VERSION 5

Townsville Inundation Hazards Risk Assessment and Planning Scheme Review – Planning Scheme Policy Response for Flood

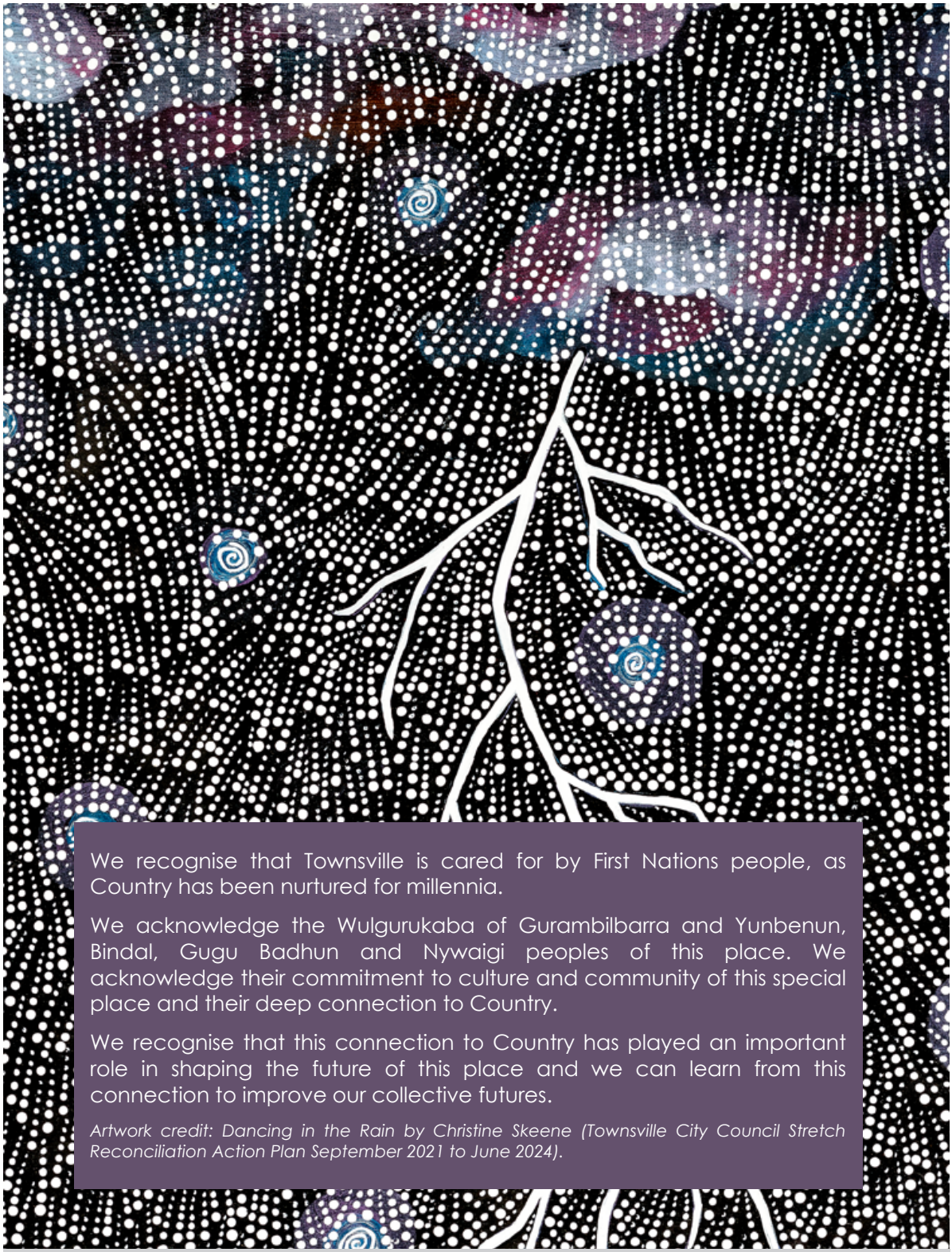
PREPARED FOR
TOWNSVILLE CITY COUNCIL

October 2024

Meridian Urban

QUALITY STATEMENT AND REVISION SCHEDULE

Rev No.	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
1	19/12/2023	Draft Land Use Policy Response to FRA	RMS/KK	KK	SD	SD
2	9/02/2024	Draft benchmark review of planning scheme	JB/KK	KK		KK/SD
3	20/08/2024	Integration of updated FRA and Council comments received to date	MS/LY	KK		KK
4	08/10/2024	Integration of Council comments issued 27/09/2024	LY	KK		KK
5	28/10/2024	Integration of Council comments issued 24/10/2024	LY			KK



We recognise that Townsville is cared for by First Nations people, as Country has been nurtured for millennia.

We acknowledge the Wulgurukaba of Gurambilbarra and Yunbenun, Bindal, Gugu Badhun and Nywaigi peoples of this place. We acknowledge their commitment to culture and community of this special place and their deep connection to Country.

We recognise that this connection to Country has played an important role in shaping the future of this place and we can learn from this connection to improve our collective futures.

Artwork credit: Dancing in the Rain by Christine Skeene (Townsville City Council Stretch Reconciliation Action Plan September 2021 to June 2024).

Meridian Urban's 'Reflect' Reconciliation Action Plan (RAP) details our commitments to advancing cultural change, active participation and inclusive and informed approaches, with a focus on increasing economic and social equity for Aboriginal and Torres Strait Islander peoples and supporting First Nations self-determination.

A copy of our RAP can be viewed online at *meridianurban.com*.

Executive Summary

Townsville City Council (Council) has been embarking on a number of projects to increase the city's resilience to future flood and coastal hazard events through a coordinated approach between government, industry and the community.

Council is currently developing the Townsville Floodplain Management Strategy to build community resilience to flooding by guiding future infrastructure investment, land use planning, development controls, emergency management and community programs. In support of these, Council is undertaking an extensive body of work to integrate flood and coastal inundation related matters into the *Townville City Plan (Version 2022/02)* (Townsville City Plan).

Together, AECOM and Meridian Urban have been engaged by Council to undertake the *Townsville Inundation Hazards Risk Assessment and Planning Scheme Provisions Review* project (the project).

Report purpose

The purpose of this report is to consider the appropriate risk-based land use planning policy positions for flood hazard risk only, including development of:

- **guiding principles** to represent the broader intentions and outcomes for managing flood risk across the local government area (LGA);
- **planning policy pathway options** for translating the flood risk assessment outputs into land use planning policy positions, that are considered in the context of the:
  - flood risk;
  - intended land use response commensurate with the level of flood risk;
  - intended settlement and growth outcomes for a particular zone;
- **risk-based policy response tables** that provide a concise articulation of land use policy per flood hazard risk level (i.e., FR1, FR2 etc.) forming the basis for updates to the Townsville City Plan, including its strategic framework, tables of assessment, overlay codes and mapping, definitions and other consequential amendments, in a consistent and transparent way;
- **benchmarked review of the Townsville City Plan**.

Guiding principles

The following guiding principles have been developed to underpin the land use and zoning policy responses, and ultimately the structure and content of the draft flood overlay code, and, together with Council's land use policy positions, provide the foundation for future decision-making relating to the management of flood risk.

Guiding principles for managing flood risks across the Townsville LGA

	Principle 1	Understand, reduce and manage risk
ⓘ	*1.1: Disaster risk management and land management considerations related to mitigation, response and recovery are integrated into land use and strategic planning.* *1.2 Settlement scale mitigation, evacuation routes and adaptation measures identified through flood risk management plans is facilitated.*	

	**Principle 2**	**Protect and maintain the safety of the community and resilience of built form**
	2.1 Exposure to unacceptable risks is avoided. *2.2 Population density is only increased in safe areas that support and sustain quality of life.* *2.3 Information is shared with the community to enable stronger more resilient communities.* *2.4 The exposure and isolation of people and property to flood risk is limited.*	
	**Principle 3**	**Sustain the economy and ensure it prospers through resilient places, spaces and infrastructure**
	3.1 Support a resilient economy that attracts and sustains industry, de-risks investment and value adds to supply chains.	
	**Principle 4**	**Enhance the protective function of the natural environment**
	4.1 Preserve flood conveyance and storage on site and link to broader environmental values and outcomes. *4.2 Maintain and enhance the protective function of landforms, vegetation and natural processes in managing the effects of flooding.*	
	**Principle 5**	**Design for resilience**
	5.1 Developments are designed for resilience through flood resilient design and materials, and the integration of emergency and recovery planning. *5.2 Consider the future obligation on Council and other entities to invest in infrastructure upgrades or large-scale mitigation.*	
	**Principle 6**	**Governance and accountable decisions builds and enhances the trust of the community**
	6.1 Decision making is evidence-based and risk informed through science-based and data-informed policies and guidance.	

Risk tolerability

As part of the integration of the outcomes of a flood risk assessment, Council is required to determine the acceptability of the level of risk for land uses in existing and planned zones.

With regards to the determination of the acceptability of the level of risk, the State Government's *Integrating state interests in a planning scheme – Guidance for local governments, November 2021 – VS 1.2* (the SPP guideline) provides that:

Acceptable risk	A risk that is sufficiently low as to require no new treatments or actions to reduce the risk as communities can live with this level of risk without further action.
Tolerable risk	A risk that is low enough as to allow the exposure to a natural hazard to continue while at the same time high enough to require new treatments or actions to reduce risk. Communities can live with this level of risk but as much as is reasonably practical should be done to further reduce the risk and may include planning responses for: • reducing the likelihood of the risk (avoidance); or

	• reducing the consequences of the risk (mitigation and hazard management over time).
Intolerable risk	A risk that, following an understanding of the likelihood and consequences, is so high that it requires actions to avoid or reduce the risk. Individuals and society will not accept this risk and measures are to be put in place to reduce the risk to at least a tolerable level.
Residual risk	The risk a community is exposed to that is not being remedied through established risk treatment processes. Generally, it is the total risk to a community, less any measure in place to reduce that risk. For example, for a flood hazard: • for a town protected by a levee, the residual flood risk comprises the consequences of the levee being overtopped by floods larger than the design flood; or • 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.

Unmitigated risk tolerability

The following table represents the identified tolerability levels to flood hazard risk relative to the identified levels of untreated risk exposure for each zone group. These represent existing levels of tolerability without mitigation or planning intervention.

Unmitigated risk tolerability by land use zone group for flood hazard

Zone group	Very high risk (FR5)	High risk (FR4)	Medium risk (FR3)	Low risk (FR2)	Very low risk (FR1)
Urban residential	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Centres/Mixed use	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Industry	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Rural residential	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Open space/ Environmental management and conservation	Tolerable	Acceptable	Acceptable	Acceptable	Acceptable
Rural	Intolerable	Tolerable	Tolerable	Acceptable	Acceptable
Sport and recreation	Intolerable	Tolerable	Tolerable	Acceptable	Acceptable
Community facilities	Intolerable	Intolerable	Intolerable	Tolerable	Tolerable
Emerging community	Intolerable	Intolerable	Intolerable	Acceptable	Acceptable
Special purpose	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable

Overarching flood risk land use policy response

Further to this, the following table provides a summary of the proposed planning pathway responses by risk category across the region's settlement framework for flood risk.

OVERARCHING POLICY POSITION

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Policy position	• **AVOID** new development. • **STOP** the intensification or expansion of existing urban uses (except for flood compatible uses i.e., waterfront and marine) • Actively **TRANSITION** away from risk i.e., rezone part of the land to Environmental management and conservation zone or Limited development zone. • Consider the use of Flood resilient precincts[1] in locations where innovative design solutions and/or site-specific mitigation measures can be implemented, or **SETTLEMENT SCALE MITIGATION** solutions are identified to mitigate the flood risk i.e., redevelopment locations. • To preserve the flow paths and conveyance functions, no excavation works/no filling should occur. • Strict land use permissibility: o No intensification of existing uses o No new urban development o No vulnerable uses, accommodation activities or tourist activities o No greenfield expansion o No rural industry o Suitable for open space, parks and low intensity development with low built form needs, sacrificial built form, or rural land uses o No hazardous material.	• **AVOID** new development. • **STOP** the intensification or expansion of existing urban uses (except for flood compatible uses i.e., waterfront and marine). • Consider the use of Flood resilient precincts in locations where innovative design solutions and/or site-specific mitigation measures can be implemented, or **SETTLEMENT SCALE MITIGATION** solutions are identified to mitigate the flood risk i.e., redevelopment locations. • To preserve the flow paths and conveyance functions, no excavation works/no filling should occur. • Strict land use permissibility: o No intensification of existing uses o No new urban development o No vulnerable uses, accommodation activities or tourist activities o No greenfield expansion o No rural industry o Suitable for open space, parks and low intensity development with low built form needs, sacrificial built form, or rural land uses o No hazardous material.	• **MITIGATE** to an acceptable or tolerable level. • Manage risk through siting and resilient built form and building materials. • Encourage reduction in existing risk by adapting/improving existing development over time. • Consider the use of Flood resilient precincts in locations where innovative design solutions and/or site-specific mitigation measures can be implemented, or **SETTLEMENT SCALE MITIGATION** solutions are identified to mitigate the flood risk. • No vulnerable uses for flood hazard. • Development controls for excavation and filling. • Rural industry only where no other reasonable alternative site. • No hazardous material for flood hazard. • No greenfield expansion.	• **ACCEPT / MANAGE** with a strong focus on resilient built form and building materials. • Development controls for excavation and filling. • Vulnerable uses are limited and supported by a flood emergency management plan[2] that can preferably meet a requirement for a rising road evacuation route to beyond the PMF. • Mitigate hazardous material.	• **ACCEPT / MANAGE** with a strong focus on resilient built form and building materials. • Vulnerable uses are limited and supported by a flood emergency management plan. • Mitigate hazardous material.

[1] Flood resilient precincts can be used to enable a more flexible and innovative design response to mitigate flood risk to a tolerable level. For example, there may be specific areas of the LGA that are subject to intolerable levels of risk, but the land is also highly valuable and/or critical to the economic prosperity or functioning of the locality / land use e.g., the CBD or key infill / redevelopment locations. In this case, a 'Flood resilient precinct' can be applied to the spatial area and shown on the overlay mapping, with specific assessment benchmarks included in the code to ensure greater flexibility in managing flood risk.
[2] Flood emergency management plans are considered operational tools only and should not be used to justify an approval of a vulnerable use in an at risk location.

