved agencies. Decision makers at all levels need to be aware of their duty of care for decisions made with respect to the use of the floodplain, and for developing and implementing plans to manage flood risk.

This handbook supports this approach by providing the flood risk management framework (Figure 1.1). Thehandbook can also be supplemented with appropriate administrative and technical guidance developed by jurisdictions, either independently or cooperatively where desired. It supports cooperation in understanding and managing flood risk within a catchment which is important where land use or flood risk management practices in one FME may influence the flood risk in another FME, including across State or Territory boundaries.

1.2.2 A risk management approach

The approach outlined in this handbook is consistent with *Australian Disaster Resilience Handbook 10 - National Emergency Risk Assessment Guidelines* (NERAG) (AIDR 2015), and *ISO 31000:2009 Risk Management – Principles and Guidelines* (International Organization for Standards, 2009). The NERAG provides a contextualised approach for the conduct of risk assessments for emergency events and is consistent with *ISO 31000:2009*.

Where considered more appropriate to the situation, equivalent risk management approaches to those outlined here can be used where consistent with NERAG and *ISO 31000:2009*.

A risk management approach enables investment to be focused on understanding and managing flood risk where it is needed most. Studies and management effort can be targeted considering the current knowledge, the scale of flood risk to existing development, and the potential for growth in flood risk through increased development within the floodplain. Plans to manage risk are 'live documents' and need to be regularly reviewed to ensure that they are current, able to be implemented and consider lessons that may be learnt from any recent flood events.

1.2.3 A proactive approach

A proactive approach involves actively managing the risks of occupying the floodplain. This involves considering the full range of flood risk early in the process of developing strategic land-use plans and in managing risk to the existing community and to infrastructure.

It promotes the development and implementation of sustainable plans to manage flood risk effectively so that the existing community is more resilient to flooding. The community is encouraged to contribute to the understanding of flood behaviour and how risks are managed. Risks may be reduced by treatments where these are practical, feasible, economical and a priority within an FME service area. Community resilience may be improved by increased protection or because the community is better informed on flood risks and how to respond to the flood threat.

Understanding the development capability of the land in relation to the full range of flood risk and considering this in strategic land-use planning can lead to more sustainable floodplain development and improved resilience of future development in communities to flooding. This can lead to areas being set aside from intensification of development:

- to perform their flow conveyance, storage and environmental functions
- to limit the impacts of development on flooding to the existing community

- where flood hazard to new development is not able to be effectively managed.

In areas suitable for intensification of development, the flood risk to the community is managed by limiting the types of development allowable at specific locations considering flood hazard and using development conditions to reduce residual risk to acceptable levels.

Impacts of flooding on infrastructure are managed by using design standards that limit their vulnerability to flooding.

1.2.4 A consultative approach

Public consultation is an important element of understanding and managing flood risk. It can facilitate:

- understanding of flood behaviour by tapping into community knowledge on historic floods
- informing the community of the flood threat they face and how and when to react to this threat
- developing sustainable floodplain management plans that have broad community support.

1.2.5 An informed approach

Knowledge and experience of previous flood events is a starting point for understanding flood risk. However, using this information without understanding the potential range and severity of flood events at a location can result in poor management decisions – leaving the community unsustainably exposed to risk. Information from historic flood events can be improved using investigative techniques and more sophisticated modelling to increase understanding of these events, facilitate extrapolation to provide a greater understanding of the range of flood behaviour and risk, and enable assessment of treatment options to inform management decisions.

It is important that this knowledge be maintained – and, where necessary, improved – so that lessons from previous events and investigations can be used to manage risk into the future. The degree of knowledge required for effective management of risk varies with the:

- exposure of the community to the risk
- potential for growth in risk due to new development
- potential for change in flood behaviour
- complexity of the flood situation
- information needs of decision makers, risk managers and the community.

FMEs need to understand their existing information on flood risk and the knowledge necessary to manage flood risk in their communities so that they can identify knowledge gaps. Examining ways to fill these gaps can inform the scope of investigations. The Queensland Flood Commission of Inquiry (2012) provides advice on a hierarchy of information for use in managing flood risk (discussed in Section 3.3.1).

1.2.6 Supporting informed decisions

It is important that flood information is readily accessible to government (including decision makers, flood risk managers, land-use planners, emergency managers), non-government entities (including infrastructure providers, insurers) and the community to provide the basis for informed decisions on investing in floodplains and managing flood risk.

1.2.7 Recognition that all flood risk cannot be eliminated

The community and government need to recognise that living in the floodplain has an inherent risk, and a residual risk will always exist even after management measures, including mitigation and land-use planning measures, are implemented. The level of this risk will vary depend on how exposed areas of the floodplain are to flooding, the development controls that were in place when the area was developed, and the measures implemented to manage flood risk.

1.2.8 Recognition of individual responsibility

Individuals within the community need to recognise that they are responsible for informing themselves about flood risks and the need, availability and coverage of flood insurance; being aware of how to respond to a flood threat in consideration of community response plans; and heeding the advice of relevant government and emergency management personnel during flood events.

1.3 Key objectives for achieving best practice in flood risk management

The effort required to achieve best practice will vary depending upon the area of interest and current flood risk management practice. It begins with bringing together current knowledge of flood risk and its management, and communicating this to decision makers, risk managers and the community. Where necessary, it then identifies and fills gaps in knowledge and management practices, so that risk can be better understood and managed.

The degree of sophistication necessary to improve knowledge and inform management will vary depending upon the current level of knowledge, the complexity of the flood behaviour in the area and the exposure of the community to flood risk. Improvements in knowledge and management of flood risk are likely to occur over time, depending on need and available resources. Efforts are likely to be concentrated on where flood problems are known to exist and need management, where knowledge is insufficient to understand and manage risk, where exposure is high, or where growth of exposure due to future development is likely to be high.

The flood risk management framework (Figure 1.1 and Chapter 3) provides a robust, fit-for-purpose approach to managing flood risk, and enables an understanding of existing knowledge on flood risk and current management practices. These features can be used to create a platform that works towards achieving the vision and best practice management. To help accomplish this, five key objectives have been identified:

1. develop sustainable governance arrangements for managing flood risk, so that responsibilities for managing this risk are assigned and clearly understood. Sustainable governance arrangements are discussed in Section 3.1
2. make information on flood risk readily available (discussed in Section 3.3), so that government, risk managers and community can make informed risk management and investment decisions
3. understand flood behaviour (Chapter 5) and risk (Chapter 6) to recognise the impacts of floods on the community and enable effective decisions to be made on flood management
4. understand (Section 5.2) and maintain (Chapter 7) the natural flood functions of flow conveyance and storage of the floodplain to enable effective flood risk management and minimise environmental impacts
5. manage flood risk (Chapters 7–9) to improve community resilience to flooding, and to handle the potential growth of this risk through development and redevelopment, and future changes to floodplain topography and climate.

CHAPTER 2

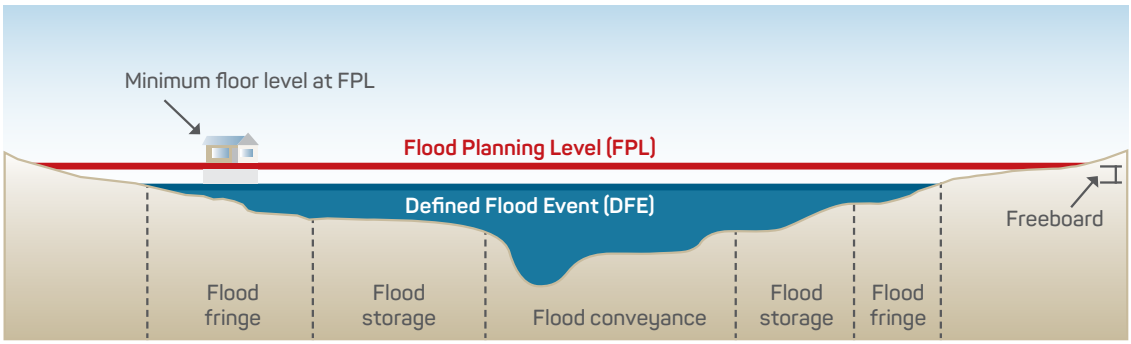
The need for flood risk management

In a nutshell...

Floods are part of the Australian landscape. They occur in many parts of Australia, and their severity varies widely between locations. Floods are of many types and are caused by different mechanisms. They may be exacerbated by human occupancy and activity in the floodplain. Floods have both positive and negative impacts. Positive impacts include inflows to water supplies, sustaining flood-dependent ecosystems and improving soil moistures and fertility for farming. Negative effects mainly occur due to human occupancy of the floodplain, without which there is no flood risk to the community. These negative effects include human fatalities and injuries, as well as economic damage, disruption of individuals' lives and communities' function, and environmental damage. Historically, flood damage is greater than that of any other natural hazard. However, it is also the most manageable disaster, because its behaviour and location can be estimated and considered in decisions. Flood risk management practices vary considerably in Australia. However, it is possible to discern a general trend in which practice has become more strategic in focus. We have recognised that flood risk management must deal with both existing and future development in the floodplain, and must involve the application of the skills of practitioners in many disciplines.

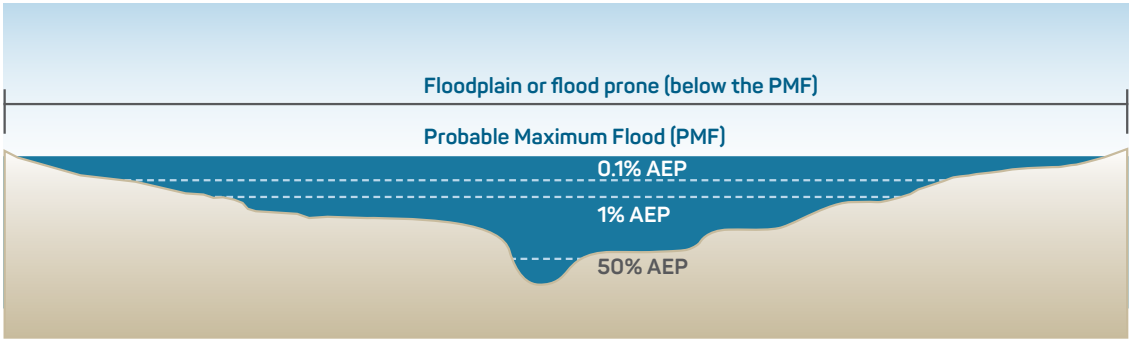
Floods are natural phenomena that occur when water covers land that is usually dry. Floods vary greatly in size and frequency. Small floods may cause a local nuisance in an area each year, or even more often. Larger floods causing significant community impacts may occur at the same location any number of times in a lifetime or, in some cases, not at all. These larger floods are often treated as key events in determining minimum development standards and may be referred to as **defined flood events (DFEs)**. The **probable maximum flood (PMF)** is the largest flood event that could possibly occur in a particular location. It exceeds virtually all flood-related development standards and overwhelms many flood mitigation works, resulting in significant impacts on the community. It causes the largest scale of flood emergency and is therefore often used for emergency management planning. The extent of the PMF defines the largest area deemed to be inundated by floods and generally defines the **floodplain**. These terms are illustrated in Figures 2.1 and 2.2.

Floodplains are important as commercial, social and ecological arteries of the nation. Historically, most of Australia's towns and cities were located on floodplains. This was principally due to reasons associated with water supply, transportation, waste disposal, amenity or recreation; because they were suitable points for river crossings; or to act as service centres for surrounding rural areas. Regular flooding improves agricultural land by increasing soil moisture, recharging groundwater and depositing fertile silts. These benefits mean that a significant proportion of Australia's extensive agricultural output is produced on floodplains.



Note: flood conveyance, flood storage and flood fringe areas vary with the severity of the flood event

Figure 2.1 Defined flood event showing some key terms



AEP = annual exceedance probability

Figure 2.2 Floodplain and probable maximum flood

Floods also produce many deleterious community impacts, especially in urban areas where – for all intents and purposes – there are no beneficial effects of flooding.

Transport-related infrastructure, mining operations and industry are also often partly or completely located on floodplains, which both exposes them to flood risk and raises the possibility that they may contribute to alteration of the natural flood regime.

Since 1788, there have been more than 2300 flood-related fatalities in Australia. Many of these deaths were in isolated incidents. However, a number of floods involved multiple fatalities, including 89 at Gundagai, New South Wales, in 1852; 65 in the Clermont area, Queensland, in 1916; and 47 in Brisbane and Ipswich, Queensland, in 1893 (Coates 1999).

Between 1997 and 2008, there were more than 73 flood-related fatalities (Fitzgerald et al. 2010), and in January 2011, floods in southern Queensland claimed 33 lives (Queensland Floods Commission of Inquiry 2012).

Australia-wide, the overall death rate due to floods decreased from around 24 per 100,000 people per decade in the 1800s, to 0.04 per 100,000 per decade during the 1990s and the first decade of the 21st century. Although the general trend has been for a reduction in flood fatalities, spikes in deaths still occur from time to time, as in 2011. The continuation of the downward trend in deaths, even without any increase in event severity, relies upon continued improvements in flood risk management, land-use planning, building and emergency management practices.

Although deaths have declined, the economic damage caused by floods in Australia has continued to grow as a result of the increasingly intensive human use of floodplains. The built environment, with its public and private infrastructure and buildings, is highly susceptible to the impacts of flooding. The annual average natural disaster relief costs of floods in Australia was $377 million in natural disaster declared areas between 1967 and 1999 (BTRE 2001). The broader cost of floods to the community could be expected to at least double these figures.

The total economic exposure of communities to flooding in Australia is in the order of $100 billion (extrapolated from BTRE 2001, McLuckie et al. 2010). It is estimated that the 2011 Queensland floods temporarily depressed gross domestic product growth by up to 1% (Reserve Bank of Australia 2011). These effects are significantly higher than those of any other type of natural disaster experienced in Australia at the time of publication.

There are hundreds of thousands of dwellings, and large areas of agricultural, commercial and industrial development located within floodplains in Australia. This large scale of development makes the nation and many of its communities vulnerable to flooding. Increasing the scale of development and supporting infrastructure on floodplains can also affect flood behaviour, which may add to the detrimental effects of flooding on existing communities. In many areas, the negative impacts of flooding on communities have been reduced during recent decades. The flood risk management activities guided by predecessors to this handbook – including *Floodplain Management in Australia: Best Practice Principles and Guidelines* (SCARM 2000) and State counterparts – along with the associated efforts of all levels of government to consider flood hazard and behaviour through the floodplain management process have contributed greatly to this trend. The reduction has been uneven, though, both within and between the States and Territories. It is important that these efforts to manage the negative consequences of flooding continue. The exposure of existing developments to flood risk, the growth of flood risk through increased development and redevelopment of floodplains, and the changes in flood behaviour need to continue to be managed.

2.1 Floods and flood hazard

Floods create hazardous conditions to which humans are particularly vulnerable. If floodplains were unoccupied and unused, flooding would not create a risk to the community. It is the human interaction with the floodplain and the associated exposure to flood hazard that creates flood risk.

Fast-flowing, shallow water or slow-flowing, deep water can unbalance people and sweep them away. Similarly, floodwaters can result in significant impacts on the built environment. Structures can be undermined, or have their structural and non-structural elements damaged or destroyed by floodwater and debris. The contents of structures are generally vulnerable to contact with floodwater and can also be severely damaged or destroyed.

Infrastructure required for community functioning is vulnerable to flooding. Road surfaces and substructures, rail lines, airfields, and electrical, water, sewerage, stormwater and communication systems are all susceptible to damage from flooding. Moreover, human-made structures and development can exacerbate the damage caused by flooding. They may alter flood paths, depths and velocities of flow, and add debris to floodwaters.

The safety of people and the susceptibility of development and infrastructure to damage are primarily linked to flood behaviour, which will vary across the floodplain, between flood events of different sizes and across different floodplains. Therefore, it is important to understand the full range of potential flood behaviour to comprehend the vulnerability of the community to flooding. This understanding underpins decisions on managing floodplains.

Flood behaviour varies significantly in Australia (see Figure 2.3). This is in response to differences in location, the types and prevalence of extreme weather, catchment and floodplain topography, vegetation, existing development, the nature of infrastructure in the catchment and on the floodplain, and the features of the waterway. For instance, coastal rivers generally have shorter duration floods that rise sharply compared to inland rivers downstream of the headwaters, where floodwaters generally rise and fall relatively slowly and can last for up to weeks or months.

Significant local flooding can also occur as water flows overland within catchments to watercourses and rivers. This can occur both in urban areas, where artificial drainage (i.e. stormwater) systems are overwhelmed, and in rural areas, where both natural and artificial drainage channels surcharge. Like its predecessor (SCARM 2000), this handbook does not replace the latest version of Australian Rainfall & Runoff (Engineers Australia 1999) in dealing with stormwater systems and local drainage. It does, however, provide a risk-based approach for investigating and managing local overland flooding issues where they may have significant impacts for the community.

For a particular floodplain, flood behaviour can be studied, and the likely location, type and scale of effects for a range of floods can be determined within reasonable accuracy to inform its management. With floods, it is not a matter of if, but when, the flood will occur. Understanding flood behaviour, including potential alterations due to changes in climate or catchment development, enables us to assess the likely impact of flooding on the community and examine options to manage the community's exposure to flood risk.

Source: based on Middelmann et al. (2007)

Figure 2.3: Flooding mechanisms across Australia

2.2 The evolution of floodplain management in Australia

Floodplain management, defined as a deliberate effort to reduce the harmful effects of flooding, commenced early in the occupation of Australia. Its beginnings can be seen in the early 1800s; in particular, in the 1810 edict of Governor Lachlan Macquarie, which followed a series of fatal and damaging floods in the Hawkesbury – Nepean Valley west of Sydney. The edict assigned each settler whose farm was within the influence of known flooding an allotment on high land within a township for a dwelling, office, garden, storage and stockyard. The assignment was on the clear understanding that these allotments were to be inseparable from the farms – that is, they were to be part of the ownership of the farm. Macquarie's intention was that settlers would live on the allotments, commuting to their actual farmlands to tend their animals and crops.

However, seven years and several floods later, there is evidence that the expected change in behaviour had not occurred. A subsequent 1817 edict by Macquarie indicated that the settlers had ignored frequent advice to move their residences to townships on high ground, and had consequently incurred further flood losses. The second edict expressed the hope that recent losses would spur settlers into action to protect their own futures, and indicated that those who followed the advice provided would obtain favourable consideration and protection from the government.

Floodplain management in Australia evolved from this point through a number of phases whose timing varied in different areas. Some change involved the efforts of individuals, but over time, all levels of government became involved in flood management initiatives.

Since the mid-19th century, farmers in some areas built levees to keep floodwaters off their land, and some communities constructed levees and drains to exclude floodwaters and speed drainage after heavy rains. Severe flooding in the 1950s resulted in the construction of substantial flood mitigation works in eastern Australia, particularly in New South Wales. Further severe floods in the eastern states in the 1970s caused large-scale

and widespread damage, and a further focus on flood mitigation, including dam construction to reduce, at least in part, downstream flood impacts. At the same time, Western Australia initiated a floodplain management program and the Northern Territory adopted an interim floodplain management policy. These initiatives were not all effective, largely because:

- there was a lack of appreciation of the range of potential flood severity for many years
- attempts to manage floods were generally uncoordinated
- there was little understanding of the varying types of approach that were best suited to particular environments.

In addition, some measures that were taken in earlier times exacerbated the damage done by flooding to both development and the environment.

Despite such failures, flood mitigation works did reduce negative impacts of flooding in many areas. Yet community exposure to flood risk had, in many instances, continued to grow, because floodplain development continued to intensify. The importance of land-use planning and development controls for the effective management of flood risk was gradually recognised. The focus on structural flood mitigation works was broadened to include development controls aimed at reducing the growth of unsustainable flood risk to the community.

There has also been an increased focus on environmental issues and on taking a more holistic approach to floodplain management. Since the 1970s, and particularly since the early 1980s, floodplain management in Australia has included:

- adopting a risk management approach that considers the impacts of the full range of floods up to, and including, the PMF
- using different land-use planning practices to limit the risk that will be created through the future development of floodplains
- recognising, communicating and managing the residual risk that continues to exist where the protection provided by development controls and/or flood mitigation works are overwhelmed
- developing more accurate and timely flood warning and emergency management capabilities
- developing recovery planning to improve community responses to, and recovery from, flood disasters
- considering cultural and environmental issues and community views when assessing flood mitigation and other flood risk management measures.

This increasingly strategic approach to flood risk management continues today. It requires a coordinated multidisciplinary effort across all levels of government, and between agencies and departments with different responsibilities. It also requires the support of non-government organisations and professionals in a wide range of industries. It is ideally undertaken by the interactive efforts of multidisciplinary teams of hydrologists, floodplain managers, engineers, emergency response managers, land-use planners and environmental managers who engage with and consult the community. The outcome is advice to decision makers on how to manage the risk of flooding to the existing and future community, and to the supporting built environment in consideration of community aspirations.

Using a strategic approach allows robust management plans and measures to be developed, which can consider changing risk due to influences such as better data, improved analysis methods, changing climate and intensification of development. Such an approach supports sustainable management and long-term community resilience.

However, even today flood risk management practice varies greatly around Australia, not just at a state or territory level, but at regional and local levels, as floodplain management entities are at different points on a path towards best practice. This variation occurs due to various factors, including societal, governance and resourcing priorities, and the differing severity of flood risk across Australia.

The *National Strategy for Disaster Resilience* (COAG 2011) outlines that, given the increasing regularity and severity of natural disasters, Australian governments have recognised that a national, coordinated and cooperative effort is required to improve Australia's capacity to withstand and recover from emergencies and disasters. A disaster-resilient community is one that works together to understand and manage the risks that it confronts. Disaster resilience is the collective responsibility of all sectors of society, including all levels of government, business, the non-government sector and individuals. If all these sectors work together with a united focus and a shared sense of responsibility to improve disaster resilience, they will be far more effective than the individual efforts of any one sector.

CHAPTER 3

The flood risk management framework

In a nutshell...

The flood risk management framework provides a basis for a floodplain management entity (FME) – the government agency with primary responsibility for managing flood risk in the area to improve management of flood risk for its community. The framework can help FMEs to:

- understand flood risk management roles and responsibilities, and engage the relevant agencies in understanding and managing risk
- understand relevant legislation, regulations, policies, directions and guidance
- consider the community profile, including vulnerability and exposure to flood risk
- gather and use the best available information
- assess gaps in knowledge and manage flood risk, and make informed decisions about these issues
- develop and implement plans to improve knowledge and management of flood risk
- make informed decisions on development within the floodplain
- consult with the community and key stakeholders.

This can provide the basis for informed decision making by the community, flood risk managers, land-use planners and emergency managers for managing floods or investing in development on the floodplain. There are many treatment options available; however, they must be chosen carefully to suit individual locations within the floodplain, and consider the full range of potential flooding and its impacts upon the community and built environment.

Risk management processes assist risk managers to identify and analyse risks systematically, and to develop measures to treat them, where necessary. The aim is to produce more reliable planning and greater certainty about management outcomes, and to improve decision making. *ISO 31000:2009* (International Organization for Standards 2009) provides a detailed guide for developing a principle-based risk management framework and implementing a risk management process. The value of this approach is incorporated into ADR Handbook 10 NERAG, which has been considered in developing the flood risk management framework to help manage flood risk across a floodplain management entity (FME). The flood risk management framework is illustrated in Figure 3.1.

An understanding of flood risk is generally developed for an individual floodplain or catchment. Risk management is generally undertaken based upon the administrative boundaries of an FME, which may span multiple catchments and involve a range of different types of flood problems. The framework supports managing flood risk across an FME by:

- providing a basis for establishing, monitoring, maintaining and communicating the sustainable governance arrangements with which the FME manages flood risk (Section 3.1). This includes relevant roles and responsibilities and the legislative and policy framework
- considering the profile of the community living in the floodplain. Community vulnerability and exposure to flooding may influence management decisions. It is therefore important to understand the community profile, as different sections of the community are more vulnerable to floods
- providing a structure for the FME to oversee flood risk management, and to access available technical and policy advice from relevant State or Territory agencies (Section 3.2)

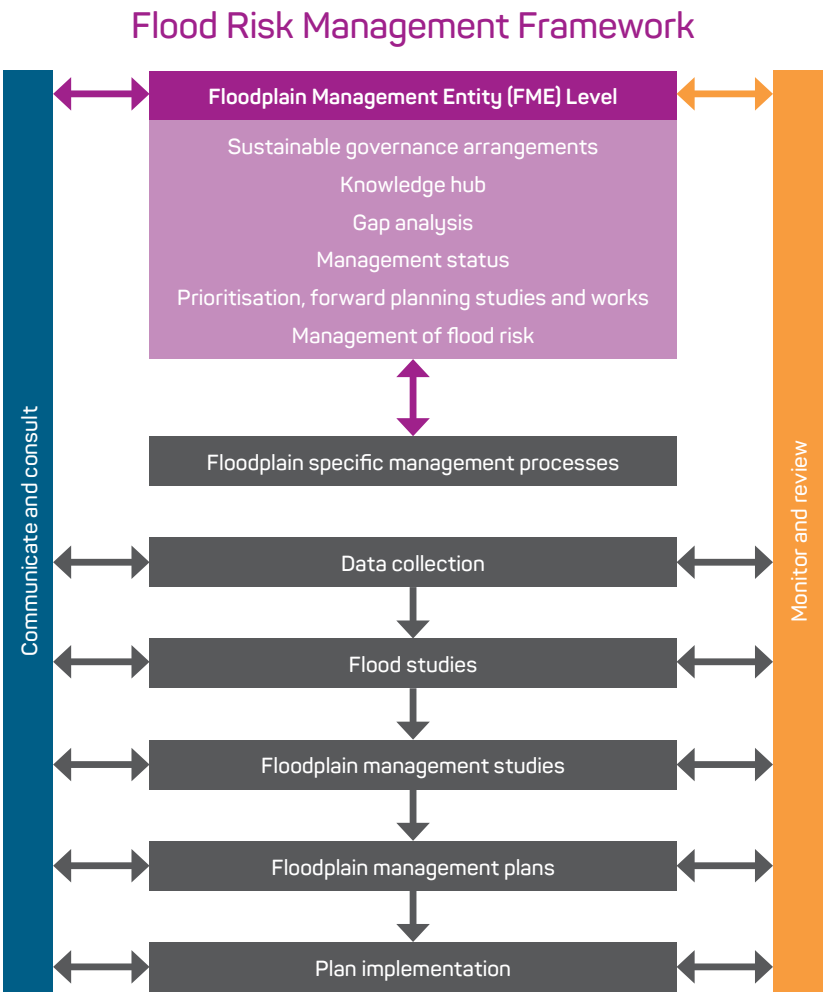


Figure 3.1: The flood risk management framework

- providing the basis for collating, maintaining, using and sharing the best available information on flood risk and management, through the knowledge hub (Section 3.3). The framework promotes the communication of this information within government to inform decision makers in land-use planning, flood risk management, flood forecasting and warning, emergency response and recovery management. It also provides the basis for communicating information to the community in a consistent format, which promotes improved community knowledge of, and resilience to, flooding
- outlining the importance of consulting the community (Section 3.4) to gather their knowledge of flood risk and obtain input on strategies to manage this risk
- providing a basis for monitoring and reviewing the current knowledge and management of risk, and assessing and prioritising efforts and resources to fill gaps in the short and long term (Section 3.5)
- linking floodplain-specific management processes to management of flood risk at an FME level. Existing studies provide the basis of current knowledge and future studies can address gaps in knowledge or flood risk management in the short and long term (Section 3.6).

This chapter provides advice on the development and implementation of the flood risk management framework.

3.1 Developing sustainable governance arrangements

The success of risk management depends on '*...the effectiveness of the management framework providing the foundations and arrangements that will embed it throughout the organisation at all levels' (AS/NZS ISO 31000 Risk Management – principles and guidelines).*

Therefore, to manage flood risk effectively, it is important to determine the administrative, legislative and policy framework within which flood risk needs to be managed. The development, monitoring, maintenance and ready availability of sustainable governance arrangements that support partnerships in the effective management of flood risk is a key objective in achieving best practice in flood risk management. This involves developing sustainable governance arrangements that consider the roles and responsibilities outlined in Chapter 4. These arrangements need to:

- provide clarity about and communicate flood risk management roles, responsibilities and liabilities, ensuring that the various roles and responsibilities of government, the community, industry and non-government organisations are defined and integrated effectively across the prevention, preparedness, response and recovery phases of managing floods
- outline effective links between flood risk management, flood forecasting, flood warning, emergency management and land-use planning in decision making, to manage the full range of flood risk to the existing and future community
- encourage a proactive and cooperative approach across governments to manage flood risk before events happen (e.g. by land-use planning, mitigation works, flood warnings, building controls and emergency management planning) rather than focusing on emergency response and recovery
- encourage the local community and individuals to take responsibility for their actions when developing the floodplain and responding to flood events
- outline the support available to local communities to help with flood risk management
- encourage the development of performance indicators, and the monitoring, review and continuous improvement of the understanding and management of flood risk.

Sustainable governance arrangements should also outline the legislative and policy framework that contributes to flood risk management to the local community. This framework needs to identify relevant Australian, State or Territory, and local:

- legislation, regulations, standards, codes, policies and directions
- administrative and technical guidance
- land-use planning strategies
- statutory planning instruments and development control plans and policies
- emergency management plans
- recovery arrangements.

State and Territory governments have a shared responsibility with all levels of government for managing the flood risk of local communities within their jurisdictions. However, as governance arrangements vary between jurisdictions it is recommended that they each develop, monitor, and maintain guidance that outlines these arrangements and make this readily accessible within their jurisdiction.

This advice could be used to inform local governance arrangements, which should also outline local roles and responsibilities and any local standards, policies, guidance, direction and plans that influence the management of flood risk. Where State or Territory advice is not available, consultation with relevant agencies should provide an understanding of the assistance available, the legislation and policies to be considered, and the information they need to fulfil their management role.

3.2 Overseeing the flood risk management framework

The FME responsible for managing flood risk would generally develop local governance arrangements and develop and implement the flood risk management framework for its service area. This would generally be managed from within the FME and be overseen by an administrative committee that can make decisions on cross-catchment priorities, and forward plans and budgets for studies and works. It should also be able to provide input into strategic land-use planning processes.

For floodplain-specific studies, a flood risk management committee may be established to oversee development and implementation of management plans. This committee needs to be fit for purpose for the scale and scope of the problem it is addressing and the associated investigations. The flood risk management committee would be overseen and advised by a FME administrative committee, who would consider recommendations from the flood risk management committee in their decision making.

The membership of a broad flood risk management committee could include a balanced mix of:

- FME staff, to provide the technical knowledge, and project management and administrative skills needed to develop and implement the management plan
- representatives from other agencies with responsibilities for supporting management plan development and/or implementing decisions
- decision makers, who may include elected representatives of the relevant FME administrative committee, who are likely to be making management decisions
- community representatives from affected residential and commercial areas or key community groups, who provide a direct linkage to the community and thus facilitate consultation. They have a legitimate role in representing community concerns and issues, and in fostering community ownership of the management plan. They should not be seen as having a conflict of interest that would affect impartiality.

Where the catchment boundaries go beyond the FME service area, and development or flood risk management within different FMEs will influence flood behaviour in each other, consideration should be given to establishing a joint committee with representatives of each FME. This can result in a more holistic appraisal of flooding and associated issues across the catchment, and help the successful implementation of management strategies.

A flood risk management committee can provide a focus and forum for the discussion of technical, social, economic, cultural and environmental issues, and for the distillation of possibly differing viewpoints on these issues into a management plan. It could advise the FME on progress in developing the plan and any issues arising during the process. It would also inform the community on the process, and facilitate community consultation at appropriate points in the investigations.

Flood risk management committee membership is likely to change during the development and implementation of the plan to reflect the requirements of particular points in the process. It is likely that only a small group of agencies directly responsible for implementing or supporting the implementation of the plan will oversee implementation. The FME would be expected to inform the community on progress in implementing the plan and associated issues.

A flood risk management committee may be supported by a sub-committee involving technical staff of the FME and other relevant agencies.

Where established, the sub- committee could support the committee on technical issues, in particular hydrology and hydraulics, flood mitigation, emergency management and land-use planning. It could be considered as the 'engine room' to establish and drive the process for the broader committee.

3.3 Making flood information readily available and reusable

Making flood risk information readily available and useable is essential to delivering the vision for flood risk management in Australia. It facilitates informed decisions by government, industry and the community on managing flood risk and investing in the floodplain. To achieve this, it is important to:

- make the best available information on flood risk openly, transparently and inclusively available to promote community flood resilience and support informed decision making. This information may go beyond that available within reports which generally contain a summary of the key information derived from an investigation.
- encourage procurement and publishing practices that use the least restrictive intellectual property and copyright licenses to support sharing, linking and reuse of information that benefits multiple stakeholders
- collect and maintain data – including post-event data collection and information, and outputs from floodplain-specific investigations – to achieve a better understanding and management of flood risk into the future
- encourage use of consistent terminology and mapping standards to help achieve a better understanding of flood risk by the community
- develop information to aid the understanding and strategic management of flood risk and provision of this information to key end users and decision makers (e.g. flood risk managers, emergency managers, land-use planners, infrastructure providers, insurers and the community) in a format that suits their needs and is consistent with the level of flood risk
- support initiatives that inform education and engagement measures that will enhance community resilience to flood
- highlight that it is the responsibility of the local community and individuals to inform themselves about their flood risks.

Table 3.1: Hierarchy of comprehensive to simplistic information development methodsa

Complex to simple	Output	Method type
1	Flood maps that depict flood characteristics (including extents, flood function and hazard)	Study deriving all modelled probabilities, flood function, hazards and evacuation
2	Flood maps that depict a number of different levels of flood likelihood	Study deriving maps for all modelled probabilities
3	Single probability flood map. For example, 1% annual exceedance probability, AEP, probability flood map	Study deriving in single probability flood map; for example, 1% AEP flood map
4	Simplified flood modelling	Simplified assessment based upon readily available or derivable information
5	Mapping of historic events accompanied by a flood frequency analysis	
6	Mapping of historic events without a flood frequency analysis	
7	Maps based on topographical or geological information	

a Considers the Queensland Flood Commission of Inquiry (2012)

3.3.1 Establishing and maintaining a knowledge hub

Up-to-date knowledge of flood risk and its management is essential to facilitate informed decisions on investment in the floodplain, and to manage gaps in knowledge and management. At an FME scale, the best available information on flood risk and its management is likely to be derived from collating data from different sources, and developed using different methodologies and to different standards. A hierarchy of complex to simplistic methods of data collection is provided in Table 3.1.

A knowledge hub can aid collation of knowledge on flood risk and its management within an FME service area and communication of this information to the community and decision makers. It can bring together information from historic events and floodplain- specific studies (Chapters 10–13) and more simplified methods, and incorporate knowledge on proposed and implemented treatment measures. It can provide a basis for identifying knowledge and management gaps.

Conveying flood risk information is best achieved through spatial tools, such as maps with supporting information. The ability to aggregate, convey and use this information for monitoring understanding and management of risk can be improved if:

- the information is transparent and openly available
- the basis, limitations and context are clear
- consistent terminology and formats are used
- output is generally tailored to broad end-user needs
- there is differentiation between degrees of impact
- treatment measures and their limitations are considered
- the information is monitored, maintained and continually improved
- the information avoids inadvertently giving the impression that no flood risk exists in an area when risk may exist above an arbitrary design standard
- it considers factors that may affect risk significantly into the future.

Developing a knowledge hub may be simple – for example:

- Bring the best available flood information into one location with a simple plan outlining where information exists (see Figure 3.2), a source for the data for further investigation and an understanding of the quality of the data. This may include a combination of information from historic floods and flood investigations of varying qualities. It is important to consider the quality and limitations of different sources in their use in managing risk
- Develop an understanding of the vulnerability of the community to the flood threat, and how this may vary across the floodplain and between catchments. This may be derived from studies and historic data, and can help inform decisions on the need for further investigations and management
- Develop an understanding of the current measures in place to manage flood risk (mitigation measures, land-use and emergency management planning), so that these are understood and can be considered in decision making. It is also important to understand proposed measures recommended in studies that have not been implemented

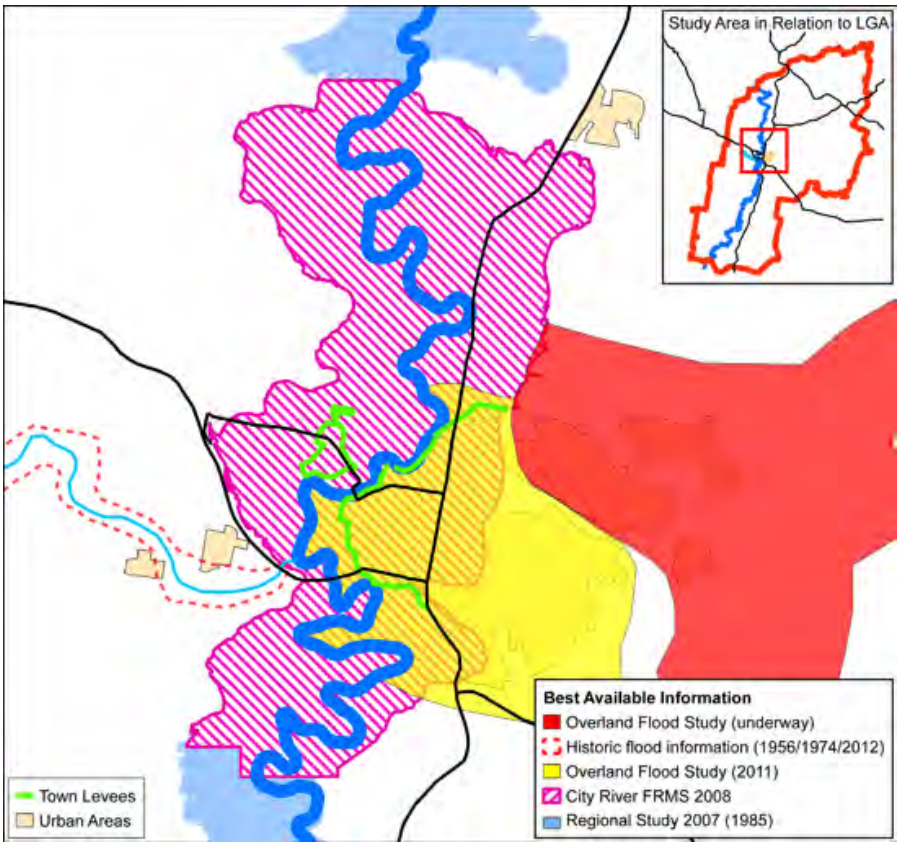


Figure 3.2: Example of best available information from different sources

- Maintain a register of data so that updates and changes can be tracked and communicated as necessary. Data are likely to be of varying quality, so when aggregating data, it is important to identify their source and reliability so that these are readily understood. This should include the methodology used to obtain or analyse the data, so the end users can determine to what degree they can rely on the information. The register should identify any intellectual property limitations on the data.

If the FME considered it necessary, the knowledge hub could be more sophisticated, such as a spatially based database of information. The hub could also store other relevant data (Queensland Flood Commission of Inquiry 2012), including the data listed as necessary for the completion of a flood study. Specifications for data collection should aim to enable the broad use across government where feasible, practical and cost-effective.

The knowledge hub should be updated where improved knowledge on flood risk or its management becomes available, and as treatment measures are implemented. It should be maintained with the best available information and reference current investigations so these can be considered, where warranted. Updating the hub's information may trigger the need for updated advice to the community and stakeholders. This may be facilitated with the development of a communication plan (Section 3.3.4) outlining when and how different stakeholders are informed.

3.3.2 Data storage

Significant amounts of data are collected during the floodplain-specific management process and for the development of a knowledge hub. The long-term storage of these data, the associated formats and means of providing ready access to the information should be considered as part of the specification for data collection (Chapter 10).

Each jurisdiction should consider whether such a system is centralised or locally based, or a mixture of the two, and what form of data-sharing agreements are appropriate. This is particularly important for emergency management agencies who respond to major flood events covering large areas, where flood data and intelligence needs to be shared. Key considerations will be the source, type, and format; data custodianship; and availability.

As a minimum, data storage could involve a repository of raw data (with appropriate management of any copyright issues), which can then be processed when required (e.g. for a flood study). This could be supplemented by more comprehensive spatially based processed data in a format that enables them to be readily used for studies and other purposes (e.g. generating maps). Data should be collected and stored in a manner that enables production of outputs from the process, and in formats to suit the interaction with relevant government databases and information systems. Information should be made readily available to those involved in managing flood risk, and specifying and completing flood investigations.

3.3.3 Using the information in the knowledge hub

The information in the hub could be used for a range of strategic purposes, such as for developing an FME-wide or broader scale understanding of the flood risk and how this is being managed. This provides an opportunity to identify and assess gaps in knowledge and management (both in coverage and in adequacy) so that consideration could be given to how these can be managed. This can inform forward planning, including resources allocation to improve knowledge and management of flood risk.

The knowledge hub could also inform the development of land-use planning, flood risk management and emergency management planning strategies, inform decisions to invest in public and/or private infrastructure and development within the floodplain and on insurance.

Managing gaps in knowledge

It is likely that there will be gaps in the knowledge of flood risk across an entire FME. These gaps may relate to the availability of data, the quality of the available data and the data's ability to support effective management through land-use planning, flood risk management, and emergency response and recovery. The significance of these gaps will depend upon a range of factors, which could include:

- the existing settlement and investment patterns, and, therefore, the scale of existing development within the floodplain and its exposure to flood risk
- the future settlement and investment patterns, and, therefore, the scale and desired location of future growth within the floodplain
- the capability of the existing data to support effective management measures to limit the flood risk to existing and future property and ensure that the impacts of new development on flood behaviour and the associated flow-on effects to existing development are effectively managed
- the existence of effective management measures.

Gaps in knowledge need to be identified and understood so that these can be managed to limit growth of risk through new development within the floodplain. A strategy to deal with gaps needs to be developed, and may involve assessing the relative priority for detailed investigations considering the significance of the gaps.

Identifying gaps could also involve instigating simplistic or interim approaches to identify broad areas of interest where flood risk needs to be considered in land-use and flood emergency response planning. This can inform development decisions to limit growth of flood risk in the short term, while further consideration is given to the long-term management needs. Such approaches may include the conservative use of the best available information and simplified methods that allow rapid evaluation of flood risk, at the expense of reliability and a full understanding of flood risk. These methods have a very valid place in informing the knowledge hub to support interim arrangements and may represent the first step in addressing flood risk that can be improved over time. They may also be adequate, within their reliability limits, to provide sufficient information to manage flood risk in locations where flood risk, population and development pressure is limited.

The type of simplified method selected (see Table 3.1 for a hierarchy of mapping outputs) needs to be fit for purpose for the circumstance for which it is proposed to be used. The benefit in using simplified methods in appropriate situations means that an FME may be able to:

- limit growth in risk – these approaches may require proposals for new development and major investment projects to undertake detailed flood investigations early in their feasibility assessments to ensure they are appropriately located and conditioned. This will facilitate effective long-term management of on-site risk and limit impacts to other development
- prioritise funding for detailed studies in locations at higher risk, improve the baseline flood information available in lower risk areas and continue to improve the FME-wide understanding of flood risk over time.

However, in most locations, particularly where populations are larger, the floodplain is more complex and development pressures are greater. Simplified methods may not provide sufficient information for the long-term management of the floodplain. Because these methods do not provide robust estimates of flood probability or flood risk, they need to be used in a conservative way or may fail to protect parts of the community. Where they are used in a conservative way, they often foster strong community resentment because reasonable use of the floodplain is restricted. Simplified methods, therefore, should not be used as the basis for not undertaking detailed flood investigations where a major community is at risk, existing risk is not adequately managed, redevelopment is occurring or major mitigation investments are being considered.

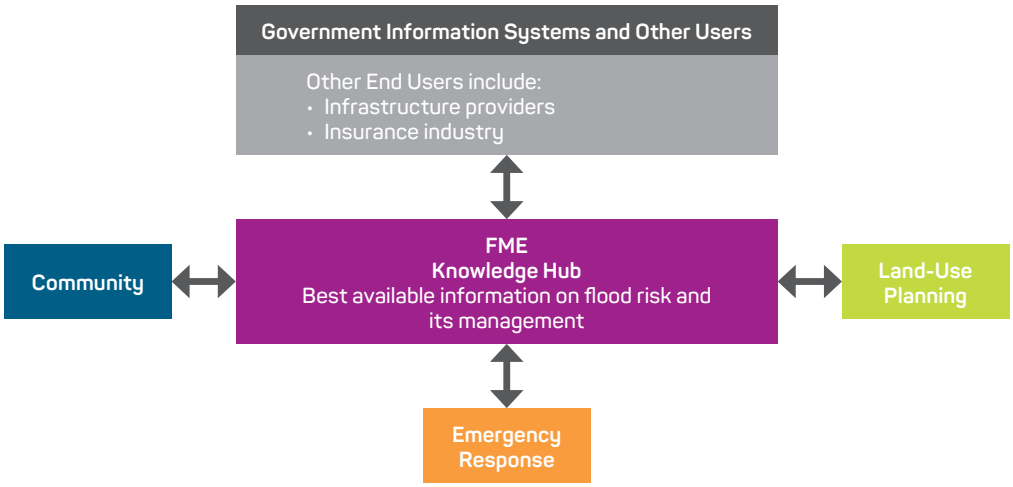


Figure 3.3 Communication from the knowledge hub

It also important to recognise that the use of the information derived from these methods beyond their reliability limits could result in ill-informed decisions leading to poor risk management outcomes. In addition, these methods may be limited in meeting the needs of end users such as emergency managers, land-use planners and flood risk managers, particularly where unique local conditions require a detailed understanding of flood risk. These methods are also generally unable to deal with cumulative catchment or floodplain changes, which may impact on flood behaviour and risk to existing development.

Therefore, in the long term, simplified methods used conservatively, and with clear knowledge and understanding of their limitations, are only likely to be adequate to deal with flood risk management in areas with little existing risk exposure and little potential for future settlement or investment growth. Beyond these limits, more rigorous approaches, such as outlined in the floodplain-specific management process (Section 3.6), provide a more informed basis to manage flood risk through a process of continuous improvement.

Finally, gap identification could include developing and implementing a prioritised forward plan to progress detailed investigations through the floodplain-specific management process (see Section 3.6 and Chapters 10–13).

Managing gaps in flood risk management

Flood risk management and land-use and emergency response management planning may contain gaps, which could result in levels of residual flood risk that are unacceptable to the community.

The knowledge hub can provide a basis for understanding existing and proposed treatment measures, and identifying where additional treatment may be necessary. This information can be used to create a prioritised forward program of investigations that can assess and recommend practical, feasible and economically viable options to reduce residual risk.

Making informed decisions on treatment options relies on a detailed understanding of flood behaviour and its impacts, and the effectiveness, benefits, costs and limitations of various management measures. Options are usually assessed in a floodplain management study (Chapter 12) or equivalent assessment. The treatment of risk, including the selection of options, is discussed in Chapter 7. Where the knowledge hub includes information on proposed treatments, this may assist with the FME-wide prioritisation of treatment options.

3.3.4 Communicating information from the knowledge hub

Communication is fundamental for sharing information about flood risk within government and to the community. This information can inform flood risk management, emergency management, land-use planning and investment decisions. It is also an essential element of floodplain-specific management process. The knowledge hub aims to support communication by providing a basis for developing and maintaining the best available information on flood risk and its management within the FME, and making this information available to decision makers in government and the community (Figure 3.3).

A simple communication plan may facilitate dissemination of information. This plan may identify when and how to make information available to different stakeholders and the community, such as through a website or provided directly to those managing government systems. The plan may also identify key points where proactive communication is important. For example, it is important that land use, emergency management and recovery planners are made aware of the construction of treatment measures as these may change the management of and/or response to floods.

3.4 Consultation

Consultation is fundamental to the successful delivery of flood risk management to the community. It should be undertaken with internal and external stakeholders during all stages of the floodplain-specific management process. It may also play an important role in developing an improved understanding of historic floods to feed into gap analysis. Design and implementation of an effective consultation strategy should enable:

- gathering information from the community, stakeholders and other agencies so that a reasonably clear picture can be put together about historic flooding, and the vulnerability of people and the built environment to past floods
- understanding the information needs of those who have a role in managing flood risk or facilitating community recovery
- gathering information on treatment options that the community may feel will reduce their flood risk and gauge community support for potential options
- informing the community and key groups on the progress and outcomes of studies, and on management decisions.

It is important to ensure that all those who need to be involved (i.e. those with responsibility for managing flood risk and those with a vested interest in its management, such as property owners) are kept informed and invited to contribute to the process to establish a common understanding of flood risk and how decisions are made. Effective engagement will improve risk management. Stakeholders may tend to make judgements about risk based solely on their own perceptions. These perceptions can vary due to differences in values, needs, assumptions, concepts, concerns and degrees of knowledge. Stakeholders' views can have a significant impact on the decisions made, so it is important that differences in their perceptions of risk be identified, recorded and addressed.

3.5 Monitoring and review

Monitoring and review is an important part of managing flood risk, and completes the risk management framework. These steps ensure that assumptions, methods, data sources, results and reasons for decisions are subject to regular checks. These checks should consider changes in our understanding of flooding, its impacts or its management, lessons learnt from flood events, and trends in changes of exposure or vulnerability. Such checks keep the overall understanding of flood risk and management measures relevant and up to date. These checks also assist with reporting against key performance indicators (KPIs). Establishing KPIs can help assess progress toward understanding and managing flood risk. KPIs will differ depending upon the roles and responsibilities in managing flood risk, and may include the:

- percentage of area that is zoned for development within the floodplain where flood information is available for strategic land-use planning and to the community
- percentage of developed area in the floodplain supported by emergency management plans
- percentage of properties that have experienced above-floor flooding in key flood events
- number of high-priority treatments identified in management plans, and the percentage implemented
- number of properties that are protected by mitigation works and the level of protection provided.

The agreed processes and outputs of monitoring and review should be recorded and reported. They form an important part of the review cycle for the risk management framework. The FME should develop systems to monitor risk and management gaps so that these can be prioritised and addressed.

Monitoring should help provide up-to-date advice to decision makers and others on the effectiveness of flood risk management, and where implementation may be impeded. Any setbacks with successful implementation may mean the management plans need to be reviewed to see if the obstacles can be overcome or whether other options may be viable and require further investigation.

3.6 Floodplain-specific management process

Floodplain management in an FME relies on consolidated knowledge of flood risk and its management from historic information and studies, which generally relate to a more limited area such as a catchment, floodplain or study area.

The floodplain-specific management process (Figure 10.1) is a portion of the flood risk management framework (Figure 3.1) that generally aims to consider flood risk in detail at the floodplain scale rather than at an FME scale. It is a mature risk management process that, when used, has provided the information necessary to support informed decision making across the spectrum of land-use planning, emergency management and flood risk management for specific floodplains for decades. Where considered more appropriate to the situation, equivalent risk management approaches can be used (see Section 1.2.2).

The process involves a series of related interdependent steps aimed at developing and implementing a management plan to manage risk in a specific area. Section C provides general guidance on how to implement the process. However, as the flood behaviour, topography, development conditions, population and social context of each floodplain are unique, the application of the process needs to be flexible to be fit for purpose. For example, the complexity of modelling methods can vary with the flood behaviour and exposure of the current and potential future community to flooding. There are also situations where some process stages may be combined into a single project for cost and time efficiency. In such projects, strong 'hold points', beyond which work cannot progress without approval, are recommended at critical points in the project. For example, it would be unwise to evaluate flood mitigation options before the community has validated the results of modelling against a known flood, as individuals or communities may dispute the model results.

The process and its stages generally lead to improved information on flood risk and management options which can feed into the knowledge hub. The knowledge hub can then enable dissemination of this information to the community and relevant stakeholders, as well as facilitate forward planning and cross-catchment prioritisation of risk management projects.

3.7 Considering other related management processes

Good floodplain management cannot occur in isolation. It is important for the FME and those overseeing the flood risk management framework to interact with other management and planning processes (such as land-use, infrastructure, emergency management and catchment management planning) occurring within the catchment. The information available and decisions made will influence one another. Therefore, it is important for those responsible for these processes to effectively engage and communicate to ensure that information is shared and decisions are cognisant of other relevant issues. To facilitate informed decision, flood investigations to inform strategic land use or infrastructure planning should be cognisant of existing flood information and be undertaken prior to, or in the early stages of, the planning process. This can ensure that flood conveyance and storage are considered in decisions, any changes to the flood risk to existing development are managed, and the residual risk to the new development or infrastructure is managed.

CHAPTER 4

Roles and responsibilities

In a nutshell...

Managing flood risk to the community requires cooperation across all levels of government, and between the government and non-government sector. States and Territories have a shared responsibility with all levels of government for managing flood risk. They do this through administrative arrangements, which vary between jurisdictions. It is important for State and Territory policy frameworks to delineate clearly responsibilities and linkages across all necessary prevention, preparedness, response and recovery functions. This may require legislation.

The review *Natural Disasters in Australia: reforming mitigation, relief and recovery arrangements* (COAG 2002) outlines the benefits of cooperation between all levels of government. More recently, the Council of Australian Governments recognised that a national, coordinated and cooperative effort is required to increase Australia's capacity to withstand and recover from emergencies and disasters. Disaster resilience is a shared responsibility (COAG 2011); in 2011, Police and Emergency Management Ministers committed to leading governments towards a national, integrated approach to building disaster resilience, and delivering sustained behavioural change and enduring partnerships across Australia (Police and Emergency Management Ministers Meeting Communiqué 2011). The Standing Council on Police and Emergency Management (SCPEM) is now responsible for implementing the *National Strategy for Disaster Resilience* (COAG 2011).

Flood risk management is complex, and therefore requires access to a range of different skills and disciplines, which reside in a variety of agencies and across government levels. Government flood risk managers may use in-house or outsourced hydrology and hydraulics skills to provide information on flood behaviour, which is then used to:

- understand the impacts of floods on the community
- analyse mitigation and management options by flood risk managers
- investigate, design, construct and maintain mitigation works by engineers
- inform land-use planners, so they can consider varying flood hazard and flood function in establishing zonings, and develop controls in planning instruments
- improve flood predictions and warnings by flood forecasters
- improve flood intelligence, and incorporate this into emergency management planning and response activities by emergency managers
- inform agencies involved in flood recovery to help them locate recovery centres and determine the resources needed to assist the community in flood recovery
- facilitate informed decisions for floodplain development or flood risk treatment
- provide information to the community on flood risk and emergency response.

These different activities require specialist skills, because flood risk management needs to inform a variety of decision makers and the community. For example, flood risk managers need a range of technical, hydrologic, hydraulic, negotiation and consultation skills to understand and manage flood hazard, facilitate trade-offs within the community, educate the community about flood risk, develop management strategies and investigate, design, construct and maintain mitigation works. Land-use planners need expertise in town planning, strategic land-use planning and conflict resolution given that they need to manage competing land-use objectives. Emergency response managers need skills in emergency response planning and logistics, community education and data management. Flood recovery managers require knowledge in financial and social counselling.

4.1 Government responsibility

Australian governments are working collectively to incorporate the principle of disaster resilience into aspects of natural disaster arrangements. The *National Strategy for Disaster Resilience* (COAG 2011) identified that governments, at all levels, have a significant role in strengthening the nation's resilience to disasters by:

- developing and implementing effective, risk-based land management and planning arrangements and other mitigation activities
- having effective arrangements in place to inform people about how to assess risks and reduce exposure and vulnerability to hazards
- having clear and effective education programs so people understand what options are available to them, and what the best course of action is when responding to an approaching hazard
- supporting individuals and communities to prepare for extreme events
- ensuring the most effective, well-coordinated responses from emergency services and volunteers when a disaster hits
- working in a swift, compassionate and pragmatic way to help communities recover from devastation, and to learn, innovate and adapt in the aftermath of disastrous events
- developing and reporting against KPIs as discussed in Section 3.5.

For these roles to be undertaken effectively in relation to the flood risk, governments at all levels must develop an appropriate, coordinated policy framework. Relevant agencies across all levels of government should be linked by this framework, and include:

- overarching and coordinating roles that provide high-level advice to facilitate management of flood risk at a local level, which are generally undertaken by a State or Territory government (however, the Australian Government may also have a role; see Section 4.1.1)
- direct management roles to manage flood risk at the local level, which are generally carried out by the relevant FME (often a local government or catchment management authority; see Section 4.1.1)
- supporting roles that provide essential but specific assistance in management of flood risk at a local level, which are generally undertaken by the Australian Government (see Section 4.1.2).

Some roles and responsibilities are shared across levels of government; these are discussed in Section 4.1.3.

4.1.1 State and Territory governments and floodplain management entities

Best practice encourages arrangements that enable local problems to be managed locally, but in a broadly consistent manner across the jurisdiction. This develops local community resilience to flooding impacts. High-level policies and activities support consistency in dealing with flood hazards at the local level (though this may be managed by regional, State or Territory agencies).

State and Territory governments have a shared responsibility with all levels of government for managing the flood risk of local communities within their jurisdictions. However, governance arrangements for land-use planning, flood warning, flood mitigation, emergency response and recovery vary between jurisdictions. Therefore, it is recommended that each State and Territory identify clearly the specific roles and responsibilities in legislation, or binding management arrangements within a policy framework. The arrangements need to:

- be continuous and consistent across local and regional boundaries
- cover the full range of roles that influence effective flood risk management outcomes
- be sustainable and facilitate cooperation on issues that may have cross-boundary (including State and Territory boundaries) implications as far as flood behaviour, flood hazard and community impacts are concerned.

This advice could be in the form of an administrative guideline that outlines clearly any jurisdictional arrangements that fulfil the roles and responsibilities outlined in Sections 4.1.1 to 4.1.3, and identify any associated agreements.

Overarching and coordinating roles

These roles are generally undertaken by the State or Territory governments; however, the Australian Government may also have a role.

Leading, monitoring and maintaining the legislative, policy and administrative framework for flood risk management

It is recommended that each State and Territory develop, monitor, and maintain guidance that outlines sustainable governance arrangements (see Section 3.1) and make this readily accessible within their jurisdiction. To facilitate implementation of flood risk management policy this guidance should:

- set strategic direction as a basis for implementing flood policy. This handbook provides general best practice advice. However, it is recommended that States and Territories provide more specific direction in key areas, including flood risk management, land-use planning, flood emergency management planning, and response and recovery from floods

- identify relevant legislation in a single document, although consolidated legislation could be considered for dealing with flood risk management matters. Indemnities provided under this legislation may be considered under specific circumstances if certain principles are followed
- define, in a single document, the responsibilities of the various State or Territory agencies, and local government in flood risk management, and indicate how these roles will be coordinated
- identify the lead agencies and cross-agency linkages with respect to key aspects of flood risk management (i.e. management and mitigation, emergency management planning, land-use planning, flood warning and gauges, and recovery management)
- define flood emergency management roles and responsibilities of relevant State and Territory agencies, and local government in emergency management legislation
- define consent authorities and control mechanisms for dealing with land-use and emergency management planning matters in the floodplain, and identify appropriate mechanisms for coordination within catchments
- outline responsibilities for monitoring knowledge of floods and their management, and the dissemination of this information within government and to the community
- define and monitor progress towards KPIs
- outline responsibilities for education of the community about flood risk and how to respond to a flood threat.

Supporting direct management of flood risk by floodplain management entities

State and Territory governments should assist the direct management of flood risk by FMEs by encouraging and supporting:

- the development and implementation of floodplain management plans by FMEs as an effective way to understand and manage flood risk
- the use of the best available information to manage flood risk at all times, including during the development of management plans
- the cooperation of FMEs within a catchment (including across State and Territory boundaries) where they may influence the flood risk of other FMEs
- the accessibility of information on flood risk to the community, and the availability of information and its management within government
- consultation with the community and key stakeholders.

Supporting effective land-use planning, and development and building controls

Strategic direction for managing flood risk to future development should include guidance on land-use planning and building controls, such as:

- setting overall planning directions through standard documentation
- managing State- or Territory-significant development
- undertaking strategic planning a scale above local planning (i.e. regional planning)
- reviewing local planning for consistency with jurisdictional planning directions
- establishing building controls and having input into national building codes.

National codes, standards and intergovernmental agreements may also provide support.

Flood emergency management planning and response

Each State or Territory is responsible for emergency planning and response to flood events at a jurisdictional level. They may also provide strategic direction and guidance on the emergency management at a regional, district or local level, which may involve:

- identifying general roles and responsibilities in flood emergency management, including management committees
- establishing and maintaining flood intelligence systems
- establishing and maintaining emergency management plans for flooding
- undertaking or assisting with community education on floods
- reviewing flood intelligence and emergency management planning after floods, so that plans can be improved.

Specific advice may also be provided to improve community resilience in response to a particular flood threat. Community members need to know how they can help themselves, and protect lives and property when emergency responders are unavailable. Advice can also help communities by adding value to flood predictions and warnings.

Information systems to support decision making

States, Territories and the Australian Government may maintain information systems to:

- support flood risk management
- help inform and monitor knowledge on flood risk and/or risk exposure
- help monitor the implementation of flood risk management plans

- provide information to support strategic planning or the establishment of effective emergency management resources, such as flood intelligence systems
- outline flood risk exposure to the government
- share information on flood risk within government and to the community.

Direct management roles

Direct management roles manage flood risk at the local level, generally within an FME. These roles may be within local government or may be undertaken at a regional level (e.g. catchment management authorities), or at a State or Territory level. FMEs within a catchment should explore the opportunity for formal or informal collaborations to manage flood risk where changes in one FME may affect flood behaviour in another.

Flood risk management, land-use planning, development and infrastructure provision

Most roles in flood risk management, land-use planning, development and infrastructure provision are undertaken at the municipal or regional scale. They should consider the policy framework and directions outlined above. The roles may be the responsibility of more than one agency; regional strategies may also be prepared to guide policy and investment decisions, and collectively involve:

- bringing together and maintaining the best available information on flood risk and its management to facilitate the
  - identification of knowledge and management gaps
  - prioritisation of future studies and treatment measures
  - use of strategic and development scale land-use planning, to update flood intelligence and inform emergency management and recovery planning
  - provision of the best available information to the community
  - review of flood risk management, land-use and emergency management planning as new information becomes available or treatment measures are implemented
  - monitoring of KPIs
- collecting data after flood events, and for studies and updating the knowledge hub; this improves knowledge of flood risk and its management
- investing in developing, implementing and reviewing management plans to update knowledge and management practices, and inform and review decisions
- developing and implementing operation, maintenance and monitoring plans for works
- considering community flood risk in new development decisions in investigating, implementing and maintaining new or refurbished infrastructure.

Flood emergency management

Local roles in emergency management planning and response to flood threats include:

- developing and maintaining local flood intelligence
- undertaking emergency management planning in relation to flooding
- informing the community on how and when to react during a flood threat
- working closely with flood warning agencies to monitor the potential for floods
- responding to floods and coordinating agencies with a responsibility in flood threats
- reviewing emergency management planning in the aftermath of flooding
- providing feedback on problems during events to responsible agencies.

Local flood recovery

Roles in local flood recovery include restoration of essential and community services, facilities and infrastructure, with assistance from State, Territory and Australian Government agencies under Natural Disaster Relief and Recovery Arranagements (NDRRA). They may also include responsibility for managing financial assistance, for providing temporary accommodation and for providing counselling services.

4.1.2 Australian Government roles

There are a range of essential services that are generally established at higher levels of government to support flood risk management at a local level. These are generally undertaken by the Australian Government; however, State and Territory governments may also have a role.

Flood prediction and warning services, and associated infrastructure

In general, the Australian Government is responsible for providing weather forecasts, monitoring situations likely to lead to flooding, making flood level predictions and issuing flood warnings. Flood warning arrangements, which set out the roles and responsibilities of all levels of government, have been developed and operate under the guidance of flood warning consultative committees within each State and Territory. These arrangements are essential to enable effective warnings to local communities and emergency management agencies.

The Australian Government operates rainfall and some river gauging networks to inform flood predictions, forecasts and warnings. It disseminates this information via the internet and mass media. It also provides direct advice to agencies responsible for local flood emergency management, who may use flood intelligence to give more specific advice to the community on local effects and how to respond to the flood threat. Gauge networks may be supplemented by gauges managed by other levels of government.

Data management

The Australian Government maintains national scale earth observation data such as satellite imagery. The available satellite imagery includes up to 30 years of nation-wide archives of medium and low resolution data useful for the analysis of broad-scale flooding, and some higher resolution images for more detailed studies in specific areas. It also maintains and distributes best available national scale digital elevation models for public access (for example, national 9, 3 and 1 arc-second digital elevation models), and significant areas of high resolution elevation data (LIDAR) for whole of government use.

The Australian Government also derives aggregated national exposure information about residential, commercial and industrial buildings from available statistical and geospatial datasets. It maintains the Australian Flood Studies Database (being expanded through the National Flood Risk Information Project) and the national climate data archive. The Australian Government is also responsible for compiling and delivering Australia's water information and providing design rainfall information for use in flood risk studies. The Australian Government also plays an important role as both an aggregator and publisher of flood information and data.

Conservation of natural resources and environmental values of national significance

The Australian Government provides legislation for matters of national and international environmental significance. This legislation needs to be considered when assessing the impacts of proposed flood mitigation works.

4.1.3 Shared roles and responsibilities

There are a range of roles that have varied or shared responsibilities between the Australian, State or Territory, and local governments depending upon current agreements and jurisdictional arrangements. Service-level agreements or partnerships should be established between the parties involved to document the services provided. These should be clearly articulated in State and Territory administrative arrangements.

Managing gauges and supporting systems to inform flood warning

Owners of river level and key automatic rainfall gauges that provide information to flood predictions and warnings services should ensure that gauges are maintained so that they remain functional (within operational parameters) during a flood. Owners of gauges may also be responsible for:

- maintaining and adding to their gauging networks to provide additional data to support the development of flood predictions and warnings for the community
- monitoring of gauges and gauging of river flows during flood events
- developing and maintaining storage systems and making data available within government.

In the case of flash-flood warnings, local agencies are responsible for ensuring that local systems are in place, where warranted, to inform flood monitoring and/or prediction so that flood warnings can be issued.

Funding coordination and management

The Australian Government and, where relevant, States and Territories, coordinate financial support under relevant funding programs within their eligibility criteria, and establish administrative arrangements to provide effective and efficient access to funds for priority projects. Eligible organisations, such as FMEs, can apply for financial support through such programs to assist with developing and implementing floodplain management plans. Funding is generally provided through partnership arrangements where more than one or all levels of government contribute.

The NDRRA help alleviate the financial burden of natural disasters on State, Territory and local governments, and the community. This assistance is comprehensive and includes emergency food, clothing and accommodation for individuals; clean-up and recovery loans and grants for businesses and primary producers; recovery funds for communities; and the repair or replacement of essential public infrastructure. These arrangements are outlined in *Australian Disaster Resilience Handbook 9 - Australian Emergency Management Arrangements* (AIDR 2014).

Recovery after a flood

Helping a community recover from a flood event is essential to improving long-term community resilience to flooding. People's ability to recover their homes and contents will frequently rely upon assistance from both the government and non-government sectors.

A coordinating committee, consisting of representatives from relevant agencies, may be established to respond to a large-scale event following a natural disaster declaration. A lead agency for each area of recovery should be identified. 'One-stop shop' arrangements for government and non-government assistance may assist in community recovery.

Effective and timely support to the community can be aided by mobilising for flood recovery as soon as response operations begin to provide support to the community. Flood recovery arrangements need to consider the degree of access available to, and take up

of, flood insurance within the impact area. *Australian Disaster Resilience Handbook 2 Community Recovery* (AIDR 2013) should be considered in recovery planning.

Research and training

Responsible agencies should cooperate in the establishment of research and training programs to improve the knowledge and understanding of the consequences of floods, and how these can be managed effectively.

National coordination and cooperation in best practice

NFRAG is an advisory group that has facilitated national coordination and cooperation in best practice flood risk management since 2005. NFRAG is a reference group of the Australian – New Zealand Emergency Management Committee (ANZEMC), and provides advice on strategic leadership in flood risk management and expert technical advice to ANZEMC and its sub-committees. It identifies, promotes and provides advice on nationally consistent best practice and promotes research into improving the quality of flood risk management. NFRAG facilitates communication between emergency, flood risk and land-use managers, and other stakeholders. NFRAG aims to augment community resilience to flooding.

NFRAG brings together technical representatives actively involved in flood risk management in their jurisdictions with other key stakeholder groups. Membership includes technical representatives from each State and Territory, and the Australian Government, Australian Local Government Association, Australian Council of State Emergency Services, Australian Building Code Board, Insurance Council of Australia and research community. NFRAG works in collaboration with other groups such as Engineers Australia on areas of mutual interest.

4.2 Community responsibility

Communities should be responsible for following the direction of emergency management and recovery agency's before, during and after a flood event, and to seek their assistance where required. Therefore, it is important that the community has both access to information to appraise their flood risk as well as input into how this risk is managed.

4.2.1 Role of individuals

The *National Strategy for Disaster Resilience* (COAG 2011) indicates that 'disaster resilience is based on individuals taking their share of responsibility for preventing, preparing for, responding to and recovering from disasters' (COAG 2011, p. v). Individuals need to be aware of the flood threat they face and what to do about it. They can draw on guidance, resources, government policies and other sources, such as community organisations, to obtain information and assistance. FMEs are generally responsible for informing the community of their exposure to flooding. Agencies responsible for local flood emergency management should also inform the community on how to prepare for, and how and when to react to, a particular flood threat.

The disaster resilience of people and households is significantly increased by active planning and preparation for protecting life and property, based on an awareness of the threats relevant to their locality. It is also increased by knowing and being involved in local community disaster or emergency management arrangements, and – for many – being involved as a volunteer. Individuals are expected to remove themselves from potential harmful situations where directed. They also need to be aware of the need, availability and coverage of flood insurance for their property.

4.2.2 Role of business

The *National Strategy for Disaster Resilience* (COAG 2011) states that businesses can play an important role in supporting community resilience to disasters. They provide resources, expertise, infrastructure and many essential services upon which the community depends. Business' roles are key in helping the community maintain continuity of services following a disaster.

4.2.3 Role of insurers

Flood insurance is an important tool to help individuals recover after a flood event. Where suitable information on flood risk exists, insurers have a role in facilitating the provision of flood insurance to property owners whose risks fit within the limitations set in insurers' individual portfolios.

4.2.4 Role of non-government organisations and volunteers

The *National Strategy for Disaster Resilience* (COAG 2011) highlights the critical role that non-government and community organisations (often volunteers) play in strengthening disaster resilience in Australia. Australians often turn to them for support or advice during a disaster. The dedicated work of these organisations is critical to helping communities to cope with and recover from a disaster. Governments partner with these organisations to communicate the disaster resilience message and to strengthen community disaster resilience.

SECTION B

Understanding flood behaviour and flood risk, and treatment options

Treating flood risk is essential to limiting two sources of risk: the flood risk associated with existing development, and the flood risk introduced by future development.

Understanding flood risk in sufficient detail is essential to give the different agencies with a responsibility for managing flood risk the ability to fulfil their roles effectively.

Simplistic approaches to understanding flood behaviour, as described in Section 3.3.1, have their place in improving knowledge, particularly where gaps in knowledge exist. However, they have limitations. An adequate understanding of flood behaviour (Chapter 5) and flood risk (Chapter 6) can inform:

- decisions to manage flood risk to existing development and prioritise competing management efforts within a catchment and a floodplain management entity service area (Chapters 7 and 9)
- strategic land-use planning processes (Chapter 8) to limit growth of flood risk using zonings that consider both the flood function of the land and the potential to interfere or alter this function, and the drivers for flood hazard and its relative severity
- development conditions within zonings to limit growth in residual risk (Chapter 8)
- emergency response management planning (Chapters 8 and 9).

CHAPTER 5

Understanding flood behaviour

In a nutshell...

Understanding flood behaviour is essential for understanding and managing flood risk, and includes comprehending the:

- range of potential flooding and the implications of a changing climate
- flood function of the area, particularly conveyance and storage of water
- variation in flood hazard within the floodplain – this depends upon flow depth and velocity, and the interaction of the flood with the landscape, which can isolate areas from flood-free land and result in difficult evacuation situations.

Flood behaviour depends upon a range of factors, including the source of flooding, and catchment and floodplain location, size, shape, topography, vegetation, underground geological features and development. Understanding flood behaviour is essential to assessing risk and making informed management decisions. Key components to adequately understanding flood behaviour include understanding: the probability of flooding (Section 5.1); flow conveyance and storage functions of the floodplain (Section 5.2) and the variation in the drivers and degree of flood hazard within the floodplain (Section 5.3).

Long-term changes in catchment and floodplain use may adversely affect the flood regime, which may be a result of cumulative changes in:

- land use (increased scale or density of development)
- rural practices (such as stocking or cropping types)
- topography (due to filling or reshaping)
- environment (riparian, floodplain and catchment vegetation)
- water table levels
- flood mitigation infrastructure
- other infrastructure (road and rail).

These changes should be considered when assessing future flood behaviour considering forward infrastructure plans and the development of existing zoned land.

It is also important to understand how changes in climate may alter the flood regime within the planning horizon or the design life of development and/or infrastructure. These may include changing sea levels, which alter the tidal regime and adversely affect flood behaviour in coastal waterways; the frequency and severity of flood-producing rainfall events; and antecedent catchment, floodplain and waterway conditions that may have impacts in all areas (see Section 5.4).

5.1 Flood probability

Managing flood risk relies on an understanding of the full range of flood events, typically from the 10% annual exceedance probability event to the probable maximum flood, though the needs of individual studies vary.

The probability of a flood occurring affects the risk of exposure to that threat. In some areas of Australia, flooding does have some seasonality. However, over much of Australia, floods of any size can occur in any year, and at virtually any time during the year.

Flood studies (Chapter 11) provide a sound technical basis for developing calibrated and verified models, which consider historic floods. Models can be extrapolated to understand the full range of flood behaviour, the probability of occurrence of different sized floods and the impacts of floods of different probabilities. Models can also provide an understanding of the probability of the occurrence of events of a similar size to key historic events.

There is broad industry consensus that the best way to express probability when talking to the community about flood risk is using percentage AEP. AEP refers to the probability each year of a certain size event being exceeded and reinforces that there is an ongoing flood risk every year. The term average recurrence interval (ARI), where probability is expressed as a return period in years, is actively discouraged as it may mislead the community about ongoing flood risk after an event.

Although the probability of a flood of a given size occurring remains the same from year to year (unless the flood regime is altered or new data lead to a revision of statistical estimates), the chance of such a flood occurring at least once in any continuous period increases as the length of time increases. Table 5.1 shows the probability of experiencing various-sized floods at least once or twice in a lifetime.

Annual exceedance probability (%)	Approximate Average recurrence interval (years)	Probability of experiencing a given-sized flood in an 80-year period	
		At least once (%)	At least twice (%)
20	5	100	100
10	10	99.9	99.8
5	20	98.4	91.4
2	50	80.1	47.7
1	100	55.3	19.1
0.5	200	33.0	6.11
0.2	500	14.8	1.14
0.1	1,000	7.69	0.30
0.01	10,000	0.80	0.003

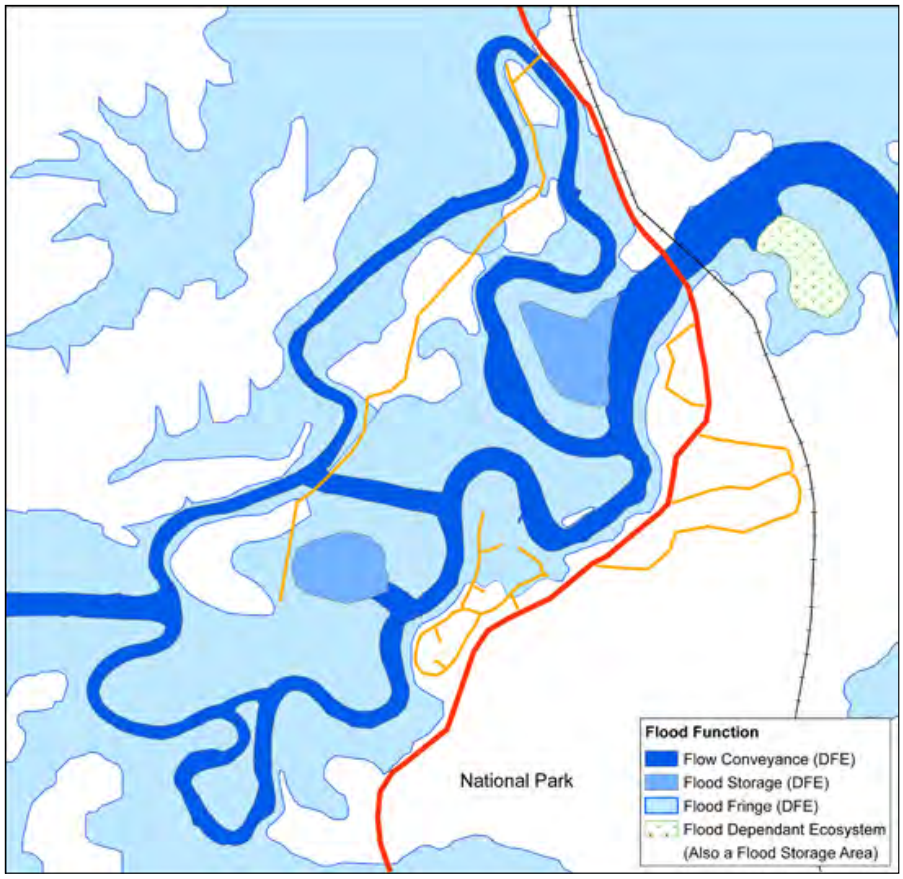
Table 5.1: Probability of experiencing a given-sized flood one or more times in 80 years

5.2 Flood function

Maintaining the flood function of the floodplain is a key objective of best practice in flood risk management in Australia (Section 7.1.2), because it is essential to managing flood behaviour. The flood function of areas of the floodplain will vary with the magnitude in an event. An area which may be dry in small floods may be part of the flood fringe or flood storage in larger events and may become an active flow conveyance area in an extreme event. In general flood function is examined in the defined flood event (DFE), so it can be maintained in this event, and in the PMF so changes in function relative to the DFE can be considered in management.

Understanding flood behaviour is a first step. This is generally developed in the flood study (Chapter 11), where flood function should be assessed at a strategic scale to allow for consideration of cumulative impacts of potential changes. Flow conveyance and flood storage are the key flood functions (Figure 5.1). Flood behaviour is sensitive to changes in topography, development and infrastructure crossing the floodplain that may alter flood functions, and lead to increased upstream flood levels, redistributed flood flows or increased downstream flood flows and levels. These impacts may have ramifications for the broader community. Breaking down the floodplain considering these functions identifies the areas of the floodplain where flood behaviour is particularly sensitive to change. This information can be used to limit adverse impacts on flood behaviour through strategic planning (limiting development in to areas where it is compatible with flood function), infrastructure planning and design, and to inform flood mitigation decisions.

Flow conveyance areas (Figure 5.1) are a fundamental element of the floodplain and are generally continuous. They flow from the upper reaches of the catchment (on the main waterway and its tributaries) to the catchment outlet and generally extend to at least the banks of waterways. They may flow into larger waterbodies, such as lakes, and re-emerge to convey flows from the waterbody to the ultimate outlet. They are often, but are not necessarily, areas where flow is deeper or velocity is greater. Floodwaters are temporarily stored in flood storage areas (also shown on Figure 5.1) during the passage of a flood, which can reduce downstream flood flows and impacts. The remaining area of land inundated by the flood is generally known as the flood fringe, which can often be safely developed without significant adverse flood impacts if flood hazard (Section 5.3) can be managed effectively.



DFE = defined flood event

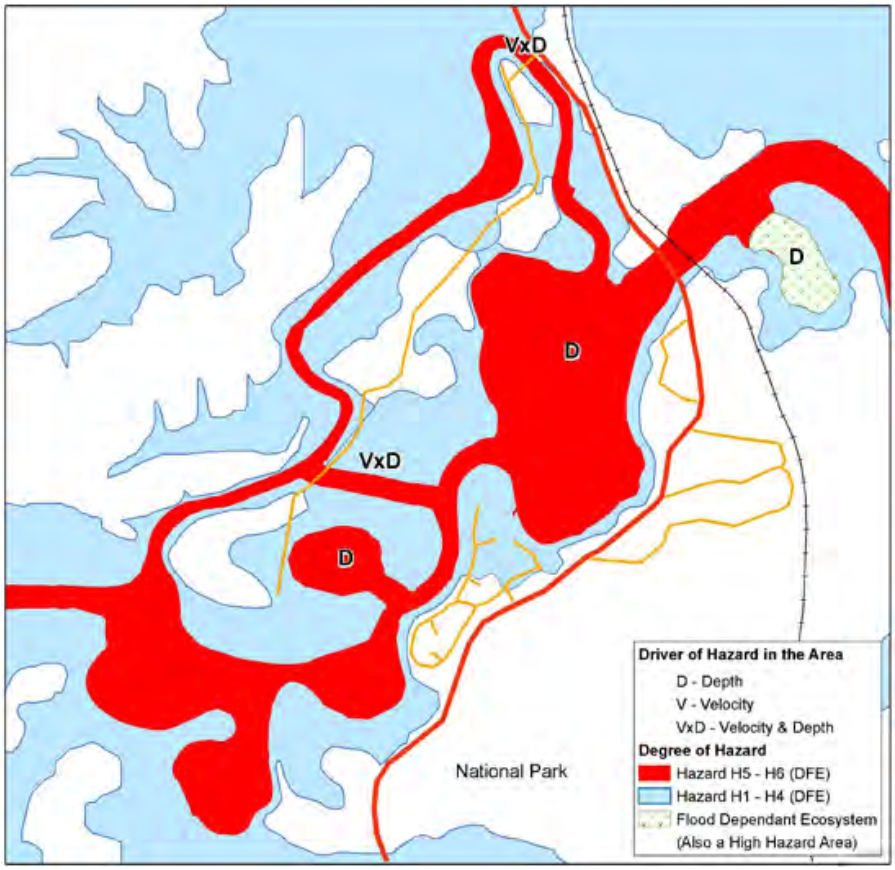
Figure 5.1: Breakdown of the floodplain into flood functions

5.3 Flood hazard

Flood hazard varies with flood severity (i.e. for the same location, the rarer the flood the more severe the hazard) and location within the floodplain for the same flood event. This varies with both flood behaviour (velocity and depth, rate of rise of floodwater and the timeframe from rainfall to flooding) and the interaction of the flood with the topography. It is important to understand the varying degree of hazard and the drivers for the hazard (Figure 5.2), as these may require different management approaches. Flood hazard can inform emergency and flood risk management for existing communities, and strategic and development scale planning for future areas.

5.3.1 Velocity of floodwaters

Relatively high-velocity, low-depth floodwaters can be dangerous, as they can sweep people off their feet, carry cars away and cause damage to light structures. Even flood waters with low velocities can be dangerous with greater water depth. Velocities are generally derived from hydraulic models (Section 11.4). Care needs to be taken when comparing velocities from models that use different grid resolution or treat obstructions differently. Average velocities vary with the model and the grid resolution, and can be increased significantly by obstructions. Localised areas of high velocity may also occur around buildings, bridges, culverts and other structures which may not be shown by models.



DFE = defined flood event

Figure 5.2: Variation in the drivers and degree of flood hazard

5.3.2 Depth of floodwaters

Deep floodwaters can be dangerous because they can destabilise people and cars, and carry them away, resulting in injuries and fatalities. For instance, 1.2 m-deep water with no velocity is sufficient to prevent able-bodied adults from wading. If flow velocity increases or individuals have any physical limitations, they can be destabilised by much lower water depths. Cars can become unstable at very low depths.

5.3.3 Combination of velocity and depth of floodwaters

The effects identified above can be combined to identify significant hazards to people, property, development and infrastructure. Velocity and depth of flow are dependent upon the size of the flood, and the hydraulic characteristics of the waterway and floodplain. The higher the depth or velocity, the greater the danger of people, animals and vehicles being swept away. An uneven ground surface and any depressions, potholes, fences or major stormwater drains can all reduce the safety of wading. These are important considerations in formulating evacuation procedures for developed areas and in considering new development in flood-affected areas. As depth increases, caravans and lightly constructed buildings can float. This can lead to severe damage if they settle unevenly in receding floodwaters or in total destruction if velocity is significant. Debris can cause significant structural damage to buildings and bridges, and block flow paths and structures diverting water away from normal flow paths. This increases flood levels and damage.

Australian Disaster Resilience Guideline 7-3 Flood Hazard provides a method for breaking down the floodplain based upon the varying combinations of velocity and depth considering the associated impacts on people, vehicles and buildings.

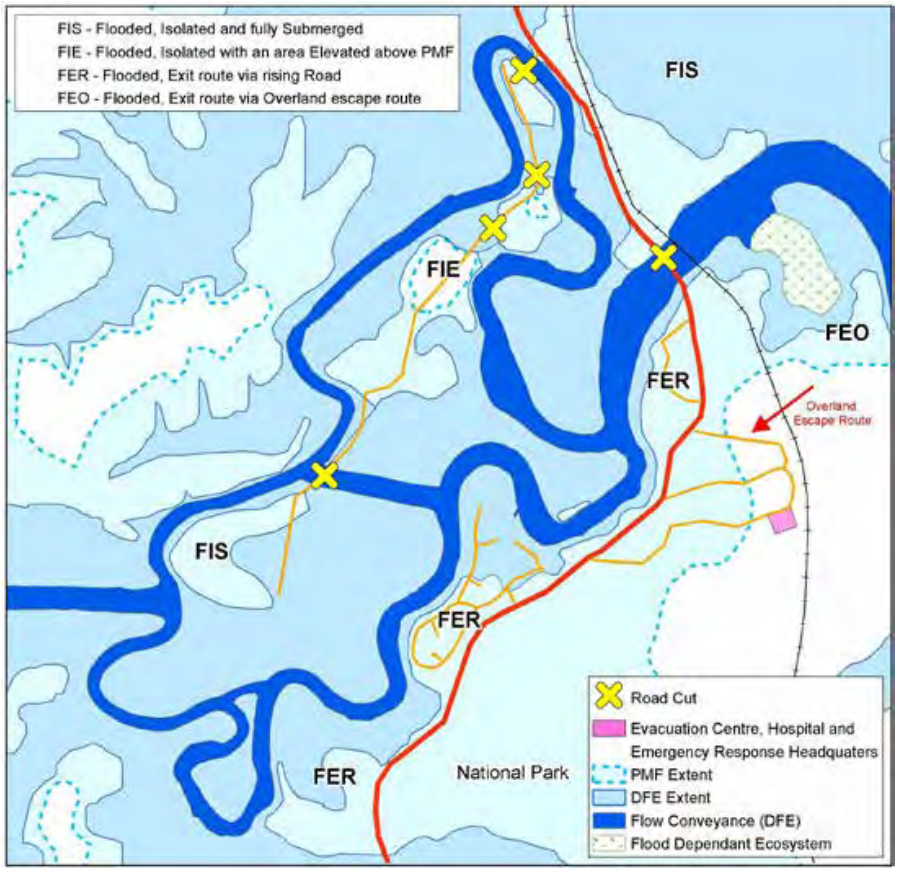


Figure 5.3: Areas with different emergency response classifications

5.3.4 Effective warning time

The consequences of flooding can be reduced if adequate time is available and is used well. The total warning time available is largely determined by catchment characteristics – that is, the larger the catchment and the slower the rate of rise of floodwaters, the longer the time available. For communities in the lower reaches, warnings are often based on rates of rise and peak water levels at upstream gauges, and can vary from hours to days to weeks.

In small, steep catchments and for overland flooding from heavy local rain, there is often no warning time due to the speed of catchment response. Advice may not be available on the expected height of floodwaters.

Effective warning time is the time available for people to undertake appropriate actions, such as lifting or transporting belongings and evacuating. It is less than the total warning time available, because time is needed to mobilise resources, alert the community to the imminent flood threat, and have them begin property protection or evacuation. Effective warning time is influenced by technology (automatic monitoring equipment is generally used to measure water levels and rainfall) and procedures (flood warnings based on rainfall measurements or predictions rather than river levels in quick-response catchments) that can 'buy time for action', but which provide less certainty of the scale of impact of the flood.

5.3.5 Rate of rise of floodwater

A faster rate of rise can potentially result in more danger and damage to the community. It is typically more rapid (0.5 m/hour) in small, steep catchments where floods might peak within hours of rainfall compared to larger, flatter inland rivers (less than 0.1 m/hour), where it could take up to several weeks for flood levels to peak in some locations.

5.4 Emergency response classification

Flooding can isolate parts of the landscape and cut-off evacuation routes to flood-free land or locations where community facilities are available to support evacuated residents in a flood event. This can result in a dangerous situation, because people may see the need to cross floodwaters to access services, employment or family members. Many flood fatalities result from the interaction of people, often in vehicles, with floodwaters. Any situation that increases people's need to cross floodwaters increases the likelihood of an injury or fatality.

Floodplain areas can be classified in regards to isolation and access considerations in a way that informs emergency response management (see *Guideline 7-2 Flood Emergency Response Classification of the Floodplain*). This classification provides the basis for understanding the nature, seriousness and scale of isolation problems. Figure 5.3 shows several different categories. These include flooded isolated and submerged areas (FIS, also known as low flood islands LFIs), the most dangerous isolation scenario.

The area is first isolated from flood-free land and then completely inundated by floodwater as the flood continues to rise. In this situation, people either have to evacuate before the loss of access or be rescued after access is cut, or they may drown.

Another category shown is flooded isolated elevated (FIE or high flood islands, HFI). These are similar to FIS areas, however, a portion of the site remains flood free in a probable maximum flood (PMF) providing flood-free land for people to retreat to if they do not evacuate before the loss of access. However, they may be without services and shelter for an extended period, need assistance with critical supplies, and may need rescue where medical conditions warrant. Other classifications shown include FER, where the area is flooded but there is an exit route by road, and FEO, which is similar but the exit route is overland rather than by road.

5.5 Impacts of a changing climate on flood behaviour

A changing climate is expected to affect both catchment and coastal flooding. Depending upon the location, this may alter the frequency and scale of flooding and its associated impacts due to both sea level rise, and changes to annual, seasonal and flood-producing rainfall events. This might affect catchment flood events in areas across Australia, and coastal flooding in the lower portion of coastal waterways where coast and catchment flooding can interact. Flood investigations provide an opportunity to assess and report on the potential impacts of change on flood behaviour, the risk to the community and the adaptability of management measures to change. Impact assessments should consider relevant government and industry guidance, and the best available, broadly accepted information on the potential scale of changes. The impacts of changes to rainfall and sea level rise should be considered separately, to understand the drivers of change, and in combination, to assess the potential cumulative impacts.

CHAPTER 6

Understanding flood risk

In a nutshell...

Flood risk is a combination of the likelihood of occurrence of a flood event and the consequences of that event when it occurs. It is the human interaction with a flood that results in a flood risk to the community. This risk will vary with the frequency of exposure to this hazard, the severity of the hazard, and the vulnerability of the community and its supporting infrastructure to the hazard. Understanding this interaction can inform decisions on which treatments to use in managing flood risk.

The *International Standard on Risk Management* (ISO 31000:2009) defines risk as the effect of uncertainty on objectives, whereas risk analysis is a systematic approach to understanding the nature of and deducing the level of risk. In November 2011, the Standing Council on Police and Emergency Management agreed to the use of the *NERAG* as outlined in ADR Handbook 10 as the nationally consistent methodology for the future assessment of risk for priority hazards.

In flood risk management terms, risk results from the interaction of the community with flooding through human occupation or use of the floodplain. Flooding affects the health and safety of individuals and communities living in the floodplain. It also affects the built environment and other interests that support them. Exposure to flood hazard varies significantly between and within floodplains, and between flood events of different magnitudes. People, buildings and infrastructure are not all the same, and their vulnerability to flood varies significantly within these individual elements and between element types.

There are generally three types of risk to be managed in flooding. These are:

- **Existing flood risk.** This is the risk associated with current development in the floodplain. Knowing the likelihood and consequences of various scales of floods to the existing community provides the basis for determining existing risk. Understanding this risk can assist with decisions on whether to treat this risk and, if so, how.
- **Future flood risk.** This is the risk associated with future development of the floodplain. Knowing the likelihood and consequences of flooding can inform decisions on where not to develop (where new development may affect flood behaviour, where this may impact upon risks to existing development, or where hazards are high and cannot be managed), and where and how to develop the floodplain (to ensure risk to new development and its occupants are acceptable). This information can feed into strategic land-use planning.
- **Residual flood risk.** This is the risk remaining, in both existing and future development areas, after management measures such as works, land-use planning and development controls are implemented. Unless the probable maximum flood is used as the basis for development controls or works (and works do not fail), a flood risk will still remain. Residual risk can vary significantly within and between floodplains. Emergency management and recovery planning, supported by systems and infrastructure, can assist to reduce residual risk.

Risk analysis involves developing an understanding of the nature, driver for, and level of risk to rank the relative seriousness of risks. Risk analysis can then be used to inform decisions on both the acceptability of residual risk, and the effective and efficient use of scarce resources to better understand and treat risk. Therefore, risk analysis involves understanding the likelihood of events (Section 5.1), generally measured in terms of annual exceedance probability, and the severity of their consequences.

Table 6.1: Example qualitative risk matrix

Likelihod of consequence	AEP range (%)	Level of consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likely	>10					
Unlikely	1 to 10					
Rare to very rare	0.01 to 1					
Extremely rare	<0.01					

Risk: Very low Low Medium High Extreme

AEP = annual exceedance probability

Flooding has consequences to the community, and to the built and natural environments (Sections 6.1–6.3). Consequences vary with location in the floodplain and depend upon the element (community or built environment) under consideration. Likelihood and consequences can be combined to assign a relative risk rating for an event through development of a risk matrix or other tool. This should involve an assessment of the confidence of likelihood and consequence, which considers factors such as the divergence of opinion, level of expertise, uncertainty, quality, quantity and relevance of data and information, and limitations on modelling. Table 6.1 provides an example risk matrix. Section 6.4 provides some advice on assessing consequences. Chapter 7 discusses the need for treatment of risk and prioritisation of efforts across a floodplain and a floodplain management entity service area.

6.1 Consequences to the community

The flood-affected community can be regarded as those people who reside, work on or traverse the floodplain.

The social implications of flooding on people's lives are many and varied, and cannot all be readily quantified. These include fatalities, health influences, disruption and financial implications. Community vulnerability can change with the population at risk, community composition, and the logistics of flood warning and emergency response.

The larger the population at risk, the greater the number of people that need to be warned and, if possible, self-evacuate. Vulnerability increases if people need additional support to evacuate. This can include those in hospitals, nursing homes, corrective facilities, people with mobility limitations, older people, and children in schools and child care facilities. Vulnerability also increases as emergency-response logistics become more difficult – that is, less warning time and time to evacuate, less resources to assist and more limitations on evacuation routes.

6.1.1 Fatalities and health issues

The most serious consequence of flooding is the risk of fatality to individuals who may interact with hazardous flood situations.

Humans are particularly vulnerable to drowning in floods. Other causes of fatalities include flood-induced stress (potentially leading to cardiac failure), electrocution and problems resulting from a lack of essential medicines. In recent years, a high proportion of flood-related deaths in Australia have occurred on flooded roads. Fatalities also result from people being swept away while crossing rivers, stormwater channels, overland flow paths or other flooded areas. While evacuation can reduce the risk to life, the evacuation of elderly people can lead to an increase in mortality rate. Although the number of flood-related fatalities is declining in general, the continuation of this trend relies upon continued improvements in flood risk and emergency management practices, strategic land-use planning practice and community education.

Floods can result in hospital admission spikes. The June 2007 storm on the New South Wales Central Coast resulted in 10 fatalities and evacuation of more than 6000 residents. It also resulted in 180 emergency department presentations for hypothermia, fractures, lacerations, dyspnoea (breathlessness), and joint and limb pain, with one in five resulting in admission. The event also had public health implications, through effects on wastewater disposal systems, drinking water supplies and food outlets (Cretikos et al. 2007). Flood-related health concerns such as mosquito-borne illnesses, and exposure to moulds, toxins and contaminants, may be felt for some time after an event. Many flood-affected residents also attribute a variety of physical and psychological health problems to flooding. Survey responses (Handmer & Smith 1983) indicate that these include a worsening of existing pre-existing health problems, emotional and psychological problems that continue well after floodwaters recede, and anxiety leading to stress. Any sudden onset of flooding and the absence of warning can exacerbate the situation.

6.1.2 Community disruption

Flooding can last for minutes to months and cause significant disruption to communities and households. The degree of disruption depends upon the size of the flood, its impacts on community services and infrastructure, and the time needed to restore services.

Direct impacts depend upon whether the community or individual households are isolated and inundated. Flooded homes might be unfit to live in for lengthy periods and, in the worst cases, need demolition. Either case requires temporary accommodation, which can be in short supply and at inflated prices due to post-event demand. People might have to temporarily relocate some distance from home, education and workplace, even though financial commitments to the home continue. Clean-up, drying-out, and restoration and replacement can take weeks or months. Surveys indicate that the average disruption to normal life in a house flooded above floor level is two to three months. It can, in some cases, take years, and it is not uncommon for flood-affected residents to feel that they will never get their lives back to normal.

Indirect impacts on the community might include loss of services, even when areas may not be flooded. Water, sewerage, electricity and communications infrastructure, if inundated, may be out of service for extended periods. Community and business services may be flooded or isolated from the community or suppliers, and may not be able to operate.

6.1.3 Financial impacts

Financial losses from properties and building damage affect the financial health of households. A family home is usually the largest purchase in a person's life. For the majority of families, it is both their principal asset and is associated with their largest debt. It is also likely to contain the majority of their possessions. The size and effect of financial impacts depend on the severity of flooding, the susceptibility of the house and contents, current and projected future income, financial assets and debt, and capacity to recoup the losses sustained. For a single storey dwelling, 1.5 m of water on the floor would result in the loss of most personal possessions, contents and fittings, and structural damage to the house, particularly if the flow velocity was high. The short-term consequences of flooding are generally catered for in emergency response and recovery plans, and through assistance provided to individuals and families through natural disaster relief arrangements. Long-term recovery relies upon the ability of households to recover financially. This depends upon available finance and insurance, and continued employment or income generation.

6.2 Consequences to the built environment

Consequences to the built environment are related to impacts on individual properties and on community infrastructure.

6.2.1 Buildings

Contemporary houses are not generally designed to be flooded above floor level. Their exposure to flooding is generally managed by setting minimum floor levels to limit the frequency of flooding, but does not remove the risk from larger floods. Flooding can result in significant damage to the contents, fabric and structure of buildings – and, in severe cases – loss of the structure itself. The scale of impact is influenced by the depth of flooding above the ground and floor level, the velocity of flow, and the design of the house. For example, contemporary houses are predominantly constructed from either brick veneer or double brick. Both rely on an internal load-bearing wall constructed of either a timber, light-gauge steel frame or another brick wall to support the roof structure. Brick walls may fail due to brickwork cracking, wall(s) bowing, external brick wall(s) collapsing, and the frame snapping or bending due to the following forces exerted on buildings:

- hydrostatic forces associated with pressures of still water, which increase with depth
- hydrodynamic forces associated with the energy of moving water
- impact forces associated with floating debris moved by water.

Wave action produced by wind, boats or motor vehicles can add to loadings.

6.2.2 Infrastructure

Floods can result in damage, disruption and loss of infrastructure, which can delay community recovery. These impacts can include:

- interference to community infrastructure, such as power, sewerage, water and communication, due to damage to the supply source, treatment facilities or distribution infrastructure
- damage to roads and other transport infrastructure, such as rail lines and airports
- damage to flood mitigation infrastructure, including levees, spillways and associated structures; failure of these structures may exacerbate flood impacts
- damage to dams, which can significantly increase the negative consequences of floods; therefore, the management and monitoring of dams by owners considers flood impacts and the consequences of dam failure
- damage to, or loss of, waterway infrastructure, such as bridges.

6.3 Consequences to the natural environment

Floods can have significant environmental impacts. They can erode waterways, and cause conditions that lead to fish deaths through oxygen depletion or a temporary build-up of naturally found toxins. Significant environmental impacts may also result from the flooding of industrial and mine sites, particularly those using or producing hazardous materials. Floods can be beneficial to the environment by providing water to flood-dependent ecosystems, depositing fertile silt on farmland and increasing soil moisture content.

The study of the consequences of floods on the natural environment is an important and specialist area not covered by this handbook.

Impacts of flooding on the natural environment can be an important element in the development of a floodplain management plan for a rural area or it may be more effectively considered as part of integrated catchment management which is considered in the development of a management plan.

6.4 Assessing the scale of consequences

Flood risk assessment should make use of the data and tools available. Hydrologic, hydraulic and vulnerability models are important to understanding the range and complexity of potential flood behaviour and impacts. The value of understanding historic flooding, and calibrating and verifying models considering historic floods, cannot be underestimated.

The severity of consequences of flooding on the community can be assessed based upon the frequency and scale of tangible and intangible impacts. Tangible impacts are financial in nature and can be readily measured in monetary terms. They include the direct damage caused by goods and possessions getting wet, and indirect damages, such as the loss of wages and extra outlays incurred during clean-up operations and in the post- flood recovery period.

Intangible damages include fatalities, the increased levels of emotional stress, and mental and physical illness caused by flood episodes. A flood is a traumatic experience for many victims, leading some to suffer nightmares, for example, for considerable periods. There is the sense of personal loss and despondency caused by the destruction of memorabilia (photographs and precious items) and official documents, or the loss of pets. There is also the stress caused by additional financial outlays to replace flood- damaged possessions. Stress may also be caused by families functioning differently – separating family members, living in temporary accommodation or children attending different schools. Intangible damages cannot be quantified in financial terms.

Nevertheless, they are real and represent a significant cost to a flood-affected community or individual, and can be long lasting. Most studies acknowledge intangible damages, but do not attempt to quantify them. However, it may be possible to approximate intangible damages by, for example, estimating how many flood-affected people may require additional medical treatment for depression, the ecological cost of the loss of a local environmental feature, or the additional assistance required by the community to recover.

The assessment of damages can help focus risk management efforts by providing important information on the severity and location of impacts. Any reduction in impacts resulting from the implementation of treatment measures provides advice on their relative cost-efficiency through cost–benefit analyses.

CHAPTER 7

Treating flood risk

In a nutshell...

Treating risk involves developing an effective management plan. This relies upon a detailed understanding of the local flood situation and its impacts on the community, and an understanding of the treatment options available and their limitations. There is no single treatment or set of treatments to manage the full range of flood risk that are valid for all communities. In addition, flood risk does not necessarily remain constant. Unless effectively managed, flood risk can change significantly with alterations to catchment and floodplain development, the geomorphology and topography of the floodplain, catchment and floodplain vegetation, and infrastructure on the floodplain. Risk can also vary with a changing climate. Growth of risk can be managed by limiting risk to new development.

Reducing risk to existing development needs to consider the efficient and effective use of scarce resources. Residual risks need to be understood, and managed or accepted.

Risk treatment generally draws on one or more of the strategies of risk prevention or avoidance (limiting or negating exposure to the hazard), risk reduction (by mitigating the consequences of the hazard) and/or risk acceptance (accepting the risk that exists). Occupation of floodplains and management of the associated risks is, in many respects, a balancing act. It involves acknowledging that living on the floodplain comes with an inherent risk and understanding what adverse impacts the community is prepared to accept in return for the benefits of living on the floodplain. Knowing the consequences of the full range of flooding can inform decision making on risk reduction to the existing community to more tolerable levels and limit the growth of risk resulting from new development.

Although there is a common vision for managing flood risk, there is no single blueprint that can be applied in all flood environments. The most effective means of achieving sound management outcomes is to formulate and implement risk-based management plans through the floodplain-specific management process (Section 3.6) or an equivalent process for a study area, generally at the catchment or floodplain scale. This encourages a balanced consideration of social, economic and environmental issues, and consultation to make informed decisions. Balanced management plans need to address risk to existing and future development, and remaining residual risk in a comprehensive manner that considers all factors affecting floodplain use.

A plan should outline the recommended approach to managing flood risk to future development including residual risk (Chapter 8) and existing development including residual risk (Chapter 9). Existing risk is often managed by treatment measures that aim to reduce risk. Growth in future risk is principally limited through land-use planning in consideration of flood risk. Residual risk is limited by managing existing and future risk. It may be further reduced through effective community response to a flood threat, facilitated by evacuation infrastructure, flood warning, emergency management planning, community education and through assistance with community recovery.

The objectives of treating risk are discussed in Section 7.1. The remainder of the chapter discusses where risk treatment may be warranted (Section 7.2), the selection and prioritisation of options (Sections 7.3 and 7.4), and managing risk to community infrastructure and utility services (Section 7.5).

7.1 Objectives of treating flood risk

Treatment of flood risk needs to consider two key objectives of best practice – managing flood risk and maintaining the flood function of the floodplain.

7.1.1 Managing flood risk

Managing flood risk is important to improve community resilience to flooding and limiting flood risk growth (from increased floodplain development, and changes to climate and floodplain topography). Achieving effective management involves encouraging or promoting the:

- management of existing, future and residual flood risk for local communities using the range of treatments available
- engagement with, and active participation of, the local community in managing the flood threat they face
- inclusion of flood risk management outcomes in policies, planning instruments and forward plans
- strategic planning and use of floodplains as valuable and sustainable resources capable of multiple uses of benefit to the community. These uses should be compatible with the flood function and flood hazard, and aim to limit the impacts of flooding on damage to property and infrastructure, and the wellbeing, health and safety of the future floodplain community. Strategic planning should consider long-term climate, cumulative land-use and demographic changes that are expected to influence risk
- identification, assessment and implementation of feasible, practical and effective options to treat intolerable risks to the existing community, considering their social, environmental and economic benefits and costs, and their sustainability
- cross-catchment prioritisation of treatment efforts by floodplain management entities to ensure efficient and effective allocation of scarce resources to treat flood risk
- sustainable emergency management practices that consider long-term climate variation, and cumulative land-use and demographic changes
- management of flood risk to infrastructure and the design of new infrastructure to limit its impacts on flood behaviour; key infrastructure for emergency response and recovery needs to be fit-for-purpose when required
- continued aid to the community in recovering from the impacts of floods.

7.1.2 Maintaining the flood function of the floodplain

Maintaining the flood function of the floodplain is essential to ensure that the floodplain can perform its natural functions of flow conveyance and storage. Understanding (Chapter 5) and maintaining these natural functions (Section 8.1) are essential to effective management. Maintaining flood function involves encouraging:

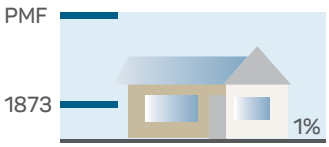
- maintenance or improvement of the capability of the floodplain to perform its natural function of conveying and storing floodwater
- land uses that are compatible with the flood function of the specific area of the floodplain
- maintenance of the capability of the floodplain to supporting floodplain ecosystems dependent on inundation
- floodplain and catchment management practices that are ecologically sustainable.

7.2 Does risk warrant treatment?

ISO 31000:2009 states that risk evaluation is a process of comparing the results of risk analysis with risk criteria to determine whether the risk and its magnitude are acceptable or tolerable. Decision makers often use the risk evaluation process to determine if further analysis is required to:

- improve confidence in estimates or understanding of risk
- decide if risks are either broadly acceptable or intolerable
- decide if action is needed to treat the risk.

The need to treat risk will depend upon whether the current level of residual risk is acceptable to the community. What level of risk is acceptable will depend upon who is asked, what their experience of floods has been and when they are asked. Accordingly, governments may make decisions in the 'public interest', yet remain mindful of the general need for a consistent standard. They may come to a decision in consultation with the community and in consideration of what may be considered reasonable general practice. In the flood context, this advice is often linked to flooding likelihood being a statistical probability. The selection of this standard is discussed in Section 7.2.1.

	Coastal lake	Inland river	Coastal river
			
Flooded when flood exceeds 1% event	2000 buildings	800 buildings	1000 buildings
Length of evacuation route	2km	160km	200m
Typical catchment response to rainfall	Hours to days	Days to weeks	Hours to days
Typical flood duration	Days	Days to months	Days

Note:
Houses conceptually shown at the 1% AEP level to indicate comparative flood levels which are to scale relative to houses.

AEP = annual exceeance probability; PMF = probable maximum flood

Figure 7.1 Variation in the range of flood risk

When examining treatment options to reduce risk to existing development, it is not always practical, feasible or cost-effective to meet a general standard for protection applicable to new development. Lower standards of protection may provide significant reductions in the existing exposure of communities to frequent flood risk, and present a more feasible, practical and cost-effective solution. Treatment priorities should consider the current residual risk, and the relative benefits and costs of treatments of differing standards. This is discussed further in Section 9.4.

7.2.1 Setting general local standards

The selection of a general local standard, often based upon a single or several defined flood events (DFEs), is traditionally concerned with limiting growth in risks by limiting the frequency of exposure of new development and its inhabitants to hazardous flood situations. This is a risk management decision that involves balancing the flood risk and the costs of living with this risk alongside the benefits of occupying the floodplain in consideration of a reasonable level of service to the community. It is the community, not the land developer, who takes on this long-term risk, and the members of the community who may have their lives and their homes at risk. This decision is generally reflected in the selection of a DFE as the basis for general property protection.

Selection of a DFE should consider the full range of flood events, and take into account standards and guidance from government and industry. It can reflect what government and the local community may accept as a general standard that allows for a reasonable compromise between living on the floodplain and accepting the consequences of this choice. In Australia, the 1 % AEP flood (plus a freeboard, see Section 7.2.2) is often used in government guidelines and policy instruments to define the standard up to which general development controls are applied to new standard residential development to limit growth in risk. A residual risk remains from floods larger than 1 % annual exceedance probability events as outlined in Table 5.1. Suffering the economic impact of rarer events may have been seen as tolerable by default. However, residual risk varies, because the range of floods (see Figure 7.1) and the consequences of the same magnitude of flood can vary greatly between locations.

Therefore, there can be locations where adopting the general standard for development controls may result in a residual risk that is intolerable to the community. In these circumstances, additional localised development constraints may be warranted to reduce residual risk further. In addition, certain community groups and the types of development they inhabit may be more vulnerable to flooding and may need additional constraints. For example, aged care homes and hospitals can be difficult to evacuate and, therefore, may best be located where emergency response is relatively straightforward. Also, the likelihood of needing to react to a flood may also be reduced by using increased protection levels. This can lead to areas with development controls based upon their location (see Figure 8.1).

The decision on an acceptable level of flood risk for general standards also depends upon the element at risk. Governments generally provide additional support or implement additional measures (e.g. flood warning systems, emergency management planning and infrastructure to support emergency management) in excess of general standards to further reduce the threat to community members. Key community infrastructure such as power supplies, communication centres, emergency response headquarters and evacuation centres may also require additional protection to ensure that they are fit for purpose in emergency response and recovery. Once selected DFEs are generally used to derive information to inform management and land-use planning process, which includes:

- identifying areas where flood function (conveyance and storage) are important to facilitate decisions on how to maintain flood function and reduce the potential for significant impacts upon existing flood behaviour
- defining flood planning levels (FPLs) with the addition of an appropriate freeboard (Section 7.2.2) and, hence, the flood planning area, which provides an indication of where the majority of general flood-related development controls will apply.

7.2.2 Freeboard

Freeboard is added to flood levels to provide reasonable certainty of achieving the desired level of service from setting a general standard or DFE. It should be estimated in studies considering the following factors:

- uncertainties in the estimates of flood levels. These can arise from the relatively short record of past floods (and storm surges in coastal waters), together with uncertainties and simplifications in the models used to predict flood flows and flood levels.
- local factors that can result in differences in water levels across the floodplain. These factors can often not be determined in flood modelling, because they are too difficult, complex or expensive to incorporate.
- wave action is not considered in hydraulic models. Models assume flat surfaces and do not replicate the undulations in surface levels occurring in flood events. Waves can result from local factors, wind from meteorological events, movement of boats and vehicles through flooded areas, and coastal processes. In areas with long flood durations, the potential for a separate wind event to the flood event resulting in wind waves is increased. Open coastal waterways with broad, deep entrances can also allow a high degree of coastal wave penetration.
- the cumulative effect of subsequent infill development of existing zoned land.
- where the future climate has the potential to significantly increase risk.

In effect, freeboard acts as a factor of safety. However, it should not be considered as giving additional protection beyond the DFE to which it is applied. A flood planning area is the extent of area below an FPL.

There are many circumstances in which a freeboard of 0.3–0.6 m may be considered acceptable. The lower freeboard is generally only considered acceptable for use in very shallow water where the potential for other effects is limited. A freeboard higher than 0.6 m may be necessary due to particular local circumstances, such as where estimated design flood levels are particularly sensitive to modelling assumptions.

Flood mitigation works – such as levees, and retarding and detention basins (see Chapter 9) – may also require higher freeboards to offset additional uncertainties due to their nature and construction. For example earthen mitigation works also need to consider:

- post-construction settlement, which reduces the long-term level of the embankment
- surface erosion due to vehicles, animals or pedestrians crossing, reducing the level of the embankment
- the potential for significant surface shrinkage, cracking and associated additional risk of failure where good grass cover and appropriate moisture content cannot be maintained
- the additional erosion caused by the overtopping of earthen structures, which can lead to embankment breaches. This can result in fast-rising flooding and difficult evacuation, which is exacerbated when there is no vehicular access to flood-free land.

Table 7.1: Treatment measures for existing development

Development scale	Type of flood risk	Treatment measures
Community or a specific area	Existing	Flood mitigation dams Retarding and detention basins Permanent levees Flow conveyance improvements Flood gates Temporary barriers Change in property zoning
	Residual	Flood prediction and warning Community-scale emergency response plans Evacuation arrangements Evacuation route upgrade Community flood readiness Community recovery plans
Property	Existing	House raising House purchase Relocation of development Flood proofing of buildings Temporary measures
	Residual	Residual risk management options listed above augmented by appropriate property based emergency management plans

Table 7.2: Treatment measures for future development

Development scale	Type of flood risk	Treatment measures
New development and redevelopment areas	Future	Zoning Development controls Building controls
	Residual	Flood prediction and warning Flood access and evacuation routes Emergency response arrangement for new areas Update of community-scale emergency management plans Development-scale flood awareness and readiness
Infill development within existing zoned areas	Future	Development controls Building controls
	Residual	Residual risk management options listed above augmented by appropriate property based emergency management plans

7.3 Selecting treatment options

Tables 7.1 and 7.2 outline a range of treatment options suitable for managing risk to existing and future development respectively. The identification and assessment of treatment options for a specific floodplain is generally undertaken in the management study (Chapter 12). The management plan (Chapter 13) outlines the proposed method of treatment of risk on a prioritised basis across the catchment. The selection of suitable options requires the consideration of community aspirations and what can be done to reduce the flood risk.

Treatments may be developed at the regional, community or individual property level. Suitable treatment measures may include better land-use planning and development controls, improved information to inform emergency management planning, improved flood warning systems, more infrastructure to protect areas from flooding and better communication of flood risk to the community. Treatment options and their cumulative effects, both positive and negative, need to be considered strategically, which involves:

- considering the limitations that flood behaviour, hazard and impacts place on the capability of land to support community growth (Section 8.2)

- accounting for future growth in the numbers of occupants in the floodplain – such growth increases the pressure on response and recovery agencies when flooding occurs and may impact upon community-scale emergency management plans
- assessing decisions on mitigation works and measures, future development and infrastructure, and environmental consequences on a long-term strategic basis
- considering costs on a life-cycle basis. All treatment options come with up-front, ongoing (operation and maintenance) and complementary costs, and may depend upon other measures (see Tables 8.1, 9.1 and 9.2)
- considering interactions and interdependence with other options
- considering the effects of a changing climate on flood behaviour, flood hazards and the associated impacts upon the community.

Tables 7.1 and 7.2 outline treatment measures for different types of flood risk.

It is important to consider how effective each option is for managing risk and how important that issue is for the specific community when assessing options. Table 7.3 provides a summary of the general benefits of a range of different types of options in managing flood risk. Some may have localised benefits, while others may have broader community benefit. Assessment should consider:

- the full range of flood events
- the limitations, and social, economic and environmental benefits and costs of options
- existing development and infrastructure
- future development needs and opportunities that cater for a growing community and how this may influence flood behaviour
- any impacts on emergency management infrastructure – for example, existing or proposed flood warning systems, evacuation routes and response strategies
- any impacts of the option on flood risk elsewhere in the floodplain.

7.4 Prioritising treatment options across a floodplain management entity service area

Floodplain management plans provide a way to prioritise treatment options across a study area. A floodplain management entity (FME) service area will generally contain a number of floodplains and therefore may have a number of plans. Plans generally involve a range of measures, such as updating strategic planning instruments that are complementary across plans and generally require limited resources. These types of measures should be implemented without prioritisation across the FME service area.

There are other management measures, such as works projects, that require significant investment. It is recommended that all projects requiring significant financial and resource investment identified in management plans be compared to develop an overall priority list that considers benefits, costs and feasibility. This provides a basis for prioritisation considering the most effective and efficient use of the available resources across the entire FME service area.

7.5 Managing the flood risk to, and resulting from, infrastructure

A community's ability to respond to and recover from the impacts of flooding relies upon the availability of community infrastructure such as emergency response hospitals, emergency management headquarters, evacuation routes and centres, and communications infrastructure. The location and level of protection provided to this infrastructure needs to allow it to perform its function during and after a flood event, where practical. Utility services essential to recovery from a flood and in response to long-duration floods include water supply and reticulation, sewerage reticulation and sewage treatment, electricity and communications, and road and rail networks.

Infrastructure providers need to consider design standards that enable continuity of use or ready re-establishment of services after a flood, as appropriate. These standards may involve reducing the likelihood of infrastructure flooding or the vulnerability of the infrastructure to the impacts of flooding when it occurs, and using readily available components to re-establish services easily after a flood.

Design standards should also consider the potential impacts of new, upgraded or refurbished infrastructure in the floodplain on flood risk to the community. Elements such as roads and railway lines that cross the floodplain or otherwise interact with flooding can alter flood behaviour with adverse consequences to the community. Their design should also consider their role in response and recovery to ensure they are fit for purpose for this role.

Table 7.3: Typical ability of management options to address flood risks

Option type	Existing developed areas			Future development areas		
	Existing risk		Residual risk	Future risk		Residual risk
	Safety	Damage	Safety	Safety	Damage	Safety
Measures to modify property						
Zoning and development control				High	High	Low[a]
Voluntary purchase	High	High	High			
Voluntary house raising	Low	Medium	Negative[c]			
Flood proofing of buildings	Low	Low				
Access during flood events	High	Low[e]	High	High	Low[e]	High
Measures to modify response						
Community flood awareness & readiness[b,d]	Low[b]	Low[b]	Low[b]	Low[b]	Lowb	Low[b]
Flood predictions and warnings[b]	Medium[b]	Low[b]	Medium[b]	Medium[b]	Low[b]	Medium[b]
Emergency response planning for floods[b]	Medium[b]	Low[e]	High[b]	Medium[b]	Low[e]	High[b]
Measures to modify flood behaviour						
Levees	High	High	Negative[c]	High	High	Negative[c]
Detention/retarding basins	Medium	Medium	Negative[c]	Medium	Medium	Negative[c]
Flood mitigation dams	Medium	Medium		Medium	Medium	
Bypass flow conveyance	Medium	Medium		Medium	Medium	
Channel improvements	Medium	Medium		Medium	Medium	
Enhance environment						

a. Depends on consideration of emergency management issues and vulnerable development in land-use planning activities.

b. These options all rely on each other to be effective.

c. Measures such as house raising and levees reduce risk to property but are known to have an adverse impact on perceived risk to life because people incorrectly assume that property protection measures have eliminated flood risk.

d. There is little qualitative evidence showing community awareness and education campaigns are effective to reliably and perpetually reduce risk.

e. Have no impact on structural damage. However, in some cases, where response times and conditions allow may permit some reduction in contents damage.

Notes: Existing risk: events up to the design flood for mitigation works or the main defined flood event (DFE) for land-use planning

Residual risk: events rarer than the design flood for mitigation works or the main DFE for land-use planning. Future risk: events up to the design flood for mitigation works or the main DFE for land-use planning.

The ratings in this table are a guide only as the effectiveness will vary dependent upon the individual situation and should be assessed accordingly.

Blank squares may be not applicable or options have nil affect. High/medium/low relate to positive effects.

Negative relates to potential adverse impacts.

CHAPTER 8

Treating flood risk to future development

In a nutshell...

There are areas of the floodplain that may be either too hazardous to develop or where development may have a significant impact on existing flood function that can result in adverse impacts on the existing community or environment. Managing flood risk to new development is essential to limiting the growth of flood risk. This can be achieved most effectively by strategic and development-scale land-use planning cognisant of the need to maintain flood function, consider flood hazard and develop sustainable emergency response arrangements. Best practice encourages the setting of 'flood risk' informed strategic land-use planning directions, and supporting zonings and development and building controls that:

- limit the impacts of new development and the intensification of development on the flood risk of the existing community
- limit the exposure of the new community to flood hazard
- limit damage to new property and infrastructure to acceptable levels
- consider public safety and the associated needs of emergency response management.

Managing the growth in risk resulting from urban expansion and consolidation within floodplains provides the opportunity to manage this risk **from the outset** by reducing risk to an acceptable level. This may involve:

- limiting the impacts of new development and intensification of development on the flood risk to the existing community and its emergency response capability through zonings
- limiting development to be compatible with flood function and hazard (including hazard resulting from 'islands' of land isolated from flood-free land) through zonings
- limiting where different types of development can occur, through zonings, to encourage developments that locate people who are more vulnerable in less-exposed areas
- having appropriate development controls in place to support zonings to limit the vulnerability of development to flooding
- designing infrastructure considering its potential impacts on flood behaviour and making it fit for purpose when needed in response to and recovery from floods.

Land-use planning measures informed by a good understanding of flood behaviour provide the most effective means to address future flood risk. The earlier flood risk is considered in the planning process, the more effectively flood risk can be addressed. For example, considering the full range of flood risk in zonings can encourage development in locations where it is compatible with flood function and flood hazard, and where emergency response arrangements are sustainable.

Table 8.1 outlines some of the key complementary options for treating risk to future property. The following issues need to be considered when managing risk for new or future development:

- flood risk when assessing the development capability of land (Section 8.1)
- flood risk when planning strategically, using zonings, and development and building controls (sections 8.2 and 8.3)
- emergency management arrangements for new development (Table 8.1)
- climate change impacts on flood risk for new development (Section 8.4)
- impacts on community-scale emergency response plans (Section 8.5).

8.1 Understanding development capability of land considering flooding

The floodplain-specific management process (Chapters 10–13) provides information to better understand the full range of flood behaviour (Chapter 5), such as the varying flood function of areas within the floodplain, the variation in flood hazard and its drivers (including isolation) and the impacts of flooding on the existing community. This information can be used to assess land capability for development in relation to flooding and:

- steer development away from areas where it may adversely affect flood behaviour, where the hazard is too high or emergency response is too difficult, or where development may impact adversely on the hazard or emergency response of the existing community
- steer development towards areas where it would have limited impact upon flood behaviour, where the hazard is relatively low and can be managed, and where emergency management can be effectively achieved
- steer development types to areas that consider people's specific vulnerabilities – for instance, developments whose occupants are vulnerable in terms of their independence of action may be directed towards areas where evacuation is more readily achievable.

To assist in informing strategic land-use planning and associated development conditions, it is important to understand the potential impacts of the full range of floods on future development. It is possible to do this by estimating flood damages to, and assessing the emergency response capacity of, new development areas, based upon general development standards. This can help in assessing whether general development standards can reduce residual risk to an acceptable level in these areas or whether additional controls need to be considered. This can then feed into strategic land-use planning considerations (Section 8.2).

Table 8.1: Up-front, ongoing and complementary options to treat future risk

Option	Up-front work	Ongoing work	Complementary work
Zoning	Inform zonings with an understanding of flood function, hazard and emergency response limitation, and vulnerability of different development types to flooding.	Ensure intent of zonings is maintained, and development controls are reducing risk to an acceptable level. Monitor effectiveness and revisit if outcomes unsatisfactory.	Incorporate zonings intent into statutory plans. Reduce residual risk to an acceptable level with complementary development controls. Interact with flood warning and emergency response management, and ensure community awareness.
Emergency response arrangement from new development	Examine evacuation needs of new development, including flood access to site and evacuation capacity from site.	Monitor effectiveness versus expectations to inform future work.	Ensure arrangements are complementary with zonings; may require specific development controls. Interact with flood warning and emergency response management, and ensure community awareness.
Impacts on community-scale emergency response plans	Examine the impacts of development on community emergency response plans and evacuation capacity of relevant roads, etc.	Monitor effectiveness versus expectations to inform future work.	Ensure arrangements are complementary with zonings; may require specific development controls. Interact with flood warning and emergency response management, and ensure community awareness.
Flood access to site	Examine appropriateness of access point to development given flood behaviour and risks.	Monitor maintenance of any special (non-road or not in public ownership) evacuation paths so these are maintained and available as necessary.	Ensure arrangements are complementary with zonings; may require specific development controls. Interact with flood warning and emergency response management, and ensure community awareness.
Development and building controls	Understand purpose and desired outcome in supporting zonings.	Ensure intent of zonings is maintained and development controls are reducing risk to an acceptable level. Monitor effectiveness and adjust if outcomes unsatisfactory.	Ensure arrangements are complementary with zonings. Place development controls into statutory planning instruments and development control plans and/or policies. Interact with flood warning, emergency response management, and ensure community awareness.

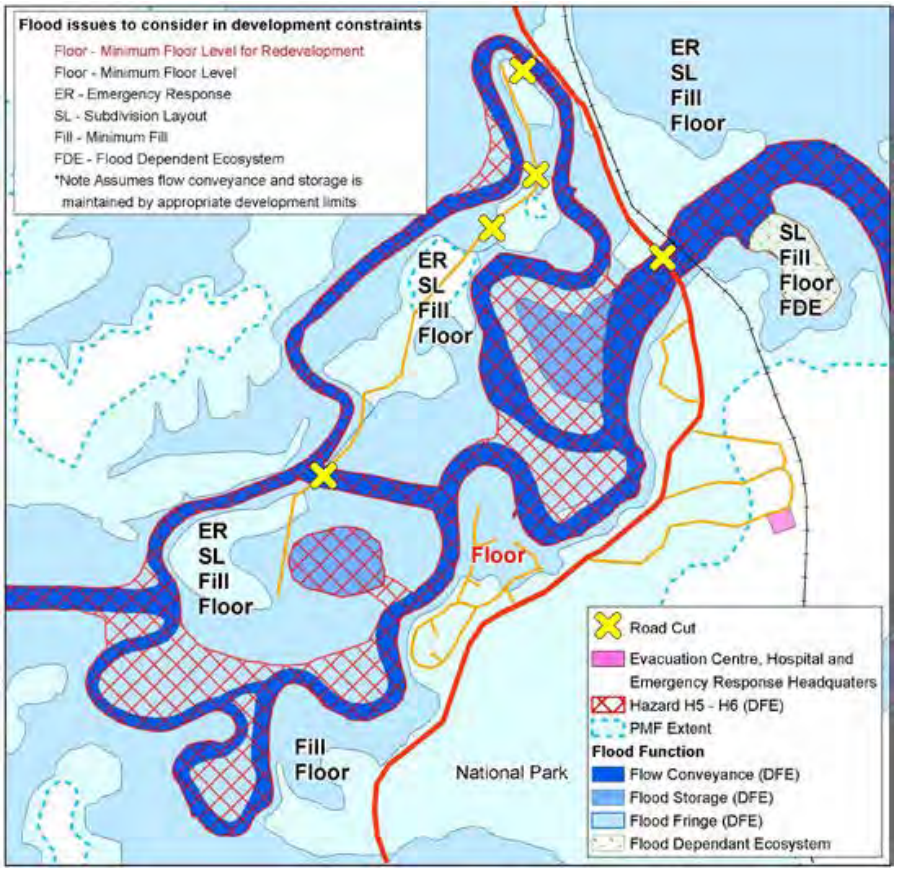


Figure 8.1 provides an overlay of the constraints shown in figures 5.1–5.3 as they differ with relevance depending upon location within the floodplain. These constraints assume that the flood function (conveyance and storage) have been considered in setting limits on intensification of development as changes to these parameters can have a significant impact upon flood behaviour elsewhere in the floodplain.

Figure 8.1: Variation in development considerations within a floodplain

8.2 Considering flood risk in land-use planning activities

Land-use planning activities often involve striking a balance between competing objectives. The management of flood risk is just one of these objectives. However, it is important to understand that it can be impossible, impractical or very expensive to rectify a decision to place development in a location where the flood risk is unacceptable or the development's impact on flood behaviour significant. The initial decision to allow intensification of development, and the type of development to permit in specific locations, needs to be an informed one that considers the implications for emergency management and the risk to the community.

Figure 8.1 provides an example of flood issues that may impact upon strategic land-use planning and how these may vary with location within a floodplain. *Australian Disaster Resilience Guideline 7-5 Flood Information to Support Land-use Planning* (ADR 2017) outlines how information on flood extents for varying scales of floods, varying flood function, varying flood hazard, and varying flood range (including isolation) can all be bought together to develop flood planning constraint categories that can provide information on the varying types and severities of flood issues on land within the floodplain. This guideline also outlines how this information can assist in land-use planning activities.

The early consideration of flood risk in strategic land-use planning can result in zonings that steer development

away from areas where intensification of development is not sustainable due to its impacts on flood behaviour or flood risk to the existing community or the degree of residual risk the new community will face. It can also result in zonings and development controls that support sustainable development of the floodplain in consideration of flood risk.

Considering this information in developing strategic planning instruments and associated development control plans provides the opportunity to manage land use and development within floodplains. Although the requirements will vary between States and Territories, collectively, they can address the way land use and development have regard for the flood function within the floodplain, the varying degrees and drivers of flood hazard, and the varying vulnerability of buildings and their occupants.

Zonings can support land uses that can limit the impact of intensification of development on the flooding of other property and limit the impact of flooding on the new development itself. Therefore, it is important that the best available information is considered in limiting risk to new development. Where there is insufficient information to inform decisions then undertaking flood investigations to inform decisions may be warranted. If strategic land-use planning decisions are required before flood investigations are complete, then these should be made in a precautionary way using the best available information in a conservative manner. These decisions may need to be revisited when improved information becomes available.

Zonings can be used to restrict activities within areas of the floodplain needed to perform their natural flood function (see Section 5.2) to uses compatible with this function. This will limit impacts of activities in these areas upon existing flood behaviour.

Zoning can also be used to discourage development incompatible with flood hazard in areas where the flood hazard is too high and cannot be effectively managed. This can limit exposure to excessive hazard or may limit the type of development permissible due to a particular driver for hazard. For example, developments expected to have inhabitants who are more vulnerable in terms of their independence of action (such as aged care homes and hospitals) should be placed in areas where evacuation is not necessary, or can be more readily achieved. Other types of development housing inhabitants who are more agile may be better suited to these locations.

Zonings can also curb the scale of intensification of development by limiting development type or density. This can help control the scale of development in evacuation-constrained areas, unless constraints such as road capacity are increased to allow for further development.

Effective zonings are critical because poor locations of development cannot be overcome by development controls (such as minimum floor levels). Moreover, inappropriately located new development adds to the potential damage, creates later demand for mitigation expenditure and increases the scale and difficulty of the emergency management task.

It is important that zonings are accompanied by development controls to reduce residual risks to acceptable levels. These can be expected to vary between development types and across the floodplain, due to the variation in the drivers for, and degree of, flood hazard present. Some controls are related to a particular flood event – for example, minimum fill levels generally relate to the DFE. However, other controls may relate to a specific area, such as providing adequate infrastructure to facilitate effective emergency management.

8.3 Planning and development controls

The planning and development controls necessary to manage risk will vary depending upon the drivers for, and scale of, flood hazard in a particular area for the full range of flooding and the cumulative impacts of development. They may also be different for infill development and new development areas.

Development controls may be needed to reduce vulnerability even further for a particular development type. For example, emergency response hospitals may be located outside the floodplain or be designed to be protected from rarer floods than the DFE. Caravan and mobile-home parks may be required to have detailed site-evacuation plans, awareness documents and signage.

8.3.1 Impact of development on flood behaviour

Development may alter flood behaviour by diverting or altering flow paths due to changes to topography within the floodplain. Filling, reshaping or placing infrastructure can alter flow paths or result in a loss of flood storage. Land clearing may increase flow off the land, which may have downstream impacts that need to be considered and managed.

Zonings that maintain flood function can manage these changes by setting limits on development not compatible with these functions. Cumulative impacts of changes should be considered and are best addressed in broader or strategic (rather than site-specific or development-scale) studies.

8.3.2 Excavation and compensatory fill

Some development projects will seek to be based upon a balance of fill and compensatory excavation. It should be noted, however, that excavation and filling are not comparable, as excavation is more likely to take place on the lower part of the floodplain, while fill will take place on the higher parts. The net effect will be that any additional storage created through excavation will be lost if the excavated area fills with floodwater before the flood peak arrives. Any fill on the floodplain will have a greater impact when major floods occur. Fill should be excluded from flow conveyance areas because of the effect on flow conveyance. In flood storage areas, there will often be a need to place limits on the location, level and quantity of fill and excavation in consideration of the cumulative effect of potential excavation or filling projects across the whole floodplain.

8.3.3 Minimum fill levels

Filling of the floodplain can have a detrimental impact on flood behaviour, which should be assessed. Limiting filling to areas outside flow conveyance and flood storage areas can limit the potential impacts. It is common practice to set minimum fill levels to reduce the frequency of exposure of developed land and its occupants to a flood threat. Minimum fill levels are generally directly related to development standards, such as the DFE.

8.3.4 Minimum floor levels

It is also common practice to set minimum floor levels, particularly for habitable rooms in residential buildings and other structures. Setting minimum floor levels can reduce the frequency and extent of flood damage. These are generally derived from development standards, such as the FPL. A different FPL may be used for residential and commercial development, and a higher FPL adopted to reduce the risk exposure of more vulnerable or emergency response development (e.g. hospitals).

8.3.5 Fencing

Fences, whether solid or open, can affect flood behaviour by altering flow paths. The impact will depend upon the type of fence and its location relative to the flow path. Where a significant impact is expected in an area, controls should be considered in relation to type of fencing permitted, or to limit its location or height. In general, solid fencing, especially to ground level, should not be erected across flow paths where it might act as a dam. Open fencing is preferable.

8.3.6 Structural requirements for building

Flow velocities, flow depths and associated debris loads can affect the structural soundness of buildings in a number of ways. Structural soundness of buildings can be tested by the resultant impacts, including buoyancy. Certification of the soundness of structures (including use of appropriate materials able to maintain their structural soundness once inundated) for the local hydraulic conditions should be considered in flood-affected areas.

8.3.7 Provision of essential services

Services might be disrupted at key infrastructure plants (water treatment, sewerage treatment, power generation and communication exchanges) or along distribution networks. To reduce interruption caused by floodwaters, service location or vulnerability to flooding should be limited. Service providers should also consider emergency response and recovery planning for floods for key assets.

8.3.8 Using building controls

Building controls are not stand-alone solutions to mitigating flood risk. They need to be used in conjunction with strategic land-use planning, flood mitigation measures and emergency management planning. Building controls are important to reduce damage to buildings and their contents, and to ensure the building does not collapse in events up to the structure's design flood event. The standard *Construction of Buildings in Flood Hazard Areas* (ABCB 2012a) and associated handbook released by the Building Code of Australia provide guidance (ABCB 2012b). State and Territory, and local government requirements also need to be considered.

8.4 Climate change

Managing the potential impacts of climate change on flood behaviour needs to consider the policy advice and guidance material relevant to the State or Territory. Building the resilience of the community to the impacts of climate change should consider adaptive decision making. The options relevant will vary depending upon the location and its vulnerability to climate change impacts. Some examples of adaptive solutions include:

- strategic land-use planning that builds consideration of climate change into decisions to rezone land to allow for more intense development
- land-use strategies that may encourage consolidated urban development on less-vulnerable land with surrounding more-vulnerable land used for communal purposes
- designs that are adaptable – for example, levees or houses that are designed to be able to be readily raised in the future if necessary
- designs that consider the proposed life of structures, particularly those meant to be short term (note that design life and the actual working life of the structure may bear little resemblance).

8.5 Management measures to reduce residual risk to new development

New developments also need to consider managing residual flood risks. Whether infill within existing areas or in new development areas, new development may affect existing emergency management arrangements, such as flood warning systems, evacuation routes and arrangements, and community-scale emergency management planning. Any adverse consequences need to be considered and managed – ideally through strategic planning (Section 8.2) – so the broader community is not affected by intensification of development. If this is not possible, then it should be considered when developing the area – it may influence the scale of development, or the external and internal infrastructure needed to support development.

Master planning of new development areas can also inadvertently add to the flood risk of occupants if emergency management is not considered effectively. For example, if the only access to an area is cut-off before the area is flooded, evacuation problems can be exacerbated. Suitable access to facilitate emergency management is recommended.

An important consideration is the ability to assess the cumulative impacts of changes in development on flood behaviour and its impacts. Cumulative impact assessment enables more informed understanding on the broad effects of changing development patterns.

Section 9.3 discusses treating residual risk at a community scale.

CHAPTER 9

Treating flood risk to existing development

In a nutshell...

Strategic management of flood risk to the existing community requires an understanding of the flood risk they face and a prioritised plan for reducing intolerable risks where practical and feasible, and in light of resource issues. Generally, consequences of flooding to existing buildings and infrastructure cannot be reduced in the short term through land-use planning and development controls. Strategic management of flood risk requires intervention through management and mitigation measures as discussed in this chapter. Options to reduce risk to the existing community aim to reduce vulnerability or exposure of the community to flood impacts, or improve the community's resilience to respond to floods.

Mitigating flood risk to existing development involves lowering flood impacts retrospectively by reducing the frequency and/or the consequences of flooding by:

- modifying flood behaviour
- improving flood warning and emergency response
- altering the community's behaviour during floods (e.g. changing attitudes to entering or driving through flood waters) or their response to floods
- reducing the effects of flooding on vulnerable sectors of the community
- reducing the vulnerability of the built environment to flooding.

An effective risk reduction strategy for existing development encompasses a suite of often interdependent measures to deal with existing and residual risk (Tables 9.1 and 9.2). These may be developed at a community-wide or regional scale (Section 9.1), or on an individual property basis (Section 9.2). The management of the resulting residual risk is discussed in Section 9.3; the assessment of mitigation options is discussed in Section 9.4. Sections 7.3 and 7.4 are also relevant to reducing existing risk.

Treating risk to existing development is constrained by current circumstances, which limit the risk reduction that can be practically achieved through mitigation. Although implementation of mitigation measures might present challenges, decision making is generally based upon an assessment that considers the economic, social and environmental benefits and costs. The assessment generally involves calculating the potential damage reduction and comparing it against the cost of the required works. If considered worthwhile economically or socially, the works are then put forward for consideration. Social benefits from works may include reducing the exposure of people to the flood threat, and enabling the community to function and support surrounding rural areas during an event, particularly in areas affected by long-duration flood events lasting weeks to months.

Treating risk to existing properties cannot generally be achieved in the short term through land-use planning and development controls, unless supported by a legislative and policy framework and a coordinated and funded relocation program. Large scale changes to existing settlement patterns or the built form through relocation or other land use changes requires careful consideration and analysis of the social, economic and environmental consequences of taking such action. Broad agreement of the affected and wider community is critical for such actions to be successful.

Table 9.1: Different management options for existing risk and associated works

Option	Up-front work	Ongoing work	Complementary work
Permanent levees and associated works	Analyse impacts, investigate, design and construct. Develop operation and maintenance manuals.	Perform maintenance and operate, and monitor during floods. Regularly monitor condition and rectify issues. Regularly trial and test operational procedures.	Manage the drainage and local flooding behind the levee (e.g. upgrade, flood gates, detention and/or pumping) and have development controls in place. Interact with flood warning and emergency response management, and planning and community awareness.
Temporary barriers	Analyse impacts, investigate, design and construct. Develop operation and maintenance manuals.	Perform maintenance and operate, and monitor during floods. Regularly monitor condition and rectify issues. Regularly trial and test operational procedures.	Manage the drainage from behind the structure and associated local flooding. Consider access across the structure for evacuation/rescue. Interact with flood warning and emergency response management, and planning and community awareness.
Flood gates	Investigate, design and construct. Develop operation and maintenance manuals.	Perform maintenance and operation, and monitoring during flood. Regularly monitor condition and rectify issues. Regularly trial and test operational procedures.	Ensure timely gate closure and that closure occurs in automated systems. Help with community awareness.
Flood mitigation dams	Analyse impacts, investigate, design and construct. Develop operation and maintenance manuals. Meet dam safety requirements where relevant.	Perform maintenance and operate, and monitor during flood. Regularly monitor condition and rectify issues. Regularly trial and test operational procedures.	Manage dam gate operation. Interact with flood warning and emergency response management and planning, and community awareness.
Detention and retardation basins	Analyse impacts, investigate, design and construct. Develop operation and maintenance manuals. Meet dam safety requirements where relevant.	Perform maintenance and operate, and monitor during flood. Regularly monitor condition and rectify issues. Regularly trial and test operational procedures.	Interact with flood warning and emergency response management, and planning and community awareness. Manage downstream zonings and development controls to limit impacts on development.
Improved flow conveyance (i.e. channel widening, bypass flow conveyance)	Investigate, design and construct considering environmental issues such as riparian vegetation and environmental flows.	Rectify issues; perform ongoing maintenance.	Interact with flood warning and emergency response management, and planning and community awareness.
Evacuation route improvement	Investigate, design and construct (e.g. raise low points on roads to improve emergency response capacity). Consider potential growth in risk due to development.	Rectify issues; perform ongoing maintenance.	Interact with flood warning and emergency response management and planning, and community awareness.
Relocate development and rezoning to more flood-compatible purposes	Investigate and justify. Remove existing development. Rezone for flood-compatible purposes. Relocate development or build new.	Ensure land remains appropriately zoned.	Investigate availability of suitable areas of correct zoning and appropriate risk. Restrict development of original site to be compatible with flood hazard.
House purchase	Investigate and justify. Remove existing development. Rezone for flood-compatible purposes.	Ensure land remains appropriately zoned.	Ensure knowledge of purpose of zoning remains.

Option	Up-front work	Ongoing work	Complementary work
Rezoning property for reduced use	Reduce potential to develop or redevelop existing development areas.	Ensure land remains appropriately zoned.	Ensure knowledge of purpose of zoning remains.
House raising	Investigate and justify. Gain building approvals.	Monitor to ensure no development below raised floor level. Notify future purchasers.	Ensure infill with an appropriate system, and notify future purchases of risk and limitations. Interact with flood warning and emergency response management, and planning and community awareness.
Flood proofing of buildings	Investigate, justify and understand limitations and operation.	Perform operation and maintenance; rectify issues.	Ensure owner is aware of the system's limitations.

Table 9.2: Different management options for residual risk, and associated works

Option	Up-front work	Ongoing work	Complementary work
Flood prediction and warning	Investigate, design and construct. Develop operation and maintenance manuals for gauges and associated information systems or networks.	Perform maintenance and operation. Monitor during flood. Regularly monitor condition, and rectify and upgrade as necessary as technology and requirements change.	Gauge flows at key locations during a flood. Interact with flood emergency response management and planning, and community awareness.
Community-scale emergency response plans	Gather information, investigate, analyse, develop strategy, formalise and communicate.	Operational use during flood. Collect extra flood intelligence. Maintain plans to allow for knowledge changes or mitigation measures, or new emergency response procedures implemented (includes new development impacts).	Implement management plans and monitor impacts of these and new development on emergency response management plans. Interact with flood warning and emergency response, and community awareness.
Community awareness and flood readiness	Understand flood behaviour, impacts and evacuation limitations. Make flood risk information available. Understand community exposure. Make clear advice available to community on how to respond to a flood threat.	Maintain up-to-date advice with changes in knowledge and the implementation of management measures. Provide regular advice to the community to maintain knowledge of flood threat and necessary response.	Interact with flood warning and emergency response, and community awareness. Implement floodplain management plans and improve flood risk knowledge through data collection or studies.
Residential or commercial emergency response plans	Provide templates and promotion. Assist with understanding flood issue and completion.	Operational use during flooding. Provide training and ongoing reminders and assistance.	Provide flood information for the community, including warnings and time for action.
Recovery plans	Understand scale of potential flood impacts and emergency response planning. Ensure flood recovery planning is in place.	Ensure advice is up to date with changes in knowledge and management measures.	Interact with flood warning and emergency response, and community awareness. Implement floodplain management plans and improve knowledge of flood risk.

9.1 Reducing flood risk at a community scale with structural works

Structural mitigation options are generally used to reduce the exposure of the existing community to flood risk. Current circumstances can limit the level of service that can be practically and cost-effectively achieved through mitigation works. This may result in a level of service below the standards for new development; however, it might still significantly reduce current risk exposure. This section discusses community-scale options from Table 9.1 with option assessment discussed in Section 9.4.

9.1.1 Permanent levees

Traditionally, levees have been used to reduce the frequency of riverine flooding in towns as they are often the most economically attractive measure. For events up to their design flood, levees can provide significant reductions in damage and allow communities to function during long-duration floods, provided the structural integrity of the levee is not compromised.

Levees generally have a finite design limit and freeboard (Section 7.2.2) on top of this. They are almost never designed to exclude the PMF and, as such, will be overtopped at some stage. Levees are only as good as their weakest link, which is often the lowest crest level. However, they may also fail through mechanisms, such as piping, if they are not adequately maintained. They should be designed to ensure that overtopping floods can enter the protected area in a manner that reduces the associated consequences. A purpose-built spillway may direct overflows to the most manageable location in the protected area.

Levees can have a significant effect on flood behaviour, particularly if located in a flow conveyance area. Investigations should consider the potential to offset impacts where necessary. Current development and infrastructure may limit the levee alignment, and the levee may cut local drainage paths, which may result in flooding inside the levee that needs to be managed. Legal arrangements are generally necessary to gain permanent access to the levee and prohibit land-use practices that may reduce its ability to perform its design function.

Levees require large capital investments to construct. They also require an ongoing financial and resource commitment to operate the levee, monitor its condition, and maintain it so it can fulfil its design function for its design life. Without this long-term commitment, levees may not be sound when a flood occurs and the value of the initial capital investment will be significantly reduced. Therefore, life-cycle costs should be considered when assessing levee options.

A fully documented and implemented operational, maintenance, monitoring and asset management plan can help ensure the levee can perform its design function when required. Operation may involve placing temporary components across areas where road or rail access is maintained when there is no flood threat. These elements need to be able to be installed within the effective warning time available for the location.

Land-use planning controls may be needed inside the levee to limit development near any spillway and to limit the impacts of local flooding from internal drainage issues to development within the protected area.

Emergency management planning should consider the ability to maintain the community behind the levee during an event. This may depend upon the residual risk, the safety of occupying the area, the rate at which the protected area would fill if the levee overtopped, the ability to evacuate if the levee overtops and the availability of essential community services.

Ongoing community education is required to ensure that the population is aware of the risk of overtopping and associated emergency management plans, and does not lapse into the common belief that a levee provides protection against all floods.

9.1.2 Temporary barriers as part of a long-term management strategy

Temporary barriers are relocatable systems erected in response to a flood threat. They can be considered as part of a long-term strategy to manage flood risk if designed to be erected each time a flood occurs that threatens the area. Temporary barriers are like all barrier-style systems, including permanent levees. If placed in the wrong location, they can have a significant negative effect upon flood behaviour, which may adversely affect other development. Their location needs to consider potential impact on flood behaviour, local drainage, emergency management planning – and when considered as part of a long-term strategy – they need to consider the full range of issues identified for permanent levees (Section 9.1.1) and the service life of the product and its components.

The suitability of temporary barriers as part of a permanent management approach will also depend upon the ability to have the system in place and operational within the effective warning time (i.e. before the flood arrives). This is a matter of operational logistics. Additional issues to consider include the risk of the location (i.e. proximity to riverbank); the stability of the foundation; the ability to manage seepage; the security of storage; the logistics of collection, handling, transport, and erection in the available time; any workplace health and safety issues in erection; service life of the product and ongoing training needs of staff. The need for

emergency service and public access across the barrier, particularly in longer duration floods where a town may support surrounding rural areas, should also be considered. Logistical issues mean that temporary barriers are unlikely to be feasible for flash-flood environments.

9.1.3 Temporary barriers as part of a short-term management strategy

Temporary barriers, like levees, can significantly affect flooding. Ideally, they are used where hydraulic investigations into their impacts have been completed through studies outlined in this handbook or equivalent. Unless these detailed investigations are undertaken and indicate their use in the location is appropriate, it would not be recommended that they be located in any of the following locations:

- On the spillway of an existing levee. Spillways are designed to direct overtopping flows to areas that minimise their impacts. Blocking spillways may cause the levee to overtop at another location with additional community impacts and potential risk of levee failure.
- On top of an existing levee. This may place more hydraulic load on the levee than it is designed to manage, and increase the potential for seepage or piping failures.
- In flow conveyance or active flow areas. Use in these areas may have a significant impact upon flood behaviour and may increase flood risk in unprotected areas.

However, there may be situations or areas where a FME, with advice from suitably qualified technical staff, may consider that a temporary system will not adversely affect flood behaviour and may be a viable short-term emergency option, without the need for significant additional investigation. These may include being a temporary solution:

- to fill a gap in a partially constructed levee, thus providing the town with flood protection while the remainder of the levee is being constructed
- where a permanent levee has been designed but is yet to be constructed – the alignment should stay within the design limits of the permanent levee, and local catchment flooding, overtopping and access over the levee need consideration
- in areas such as inactive or backwater areas where the FME considers they will not adversely affect flood behaviour. Issues such as local catchment drainage, overtopping and access across the barrier need to be considered.

9.1.4 Floodgates

Floodgates may be designed to prevent backflow from rivers into town drainage systems during floods. They can allow regular tidal inundation of areas behind structures between floods, facilitate environmental flows into protected areas, control flow into a bypass flow system until design conditions are reached and control minor flows in spillways on major dams. Their operation may be automatic or manual. In either case, they require regular maintenance and operation because they may readily become stuck open or blocked closed when fouled by debris. The appropriateness and feasibility of floodgates need to consider benefits relative to costs from social, economic and environmental perspectives. Environmental implications can include:

- changed aquatic ecology
- exposed acid sulfate soils
- changed water quality
- dried out wetlands and change in function
- potentially altered hydrological regimes resulting in changed vegetation species composition
- restricted fish passage and lost nursery habitat.

9.1.5 Dams

The primary purpose of most dams in Australia is to provide a secure water supply. They are, therefore, generally kept as full as possible and cannot be relied upon to provide significant volume capacity to mitigate a flood threat, as this is not their design purpose. Major storage dams, whether they have a designed flood mitigation capacity or not, may have some flood mitigation impact. This is often small and depends upon the dam surface area, the size of the spillway and the available capacity relative to the size of the flood. Where a major dam exists in the catchment of interest, it may be prudent to test its potential to reduce downstream flood flows whether or not it has a specific flood mitigation capacity.

There are, however, a number of dams in Australia that are designed with some flood mitigation component. They mitigate flooding by absorbing some of the flood volume in 'air space' kept free from water supply needs. This usually has more impact on peak flows in minor or moderate floods – the benefits diminish as the scale of the flood increases. Dams with gated spillways have a greater potential to be operated to reduce the impacts of flooding on downstream areas. For flood mitigation dams to be effective, they generally need to be located near the area of interest; otherwise, there may be significant catchment area downstream of the dam and tributaries that bypass a dam and reduce its effectiveness.

9.1.6 Retarding and detention basins

Basins provide temporary storage for floodwaters as a means of reducing peak downstream flows, often to offset the impact of land-use changes on flows. Basins can be large and may, in some cases, be regarded as small dams and need to meet dam safety requirements. They behave in a similar manner to flood mitigation dams, but on a smaller scale. In urban areas, basins are most suitable for small streams that respond quickly to rapidly rising floods. They may require a substantial area and reasonable depth to achieve the necessary storage and sufficient differential ground level to limit upstream impacts. Long-duration or multi-peak storms can increase the likelihood of overtopping or failure. They often have little attenuating effect on larger events than the design storm and, once overtopping occurs, downstream flows can rise quickly. These factors require careful consideration in urban design, emergency management planning and community education programs. They are often sited in areas with multipurpose use (e.g. playgrounds), so safety aspects need to be considered. Consequently, it is important that basins are properly designed (including consideration of alternative storm patterns), constructed and maintained. Risk is reduced by complementary works (bywash spillways) or specific land-use planning measures (to keep incompatible development clear of downstream flow paths and facilitate emergency response).

Well-designed retarding and detention basins may also be utilised to achieve water- sensitive urban design principles, such as stormwater treatment and stormwater capture and harvesting.

9.1.7 Improved flow conveyance

Improved flow conveyance can reduce peak flood levels upstream of locations where additional capacity is provided by improving channel capacity or bypass flow conveyance.

Channel capacity improvements

The hydraulic capacity of a river channel to convey floodwater can be increased by widening, deepening or re-aligning the channel, and by clearing the channel banks and bed of obstructions to flow. The effectiveness of channel modifications depends upon the characteristics of the river channel and the river valley. In urban situations, channel modifications can also provide the community with additional positive benefits such as visual aesthetics by landscaping with vegetated riparian corridors and recreation facilities, such as linear parks, and provide for a more water sensitive.

Channel modifications are likely to be most effective on steep, small streams with overgrown banks and narrow floodplains. They are unlikely to have a significant effect in flood situations where there are extensive areas of overbank flooding or where flood effects are dominated by downstream effects.

If carefully designed to maintain a natural stream length – with appropriate riparian and floodplain vegetation, but with increased waterway area – the impact of channel modification on downstream flood flows, bank and bed stability, and maintenance costs can be reduced. The use of concrete-lined channels to replace natural streams is particularly undesirable from an environmental standpoint and should be avoided where possible. Where modifications to natural streams are proposed, these should be designed considering guidelines for the rehabilitation and restoration of streams.

Bypass flow conveyance

Bypass flow conveyance redirects a portion of the floodwaters away from threatened areas, and so reduces flood levels along the channel downstream of the diversion. Opportunities for construction of bypass flow paths are limited by the area's topography, environmental considerations and land availability. Bypass measures may exacerbate downstream flood problems and, as they direct flows away from natural paths, and may affect channel form both upstream and downstream of the site of the works. Despite these shortcomings, bypass flow conveyance can, on occasions, provide a useful risk management option.

9.1.8 Evacuation route improvement

Evacuation relies upon having an available route of sufficient capacity to enable the community to self-evacuate to evacuation centres within the time available. Routes can be upgraded (Figure 9.1) to improve their carrying capacity for the available evacuation window by adding trafficable lanes (contra-flow is not generally recommended, as emergency management vehicles may need to enter evacuated areas), the time available to evacuate the community (by raising the evacuation route, but maintaining evacuation procedures) or by increasing certainty of knowledge of the eventuality of a flood (i.e. reducing reliance on forecast rainfall or early predictions in deciding when to enact an emergency management plan).

The upgrade of evacuation routes needs to balance the relative benefits of improved safety with the costs. It may be possible for such works to be incorporated as part of upgrades of existing roads, or by upgrading road shoulders and bike lanes to enable vehicular traffic.

AEP = annual exceedance probability;
DFE = defined flood event

Figure 9.1: Upgrade to improve evacuation routes

9.1.9 Relocation of urban development and rezoning of existing location

Where the impacts of flooding are significant and not able to be feasibly or cost- effectively managed by mitigation works, relocation of urban development to a less hazardous situation or rezoning of land to limit its development potential may be alternatives. It was found to be the most appropriate response in Grantham, Queensland, after flooding in 2011. Relocation can remove urban development from flow conveyance areas and improve flood flow, remove people and property from hazardous areas where they and their potential rescuers are at significant danger during flood events, and limit future development to purposes compatible with flow conveyance and flood hazard.

Relocation would generally involve the establishment or identification of appropriately zoned development sites in areas where flood risk is limited to more acceptable levels. It may involve a land swap with the existing site being transferred to government and rezoned for flood-compatible purposes. It may involve either relocating the existing structure to the alternate site, or constructing new buildings on the alternate site and demolishing the existing structure. Such change cannot generally be achieved in the short term through land-use planning and development controls, unless supported by a legislative and policy framework; a coordinated and funded program of relocation and the affected and wider community.

9.2 Mitigation works to reduce existing flood risk at the property scale

A house and associated property is often an individual's largest capital investment, and they can have strong sentimental and emotional attachment to it. Once a structure is built, the potential to reduce flood damage substantially at the property scale is limited. Table 9.1 outlines some of these options and the up-front, ongoing and complementary effort required for implementation. These options may be used as part of broader schemes. Their effectiveness should be tested against other options considering their social, economic, environmental and cultural costs and benefits, and considering their limitations.

9.2.1 House raising

The damage to a structure due to flooding generally increases significantly once its habitable floor level overtops. In some cases, the floor level can be raised to reduce the frequency of above-floor flooding, the scale of losses and clean-up required, and the post-flood trauma and stresses on individuals. House raising is generally best suited to timber-framed and clad structures; single or double brick, or slab-on-ground structures are often impractical or cost-prohibitive to raise. To achieve this benefit, the structural elements of a building need to be designed to cater for the potential flood forces possible at the location for the design event. This can reduce the frequency of over-floor flooding – but, unless the PMF is used for the floor event – the floor will still be inundated in rarer floods.

Therefore, house raising does not remove the need for the occupants to respond appropriately to a flood threat. Experience has shown that it is poor emergency management practice, particularly in urban areas, to leave people isolated in houses surrounded by floodwaters. This may mean that emergency management planning may identify the need to evacuate a house even though it may not be at-risk of above-floor flooding in the particular event. If evacuation is not undertaken in a timely manner, the occupants may have to traverse significant depths of water to flood-free areas and the potential need for rescue increases, particularly where flood levels exceed earlier predictions.

It is essential that both the benefits and the problems associated with house raising be examined if it is to be considered as a management option.

9.2.2 Shelter in place

There are some limited instances where an individual house or commercial development may be designed as a shelter during a flood event. This would generally only be considered appropriate in existing developed areas:

- that have no other practical management options available
- where evacuation is not possible due to lack of flood warning
- the development is outside flow conveyance areas
- it is likely to be safer to shelter in place than to try and evacuate at the wrong time.

This approach generally involves risk reduction by replacing existing flood-affected development with less-vulnerable development of the same density.

The structure should be designed for flood impacts with suitable water-resistant structural materials, and be designed to have some habitable floor area above, and to withstand the forces of, the PMF. Even in the case of shelter in place, occupation during a flood may be without water, sewerage, electricity, communications and other services, and the house will be isolated (and there is no safe duration of isolation). These factors all increase the risk of a need for rescue or on-site assistance due to, for example, the need for medical attention, on-site risks such as house fire (exacerbated by lack of electricity and difficult to extinguish due to isolation) and the need for basic supplies.

These factors can impose additional loads on emergency services during floods. For these reasons, shelter in place is a last resort option, normally only appropriate for existing flash-flood environments.

9.2.3 Government house buyback

There are areas of floodplains where hazards are extremely high and the danger to people during flood events can be significant, but where it may not be feasible or economic to mitigate the effects of flooding by any of the means discussed above. In these cases, it may be appropriate for an FME to consider house buyback as an alternative, to give the property owner the opportunity to relocate away from the danger associated with flooding at the specific location. House buyback aims to remove the people and the structure from the floodplain, and involves either removing or demolishing the house, and rezoning the land to a more flood-compatible purpose. It is generally an expensive option and, as such, is generally targeted to specific locations and scales of problems. Properties may be purchased to remove urban development from flow conveyance areas to improve flood flows, and remove people and property from hazardous areas where they and their potential rescuers are at significant danger during flood events. However, it may also be done to enable the construction of flood mitigation works, such as levees. This may be due to the location of the structure in relation to the works or the inability to manage the impact of works on flood behaviour at the structure.

9.2.4 Flood proofing of buildings

Flood proofing of buildings may involve using materials that are flood compatible (i.e. are resistant to damage by floodwaters) or temporary measures. They may include a range of built-in automatic and manual barrier systems that aim to prevent water penetration into the building during a design flood. These measures need to consider the overall design of the building, the potential for alternative ways for water to penetrate the building and the potential flood forces that may need to be managed. These systems are likely to have design limitations (i.e. maximum depths of water that they can withstand before failure) that need to be considered. They may facilitate ground-level access to a building when no flooding is occurring along with offering the ability to reduce damages during a flood. In cases where there is a need to reduce the differential in water levels between the exterior and interior of the building to minimise the potential for structural failure of building components, permanent measures allowing water penetration into the structure may be used.

9.3 Treating residual risk at a community scale

Rare floods may result in buildings with minimum floor levels based upon the DFE or protected by works such as levees being flooded. This may expose people to hazardous flood situations requiring emergency response, which could result in damage to infrastructure, and both public and private property. Informed flood emergency management planning and associated support systems (flood warning systems) and infrastructure (evacuation routes and centres) can facilitate the development of effective emergency management plans for the community to reduce the risk to life and enable some damage reduction. Table 9.2 outlines a range of measures to reduce residual flood risk at a community scale. These include flood prediction and warning, community-scale emergency response, and community preparedness and recovery. These are discussed in Sections 9.3.1–9.3.4. Treating residual risk to new development at a property scale is discussed in Section 8.5.

9.3.1 Flood forecasting and warning systems

Flood forecasting and warning systems, and emergency response arrangements that help communities cope with the impacts of flooding are essential in managing flood risk. They need to be buttressed by appropriate flood intelligence, which can be used by those who are responsible for warning and response activities. Flood warning is discussed in detail in *Australian Disaster Resilience Manual 21 Flood Warning* (AIDR 2009).

A flood warning system is an important element of flood response arrangements for any community. It may be technically simple or complex, and needs to consider the local flood situation, the needs of the emergency response agencies and the community.

Effective flood warning messages communicate to the public the threat posed by a flood event, the action they should take in response to the threat and the assistance that may be available to them. The careful use of language in flood warnings is critical to help people understand the flood threat and encourage them to act appropriately. The floodplain-specific management process can provide data, and hydrologic and hydraulic tools to assist in flood forecasting (Section C). It may also identify the need to develop or upgrade the flood warning system for a specific location to improve emergency response or community resilience.

9.3.2 Community-scale emergency response plans

A high standard of flood emergency management planning based on national, State and Territory guidelines is fundamental to flood risk management. Detailed advice on flood emergency response planning is provided in the *Australian Disaster Resilience Manual 43 - Emergency Planning* (AIDR 2004). Planning should:

- be based on flood intelligence from all credible sources, and be improved through data collection after flood events and using information from flood investigations
- include detailed evacuation planning where human populations are threatened; this requires identifying constraints to evacuation (e.g. lack of effective flood warning or time to act), lack of evacuation access and the scale of impact upon the area. Special consideration is usually necessary for more severe floods
- link with community flood awareness, education and advice (e.g. brochures about flood safety)
- identify infrastructure, such as emergency hospitals and evacuation centres, and routes and services to them, including emergency water, sewerage and power supplies. These are essential to emergency response and recovery, and it is important to understand the limitations that flooding may place upon their use during and after an event
- be subject to regular audits after flood events.

The floodplain-specific management process (Section C) is a valuable source of information for the development, maintenance and upgrade of community-scale emergency management plans. The process provides the opportunity to improve the knowledge of emergency managers about the full range and scope of the flood threat, and the varied types and severities of issues that need to be considered in emergency management planning.

Table 9.3: Example floodplain management option assessment matrix

CATEGORY	ISSUE	OPTION – RAW SCORES					OPTION – WEIGHTED SCORES			
		Weighting 5 highest, 1 lowest	Continue current practice or no change	DFE Levee	Flood Warning & Evacuation	Development Control	Continue Current Practice or no change	DFE Levee	Flood Warning & Evacuation	Development Control
SAFETY OF PEOPLE:	Reduce hazards in event deriving flood planning levels	4	2.5	4.5	3.5	3.5	10	18	14	14
	Reduce hazards extreme event	3	2.5	3.5	3.5	3	7.5	10.5	10.5	9
	Improve evacuation extreme event	4	2.5	3	3.5	2.5	10	12	14	10
SOCIAL:	Increase community growth									
	Disruption/ relocation due to measure									
	Improve property values									
	Minimise social disruption during flooding									
ECONOMIC:	Life cycle cost of management measures									
	Reduce flood damage									
ENVIRONMENTAL:	Flora/fauna impact									
	Enhance environment									
FLOOD BEHAVIOUR/ IMPACTS:	Negative or positive impacts of change in hydraulic behaviour									
	Reduce number of houses impacted									
FEASIBILITY:	Physical/ technical									
	Financial council									
	Potential for Australian, State or Territory funding									
ATTITUDE:	Decision makers									
	Community									

CATEGORY	ISSUE	OPTION – RAW SCORES					OPTION – WEIGHTED SCORES			
		Weighting 5 highest, 1 lowest	Continue current practice or no change	DFE Levee	Flood Warning & Evacuation	Development Control	Continue Current Practice or no change	DFE Levee	Flood Warning & Evacuation	Development Control
COMPATIBILITY:	Other hazards & urban drainage									
	Environmental management measures									
KEY INFRASTRUCTURE:	Improve availability and function									
TOTAL										

DFE= defined flood event

Notes: Issues considered, their weighting and score vary between committees and location depending on their effectiveness. Example calculations shown (including item weighting and scores). These can be extended to other items and totalled.

Weighting is from 1 to 5, with 5 the highest rating. These may be derived from committee discussions.

Options have been rated on a scale of 1 to 5, with 5 the highest score. The 'continue current practice' or 'no change' option is weighted at 2.5 for each issue, as it does not have a cost or benefit to the community. This provides a basis for ranking other options based upon their relative benefit or cost. Options with positive benefits are scored from 2.5 to 5. Options with negative impacts are scored from 0 to 2.5. Scores may be derived from committee discussions.

It also provides the opportunity to develop or review community- scale emergency management plans as it may:

- provide improved information on the flood threat, and its impacts upon the community and key emergency response infrastructure
- identify and lead to the implementation of treatments that may improve flood warning, significantly alter the flood threat and the scale of impacts on the community, or alter the viability or relevance of current emergency response plans.

It is important that the best available information is used for emergency management planning. This requires regular contact between the FME and those undertaking emergency management planning.

9.3.3 Community preparedness

Community engagement, education and communication provide advice on flood risk to make the community aware of the flood threat they face and how to respond to it appropriately. However, just because the community is made aware of this risk, it does not mean that they are prepared for all floods. Advice on preparation should not be solely for the more common or less severe floods. The community also needs to be prepared for floods that are outside of their experience, as there will eventually be a flood that overwhelms access routes used during more frequent floods, overtops levees, and inundates rural or urban areas that have not been previously affected. The key message is that for these rare floods, different actions must often be taken from those appropriate in the smaller event, which some community members may have experienced.

The first step in creating readiness is creating awareness of the potential for flooding. Other steps will follow that may be specific to particular areas, and will seek to create learning about particular issues, such as how to use warnings, means of protecting property, what to do before and while evacuating, and how to manage household recovery from flooding. Like all flood risk management measures, flood readiness needs to be developed and maintained to be effective. The development of community preparedness for floods is discussed in detail in the *Australian Disaster Resilience Manual 20 - Flood Preparedness* (AIDR 2009) and *Australian Disaster Resilience Manual 45 - Guidelines for the Development of Community Education, Awareness and Engagement Programs* (AIDR 2010).

9.3.4 Community recovery plans

Floods can have devastating impacts upon the community and the built environment, and require significant effort from the community, government, utility service providers and industry to recover. *Australian Disaster Resilience Handbook 2 - Community Recovery* (AIDR 2011) discusses recovery from flood events that should be considered in recovery planning.

9.4 Assessment of treatment options to reduce existing risk

Existing development is constrained by current circumstances, limiting the risk reduction that may be able to be practically achieved through mitigation. Decisions on treatments are generally based on an assessment of economic, social and environmental benefits and impacts, which generally involves calculating the potential damage reduction and comparing it against the cost of the required works. If considered worthwhile economically or socially, the works are then considered for implementation. Social benefits from works may include reducing the exposure of people to the flood threat, enabling the community to function during a flood, and enabling towns to support surrounding rural areas during an event, particularly in areas affected by flood events lasting weeks to months.

The assessment may consider different levels of service to the community, such as protection for the 5%, 2%, 1% and 0.5% annual exceedance probability floods, to determine which one is most practical, feasible and beneficial to the community relative to the cost. Some treatments have relatively high social or environmental costs – for example, the relocation or disruption of a community, the construction of a levee, the clearing of vegetation, or the reshaping of a waterway to improve hydraulic efficiency and lower flood levels. In addition, the implementation of risk management measures may benefit some groups in the community while disadvantaging – or at least not benefiting – others (e.g. protecting those inside the levee, but potentially impacting on those outside of the levee).

To compare issues and management measures objectively, it is necessary to gather a variety of socio-economic data. An economic appraisal of proposed management measures would generally need to be undertaken to ensure that costs are at least balanced by the benefits derived. This economic analysis principally deals with tangible costs, but also needs to consider:

- the flood damage assessment, to determine the reduction in damages due to mitigation. Although direct economic benefit is important, it is not unusual to proceed with mitigation schemes on largely social grounds – that is, on the basis of the reduction in intangible costs, and social and community disruption. In fact, on a global basis, it is often the experience that many mitigation schemes are often only marginally economical in strict tangible cost-benefit terms
- any social costs and benefits. The social impact of flooding on the community – in general and on specific community groups – needs to be assessed, and the benefits of mitigation understood. For example,
  - do flood-prone residents have certain characteristics or disadvantages that will make them less resilient in dealing with the occurrence and aftermath of a flood?
  - does regular flooding occur and is the community flood aware?
  - are floods highly disruptive to the community and could strategies address this disruption to the social fabric of the community?
  - is the community mobile and is there a high turnover of people?
  - what is the benefit of mitigation to public safety and to reducing community disruption?
- the environmental costs, considering the principles of environmentally sustainable development. Valuation of environmental assets and services should be included.

It is possible that public safety management measures are not properly assessed solely using traditional cost–benefit methodologies – they should consider broader assessment criteria. Table 9.3 shows a typical option assessment matrix, which identifies issues and enables their importance to be considered. The outcomes provide advice that can be used to inform decision making. The matrix considers the benefit of the option and multiplies this by the importance to develop a weighted score, and assessment criteria apply across a range of economic, social and environmental categories. An understanding of how risk is currently managed provides a continuing current practice or 'no change' option to compare with options to change practice. Assessments provide an understanding of the effectiveness of options and in optimising the mixture of measures needed to treat risk.

Effective risk management generally involves a mix of management options. It is unusual for a single management option to manage the full range of flood risk to existing and future development. Recommendations may involve:

- options to treat flood risk to the existing community, which may vary from options with localised benefits to those with broad community benefit
- strategies to reduce the risk to public infrastructure, which may involve reducing or limiting the vulnerability of infrastructure to flooding, or improving its ability to perform its function during a flood event
- strategies to manage risk to future development, and ensure it does not adversely affect the current flood regime and existing development, and has acceptable residual risks.

Guideline 7-6 Assessing Options and Service Levels for Treating Existing Risk provides advice on multi-criteria assessment of selecting options and combinations of options for treating existing risk and optimising these options.

SECTION C

Floodplain-specific management process

The floodplain-specific management process, as shown on Figure 10.1, is a risk-based process that involves steps that support understanding and management of flood risk for a specific geographic area. This is generally part or all of the floodplain of a single waterway (and may include its tributaries) or a combination of the floodplains of several waterways, where flood behaviour may interact. This understanding begins with knowledge of local flood history, evidence of the types and scales of storms that have previously caused problems, and indications of what landforms or human-made structures may influence flooding.

Data collection (Chapter 10) provides a starting point for understanding flood behaviour. However, catchments and floodplains are not static and, therefore, changes in vegetation, topography, density of development and infrastructure since key historic events need to be understood to derive current flood behaviour. The flood study (Chapter 11) provides a sound technical foundation for calibrating and verifying models against historic floods, and updating and extrapolating these models to understand the full range of flood behaviour for the current conditions. This can inform strategic land-use planning and emergency management, and provides the technical basis for the assessment of management options and more detailed consideration of future development in a floodplain management study (Chapter 12). This in turn supports informed management of flood risk through the development and implementation of a management plan (Chapter 13).

CHAPTER 10

Data collection

In a nutshell...

Data that is key to understanding and managing floods includes information on the community, the floodplain and its catchment and historic flood events. There are many sources of data to be tapped to support a more complete and credible floodplain-specific management plan. An important source is post-event data collection, because it provides clear evidence of the scope, scale and impacts of floods. The value in collecting this information and the associated lessons learnt cannot be underestimated.

Data accessibility is important. Systems to store data in consistent formats are important to making information readily available and usable. A flood risk knowledge hub may assist.

Flood data can come from many sources and should be collected when opportunities arise (i.e. immediately after a flood event when it is readily available and memorable). Data is essential for providing a robust basis for understanding flood behaviour and impacts and making decisions on its management. Data collection should not be seen as an end in itself, but rather as an input to help prepare properly informed studies than can facilitate informed decision making.

At the start of the floodplain-specific management process, it is unlikely there will be sufficient data to complete flood investigations; gaps will exist. The relevant floodplain management entities and government and non-government agencies will have some information. Relevant data types may include historic, topographic, social, economic, flood, ecological, land-use, cultural and emergency management data.

The data collection phase of the process involves gathering current knowledge on floods and extending it to facilitate management. Before collecting data, it is important to consider the types of information that may assist with scoping and undertaking investigations, and the preferred format of these data, which may include:

- flood risk management standards, manuals, guidelines and other material that provide guidance on data collection and preferred data format
- records of previous flood investigations
- records of historic events including information on the weather systems that have produced flooding and flood behaviour, such as peak flood flow measurements, aerial flood photography, satellite imagery and flood levels
- data from rain and river gauges, and dams
- survey information (both ground level survey and feature survey)
- details of catchment conditions, infrastructure, and areas of interest from a culture and heritage perspective
- information on flood vulnerability and damage to structures and infrastructure
- land use information.

Data from sources such as light detecting and ranging (lidar) survey, sometimes called aerial laser survey (ALS), has many uses across the government. Appropriate licensing can facilitate availability and avoid duplication of effort. The specification should ensure the data meet the high degree of accuracy in height and location (coordinates) required for flood risk management purposes.

Data collection should be encouraged after significant floods to provide a record of historic floods and their impacts, and inform future studies. This data is invaluable for informing decision making, and calibrating and validating flood models. The data is also evidence when disputes arise over the accuracy of flood information.

Information needs will vary with the type of study, its scale and complexity, and the output needs. However, Table 10.1 outlines some of the key data that can inform management efforts.

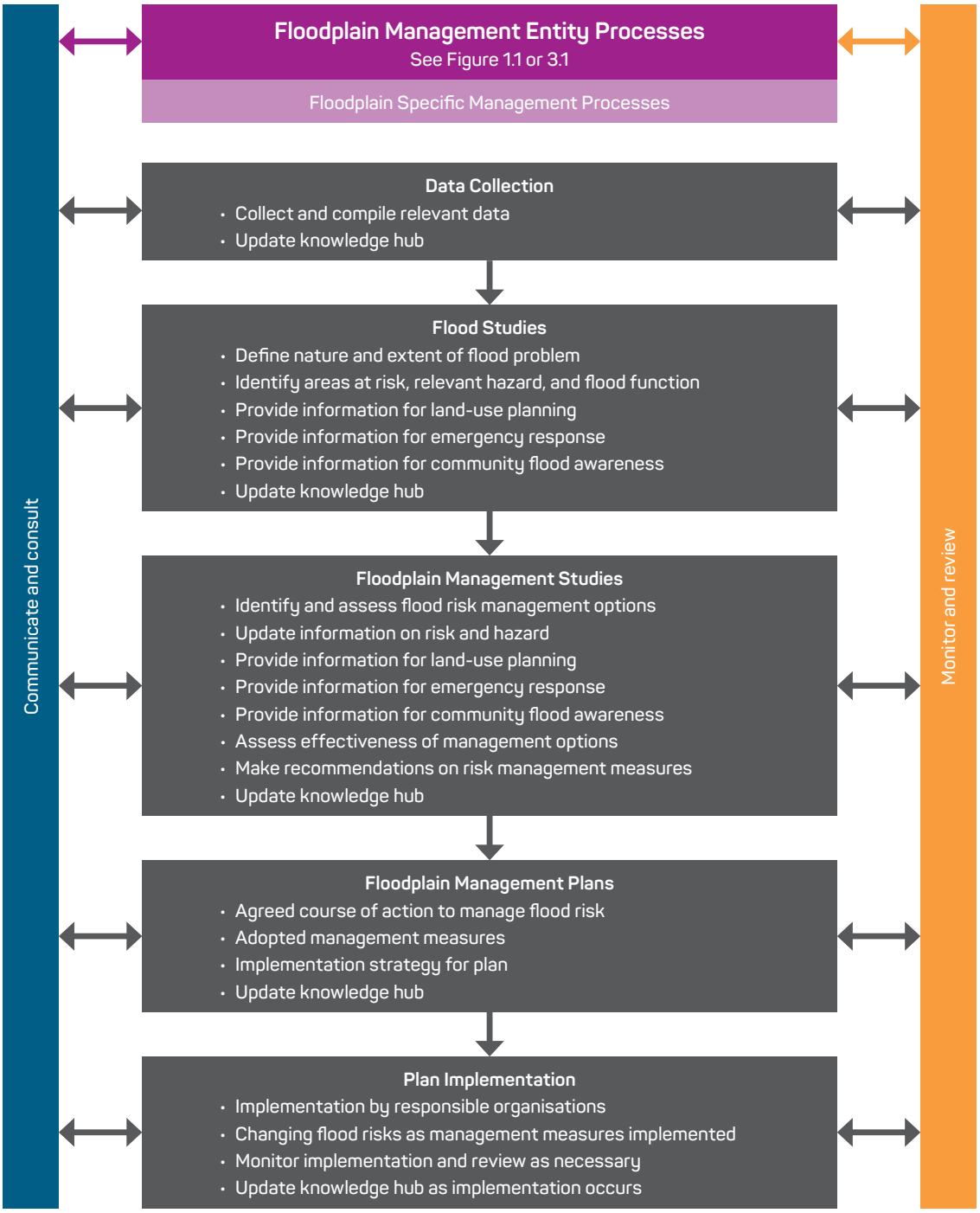


Figure 10.1 Floodplain-specific management process

10.1 Reporting on data collection

Data collection, as part of the management process, should be summarised and documented in a report that could either form part of a study report or (where substantial) be a stand-alone report. The report should provide information about the original source of all data, their quality and any assumptions used to adjust them to current conditions. For key historical information, such as flood levels, it is worth recording the primary source of information, such as newspaper stories, and the source document that describes how the flood level was converted to current datum. Any license limitations on the use of the data should be clearly outlined.

All the data collected should, wherever possible, be appropriately licensed and supplied with the report in standard digital formats to enable aggregation into data management systems and broader use.

Table 10.1: Key data for specifying and undertaking flood investigations

Information category	Information subcategory	Type of information
Available guidance at national, State, Territory or local level	Context	Relevant legislation, policies, administrative guidance.
	Floodplain management guidance	Relevant standards, manuals and guidelines from government and industry to consider. Relevant specifications for studies. Relevant specifications for data collection (e.g. lidar). Relevant information sources. Requirements for outputs from studies (e.g. compatibility with databases).
	Climate change guidance	Projections of changes to relevant sea level. Projections of changes to antecedent catchment conditions. Projections of changes to flood-producing rainfall events.
Existing and historical information	Existing flood investigations	Existing flood investigations in the area, and their extent, scope, availability, relevance and limitations.
	Historical records on significant flood events and their impacts	Rainfall from historic events, including preceding rainfall. Flood behaviour in general, major flow paths, peak flood levels, flow velocities, rate of rise of floodwaters, travel time between points. Information on the impacts of flooding on the community from sources. Flood photography and satellite imagery of flood events.
	Significant changes in the floodplain and catchment	Information on significant changes that may influence flood behaviour and their timing relative to historic events, such as: • changes to major infrastructure crossing the floodplain or key waterways • changes to the scale of development in flow conveyance and flood storage areas, on the floodplain and in the catchment • implementation of significant flood mitigation measures.
Long-term datasets	Long-term datasets	Historic data from rainfall and river flow and level gauges. Historic records of flood warnings. Data on conditions in the waterway and catchment, and downstream areas receiving water (i.e. the ocean, estuaries or downstream waterways). Data on the condition in flood mitigation dams in the catchment. Available survey data including that from lidar. Information on watertable levels where these may influence surface flooding. Long-term surveys of coastal entrances. Records of coastal entrance works (training walls and bypass systems).

Information category	Information subcategory	Type of information
Current floodplain and catchment conditions	Current catchment and floodplain	Topography of the area from ground, ALS, lidar survey, maps, etc. Information on the geology of area, including soil types, and rates of erosion and deposition. Information on land use and vegetation, and changes over time. Information on groundwater and local recharge areas. Detailed survey of natural and artificial features likely to influence flood behaviour.
	Infrastructure	Details on infrastructure that may control flood behaviour. Details on key infrastructure used in supporting a community in emergency response and recovery.
	Flood controls and management measures	Details on human-made flood-control structures such as levees, retarding basins, bridges and culverts. Details of current flood risk management measures, their effectiveness and deficiencies, including environmental disturbance and impacts on water quality. Details on current flood warning systems, emergency response plans and community flood readiness. Operating plans for flood control structures such as dams.
	Land-use and building information	Information on current flood-related zonings and development controls. Information on developed and vacant lots. Ground- and flood-level information for buildings.
	Environmental and cultural information	Areas of Indigenous and historical cultural significance. Aquatic and terrestrial flora and fauna surveys and habitat information, especially on threatened species, endangered populations and ecological communities.
	Emergency response, and recovery management limitations and planning	Information on likely evacuation routes. Information on the effects on the community of flooding to different heights, including road closures, isolation and the need to evacuate, etc. Likely community disruption caused by flooding. Planning in place for emergency response and recovery from floods. Information on the flood risk exposure of key infrastructure in response and recovery including evacuation routes and emergency response operational headquarters; potential evacuation centres; and key utility services, such as water supply, sewage treatment, electricity substations and communications.
Future floodplain and catchment conditions	Flood controls and management measures	Details on proposed management measures and their limitations.
	Land-use and building information	Current and projected future land-use and development trends within the catchment, including available land and demand for future development.
	Infrastructure	Details on proposed upgrades to infrastructure that may control flood behaviour. Details on proposed future infrastructure that may control flood behaviour. Details on proposed changes or replacement of key infrastructure for emergency response and recovery.
	Climate change	Projections of changes to relevant sea level rise. Projections of changes to antecedent catchment conditions. Projections of changes to flood-producing rainfall events.

ALS = aerial laser survey; lidar = light detecting and ranging

CHAPTER 11

Flood study

In a nutshell...

The flood study is a comprehensive technical investigation of flood behaviour that provides the main technical foundation of a robust management plan. It aims to provide a better understanding of the full range of flood behaviour (Chapter 5) and consequences (Section 6.1). It involves consideration of the local flood history, available collected data, and the development of models that are calibrated and verified, where possible, against significant historic flood events and extended to determine the full range of flood behaviour.

The flood study provides information to update the knowledge hub, inform the community, update emergency management planning, and limit growth in risk by informing land-use planning measures to control new development. The degree of sophistication of the flood study should be commensurate with the outcomes and outputs required from the study and the complexity of the flood situation (Section 3.3.3).

Flood risk management involves the extension of our current knowledge on flood behaviour to understand better the full range of potential impacts of flooding to the community. This can be in response to gaps in current knowledge, as discussed in Section 3.3.3, where the suitability of simplified methods is discussed.

A flood study can be used to fill gaps in knowledge and may also provide a platform for considering options to manage flood impacts. It needs to be undertaken with sufficient technical rigour to meet the needs of the FME and the other agencies with key roles in managing flooding. It can be undertaken to different degrees of complexity, depending upon the outcomes required, the complexity of the flood situation, the exposure to risk and the potential growth in risk exposure. The study should consider the implications and interaction of different sources of flooding in the study area (Chapter 1). The main components of a study involve the consideration of the following elements over the full range of floods:

- determining hydrologic aspects and varying flow over time
- determining hydraulic aspects, including water levels, velocities as they vary with time
- understanding varying flood (or hydraulic) function within the floodplain
- understanding varying flood hazard within the floodplain
- assessing the scale of potential impacts of floods on the existing community
- assessing the potential impacts of floods on areas of the floodplain that may be considered for future development
- understanding the potential impacts of climate change on flooding and the community.

The outputs of the study should be produced so they can be integrated into the knowledge hub, and can inform the community and stakeholders of flood risk.

11.1 Scoping

A flood study generally identifies the degree and scale of existing flood inundation and impacts on the community within a study area. It should be developed cooperatively with relevant agencies to ensure best value for money within financial and any other constraints.

Hydrological modelling is undertaken, considering the whole catchment to the location of interest. Hydraulic modelling is normally based around the study area that has a more limited areal basis than the catchment. This is generally determined by where management efforts need to concentrate – that is, where it is warranted by the scale of existing risk (due to development, population or investment) and the potential for growth of risk are highest. Thus, the usual focus will be on existing development and areas that may, over a reasonable planning horizon, be considered for development. It may be undertaken at a catchment scale where warranted by the risk (e.g. small urban catchments).

To reduce uncertainties in flood behaviour in the study area and for model calibration purposes, the hydraulic model often extends beyond the study area. This may result in less accurate flood estimates being available outside the study area. These estimates have greater uncertainty and should only be used in decision making with caution and with accommodation of this increased uncertainty.

11.1.1 Study outcomes

A flood study should aim to:

- gain an understanding of the flood behaviour and impacts upon the community for the full range of floods – this can inform decisions on the adequacy of current management regimes and identify whether additional management measures may need consideration
- make updated information available through the knowledge hub
- inform land-use planning decisions by providing
  - an understanding of the flood constraints and management considerations for future development of undeveloped areas
  - information to support development controls to reduce risk in areas already identified for development in statutory planning instruments
- allow emergency managers to be better informed when planning for emergency response. This provides an essential understanding of the implications of flooding on the community (including isolation and flooding of areas and the flooding of transport links that could be used for evacuation) for a range of flood scenarios, up to and including the PMF. This information should be able to be related to flood predictions, and as such, should be related to relevant flood gauges where practical
- facilitate flood insurance availability by providing information that allows insurers to make informed decisions on insurance pricing
- understand the potential impacts and implications of climate change on flood behaviour
- account for uncertainty. Every step in hydrologic and hydraulic assessment reduces the uncertainty associated with estimated flood levels, velocities and extents. Uncertainty needs to be identified and its implications, in terms of study objectives and desired outcomes, quantified for decision makers. In general, the greater the quantity and quality of data, the greater the confidence in design estimates. Using experienced practitioners to undertake the hydrologic and hydraulic components will minimise systematic errors and facilitate an assessment of overall uncertainty. Sensitivity analyses to key input variables can indicate the risk associated with errors in adopted criteria, coefficients or assumptions, so that these can be considered in management decisions, such as the freeboard selected.

11.1.2 Study outputs

Generally, and as a minimum, the events for which information is provided should include the defined flood event, several more frequent and a slightly rarer flood, and the PMF. As the cost to develop and produce outputs for extra flood scenarios is small compared to the cost of setting up the model, a wider range of events should be considered to provide additional information to inform end users. The information should be produced in digital format and include:

- a description of existing flood mitigation measures
- a description of the historic floods, and calibration and verification of models
- a description of the existing flood situation, and flood extent and level information
- the scale and variation in flood impacts, which can include the number of properties affected and the potential flood damages
- variations in flood functions (i.e. flow conveyance, flood storage and flood fringe) in the floodplain
- breakdown of the floodplain considering the drivers for hazard (e.g. depth, velocity, velocity and depth, isolation) and their relative severity
- emergency response management limitations, including a breakdown of the floodplain to identify areas with different types and severities of response limitations
- updated details for the knowledge hub, including on emergency management and land-use planning, and community flood awareness
- information to facilitate understanding of the degree of uncertainty in flood estimates.

11.2 Analytical tools for understanding flood behaviour

A variety of analytical tools can be used in flood studies. The tools selected need to be fit for purpose, and will depend upon the data available, the flow situation, the nature and extent of development, the level of detail required, the end use of the information, and the specification of required outputs. The use of these tools to develop effective models that reasonably reflect flood behaviour and the interpretation of their results can be extremely complex. This is a specialist area, and it is strongly recommended that the tools be used and results reviewed by suitably qualified and experienced flood risk management professionals.

In most cases, the analytical tool used will be one or more computer models. The degree of sophistication of the model and its appropriateness for the assessment of the flood behaviour for a particular situation will vary dependent upon the:

- need to calibrate and verify the model against historical flood events, which may involve modelling historic catchment development, and floodplain infrastructure and topography

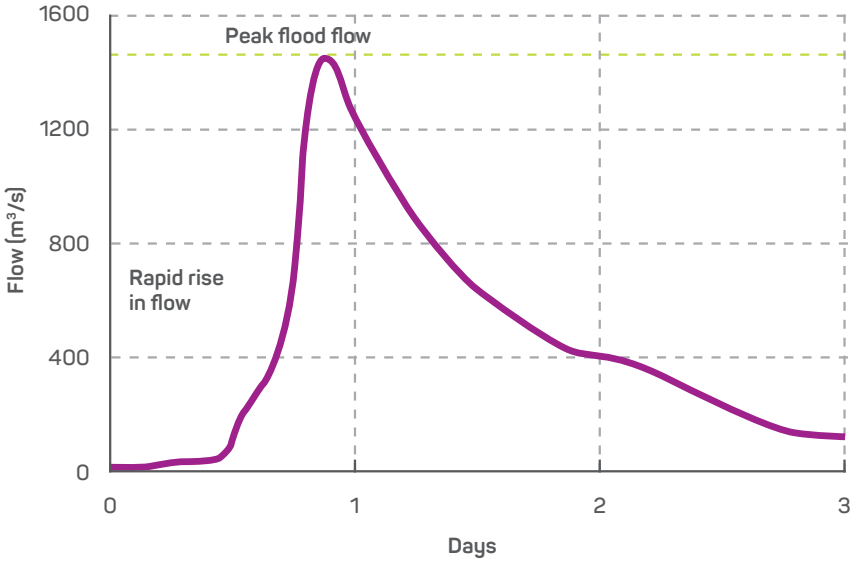


Figure 11.1 Typical coastal river flow hydrograph

- scale of the study; the larger the study area the coarser the scale of a model necessary to be able to model flood behaviour within reasonable costs and timeframes
- flood situation – if it is complex then models generally need to reflect the complexity
- ability for the model to reflect historic conditions for calibration and verification purposes
- available information and cost of collecting base information, particularly survey data
- scale of the catchment and the relevance of catchment models in determining flood flow; in very large catchments, flood frequency analyses are often used rather than detailed hydrological modelling where appropriate data is available and large hydrological models are impractical
- ability to make changes to reflect likely future development of the catchment
- likely variety of flood modification options affecting flood behaviour that may need to be assessed; it is generally more efficient to develop a model capable of assessing options rather than having to develop and calibrate a separate model
- logistical information needs of emergency management; managing floods in real time requires an understanding of issues relating to the initial flooding of areas, the overtopping of structures such as levees, timing of loss of evacuation routes and ramifications to community infrastructure
- need to provide information in a form suitable for FME and government end users.

Analytical tools will usually involve models to undertake hydrologic and hydraulic analysis as discussed below. More detailed advice on hydrologic and hydraulic analyses and on the use of associated models is given in the latest version of Australian Rainfall & Runoff (Engineers Australia 2009).

11.3 Hydrologic analysis

The flow of floodwaters past a given point on a river system is measured in volumetric terms (e.g. cubic metres per second [m3/s] or megalitres per day [ML/day]) and varies throughout the course of a flood event. Figure 11.1 shows a hydrograph indicating variation of flow with time. This is characterised by a relatively rapid rate of increase in flow on the rising limb, followed by a slower decline in flow on the falling limb.

Peak flow information is of limited use. It does not provide information on how quickly floods may reach critical levels, which is essential to time-constrained emergency management activities like asset protection or evacuation. It may need to be used in conjunction with knowledge of rates of rise and timings from large-scale historic events.

Flood frequency analyses (based upon available recorded rainfall and/or flood data near the point of interest or in the upstream catchment) and rainfall-runoff routing modelling (which uses regional or design rainfall methods recommended in the latest version of Australian Rainfall & Runoff [Engineers Australia 2009]) are the two techniques commonly used to estimate peak flood flows and hydrographs.

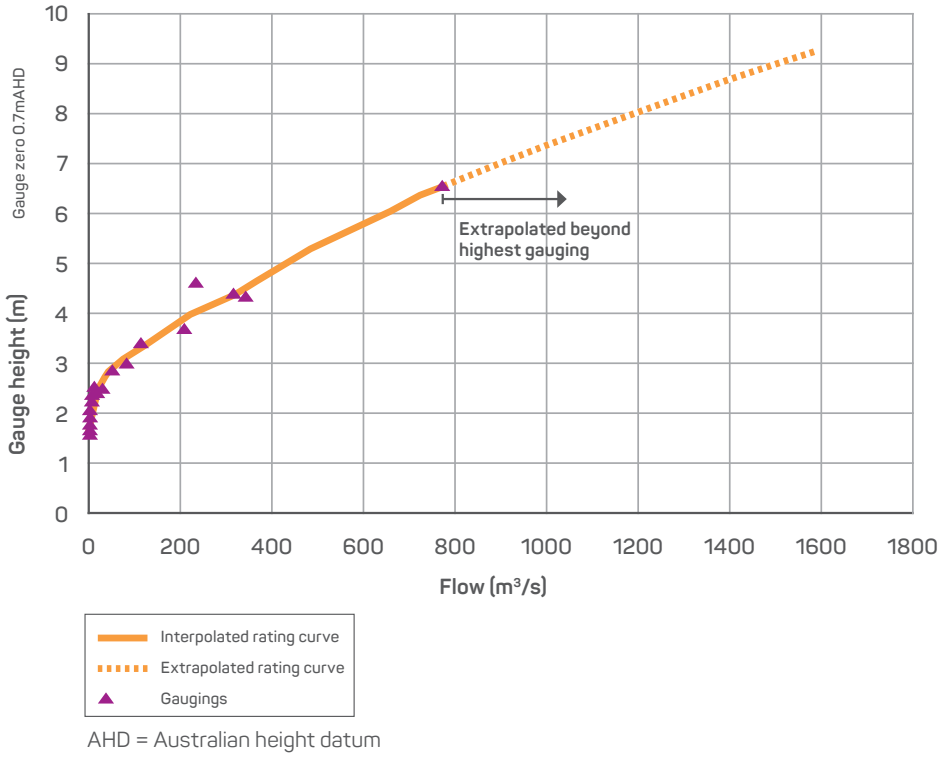


Figure 11.2 Typical rating curve for a stream gauging station

There is a common misconception that flood frequency analysis is less accurate than rainfall-based methods because it involves uncertainty bounds. However, many of the parameters used in rainfall-based methods were validated with flood frequency analysis and, therefore, most of the uncertainties in flood frequency analyses are also inherent in rainfall-based methods.

Hydrologic data are key to a reliable hydraulic analysis. Therefore, it is essential that experienced practitioners undertake the calibration, validation and design application of any numerical methods or models.

11.3.1 Flood-frequency studies

A flood-frequency study is a relatively rapid means of determining the relationship between peak flood flow at a location of interest and the likelihood of occurrence of a flood event of that size or greater. They are generally based on the annual (or water year) flood series, which comprises the highest or peak instantaneous rate of flow at a stream gauging station close to the location of interest in each year of record.

In general, creek and river flows are not measured directly. Rather, flows are estimated from water levels using rating curves that relate water level to estimated flow based upon gauge measurements and on hydraulic analyses. Due to the relative infrequency of high (flood) flows, most flow measurements are taken in the low-flow range. Thus, a rating curve may be reliable for low flows, but usually becomes increasingly inaccurate for higher flows, such as larger floods. Hydraulic analysis is used to extend the rating curve to cover larger floods, an approach that is approximate rather than exact. As a consequence, flow estimates obtained from recorded water levels at a gauging station are probably at best only accurate to within ±20%, even when made by an experienced hydraulic engineer.