Summary of key issues and recommendations

The following table provides a summary of the identified key issues and recommendations to inform a future amendment to the Townsville City Plan to integrate the outcomes of the flood risk assessment into land use planning policy positions for flood hazard risk:

Key matter	Summary of issues	Recommendations
Building matters in planning schemes	A planning scheme cannot include mandatory parts in the current parts of the Queensland Development Code, which includes MP3.5. For MP3.5 to be considered, the planning scheme must designate all or part of its LGA a "flood hazard area" and include a statement that a designation / declaration has been made under the Building Regulation. A planning scheme may designate a flood hazard area and declare a defined flood level, maximum flow velocity of water, inactive flow or backwater area, freeboard that is more than 300mm or finished floor level of Class 1 buildings built in all or part of the designated flood area.	There is an opportunity to review and update *section 1.6 – Building matters in planning schemes* of the Townsville City Plan to ensure the declaration of all matters pursuant to section 8 of the Building Regulation.
	There are no BAPs specific to withstanding storm tide inundation or coastal erosion, noting that a designated flood hazard area does not include areas subject to storm surge and therefore MP3.5 would not apply on land subject to flood hazard and storm surge. As a consequence, BAPs will be required to be developed and included as part of the Flood hazard overlay code and/or the Coastal environment overlay code, where areas are subject to storm surge, and where part of the designated flood hazard area is also subject to surge, or alternate options investigated.	Investigate options for managing the relationship between flooding and storm tide inundation in the Townsville Planning Scheme with the State.
Strategic framework	The Strategic framework of the Townsville City Plan sets the overarching policy positions for development. It is an assessment benchmark for impact assessable development and is considered the major element of the Townsville City Plan. Policy directions must be clearly articulated, particularly those that are considered highly important for protecting the community and ensuring appropriate development occurs. The current Strategic framework contains several provisions relating to flooding in general. In order to reflect the new risk-based planning approach undertaken, as well as the key policies in the SPP, a review and update of the Strategic framework is required. Suggested changes are proposed to provide additional policy direction for flood risk management across the City, as well as ensure key policies of the revised Flood hazard overlay code are elevated and supported by a strong, clear vertical integration of provisions within the Townsville City Plan.	Review and update the Strategic framework in accordance with section 6.1 of this report.
Levels of assessment	The levels of assessment indicate the need for or the ease of compliance with regulatory provisions. They also	As part of the translation of flood risk into the Townsville

	dictate whether the community will be consulted with and whether they are able to appeal a decision. The extent to which the regulatory provisions can be applied without intervention are a primary consideration for assigning assessment levels. Low levels of assessment indicate a low-risk proposal where benchmarks can be applied and complied with relatively simply without the need for individual assessment. Higher levels of assessment indicate the need for alternative solutions and assessment manger review, or the need for public consultation. Further, the levels of assessment for the overlay can convey messages of suitable land uses which are foreseen in a risk area or locality. The tables of assessment can attribute an assessment level by hazard, risk or land use. Code assessment is used for tolerable and intolerable risk areas where mitigation is codified. While impact assessment may be triggered for inappropriate land uses. The SPP guidance requires the consideration of whether the categories of assessment reflect the level of risk and vulnerability of the land use. In particular, it notes that the impacts on vulnerable uses, reconfiguring a lot which facilitates the increases in population, significant earthworks which involve the redirection of existing overland flow paths and development that involves the storage of significant amounts of hazardous material or hazardous chemicals in a flood hazard area are fully considered.	City Plan, identify land use risk tolerability and review the Tables of assessment and ensure that levels of assessment for development are commensurate with the level of risk for the land use.
Flood hazard overlay code	Overlays can alter the level of assessment for proposed land uses and will take precedence over zone provisions in the hierarchy of assessment benchmarks. A risk-based Flood risk overlay code and overlay map draws greater linkages to the underlying assessment of risk to calibrate land use and planning responses (strategic framework, settlement pattern, zoning, overlay and codes) to the identified levels of risk. The overarching policy intent for a revised Flood hazard overlay code is for development to not result in an unacceptable level of flood risk to people, property and the environment.	Review the Flood hazard overlay code in accordance with section 6.1 of this report to ensure compliance with the SPP. As part of the translation of flood risk into the Townsville City Plan, identify land use tolerability to risk, and ensure that land use compatibility by risk level is reflected in the Flood hazard overlay code. Review the Flood hazard overlay code to ensure that there are clear policy statements for any specific land uses

		that require careful management in a natural hazard / risk area, or that should be avoided i.e., Critical infrastructure/ Essential community infrastructure and Vulnerable uses.
Overlay mapping	Risk-based overlay maps for flood risk (which indicates the degrees of risk i.e., from very low risk to very high risk) provides for the spatial application of the flood hazard overlay code. It creates a 'footprint' that will help determine the appropriate land use response in certain areas relative to the risk, spatially identifying the locations relative to the overlay codes' assessment benchmarks which provide circumstances for example, where: • development can occur subject to controls such as the finished floor level of all habitable floor space being above the defined flood level and the additional required freeboard; • development may be able to occur subject to demonstrating that it does not result in an intolerable level of risk to people and property, and it does not hinder disaster management capacity and capabilities including providing for the safe self-evacuation of occupants and visitors to occur via identified evacuation routes; or • development should be avoided.	Review the flood risk assessment and consider the spatial representation of flood risk, considering: • Whether and how to display the full floodplain extent out to Probable Maximum Flood consistent with prevailing practice and used to indicate a floor level check and trigger land uses that are vulnerable uses • What flood risk levels should be identified (i.e., Very high – Very low) based on the flood risk categorisation.
Definitions	A number of flood related administrative definitions and defined activity groups are required to give effect to the flood hazard overlay code. New definitions are proposed to reflect current, best practice terminology for flood and coastal risk management.	Review and update the administrative definitions and consider the use of defined activity groups in Schedule 1 of the Townsville City Plan, in accordance with Table 5-6 of this report, to ensure alignment with the revised Flood hazard overlay code.
Planning scheme policy	The current Townsville City Plan includes a Flood hazard planning scheme policy to support application and interpretation of the Flood hazard overlay code. As part of the scope of work for this project, the Flood hazard planning scheme policy is to be reviewed and updated to align with the revised Flood hazard overlay code.	Review and update the Flood hazard planning scheme policy to ensure alignment with the

		revised Flood hazard overlay code.
Format and structure	For flood hazard, there is an inconsistency of use of terms and language across the different parts of the Townsville City Plan.	Review the Townsville City Plan to ensure there is a consistency in structure and language between the Strategic framework, purpose and overall outcomes and assessment benchmarks for flood and coastal hazards.

Townsville City Council

Townsville Inundation Hazards Risk Assessment and Planning Scheme Review – Planning Scheme Policy Response for Flood

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1 Introduction

Townsville City Council (Council) has been embarking on a number of projects to increase the city's resilience to future flood and coastal hazard events through a coordinated approach between government, industry and the community.

Council is currently developing the Townsville Floodplain Management Strategy to build community resilience to flooding by guiding future infrastructure investment, land use planning, development controls, emergency management and community programs. Key steps in developing the strategy include:

- reviewing and understanding of Townsville's flood hazard;
- identifying options for managing Townsville's flood risk;
- evaluating options for managing Townsville's flood risk; and
- shaping council's response to flood and storm tide emergencies.

At present, Council is finalising flood studies that include new flood models (based on TUFLOW HPC) and flood maps under the ***Townsville Recalibrated Flood Modelling and Mapping* project**.

Further to this, and in partnership with the Queensland Government, Council has also been planning for coastal change via the ***Adapting to Coastal Change in Townville* (A2CCT) project**. As part of the A2CCT project, Council is developing a long-term strategy for the city to help manage coastal changes in a sustainable way.

In support of these, Council is undertaking an extensive body of work to integrate flood and coastal inundation related matters into the *Townville City Plan (Version 2022/02)* (Townsville City Plan).

Together, AECOM and Meridian Urban have been engaged by Council to undertake the *Townsville Inundation Hazards Risk Assessment and Planning Scheme Provisions Review* project (the project).

1.1 Project methodology

The project will involve a risk assessment for flooding and coastal hazards, in accordance with the *State Planning Policy, July 2017* (SPP 2017), before preparing updates to the Townsville City Plan provisions to include the latest hazard mapping and risk-based planning outcomes. To achieve this, the project comprises five phases of work, as outlined in **Figure 1-1** below.

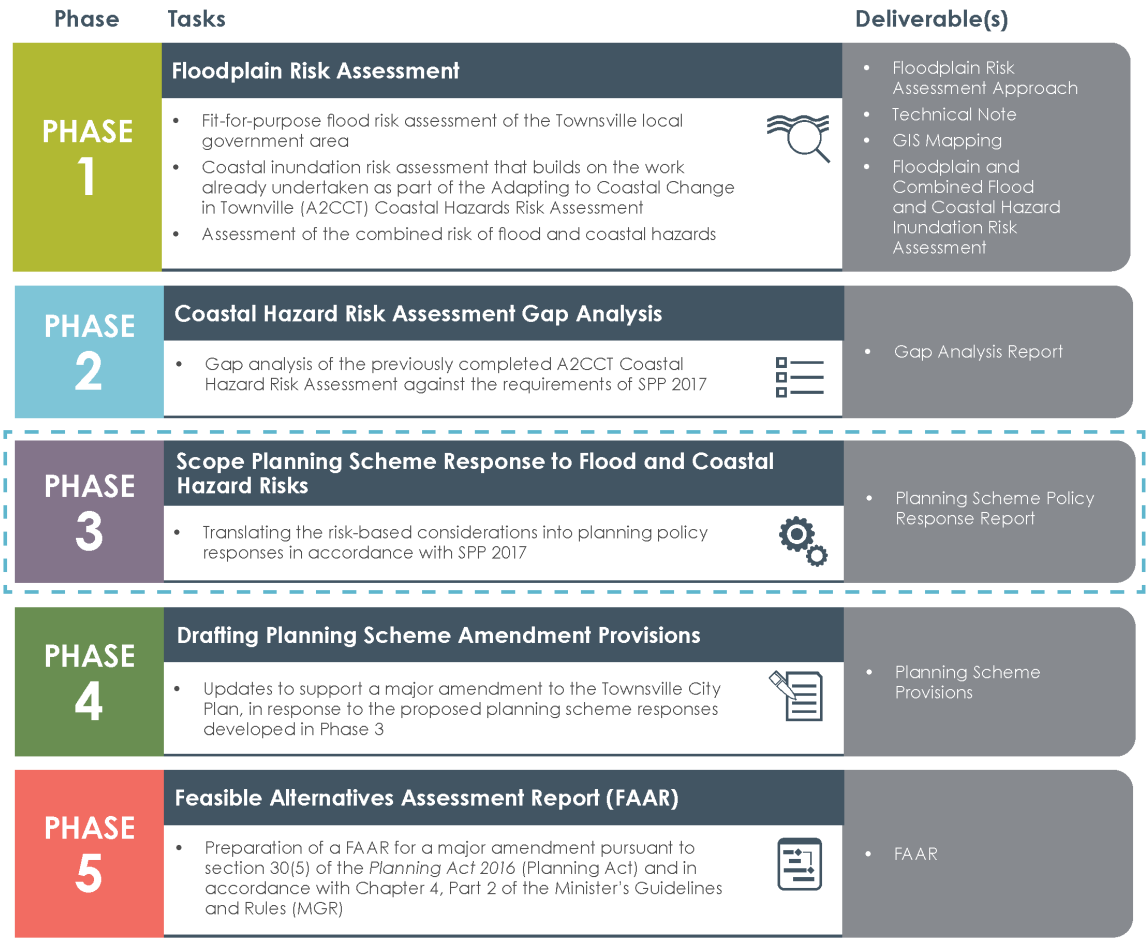


Figure 1-1: Methodology summary

1.2 Purpose of this report

The purpose of this report is to determine the appropriate risk-based land use planning policy positions for flood hazard and present the analysis and recommended changes to the Townsville City Plan to inform the drafting of updated planning scheme provisions as part of Phase 4 of this project.

This report will present the proposed:

- **guiding principles** to represent the broader intentions and outcomes for managing flood risk across the local government area (LGA);
- **planning policy pathway options** for translating the flood risk assessment outputs into land use planning policy positions, that are considered in the context of the:
  - flood risk;
  - intended land use response commensurate with the level of flood risk;
  - intended settlement and growth outcomes for a particular zone;
- **risk-based policy response tables** that provide a concise articulation of land use policy per flood hazard risk level (i.e., FR1, FR2 etc.) forming the basis for updates to the Townsville City Plan, including its strategic framework, tables of assessment, overlay codes and mapping, definitions and other consequential amendments, in a consistent and transparent way;
- **benchmarked review of the Townsville City Plan**, considering:
  - the SPP requirements (including the SPP and its supporting guidance document);
  - policy principles and risk-based policy response tables;
  - land use policy responses / directions;
  - engagement findings from the internal Council workshop.

The benchmarked review of the Townsville City Plan will consider:

- Section 1.6 Building work regulated under the planning scheme;
- Part 3 Strategic framework;
- Part 5 Tables of assessment;
- Section 8.2.3 Coastal environment overlay code (to be included in future report update);
- Section 8.2.6 Flood hazard overlay code;
- Schedule 2 Mapping (respective overlay mapping);
- Schedule 1 Definitions;
- SC6.7 Flood hazard planning scheme policy; and
- any line-of-sight consequential amendments, as required (i.e., zones and development codes).

2 Regional context

Situated in North Queensland, the Townsville LGA is halfway between the tip of Cape York and Brisbane, with an area that covers approximately 3,736 square kilometres. It is on the traditional lands of the Wulgurukaba of Gurambilbarra and Yunbenun, Bindal, Gugu Badhun and Nywaigi.