Because of the generally short periods of record at gauging stations (30–60 years), there is an added degree of uncertainty in the estimates of peak flow obtained from a flood- frequency study, particularly in the medium- to large-flood range. These uncertainties are a statistical characteristic of the method of analysis or the short period of record, and are additional to inaccuracies arising from rating curves. Long periods of continuous stream flow monitoring can reduce the uncertainty of flood frequency analyses and enable these to be updated over time as more information becomes available. The implications of the uncertainty in design flood estimates need to be assessed in the flood study.

Figure 11.2 shows the rating curve for a stream gauging station. Once a rating curve has been defined, the peak annual (or water year) flood levels recorded at a gauging station can be converted to peak annual flows and a frequency analysis of the flows can be undertaken.

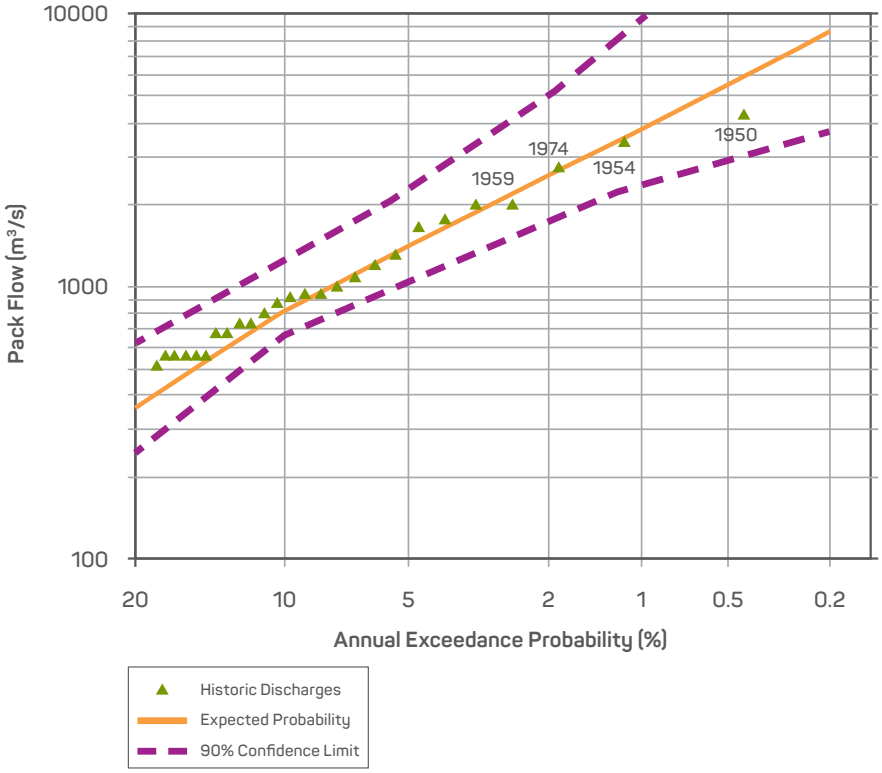


Figure 11.3 Typical frequency distribution for a stream gauging station

Figure 11.3 shows a frequency distribution and 90% confidence limits for a stream gauging station. Based on statistical theory, these limits define the range in which the actual frequency curve is expected to lie for a selected level of probability. In this case, there is a 90% chance that the actual flood frequency curve lies within the range defined by the confidence limits. The range is narrowest about the mean annual peak flow (approximately 40% AEP), and increases in width with increasing flow and decreasing frequency of occurrence. Confidence limits will be wider where less information is available. The implications of this increase in uncertainty in estimates of peak flows, particularly events used in a flood study, needs to be considered.

In the absence of recorded peak flood flow estimates at a stream gauging station close to the point of interest, regional methods of flood frequency analysis are generally followed. The latest version of Australian Rainfall & Runoff (Engineers Australia) recommends a range of methods that vary with location and catchment size. The uncertainty of design estimates based on regional methods is generally greater than those based on recorded flood data and the implications of this uncertainty need to be assessed in the flood study.

Additional studies enable the hydrographs associated with these peak flows to be estimated.

11.3.2 Rainfall-runoff routing models

A rainfall-runoff routing model is a mathematical representation of the various catchment processes that transform rainfall into runoff. With these models, a rainfall event defined in space and time is used as input data for the model, which then simulates the associated flow hydrograph at locations of interest in the catchment. There are generally two methods of applying rainfall-runoff routing models. The first uses recorded flood and rainfall event data, and is generally used in flood forecasting and in calibrating and validating rainfall-runoff routing models for use in probabilistic applications. The second application is used to determine flood hydrographs for different AEPs. It involves the use of probabilistic design model parameters and design rainfall (spatially and temporally) to simulate a design flood hydrograph at the catchment outlet or at nominated locations on the catchment.

The two main catchment processes that affect the size and shape of the flow hydrograph are rainfall losses and storage routing effects as runoff travels down the catchment. Rainfall-runoff models can only

represent these processes approximately. To obtain reliable estimates of flow hydrographs, it is necessary to calibrate the model parameters to a large flood event with available recorded rainfall and flow data.

The data requirements for calibrating rainfall-runoff routing models are considerably more intensive than for flood-frequency analyses. Total flow hydrographs at the catchment outlet, and data for the corresponding rainfall event defined spatially and temporally across the catchment, are required. In the absence of these data, regional parameters for the rainfall-runoff routing models are generally followed.

The calibration process consists of adjusting rainfall loss rates and routing parameters to obtain agreement between the recorded and simulated hydrographs. This can be a lengthy and difficult process, and should be undertaken for a number of large flood events. The calibrated model should be validated against several other recorded flood events to ensure that the model acceptably reproduces recorded results. The calibrated model parameters will vary with the flood event being assessed, so some form of weighting process is required to estimate model parameters for use in design flood estimation applications. The uncertainty associated with this procedure needs to be recognised and any implications assessed as part of the study. Once calibrated and verified, the rainfall-runoff routing model and adopted parameters can be used to predict the design flow hydrographs associated with the design rainfall events of known AEPs.

Design rainfall data throughout Australia are available in the form of intensity– frequency–duration data (spatial) and design temporal patterns (time). With these data, it is possible to estimate the time-varying intensity of rainfall (in millimetres/hour [mm/h]) for a given duration of storm (in hours) with a specified AEP for any given location in Australia, using the latest version of Australian Rainfall & Runoff (Engineers Australia). Design rainfall data are fed into the rainfall-runoff model, rainfall losses are abstracted and the associated design flow hydrograph is simulated. The use of these models in estimating design flood hydrographs involves a number of assumptions and a relatively large degree of uncertainty. The implications of this uncertainty need to be assessed by an experienced practitioner. Once calibrated, rainfall-runoff routing models also provide a convenient way of simulating the effects of dams, retarding basins and reservoirs within catchments. They can also provide advice on the propagation and timing of events.

11.3.3 Comparison of methods

The overall objectives set for the flood study, the size and nature of the catchment being investigated, and the availability of recorded flood and rainfall data on the catchment will determine which method or combination of methods (e.g. flood frequency or rainfall- runoff models) will provide the desired outcomes.

In general, rainfall records are longer, more extensive and more accurate than stream flow records. Hence, rainfall data have a greater degree of statistical reliability than flow data. Consequently, it is usual to use rainfall-based techniques, such as rainfall-runoff routing models, to estimate design peak flows and flood hydrographs for less-frequent events. On the other hand, as long as recorded flood data are available at a representative stream gauging station and that the period of record is sufficiently long, a flood frequency analysis generally provides a more accurate estimate of design peak flows for the more frequent events. As the flood study requires design flood estimates for the full range of flood events, up to and including the PMF, a combination of methods generally provides estimates of both design peak flow and flood hydrographs. These procedures are presented in the latest version of Australian Rainfall & Runoff (Engineers Australia).

For the larger catchments, where sufficient data exist to carry out a flood-frequency analysis or use a regional flood-frequency method, and the use of rainfall-runoff routing models is not practicable, recorded flood hydrographs are generally used to estimate design flood hydrographs at points of interest. This involves scaling recorded flood hydrographs until the resulting peak flow and – occasionally, the flood volume – are equal to the corresponding estimates from the frequency analysis.

Irrespective of the method or combination of methods used to estimate design peak flows or hydrographs, the implications of the uncertainty of the methods and estimates need to be assessed as part of the study. These can be tested by undertaking and reporting on sensitivity analysis of key parameters.

11.4 Hydraulic analysis

Once the design flow hydrograph or design peak flows for the flood events of interest are determined, variations in water levels, velocities, depths and the extent of flooding can be determined for the study area. This requires a hydraulic model.

Hydraulic models are of two main types – numerical and physical. In numerical models, a computer is used to solve equations representing the flow of water down a river system, and to predict water levels and velocities. Numerical models do this by solving fundamental equations based on conservation of mass, and momentum or energy. A physical model is a scaled version of the floodplain being studied. Before describing numerical and physical models, the various factors that affect water levels and velocities are briefly discussed.

11.4.1 Water levels and velocities

The water level and velocity associated with a flow of water past a given point on a river system depends upon a range of factors. Water flows from one place to another because of a difference in energy levels. In broad terms, the slope of the river channel defines the available energy. A greater slope results in more available gravitational energy to cause water to flow faster downstream. Energy is used to overcome frictional resistance from the river channel and floodplain. Smooth surfaces have less frictional resistance, which results in faster and shallower flows compared to rough surfaces. The effects of frictional resistance are also reduced as flow depths increases.

Water level and velocity are not constant. The slope of the river channel changes along its length. Frictional resistance will generally vary across the river and floodplain, and along the river reach. The shape of the channel and floodplain also changes along the length of a river. Because of these variations, the factors that affect water levels and velocities interact in a complicated way. It is further complicated by infrastructure, such as road embankments or bridges, rural and urban development, and any major constrictions along the river system. In the lower reaches of tidal rivers, and in estuaries, the ocean tide level can be of great significance in overall water level estimation. Any rise in sea level will impact upon flooding in lower coastal waterways, because it reduces the available 'air space' for flood storage in waterways and increases downstream levels, whether ocean level or outlet berm height.

11.4.2 Developing numerical hydraulic models

In a numerical hydraulic model, the equations that relate available energy to friction losses and the area and depth of flow are solved on a computer. This process provides estimates of the variations over time in water levels, velocities and extent of flooding. Numerical models vary greatly, from simple backwater flow models to complex two- dimensional (2D) models. Developing an effective model relies on understanding the available topographic data, and how the catchment and floodplain may have changed over time (particularly for calibration and verification against historic events), and information on likely controls on flood behaviour. Model development can also be informed by aerial photography and survey, historical information and field inspections to obtain a general understanding of the expected flood behaviour and model parameters, including loss factors such as spatial variations in frictional resistance or roughness. Published typical values of resistance for different conditions and materials should only be used as a guide, because different models treat resistance slightly differently. Values tend to change between models and even with different grid size.

All of these data are input into the model, which is then ready for calibration. If the downstream end of the model is non-tidal, then a rating curve is used to determine the downstream water level. If the downstream end of the model is a tidal river reach or the sea, it is necessary to incorporate the tidal fluctuations in downstream water levels in the model.

11.4.3 Calibrating and validating numerical hydraulic models

The most common calibration parameter for hydraulic models is surface roughness. The calibration process consists of adjusting model parameters to obtain agreement between simulated flood behaviour and that which has been recorded or observed. First, a flood suitable for calibration purposes is selected. Next, the flood flow is estimated (Section 11.3). Information on flood behaviour and peak levels is sought from long-term residents, newspapers, FME records and other sources, all of which is used as a basis for adjusting parameters to achieve agreement between recorded and simulated water levels in calibration. Once the model is calibrated, it should be validated against several other recorded flood events to ensure that the model acceptably reproduces recorded results.

There are uncertainties in the calibration and validation process. First, the most recent large flood suitable for calibration purposes may have occurred many years ago and catchment conditions may have changed. The number of long-term residents still living in the area will be fewer and time may have clouded their memories of the flood. Calibrating hydraulic models requires both detective work and judgement to uncover facts. Inconsistent information must be identified and discarded, and discrepancies studied and explained. It is essential that the work is undertaken by experienced practitioners. For some floodplains, the lack of calibration data may mean that published parameter values may need to be used.

The latest version of Australian Rainfall & Runoff (Engineers Australia) provides details on the available numerical models, and their applications and limitations. These include one-dimensional (1D), quasi-2D, 2D and three-dimensional (3D) models. In general, 1D and quasi-2D models require the user to define the flow paths that are modelled as a 1D system, with flow paths fixed during computation. In the quasi-2D model, the 1D flow paths are connected by a series of weir or fluvial links to enable the complex nature of flood behaviour to be modelled. In 2D and 3D models, the user does not need to define flow paths, but the data requirements, particularly topographic survey and calibration data, are far greater than for 1D and quasi-2D models. In combination, 1D, quasi-2D and 2D models can provide varying degrees of hydraulic detail, with the 1D or quasi-2D model generally used to model large reaches of the floodplain (particularly if flow is generally linear and the floodplain narrow). They may also be used to coarsely model a larger area than the study area to set boundary conditions for a 2D model, which models the study area in more detail.

CHAPTER 12

Floodplain management study

In a nutshell...

The floodplain management study extends the flood study to increase understanding of the impacts of floods on the existing and future community, and test management options. It provides a basis for informing the development of a management plan to increase community safety through the treatment of existing, future and residual risk. Community engagement is vital to the successful development of the management study. The community should be consulted to allow their concerns, suggestions and comments about management and options to be considered.

The floodplain management study increases the understanding of the impacts of floods on the existing and future community from the flood study. It also provides a basis for the assessment of management options. It needs to be undertaken with the technical rigour to meet the requirements of the floodplain management entity and other agencies with flood risk management roles, and support the development of the management plan. The study may provide improved information on flood risk and its management in its area of interest that can feed into the knowledge hub in a consistent format to facilitate data sharing.

A management study aims to identify, quantify and weigh all relevant issues so that these can be considered in developing a management plan by which the community, as a whole, is better off. A successful management study requires a comprehensive multidisciplinary approach and active public consultation. The study should provide advice on the mix of practical, feasible and economic measures necessary to manage the varying flood hazard to the existing and future community to limit the resultant residual risk to a level acceptable to the community. This advice should be considered in the development of a management plan (Chapter 13).

A management study may be undertaken over the same area of interest as the flood study that precedes it. Alternatively, it may concentrate on one or a number of key locations of interest – for example, individual towns or other areas with significant local risks that need to be addressed by local measures. This may result in one or more narrowly focused management studies done within the overall area of the flood study.

12.1 Study outcomes

A management study needs to:

- review the flood study and other relevant data to understand the current flood risk and consider whether treatment is necessary to reduce this risk
- compile relevant background information on flood impacts, the environment, land use, emergency management planning and socioeconomic matters, and – where relevant – build associated vulnerability models to inform decision making. The methods used for analysis should be justified based upon their reliability and validity to the situation
- review the information in the knowledge hub and the adequacies of management strategies to identify areas where improvements may be necessary in managing risk
- engage with the community to identify options, provide opinions and raise concerns about options so that people's views can be considered in decision making
- identify, assess, compare, make recommendations and report on options to improve risk management for the community. Options should be tested against the current management practice and existing community exposure, which requires an understanding of the social, economic and environmental benefits and costs of options, and their relative benefit and effectiveness in managing risk. The assessment provides a basis for understanding the level of service provided; the feasibility, practicality and cost-effectiveness of different options; and constraints that may inhibit implementation. It also involves understanding where the benefits accrue, the work required to achieve these benefits and the residual risks that remain with options in place

- consider the adaptability of options to the potential impacts of climate change, and advice on adaptability and suitability to any associated changing risk profile
- assess the cumulative impacts of potential future development on flood behaviour, emergency management and associated risk to the existing community.

Undeveloped zonings within statutory planning instrument and specific development proposals can provide a basis for this assessment. Where relevant, strategies to manage cumulative impacts should be assessed

- inform strategic land-use planning on the capability of land to support future development, and the limitations, controls and infrastructure necessary to support the development at an acceptable level of risk, and without exacerbating the flood risk of the existing community
- inform emergency management planning on the limitations to, and constraints on, emergency response and their implications for the capability of undeveloped land to support future development
- make updated information available through the knowledge hub
- make recommendations to consider when developing a floodplain management plan.

12.2 Study outputs

To support these outcomes in Section 12.1, the management study should produce information in digital format. As a minimum, the events for which information is provided should include the defined flood event, several more frequent and a slightly rarer flood, and the probable maximum flood. The information should include:

- a description of existing flood mitigation measures
- flood extent, and flood level information and maps for a range of floods, preferably linked to a relevant flood gauge
- the scale and variation in flood impacts, including the number and types of properties affected, and the potential flood damages
- areas of different flood function (flow conveyance, flood storage, flood fringe)
- breakdown of the floodplain, considering the drivers for hazard (e.g. depth, velocity, velocity and depth, isolation) and their relative severity
- emergency response management limitations, including a breakdown of the floodplain to identify areas with different types and severities of response limitations
- updated information for the knowledge hub – this should include information to assist with emergency management planning, land-use planning, and understanding the climate change impacts and the degree of uncertainty in flood estimates
- sufficient information on viable options to provide an understanding of their capabilities, limitations and interdependencies, costs and feasibility to inform implementation or further investigation.

12.3 Detail of assessment needed

A management study provides a robust basis to assess and compare individual and combinations of treatment options in terms of their effectiveness in managing the flood risk. The development and assessment of treatment options relies upon a detailed understanding of flood behaviour and its impacts, and understanding the benefits, costs and limitations of various management measures. As such, the management study draws together the results of the flood study and data collection to provide a basis for examining the feasibility, effectiveness and limitations of options. It also provides information and tools to inform the robust decision making required to develop a plan.

Detailed management studies are generally undertaken in areas where current management strategies are insufficient to manage flood risk into the future, and investigations are necessary to identify and assess treatment options for risk management. Where there is a community at risk and a management study does not exist, the need for a detailed management study may be due to one or a combination of the following factors:

- the current level of flood risk exposure is considered intolerable and management is necessary to reduce risk to a more tolerable level
- the current level of flood risk may be expected to change significantly due to alteration to land use in the floodplain or catchment, or the impacts of climate change
- where significant demand is anticipated for new development in the floodplain outside existing areas zoned for development within a reasonable planning horizon. The study provides an opportunity to determine flood-related constraints to inform statutory planning to manage the risk to new development areas to within acceptable levels.

A detailed management study may not be necessary if the risk to the existing community is acceptable, the growth in development is limited to within the boundaries of the existing zoned land and the flood risk exposure of new development is being managed by effective development controls. A simple management study could be undertaken to update information for the community, improve the information available for relevant management agencies and inform the development of a management plan.

CHAPTER 13

The floodplain management plan

In a nutshell...

The management plan forms the heart of the study area's flood risk management into the future. The management plans is where decisions are made on how to manage flood risk into the future. It should be developed in consultation with the community and in consideration of relevant legislation, policies and guidance that may influence its implementation and the viability of the various management measures.

The plan generally involves a range of measures to manage existing, future and residual risk, which will vary between different locations in the floodplain. It needs a prioritised implementation strategy, which outlines the commitment to implement, its staging and provides sufficient detail to facilitate implementation. Once a plan has been finalised and adopted, it should be used to update the knowledge hub, and communicated to relevant agencies and the community to update them on the flood threat. The plan needs to be implemented to manage risk, and this implementation monitored. This requires commitment, coordination and communication within government and with the community. This may best be achieved by having a group overseeing implementation, led by the floodplain management entity (FME) and involving relevant agencies.

The management plan should feed into the broader consideration and prioritisation of management options across the whole FME service area.

A management plan provides the vehicle for the FME to make and convey decisions on how it and any partner agencies intend to manage flood risk for the study area. It is prepared in consideration of the investigations and consultation undertaken in the management study. The plan can be relatively simple, depending upon the degree of change necessary to existing management practices to manage flood risk to an acceptable level.

The management plan needs to outline not only what measures are proposed to manage flood risk, but also how they will be implemented. This involves the development of a prioritised implementation strategy, which outlines the commitment necessary to implement the plan, stages implementation and describes measures in sufficient detail to enable them to be taken forward to implementation. The plan should also identify the residual risk remaining after options are implemented and indicate how it will be managed.

A management plan is not a static document but should be kept up to date and implementation monitored by the FME who can in turn use it to update the knowledge hub and inform relevant agencies and the community.

13.1 Developing a successful plan

For a management plan to be fit for purpose, it needs to:

- be consistent with any relevant legislation, policies and guidance material developed by the local, State or Territory, or Australian government
- be effective and efficient in addressing the full range of flood risk to both existing and future development by limiting growth in risk to future development, and outlining practical, feasible and cost-effective measures to reduce risk to existing development to more tolerable levels
- have prioritised actions that can feed into other FME processes – for example, treatment options requiring significant investment should be considered in forward-planning processes for relative priority against other such measures across the FME service area
- be supported, on balance, by the community, which can be facilitated by an inclusive consultation approach that provides the community with an opportunity to provide input. The plan should indicate how the community has been consulted and how community members' concerns were addressed

- have actions that are practical and sustainable in social, economic, environmental and cultural terms in the short and long term. These need to be able to be implemented, operated and maintained considering available resources and support available from government and industry. It is important to identify any significant obstacles to feasible implementation – for example, levees are costly to build, and a long-term operational and maintenance commitment is required to ensure that their design capability is maintained; flood gauges are relatively inexpensive to install, but have a high maintenance-to-capital cost ratio; and community education programs require regular ongoing effort to remind people of the risks they face and the actions they can take to manage them, and to related these issues to new individuals in the community
- have the commitment of the FME and other agencies that may be requested to undertake or assist with plan implementation
- be fully integrated with the mechanisms that will be used in delivery (e.g. statutory planning instruments, development control plans and policies, and forward plans)
- include base information necessary to support funding applications
- consider the need for interim measures while awaiting implementation of the plan, which may include interim development controls while statutory planning instruments are updated or mitigation works are implemented
- outline how implementation of the plan should be monitored and under what guidance
- update the knowledge hub, and use this to make information available to the community and relevant agencies when actions are implemented.

13.2 Developing an implementation strategy

Generally, an entire management plan cannot be implemented immediately. Certain components of the plan can be implemented relatively quickly, such as incorporating flood-related development controls into statutory planning instruments or development control plans or policies. Others are likely to require development approvals, environmental assessments, investigations and designs, and successful funding applications. In cases where implementation is likely to be a drawn-out process, interim measures may need to be instigated before long-term strategies are implemented. These should be incorporated in the management plan.

Consequently, a management plan should include an implementation strategy to outline how it will be delivered. This strategy should outline:

- the relative priority of measures, which should consider their relative benefits and costs, and ease of implementation. Generally, land-use planning changes are low cost and can be relatively straightforward to implement
- the organisation responsible for implementation and their agreement to implement
- the timeframe for delivery (including any associated staging)
- potential funding sourced
- the way in which options can be delivered, the limitations or inhibitors that may exist to delivery, and how these constraints are to be addressed – for instance, how options will be funded and any associated assumptions, the approvals necessary to enable implementation (development, environmental and cultural assessments and approvals) and relevant legislation and policies that must be considered in implementing the option
- the social, economic and environmental benefits and costs of implementation to the community
- any specific ramifications to the community if these measures are not delivered
- any interdependence between options (e.g. works to offset any adverse impacts of other works instituted to benefit a portion of the community)
- any interim measures necessary before implementing a portion of, or the entire, management plan
- whether individual options trigger the need to update the knowledge hub, and to activate the communication plan or any other portion of it.

13.3 Implementing the plan

The process of reducing flood risk begins with implementing the management plan. The plan is not static, but will change as the project is implemented, and will therefore need to be reviewed and updated. Implementation is generally undertaken during an extended period through a series of stages.

Implementation of flood mitigation works or flood warning system upgrades will often involve several partners, and require agreement to be reached on who owns, operates and maintains the assets (e.g. levees or river level gauges). Processes need to be completed to acquire land, undertake cultural and heritage surveys and environmental assessments, obtain any necessary permits, and consult the community.

Project management tasks associated with design and construction of the works also need to be undertaken. Implementation of the plan may be assisted by:

- the knowledge hub, and updating it with current information on flood risk exposure and its management across the FME (these should be updated when the plan is completed, and at stages during implementation when risks or response change significantly)
- communication plans to ensure the community and agencies are kept up to date on the flood threat and how to respond to it. It is particularly important that government and the community know when measures are implemented that may change how they need to manage or react to a flood threat
- community education programs to inform and remind the community of the flood threat and actions they can undertake in preparing for and responding to floods. These programs should aim to improve community resilience to flood risk and the ability of community members to properly fulfil their roles in emergency preparation and response
- strategic land-use planning, and supporting development and building controls that are based on the best available information. These may need to be updated with plan implementation, and amendment processes should be done according to relevant legislation, and State or Territory direction and policy guidance
- mitigation and forward-works programs that facilitate implementation of works to reduce the flood risk to the portion of the community who are benefiting from the works
- acquisition plans to purchase properties or attain easements for mitigation works, or as part of flow conveyance path clearance or other mitigation schemes
- flood emergency management plans developed by the responsible agency in accordance with relevant legislation, policy guidance and direction of government; such plans need to consider the flood threat, community exposure, and any constraints on warning or evacuation
- recovery plans developed by the responsible agency; such plans need to outline actions that aid the community recover from a flood event.

13.4 Updating and reviewing the floodplain management plan

A plan is never truly finished. It may be adopted by the relevant committee of decision makers at a point in time as the agreed way forward to manage risk, but social and economic circumstances and flood conditions can all change. Therefore, implementation needs to be monitored, and plans and implementation strategies reviewed every five years to ensure that they remain appropriate. Where necessary, a plan should be revised to reflect changes or updates, and deficiencies, because the situation may change with recent flood events. A range of circumstances may trigger the need to review a management plan sooner:

- if the needs of the community change significantly
- when impediments to implementation exist that may warrant a review
- when significant changes in future land-use trends, outside those considered in the plan, are proposed
- after significant flood events, which provide lessons to consider in management
- where new technologies change the utility of different management options or produce new ones
- where options previously thought to be viable may prove not to be after more detailed investigation
- where management options, such as mitigation works, are implemented
- where there are significant changes to the relevant emergency management plan.

Each management review should account for changes across the full range of issues originally addressed and consider any associated emergent issues.

SECTION D

ADDITIONAL MATERIALS

CHAPTER 14

Terminology

In a nutshell

The acronyms and glossary of relevant terms is provided below. If using this handbook within their jurisdiction, States and Territories may wish to provide a list of jurisdictional terms where they differ from this handbook.

14.1 Acronyms

AAD	average annual damage
AEP	annual exceedance probability
AHD	Australian height datum
ARI	average recurrence interval
DFE	defined flood event
FME	floodplain management entity
FPL	flood planning level
KPI	key performance indicator
PMF	probable maximum flood
PMP	Probable maximum precipitation

14.2 Glossary

Annual exceedance probability (AEP)

The likelihood of the occurrence of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood flow of 500 m3/s has an AEP of 5%, it means that there is a 5% chance (that is, a one-in-20 chance) of a flow of 500 m^3/s or larger occurring in any one year (see also *average recurrence interval, flood risk, likelihood of occurrence, probability*).

Astronomical tide

The variation in sea level caused by the gravitational effects of (principally) the moon and sun. It includes highest and lowest astronomical tides (HAT and LAT) occur when relative alignment and distance of the sun and moon from the earth are 'optimal'. Water levels approach to within 20 cm of HAT and LAT twice per year around mid-summer and mid-winter 'king tides'.

Australian height datum (AHD)

A common national survey height datum as a reference level for defining reduced levels; 0.0 m AHD corresponds approximately to sea level.

Average annual damage (AAD)

Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood-prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time. If the damage associated with various annual events is plotted against their probability of occurrence, the AAD is equal to the area under the consequence–probability curve. AAD provides a basis for comparing the economic effectiveness of different management measures (i.e. their ability to reduce the AAD).

Average recurrence interval (ARI)

A statistical estimate of the average number of years between the occurrence of a flood of a given size or larger than the selected event. For example, floods with a flow as great as or greater than the 20-year ARI (5% AEP) flood event will occur, on average, once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event (see also *annual exceedance probability*).

Catchment

The area of land draining to a particular site. It is related to a specific location, and includes the catchment of the main waterway as well as any tributary streams.

Catchment flooding

Flooding due to prolonged or intense rainfall (e.g. severe thunderstorms, monsoonal rains in the tropics, tropical cyclones). Types of catchment flooding include riverine, local overland and groundwater flooding.

Chance

The likelihood of something happening that will have beneficial consequences (e.g. the chance of a win in a lottery). Chance is often thought of as the 'upside of a gamble' (Rowe 1990) (see also *risk*).

Coastal flooding

Flooding due to tidal or storm-driven coastal events, including storm surges in lower coastal waterways. This can be exacerbated by wind-wave generation from storm events.

Consent authority

The authority or agency with the legislative power to determine the outcome of development and building applications.

Consequence

The outcome of an event or situation affecting objectives, expressed qualitatively or quantitatively. Consequences can be adverse (e.g. death or injury to people, damage to property and disruption of the community) or beneficial.

Defined flood event (DFE)

The flood event selected for the management of flood hazard to new development. This is generally determined in floodplain management studies and incorporated in floodplain management plans. Selection of DFEs should be based on an understanding of flood behaviour, and the associated likelihood and consequences of flooding. It should also take into account the social, economic, environmental and cultural consequences associated with floods of different severities. Different DFEs may be chosen for the basis for reducing flood risk to different types of development. DFEs do not define the extent of the floodplain, which is defined by the PMF (see also *design flood*, *floodplain* and *probable maximum flood*).

Design flood

The flood event selected for the treatment of existing risk through the implementation of structural mitigation works such as levees. It is the flood event for which the impacts on the community are designed to be limited by the mitigation work. For example, a levee may be designed to exclude a 2% AEP flood, which means that floods rarer than this may breech the structure and impact upon the protected area. In this case, the 2% AEP flood would not equate to the crest level of the levee, because this generally has a freeboard allowance, but it may be the level of the spillway to allow for controlled levee overtopping (see also *annual exceedance probability*, *defined flood event*, *floodplain*, *freeboard* and *probable maximum flood*).

Development

Development may be defined in jurisdictional legislation or regulation. This may include erecting a building or carrying out of work, including the placement of fill; the use of land, or a building or work; or the subdivision of land.

Infill development refers to the development of vacant blocks of land within an existing subdivision that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development.

New development is intensification of use with development of a completely different nature to that associated with the former land use or zoning (e.g. the urban subdivision of an area previously used for rural purposes). New developments generally involve rezoning, and associated consents and approvals. It may require major extensions of existing urban services, such as roads, water supply, sewerage and electric power.

Redevelopment refers to rebuilding in an existing developed area. For example, as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either rezoning or major extensions to urban services.

Ecologically sustainable development

Using, conserving and improving natural resources so that ecological processes on which life depends are maintained, and the total quality of life – now and in the future – can be maintained or increased.

Effective warning time

The effective warning time available to a flood-prone community is equal to the time between the delivery of an official warning to prepare for imminent flooding and the loss of evacuation routes due to flooding. The effective warning time is typically used for people to self-evacuate, to move farm equipment, move stock, raise furniture, and transport their possessions.

Existing flood risk

The risk a community is exposed to as a result of its location on the floodplain.

Flash flood

Flood that is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. It is generally not possible to issue detailed flood warnings for flash flooding. However, generalised warnings may be possible. It is often defined as flooding that peaks within six hours of the causative rain.

Flood

Flooding is a natural phenomenon that occurs when water covers land that is normally dry. It may result from coastal or catchment flooding, or a combination of both (see also *catchment flooding* and *coastal flooding*).

Flood awareness

An appreciation of the likely effects of flooding, and a knowledge of the relevant flood warning, response and evacuation procedures. In communities with a high degree of flood awareness, the response to flood warnings is prompt and effective. In communities with a low degree of flood awareness, flood warnings are liable to be ignored or misunderstood, and residents are often confused about what they should do, when to evacuate, what to take with them and where it should be taken.

Flood damage

The tangible (direct and indirect) and intangible costs (financial, opportunity costs, clean-up) of flooding. Tangible costs are quantified in monetary terms (e.g. damage to goods and possessions, loss of income or services in the flood aftermath). Intangible damages are difficult to quantify in monetary terms and include the increased levels of physical, emotional and psychological health problems suffered by flood-affected people that are attributed to a flooding episode.

Flood education

Education that raises awareness of the flood problem, to help individuals understand how to manage themselves and their property in response to flood warnings and in a flood event. It invokes a state of flood readiness.

Flood emergency management plan

A step-by-step sequence of previously agreed roles, responsibilities, functions, actions and management arrangements for the conduct of a single or series of connected emergency operations. The objective is to ensure a coordinated response by all agencies having responsibilities and functions in emergencies.

Flood emergency management

Emergency management is a range of measures to manage risks to communities and the environment. In the flood context, it may include measures to prevent, prepare for, respond to and recover from flooding.

Flood fringe areas

The part of the floodplain where development could be permitted, provided the development is compatible with flood hazard and appropriate building measures to provide an adequate level of flood protection to the development. This is the remaining area affected by flooding after flow conveyance paths and flood storage areas have been defined for a particular event (see also *flow conveyance areas* and *flood storage areas*).

Flood hazard

Potential loss of life, injury and economic loss caused by future flood events. The degree of hazard varies with the severity of flooding and is affected by flood behaviour (extent, depth, velocity, isolation, rate of rise of floodwaters, duration), topography and emergency management.

Floodplain

An area of land that is subject to inundation by floods up to and including the probable maximum flood event – that is, flood-prone land.

Floodplain management entity (FME)

The authority or agency with the primary responsibility for directly managing flood risk at a local level.

Floodplain management plan

A management plan developed in accordance with the principles and guidelines in this handbook, usually includes both written and diagrammatic information describing how particular areas of flood-prone land are to be used and managed to achieve defined objectives. It outlines the recommended ways to manage the flood risk associated with the use of the floodplain for various purposes. It represents the considered opinion of the local community and the floodplain management entity on how best to manage the floodplain, including consideration of flood risk in strategic land-use planning to facilitate development of the community.

It fosters flood warning, response, evacuation, clean-up and recovery in the onset and aftermath of a flood, and suggests an organisational structure for the integrated management for existing, future and residual flood risks. Plans need to be reviewed regularly to assess progress and to consider the consequences of any changed circumstances that have arisen since the last review.

Flood planning area

The area of land below the flood planning level, and is thus subject to flood-related development controls.

Flood planning level (FPL)

The FPL is a combination of the defined flood levels (derived from significant historical flood events or floods of specific annual exceedance probabilities) and freeboards selected for floodplain management purposes, as determined in management studies and incorporated in management plans.

Flood-prone land

Land susceptible to flooding by the probably maximum flood event. Flood-prone land is synonymous with the floodplain. Floodplain management plans should encompass all flood-prone land rather than being restricted to areas affected by defined flood events.

Flood proofing of buildings

A combination of measures incorporated in the design, construction and alteration of individual buildings or structures that are subject to flooding, to reduce structural damage and potentially, in some cases, reduce contents damage.

Flood readiness

An ability to react within the effective warning time (see also *flood awareness* and *flood education*).

Flood risk

The potential risk of flooding to people, their social setting, and their built and natural environment. The degree of risk varies with circumstances across the full range of floods. Flood risk is divided into three types – existing, future and residual.

Flood severity

A qualitative indication of the 'size' of a flood and its hazard potential. Severity varies inversely with likelihood of occurrence (i.e. the greater the likelihood of occurrence, the more frequently an event will occur, but the less severe it will be). Reference is often made to major, moderate and minor flooding (see also *minor, moderate and major flooding*).

Flood storage areas

The parts of the floodplain that are important for temporary storage of floodwaters during a flood passage. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas (see also *flow conveyance areas* and *flood fringe areas*).

Flood study

A comprehensive technical investigation of flood behaviour. It defines the nature of flood hazard across the floodplain by providing information on the extent, level and velocity of floodwaters, and on the distribution of flood flows. The flood study forms the basis for subsequent management studies and needs to take into account a full range of flood events up to and including the probable maximum flood.

Flow

The rate of flow of water measured in volume per unit time – for example, cubic metres per second (m^3/s). Flow is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).

Flow conveyance areas

Those areas of the floodplain where a significant flow of water occurs during floods. They are often aligned with naturally defined channels. Flow conveyance paths are areas that, even if only partially blocked, would cause a significant redistribution of flood flow or a significant increase in flood levels. They are often, but not necessarily, areas of deeper flow or areas where higher velocities occur, and can also include areas where significant storage of floodwater occurs.

Each flood has a flow conveyance area, and the extent and flood behaviour within flow conveyance areas may change with flood severity. This is because areas that are benign for small floods may experience much greater and more hazardous flows during larger floods (see also *flood fringe areas* and *flood storage areas*).

Freeboard

The height above the DFE or design flood used, in consideration of local and design factors, to provide reasonable certainty that the risk exposure selected in deciding on a particular DFE or design flood is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels and so on. Freeboard compensates for a range of factors, including wave action, localised hydraulic behaviour and levee settlement, all of which increase water levels or reduce the level of protection provided by levees. Freeboard should not be relied upon to provide protection for flood events larger than the relevant defined flood event of a design flood.

Freeboard is included in the flood planning level and therefore used in the derivation of the flood planning area (see also *defined flood event, design flood, flood planning area* and *flood planning level*).

Frequency

The measure of likelihood expressed as the number of occurrences of a specified event in a given time. For example, the frequency of occurrence of a 20% annual exceedance probability or five-year average recurrence interval flood event is once every five years on average (see also *annual exceedance probability, annual recurrence interval, likelihood* and *probability*).

Future flood risk

The risk that new development within a community is exposed to as a result of developing on the floodplain.

Gauge height

The height of a flood level at a particular gauge site related to a specified datum. The datum may or may not be the AHD (see also *Australian height datum*).

Habitable room

In a residential situation, a living or working area, such as a lounge room, dining room, rumpus room, kitchen, bedroom or workroom. In an industrial or commercial situation, it refers to an area used for offices or to store valuable possessions susceptible to flood damage in the event of a flood.

Hazard

A source of potential harm or a situation with a potential to cause loss. In relation to this handbook, the hazard is flooding, which has the potential to cause damage to the community.

Hydraulics

The study of water flow in waterways; in particular, the evaluation of flow parameters such as water level, extent and velocity.

Hydrograph

A graph that shows how the flow or stage (flood level) at any particular location varies with time during a flood.

Hydrologic analysis

The study of the rainfall and runoff process, including the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods.

Intolerable risk

A risk that, following understanding of the likelihood and consequences of flooding, is so high that it requires consideration of implementation of treatments or actions to improve understanding, avoid, transfer or reduce the risk.

Life-cycle costing

All of the costs associated with the project from the cradle to the grave. This usually includes investigation, design, construction, monitoring, maintenance, asset and performance management and, in some cases, decommissioning of a management measure.

Likelihood

A qualitative description of probability and frequency (see also *frequency* and *probability*).

Likelihood of occurrence

The likelihood that a specified event will occur. (With respect to flooding, see also *annual exceedance probability* and *average recurrence interval*).

Local overland flooding

Inundation by local runoff on its way to a waterway, rather than overbank flow from a stream, river, estuary, lake or dam. Can be considered synonymous with stormwater flooding.

Loss

Any negative consequence or adverse effect, financial or otherwise.

Mathematical and computer models

The mathematical representation of the physical processes involved in runoff generation and stream flow. These models are often run on computers due to the complexity of the mathematical relationships between runoff, stream flow and the distribution of flows across the floodplain.

Merit approach

The merit approach weighs social, economic, ecological and cultural impacts of land-use options for different flood-prone areas, together with flood damage, hazard and behaviour implications, and environmental protection and wellbeing of rivers and floodplains. This approach operates at two levels. At the strategic level, it allows for the consideration of flood hazard and associated social, economic, ecological and cultural issues in formulating statutory planning instruments, and development control plans and policies. At a site-specific level, it involves consideration of the best way of developing land in consideration of the zonings in a statutory planning instruments, and development control plans and policies.

Minor, moderate and major flooding

These terms are often used in flood warnings to give a general indication of the types of problems expected with a flood:

Probability

A statistical measure of the expected chance of flooding. It is the likelihood of a specific outcome, as measured by the ratio of specific outcomes to the total number of possible outcomes.

Probability is expressed as a number between zero and unity, zero indicating an impossible outcome and unity indicating an outcome that is certain. Probabilities are commonly expressed in terms of percentage. For example, the probability of 'throwing a six' on a single roll of a die is one in six, or 0.167 or 16.7% (see also *annual exceedance probability*).

Probable maximum flood (PMF)

The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from PMP and, where applicable, snow melt, coupled with the worst flood-producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood-prone land – that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event, should be addressed in a floodplain risk management study.

Probable maximum precipitation (PMP)

The PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given-size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (WMO 1986). It is the primary input to probable maximum flood estimation.

Rainfall intensity

The rate at which rain falls, typically measured in millimetres per hour (mm/h). Rainfall intensity varies throughout a storm in accordance with the temporal pattern of the storm (see also *temporal pattern*).

Residual flood risk

The risk a community is exposed to that is not being remedied through established risk treatment processes. In simple terms, for a community, it is the total risk to that community, less any measure in place to reduce that risk.

The risk a community is exposed to after treatment measures have been implemented. For a town protected by a levee, the residual flood risk is the consequences of the levee being overtopped by floods larger than the design flood. For an area where flood risk is managed by land-use planning controls, the residual flood risk is the risk associated with the consequences of floods larger than the DFE on the community.

Risk

'The effect of uncertainty on objectives' (ISO31000:2009). NOTE 4 of the definition in ISO31000:2009 also states that 'risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence'. Risk is based upon the consideration of the consequences of the full range of flood behaviour on communities and their social settings, and the natural and built environment (see also *likelihood* and *consequence*).

Risk analysis

The systematic use of available information to determine how often specified (flood) events occur and the magnitude of their likely consequences. Flood risk analysis is normally undertaken as part of a floodplain management study, and involves an assessment of flood levels and hazard associated with a range of flood events (see also *flood study*).

Risk management

The systematic application of management policies, procedures and practices to the tasks of identifying, analysing, assessing, treating and monitoring flood risk. Flood risk management is undertaken as part of a floodplain management plan. The floodplain management plan reflects the adopted means of managing flood risk (see also *floodplain management plan*).

Riverine flooding

Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam. Riverine flooding generally excludes watercourses constructed with pipes or artificial channels considered as stormwater channels.

Runoff

The amount of rainfall that drains into the surface drainage network to become stream flow; also known as rainfall excess.

Stage

Equivalent to water level. Both stage and water level are measured with reference to a specified datum (e.g. the Australian height datum).

Storm surge

The increases in coastal water levels above predicted astronomical tide level (i.e. tidal anomaly) resulting from a range of location dependent factors including the inverted barometer effect, wind and wave set-up and astronomical tidal waves, together with any other factors that increase tidal water level (see also *astronomical tide, wind set-up* and *wave set-up*).

Stormwater flooding

Is inundation by local runoff caused by heavier than usual rainfall. It can be caused by local runoff exceeding the capacity of an urban stormwater drainage systems, flow overland on the way to waterways or by the backwater effects of mainstream flooding causing urban stormwater drainage systems to overflow (see also *local overland flooding*).

Temporal pattern

The variation of rainfall intensity with time during a rainfall event.

Tidal anomaly

The difference between recorded storm surge levels and predicted astronomical tide level.

Treatment options

The measures that might be feasible for the treatment of existing, future and residual flood risk at particular locations within the floodplain. Preparation of a treatment plan requires a detailed evaluation of floodplain management options (see also *floodplain management plan*).

Velocity of floodwater

The speed of floodwaters, measured in metres per second (m/s).

Vulnerability

The degree of susceptibility and resilience of a community, its social setting, and the natural and built environments to flood hazards. Vulnerability is assessed in terms of ability of the community and environment to anticipate, cope and recover from flood events. Flood awareness is an important indicator of vulnerability (see also *flood awareness*).

Wave set-up

The increase in water levels in coastal waters (within the breaker zone) caused by waves transporting water shorewards. The zone of wave set-up against the shore is balanced by a zone of wave 'set-down' (i.e. reduced water levels) seawards of the breaker zone. Wave set-ups of 2–4 m could occur during tropical cyclones.

Wind set-up

The increase in water levels in coastal waters caused by the wind driving the water shorewards and 'piling it up' against the shore. Wind set-up can be as high as 10 m in an extreme case, and often exceeds 2–3 m in typical tropical cyclones.

CHAPTER 15

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TITLE: **DA0453/2024 - 65A Bourke Street and 65 Bourke Street Launceston - Residential - Partial Demolition, Construction of Alterations and Additions to a Dwelling and Construction of a Crossover with ROW access over 65 Bourke Street Launceston**

FILE NO: DA0453/2024

AUTHOR: Catherine Mainsbridge (Senior Town Planner - Development)

GENERAL MANAGER: Chelsea van Riet (Acting General Manager Infrastructure and Assets Network)

ATTACHMENT ONE:

PLANNING APPLICATION INFORMATION:

Applicant:	S. Group
Property:	65A Bourke Street and 65 Bourke Street, Launceston
Zoning:	Inner Residential
Receipt Date:	16/10/2024
Validity Date:	6/11/2024
Further Information Request:	18/10/2024
Further Information Received:	06/11/2024
Deemed Approval:	18/12/2024
Representations:	4

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3. PLANNING SCHEME REQUIREMENTS

3.1 Zone Purpose

9.0 Inner Residential Zone
The purpose of the Inner Residential Zone is: 9.0.1 To provide for a variety of residential use or development that accommodates a range of dwelling types at higher densities. 9.0.2 To provide for the efficient utilisation of available social, transport and other service infrastructure. 9.0.3 To provide for non-residential use that: (a) primarily serves the local community; and (b) does not cause an unreasonable loss of amenity, through scale, intensity, noise, activity outside of business hours, traffic generation and movement, or other off site impacts. 9.0.4 To provide for Visitor Accommodation that is compatible with residential character.
Consistent
The proposal will continue and enhance the residential occupancy of the fully serviced inner city property without impacting on the amenity of adjoining properties.
9.4.2 Setbacks and building envelope for all dwellings
That the siting and scale of dwellings: (a) provides reasonably consistent separation between dwellings and their frontage within a street; (b) provides consistency in the apparent scale, bulk, massing and proportion of dwellings; and

(c) provides separation between dwellings on adjoining properties to allow a reasonable opportunity for daylight and sunlight to enter habitable rooms and private open space.

Consistent

The scale of the proposed development is appropriate for the site and streetscape setting and maintains the separation with adjoining dwellings without impacting the levels of daylight and sunlight to adjoining properties.

A1 Unless within a building area on a sealed plan, a dwelling, excluding garages, carports and protrusions that extend not more than 0.9m into the frontage setback, must have a setback from a frontage that is:

(a) if the frontage is a primary frontage, not less than 3m, or, if the setback from the primary frontage is less than 3m, not less than the setback, from the primary frontage, of any existing dwelling on the site;

(b) if the frontage is not a primary frontage, not less than 2m, or, if the setback from the frontage is less than 2m, not less than the setback, from a frontage that is not a primary frontage, of any existing dwelling on the site;

(c) if for a vacant site and there are existing dwellings on adjoining properties on the same street, not more than the greater, or less than the lesser, setback for the equivalent frontage of the dwellings on the adjoining sites on the same street; or

(d) if located above a non-residential use at ground floor level, not less than the setback from the frontage of the ground floor level.

Complies

The existing dwelling is constructed to the property frontage with the proposed alterations and additions to the rear.

A3 A dwelling, excluding outbuildings with a building height of not more than 2.4m and protrusions that extend not more than 0.9m horizontally beyond the building envelope, must:

(a) be contained within a building envelope (refer to Figures 9.1, 9.2 and 9.3) determined by:

  (i) a distance equal to the frontage setback or, for an internal lot, a distance of 3m from the rear boundary of a property with an adjoining frontage; and

  (ii) projecting a line at an angle of 45 degrees from the horizontal at a height of 3m above existing ground level at the side and rear boundaries to a building height of not more than 9.5m above existing ground level; and

(b) only have a setback within 1.5m of a side or rear boundary if the dwelling:

  (i) does not extend beyond an existing building built on or within 0.2m of the boundary of the adjoining property; or

  (ii) does not exceed a total length of 9m or one-third the length of the side boundary (whichever is the lesser).

Relies on Performance Criteria

The dwelling is constructed to the southern side boundary with the development not extending beyond the depth of the existing dwelling other than for a set of stairs down to the rear area of the site and therefore meets the horizontal building envelope at (a). The extension along the northern side is within 1.50m of the boundary but is less the 9m in length. The steps at the end of the car space extend to the boundary but are only 3m in length to also comply.

The heights of the proposed roof over the deck and the roof light protrude beyond the vertical envelope along the southern side boundary, do not comply with (a) (ii). The development must be considered against the performance criteria.

P3 The siting and scale of a dwelling must:

(a) not cause an unreasonable loss of amenity to adjoining properties, having regard to:

(i) reduction in sunlight to a habitable room (other than a bedroom) of a dwelling on an adjoining property;
(ii) overshadowing the private open space of a dwelling on an adjoining property;
(iii) overshadowing of an adjoining vacant property; and
(iv) visual impacts caused by the apparent scale, bulk or proportions of the dwelling when viewed from an adjoining property; and

(b) provide separation between dwellings on adjoining properties that is consistent with that existing on established properties in the area.

Complies

The nature of the proposed building works will not cause an unreasonable loss of amenity to the adjoining southern neighbour. Regard is given to the following matters:

(i) reduction in sunlight to a habitable room (other than a bedroom) of a dwelling on an adjoining property;
The protrusion of the deck roof extends over a length of 1.2m to a maximum height of 400mm above an existing parapet wall between the two properties. It is north west of the neighbouring dwelling where the adjoining wall is 2.8m of the common boundary and contains a window. The extent of the protrusion and distance between the dwellings is not considered to have an unreasonable impact on the amount of sunlight reaching the window of the adjoining property given that the sun is relatively higher in the sky around 2pm when a shadow might be cast.

The protrusion of the skylight is also not considered to impact on the adjoining dwelling as it aligns with the front wall and clear of any windows.

Regardless, following representations which raise concern about overshadowing and the design impact on the heritage values of the property. The applicant has been advised of the concerns and proposed changes to address both elements, reducing the height of the deck roof so it does not protrude above the parapet wall and noting that the roof of the skylight has been reduced as much as possible following initial discussion with the THC. The proposed reduction of the roof height will be reinforced by a condition if the application is approved.

(ii) overshadowing the private open space of a dwelling on an adjoining property;
The proposed protrusions would not cause any overshadowing of the private open space of the adjoining property given the relative position of the protrusions and the open space of the neighbour being 12m to the north east beyond the depth of the neighbouring residence.

(iii) overshadowing of an adjoining vacant property; and
The adjoining properties are developed.

(iv) visual impacts caused by the apparent scale, bulk or proportions of the dwelling when viewed from an adjoining property; and
The scale of the proposal will not cause a visual impact on an adjoining property.

(b) provide separation between dwellings on adjoining properties that is consistent with that existing on established properties in the area.
The proposed development is for a dwelling constructed up to its property boundary to maintain the existing separation between the dwellings.

The performance criteria are met.

9.4.3 Site coverage and private open space for all dwellings
That dwellings are compatible with the amenity and character of the area and provide: (a) for outdoor recreation and the operational needs of the residents; (b) opportunities for the planting of gardens and landscaping; and (c) private open space that is conveniently located and has access to sunlight.
Consistent
The proposed works will maintain a suitable area of outdoor space for recreation and garden with a sufficient quantity of sunlight.
A1 Dwellings must have: (a) a site coverage of not more than 65% (excluding eaves up to 0.6m wide); and (b) for multiple dwellings, a total area of private open space of not less than 40m^2 associated with each dwelling, unless the dwelling has a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer).
Complies
The site has an area of 324m² and the resulting roof cover will increase by 3m² to 92.5m². Therefore the site cover is 28.5% to meet (a).
A2 A dwelling must have private open space that: (a) is in one location and is not less than: (i) 24m^2; or (ii) 12m^2, if the dwelling is a multiple dwelling with a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer); (b) has a minimum horizontal dimension of: (i) 4m; or (ii) 2m, if the dwelling is a multiple dwelling with a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer); (c) is located between the dwelling and the frontage only if the frontage is orientated between 30 degrees west of true north and 30 degrees east of true north; and (d) has a gradient not steeper than 1 in 10.
Complies
The property retains an open space area of 211m² at the rear of the dwelling which has an area of 195m² with a dimension of at least 4m to meet the necessary points of (a) (i) and (b) (i). Sunlight extends to this area through the day.
9.4.6 Privacy for all dwellings
To provide a reasonable opportunity for privacy for dwellings.
Consistent
The privacy of dwellings will be retained.
A1 A balcony, deck, roof terrace, parking space, or carport for a dwelling (whether freestanding or part of the dwelling), that has a finished surface or floor level more than 1m above existing ground level must have a permanently fixed screen to a height of not less than 1.7m above the finished surface or floor level, with a uniform transparency of not more than 25%, along the sides facing a: (a) side boundary, unless the balcony, deck, roof terrace, parking space, or carport has a setback of not less than 3m from the side boundary; (b) rear boundary, unless the balcony, deck, roof terrace, parking space, or carport has a setback of not less than 4m from the rear boundary; and (c) dwelling on the same site, unless the balcony, deck, roof terrace, parking space, or carport is not less than 6m:

(i) from a window or glazed door, to a habitable room of the other dwelling on the same site; or (ii) from a balcony, deck, roof terrace or the private open space, of the other dwelling on the same site.
Relies on Performance Criteria
The proposed extent of the deck alongside of the laundry has a finished floor level approximately 1.51m with a setback of 2.699m from the southern side boundary and 950mm from the northern side boundary. The height of the southern boundary parapet is approximately 1.3m above the level of the deck and does not meet A1. A 1m high glass balustrade is proposed along the northern side of the deck and also doesn't meet A1. To the northern side boundary the raised car parking space will be up to 1.4m above ground level. The 6m extent of the space is fitted with steps down to ground level. A glass balustrade is proposed along the northern side of the space and the steps. A window of the adjoining property adjoins the extend to the steps. Given the sill height is approximately 2.4 above ground level the acceptable solution is considered to be met. The performance criteria must therefore be addressed in relation to the deck.
P1 A balcony, deck, roof terrace, parking space or carport for a dwelling (whether freestanding or part of the dwelling) that has a finished surface or floor level more than 1m above existing ground level, must be screened, or otherwise designed, to minimise overlooking of: (a) a dwelling on an adjoining property or its private open space; or (b) another dwelling on the same site or its private open space.
Complies
The proposed deck is not considered to cause any unreasonable overlooking of a dwelling or its private open space. The southern side of the deck is separated from the boundary by the 2.69m depth of the existing laundry, which is enclosed by a parapet wall on the boundary and provides a vertical buffer to 1.3m above the deck height. Discussions with the neighbour has concluded that a screen, one which could be installed adjacent northern side of the deck, is not necessary given the alignment of the deck to the windows next door. To the north the deck adjoins a wall with no windows and also ends prior to the extent of the neighbours adjoining wall. Therefore there will be no loss of privacy to the dwelling and minimal overlooking would occur into the northern neighbours rear yard from the steps into the rear yard. A1 (a) is therefore considered to be addressed and the performance criteria are met.
C2.0 Parking and Sustainable Transport Code
The purpose of the Parking and Sustainable Transport Code is: C2.1.1 To ensure that an appropriate level of parking facilities is provided to service use and development. C2.1.2 To ensure that cycling, walking and public transport are encouraged as a means of transport in urban areas. C2.1.3 To ensure that access for pedestrians, vehicles and cyclists is safe and adequate. C2.1.4 To ensure that parking does not cause an unreasonable loss of amenity to the surrounding area. C2.1.5 To ensure that parking spaces and accesses meet appropriate standards. C2.1.6 To provide for parking precincts and pedestrian priority streets.
Consistent

Parking facilities are to be provided to service the use for a site that is close the city centre and the services it provides.

C2.5.1 Car parking numbers

That an appropriate level of car parking spaces are provided to meet the needs of the use

Consistent

Sufficient parking will be provided.

A1 The number of on-site car parking spaces must be no less than the number specified in Table C2.1, less the number of car parking spaces that cannot be provided due to the site including container refund scheme space, excluding if:

(a) the site is subject to a parking plan for the area adopted by council, in which case parking provision (spaces or cash-in-lieu) must be in accordance with that plan;
(b) the site is contained within a parking precinct plan and subject to Clause C2.7;
(c) the site is subject to Clause C2.5.5; or
(d) it relates to an intensification of an existing use or development or a change of use where:
    (i) the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is greater than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case no additional on-site car parking is required; or
    (ii) the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is less than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case on-site car parking must be calculated as follows:
    N = A + (C- B)
    N = Number of on-site car parking spaces required
    A = Number of existing on site car parking spaces
    B = Number of on-site car parking spaces required for the existing use or development specified in Table C2.1
    C= Number of on-site car parking spaces required for the proposed use or development specified in Table C2.1.

Complies

Table C2.1 requires a single dwelling in the Urban Residential zone to have the following:

Any Residential use in any other zone	1 space per bedroom or 2 spaces per 3 bedrooms + 1 visitor space for every 5 multiple dwellings or every 10 bedrooms for a non-dwelling residential use (rounded up to the nearest whole number)	No requirement for single dwellings, multiple dwellings, residential care facility, assisted housing and retirement village. All other uses require 1 space per 5 bedrooms in other forms of accommodation.

The dwelling does not have an on-site car parking space with the proposal creating a space for the dwelling. There are currently two bedrooms and following the development only two will be retained. The proposed car space therefore brings the use into greater compliance with the code requirements.

If point (d) (ii) is applied, that is *the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is less than the number of car parking spaces specified in Table C2.1 for the proposed use or development*

N = A + (C- B)

A = Number of existing on-site car parking spaces - 0 *B = Number of on-site car parking spaces required for the existing use or development specified in Table C2.1* - 2 *C= Number of on-site car parking spaces required for the proposed use or development specified in Table C2.1.* - 2 N -= 0 therefore the provision of 1 space complies.
C2.5.2 Bicycle parking numbers
That an appropriate level of bicycle parking spaces are provided to meet the needs of the use.
Consistent
Bicycle spaces could be provided.
A1 Bicycle parking spaces must: (a) be provided on the site or within 50m of the site; and (b) be no less than the number specified in Table C2.1.
Complies
Single dwellings are not required to provide bicycle parking spaces.
C2.6.1 Construction of parking areas
That parking areas are constructed to an appropriate standard.
Consistent
The parking space will be constructed to an appropriate standard.
A1 All parking, access ways, manoeuvring and circulation spaces must: (a) be constructed with a durable all weather pavement; (b) be drained to the public stormwater system, or contain stormwater on the site; and (c) excluding all uses in the Rural Zone, Agriculture Zone, Landscape Conservation Zone, Environmental Management Zone, Recreation Zone and Open Space Zone, be surfaced by a spray seal, asphalt, concrete, pavers or equivalent material to restrict abrasion from traffic and minimise entry of water to the pavement.
Complies
The parking area will be constructed of a durable pavement and drained to the stormwater system.
C2.6.2 Design and layout of parking areas
That parking areas are designed and laid out to provide convenient, safe and efficient parking.
Consistent
The layout will be safe and efficient.
A1.1 Parking, access ways, manoeuvring and circulation spaces must either: (a) comply with the following: (i) have a gradient in accordance with *Australian Standard AS 2890 - Parking facilities, Parts 1-6*; (ii) provide for vehicles to enter and exit the site in a forward direction where providing for more than 4 parking spaces; (iii) have an access width not less than the requirements in Table C2.2; (iv) have car parking space dimensions which satisfy the requirements in Table C2.3; (v) have a combined access and manoeuvring width adjacent to parking spaces not less than the requirements in Table C2.3 where there are 3 or more car parking spaces; (vi) have a vertical clearance of not less than 2.1m above the parking surface level; and

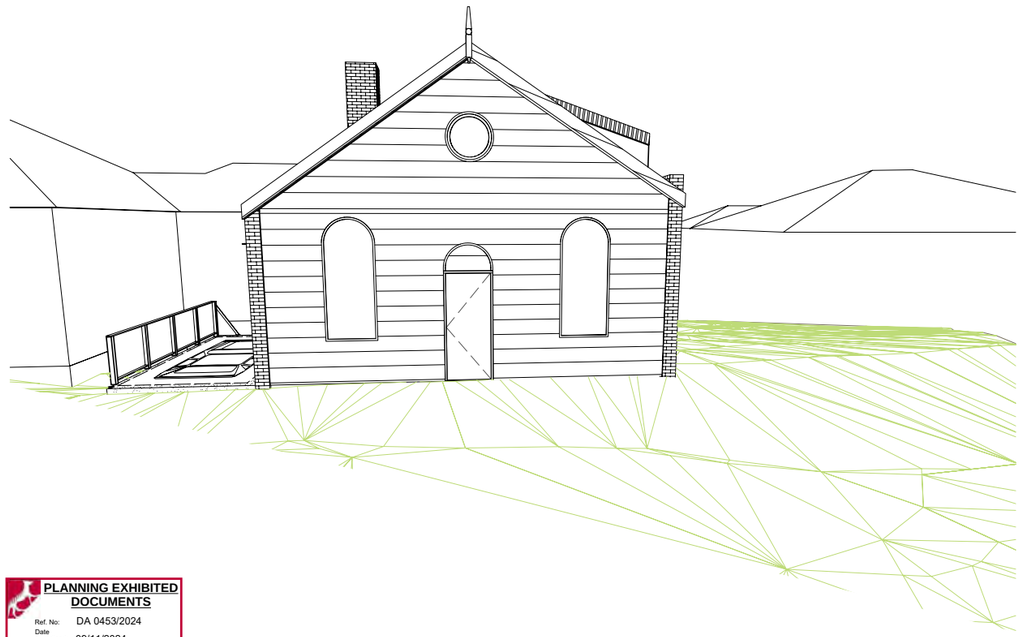
(vii) excluding a single dwelling, be delineated by line marking or other clear physical means; or (b) comply with *Australian Standard AS 2890-Parking facilities, Parts 1-6*.
Complies
The proposed car parking space is level, has dimensions to meet Table C2.2 and C2.3.
C2.6.3 Number of accesses for vehicles
That: (a) access to land is provided which is safe and efficient for users of the land and all road network users, including but not limited to drivers, passengers, pedestrians and cyclists by minimising the number of vehicle accesses; (b) accesses do not cause an unreasonable loss of amenity of adjoining uses; and (c) the number of accesses minimise impacts on the streetscape.
Consistent
The access will be safe and convenient.
A1 The number of accesses provided for each frontage must: (a) be no more than 1; or (b) no more than the existing number of accesses, whichever is the greater.
Complies
The site will have one access point.
C2.6.8 Siting of parking and turning areas
That the siting of vehicle parking and access facilities in an Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone, General Business Zone or Central Business Zone does not cause an unreasonable visual impact on streetscape character or loss of amenity to adjoining properties.
Consistent
The siting of the vehicle space will not cause a visual intrusion within the streetscape nor cause a loss of amenity to adjoining properties.
A1 Within an Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone or General Business Zone, parking spaces and vehicle turning areas, including garages or covered parking areas must be located behind the building line of buildings, excluding if a parking area is already provided in front of the building line.
Complies
The parking space aligns with the existing dwelling which is constructed up to the front boundary.

Alterations & Additions

65a Bourke Street, Launceston

DRAWING SCHEDULE:

Sheet No:	Drawing	Rev:	Revision Date
A001	COVER SHEET	B	23/10/2024
A101	SITE PLAN	B	23/10/2024
A102	SITE PLAN TITLE	B	23/10/2024
A201	EX/DEMO GROUND FLOOR PLAN	B	23/10/2024
A202	EX/DEMO LOWER FLOOR PLAN	B	23/10/2024
A203	PROPOSED UPPER FLOOR PLAN	B	23/10/2024
A204	PROPOSED GROUND FLOOR PLAN	B	23/10/2024
A205	PROPOSED LOWER FLOOR PLAN	B	23/10/2024
A206	EX/DEMO ROOF	B	23/10/2024
A207	PROPOSED ROOF	B	23/10/2024
A208	PROPOSED CARPORT PLAN	B	23/10/2024
A401	SECTION SHEET 01	B	23/10/2024
A402	SECTION SHEET 02	B	23/10/2024
A403	SECTION SHEET 03	B	23/10/2024
A404	SECTION SHEET 04	B	23/10/2024
A501	EX/DEMO ELEVATION SHEET 01	B	23/10/2024
A502	EX/DEMO ELEVATION SHEET 02	B	23/10/2024
A503	PROPOSED ELEVATION SHEET 01	B	23/10/2024
A504	PROPOSED ELEVATION SHEET 02	B	23/10/2024
A901	3D VIEWS	B	23/10/2024
A902	3D VIEWS 02	B	23/10/2024



LOCATION PLAN - Scale: NTS

GENERAL INFORMATION:

Accredited Architect:	**Sam Haberle**	
Accreditation Number:	**CC5618 U**	
Land Title Reference Number:	**C.T. 162092/1**	(Certificate volume and folio)
Municipality:	**Launceston City Council**	
Planning Scheme Overlay:	**Tasmanian Planning Scheme**	Local Heritage Place, Low Landslip Hazard Band, Medium Landslip Hazard Band, Airport obstavle limitation Area
Zoning:	**9.0 Inner Residential**	
Building Class:	1**A**	
Tasmania Heritage Register (ID - Site Name)	**9144 -** Lanoma Villa and **former Hythe School**	
Soil classification:	**TBC**	Site classification to AS 2870-2011 (Reference report author)
Wind Classification:	**TBC**	Site classification to AS 4055-2006 (Reference report author)
Climate Zone:	**7 (TBC)**	(www.abcb.gov.au map)
Alpine Area:	**N/A**	<300m AHD (NCC Figure 3.7.5.2)
Bushfire-prone Area BAL Rating: Dwellling -	**BAL N/A (TBC)**	As determined by registered Bushfire Assessor (AS3959-2009)
Corrosion environment:	Low	For steel subject to the influence of salt water, breaking surf or heavy industrial areas, refer to NCC section 3.4.2.2 & NCC Table 3.4.4.2. Cladding and fixings to manufacturer's recommendations
Other Known site hazards:	Landslip	High wind, earthquake, flooding, landslip, dispersive soils, sand dunes, mine subsidence, landfill, snow & ice or other relevant factors

PLANNING EXHIBITED DOCUMENTS
Ref. No: DA 0453/2024
Date advertised: 09/11/2024
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @SO A3 1:200	DWG # A001
DWG COVER SHEET		DRAWN -	
		CHKD -	PROJECT# J008586

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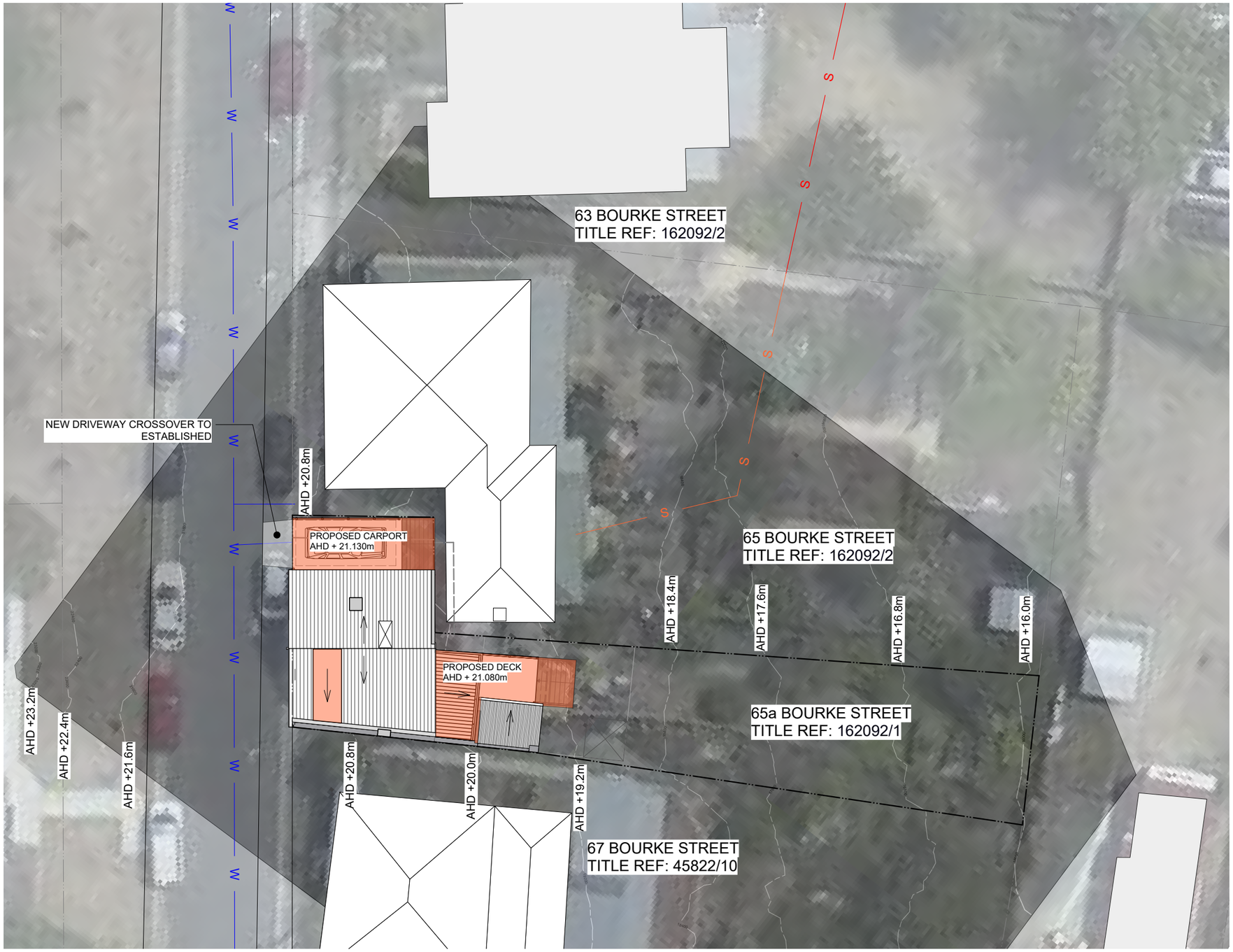

PROPOSED:

BUILDING AREAS:

Site Area:	324m²
Existing Dwelling (Ground):	85.28m²
Existing Dwelling (Lower):	9.17m²
Existing Dwelling (Total):	94.45m²
For Removal (Lean-To):	10.91m²
For Approval (Carport & Deck):	43.65m²
For Approval (Upper):	23.5m²
Total Building Area: (Ground + Lower + Carport & Deck)	**126m²**
Site coverage percentage: (Total / Site)	38.88%

PLANNING EXHIBITED DOCUMENTS
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1 SITE PLAN
Scale: 1:200

1:200
0 mm 7000 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES DERIVED
FROM AERIAL PHOTOGRAPHY.

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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE -
CLIENT Molly		SCALE @SO A3 1:200	DWG # A101
DWG SITE PLAN		DRAWN -	
		CHKD -	PROJECT# J008586

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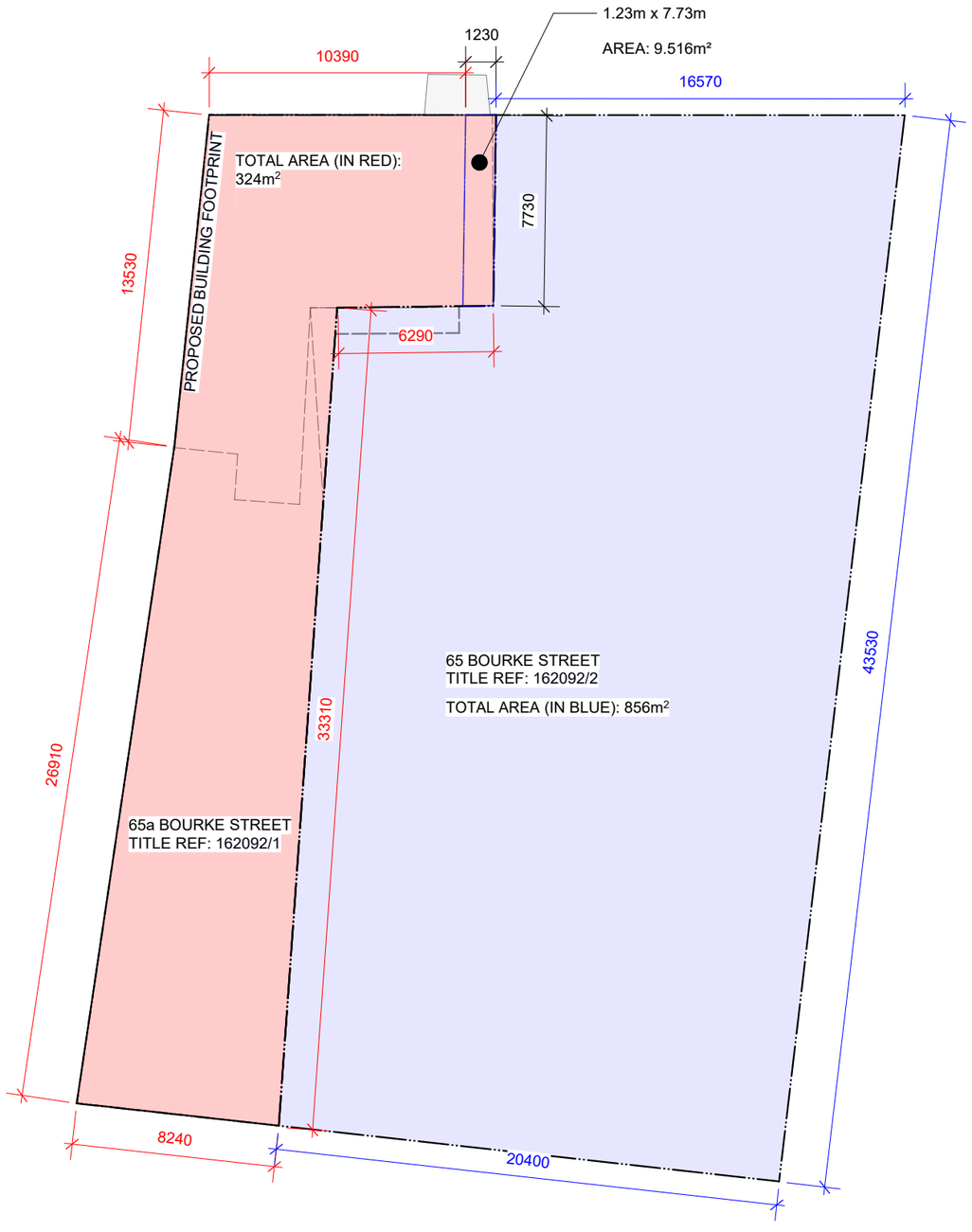

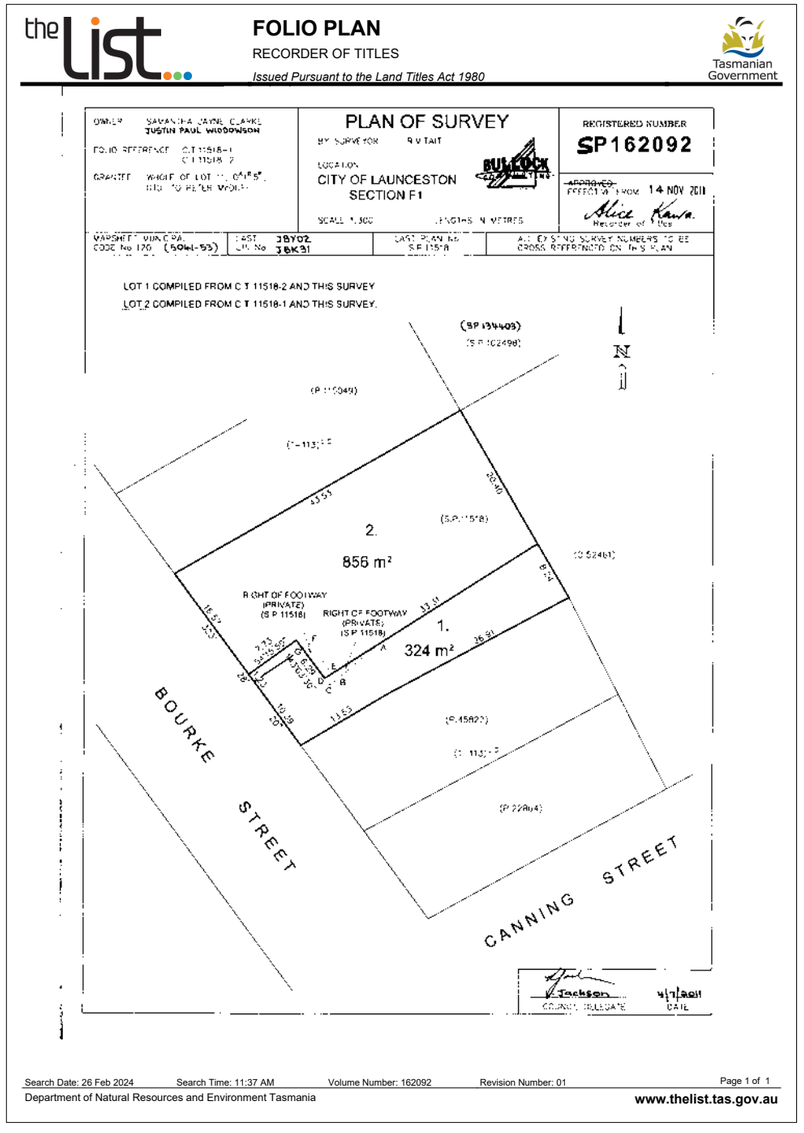

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SITE PLAN NOTES:
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LOCATION OF SITE FEATURES DERIVED
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE	-
CLIENT Molly	SCALE @SO A3 1:200	DWG #	A102
DWG SITE PLAN TITLE	DRAWN -		
	CHKD -	PROJECT#	J008586

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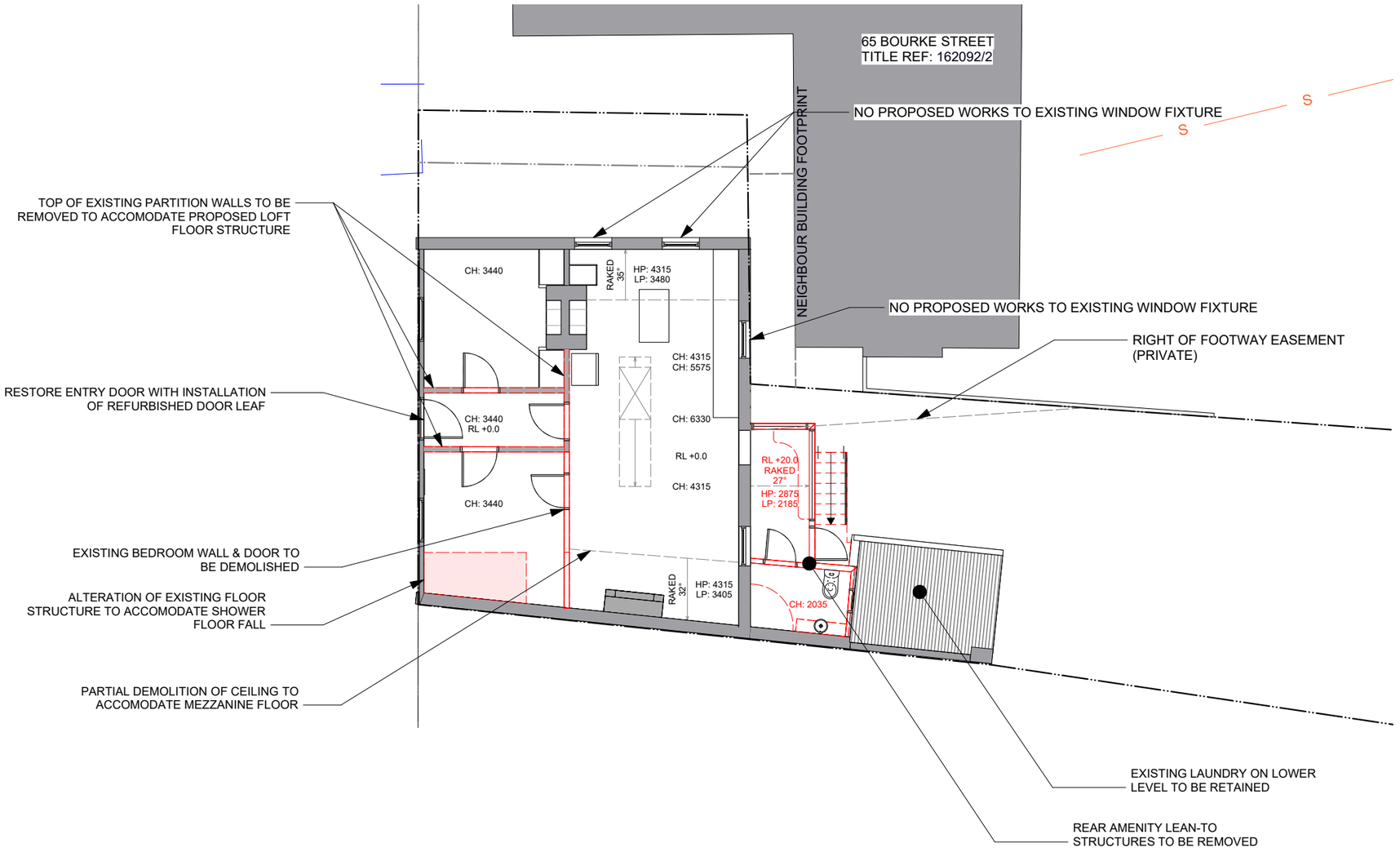

PLANNING EXHIBITED DOCUMENTS
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Date advertised: 09/11/2024
Planning Administration

1 EX/DEMO GROUND
Scale: 1:100

1:100

0 mm 3500 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES DERIVED
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE -	
CLIENT Molly	SCALE @SO A3 1:100	DWG # A201	
DWG EX/DEMO GROUND FLOOR PLAN	DRAWN -		
	CHKD -	PROJECT# J008586	

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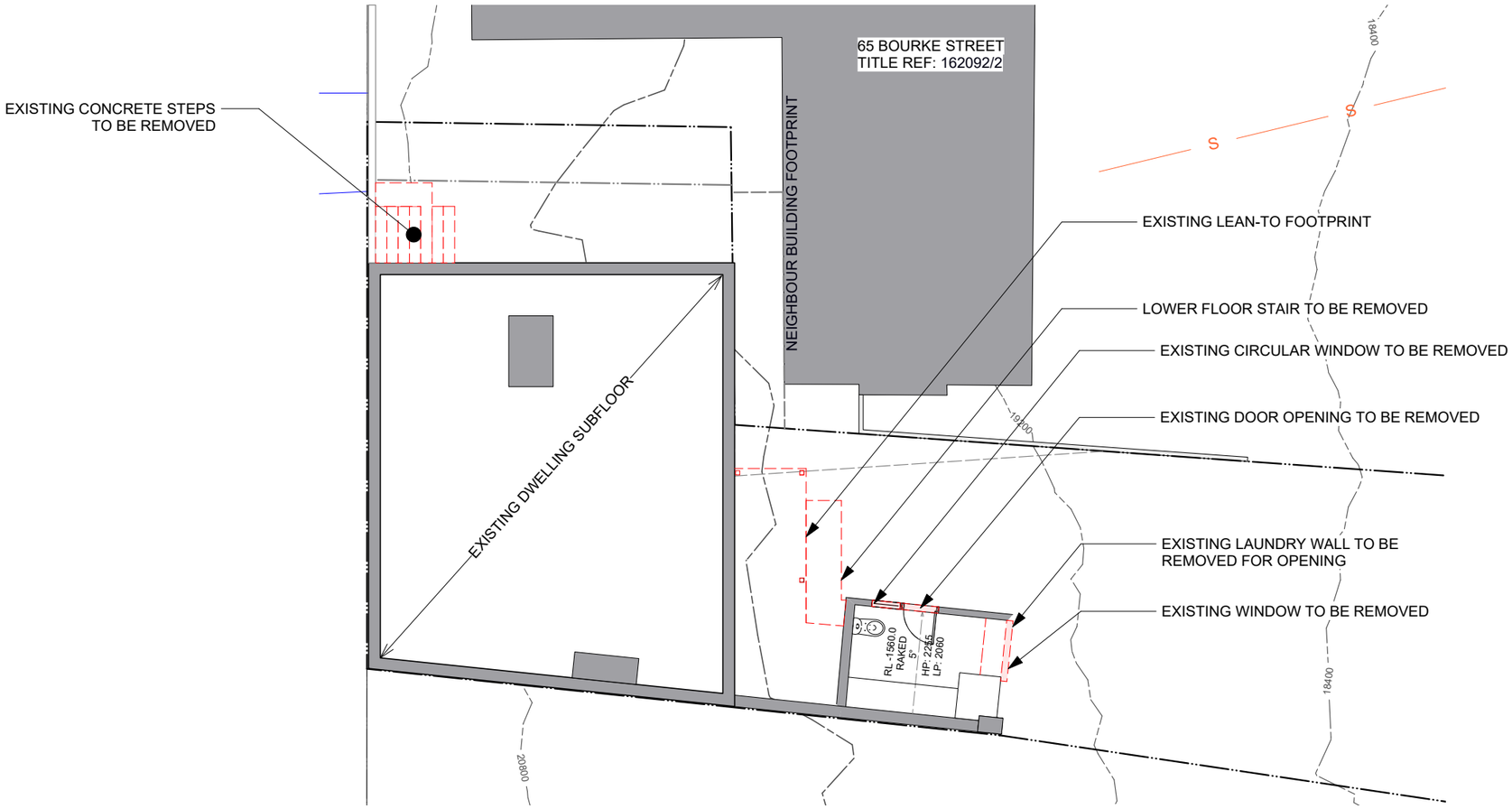

1 EX/DEMO LOWER
Scale: 1:100

1:100

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SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A202
DWG EX/DEMO LOWER FLOOR PLAN		DRAWN -	
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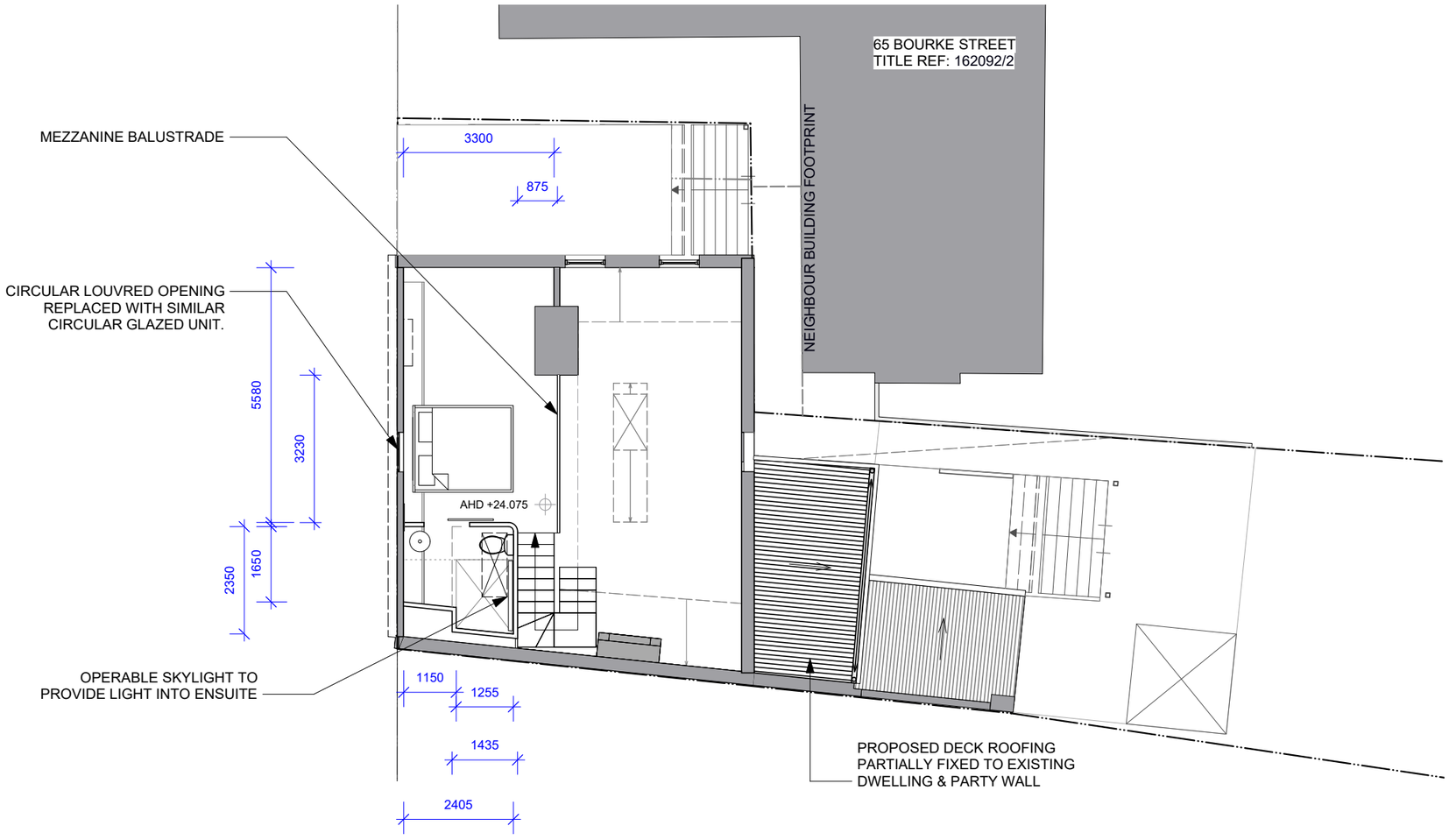

PLANNING EXHIBITED DOCUMENTS
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1 PROPOSED UPPER
Scale: 1:100

1:100

0 mm 3500 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @ISO A3 1:100	DWG # A203
DWG PROPOSED UPPER FLOOR PLAN		DRAWN -	
		CHKD -	PROJECT# J008586

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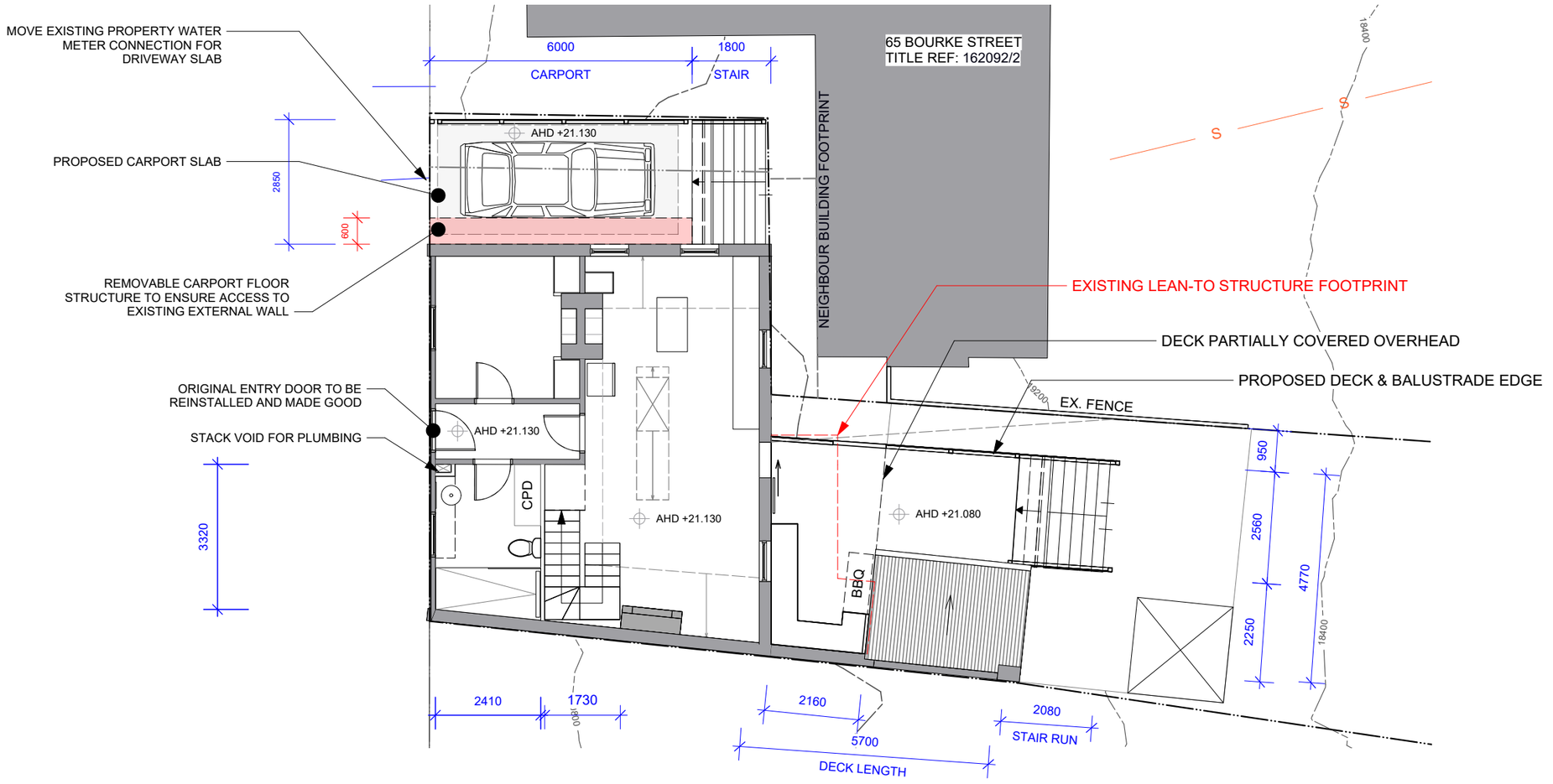

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1 PROPOSED GROUND
Scale: 1:100

1:100

0 mm 3500 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES DERIVED
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A204
DWG PROPOSED GROUND FLOOR PLAN		DRAWN -	
		CHKD -	PROJECT# J008586

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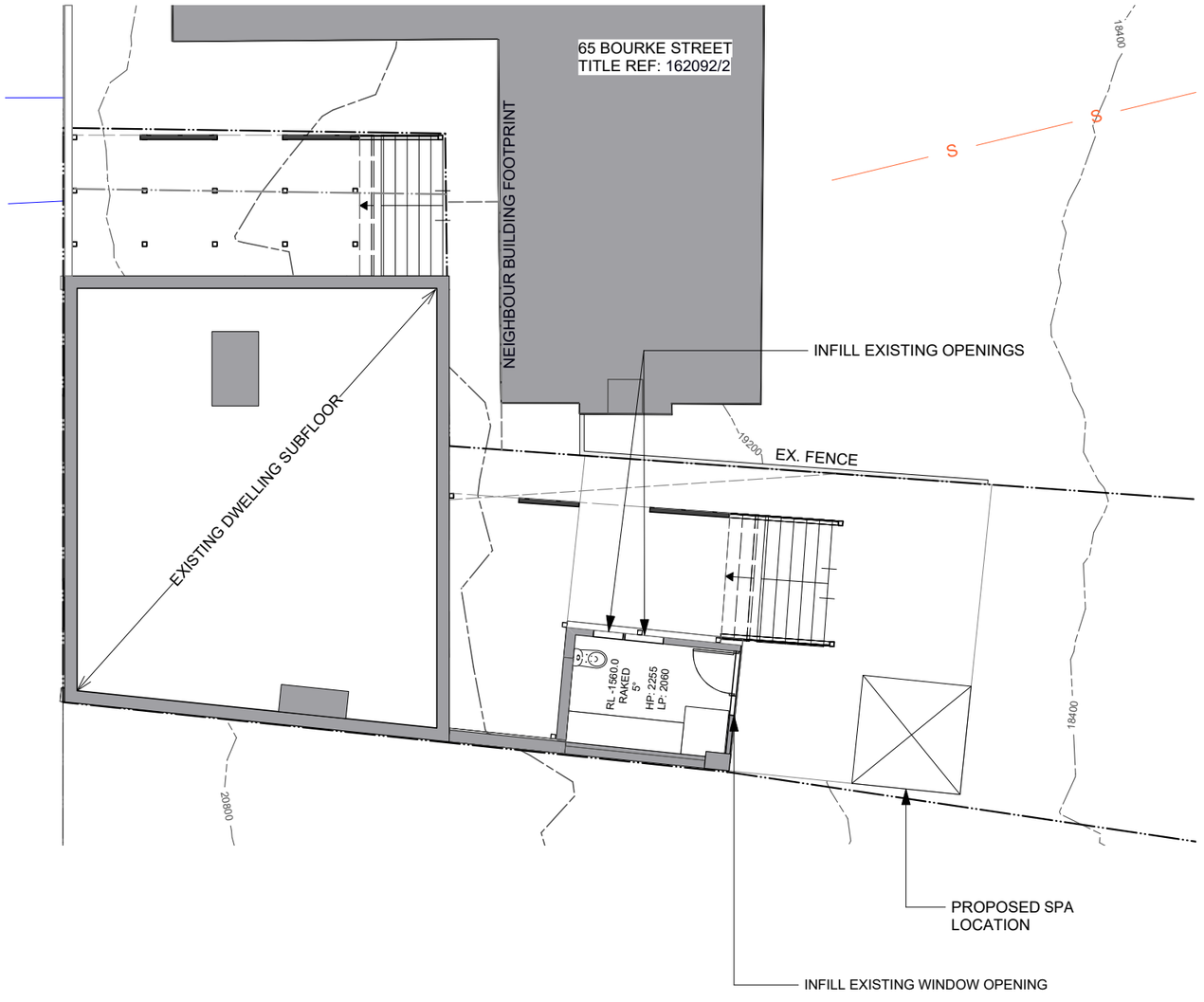

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1 PROPOSED LOWER
Scale: 1:100

1:100
0 mm 3500 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES DERIVED
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
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DWG PROPOSED LOWER FLOOR PLAN		DRAWN -	
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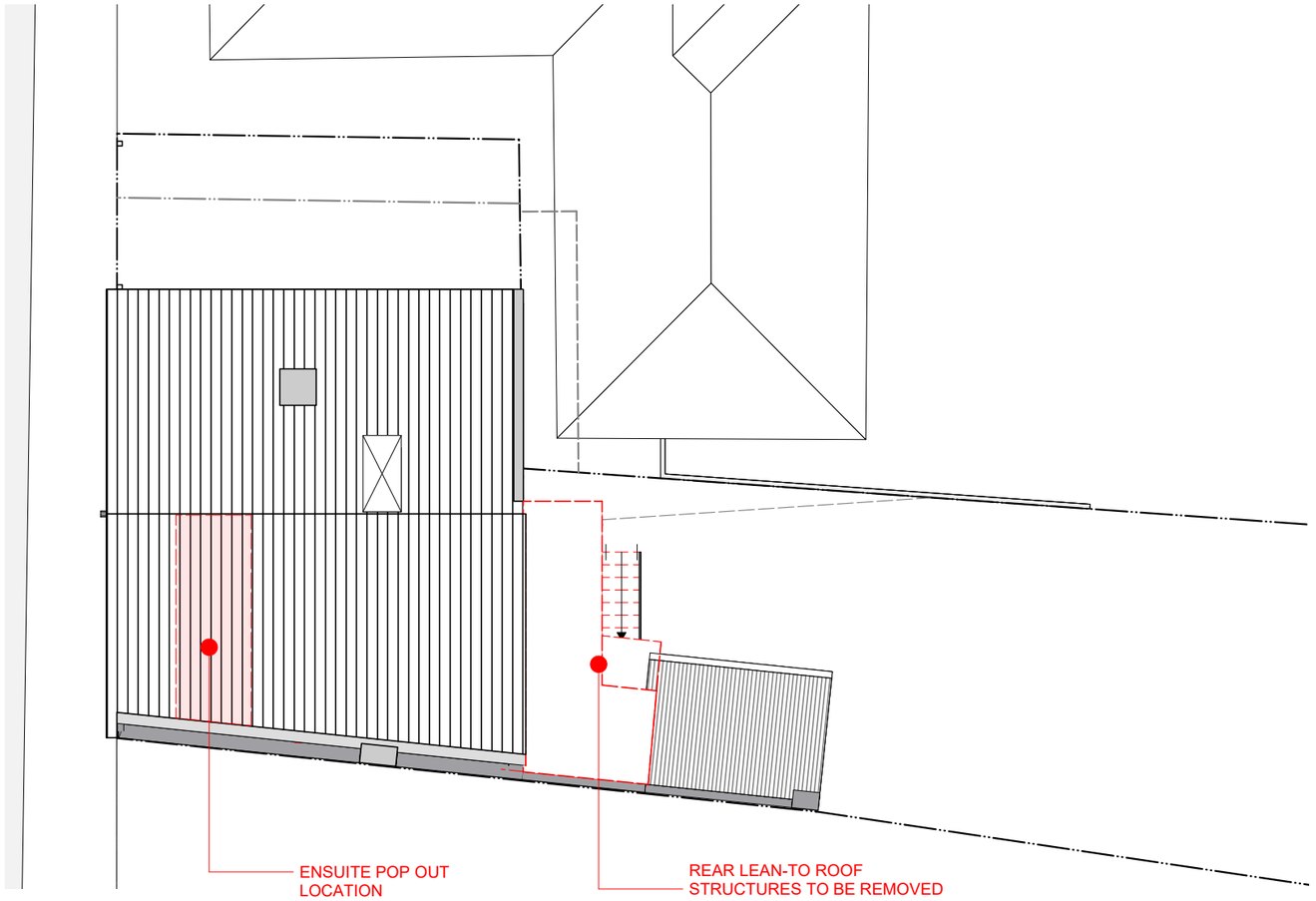

1 EX/DEMO ROOF
Scale: 1:100

1:100

0 mm 3500 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES DERIVED
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A206
DWG EX/DEMO ROOF		DRAWN -	
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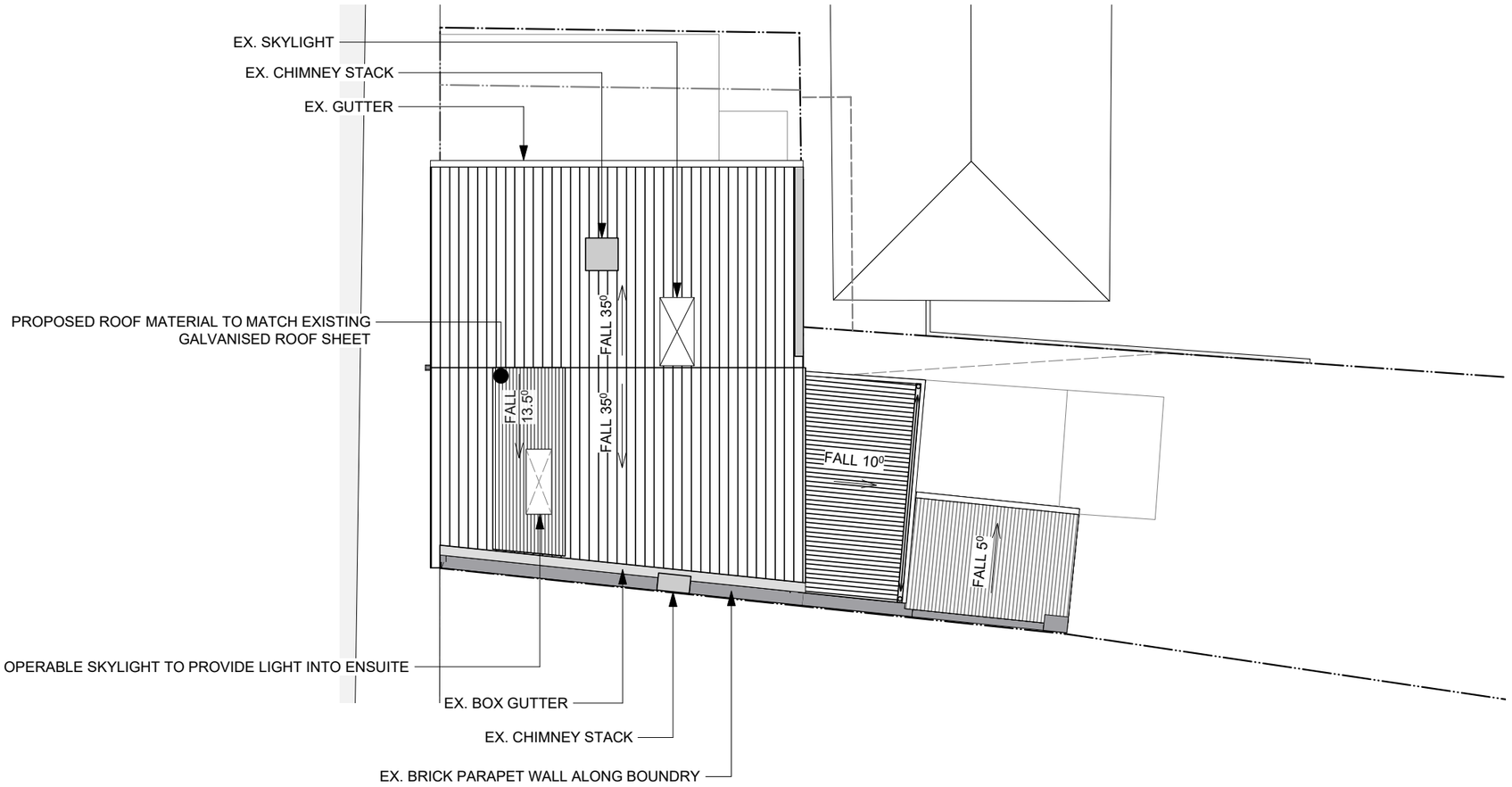

PLANNING EXHIBITED DOCUMENTS
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1 PROPOSED ROOF
Scale: 1:100

1:100

0 mm 3500 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES DERIVED
FROM AERIAL PHOTOGRAPHY.

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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A207
DWG PROPOSED ROOF		DRAWN -	
		CHKD -	PROJECT# J008586

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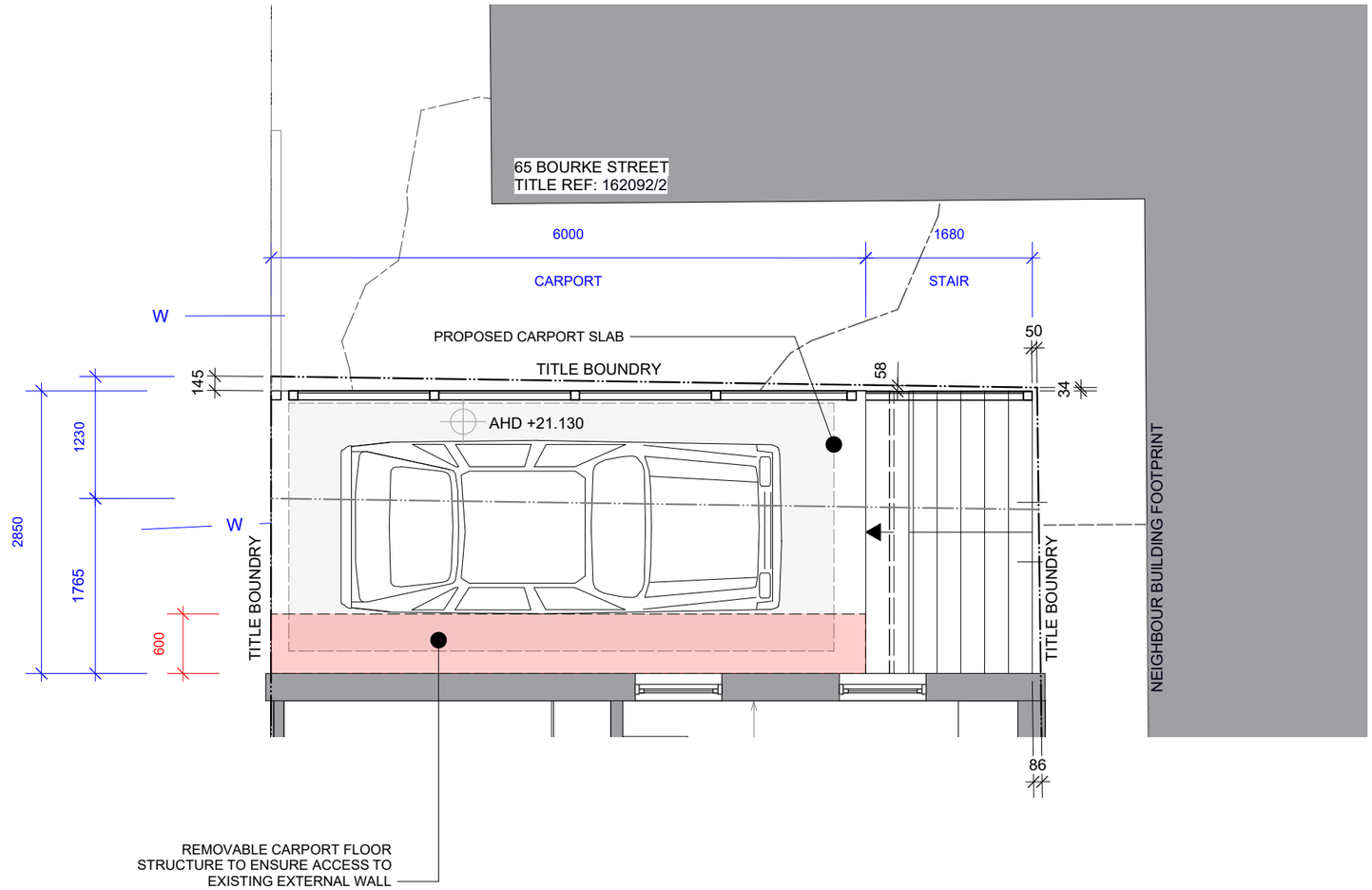

PLANNING EXHIBITED DOCUMENTS
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0 mm 3500 mm

SITE PLAN NOTES:
ALL DIMENSIONS TO WALL FRAME.
LOCATION OF SITE FEATURES DERIVED
FROM AERIAL PHOTOGRAPHY.

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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE	-
CLIENT Molly	SCALE @SO A3 1:100	DWG #	A208
DWG PROPOSED CARPORT PLAN	DRAWN -		
	CHKD -	PROJECT#	J008586

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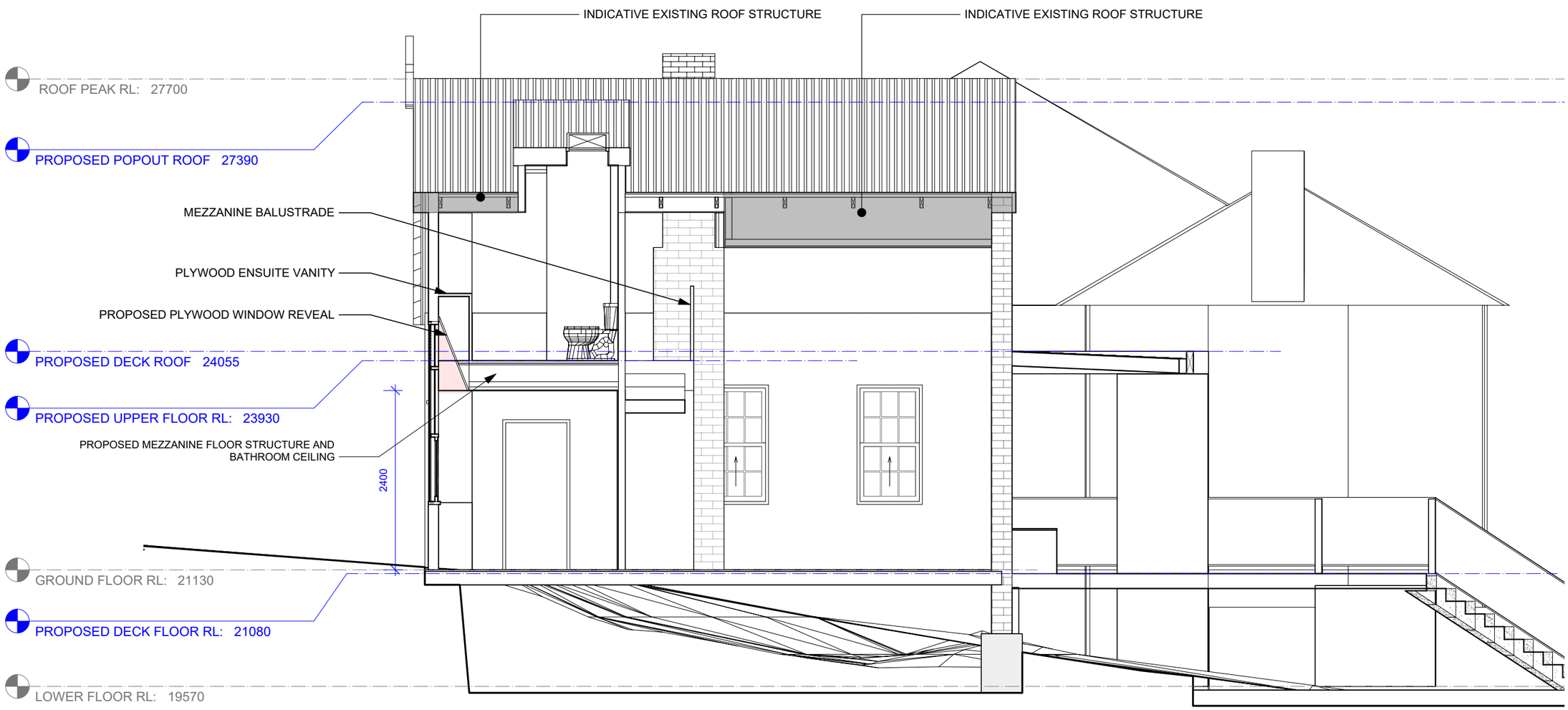

01 SECTION 01
Scale: 1:50

create. wonder.

REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
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CLIENT Molly		SCALE @SO A3 1:100	DWG # A401
DWG SECTION SHEET 01		DRAWN -	
		CHKD -	PROJECT# J008586

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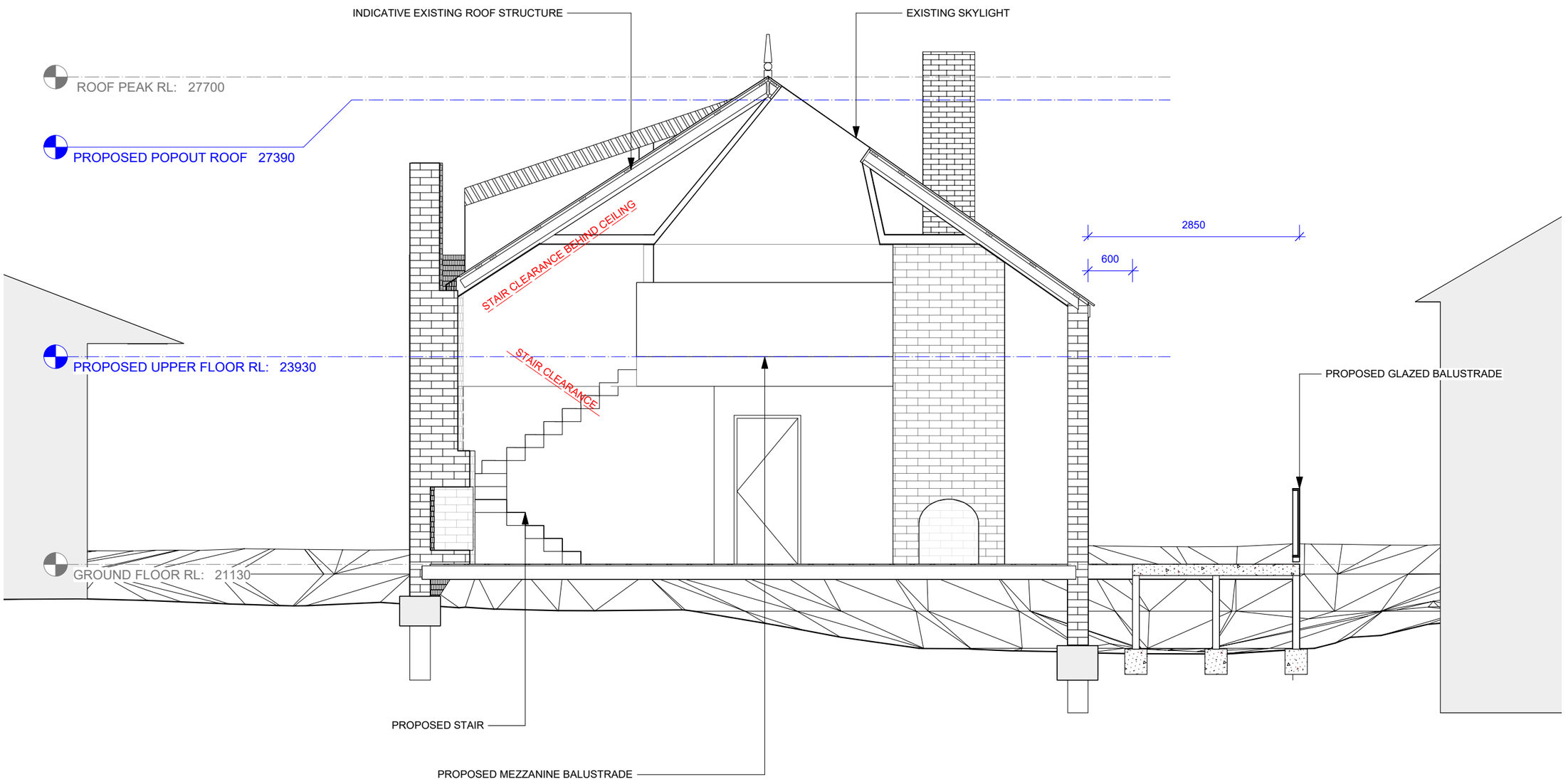

PLANNING EXHIBITED DOCUMENTS
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02 SECTION 02
Scale: 1:50

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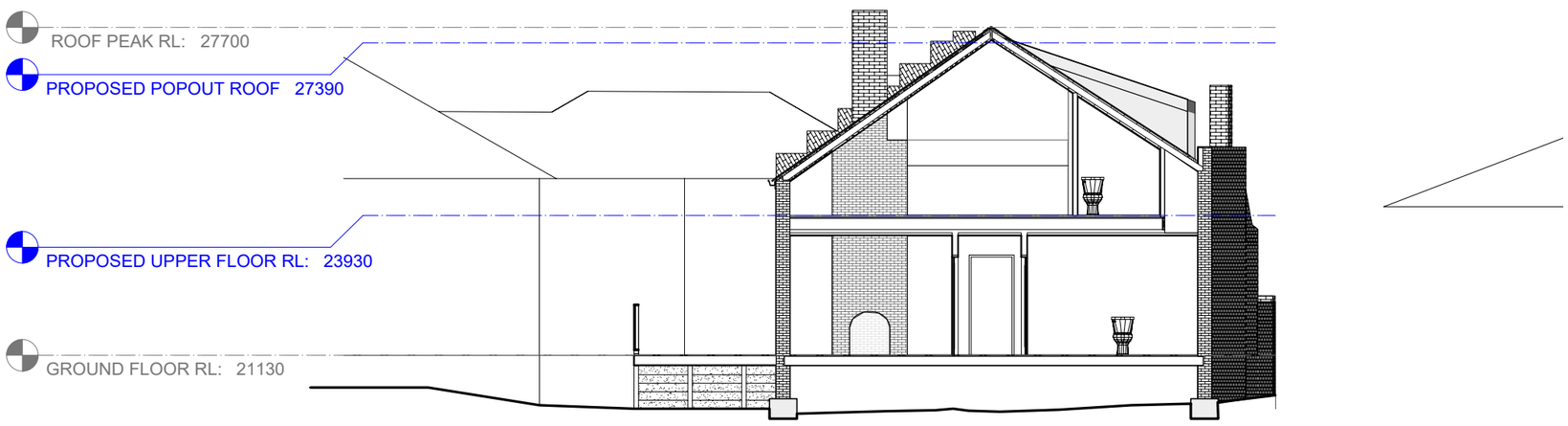
REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A402
DWG SECTION SHEET 02		DRAWN -	
		CHKD -	PROJECT# J008586

S. Group

Ground floor 73 - 75 St John street, **Launceston** | Elizabeth st, **Hobart** | 552 Victoria st, **North Melbourne**
T: 03 63 111 403 **E**: info@sgroup.com.au **sgroup.com.au**



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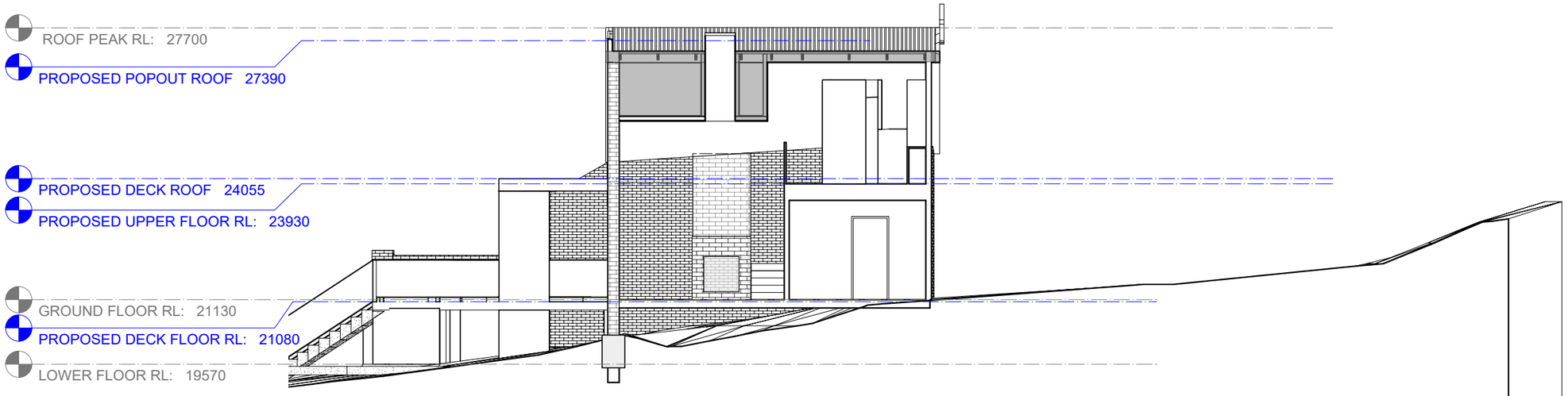

04 SECTION 04
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PLANNING EXHIBITED DOCUMENTS
Ref. No: DA 0453/2024
Date advertised: 09/11/2024
Planning Administration

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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly	SCALE @ISO A3 1:100		DWG # A403
DWG SECTION SHEET 03	DRAWN -		
	CHKD -		PROJECT# J008586

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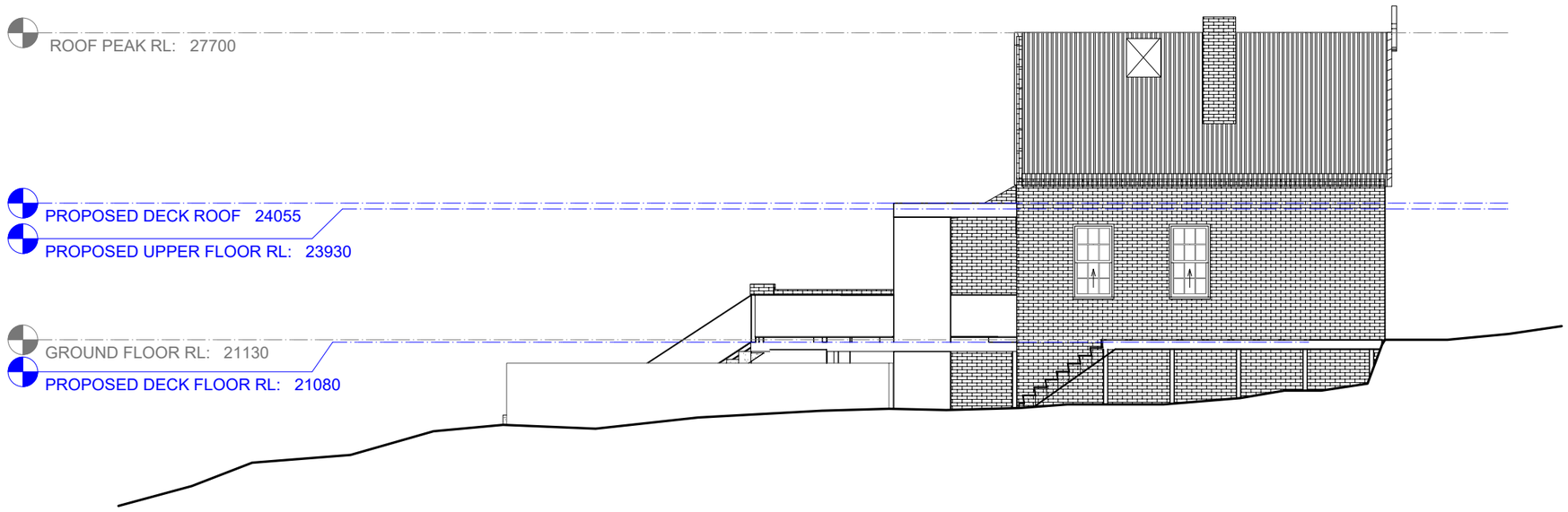

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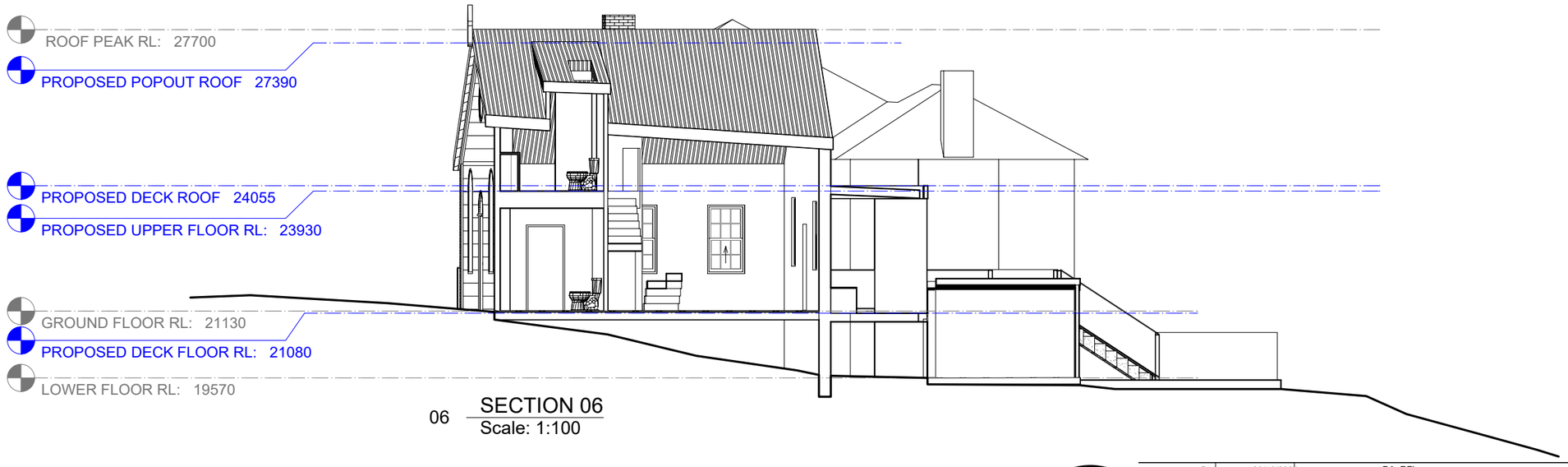

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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly			DWG # A404
DWG SECTION SHEET 04	SCALE @SO A3 1:100	DRAWN -	
		CHKD -	PROJECT# J008586

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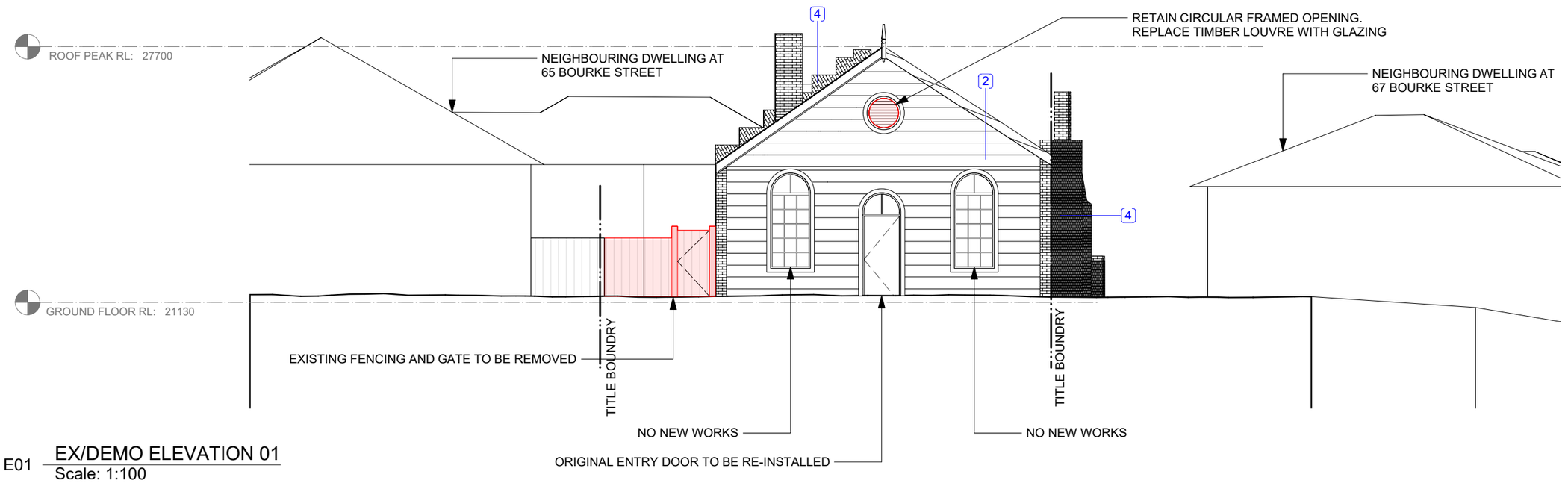

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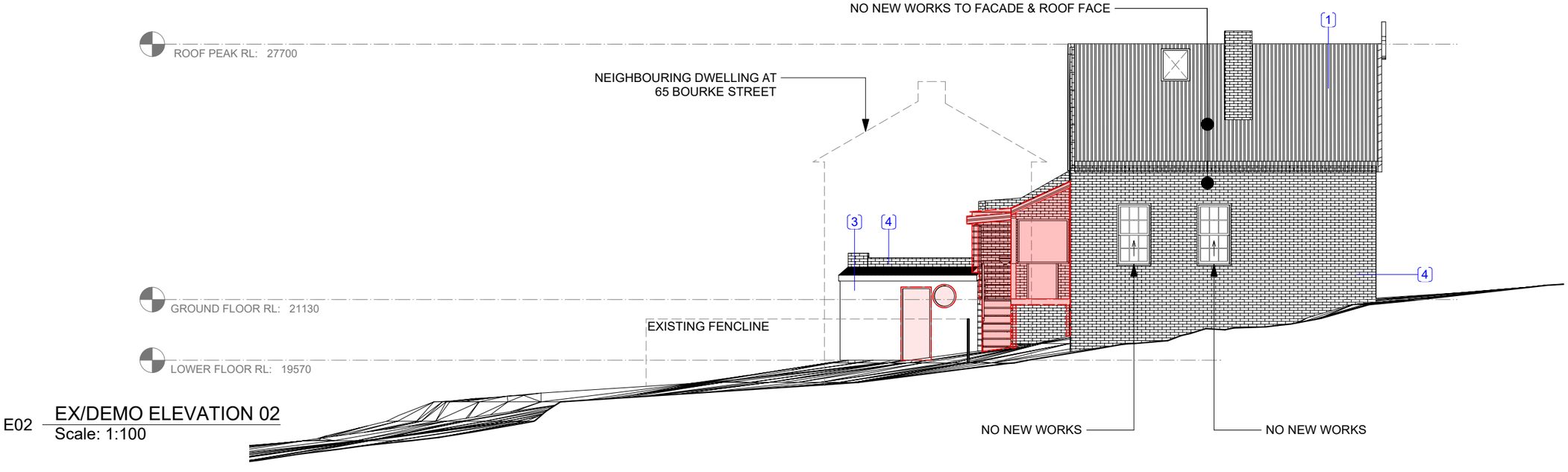
Scale: 1:100



E02 EX/DEMO ELEVATION 02
Scale: 1:100

EXTERNAL FINISHES & COLOURS SCHEDULE:

1	Roof sheeting: Colour:	Corrugated Iron Galvanised	3	Cladding Type: Colour:	Weatherboard White
2	Cladding Type: Colour:	Weatherboard Navy Blue	4	Wall Type: Colour:	240mm Double Brick Natural Finish

PLANNING EXHIBITED DOCUMENTS
Ref. No: DA 0453/2024
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS		ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A501
DWG EX/DEMO ELEVATION SHEET 01		DRAWN -	
		CHKD -	PROJECT# J008586

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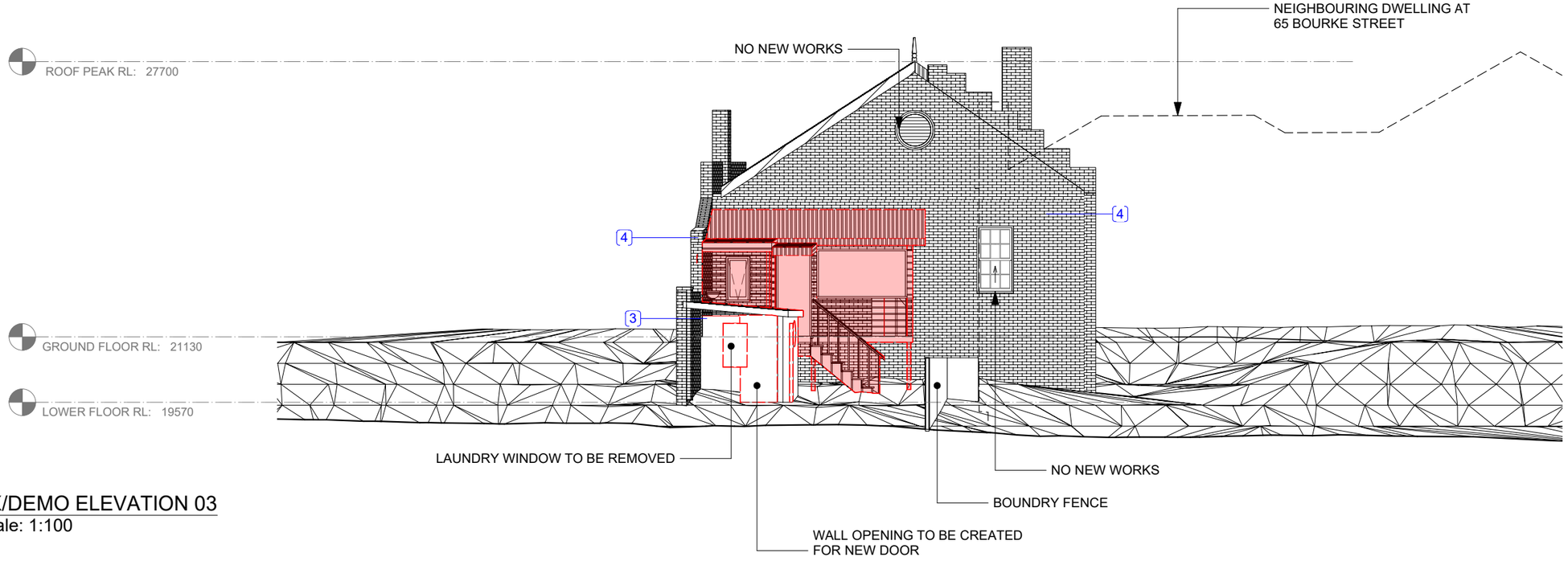
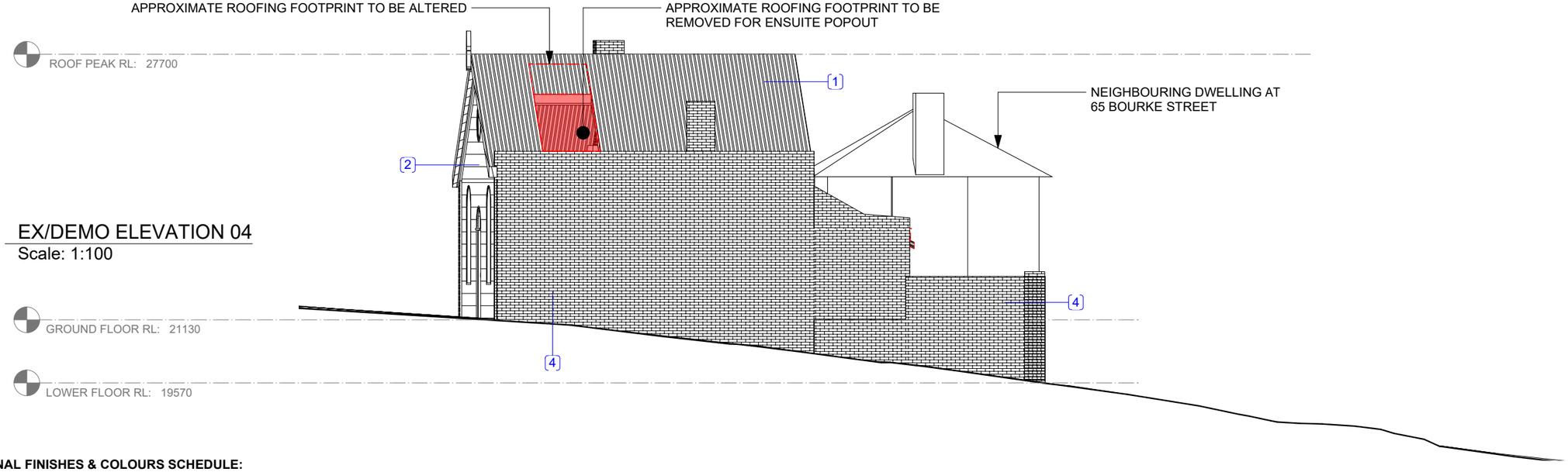


E03 EX/DEMO ELEVATION 03
Scale: 1:100



E04 EX/DEMO ELEVATION 04
Scale: 1:100

EXTERNAL FINISHES & COLOURS SCHEDULE:

1	Roof sheeting: Colour:	Corrugated Iron Galvanised	3	Cladding Type: Colour:	Weatherboard White
2	Cladding Type: Colour:	Weatherboard Navy Blue	4	Wall Type: Colour:	240mm Double Brick Natural Finish

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Ref. No: DA 0453/2024
Date advertised: 09/11/2024
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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS 65a Bourke Street, Launceston		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A502
DWG EX/DEMO ELEVATION SHEET 02		DRAWN -	
		CHKD -	PROJECT# J008586

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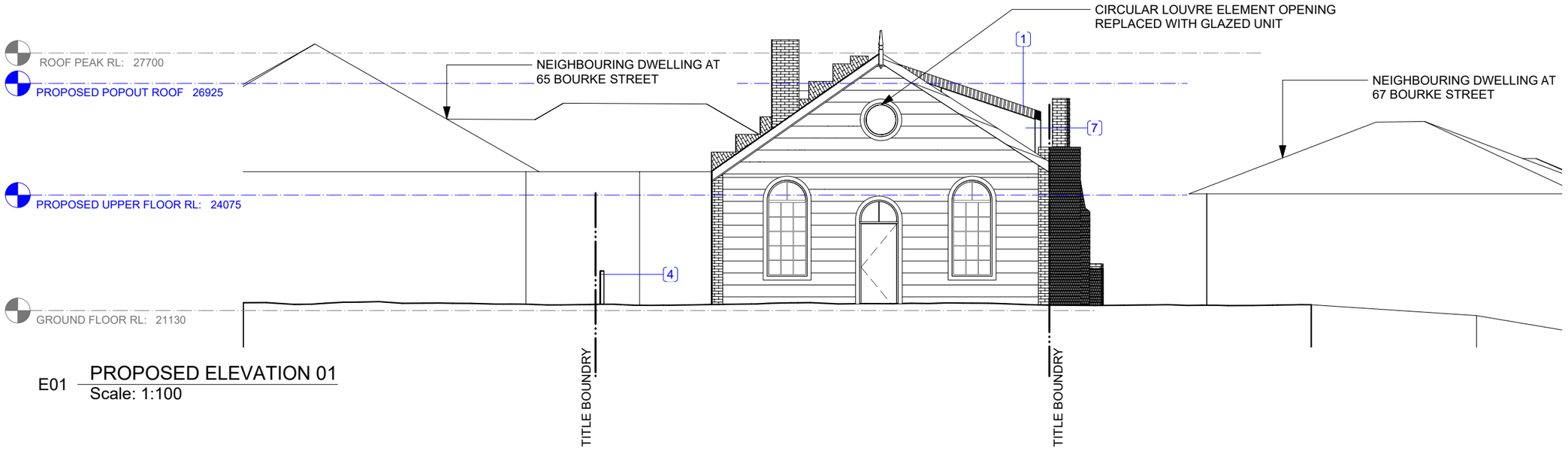
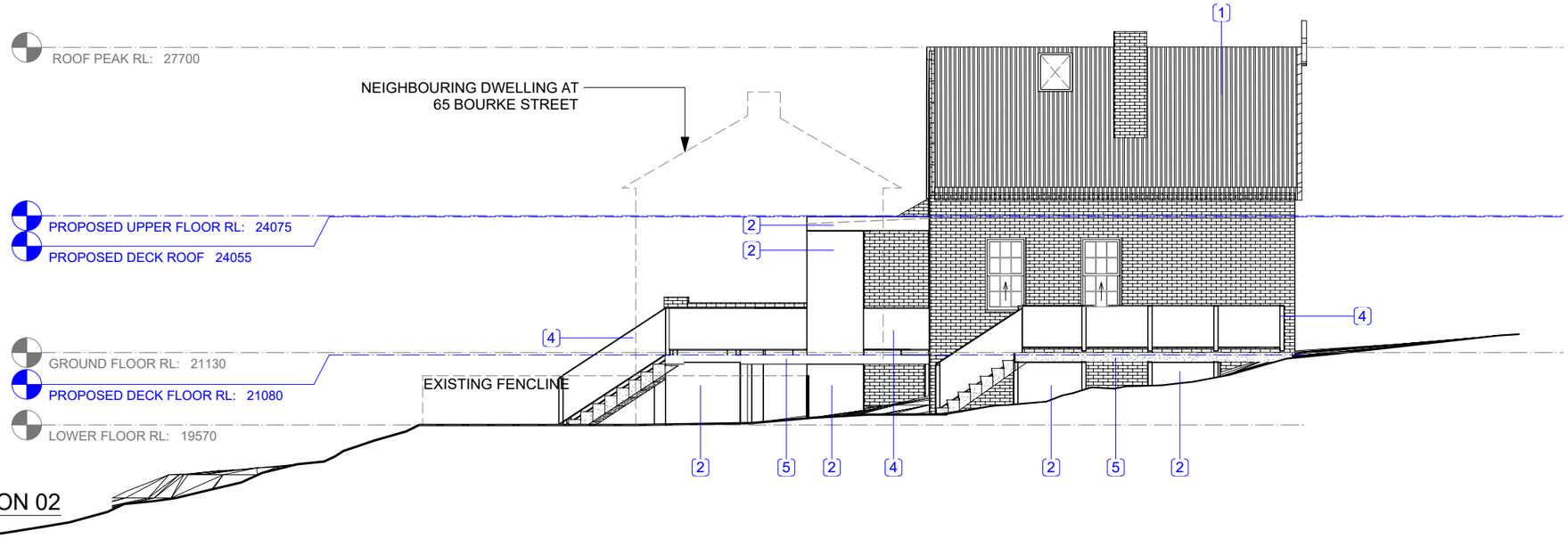


E01 PROPOSED ELEVATION 01
Scale: 1:100



E02 PROPOSED ELEVATION 02
Scale: 1:100

PROPOSED EXTERNAL FINISHES & COLOURS SCHEDULE:

1	Roof sheeting: Colour:	Corrugated Iron Galvanised	4	Railing Type: Graphite (Matte) Finish,	Steel Glazed Panel	7	Cladding Type: Colour: Cement Sheeting Match Front Facade (Navy)
2	Cladding Type: Colour:	Cement Sheet Graphite (Matte)	5	Floor Type:	Precast Concrete Panel		
3	Cladding Type: Timber Finish	Composite Wall Cladding	6	Floor Type: Colour:	Modwood Decking Silver Gum		

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REVISION B	DATE 23/10/2024	DESCRIPTION DA_RFI	
ADDRESS	65a Bourke Street, Launceston	do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE -
CLIENT	Molly	SCALE @SO A3 1:100	DWG # A503
DWG	PROPOSED ELEVATION SHEET 01	DRAWN -	
		CHKD -	PROJECT# J008586

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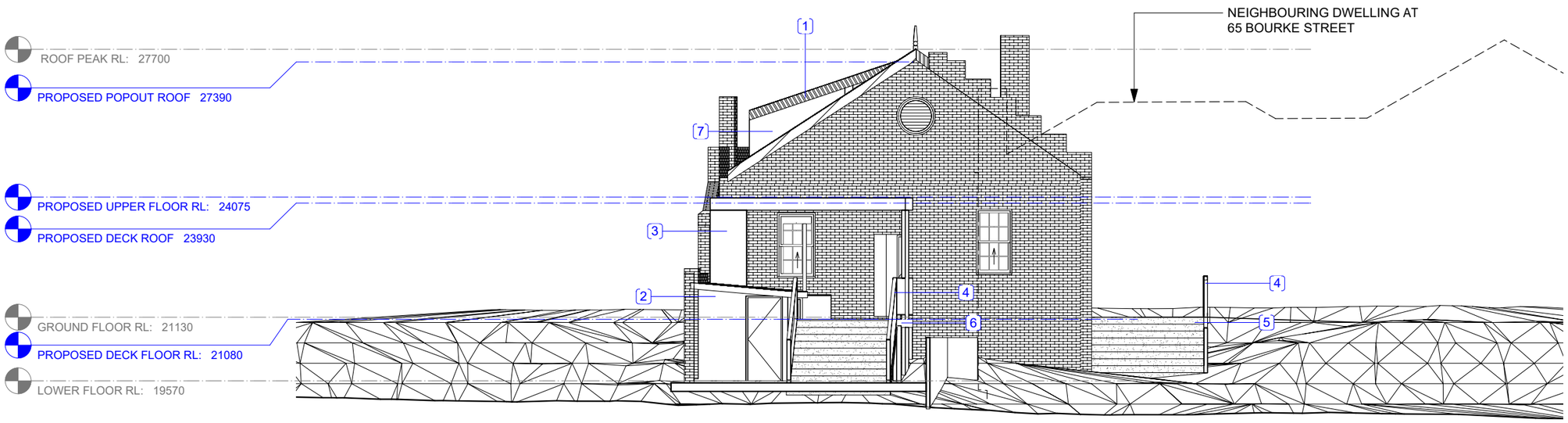

E03 PROPOSED ELEVATION 03
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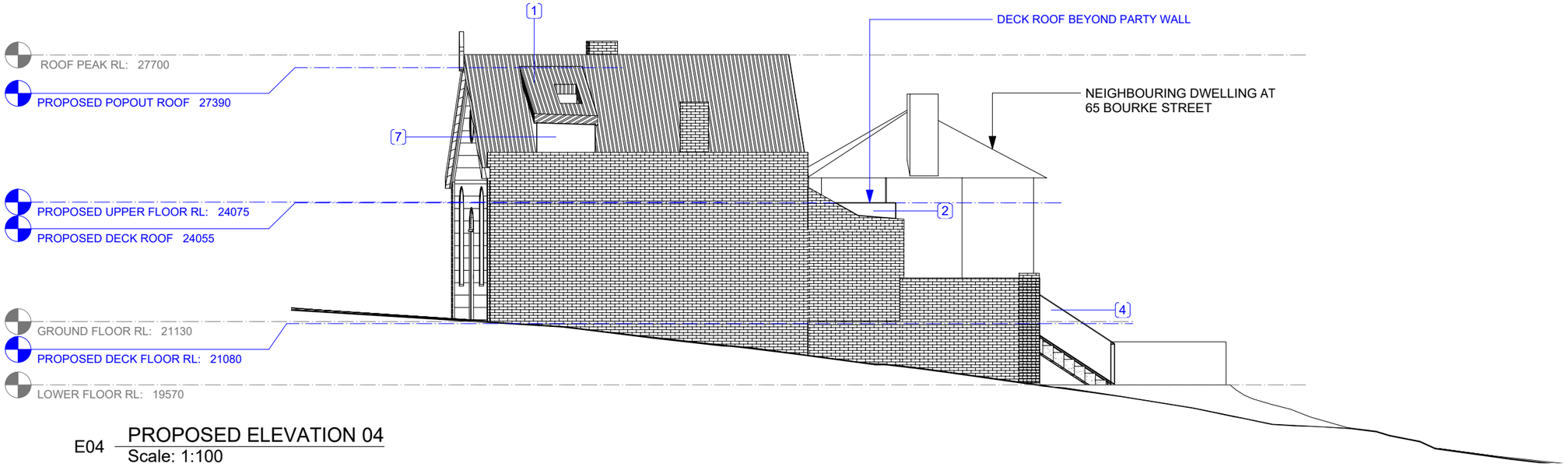

E04 PROPOSED ELEVATION 04
Scale: 1:100

PROPOSED EXTERNAL FINISHES & COLOURS SCHEDULE:

1	Roof sheeting: Colour:	Corrugated Iron Galvanised	4	Railing Type: Graphite (Matte) Finish, Glazed Panel	Steel	7	Cladding Type: Colour:	Cement Sheeting Match Front Facade (Navy)
2	Cladding Type: Colour:	Cement Sheet Graphite (Matte)	5	Floor Type:	Precast Concrete Panel			
3	Cladding Type: Timber Finish	Composite Wall Cladding	6	Floor Type: Colour: Side:	Modwood Decking Silver Gum Cement Sheet - Graphite			

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ADDRESS 65a Bourke Street, Launceston		do not scale off plans all dimensions in millimetres confirm all dimensions on site all work to relevant NCC and AS	ISSUE -
CLIENT Molly		SCALE @SO A3 1:100	DWG # A504
DWG PROPOSED ELEVATION SHEET 02		DRAWN -	
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TITLE: DA0479/2024 - 48 Bill Grove, Mowbray - Residential - Construction of a Dwelling and an Outbuilding

FILE NO: DA0479/2024

AUTHOR: Dileep Karna (Town Planner)

GENERAL MANAGER: Chelsea van Riet (General Manager Community and Place Network)

ATTACHMENT ONE:

PLANNING APPLICATION INFORMATION:

Applicant:	Graeme Rex Johnson
Property:	48 Bill Grove, Mowbray
Zoning:	General Residential
Receipt Date:	30/10/2024
Validity Date:	31/10/2024
Further Information Request:	N/A
Further Information Received:	N/A
Deemed Approval:	12/12/2024
Representations:	3

3. PLANNING SCHEME REQUIREMENTS

3.1 Zone Purpose

8.0 General Residential Zone

The purpose of the General Residential Zone is: 8.0.1 To provide for residential use or development that accommodates a range of dwelling types where full infrastructure services are available or can be provided. 8.0.2 To provide for the efficient utilisation of available social, transport and other service infrastructure. 8.0.3 To provide for non-residential use that: (a) primarily serves the local community; and (b) does not cause an unreasonable loss of amenity through scale, intensity, noise, activity outside of business hours, traffic generation and movement, or other off site impacts. 8.0.4 To provide for Visitor Accommodation that is compatible with residential character.
Consistent The zone purpose is met as the proposal is for the construction of a dwelling and an outbuilding, where infrastructure services are available, except for a connection to the public stormwater system. The proposed development, specifically the subject site, can accommodate adequate on-site stormwater management.

8.4.2 Setbacks and building envelope for all dwellings

The siting and scale of dwellings: (a) provides reasonably consistent separation between dwellings and their frontage within a street;

(b) provides consistency in the apparent scale, bulk, massing and proportion of dwellings; (c) provides separation between dwellings on adjoining properties to allow reasonable opportunity for daylight and sunlight to enter habitable rooms and private open space; and (d) provides reasonable access to sunlight for existing solar energy installations.
Consistent The siting and scale of the dwelling and outbuilding will not cause an unreasonable loss of amenity to the adjoining properties at 42A, 46 and 50 Bill Grove, as the development provides reasonably consistent separation between the dwellings.
A1 Unless within a building area on a sealed plan, a dwelling, excluding garages, carports and protrusions that extend not more than 0.9m into the frontage setback, must have a setback from a frontage that is: (a) if the frontage is a primary frontage, not less than 4.5m, or, if the setback from the primary frontage is less than 4.5m, not less than the setback, from the primary frontage, of any existing dwelling on the site; (b) if the frontage is not a primary frontage, not less than 3m, or, if the setback from the frontage is less than 3m, not less than the setback, from a frontage that is not a primary frontage, of any existing dwelling on the site; (c) if for a vacant site and there are existing dwellings on adjoining properties on the same street, not more than the greater, or less than the lesser, setback for the equivalent frontage of the dwellings on the adjoining sites on the same street; or (d) if located above a non-residential use at ground floor level, not less than the setback from the frontage of the ground floor level.
Complies The proposed dwelling and outbuilding are set back more than 4.5m from the primary frontage, which is located to the north of the property. Therefore, the proposed development complies with A1(a).
A2 A garage or carport for a dwelling must have a setback from a primary frontage of not less than: (a) 5.5m, or alternatively 1m behind the building line; (b) the same as the building line, if a portion of the dwelling gross floor area is located above the garage or carport; or (c) 1m, if the existing ground level slopes up or down at a gradient steeper than 1 in 5 for a distance of 10m from the frontage.
Complies The proposed development does not include a garage or carport within 5.5m of the primary frontage.
A3 A dwelling, excluding outbuildings with a building height of not more than 2.4m and protrusions that extend not more than 0.9m horizontally beyond the building envelope, must: (a) be contained within a building envelope (refer to Figures 8.1, 8.2 and 8.3) determined by: (i) a distance equal to the frontage setback or, for an internal lot, a distance of 4.5m from the rear boundary of a property with an adjoining frontage; and (ii) projecting a line at an angle of 45 degrees from the horizontal at a height of 3m above existing ground level at the side and rear boundaries to a building height of not more than 8.5m above existing ground level; and (b) only have a setback of less than 1.5m from a side or rear boundary if the dwelling: (i) does not extend beyond an existing building built on or within 0.2m of the boundary of the adjoining property; or (ii) does not exceed a total length of 9m or one third the length of the side boundary (whichever is the lesser).
Relies on Performance Criteria

The proposed development involves the construction of a single dwelling and an outbuilding on an irregularly shaped lot with two frontages, located to the north and south of the property.

Dwelling:
Due to the site's topographical constraints, the dwelling is positioned behind 42A Bill Grove with a setback of 1.76m at the closest point to 3.2m at the furthest point, as shown in drawing no. 240802-P2. The proposed dwelling will feature varied wall heights from approximately 2.69m - 5.1m above the existing ground level, with an overall height of approximately 7.6m above the existing ground level.

The dwelling is setback more than 20m from the side and rear boundaries, and the proposed wall heights along these boundaries will fit within the prescribed building envelope. However, along the western side boundary, a length of approximately 7m will extend beyond the prescribed building envelope specified in Figure 8.3 of the General Residential Zone.

The subject site is an internal lot with an access strip to Bill Grove. The boundary to which the dwelling abuts is a frontage for the purpose of the assessment against this clause. The siting of the dwelling is behind another lot (42A Bill Grove), therefore a setback of 4.5m is required from the rear of this property which has an adjoining frontage. As the proposed dwelling (as shown in figure 1) will have a setback of less than 4.5m from this boundary, it relies on the performance criteria.

Figure 1

The proposed dwelling is not located within 1.5m of the side or rear boundaries in any section that exceeds a total length of 9m.

Therefore, the proposed dwelling satisfies (b) and does not satisfy (a).

Outbuilding:
The proposed outbuilding is located behind 46 Bill Grove, with a setback of 1m from the western boundary. The site is an internal lot with an access strip to Bill Grove. The boundary

to which the outbuilding abuts is a frontage for the purpose of the assessment against this clause.

The siting of the outbuilding is behind another lot (46 Bill Grove), therefore a setback of 4.5m is required from the rear boundary of this property which has an adjoining frontage. As the proposed outbuilding will have a setback of 1m from this boundary and therefore, relies on the performance criteria.

The outbuilding is setback approximately 20.2m from the northern side boundary, 11.4m from the southern side boundary at its closest point, and more than 20m from the eastern side boundary. The outbuilding will have a height of 2.6m - 4.1m along the sides, with an overall height of 5m - 5.3m above the existing ground level. Therefore, meets the rear and side setback requirements.

The proposed outbuilding is not located within 1.5m of the side or rear boundaries that exceeds a total length of 9m.

Therefore, the proposed outbuilding satisfies (b) and does not satisfy (a).

P3 The siting and scale of a dwelling must:

(a) not cause an unreasonable loss of amenity to adjoining properties, having regard to:
  (i) reduction in sunlight to a habitable room (other than a bedroom) of a dwelling on an adjoining property;
  (ii) overshadowing the private open space of a dwelling on an adjoining property;
  (iii) overshadowing of an adjoining vacant property; and
  (iv) visual impacts caused by the apparent scale, bulk or proportions of the dwelling when viewed from an adjoining property;

(b) provide separation between dwellings on adjoining properties that is consistent with that existing on established properties in the area; and

(c) not cause an unreasonable reduction in sunlight to an existing solar energy installation on:
  (i) an adjoining property; or
  (ii) another dwelling on the same site.

Complies

The subject site is an internal lot with an access strip to Bill Grove. The proposed dwelling and outbuilding are positioned behind another lot, with setbacks of 1.76m - 3.2m point from the dwelling to the rear boundary of 42A Bill Grove and 1m from the outbuilding to the rear boundary of 46 Bill Grove. Therefore, the proposed development is outside the building envelope, as it has a setback of less than 4.5m from an internal boundary, as specified in Figure 8.3.

(a) The siting and design of the proposed development does not cause an unreasonable loss of amenity to adjoining properties. The variation has been considered with regard to the above criteria as follows:
  (i) The design and orientation of the dwelling and outbuilding will not directly impact the habitable rooms of 42A and 46 Bill Grove, providing more than 3 hours of unrestricted access to daylight and sunlight, while maintaining separation between the dwelling and the outbuilding.

  (ii) The location of the proposed dwelling and its incursion into the prescribed building envelope, as shown in Figure 1, is minor. Part of the private open space of 42A Bill Grove is located adjacent to the proposed dwelling, however the proposal will not adversely impact this space. It will allow more than three hours of unrestricted

access to daylight and sunlight, as the dwelling particularly the portion encroaching into the building envelope is located to the southwest.

The proposed outbuilding is set back 1m from the western common boundary of 46 Bill Grove. The existing dwelling at 46 Bill Grove provides multiple locations for private open space, particularly to the south and east of the property.

The existing outbuilding is located at the rear of the property, adjacent to the proposed outbuilding with a separation of 1m from the western common boundary. The longer western side of the proposed outbuilding will be adjacent to existing flat and gable-roofed outbuildings, as well as a solid fence on 46 Bill Grove.

The design and orientation of the proposed outbuilding, including its proposed heights as demonstrated in Figures 2 and 3, will allow for more than three hours of unrestricted access to daylight and sunlight. Therefore, the reduction in sunlight to the private open space at 46 Bill Grove is minimal and does not result in an unreasonable loss of amenity.

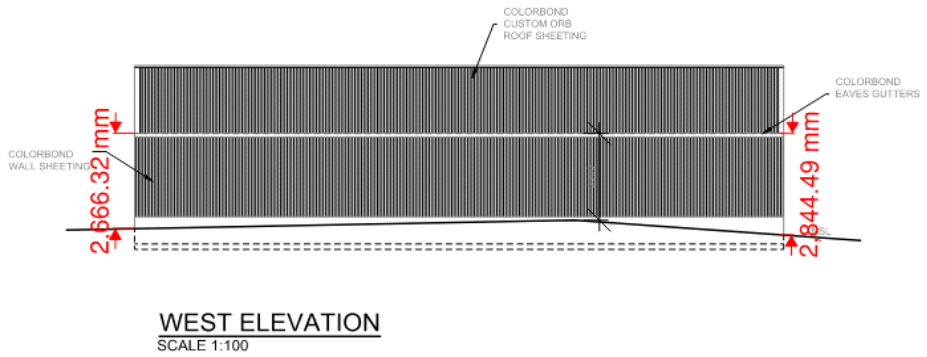


Figure 2

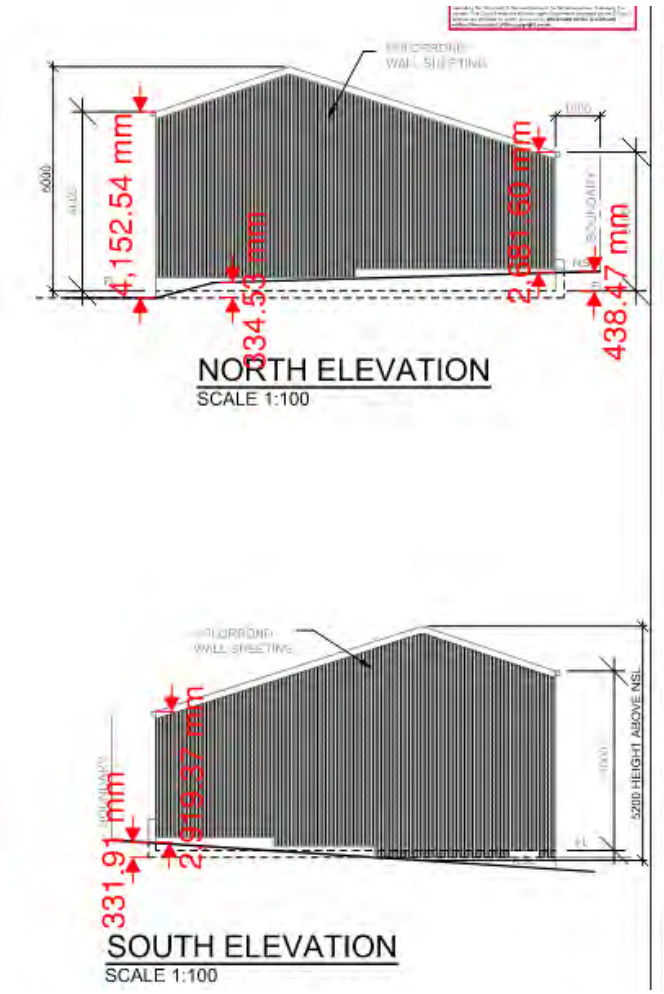


Figure 3

(iii) The subject site adjoins a vacant lot to the south and east of the property. However, the design and siting of the proposed development does not overshadow any vacant property.

(iv) The proposed development does not cause any visual impact by the apparent scale, bulk, or proportion of the dwelling and outbuilding when viewed from the adjoining properties 42A and 46 Bill Grove.

Dwelling:

The dwelling will have some visual impact from the portion adjacent to 42A Bill Grove, the existing dwelling has two windows on its eastern side, which serve a bedroom and a kitchen. Additionally, part of the private open space of 42A Bill Grove is located adjacent to the proposed dwelling, particularly near the section outside the building envelope.

The incursion into the prescribed building envelope, is not significant enough to cause an unreasonable loss of amenity. The proposed setbacks and heights along the western side will appear as a single-storey dwelling due to the site's topography and a solid fence along the shared western boundary.

Outbuilding:

The proposed outbuilding is clearly visible from the adjoining properties at 42A & 46 and 50 Bill Grove. The subject land, particularly at the location of the outbuilding, has a slope of approximately 2.8% - 4.6%. The proposed heights along the western side are about 2.6m - 2.8m above the existing ground level with an overall height of about 4.7m - 5.2m above it. The longer side of the outbuilding, particularly to the western side will cut in to the existing ground level by 0.15m - 0.5m (cut).

The roof design of the proposed outbuilding will lead to the building height to rise from 2.7m to 5.2m above the existing ground level when viewed from sides, as shown in figure 2. The total proposed total length along the western boundary is 18m with a setback of 1m from this boundary. Approximately 12m of this length will be adjacent to the existing flat and gable-roofed outbuildings on 46 Bill Grove, with the remaining length screened by a solid fence.

The visual impact caused by the apparent scale, bulk or proportions of the outbuilding when viewed from 46 Bill Grove is minor, given the existing solid fence and outbuildings located adjacent to the proposed outbidding. Therefore, the visual impact of the proposed outbuilding is not significant enough to cause an unreasonable loss of amenity, when viewed from the adjoining properties at 42A, 46, and 50 Bill Grove, Mowbray.

(b) The proposed development provides adequate separation between the dwellings on adjoining properties, which is consistent with the existing established properties in the area.
(c) The proposed heights and setbacks for the dwelling and outbuilding are within the prescribed building envelope. Therefore, no reduction in sunlight to existing solar energy installation on adjoining properties.

Therefore, the proposal complies with the performance criteria.

8.4.3 Site coverage and private open space for all dwellings

That dwellings are compatible with the amenity and character of the area and provide: (a) for outdoor recreation and the operational needs of the residents; (b) opportunities for the planting of gardens and landscaping; and (c) private open space that is conveniently located and has access to sunlight.
Consistent Complies with acceptable solutions.
A1 Dwellings must have: (a) a site coverage of not more than 50% (excluding eaves up to 0.6m wide); and (b) for multiple dwellings, a total area of private open space of not less than 60m^2 associated with each dwelling, unless the dwelling has a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer).
Complies The proposed development has a roofed area of approximately 467sqm or 2.12% of the 21940sqm lot.
A2 A dwelling must have private open space that: (a) is in one location and is not less than: (i) 24m^2; or (ii) 12m^2, if the dwelling is a multiple dwelling with a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer); (b) has a minimum horizontal dimension of not less than:

(i) 4m; or (ii) 2m, if the dwelling is a multiple dwelling with a finished floor level that is entirely more than 1.8m above the finished ground level (excluding a garage, carport or entry foyer); (c) is located between the dwelling and the frontage only if the frontage is orientated between 30 degrees west of true north and 30 degrees east of true north; and (d) has a gradient not steeper than 1 in 10.
Complies The proposed development includes a deck of more than 24sqm, approximately 32sqm located to the south of the dwelling. The deck will have access from the living area, can accommodate a minimum of 4m horizontal dimensions with a gradient not steeper than 1 in 10 and is located in one location and is not used for vehicle access for parking.

8.4.5 Width of openings for garages and carports for all dwellings

To reduce the potential for garage or carport openings to dominate the primary frontage.
Consistent Complies with acceptable solutions.
A1 A garage or carport for a dwelling within 12m of a primary frontage, whether the garage or carport is free-standing or part of the dwelling, must have a total width of openings facing the primary frontage of not more than 6m or half the width of the frontage (whichever is the lesser).
Complies The proposed development does not include a garage or carport within 12m of a primary frontage with openings facing the primary frontage.

8.4.6 Privacy for all dwellings

To provide a reasonable opportunity for privacy for dwellings.
Consistent Complies with acceptable solutions A1 & A2.
A1 A balcony, deck, roof terrace, parking space, or carport for a dwelling (whether freestanding or part of the dwelling), that has a finished surface or floor level more than 1m above existing ground level must have a permanently fixed screen to a height of not less than 1.7m above the finished surface or floor level, with a uniform transparency of not more than 25%, along the sides facing a: (a) side boundary, unless the balcony, deck, roof terrace, parking space, or carport has a setback of not less than 3m from the side boundary; (b) rear boundary, unless the balcony, deck, roof terrace, parking space, or carport has a setback of not less than 4m from the rear boundary; and (c) dwelling on the same site, unless the balcony, deck, roof terrace, parking space, or carport is not less than 6m: (i) from a window or glazed door, to a habitable room of the other dwelling on the same site; or (ii) from a balcony, deck, roof terrace or the private open space of the other dwelling on the same site.
Complies The proposed development includes a deck that has a finished floor level more than 1m above existing ground level located to the south of the dwelling. The proposed deck will have seatbacks more than 4m from the property boundaries. Therefore, the proposal complies with acceptable solution A1.
A2 A window or glazed door to a habitable room of a dwelling, that has a floor level more than 1m above existing ground level, must satisfy (a), unless it satisfies (b):

(a) the window or glazed door: (i) is to have a setback of not less than 3m from a side boundary; (ii) is to have a setback of not less than 4m from a rear boundary; (iii) if the dwelling is a multiple dwelling, is to be not less than 6m from a window or glazed door, to a habitable room, of another dwelling on the same site; and (iv) if the dwelling is a multiple dwelling, is to be not less than 6m from the private open space of another dwelling on the same site. (b) the window or glazed door: (i) is to be offset, in the horizontal plane, not less than 1.5m from the edge of a window or glazed door, to a habitable room of another dwelling; (ii) is to have a sill height of not less than 1.7m above the floor level or have fixed obscure glazing extending to a height of not less than 1.7m above the floor level; or (iii) is to have a permanently fixed external screen for the full length of the window or glazed door, to a height of not less than 1.7m above floor level, with a uniform transparency of not more than 25%.
Complies The proposed windows and glazed doors to habitable rooms have a floor level more than 1m above existing ground level. However, the proposed setbacks especially from the edge of the habitable rooms will have more than 1.5m offset in a horizontal plane from another dwelling. Therefore, the proposed development complies with A2 (b) (i).

C2.0 Parking and Sustainable Transport Code

The purpose of the Parking and Sustainable Transport Code is: C2.1.1 To ensure that an appropriate level of parking facilities is provided to service use and development. C2.1.2 To ensure that cycling, walking and public transport are encouraged as a means of transport in urban areas. C2.1.3 To ensure that access for pedestrians, vehicles and cyclists is safe and adequate. C2.1.4 To ensure that parking does not cause an unreasonable loss of amenity to the surrounding area. C2.1.5 To ensure that parking spaces and accesses meet appropriate standards. C2.1.6 To provide for parking precincts and pedestrian priority streets.
Consistent The proposed development is consistent with the code purpose as the proposal provides safe and efficient parking and access. The parking area will meet the appropriate standards and will not adversely impact the amenity of the locality.

C2.5.1 Car parking numbers

That an appropriate level of car parking spaces are provided to meet the needs of the use
Consistent Complies with acceptable solution.
A1 The number of on-site car parking spaces must be no less than the number specified in Table C2.1, less the number of car parking spaces that cannot be provided due to the site including container refund scheme space, excluding if: (a) the site is subject to a parking plan for the area adopted by council, in which case parking provision (spaces or cash-in-lieu) must be in accordance with that plan; (b) the site is contained within a parking precinct plan and subject to Clause C2.7; (c) the site is subject to Clause C2.5.5; or (d) it relates to an intensification of an existing use or development or a change of use where:

(i) the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is greater than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case no additional on-site car parking is required; or (ii) the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is less than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case on-site car parking must be calculated as follows: N = A + (C- B) N = Number of on-site car parking spaces required A = Number of existing on site car parking spaces B = Number of on-site car parking spaces required for the existing use or development specified in Table C2.1 C= Number of on-site car parking spaces required for the proposed use or development specified in Table C2.1.
Complies The proposed development is for the construction of a dwelling and an outbuilding. The dwelling will have four bedrooms. For any dwelling with more than two bedrooms in the General Residential Zone, Table C2.1 requires two car parking spaces per dwelling. Therefore, two car parking spaces are required for the proposed dwelling. The proposed development includes a double internal garage and an outbuilding, which can accommodate the required two car parking spaces. Therefore, the proposal complies with acceptable solution A1.

C2.6.1 Construction of parking areas

That parking areas are constructed to an appropriate standard.
Consistent Complies with acceptable solution.
A1 All parking, access ways, manoeuvring and circulation spaces must: (a) be constructed with a durable all weather pavement; (b) be drained to the public stormwater system, or contain stormwater on the site; and (c) excluding all uses in the Rural Zone, Agriculture Zone, Landscape Conservation Zone, Environmental Management Zone, Recreation Zone and Open Space Zone, be surfaced by a spray seal, asphalt, concrete, pavers or equivalent material to restrict abrasion from traffic and minimise entry of water to the pavement.
Complies The proposed parking, access ways, manoeuvring, and circulation spaces will be sealed and will contain stormwater on the site. This will be ensured by placing a condition on the permit.

C2.6.2 Design and layout of parking areas

That parking areas are designed and laid out to provide convenient, safe and efficient parking.
Consistent Complies with acceptable solution A1.1.
A1.1 Parking, access ways, manoeuvring and circulation spaces must either: (a) comply with the following: (i) have a gradient in accordance with *Australian Standard AS 2890 - Parking facilities, Parts 1-6*;

(ii) provide for vehicles to enter and exit the site in a forward direction where providing for more than 4 parking spaces; (iii) have an access width not less than the requirements in Table C2.2; (iv) have car parking space dimensions which satisfy the requirements in Table C2.3; (v) have a combined access and manoeuvring width adjacent to parking spaces not less than the requirements in Table C2.3 where there are 3 or more car parking spaces; (vi) have a vertical clearance of not less than 2.1m above the parking surface level; and (vii) excluding a single dwelling, be delineated by line marking or other clear physical means; or (b) comply with *Australian Standard AS 2890-Parking facilities, Parts 1-6*.
Complies (i) The proposed parking, access ways, manoeuvring and circulation space will have a gradient from approximately 2.8% - 4.6%, that is in accordance with Australian Standard AS 2890. (ii) Not applicable - The proposed development requires two parking spaces, which can enter and exit the site in a forward direction. (iii) The subject site has existing access to Bill Grove. The proposed access to the proposed dwelling and outbuilding will have dimensions in accordance with Table C2.2. However, the submitted site plan (drawing no. 240802-P3) does not show the full extent of the driveway to Bill Grove. But the subject site can accommodate the minimum access width from the proposed development to the existing driveway. (iv) The car parking spaces will have dimensions in accordance with Table C2.3. (v) Not applicable - The proposal requires two parking spaces. (vi) The proposed internal garage will have a clearance of more than 2.1m above the parking surface level. (vii) Not applicable - The proposed development is for a single dwelling and associated outbuilding. Therefore, the proposed development complies with A1.1.

C2.6.3 Number of accesses for vehicles

That: (a) access to land is provided which is safe and efficient for users of the land and all road network users, including but not limited to drivers, passengers, pedestrians and cyclists by minimising the number of vehicle accesses; (b) accesses do not cause an unreasonable loss of amenity of adjoining uses; and (c) the number of accesses minimise impacts on the streetscape.
Consistent Complies with acceptable solution A1.
A1 The number of accesses provided for each frontage must: (a) be no more than 1; or (b) no more than the existing number of accesses, whichever is the greater.
Complies The proposal does not include any changes to the existing access. The subject site has one access located to the north of the property with a frontage to Bill Grove. Therefore, the proposed development satisfies (a).

C3.0 Road and Railway Assets Code

The purpose of the Road and Railway Assets Code is:

C3.1.1 To protect the safety and efficiency of the road and railway networks; and C3.1.2 To reduce conflicts between sensitive uses and major roads and the rail network.
Consistent The proposed development will not have a negative impact on any road or railway network.

C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction

To minimise any adverse effects on the safety and efficiency of the road or rail network from vehicular traffic generated from the site at an existing or new vehicle crossing or level crossing or new junction.
Consistent Complies with acceptable solution A1.4.
A1.4 Vehicular traffic to and from the site, using an existing vehicle crossing or private level crossing, will not increase by more than: (a) the amounts in Table C3.1; or (b) allowed by a licence issued under Part IVA of the *Roads and Jetties Act 1935* in respect to a limited access road.
Complies The proposed development is for the construction of a single dwelling, which will generate an average of 9 vehicle movements per day, according to the New South Wales Guide to Traffic Generating Developments. Therefore, the vehicle movement for the subject site will be less than 10 per day, which is below 40 vehicle movements, as set out in Table C3.1 and is considered to meet the acceptable solution.
A1.5 Vehicular traffic must be able to enter and leave a major road in a forward direction.
Complies

C7.5.1 There are no Use Standards in this code.

C9.0 Attenuation Code

The purpose of the Attenuation Code is: C9.1.1 To minimise adverse impacts on the health, safety and amenity of sensitive use from activities which have the potential to cause emissions. C9.1.2 To minimise the likelihood for sensitive use to conflict with, interfere with, or constrain, activities which have the potential to cause emissions.
Consistent The proposed development is for the construction of a single dwelling and associated outbuilding. The code applies, as the proposed development is for sensitive use and is located within the attenuation distance of 2000m for shooting range, a level 1 activity. However, the existing activity is unlikely to impact on the health, safety or amenity of the proposed sensitive use and development, as the proposed sensitive use is located approximately 1100m from the activity that occurs at 75 Remount Road. Additionally, no complaints are registered to the property regarding the shooting range emissions. Therefore, the proposed development is consistent with the code.

C9.5.2 Sensitive use within an attenuation area

That sensitive use located within an attenuation area does not interfere with or constrain the operation of an existing activity listed in Tables C9.1 or C9.2.
Consistent Complies with performance criteria.
A1 No Acceptable Solution.
Relies on Performance Criteria

Relies on Performance Criteria
P1 Sensitive use within an attenuation area, must not interfere with or constrain an existing activity listed in Tables C9.1 or C9.2, having regard to: (a) the nature of the activity with potential to cause emissions including: (i) operational characteristics of the activity; (ii) scale and intensity of the activity; and (iii) degree of hazard or pollution that may be emitted from the activity; (b) the nature of the sensitive use; (c) the extent of encroachment by the sensitive use into the attenuation area; (d) measures in the design, layout and construction of the development for the sensitive use to eliminate, mitigate or manage effects of emissions of the activity; (e) any advice from the Director, Environment Protection Authority; and (f) any advice from the Director of Mines.
Complies The proposed single dwelling is a sensitive use and is located within the 2000m attenuation distance for a shooting range, a Level 1 activity listed in Table C9.1. The proposed sensitive use within the attenuation area does not interfere with or constrain the activity listed in Table C9.1. The variation has been considered with regard to the above criteria as follows: (a) The existing activity at 75 Remount Road is a shooting range, classified as a Level 1 activity with the potential to cause noise emissions, requiring a 2000m attenuation distance as set out in Table C9.1. This activity operates within a rural zone with no restrictions on its hours of operation. According to the business website, the gun club operates throughout the year on weekends, as well as on Mondays, Wednesdays, and Thursdays during weekdays. The primary attenuation concern relates to noise, as specifically stated in Table C9.1. No complaints have been registered regarding noise emissions from the shooting range. Further, noting the subject site is located within an established residential neighbourhood, and due to the relatively minor intensity of the range, it is not anticipated a dwelling in this location will interfere or constrain the activity. (b) The proposed sensitive use is for a single dwelling located on General Residential zoned land. (c) The dwelling is located approximately 1100m from the activity occurring at 75 Remount Road. (d) The dwelling, located approximately 1100m from the activity, will be constructed with a brick veneer. The proposal does not include any specific mitigation measures for noise emissions caused by the activity. However, the proposal is considered appropriate for its location and is unlikely to impact the health, safety, or amenity of the sensitive use or development. Furthermore, no complaints have been registered to the property regarding noise emissions from the shooting range. (e) & (f) Advice from the director, Environment Protection Authority or Director of Mines has not been sought for the proposed development. Therefore, the proposed development does not cause interference with or constrain the existing activity at 75 Remount Road.

C15.0 Landslip Hazard Code

The purpose of the Landslip Hazard Code is: C15.1.1 To ensure that a tolerable risk can be achieved and maintained for the type, scale and intensity and intended life of use or development on land within a landslip hazard area.
Consistent The subject site is located within low and medium landslip areas. The proposed development involves the construction of a dwelling and an outbuilding, will require both building and

plumbing works, including significant works as defined in the *Building Act 2016*. Therefore, the proposed development is exempt under C15.4.1 (d) (i).

PLANNING EXHIBITED DOCUMENTS
Ref. No: DA 0479/2024
Date advertised: 09/11/2024
Planning Administration _____

PROPOSED RESIDENCE & SHED

48 BILL GROVE MOWBRAY 7248

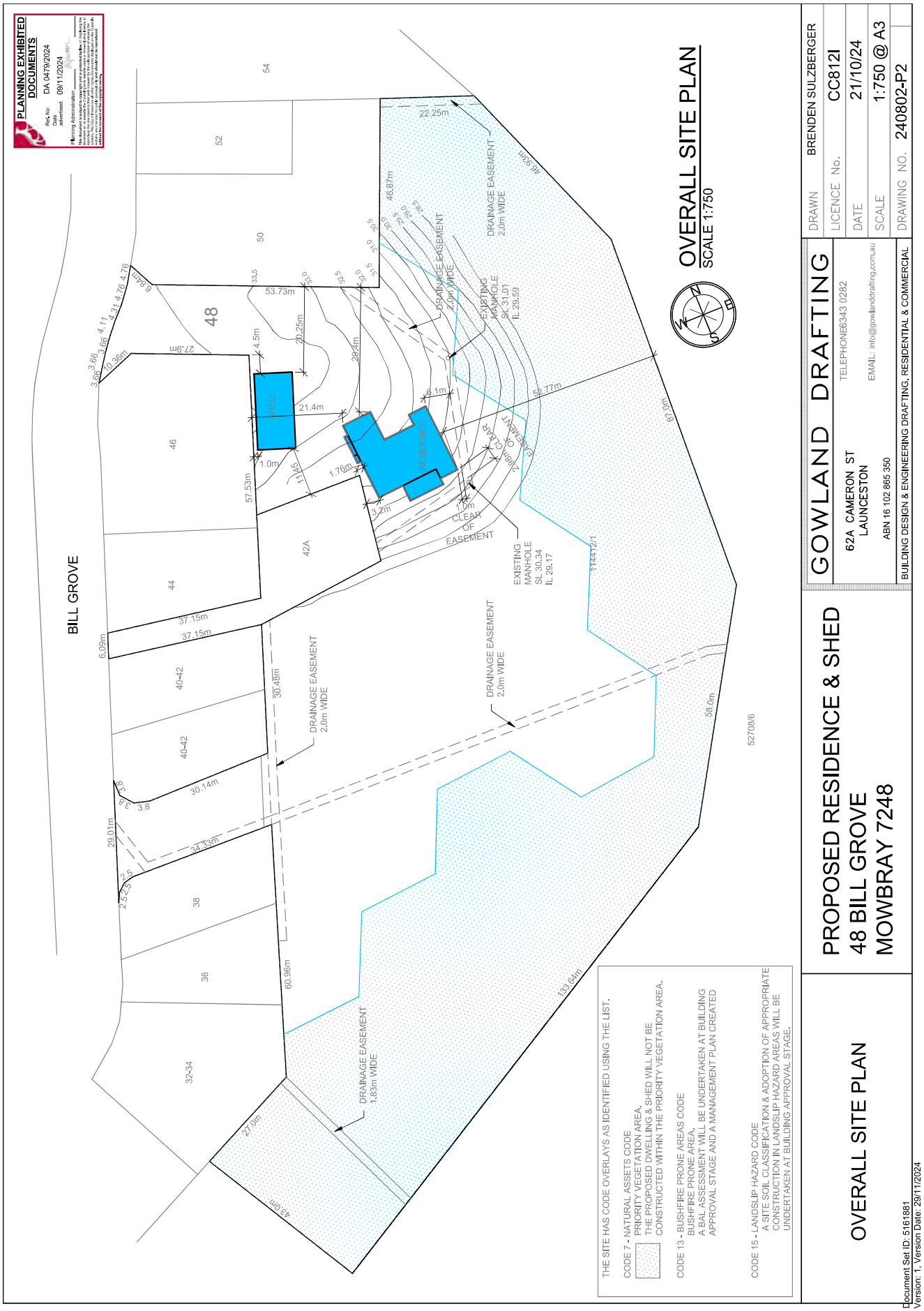
Title:	114412/1
Site Area	2.194ha
House floor area	305m^2
Deck floor area	35.2m^2
Shed floor area	162m^2

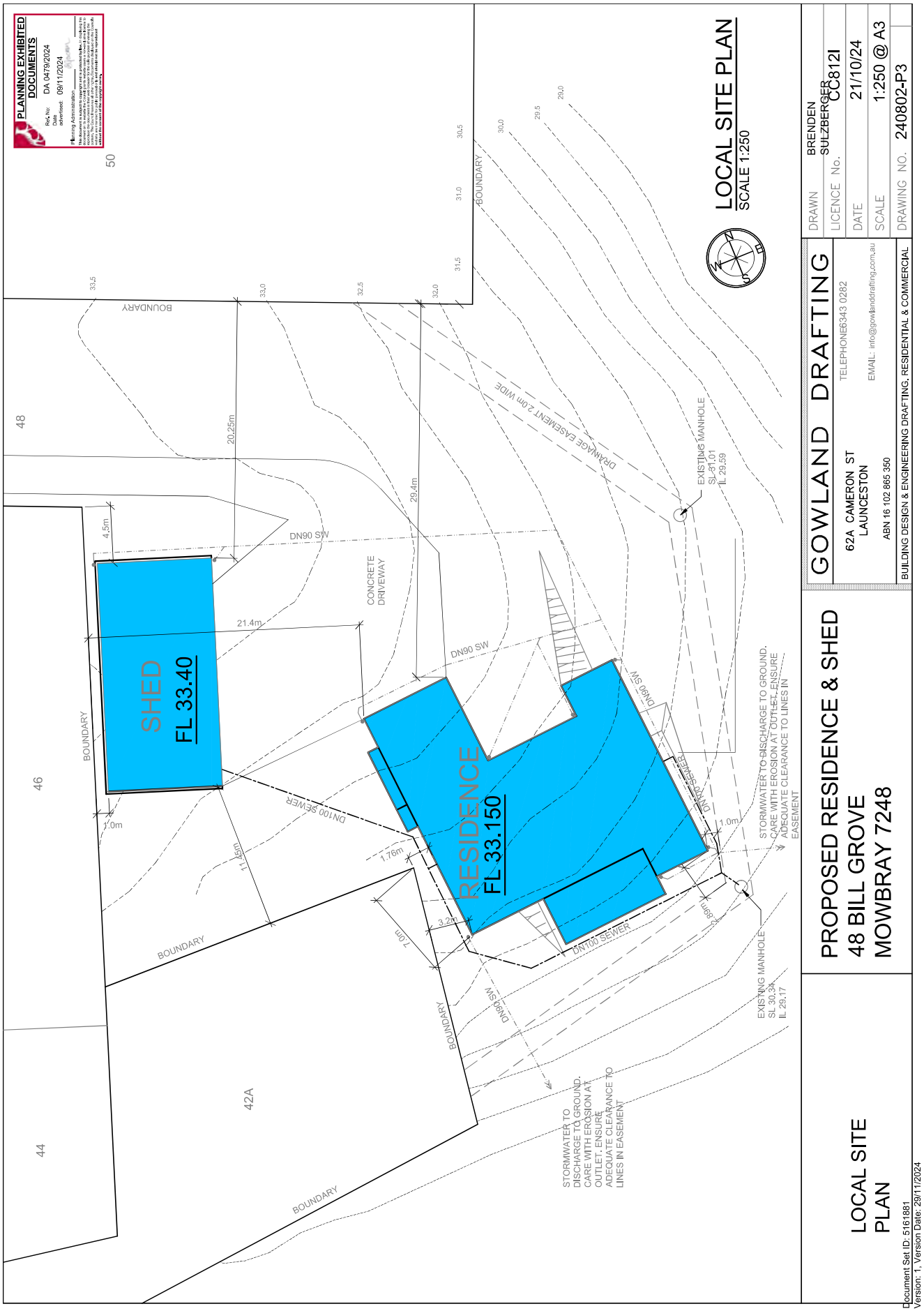
DRAWING SCHEDULE
PLANNING APPROVAL

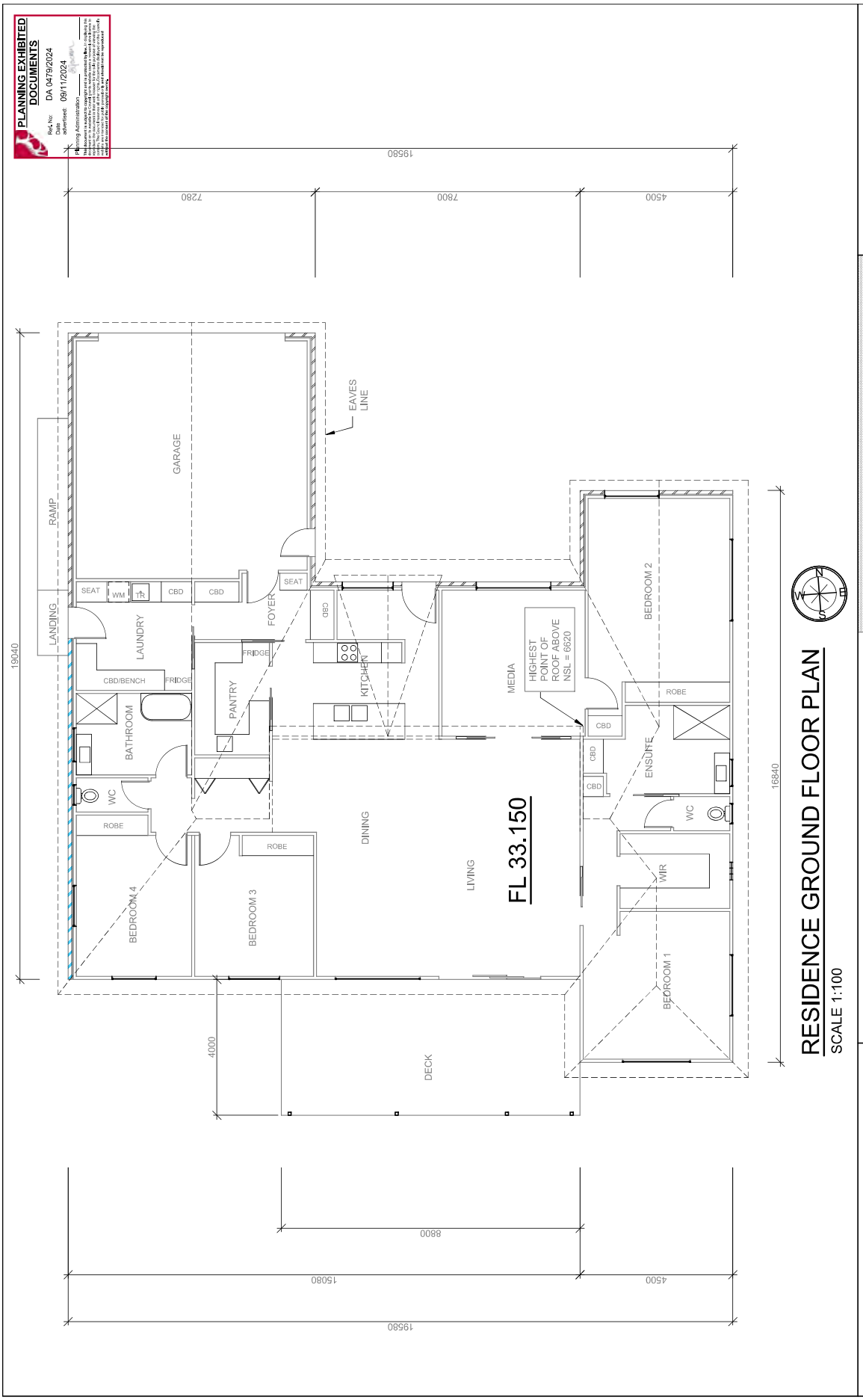
DRAWN BY BRENDEN SULZBERGER LICENCE No. CC812I

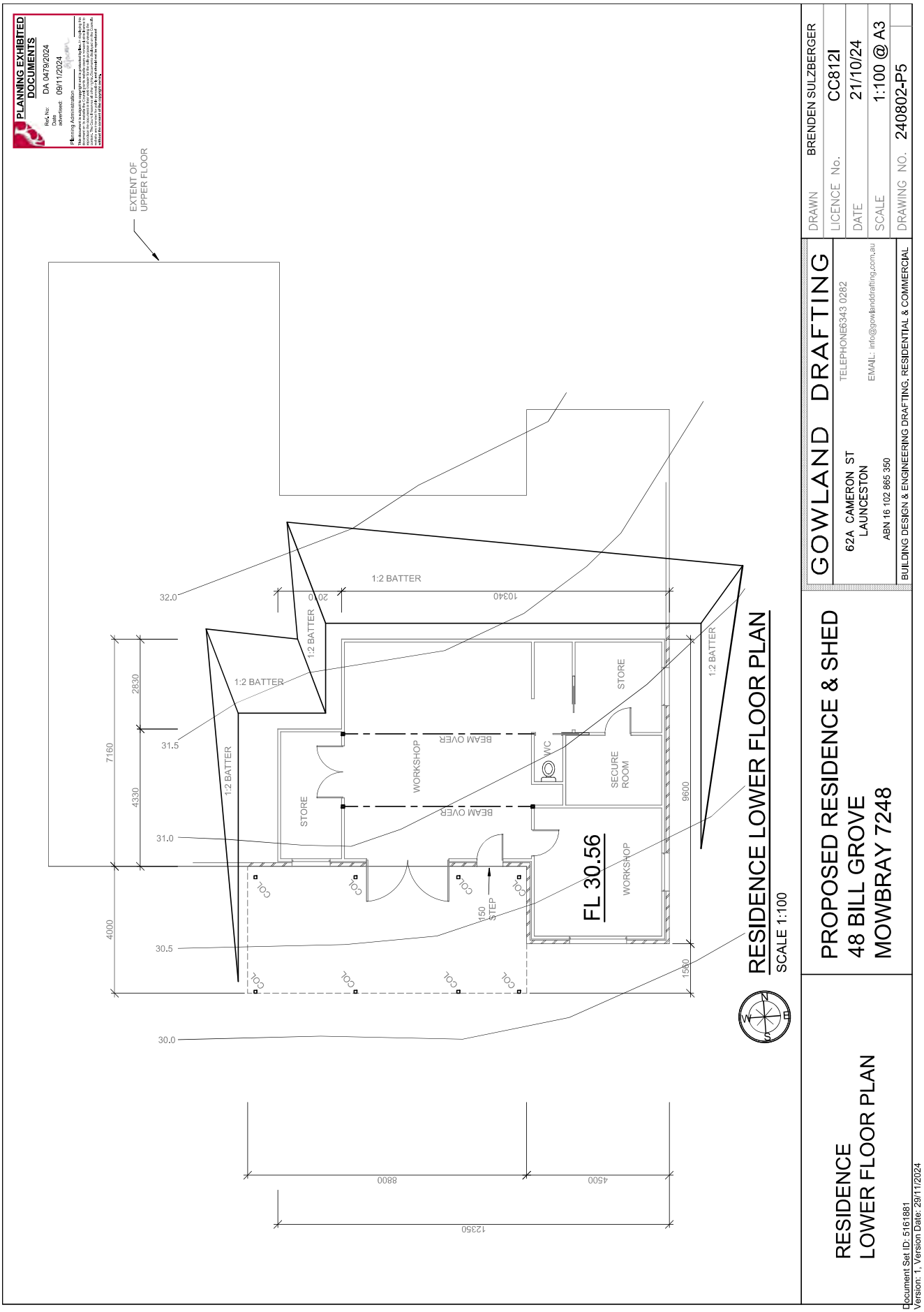
240802-1	COVER PAGE & DRAWING SCHEDULE
240802-2	OVERALL SITE PLAN
240802-3	LOCAL SITE & DRAINAGE PLAN
240802-4	RESIDENCE GROUND FLOOR PLAN
240802-5	RESIDENCE LOWER FLOOR PLAN
240802-6	RESIDENCE ELEVATIONS
240802-7	RESIDENCE ELEVATIONS
240802-8	SHED FLOOR PLAN
240802-9	SHED ELEVATIONS