The city's early history since its settler-colonial establishment in 1864-65 on the Ross River floodplain was marked by the feature of water. Access to water was an important feature of the landscape which informed the settlers' decision to establish on the banks of the Ross Creek, displacing Wulgurukaba and Bindal peoples. The settlement served pastoral, mining and sugar industries and its location in close proximity to the north Queensland hinterland meant the port become commercially successful, despite navigational changes due to shallow water and sediment deposits caused by flooding.

In the present day, Townsville is the largest city in northern Australia, with approximately 198,000 residents. The city is a significant service centre for the entirety of north and north-west Queensland and is often referred to as Queensland's 'second capital'. The Townsville LGA is boarded to the north by the Hinchinbrook LGA, to the west by the Great Dividing Range and Charters Towers LGA, and to the south by the Burdekin LGA. By 2046, an estimated additional 66,000 residents is expected to bring the population to approximately 265,000 residents. The median age of the city's population is 36.1 years, with 14.3 per cent of residents aged over 65 years.

The Townsville LGA is located in the Burdekin Dry Tropics region. The long coastline comprises a diverse mix of sandy beaches, rocky headlands, mangrove estuaries, saltpans and coastal wetlands. These natural habitats support a wide range of flora and fauna. In the low-lying coastal plains there are several rivers, creeks and wetlands. Hills and mountains rise out of the coastal plain, creating distinctive landmarks such as Castle Hill, Mount Stuart, the Pinnacles, Mount Elliot and Cape Cleveland.

National parks and other reserves include Magnetic Island, Paluma Range, Bowling Green Bay National Park, and Cape Pallarenda and Townsville Town Common Conservation Parks.

There are four (4) major river systems within the Townsville LGA – Black, Bohle, Ross and Haughton Rivers. The Black, Bohle and Ross systems are each primarily within the Townville LGA's boundary, while the Haughton catchment sits across the Townsville, Charters Towers and Burdekin LGAs. These are described further in Section 2.2 of this report.

The coastal strip includes 25.4 kilometres of Council managed esplanades on the mainland and 6.35 kilometres on Magnetic Island and is currently experiencing residential development growth, including in the Northern Beaches corridor. Some parts of Townsville's coast are affected by coastal erosion and coastal inundation. Both naturally occurring processes can impact the built areas and natural environment along the 180 kilometres of coastline.

The Townsville CBD is the region's principal activity centre. It accommodates a large variety of administrative, civic, cultural, commercial and education facilities. Major centres offer further business, employment and residential functions across broad catchment areas, including the locations of Aitkenvale, Thuringowa Central and Hyde Park. In the Townsville City Plan, Burdell and Julago are identified as future major centres. District centres offer a mix of activities and uses, catering for their immediate surrounding communities. These locations are Idalia, Deeragun, Rasmussen, Annandale. The Townsville City Plan identifies Shaw as a future district centre.

Townsville is home to several established industries, including defence, mineral processing, engineering and tourism, as well as having facilities which support the health and knowledge sectors. Emergent industries include renewable energy.

2.1 Local climate

1,143 mm
Average annual rainfall

29°C
Average annual max. temp

19.9°C
Average annual min. temp

66%
Average annual relative humidity (9am)

Townsville has a tropical climate with two distinct seasons – the wet season in summer (November to April) and the dry season in winter (May to October). Average annual rainfall is approximately 1,143 mm which is often delivered through bursts of monsoon rains or several weeks of constant rain.

Due to Townville's geographical location and the nature of tropical weather events, there can be considerable variation in rainfall from year to year. For example, the year 2000 was the wettest year on record, with 2,400 mm of rain. This was followed by the second driest year in 2001, when Townsville received only 467 mm[3].

Average annual temperatures range from 20°C to 29°C, with little relief from the heat and humidity during summer months. Average annual relative humidity is approximately 66% in the morning (9am) and 58% in the afternoon (3pm)[4]. Most of the city experiences a prevailing, cool, north-easterly afternoon sea breeze which provides cooling benefits in the summer.

The summer months also bring thunderstorms, monsoon rains, tropical lows and the threat of tropical cyclones.

2.2 Water catchments

There are two (2) main basins within the Townsville City LGA – the **Black basin** and the **Ross basin**. There is also the **Magnetic Island basin** and **Haughton basin**. These basins are further broken down into 10 sub-basins and 45 water catchments as shown in **Table 2-1** and **Figure 2-1** below.

[3] Bureau of Meteorology, *Climate of Townsville*, available via http://www.bom.gov.au/qld/townsville/climate_Townsville.shtml
[4] Bureau of Meteorology (2024), *Monthly climate statistics – Summary statistics TOWNSVILLE AERO*, available via http://www.bom.gov.au/climate/averages/tables/cw_032040.shtml

Table 2-1: Townsville sub-basins and associated waterways/catchments

Source: Gunn, J. and Manning, C. (2010), Black Ross (Townsville) Water Quality Improvement Plan: Improving Water Quality from Creek to Coral, Townsville City Council - Creek to Coral, Townsville, available via https://www.townsville.qld.gov.au/__data/assets/pdf_file/0013/4270/Black-Ross-Water-Quality-Improvement-Plan.pdf

No.	Sub basin	Main waterways/catchments	Area (Ha)
1	**Crystal Creek**	Crystal Creek, Lorna Creek, Ollera Creek, Scrubby Creek, Hencamp Creek	23,969
2	**Rollingstone Creek**	Rollingstone Creek, Surveyors Creek, Saltwater Creek, Leichhardt Creek	22,003
3	**Bluewater Creek**	Bluewater Creek, Sleeperlog Creek, Althaus/Deep Creek, Healy Creek	29,037
4	**Black River**	Black River, Alice River, Alick Creek, Log Creek, Scrubby Creek, Canal Creek	30,377
5	**Bohle River**	Bohle River, Saunders Creek, Stony Creek, Louisa Creek, Town Common	32,229
6	**Lower Ross River**	Ross River, Ross Creek, Pallarenda, Mundy Creek, Esplanade	13,475
7	**Upper Ross River**	Ross River, Six Mile Creek, Sachs Creek, Antill Plains Creek, Toonpan Lagoon, Mt Stuart	75,460
8	**Stuart Creek**	Stuart Creek, Sandfly Creek	10,371
9	**Alligator Creek**	Alligator Creek, Crocodile Creek, Cocoa Creek, Cape Cleveland	26,489
10	**Magnetic Island**	Gustav Creek, Petersen Creek, Gorge Creek, Endeavour Creek, Retreat Creek, Butler Creek	4,990

Figure 2-1: The 10 Townsville sub-basins

Source: Gunn, J. and Manning, C. (2010), Black Ross (Townsville) Water Quality Improvement Plan: Improving Water Quality from Creek to Coral, Townsville City Council - Creek to Coral, Townsville, available via https://www.townsville.qld.gov.au/__data/assets/pdf_file/0013/4270/Black-Ross-Water-Quality-Improvement-Plan.pdf

Black basin

The Black basin is located in the north of the LGA, between the Great Dividing Range and Coral Sea. The upper reach of the basin marks the LGA boundary between Townsville and Charters Towers in the south-west, and Hinchinbrook in the north.

Black River is the primary watercourse in the catchment. Its headwaters begin near Bluewater Hills and along the slopes of the Paluma Range National Park and Clemant State Forest. Other smaller waterways in the catchment drain into the Coral Sea. These include:

- Deep, Bluewater, Sleeper Log, Leichhardt, and Saltwater creeks in the south; and
- Rollingstone, Hencamp, Ollera and Crystal creeks in the north.

The nature of the catchment's steep headwaters and short-run mean flooding is typically quick to rise and fall. Flooding in downstream areas is influenced by tidal conditions.

Ross basin

The Ross basin is located in the centre of the Townsville LGA and extends to the eastern boundary with Burdekin Shire. The Ross River itself flows through the urban areas of Townsville, discharging into the Coral Sea. The river's flows are moderated by Lake Ross, which is an embankment dam serving potable water supply and flood mitigation to Townsville. The dam is not prescribed as a flood mitigation dam under the *Water Supply (Safety and Reliability) Act 2008*.

The stretch of the Ross River downstream of the dam is characterised by its narrow width and natural and constructed banks. A series of weirs mean the previously ephemeral river is a permanent presence, either as a series of ponds or a flowing waterway, depending on the amount of water flowing through the system.

Tributaries of the Ross River located downstream from Lake Ross dam are:

- **Gordon Creek** – This creek drains into the Ross River near the river's mouth. The catchment area incudes Idalia, Wulguru and parts of Annandale, Cluden, Murray, Oonoomba and Stuart; and
- **Stuart Creek** – This creek drains into the Ross River near the river mouth. The catchment area includes Brookhill, Cluden, Julago, Oak Valley, Roseneath, and Stuart.

Other watercourses in the Ross basin include:

- **Bohle River** – This river is a sub-basin of the Ross basin. It flows to the Coral Sea via Halifax Bay and Cleaveland Bay. It drains the western suburbs of Townsville into the Coral Sea. The river shares hydrological surface, ground and storm water connections with the Ross;
- **Louisa Creek** – The upper reaches of Louisa Creek drain the suburbs of Vincent and Garbutt. This creek flows behind the Townsville Airport through the Townsville Town Common Conservation Park and drains into the Bohle River near the river mouth;
- **Ross Creek** – This creek is located immediately to the north of Ross River in the CBD and inner-suburban areas of Townsville. Water can break the banks of the Ross River and flow into the Ross Creek catchment at several locations during extreme rainfall events; and
- **Alligator Creek** – This creek is located to the east of Townsville and drains into the Coral Sea. Mount Elliot is a significant part of the Alligator Creek catchment.

Magnetic Island basin

Magnetic Island is situated eight (8) kilometres off the coast of Townsville. The island has many small waterways and creeks. Most of the basin is within nature and conservation areas, including the Magnetic Island National Park, the GBR World Heritage Area and the GBR Marine Park.

Haughton basin

The Haughton basin is a part of the Lower Burdekin catchment and is covered by the Townsville, Charters Towers and Burdekin LGAs. Within the Townville LGA boundaries, the Haughton River drains the suburbs of Calcium, Granite Vale, Majors Creek, Mount Elliot, Reid River, and Woodstock. The river flows north-eastward towards the Coral Sea, primarily through Burdekin LGA. Tributaries of the Haughton River include Ried River and Majors Creek.

2.3 Inundation hazard event history

Townsville has been described as having a complex relationship with flood, and its associated cycles of drought. There is little to no pre-colonial written history about flood events in the river basins which now make up the Townsville region. Over the course of the 19th, 20th and now the 21st centuries, the city has experienced major inundation events which have impacted residents, businesses and the environment.

A series of flood events in the immediate decades post-settlement (1870s, 1880s & 1890s) showcased the landscape's flooding potential to these new settlers. In 1946, two large floods occurred one month apart. These became the urban collective reference point for flooding events in the years that followed, and discourse grew around flood mitigation options along the Ross and Bohle Rivers. In December 1971, the city experienced one of the most powerful and destructive cyclones – Severe Tropical Cyclone Althea – which caused three deaths and extensive damage in the region.

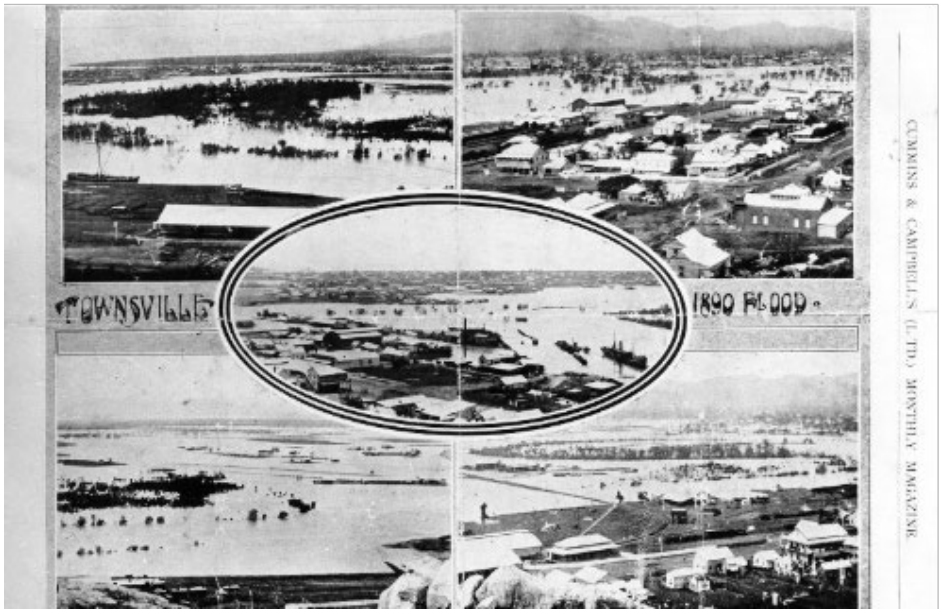
Construction of the Ross River dam in 1974 contributed to a reduction in major flood events during the late 20th century. It also led to a shift in public perceptions of inundation, with community focus drawn away from riverine flooding and concerns becoming about localised catchment flooding and storm surge events.