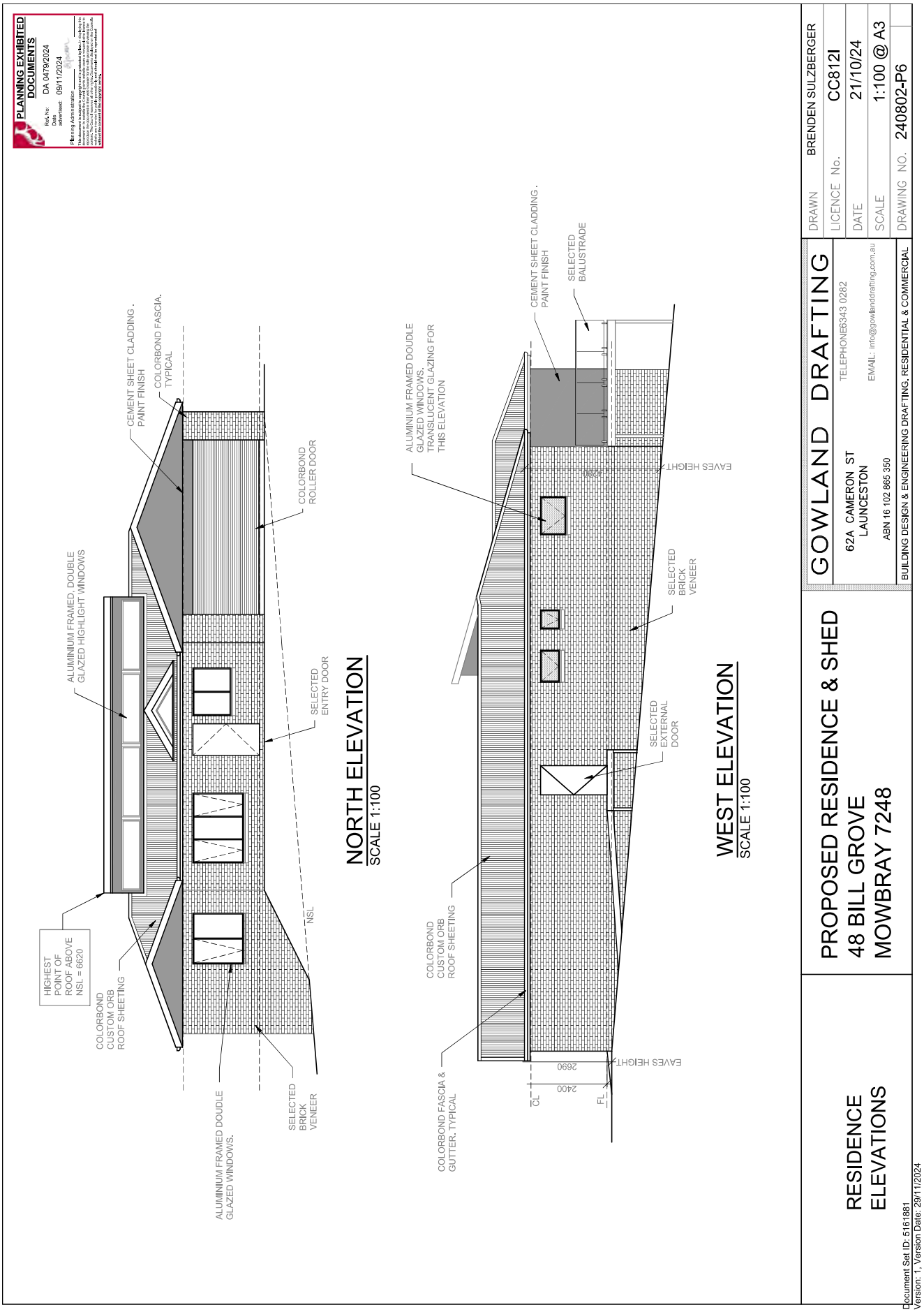
COVER & DRAWING SCHEDULE	PROPOSED RESIDENCE & SHED 48 BILL GROVE MOWBRAY 7248	GOWLAND DRAFTING 62A CAMERON ST LAUNCESTON ABN 16 102 865 350 TELEPHONE6343 0282 EMAIL: info@gowlanddrafting.com.au BUILDING DESIGN & ENGINEERING DRAFTING. RESIDENTIAL & COMMERCIAL	DRAWN BRENDEN SULZBERGER LICENCE No. CC812I DATE 21/10/24 SCALE NTS @ A3 DRAWING NO. 240802-P1

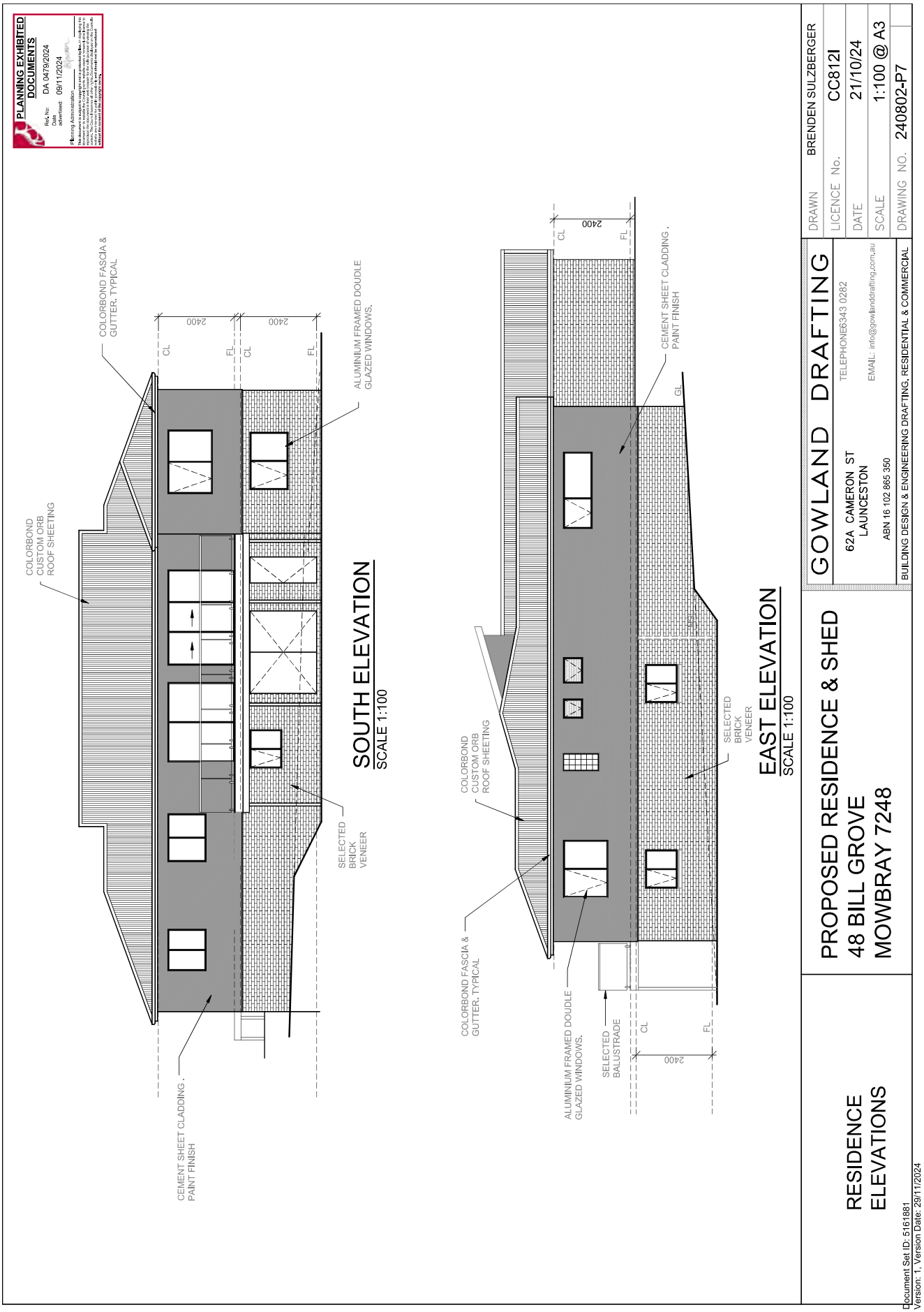


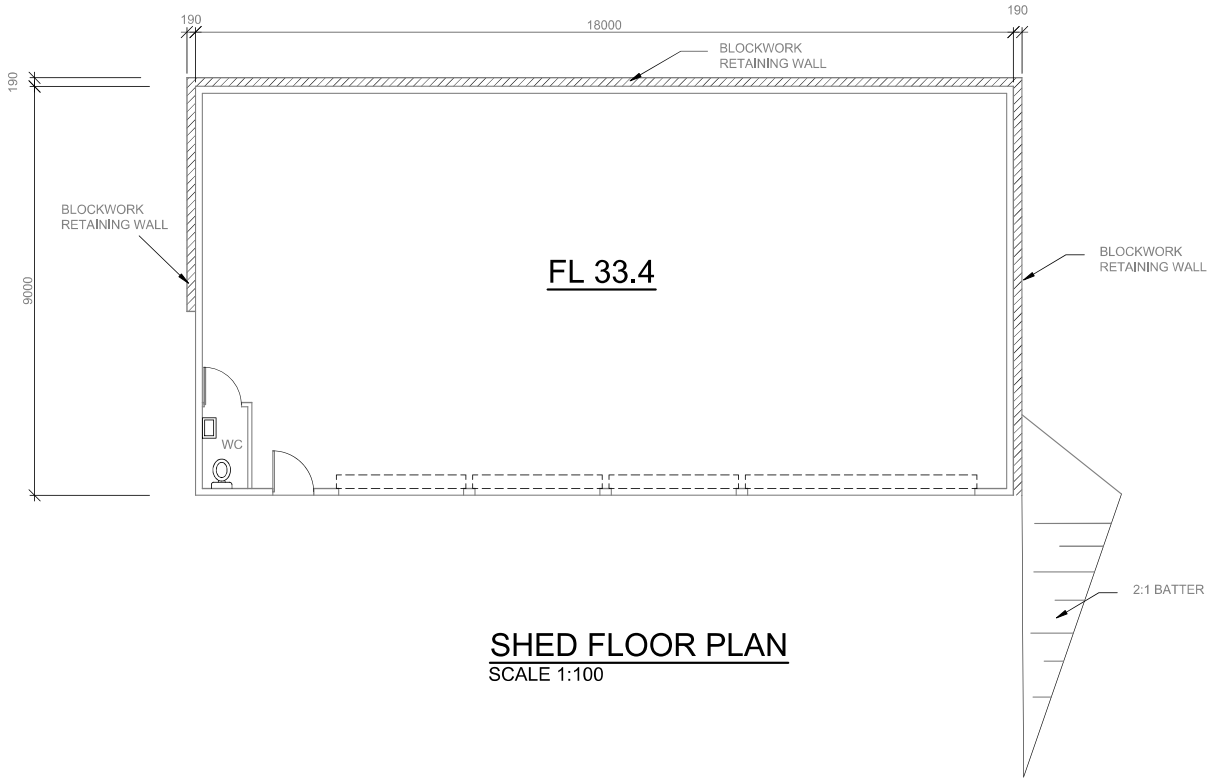






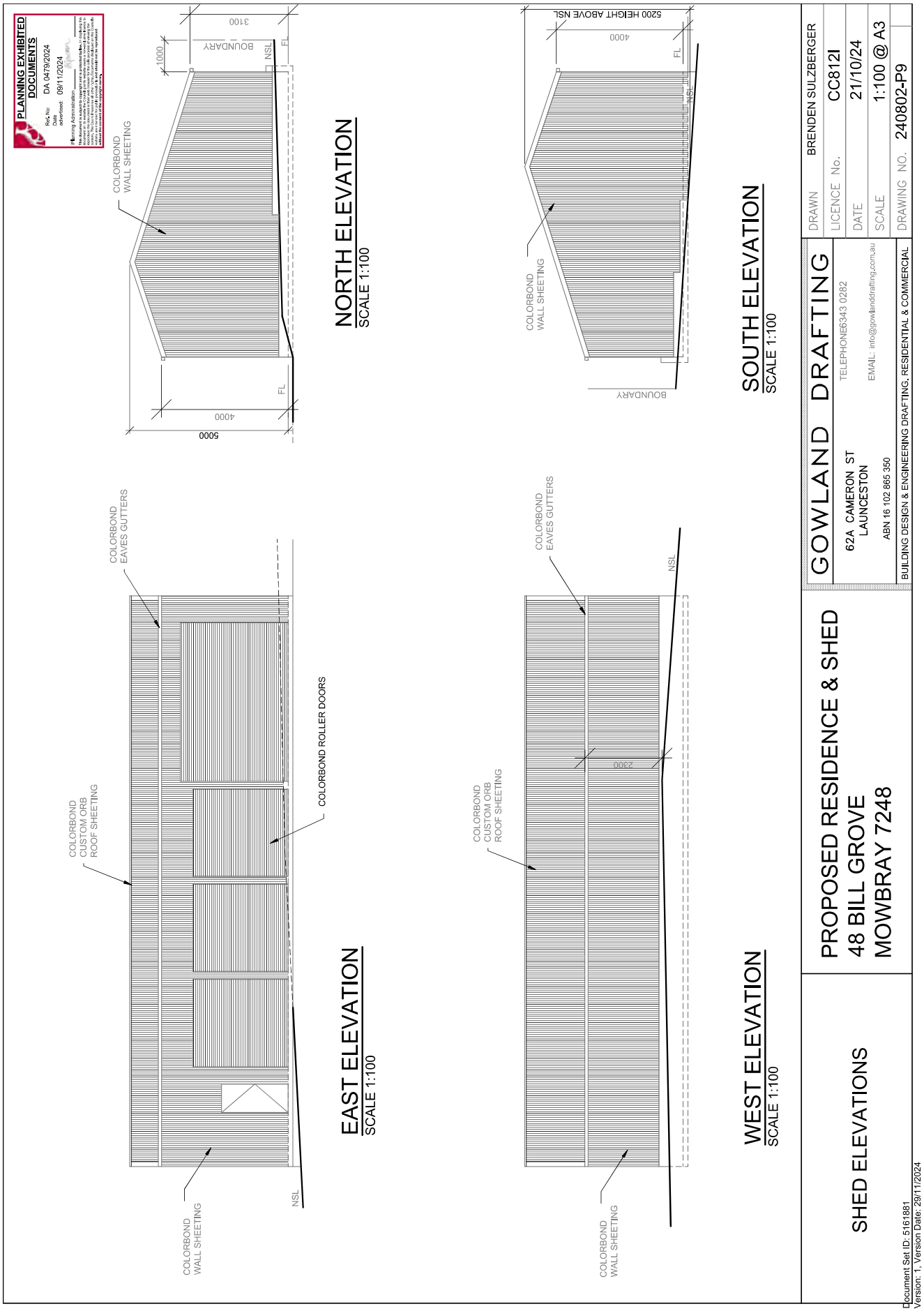






SHED FLOOR PLAN
SCALE 1:100

SHED FLOOR PLAN	PROPOSED RESIDENCE & SHED 48 BILL GROVE MOWBRAY 7248	GOWLAND DRAFTING 62A CAMERON ST LAUNCESTON TELEPHONE 6343 0282 EMAIL: info@gowlanddrafting.com.au ABN 16 102 865 350 BUILDING DESIGN & ENGINEERING DRAFTING, RESIDENTIAL & COMMERCIAL	DRAWN BRENDEN SULZBERGER LICENCE No. CC812I DATE 21/10/24 SCALE 1:100 @ A3 DRAWING NO. 240802-P8



TO:	Council
FROM:	John Marik (General Manager), Rohan Willis (Assistant General Manager), Bridget Waterhouse (Program Manager)
SUBJECT:	North East Rail Trail – Stage 3 (Scottsdale to Lilydale Falls)
DATE:	22 July 2024
File Ref:	DOC/24/8906| Prospectus: DOC/24/7547 | Business Case: DOC/24/7548

Recommendation

That Council:

1. receive and note the North East Rail Trail Revised Business Case (copy provided at the Agenda Attachments);
2. resolve to receive written submissions from the community regarding the North East Rail Trail Revised Business Case for a 28-day period, commencing Wednesday 24 July 2024;
3. resolve to support the pursuit of further funding opportunities that will support the Rail Trail project;
4. resolve to provide communications to adjoining landowners and project stakeholders; and
5. resolve to work with City of Launceston throughout the consultation period to inform next steps.

Purpose

The purpose of this item is for Council to review the draft updated Business Case and determine next steps in the project.

Background

The Launceston to Scottsdale railway line was opened in February 1889 with the rail reaching Branxholm in 1911 and to Herrick in 1919. By 1978 the last passenger trains were closed in Tasmania and the rail network, including the Launceston-Scottsdale line, focused solely on freight. By the early 1980's the Scottsdale line had just three daily services and by 2005 the length of the line from Coldwater Creek (at Turners Marsh) through to Scottsdale was closed.

The original Rail Trail concept was in effect a three-stage project extending a total of approximately 90 kilometres, from Launceston through to Billycock Hill. Stage 1, opened in 2012, was developed by the Rotary Club of Scottsdale and volunteers and consisted of 14 km of trail from Tonganah to Billycock Hill. Stage 2, comprising 12 km of trail from Scottsdale to Tonganah, received funding from the Tasmanian Community Fund and assistance from Dorset Council, and was opened in November 2015.

Stage 3 of the project – the largest trail component - initially sought to complete the remaining trail length from Scottsdale to Launceston. Funding in support of this component was sought by Dorset Council in late 2014 through submission of a grant application under the Australian Government's National Stronger Regions Fund (NSRF). Accompanying the application was the Northern Tasmania Development (NTD) commissioned 'North East Rail Trail Preliminary Demand and Economic Benefit Assessment'. The application was successful, with Dorset Council receiving $1.47 million in 2015. At around the same time as Council announced its proposal to develop the Rail Trail, a group named the Launceston and North East Railway (L&NER) was formed. L&NER presented an alternative project to develop a heritage tourist railway that would, on completion extend from Turners Marsh through to Scottsdale.

In late 2017 the Department of Treasury and Finance (DTF) was tasked to undertake an assessment of the two projects (Dorset Council's Rail Trail project and L&NERs Tourist Railway project) to evaluate the costs, benefits and risks of the two proposals and inform the State Government's decision on the future of the corridor. By the time the DTF released its findings of the assessment in July 2018, Stage 3 of the Rail Trail project had evolved into extending from Scottsdale into Lilydale Falls; with an added consideration of extending a path from Lilydale Falls into Lilydale township contingent upon State government or other assistance being provided to facilitate such extension. The DTF, having assessed the risks of the Rail Trail proposal for the length of trail between Scottsdale and Lilydale Falls, concluded the project to be low risk, determining that the project had the potential to deliver significant economic benefits to local economies. Parallel to this, the DTFs assessment of the Tourist Railway project found the project as having 'significant risk' due to the financial risks associated with requirements imposed by the National Rail Safety Regulator, financial risks associated with insurance requirements, and funding shortfall risks that place emphasis on the public to assist in establishment costs.

Shortly after the release of the findings of the DTFs assessment of the two projects, the Tasmanian Government announced a compromise solution on both assessed proposals. Dorset Council's Rail Trail project could proceed and would comprise the length of approximately 40 km from Scottsdale to Lilydale Falls (with Council to become responsible for corridor management pending legislative declaration), while the Tourist Railway proposal would be offered a two stage pathway, initially comprising the 12.5 km section of corridor from Lilydale to Turners Marsh, with the possibility of extending the proposal back further to Coldwater Creek subject to completion of the initial stage. A Notice of Motion was subsequently successfully passed at Dorset Council's November 2018 Council Meeting to adopt the proposed compromise solution and provide both groups the opportunity to achieve their aims and generate economic activity in North East Tasmania.

In October 2018, and following ongoing community concerns surrounding both proposals, the Legislative Council Government Administration Committee B (the Committee) resolved to inquire into the potential use of the North East Rail Corridor. Parliament was prorogued on 28 January 2019 with the Inquiry re-established by Order of the Legislative Council on 19 March 2019. The *Final Report on Tasmania's North East Railway Corridor* was handed down by the Committee in July 2019 with 63 written submissions. Of those submissions, 43 individuals representing themselves and/or various groups or organisations, provided verbal evidence at one of the hearings which were held across Launceston, Victoria, New Zealand, and Hobart. A total of nine recommendations were ultimately handed down by the Committee to the Government, among which included the following:

- Continue to support the Scottsdale to Lilydale Falls rail trail proposal;
- Support the establishment of a heritage railway between Launceston and Lilydale (and negotiate with TasRail for access, as necessary, to the section of rail line between Launceston and Turners Marsh); and
- Ensure that, where possible, the rail trail is co-located within the rail corridor and that rail infrastructure is not removed unless necessary for construction of the rail trail.

In February 2020 the Minister for Infrastructure and Transport appointed Dorset Council as Corridor Manager of the North East Corridor from Lilydale Falls to Tonganah pursuant to Section 29 of the *Strategic Infrastructure Corridors (Strategic and Recreational Use) Act 2016*, after which the planning assessment process was able to commence. Planning approval, following extensive public advertisement, assessment and appeal proceedings, was obtained in 2021 for the portion of trail situated within the Dorset Council local government area (approximately 26 km from Scottsdale to Wyena) and in 2023 for the portion of trail situated in the City of Launceston local government area (approximately 14 km from Wyena to Lilydale Falls Reserve).

Following receipt of the City of Launceston planning permit, Council Officers commenced a full review of the project plan, including contemporary appraisal of full project costings (construction and maintenance) and review of the project business case. Understandably, construction requirements for the project have shifted as the project has evolved over time – firstly via altered construction costs impacted by high infrastructure inflation levels and deviations in steel price (for salvage and investment into project construction), and secondly as a consequence of the need to satisfy planning approvals in both municipalities (e.g. requirement to expand the car park at Lilydale Falls to provide additional parking spaces, requirement to upgrade the access point of Lilydale Falls Reserve onto Golconda Road, requirement for implementation of stormwater management measures such as silt fencing in proximity to watercourses to maintain water quality). Additionally, and noting that the overall trail length to be delivered by the project has reduced since the time of project inception (by virtue of now locating the trailhead at Lilydale Falls Reserve rather than in Launceston), the need to revisit and refine the business case to appraise the costs/benefits of the project within this new project paradigm has been crucial.

The revised business case has now been prepared and early discussions have commenced with City of Launceston in regards to project delivery and ongoing maintenance. The business case has estimated the project to contemporarily have a revised capital cost of $4.281 million (unsealed trail construction), leaving a project funding shortfall of $2.8 million (total capital cost minus federal government funding of $1.47 million). In addition, there are estimated ongoing operational and maintenance costs of approximately $116,000 per annum, totalling $1.161 million over 10 years. However, despite these cost increases, the business case lauds the strong and tangible socio-economic benefits generated by the project; estimating the Rail Trail will stimulate an injection of approximately $30.125 million into the region's income by trail users during its first decade of operation alone. In addition, the business case emphasises that the project would realise an estimated $5.266 million in health benefits, $5.555 million in user valuation[1] and $1.265 million in productivity benefits. In summary, the revised business case estimates $42.211 million of total benefits being generated by the project into the regional economy of Dorset and City of Launceston over 10 years.

Planning, Environment and Statutory Requirements

Land Use Planning and Approvals Act 1993

- Planning permits for the Rail Trail and ancillary components (car park construction, crossover upgrade, etc.) have been approved by Dorset Council and City of Launceston, each pursuant to Section 57 of the Act.

[1] While Council does not intend to charge for usage of the trail for the purposes of the cost benefit analysis a user value (based on Shadow pricing of $20/user) has been applied.

Strategic Infrastructure Corridors (Strategic and Recreational Use) Act 2016

- Dorset Council has been appointed the Corridor Manager for the North East Corridor pursuant to Section 29 of the Act.
- Planning approval for the trail length from Scottsdale to Lilydale Falls Reserve has been obtained in accord with those provisions provided at Part 6 of the Act.
- Further ministerial approval pursuant to relevant provisions provided under (i) Part 14 of the Act, for removal of the former rail infrastructure and (ii) Part 5, Division 3 of the Act for use of substantial fixed infrastructure (e.g. bridges, the tunnel), are still respectively required to be obtained prior to development and use of the Rail Trail.

Strategic and Annual Plan

- Strategic Plan (2023 - 2032), Imperative 8.2
- 2024/25 Annual Plan – Activity 23
- Priority Projects Plan (2023 - 2025), Activity 10

Risk Management

Community relations

- The Rail Trail project has been a disputed matter within the north east Tasmania community for several years. There is a risk that the construction of the Rail Trail may re-agitate community tensions and differences of opinion. Compliance with planning permit conditions and processes bedded within the *Strategic Infrastructure Corridors (Strategic and Recreational Use) Act 2016* by the Minister in deliberating upon removal of the former rail infrastructure and use of substantial fixed infrastructure should ameliorate community concerns regarding any future project construction works.

Financial

- Dorset and City of Launceston municipal areas would both receive the benefits of the project overall, however currently Dorset Council would have to fund 66% of the upfront cost (with the remaining balance absorbed by the funding received from the Australian Government), along with 100% of the on-going operation costs to maintain the Rail Trail. This would form another cost centre within Dorset Council reliant on the broader rate base. The mitigating factors to this risk is for Dorset Council to communicate the overall benefits of the project including positive impacts on the rate base and income producing potential for Council from the Rail Trail.
- The current funding agreement for the $1.47 million is due to be completed by March 1, 2026. There is a risk that a variation may not be approved if required, due to the length of time since the initial funding agreement was initiated.

Decision Making Process

- Pursuant to the *Strategic Infrastructure Corridors (Strategic and Recreational Use) Act 2016* requests must be made in writing to the Minister to remove rail infrastructure prior to the project being able to commence. The approval process involves a four (4) week public advertisement period, during which persons interested in using the rail infrastructure proposed for disposal can apply to the Minister to obtain the infrastructure for the purposes of the operation of a railway in Tasmania (contingent upon the Minister then being satisfied that the person/s will remove the infrastructure from the corridor within 6 months). As such, there is a risk that the request to remove infrastructure for the purposes of Rail Trail construction may not be supported by the Minister, or otherwise may experience significant delays before trail construction works can commence pending deliberation upon infrastructure disposal by the Minister. This risk has been managed through discussions with the Department of State Growth, as well as other local government areas that have necessarily navigated these provisions of the *Strategic Infrastructure Corridors (Strategic and*

Recreational Use) Act 2016, to understand the approval criteria and the level of information that will be required to be presented by Council to the Minister in requesting removal of the former rail infrastructure.

- The project, to date, has endured delays associated with multiple elements including government assessment and inquiry processes, planning assessment and appeal proceedings, and the need to undertake a contemporary and comprehensive review of the project's business case and costings. This has understandably caused significant adjustments to the project schedule. The below schedule has been developed to provide proper clarity to the remaining steps required in delivering the project, with maximum lead times included to mitigate the risks where possible and allow for the project to be completed on time and on budget.

Table 1: Project Schedule.

STAGE	ACTIVITY	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25	Jan-26	Feb-26	Mar-26
Pre Project	Detailed works assessment and costings	■																					
	Complete busines case	■																					
Consultation	Public consultation		■	■																			
	Landholder and Stakeholder consultation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
PROJECT REVIEW POINT																							
Funding	Obtain additional funding		■	■	■	■	■	■															
PROJECT REVIEW POINT																							
Approvals	Request to remove rail infrastructure			■	■	■	■	■	■														
PROJECT REVIEW POINT																							
Tender Process	Finalise Design									■	■												
	Write tender documentation										■	■											
	Construction Management Plan										■	■											
	Procure contractors											■	■	■									
Field-Works	Surveying												■	■									
	Trail marking												■	■									
	Tree marking												■	■									
	Environment Management Plan												■	■									
	Stormwater Management Plan												■	■									
	Removal of vegetation												■	■									
Construction	Bridge upgrades												■	■									
	Remove rail line infrastructure														■								
	Culverts, erosion control, drainage measures														■	■							
	Trail surfacing																■	■	■	■			
	Install bollards, road crossings																		■	■			
	Install signage																		■	■			
	Install trailside furniture																		■	■			
	Install trailhead - Lilydale Falls																		■	■			
	Install trailhead - Scottsdale																		■	■			
Post Project	Grand Opening																					■	
	Funding Acquittal - as needed																						■
Project Management		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Financial and Asset Management Implications

Project costs incurred since October 2020 (preparation of the initial planning application for the Scottsdale to Wyena trail section) identify a total project spend of $277,936.13 to date, with a significant portion of these costs attributable to planning assessment and appeal proceedings instigated by the requirement to obtain planning permits for trail construction. The project costs are tabulated below:

Table 2: Project Expenditure.

ITEM	COST
Planning Approval and Legal Fees	$208,454
Consultants Business Case	$50,394
Overheads	$13,794
Internal Labour and Plant	$5,294
TOTAL	$277,936

The original business case for the project looked at the socio-economic benefits and market demand associated with a Rail Trail concept comprising approximately 90 kilometres of uninterrupted trail network extending from Launceston through to Billycock Hill (on the edge of Legerwood). The full construction of the trail was costed at $3.89 million, with the economic benefits (conservative scenario) expected to deliver $4.18 million in the first 10 years post-construction and 48 full time equivalent (FTE) jobs. Total users – 10 years post-construction - were projected to reach almost 30,000, with maintenance costs not included[2].

The updated business case is a significantly refined report that has employed updated methodologies to provide a more holistic, comprehensive review of the project. The report looks at the broader socio-economic benefits and the substantially increased market demand of the project – tailored to considering these matters within the context of Stage 3 of the Rail Trail project now comprising approximately 40 km (from Scottsdale to Lilydale Falls).

Three development options for the project have been appraised in relation to construction methodology to support a comprehensive benefit-cost appraisal exercise and ensure the best outcome from a financial benefit perspective. These options were (i) unsealed trail (crushed ballast), (ii) spray seal trail, and (iii) asphalt trail. Of the three, the unsealed trail model was the preferred option due to the significant savings in spend over the 10-year period and the broader benefit-to-cost ratio. Cost-benefit results for this option are outlined below:

[2] The maintenance component of the project at this time was proposed to be managed by the North East Rail Trail Inc (NERT), a group that has since disbanded.

Table 3: Benefit Cost Analysis.

OPTION ONE: UNSEALED TRAIL	
Total Project Regional Cost Benefit (2024 prices) Period – 10 years	**Discount Rate (7%)**
A. Project Costs	
Capital Costs	$4,281,001
Costs – Maintenance (10 years) *Includes: trail maintenance, bridge maintenance, road crossing maintenance, toilet maintenance and operations expenses, and vegetation management.*	$1,161,970
Total Costs	**$5,442,971**
B. Project Benefits	
Direct Benefits – User Value	$5,554,771
Regional Income Increase (users)	$30,125,291
Health Benefits (exercise)	$5,265,922
Workforce Productivity	$1,264,821
Total Benefits	**$42,210,805**
Total Benefits ($) Present Value	$28,491,815
Net Present Value ($) Total Benefits	$23,048,844
NPV/Cost	4.2
Benefit Cost Ratio (BCR)	**5.2**[3]

Dorset Council, as previously outlined, has successfully secured $1.47 million in funding for the development of the Rail Trail, with this funding currently due to be expended by early 2026. The budget associated with the original (2014) funding application in comparison to the new budget is contrasted in the below table:

[3] Based on the current interest rates on term deposits paying above 5%, the minimum acceptable rate of return – or the 'discount rate' utilised for the project – has been deemed as 7%. At this *discount rate* the project conservatively has a benefit-cost ratio of 5.2 over the 10-year life of the project (i.e. total benefits of $28,491,815 divided by the total cost of the project of $5,442,971 equals 5.2). In essence, this means that the project is projected as paying for itself by more than five-fold over the initial 10-year life post-construction. Impressively, the benefit-cost ratio of the project would expectedly grow even greater than this due to the rail trail having a much longer project lifespan of 10 years.

Table 4: Business Case Comparison – Original (2014) Concept versus Revised (2024) Concept

Original - 2014 (Scottsdale to Launceston)	Cost	New - 2024 (Scottsdale to Lilydale Falls)	Cost
PROJECT EXPENDITURE			
Decomissioning Decommissioning Contingency (15%)	$999,488	Decommissioning *(Vegetation Management, Rail Cutting, Rail Removal, Sleeper Removal, Hazardous Material Disposal)*	$1,393,700
Bridge Upgrades (17)	$340,000	Bridge / Culvert Upgrades (8)	$1,350,301
Tunnel Lighting Road Crossings (39)	$98,000	Crossings (8) and Tunnel	$477,000
Signage	$40,000	Signage (Trailhead)	$15,000
Trail Construction	$1,184,000	Trail Construction	$840,000
Other Costs *(Bike Racks, Cycle Lane - Lilydale Road, Lilydale Rd to NE Rail Junction, Marketing/Branding, Project Manager)*	$280,500	Other Costs *(Lilydale Falls Carpark, Management Plans, Toilet)*	$205,000
TOTAL EXPENSES	**$2,941,988**	**TOTAL EXPENSES**	**$4,281,001**
PROJECT REVENUE			
Original budget included value for recovered materials: Scrap Metal, Wooden Sleepers, and Ballast	$1,471,920	New budget has not included value for recovered materials. Returns of $180-$250/tonne are possible with slightly over 3000t of steel to be recovered (approx. market value of $540,000 - $750,000). This element requires Ministerial approval	$Nil
Grant Funding	$1,470,000	Grant Funding	$1,470,000
TOTAL INCOME	**$2,941,920**	**TOTAL INCOME**	**$1,470,000**
PROJECT SHORTFALL	**$68**	**PROJECT SHORTFALL**	**$2,811,001**

Evidently, the most significant differences in project costs are those attributable to necessary bridge upgrades, road crossings and works within the tunnel. Although the number of bridges and road crossings requiring treatment for the project have decreased (owing to the reduced length of the trail compared to the 2014 conceptualisation), contemporary condition assessments of applicable bridges and reconsideration of lighting needs within the historic tunnel feature have contributed to significant cost increases in these items. Elaboration of these items is provided below:

- Bridge Upgrades: There are a total of six bridges and two culverts situated on the length of trail between Scottsdale and Lilydale Falls. Level 2 Condition Inspections were undertaken on the six bridge structures. Procedures used were visual inspection, sounding techniques and coring of the main timber components. In addition, a visual inspection was undertaken on the two culverts. The bridge inspections found that the rail line components of the six structures had all failed, or were failing, and would require removal to install new, or reuse existing, bridge decks. One bridge has been identified as requiring full replacement of the superstructure due to the advanced level of structural deterioration. The $20,000 estimated for each bridge in the original business case is believed to have been based on the bridges being assumed in good condition and requiring simple safety upgrades such as handrails. These condition assessments undertaken by Council during the recent project plan review exercise have established that the level of works on these structures is far more substantial than originally ascertained during the project infancy stages.
- Road Crossings and Tunnel: The tunnel lighting estimates for the original business case were $20,000. Further investigations have revealed that the lighting of the 700m long tunnel is more complex than first

realised. This has had a significant impact on the costs associated, with an electrical engineer required to be engaged to complete the works.

In completing a comprehensive and diligent project plan review exercise, a project shortfall of $2.8 million has been identified and is now required to be obtained via alternative sources to bring the project to completeness. Additionally, ongoing operational costs of approximately $116,000/year associated with trail maintenance, bridge maintenance, road crossing maintenance, toilet maintenance and expenses and vegetation management must also be taken stock of. To this end, Council has preliminarily identified potential funding opportunities and revenue streams to supplement the project shortfall and support operational/maintenance costs of the trail, with a view to progressing negotiations pending adoption of the recommendations of this agenda item.

Community Considerations

The Dorset Council Strategic Plan (2023-2032) identifies four strategic areas for focus (pillars). These pillars encapsulate projects that strive to achieve the outcomes and deliver on the overarching strategic focus of Council. The Rail Trail proposal is identified under, and will deliver upon, Pillar 2 (Economic Development) as the economic benefits of the project are both compelling and significant. The project will create a diversification of economic opportunities through increased visitation to the region and associated expenditure, through job creation, and through stimulating the local economy and supporting private sector investment opportunities. The injection of $1.488 million in regional income in the construction period alone[4] across the Dorset and Launceston municipalities will act as a significant boost to each local economy, with the potential for $30.125 million in regional income over a 10-year period (2024 prices). Significantly, an increase in opportunities for employment will arise through increased demand on service industries e.g. bike hire, visitor-stay accommodation, hospitality enterprises, shuttle operations. This activity has been estimated by the business case as creating opportunities for 25.1 FTE jobs in Year One, increasing to 43.8 FTE jobs by Year 10:

Table 5: Estimated regional benefits.

ESTIMATED FIGURES		
	Year One	Year Ten
Total Trail Users	21,469	39,500
Total User Spend (annually)	$4,757,000	$8,268,000
Total FTE Jobs	25.1	43.8

Concerningly, Tasmania currently leads the rest of Australia with the highest rates of obese or overweight children (28.7%) and adults (70.9%) (ABS Census Data). Mental health impacts are also a growing concern and challenge amongst the population with approximately 1 in 5 people[5] in Tasmania experiencing mental health problems in any year and mental health conditions second only to arthritis as the most common chronic conditions currently experienced by adults in Northern Tasmania[6] and the burden of this concentrated amongst those who are most socioeconomically disadvantaged. The health benefits derived from access to low-and-no cost community infrastructure are significant, with increased positive physical and mental health and wellbeing outcomes garnered particularly when exercising in "green space". With an aging population in the North East it is increasingly important to provide flat/low gradient fitness options for the community to engage in physical activity. The increased opportunities to engage in physical activity that this project provides will improve community liveability (delivering upon Pillar 1 of the Strategic Plan), delivering health benefits totalling $5.266 million over a 10-year period (2024 prices). The scale of the project will also provide users the opportunity to engage in the full trail over a multiple-day period (or one day should they choose), or alternatively in smaller, localised segments as time/fitness permits (see Table 6 below). Fundamentally the project will provide significant infrastructure and connect our smaller outlying communities via access to an off-road trail for

[4] 2024 Business Case – Section 7.2 Regional income impacts

[5] Primary Health Tasmania Health Needs Assessment 2022-2023 to 2024-2025

[6] Clinical Services Profile – 2023-2027

walking, cycling, or running.

Table 6: Trail Segments of Stage 3 of the North East Tasmania Rail Trail

TRAIL SEGMENT	DISTANCE (Approx)
Scottsdale to Lietinna	5.5 km
Lietinna to Blumont	5.5 km
Blumont to Nabowla	3.5 km
Nabowla to Golconda	6.5 km
Golconda to Wyena	3.5 km
Wyena to Denison Gorge	3.0 km
Denison Gorge to Lebrina	3.5 km
Lebrina to Tunnel	3.5 km
Tunnel to Lilydale Falls	5.5 km
Total	**40 km**

Consultation

- On 17 October 2014 a letter to more than 130 landowners identified by City of Launceston and Dorset Council as owning land adjacent to the trail was sent by the North East Recreation Trail Inc. The letter contained information about the proposed project and received a total of 14 responses. Of the 14 responses some were to enquire regarding investment opportunities while some were responding to say they did not support the project but could not identify any specific issues that could be worked on for a resolution. Four residents raised concerns and were met with in person to work through some solutions.
- Prior to the Notice of Motion endorsement at the 19 November 2018 Council Meeting to support the Tasmanian Government's proposed compromise of the two rail corridor projects, support was documented from approximately 18 individuals / groups.
- Planning applications for both sections of the Rail Trail project within the Dorset and City of Launceston local government areas were each subject to a two-week statutory public advertisement process, with site notices erected along the length of the corridor and all adjoining landowners notified in writing of the respective applications.
- Additionally, there has been community consultation of 4 weeks each respectively for the development of both the Strategic Plan 2023-2032 (with a further 4 week extension period) and the Priority Projects Plan 2023-2025, both of which include direct reference to the Rail Trail project.

A Community Information Pack and Frequently Asked Questions will be available on the project page of the Council website from Wednesday, 24 July 2024 – click here to view the page.

Officer's Comments

North East Tasmania Rail Trail project has the genuine potential to have a transformative impact on the North East region, opening up considerable economic and social investment opportunities for the community by providing the longest rail trail in Tasmania. The project has been identified and acknowledged as a regionally significant project by the Northern Tasmania Development Corporation. Across Australia rail trails are reviving and stimulating regional communities through diversification of their economies and provision of support to the private sector to activate new and intensify existing businesses. This project would be similarly ambitious, with a scope of delivering regional income totalling $30.125 million for its first decade of operation.

Rail trails are used by both cyclists and walkers with growing demand in both sectors, particularly e-bikes. In the year ending September 2023, data from the Tasmanian Visitor Survey (TVS) Analyser showed 93,000 visitors to Scottsdale (with 90% of those participating in cycling, mountain biking or bushwalking) and 69,000 visitors to Lilydale (with 73% participating in cycling, mountain biking or bushwalking). The project will provide a drawcard

for these visitors, and others, to stay longer, spend more and return to the North East as well as provide opportunities for active recreation opportunities provided by connecting our communities via the trail. While the Rail Trail will represent an additional biking asset for the region, it is a different target market that will broaden and diversify the economy in a different capacity to that of mountain biking. There are numerous add-ons to the rail trail experience that can be incorporated to further engage users, including distance markers for fitness enthusiasts, support for events and trail activities, and art/history installations to increase cultural and historical knowledge and entice visitation (with some elements only discoverable by trail). Private sector investment is expected to include accommodation, shuttle operations, guiding services, bike hire and farm gate stands for produce. The Scottsdale Railway Station precinct, which recently received funding via Open Spaces Round 2, will play a significant role in the development of this project as a trailhead and central community space.; and it is the ambition of the Scottsdale Rotary Club, in conjunction with support from Council, to develop the former station into a proud community asset that will further complement the proposed extension to the trail.

Outward migration of young people from regional areas is an ongoing concern. The 43.8 FTE employment opportunities created by this project (by year 10) will provide young people of our community with additional options to build their career path in their local community if they choose. Dorset Council Priority Projects listed under Economic Development, centre on creating vibrant, liveable, and resilient communities that attract new families, residents and business entrepreneurs to our region. The Rail Trail is listed as a Recreational Infrastructure project, however, progressing the Rail Trail is a key driver of economic development through the benefits that will be gained throughout its development. Linking in with many of the economic development projects listed in the Priority Projects Plan including the Tourism Infrastructure Plan, Municipal Marketing Strategy and Plans, Signage and Branding and the Municipal Prospectus, the Rail Trail project is a key component to the economic development and future of the region and one which, despite the additional capital cost, is set to pay back dividends in economic development and social opportunities for the community.
The costings for the updated business case have been provided by various, suitably qualified civil construction and industry personnel, noting vegetation management and bridge condition assessments have undergone extensive appraisal and review exercises to properly inform the updated business case costings. Option 1 (unsealed trail construction) identified in the business case is the more financially viable method of delivering the project; an approach that would not impact on user experience or the estimated benefits derived from the trail. There is no other comparable project at this time for the local community that will unequivocally deliver the substantial socio-economic benefits (incorporating both income as well as health and wellbeing benefits) to the region on the scale anticipated by this proposal ($42.211 million over the first decade of operation). The updated business case has shown that the shortening of the trail has not diminished the positive impacts of the project; and that although with the passage of time costs have increased, time has also added significantly to the target market, the user demand and the overall benefits of the project. This project, combined with complementary projects identified throughout the strategic and priority plans, including (i) *Golconda Road upgrades* (underway), (ii) *Sideling upgrade advocacy* (underway), (iii) *Municipal Marketing Strategy and Plans* (underway), (iv) *Municipal Prospectus* (to be developed), and (v) *Tourism Infrastructure Plan* (to be developed), are needed to provide economic development through the North East and harness the growth potential of our region to ensure a diversified future without reliance on a single or small number of industries.

While the Rail Trail concept has at times been a divisive matter amongst the community it is regarded that the 2017 DTF's Report as well as the findings and support from the 2019 Legislative Council Inquiry (and the subsequent attainment of rigorously scrutinised planning approvals from the Tasmania Civil & Administrative Tribunal) will have contributed toward alleviating lingering community apprehensions. The Inquiry Report included the recommendation for more thorough community consultation regarding future Rail Trail developments. Presentation of the revised business case to the community provides the opportunity to deliver on this recommendation and ensure that merited public feedback is an informative element of the project moving forward.

Despite the increased costs of the project the business case for its development is stronger than ever. The project still stands to be a significant drawcard for the region and for Tasmania as a whole. Of course, the trail would be more than just bikes and tourism. It would be a place where localities with limited recreational

facilities have a safe place to go for a walk or a ride with their kids, their family, their friends; it would be a place to showcase the North East and its rich history, create art and bring vibrancy and prosperity back to our regional communities; it would be a place providing opportunity for farms, businesses and homeowners to diversify and create investment opportunities to ensure that the young people of the region have career pathways in their own towns; it would be a place for our local and regional communities to connect.

A copy of the summary Prospectus and revised Business Case is included in the attachments for information.

14 June 2024

North East Rail Trail
Revised Business Case

dorset
COUNCIL

This Revised Business Case for the North East Rail Trail was prepared by TRC Tourism to progress the development of the North East Rail Trail by Dorset Council.

Disclaimer

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Acknowledgement

We acknowledge the Indigenous peoples of the lands, waters and communities we work together with. We pay our respects to their cultures; and to their Elders – past, present and emerging.

COVER IMAGE

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Version control

Report name	Version	Date submitted	Author(s) / Editor(s)
Refreshed North East Rail Trail Business Case	1.0	26 April 2024	CR, JM, MC
Refreshed North East Rail Trail Business Case	2.0	15 May 2024	CR, JM, MC
Amended North East Rail Trail Business Case	3.0	14 June 2024	CR, JM, MC

Content

Executive Summary

Summary

This business case updates the 2014 Business Case that explored the costs and benefits of constructing a rail trail for cyclists, walkers and the community in general on the NE Tasmania rail corridor between Launceston and Scottsdale.

Since that time, changes to the scope of the trail, changes to the user markets (tourists and visitors) and equipment such as e-bikes have led to a need to revisit the business case and update the assumptions and scope.

The trail will now begin (or end) in the western end at Lilydale Falls. This change has been brought about by planning considerations that will leave the Lilydale Falls to Launceston component of the trail available for the potential return of a tourist railway.

The proposed rail trail will now travel 40 kms from Lilydale Falls to the old station at Scottsdale where it will join the completed section from Scottsdale south east to Billycock Hill.

The entire proposed trail will be in the order of 66 km long when completed – providing the market with an easily consumable trail experience over two days (some can do it in one day should they choose).

Highlights from the original business case remain including the outstanding scenery, the 700 m long tunnel and the proximity of the trail to many small communities, each with their individual character. The region is also famous for food and wine and the trail presents an opportunity to increase access to and exposure of the region's epicurean offering.

The benefits of the proposed rail trail only accrue as potential users use the trail.

This business case provides insights into the current visitor economy and the markets that are likely to use the trail. Additionally, it provides strong evidence of the cycle tourism economy and the benefits it can bring regional communities when done well.

The growth in cycle tourism has also occurred due to the rise in popularity of e-bikes. The technology allows people who had not ridden previously, or who had given up cycling, to come back into the market and explore trails around the world such as the North East Rail Trail.

This report provides an economic impact assessment and cost benefit analysis of the proposed North East Rail Trail in Tasmania.

The economic assessment covers the construction phase and the operations phase when the trail is open and operating. The operation of the trail is modelled, with 10-year estimates developed for trail users (local residents and tourist visitors to the region). The detailed analysis is for Option 1 Unsealed Trail.

Trail users and spending

Trail users comprise locals in the LGA in which the trail sections are located and tourist visitors who ride on the trail. Tourists are split between internationals, domestic overnights and day visitors. Estimates are based on TRA data on the visitor mix (2019) for each LGA where the trail is located.

Trail users are segmented into local users and tourist users:

- Year 1 is projected to have 21,469 total users, with 12,190 being local users and tourists accounting for 9,279 of the trail's users
- By year 10, total users are expected to have grown to around 39,500 users (20, 561 locals and 18,951 tourist users)
- The growth occurs with the increased interest in cycling by locals and tourist visitors and the promotion of the trail experience.

Spending in the region by trail users was modelled and estimated.

- Tourist users are expected to spend approximately $4.330 million in year 1, increasing to $7.549 million by year 10
- Local trail users obviously spend at a much lower rate.[1] In year 1, local users are projected to spend $427,000, growing to $720,000 over the 10-year period
- Total spending in the region increases from $4.757 million in year 1 to $8.268 million in year 10.

Construction phase benefits

Three trail surface options have been identified and costed by Dorset Council. Option 1 – unsealed trail surface provides the cheapest construction and lifecycle costs over the 10-year period analysed in this Business Case. It is assumed that the trail surface type would not impact the number of people using the trail or the experience on offer.

Construction impacts for trail surface option 1 (Unsealed Trail) were analysed.

During the construction of the trail a total of 13.3 FTE jobs would be generated (10.3 FTE direct jobs and 3.0 FTE indirect/induced jobs). For total jobs, 4.4 are in onsite decommissioning of rail infrastructure on the proposed trail and 8.9 are associated with trail construction and other construction activities (bridge upgrades, crossings and tunnels etc).

During the construction period a total of $1.488 million in regional income would be generated in the Dorset and Launceston regions ($1.299 million direct income and $0.189million indirect/induced). [2]

Trail operations – North East Rail Trail extension

Trail users and their spending in the region will have a major impact and generate an increase in jobs and regional income.

- The analysis shows the total jobs (direct and indirect/induced) generated in the region by the operations of the trail. The number of jobs increase as the trail is promoted and recognised, and businesses develop servicing the trail (e.g. bike hire)
- Total jobs increase from 25.1 FTE in year 1 to 43.8 FTE jobs in year 10. The jobs are generated by the spending of trail users while they are in the region. The increase reflects the progressive growth in trail users over the period.

Benefit cost analysis

A cost benefit analysis was conducted for the project. The benefits of the trail comprise:

- the increase in regional income
- health benefits – the reduction in health costs associated with exercise (trail rides/walking)
- the valuation of the trail experiences, based on a shadow price (per trail user) as there are no user charges for the trail
- the improvement in productivity (for persons in employment) associated with exercise on the trail.

See Appendix A for definition and sources.

Costs comprise capital costs of construction and asset maintenance costs over a 10-year period. For Option 1 Unsealed trail, these comprise:

- decommissioning and construction costs of $4.281 million
- maintenance costs (10 years) of $1.162 million.

The benefits are quantified (in $ million 2024 prices) over a 10-year period. These benefits total $42.211 million over this period:

- regional income ($30.125 million)
- health benefits ($5.266 million)
- user valuation ($5.555 million)
- productivity benefits ($1.265 million).

The benefits from the trail are compared with the capital costs for the new trail development. Benefits are discounted by 3 discount rates (3%, 7%,10%).[3]

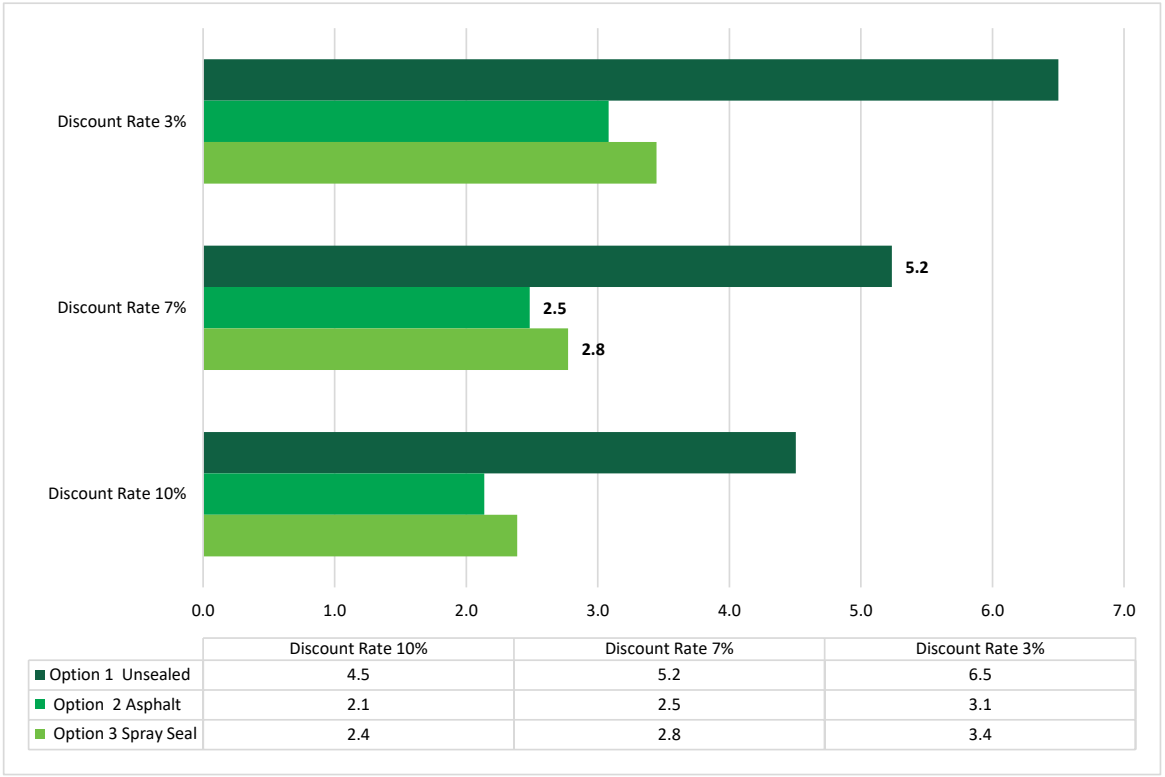
[1] Spending by locals is limited to refreshments during or after a ride.
[2] This assumes the construction workforce would come from the region and adjacent areas.
[3] These discount rates are those required by state governments and the Australian Government for business cases and cost benefit assessments.

Benefit cost ratios

For option 1, when the benefits and construction/maintenance costs are considered, the project yields a benefit cost ratio (BCR) of 6.5 for a 3% discount rate, a BCR of 5.2 for a 7% discount rate and 4.5 for a 10% discount rate.

Comparison of options: The following chart compares BCRs for the 3 trail construction options.[4] These comparisons assume that the user numbers, spending and measured benefits of the trail operations are the same for each trail composition option. For a 7% discount rate (the rate that is used for many infrastructure projects), the BCRs are Option 1- 5.2; Option 2- 2.5; and Option 3 - 2.8.

Figure 1. **Benefit Cost Ratios – Comparison of Trail Options**



	Discount Rate 10%	Discount Rate 7%	Discount Rate 3%
Option 1 Unsealed	4.5	5.2	6.5
Option 2 Asphalt	2.1	2.5	3.1
Option 3 Spray Seal	2.4	2.8	3.4

Source: MCa Modelling April 2024.

[4] Appendix B shows the benefit cost details for Option 2 and Option 3.

1 Introduction

This business case has been developed to revise the 2014 Preliminary Demand and Economic Benefit Assessment report completed for Northern Tasmania Development Corporation to understand the costs and benefits of the revised proposed North East Rail Trail from Lilydale Falls to Scottsdale.

Since the 2014 report, significant changes have occurred to the scope of the project, the market demand for rail trails and cycling experiences, and both the cost of developing the trail and the visitor's spending patterns. This business case updates those elements and provides a summary of the costs and benefits of developing the trail.

1.1 The scope

Since the 2014 business case was completed, changes have occurred to the scope of the trail project and accordingly the business case. The primary change is the reduction in rail trail length from that originally proposed. The full trail was to have included conversion of 89.6 km of disused rail corridor between Launceston and Billycock Hill in North East Tasmania. The trail was to pass through both City of Launceston and Dorset Local Government Areas.

The revised proposal that now has planning permission is for the trail to begin at Lilydale Falls – approximately 30 km to the north of the original start of the trail. The trail will then follow the proposed alignment through to Scottsdale where it will join the existing NE Tasmania Rail Trail. Some of the trail east of Scottsdale has also been constructed since the 2014 business case.

The revised trail still presents a strong opportunity to create an inspiring experience through the lush forests and farmlands of NE Tasmania as well as showcasing a long tunnel which cyclists will pass through. The strategic alignments identified in the 2014 business case are still relevant. The trail will still link many of the townships in the region including Lilydale, Tunnel, Lebrina, Nabowla and Scottsdale and will provide a market ready piece of infrastructure that supports other experiences in the region.

A lot has changed in construction and decommissioning costs in the 10 years since the original plan was produced. Dorset Council have prepared costs for the approximately 40 km of trail to be constructed that includes decommissioning costs, and three surface types to determine not only construction costs, but also lifecycle costs over a 10-year period.

The costs for the 40km of trail under the least capital-intensive surface type approximate those of 2014 of the construction of 90km of trail.

1.2 Purpose of this report

This report provides an updated assessment of the benefits and costs of the proposed NE Tasmania Rail Trail in its revised scope. It considers the type and extent of the existing visitor markets and makes projections on the likely visitation to the trail over a 10 year period based on a range of inputs including Ausplay Survey data.

The report provides spending projections based on the projected visitor demand for the trail and using Tourism Research Australia data.

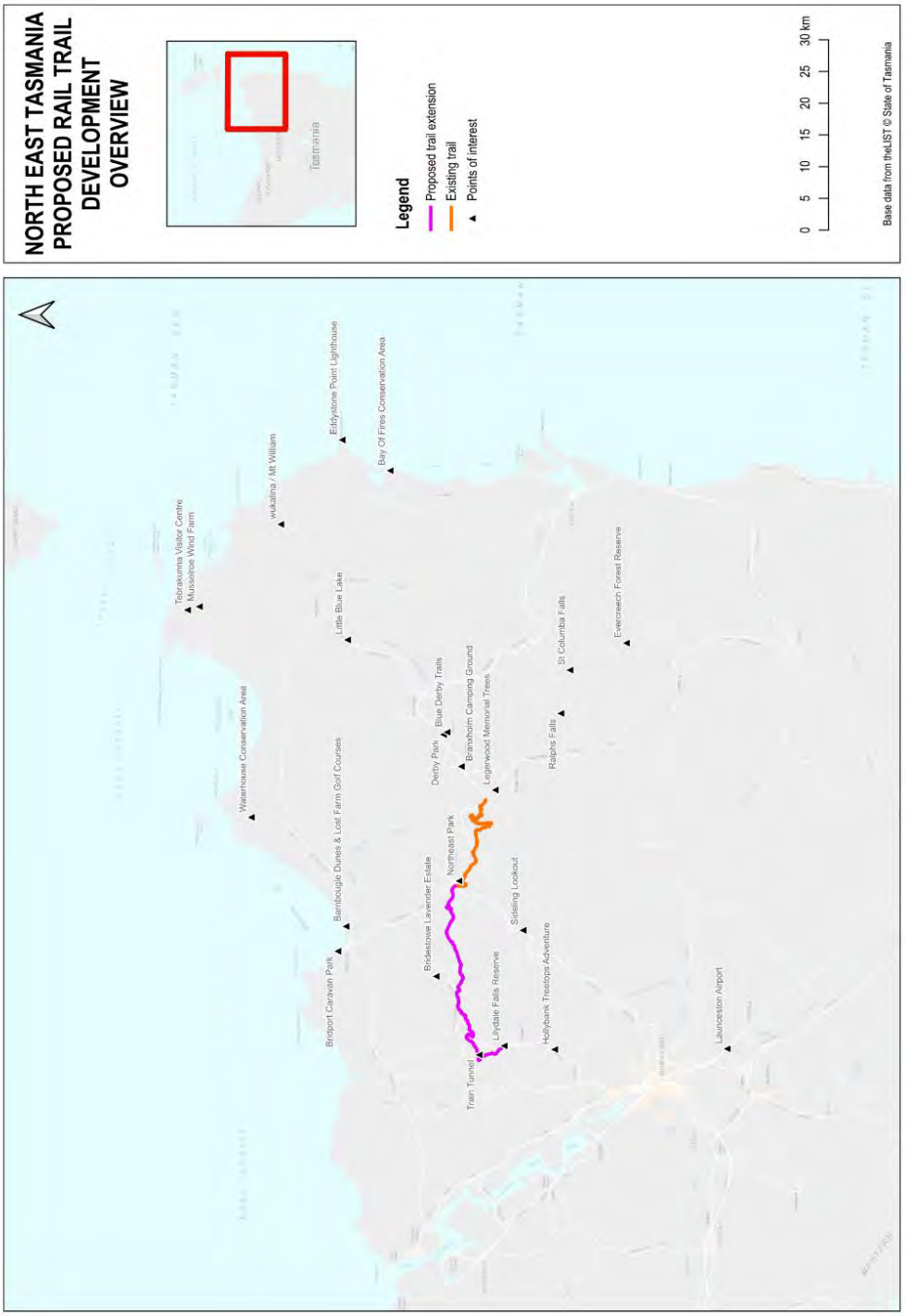
The economic assessment provides employment benefits both directly from construction, and ongoing trail operations, by sector and both direct and induced jobs. Further, regional income derived, and the cost benefit ratios will provide Council and other parties with the information they need to make investment decisions and apply for grant funding to support the trail's extension and operations.

Alignment of the proposed rail trail is still strong. It remains a priority for the Visit North Tasmania Regional Tourism Board noting in the 2022/2023 Annual Report that the North East Rail Trail remains a place-making priority for the region.

1.3 The existing North East Rail Trail

The proposed 40-kilometre trail from Lilydale Falls to Scottsdale is to join into the existing 26 km North East Rail Trail. The trail heads southeast from Scottsdale and currently terminates in Tulendeena (Billycock Hill).

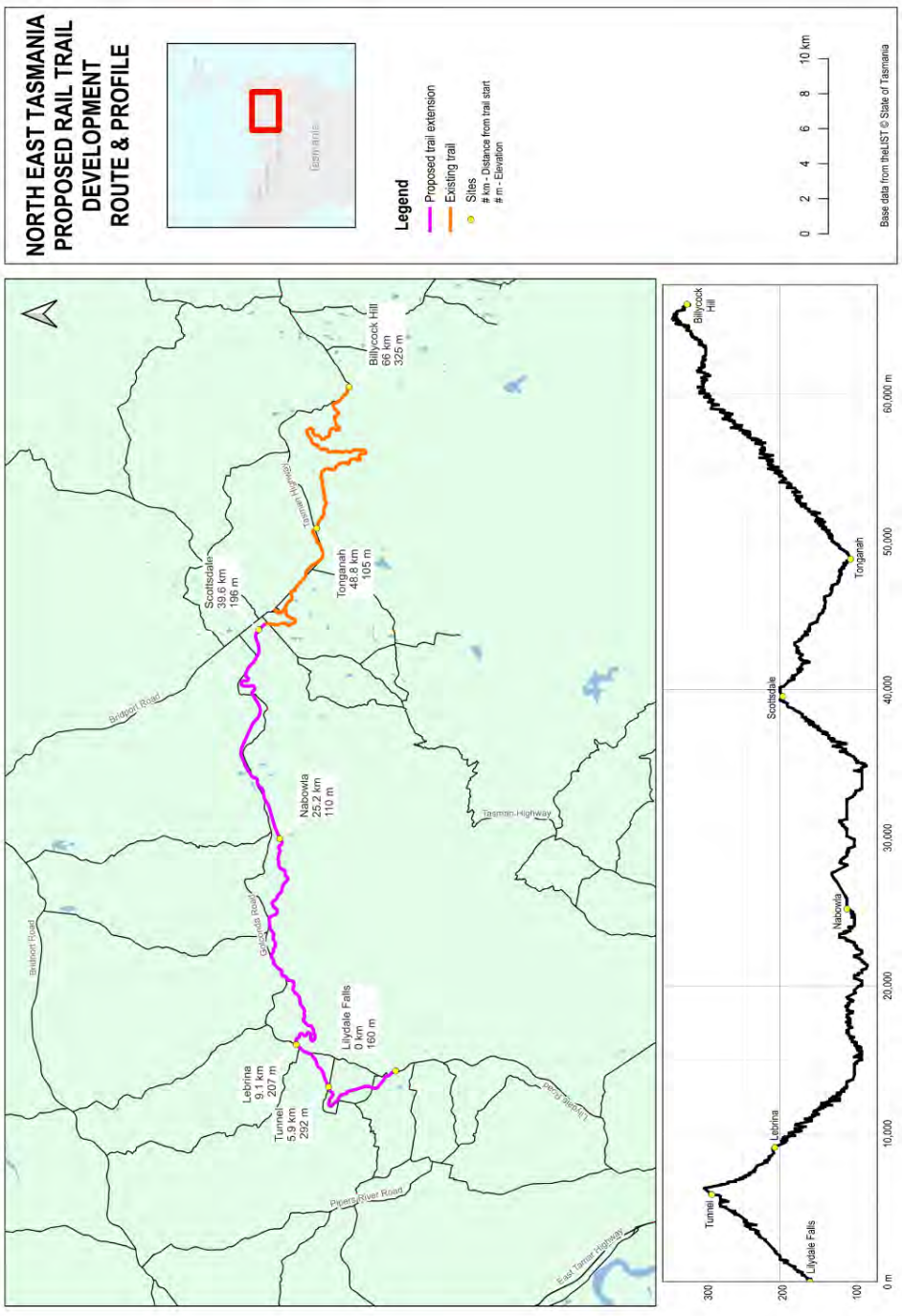
Figure 2. **Map of the existing and proposed NE Tasmania Rail Trail**



Source: Dorset Council 2024

The following map from the same source shows the proposed rail trail extension.

Figure 3. Proposed extension of the NE Tasmania Rail Trail Lilydale Falls to Scottsdale



Source: Dorset Council 2024

1.4 The proposed trail's attractions

North East Tasmania is known as a beautiful place that has strengths in the outstanding natural features and food and wine as well as outdoor active pursuits such as cycling, walking, trail riding (horses and motorbikes) and golf.

The old rail alignment passes through lush forests as well as through farmlands and villages. The western end of the trail will begin at Lilydale Falls and will include a new car park and trail head facilities as well as the waterfall.

The proposed trail surface will be high quality crushed gravel – a similar surface to many of the popular rail trails in Australia.

The trail will pass through one of the longest rail tunnels in Tasmania and Australia at 700m in length which will be a significant drawcard for visitors to the region.

Other cycling experiences in the region include Blue Derby Mountain Bike Trails and the existing North East Rail Trail east from Scottsdale.

Scottsdale itself is a major regional town with facilities required to be a base for the trail. Further, Launceston is Tasmania's major northern city and will be a feeder for visitors to the NE region.

Scottsdale can be the mid-point for the trail (not in distance but in a 2-day experience) as it offers accommodation, food, brewery, good coffee and the other essential ingredients to make the trip a strong experience.

The proposed trail extension to Lilydale Falls, assuming it is constructed, will provide further incentive and business opportunities for cycle friendly services such as bike shops and transport services.

Nearby, the world class wine region of Pipers Brook presents visitors with opportunities to stay longer in the region and sample some of the food and wine experiences on offer.

Figure 4. **Cycling on the North East Rail Trail east of Scottsdale**

Source: Rail Trails Australia.

Figure 5. **The long tunnel at Tunnel on the proposed trail extension**

Source: Rail Trails Australia.

2 Market Analysis

To forecast demand for the North East Rail Trail, we have assessed the potential markets for this type of experience.

Rail trails are a popular option for active families wanting to explore more of the landscape at a slower pace. The access to facilities including toilets, cafes, restaurants and supermarkets is another enticing factor.

The assessment of the potential market for the North East (NE) Rail Trail has been updated to forecast demand for the experience over the next 5, 10 and 15 years. This assessment has considered participation in recreation, usage of trail networks, recent trail developments and visitor preferences, as well as general trends in cycling and walking tourism.

The market for the North East Rail Trail experience will be a combination of those who already walk or cycle while away from home (e.g. visitors), recreational cyclists and walkers (e.g. those who cycle and walk at home) and a broader potential market that does not currently walk or cycle regularly.

2.1 Cycling and walking tourism

Cycling and walking tourism is defined as visits to places outside the participant's home region for a holiday, leisure or sport where cycling or walking are undertaken as either a primary or secondary activity. There are different categories including bushwalking, adventure riding and road cycling.

2.1.1 Growth markets

The cycling and walking markets are growing in Tasmania. In the year ending September 2023, data from the Tasmanian Visitor Survey (TVS) Analyser showed that, from a total of 1.2 million visitors to Tasmania, 56,700 participated in cycling or mountain biking with 60% of those riders undertaking general cycling activities. A total 607,000 visitors participated in bushwalking activities. Of those bushwalkers, 75% walked for less than four hours, 26% walked for more than four hours, and 9.8% went on overnight or longer bushwalking trips.

In the 10 years between reports, there has been a 78% increase in the number of visitors to Tasmania who participated in cycling activities. In 2012/13, (the most current data available when the initial North East Rail Trail Feasibility report was written) 31,800 visitors across Tasmania cycled while in the State. That was a 35% increase on the previous year and continued a trend of strong growth that had been in play since 2009/10.

In the Northern Tasmania region, YE September 2023:

- 388,000 (from a total of 662,000 visitors) went bushwalking
- of those bushwalkers, 77% did walks less than four hours, 29% more than four hours, 8% overnight or longer
- from 38,000 visitors who engaged in cycling and mountain biking activities, 65% cycled
- the largest segment at 40% was adult couples with no kids
- families with older children were the second largest group at 21%
- single travellers made up 14% of the total
- families with young children were 10% of the market.[5]

During the same period:

- from 69,000 visitors to Lilydale, 6,500 (9%) went cycling or mountain biking and 44,000 (64%) went bushwalking
- from 93,000 visitors to Scottsdale, 9,000 (10%) went cycling or mountain biking and 66,000 (70%) went bushwalking.

[5] Tourism Tasmania, TVS Analyser

This is interesting when compared to Derby's visitation for the same period:

- from 79,000 visitors, 14,000 (18%) went mountain biking or cycling, with 8,000 (10%) focussed on mountain biking, and 57,000 (72%) went bushwalking.[6]

2.1.2 Cycle tourism

Cycle tourism encompasses visits outside the home region for the purpose of holiday, pleasure or sport, where participation in cycling is either a primary or secondary activity.

Cycle tourism continues to be an important, growing market within the Australian tourism sector, particularly within the nature-based tourism segment.

In the pre-COVID benchmark year of 2019, Australians:

- Took 2.6 million overnight trips to go cycling, plus 2 million day trips
- They averaged 4.4 nights per trip and spent an average of $189 per night
- About 64% of Australians who went cycling on holiday lived in a capital city
- On average, 2.2% of domestic overnight visitors went cycling. This was higher among 40 to 49-year-olds at 3.6%
- Of family trips, 4.5% went cycling over three-quarters (78%) of people cycling on a domestic holiday did it in a regional area
- Intrastate destinations made up 76% of all cycling trips.[7]

We Ride Australia's 2023 Report, The Australian Cycling and E-Scooter Economy in 2022 showed that 33% of Australians cycled, with fitness the primary motivation, with 18-34-year-olds the most engaged segment, with 43% participating. Their research valued the total economic, social and health benefits of cycling in Australia at $18.6 billion.

Cycle tourism in Australia generated $1.88 billion in direct output over the same period. Approximately 2.4 million trips where cycling was the main purpose, were taken in 2022. Average spend per trip was $550.[8]

Tasmania had the highest average spend per trip, at $1290. This most likely reflects the ongoing investment being made into cycling tourism infrastructure in Tasmania in addition to the cost of arriving in Tasmania.

Expenditure related to cycling on day trips resulted in $346.2 million in direct expenditure in the Australian economy, 2022.

Total visitation to Tasmania continues to recover from the effects of the COVID-19 lockdowns. Post-pandemic recovery is continuing, with interstate and international visitation for the year ending September 2023, up by 31%on the same time last year. Numbers were, however, still down slightly compared to the pre-COVID-19 benchmark year, 2019. However, both visitor nights and spend were higher than pre-pandemic levels and 2022.[9]

2.1.3 Recreational cycling and walking

Recreational cycling and walking are activities that take place from home and do not involve an overnight stay. Participation in recreational activities by Australian and Tasmanian residents aged 15 or more years is currently recorded in the AusPlay National Sport and Physical Activity Participation Report.[10]

In 2022/23, cycling was the sixth most popular activity in Tasmania, with 11.3% of all adults participating. This is very similar to the figure of 11.1% of Tasmanian adults in 2010. However, the actual numbers have experienced a small increase.

Table 1. Participation rates in Tasmania

Activity	Participation rate		TOTAL TASMANIANS (OVER 15 YEARS)	
	2010	2023	2010	2023
Walking	38.4%	47.1%	154,700	212,100
Cycling	11.1%	11.3%	44,600	50,800
Bushwalking		14.1%		63,500
Total			199,300	275,600

It is worth noting the ongoing increase in walking and bushwalking, which have continued to rise since the end of COVID-19 lockdowns.

[6] Tourism Tasmania, TVS Analyser
[7] Tourism Research Australia Cycling Visitor Profile, 2019
[8] We Ride Australia, The Australian Cycling and E-Scooter Economy in 2022
[9] Tourism Tasmania, Tasmanian Tourism Snapshot Year Ending September 2023
[10] Australian Government. Ausplay National Sport and Physical Activity Participation Report. October 2023.

2.2 Accessibility

In 2022/23, Accessibility is recognised as one of the most important drivers of, and opportunities for, the visitor economy. In 2022/23, cycling was the second-most popular sport-related activity for Australian adults with a disability (310,000 participants).

Walking was by far the most popular non-sport-related activity, with 1.7 million Australian adults participating. Bushwalking was the third most popular, in this category with 239,000 participants.

Rail trails are generally a more accessible type of trail, with easy access, facilities available at regular intervals and the ability to select different sections of the trail based on their length and ease of terrain.

An opportunity exists to ensure any rail trail developments factor in accessibility requirements to cater for a significant market that already exists.

2.3 Rail trail features

A key advantage of rail trails is their gradient. Given that most rail lines have a gradient of less than three degrees, this allows and encourages use by almost all cycling market segments, regardless of age and ability.

Rail trails are known for providing comfortable environments that people can enjoy for leisure.[11] Research indicates that rail trail infrastructure appeals predominantly to couples aged 50-plus and families with children, who seek an experience that allows them to spend quality time with friends and family.[12] The rise of E-bikes makes Rail Trail experiences an even more appealing prospect for older visitor segments.

This aligns with Northern Tasmania's largest travel segments, with 69% of all visitors aged 45 and over, and families with children the second largest travel party at 31%.

These markets also align with Northern Tasmania's brand positioning of 'finding your bearings', which invites visitors to find their place and choose their way.[13] Rail trails, and the variety of options they offer to users, are perfectly aligned with Visit Northern Tasmania's positioning pillar Choose Your Own Adventure – "Our region is the ultimate landscape to pursue riding, walking and year-round adventures that connect you with our exceptional natural places".

2.4 Target markets

Visit Northern Tasmania highlights Tasmania's target markets Raw Urbanites and Erudites, both of which are aligned to the quintessential Rail Trail experience.

Raw Urbanites skew towards the 50+ age group, empty nesters and older families. They seek peace, connection, inspiration, captivation, and value natural experiences, a return to basics and local immersion.

Erudites are spread across the age spectrum, with a minor skew towards empty nesters and single travellers. They seek stimulation, enrichment, and value cultural immersion, gourmet dining and natural experiences. Both groups are most likely to travel from NSW or Victoria.

The proximity of the North East Rail Trail to Launceston, and the inclusion of regional centre Scottsdale, plus the proposed expansion that would include Denison Gorge and an historic 700-metre-long tunnel, meet the requirements of the target markets.

2.5 Differentiating cycling

Mountain biking has become a general term for many cycle trail types. However, there are growing markets that are similar, but distinct from mountain biking, which use trails and dirt roads for cycling recreation.

Along with mountain biking, these markets are more broadly described under the label 'adventure cycling'. This is defined as any cycling that travels off bitumen seeking an experience enjoyed on two wheels in nature.

The attraction of adventure cycling is that it enables people to choose who they ride with – generally family or close friends. It can be done anytime, it does not require a minimum level of competency (other than the ability to ride a bicycle), and it allows people to choose trails to match their ability. Those who are self-conscious about their ability can choose where, when and who they ride with.[14]

A region seeking to attract the adventure cycling community needs to be mindful of the diverse perception of adventure cycling among different markets. Creators of nature-based cycling experiences also need to recognise that today's riders demand a higher quality experience and services. With the cycling market becoming increasingly fragmented, the challenge for nature-based cycling regions is to target

[11] Victorian Government, Victorian Cycling Strategy 2018-2028.
[12] Victorian Government, Victorian Cycling Strategy 2012.
[13] Visit Northern Tasmania, Northern Tasmania Destination Management Plan, June 2022
[14] Warburton Mountain Bike Feasibility Study 2019

the biggest user base that best matches the style of riding most suited to the experience offered.

Adventure cycling can be broken down into subset descriptors of mountain biking, bike packing/touring, gravel riding and road riding.

2.5.1 Bike packing / back country touring

This segment is the convergence of mountain biking and backpacking. It delivers the adventurous freedom of multi-day backcountry hiking, combined with the range and added thrills of riding a mountain bike. It's about exploring remote places via a range of roads or singletrack trails, or abandoned dirt roads, carrying only essential gear. Rail trails are a popular option for this type of journey.

Backcountry touring is most often undertaken on a mountain bike or more recently, e-bikes, which deliver better capacity for loading up with luggage while maintaining better stability. Daily distances tend to be shorter for backcountry rides, favouring roughly the 60km mark, and often entailing lots of stopping enroute to admire vistas, local features and providores, or the country bakery.

Bike packing is all about slow travel exploration. It is based around multiday, often multi-week and sometimes multi-month journeys where the focus is on exploration of places, landscapes, towns, and tourist attractions: simply, it is having a grand adventure on two wheels while being mostly self-sufficient. 'Mostly' because while hardcore riders take pride in being an island unto themselves in terms of sufficiency, the profile of bike packing has softened somewhat with riders now often staying at B&Bs, hotels, motels and caravan parks and eating out at cafes and restaurants and contributing to the regional economy.

This market is also growing for organised tours.

2.5.2 Gravel riding

Gravel riding encompasses a broad sweep of riding activity but pertains mainly to long distance day rides – usually approx. 100km – that seek out back country, dirt, and fire track roads with little to no traffic. Gravel grinders will often seek high-end ascent profiles and likely compete with friends either in person or through online platforms (such as Strava).

2.5.3 Mountain biking

Mountain bikers use predominantly singletrack trails (often using dirt and fire roads as connecting trails). They seek more technical terrain with features that are increasingly designed and groomed for use (i.e., flow trails, jumps and berms).

There are many different styles of mountain biking from cross country (XC) to all mountain, gravity, flow and downhill (DH), along with niche styles of trails, freeride, freestyle, 4X, and slalom. For the purposes of this business case, the target user would predominantly be cross country riders, which is one of the largest markets and more traditional style of mountain biking focusing on using a mix of singletrack and dirt roads, riding variable terrain both ascent and descent profiles, to experience an adventure ride in natural environments.

2.6 Blue Derby and its impacts

The launch of the Blue Derby MTB experience in 2015 was one of the most influential changes to the cycling and trail scene in Tasmania and Australia since the original North East Rail Trail feasibility study was completed.

Just 27 minutes from Scottsdale, Blue Derby is consistently attracting 60,000 visitors to the region each year. They stay an average of four to five nights. In 2021, it was estimated that the economic impact of Blue Derby for the region was between $15 and $18 million dollars.[15]

With the Blue Derby MTB trail network and other existing trails in Northern Tasmania, this proposed expansion of the North East Rail Trail would strengthen the region's positioning as a cycling destination for a range of markets.

Extending the positioning beyond mountain biking to attract visitors and recreational cyclists and walkers across a broad range of demographics would benefit the region from visitation and liveability perspectives. The slower nature of Rail Trail experiences, connection with nature, locals the adjacent communities all provide experiences being sought by Northern Tasmania's target markets.

[15] www.ridebluederby.com.au, www.abc.net.au/news, www.rdatasmania.org.au

2.7 Strong growth in multi-use trails

Rail trails have been successfully developed in all states of Australia. They are also well established in New Zealand, Europe and North America.

Trail developments have been prioritised on their potential to attract interstate and intrastate visitation and increase length of stay.

The Rail Trails Australia website shows Victoria has the most established rail trails of all states with 48 individual experiences and around 1300km of trails. Tasmania has 20 existing rail trails. Rail trails often evolve into nationally significant experiences drawing significant visitation from interstate and international markets. Trails such as Murray to Mountains (Vic), the Riesling Rail Trail (SA), Brisbane Valley Rail Trail (Qld) or the Central Otago Rail Trail (NZ), have become popular destination targets for cycle tourists worldwide.

Increased participation in cycling and walking, especially in natural environments such as those traversed by rail trails, has thrown further community spotlight on rail trails. A significant advantage of rail trails is that the corridor they occupy joins many small towns and local features providing an economic and social benefit to the smaller communities.

2.7.1 Supporting rural economies

There has been significant government investment into trail networks across Australia over the past 10 years. Generally, governments understand that the economic, social and health benefits to small, regional communities can be significant. Attracting new visitor expenditure, encouraging additional expenditure by locals, creating jobs through construction and maintenance work, and stimulating local businesses by providing opportunities for support services, tours and events are all positive outcomes.

A feasibility study conducted on the 12km Grand Ridge Trail in South Gippsland, Victoria in 2021 demonstrated that even a small 8km extension from Boolara to Yinnar would have significant benefits. Usage would increase by 25% and expenditure was predicted to increase by 21%.

The Yarra Valley Trail (another rail trail development) assessment, released in 2017, showed that close to 80 FTE jobs would be generated and income to the region would increase by $5.955 million.

Still a bastion of rail trail economic success, the 100km+ Murray to the Mountains Rail Trail was referred to in the original North East Rail Trail feasibility study. A study by Tourism North East (Victoria) showed that recreational cyclists coming to the region contributed about $26.2 million in regional output and $13.6 million in regional value, supporting 22.7 jobs.[16]

Established in 2009, the trail attracts upwards of 45,000 users annually. Cyclists account for 59%, most spending 2-3 days on the trail, extending their length of stay and expenditure.

The Otago Central Rail Trail in New Zealand hosted almost 13,000 users in 2022/23, and in NSW in 2021, the Tumbarumba to Rosewood Rail Trail was credited with significant economic benefits just a year after launching. The 21km Rail Trail increased visitation, length of stay and expenditure so significantly that 9 new businesses opened to cater for them.

One operator, Magenta Cottage reported consistent bookings since the opening of the Rail Trail. Average length of stay was 2-3 nights and 98% of her guests were cyclists who had come to ride the trail. Repeat visitation was also cited as a direct benefit, along with bridging seasonal peaks. Some guests had come back up to four times, bringing new visitors with them.[17]

An evaluation of the Rail Trail in 2022 showed spend in the Tumbarumba region had increased by 20% from 2019 to 2020 from $14 million to $16.9 million. This was well above the state average of 12% and substantially more than the average of 0.2% growth in the Snowy Valleys Local Government Area.[18]

Discretionary spend was up by 55% due to the increased visitation in the region, and additional leisure-based activities. It jumped from $2.7million in the June-December 2019 period, to $4.2 million in the corresponding 2020 period.

Spend on consumer staples also increased by 14% from $10.8 million to $12.3 million. This was most likely due to visitors staying in town and staying longer, using the supermarket and other services. Most groups spend around $460 per visit and more than two thirds (68%) would potentially return and were willing to recommend the Rail Trail to others. This suggested the increased economic activity would be sustained.[19]

[16] SGS Economics and Planning (2012), North East Victoria Tourism Gap Analysis
[17] Rail Trails Australia, video, https://www.railtrails.org.au/news/local-economy-thrives-since-the-opening-of-the-tumbarumba-to-rosewood-rail-trail/
[18] NSW Government, Rail Trails for NSW Evaluation Summary, June 2022
[19] NSW Government, Rail Trails for NSW Evaluation Summary, June 2022

2.7.2 Opportunities for business diversification

Rail trails present opportunities for businesses to develop products and services to meet the needs of visiting cyclists and walkers. This includes transport, merchandise, accommodation or provisioning and guiding services. Cyclists generally do several activities while on holiday, making them a strong source of income for regional economies. This pattern of use has resulted in the diversification of the tourism product mix in some regional areas.

2.7.3 Regional revitalisation

Available research demonstrates rail trails have been highly successful in developing cycle tourism product and delivering significant economic, social, environmental, and cultural benefits to regional Australia. Quality rail trails and riding experiences bring cyclists and walkers to regions and small communities. We have seen from other destinations that riders will travel, sometimes to previously unknown destinations, if the rail trail is appealing. Visitors using the rail trail bring money to a region and drive local economic activity. In other destinations cyclists on rail trails often stay longer and spend on average more than other visitors over the length of their stay. The development of rail trails has resulted in revitalization of villages and businesses, the creation of new businesses and adaptation of farms and other buildings as character accommodation. Small communities such as those between Launceston and Scottsdale have the potential to offer these services and become vibrant centres along the trail.

2.8 Economic benefits of cycling

In Australia in 2022, cycling and e-scooters contributed an estimated $18.6bn in economic and social benefit to the economy.

Cycling engagement alone in Tasmania led to the following economic contribution.

Table 2. Economic contribution of cycling[20]

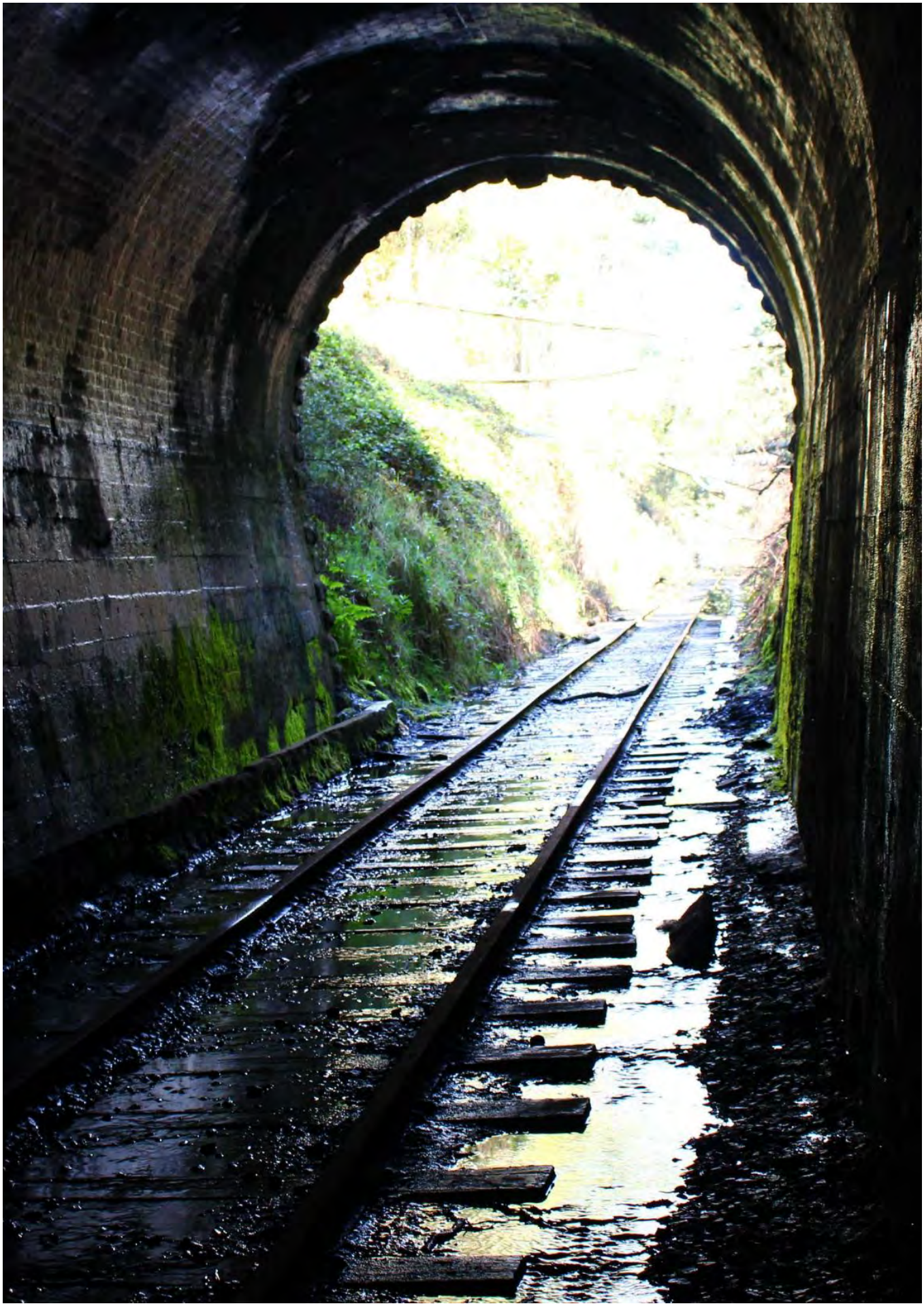
TASMANIA	DIRECT	INDIRECT	TOTAL
Output	$213m	$327m	$541m
Value add	$113m	$156m	$270m
Jobs (FTE)	1,047	823	1870

2.9 Social and health benefits

A well-built, well-planned rail trail that is set in an attractive environment will actively encourage people to exercise more to maintain their health. This will contribute to physical and mental health improvements, assisting with disease prevention particularly cardiovascular, musculoskeletal, respiratory, nervous and endocrine systems as well as reducing obesity, hypertension, depression and anxiety.

In Australia in 2021, cycling generated an estimated $954 million in health and social benefits, including $313m net avoided financial health system costs, and $101m in value of life years gained.

[20] We Ride Australia, The Australian Cycling and E-Scooter Economy in 2022



3 What Makes a Great Rail Trail Destination?

Cycling is now well established as a tourism product and key travel motivator. This has followed from increased participation in outdoor recreation, and increased travel with outdoor or adventure components. The rise of E-bikes has also brought new markets both back into, and into cycling.

Walking and cycling holidays and their related services are now familiar products in the tourism industry. This is demonstrated by the ongoing development of trails and associated products in Australia and New Zealand.

Several factors contribute to a great trail or rail trail destination. Following is a brief description of the elements required.

3.1 Diversity of trails

A destination's optimal level of trail diversity depends on its positioning and target markets. In the case of the proposed North East Rail Trail expansion, a multi-use leisure trail with access to quality natural, cultural and dining experiences is ideal. The option to complete the entire trail or complete sections will also be a motivating factor for users.

A diversity of trail types that fit the targeted markets can be achieved in several ways. These may include offering trails to different and trail markets such as walking, hiking, multi-use, cycling and mountain biking. Rail trails cover a range of these markets all within one corridor. As well as different types of trails, they should also be offered to people with different fitness, skill levels, abilities and equipment.

Local people have a strong interest in local trails, the rail trail will provide great opportunity for fitness and wellbeing through exercise and use of open space and the outdoors. This may include degree of difficulty in use, length of trail, the number of points at which people can stop for refreshments or rests, or technical equipment requirements.

3.2 Icon and supporting trails

Great trails destinations are likely to have drawcard trails that provide the 'hook' to bring people into the region to experience a trails-based holiday. In the case of the North East Rail Trail, it would complement Derby, the Bay of Fires and other rail trails in northern Tasmania.

The existing North East Rail Trail is already the longest of these, at 26 kilometres. The proposed expansion – an additional 40km taking users to Lilydale Falls, Denison Gorge and the historic 700m tunnel – would cement the North East Rail Trail's status.

A variety of trails helps to keep people in the region as long as possible (increased length of stay generally equates to increased yield). It encourages repeat visitation and contributes to the area's attractiveness as a trail locality.

3.3 Concentration of trail opportunities

Transport between rail trail sections can be a barrier for visitors seeking a one-way or section-based trail experience. The nature of historic rail corridors is that they connect historic towns where trail heads can be linked to accommodation and hospitality and other services. These services could include shuttles, commercial tour operators and taxis.

3.4 High quality infrastructure

Rail trails, particularly when placed on the disused rail corridor, are environmentally sustainable and generally sit well within the landscape, usually without the need for vegetation clearance, disturbance to wildlife and changes to land use. Contemporary, professional trail construction promotes good design with a strong emphasis on sustainability and enjoyable user experiences.

Importantly, rail trail design and associated infrastructure, including trails surfaces and bridges, can in many situations be lightweight and should be fit for purpose for pedestrians, bikes and in some cases horses.

Heavy emergency or maintenance vehicles can access the trail via road crossings and access points, the location and frequency of which are considered in conjunction with emergency services during the detailed design phase. Supporting infrastructure includes trail heads, toilets, information and car parks which are important particularly for the type of users attracted to rail trails. These services are often already located within the small towns along the way.

Rail trails and infrastructure should be designed and managed to be comfortable and safe for the proposed users and a culture of shared use should be promoted and encouraged. To contribute to the comfort, safety and enjoyment information should be clear and accessible (on signs and online sources). It should assist orientation and wayfinding while providing appropriate advice on user behaviour and journey length.

3.5 Accessibility

Rail trails need to be accessible to user markets with transport and access needs to be aligned to those using the trail. Considerations include:

- Where and how would visitors easily access the trail?
- Can users utilise public transport to reach the trail or trail head?
- Access for all, particularly radiating from towns encouraging community use across all user groups.

The region already has many shuttle and bike transport services that could amend their services to include this proposed rail trail.

3.6 Distinctive experiences

Destinations attracting strong growth and market position offer something distinctive that positions them uniquely in the market. Generally, that point of difference will include:

- showcasing the natural or cultural landscape in which the trails sit and enable the users to have a memorable experience
- the experience of riding the corridor through the ranges and along historic embankments, cuttings, bridges, over rivers and watercourses and through rural settings
- the proximity and nature of supporting infrastructure and services that add to the overall experience – including accommodation, wineries, breweries, local produce and food and beverages
- events and other activities
- story-telling and local interaction including interpretation that is well presented.

3.7 Attractive natural and cultural setting

The setting in which the rail trail is located is vitally important to attracting visitors. Trail destinations often use hero marketing shots of trails to showcase the area. This includes forests and waterfalls.

Trails based on cultural elements including Aboriginal culture are also important.

3.8 Quality pre-trip information

More and more, visitors are researching their trip based on on-line content. Quality pre-trip information provides prospective visitors with the information they need to decide where is best for them to jump on and jump off the rail trail sections.

3.9 Support food and beverage businesses

Rail trail destinations attract visitors not only for the trail itself but also for the range of support services that can make the trail experience a highlight. The towns along the way have cafes, showcase regional and local produce, have strong beverage offerings including historic pubs, cellar doors and distilleries. These are generally located close to the historic rail transport routes and are easily accessible.

Other businesses include bike and walking equipment shops, repair services, trail shuttles/transport etc.

Rail trail destinations are important equipment rental depots. Access to E-bikes is important when catering for international visitors and domestic markets that travel some distance and look for convenience.

3.10 Strong positioning and marketing

Strong marketing is required to ensure a trail is noticed in what is becoming an increasingly crowded marketplace. Each destination must ensure it positions itself well and aligns its core strengths and experiences to the market and promotes it accordingly.

Consistent application of a brand across the destination and the partners involved is also critical to avoid mixed signals and inconsistent messaging.

Strong planning and collaboration between partners, land managers, businesses and the tourism industry more generally are essential to getting the marketing and positioning delivered well.

3.11 Strong governance

Good governance provides for well made, collaborative decisions based on evidence and aligned to a strong sense of vision and long-term planning. An effective governance structure and mechanism is important for each destination including the trails, and it is important that the governance model is fit for purpose for the area.

Elements of a good governance model include:

- the partners and operators have a clear sense of a vision for the destination
- the partners have a clear understanding of their roles, accountabilities, and work together in that framework
- teams with the right skills and experience to drive outcomes
- Having access to the necessary financial, human and support resources they need to develop and maintain the destination.

Effective governance and management of any existing trails is vital and should be well thought out and planned before expanding trail networks or introducing new trails.

Management arrangements will need to have the capacity to provide the leadership and management of cross-tenure trails, lease arrangements with the principal land managers, neighbour relations, trail development approval processes and risk management. There would also need to be mechanisms in place to coordinate partnerships (such as commercial operators, volunteer groups, events, tourism, marketing and promotion) to ensure they are consistent.

3.12 Community engagement

Strong community engagement with local communities about plans, issues and opportunities helps ensure that the trail experiences are delivered by managers, businesses and community alike. It also helps ensure that local needs are considered in the trail management and development.

3.13 Events

A strong events calendar can help bring trails and a destination to life, particularly in shoulder and off seasons for trail-based visitors, given the year-round attraction of trails including rail trails. Events also assist in providing trail related businesses in the area an income opportunity and provide some business certainty based on a strong calendar of events.

Trails and trail networks represent important assets for commercial and not-for-profit event operators, enabling nature-based events (including challenge walks and trail runs) that drive visitation in large numbers on event dates. Further benefit is derived by events creating destination exposure and driving non-event day visitation pre- and post-event.

4 Global Trends

The following global trends in trails demonstrate an increasing enthusiasm for outdoor activities and a heightened recognition of the significance of establishing sustainable and user-friendly trail networks. They support the concept of the expanded North East Rail Trail.

4.1 Adventure experiences for women

In recent years, there has been a notable rise in the involvement of women in outdoor recreational pursuits, specifically in bushwalking. In Australia, the number of female participants in bushwalking now exceeds that of males[21]. The research suggests that women are increasingly attracted to trail experiences that offer chances to connect with nature and leverage the advantages for both physical and mental well-being.

4.2 Promoting inclusivity and ensuring accessibility

There is a growing recognition of the importance of creating inclusive trails and trail experiences that cater to individuals of varying abilities. This awareness has led to the incorporation of trails designed for diverse abilities in new trail development projects. These elements include high contrast signage, accessible canoe launches, all-terrain and beach wheelchairs, as well as adaptive mountain bikes.

Universal design principles support the enjoyment of infrastructure to all participants and users.

4.3 How the trail experience is evolving

Trails have the potential to be integrated into active transport routes to work, school, retail precincts, community and recreation facilities.

Facilitating integration with other transportation services, like trains and buses, will play a crucial role in incentivising individuals and visitors to utilise trails for their daily commuting needs.

There is an increased use of e-bikes, e-scooters and other e-transportation on trails and paths. Moving forward, a significant challenge lies in adapting trail planning, design, construction, and maintenance to accommodate these emerging trail usage patterns, all while addressing potential safety concerns and mitigating conflicts with other trail users.

There is a developing trend for long distance trails such as rail trails, offering trail users options to tailor experiences to their preference including mode of transport and length of experience. Bike packing, cycle touring and multi-day walking routes also provide opportunities for small business development to support these activities and users.

The popularity of trail running, and events is on the rise as individuals seek to venture off the conventional paths and challenge themselves in diverse and demanding terrains.

4.4 Revenue models are changing

In recent years, revenue models for supporting trail development, maintenance, and the provision of supporting infrastructure have become more diverse. These models now encompass user fees, shuttle services, involvement of commercial operators, trail sponsorship, and merchandise sales.

4.5 Online is essential

Online apps are available for navigation, performance monitoring, training, marketing and promotion. Trail users are progressively favouring online apps over traditional paper maps and guidebooks as their primary source of information. These apps offer an opportunity to aid in promoting trails, raising awareness of environmental and cultural heritage values, gathering significant participation data, enabling users to report maintenance issues, and enhancing trail safety. Trail users and tourists are also using social media pages and blog posts to connect with community groups and share information on their trail experience.

[21] Commonwealth Government. Ausplay Australian Sport and Physical Activity Participation Survey 2021.

Lilydale Falls will be a key attraction for potential users of the proposed North East Rail Trail expansion.

5 Estimating Trail User Numbers

This section outlines 10-year projections of trail users and their spending in the region (Dorset & Launceston LGAs).[22] Appendix A outlines the basis of the modelling of user estimates and associated spending in the region. In the modelling, the user numbers grow over time as the trail is recognised and promoted to visitors and locals. Cycling (including mountain biking (MTB)) is a growing activity as the community is increasingly focused on fitness and active leisure. In addition, visitors are interested in active experiences during their stay in a region.

These trail projections are used in the economic impact assessment and in the benefit cost analysis of the trail project.

5.1 Trail users – summary

There is limited direct information on trail users on the existing North East Rail Trail. Trail user numbers have been estimated for a 10 -year period of operations.

Trail users comprise residents in the LGAs adjacent to and accessible to the trail and tourist visitors that ride/walk the trail or segments of it as shown in the table below. Modelling was undertaken to estimate the number of local users and tourists (day visitors and overnight visitors). The assumptions used in the modelling are outlined in Appendix A. Conservative assumptions have been used in estimating users and their spending patterns in the region during their visit and use of the trail.

Table 3. Catchment area of the trail

CATCHMENT	LGAS
LOCAL USERS	
Primary Catchment	Launceston & Dorset
Secondary Catchment	Break O' Day, George Town, Meander Valley, West Tamar
TOURIST USERS	
Internationals, domestic overnight visitors, day visitors	Launceston & Dorset

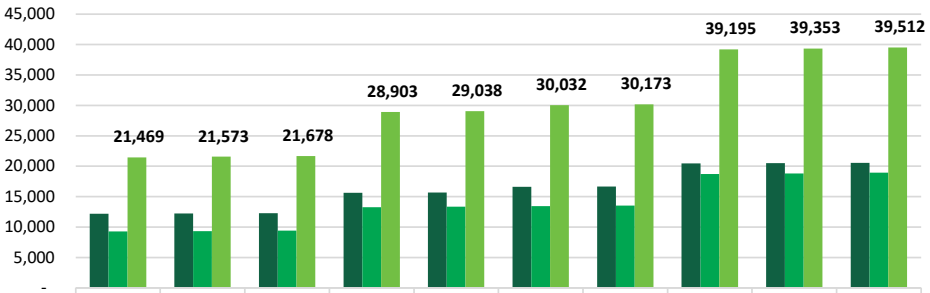
Source: MCa modelling & analysis, April 2024

The following figure shows estimates of all trail users over a 10-year period. Users are segmented into local users and tourist users.

- Year 1 is forecast to have 21,469 total users with 12,190 being local users and tourists accounting for 9,279 of the trail's users
- By year 10, total users are expected to have grown to around 39,500 users (20, 561 locals and 18,951 tourist users)
- The growth occurs with the increased interest in cycling by locals and tourist visitors and the promotion of the trail experience.

[22] Trail users are predominantly cyclists but also include casual walkers that may use segments of the trail.

Figure 6. **North East Rail Trail Users**



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Local Users	12,190	12,225	12,261	15,654	15,697	16,597	16,644	20,485	20,523	20,561
Tourist Users	9,279	9,348	9,417	13,248	13,341	13,435	13,529	18,711	18,830	18,951
Total All Trail Users	21,469	21,573	21,678	28,903	29,038	30,032	30,173	39,195	39,353	39,512

Source: MCa modelling & projections, April 2024. May be differences due to rounding. Users are mainly cyclists but include casual walkers that may use segments of the trail.

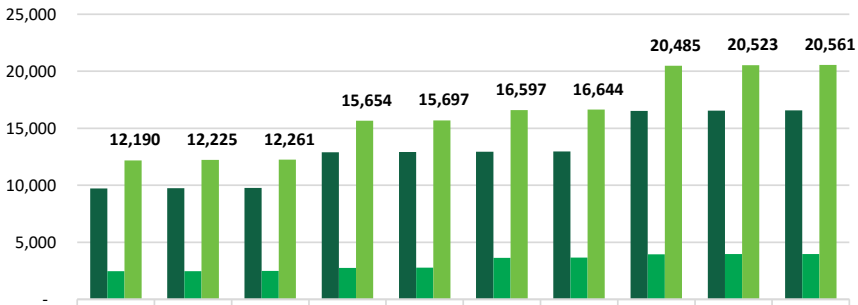
5.2 Local trail users

The chart below shows projections of local trail users over the 10-year period. The primary catchment LGAs (from which most local users come from), include Launceston and Dorset. The secondary catchment includes adjacent LGAs of Break O'Day, George Town, Meander Valley and West Tamar.

- In year 1, the total number of local users is projected at 12,190, of which, 9,728 live in a primary catchment LGAs, and 2,462 live in a secondary catchment LGA
- By year 10, total local users are 20,561 (16,577 from the primary catchment and 3984 from the secondary catchment)
- The projected growth in local users reflects a combination of regional population growth, recognition of the trail and an increased interest in active recreation (cycling and walking activities).

Details for each of the LGAs is provided in table 3.

Figure 7. **North East Rail Trail – Local Users (annual no.)**



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Total Primary Catchment	9,728	9,751	9,774	12,889	12,919	12,948	12,978	16,530	16,553	16,577
Total Secondary Catchment	2,462	2,474	2,487	2,765	2,778	3,649	3,666	3,955	3,969	3,984
Total Locals	12,190	12,225	12,261	15,654	15,697	16,597	16,644	20,485	20,523	20,561

Source: MCa modelling & projections, April 2024. May be differences due to rounding. Users are mainly cyclists but include casual walkers that may use segments of the trail.

Table 4. Local Trail User Estimates – 10 Years

LOCAL TRAIL USERS (ANNUAL) LGAS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
PRIMARY CATCHMENT										
Launceston	8,876	8,902	8,928	11,653	11,686	11,719	11,752	15,136	15,165	15,194
Dorset	852	849	846	1,237	1,233	1,229	1,226	1,394	1,389	1,383
Total Primary Catchment	**9,728**	**9,751**	**9,774**	**12,889**	**12,919**	**12,948**	**12,978**	**16,530**	**16,553**	**16,577**
SECONDARY CATCHMENT										
Break O'Day	280	282	283	314	316	415	417	450	451	453
George Town	288	288	288	320	320	419	420	451	451	452
Meander Valley	851	855	858	953	956	1,255	1,259	1,357	1,361	1,365
West Tamar	1,043	1,050	1,058	1,178	1,186	1,560	1,570	1,697	1,706	1,715
Total Secondary Catchment	**2,462**	**2,474**	**2,487**	**2,765**	**2,778**	**3,649**	**3,666**	**3,955**	**3,969**	**3,984**
Total Local Trail Users	**12,190**	**12,225**	**12,261**	**15,654**	**15,697**	**16,597**	**16,644**	**20,485**	**20,523**	**20,561**

Source: MCa modelling & projections, April 2024. May be differences due to rounding. Users are mainly cyclists but include casual walkers that may use segments of the trail.

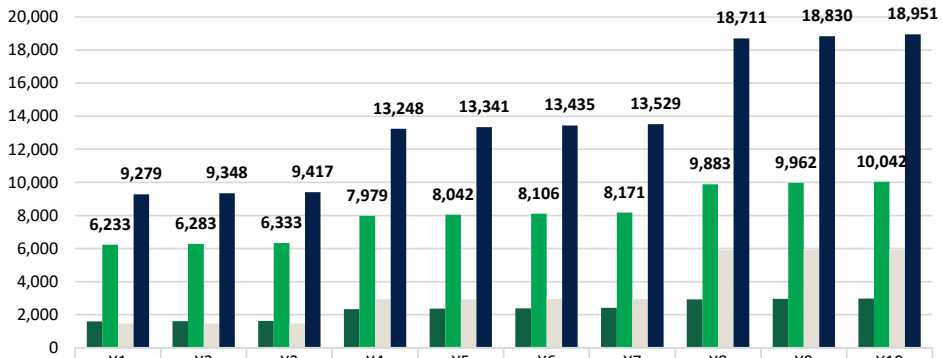
5.3 Trail users - tourists

The figure below shows projections of tourist users by the characteristics of their stay.

- As outlined, total tourist users are projected to be 9,279 in the first year of operation. By year 10, this is expected to increase to 18,951 annual users
- International visitors are projected to account for 1,591 of the users in year 1 and grow to 2,983 users by year 10
- Domestic overnight visitors make up the largest projected proportion of trail users. In year 1, they account for 6,233 users, rising to 10,042 users by year 10
- Tourists on day visits account for the smallest projected pool of trail users (1,455 users in year 1 and increasing to 5,927 users by year 10.

This growth in tourist users reflects the combination of projected growth in total tourist visitors to the region (Launceston and Dorset LGAs), promotion and recognition of the trail and new businesses being established to service users/visitors (e.g. bike hire and other on trail activities/services).

Figure 8. North East Rail Trail Users – Tourists (annual number)



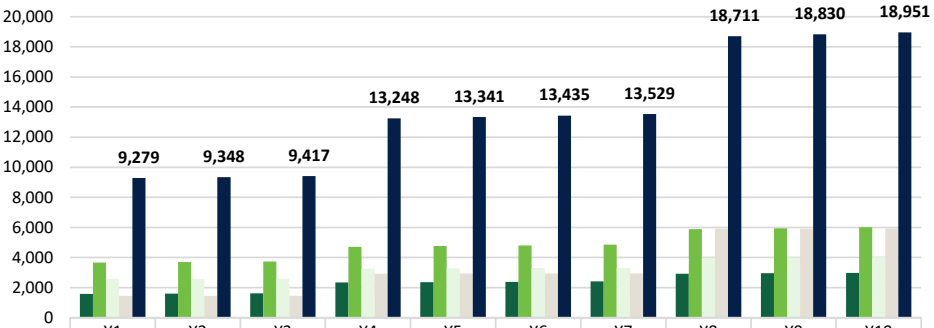
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Internationals	1,591	1,607	1,623	2,342	2,365	2,389	2,412	2,924	2,953	2,983
Domestic O/N	6,233	6,283	6,333	7,979	8,042	8,106	8,171	9,883	9,962	10,042
Day Visitors	1,455	1,458	1,461	2,928	2,934	2,940	2,946	5,903	5,915	5,927
Total Users - Visitors	9,279	9,348	9,417	13,248	13,341	13,435	13,529	18,711	18,830	18,951

Source: MCa modelling & projections, April 2024. May be differences due to rounding. Users are mainly cyclists but include casual walkers that may use segments of the trail.

The figure below further segments domestic overnight visitors into interstate and intrastate.

- Interstate visitors account for a larger proportion of trail users relative to intrastate visitors
- In year 1, interstate visitors account for 3,663 users growing to 6,008 by year 10
- Intrastate visitors are 2,571 users in year 1 and projected to increase to 4003 by year 10.

Figure 9. North East Rail Trail Users – Tourists (annual number).



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Internationals	1,591	1,607	1,623	2,342	2,365	2,389	2,412	2,924	2,953	2,983
Interstate	3,663	3,699	3,736	4,717	4,764	4,812	4,860	5,890	5,949	6,008
Intrastate	2,571	2,584	2,597	3,262	3,278	3,295	3,311	3,993	4,013	4,033
Day Visitors	1,455	1,458	1,461	2,928	2,934	2,940	2,946	5,903	5,915	5,927
Total Users - Visitors	9,279	9,348	9,417	13,248	13,341	13,435	13,529	18,711	18,830	18,951

Source: MCa modelling & projections, April 2024. May be differences due to rounding. Users are mainly cyclists but include casual walkers that may use segments of the trail.

Table 5. Tourist Trail User Estimates – 10 Years.

TOTAL TOURIST USERS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
OVERNIGHT VISITORS										
Internationals	1,591	1,607	1,623	2,342	2,365	2,389	2,412	2,924	2,953	2,983
Domestic O/N	**6,233**	**6,283**	**6,333**	**7,979**	**8,042**	**8,106**	**8,171**	**9,883**	**9,962**	**10,042**
Interstate	3,663	3,699	3,736	4,717	4,764	4,812	4,860	5,890	5,949	6,008
Intrastate	2,571	2,584	2,597	3,262	3,278	3,295	3,311	3,993	4,013	4,033
DAY VISITORS										
Day Visitors	1,455	1,458	1,461	2,928	2,934	2,940	2,946	5,903	5,915	5,927
Total Users - Visitors	**9,279**	**9,348**	**9,417**	**13,248**	**13,341**	**13,435**	**13,529**	**18,711**	**18,830**	**18,951**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

6 Trail User Spending in the Region

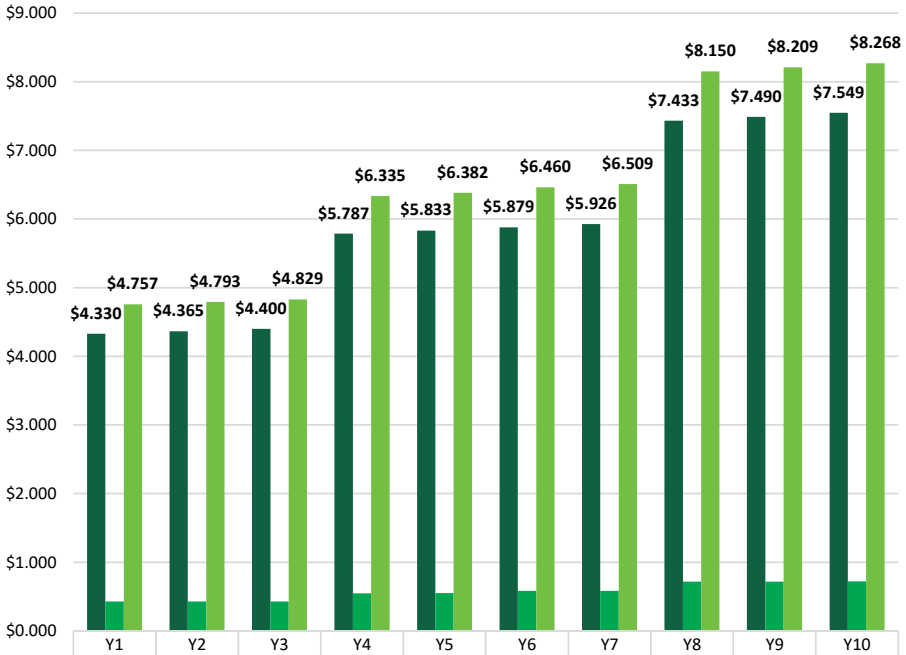
6.1 Summary – spending from all trail users

The figure below highlights varying spending levels across the broad trail user categories. Even though tourist users account for a smaller proportion of trail users, they account for a much higher proportion of spend.[23]

- Tourist users are expected to spend approximately $4.330 million in year 1, increasing to $7.549 million by year 10
- Local trail users obviously spend at a much lower rate.[24] In year 1, local users are projected to spend $427,000, growing to $720,000 over the 10-year period
- Total spending in the region increases from $4.757 million in year 1 to $8.268 million in year 10.

Appendix A outlines all the assumptions used in estimating trail user spending in the region (all spending is in constant 2024 prices).[25]

Figure 10. Trail Users Spending in Region (annual $m 2024 prices)



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Tourist Users Spending	$4.330	$4.365	$4.400	$5.787	$5.833	$5.879	$5.926	$7.433	$7.490	$7.549
Local Users	$0.427	$0.428	$0.429	$0.548	$0.549	$0.581	$0.583	$0.717	$0.718	$0.720
Total All User Spending	$4.757	$4.793	$4.829	$6.335	$6.382	$6.460	$6.509	$8.150	$8.209	$8.268

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

[23] This includes spending on accommodation, food and other visitor services.

[24] Spending by locals is limited to refreshments or simple meals during /after a ride. This has been assumed to be an average of $25 per person (in constant $2024 prices).

[25] Average spending estimates for users are derived from Tourism Research Australia data for Dorset & Launceston LGAs. Averages (tourists): Day visitors = $112; International visitors=$136; Domestic overnight visitors =$188

Table 6. Trail User Spending – Annual ($m 2024 prices)

Trail Users Spending ($m 2024 prices)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Total 10 Years
TOURIST USERS											
OVERNIGHT VISITORS											
Internationals	$0.651	$0.658	$0.665	$0.959	$0.968	$0.978	$0.988	$1.197	$1.209	$1.221	$9.495
Domestic O/N	**$3.516**	**$3.543**	**$3.572**	**$4.500**	**$4.536**	**$4.572**	**$4.608**	**$5.574**	**$5.619**	**$5.663**	**$45.703**
Interstate	$2.066	$2.086	$2.107	$2.660	$2.687	$2.714	$2.741	$3.322	$3.355	$3.389	$27.127
Intrastate	$1.450	$1.457	$1.464	$1.840	$1.849	$1.858	$1.867	$2.252	$2.263	$2.275	$18.576
DAY VISITORS											
Day Visitors	$0.163	$0.163	$0.164	$0.328	$0.329	$0.329	$0.330	$0.661	$0.662	$0.664	$3.793
Total Tourist Users	**$4.330**	**$4.365**	**$4.400**	**$5.787**	**$5.833**	**$5.879**	**$5.926**	**$7.433**	**$7.490**	**$7.549**	**$58.992**
LOCAL USERS											
Local Users	**$0.427**	**$0.428**	**$0.429**	**$0.548**	**$0.549**	**$0.581**	**$0.583**	**$0.717**	**$0.718**	**$0.720**	**$5.699**
ALL USERS -TOTAL											
Total All Users	**$4.757**	**$4.793**	**$4.829**	**$6.335**	**$6.382**	**$6.460**	**$6.509**	**$8.150**	**$8.209**	**$8.268**	**$64.691**

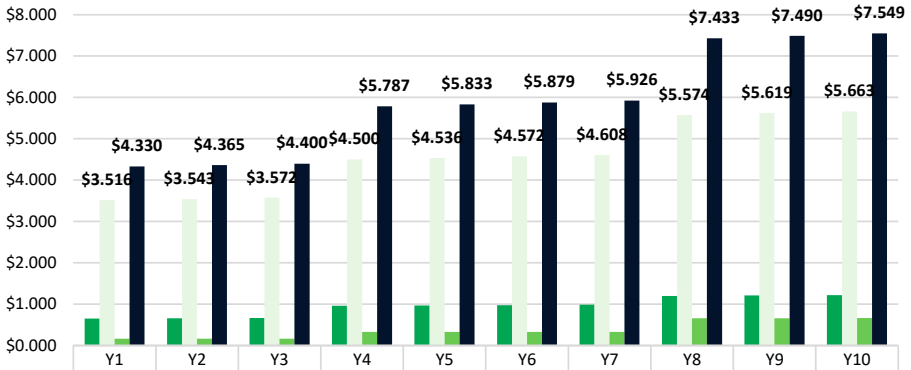
Source: MCa modelling & projections, April 2024. May be differences due to rounding.

6.2 Trail users (tourists) spending

The figure below shows estimated spend levels across the trail user segments.

- International visitors are expected to spend $651,000 in year 1 and this is projected to increase to $1.221 million by the end of the 10-year period
- Domestic overnight visitors not only make up the largest proportion of total tourist users, but also the largest proportion of tourist spend. Domestic overnight visitors are projected to spend $3.516 million in year 1 and this will increase to $5.663 million by year 10
- Day visitors are projected to make up the smallest proportion of tourist visitor spend. In year 1 spend is only $163,000 and this is estimated to increase to $664,000 by year 10
- Total visitor spending increases from $4.330 million in year 1 to $7.549 million in year 10.

Figure 11. Trail Users Spending by Tourist Visitors (annual $m 2024 prices)



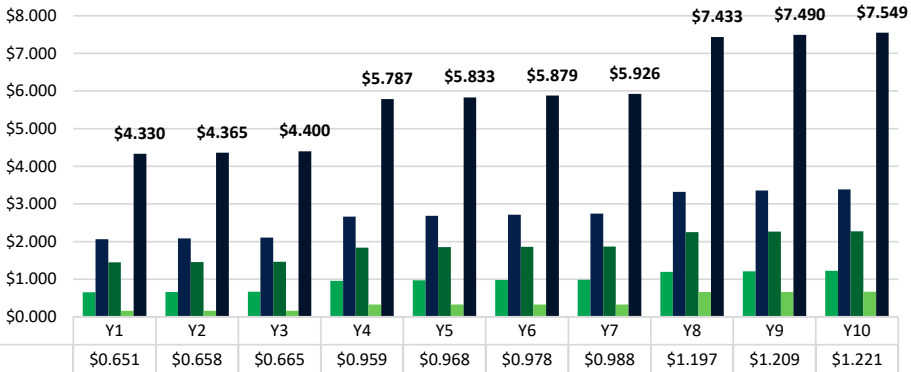
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Internationals	$0.651	$0.658	$0.665	$0.959	$0.968	$0.978	$0.988	$1.197	$1.209	$1.221
Domestic O/N	$3.516	$3.543	$3.572	$4.500	$4.536	$4.572	$4.608	$5.574	$5.619	$5.663
Day Visitors	$0.163	$0.163	$0.164	$0.328	$0.329	$0.329	$0.330	$0.661	$0.662	$0.664
Tourist Users Spending	$4.330	$4.365	$4.400	$5.787	$5.833	$5.879	$5.926	$7.433	$7.490	$7.549

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

The figure below further segments tourist spending by comparing domestic overnight visitors from interstate and intrastate.

- Interstate visitors account for a larger proportion of domestic overnight visitor spend. In year 1, they're expected to spend $2.066 million, which will increase to $3.389 million by year 10
- Intrastate visitors are projected to spend $1.450 million in year 1, increasing to $2.275 million by year 10.

Figure 12. Trail User Spending by Tourist Visitors (annual $m 2024 prices)



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Internationals	$0.651	$0.658	$0.665	$0.959	$0.968	$0.978	$0.988	$1.197	$1.209	$1.221
Interstate	$2.066	$2.086	$2.107	$2.660	$2.687	$2.714	$2.741	$3.322	$3.355	$3.389
Intrastate	$1.450	$1.457	$1.464	$1.840	$1.849	$1.858	$1.867	$2.252	$2.263	$2.275
Day Visitors	$0.163	$0.163	$0.164	$0.328	$0.329	$0.329	$0.330	$0.661	$0.662	$0.664
Tourist Users Spending	$4.330	$4.365	$4.400	$5.787	$5.833	$5.879	$5.926	$7.433	$7.490	$7.549

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

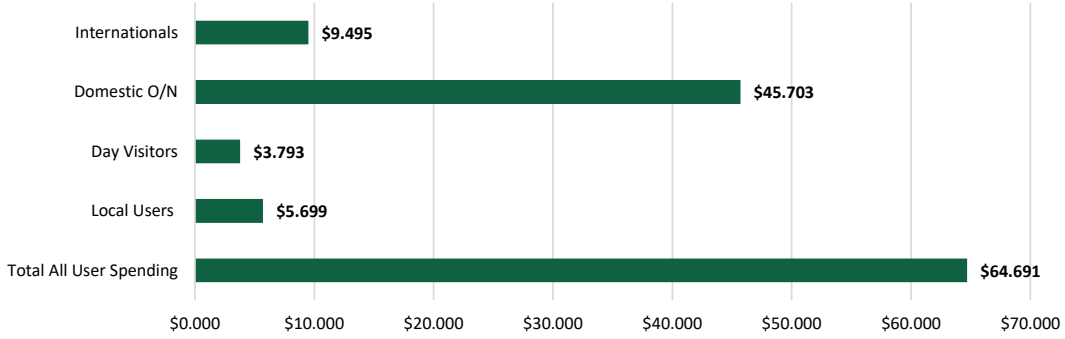
6.3 Spending – 10 years

The following figures show total trail user spending (in constant 2024 prices) over the 10-year period. Spending by all users totals $64.691 million over this period. This comprises:

- local resident users $5.699 million
- international tourists $9.495 million
- domestic overnight tourists $45.703 million, and
- day tourists $3.793 million.

Tourists spend a total of $58.992 million over the 10-year period. Domestic overnight tourist spend ($45.703 million) comprises interstate visitors $27.127 million and intrastate $18.576 million.

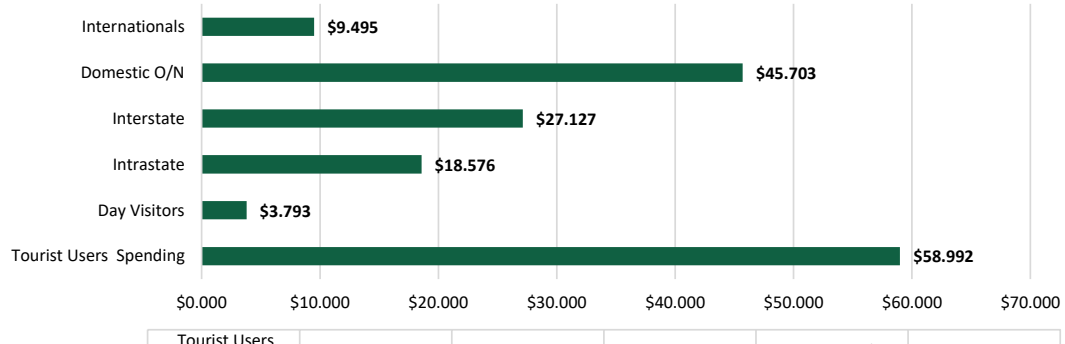
Figure 13. Trail User Spending – Total 10 years ($m 2024 prices)



	Total All User Spending	Local Users	Day Visitors	Domestic O/N	Internationals
Total 10 years	$64.691	$5.699	$3.793	$45.703	$9.495

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

Figure 14. Tourist Trail Users – Total Spending 10 years (4M 2024 prices)



	Tourist Users Spending	Day Visitors	Intrastate	Interstate	Domestic O/N	Internationals
Total 10 years	$58.992	$3.793	$18.576	$27.127	$45.703	$9.495

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

7 Trail Construction – Economic Impacts

The economic impacts of the development of the trail are modelled for both the construction phase and the operations phase. The impacts are measured in terms of full-time equivalent jobs (FTE) and the increase in regional income that is generated by construction activity, and by trail users and their spending in the region.[26]

The following table shows the costs of construction for each trail construction type. These estimates are used in the modelling of construction impacts. The preferred trail construction type (Option 1 unsealed) is the one that is analysed in detail.

MCa's construction model allocates the $value of project costs to a number of categories: on site construction; design & management; materials supply; plant hire and wages. It also includes a gross margin of 20% for the businesses doing the work.

- For estimating direct employment/regional income, the model uses ABS (2023) weekly wage rates (annualised) for the various activities (plus oncosts of 25%)
- Indirect/induced employment & regional income generated by employee spending is modelled based on average employee/consumer spending patterns (CPI 2022 basket), average tax rates of 25% and a 3% savings rate. The model estimates the local value added ($) component of each industry category of spending. The same approach is used in relation to annual wages by activity and oncosts.

Table 7. Trail Construction Costs ($2024 prices)

SUMMARY CONSTRUCTION COSTS (EX GST)	OPTION 1 UNSEALED	OPTION 2 SEALED ASPHALT	OPTION 3 SPRAY SEAL
Decommissioning Costs	**$1,393,700**	**$1,393,700**	**$1,393,700**
CONSTRUCTION			
Bridge Upgrades	$1,350,301	$1,350,301	$1,350,301
Crossings & Tunnels	$477,000	$477,000	$477,000
Signage	$15,000	$15,000	$15,000
Trail Construction	**$840,000**	**$7,417,600**	**$5,023,600**
Other Costs	$205,000	$205,000	$205,000
Total Project Costs	**$4,281,001**	**$10,858,601**	**$8,464,601**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

[26] Regional income is the total net income generated from the activity and covers wages and salaries of employees and profits of businesses within the region. It includes income generated directly within the business and indirect income, which is generated in other regional businesses (wages and profits) from the multiplier impacts of employee spending on the region. In the modelling of income generated, income tax and GST on spending, are both treated as leakages from the region. A significant % of the value of purchases is a leakage outside of the region. MCa's economic model measures the local value added component of the spending in the region.

7.1 Employment impacts

The following table shows the jobs generated in the construction of the trail (Option 1).

- Overall, 13.3 FTE jobs would be generated (10.3 FTE direct jobs and 3.0 FTE indirect/induced jobs). For total jobs 4.4 are associated with decommissioning of rail infrastructure on the trail and 8.9 are associated with trail construction and other construction activities (bridge upgrades, crossings and tunnels etc.)
- Of the 10.3 direct jobs, 7.3 are in onsite decommission/ construction, 1.7 are in materials supply, and 1.2 in design and project management.

Table 8. Jobs Generated in the Construction Phase (FTE No.)

OPTION 1 SUMMARY JOBS	DIRECT JOBS	INDIRECT/INDUCED JOBS	TOTAL JOBS
DECOMMISSION			
Construction on Site	2.4	0.7	3.1
Design & Management	0.4	0.1	0.5
Plant Hire	0.0	0.0	0.0
Materials Supply	0.6	0.2	0.7
Total Jobs	**3.4**	**1.0**	**4.4**
CONSTRUCTION ON SITE			
Construction on Site	4.9	1.4	6.3
Design & Management	0.8	0.2	1.0
Plant Hire	0.1	0.0	0.1
Materials Supply	1.1	0.3	1.5
Total Jobs	**6.9**	**2.0**	**8.9**
TOTAL JOBS -PROJECT			
Construction on Site (& decommissioning)	7.3	2.1	9.5
Design & Management	1.2	0.3	1.5
Plant Hire	0.1	0.0	0.1
Materials Supply	1.7	0.5	2.2
Total Jobs	**10.3**	**3.0**	**13.3**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

7.2 Regional income impacts

During the construction period a total of $1.448 million in regional income would be generated in the Dorset/Launceston Region ($1.299 million direct income and $0.189 million indirect/induced). The gross business margin of 20% for the business building the trail are included in the regional income.[27]

Table 9. Regional Income Generated in the Construction Phase ($m 2024 prices)

SUMMARY REGIONAL INCOME OPTION 1 ($2024 PRICES)	DIRECT INCOME	INDIRECT/INDUCED INCOME	TOTAL INCOME
DECOMMISSION			
Construction on Site	$306,614	$44,612	$351,226
Design & Management	$48,780	$7,097	$55,877
Plant Hire	$4,181	$608	$4,789
Materials Supply	$70,242	$10,220	$80,463
Total Regional Income	**$429,817**	**$62,538**	**$492,355**
CONSTRUCTION ON SITE			
Construction on Site	$620,092	$90,223	$710,316
Design & Management	$98,651	$14,354	$113,005
Plant Hire	$8,456	$1,230	$9,686
Materials Supply	$142,057	$20,669	$162,727
Total Regional Income	**$869,257**	**$126,477**	**$995,733**
TOTAL REGIONAL INCOME -PROJECT			
Construction on Site	$926,706	$134,836	$1,061,542
Design & Management	$147,431	$21,451	$168,882
Plant Hire	$12,637	$1,839	$14,476
Materials Supply	$212,300	$30,890	$243,190
Total Regional Income	**$1,299,074**	**$189,015**	**$1,488,089**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

[27] This assumes the construction workforce would come from the region and adjacent areas.

8 Trail Operations – Economic Impacts

MCa's *Regional Economic Impact Model* is used to estimate impacts in the region of trail operations over a 10 year period:

- The inputs are the spending in the region by the various categories of trail users, which is then allocated by industry category
- The model estimates the local value added associated with each type of spending and the wages share of these industries. Estimates are then generated of direct jobs (full time equivalent) in the businesses where trail users spend
- The model also produces estimates of indirect/induced jobs generated by the spending of these direct employees with other businesses in the region
- Regional income (direct and indirect/induced) estimates are also provided.

Appendix B contains a full description of the model.

8.1 Jobs in the region.

The following table show the total jobs (direct and indirect/induced) generated in the region by the operations of the trail. The number of jobs increase as the trail is promoted and recognised, and business develops servicing the trail (e.g. bike hire).

Total jobs increase from 25.1 FTE in year 1 to 43.8 FTE jobs in year 10. The jobs are generated by the spending of trail users while they are in the region. The increase reflects the progressive growth in trail users over the period.

The jobs are mainly in sectors servicing visitor – accommodation, food & beverage, retail and recreation services (bike hire, shuttles, guides).

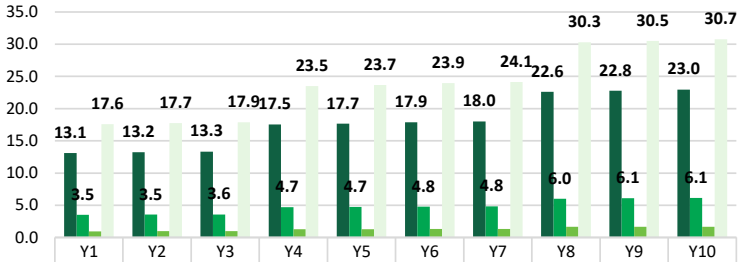
Table 10. Regional Jobs Generated by Trail Users (FTE No.)

TOTAL ALL USERS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Direct Jobs	17.6	17.7	17.9	23.5	23.7	23.9	24.1	30.3	30.5	30.7
Indirect Jobs	7.5	7.6	7.8	10.0	10.1	10.2	10.3	12.9	13.0	13.1
Total Jobs -All Users	**25.1**	**25.3**	**25.6**	**33.5**	**33.8**	**34.2**	**34.4**	**43.2**	**43.5**	**43.8**
					TOTAL ALL USERS					
Overnight Visitors Total	22.4	22.6	22.9	29.4	29.6	29.9	30.1	36.5	36.8	37.1
Day Visitors	0.9	0.9	0.9	1.9	1.9	1.9	1.9	3.8	3.8	3.8
Locals Total	1.7	1.7	1.8	2.2	2.2	2.4	2.4	2.9	2.9	2.9
Total All Jobs	**25.1**	**25.3**	**25.6**	**33.5**	**33.8**	**34.2**	**34.4**	**43.2**	**43.5**	**43.8**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

The figure and table below show the direct jobs generated by industry. Most of the direct jobs are in tourism industries (year 1 - 13.1 FTE jobs, increasing to 23.0 in year 10), with others in tourism connected industries (year 1 - 3.5 FTE jobs, increasing to 6.1 in year 10).

Figure 15. Direct Jobs Generated by Trail Users (FTE No.)



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Total tourism characteristic industries	13.1	13.2	13.3	17.5	17.7	17.9	18.0	22.6	22.8	23.0
Total tourism connected industries	3.5	3.5	3.6	4.7	4.7	4.8	4.8	6.0	6.1	6.1
All other industries	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.6	1.7	1.7
Total Direct Jobs (Employees & Proprietors)	17.6	17.7	17.9	23.5	23.7	23.9	24.1	30.3	30.5	30.7

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

Table 11. Direct Regional Jobs Generated by Industry (FTE No.)

TRAIL OPERATIONS: JOBS GENERATED OPTION 1 DIRECT JOBS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
TOURISM INDUSTRIES										
Accommodation	3.1	3.1	3.2	4.1	4.1	4.1	4.2	5.0	5.1	5.1
Cafes, restaurants and takeaway food services	2.3	2.3	2.4	3.1	3.2	3.2	3.2	4.1	4.1	4.2
Clubs, pubs, taverns and bars	2.9	2.9	2.9	3.9	3.9	4.0	4.0	5.1	5.1	5.2
Transport Services	0.8	0.8	0.8	1.1	1.1	1.1	1.1	1.5	1.5	1.5
Transport equipment rental	0.9	0.9	0.9	1.1	1.2	1.2	1.2	1.5	1.5	1.5
Visitor Services	1.4	1.5	1.5	1.9	1.9	2.0	2.0	2.5	2.5	2.5
Recreation Services (including hire)	**1.7**	**1.7**	**1.7**	**2.3**	**2.3**	**2.3**	**2.3**	**2.9**	**2.9**	**3.0**
Total Tourism Characteristic Industries	**13.1**	**13.2**	**13.3**	**17.5**	**17.7**	**17.9**	**18.0**	**22.6**	**22.8**	**23.0**
TOURISM CONNECTED INDUSTRIES										
Automotive fuel retailing	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7
Other retail trade	2.8	2.8	2.8	3.7	3.8	3.8	3.8	4.8	4.8	4.9
Education and training	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.6
Total Tourism Connected Industries	**3.5**	**3.5**	**3.6**	**4.7**	**4.7**	**4.8**	**4.8**	**6.0**	**6.1**	**6.1**
All other industries	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.6	1.7	1.7
Total Direct Jobs (Employees & Proprietors)	**17.6**	**17.7**	**17.9**	**23.5**	**23.7**	**23.9**	**24.1**	**30.3**	**30.5**	**30.7**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

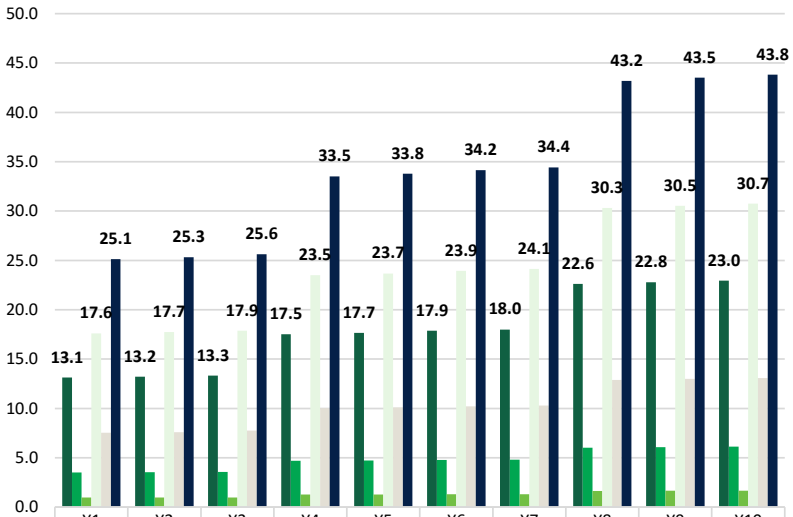
Table 12. Indirect Regional Jobs Generated by Industry (FTE No.)

Trail Operations: Jobs Generated Option 1 Indirect/Induced Jobs	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Food & Beverage	**2.6**	**2.7**	**2.6**	**3.5**	**3.6**	**3.6**	**3.6**	**4.5**	**4.6**	**4.6**
Retail	**2.0**	**2.0**	**2.2**	**2.6**	**2.7**	**2.7**	**2.7**	**3.4**	**3.4**	**3.4**
Health	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7
Transport	0.6	0.6	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0
Communication	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Recreation and culture	1.0	1.0	0.8	1.3	1.4	1.4	1.4	1.7	1.7	1.8
Education	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Insurance and financial services	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.7	0.8	0.8
Total Indirect Jobs	**7.5**	**7.6**	**7.8**	**10.0**	**10.1**	**10.2**	**10.3**	**12.9**	**13.0**	**13.1**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

The following chart and table show the industry mix of total jobs (direct and indirect) generated by trail users.

Figure 16. Trail Operations All Jobs Generated by Industry (FTE No.)



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Total tourism characteristic industries	13.1	13.2	13.3	17.5	17.7	17.9	18.0	22.6	22.8	23.0
Total tourism connected industries	3.5	3.5	3.6	4.7	4.7	4.8	4.8	6.0	6.1	6.1
All other industries	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.6	1.7	1.7
Total Direct Jobs (Employees & Proprietors)	17.6	17.7	17.9	23.5	23.7	23.9	24.1	30.3	30.5	30.7
Total Indirect Jobs	7.5	7.6	7.8	10.0	10.1	10.2	10.3	12.9	13.0	13.1
Total All jobs	25.1	25.3	25.6	33.5	33.8	34.2	34.4	43.2	43.5	43.8

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

The following table shows total jobs (direct & indirect/induced) generated over the 10 year period by industry sector. Most of the jobs are in food & beverage, local retail, accommodation and recreation services.

Table 13. Trail Operations – Total Jobs Generated by Industry (FTE No.)

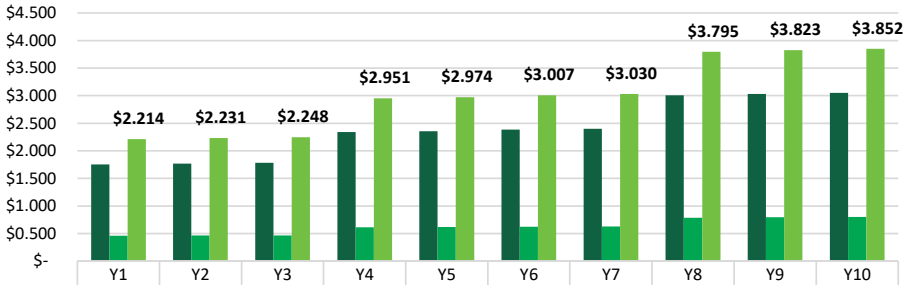
TRAIL OPERATIONS: OPTION 1										
Total Jobs (FTE)	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Accommodation	3.1	3.1	3.2	4.1	4.1	4.1	4.2	5.0	5.1	5.1
Food & Beverage	7.9	7.9	7.9	10.5	10.6	10.7	10.8	13.7	13.8	13.9
Retail	4.4	4.4	4.1	5.9	5.9	6.0	6.0	7.5	7.6	7.7
Transport	2.2	2.3	2.5	3.0	3.0	3.1	3.1	4.0	4.0	4.0
Communication	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Health	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7
Recreation & Culture	2.7	2.7	2.5	3.6	3.6	3.7	3.7	4.6	4.7	4.7
Education & Training	0.6	0.6	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.1
Insurance and financial services	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.7	0.8	0.8
Housing	0.8	0.8	1.3	1.0	1.0	1.1	1.1	1.3	1.3	1.4
Other Services	2.4	2.4	2.4	3.2	3.2	3.3	3.3	4.1	4.2	4.2
Total Jobs	**25.1**	**25.3**	**25.6**	**33.5**	**33.8**	**34.2**	**34.4**	**43.2**	**43.5**	**43.8**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

8.2 Regional Income

The following show the regional income generated by trail users and their spending over the 10 year period. Regional income (in $2024 prices) increases from $2.214 million in year 1 to $3.852 million in year 10. Total income over the 10 year period is $30.125 million. Regional income includes wages, salaries, and profits. Direct income is that generated in the businesses directly servicing the trail users. Indirect/induced income is that in businesses servicing consumer needs of the direct employees.

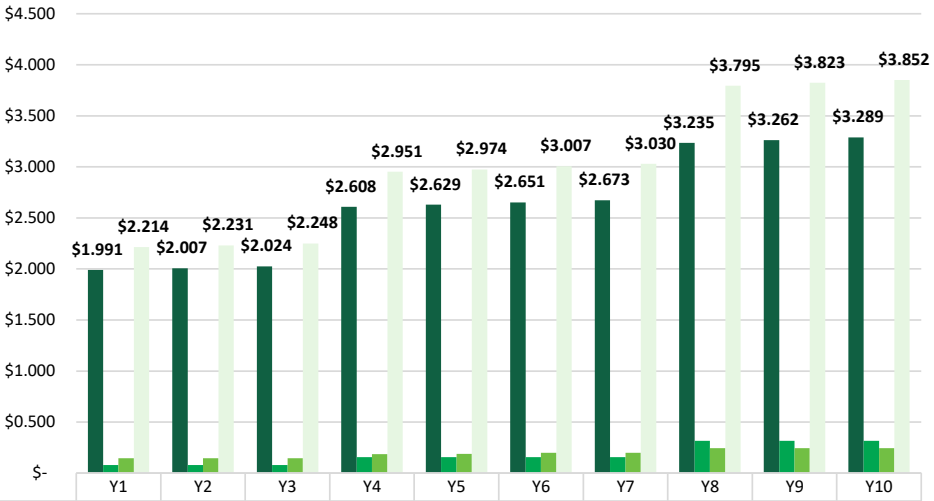
Figure 17. Trail Operations – Regional Income ($m 2024 prices)



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Direct Income	$1.754	$1.768	$1.781	$2.339	$2.356	$2.383	$2.401	$3.007	$3.030	$3.052
Indirect/induced income	$0.460	$0.463	$0.467	$0.613	$0.617	$0.624	$0.629	$0.788	$0.794	$0.800
Total Regional Income	$2.214	$2.231	$2.248	$2.951	$2.974	$3.007	$3.030	$3.795	$3.823	$3.852

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

Figure 18. Trail Operations – Total Regional Income by User Type ($m 2024 prices)



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Overnight Visitors	$1.991	$2.007	$2.024	$2.608	$2.629	$2.651	$2.673	$3.235	$3.262	$3.289
Day Visitors	$0.078	$0.078	$0.078	$0.157	$0.157	$0.157	$0.158	$0.316	$0.316	$0.317
Locals	$0.146	$0.146	$0.146	$0.187	$0.187	$0.198	$0.199	$0.245	$0.245	$0.246
Total Regional Income	$2.214	$2.231	$2.248	$2.951	$2.974	$3.007	$3.030	$3.795	$3.823	$3.852

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

Table 14. Regional Income Generated by all Trail Users ($m 2024 prices)

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL 10 YEARS
TOTAL INCOME											
Direct Income	$ 1.754	$ 1.768	$ 1.781	$2.339	$ 2.356	$ 2.383	$ 2.401	$ 3.007	$3.030	$ 3.052	$23.871
Indirect/ induced income	$ 0.460	$0.463	$0.467	$ 0.613	$0.617	$0.624	$ 0.629	$ 0.788	$ 0.794	$0.800	$ 6.254
Total Regional Income	**$ 2.214**	**$2.231**	**$ 2.248**	**$2.951**	**$ 2.974**	**$ 3.007**	**$ 3.030**	**$ 3.795**	**$3.823**	**$ 3.852**	**$30.125**
INCOME BY USER											
Overnight Visitors	$1.991	$ 2.007	$ 2.024	$ 2.608	$ 2.629	$ 2.651	$ 2.673	$ 3.235	$3.262	$ 3.289	$26.368
Day Visitors	$ 0.078	$ 0.078	$ 0.078	$0.157	$ 0.157	$ 0.157	$ 0.158	$ 0.316	$ 0.316	$0.317	$ 1.812
Locals	$ 0.146	$ 0.146	$0.146	$ 0.187	$0.187	$ 0.198	$0.199	$ 0.245	$ 0.245	$0.246	$1.945
Total Regional Income	**$2.214**	**$2.231**	**$2.248**	**$2.951**	**$ 2.974**	**$3.007**	**$3.030**	**$ 3.795**	**$3.823**	**$3.852**	**$30.125**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

9 Benefit Cost Analysis

Benefit cost analysis is the approach used to assess a project or investment and the returns that it will deliver. In an assessment of a trail the measured benefits to the community are compared with the total costs (initial investment in the construction and the estimated costs of maintaining the trails). Benefits and costs are compared over a 10 year period.[28]

9.1 Project costs

The following are the construction costs associated with the development of the trail (3 options). For the preferred construction, Option 1 Unsealed Trail, these comprise decommissioning and construction costs of $4.281 million, and maintenance costs (over 10 years) of $1.162 million.

Table 15. Trail Construction Costs of Three Options ($2024 prices)

SUMMARY CONSTRUCTION COSTS (EX GST)	OPTION 1 UNSEALED	OPTION 2 SEALED ASPHALT	OPTION 3 SPAY SEAL
Decommissioning Costs	$1,393,700	$1,393,700	$1,393,700
Bridge Upgrades	$1,350,301	$1,350,301	$1,350,301
Crossings & Tunnels	$477,000	$477,000	$477,000
Signage	$15,000	$15,000	$15,000
Trail Construction	$840,000	$7,417,600	$5,023,600
Other Costs	$205,000	$205,000	$205,000
Project Costs -Total	**$4,281,001**	**$10,858,601**	**$8,464,601**
Maintenance Cost 10 Years	**$1,161,970**	**$621,250**	**$1,805,650**

Source: Dorset Council Estimates, April 2024

Option 1 has been chosen as the preferred option due to the lower cost and the expectation that the trail surface if properly constructed will not impact the user experience as most cyclists will have hybrid or mountain bikes and e-bikes suitable to a fine crushed and rolled gravel.

9.2 Benefits of trail operations

9.2.1 Modelling benefits

The benefits of the trail comprise:

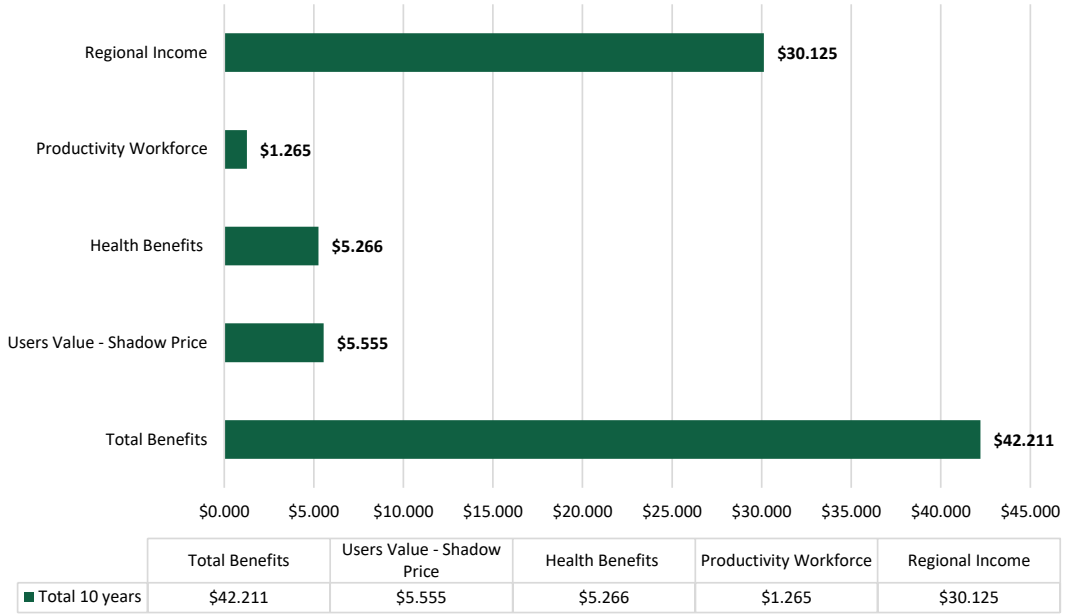
- the increase in regional income generated by user spending
- health benefits – the reduction in health costs associated with exercise (trail rides)
- the user valuation of the trail experiences, based on a shadow price (per trail user) as there are no user charges for the trail, and
- the improvement in productivity (for persons in employment) associated with exercise on the trail29 (See Appendix A for definition and sources.).

[28] It is normally a requirement for funding provided by the Commonwealth and State Governments for projects, that a cost benefit analysis be prepared.
[29] As there are no charges for using the trail, a consumer valuation of the user experience is measured by providing a shadow price (what a user might be willing to pay). For this analysis, a shadow price of $20 per person was applied (see Appendix A).

The benefits are quantified in the tables below (in $ million 2024 prices) over a 10-year period.
These benefits total $42.211million over this period:

- regional income ($30.125 million)
- health benefits ($5.266 million)
- user valuation ($5.555 million)
- productivity benefits ($1,265 million).

Figure 19. Project Benefits – Total 10 Years



	Total Benefits	Users Value - Shadow Price	Health Benefits	Productivity Workforce	Regional Income
Total 10 years	$42.211	$5.555	$5.266	$1.265	$30.125

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

Table 16. Measuring Benefits – Trail Operations

BENEFITS (INCLUDED IN ANALYSIS)	DESCRIPTION	VALUE 10 YEARS ($ MILLION 2024 PRICES)
Regional Income	Increase in regional income generated by users and their spending in the region.	$30.125
Health Benefits	Reduced health costs (public & private) associated with exercise activity. Benefits calculated for local users & tourists.	$5.266
Consumer/User valuation (shadow price)	Based on a shadow price of $20 per trail user ($2025 prices). Valuation for local users & tourist users.	$5.555
Productivity Benefit	Exercise improves a person's productivity and reduces absenteeism. Valuation for local users & tourist users.	$1.265
TOTAL BENEFITS		**$42.211**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

Table 17. Benefits of Trails ($m 2024 prices)

BENEFITS OF TRAIL	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	TOTAL 10 YEARS
Regional Income	$2.214	$2.231	$2.248	$2.951	$2.974	$3.007	$3.030	$3.795	$3.823	$3.852	$30.125
Productivity Workforce	$0.091	$0.091	$0.091	$0.121	$0.121	$0.126	$0.126	$0.165	$0.166	$0.166	$1.265
Health Benefits	$0.377	$0.379	$0.380	$0.504	$0.506	$0.524	$0.526	$0.688	$0.690	$0.693	$5.266
Users Value - Shadow Price	$0.398	$0.399	$0.401	$0.531	$0.533	$0.553	$0.555	$0.725	$0.728	$0.731	$5.555
Total Benefits	**$3.079**	**$3.100**	**$3.121**	**$4.107**	**$4.135**	**$4.210**	**$4.238**	**$5.374**	**$5.407**	**$5.441**	**$42.211**

Source: MCa modelling & projections, April 2024. May be differences due to rounding.

9.3 Benefit cost analysis

Annual benefits ($2024 prices) are estimated for a 10 year period and these benefits are then discounted to calculate an aggregate present value to compare with the construction and maintenance costs. Several discount rates (3%, 7%,10%) are used for this present value calculation. These discount rates are those required by state governments and the Australian Government for business cases and cost benefit assessments.

The following analyses construction costs and benefits over the 10 year period for the trail. The benefits for trail are compared with the capital costs for the new trail development. Benefits are discounted by the 3 discount rates.

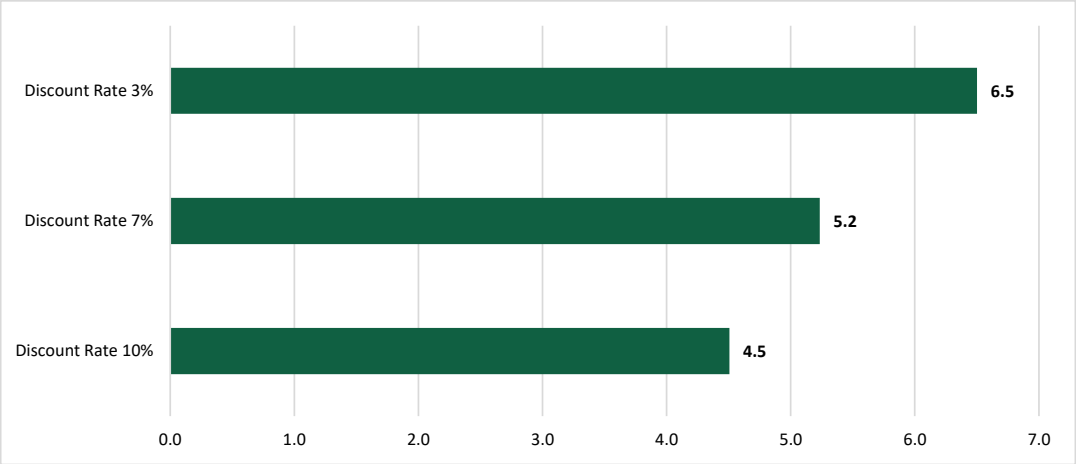
For option 1, when the benefits and construction/maintenance costs are taken into account, the project yields a benefit cost ratio (BCR) of 6.5 for a 3% discount rate, a BCR of 5.2 for a 7% discount rate and 4.5 for a 10% discount rate. Benefit cost ratios compare the aggregated discounted benefits over 10 years with the total project costs over this period.

Table 18. Benefit Cost Analysis – North East Rail Trail Extension

OPTION 1 UNSEALED TOTAL PROJECT REGIONAL COST BENEFIT ($2024 PRICES) PERIOD : 10YEARS	DISCOUNT RATE 3%	DISCOUNT RATE 7%	DISCOUNT RATE 10%
A. PROJECT COSTS			
Capital Costs	**$4,281,001**	**$4,281,001**	**$4,281,001**
Costs - Maintenance (10 years)	$1,161,970	$1,161,970	$1,161,970
Total Costs	**$5,442,971**	**$5,442,971**	**$5,442,971**
B. PROJECT BENEFITS			
Direct Benefits - User Value (Shadow Price)	$ 5,554,771	$5,554,771	$ 5,554,771
Regional Income Increase (users)	$30,125,291	$30,125,291	$30,125,291
Health Benefits (exercise)	$5,265,922	$5,265,922	$5,265,922
Workforce Productivity	$1,264,821	$1,264,821	$1,264,821
Total Benefits	**$42,210,805**	**$42,210,805**	**$42,210,805**
Total Benefits ($) Present Value	$35,388,987	$28,491,815	$24,526,617
Net Present Value ($) Total Benefits	**$29,946,016**	**$23,048,844**	**$19,083,646**
NPV/Cost	**5.5**	**4.2**	**3.5**
Benefit Cost Ratio (BCR)	**6.5**	**5.2**	**4.5**

Source: MCa Modelling April 2024.

Figure 20. Option 1 Trail Development – Benefit Cost Ratio (BCR)



Source: MCa Modelling April 2024.

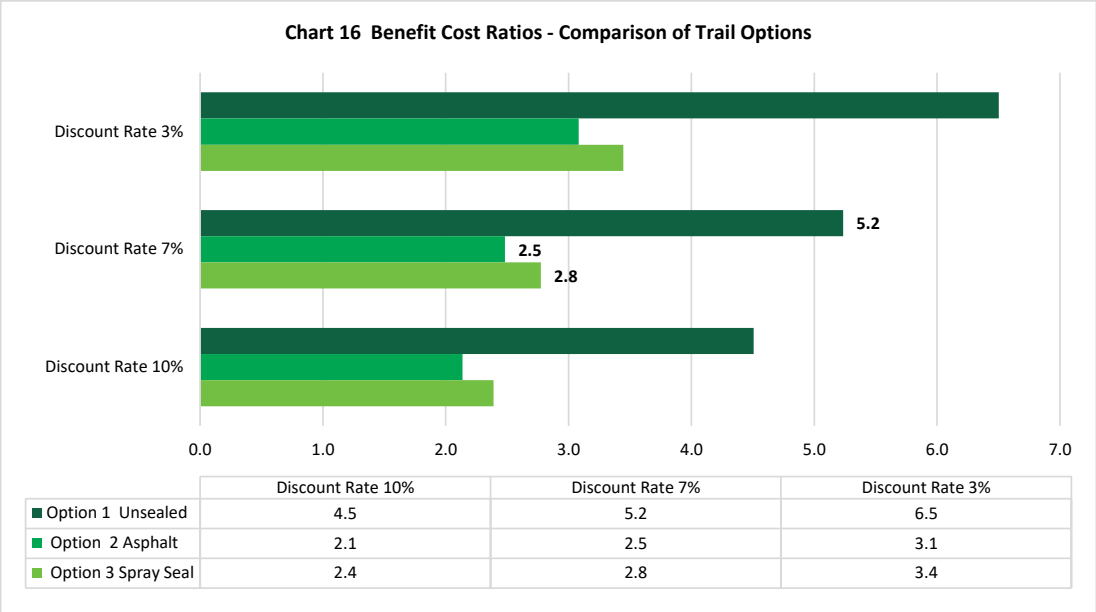
9.4 Comparison of trail options

The following figure compares BCRs for the 3 trail options.[30] These comparisons assume that the user numbers, spending and measures benefits of the trail operations are the same for each trail composition option. For a 7% discount rate (the rate that is used for many infrastructure projects), the BCRs are

- Option 1- 5.2
- Option 2- 2.5
- Option 3- 2.8.

[30] Appendix C shows the benefit cost details for Trail Construction Types 2 and 3.

Figure 21. **Benefit Cost Ratios – Comparison of Trail Options**



	Discount Rate 10%	Discount Rate 7%	Discount Rate 3%
Option 1 Unsealed	4.5	5.2	6.5
Option 2 Asphalt	2.1	2.5	3.1
Option 3 Spray Seal	2.4	2.8	3.4

Source: MCa Modelling April 2024.

APPENDIX A. Modelling Assumptions

VARIABLE	DESCRIPTION	SOURCES
1. Trail Locations	**LGAs**	
Lilydale to Scottsdale in north-east Tasmania (40 kms)	Dorset LGA	
2. Trail Users -Locals	**Estimate local users for each trail**	
Local Residents	Estimate of local residents using the trail. Use the trail segment which is located in or adjacent to their LGA. • Primary Catchment (LGAs): Dorset & Launceston • Secondary Catchment (LGAs): Break O Day; George Town; Meander Valley; West Tamar	MCa modelling based on population data and likely catchment for trail use
Potential users: persons who cycle in each LGA (primary catchment & secondary catchment)	LGA population 10 years from Tasmanian Govt projections. Population projections examined for 10 years 2026 to 2035. Potential users bike users • Cyclists in the LGA: apply cycle participation rate 13.4 % (average for 7 years 2016-2022) to LGA population. • Mountain bikers in the LGA: apply participation rate 2.1% (average for 7 years 2016 -2022). • Modelling assumes that trail users will mainly be cyclists on bikes or MTBs. • Walkers will mainly be persons walking on parts of the trail. <Bushwalkers participation rate 9.1% (average for 7 years 2016-2022.> User numbers grow in line with populations growth	Tasmanian Government*: Draft medium series population projections for Tasmania* - Treasury population projections 2023 *Ausplay Data Tables, April 2023* <Sports & Recreation Participation> MCa modelling
Likely to use the trail (% of cycle & MTB user population)	Percentage probability assigned to each LGA: • 15% of cycle population for the 2 primary catchment LGAs; and 10% for 4 secondary catchment LGAs. • 40% of MTB population for the 2 primary catchment LGAs; and 20% for 4 secondary catchment LGAs.	MCa assumptions
Average uses per year <Based on accessibility of trail to population centres; increase over time as trail experience becomes known.>	• Cycle: Ranges from 4 to 6 for the 2 primary catchment LGAs; and 2 to 3 for 4 secondary catchment LGAs. • MTB: Ranges from 5 to 10 for the 2 primary catchment LGAs; and 3 to 5 for 4 secondary catchment LGAs. • <MTB users more likely to go out on trail>	MCa assumptions

Variable	Description	Sources
3. CYCLE TRAIL USERS – TOURISTS	ESTIMATE TOURIST USERS FOR EACH TRAIL	
Tourists (in trail locations)	Tourist numbers for each LGA: international overnights; domestic overnights (interstate & intrastate); and day visitors. **Assumed annual growth over 10 years:** International overnights (1%). Domestic overnights (interstate 1% & intrastate 0.5%); and day visitors (0.2%).	TRA Local Government Area Profiles, 2019 • Dorset LGA • Launceston LGA
Potential users: tourists who may be cycle tourists	Cycle tourists – 21% of visitors in each category. *"Approximately 21% of the Australian adult population have participated in a cycle tourism activity in the past year".* Applied to projected visitor numbers to each LGA (Dorset & Launceston).	• TRC: *Cycle Market Insights note*. • *Cycle Tourism Insights Sept 2021, Angus & Associates* **https://www.mbie.govt.nz/dmsdocument/19860-cycle-tourism-insights-new-zealand-and-australian-summary-september-2021-pdf**
Likely to use the trail during their visit. **<% of cycle tourists using trail >**	% of cycle tourists (depends on nature of trail) • International overnights: 7% to 12% • Domestic overnights: 4%-6% • Day visitors:0.5%-2% % using increases over time as the trail becomes promoted & known.	MCa assumptions

VARIABLE	DESCRIPTION	SOURCES
3. CYCLE USER SPENDING IN REGION ($2024 PRICES)		
Local Trail Users	Average spend refreshments: $35 per user ($2024 prices) – Launceston LGA; $20 per user Dorset LGA. **Regional average: $25 per user (used in modelling)**	MCa assumptions
Tourist trail users – day visitors	Trail use is the reason for the visit. Average spending/person based on TRA data for 2 LGAs - averaged. Spending levels per day: Dorset & Launceston (simple average = **$112/person** <Launceston=$140; Dorset =$84>.	MCa assumptions *TRA Local Government Area Profiles, 2019* Dorset LGA & Launceston LGA. <Average spend in $2024 prices>
Tourist trail users – international overnights	Average stay associated with trail use: 3 nights. Spending levels per day: Dorset & Launceston - simple average = **$136/person** <Launceston=$104; Dorset =$169>. (Using average spend <not commercial accommodation rate> reflects that some may being staying with friends & relatives and others in commercial accommodation.)	MCa assumptions *TRA Local Government Area Profiles, 2019* Dorset LGA & Launceston LGA. <Average spend in $2024 prices>
Tourist trail users – domestic overnights	Average stay associated with trail use: 3 nights. Spending levels per day: Dorset & Launceston - simple average = **$188/person** <Launceston=$191; Dorset =$185>. (Using average spend <not commercial accommodation rate> reflects that some may being staying with friends & relatives and others in commercial accommodation.)	MCa assumptions *TRA Local Government Area Profiles, 2019* Dorset LGA & Launceston LGA. <Average spend in $2024 prices>

VARIABLE	DESCRIPTION	SOURCES
4. BENEFITS (FOR BENEFIT COST ANALYSIS)		
Regional Income	Increase in regional income generated by users and their spending in the region	Estimates generated from MCa's regional impact model.
Health Benefits	Reduced health costs (public & private) associated with exercise activity and fitness. Based on average trail ride per person of 12kms & health cost saving of **$1.60 per km ($19 per average ride).** Benefits calculated for local users & domestic tourists - $2024 prices. <Mountain bike estimate used for all riding on trail>	*Mountain Biking in Australia: An Economic and Participation Analysis (AusCycling),* GHD Advisory, March 2021 *Green Space Interim Framework for Valuing Green Infrastructure and Public Spaces*, NSW Department of Planning and Environment, March 2022. MCa assumptions.
Consumer valuation of Trail Experience	Based on a **shadow price of $20 per trail user** ($2024 prices) Indicative valuation for local users & domestic tourist users, as no fees charged for trail use.	MCa assumption. Users would be willing to pay $20 if fees were applied.
Productivity Benefit	Exercise improves a person productivity and reduces absenteeism. Assumed that 60% of all trail users are in employment and the benefit is valued at **$7.60 per ride.** Valuation for *local users & domestic tourist* users. <Mountain bike estimate used for riding on trail>	*Mountain Biking in Australia: An Economic and Participation Analysis (AusCycling)*, GHD Advisory, March 2021 *Social Value of Community Sport & Recreation - Value Assessment Report,* KPMG 21 October 2021 (for City of Melbourne

APPENDIX B – Economic Impact Model

The MCa economic impact model is a regional model, which assesses the impacts of a project or new infrastructure on the region in which it is located. The model works in the following way.

It takes estimated visitor spending in the region (net of 10% GST, which is treated as a leakage out of region) and allocates it across a number of industry sectors based on the average spending patterns of tourist visitors.[31] The model takes account that a significant part of this total spending leaks outside of the region (as it comprises inputs into the goods and services sold by local businesses - and these inputs come from outside the region).

- **Direct Jobs**: the model estimates the proportion of this spending by each industry sector and that which represents local value added and income to local employees and income to local business owners. Job numbers are then derived by industry sector using average wages (plus labour on costs) for each sector. The sector jobs generated are then aggregated to get the total direct jobs figure. These jobs are full time equivalent (FTE) jobs and may represent part of job spread across many businesses in the region (rather than additional jobs in a few enterprises in each sector).
- **Indirect/Induced Jobs**: these are the jobs generated by the spending of the employees, who are in the direct jobs. The spending of these direct employees is calculated net of both income tax (based on average tax rates) and savings (an average savings rate). The model allocates this spending (net of 10% GST) across industry sectors based on the spending patterns of a local resident (not a visitor).[32] The model then estimates the proportion of this spending by sector that represents incomes to local employees and income to local business owners and job numbers are then derived by industry sector using average wages (plus labour on costs) for each sector. The sector jobs are then aggregated to get the total indirect jobs figure. These jobs are full time equivalent (FTE) jobs and may represent part of a job spread across many businesses in the region (rather than jobs concentrated in a few enterprises in each sector).
- **Regional income**: is the total net income generated from the activity and covers wages and salaries of employees and profits of businesses within the region. It includes income generated directly within the business supplying the services to visitors and indirect income, which is generated in other regional businesses (wages and profits) from the multiplier impacts of employee spending in the region. In the modelling of income generated, income tax and GST on spending, are both treated as leakages from the region.

[31] For an overnight visitor this comprises spending on accommodation, food, recreational services, and other retail. For a day visitor this comprises spending on food, recreational services and other retail.

32 The spending pattern of employees is based the ABS CPI 2022 product mix.

APPENDIX C. Benefit Cost Analysis – Trail Surface Options 2 And 3

The following table provides the Benefit Cost analysis for the trail construction types 2 and 3.

Table 19. Benefit Costs Analysis – Trail Surface Option 2

OPTION 2 ASPHALT TOTAL PROJECT REGIONAL COST BENEFIT ($2024 PRICES)	DISCOUNT RATE 3%	DISCOUNT RATE 7%	DISCOUNT RATE 10%
	PERIOD : 10YEARS		
A. PROJECT COSTS			
Capital Costs	$10,858,601	$10,858,601	$10,858,601
Costs - Maintenance (10 years)	$621,250	$621,250	$621,250
Total Costs	$11,479,851	$11,479,851	$11,479,851
B. PROJECT BENEFITS			
Direct Benefits - Consumer Value	$ 5,554,771	$5,554,771	$ 5,554,771
Regional Income Increase (users)	$30,125,291	$30,125,291	$30,125,291
Health Benefits (exercise)	$5,265,922.53	$5,265,922.53	$5,265,922.53
Workforce Productivity	$1,264,821	$1,264,821	$1,264,821
Total Benefits	$42,210,805	$42,210,805	$42,210,805
Total Benefits ($) Present Value	$35,388,987	$28,491,815	$24,526,617
Net Present Value ($) Total Benefits	$23,909,136	$17,011,964	$13,046,766
NPV/Cost	2.1	1.5	1.1
Benefit Cost Ratio (BCR)	3.1	2.5	2.1

Source: MCa Modelling April 2024.

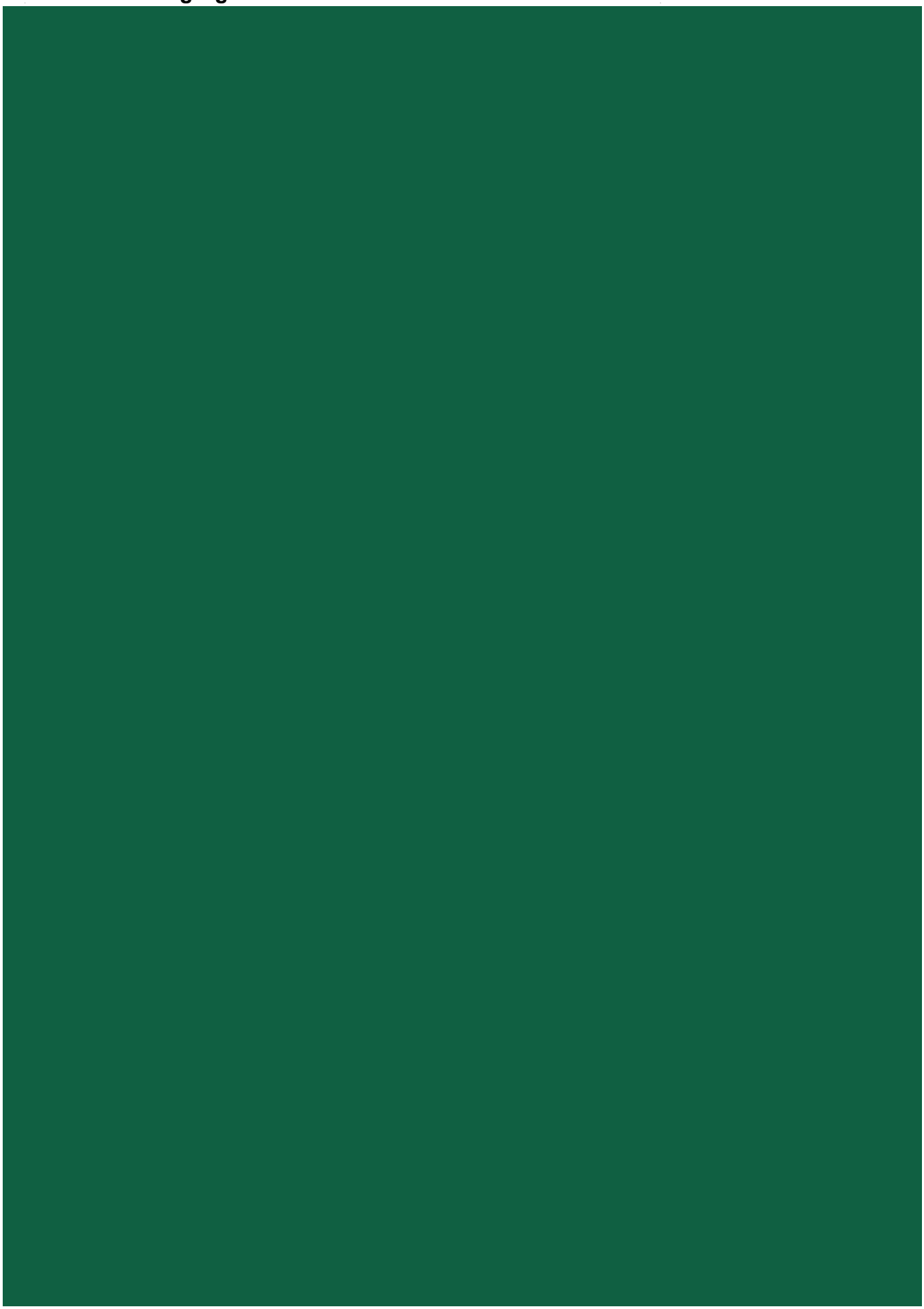
Table 20. Benefit Cost Analysis – Trail Surface Option 3

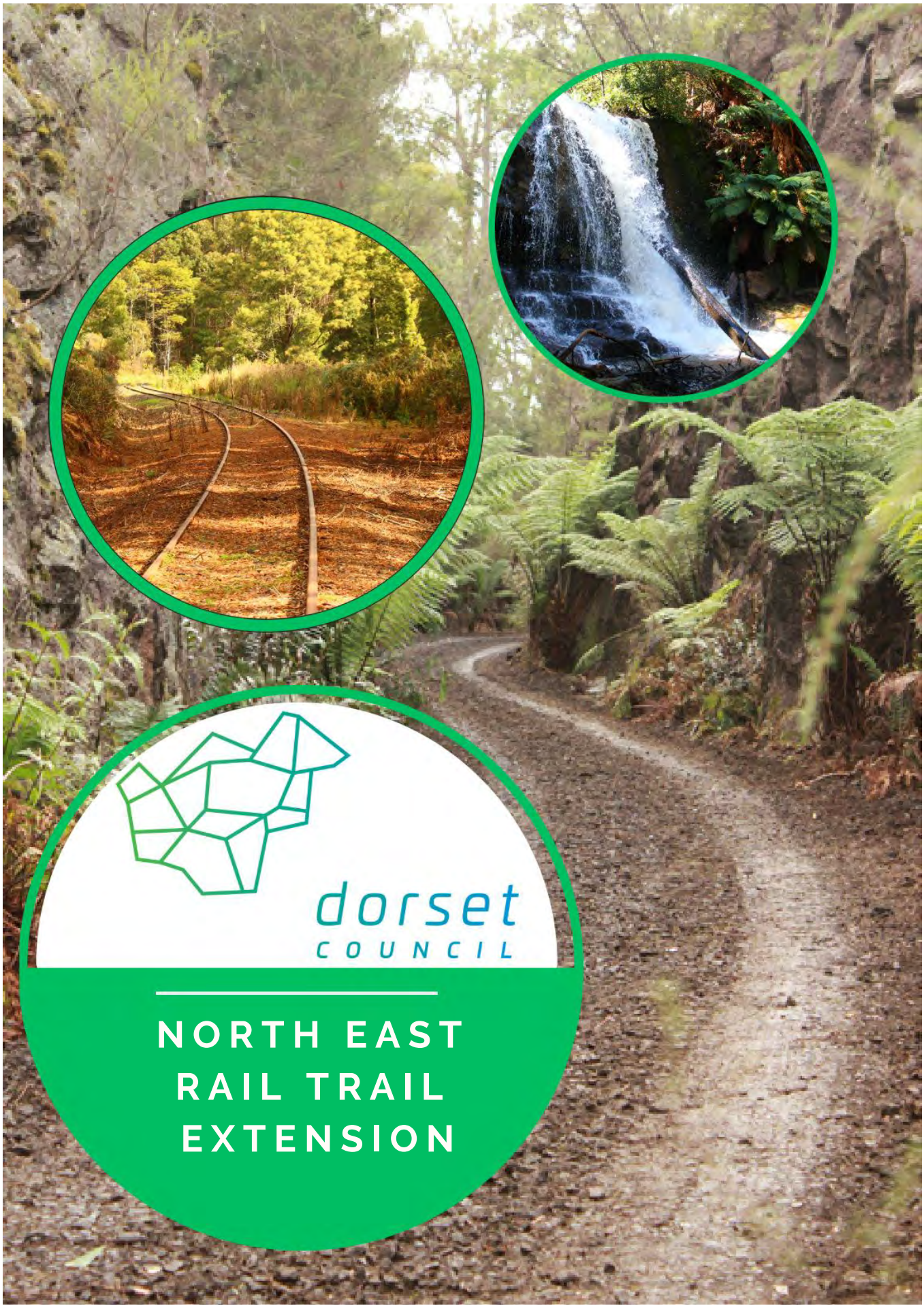
OPTION 3 SPRAY SEAL TOTAL PROJECT REGIONAL COST BENEFIT ($2024 PRICES)	DISCOUNT RATE 3%	DISCOUNT RATE 7%	DISCOUNT RATE 10%
Period: 10Years			
A. PROJECT COSTS			
Capital Costs	$8,464,601	$8,464,601	$8,464,601
Costs - Maintenance (10 years)	$1,805,650	$1,805,650	$1,805,650
Total Costs	$10,270,251	$10,270,251	$10,270,251
B. Project Benefits			
Direct Benefits - Consumer Value	$ 5,554,771	$5,554,771	$ 5,554,771
Regional Income Increase (users)	$30,125,291	$30,125,291	$30,125,291
Health Benefits (exercise)	$5,265,922	$5,265,922	$5,265,922
Workforce Productivity	$1,264,821	$1,264,821	$1,264,821
Total Benefits	$42,210,805	$42,210,805	$42,210,805
Total Benefits ($) Present Value	$35,388,987	$28,491,815	$24,526,617
Net Present Value ($) Total Benefits	$25,118,736	$18,221,564	$14,256,366
NPV/Cost	2.4	1.8	1.4
Benefit Cost Ratio (BCR)	3.4	2.8	2.4

Source: MCa Modelling April 2024.

APPENDIX C. References

- Ausplay Data Tables, April 2023 <Sports & Recreation Participation>
- Cycle Tourism Insights (New Zealand) September 2021, Angus & Associates
- *Green Space Interim Framework for Valuing Green Infrastructure and Public Spaces* NSW Department of Planning and Environment, March 2022.
- Local Government Area Profiles, 2019 Dorset LGA, Tourism Research Australia
- Local Government Area Profiles, 2019 Launceston LGA, Tourism Research Australia
- *Mountain Biking in Australia: An Economic and Participation Analysis (AusCycling),* GHD Advisory, March 2021
- North East Rail Trail Preliminary demand and economic benefit assessment 2014. TRC for Dorset Council.
- Profile Cycling Selected LGAs, Tourism Research Australia (Sept 2023)
- *Social Value of Community Sport & Recreation - Value Assessment Report,* KPMG 21 October 2021 (for City of Melbourne
- Tasmanian Government: Draft medium series population projections for Tasmania - Treasury population projections 2023
- Visit Northern Tasmania Annual Report – 2022/2023

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COUNCIL
NORTH EAST
RAIL TRAIL
EXTENSION

NORTH EAST RAIL TRAIL EXTENSION

CONNECTING

Lilydale Falls to Scottsdale

THROUGH SOME OF

Tasmania's finest scenery and small villages.

NORTH EAST RAIL TRAIL EXTENSION

THE CONCEPT

The proposed rail trail extension will travel 40kms from Lilydale Falls to the old station at Scottsdale where it will join the completed section of trail from Scottsdale south east to Billycock Hill.

The proposed trail builds on NE Tasmania's reputation as a cycling destination and adds significantly to the product base.

The entire proposed trail will be in the order of 66km long when completed – providing the market with an easily consumable trail experience over two days (some can do it in one day should they choose).

Highlights include the 700m long tunnel and the proximity of the trail to many small communities, each with their individual character. The region is also famous for food and wine and the trail presents an opportunity to increase access to and exposure of the region's epicurean offering.

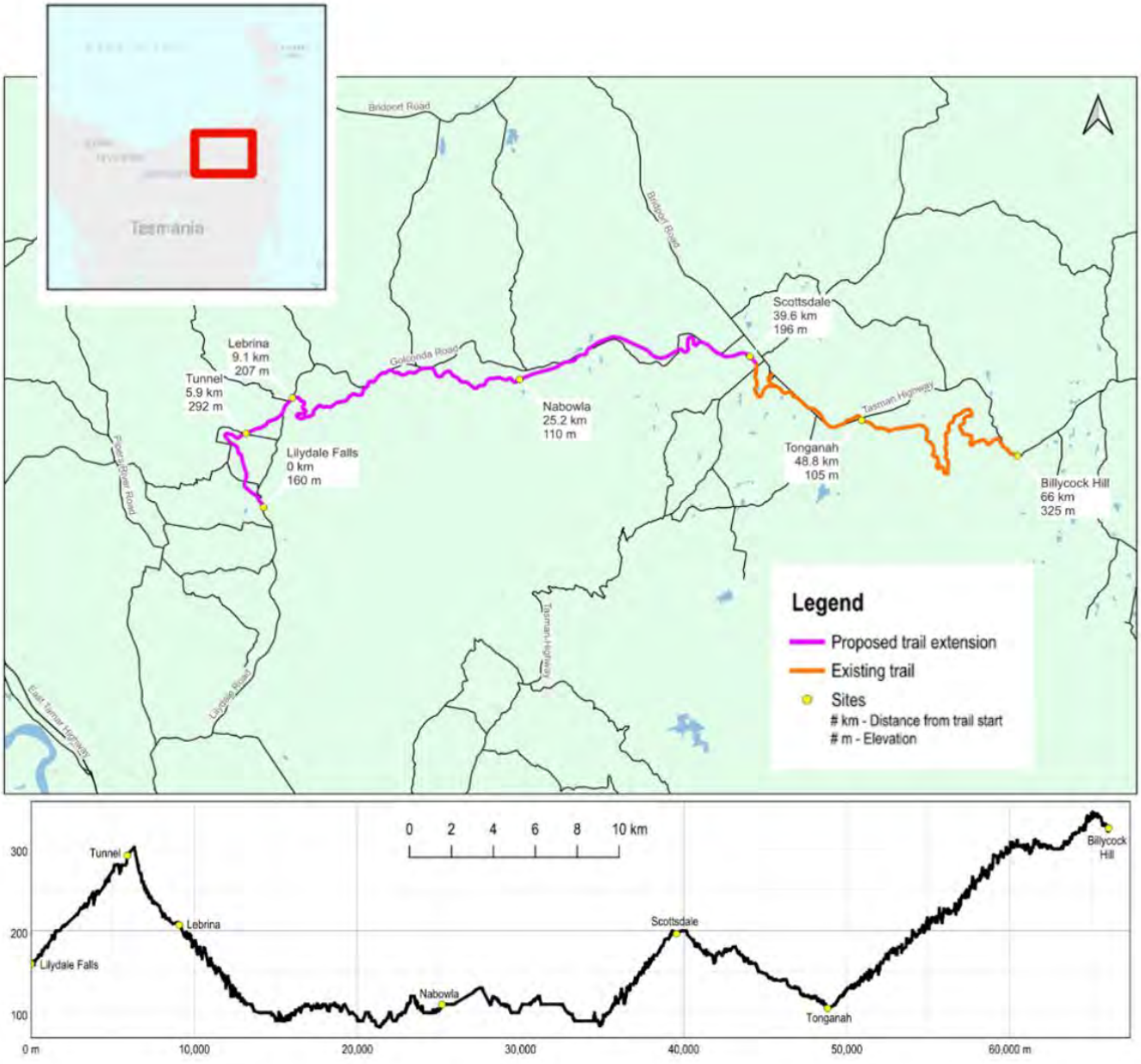
The business case on which this prospectus and investment summary is based provides insights into the current visitor economy and the markets that are likely to use the trail. Additionally, it provides strong evidence of the cycle tourism economy and the benefits it can bring regional communities when done well.

The growth in cycle tourism has in part occurred due to the rise in popularity of e-bikes. The technology allows people who had not ridden previously, or who had given up cycling, to come back into the market and explore trails around the world such as the North East Tasmania Rail Trail.

OVERVIEW MAP:
NORTH EAST TASMANIA PROPOSED RAIL TRAIL DEVELOPMENT

NORTH EAST RAIL TRAIL EXTENSION

DETAILED TRAIL MAP:
NORTH EAST TASMANIA -
EXISTING AND PROPOSED TRAILS



NORTH EAST RAIL TRAIL EXTENSION

NORTH EAST RAIL TRAIL EXTENSION

THE TRAIL BENEFITS & COSTS

THE CREATION OF NEW EXPERIENCES & PRODUCTS:

- Developing approx. 40km of new rail trail on the disused rail alignment between Lilydale Falls and Scottsdale
- Adding to the existing 26km of rail trail to create a 66km trail that will have strong and unique experiences attached to it including 700m long rail tunnel – thought to be the longest rail trail tunnel in Australia
- The proposed trail can be anchored in Scottsdale with riders choosing to stay, and eat in the region
- The proposed trail showcases some of the region's finest scenery and builds on the reputation of NE Tasmania as a cycling destination.

CREATING DEMAND FROM LOCALS AND TOURISTS:

Based on a range of conservative assumptions and Tourism Research Australia data, a range of user estimates are derived in the business case.

Trail users are segmented into local users (Dorset and Launceston LGS's) and tourist users:

- **Year 1 is projected to have 21,469 total users,** with 12,190 being local users and tourists accounting for 9,279 of the trail's users
- **By year 10, total users are expected to have grown to around 39,500 users** (20,561 locals and 18,951 tourist users)
- The growth occurs with the increased interest in cycling by locals and tourist visitors and the promotion of the trail experience.

WILL BRING ECONOMIC BENEFITS

During the construction of the trail (option 1 – unsealed trail) a total 13.3FTE jobs would be generated (10.3 FTE direct jobs - 3.0 FTE indirect/induced jobs). For total jobs, 4.4 are in onsite decommissioning of rail infrastructure on the proposed trail and 8.9 are associated with trail construction and other construction activities (bridge upgrades, crossings and tunnels etc).
During the construction period a total $1.488M in regional income would be generated in the Dorset and Launceston regions ($1.299M direct income and $0.189M indirect/induced).[1]
Trail users and their spending in the region will have a major impact and generate an increase in jobs and regional income.

- The analysis shows the total jobs (direct and indirect/induced) generated in the region by the operations of the trail. The number of jobs increase as the trail is promoted and recognised, and businesses develop servicing the trail (e.g. bike hire)
- Total jobs increase from 25.1 FTE in year 1 to 43.8 FTE jobs in year 10. The jobs are generated by the spending of trail users while they are in the region. The increase reflects the progressive growth in trail users over the period and includes direct and induced jobs across all sectors.

COSTS AND BENEFITS ARE:

- The total costs of the trail over 10 years including maintenance are $5.443M
- The benefits of the trail comprise an increase in regional income, health benefits due to the reduction in health costs associated with exercise, the valuation of the trail experiences based on a shadow price (per trail user), and the improvement in productivity for persons in employment associated with exercise on the trail- and they total $42.211M
- The cost benefit for the trail over a 10 year period (it would be higher if measured over a longer period due to the asset life of the trail) is 5.2 using a 7% discount rate.

[1] This assumes the contruction workforce would come from the region and adjacent areas.

NORTH EAST RAIL TRAIL EXTENSION

WHY THIS PROJECT AND WHY NOW?

Aligns strongly with State and Regional plans, strategies and policies that currently exist.

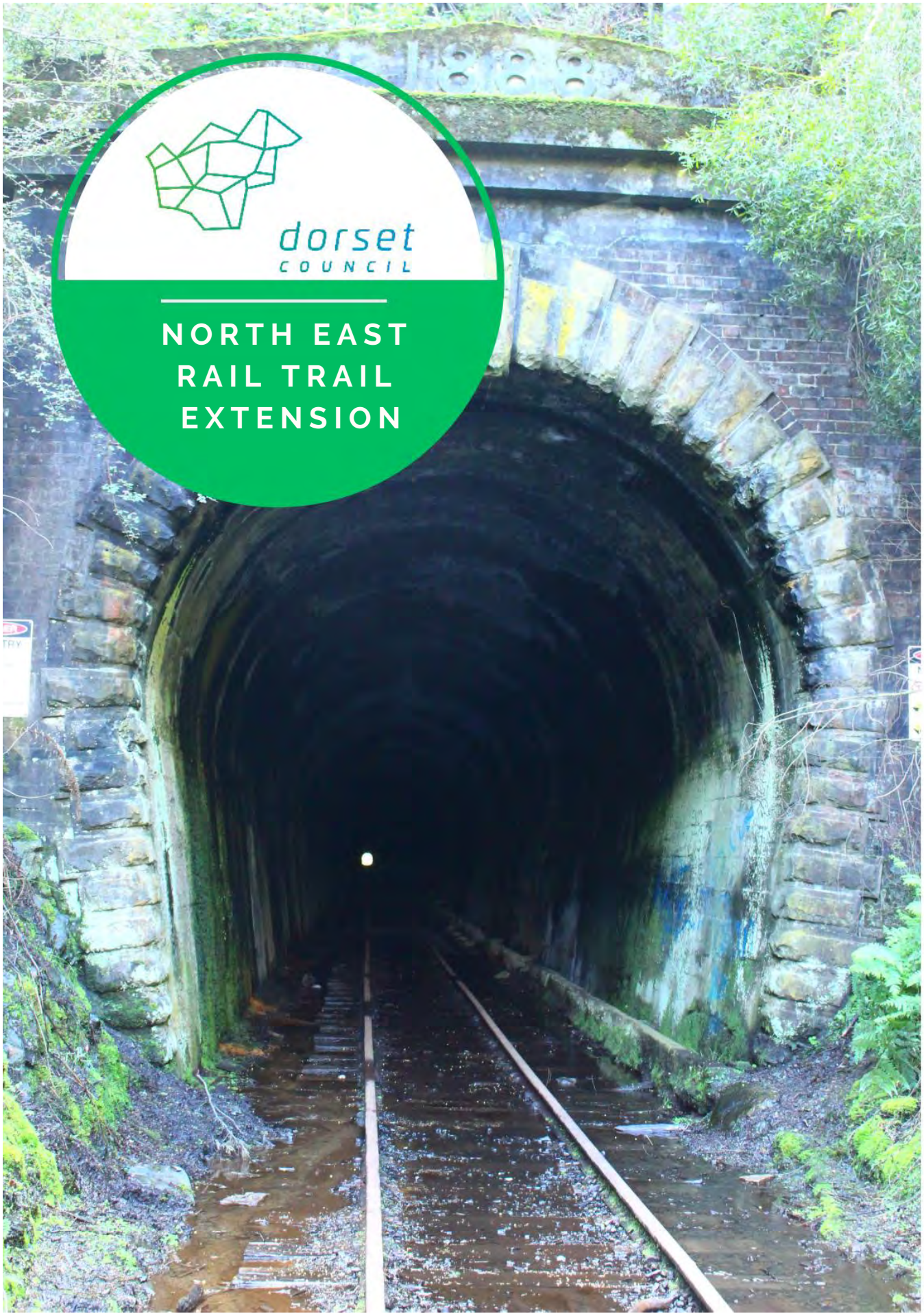
Capitalises on global trends that have emerged since COVID.

Existing and growing market of potential users.

Provides for safer and sustainable cycling transport options for residents as well as visitor economy benefits.

Builds on the demonstrated success of cycling in North East Tasmania.

Planning pathways are available to deliver much of the trail without significant issues and it could start relatively quickly.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COUNCIL
NORTH EAST
RAIL TRAIL
EXTENSION

CITY OF LAUNCESTON

MEMORANDUM

FILE NO:	SF5547 : SF0138 SC	
DATE:	28 November 2024	
TO:	Sam Johnson	Chief Executive Officer
c.c.		Committee Clerks
FROM:	Susie Cai	Councillor
SUBJECT:	**Notice of Motion - Graffiti removal from private dwellings within the Launceston Municipality**	

In accordance with Clause 16 (5) of the *Local Government (Meeting Procedures) Regulations 2015* please accept this Notice of Motion for placement on the agenda of the Meeting of Council to be held on 12 December 2024.

Motion
That Council considers expanding graffiti removal to include private dwellings and infrastructure by:

- Reviewing and amending the City of Launceston's graffiti policy framework to expand to removal of graffiti in all locations throughout the municipality.

Background
The City of Launceston has a zero-tolerance approach to graffiti and works with Tasmania Police, the local community and other relevant agencies to support and generate activities that draw on social and environmental approaches to prevent, reduce and remove graffiti.

Currently, the Council only removes graffiti from its infrastructure and assets, utilising a dedicated resource. Daily inspections are conducted as part of the servicing schedule and removal is conducted usually within a 24-hour period - immediately if the content is of an offensive nature - as this is a well-recognised method of discouraging further vandalism.

Graffiti is illegal unless the City of Launceston has designated a legalised area or the owner of a property has given permission for it. In the Launceston municipality, there are some legalised graffiti walls in a defined space at the Royal Park Skate Park. There are also legalised murals and other forms of street art, many on privately-owned buildings and Council owned assets, which add to the uniqueness of the Launceston streetscape.

CITY OF LAUNCESTON

MEMORANDUM

Any graffiti or tagging in the CBD on private buildings is currently the responsibility of the property owner to remove. The Council will provide notification when observed. If the Council observes any graffiti deemed as offensive in nature to the community - regardless of the asset owner, team members will cover or remove.

Attachments
N/A

Councillor Susie Cai

CITY OF LAUNCESTON

MEMORANDUM

FILE NO: SF5547
LM:kh
DATE: 4 December 2024

TO: Sam Johnson OAM Chief Executive Officer
c.c. councilmeetings@launceston.tas.gov.au

FROM: Councillor Lindi McMahon

SUBJECT: **Notice of Motion - Waiving of all On-Street Dining for a period of 3 months**

In accordance with Clause 16 (5) of the *Local Government (Meeting Procedures) Regulations 2015* please accept this Notice of Motion for placement on the agenda of the Meeting of Council to be held on Thursday 12th December 2024.

Motion

That Council resolves to waive all on-street dining fees across the municipality for a period of 3 months, effective from the 20th December 2024 to activate public spaces and to stimulate economic activity.

Background

On street dining plays a significant role in creating vibrant and welcoming public spaces. It enhances the social atmosphere of our city while supporting local businesses by increasing customer traffic and fostering a thriving dining culture.

In light of the current economic challenges and the need to invigorate public spaces, waiving on-street dining fees for a temporary period will reduce financial pressures on businesses, encouraging greater participation in outdoor dining. This initiative aligns with the Council's objectives. To support economic recovery, boost the local economy, and activate public spaces as key areas of community interaction and engagement.

This is a modest financial impact in relation to the potential benefits of increased economic activity, which supports more than 40 businesses and adds to community vibrancy.

Attachments
Nil

Councillor Lindi McMahon

Community Grants (Organisations) - 2024/2025 Round 1
Community Grants (Organisations) - 2024/2025 Round 1
Application No. CGP906 From Able Australia
Form Submitted 30 Aug 2024, 11:29AM AEST

Background and Funding

*** indicates a required field**

Community Grants (Organisations)

Overview

The purpose of the Community Grants (Organisations) Program is to support community projects held within the City of Launceston municipality that will result in community, social, cultural and environmental benefits for the Launceston community.

Grants Available

Applications can be made amounts from $1,000 up to $5,000 (plus GST if applicable).

There are two funding rounds per year.

Round 1: Opens 1 July closes 31 August (for projects commencing after 31 October)

Round 2: Opens 1 February closes 31 March (for projects commencing after 31 May)

Please view the Community Grant (Organisations) Guidelines on the City of Launceston Website before applying.

Need help?

Contact: Grants & Sponsorship Officer Liveable Communities **T** 03 6323 3380**E** grants.sponsorship@launceston.tas.gov.au

Summary Details

Applicant organisation/group name *
Able Australia

Total amount requested *
$4,946.00
Must be a dollar amount.
Total amount you are requesting (from $1,000 and up to $5,000) and exclusive of GST

Name of project *
Able Launceston Festivale & Fitness for all!

Project start date *
01/11/2024
Must be a date.

Project end date *
13/06/2025
Must be a date.

Project location *
Festivale in Launceston City Park, Tamar St Launceston AND Launceston Leisure & Aquatic Centre, 18A High Street, Launceston.
You must provide exact details of the location or locations where this project will be held. The project or elements of the project must be held within the City of Launceston municipality. Should the project be held entirely outside the City of Launceston municipality you will be ineligible to apply for funding.

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Project Eligibility

*** indicates a required field**

Eligibility

The questions below MUST be completed prior to proceeding.

Your organisation/group is a community and/or a not for profit organisation *
◉ True ○ False
if FALSE, please contact the Grants and Sponsorship Officer to discuss your eligibility to apply.

Your community and/or not for profit organisation is incorporated, or if it is not incorporated it is being auspiced by an incorporated entity for this project. *
◉ True ○ False
if FALSE, please contact the Grants and Sponsorship Officer to discuss your eligibility to apply.

Your organisation does NOT have a long term outstanding debt to the City of Launceston *
◉ True ○ False
If FALSE, please contact the Grants and Sponsorship Officer to discuss your situation.