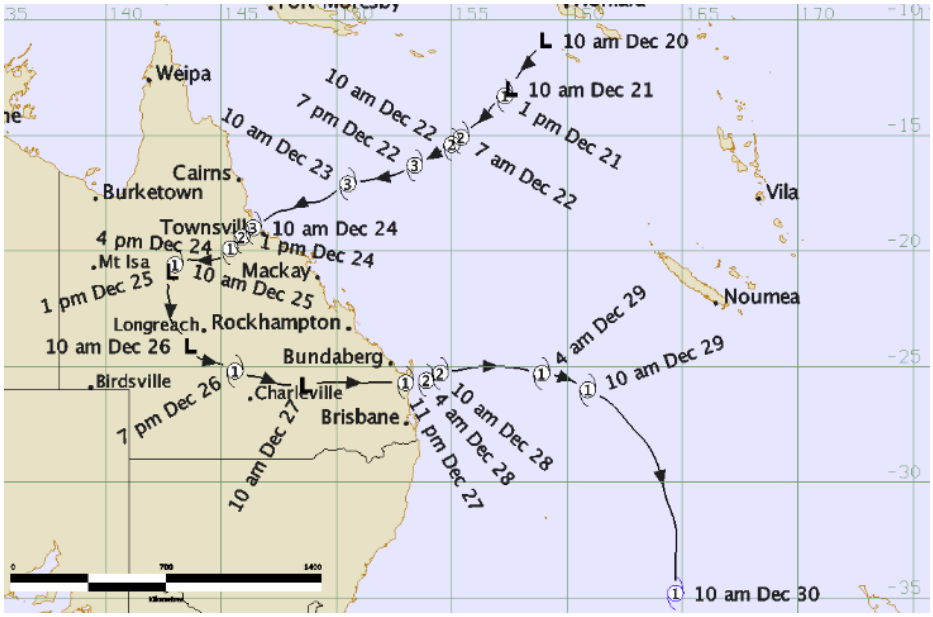
Severe Tropical Cyclones Larry (2006) and Yasi (2011) reinforced these perceptions, as the nature of their impact was from tidal forces and severe winds. It was not until 2019 that the city experienced another significant riverine flooding event, followed by Tropical Cyclone Kirrily in early 2024.

Table 2-2 details the records of major inundation events in the region. Due to the changing climate, into the future Townsville will experience more intense downpours, rising sea level, and more frequent sea-level extremes (i.e. storm surge).

Table 2-2: Inundation hazard major event history

Year	Hazard event description
1870	A short period after the settlement was established on the Ross Creek, settlers experienced a series of large floods over several years – in 1870, 1881, 1884, 1890 and 1892. During the 1890s, civic discourse began about flood mitigation and potential of hydro-engineering, with options considered including diverting the upper Ross River into the Bohle River.
1881	
1884	
1890	
1892	

	 Unknown (1890), *Scenes of Townsville during the 1890 flood.*
Early 20th century	*In the early twentieth century, a series of weirs (Black, Gleeson and Aplin) were established along the Ross River to improve water storage.*
1946	The year of 1946 was one of Townsville's wettest summers on record at the time. The town suffered from two major floods, one in January and another in February. The former caused the city's largest flood in the 40 preceding years. A levee on the south side of Alpin's Weir burst spilling just over 1,500 megalitres of water into the area which is now the suburb of Annandale. Both flood events have been noted as a moment of realisation for the town, as they became the 'high-water mark' for the city's collective flood hazard memory over the following years.  State Library of Queensland (2021). *Townsville during flood, 1946.*
1971	In December 1971, Townsville experienced one of the most powerful and destructive cyclones – Severe Tropical Cyclone Althea (category 3). Althea crossed the coast about 50 km north of Townsville, bringing wind gusts of

	196 km/h and causing three deaths and extensive damage to the region reaching $50 million[5]. 90 per cent of homes on Magnetic Island were damaged or destroyed[6].  Bureau of Meteorology, *Severe Tropical Cyclone Althea – Track and intensity*.
1974	*The Ross River dam becomes operational following 3 years of construction.*
1998	The night of 10 January 1998, Townsville recorded 549 mm of rain, associated with Tropical Cyclone Sid. This was the city's wettest 24-hour period on record and become colloquially known as 'the Night of Noah'. The system caused significant damage, leading to one man losing his life and inundation of up to 100 homes. Communities of Black River and Bluewater suffered wide-spread damage, washing away eight homes. Significant erosion occurred at the Strand and a Magnetic Island resort complex experienced major damage due to a landslide.

[5] Bureau of Meteorology, *Severe Tropical Cyclone Althea*, available via http://www.bom.gov.au/cyclone/history/althea.shtml
[6] Ibid.

	 Unknown (1998), *Damage to the Strand, Townsville, 15th January 1998.*
2007	A monsoonal depression settled over the North Queensland coast at the end of January 2007, which brought heavy rainfall over the proceeding days into February. In the Ross River basin, rain led to moderate and major flooding in the Bohle River and Stuart Creek areas. Daily storm events led to renewed river rises each day, with multiple instances of flash flooding.
2011	Severe Tropical Cyclone Yasi – a category 5 cyclone – hit the Queensland coast at Mission Beach near Cairns on 2 February 2011. The cyclone maintained a strong core with damaging winds and heavy rain stretching across the large system and causing inundation of parts of Townsville. Peak levels measured at the Townsville tide gauge recorded close to the expected 0.6 m above HAT[7].
2019	A monsoonal trough and slow-moving low-pressure system caused heavy and prolonged rainfall over Townsville in late January and early February 2019. These weather events saturated the ground and led to water levels rising within rivers and creeks, inundating several thousand homes and businesses. Four people died. This flood was unprecedented for the catchment, leading to flash flooding across Townsville. Over this period, water levels rose in the Ross River Dam significantly. This led to the automatic opening of the dam gates, which at its peak was releasing 1,888 cubic metres of water every second into the Ross River.

[7] Bureau of Meteorology, *Severe Tropical Cyclone Yasi*, available via http://www.bom.gov.au/cyclone/history/yasi.shtml

	 Laird, Cameron (2019), *Aerial view of flooded streets and houses, Townsville, 4 February 2019,* John Oxley Library, State Library of Queensland
2024	Most recently, in January 2024, Townsville experienced Tropical Cyclone Kirrily – a category 2 cyclone that crossed the coast near Balgal Beach in Rollingstone. Influenced by strong monsoon winds, cyclone Kirrily caused widespread power outages and flooding across the Townsville area. Sustained wind of more than 100 km/h and gusts of up to 170 km/h were reported. As the cyclone moved inland across Queensland, it began to interact with an upper trough, leading to heavy falls and widespread flooding. It is estimated approximately 125 properties across Queensland had moderate to severe damage, with one property being destroyed[8].

[8] Queensland Reconstruction Authority (2024), *Tropical Cyclone Kirrily: the northern system that became a statewide disaster event*, available via https://www.qra.qld.gov.au/news-case-studies/case-studies/tropical-cyclone-kirrily-northern-system-became-statewide-disaster-event

3 Policy context

3.1 State statutory planning scheme requirements for flood

The *Planning Act 2016* (Planning Act) establishes the framework for achieving ecological sustainable development which includes state planning policies outlined in the Queensland Government's SPP 2017. SPP 2017 expresses the matters of state interest in land use planning and development.

Natural hazards, risk and resilience is identified as a key state interest which seeks that '*the risks associated with natural hazards, including the projected impacts of climate change, are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards*.' In particular, SPP 2017 requires that:

Table 3-1: Relevant state interest policies for flood hazard

State interest policy (summarised)	Relevance
1 – Natural hazard areas are identified (i.e., mapped)	✓
2 – A fit-for-purpose risk assessment is undertaken	✓
4 – Development avoids natural hazard areas or mitigates risk to an acceptable or tolerable level	✓
5 – Development incorporates a range of risk reduction and resilience measures	✓
6 – Community infrastructure is located and designed to limit risk and maintain functionality	✓

3.1.1 SPP guidance for local governments

The current SPP guidance, known as *Integrating state interests in a planning scheme – Guidance for local governments, November 2021 – VS 1.2* (the SPP guideline), consolidates all state interests, including for natural hazards, into the one document. It was prepared to assist local government in the interpretation, integration and advancement of the state interests articulated in the state planning instruments when making or amending their planning scheme.

The SPP guideline sets out drafting considerations related to flood hazards for the state interest *Natural hazards, risk and resilience*.

A risk assessment is required to inform the provisions of a planning scheme relating to natural hazard risk. The risk assessment helps a local government understand whether their planning intentions are appropriate, given the level of risk posed by the natural hazard.

Upon the completion of a risk assessment, a local government should have a clear understanding of its 'at-risk' areas, which will assist with developing risk-based plans for land use, including identifying amendments needed to the planning scheme to avoid, mitigate or manage identified risks appropriately.

3.1.1.1 Risk categorisation

The SPP guideline related to the state interest for *Natural hazards, risk and resilience* provides that, amongst other matters:

- the **identification of LGA-wide flood hazard areas** is to be fit-for-purpose (i.e., reflective of level of population, future growth, and floodplain complexity of the areas);
- any new hazard studies produced for the purpose of identifying hazards **should incorporate climate change**;
- the **risk mapping is to represent the broad spectrum of risk**, including events both rarer and more frequent than the traditional 1 in 100-year (1% AEP) flood event and consider flood behaviour; and
- a **fit-for-purpose risk assessment is undertaken** to identify and achieve an acceptable or tolerable level of risk.

3.1.1.2 Determination of risk acceptability

State interest policy 4 requires the determination of the acceptability of the level of risk for land uses in existing and planned zones. With regards to the determination of the acceptability of the level of risk, the SPP guideline provides that:

Acceptable risk	A risk that is sufficiently low as to require no new treatments or actions to reduce the risk as communities can live with this level of risk without further action.
Tolerable risk	A risk that is low enough as to allow the exposure to a natural hazard to continue while at the same time high enough to require new treatments or actions to reduce risk. Communities can live with this level of risk but as much as is reasonably practical should be done to further reduce the risk and may include planning responses for: • reducing the likelihood of the risk (avoidance); or • reducing the consequences of the risk (mitigation and hazard management over time).
Intolerable risk	A risk that, following an understanding of the likelihood and consequences, is so high that it requires actions to avoid or reduce the risk. Individuals and society will not accept this risk and measures are to be put in place to reduce the risk to at least a tolerable level.
Residual risk	The risk a community is exposed to that is not being remedied through established risk treatment processes. Generally, it is the total risk to a community, less any measure in place to reduce that risk. For example, for a flood hazard: • for a town protected by a levee, the residual flood risk comprises the consequences of the levee being overtopped by floods larger than the design flood; or • 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.

The SPP guideline also notes that the identification of acceptable, tolerable and unacceptable risk areas for common development types is a working component of the risk assessment rather than a direct output for inclusion in the planning scheme (i.e., the overlay mapping), as the acceptability of the risk may vary for different land use types. For example, the risk may be tolerable for land in a rural zone where access to safe refuges exist, but intolerable in an urban zone with a greater population and population density, or for specific vulnerable uses.

As such, the consideration of whether the risk is acceptable, tolerable or intolerable is relative to:

- **land use types**, which informs the policy matters that the Flood overlay code would need to address i.e., vulnerable uses may be exposed to an intolerable level of risk in a high flood risk category and therefore should be avoided on the parts of land subject to a high flood risk; and
- **spatial zoning**, which informs the settlement pattern for the LGA i.e., informs the consideration of whether a zoning check is needed for residential zoned land located on the parts of land subject to a very high flood risk.

3.2 Building provisions in planning schemes

The planning system maintains a natural relationship with building provisions. Planning schemes set out whether development can occur in an area whereas building assessment provisions (BAPs) detail how to build. Generally, it is not appropriate to include BAPs in a planning scheme.

The primary BAPs that a planning scheme cannot include are matters covered by the Building Code of Australia (BCA) and parts of the Queensland Development Code (QDC).

Section 8 of the *Planning Act 2016* provides that:

> **(5) A local planning instrument must not include a provision about building work, to the extent the building work is regulated under the building assessment provisions, unless allowed under the Building Act.**
>
> (6) To the extent a local planning instrument does not comply with subsection (5), the local planning instrument is of no effect.

The State Government's *Integrating Building Work in planning schemes – Guidance for local governments, Updated November 2021* (Integrating Building Work guidance) states that:

Generally, with regards to flood hazard, the following matters in the BCA are BAPs and cannot be included in a planning scheme unless permitted by the *Building Act 1979* (Building Act):

1. The structural stability of the building (e.g., footings). This includes the structural resistance that materials and forms of construction (e.g., slab on ground) must achieve to withstand floods, cyclones, landslip, earthquakes, etc;
2. Damp and weatherproofing, sanitary facilities, room sizes, light and ventilation, sound insulation and the ability to resist the effects of termites;
3. Structures that are ancillary to the main use of the building including minor structures (swimming pools, vaults, cool rooms), heating appliances (fireplaces, flues and chimneys), and atrium construction; and
4. Telecommunications facilities within a building.

The following sections the integration of building provisions in planning scheme with specific regard to flood and coastal hazards in more detail.

3.2.1 Designation of area liable to flooding

With regards to flood hazard, a planning scheme may designate a flood hazard area and declare a defined flood level, maximum flow velocity of water, inactive flow or backwater area, freeboard that is more than 300 mm or finished floor level of Class 1 buildings built in all or part of the designated flood area.

Sections 32 and 33 of the *Building Act* provide the matters a planning scheme may include:

> ***32 Local laws, local planning instruments and local government resolutions that may form part of the building assessment provisions***
>
> *A local government may make or amend—*
>
> *(a)* ***a local planning instrument that designates, for the BCA or QDC, matters prescribed under a regulation****; or*
>
> *Example of a matter that may be prescribed— designated bush fire prone areas for the BCA*
>
> *(b) a provision of a local law or planning scheme or a resolution about an aspect of, or matter related or incidental to, building work prescribed under a regulation; or*
>
> *Examples of aspects that may be prescribed— swimming pool fencing or land liable to flooding*
>
> *(c) alternative provisions under section 33.*
>
> ***33 Alternative provisions to QDC residential design and siting provisions for particular buildings***
>
> *(1) This section applies for work (relevant work) that—*
>
> *(a) is building assessment work or accepted building work; and*
>
> *(b) is for a relevant building or a class 10 building or structure located on the same allotment as a single detached class 1 building.*
>
> ***(2) A planning scheme or PDA instrument may include provisions (alternative provisions) that, for relevant work, are alternative or different to the QDC residential design and siting provisions.***
>
> ***(3) However, a planning scheme or PDA instrument may include alternative provisions only if the provisions are a qualitative statement or quantifiable standard****.*
>
> *(4) If there are alternative provisions for relevant work, the QDC residential design and siting provisions only apply to the extent the alternative provisions do not apply to the work.*
>
> *(5) Alternative provisions cannot be made other than under a planning scheme or PDA instrument.*
>
> *(6) In this section—*
>
> ***PDA instrument*** *means a relevant development instrument for a priority development area, made under the Economic Development Act 2012.*
>
> ***qualitative statement*** *means a statement about a performance or outcome sought to be achieved when applicable buildings or structures are completed.*
>
> ***quantifiable standard*** *means a standard that achieves a performance or outcome sought under a qualitative statement.*
>
> ***relevant building*** *means a building that is— (a) a single detached class 1 building; or (b) a building of a class and type prescribed by regulation*

Section 8 of the Building Regulation 2021 (Building Regulation) provides:

> ***8 Designation of area liable to flooding***
>
> *(1) A local government may in a planning scheme, temporary local planning instrument under the Planning Act or by resolution—*
>
> ***(a) designate all or part of its area as a flood hazard area; and***
>
> ***(b) declare the following matters for all or part of the designated flood hazard area—***

i. the defined flood level;

ii. the maximum flow velocity of water;

iii. an inactive flow or backwater area;

iv. a freeboard that is more than 300mm;

v. the finished floor level of class 1 buildings built in all or part of the flood hazard area.

(2) The local government must, in designating a flood hazard area, comply with—

(a) a State planning policy; and

(b) if a temporary State planning policy is in effect when the designation is made—the temporary State planning policy to the extent it applies in relation to the designation.

(3) If the local government makes a designation or declaration under subsection (1), the local government must state in the planning scheme, temporary local planning instrument under the Planning Act or resolution, that the designation or declaration is made under this section.

Note— QDC MP 3.5 applies to the carrying out of particular building work carried out wholly or partly within a flood hazard area and a defined flood level is declared by a local government for the area.

(4) The local government must keep a register of—

(a) each flood hazard area designated by the local government; and

(b) the date each area was designated as a flood hazard area.

Note— For public access to the register see the Planning Act, section 264 and the Planning Regulation 2017, schedule 22.

(5) In this section—

***defined flood level** means the level to which it is reasonably expected flood waters may rise.*

***finished floor level** means the level of the uppermost surface of a finished floor not including any floor covering.*

Examples of a floor covering— carpet, tiles

***freeboard** means a height above the defined flood level that takes account of matters that may cause flood waters to rise above the defined flood level.*

Examples of matters that may cause a flood level to rise above the defined flood level— wave action, localised hydraulic behaviour

***inactive flow or backwater area** means all or part of a flood hazard area where the maximum flow velocity of water is not likely to be greater than 1.5m/s.*

***maximum flow velocity of water**, for all or part of a designated flood hazard area, means a flow velocity of water reasonably expected to be the maximum flow velocity of water for all or part of the area.*

***State planning policy** means a State planning policy under the Planning Act, other than a temporary State planning policy.*

***temporary State planning policy** see the Planning Act, section 12.*

The state's Integrating Building Work guidance provides that a note in the planning scheme to alert users that compliance with the BCA is required for all building work in a flood hazard area, at the building approval stage, will assist in ensuring any design considerations can be resolved upfront if necessary. For example:

> **Editor's note – The flood hazard area defined by this planning scheme is taken to be the flood hazard area pursuant to section 8 of the Building Regulation 2021. Building work in a designated flood**

hazard area must meet the requirements of the relevant building assessment provisions under the *Building Act 1975*.

It further notes the following:

- It is important that the correct terminology is used when designating a flood hazard area, for example phrases like 'flood planning area' must not be used instead.
- Where a flood hazard area is designated, the following parameters may be defined for all or part of the flood hazard area, and the local government may choose which of these requirements it wishes to declare in the planning scheme:
    - the defined flood level (DFL) – declaring of a defined flood level is necessary to trigger MP 3.5 to apply;
    - the maximum flow velocity of water;
    - an inactive flow or backwater area;
    - a freeboard that is more than 300mm;
    - the finished floor level of class 1 buildings built in all or part of the flood hazard area.
- These precise terms must be used throughout the planning scheme when declaring a defined flood level or declaring requirements (for example do not use phrases like 'flood planning level').

3.2.2 Building matters a planning scheme cannot include

A planning scheme cannot include mandatory parts in the current parts of the Queensland Development Code, which includes **Mandatory Part 3.5 – Construction of buildings in flood hazard areas (MP 3.5)**. For MP 3.5 to be considered, the planning scheme must designate all or part of its LGA a flood hazard area and include a statement that a designation / declaration has been made under the Building Regulation.

MP 3.5 of the QDC regulates the design and construction of buildings in designated flood hazard areas to ensure they resist flotation, collapse or significant permanent movement resulting from actions during the 'defined flood event', including the design and location of utilities and customer dedicated substations and protection from backflow from sanitary drains. MP 3.5 only applies to the extent the building work is carried out wholly or partly within a flood hazard area for new buildings and additions to, and a defined flood level is declared by a local government for the area (**Table 3-2**).

The purpose of MP3.5 is to ensure:

(a) particular buildings located in flood hazard areas—

resist flotation, collapse or significant permanent movement caused by flood water; and

safeguard occupants and other people against illness or injury caused by flood water affecting buildings; and

are protected from backflow; and

have utilities that are protected from the effects of flood water; and

(b) that a customer dedicated substation is designed or located so its ability to function effectively is not affected by flood water.

MP3.5 applies to lawful building work in accordance with the following table:

Table 1 – Application of MP 3.5

Application	Performance Requirements			
	P1	P2	P3	P4
Construction of a new *class* 1 or a *class* 4 part of a *building*	✓	✓	✓	
Construction of a new class 2, 3, 9a or 9c *building*	✓	✓	✓	✓
Relocation of a *class* 1 *building*	✓	✓	✓	
Additions to a *class* 1 *building* where the additions constitute 50% or more of the *floor area* of the existing *building*	✓	✓	✓	
Additions to a *class* 2, 3, 9a or 9c *building*, or a *class* 4 part of a *building*	✓	✓		✓
Construction of a new *class* 5, 6, 7, 8 or 9b *building*		✓	✓	✓

[1]Any plumbing or drainage work mentioned in this Part is plumbing or drainage work under the *Plumbing and Drainage Act 2002* and is subject to the requirements under that Act.

Source: MP3.5 Construction of buildings in flood hazard areas

Amongst other matters, it is noted that MP3.5 does not apply to a building located, or proposed to be located, on a lot that is subject to:

- significant mudslide or significant landslide cause by rainfall or runoff, where it would be reasonable to expect that the mudslide or landslide would affect the part of the lot where the building is, or is proposed to be, located; or
- storm surge.

For the purposes of the table above, the following groups of buildings by their function and use are provided:

- **Class 1 buildings** – houses or dwellings of a domestic or residential nature:
  - Class 1a – a single dwelling being a detached house or one of a group of attached dwellings being a town house etc
  - Class 1b – is a boarding house, guest house or hostel that has a floor area less than 300m2
- **Class 2 buildings** – Apartment buildings – residential buildings containing two or more sole-occupancy units which may also be single storey attached dwellings where the is a common space
- **Class 3 buildings** – a residential building (other than a class 1 or 2 building) which is a common place of long term or transient living such as a boarding house, hostel, backpackers accommodation, residential part of a hotel, motel, school or detention centre, or could also include dormitory style accommodation, or q workers' quarters for shearers or fruit pickers. Class 3 buildings may also be "care-type" facilities such as accommodation buildings for children, the elderly, or people with a disability, and which are not considered to be Class 9 buildings
- **Class 4 buildings** – part of a building that is a dwelling or residence within a non-residential building (Class 5 to 9), such as a caretaker's residence in a hospital
- **Class 5 buildings** – office buildings for professional and/or commercial purposes (excluding Class 6 to 9), such as offices for government agencies, accountants, or lawyers
- **Class 6 buildings** – shops, restaurants and cafes where there is the sale of goods or the supply of services direct to the public
- **Class 7 buildings** – buildings including carparks, warehouses or storage buildings:
  - Class 7a – carparks

  - Class 7b – warehouses, storage buildings or buildings for the display of goods (or produce) that is for wholesale
- **Class 8 buildings** – factories where buildings are used for production, assembling, altering, repairing, finishing, packing, or cleaning or goods or produce i.e., mechanics workshop, abattoir, laboratory
- **Class 9 buildings** – public buildings:
  - Class 9a – healthcare buildings such as hospitals and day surgery clinics
  - Class 9b – buildings where people assemble for social, political, theatrical, religious or civic purposes e.g., churches, schools, universities, sports facilities, night clubs
  - Class 9c – aged care facilities
- **Class 10 buildings or structures** – non habitable buildings or structures:
  - Class 10a – non-habitable buildings including sheds, carports, and private garages
  - Class 10b – structures such as fence, mast, antenna, retaining wall, swimming pool
  - Class 10c – private bushfire shelter associated within, but not attached to, a class 1a building

Table 3-2: Modified excerpt from MP3.5

QDC, MP3.5 – Construction of building in flood hazard areas		Applicable building class/es	How a planning scheme can deal with this provision
PERFORMANCE REQUIREMENT	**ACCEPTABLE SOLUTION**		May not be modified, but planning scheme 'triggers' application
Design and construction of buildings			
P1 **A building must be designed, constructed, connected and anchored so that, in the event of a flood up to the DFL, it—** **(a) resists flotation, collapse or significant permanent movement, resulting from—** **(i) hydrostatic action; and** **(ii) hydrodynamic action; and** **(iii) erosion and scouring; and** **(iv) wind; and** **(v) any other action; and** **(b) safeguards occupants and other people against illness and injury caused by flood water affecting the building.**	A1 The building complies with sections 2.3, 2.5 - 2.8 and section 2.10 of the national flood standard, and— (a) if the building is a class 1 building and the local government has declared, under section 13 of the Building Regulation 2006, the finished floor level for a class 1 building—the finished floor level of the building complies with the level declared; or (b) otherwise—the finished floor level of the building complies with section 2.4 of the national flood standard. *Note— Where A1 does not apply (refer to the provision in this part with the heading 'Limitations'), an alternative solution will be required in order to ensure it complies with P1. To formulate an alternative solution, the services of a competent person may be required.*	Construction of a new: Class 1 – Residential Class 4 – Residential part Class 2 or 3 – Residential Class 9a or 9c – Health care / aged care Relocation of a Class 1 – Residential building Additions to a Class 1 – Residential building (50% or more) Additions to a: Class 2 or 3 – Residential Class 4 – Residential part Class 9a or 9c – Health care / aged care	
Design and location of utilities			
P2 **Utilities associated with a building, other than an electrical meter for a class 1 building, must be designed or located to reduce the effects of flood water on the utilities in the event of a flood up to the DFL.**	A2 (1) Utilities associated with a class 1 building, other than an electrical meter for the building, are located above— (a) if the local government has declared, under section 13 of the Building Regulation, the finished floor level for a class 1 building—the level declared; or (b) otherwise—the flood hazard level. (2) Utilities associated with a building other than a class 1 building are located above the flood hazard level. *Note— Electrical installations may be installed by a person only if the person is a licensed electrician. Electrical meters must be installed in accordance with electrical entity requirements.*	Construction of a new: Class 1 – Residential Class 4 – Residential part Class 2 or 3 – Residential Class 9a or 9c – Health care / aged care Relocation of a Class 1 – Residential building Additions to a Class 1 – Residential building (50% or more) Additions to a: Class 2 or 3 – Residential Class 4 – Residential part Class 9a or 9c – Health care / aged care Construction of a new: Class 5 – Business Class 6 – Commercial Class 7 – Industry Class 8 – Industry Class 9b – Public buildings where people assemble i.e., churches, schools	

Protection from backflow from sanitary drains			
P3 **A building with a sanitary drain must be protected from backflow so that in the event of a flood up to the DFL the effects of flood water on the building are reduced.**	A3 (1) A building with a sanitary drain is protected from backflow by a reflux valve fitted between the building and— (a) if the building has an onsite sewerage facility—the on-site sewerage facility; or (b) otherwise—the connection point. (2) Also, a reflux valve fitted under subsection (1) is accessible for maintenance in accordance with AS3500.2:2003, section 4.5. *Note— A reflux valve may be fitted by a person only if the person is licensed to fit the valve under the Plumbing and Drainage Act 2002*	Construction of a new: Class 1 – Residential Class 4 – Residential part Class 2 or 3 – Residential Class 9a or 9c – Health care / aged care Relocation of a Class 1 – Residential building Additions to a Class 1 – Residential building (50% or more) Construction of a new: Class 5 – Business Class 6 – Commercial Class 7 – Industry Class 8 – Industry Class 9b – Public buildings where people assemble i.e., churches, schools	
Design and location of customer dedicated substations			
P4 **A customer dedicated substation located in a building must be designed or located so its ability to function effectively is not affected by a flood event up to the DFL. Note— Under section 59(2)(a) of the Electricity Regulation 2006, an entity may require the owner of premises to provide space on the premises for a substation.**	A4 A customer dedicated substation located in a building is located above the DFL.	Construction of a new: Class 2 or 3 – Residential Class 9a or 9c – Health care / aged care Additions to a: Class 2 or 3 – Residential Class 4 – Residential part Class 9a or 9c – Health care / aged care Construction of a new: Class 5 – Business Class 6 – Commercial Class 7 – Industry Class 8 – Industry Class 9b – Public buildings where people assemble i.e., churches, schools	

The State's Integrating Building Work guidance also provides what a planning scheme may include, noting the following:

- A planning scheme may include provisions including construction morphologies that address flood storage and to maintain conveyance capacity across the flood plain, as opposed to addressing individual building resilience. These responses may for example include provisions for the pier/post construction and considering the cumulative effect of fill.
- A planning scheme may include provisions about the style and design of buildings in a flood hazard area for aesthetic and streetscape character reasons. For example, the overall height of buildings above necessary finished floor levels for dwellings in character areas and whether minimum height requirements are delivered via high set dwellings or mounding.
- A planning scheme may contain provisions to mitigate adverse environmental impacts or health risks from certain uses or activities. For example, the planning scheme may contain outcomes to avoid the storage of hazardous materials in flood hazard areas, or provisions to mitigate the risk associated with that storage.

3.2.3 Relationship between flooding and storm tide inundation

There are no building requirements specific to withstanding storm tide inundation.