Your organisation is only making one (1) application within this current Community Grants (Organisations) round *
◉ True ○ False

Your organisation has met all conditions of any previous City of Launceston grants or sponsorships eg. acquittal reports are NOT outstanding *
◉ True ○ False ○

The project or elements of the project will be held within the City of Launceston municipality *
◉ True ○ False

Your organisation is able to obtain the appropriate insurance for the project *
◉ True ○ False
e.g. volunteers, professional indemnity, public liability ($20,000,000)

Your organisation will co-contribute at least 20% of the cost of the project (Co-contributions can be in-kind or financial) *
◉ True ○ False

Your organisation has NOT received any funding for this project from any City of Launceston funding program in this financial year *
◉ True ○ False
e.g. Event Sponsorship, Conference Incentive or Special Event Funding

The project has NOT yet commenced or completed *
◉ True ○ False
Note: Projects that have commenced or are complete are not eligible for funding

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The project is eligible for funding support under the Community Grants (Organisations) Guidelines *
◉ True ○ False
Community Grants (Organisations) Guidelines can be found the previous section Background and Funding

If you answered 'FALSE' to any of the questions above you may be ineligible to receive funding support. Please contact the Grants and Sponsorship Officer to discuss eligibility before continuing with this application.

Grants & Sponsorship Officer - Community and Economic Development **T** 03 6323 3380**E** grants.sponsorship@launceston.tas.gov.au

Contact Details

*** indicates a required field**

Applicant Organisation Details

Applicant Organisation/Group Name *
Able Australia

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Does your Organisation have an ABN? *
◉ Yes ○ No

ABN * 83 024 339 234

Information from the Australian Business Register	
ABN	83 024 339 234
Entity name	ABLE AUSTRALIA SERVICES
ABN status	Active
Entity type	Other Incorporated Entity
Goods & Services Tax (GST)	Yes
DGR Endorsed	Yes (Item 1)
ATO Charity Type	Public Benevolent Institution More information
ACNC Registration	Registered
Tax Concessions	FBT Exemption, GST Concession, Income Tax Exemption
Main business location	3127 VIC
Information retrieved at 4:39am yesterday	

Must be an ABN

Auspice Organisation Details

Auspice Organisation Name
Only complete this section if your project is being auspiced by an eligible entity.

Auspice Primary Address
Australia
Must be an Australian post code

Auspice Postal Address (if different from above)
Australia

Auspice Project Contact

Auspice Project Contact Position

Auspice Project Contact Primary Phone Number

Must be an Australian phone number

Auspice Project Contact Primary Email

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Must be an email address

Does the Auspice Organisation have an ABN Number?
○ Yes ○ No

Please attach signed certification letter by Office Bearer of Auspice Organisation
No files have been uploaded
President, Chair, Secretary or Treasurer. Letter must include, name, position, signature and date. Max 25mb

Organisation Background and Project Overview

*** indicates a required field**

Organisation Background

How long has your organisation been operating? *

52 years
This can be an approximation

What is the primary purpose of your organisation? *

Able Australia is a leading provider of disability and deafblind services. We empower the individuals we support to reach their potential by living our values of trust, kindness, respect and excellence every day.

We aim to create a community where people with multiple disabilities including deafblindness are seen, heard, respected, valued and connected. Able's 60 supported independent living residential homes provide 24-hour support and our day services have group, centre-based and community activities that encourage social interaction and build independence for over 130 clients with disability.

At Able we provide a range of person-centred services to support people with disability participate in their community while developing their skills and wellbeing. Able’s trained and qualified Support Workers have built trusting relationships with our clients and will guide them while ensuring client-led participation in the activities.
No more than 200 words.

Number of active members *

315 clients
Active members are members who regularly attend meetings and participate in projects/events

Project Overview

Provide a brief description of the project *
"Able Launceston Festivale & Fitness for all!" will provide opportunities for 20 Tasmanian people with disability (PWD), including deafblindness, to enjoy entertaining community

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activities together in Launceston. Participation will enhance community inclusiveness, build friendships and relationships to improve wellbeing and quality of life and ensure that the clients remain active, connected, develop independence and participate equally in activities available to the broader public.

We have worked closely with every participant and their support network to identify community-based activities that they are most interested in doing and are appropriate for their current social and communications skills. Participants will make choices about the activities they participate in each month, with 1:1 support from Able staff. Our experienced staff are highly skilled in working with a diverse range of disabilities, including complex needs and behaviours of concern.

Twenty Able clients will attend the highly anticipated Festivale in Launceston including catering, with the support of Able Support Workers who have built trusting relationships with our clients. They will also access a 10-pass to Launceston Aquatic Centre (plus transport) for fitness, fun and improved water safety. We seek funding for the entry fees, accessibility, transport and catering costs.

We will promote the program (with client consent), and share images with Able Australia's 7000 followers on social media platforms, and in supporter newsletters to help improve community inclusiveness for other people with disability and increase understanding and acceptance within the general community. We are always pleased to acknowledge funders in these stories.

Must be between 50 and 250 words

Assessment Criteria

*** indicates a required field**

Community Need

Explain the community need for the project and how the need was identified. *

Clients from Able’s day services in Launceston will be invited to engage in the “Able Launceston Festivale & Fitness for all!" program at no extra cost to participants. Without funding, and support from Able's trained Support Workers, our clients with disability cannot experience these activities independently.

PWD need social interaction and integration with the community, to foster a sense of belonging and reduce feelings of helplessness or exclusion. People with intellectual disability often face significant barriers to making and keeping friends and may experience loneliness and social isolation. Friends and community activities enrich our lives and improve mental health and ability to bounce back from many of life’s challenges, but good friends and social connection can be hard to come by. This project provides regular opportunities to support PWD to make and keep friends, with shared fun community experiences.

People with multiple disabilities, including deafblindness, are amongst the most marginalised and isolated individuals in society due to the complexity of their disabilities, their vast communication needs (including

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Auslan and tactile communication) and their extremely limited financial means. PWD have much lower labour force participation rates and lower income than people without disability, leading to high rates of poverty. They are reliant on support including the NDIS as a source of income and increasingly likely to be on unemployment payments. NDIS payments do not cover the entry fees, transport or catering needed for the planned excursions in the “Able Launceston Festivale & Fitness for all!" program.
Must be between 50 and 250 words

Community Participation

Who is the target audience for the project? *
Twenty clients of a variety of cultural backgrounds, aged between 18-71 years, who attend Able’s day services in Launceston will be invited to engage in the “Able Launceston Festivale & Fitness for all!" program at no extra cost to participants.

Many of our clients have complex needs and dual diagnosis including sensory, psychosocial, intellectual, and physical impairments. Five of the clients with physical disabilities are in wheelchairs, while one uses a walker, and one client is both hearing and visually impaired (deafblind). They need the physical and emotional assistance of our professional support workers in order to attend and enjoy the fun excursions and activities within this program. This will increase confidence and improve friendships and social opportunities.
Must be between 50 and 150 words

How will you engage the target audience and enable participation in the project? *
We have worked closely with every participant and their support network to identify the community-based activities and that they are most interested in doing and are appropriate for their current social and communications skills. Participants will make choices about the activities they participate in each month, with 1:1 support from Able staff. They can choose to attend Festivale and Launceston Leisure & Aquatic Centre.

Our experienced staff are highly skilled in working with people with a diverse range of disabilities, including complex needs and behaviours of concern. Able's dedicated client support team in Launceston will promote the activities personally with each of the clients, and with their carers, including sharing images and letting clients know in advance where they are going.

Able staff will arrange the administration of the grant including arranging Festivale entry, transport and food tickets, and the tickets and transport for 10 visits to Launceston Leisure and Aquatic Centre.
Must be between 50 and 250 words

Community Benefit

Estimated number of people who will directly benefit from the project? *
20

How many volunteer hours will contribute to the project? *
0
Must be a number.

How will the Launceston community benefit from the project? *

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Able's Clients who will participate in the “Able Launceston Festivale & Fitness for all!" project are PWD from greater Launceston. By facilitating outings like these for PWD, we raise awareness about the needs and challenges faced by them. It highlights the importance of accessibility and inclusion in public spaces like the aquatic centre and festivals, advocating for policies and practices that promote equal opportunities for all. This an opportunity for PWD for social interaction and integration with the community, fostering a sense of belonging and reducing feelings of helplessness or exclusion. It will show that the Launceston community values their inclusion and actively seeks to provide opportunities for them to participate in recreational activities like everyone else.

Engaging in a variety of physical activities at these sites also promotes independence, improves mobility, and enhances overall physical health. Water safety for our clients with disability will be improved through 10 sessions at Launceston Leisure and Aquatic centre.
Must be between 50 and 250 words

Assessment Criteria (continued)

*** indicates a required field**

Budget (GST Exclusive)

Your budget will be assessed. The budget must be detailed, realistic, demonstrate your organisations co-contribution of at least 20% and outline how the City of Launceston funding will be utilised.

Please complete the budget template below or attach the budget document for the project.

IMPORTANT INFORMATION

The budget must:

- be realistic, detailed and include all income and expenditure;
- clearly show your organisation's co-contribution of at least 20% towards the project, in addition to the Council funding requested. (NOTE: Co-contribution can be in-kind or financial);
- detail any other grants or support you are receiving or seeking, including in-kind and the amount requested from the City of Launceston;
- **show what costs/expenditure that the requested Council funding will be used for (see example budget below).

Example of a project budget

Income$Expenditure$

Council funding$5000Staff wages$3000****

Other grants or sponsorship$2500Venue hire (incl catering)$2000****

Co-contribution - Volunteers - 100 hrs @ $20 per hr$2000Marketing$3500

Council permits/licenses$1000

Total$9,500Total$9,500

**** Costs/Expenditure that the requested Council funding will be used to cover.

GST

If your organisation **is** registered for GST, please provide **GST exclusive** amounts in your budget. The City of Launceston will add GST to the amount funded, should your application be successful.

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If your organisation **is not** registered for GST, your expenses should **include GST** where applicable.

Income	$	Expenditure	$
		Use ** to highlight which costs the requested Council funding will cover	
Council funding	$4,946.00	**20 clients Festivale entry and catering	$1,500.00
Co-contribution - Support Workers - 253 hours x $45	$11,385.00	**20 clients Transport to Festivale	$240.00
	$	**20 clients 10 visit pass Launceston Leisure & Aquatic Centre	$1,206.00
	$	**20 clients x 10 visits Transport to Launceston Leisure & Aquatic Centre	$1,200.00
	$	**Project coordination and administration	$800.00
	$	Support Workers - 253 hours x $45	$11,385.00
	Total: $16,331.00		Total: $16,331.00

Please upload the project budget if not completing the above template.
No files have been uploaded
Maximum 25mb per file attachment. Recommended no more than 5mb per attachment.

If income/expenditure do not match in the budget please explain (i.e. profit/deficit) *
N/A
Must be no more than 150 words.
Type N/A if not applicable

What are you planning to use the City of Launceston Community Grant funding for? Please provide details below. *
We plan to use the City of Launceston Community Grant to give twenty Able clients with disability the opportunity to attend the highly anticipated Festivale in Launceston including catering, with the support of Able Support Workers who have built trusting relationships with our clients. They will also access a 10-pass to Launceston Aquatic Centre (plus transport) for fitness, fun and improved water safety.
Please provide a brief explanation

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If you are seeking or have sought other assistance/sponsorship (financial or in-kind) please provide details below *
N/A

Type N/A if not applicable. Please state whom you have sought assistance from (name of government agency/organisation/other), the amount requested/sought and if the assistance is pending or confirmed

Should the project be recommended a funding amount less than the amount you have requested in this application, will the project still be conducted? *
◉ Yes ○ No

If the project is still able to be conducted, please outline how your organisation would be able to proceed with part funding.
If only part funding is provided, we could provide our clients with either the opportunity to attend Festivale with transport and catering ($1740) OR a 10 pass to Launceston Aquatic Centre, plus transport ($2406).

Project Plan

The project plan needs to demonstrate good organisational planning. You should provide as much detail as possible, as this plan will be used by the assessment panel to assess your ability to achieve the aims and outcomes of the project. Please note the project cannot have commenced or completed.

The project plan must include the following information:

- The proposed start date for the project;
- Key milestones throughout the project;
- The proposed end date of the project.

For example:

MonthActivity

February
- Form steering committee and begin planning process

February - May
- Steering committee meet fortnightly to plan the project
- Development of marketing materials

April
- Ensure all permits have been completed
- Conduct the project

May - June
- Debrief meeting held with steering committee
- Prepare acquittal reports

Month and Activity
November 2024

Able Launceston team meet to plan the project and staff requirements

Pre-program survey to ascertain individual client's knowledge and interest in attending Festivale and Launceston Aquatic Centre

Purchase Launceston Aquatic Centre 10-passes for 20 clients

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Purchase Festivale tickets for 20 clients
Should be between 50 and 100 words

Month and Activity
December 2024

2 visits each for 20 clients to Launceston Aquatic Centre

January 2025

20 clients attend Launceston Festivale with Able support workers

Share images and stories on Able social media (with client consent)

1 visit each for 20 clients to Launceston Aquatic Centre

February -May 2025

7 visits each for 20 clients to Launceston Aquatic Centre

Share images and stories on Able social media (with client consent) and in Able newsletter
Should be between 50 and 100 words

Month and Activity
June 2025

Debrief meeting with project team

Prepare acquittal reports
Should be between 50 and 100 words

Month and Activity
Should between 50 and 100 words

Please upload your project plan if not completing the template above
No files have been uploaded
Maximum 25 mb per file to upload. Recommended no more than 5 mb per file to upload

Additional Information, Feedback, Review and Submit

*** indicates a required field**

Environmental Sustainability

The Environment Protection Authority provides tips and information on environmentally sustainable practices. The City of Launceston strongly encourages you to include sustainable practices in your project.

The City of Launceston encourages sustainable waste management and environmentally sustainable practices for events.

City of Launceston adopted a policy to phase out single use plastics at Council sponsored events, by 2022. **No single use plastics are to be used at both sponsored and non-sponsored events from 1 January 2022 onwards.** Approved single use compostable packaging or reusable packaging will be permitted.

Risk Management

You may be required to provide a risk management plan:

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- If the project is to be held on land or in facilities owned or controlled by the City of Launceston.

and/or

- Should the project require a place of assembly licence

Supporting Documentation

The file upload option is available should you wish to provide additional information to support your application - ie. letters of support are strongly encouraged.

Additional information to support your application
No files have been uploaded
Maximum 25mb per file upload. Recommend no more than 5 mb per file upload

Community Care

City of Launceston is committed to encouraging the involvement of young people and children in Community activities. If you are successful in receiving support from City of Launceston, and your activity involves people under the age of 18, you will be obligated to abide by any relevant laws and regulations that apply in Tasmania or other jurisdictions where the supported activity is taking place.

Details on the requirements in Tasmania are available at: https://cbos.tas.gov.au/topics/licensing-and-registration/registrations/work-with-vulnerable-people

Certification

This MUST be completed by the applicant organisation/group.

I certify that to the best of my knowledge the statements made within this application are true and correct, and I understand that if the City of Launceston approves a Community Grant, I will be required to accept the terms and conditions as outlined in the funding agreement.

We agree * ◉ Yes ○ No

1. Name (Chair or President) *

Position *

2. Name (Secretary or Treasurer) *

Position *

Date *

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Personal Information Protection Statement

As required under the *Personal Information Protection Act 2004*

1.

Personal information is managed in accordance with the Personal Information Protection Act 2004 and may be accessed by the individual to whom it relates, on request to City of Launceston.

2.

Your personal information is being collected to enable the City of Launceston to assess your application and contact you if required. Your information may be shared with relevant Council Officers and the Community Grant Assessment Panel. Information can be used for other purposes permitted by the Local Government Act 1993 and regulations made by or under that Act, and, if necessary, may be disclosed to other public sector bodies, agents or contractors of City of Launceston, in accordance with Council's Personal Information Protection Policy (17-Plx-005).

3.

Failure to provide this information may result in your application not being able to be accepted or processed.

Feedback - Optional

You are now coming to the end of your application process and before you **REVIEW** and click the **SUBMIT** button please take a few moments to provide some feedback.

We would value any feedback you may have regarding our online grants application process.

Please indicate how you found the online application process:
○ Very easy ◉ Easy ○ Neither ○ Difficult ○ Very difficult

How many minutes did it take you to complete this application?
120
Please estimate in minutes e.g. 1 hour = 60 minutes

Please provide us with any suggestions for improvement to the application process/form.
No more than 100 words.

City of Launceston Annual Plan 2024-2025 Quarterly Progress Report

Quarter One: 1 July 2024 - 30 September 2024

Welcome to the City of Launceston's Quarterly Progress Report for the Quarter One - July to September 2024 period.
This Quarterly Progress Report provides an update on Council's progress towards delivering the *Annual Plan 2024-25*.

Annual Plan Action - Status Summary

There are 51 Action Items included in the Annual Plan for 2024-25. This section provides a summary of statuses for these Actions.

Summary of Action status' as at the 30 September 2024:

Action Status	Number of Actions
Complete	1
Not Progressing	0
Not Started	2
In Progress	48
Recommended for Deferral	0
Total Number of Actions	**51**

This diagram shows how many Action Items are allocated to each of our Strategic Priorities, grouped by Action Status.

Annual Plan Action - Progress Reporting

This section provides detailed statements to report the progress against the Action Items from the Annual Plan 2024-25 as at the end of the first quarter (30 September 2024).

How to read this report

Term	Definition
Progress Percentage	This percentage is representative of tasks to be completed within this Plan period (financial year) only. For Actions that are multi-year projects, the progress percentage stated in this report refers to the projects progress within this Plan period only, not the lifespan of the project. This percentage is cumulative throughout the years' quarterly progress reports.
Progress Comment	These comments provide an update on status and on tasks carried out during the applicable reporting quarter within the Plan Period (financial year). If an Action has been delayed or deferred, this comment will provide reasoning for this.
Action Item ID	Corresponding reference number allocated to an Action Item within the Annual Plan.

Accessing a copy of the Annual Plan:

The Annual Plan for 2024-25 is available publicly on the City of Launceston website (https://www.launceston.tas.gov.au/Council-Region/Reports-Plans-and-Strategies/Annual-Plan-and-Budget)

Strategic Priority 1 - We Connect with our Community and Region

Our interactions with our community are authentic, timely, accurate and open. We want to build strong and productive relationships with our community and regional partners.

10-Year Goal:
To seek out and champion positive engagement and collaboration to capitalise on the major opportunities, and address the future challenges facing our community and region.

Focus Areas:
1. To develop and consistently utilise contemporary and effective community engagement processes.
2. To lead the implementation of the Greater Launceston Plan via collaborative and constructive relationships with our regional partners.
3. To advocate and collaborate to enhance regionally significant services and infrastructure for the benefit of our communities.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
1.1	Develop and implement an effective advocacy strategy for the State and Federal funding that identifies the key projects for which we would seek support.	3	Chief Executive Officer Organisational Services	Leader	• Develop an Advocacy Strategy. • Maintain a list of priorities for the Council that aligns with our Strategic Plan and Four Year Delivery Plan.	100%	Council selected and endorsed five key projects to seek support and funding ahead of the Federal election. A prospectus highlighting the projects has been provided within the recent Chief Executive Officer's quarterly report. Plans to develop an advocacy framework to inform the future advocacy strategy are on hold. This is awaiting completion of the new Strategic Plan, to ensure appropriate alignment of key strategic documents.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
1.2	Deliver identified actions in the Northern Tasmanian Sports Facility Plan.	3	Infrastructure and Assets	Leader	• Progress the masterplan for the Northern Tasmanian Cricket Precinct. • Develop an investment business case for the Northern Tasmanian Cricket Precinct. • Develop a prioritised program for the renewal of aging infrastructure. • Commence year one of a 3 year program to renew nine courts at Hobblers Bridge netball Facility - four netball courts are to be resurfaced in 2024/2025.	25%	The Northern Tasmania Cricket Association Facility Management Group was presented with a revised masterplan on 21 August 2024. Feedback was collected and the masterplan was further refined and re-presented to the Group on 18 September 2024. On 19 September 2024, Council approved the completion of the transition of management of the Northern Tasmania Cricket Association facility to the City of Launceston. The transition will be completed by March 2025. Work is underway to finalise a transition plan. The first stage of the renewal of Hoblers Bridge Netball courts is underway, with RARE Engineering engaged to deliver. This project is currently out for tender.
1.3	Continue to implement the Aboriginal Partnership Plan.	1	Community and Place	Leader	• Implement cultural awareness programs for employees. • Promote employment opportunities for Aboriginal people in local government.	25%	Aboriginal Cultural awareness training continues with the aim of senior leaders participating before the end of the year. The annual report for the first year of operation is being finalised and when it is, we will engage with Launceston focused Aboriginal organisations to discuss progress and establish priorities for the next 12 months. The team has started discussions with an Aboriginal historian and art curator, with regards to existing public art and commemorative elements in Launceston. Work is underway on a suite of resources to offer guidance to council officers in engagement with Aboriginal stakeholders and in ensuring consistency of respect and acknowledgement across the suite of communication collateral.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
1.4	Continue to engage with our community on: • Our strategic community engagement program, Tomorrow Together with theme A Mobile and Accessible city. • Key projects and initiatives of community impact such as the Corporate Strategic Plan, the development of a flood strategy for Launceston and key infrastructure projects.	1	Organisational Services	Leader	Feedback from community received on: • New Corporate Strategic Plan. • Launceston's Public Transport to help understand the barriers to the use of public transport. • Air quality, flood mitigation health and wellbeing to provide baseline data to enable the development of strategies, plans and projects etc. • Specific feedback relating to individual projects. Engagement activities follow City of Launceston's five community engagement principles: 1. Inclusive participation. 2. Open and transparent disclosure. 3. Engage early and on an ongoing basis with clarity and purpose. 4. Design and implementation of good quality engagement processes, tools and methods.	25%	Scheduling of engagement: • Internal consultation with the Executive Leadership Team, Senior Leadership Team, and Project Leads to understand engagement requirements on annual plan and capital works actions to include in the Engagement schedule for the 2024-25 financial year, including but not limited to the Strategic Plan, Public Transport, Clean Air Strategy and infrastructure projects. • The Engagement schedule ensures projects are well coordinated and avoid overlapping, reducing the risk of engagement fatigue within the community and stakeholders. Key engagement updates for Quarter One: • Strategic Plan: Conducted a thorough review and analysis of community feedback to capture sentiment across various categories. The insights will be available for Councillors to use and reference in the development of the new Strategic Plan. • Carr Villa Memorial Park Masterplan: Supported the Project Lead to plan and implement engagement activities to seek community and stakeholder input into the development of the Masterplan for Carr Villa Memorial Park. • Mobile Vendor Policy: Supported the Project Lead to plan and implement engagement activities to seek stakeholder input into the review and revision of the Mobile Vendor Policy.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
					5. Consideration of engagement outcomes and provision of feedback.		
1.5	Connect with our community via storytelling to share the broader work of the Council with community.	1	Community and Place Organisational Services	Leader	Rolling proactive narrative with community about what Council does beyond the traditional media releases.	25%	Storytelling continues. One example relates to the free public Wi-Fi initiative which began in 2014 and reactivation to create awareness. Originally intended to support tourism and activate public spaces, free public WI-FI has evolved into a key tool for promoting digital inclusion and literacy with support from the My Place My Future program. Launceston's northern suburbs, among the lowest in the nation for internet connectivity, were identified as ideal locations for community-based Wi-Fi hotspots. To date, 11 hotspots have been installed in these areas. A decade later, the network continues to grow, helping users access essential services such as education, job applications, and government services. The network now includes over 50 wireless access points across the city, with an average of 1,600 daily connections. As part of a submission for a local government award, the City of Launceston engaged the community through the voting process, raising renewed awareness of the free public Wi-Fi service. This effort contributed to the city winning the national Local Government award in the Regional Growth category.

Strategic Priority 2 - We Facilitate Prosperity

We use our influence and resources to deliver the foundations for ongoing economic development. We want Launceston to be the heart of a thriving regional economy.

10-Year Goal:
To have realised opportunities that grow and sustain our economy, and foster creative and innovative people and industries.

Focus Areas:
1. To actively market the City and Region and pursue investment.
2. To facilitate direct investment in the local economy to support its growth.
3. To provide an environment that is supportive to business and development within the municipality.
4. To promote tourism, and the development of a quality tourism offering for Launceston.
5. To understand and support the establishment and growth of new and creative industries and businesses in Launceston.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
2.1	Progress implementation of the City of Innovation Strategy.	1	Organisational Services	Leader	• Establish and communicate a clear city innovation governance structure within Council. • Review open data, assess needs and establish future direction. • Participate in tourism advertising campaigns to promote city innovation infrastructure and services (e.g. highlighting to tourists the EV Charger Network, Wayfinding Signage, or e-Scooters in Launceston).	25%	• Innovation Project Decision Making Guidelines have been established with an associated checklist. Based on a Desirability, Viability & Feasibility (DVF) Framework, the guidelines ensure that key considerations are given to projects at the stage of inception such as potential risks, resource allocation, stakeholder engagement and projected outcomes. • Spatial data available on the Open Data portal has been reviewed, promoting transparency, encouraging innovation and supporting informed decision making. Regular reviews are important to make sure that the data remains accurate, up to date and relevant for users. • The team at the Travel and Information Centre has participated in a workshop covering topics such as the Electric Vehicle

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							(EV) Charger Network and Ride Share e-Scooters. They are now well informed on the topics and equipped with resources to assist in guiding visitors. • City of Launceston Electric Vehicle (EV) Chargers have been added to community platforms such as Plug Share to provide information to locals and visitors on locations, costs and how to access.
2.2	Support activation by increasing opportunities for events for the CBD and placemaking initiatives that support activated spaces.	2	Community and Place	Leader	• Capture actions that support the activations in the Tourism Strategy and Events Strategy. • Collaborate with Launceston Central. • Placemaking Team to consider activations that support night-time utilisation.	10%	An extension to the Flagtrax system to support City Heart and potential precincts is underway as 16 new banner systems along St John Street will complement the city's existing 62 systems. In addition, the Brisbane Street Mall and Civic Square banner systems are to receive new systems which will allow ground access banner installation. The banners are anticipated to be installed prior to December 2024. Greater Flagtrax usage has been a key focus for event activation, and improvements have been made to lower the cost of banner production and banner designs to allow for usage over multiple years, and a reduced banner installation fee. The Flagtrax system has been adopted for use by both Junction Arts Festival (4 to 27 September) and the North Festival (27 September to 30 October). Festivale has also confirmed a booking for 2025 and submitted design work. A review of the Brisbane Street Mall and a plan for activations was completed in September 2024. It is the intention to further develop the plan into actions in coming months.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							Placemaking has collaborated with Launceston Central as follows: • supported "The Lounge" with assets such as the chess table. • use of the Flagtrax system, which was adopted for the promotion of the North Festival.
2.3	Implement the Economic Development Strategy.	2	Organisational Services	Leader	• Deliver business support services in partnership with industry stakeholders, including facilitating business networking, clustering, and fostering collaboration, skill-building, and shared learning opportunities. • Develop a streamlined investor procedure for the City of Launceston, incorporating the creation of quarterly economic snapshots for the Local Government Area (LGA) to enhance investment facilitation in Launceston. • Continue to work in collaboration with key stakeholders in the region regarding coordination of economic development effort. • Continue to deliver the annual State of the City Report and to share	25%	• Delivered the "Building a Thriving Business" workshop in partnership with Launceston Central and Business Tasmania, attracting 80 participants from various industries. The event, which featured expert speakers and highlighted Launceston's place brand, successfully reinforced collaboration and support for local businesses, aligning with our commitment to fostering business growth and driving economic progress in the Launceston LGA. • Facilitated strategic partnerships and capacity-building initiatives through ongoing collaborations with Business Tasmania, the Launceston Employment Partnership Group, and key stakeholders. This included participation in the Digital Ready for Businesses workshops and attendance at the Mainstreet Australia Conference, focusing on strengthening local business capabilities and promoting best practices in economic development. • Strengthened local economic insights and monitoring through the subscription to Spendmapp, providing real-time analysis of economic trends within the Launceston LGA. These insights will be shared internally

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
					findings with our business community.		and with Councillors to guide decision-making and investment facilitation. • Supported regional economic priorities by contributing to Northern Tasmania Development Corporation (NTDC) regional projects and renewing engagement with the Bell Bay Advanced Manufacturing Zone, while aligning policy developments, such as the Mobile Vendor Policy, with Launceston's broader economic development strategy.
2.4	Partner with the State Government's International Engagement Program where there are clear benefits to the City of Launceston which are aligned with our Sister City relationships.	4	Chief Executive Officer	Advocate	• Review our Sister City relationships to consider the benefits for the City of Launceston and our community. • Continue to partner with State Government where relevant opportunities arise.	50%	Works are ongoing with existing and emerging relationships. The City Deal continues to be delivered until project completion in 2027. The Chief Executive Officer has engaged with the Coordinator General's Office to see what opportunities may present in 2025 for Council to support State based trade delegations.
2.5	Seek to understand community perspectives regarding opportunities to increase utilisation of public transport in the Launceston municipality and advocate to the State Government for change in the service model.	1	Infrastructure and Assets	Leader	• Undertake community engagement to understand barriers to use of public transport. • Develop a vision for public transport which Council can use for advocacy and partnership with the State Government.	5%	Preliminary discussions have commenced to explore engagement options. The engagement is now expected to take place in early autumn to align with the back-to-school and back-to-work period.

Strategic Priority 3 - We are a Progressive Leader

Our decision-making and actions are evidence-based, strategic, transparent and considered. We are ethical, fair and impartial in complying with and enforcing the law.

10-Year Goal:
To ensure decisions are made in a transparent and accountable way, that effectively meet our statutory obligations, support quality services and underpin the long-term sustainability of our organisation.

Focus Areas:
1. To provide for the health, safety and welfare of the community.
2. To fairly and equitably discharge our statutory and governance obligations.
3. To ensure decisions are made on the basis of accurate and relevant information.
4. To continually improve our service delivery via a continuous improvement mindset, pursuing efficiency gains, and adopting technological and other process innovations.
5. To maintain a financially sustainable organisation.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
3.1	Implement recommendations of the QVMAG Futures Plan.	5	Chief Executive Officer Creative Arts and Cultural Services	Leader	Key Directions and numbering taken direct from the QVMAG Futures Plan: • Key Direction 1 - progress the future governance model. • Key direction 2 - lobby for increased State contribution to the funding of the QVMAG. • Key Direction 5 - continue work on scope and delivery of the Priority Projects identified in the Futures Directions Plan.	25%	• Key Direction 1: Work is underway in identifying resources to progress the transition of governance process and actions. Transition of Governance Framework, including timelines and milestone deliverables, endorsed by Council in July 2024. • Key Direction 2: Discussions have been held with appropriate State Minister in relation to opportunities in this area. Work is underway to identify programmatic initiatives which will support lobbying efforts and will be presented to Council in Quarter 2. • Key Direction 5: Identification and endorsement of seeking Federal Government funding to commence the master planning of the priority projects outlined in the Futures Plan, specifically the

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							QVMAG Collections Discovery Centre has been completed and endorsed. The Chief Executive Officer and Mayor will progress lobbying efforts with the Federal Government in Quarter 2.
3.2	Continue to work on the transfer of UTAS Stadium to Stadiums Tasmania.	5	Chief Executive Officer	Partner	• UTAS Stadium transferred to Stadiums Tasmania.	90%	Council has resolved to transfer the Stadium, and with the decision made, Council is now working through the transfer process. This is proposed to be completed early 2025.
3.3	Continue to explore opportunities for shared services and/ or resource sharing in the local government sector.	2	Chief Executive Officer	Leader	• In line with the Local Government Review recommendations, seek to encourage and support shared services and resource sharing with adjoining Councils.	15%	Further works will be required, and initial discussions have commenced as part of the Regional General Managers network group. Preliminary areas of shared services have been identified, but increased appetite will be required amongst the surrounding councils. The Chief Executive Officer has approached 2 surrounding council General Manager's directly, to see what opportunities can be explored in a structured format (service delivery agreement).
3.4	Implement the Organisational Cultural Development Roadmap.	4	Organisational Services	Leader	• Continue to implement initiatives that support a values aligned culture. • Continue to invest in training and development opportunities for employees.	40%	The Organisational Development (OD) Team has a well prepared A3 Plan which is focusing on developing our Employee Development Framework. Over the last quarter the OD Team within the People and Culture Team have been working with our Values Champions to promote our Value in Focus – *Our People Matter* through initiatives captured in the Values Champion's Annual Plan for 2024-25. The OD Team continues to coordinate and arrange training and development for our employees in line with the Employee

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							Development Framework, including compliance training. All members of the Senior Leadership Team have recently commenced the Diploma in Local Government. All leaders have completed Difficult Conversations training to support leadership capability and confidence to have difficult conversations and performance manage employees as required and in a values-aligned way. Quarterly Reporting to Councillors has been implemented and it is expected that this will support improvement in "achievement": our people feeling a sense of achievement in their work across the organisation.
3.5	Continue delivery of the Corporate Application Replacement Program (CARP).	4	Organisational Services	Leader	• Commence second phase of CARP (Customer Experience) which includes health activities, animal registration, plumbing and building etc., property and rates and optimising data analytics.	25%	• Oracle Implementation Phase 1 (Finance, Procurement, Human Resources, Payroll, Assets and Mobility) - Currently this project is on hold while we work through some vendor delivery issues. Phase 1 of the project is sitting at approximately 80% delivered; however, some core dependencies to go live for the phase have not been met. Council is currently working through these non-delivered milestones with the vendor. • Document Management System Replacement - Project has progressed this quarter as the team works through the complexities of migrating all the data from our current Technology One's Enterprise Content Manager (ECM) to the ELO Digital Office project. Initial plan of go live in Quarter 4 2024 has been pushed to early

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							2025 (January - March 2025) to ensure the organisation has sufficient time to be trained and understand the changes in product and process when managing our corporate records. • Bookable Resource Booking Project - Project started this quarter with the planning, build and testing workshops occurring. Training will be delivered for the staff using the software before a go live in the middle of November. The remainder of the resources will be built and will go live in 2025. • The CARP Team has supported the planning team in the assessment of the statewide planning application, PlanBuild. Work has begun on bringing this option to the Executive Leadership Team for final signoff.
3.6	Deliver a new Corporate Strategic Plan for the next ten-year period covering 2025-2034.	2	Organisational Services	Leader	• New Strategic Plan 2025-2034 for the City of Launceston adopted.	25%	Ethos Urban have been engaged to assist Council in the delivery of a new 10 year Strategic Plan. This includes a 2 day workshop for councillors in October. Staff and external workshops will be carried out in November, and the next session with Councillors will be held in January 2025 to assist in formulating the draft plan.
3.7	Commence negotiations for the City of Launceston Enterprise Agreement.	2	Chief Executive Officer Organisational Services	Leader	• New Enterprise Agreement for the City of Launceston progressed.	25%	Our Enterprise Agreement Advisor has commenced. The project has commenced to benchmark a range of roles and review salary/wage classification structure in preparation for enterprise agreement (EA) negotiations. Research has been completed to benchmark employee benefits with other organisations.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							The Communications Plan and survey to consult with our people has been drafted for approval by the Chief Executive Officer. A memorandum of understanding (MoU) is being prepared to allow the EA negotiations to kick off in the second quarter of 2025, giving additional time for an appropriate role classification review to occur prior to EA negotiations concluding. Work has commenced to undertake an impact analysis on combining City of Launceston and Launceston Aquatic Centre Agreements. Weekly meetings are in place to continue to progress planning and preparation for the EA negotiations.
3.8	Explore and consider the need for responsible use of AI (Artificial Intelligence) and new technologies in line with City Innovation Strategy principles.	4	Organisational Services	Leader	• Clear guidelines developed to support use of AI technologies for the City of Launceston.	80%	A 'Current Position' statement was communicated to all staff in August, covering key topics such as the responsible use of Artificial Intelligence (AI) technologies, transparency, data privacy and security protocols, ethical considerations and the potential benefits and limitations of AI integration in council operations. This process was intended to be a stop gap while a policy was developed. The policy is in the final draft stages and nearing completion. Once complete, the policy will be communicated to staff and promoted via practical, hands-on workshop sessions.

Strategic Priority 4 - We value our City's Unique Identity

We facilitate our community's sense of place by enhancing local identity. We want people to be proud to say that Launceston is "my city".

10-Year Goal:
To sustain and promote Launceston as a unique place to live, work, learn and play.

Focus Areas:
1. To promote and enhance Launceston's rich heritage, culture and natural environment.
2. To continue to offer an attractive network of parks, open spaces and facilities throughout Launceston.
3. To promote and attract national and international events and support the sector to ensure a diverse annual events calendar.
4. To support the central business district (CBD) and commercial areas as activity places during day and night.
5. To support sustainable growth in the Northern Region.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
4.1	Progress the Launceston City Heart Project.	4	Infrastructure and Assets Community and Place	Leader	• Engage and commence development of implementation plan for traffic calming, including the introduction of two-way traffic. • Completion of place plans for City Heart. • Commence implementation of place plans.	25%	Councillors have recently been presented with a revised City Heart Plan, which is based on a 5 year period. This is supported by a 5 year implementation plan and an Urban Design Guide. Work has already begun on factoring the proposed works within the plan into the 2025-2026 capital program of Council, and importantly, upcoming budget deliberations for the 2025-2026 budget. A formal report outlining the City Heart Plan will be presented to a council meeting soon, seeking a formal decision of Council to give a direction on City Heart.
4.2	Implement the Northern Gateway Project.	5	Community and Place	Leader	• In partnership with Department of State Growth, deliver an entry statement at the southern outlet.	15%	A grant deed provided to the City of Launceston by the Department of State Growth which provides funding for the Northern Gateway project has been approved by the Chief Executive Officer.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							The Northern Gateway project tender is due for release next quarter.
4.3	Launceston Heritage List Review and Precincts - continuing the review of the City of Launceston's local heritage list: • Creation of any outstanding precinct datasheets. • Review nominations and removals from within each precinct. • Initiate community consultation and activities to support community awareness and engagement.	1	Community and Place	Leader	• Deliver up to 4 precincts over the financial year 2024-2025.	25%	For our local heritage list due to go to Council for endorsement at a Council Meeting in October there are 38 new listings and 11 amendments to existing listings. The development of a Babington Street precinct, including corresponding datasheet, has been finalised while both the Newstead and Mayne Street precincts are currently under development. These precincts will be brought to Council for initiation at a future meeting. It was determined that further community consultation and education regarding the concept of precincts is essential to the success of precinct listing. As such, we are currently working with a graphic designer to put together an informative piece. We will also prepare an explainer video describing the benefits of precincts. Our current timeline supports the delivery of multiple precincts by the end of the financial year. In addition, a consultant arborist has been engaged to identify 50 significant trees to start populating our significant tree register. We anticipate delivery of this report in mid-to late October 2024. Further, we have identified 2 archaeological sites to start populating our local archaeological site register. Once these sites have been finalised, they will likely be submitted to Council in a group amendment with the

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							significant trees once the arborist's report has been reviewed.
4.4	Continue to implement actions within the Cultural and Public Art Strategies.	1	Community and Place	Leader	• Identify suitable locations for activation of public art in line with the Public Art Strategy. • Investigate potential locations to support creative practices to be celebrated and activated by the community. • Develop an Arts & Culture Grant Policy with cultural outcomes established as a criteria for assessment.	25%	There are seven public art interventions currently underway within the city including: • 2 completed mural works in Criterion Place; • expressions of interest (EOIs) are currently advertised for mural projects on George Street and the Road Safety Centre; • EOIs are soon to be released for a Howick Street mural, and a series of bus shelters to be delivered with public art. Investigations for a Street Art Laneway are underway, in accordance with the recommendations outlined in the Public Art Strategy. Work towards this has included investigations for potential vendors who may have capability to map the CBD's internal laneways to consider how a long-term street art program would be effectively rolled out within the city while maintaining aesthetic and heritage considerations. Early stages of exploration into the Launceston Arts and Creative Hub (LAACH) are underway with research into the needs of Launceston's arts, creative, and cultural communities being conducted by the Cultural Development Officer and members of the Cultural Advisory Committee. Interviews of leading community members are likely to conclude in December. Complimentary to this the Cultural Development Officer has been exploring the possibility of re-establishing an artist residency program within the City of Launceston.

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							Progress towards this has consisted of working collaboratively with Building and Asset Management and QVMAG to ascertain other Council projects relating to residency programs. The development of an Arts and Culture grant policy has been brought before the Cultural Advisory Committee for input and a discussion paper is to be presented to the committee at the next meeting in December. Further work towards developing the policy is being informed by internal discussion and external consultation with City of Hobart, Glenorchy City Council and Clarence City Council.
4.5	Finalise and commence delivery of the Recreation and Open Space Strategy.	2	Infrastructure and Assets	Leader	• Recreation and Open Space Strategy presented to Council and endorsed.	95%	Final draft of the Recreation and Open Space Strategy is with selected stakeholders for comment. Next stage includes engagement with Councillors on 28 November 2024.
4.6	Continue the Albert Hall Renewal program including the establishment and delivery of an operational model that will increase usage of the facility.	2	Infrastructure and Assets Community and Place Organisational Services	Leader	• Complete construction works. • Conduct a public opening. • Ensure Operator in place for the café. • Coordinate arrangements for management of the facility.	25%	Construction works continue to remain on track for a quarter 1 2025 completion. Council has endorsed Theatre North to manage bookings.
4.7	Develop and commence staged implementation of an improvement plan for the for the Princess Theatre and Earl Arts Centre upgrade.	2	Infrastructure and Assets Community and Place Organisational Services	Leader	• Advocate for State and Federal Government investment in redevelopment. • Deliver conceptual design and progress development application.	25%	The Princess Theatre & Earl Arts Centre redevelopment is one of 5 projects included in the Council endorsed advocacy strategy. Accordingly, Council will actively seek funding through grant and funding programs.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
	This a multi-year project with main renewal works planned for 2026.				• Work with Theatre North to minimise construction impacts through good planning.		The development application has been submitted and a tender has been released to support early works contractor engagement.
4.8	Development of 118-124 Brisbane Street.	4	Chief Executive Officer	Leader	• Continue planning for the future utilisation of the site.	75%	Works are well underway with feasibility analysis to identify development options. More details on proposed site uses have been presented to Council via workshop, and a council report for endorsement on future direction is proposed late 2024.

Strategic Priority 5 - We Serve and Care for our Community

We are invested in our community's long-term health, well-being, safety and resilience. We want to be trusted and respected by our community.

10-Year Goal:
To offer access to services and spaces for all community members, and to work in partnership with stakeholders to address the needs of vulnerable communities.

Focus Areas:
1. Plan for and provide services and facilities that recognise the changing demographics and needs of our community.
2. To define and communicate our role in promoting social inclusion and equity.
3. To work in partnership with community organisations and other levels of government to maximise participation opportunities for vulnerable and diverse members of the community.
4. To support the delivery of programs and events for people to connect with each other through participation in community activities and civic life.
5. To promote and support active and healthy lifestyles of our community.
6. To enhance community awareness of the impacts of uncertain weather patterns, natural and other disasters, and build community resilience.
7. To develop and manage infrastructure and resources to protect our community from natural and other hazards.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
5.1	Implement Council commitments from the My Place My Future Plan.	1	Community and Place	Leader	• Continue small business workshops within the Northern Suburbs. • Facilitate community led events within the Northern Suburbs to promote engagement and connection. • Support digital inclusion, community safety and food security projects and initiatives.	30%	Support for community-led action groups continues in the Northern Suburbs with 3 groups meeting monthly. In July, the Rocherlea Action Project hosted a Silent Disco, attracting 60 parents and children. Community Together 7248 is currently planning "Let's Fly Together", a family kite-flying event for Seniors and Children's Week. Business Connect hosted a free small business workshop specifically for the Northern Suburbs. Additionally, My Plan My Future supported 2 primary school classes in attending QVMAG for Science Week. July was the first meeting of the Digital Inclusion Working Group facilitated by the Council with participants including the Libraries Tasmania, 26Ten, NBN Co, Community Housing Limited and the Department of Premier and Cabinet. This meeting provided a platform to discuss digital programs and to identify opportunities for collaboration to make a significant and positive impact on the community's use of local digital assets and technology. In August, a "Let's Talk Road Safety" meeting brought together community members, service providers and government agencies.
5.2	Review the Access Framework.	3	Community and Place	Leader	Complete review of the Access Framework.	0%	Work has yet to commence on this review. Part of this review will consider the evolution of this framework to be a broader equity and inclusion strategy encompassing a larger array of issues facing disadvantaged people and marginalised groups in Launceston as per the Notice of Motion (NOM) to produce an equity and inclusion strategy.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
5.3	Implementation of outcomes from the strategic review of the ABCDE Learning Sites community development program.	3	Community and Place	Leader	To be determined post completion of strategic review.	25%	The review of the ABCDE Learning Site program has been finalised with 5 key changes as follows: 1. Progress to an independent, self-governing programming model. Key changes include a new program name, resources and facilitation support. 2. Rename the ABCDE Learning Site to 'Launnie Connecting Community'. 3. Maintain a physical site for 2 years to enable authentic relationship building with the option to incorporate thematic and demographic focus areas. 4. Strengthen the Community Continuity Plan with a focus on community builders' development beyond the site's duration, utilising findings from the Social Impact Research Report. 5. Stronger project collaboration between City of Launceston officers/teams to purposefully embed the asset-based community development approach more widely across the organisation. A site for the revamped program has been selected as Waverley for 2 years beginning in February 2025.
5.4	Continued implementation of the Homelessness Statement of Commitment (HSoC).	3	Community and Place	Leader	• Change the narrative. • Engage the community. • Facilitate cohesive services. • Strive towards prevention.	25%	Council officers responded to 78 customer service requests across the period from 1 July to 30 September 2024, and 4 staff reported incidents of related threats or abuse arising from rough sleepers. The Workplace Health and Safety and Community Development Teams introduced a procedure to capture into the homelessness database staff reports of

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
					• Engage in data informed decision making. • Advocate. • Ensure transparency and accountability.		threats or abuse. Officers would like to express their gratitude to community members, staff and Councillors for sharing information to support those experiencing housing vulnerability and homelessness. There were 2 trespass orders issued after all efforts to actively engage with support services and repeated requests to maintain respectful behaviour and amenity were unsuccessful. In these instances, the immediate safety of the community could no longer be confidently maintained requiring the serving of trespass orders. Councillor Walker chaired 2 Homelessness Advisory Committee meetings in July and September, and officers participated in 3 Northern Community Action Group (NCAG) meetings. The team supported and participated in events held by Vinnies and the Salvation Army during Homelessness Week. The Community Development Team Leader was a panellist at the national Homelessness Conference, hosted by the Australian Housing and Urban Research Institute (AHURI) in Adelaide. The national homelessness magazine, Parity, issued by the *Council to Homeless Persons*, featured the City of Launceston in their local government and homelessness edition.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
5.5	Develop the Community Health and Wellbeing Strategy.	5	Community and Place Infrastructure and Assets Creative Arts and Cultural Services	Leader	• Assess and document the City of Launceston's current investments in supporting community health and wellbeing.	0%	This project has yet to commence due to staff resourcing issues in the first quarter. Work will commence in the second quarter.
5.6	Embed the Child and Youth Safe Organisations Framework as required by the Child and Youth Safe Organisations Act 2023.	2	Community and Place Organisational Services	Leader	• Review organisational policies and identify those that require updating. • Deliver training for employees.	25%	Work on the Child and Youth Safe Organisations Framework (CYSOF) is well underway. The statement of commitment to the safety of children and young people was adopted by Council at a meeting in September. A webpage has been established with the published commitment, which is also provided in a child friendly version. Additionally, the website shows the progress we are making as a city to adopt and embed the CYSOF into our organisation. Training to frontline officers has also been provided by Laurel House. Further training is planned for team leaders so they can lead discussions with their teams about the 10 child safe standards. The next phase of work involves planning for the national survivors' day on 12 November as well as reviewing policies.

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5.7	Implement Flood Intelligence System Improvements.	7	Infrastructure and Assets	Leader	• Install river level and rainfall sensors. • Update flood warning plan associated with data inputs.	10%	Location scoping is underway, with various options being evaluated. Plans are being made for a visit to other councils, to be completed in November, to gain insights from their flood warning and intelligence systems and experiences.

Strategic Priority 6 - We Protect our Environment

We strive to minimise the impact of our actions on the environment, while planning for, adapting to and managing the impact of climate change. We want to protect the special character and values of our city for future generations.

10-Year Goal:
To enhance the unique natural character, values, and amenity of our city by minimising the impacts of our organisations and our community's activities in the environment.

Focus Areas:
1. To reduce our and the community's impact on the natural environment.
2. To contribute to air and river quality improvements in Launceston.
3. To manage the risks of climate related events, particularly in the area of stormwater management and riverine flooding.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
6.1	Support the Tamar Estuary Management Taskforce including supporting the implementation of the 10-year vision for the Kanamaluka/Tamar Estuary.	2	Chief Executive Officer	Service Provider Part	• Participate in working groups for the wetlands and revegetation project and the master planning project.	50%	Works on schedule with regular attendance at Tamar Estuary Management Taskforce (TEMT) meetings. TEMT has recently completed a request for quote for a consultant to prepare a master plan for the upper estuary to revitalise the waterfront and activate the space by bringing

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							people to the water's edge through the provision of infrastructure and amenities. Target completion of the master plan is February 2025. TEMT recently finalised procurement: 1. to gain new data on levees and ground elevation using LiDAR technology and aerial imagery. This information will be used by the Taskforce in the detailed design of the trial wetland project. 2. of an Ecosystem Baseline Inventory (EBI) to identify changes in the ecosystem with the implementation of the project; and 3. on the project design for the trial river-edge revegetation project between the Tamar Street and Charles Street bridges. The trial work will help to identify planting methods and plant species that will thrive in the intertidal zone of the North Esk River and the kanamaluka/Tamar estuary. The results of this trial will be used to revegetate the wetlands in the North Esk and the mudflats along the estuary. The City of Launceston Chief Executive Officer is the Chair of the Infrastructure & Amenity Steering Committee.
6.2	Flood focused emergency management planning.	3	Community and Place	Leader	• Develop a Recovery Framework and supporting Action Plan in conjunction with recovery partners.	10%	The Launceston Recovery Project Officer has been appointed and commenced on 23 September 2024. The Terms of Reference for the Steering Committee were approved at the first meeting, with in principle support of the project plan pending further review. The project has a 2-

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							year life span with the aim to develop the Launceston Flood Recovery Framework.
6.3	Support TasWater and NRM North with the implementation of the $129.2M River Health Action Plan to improve catchment management and reduce overflows from the combined system.	2	Infrastructure and Assets	Service Provider Part	• City of Launceston outputs are limited to facilitation of the project as it relates to City of Launceston's land and assets.	25%	Council Officers continue to support TasWater in the implementation of the River Health Action Plan project. Most recently this has included: • site walkovers at the West Tamar Silt Ponds following TasWater's demobilisation from site. • facilitation of use of Council land (East Tamar Silt Ponds) for silt management. • approval of sheet piling in the vicinity of Paterson Levee to facilitate pipeline connections.
6.4	Review the future of waste management infrastructure for the Launceston municipality.	1	Infrastructure and Assets	Leader	• Review future requirement of Russells Plains for landfill operations. • Conduct feasibility study on construction and diversion facility.	40%	The company GHD has been engaged to undertake landfill suitability assessment of council's Russells Plains property. The consultant MRA has been engaged to undertake an initial audit at the Launceston Waste Centre which is now complete. A draft report and recommendations are to shortly be submitted.
6.5	Scope development of Clean Air Strategy.	2	Community and Place	Leader	• Scope developed for documentation of Council's position on clear air.	50%	The scope has been developed and will now be taken to Council Workshop for direction and the next steps in the strategy development. The scope has identified more areas to address than the original Wood Smoke issues. The strategy will require a regional view and engagement with multiple agencies. The elected members of Council will assist with forward direction.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
6.6	Implement the City of Launceston Urban Greening Implementation Plan.	1	Infrastructure and Assets	Leader	Develop and commence implementation of year one of a 4-year delivery plan, including: • Street Tree Masterplan. • Precinct Plans for high priority areas. • Car park greening.	25%	Precinct plan work has commenced with the completion of Mayfield. Pre-planning for Street Tree Masterplan has commenced with a detailed cost analysis on the implementation and including project methodology.
6.7	Continue to implement the City of Launceston Sustainability Action Plan.	1	Infrastructure and Assets	Leader	Outputs and numbering taken direct from the Sustainability Action Plan: • 1.4 Conduct sustainability education and awareness program across Council. • 2.4/6.6 Continue upgrading of facilities to increase energy efficiencies. • 5.1 Undertake bio-condition assessment of key reserves. • 5.21 Hold a native plant giveaway to support urban forest. • 6.1 Conduct a lighting audit and replace inefficient lighting. • 6.9 As required, upgrade corporate and commercial equipment to modern energy efficient models.	35%	Works are progressing against each of these outputs as follows: • 1.4 - Developed an e-learning module and workshop for the organisation. E-learning module rolled out and workshops to commence. • 2.4/6.6 - Energy efficiency works completed at Launceston Aquatic Centre, Princes Theatre lighting upgrade and major works to include energy efficiency best practise at Albert Hall and Earl Arts Centre projects. o To be commenced in line with Sustainability Action Plan schedule. o Native plant giveaways for 2024 at Sustainable Living Festival and two Urban Greening community engagement sessions. • 6.1 - LED replacement for all failed bulbs, however an audit across all sites yet to be completed. • 6.9 - Ongoing and as identified.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
6.8	Ongoing implementation of the Stormwater System Management Plan.	1	Infrastructure and Assets	Leader	• Adopt a Stormwater Policy for developments. • Implement Urban Waterway Health Plan. • Deliver Prospect Flood Alleviation Project.	10%	The Stormwater Policy for Development is being drafted with various implementation options currently under consideration. Implementation of an Urban Waterway Health Plan is ongoing, and planning is underway for the major Financial Year 2025 site at Hargrave Crescent, Mayfield, in Autumn 2025. Prospect Flood Alleviation Project is progressing to detailed design, currently projected for tender in early 2025.
6.9	Develop the Launceston Flood Strategy	3	Infrastructure and Assets	Leader	• Endorse project scope and plan. • Consider budget implications of findings.	25%	A project scoping study is currently being finalised to be presented at the Council meeting in quarter 2.

Strategic Priority 7 - We are a City Planning for our Future

We play a leading role in balancing the enviable amenity of our municipality with the needs of future development and growth. We want to influence the delivery of the right investment for our city and region.

10-Year Goal:
To facilitate appropriate development via integrated land-use planning, infrastructure investment, and transport solutions within our municipality and region.

Focus Areas:
1. To ensure that our application of the land-use planning system at a local and regional level is effective and efficient.
2. To take a strategic approach to development sites and infrastructure investment within the municipality to maximise public benefit and encourage development and investment.
3. To improve and maintain accessibility, transport options, and infrastructure within the Launceston area, including its rural areas.
4. To ensure our suite of strategic planning initiatives are coordinated, and representative of our community's needs and aspirations.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
7.1	Continue to work with the Commonwealth and State Governments to successfully implement commitments and projects under the City Deal program that deliver a range of economic and social benefits to the city.	4	Chief Executive Officer	Service Provider Part	• Reporting on City Deal commitments delivered as required. • Consider mechanisms to support City of Launceston liaison with Commonwealth and State Governments following conclusion of the City Deal.	50%	A City Deal update is provided through the Chief Executive Officer's quarterly report.
7.2	Continue work on St Leonards Residential Growth Strategy and Masterplan.	2	Community and Place Infrastructure and Assets	Leader	• Work towards establishing a master plan and zoning amendment to support residential growth.	25%	City of Launceston received Federal Government funding under the Housing Support Grant Stream One for this project in July 2024. Mesh has been engaged as lead consultant to deliver the Structure Plan and Infrastructure Funding Framework by 31 May 2025. Mesh will be supported by a team of specialist sub-consultants. A Project Reference Group has been established comprised of internal council officers with relevant technical expertise. A project inception meeting was held in August, a background review of documentation has been completed, and preliminary investigations commenced by consultants ahead of the visioning workshops (to be held in October).
7.3	Participate in the Northern Regional Land Use Strategy Review.	1	Community and Place	Service Provider Part	• Ongoing participation in the Northern Regional Land Use Strategy Review.	25%	Consultant Ethos Urban have been appointed to complete the first stages of the review including a regional “state of play” report. Councillor engagement is planned for November.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
7.4	Complete municipality specific strategic planning projects.	4	Community and Place	Leader	• Deliver Levee Protected Areas Code. • Building Heights and Massing.	75%	A Council workshop was held on 1 August to foreshadow the Levee Protected Areas Specific Area Plan (SAP) being brought before a Council Meeting in quarter 2, 2024. As the SAP will be an amendment to the planning scheme, it will need to be initiated by Council ahead of a statutory public exhibition period. The building heights and massing project is underway. Consultants Urbis have been progressing and workshops between Urbis and the Council project team were held to discuss and confirm the built form approach in July. A Project Reference Group comprised of internal council staff with relevant expertise have provided input on drafts to date. Urbis provided a Draft Central Area Specific Area Plan (SAP) for review in late September. It is being considered internally by the project team and project reference group ahead of the 'stretch testing' phase with expert panel in quarter 2, 2024. Depending on feedback received and updates required, SAP to be brought to a Council Workshop ahead of a community engagement period to commence in quarter 2 or quarter 3 (outside of the Christmas closure period).
7.5	Finalise the Structure Plan for Alanvale and progress appropriate rezonings.	2	Community and Place	Leader	• Structure Plan for Alanvale endorsed by Council. • Commence rezoning process.	10%	The Northern Regional Land Use Strategy (NRLUS) identifies land within Newnham, east of the East Tamar Highway, as a supporting consolidation area of urban growth requiring a local strategy for land to be rezoned. Over the past years, Council has received several rezoning applications to residential zone on different sites within the Alanvale Structure Plan urban growth area.

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							Council is currently preparing a project plan to ascertain how the Structure Plan may be delivered by the end of the 2024-25 financial year to allow rezoning applications to progress and urban growth to occur in an orderly and considered manor.
7.6	Scope approach to deliver a Housing Strategy for our municipality.	2	Community and Place	Leader	• Council commitment to adopting a Housing Strategy achieved.	15%	Council engaged consultants, REMPLAN, on 23 September 2024 to prepare a Local Housing Strategy that will outline a plan to appropriately accommodate housing needed within the municipality over the coming years. It is anticipated a draft Strategy will be finalised by the end of quarter 2, 2024, for consideration at a Council Meeting in the first half of 2025. Community engagement is to occur in the first half of 2025, pending Councillor consideration and decision.
7.7	Develop a future operations and land development Masterplan for Carr Villa Memorial Park and related cemeteries.	1	Community and Place	Leader	• Develop a Masterplan for the future of Carr Villa and related cemeteries.	45%	The development of a Carr Villa Memorial Park draft Masterplan commenced in July 2024, with the appointment of consultants McGregor Coxall. The masterplan will guide the development of the site for cemetery services for the next 100+ years. The consultants have completed phase one of the project, with the emphasis on research, listening and learning. The knowledge gained from this phase, a thorough review of background documents, stakeholder workshops and site analysis through desktop environmental research, has been complimented by a visit to Carr Villa to validate an understanding of site conditions. Phase 2 of the project 'Consultation' is due to commence in early October, with stakeholder

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							sessions, community consultation, as well as further site analysis. This phase works towards the development of a return brief, planned for mid-November, that will outline and confirm the project scope, the vision and objectives, and begins to map the opportunities, and constraints prior to the development of a draft masterplan. The project timeline has been developed to allow for a draft masterplan to prepare by early 2025, working towards an endorsed plan by June 2025.
7.8	Action the 2022-2025 Launceston Transport Strategy Implementation Plan.	3	Infrastructure and Assets	Leader	• Deliver Transport Safety Improvement Program. • Complete gap-analysis and prioritised improvement program for intra-city cycle routes. • Deliver bus stop improvement program.	20%	Progress regarding the transport safety improvement program includes: • Lilydale Golconda Road Safety Improvement Program - The safety audit has been completed, with the recommendations verified on-site. Planning is now underway for implementation. This work will involve improvements to signage, line marking, guideposts, and the installation of significant sections of guardrail. • The Black Spot funded Mulgrave Street outstand improvements were completed in September. • Planning is underway for the Black Spot funded Gorge Road reseal, likely to be delivered in early 2025. • Detailed designs are being completed for the 2 projects associated with the vulnerable road user program, including a raised intersection at Basin Road/Denison Road (near West Launceston Primary

Action Item ID	Annual Plan Actions 2024-25	Focus Area	Responsible Network/s	Our Role	Output	Progress %	Progress Update
							School) and the Prossers Forest Road Pedestrian Crossing. The cycle route project is scheduled to commence in early 2025. A total of 40 bus stops will be upgraded as part of the bus stop improvement program. There will be minor upgrades at most sites, installation of 5 new bus shelters and some associated civil works. Minor upgrades to 9 sites have been completed by the Operations Team and further works are currently on hold awaiting delivery of additional pavement tactiles. Estimates have been obtained for shelters and conversations are underway with contractors for delivery of these works.
7.9	Determine a project approach to clarify the vision for the future use of the Russells Plains land owned by City of Launceston and the opportunity that provides for the Northern Suburbs.	2	Chief Executive Officer	Leader	• Develop an approach to progress the establishment of a vision for the future of Russells Plains. • Prepare Project Plan to progress approach to establishing vision.	10%	Discussions have commenced with an external consultant to assess the need for future use of Russells Plains for landfill related purposes. Further works will be dedicated to this in early 2025.

GSTD 2024/2 - Goods and services tax: is the supply of a burial right in respect of a public cemetery subject to GST?

This cover sheet is provided for information only. It does not form part of *GSTD 2024/2 - Goods and services tax: is the supply of a burial right in respect of a public cemetery subject to GST?*

There is a Compendium for this document: **GSTD 2024/2EC** .

Australian Government
Australian Taxation Office

Goods and Services Tax Determination
GSTD 2024/2

Status: **legally binding**

Goods and Services Determination

Goods and services tax: is the supply of a burial right in respect of a public cemetery subject to GST?

Relying on this Determination

This publication (excluding appendix) is a public ruling for the purposes of the *Taxation Administration Act 1953*.

If this Determination applies to you, and you correctly rely on it, we will apply the law to you in the way set out in this Determination. That is, you will not pay any more tax or penalties or interest in respect of the matters covered by this Determination.

Table of Contents **Paragraph**

What this Determination is about

1. This Determination explains how the special rules in Division 81 of the *A New Tax System (Goods and Services Tax) Act 1999* (GST Act) and the associated regulations in Division 81 of the *A New Tax System (Goods and Services Tax) Regulations 2019* (GST

Status: **legally binding**

Regulations) operate to exempt the supply of a burial right made by an Australian government agency from goods and services tax (GST). For the purposes of this Determination, such supplies are referred to as supplies of burial rights in public cemeteries.

2. This Determination also considers the GST consequences of the:

- supply by an Australian government agency of the permission required to exercise a burial right in a public cemetery
- renewal by an Australian government agency of a burial right and the recording of the granting or transfer of a burial right in a public cemetery
- supply of other goods and services in relation to a burial or cremation, including memorial plaques and gravedigging services, and
- supply of a burial right in a public cemetery where a funeral director arranges for the supply, including as an agent for the public cemetery operator or as an agent for the purchaser of the burial right.

3. The GST exemptions in Division 81 of the GST Act and Division 81 of the GST Regulations only apply to supplies made by Australian government agencies. Consequently, this Determination and the GST exemptions explained in it, do not apply to the supply of a burial right or the renewal of a burial right by an entity that is not an Australian government agency. A burial right that is granted or renewed by an entity that is not an Australian government agency is subject to GST, where the grant or renewal of the burial right meets the definition of a taxable supply in section 9-5 of the GST Act.

Background

4. Taxable supplies are subject to GST.[1] Supplies are defined to include the supply of goods[2], the supply of services[3], and the grant of any right.[4] If there is no consideration for a supply, the supply is not a taxable supply and is therefore not subject to GST.

5. Division 81 of the GST Act and the GST Regulations exclude from GST certain legislatively imposed fees and charges by ensuring these payments do not constitute consideration for a supply.[5] This exclusion from GST does not apply to a fee or charge that is prescribed to be consideration by the GST Regulations.[6]

6. The GST Act refers to a fee or charge that is subject to these special rules as an Australian fee or charge. An Australian fee or charge is defined to mean a fee or charge, however described but not including an Australian tax that is imposed under an Australian law, and which is payable to an Australian government agency.[7]

[1] Section 9-40 of the GST Act.
[2] Paragraph 9-10(2)(a) of the GST Act.
[3] Paragraph 9-10(2)(b) of the GST Act.
[4] Paragraph 9-10(2)(e) of the GST Act. The word 'right' is not defined for GST purposes and has a very broad meaning under the general law. A 'right' has been defined as '[g]enerally, a benefit or claim entitling a person to be treated in a certain way': see paragraphs 25, 26 and 53 of Goods and Services Tax Ruling GSTR 2003/8 *Goods and services tax: supply of rights for use outside Australia – subsection 38-190(1), item 4, paragraph (a) and subsection 38-190(2)*.
[5] Sections 81-1, 81-10, 81-15 and 81-20 of the GST Act.
[6] Section 81-1 of the GST Act.
[7] Section 195-1 of the GST Act.

Status: **legally binding**

7. An Australian law is defined to mean the law of the Commonwealth, a state, or a territory and therefore includes state or territory legislation.[8] An Australian government agency is defined to mean the Commonwealth, a state, a territory, or a Commonwealth, state or territory authority.[9] This definition encompasses entities including trusts formed by state or territory governments under state or territory legislation[10], local municipal councils and shire councils.[11] Cemeteries operated by these kinds of entities or councils are referred to as public cemeteries in this Determination.

8. State and territory legislation that regulates burials and cemetery operations empowers public cemeteries to grant to a person the right to bury or inter human remains (including cremated human remains) in a public cemetery in exchange for the payment of a fee or charge.[12] This right is referred to as a burial right in this Determination. Depending on the state or territory legislation involved, a burial right may also include the right to place a memorial on the land that is the subject of the right.[13]

9. A burial right is different to any permission that an Australian government agency must provide to a person under state or territory legislation, in order to allow the exercise of a burial right in a public cemetery by performing the physical act of burying human remains, or creating a memorial at the location covered by the burial right. This permission may be referred to as an order for interment or an interment authorisation depending on the state or territory legislation involved.[14]

[8] Section 195-1 of the GST Act and section 995-1 of the *Income Tax Assessment Act 1997* (ITAA 1997).
[9] Section 195-1 of the GST Act and section 995-1 of the ITAA 1997.
[10] A charitable trust created by statute for the purpose of operating a cemetery under the supervision of a state or territory government on government-owned land may, depending on all the relevant facts and circumstances, be capable of satisfying the definition of an Australian government agency. Entities in this situation should consider the principles explaining when an entity will be regarded as being part of the Commonwealth, a state or a territory in Goods and Services Tax Ruling GSTR 2006/5 *Goods and services tax: meaning of 'Commonwealth, a State or a Territory'* to determine if they satisfy the definition of an Australian government agency.
[11] See GSTR 2006/5 in relation to the inclusion of local municipal and shire councils and other entities formed by state or territory governments to perform generally accepted governmental functions in the Australian government agency definition.
[12] A burial right may be known by different names such as a right of interment or an interment right in Victoria, New South Wales and South Australia, and an exclusive right of burial, right to burial or right to interment in Western Australia, Tasmania, the Northern Territory and the Australian Capital Territory. See section 73 of the *Cemeteries and Crematoria Act 2003* (Vic), section 56 of the *Cemeteries and Crematoria Act 2013* (NSW), section 30 of the *Burial and Cremation Act 2013* (SA), section 25 of the *Cemeteries Act 1986* (WA), section 41 of the *Burial and Cremation Act 2019* (Tas), section 50 of the *Burial and Cremations Act 2022* (NT), and sections 8 and 9 of the *Cemeteries and Crematoria Act 2020* (ACT). The *Local Government Act 2009* (Qld) empowers local governments to make local laws pertaining to their local government area. It is through such laws that a right to be buried in a public cemetery is granted.
[13] See, for example, section 30 of the *Burial and Cremation Act 2013* (SA) which enables the holder of a burial right to create a memorial to a deceased person at the location covered by the burial right subject to obtaining the approval of the relevant authority and complying with any other applicable terms of the right. See also section 25 of the *Cemeteries Act 1986* (WA), which enables the holder of a burial right to place a memorial on the site that is the subject of the right.
[14] See, for example, section 67 of the *Cemeteries and Crematoria Act 2013* (NSW), which provides that an interment cannot take place in a cemetery without the cemetery operator issuing an order for interment and section 115 of the *Cemeteries and Crematoria Act 2003* (Vic), which prohibits a person from interring bodily remains in a public cemetery unless the cemetery trust responsible for that public cemetery has granted an interment authorisation for the interment.

Status: **legally binding**

Ruling

10. The following supplies made by an Australian government agency are not subject to GST:

- the supply of a burial right in a public cemetery
- the renewal of a burial right in a public cemetery, and
- the supply of any permission that must be obtained under state or territory legislation to exercise a burial right by physically burying human remains or creating a memorial at the location covered by the burial right.

11. The fees or charges payable to an Australian government agency in relation to the agency recording the granting or transfer of a burial right in a public cemetery are not consideration for a supply and therefore not subject to GST.

12. The fees or charges payable to a public cemetery operator, funeral director, or to another entity for the supply of other goods and services made in relation to a burial or cremation, including memorial plaques and gravedigging services are consideration for a supply. The supply of these goods or services are a taxable supply where the other requirements in section 9-5 of the GST Act are met.[15]

13. Where an Australian government agency that operates a public cemetery is paid fees or charges for supplying burial rights which are not subject to GST, together with fees or charges for supplying other goods or services which are subject to GST, the operator must apportion the total amount of fees or charges between the amount that relates to supplying the burial right which is not subject to GST, and the amount that relates to making taxable supplies of other goods or services on which GST must be accounted for.[16]

14. A funeral director that arranges for the supply of a burial right in a public cemetery, including by acting as an agent for the Australian government agency that operates the public cemetery or for the purchaser in relation to the supply of the burial right, must ensure that GST is not applied to any amount they receive that is payable to the Australian government agency for the supply of the burial right. A funeral director is liable for GST on any taxable supplies of goods, services or of other things that the funeral director itself makes to the purchaser of the burial right.

Example 1 – grant of a burial right by an Australian government agency

15. *Essandtee Public Cemetery (EPC) is an Australian government agency which operates and manages a public cemetery for the Essandtee Municipal Council.*

16. *Kerron purchases a burial right from EPC. The right is for a period of 25 years, with an option to renew for a period of up to a total of 99 years. The right allows Kerron to determine who can be buried in a specified location in the cemetery and install an approved memorial of the deceased on the site. EPC will supply and install a memorial for a separate fee. EPC will also provide a gravedigging service for a separate fee.*

[15] The other requirements for making a taxable supply in section 9-5 of the GST Act are that the supply is made in the course or furtherance of an enterprise carried on by the supplier, that the supply is connected with the indirect tax zone, and that the supplier is registered or required to be registered for GST.

[16] For further information on the ATO's view regarding apportionment see Goods and Services Tax Ruling GSTR 2001/8 *Goods and services tax: Apportioning the consideration for a supply that includes taxable and non-taxable parts*.

Status: **legally binding**

17. *Under Division 81 of the GST Act and Division 81 of the GST Regulations, the payment received by EPC from Kerron in return for the grant of the burial right is not the provision of consideration. The supply of the right is therefore not a taxable supply and no GST is payable by EPC.*

18. *If the initial 25-year period is renewed, the payment for the renewal is also not the provision of consideration and the supply is not a taxable supply.*

19. *However, the supply and installation of the memorial and the supply of the gravedigging service are both subject to GST.*

20. *Had Kerron's deceased estate purchased the burial right together with the other taxable supplies from EPC after Kerron's death, EPC would have needed to apportion the total fee or charge for all of the supplies it makes to the deceased estate to ensure that GST is not applied to the portion of the total fee or charge that is payable for the supply of the burial right.*

Example 2 – supply of a burial right in a public cemetery arranged by a funeral director

21. *The executor of Mary's deceased estate engages a funeral director to arrange Mary's funeral in a public cemetery. The funeral director arranges items that include the following:*

- *supply of the burial right by the Australian government agency that operates the public cemetery*
- *supply of the gravedigging services*
- *services of a monumental mason*
- *the public cemetery's permission to conduct a burial and place a monument at the burial site*
- *supply of a religious ceremony by a religious institution as part of the funeral, and*
- *supply by an Australian government agency of a death registration certificate for the deceased.*

22. *In addition to this, the funeral director supplies the coffin and the services of preparing the deceased for burial to the estate.*

23. *The funeral director invoices Mary's estate. The invoice itemises the amounts payable for the burial right, the permission to conduct the burial and place the monument, the gravedigging services, the services of the monumental mason, the religious ceremony, the supply of the death registration certificate, the sale of the coffin, the preparation of the deceased and the funeral director's fee for arranging Mary's funeral.*

24. *The funeral director is liable for GST on the amounts on their invoice to Mary's estate which relate to the taxable supplies that the funeral director makes to the estate – for example, the taxable supply of the funeral director's service of arranging the purchase of the burial right, arranging the permission to conduct the burial, arranging the gravedigging services, arranging the services of the monumental mason, arranging the religious ceremony, arranging the supply of the death registration certificate, the sale of the coffin, the preparation of the deceased, and the taxable supply of any other goods or services made by the funeral director to the estate.*

Status: **legally binding**

25. *As the funeral director is only arranging the Australian government agency's supply of the burial right and permission to conduct the burial, the amount that the funeral director invoices Mary's estate does not include any GST on the fees payable to the Australian government agency for the supply of the burial right and the permission. This is because the supply of the burial right and the supply of the permission by the Australian government agency, are supplies that are made by the agency and are not subject to GST.*[17]

26. *The funeral director is required to ensure that GST is not applied to the cost of the religious ceremony if the religious ceremony was provided by a religious institution that satisfied the requirements in section 38-220 of the GST Act.*[18] *The funeral director would also be required to ensure that GST is not applied to the fee charged by the Australian government agency for issuing the death registration certificate.*[19]

27. *If the funeral director's invoice did not separately itemise the amounts payable for the different goods and services involved in providing the funeral, the funeral director would still be required to ensure that GST was not applied to any part of the invoiced amount that was for any fees charged by Australian government agencies, religious institutions or other entities that were not subject to GST. This would include the fees charged by an Australian government agency for supplying the burial right, the permission to conduct the burial and the death registration certificate.*

Date of effect

28. This Determination applies on and after 4 December 2024, being the date of publication of this Determination. However, the Determination does not apply to taxpayers to the extent that it conflicts with the terms of settlement of a dispute agreed to before the date of issue of the Determination (see paragraphs 75 to 76 of Taxation Ruling TR 2006/10 *Public Rulings*).

Commissioner of Taxation
4 December 2024

[17] The fee payable to the Australian government agency for the supply of the burial right in the public cemetery to the deceased estate is not subject to GST, whether or not the funeral director acts as an agent for the Australian government agency in relation to the supply of the burial right.
[18] Section 38-220 provides that a supply is GST-free if it is a supply of service that is supplied by an Australian Charities and Not-for-profit Commission (ACNC)-registered religious institution and is integral to the practice of that religion.
[19] As subsection 81-10(5) of the GST Act excludes this fee from being the consideration for a supply.

Status: **not legally binding**

Appendix – Explanation

This Explanation is provided as information to help you understand how the Commissioner's view has been reached. It does not form part of the binding public ruling.

Division 81 of the GST Act and Division 81 of the GST Regulations

29. Subsection 81-10(1) of the GST Act excludes from consideration certain Australian fees or charges if they are covered by subsections 81-10(4) or 81-10(5) of the GST Act. Section 81-15 of the GST Act also enables the GST Regulations to prescribe that kinds of Australian fees or charges are excluded from being consideration.

30. If these exclusions apply, the supply to which the fees or charges relate is not subject to GST, because the supply is not made for consideration.

31. The exclusions from GST cover the following kinds of fees or charges imposed by and payable to Australian government agencies under state or territory legislation:

- a fee or charge paid in relation to (or in relation to an application for) the provision, retention or amendment under state or territory legislation, of a permission, exemption authority or licence however described – see subsection 81-10(4) of the GST Act
- a fee or charge paid in relation to the agency recording, copying, modifying, allowing access to, receiving, processing or searching for information – see subsection 81-10(5) of the GST Act, or
- a fee or charge paid for a supply of a regulatory nature made by an Australian government agency – see paragraph 81-15.01(f) of the GST Regulations.

32. As an exception to these exclusions from GST, subsection 81-10(2) of the GST Act permits the GST Regulations to prescribe that certain payments of Australian fees or charges are to be treated as consideration. The prescribed fees or charges that are treated as consideration include a fee or charge paid to an Australian government agency:

- for a supply of a non-regulatory nature – see paragraph 81-10.01(1)(g) of the GST Regulations, or
- for a supply that may also be made by a supplier that is not an Australian government agency – see paragraph 81-10.01(1)(h) of the GST Regulations.

33. When these regulations apply, the fee or charge is deemed to be consideration for a supply made by the Australian government agency.[20] Consequently, that fee or charge becomes subject to GST if the other requirements for making a taxable supply are met.[21]

34. To determine if the fee or charge payable to a public cemetery operator for a burial right is excluded from being consideration, it is therefore necessary to consider:

- whether the fee or charge relates to the provision, under state or territory legislation, of a permission, authority or licence however described

[20] See subsection 81-10(3) of the GST Act.
[21] A fee or charge paid to an Australian government agency for a supply of a regulatory nature that can also be made by a supplier that is not an Australian government agency, will be consideration for a supply: see subsection 81-15.02(2) of the GST Regulations.

- whether the fee or charge is for a supply of a non-regulatory or regulatory nature, and
- whether the supply of the burial right in the public cemetery is a supply that may also be made by a supplier that is not an Australian government agency.

Supplies of a regulatory nature

35. When considering if the fee or charge paid to an Australian government agency is for a supply of a non-regulatory or regulatory nature, the fee or charge must be capable of being characterised as an amount that is paid for the supply. That supply, in turn, must be able to be characterised as being of a regulatory nature for an exclusion from GST to apply.

36. The nature of a supply refers to the combination of qualities and characteristics belonging to that supply.[22] The qualities and characteristics of the supply made by an Australian government agency in return for the payment of a legislatively imposed fee or charge must be considered in the circumstances of each case, to determine whether, based on those qualities and characteristics, the supply can properly be characterised as being of a non-regulatory or regulatory nature.

37. The word 'regulatory' is not defined in the GST Act. To 'regulate' ordinarily means to control or direct by rule[23] and the word 'regulatory' means something that regulates or relates to regulation.[24] In accordance with this ordinary usage, something that is done to regulate will relate to regulation.

38. In the context of Division 81 of the GST Act, which deals with legislatively imposed fees or charges for permissions, exemptions, authorities and licences that Australian government agencies provide under Commonwealth, state or territory law to enable entities to engage in different forms of behaviour or conduct, a supply is of a regulatory nature if the supply relates to the regulation of behaviour or conduct.

39. A supply made by an Australian government agency relates to the regulation of behaviour or conduct, if the supply itself regulates behaviour or conduct in accordance with Commonwealth, state or territory legislation, or furthers in some integral way, the operation of rules under Commonwealth, state or territory legislation that govern behaviour or conduct.

[22] The *Macquarie Dictionary* defines 'nature' to mean the particular combination of qualities belonging to a person or thing by birth or constitution; native or inherent character' (Macmillan Publishers Australia, *The Macquarie Dictionary* online, www.macquariedictionary.com.au, accessed 19 November 2024).
[23] The *Macquarie Dictionary* notes that the word 'regulatory' is an adjective related to the verb 'regulate', which it defines to mean 'to control or direct by rule, principle, method, etc' (Macmillan Publishers Australia, *The Macquarie Dictionary* online, www.macquariedictionary.com.au, accessed 19 November 2024).
[24] The *Oxford English Dictionary* defines 'regulatory' firstly as 'of or relating to regulation or regulations', secondly, as something 'that regulates', and when used in relation to an entity, thirdly as 'given to or responsible for regulating.' (Oxford University Press, *Oxford English Dictionary*, www.oed.com/, accessed 21 November 2024).

Status: **not legally binding**

40. The supply that an Australian government agency makes in return for the payment of a legislatively imposed fee or charge to an entity seeking to undertake a particular form of conduct, that is regulated by Commonwealth, state or territory legislation, is more likely to be of a regulatory nature if:

- the regulated behaviour or conduct is of a kind that must be undertaken under Commonwealth, state or territory legislation and the legislatively imposed fee or charge is paid to acquire the supply from the agency to permit that behaviour or conduct to occur (that is, there is a legal requirement to undertake the regulated behaviour and to pay the agency for a supply, such as a licence or an approval, which enables the behaviour or conduct to occur), or
- there is no requirement to undertake the behaviour or conduct that is regulated by the Commonwealth, state or territory legislation, but all entities that choose to undertake the behaviour or conduct, must as a condition of doing so, pay the legislatively imposed fee or charge to acquire the supply from the agency in order for the behaviour or conduct to occur (that is, there is a practical requirement to pay the agency the fee or charge to acquire the supply in order to undertake the chosen form of behaviour or conduct which is regulated by legislation).

41. In these circumstances, the supply made by the Australian government agency is capable of characterisation as being regulatory in nature, given that the payment of the legislatively imposed fee or charge for the supply is integrally involved in furthering the operation of rules that govern behaviour or conduct under Commonwealth, state or territory legislation.

42. The payment of the fee or charge for a supply will be integrally involved in furthering the operation of rules that govern behaviour or conduct under Commonwealth, state or territory legislation where the making of the supply for which the fee or charge is paid is a necessary step in or aspect of a legislative regime for regulating an area of human activity.

43. However, not all supplies made by Australian government agencies are regulatory in nature. Supplies made by Australian government agencies will not be regulatory in nature where, for example, the supply from the Australian government agency does not relate to regulating (that is, to controlling or directing) behaviour, ensuring consumer protection, or ensuring compliance with certain standards; these being indicators of the regulatory nature of a supply.[25]

44. Additionally, government regulation of prices in an area does not of itself mean that a legislatively imposed fee or charge is paid for a supply that is of a regulatory nature.

45. Further, if the legislatively imposed fee or charge is paid to an Australian government agency for a supply (of goods, services or anything else) which the payer chooses to acquire, without the payment for that supply being a necessary step in a regulatory regime, the supply is likely to be characterised as being non-regulatory in nature. This could arise where the supply made by the Australian government agency does not further, in some integral way, the operation of legislative rules that govern behaviour or conduct.

[25] See page 4 of the Explanatory Statement to the *A New Tax System (Goods and Services Tax) Amendment Regulation 2012 (No. 2)* which in distinguishing supplies of a regulatory nature from supplies of a non-regulatory nature, set these matters out as examples of the characteristics of a supply that is of a regulatory nature.

Status: **not legally binding**

Burial rights – fee or charge excluded from GST

46. The fee or charge imposed under state or territory legislation for the purchase of a burial right in a public cemetery relates to the provision of a permission, authority or licence, however described under state or territory legislation, and is therefore excluded from being consideration for GST purposes by subsections 81-10(1) and (4) of the GST Act.

47. This is because, under the state or territory legislation governing burials and cemetery operations, the grant of a burial right in a public cemetery permits or authorises the holder of the right to have human remains buried or interred at the location covered by the right, subject to any conditions applicable to conducting a burial or interment. Such conditions can include the requirement to obtain an additional permission from an Australian government agency to physically conduct a burial or create a memorial at the location covered by the burial right (for example, an order for interment, interment authorisation, or other similar form of permission as described by paragraph 9 of this Determination).

48. In determining if the supply of a burial right in a public cemetery is non-regulatory in nature, public cemetery operators are bound by state or territory legislation governing burials and cemetery operations to maintain public cemeteries in which human remains (including cremated human remains) are to be lawfully buried or interred and have their operations regulated by this legislation.

49. The legislation prohibits or restricts the burial or interment of human remains outside the grounds of a public cemetery in states or territories where only public cemeteries exist[26], or otherwise subjects the grant (and any subsequent use) of a burial right to regulation when an entity chooses to be buried in a public cemetery instead of a privately operated one.

50. In certain states or territories, the holder of a burial right cannot transfer, assign or otherwise deal with the right, unless this occurs in accordance with the legislation governing public cemetery operations in that jurisdiction.[27] The legislation in certain jurisdictions can also permit a public cemetery operator to refuse granting a burial right or to refuse approving the transfer of a burial right if this would tend to create a monopoly or encourage dealing in burial rights.[28]

51. The grant of a burial right can be made subject to the holder's compliance with the rules and regulations of the public cemetery that supplied the right, and with the provisions of the legislation governing burials in public cemeteries in that jurisdiction.[29] The exercise of a burial right in a public cemetery is typically further governed by a legislative requirement to obtain from an Australian government agency, the permission to exercise the burial right before a burial can occur at the location covered by the right.

[26] See, for example, section 114 of the *Cemeteries and Crematoria Act 2003* (Vic) which makes it unlawful for bodily remains to be interred in a place other than a public cemetery unless the Department of Health has granted an approval for that interment. Under section 114 of the *Cemeteries and Crematoria Act 2003* (Vic), a fine and or period of imprisonment applies for non-compliance with this provision.

[27] See, for example, section 79 of the *Cemeteries and Crematoria Act 2003* (Vic) which permits the transfer of a burial right in a public cemetery subject to the terms of that legislation. Under sections 79 and 80 of the *Cemeteries and Crematoria Act 2003* (Vic), those terms include the requirements that the transfer occur for no more than the cost of the same type of burial right in the same public cemetery, and that the transferee notify the public cemetery of the transfer and pay the applicable fee to have the transfer recorded.

[28] See, for example, section 60 of the *Cemeteries and Crematoria Act 2013* (NSW).

[29] See, for example, section 104 of the *Cemeteries and Crematoria Act 2003* (Vic), which imposes a duty on the holder of a burial right in a public cemetery to maintain or cause to be maintained in a safe and proper condition, any memorial constructed at the location that is the subject of the burial right.

Status: **not legally binding**

52. In summary, the granting by an Australian government agency of burial rights in public cemeteries under state or territory legislation in exchange for a legislatively imposed fee or charge, is integral to furthering the legislative control over, and therefore, the regulation of the behaviour or conduct involved in burying or interring human remains. There is a practical, if not legal requirement, to pay an Australian government agency that operates a public cemetery the legislatively imposed fee or charge, initially for the supply of a burial right, and then for any permission required to conduct a burial or create a monument at the location covered by the right, to be lawfully buried in a public cemetery.

53. This makes the payment of the legislatively imposed fee or charge, for the grant of a burial right in a public cemetery, a necessary step in, or aspect of, the legislative regime for regulating burials and interments.

54. It follows that, based on its qualities and characteristics, the supply of a burial right in a public cemetery is a supply of a regulatory nature made by an Australian government agency.

55. Therefore, subsection 81-10(2) of the GST Act and paragraph 81-10.01(1)(g) of the GST Regulations, which treat fees or charges paid for non-regulatory supplies as consideration, do not apply to make the fee or charge payable to an Australian government agency for the supply of a burial right in a public cemetery consideration for GST purposes.[30] As the supply by an Australian government agency of a burial right in a public cemetery is of a regulatory nature, paragraph 81-15.01(f) of the GST Regulations would also exclude the fee or charge from being consideration in these circumstances.

Renewal of burial rights – fee or charge excluded from GST

56. The supply that an Australian government agency that operates a public cemetery makes in renewing a burial right in accordance with the state or territory legislation governing burials and cemetery operations, relates to the provision or retention under state or territory legislation, of a permission, exemption, authority or licence (however described), and is therefore excluded from being consideration by subsection 81-10(1) and subsection 81-10(4) of the GST Act.

57. The supply made in renewing a burial right may take the form of the grant of a new, further or refreshed right to bury or inter human remains at the location within the public cemetery covered by the burial right, or at another location within that cemetery.[31] The supply is of a regulatory nature for the same reasons outlined in paragraphs 46 to 55 of this Determination above regarding the initial grant of a burial right.

Permissions required to exercise burial rights – fee or charge excluded from GST

58. A condition that applies to exercising a burial right in a public cemetery can include complying with a requirement under the state or territory legislation, to obtain a permission from an Australian government agency to conduct a burial or create a memorial at the location covered by the burial right (for example, an order for interment, interment authorisation, or other similar permission required by legislation, however described).

[30] Paragraph 81-15.01(f) of the GST Regulations would also exclude the fee or charge from being consideration in these circumstances.
[31] See, for example, section 54 of the *Cemeteries and Crematoria Act 2013* (NSW), section 32 of the *Cemeteries and Cremation Act 2013* (SA) and section 74 of the *Cemeteries and Crematoria Act 2003* (Vic).

Status: **not legally binding**

59. The legislatively imposed fee or charge payable to an Australian government agency for obtaining the permission to exercise a burial right in a public cemetery, by performing the physical act of burying or interring human remains or creating a memorial at the site covered by the burial right, is not subject to GST.[32]

60. This is because, under subsections 81-10(1) and 81-10(4) of the GST Act, the payment of this fee or charge to an Australian government agency relates to the provision under state or territory legislation, of a permission, authority or licence (however described), and is therefore not consideration for GST purposes.[33]

61. The supply of a permission from an Australian government agency to exercise a burial right in a public cemetery, is a supply of a regulatory nature because it is integral to furthering the legislative control over the conduct of human burials and interments (as explained in paragraph 52 of this Determination).

Burial rights in public cemeteries – only able to be supplied by Australian government agencies

62. The following supplies by an Australian government agency cannot be made by a supplier that is not an Australian government agency:

- a burial right in a public cemetery
- the renewal of a burial right in a public cemetery, and
- a permission to exercise a burial right by conducting the physical act of burial or creating a memorial at the location covered by the right.

63. The supply of a burial right and the supply of a renewal of a burial right by an Australian government agency involve the grant of a right that permits the holder to have human remains buried or interred at a specific location within the public cemetery that is operated by the agency.[34] That location may be at a site within the public cemetery selected by the holder of the right, or at a location within the public cemetery selected by the public cemetery operator.[35]

64. Accordingly, the supply in question involves the grant by an Australian government agency of a right which concerns a particular location within a public cemetery operated by that agency. Therefore, this is not a supply that may also be made by another supplier that is not an Australian government agency.

65. Under the state or territory legislation governing burials and cemetery operations, an Australian government agency must provide a permission to allow the exercise of a burial right in a public cemetery by conducting the physical act of burial or creating a memorial (for example, an order for interment or an interment authorisation). The supply of this permission cannot also be made by a supplier that is not an Australian government agency.

[32] Subsections 81-10(1) and 81-10(4) of the GST Act.
[33] Sections 81-10(1) & 81-10(4) of the GST Act.
[34] See, for example, subsection 3(1) of the *Cemeteries Act 1986* (WA) which defines a burial right to mean the right to use a specified area of a cemetery for burial. See further, section 46 of the *Cemeteries and Crematoria Act 2013* (NSW) which provides that a burial right permits the interment of the remains of the person to whom the right relates at the site in the cemetery identified in or in accordance with the burial right.
[35] See, for example, section 76 of the *Cemeteries and Crematoria Act 2003* (Vic) which classifies burial rights as allocated rights for interment at a particular place in a public cemetery or as unallocated rights of interment in a public cemetery, which permit interment at locations within a public cemetery nominated by the public cemetery operator.

Status: **not legally binding**

66. The exception in subsection 81-10(2) of the GST Act and paragraph 81-10.01(1)(h) of the GST Regulations, which treats as consideration, the fee or charge paid for supplies that can be made by both Australian government agencies and other suppliers, therefore does not apply.

67. Consequently, the supply by an Australian government agency of a burial right in a public cemetery, the supply made when an Australian government agency renews a burial right in a public cemetery, and the supply by an Australian government agency of a permission to exercise a burial right in a public cemetery by conducting the physical act of burial or creating a memorial, are not taxable supplies and are not subject to GST.

Recording the granting or transfer of burial rights

68. The state or territory legislation governing burials and cemetery operations can require the recording of the grant or transfer of a burial right in a public cemetery within the registers or other records that the cemetery must maintain.[36]

69. Subsections 81-10(1) and 81-10(5) of the GST Act exclude from consideration a legislatively imposed fee or charge paid to an Australian government agency if the fee or charge relates to the agency receiving, recording, modifying or processing information, as would occur when a public cemetery operator or other Australian government agency records the granting or transfer of a burial right in a public cemetery.[37]

70. The fee or charge set under state or territory legislation for an Australian government agency to record the granting or transfer of a burial right in a public cemetery, is therefore excluded from being consideration for a supply by subsection 81-10(5) of the GST Act and is not subject to GST.

71. The supply of gravedigging, stonemasonry and of plaques or memorials, whether made by an Australian government agency that operates a public cemetery or by a funeral director or by another entity, is subject to GST where these supplies satisfy the definition of a taxable supply in section 9-5 of the GST Act. None of the exclusions from GST in Division 81 of the GST Act and Division 81 of the GST Regulations apply to these supplies.

Agency and the arrangement of burial right supplies by funeral directors

72. Funeral directors may arrange for an Australian government agency to supply a burial right in a public cemetery to a customer of the funeral director's business, such as the administrator of a deceased estate.

73. A funeral director's arrangement of the supply of a burial right by an Australian government agency, to a customer of the funeral director's business, may involve an agency relationship.

74. Agency relationships arise when a principal appoints an entity to act as its agent. A funeral director acts as an agent, if an Australian government agency that operates a public cemetery appoints the funeral director to act as an agent of the Australian government agency for the purpose of supplying burial rights in public cemeteries to customers of the funeral director's business. A funeral director may also act as an agent, if a customer of the funeral director's business appoints the funeral director to act as the

[36] See, for example, paragraph 80(1)(b) of the *Cemeteries and Crematoria Act 2003* (Vic) and section 32 of the *Burial and Cremation Act 2013* (SA).
[37] None of the subsections in section 81-10.01 of the GST Regulations that treat a fee or charge paid to an Australian government agency as consideration are applicable to such a fee or charge.

customer's agent for purposes including making the purchase of a burial right in a public cemetery from an Australian government agency.

75. The appointment of an agent can be specifically agreed to by the parties and documented in the records kept regarding their transaction, or can be implied from the conduct of the parties based on the facts of each case in circumstances where the agent's appointment is not specifically recognised in the agreements or other records kept in relation to the transaction.[38]

76. When acting in that capacity, an agent creates a relationship between the principal and the third party with which the agent transacts on the principal's behalf.[39] Supplies and acquisitions made as part of that relationship are made between the principal and the third party for GST purposes.[40]

77. In the context of burial rights, this means that a funeral director is not the entity that makes a supply of a burial right, when the funeral director acts as an agent for an Australian government agency or acts as an agent for a customer of the funeral director's business, in relation to arranging the sale and purchase of a burial right in a public cemetery. The supplier of the burial right is the Australian government agency and the recipient of the supply of the burial right is the customer of the funeral director's business to whom the burial right is granted.

78. The Australian government agency remains the supplier of the burial right, where a funeral director arranges for the supply of a burial right in a public cemetery to a customer of the funeral director's business, without any agency relationship arising. Only public cemetery operators can grant burial rights for public cemeteries under the state and territory legislation governing burials and public cemetery operations. While a funeral director may arrange for an Australian government agency to grant a burial right in a public cemetery, the funeral director is not itself the entity that grants the right. Under the legislation, the entity that grants the right remains the Australian government agency that operates the public cemetery in which the burial right is granted.

79. Therefore, whether or not an agency relationship is involved, when a funeral director arranges for a customer of its business to be granted burial rights in a public cemetery, the funeral director does not make the supply of the burial right to the purchaser for GST purposes. Rather, the Australian government agency that operates the public cemetery is the supplier of the burial right, with the consequence that the supply of the burial right is not subject to GST given the operation of Division 81 of the GST Act and Division 81 of the GST Regulations to exclude the fee or charge paid for the burial right to the Australian government agency from GST.

Apportionment

80. A GST liability arises on making a taxable supply and the GST that is payable is included in the consideration for that supply.[41] An Australian government agency that supplies a burial right in a public cemetery (which is not subject to GST), together with other supplies that are subject to GST, such as gravedigging services, must therefore ensure that GST is not included in the fee or charge that relates to the supply of the burial

[38] *Crown Estates (Sales) Pty Ltd v Commissioner of Taxation* [2016] FCA 335 at [41]. The agent's authority may be express or implied from the agreement between the principal and agent if the agent has actual authority. Otherwise the authority might be apparent from the conduct of the principal.
[39] *Crown Estates (Sales) Pty Ltd v Commissioner of Taxation* [2016] FCA 335 at [41]. See also paragraphs 10 to 13 of Goods and Services Tax Ruling GSTR 2000/37 *Goods and services tax: agency relationships and the application of the law*.
[40] Paragraphs 15 and 55 of GSTR 2000/37.
[41] See sections 9-5, 9-40, 9-70 and 9-75 of the GST Act.

right. They are separate supplies that have different GST treatment. It is not a single supply of funeral services.

81. A funeral director must ensure that GST is not applied to the public cemetery's fee or charge for supplying the burial right where they:

- act as an agent for
  - an Australian government agency that operates a public cemetery in supplying a burial right, or
  - the purchaser in acquiring a burial right from an Australian government agency, or
- otherwise arrange for an Australian government agency that operates a public cemetery to supply a burial right, and also make their own taxable supplies of other goods and services to the purchaser of the burial right.

82. This is because Division 81 of the GST Act and Division 81 of the GST Regulations exclude this fee or charge from GST.

83. The funeral director is, however, liable for GST on the fees or charges payable for the taxable supplies that the funeral director makes to the purchaser of the burial right. This means that GST will apply to any fees or charges payable to the funeral director for arranging the grant of the burial right in the public cemetery by the Australian government agency, and to any fees or charges which are payable to the funeral director for other goods or services that the funeral director supplies.

84. If a funeral director charges a single undissected amount for the service of providing a funeral that includes arranging for the supply of a burial right by an Australian government agency, GST should not be applied to any part of the undissected amount that is referrable to the fee or charge payable to the Australian government agency for the supply of the burial right.