With regards to the designated flood hazard area, the State's Integrating Building Work guidance notes that:

> *A designated flood hazard area DOES NOT include areas subject to storm-tide inundation (unless also within a flood hazard area) and the BAPs triggered to address flood hazard do not address storm tide inundation.*

It further provides that it is important to note that MP 3.5 (which regulates the design and construction of buildings in designated flood hazard areas) does not apply on land subject to storm surge. It recommends that local governments should:

- clearly map flood hazard areas separately from storm tide inundation areas where designating a flood hazard area which triggers the building requirements related to the mitigation of risks;
- needs to be cognisant that as soon as a planning scheme maps storm tide inundation areas, MP 3.5 will no longer apply to those parts of the flood hazard area that are also then identified in the storm tide inundation area; and
- will need to include provisions directly in the planning scheme, should the local government seek to enable a building response to flood where also in storm tide inundation areas.

The following **Figure 3-1** provides an overview of the relationship between flooding and storm tide inundation, and the application of BAPs:

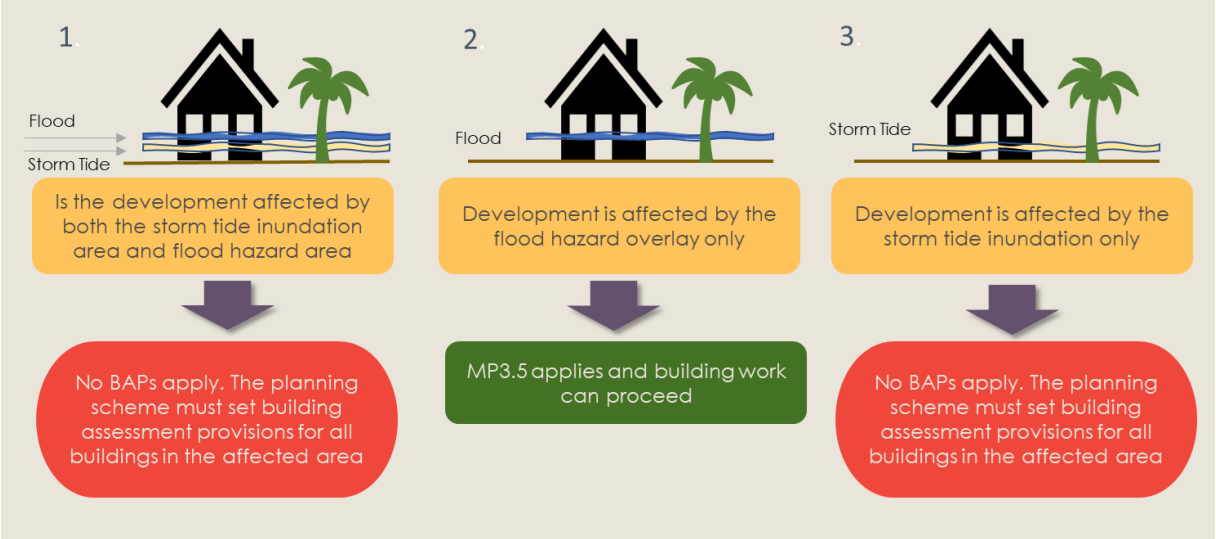


Figure 3-1: Relationship between building and storm tide inundation

There are a number of practical implementation issues with regards to mapping flood hazard and storm tide inundation within planning schemes:

- As part of undertaking a flood study with regards to riverine flooding, tidal water is considered. Specifically, the SPP guideline provides for the consideration of the potential for coastal events to contribute to riverine flooding, for example storm surges and tides. This therefore results in a number of issues including:
    - there is a potential policy tension with MP 3.5 which provides that it does not apply to a building located, or proposed to be located, on a lot that is subject to storm surge;
    - whether the building industry is already providing certification for structures at risk from both hazards;
    - limiting the ability to clearly identify flood hazard areas separately from storm surge.
- The mapped area of storm tide inundation can extend across a large proportion of the flood hazard area within coastal LGAs. Currently planning schemes generally do not include like for like BAPs which require the assessment of the structural integrity of buildings in these "overlap" locations.
- As a result, the following scenarios may be occurring:
    - MP 3.5 continues to be applied across flood hazard areas by certifiers (which may also be subject to storm surge);
    - the assessment of the structural integrity of buildings in flood hazard and storm surge areas by certifiers is not occurring; or
    - the BAPs and associated regulation a certifier may have regard to are silent on storm surge, and while certifiers must consider a wide range of material does this silence result in the absence of certification on allotments only affected by storm surge, and structural integrity confirmation from other sources not occurring.

4 Risk assessment summary

4.1 Flood risk assessment

A Flood Risk Assessment has been undertaken for this project to quantify the degree of existing and future flood risk across the Townsville LGA. The results of the Flood Risk Assessment will be used to:

- inform the policy response to flood risk, and review and amendment of Council's planning scheme – the Townsville City Plan; and
- support the identification and assessment of preferred feasible alternatives options that will underpin the FAAR.

The Flood Risk Assessment report provides a detailed analysis of the likelihood, characteristics (e.g., depths, velocities, hazard), and potential consequences of flooding that have been derived from hydrologic and hydraulic modelling of key waterways and floodplains across the LGA. The Flood Risk Assessment focused on the study areas where flood modelling was provided.

4.1.1 Flood hydraulic risk

Flood hydraulic risk (FR) was assessed based on a review of the expected flood hazard (depth x velocity) for a range of flood likelihoods. This approach expands upon the traditional AIDR hazard categorisation (i.e., using H1 – H6 for one likelihood event, such as the 1% AEP) (**Figure 4-1**) to instead include a broad range of flood events (smaller and larger than the 1% AEP) to establish a matrix that groups together bands of similar risk.

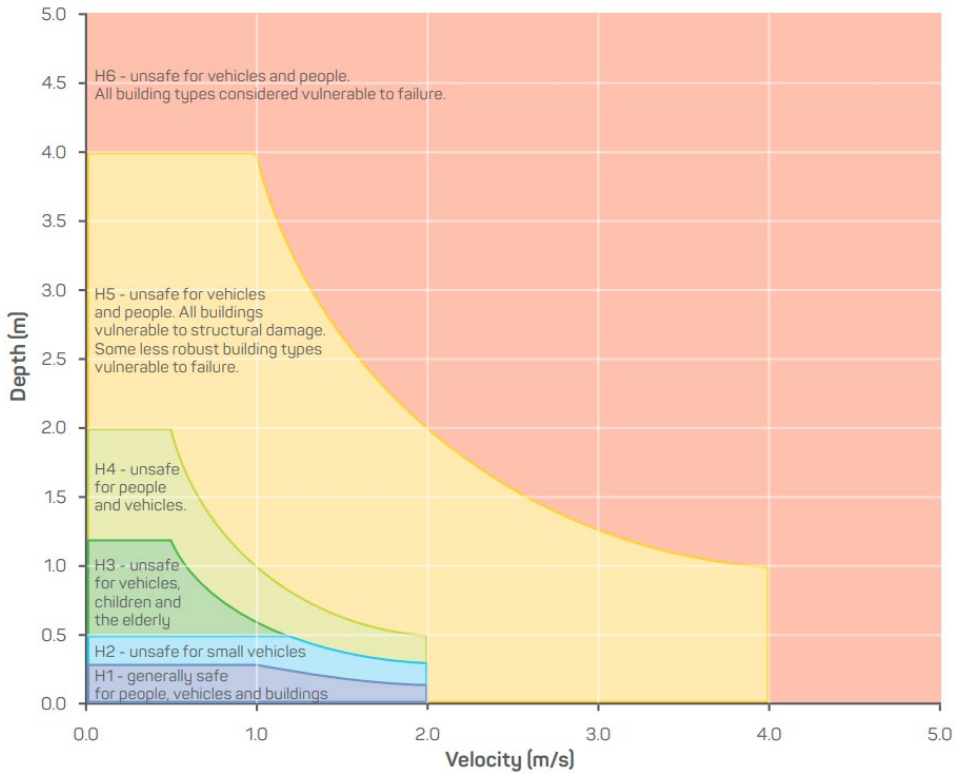


Figure 4-1: AIDR general flood hazard vulnerability curve

The methodology applied was consistent with contemporary studies recently undertaken by Moreton Bay, Toowoomba, and Brisbane LGAs. To quantify the degree of flood hydraulic risk (or 'FR'), five (5) categories were defined (FR1 to FR5) with FR1 the lowest risk, and FR5 the highest risk using the following FR matrix developed with Council:

Table 4-1: Townsville Flood Risk Assessment – Flood hydraulic risk matrix and definitions (existing)

AEP	AIDR Flood Hazard Rating					
	H1	H2	H3	H4	H5	H6
PMF	FR1	FR1	FR1	FR1	FR1	FR1
0.05%	FR1	FR1	FR1	FR1	FR1	FR2
0.2%	FR2	FR2	FR2	FR2	FR2	FR2
0.5%	FR2	FR2	FR2	FR3	FR3	FR3
1%	FR2	FR3	FR4	FR4	FR4	FR4
2%	FR2	FR3	FR4	FR4	FR4	FR5
5%	FR3	FR4	FR4	FR5	FR5	FR5
10%	FR3	FR4	FR5	FR5	FR5	FR5
20%	FR3	FR4	FR5	FR5	FR5	FR5
50%	FR3	FR4	FR5	FR5	FR5	FR5

Flood Risk Definition	FR1 Very Low Risk	FR2 Low Risk	FR3 Medium Risk	FR4 High Risk	FR5 Very High Risk

4.1.2 Floodplain function

As part of the Flood Risk Assessment, flood function maps have been prepared for the 1% AEP flood event classifying the floodplain into areas of flood conveyance, flood storage and flood fringe (see **Figure 4-2**).

The Flood Risk Assessment provides that generally:

- the 1% AEP flow conveyance areas are predominately aligned with the FR5 and FR4 flood hydraulic risk areas;
- the 1% AEP flood storage areas are mostly aligned with the FR4 and FR3 flood hydraulic risk areas;
- the 1% AEP fringe areas are mostly a combination of FR2 to FR1 flood hydraulic risk areas; and
- areas beyond the 1% AEP fringe are largely FR2 and FR1 flood hydraulic risk areas.

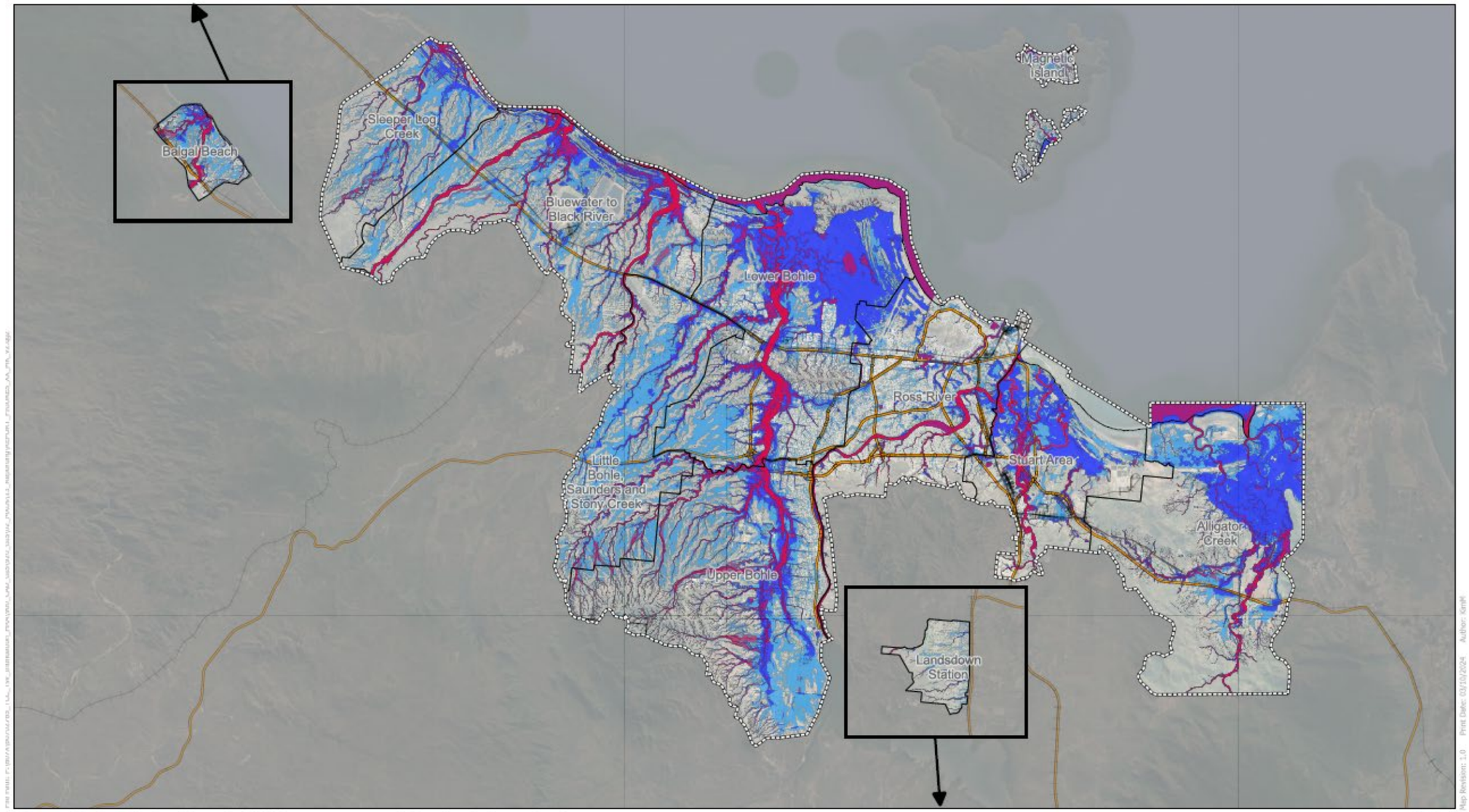


Figure 4-2: Existing floodplain function mapping

4.1.3 Flood risk multipliers

In combination with flood hydraulic risk (flood frequency and hazard), flooding has the potential to affect communities through for example, inundating properties in a short period of time (i.e., less than 6 hours), extended periods of inundation (i.e., inundation of properties for longer than 12 hours) and loss of access and isolation. These flood risk factors can increase the severity of the flood risk (referred to as flood risk multipliers) and include:

- **time to inundation** – how many hours it takes water to reach a property from a flood source. If it takes less than 6 hours for floodwaters to reach a property, then residents have a short time to react;
- **flood warning time** – how many hours properties will be affected by flood water. If a low-set residential building is inundated for more than 12 hours by low hazard floodwater, residents may need to be self-sufficient if sheltering at home for an extended period of time;
- **flood islands (low and high)** – identify areas that are surrounded by flood water and at risk of isolation;
- **vulnerability** – communities which have been mapped based on particular indicators known to increase risk during flood events including:
    - key demographic/socio-economic characteristics to determine community vulnerability including:
    - aged dependency ratios and child dependency ratios;
    - socio-economic index for areas;
    - core activity need for assistance;
    - number of motor vehicles per dwelling; or
    - proficiency in spoken English.
    - Also:
    - the location of uses with vulnerable persons; or
    - poor or under-designed infrastructure that reduces the ability to evacuate at identified risk areas;
- **evacuation and isolation** – long term infrastructure upgrades to ensure critical connections to emergency services and community, and consideration of specific requirements to ensure access/ egress to higher ground during flood events;
- **future flood risk (or filling sensitivity)** – areas highly sensitive to filling and development activities within the floodplain;
- **climate change sensitivity** – areas most sensitive to climate change impacts, which includes the projected increase in sea level of 0.8 metres above present-day levels, 10% increase in storm tide intensity by 2100 and 10 per cent increase in rainfall intensity to account for the impact of climate variability on the LGA's hydrology; and
- **economic impact** – end user impact and the ability to rebuild, insure etc.

4.1.3.1 Flood warning time

As part of the Flood Risk Assessment, flood warning time mapping has been developed to provide an indication of the time to which flooding may occur. To determine a flood warning time classification, four (4) categories were defined, from less than three (3) hours (shortest warning) to greater than 12 hours.

4.1.3.2 Vulnerable uses exposure

Flood risk to the location of existing specific vulnerable land uses was also assessed including the following[9]:

- Schools (including primary, secondary, tertiary, college, and universities);
- Hospitals;
- Childcare facilities; and
- Aged care facilities (including medical and non-medical).

In summary, the Flood Risk Assessment found that (see **Tabel 4-2**):

- Across all existing vulnerable uses, there are 83 buildings located within the FR5 and FR4 categories. 121 buildings of the total 1,594 buildings with available floor level survey are below the 1% AEP floor level immunity;
- **Schools** – 69 buildings are located within the FR5 and FR4 categories. A total of 104 buildings of the total 828 buildings have floor levels below the 1% AEP;
- **Hospitals** – 4 buildings are located within the FR5 and FR4 categories. A total of 5 buildings of the total 49 buildings have floor levels below the 1% AEP floor level immunity;
- **Childcare facilities** – 6 buildings are located within the FR4 category. 6 buildings of the total 72 buildings are below the1% AEP floor level immunity; and
- **Aged care facilities** – 4 buildings are located within the FR5 and FR4 categories. There are 6 buildings of the total 645 buildings below the1% AEP floor level immunity.

Table 4-2: Estimated flood hydraulic risk for vulnerable use buildings (existing)

Vulnerable Users Group	Total Vulnerable Use Buildings	Number of Buildings					Vulnerable Use with floor levels below 1% AEP
		FR5	FR4	FR3	FR2	FR1	
School	828	8	61	175	141	309	104
Hospitals	49	2	2	5	5	25	5
Child Care Facilities	72	0	6	8	15	28	6
Aged Care Facilities	645	1	3	79	426	110	6
All Vulnerable Uses	**1594**	**11**	**72**	**267**	**587**	**472**	**121**

***Buildings are considered to be impacted if the FHR within building footprint is greater than 5% of the total building area**

Source: Townsville Flood Risk Assessment

[9] Note the classification of 'vulnerable land uses' in this section is specific to the Flood Risk Assessment and the process of assessing risk to existing assets. Vulnerable land uses for the purpose of developing the land use policy response and flood code provisions are considered more broadly across a wider range of land uses (refer to Section 5.5 of this report for further details).

4.1.3.3 Critical infrastructure

The Flood Risk Assessment also assessed flood risk to the location of existing critical community infrastructure including:

- Emergency management facilities including Fire and Rescue, Ambulance and Police Stations;
- Evacuation/ cyclone shelters;
- Sewer infrastructure, including pump stations and treatment plants; and
- Water infrastructure, including chlorinators, booster pump stations and treatment plants.

In summary, the Flood Risk Assessment found that (see **Table 4-3**):

- **Emergency management facilities** – 3 buildings are located within the FR5 and FR4 categories and 8 buildings are below the 1% AEP floor level immunity;
- **Evacuation centres** – 6 buildings are located within the FR5 and FR4 categories and 10 buildings are below the 1% AEP floor level immunity;
- **Sewer infrastructure** – 38 pump stations are located within the FR5 and FR4 categories and 21 pump stations are below the 1% AEP flood immunity. A total of 2 treatment plants are impacted in the design event; and
- **Water infrastructure** – 1 chlorinator is located within the FR5 category. The other 17 water infrastructure assets are located within the FR3 to FR1 categories.

Table 4-3: Critical community infrastructure exposure (existing)

Critical Infrastructure	Total Critical Infrastructure Assessed	Critical Infrastructure within High Risk (FR4 & FR5)	Design Event Immunity Required in City Plan[1]	Critical Infrastructure impacted in Design Event
Emergency Management Facilities	24	3	0.2% AEP	8
Evacuation Centres	50	6	0.5% AEP[2]	10
Sewer Infrastructure	236	38	1% AEP	23 (2 Treatment Plants)
Water Infrastructure	36	1	0.5% AEP[2]	No Available Level Data

1. Required immunity is taken from the Townsville City Plan Table 8.2.6.3(b) (TCC,2014)
2. It is noted that *0.5% AEP event was not modelled in all flood studies and is unable to be assessed for infrastructure immunity. In the absence of the 0.5% AEP flood results the 1% AEP immunity has been assessed.

Source: Townsville Flood Risk Assessment

4.1.3.4 Evacuation road closure and isolation assessment

An evacuation road closure assessment and evacuation assessment was undertaken as part of the Flood Risk Assessment to identify key areas at risk of isolation, and where there may be challenges with effective flood evacuation. Areas of isolation that have been identified based on flooding and road closure across various design events within the focus areas are:

- Balgal Beach Area;
- Saunders Beach Area;
- Bluewater Area;
- Northern Black River;
- Southern Black River Area 1;
- Southern Black River Area 2;
- Northshore Area;
- Rural Gumlow;
- Upper Bohle;
- Whites Creek Area;
- Nome Area;
- Alligator Creek Area; and
- Magnetic Island Areas.

4.1.3.5 Climate change sensitivity

An assessment of flood risk under future climate change conditions was undertaken as part of the Flood Risk Assessment. Flood hydraulic risk (FR) with climate change was assessed based on a review of the expected flood hazard (depth x velocity) for a range of flood likelihoods at 2100. To determine a suitable risk matrix with future climate change considerations, five (5) FR categories were defined, from FR5 (highest risk) to FR1 (lowest risk), which were agreed with Council (see **Table 4-4**).

It is noted there is no difference between the FR matrices for both existing (present day) conditions and future conditions with climate change – the degree of risk associated with each flood likelihood event is considered the same. What does change however is the extent of the spatial area impacted by flood when climate change conditions / factors are applied.

Table 4-4: Townsville Flood Risk Assessment – Flood hydraulic risk matrix with climate change

Climate Change AEP	AIDR Flood Hazard Categories					
	H1	H2	H3	H4	H5	H6
PMF	FR1	FR1	FR1	FR1	FR1	FR1
0.05%+CC	FR1	FR1	FR1	FR1	FR1	FR2
0.2%+CC	FR2	FR2	FR2	FR2	FR2	FR2
0.5% +CC	FR2	FR2	FR2	FR3	FR3	FR3
1%+CC	FR2	FR3	FR4	FR4	FR4	FR4
2%+CC	FR2	FR3	FR4	FR4	FR4	FR5
5%+CC	FR3	FR4	FR4	FR5	FR5	FR5
10%+CC	FR3	FR4	FR5	FR5	FR5	FR5
20%+CC	FR3	FR4	FR5	FR5	FR5	FR5
50%+CC	FR3	FR4	FR5	FR5	FR5	FR5

The sensitivity analysis of existing floodplain risk to climate conditions (year 2100, RCP 8.5) identified:

- review of future climate change FR mapping against existing FR mapping identifies that there is a significant increase of FR4 and FR3 across all areas. This is typically driven by the FR in the 5% AEP, 2% AEP and 1% AEP climate change design events;
- there is an increase in percentages within the FR5 and FR4 categories of 16% across all zone groups;
- the zone group with the largest percentage increase in floodplain area in the FR5 and FR4 categories is Urban Residential with an increase of 48%;
- there is an increase in total number of buildings within the FR5 and FR4 categories of 1,997 across all zone groups;
- it is estimated that there will be an additional 2,662 buildings below the 1% AEP floor level immunity resulting in a total of 5,690 buildings that do not achieve floor level immunity in a 1% AEP in climate change conditions; and
- the greatest increase in total number of buildings within the FR5 and FR4 categories are Urban Residential and Rural Residential zone groups with an estimated increase of 1,812 and 80 respectively.

Figure 4-3 overleaf shows the region-wide mapping output for flood hydraulic risk under future climate change conditions. Maps are also provided in the Flood Risk Assessment at a smaller scale for each region.

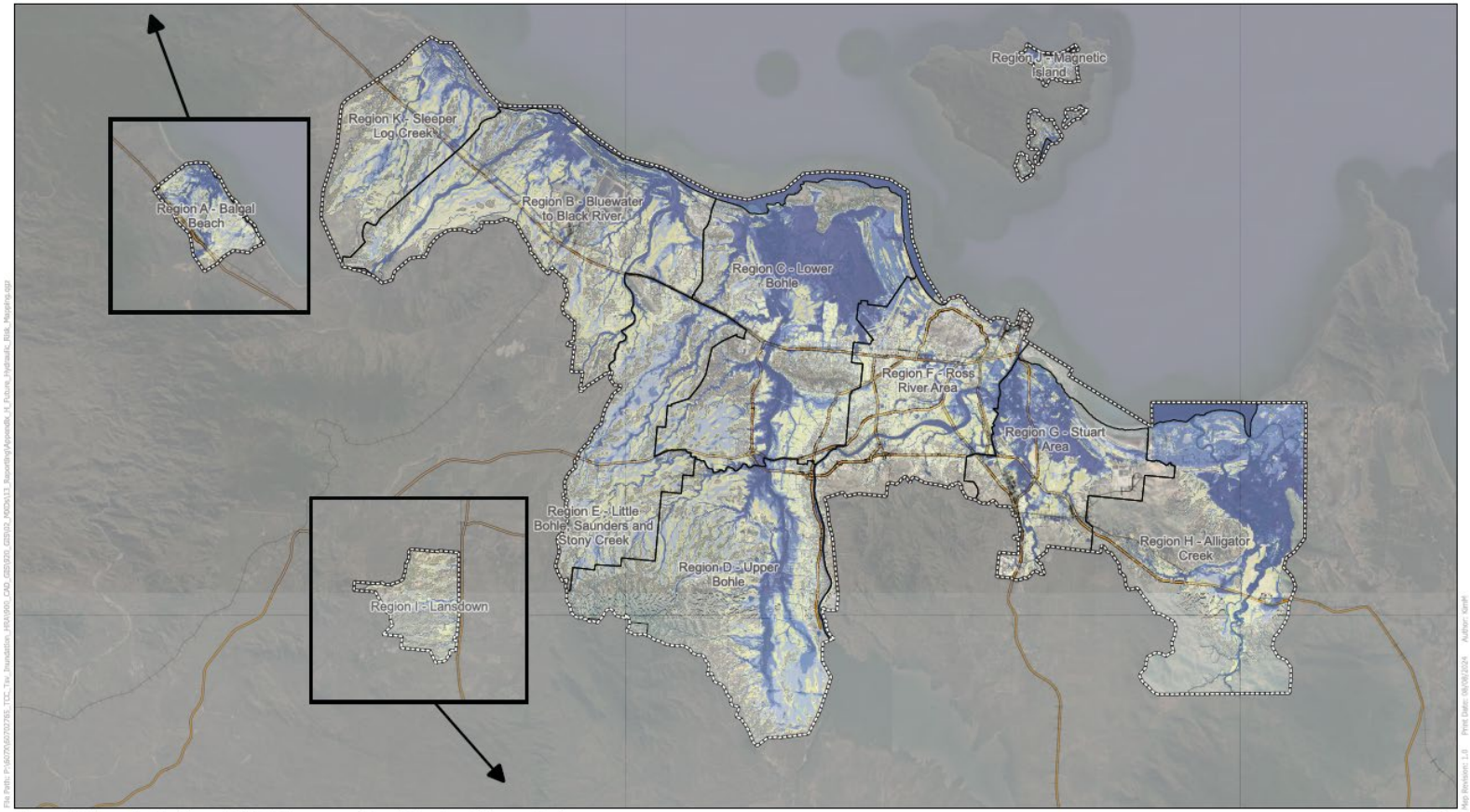


Figure 4-3: Future floodplain flood hydraulic risk mapping

4.1.4 Zone group classification

For the purposes of the Flood Risk Assessment exposure analysis, the following **Table 4-5** outlines the land use groups for all the zones identified in the Townsville City Plan. **Table 4-6** provides the estimated exposure of flood risk across each FR category against each of the zoning groups. The land use zone groups and exposure analysis will be used to assist with determining the FR tolerability.