85. Where a funeral director includes the cost of purchasing a burial right from an Australian government agency in their invoice for providing a funeral service, and also adds an amount to the invoice as the funeral director's fee or charge for arranging the supply of the burial right, the funeral director's fee or charge for arranging the supply of the burial right (but not the underlying fee or charge that was payable to the Australian government agency for the burial right) is subject to GST as consideration for the funeral director's taxable supply of the funeral service.

Status: **not legally binding**

References

Previous draft:

GSTD 2021/D2

Related Rulings/Determinations:

GSTR 2001/8; GSTR 2000/37; GSTR 2003/8; GSTR 2006/5; TR 2006/10

Legislative references:

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- ANTS(GST)A 1999 9-10(2)(a)
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- Burial and Cremation Act 2013 (SA)
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- Burial and Cremations Act 2022 (NT)
- Cemeteries Act 1986 (WA)
- Cemeteries and Crematoria Act 2003 (VIC)
- Cemeteries and Crematoria Act 2013 (NSW)
- Cemeteries and Crematoria Act 2020 (ACT)
- Local Government Act 2009 (Qld)

Cases relied on:

- Crown Estates (Sales) Pty Ltd v Commissioner of Taxation [2016] FCA 335; 2016 ATC 20-562; 152 ALD 408

Other references:

- Explanatory Statement to the A New Tax System (Goods and Services Tax) Amendment Regulation 2012 (No. 2)
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ATO references

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MEMORANDUM OF UNDERSTANDING

between

the City of Launceston

and

The St Vincent de Paul Society Tasmania

Parties

Launceston City Council (operating as the City of Launceston), ABN 73149 070 625, of Town Hall, 18–28 St John Street, Launceston, Tasmania 7250 **(CoL)**

and

The St Vincent de Paul Society Tasmania, ABN 41 003 138 898, of 191 Invermay Road, Invermay, Tasmania 7250 **(SVDP)**.

Introduction

The City of Launceston owns the building at 8A Blaydon Street, Kings Meadows **(the site)**. Until mid-2022 the site was operated as a community recreation facility by the YMCA which had a long history as a cornerstone of community connectivity within Launceston.

Following the YMCA's departure from the site in June 2022, the City of Launceston received numerous requests from community groups to use the site for a wide range of community programs and recreation activities.

In 2023, SVDP began offering a free shower and laundry service at the site for those in the Launceston community suffering from homelessness. In addition to this service, SVDP also provides frontline support, advocacy and friendship for the most vulnerable members of society at other sites across Tasmania.

SVDP has identified the site as a potential community hub which can offer new activities and services for residents, young people and people in need in our community. SVDP, as a lead organisation operating the site, seeks to reopen the site as a community hub which:

- is welcoming to all
- caters for a broad range of ages and activities, including sport and recreation
- is a place to meet and make new friends
- is a place which brings the local neighbourhood together to celebrate community.

This memorandum of understanding **(MoU)** is to acknowledge the relationship between SDVP and CoL to support and grow the service offering at the site. The aim of the MoU is to maximise community participation and use of the site while concurrently allowing SVDP to provide services to those most vulnerable in society, including our homeless community.

Purpose

This MoU provides a framework to guide the relationship between CoL and SVDP relating to the operation of the site.

Outcomes sought from this MoU include that:

- both parties have a clear understanding of the expectations for the operation of the site and can work together in a mutually respectful manner.
- the Launceston community experiences the best possible outcomes from

the operation of the site by SVDP.

- SVDP receives the necessary support from CoL to enable it to operate the site to maximise benefits to the Launceston community.

While the parties intend to co-operate in good faith under this MoU, the parties do not intend for the terms of this MoU to be legally binding.

Agreed responsibilities

CoL agrees to:

- finance a one-off capital investment to upgrade the facilities at 8A Blaydon Street to ensure adequate separation of recreation users from those using the shower and laundry service. This is to maintain the dignity of homeless people using the existing SVDP service. CoL acknowledges the shower upgrades are a priority for the proper and effective operation of the site and does not expect the full use of the facility is to occur until the toilet/showers are completed.
- work with SVDP on determining a new operating name/brand for the site.
- provide branding support to enable co-branding by both CoL and SVDP at the site.
- prepare a community communications plan outlining the council's decision about how the site is to be operated and the estimated timeline for having the site fully operational as a community recreation facility.
- once the MoU has been signed by both parties, publicly announce SVDP as the operator of the site. CoL will also provide public information about how the site is expected to run and how community groups can contact SVDP to use/book the facility.
- continue to maintain the site until the lease agreement and management agreement are in place.
- negotiate with SVDP on opening hours and how the site is to be managed outside of standard business hours.
- share the names of the organisations not successful with their proposals for the site with SVDP (where permitted to by the unsuccessful organisations) once the MoU is signed to enable SVDP to work with these organisations on their possible use of the site.
- provide a progress report template to SVDP to facilitate annual progress reporting by SVDP to CoL.

SVDP agrees to:

- work with CoL on determining a new operating name/brand for the site.
- establish a community advisory committee **(CAC)** as a first priority, with the CAC to be used to guide the direction of the site's use and capital upgrades. Both CoL and SDVP are to have representation on this committee. SVDP will chair the CAC.

- in collaboration with CoL, establish a terms of reference **(ToR)** for both the CAC and the executive group, separate to this MoU, to guide the work of the CAC and the executive group.
- use the ABCDE Kings Meadows learning site report to identify local community members/organisations for representation on the CAC.
- invite the Kings Meadows High School principal to join the CAC.
- run a public expression of interest **(EOI)** process to seek interest from other community members or organisations to join the CAC.
- establish an executive group, following the establishment of the CAC, which will sit above the CAC and which will make decisions based on the CAC's discussions. SVDP will ensure a member of the advisory group is on the executive group to ensure a flow of information between the two groups.
- employ an onsite coordinator at the site to ensure safe and secure use of the facility for the range of site users.
- ensure sport and recreation are a main component of the facility, in addition to the homelessness services already provided by SVDP.
- allow only permitted activities on the site. Permitted activities include those listed in appendix 1 and should primarily be not-for-profit activities that all of the community can have access to. Additional activities may be permitted on site with the written approval of CoL.
- contact the organisations unsuccessful with their proposals for the site, once the MoU is signed, to work with those organisations to see if they too can make use of the community facility.
- conduct operations to ensure the safety of children and young people at the site, including adhering to the Child and Youth Safe Organisations Framework and the 10 Child and Youth Safe Standards and Universal Principle for Aboriginal Cultural Safety.
- not disclose personal information, however, SVDP agrees to share information on the number of:
    - homeless people using the homelessness service per month
    - community groups utilising the site per month
    - people using the site for community activities per month
    - number of free activities fort the community per month
    - number of fee-for-service activities per month.
- hold and continue to hold $20 million public liability as well as any other relevant insurances.
- provide a progress report at the end of each financial year to CoL.

Termination

Either party reserves the right to terminate this MoU at any time. Termination of this MoU will occur if it is felt all other avenues have been exhausted to rectify identified problems, or if a party genuinely does not wish to continue with the collaboration.

Either party wishing to terminate this MoU must provide the other party with written notice.

Duration

This MoU is valid from the date of signing for a period of 5 years or until SVDP ceases its 8A Blaydon Street operation, or until such time as all parties agree it is no longer applicable.

Reviews can occur at any time at the request of either party.

Contacts:

City of Launceston
Michelle Ogulin
Manager Liveable Communities
P: 6323 3617
E: Michelle.ogulin@launceston.tas.gov.au

The St Vincent de Paul Society Tasmania
Heather Kent
Chief Executive Officer
P: 0407 201 113
E: Heather.kent@vinniestas.org.au

Signed by:

Chelsea van Reit
General Manager Community & Place
City of Launceston

Heather Kent
Chief Executive Officer
The St Vincent de Paul Society Tasmania

Date: 04 April 2024

Appendix 1 – Permitted activities at the community hub

- Continued operation of the free community shower and laundry service
- Continued provision of the free breakfast for those using the shower service
- A community hub snack bar serving refreshments and light snacks at a modest cost
- Internet access for those needing to connect, including a range of support services
- Continued use of the sports courts by existing and new sporting organisations
- Active Launceston Winter Program (if funding can be secured)
- Community library (a My Big Idea from the ABCDE Learning Site)
- Collaboration with Launceston Library
- JCP Youth casual use of the courts and sports facilities
- Community market (a My Big Idea from the ABCDE Learning Site)
- Local community art centre/gallery (a My Big Idea from the ABCDE Learning Site) – housing art groups and hosting art and craft community workshops
- Youth group sessions
- Community services including NILs Loans Centre and 26TEN Adult Literacy Services
- Senior exercise classes
- Return of carpet bowls (a major social aspect for seniors when YMCA was operating)
- Introduction of pickleball to the centre
- Outdoor area for young people to "hang out after school" (a My Big Idea from the ABCDE Learning Site)
- Supporting Kings Meadows High School during their gym refurbishment
- Dining with Friends – connects community and helps break down social isolation
- Mother and baby groups
- Yoga classes for seniors and for kids
- Tiny Tots playtime
- Financial Literacy and Food Literacy Workshops
- Wellways to Recovery Program
- Wellways Discovery mental health program
- Monthly ukulele group music sessions for anyone to join in and enjoy.

Additional activities may be added to this list on agreement by the City of Launceston.

Kings Meadows Community and Recreational Hub Community Advisory Committee

Terms of Reference

The Kings Meadows Community and Recreational Hub Community Advisory Committee is an interim committee established to assist the Executive Committee in developing initial recommendations for the future usage of the Kings Meadows Community and Recreational Hub.

PURPOSE:

The purpose of the Community Advisory Committee (CAC) is to ensure there is a collaborative approach in re-establishing the Kings Meadows site as a community-led asset. The CAC will be required to provide guidance from a range of perspectives to ensure that St Vincent de Paul Society Tas (SVDP), as the lead organisation, is effective in facilitating/offering a range of opportunities through the facility that are accessible and engaging to the Launceston community. The CAC will:

- Assist in ensuring a strategic approach is taken to mapping the medium -term usage of the facility.
- Guide an initial planning process, aiming to outline core recommendations for usage and a draft recommended schedule of implementation by April 2025.
- Assist in ensuring the facility is catering for social and recreational community needs.
- Bring key stakeholders together to provide advice and support to the Executive Committee in the planning process.

OBJECTIVES:

The objectives of the CAC are to:

- Provide a communicative link between SVDP, Council and relevant community stakeholders.
- Provide advice and make recommendations to the Executive Committee on the ongoing use of the facility.
- Provide advice on capital works to be undertaken at the site.
- Ensure the facility remains community focussed and sustainable.

MEMBERSHIP:

The Community Advisory Committee will include the following representation from SVDP and City of Launceston (CoL):

- SVDP - Youth and Community Manager
- SVDP - Van and Community Coordinator
- CoL - Manager Liveable Communities, Community and Place
- CoL - Councillor

SDVP will chair or will allocate an appropriate chair. The CAC will appoint the Deputy Chair.

In addition, the CAC will include one representative from each of the following groups:

- CoL – Community Connector

- Community Sport Representative – (two positions allocated)
- Community Representative – (two positions allocated)
- Kings Meadows High School - Principal
- Kings Meadows Business representative
- SDVP Volunteer Representative

The Committee will be supported by:

- SVDP - Youth and Community Manager
- SVDP - Van and Community Coordinator
- SDVP administrative staff
- CoL - Manager Liveable Communities, Community and Place

Additional guests may be invited to join the group to provide specialist advice when required.

COMMUNITY MEMBER REPRESENTATIVE SELECTION CRITERIA:

Community member representatives will be appointed by SVDP/CoL with consideration to the following criteria:

- Ability to represent and provide input from a broad sector of the community.
- Area of the community they represent (youth, seniors, sporting group, not for profit group)
- Ability to attend meetings in keeping with the meeting schedule determined by the committee from time to time.

A non-discrimination policy applies to the selection process for the community member representatives.

TERMS OF APPOINTMENT:

- The term of appointment will be for a twelve-month period.
- Any member may resign at any time by advising their resignation in writing to the Chair.
- If a committee member is absent without notification for three consecutive meetings, the group may declare the position vacant.
- Members are not remunerated for their service to the group.
- Members can only nominate a proxy to attend meetings with the approval of the Chair.

MEETING ARRANGEMENTS:

- If the chair is not present at a meeting the deputy chair or appropriate delegate will be appointed Chair for the meeting.
- The Community Advisory Committee will meet at least monthly for the initial six months of the committee, meetings may transition to every six weeks after this time.
- Critical non-scheduled meetings may be convened by the Chair.
- Meeting agendas will be forwarded to each committee member at least 7 days prior to the upcoming meeting.
- Minutes of the meeting will be circulated to each committee member within 10 working days of each meeting.
  Meetings may occur via online platforms, and members can attend via online platforms if they cannot attend in person.

MEETING QUORUM:

At least 8 committee members in attendance, including at least one SDVP representative and one City of Launceston representative, is considered a quorum for meetings.

MEETING NOTICES:

Meeting agendas, minutes and other relevant papers will be distributed to all committee members via email at least seven days prior to the scheduled meeting.

HOW THE GROUP WILL OPERATE:

The Community Advisory Committee:

- Is as an advisory body that provides non-binding strategic advice to the Executive Committee.
- Will be coordinated by SVDP.
- May establish working groups as needed to address specific topics and may appoint additional people to the working group from the community where there is a specific need.

CODE OF CONDUCT:

Committee members must adhere to the to the SDVP Code of Conduct for meetings and committees.

RESOURCES:

SVDP will provide administrative support to organise, distribute agendas, take minutes and distribute follow up actions to members.

CONFLICT OF INTEREST:

If a Committee member has an actual or perceived interest in a matter to be considered by the Committee, they must declare that interest prior to any discussion of the matter. Interests will be managed in a way that respects the Committee member and the operation of the Committee. In some circumstances, this will mean that a Committee member with a declared interest will be required to withdraw from the Meeting during the discussions of the matter.

Any declaration of a conflict of interest is to be recorded in the minutes of the meeting.

REPORTING:

The CAC will provide the following reports to the Executive Committee:

- A monthly status report, summarising meetings held within the last month. The status report is to be submitted within 10 working days of the last meeting of the month.
- A report on the initial recommendations, including suggested timeframes for implementation by the 30th April 2025.

REVIEW:

The terms of reference, including membership, will be reviewed 12 months from the date of the committee commencing.

St Vincent de Paul Society
TASMANIA
good works

Thursday, July 4, 2024

Request for Councillor representation on Community Advisory Group for the Kings Meadows Community and Recreational Hub

Dear Michelle,

I am writing on behalf of the St Vincent de Paul Society to request representation from a City of Launceston Councillor on the Community Advisory Group for the revitalisation of the former YMCA site now Kings Meadows Community and Recreational Hub.

The purpose of the Community Advisory Group is to assist in re-establishing the Kings Meadows site as a community and recreational facility that is accessible to the wider Launceston community and to assist in ensuring a strategic approach is taken to mapping out the medium-term usage of the facility.

I look forward to hearing from you.

Samantha Grace | Youth and Community Manager- North
St Vincent de Paul Society Tasmania

M 0448 053 201 | sam.grace@vinniestas.org.au| www.vinniestas.org.au
10 Boland Street
Launceston Tas 7250

19.1. Lease - Tamar Yacht Club

FILE NO: SF0866, SF2967

AUTHOR: Michelle Grey (Properties and Legal Officer)

APPROVER: Louise Foster (General Manager Organisational Services Network)

DECISION STATEMENT:

To consider leasing the land situated at 11 Park Street and part of Kings Park, 88-96 Paterson Street, Launceston (Folios 49784/1, 49745/2 and part of 159106/1) adjacent to Royal Park as marked on the attached map, to the Tamar Yacht Club.

This decision requires an absolute majority of Council.

RELEVANT LEGISLATION:

Sections 177A and 179 *Local Government Act 1993* (Tas)

PREVIOUS COUNCIL CONSIDERATION:

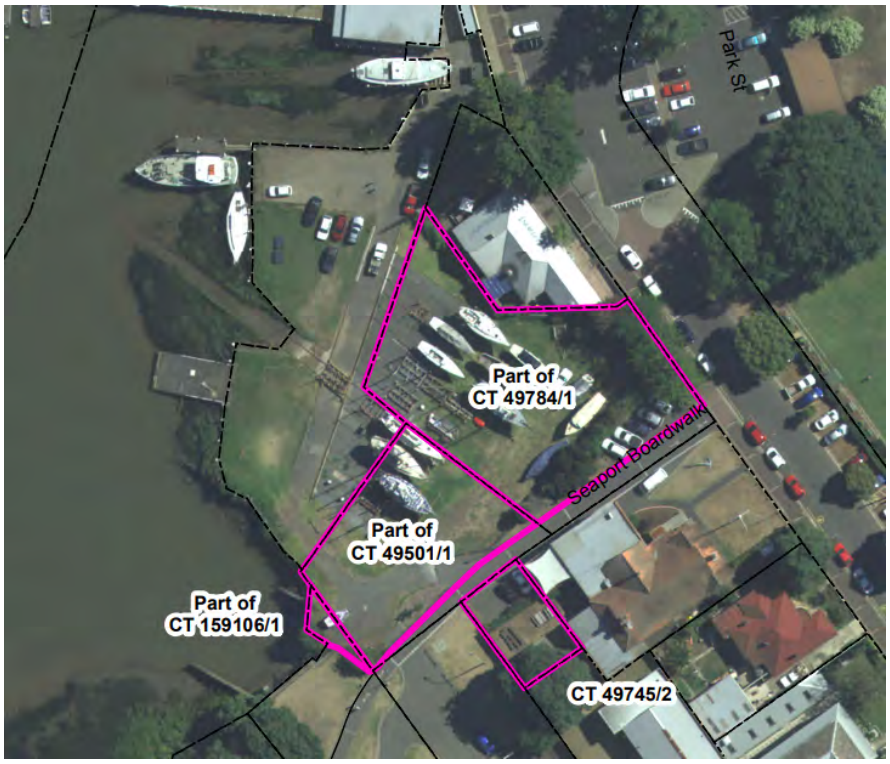
Council Meeting - 28 July 2014 - Item 17.1 - Lease - Tamar Yacht Club

Council Meeting - 26 May 2014 - Item 17.1 - Lease - Tamar Yacht Club

RECOMMENDATION:

That Council, by absolute majority:

1. Resolves to lease public land situated at 11 Park Street and part of Kings Park, 88-96 Paterson Street, Launceston (Folios 49784/1, 49745/2 and part of 159106/1) adjacent to Royal Park, to the Tamar Yacht Club Incorporated in accordance with subsection 179 of the *Local Government Act 1993* (Tas) as indicated on the plan below.



2. authorises the Chief Executive Officer to enter into a formal lease under the following terms:
   - the term shall be five years commencing 1 July 2024 or as determined by the Chief Executive Officer.
   - the lease amount shall be $8,000.00 plus GST per annum for the first year;
   - tenant to be responsible for:
     - energy costs;
     - volumetric and connection charges for water; and
     - other service charges if any.
   - tenant shall continuously maintain:
     - the property in good and reasonable order;
     - and keep clear all noxious growth from premises;
     - hold public liability insurance of at least $20 million.
   - the exact dimensions of land to be leased and all remaining terms to be determined by the Chief Executive Officer.
   - Tenant to comply with the *Environmental Guidelines for Boat Repair and Maintenance,* EPA 2024

3. authorises the Chief Executive Officer to exercise any right, option or discretion exercisable by Council under the lease.

4. notes, for the avoidance of doubt, Chief Executive Officer is a term of reference for the General Manager as appointed by Council pursuant to section 61 of the *Local Government Act 1993* (Tas).

REPORT:

The current Lessee, Tamar Yacht Club (the Lessee) is a community-based organisation and is the oldest yacht club in the southern hemisphere, formed in 1837 when the first regatta was held on the occasion of the Queen's birthday. After this event the Lessee went on to establish a clubhouse and jetty at Park Street which resulted in a significant increase in its membership. Council has leased the land situated at 11 Park Street adjacent to Royal Park as shown on the attached plan, to the Lessee for now more than seventy years. The property is used by the Lessee as a slip yard.

In 1955 the Lessee purchased a new clubhouse at 7 Park Street next door to the property. The Lessee conducts training for adult and junior sailors and has a fleet of 'club' boats for more experienced sailors to use. It also facilitates inter-school team racing with Tamar sailors having represented the Lessee at the Australian Schools Team Racing Championships.

The Lessee has requested that Council renew the lease of this area to enable it to continue housing large and small boats.

RISK IMPLICATIONS:

Not considered relevant to this report.

ECONOMIC, ENVIRONMENTAL AND SOCIAL IMPACT:

Not considered relevant to this report.

STRATEGIC DOCUMENT REFERENCE:

City of Launceston Corporate Strategic Plan 2014 - 2024
Strategic Priority 3: We are a progressive leader that is accountable to our governance obligations and responsive to our community.
10-Year Goal: To ensure decisions are made in a transparent and accountable way, that effectively meet our statutory obligations, support quality services and underpin the long-term sustainability of our organisation.
Focus Areas:
2. To fairly and equitably discharge our statutory and governance obligations.
3. To ensure decisions are made on the basis of accurate and relevant information.

Strategic Priority 5: We serve and care for our community by providing equitable and efficient services that reflects needs and expectations of our community.
10-Year Goal: To offer access to services and spaces for all community members and to work in partnership with stakeholders to address the needs of vulnerable communities.
Focus Areas:
4. To support the delivery of programs and events for people to connect with each other through participation in community activities and civic life.
5. To promote and support active and healthy lifestyles of our community.

BUDGET AND FINANCIAL IMPLICATIONS:

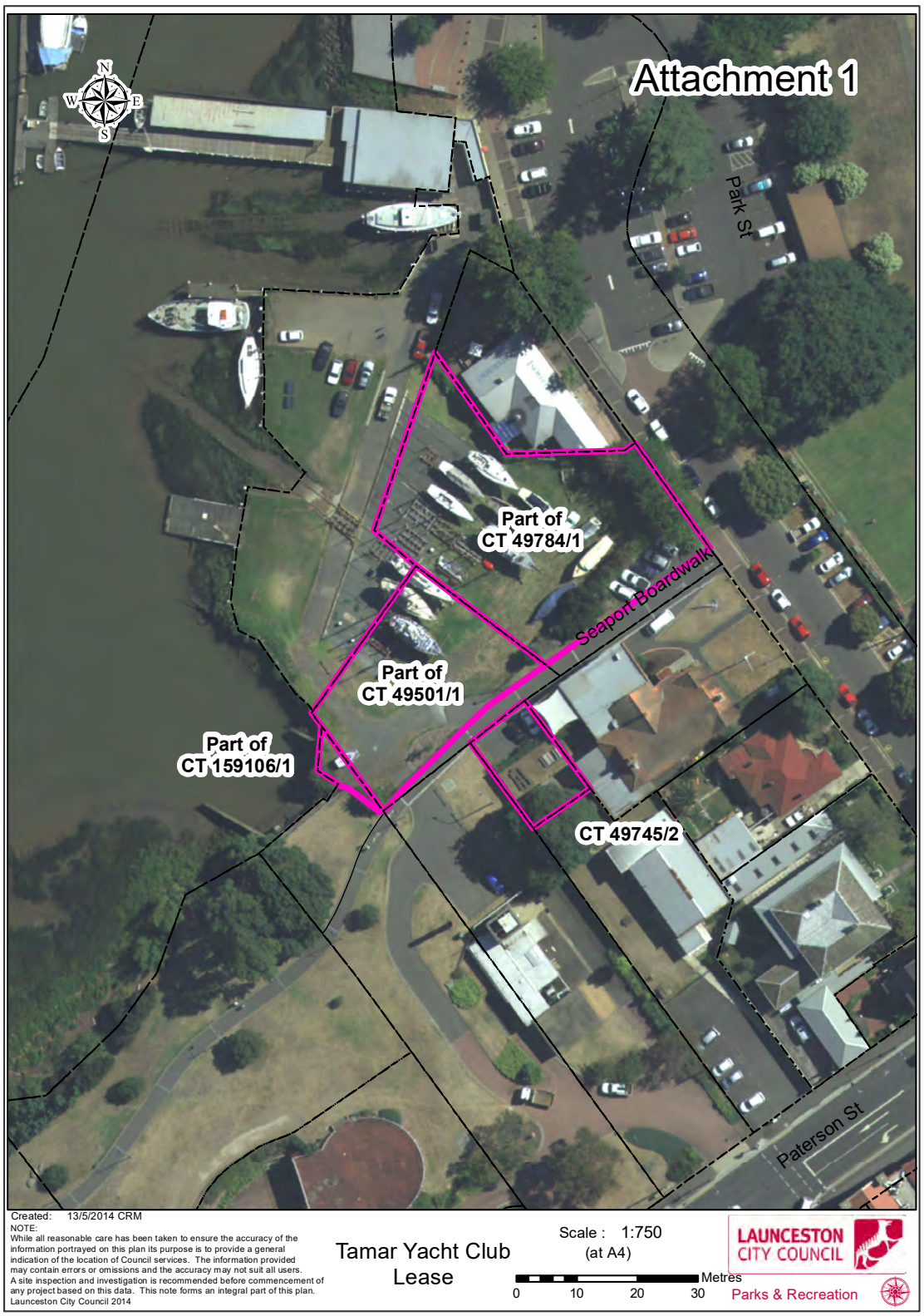
Not considered relevant to this report.

DISCLOSURE OF INTERESTS:

The Author and General Manager have no interests to declare in this matter.

ATTACHMENTS:

1. Attachment 1 - Lease Tamar Yacht Club - Copy [**19.1.1** - 1 page]
2. L G 24 1704 11 Park Street Launceston Valuation Report [**19.1.2** - 12 pages]



Document Set ID: 5079286
Version: 1, Version Date: 07/06/2024

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

LG ValuationServices

VALUATION REPORT

TAMAR YACHT CLUB 11 Park Street LAUNCESTON TAS 7250	
Client	City of Launceston
Owner	LAUNCESTON CITY COUNCIL
Valuation Date	16 February 2024
Our Reference	LG24/1704

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www.lgvals.com.au

Part of the HMC Property Group

LG Valuation Services Pty Ltd
ABN 77 095 763 625

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

Property Address

11 Park Street LAUNCESTON TAS 7250

Instructions

Written instructions have been received from Michelle Grey, Properties and Legal Officer, Organisational Services Network, City of Launceston.

Purpose

To undertake a rental assessment for the property.

Pecuniary Interest

We confirm that the valuers do not have any pecuniary interest that would conflict with the proper valuation of the property.

Date of Inspection

16 February 2024

Date of Valuation

16 February 2024

Registered Proprietor

LAUNCESTON CITY COUNCIL

Title and Legal Description

Lot 1 on Plan of subdivision 49784 (49784/1) comprising approximately 164m2

Lot 1 on Plan of subdivision 49501 (49501/1) comprising approximately 116m2

Lot 2 on Plan of subdivision 49745 (49745/2) comprising approximately 54m2

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

Our valuation has been assessed on the assumption that the property is not affected by any encumbrances that may affect the continued operation of the premises for maritime purposes. We have not searched with other Government or relevant entities to ascertain whether any easements or encumbrances exist over the subject property.

Land use and description

The land can be described as mostly level in contour and irregular in dimension.
The land has frontage to the Tamar River and is primarily used for maritime related uses such as Yacht Storage and repair with access to a boat ramp/slipway located on Crown Land. The existing use is the highest and best use due to its current positioning and zoning.

Lettable Area

Total lettable area of 334m2 approximately.

Maps

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

Zoning

Property comes under the low landslip hazard band and waterway and coastal protection area.

Services

We are advised that water and power is connected to the site.

Location and Access

The subject site is situated on the west side of Park Street approximately 100m north of the intersection with Paterson Street.

Property Description

The land is mostly level with slight fall from the road frontage to the water frontage and is highly suited to the existing use. It is irregular in dimension and is mostly covered in light grass.

Structural Improvements

Vacant Land

Market Rental Considerations

In considering applicable market rental parameters for the subject property, we have considered the fact that the site has limited alternative use or market appeal and is generally only suited to public use.

Valuation Approach and Rationale

The highest and best use of the site is the existing use due to the prevailing restrictive zoning. The land has been valued based on underlying urban mixed-use land in the subject's location less a 50% impairment due to use constraints. Analysis demonstrates an effective rate of $1,200pm2 less 50% impairment, the applied rate is $600pm2 as an assessed market value.

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

Market Value

Unimproved Value of Land						
Land Area						
334	m²	@	600	pm²		$200,804.
					Say	**$200,000**

I advise that the current market value of the land described in this report is:

TWO HUNDRED THOUSAND DOLLARS ($200,000)

Market Rental Value

As at the valuation date, having had regard for all relevant factors, we believe the current market rental of the property as outlined in this valuation report to be assessed at 4% of the nominal Market Value:

Rental Value of Land					
Land Area					
$200,000	X	0.04			$8,000.
				Say	**$8,000**

EIGHT THOUSAND DOLLARS ($8,000 per annum)

The above valuation is net or exclusive of any GST which may be payable.

The subject property was inspected by Marcus Hann AAPI, Certified Practising Valuer, LG Valuation Services Pty Ltd and the report has been prepared by Marcus Hann CPV AAPI and Anubhav Bhatia PMAPI LG Valuation Services Pty Ltd

Marcus Hann AAPI
Certified Practising Valuer
LG Valuation Services Pty Ltd

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

Comparable Sales

1) 68 Paterson Street Launceston TAS 7250

   Allowing as $820,000 as the added value of improvements and $600,000 for the land.
   505m2 sold at $1.22M = Land area is approx.=- $600,000 / 505 = Rate is $1,188 per m2

2) 58 – 60 Paterson Street Launceston TAS 7250

   Allowing as $485,000 as the added value of improvements and $890,000 as the land area.
   746m2 sold for $1.375m = Land area is approx. = $890,000 / 746 = Rate is $1,193 per m2

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

Qualifications and Disclaimers

We certify that the valuers and/or the valuation firm do not have any conflict of interest, or direct, indirect, or financial interest in relation to this property that has not been disclosed.

This valuation is current as at the date of valuation only. The value assessed herein may change significantly and unexpectedly over a relatively short period (including because of general market movements or factors specific to the particular property). We do not accept liability for losses arising from such subsequent changes in value. Without limiting the generality of the above comment, we do not assume any responsibility or accept any liability where this valuation is relied upon after the expiration of three months from the date of the valuation, or such earlier date if you become aware of any factors that have any effect on the valuation. We recommend the valuation be reviewed at regular intervals.

This report has been prepared for the private and confidential use of our client. It cannot be used for mortgage security purposes and should not be reproduced in whole or part without the express written authority of LG Valuation Services or relied upon by any other party for any purpose and the valuer shall not have any liability to any party who does so. Our warning is registered here, that any party, other than those specifically named in this paragraph should obtain their own valuation before acting in any way in respect of the subject property.

This valuation should be read in its entirety, inclusive of any summary and annexures. The valuers and valuation firm does not accept any responsibility where part of this report has been relied upon without reference to the full context of the valuation report.

The publication of the valuation or report in whole or any part, or any reference thereto, or the names and professional affiliations of the valuers is prohibited without the prior written approval of the valuers as to the form and context in which it is to appear.

This valuation is subject to the definitions, qualifications, disclaimers, and other comments contained within this report.

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

Definitions

As per International Valuation Standards Committee

"Market Value" of land, means the estimated amount for which an asset should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion.

"Highest & Best Use" is the use of an asset that maximises its value and that is physically possible, legally permissible and financially feasible.

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

PHOTOGRAPHY

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

City of Launceston
Council Meeting Agenda

Thursday 13 June 2024

City of Launceston Tamar Yacht Club 11 Park Street Launceston	LG Valuation Services Pty Ltd LG24/1704

From: "Lana McInnes" <lana@hmval.com.au>
Sent: Mon, 4 Mar 2024 14:23:09 +1100
To: "Michelle Grey" <Michelle.Grey@launceston.tas.gov.au>
Cc: "Marcus Hann" <marcus@hmval.com.au>
Subject: Valuation Report
Attachments: LG24 1704 11 Park Street Launceston Valuation Report.pdf, Invoice No. 7824.pdf

Good afternoon Michelle,

Please find attached a Valuation Report and an invoice in relation to the Tamar Yacht Club, 11 Park Street Launceston TAS 7250.

Thank you

Kind Regards

Lana McInnes
Administration Assistant - LG Valuation Services Pty Ltd
Part of HMC Property Group
PO Box 378
43 Albion Street
KYABRAM VIC 3619
Phone: 03 5851 2200
Fax: 03 5852 3423
Email: lana@hmval.com.au

LG ValuationServices

VALUATION REPORT

TAMAR YACHT CLUB 11 Park Street LAUNCESTON TAS 7250	
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Owner	LAUNCESTON CITY COUNCIL
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ABN 77 095 763 625

City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

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City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

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City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

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We are advised that water and power is connected to the site.

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City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

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Marcus Hann AAPI
Certified Practising Valuer
LG Valuation Services Pty Ltd

City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

Comparable Sales

1) 68 Paterson Street Launceston TAS 7250

   Allowing as $820,000 as the added value of improvements and $600,000 for the land.
   505m2 sold at $1.22M = Land area is approx.=- $600,000 / 505 = Rate is $1,188 per m2

2) 58 – 60 Paterson Street Launceston TAS 7250

   Allowing as $485,000 as the added value of improvements and $890,000 as the land area.
   746m2 sold for $1.375m = Land area is approx. = $890,000 / 746 = Rate is $1,193 per m2

City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

Qualifications and Disclaimers

We certify that the valuers and/or the valuation firm do not have any conflict of interest, or direct, indirect, or financial interest in relation to this property that has not been disclosed.

This valuation is current as at the date of valuation only. The value assessed herein may change significantly and unexpectedly over a relatively short period (including because of general market movements or factors specific to the particular property). We do not accept liability for losses arising from such subsequent changes in value. Without limiting the generality of the above comment, we do not assume any responsibility or accept any liability where this valuation is relied upon after the expiration of three months from the date of the valuation, or such earlier date if you become aware of any factors that have any effect on the valuation. We recommend the valuation be reviewed at regular intervals.

This report has been prepared for the private and confidential use of our client. It cannot be used for mortgage security purposes and should not be reproduced in whole or part without the express written authority of LG Valuation Services or relied upon by any other party for any purpose and the valuer shall not have any liability to any party who does so. Our warning is registered here, that any party, other than those specifically named in this paragraph should obtain their own valuation before acting in any way in respect of the subject property.

This valuation should be read in its entirety, inclusive of any summary and annexures. The valuers and valuation firm does not accept any responsibility where part of this report has been relied upon without reference to the full context of the valuation report.

The publication of the valuation or report in whole or any part, or any reference thereto, or the names and professional affiliations of the valuers is prohibited without the prior written approval of the valuers as to the form and context in which it is to appear.

This valuation is subject to the definitions, qualifications, disclaimers, and other comments contained within this report.

City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

Definitions

As per International Valuation Standards Committee

"Market Value" of land, means the estimated amount for which an asset should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion.

"Highest & Best Use" is the use of an asset that maximises its value and that is physically possible, legally permissible and financially feasible.

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Tamar Yacht Club 11 Park Street Launceston	LG24/1704

PHOTOGRAPHY

City of Launceston	LG Valuation Services Pty Ltd
Tamar Yacht Club 11 Park Street Launceston	LG24/1704

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Tamar Yacht Club 11 Park Street Launceston	LG24/1704

LG
ValuationServices

PO Box 378
Kyabram, 3619
Ph: 03 5851 2200
Fax: 03 5852 3423
Email: accounts@hmval.com.au

Tax Invoice

A.B.N. 77 095 763 625

Bill To:

Michelle Grey
City of Launceston
PO Box 396

LAUNCESTON TAS 7250

File No: LG24/1704
Date: 4/03/2024
Invoice #: 00007824
Page: Page 1 of 1

Description	Amount	Code
RE: Tamar Yacht Club 11 Park Street LAUNCESTON TAS 7250	$800.00	GST
Valuation Report		
Owner: Launceston City Council		
Client: City of Launceston		

Customer ABN:

GST:	$80.00
Total Inc GST:	$880.00
Amount Applied:	$0.00
Balance Due:	$880.00

Please make all cheques payable to: LG Valuations Services Pty Ltd

If you have any questions concerning this invoice, Marcus Hann

Accounts payable by direct deposit to:
LG Valuation Services Pty Ltd
BSB: 083 894
Account No: 81 006 8277
Please include invoice reference

Lease and License Policy

PURPOSE

To provide a consistent and equitable framework for the leasing and licensing of land and buildings ("facilities") owned and managed by City of Launceston ("Council").

SCOPE

This policy applies to:

- all Council officers involved in the negotiation and preparation of leases and licences relating to Council owned facilities
- all customers who intend to lease or licence Council owned facilities on more than an informal, occasional basis. Customers will be provided with a copy of this policy prior to signing their lease or licence

This policy does not apply to:

- hire of Council owned facilities that are routinely booked or hired for occasional uses with a standard City of Launceston venue hire agreement or booking arrangement
- occasional general community uses (for example, informal uses of open spaces, or non-exclusive gatherings)
- encroachments onto Council land (refer to the Private Use of Council Land Policy 23-Pl-003)

The information contained in this policy is not advice, and should not replace seeking legal advice on proposed Council agreements.

Special considerations and procedures apply to the leasing of public land. Officers intending to lease public land are encouraged to seek legal advice.

POLICY

Policy objectives

- To optimise the use of Council facilities to the mutual benefit of the community and Council
- To achieve fair and equitable access to facilities
- To achieve a transparent system
- For community leases, to achieve a cost management model whereby the cost of operation of the asset for community groups are not prohibitive, nor an unreasonable financial cost to Council
- For commercial leases, to ensure that Council operates in accordance with contemporary commercial practices

Optimising the benefits to be obtained from Council land facilities

The Council will ensure suitable usage arrangements are in place for its land and facilities. Use of Council facilities will support community needs in a manner that is consistent with Council's strategic plans and values.

Where Council facilities are provided for the use of the community Council must strike an appropriate balance between meeting growing needs for community assistance and endeavouring to manage limited Council resources.

The Council may consider the following strategies in order to support Community uses:

- requiring lessees and licensees to pay for the expenses arising from their use of facilities, except where specifically exempted
- the promotion of multi-use arrangements where appropriate
- offering use of alternative, more cost effective facilities
- disposing of facilities that no longer meet modern standards

Fair and equitable access

The Council will provide fair and equitable access to its facilities for all users.

For non-public land, although Council will ordinarily permit a renewal of tenancy where no breaches of the lease or licence have occurred, Council is not obligated to do so unless required by the existing lease or licence.

For public land that has a commercial use, Council will ordinarily offer a maximum term of 20 years inclusive of all options. Shorter terms are preferred to ensure equitable access to publicly owned assets which are often in premium locations.

If a renewal is not offered and instead the Council intends to grant an entirely new lease or licence, Council will publicly advertise the facility including any desired uses or particular requirements. An Expression of Interest (EOI) process will be utilised for all new leases and licences, including in circumstances where a current tenancy is not being renewed.

As part of the EOI process, the following steps are required:

- preparation of description, selection criteria, and required forms
- a public notice is to be placed in a public newspaper, inviting interested parties to provide submissions of their intended use of the facility
- a panel of not less than three Council employees will be appointed to assess the submissions and select the most suitable applicant
- A recommendation will be put to a Council meeting in support of the preferred user group (where appropriate)

For non-commercial use leases and licences, relevant factors when considering the use of a facility may include:

- the demonstrated need for the service
- the user history, financial and income capacity of the user
- the suitability of the facility
- existing and surrounding users
- any relevant environmental impact and sustainability considerations
- capital contributions made or proposed by the user
- whether co-location of the group with another user, or head leasing to representative peak bodies, is more appropriate

A transparent system

The Council must use, and be able to demonstrate its ability to meet the objective criteria and equitable processes set out in this policy.

Standardised lease and licence agreement templates will be used wherever possible.

Lessees and licensees will be provided with a clear summary of the value of any support or concessions granted by Council. **This information may be reported publicly.**

Valuation

The *Local Government Act 1993* (Tas) requires that for land that is not public land, a valuation must be obtained before disposal of facilities. The cost of such valuations will be met by Council.

Rent for commercial leases and licences will be at the market rate, based upon an independent valuation of the relevant facility, conducted within the preceding 12 months. This applies whether or not the land is public land or not.

For the purpose of calculating the effective subsidy for community use leases and licences, the rental valuation will be assessed using the property's latest available AAV figure, adjusted for CPI and any shared or part use of the land. That valuation will accompany any officer report as part of Council's decision making process on disposal.

Determining a fair contribution for non-commercial uses

Only commercial users are required to pay rent at a market rate.

Community users are required to pay a yearly fee of 182 fee units as set pursuant to the Fee Units Act 1997 (Tas) (equating to $300.30 as at 1 July 2021). This fee is in order to cover administrative costs. Any additional service charges that arise are the responsibility of the user. Community users are not required to pay for rates or land tax.

The Council will be responsible for maintenance unless otherwise agreed between the parties. Lessees remain responsible for the cleaning and other day-to-day operations.

Further details on rental and other charges are at Table 1 on page 4.

Table 1: Cost recovery summary

Category	Financial contributions	Eligibility criteria
1. Community user groups Examples: • Recreational group • Benevolent group • Community association, club or garden	Annual rental charge of $300.30 Users must pay all costs: • utilities - consumption and fixed charges • operational maintenance (e.g. cleaning, security, pest control) bin service charges and State Fire Service Levy Fee • other costs (e.g. replacement, signage) • costs of specialised sporting equipment	• must provide proof of benevolent or charitable activity/service, community service or be a sporting club • has limited revenue-raising ability • provides optimal multiple use opportunities
2. Commercial user, private user, government or grant funded user	Full market rent All associated costs	Service is provided on standard commercial terms
3. Mixed/partially assisted user group or group with limited public benefit (semi-private museums, office for partly funded program)	Rent is determined in accordance with the percentage that the user is deemed to be commercial, community, benevolent, or self-funded calculated in accordance with relevant procedures as applicable. The financial contribution outlined for Community Groups (Table) is also applied to the category.	Has a mix of community and commercial activities

Capital contributions

All proposed capital contributions or improvements to Council assets of any kind must be approved by the Council prior to being undertaken. Council strongly encourages users to proactively engage with Council on grant funding and other sources of financial support.

Any applications to undertake capital contributions or improvements and their subsequent ownership, financial compensation or any other form of compensation will be considered by the General Manager Infrastructure and Assets. Any agreements will be specified in the lease or associated documentation.

The Council retains ownership of fixed improvements on its land, unless the contrary is approved by Council, in which case this will also be specified in the lease.

When assessing users' capital contributions and improvements, the Council will give consideration to the assets management (including ongoing maintenance requirements), the strategic direction and use of the asset, Council's resources, alignment to Council's strategic plans and values.

Insurance

The Council will insure its buildings against property damage. Users are required to reimburse Council for their share of the cover. A user may elect to take out their own building cover with the approval of Council, in which case the user will be obliged to provide certificates of currency on a yearly basis.

If ownership of capital improvements sits with the user (see **Capital Contributions** above), building insurance is the responsibility of the user. Council will not insure capital improvements if it is not the owner of the capital improvements. This is because Council maintains a high excess ($50,000): in insuring a capital improvement, Council assumes responsibility for under excess claims which is not appropriate if Council is not the asset owner.

Any user may take out other specialised policies for their business or sporting activities, such as professional indemnity, contents insurance, player injury cover, additional plate glass and business interruption insurance.

The user must insure themselves against personal injury claims at a level suited to their likely risk exposure and in all cases at least $20 million in minimum cover.

Legislative compliance

Council officers must comply with relevant laws relating to disposals of land. These obligations are mainly set out in Part 12 of the *Local Government Act 1993* (Tas). Special provisions apply to public land such as public parks and gardens, and sporting facilities for public use.

Council must also comply with the *Local Government (Building & Miscellaneous Provisions) Act 1993* (Tas) relating to subdivisions when considering offers of lease terms of more than 10 years.

Council must comply with the *Residential Tenancy Act 1997* (Tas) for residential properties.

Any property being used as retail shop premises (such as cafes) must be dealt with in a manner that complies with the *Fair Trading (Code of Practice for Retail Tenancies) Regulations 1998.*

PRINCIPLES

The principles underpinning this policy are transparency, equity and public access.

All of Council's Organisational Values apply to this policy.

RELATED POLICIES & PROCEDURES

19-Pl-001 Legal Services Policy
24-Pl-003 Council Property Management Policy
24-Pl-002 Disposal or Alienation of Council Assets Policy
17-Rf-007 Legals Index Document Information Sheet

RELATED LEGISLATION

Fair Trading (Code of Practice for Retail Tenancies) Regulations 1998
Local Government Act 1993 (Tas)
Local Government (Building & Miscellaneous Provisions) Act 1993 (Tas)
Residential Tenancies Act 1997 (Tas)

Competition and Consumer Act 2010 (Cth)

REFERENCES

N/A

DEFINITIONS

"Benevolent" means an organisation or association that has objects and activities of a charitable nature that holds an Australian Tax Office certificate granting "benevolent" status.

"Community Association" means an incorporated or unincorporated association of members that has objects and activities of a social or recreational nature and openly offers membership to any member of the community reasonably able to participate in that activity.

"Commercial" means any person, partnership, trust, company or other entity intending to provide goods and/or services for a financial reward, and for the purposes of rental rebate assessment, an entity that cannot clearly fit into any other rental rebate assessment category.

"Lease" - an agreement by which the Lessor grants to the Lessee exclusive possession of a property for an agreed period in exchange for rent or fee.

"Licence" - a formal authority or permission to enter and occupy a person's land for an agreed purpose. A licence does not usually confer a right of exclusive possession of the property, or any estate or interest in it.

"Public Land" - as defined in section 177A of the *Local Government Act 1993* (Tas).

REVIEW

This policy will be reviewed no more than 2 years after the date of approval or more frequently, if dictated by operational demands and with Council's approval.

DOCUMENT INFORMATION

Reference number	19-Plx-002
Version	10/03/2022
Review	10/03/2024
Key function	19
Document type	Policy
Responsible Network	Organisational Services
Approved by	Council
Action Officer	Tricia De Leon-Hillier
Text search key words	lease licence policy legal agreement public land facilities

To be communicated to *(To be identified by Approver)* (Insert ✓ in relevant row)		Department/Area only
		Network via General Manager and Team Managers
		Specific Areas: •
	✓	Organisation-wide
	✓	Website
		Intranet (via a link)

Hard copy distribution	N/A

15.2. Next steps in expression of interest process - 56 Frederick Street, Launceston

FILE NO: CD037/2023

AUTHOR: Leanne Purchase (Manager Governance)

GENERAL MANAGER APPROVAL: Louise Foster (Organisational Services Network)

DECISION STATEMENT:

To consider the next steps regarding the future use of 56 Frederick Street, Launceston.

PREVIOUS COUNCIL CONSIDERATION:

Council – 14 December 2023 - Agenda Item Number 16.3 - Next steps in Expression of Interest Process – 56 Frederick Street, Launceston
Workshop – 22 February 2024 – Expression of Interest Process – 56 Frederick Street, Launceston
Workshop - 4 May 2023 - Disposal of 56 Frederick Street, Launceston Workshop - 23 November 2023 - Expression of Interest Process - 56 Frederick Street, Launceston
Workshop - 30 November 2023 - 56 Frederick Street, Launceston - Next Steps

RECOMMENDATION:

That Council:

1. Endorses the proposal submitted by the Launceston History Centre Inc. as its preferred proposal for the future use of 56 Frederick Street, Launceston;

2. Authorises the Chief Executive Officer to work with the Launceston History Centre Inc. to progress a lease in alignment with the Council's Lease and Licence Policy 19-Plx-002 for managing the ongoing use of 56 Frederick Street, Launceston; and

3. Notes that the Council will be asked to formally consider granting the lease with appropriate terms at a future meeting of the Council.

Kirsten Ritchie spoke against the Recommendation
Sarah Kubarych spoke against the Recommendation.
John Dent spoke for the Recommendation.
Julian Burgess Launceston History Centre spoke for the Recommendation.

DECISION: 4 April 2024

MOTION

Moved Deputy Mayor Councillor D H McKenzie, seconded Councillor A G Harris.

That the Motion, as per the Recommendation to Council, be adopted.

CARRIED 12:0

FOR VOTE: Mayor Councillor M K Garwood, Deputy Mayor Councillor D H McKenzie, Councillor D C Gibson, Councillor A E Dawkins, Councillor A G Harris, Councillor T G Walker, Councillor Prof G Razay, Councillor J J Pentridge, Councillor A J Palmer, Councillor L M McMahon, Councillor S Cai and Councillor A J Britton
AGAINST VOTE: Nil

TO BE ENGROSSED ON CITY OF LAUNCESTON POLICY TEMPLATE

REGISTER OF INTERESTS POLICY

1. INTRODUCTION

1.1 All Councillors will have interests outside of the Council. There is nothing inappropriate about having outside interests.

1.2 Under the *Local Government Act 1993* (Tas) (**LG Act**) and the *Local Government (Code of Conduct) Order 2024* (**Code of Conduct**), Councillors are only required to declare such interests if any when a conflict of interest (or in some cases, a potential or perceived conflict of interest) arises in a matter which comes before the Council (or in some cases a Council committee, special committee, controlling authority, single authority or joint authority).

1.3 All Councillors of the City of Launceston are committed to observing those requirements of the LG Act and Code of Conduct, as and when conflicts of interest or potential or perceived conflicts of interest arise.

1.4 In addition to those requirements, the Council has decided to create this policy framework whereby Councillors will also make 'standing' declarations of certain interests held by that Councillor (and certain other related persons), on an ongoing basis. That information is then included in a publicly available 'Register of Interests', maintained by the CEO.

1.5 This means that information regarding certain of Councillors' interests will be made publicly available, whether or not those interests ever give rise to a conflict of interest in a matter which comes before the Council.

1.6 Further, for completeness and added transparency, the financial and other benefits which Councillors receive by virtue of holding office as Councillors will also be recorded in the Register of Interests.

1.7 Council maintains the Register of Interests in good faith, in the interests of transparency. Information derived from the Register of Interests should not be published by others unless information constitutes a fair and accurate summary of the information, and it is published in the public interest and without malice.

2. PURPOSE

2.1 The purpose of this policy is to provide a framework for the establishment of a Register of Interests, maintained by the CEO, which contains details of certain interests held by each Councillor.

3. APPLICATION OF POLICY

3.1 This policy applies to all Councillors.

3.2 This policy also requires the CEO to maintain the Register of Interests which is established under this policy.

DZM/DZM/28640-516039

4. DEFINITIONS

CEO	The general manager of the Council.
Councillors	All persons elected to the Council including, to avoid doubt, the Mayor.
Interest in Property	Any estate, interest, right or power, in law or in equity, in or over real property. This includes sole ownership, joint tenancy, tenancy in common, and equitable and/or beneficial ownership.
Related Person	Related Person with respect to a Councillor means any of the following: • the Councillor's spouse/partner; • any children who are wholly or mainly dependent on the Councillor for support; • [consider other persons listed in definition of 'close associate' in section 51 of LG Act – none, some or all might be included here].
Register of Interests	The register established by this policy and referred to in clause **Error! Reference source not found.**.

5. REGISTER OF INTERESTS

5.1 The CEO will maintain a register, to be called the 'Register of Interests', which includes the information required under this policy.

5.2 The CEO will make the Register of Interests publicly available for inspection on the Council website in whatever manner and format the CEO considers appropriate.

5.3 The Register of Interests will be divided into two parts:

5.3.1 Part A, containing information regarding interests which Councillors hold by virtue of their appointment as Councillors;

5.3.2 Part B, containing information regarding other interests of Councillors and Related Persons.

5.4 With respect to disclosures of information made by Councillors for the purpose of Part B of the Register of Interests:

5.4.1 A Councillor is required only to disclose information that is known to the Councillor or ascertainable by the Councillor by the exercise of reasonable diligence;

5.4.2 A Councillor is not required to disclose the actual amount or extent of a financial interest;

5.4.3 A Councillor may disclose information in such a way that no distinction is made between information relating to the Councillor personally and information relating to a Related Person.

6. **PART A – INTERESTS HELD BY VIRTUE OF APPOINTMENT AS COUNCILLOR**

6.1 The CEO will include the following information in Part A of the Register of Interests, for each Councillor:

6.1.1 Allowance payable to the Councillor under the LG Act;

6.1.2 Any resources, facilities and support provided to the Councillor;

6.1.3 Any instance of reimbursement paid by the Council to the Councillor;

6.1.4 Any instance of any other payment made by the Council to the Councillor.

6.2 The information recorded in this Part of the Register will be [consider whether the information will be from the commencement of this Policy/the commencement of the current term of office/the first date upon which a Councillor was elected to Council/some other date].

7. **PART B – OTHER INTERESTS OF COUNCILLORS AND OF RELATED PERSONS.**

7.1 The CEO will include the following information in Part B of the Register of Interests, for each Councillor:

7.1.1 Any source of income for the Councillor or any Related Person [consider whether a threshold may apply, e.g. Hobart: "*any paid employment in the preceding 6 months where the income exceeds $10,000 in that period*"];

7.1.2 A description of any Interest in Property held by the Councillor or any Related Person, including a description of the suburb or locality of the relevant land and the use of the land [consider geographical limitations, e.g. only within the Council area, or else have no limitation];

7.1.3 The name of any company or other body (whether incorporated or unincorporated) in which the Councillor or a Related Person holds office whether as a director or otherwise;

7.1.4 The name or description of any company, partnership, association or other body which the Councillor or a Related Person:

7.1.4.1 has deposited money with, or lent money to, that has not been repaid and the amount not repaid equals or exceeds $10,000; or

7.1.4.2 holds, or has a beneficial interest in, shares in, or debentures of [consider whether to distinguish between public/private companies, and whether any threshold should apply e.g. $10,000 value as per City of Hobart]; or

7.1.4.3 holds a policy of life insurance issued by the body;

[Other possible interests for further discussion:]

7.1.5 [Superannuation fund and any other funds]

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7.1.6 [Trusts that the Councillor is a trustee or a beneficiary of (other than testamentary trusts)]

7.1.7 [Personal debt above some particular threshold– City of Hobart's register refers to debt over $10,000 (excluding financial institutions) - consider both debt owed by, and debt owed to, the Councillor/Related Person and whether debt with APRA registered authorised deposit-taking institutions (such as mortgages on real property) would be included]

7.1.8 [Sponsored travel or hospitality received – City of Hobart refers to where the value of the sponsored travel or hospitality exceeds $300 – N.B this would not replace the requirement to maintain the Gifts and donations register under the LG Act]

7.1.9 [Election campaign donations – N.B. this would not replace the requirement to maintain the Gifts and donations register under the LG Act]

7.1.10 A description of any other interest of the Councillor or a Related Person which is not otherwise described above but which the Councillor:

7.1.10.1 considers to be substantial; and

7.1.10.2 foresees as having the potential to give rise to a conflict of interest under the LG Act or Code of Conduct at any stage.

7.2 Within 28 days of the adoption of this policy, each Councillor will inform the CEO of any interests of any of the kinds described in clause **Error! Reference source not found.** held by that Councillor or a Related Person.

7.3 Where any new Councillor is elected to the Council they must, within 90 days of their election, inform the CEO of any interests of any of the kinds described in clause **Error! Reference source not found.** held by that Councillor or a Related Person.

7.4 If, at any time during their term of office, a Councillor obtains or becomes aware of an interest of a kind described in clause **Error! Reference source not found.** or becomes aware that a Related Person has obtained such an interest, that Councillor must inform the CEO of that interest as soon as practicable.

7.5 If a Councillor become aware that any information in the Register of Interests with respect to that Councillor or a Related Person is no longer correct, that Councillor must inform the CEO of this as soon as practicable (and, if relevant, provided updated information).

8. PERSONAL INFORMATION

8.1 If a Councillor discloses information to the CEO in accordance with this policy, and that information constitutes personal information of the Councillor or a Related Person within the meaning of the *Personal Information Protection Act 2004* (Tas), the following applies:

8.1.1 The purpose for which the information is collected is to fulfil the Council's commitment to maintaining a Register of Interests in accordance with this policy;

8.1.2 If a Councillor discloses any information regarding a Related Person in such a way that the identity of the Related Person is apparent or is reasonably ascertainable, the Councillor will make the Related Person aware of this policy (and the Related Person may contact the CEO with any queries about this policy);

8.1.3 This policy is intended to be a statement of all of the matters set out in clause 1(3) of Schedule 1 to the *Personal Information Protection Act 2004* (Tas).

9. LEGISLATION AND RELATED POLICIES

This policy should be read in conjunction with the following:

9.1 *Local Government Act 1993* (Tas);

9.2 *Local Government (Code of Conduct) Order 2024* (Tas);

9.3 *Personal Information Protection Act 2004* (Tas);

9.4 Acceptance of gifts and donations by Councillors Policy;

9.5 Alderman's Expenses and Resources Policy.

10. REVIEW

10.1 This policy shall be reviewed by the Council every two years.

DZM/DZM/28640-516039

Tasmanian Government Response to the Future of Local Government Review Final Report Recommendations

Office of Local Government
Department of Premier and Cabinet

Tasmanian Government

Acknowledgement of Aboriginal People and Country

In recognition of the deep history and culture of Tasmania, the Department of Premier and Cabinet acknowledges and pays respect to all Tasmanian Aboriginal people, the past and present custodians of this island. The Department acknowledges and pays respect to Tasmanian Aboriginal Elders, past and present.

Minister's Foreword

The Future of Local Government Review provides a once-in-a-generation opportunity to consider how to shape a flexible, adaptable, and sustainable local government system that can respond to the growing demands and changing needs of our communities in the decades ahead.

Over the last nearly-four years, a huge amount of work has been undertaken by the independent Local Government Board, the Office of Local Government, the Local Government Association of Tasmania, all our Councils – including elected members and staff – and of course the Tasmanian community. This work has culminated in the Board handing down 37 reform recommendations it sees as being the blueprint for local councils being able to deliver the essential services Tasmanians deserve.

I'm pleased to now present the Tasmanian Government's response to these recommendations.

Councils are key to supporting the wellbeing, sustainability, and prosperity of all Tasmanians. That is why, after careful thought and collaboration with the local government sector, we have accepted – either in full, in part, or in principle – 36 of the Review's 37 recommendations.

With the release of our review response, I'm also pleased to release our Local Government Priority Reform Program 2024 – 2026. This program provides a guide to how our spheres of Government will work together over the next two years to implement the key reforms from the review and deliver the best outcomes in the most efficient and effective way.

These two documents create a broad approach, informed by consultation, on the pressing issues facing the sector.

A number of the reforms will require legislative underpinning, and the Government will work closely with the sector to prioritise, develop, and bring in necessary amendments before the Parliament between now and the next local government elections in late 2026.

I am keen to move quickly to implement reforms and aim to release a Discussion Paper for public consultation in next ten weeks. This will enable the finalisation and introduction of a range of amendments into the Parliament by mid-2025.

As part of the Priority Reform Program, the Government has outlined how it will support local councils that wish to explore voluntary amalgamations. We are absolutely committed to working with and supporting interested councils with progressing structural reform where they can prepare and submit robust amalgamation proposals that demonstrate tangible benefits to their respective communities.

I would like to thank the Local Government Board, who I had the pleasure of engaging with as Mayor of Sorell Council during the Review, for their diligence and commitment to undertaking the Review, and for delivering a bold, well-considered package of reforms that will shape the future of local government in Tasmania.

I also wish to acknowledge and thank the immense input and engagement from both the sector and broader Tasmanian community to the Review. All Tasmanian's have a role in the future of local government, and thanks to the broad engagement the recommendations presented in the Final Report represent our community and sector's ideas, hopes and aspirations for this future.

I would finally like to thank my predecessor, Nic Street MP, for his ongoing support for the Review and for his leadership in delivering broader reform of Tasmania's local government sector during his tenure.

This response outlines our plan for how we will work closely with the sector to deliver enduring and meaningful reforms. It is now time to get on with the job of implementing key changes to ensure our councils are in the best position to serve their communities now and into the future.

Hon Kerry Vincent MLC
Minister for Local Government

Background

The Future of Local Government Review formally commenced in January 2022 with the objective of ensuring Tasmania's system of local government is robust, capable, and sustainable for future challenges and opportunities.

An independent Local Government Board was established to consider the optimal future design of the Tasmanian local government sector across both the administrative and representative areas. The Board sought community, sectoral and peak body input over 2022–23, receiving over 6500 submissions across multiple engagements. All submissions are published on the Future of Local Government Review website at www.futurelocal.tas.gov.au.

The Final Report was delivered to the Minister for Local Government in October 2023. It included 37 integrated recommendations covering both structural and non-structural reform. The recommendations largely related to the core objectives of enabling and empowering councils to deliver essential services and respond to the immediate and future challenges facing Tasmania's local communities.

Public Response to the Final Report

Following its delivery, the Government published the Final Report, inviting public feedback.

A total of 105 submissions were received, which included:

- 22 submissions by councils
- 2 submissions by state government agencies or bodies
- 15 submissions by community organisations and groups
- 3 councillors and council staff, and
- 63 community members.

Feedback on the Final Report was generally positive, with emerging themes of council sustainability and financial and asset management, workforce development, local decision-making and community engagement, and improved transparency and accountability of councils in the interests of their communities. Specific local concerns that were revealed included the potential impact of reforms on smaller communities, and responsibility for waste management and environmental stewardship. Submissions indicated broad interest in further exploring council structural reform and shared service arrangements as a way of supporting the sustainability or improvement of service delivery to communities.

Submissions on the Final Report are publicly available on the Office of Local Government, Department of Premier and Cabinet website at www.dpac.tas.gov.au.

Tasmanian Government Response to the Final Report

On the strength of information and advice provided to the Government throughout the Review - including the significant level of sector and community consultation and feedback - the Government has confirmed support – either in full, in part, or in principle – to all but one of the recommendations of the Final Report.

The recommendation that has not been accepted by the Tasmanian Government (Recommendation 8) relates to the Local Government Board developing a business case for council amalgamations where it is supported by a community-initiated elector-poll. The Tasmanian Government has assessed that this recommendation did not uphold an adequate process for amalgamation proposals to be considered by the Minister for Local Government, so it has not been supported. It is noted that this recommendation was not supported by the Local Government Association of Tasmania as representative body for the sector.

All 36 other recommendations of the Review are supported to some degree by the Tasmanian Government and consideration will be given to how these recommendations can be implemented so that the outcomes are effective and sustainable for communities.

Implementation of the Recommendations of the Review

In response to the Review, the Tasmanian Government has committed to delivering a *Local Government Priority Reform Program 2024–26*.

The Program – which the Government will deliver over the next two years - consolidates the most critical recommendations of the Review. It is also informed by consultation with the sector and other stakeholders to ensure the Government is investing in the right priorities that address the most pressing needs of councils and their communities.

Consideration will be given to implementation of a broader reform program, inclusive of the remaining recommendations of the Review, as second and subsequent phases of work after the 2026 local government elections. Right now, the commitment of the Government is to focus on effective and efficient implementation of the highest priority work.

The *Local Government Priority Reform Program 2024–26* is available on the Office of Local Government, Department of Premier and Cabinet website at www.dpac.tas.gov.au.

	FoLGR Recommendation	Government Response	Priority	Timeframe
1	Define in Tasmania's new Local Government Act the role of local government consistent with the statement below: The role of local government is to support and improve the wellbeing of Tasmanian communities by: 1. harnessing and building on the unique strengths and capabilities of local communities; 2. providing infrastructure and services that, to be effective, require local approaches; 3. representing and advocating for the specific needs and interests of local communities in regional, state-wide, and national decision-making; and 4. promoting the social, economic, and environmental sustainability of local communities, by mitigating and planning for climate change impacts.	**Support.** These provisions will be included in the Act through legislative amendment in 2025. This new role will inform the development of a Charter/ Partnership Agreement with the local government sector (see response to Recommendation 2, below).	High	To be incorporated as part of priority legislative amendments to be brought in before 2026 council elections.

	FoLGR Recommendation	Government Response	Priority	Timeframe
2	The Tasmanian Government – through subordinate legislation – should implement a Local Government Charter to support the new legislated role for local government. The Charter should be developed in close consultation with the sector and clarify and consolidate in a single document councils' core functions, principles, and responsibilities, as well as the obligations of the Tasmanian Government when dealing with the sector as a partner in delivering community services and support.	**Support.** Once the new role for local government is embedded in legislation, the State Government will work with the local government sector to formalise a new Charter to underpin more effective engagement and collaboration between our spheres of government. Details will be developed with the sector, but it is expected it will provide greater clarity on matters such as: • how the Tasmanian Government will support the sector deliver on its remit, including a commitment for genuine consultation where the Tasmanian Government makes decisions impacting on the sector, and vice versa. • how the Government will collaborate with the local government sector to support a genuine, co-regulatory approach to councils' regulatory responsibilities; and • the principles and parameters for where and how councils will work together (both with each other and with the State Government) on a range of strategic issues – such as land use and settlement planning, economic development, and emergency preparedness and response – at the regional level and state-wide level.	Medium	Work on charter to commence in 2026 and will be informed by new legislative provisions clarifying the role of local government.
3	The Tasmanian Government should work with the sector to develop, resource, and implement a renewed Strategic Planning and Reporting Framework that is embedded in a new Local Government Act to support and underpin the role of local government. Under this Framework councils will be required to develop – within the first year of every council election – a four-year strategic plan. The plan would consist of component plans including, at minimum, a: • community engagement plan; • workforce development plan; • elected member capability and professional development plan; and • financial and asset sustainability plan.	**Support.** The Government will embed a new high-level Strategic Planning and Reporting Framework in the Local Government Act and then support councils to implement it progressively over time (noting that the workforce development plan would be a specific responsibility of the General Manager). This framework will be informed by the role of local government, set out under recommendation 1.	High	To be incorporated as part of priority legislative amendments to be brought in before 2026 council elections.

	FoLGR Recommendation	Government Response	Priority	Timeframe
4	Formal council amalgamation proposals should be developed for the following: • West Coast, Waratah-Wynyard and Circular Head Councils (into 2 councils, with West Coast Council developing a service purchasing model to improve sustainability); • Kentish and Latrobe Councils; • Break O'Day, Glamorgan-Spring Bay and Sorell Councils (into 2 councils); • City of Hobart and Glenorchy City Councils; • Kingborough and Huon Valley Councils. The Board acknowledges council interest in and discussions on boundary changes are less advanced in respect of City of Hobart and Glenorchy, and Kingborough and Huon Valley councils, but nonetheless believes that these councils have expressed clear interest in further exploring opportunities. The Board believes there is substantial merit in ensuring that those councils (and their communities) are afforded the opportunity to genuinely explore structural consolidation proposals in greater detail.	**Support in principle.** The Government will work with, and support interested councils with progressing structural reform where councils are both able to prepare and submit credible and robust proposals and can demonstrate the intent and commitment of all participating councils to proceed with reform based on any amalgamation business cases undertaken. This approach will include: • Motivated councils further developing (in consultation with the Office of Local Government) clearly scoped amalgamation project proposals, that specify the necessary technical analysis, change management, implementation design and community engagement required to deliver robust, credible, and actionable amalgamation proposals; • Councils clearly identifying their funding needs to deliver the above proposals, including councils' own proposed investment/contributions, and any funding request from the State Government; • the Office of Local Government assisting highly motivated councils to proactively commence work over the 2024-25 period, in a manner that will maximise the objectives of any agreed amalgamation project proposal. As the program of work is being driven primarily by councils, it is proposed that councils themselves should be responsible for demonstrating community support in any final amalgamation proposal. Under this model the Government will not prescribe that elector polls or community votes be undertaken in order for amalgamation proposals to be progressed. The conduct of community consultation and engagement is at the discretion of the councils involved in the amalgamation proposals (this may include elector polls).	High	Timeframes will be contingent on council-led processes for developing amalgamation proposals.

	FoLGR Recommendation	Government Response	Priority	Timeframe
5	A new Local Government Board should be established to undertake detailed assessment of formal council amalgamation proposals and make recommendations to the Tasmanian Government on specific new council structures.	**Support.** A Local Government Board will need to be established to progress any proposed amalgamation (noting the Act prescribes that changes to local government areas may only be done as the result of a Local Government Board Review). Under this proposed approach, the role of and process for the necessary Board would be as targeted and streamlined as possible, noting that the Act prescribes certain minimum council and community consultation requirements that would need to be satisfied. The Board will be established with expertise in areas such as council administration and operations, workforce development, and organisational change management.	Lower	A Board will only be established in response to council amalgamation proposals.
6	A Community Working Group (CWG) should be established in each area where formal amalgamation proposals are being prepared. The CWG would identify specific opportunities the Tasmanian Government could support to improve community outcomes.	**Support in principle.** the extent to which a community working group is required will be a matter for councils developing amalgamation proposals to determine in consultation with the Office of Local Government.	Lower	Dependent on councils who wish to initiate a CWG to test a voluntary amalgamation proposal.
7	In those areas where amalgamation proposals are being developed, a community vote should be held before any reform proceeds, to consider an integrated package of reform that involves both a formal council amalgamation proposal and a funded package of opportunities to improve community outcomes.	**Support in principle.** Councils developing amalgamation proposals will determine how they engage with and seek community support as part of the development of their proposal. The Government supports the need for community engagement for any proposal to amalgamate.	Lower	Dependent on councils developing amalgamation proposals.
8	If a successful community-initiated elector poll requests councils to consider amalgamation, the Minister for Local Government should request the Local Government Board to develop a formal amalgamation proposal and put it to a community vote.	**Not supported.** The Local Government Act 1993 includes provisions for triggering elector polls and community votes. The Minister would need to consider a range of factors when deciding whether to ask the Local Government Board to develop a formal amalgamation proposal, not only the results of a community-initiated elector poll.	-	-

	FoLGR Recommendation	Government Response	Priority	Timeframe
9	The new Local Government Act should provide that the Minister for Local Government can require councils to participate in identified shared service or shared staffing arrangements.	**Partially support.** Any potential legislative reforms would give the Minister a power to compel councils to participate in council-owned joint entities (subject to conditions), but only after all councils party to the proposal had developed and agreed a service-sharing model. The Minister would not be empowered to initiate mandatory service sharing without strong and demonstrated sectoral support.	Lower	To be considered and incorporated in later legislative amendments (post-2026).
10	Give councils the opportunity to design identified shared service arrangements themselves, with a model only being imposed if councils cannot reach consensus.	**Partially support.** All councils would have the opportunity to develop a service sharing model, however the Minister would not be empowered to impose mandatory service sharing where that did not have support from all councils involved.	Lower	To be considered and incorporated in later legislative amendments (post-2026).
11	Before endorsing a particular mandatory shared service arrangement, the Minister for Local Government should seek the advice of the Local Government Board.	**Support in principle.** Provisions to allow the Minister to seek advice of the Local Government Board will be incorporated via a future legislative amendment. The provisions will require the Minister to also consult with affected councils.	Lower	To be considered and incorporated in later legislative amendments (post-2026).
12	If councils are unable to reach consensus on a mandatory service sharing agreement, the Minister for Local Government should have the power to require councils to participate in a specific model or models the Tasmanian Government has developed.	**Partially support.** Service sharing would only be ‘locked in’ by the Minister with the support of all affected councils.	Lower	To be considered and incorporated in later legislative amendments (post-2026).

	FoLGR Recommendation	Government Response	Priority	Timeframe
13	The first priorities for developing mandatory shared service arrangements should be: • sharing of key technical staff; • sharing of common digital business systems and ICT infrastructure; and • sharing of asset management expertise through a centralised, council-owned authority.	**Support in principle.** Mandatory service sharing arrangements would only be developed for priorities that have strong and demonstrated support from the local government sector.	Lower	Ongoing.
14	Include a statutory requirement for councils to consult with local communities to identify wellbeing priorities, objectives, and outcomes in a new Local Government Act. Once identified, councils would be required to integrate the priorities into their strategic planning, service delivery and decision-making processes.	**Support.** This requirement will be incorporated into new statutory provisions surrounding community engagement plans.	Medium	Councils will be supported to identify local wellbeing priorities upon when developing their community engagement plans.
15	To be eligible to stand for election to council, all candidates should first undertake – within six months prior to nominating – a prescribed, mandatory education session, to ensure all candidates understand the role of councillor and their responsibilities if elected.	**Support.** This requirement will be incorporated into new statutory provisions on the roles and responsibilities of councillors. A pre-candidacy education program will be implemented six months before the council elections are due in October 2026. As suggested by LGAT in 2018, amendments will also require all councillors standing for election to state or federal parliament to take leave from their council position. This will help to minimise any actual or perceived conflicts of interest in their council role.	High	To be incorporated as part of priority legislative amendments to be brought in before 2026 council elections. Information program to commence in early 2026.

	FoLGR Recommendation	Government Response	Priority	Timeframe
16	The Tasmanian Government and the local government sector should jointly develop and implement a contemporary, best practice learning and ongoing professional development framework for elected members. As part of this framework, under a new Local Government Act: • all elected members – including both new and returning councillors – should be required to complete a prescribed 'core' learning and development program within the first 12 months of being elected; and • councils should be required to prepare, at the beginning of each new term, an elected member learning and capability development plan to support the broader ongoing professional development needs of their elected members.	**Support.** The Government will work with the sector to develop the principles and core components of the Learning and Development Framework and embed these in legislation.	High	To be incorporated as part of priority legislative amendments to be brought in before 2026 council elections.
17	The Tasmanian Government should further investigate and consider introducing an alternative framework for councils to raise revenue from major commercial operations in their local government areas, where rates based on the improved value of land are not an efficient, effective, or equitable form of taxation.	**Partially support.** The Government will consult on potential frameworks to help benefit councils that assist major operations in their local government areas.	High	Work to commence by the end of 2024.

	FoLGR Recommendation	Government Response	Priority	Timeframe
18	The Tasmanian Government should work with the sector and the development industry to further investigate and consider introducing a marginal cost-based integrated developer charging regime.	**Support.** The Government will consult with the sector and industry to investigate how a new statewide developer charges framework could work if supported by industry. This would be designed to support and incentivise effective development in designated geographic areas for defined purposes. The purpose of the framework would be to provide developer certainty, remove disadvantage for early movers and support redevelopment and urban design. The framework would also include transparency measures to ensure that the developer charges were not used for general revenue raising. As a priority, the framework would target areas of medium density residential development.	High	Work to commence by the end of 2024.
19	Introduce additional minimum information requirements for council rates notices to improve public transparency, accountability, and confidence in council rating and financial management decisions.	**Support.** These requirements will be developed in consultation with the sector to ensure they are useful to the community and fit for purpose, but will include: • an explanation of the landowner's year-on-year change in general rates payable, and what has driven that change (e.g. rating policy change or property valuation) • the average year-on-year general rate change for a property in the municipality, expressed as relative change; and • a simple break-down of how a council has rates have been applied to categories of functions and services provided to the community.	High	To be incorporated as part of priority legislative amendments to be brought in before 2026 council elections.

	FoLGR Recommendation	Government Response	Priority	Timeframe
20	Within the context of the national framework, the Tasmanian Government should seek advice from the State Grants Commission on how it will ensure the Financial Assistance Grants methodology: • is transparent and well understood by councils and the community, • that assistance is being targeted efficiently and effectively, and • is not acting as a disincentive for councils to pursue structural reform opportunities.	**Support in principle.** Noting the independent role of the State Grants Commission, the Government supports the Commission's ongoing program of reviewing its methodology in consultation with councils, in accordance with the national framework.	Medium	Ongoing.
21	The Tasmanian Government should review the total amount of Heavy Vehicle Motor Tax Revenue made available to councils and consider basing this total amount on service usage data.	**Partially support.** The Government will undertake a general review of the amount of Heavy Vehicle Motor Tax made available to councils, to ensure that the distribution remains justified in the context of broader roads-related funding that is provided to local government.	High	Review to be undertaken in 2025.
22	Introduce a framework for council fees and charges in a new Local Government Act, to support the expanded, equitable and transparent utilisation of fees and charges to fund certain council services.	**Support.** The Government will engage with the sector on a suitable framework for including in the Act.	Medium	These provisions will be incorporated in later legislative amendments post-2026.
23	The Tasmanian Government should review the current rating system under the Local Government Act to make it simpler, more equitable, and more predictable for landowners. The review should only be undertaken following implementation of the Board's other rating and revenue recommendations.	**Support.** The review will be undertaken in close consultation with the community and local government sector.	Medium	Broader review to be undertaken post 2026.

	FoLGR Recommendation	Government Response	Priority	Timeframe
24	The Tasmanian Government should work with the sector to develop, resource, and implement a best practice local government performance monitoring system.	**Support.** The Government will work with the sector to improve the current performance monitoring and reporting framework, including exploring opportunities to more effectively present public-facing data to help councils and communities better understand how councils are performing on an individual and comparative basis (e.g. via an online, interactive dashboard). This work will be supported by measures to improve data quality and integrity (see Recommendation 25). Increased transparency on rating and revenue will be a priority under this framework.	Medium	Ongoing, and in line with development and roll-out of new strategic planning and reporting framework for councils.
25	The Tasmanian Government should develop a clear and consistent set of guidelines for the collection, recording, and publication of datasets that underpin the new performance reporting system to improve overall data consistency and integrity, and prescribe data methodologies and protocols via a Ministerial Order or similar mechanism.	**Support.** As part of this the Government will work with the sector to improve the current Consolidated Data Collection system with more consistent, clear, and streamlined data requirements that are fit for purpose and can better inform council and State Government decision-making.	High	New performance monitoring guidelines to be developed in 2025-26.
26	The new Strategic Planning and Reporting Framework should actively inform and drive education, compliance, and regulatory enforcement activities for the sector, and entities with responsibility for compliance monitoring and management – including the Office of Local Government and council audit panels – should be properly empowered and resourced to effectively deliver their roles. As part of this the Tasmanian Government should consider introducing a requirement for councils to have an internal audit function given their responsibilities for managing significant public assets and resources, and whether this requirement needs to be legislated or otherwise mandated. Consideration should also be given to resourcing internal audit via service sharing or pooling arrangements, particularly for smaller councils.	**Support.** As an early priority, the Government will introduce new statutory provisions requiring councils to have an internal audit function, bringing them in line with State agencies. This is appropriate given their responsibilities for managing significant public assets and resources, and analysis undertaken during FoLGR which identified highly uneven – and at times deficient – compliance with a range of statutory reporting requirements Internal audit capability will also support and bolster broader audit panel capability. The Office of Local Government will publish its local government compliance plan after the new performance monitoring requirements have been published.	High	Provisions in relation to the new internal audit function will be incorporated as part of priority legislative amendments to be brought in 2025-2026. First compliance plans published in 2027.

	FoLGR Recommendation	Government Response	Priority	Timeframe
27	The Tasmanian Government should collaborate with the local government sector to support a genuine, co-regulatory approach to councils' regulatory responsibilities, with state agencies providing ongoing professional support to council staff and involving councils in all stages of regulatory design and implementation.	**Support.** The Government will continue to engage with the sector to explore co-regulatory initiatives to improve community outcomes. The development of the new Charter for local government will provide the opportunity for the State Government and the sector to jointly identify priority focus areas.	Medium	Ongoing.
28	The Tasmanian Government should work with the local government sector to pursue opportunities for strengthened partnerships between local government and Service Tasmania.	**Support.** The Government will continue to engage with the sector to explore opportunities for strengthened partnerships between local government and Service Tasmania. Partnership opportunities may be initially targeted in municipal areas where councils are preparing voluntary amalgamation proposals, to support these councils and communities.		Ongoing.
29	Councils should migrate over time to common digital business systems and ICT infrastructure that meet their needs for digital business services, with support from the Department of Premier and Cabinet's Digital Strategy and Services (DSS).	**Support in principle.** Mandatory service sharing arrangements such as these would only be developed if there is strong and demonstrated support for this change from the local government sector.	Lower	Ongoing.
30	The Tasmanian Government – in consultation with the sector – should review the current legislative requirements on councils for strategic financial and asset management planning documentation to simplify and streamline the requirements and support more consistent and transparent compliance.	**Support.** These provisions will be reviewed as part of the work to support the implementation of the of the new Strategic Planning and Reporting Framework (recommendation 3).	Medium	These provisions will be considered in line with development and roll-out of new strategic planning and reporting framework for councils.

	FoLGR Recommendation	Government Response	Priority	Timeframe
31	The Tasmanian Government – in consultation with the sector – should investigate the viability of, and seek to implement wherever possible, standardised useful asset life ranges for all major asset classes.	**Support in principle.** The OLG and TAO will work with councils to establish benchmark asset life ranges for major asset classes. Councils who adopt asset useful lives outside these benchmarks will be asked to publish a justification for their assessment. The Director of Local Government and TAO will consider these published statements in their ongoing audit and performance review processes.	Medium	To be undertaken in 2026.
32	All Tasmanian councils should be required under a new Local Government Act to develop and adopt community engagement strategies – underpinned by clear deliberative engagement principles.	**Support.** This will form part of a broader strategic planning and reporting framework (Recommendation 3), the components of which will be introduced over time.	Medium	These provisions will be incorporated as part of priority legislative amendments to be brought in before 2026.
33	A new Local Government Act should require councils, when developing and adopting their Community Engagement Strategies, to clearly set out how they will consult on, assess, and communicate the community impact of all significant new services or infrastructure.	**Support.** New statutory provisions will require councils to consult their communities on any significant changes proposed to council services and infrastructure.	Lower	These provisions will be considered in line with development and roll-out of new strategic planning and reporting framework for councils.

	FoLGR Recommendation	Government Response	Priority	Timeframe
34	Following the phase 1 voluntary amalgamation program, the Tasmanian Government should commission an independent review into councillor numbers and allowances.	**Support in principle.** Councillor allowances will be reviewed based on the current allowance calculation methodology. Changes will be reflected in Schedule 4 of the Local Government (General) Regulations when the regulations are remade in 2025. A comprehensive review of councillor allowances and councillor numbers will be undertaken after the 2026 local government elections).	Lower	Interim review to be conducted in 2025, with broader review in 2027.
35	The Tasmanian Government should expedite reforms already agreed and/or in train in respect of statutory sanctions available to deal with councillor misconduct or poor performance.	**Support.** New provisions in the Act will define behaviours that constitute 'serious misconduct' by councillors and establish new offences with stronger sanctions for dealing with it. This may include removal from office, and disqualification from running for office. Active consideration will be given to the potential role of TASCAT in investigating and/or enforcing new serious misconduct provisions	High	New provisions to be developed and implemented as part of priority legislative amendments to be brought in before 2026.

	FoLGR Recommendation	Government Response	Priority	Timeframe
36	The Tasmanian Government should: • support the Local Government Association of Tasmania (LGAT) to develop and implement – in consultation with councils and their staff – a workforce development toolkit tailored to the sector and aligned with the Tasmanian Government's workforce development system; • support councils to update their workforce plans at the time of any consolidation; • support LGAT to lead the development and implementation of a state-wide approach to workforce development for key technical staff, beginning with environmental health officers, planners, engineers and building inspectors; • recognise in statute that workforce development is an ongoing responsibility of council General Managers and is included as part of the new Strategic Planning and Reporting Framework; and • include simple indicators of each council's workforce profile in the proposed council performance dashboard.	**Support in principle.** Noting that a statewide approach to workforce development is not intended to be limited to key technical staff; the local government sector is likely to identify additional priorities over time. The Government will work with the sector to identify and address priorities on an ongoing basis.	Medium	Ongoing.
37	The Tasmanian Government should partner with, and better support, councils to build capacity and capability to plan for and respond to emergency events and climate change impacts.	**Support.** The Government will continue with current and planned programs to provide support to local councils.	Medium	Ongoing.

Supporting Local Government Structural Reform

Principles and Processes

Phase 1 – Development of Structural Reform Study Proposals

The Office of Local Government (OLG) will work with councils to scope, develop, and refine detailed proposals for structural reform (amalgamation) studies.

In the first instance councils will need to articulate the structural reform options they are entertaining via any reform study (e.g. possible different combinations of councils, potential alternative future council boundaries, if shared services models/ options are also being considered etc).

OLG will then work with councils to design a robust methodology for assessing structural reform options, including how they will deliver benefits for councils and their communities under the following criteria:

- Strategic and Technical Capability
- Financial Capacity and Sustainability
- Service Efficiency, Effectiveness, and Equity
- Good Governance and Community Representation

OLG will also assist councils to identify and scope the necessary technical analysis, community engagement, and other support to undertake a structural reform study. Once the detailed specification for a proposed structural reform study is settled and agreed, OLG will work with councils to finalise their consolidated structural reform study proposals for consideration by the Government.

In addition to relevant technical aspects (process, timing, methodology) it is expected proposals should:

- Demonstrate the extent of any community interest, support and/or early consultation with the community in relation to the proposed structural reform study;
- Indicate the level of the financial and in-kind support councils are willing to contribute to the study;
- Demonstrate the extent of any clear, in-principle commitment from all participating councils to proceed with implementing reform where amalgamation studies indicate clear net benefits against the reform criteria; and
- Outline how councils will manage and coordinate community engagement and consultation in relation to proposed reform and articulate how this will be undertaken. While this may include community votes or elector polls, these will not be mandated by the Government as a condition of support for reform.

Following receipt of the final proposals, the Government will review all proposals and determine the level of funding and other support it will make available for the commissioning of the reform studies. (N.B. – criteria used to inform Government decision-making at this point will be developed and provided to councils early in phase 1).

Office of Local Government
Department of Premier and Cabinet

Tasmanian Government

Phase 2 – Commission and Deliver Reform Studies

The Government will fund supported structural reform studies via grant deed or similar arrangements with participating councils.

Funding agreements will establish relevant governance, reporting, accountability, and acquittal requirements. Broader support requirements (e.g. through OLG or otherwise) will be considered at this time.

Under these arrangements councils will be responsible for the overall management and delivery of the studies in accordance with the terms of the funding agreements, including the oversight of consultants, technical experts etc. OLG will provide high level guidance and support as and where required.

Final studies will be provided to the Minister and made publicly available.

Phase 3 – Local Government Board Review

A Local Government Board will be established to review completed structural reform studies and make formal recommendations to the Minister. While remaining adaptable to the unique needs of each proposal, the role of and process for the Board would be as targeted and streamlined as possible, noting that the Act prescribes certain minimum council and community consultation requirements that would need to be satisfied.

Board membership and terms of reference will have a strong technical focus, and will review the studies to test and assess their findings with respect to;

- Financial, economic, social, and strategic benefits and costs for the relevant councils and their communities;
- Impacts on levels of council accountability, community representation, service delivery and operational performance; and
- Implementation and transition arrangements, including timing, governance, and funding for any options where the Board recommends change.

The final model and terms of reference will be finalised once there is further clarity on the number and scope of structural reform studies the Government will support.

The Board will submit a final report to the Minister making recommendations on any preferred amalgamation model identified in the report(s) (including any transitional arrangements and support).

The Minister may then – under relevant provisions of the Local Government Act - make recommendations to the Governor for the drawing up of orders giving effect to any new structural arrangements (e.g. boundary changes, allocation of assets and liabilities etc). Parliamentary approval will not be required for amalgamations to proceed.

The Government would make decisions at this point as to the nature and quantum of support it would provide to support the council's and community's transition to the new structure (including potential one-off transition costs).

Formal implementation of structural reform can then commence.

Local Government Priority Reform Program 2024-2026

Office of Local Government
Department of Premier and Cabinet

Tasmanian Government

The Tasmanian Government is committed to making sure local councils can serve their communities well now, and into the future. For Tasmanian communities to thrive, with infrastructure and services to meet community needs and expectations, it is crucial that our councils are financially and culturally strong and sustainable.

That is why the Tasmanian Government commissioned the Future of Local Government Review. In October 2023, the Future of Local Government Board delivered its Final Report to the Tasmanian Government, making 37 recommendations to improve Tasmania's local government system.

In response to the recommendations of the Review, the Tasmanian Government has committed to a Local Government Priority Reform Program being implemented before the 2026 local government elections.

While the Reform Program is largely informed by the recommendations of the Review, it is broader than this. It includes additional initiatives that have been introduced through consultation with the sector to respond to pressing priority issues not specifically captured by the Review. It is anticipated that the consolidation of high priority Review recommendations, combined with clear input by the sector, will ensure the investment in the Reform Program responds to the immediate priorities of the sector and their communities.

The *Tasmanian Government Response to the Future of Local Government Review Final Report Recommendations* is available at the Office of Local Government, Department of Premier and Cabinet website at www.dpac.tas.gov.au

The Five Reform Priorities

The Reform Program is organised around five reform priorities. Several reforms will require legislative underpinning, and this will be done in stages to support system reform over the coming two years.

The five strategic reform priorities are:

1. **Lifting standards of professionalism, conduct, and integrity**
2. **Driving a high performing, transparent, and accountable sector**
3. **Improving local democracy and representation**
4. **Supporting council financial sustainability**
5. **Supporting council and community-led structural reform**

1. Lifting standards of professionalism, conduct, and integrity

Reform	Reform details
A new statutory requirement for councils to uphold good governance principles.	A new onus will be placed on councils and councillors to uphold principles of good governance. These principles will be based on universally recognised principles developed by the United Nations Development Program, and which already form the basis for the Good Governance Guide for councils published by the Office of Local Government. Where there is evidence the principles are not being upheld, this may be used as the basis for activating appropriate regulatory interventions (including Performance Improvement Directions) to address issues and support councils implement corrective action.
Supporting more effective early intervention in response to council statutory non-compliance and underperformance.	This reform comprises two key elements- • Firstly, existing statutory provisions around the issuing of Performance Improvement Directions (PIDs) will be adjusted to ensure PIDs can be utilised as an effective and timely early intervention tool to address and manage areas of underperformance or noncompliance, consistent with their original policy and regulatory intent; and • Secondly, the Director of Local Government will be empowered to direct councils in certain circumstances to appoint independent monitors/advisors to review and report on any aspect of the operations of a council and make recommendations to both the council and the Director of Local Government on any action they consider necessary to address identified issues or shortcomings, for example in relation to governance or financial and asset management.
More effective tools to respond to persistent and serious conduct issues.	New provisions in the Act will define behaviours that constitute 'serious misconduct' by councillors and establish new offences with stronger sanctions for dealing with it. This may include removal from office, and disqualification from running for office. As part of the policy design process, active consideration will be given to the potential role of TASCAT in investigating and enforcing new serious misconduct provisions.

Reform	Reform details
Clarifying council Work Health and Safety obligations and exploring options to provide councils greater scope and authority to deal more quickly and effectively with unreasonable councillor conduct at the local level.	Amendments to the Local Government Act will clarify the respective obligations, duties, and powers of council, the mayor and other elected members, and senior council staff with respect to work health and safety legislation. As part of this new tools will be considered for inclusion in legislation, which will help councils respond swiftly and effectively to work health and safety risks, particularly as they relate to the conduct and behaviour of councillors.
Embedding ongoing learning and development for all councillors.	The learning and development framework currently being developed by the Government, in collaboration with the sector, will be formalised and embedded in legislation so: • all elected members – including both new and returning councillors – will be required to complete a prescribed 'core' learning and development program within the first 12 months of being elected; and • councils be required to prepare, at the beginning of each new term, an elected member learning and capability development plan to support the broader ongoing professional development needs of their elected members. To ensure all candidates understand the role of councillor and their responsibilities all candidates will also be required to undertake – within six months prior to nominating – a mandatory education session.
A new framework for managing councillor conflicts of interest	The Government will proceed with implementing a new framework for managing councillor interests. The proposed reforms will improve how conflicts of interest are classified and managed, broaden the range of interests councillors are required to disclose, require councillors to submit annual personal interest returns, and bring Tasmania's penalties for offences more in line with other states.
Ensuring councillor allowances are fair and appropriate	Councillor allowances will be reviewed based on the current allowance calculation methodology. Changes will be reflected in Schedule 4 of the Local Government (General) Regulations when the regulations are remade in 2025. A comprehensive review of councillor allowances and councillor numbers will then be undertaken after the 2026 local government elections).

2. Driving a high-performing, transparent, and accountable sector

Reform	Reform details
Clarifying the contemporary role of local government	The role of local government will be defined in the Act consistent with the following statement: The role of local government is to support and improve the wellbeing of Tasmanian communities by: 1. harnessing and building on the unique strengths and capabilities of local communities; 2. providing infrastructure and services that, to be effective, require local approaches; 3. representing and advocating for the specific needs and interests of local communities in regional, state-wide, and national decision-making; and 4. promoting the social, economic, and environmental sustainability of local communities, by mitigating and planning for climate change impacts. This role will clearly articulate the primary responsibility of councils in delivering services that support communities. In the longer term, the role statement will inform and underpin the development of a local government Charter, which will support more effective engagement and collaboration between our spheres of government. Details of the Partnership will be developed with the sector, but it is expected it will provide greater clarity on matters such as: • how the Tasmanian Government will support the sector deliver on its remit, including a commitment for genuine consultation where the Tasmanian Government makes decisions impacting on the sector, and vice versa. • how the Government will collaborate with the local government sector to support a more genuine co-regulatory approach to councils' regulatory responsibilities; and • the principles and parameters for where and how councils will work together (both with each other and with the State Government) on a range of strategic issues – such as land use and settlement planning, economic development, and emergency preparedness and response – at the regional level and state-wide level.

Reform	Reform details
Enhancing councils strategic planning and reporting	Informed by the above role statement, a renewed local government planning and reporting framework will be established. Under this Framework councils will be required to develop a strategic plan. The plan would consist of component plans including, at minimum, a: • community engagement plan; • workforce development plan; • elected member capability and professional development plan; and • financial and asset sustainability plan. The details of this planning suite, including prescribed requirements, strategic planning principles and key data metrics will be developed and embed in legislation prior to the 2026 local government elections. Councils will then be supported to progressively develop their strategic plans with the aim to have the first iteration of plans implemented within 12 months of a new council being elected. In the longer-term, the strategic planning and reporting framework will be underpinned by an enhanced public facing performance reporting framework.
Supporting clear and consistent collection and reporting of council data	New guidelines will be developed for the collection, recording, and publication of council datasets to improve overall data consistency and integrity. The guidelines will be issued under a Ministerial Order or similar instrument to support compliance. Improved data quality is needed to provide a strong platform for the future development of the proposed new Strategic Planning and Reporting Framework for the sector.

Reform	Reform details
Setting additional minimum information requirements for council rates notices	New minimum requirements for rate notices will be included in the Act to improve public transparency, accountability, and confidence in council rating and financial management decisions. The requirements will be developed in consultation with the sector to ensure they are meaningful to the community and fit for purpose, but will include: • an explanation of the landowner's year-on-year change in general rates payable, and what has driven that change (e.g. rating policy change or property valuation); • the average year-on-year general rate change for a property in the municipality, expressed as relative change; and • a simple break-down of how a council's rates have been applied to categories of functions and services provided to the community.
Internal audit for all councils	Requiring councils to have an internal audit function will bring them in line with State agencies. This is appropriate given their responsibilities for managing significant public assets and resources, and analysis undertaken during FoLGR which identified highly uneven – and at times deficient – compliance with a range of statutory reporting requirements. Internal audit capability will also support and bolster broader audit panel capability. Consideration will be given to resourcing internal audit via service sharing or pooling arrangements, particularly for smaller councils. Under the changes recommended by FoLGR, the Director of Local Government will be given the power to request audit panel reports, and to request internal audits be undertaken, with reports provided to the relevant council and the Director. Failure by a council to act on the recommendations of its audit panel – without sound justification – may be grounds for formal regulatory intervention.

3. Improving local democracy and representation

Reform	Reform details
A new Local Government Elections Act	A new, standalone elections Bill will be introduced to improve accessibility, participation and integrity of local government elections. Existing elections provisions will be removed from the *Local Government Act*. In developing a new Bill, the Government will consider a suite of improvements to how council elections are conducted, including allowing for greater flexibility in voting methods, improving donation disclosure and quality of candidate information, and providing a legislated caretaker framework.
Explore flexible meeting provisions	New provisions will be considered to enable flexible approaches to attending council meetings in the remaking of the *Local Government (General) Regulations 2015*.

4. Supporting council financial sustainability

Reform	Reform details
Investigate and consider introducing a marginal cost-based integrated developer charging regime.	The Government will consult with the sector and industry to investigate how a new statewide developer charges framework could work if supported by industry. This would be designed to support and incentivise effective development in designated geographic areas for defined purposes. The purpose of the framework would be to provide developer certainty, remove disadvantage for early movers and support redevelopment and urban design. The framework would also include transparency measures to ensure that the developer charges were not used for general revenue raising. As a priority, the framework would target areas of medium density residential development.
Reviewing the total amount of Heavy Vehicle Motor Tax Revenue made available to councils.	The Government will undertake a general review of the amount of Heavy Vehicle Motor Tax made available to councils, to ensure that the distribution remains justified in the context of broader roads-related funding that is provided to local government.
Exploring an alternative revenue framework for major operations.	The Government will consult on potential frameworks to help benefit councils that assist major operations in their local government areas.

5. Supporting council and community-led structural reform

Reform	Reform details
Partnering with councils to explore voluntary amalgamations	The Government will work with and support interested councils with progressing structural reform, where councils are both able to prepare and submit credible and robust proposals and can demonstrate the intent and commitment of all participating councils to proceed with reform based on any amalgamation business cases undertaken. This approach will include: • Motivated councils further developing (in consultation with the Office of Local Government) well developed and clearly scoped amalgamation project proposals, that specify the necessary technical analysis, change management, implementation design and community engagement required to deliver robust, credible, and actionable amalgamation proposals; • Councils clearly identifying their funding needs to deliver the above proposals, including councils' own proposed investment/contributions, and any funding request from the State Government; • the Office of Local Government assisting highly motivated councils to proactively commence work over the 2024-25 period, in a manner that will maximise the objectives of any agreed amalgamation project proposal. A Local Government Board would need to be established to progress any proposed amalgamation (noting the Act prescribes that changes to local government areas may only be done as the result of a Local Government Board Review. Under this proposed approach, the role of and process for the necessary Board would be as targeted and streamlined as possible, noting that the Act prescribes certain minimum council and community consultation requirements that would need to be satisfied. As the program of work is being driven primarily by councils, it is proposed that councils themselves should be responsible for demonstrating community support in any final amalgamation proposal. Under this model the Government supports the need for community engagement for any proposal to amalgamate. The conduct of community consultation and engagement is at the discretion of the councils involved in the amalgamation proposals.