Table 4-5: Land use zone groups

Grouped Zoning	Zones	
Urban Residential	• High Density Residential • Medium Density Residential	• Character Residential • Low Density Residential
Rural residential	• Rural residential	
Emerging community	• Emerging Community	
Community facilities	• Community Facilities	
Centres	• Principal Centre • Specialised Centre • Local Centre • Mixed Use	• Neighbourhood Centre • Major Centre • District Centre
Industry	• Low Impact Industry • Medium Impact Industry	• High Impact Industry
Special purpose	• Special purpose	
Rural	• Rural	
Sport and recreation	• Sport and recreation	
Open space/ Environmental Management and Conservation	• Open space	• Environmental Management and Conservation

Source: Townsville Flood Risk Assessment

Table 4-6: Estimated flood hydraulic risk across grouped zonings (existing)

Grouped Zoning	Estimated Total Area (ha)*	Total % of Zoning in Floodplain										Estimated Total Area in Floodplain*		Estimated Total Area out of Floodplain*	
		FR5 Very High Risk		FR4 High Risk		FR3 Medium Risk		FR2 Low Risk		FR1 Very Low Risk					
		Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Urban Residential	5,414.5	128.8	2.4%	180.8	3.3%	540.8	10.0%	1,002.6	18.5%	1,902.0	35.1%	3,755.0	69.4%	1,659.5	30.6%
Rural residential	6,549.9	469.7	7.2%	531.4	8.1%	1,040.3	15.9%	810.4	12.4%	1,326.9	20.3%	4,178.7	63.8%	2,371.2	36.2%
Emerging Community	3,415.4	319.9	9.4%	212.3	6.2%	440.7	12.9%	280.9	8.2%	260.1	7.6%	1,513.9	44.3%	1,901.5	55.7%
Community Facilities	1,377.0	143.8	10.4%	138.6	10.1%	194.6	14.1%	166.7	12.1%	367.9	26.7%	1,011.6	73.5%	365.4	26.5%
Centres	2,178.7	351.4	16.1%	312.2	14.3%	218.0	10.0%	208.1	9.5%	357.2	16.4%	1,446.8	66.4%	731.9	33.6%
Industry	5,090.5	599.6	11.8%	380.7	7.5%	757.8	14.9%	574.6	11.3%	901.6	17.7%	3,214.4	63.1%	1,876.1	36.9%
Special Purpose	4,786.2	721.6	15.1%	354.7	7.4%	306.9	6.4%	285.5	6.0%	593.9	12.4%	2,262.6	47.3%	2,523.6	52.7%
Rural	51,882.7	3,040.0	5.9%	2,695.0	5.2%	8,076.0	15.6%	5,040.5	9.7%	6,185.8	11.9%	25,037.3	48.3%	26,845.4	51.7%
Sport and recreation	1,120.3	103.0	9.2%	167.8	15.0%	206.7	18.5%	180.4	16.1%	241.3	21.5%	899.2	80.3%	221.1	19.7%
Open space and Environmental management and conservation	87,025.8	6,219.3	7.1%	2,599.9	3.0%	2,227.4	2.6%	2,080.9	2.4%	2,061.8	2.4%	15,189.2	17.5%	71,836.5	82.5%
Across All Zones	168,840.9	12,097.0	7.2%	7,573.4	4.5%	14,009.2	8.3%	10,630.6	6.3%	14,198.6	8.4%	58,508.7	34.7%	110,332.3	65.3%

*The areas in the table relate to areas within the provided flood model boundaries, given the risk outside these areas has not been defined and is unknown

Source: Townsville Flood Risk Assessment

Specifically, the Flood Risk Assessment found that:

- **Urban residential** – 5.7% of the total zoning and 2,035 buildings are located within the FR5 and FR4 categories. There are 2,200 residential buildings that do not achieve floor level immunity at 1% AEP.
- **Rural residential** – 15.3% of the total zoning and 270 buildings are located within the FR5 and FR4 categories. There are 245 buildings that do not achieve floor level immunity at 1% AEP.
- **Emerging community** –15.6% of the total zoning and 37 buildings are located within the FR5 and FR4 categories. There are 7 buildings that do not achieve floor level immunity at 1% AEP.
- **Community facilities** – 20.5% of the total zoning and 73 buildings are located within the FR5 and FR4 categories. There are 97 buildings that do not achieve floor level immunity at 1% AEP.
- **Centres** – 30.4% of the total zoning and 225 buildings are located within the FR5 and FR4 categories. There are 176 buildings that do not achieve floor level immunity at 1% AEP.
- **Industry** – 19.3% of the total zoning and 189 buildings are located within the FR5 and FR4 categories. There are 243 buildings that do not achieve floor level immunity at 1% AEP.
- **Special purpose** – 22.5% of the total zoning and 2 buildings are located within the FR5 and FR4 categories. There are 3 buildings that do not achieve floor level immunity at 1% AEP.
- **Rural** – 11.1% of the total zoning and 27 buildings are located within the FR5 and FR4 categories. There are 33 buildings that do not achieve floor level immunity at 1% AEP.
- **Sports and recreation** – 24.2% of the total zoning and 16 buildings are located within the FR5 and FR4 categories. There are 14 buildings that do not achieve floor level immunity at 1% AEP.
- **Open space/ Environment and conservation** – 10.1% of the total zoning and 26 buildings are located within the FR5 and FR4 categories. There are 10 buildings that do not achieve floor level immunity at 1% AEP.

5 Risk-based planning framework

Planning for natural hazards is fundamentally about risk to life and property, but it is also about taking steps to limit future impositions on other government functions (like disaster management) and expenditure on recovery and reconstruction, while also supporting communities to strive for sustainable development and community wellbeing even when stresses and shocks might occur. This requires a multi-faceted view of the dimensions of risk, to ensure that future development occurs in a way that is tolerable or acceptable.

Through the planning scheme, and therefore compliance with the SPP 2017, Council is determining those risk levels for all parties involved in future development undertaken in accordance with the planning scheme. Reaching that decision regarding risk acceptability and tolerability requires Council to balance other state interests under the SPP and locally relevant values and contexts.

A risk-based planning framework is highly valuable as a tool to 'translate' the often highly technical outputs from flood risk assessments into land use policy positions for broader strategic and land use planning application. Land use planning and the integration of flood risk is fundamental in determining the settlement pattern and growth of a locality, as well as the extent, scale and type of risk responses required for mitigation.

Figure 5-1 sets out Meridian Urban's risk-based planning framework which is applied as part of this scoping report and provides a 'first pass' or strategic assessment of land use appropriateness relative to risk and considers the contextual elements critical for the proper integration of risk into the land use planning context.

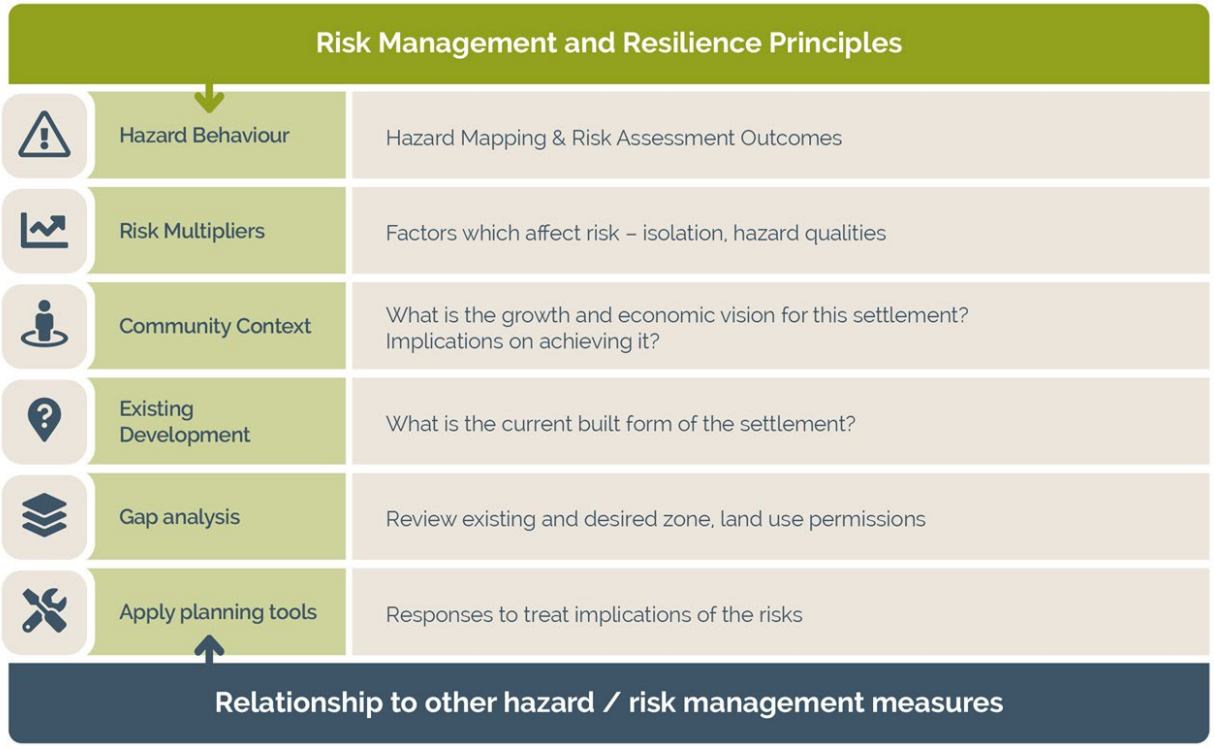


Figure 5-1: Risk-based planning framework

5.1 Guiding principles

The state interest policy for *Natural hazards, risk and resilience* requires a land use policy stance (at any level of planning) of avoiding the natural hazard risk first, and where this is not possible, mitigating the risk to an acceptable or tolerable level.

Guiding principles have been developed to represent broad intentions or outcomes for managing inundation hazard risk across the Townsville LGA, in line with Council's Corporate Plan – Townville 2021-2026.

The Corporate Plan provides Council's:

- **Vision** – A globally connected community driven by lifestyle and nature;
- **Purpose** – Grow Townsville; and
- **Mission –** Add 6,400 new jobs by 2026.

The guiding principles have been developed considering and in line with Council's Corporate goals of:

- *Goal 1 – A city that connects you to what you need at the time you choose;*
- *Goal 2 – A circular economy that advances business and moves towards zero waste;*
- *Goal 3 – The hub for modern industry;*
- *Goal 4 – A sustainable destination that embraces and participates in the arts, sports, events and recreational activities;*
- *Goal 5 – A leading centre of education, training and research commercialisation.*

The principles (shown in **Table 5-1**) will underpin the land use and zoning policy responses, and ultimately the structure and content of the draft flood overlay code, and, together with Council's land use policy positions, provide the foundation for future decision-making relating to the management of flood risk.

Table 5-1: Guiding principles for managing flood risks across the Townsville LGA

	Principle 1	**Understand, reduce and manage risk**
	1.1: Disaster risk management and land management considerations related to mitigation, response and recovery are integrated into land use and strategic planning. *1.2 Settlement scale mitigation, evacuation routes and adaptation measures identified through flood risk management plans is facilitated.*	
	Principle 2	**Protect and maintain the safety of the community and resilience of built form**
	2.1 Exposure to unacceptable risks is avoided. *2.2 Population density is only increased in safe areas that support and sustain quality of life.* *2.3 Information is shared with the community to enable stronger more resilient communities.* *2.4 The exposure and isolation of people and property to flood risk is limited.*	

	Principle 3	**Sustain the economy and ensure it prospers through resilient places, spaces and infrastructure**
	3.1 Support a resilient economy that attracts and sustains industry, de-risks investment and value adds to supply chains.	
	Principle 4	**Enhance the protective function of the natural environment**
	4.1 Preserve flood conveyance and storage on site and link to broader environmental values and outcomes. *4.2 Maintain and enhance the protective function of landforms, vegetation and natural processes in managing the effects of flooding.*	
	Principle 5	**Design for resilience**
	5.1 Developments are designed for resilience through flood resilient design and materials, and the integration of emergency and recovery planning. *5.2 Consider the future obligation on Council and other entities to invest in infrastructure upgrades or large-scale mitigation.*	
	Principle 6	**Governance and accountable decisions builds and enhances the trust of the community**
	6.1 Decision making is evidence-based and risk informed through science-based and data-informed policies and guidance.	

5.2 Risk tolerability

Council should define its own tolerability levels in order to comply with the SPP. It may strive for an acceptable level of risk as a general principle, but it also may be prepared to tolerate certain levels of risk and their resultant impacts depending on its desired risk profile.

Table 5-2 provides a general indication of what can be considered a tolerable risk impact versus acceptable risk impact for future development. As reviewed and accepted by Council, these can be used to ensure that the land use policy developed as part of this project seeks to achieve the desired tolerability outcome(s).

Table 5-2: Land use tolerability considerations – Flood risk

Issues / considerations	Tolerable risk impact	Acceptable risk impact
Urban residential		
1. Ability to feasibly construct a dwelling that can withstand the flood impact? Both floor level and structural design 2. Structural mitigation in place or committed to reduce the risk 3. Sufficient warning time and evacuation processes/infrastructure 4. Sufficient risk / landscape knowledge / awareness in community 5. Level of vulnerability of community members	*Development in existing areas (redevelopment or infill):* • No further intensification of use on the site • Additional controls for building in underneath • No over floor flooding for new buildings at the DFL + freeboard at 2100 • Structural design of buildings occurs as per requirements (i.e., MP 3.5 /planning scheme requirements) (noting that in higher risk areas it may be technically or financially infeasible to construct the building) • Isolation and access limitations do occur below the DFL • Vulnerable uses avoided unless outside of defined risk areas and subject to suitable built form and evacuation parameters (including shelter in place) • No adverse impact on flood flows • Intervention in flood flows requires a Flood Impact Assessment • Ensure the flood warning time is adequate • Community education/ awareness on what is tolerable	*Development in existing areas (redevelopment or infill) or Development in greenfield contexts:* • No property impact at the DFL + freeboard at 2100 • No on-ground flooding at the DFL + freeboard at 2100 (i.e., lot levels above the set levels) • Structural design of buildings occurs as per requirements (i.e., MP 3.5 /planning scheme requirements) (noting that in higher risk areas it may be technically or financially infeasible to construct the building) • Isolation and access limited only where events above the DFL occur • Limited restrictions for vulnerable uses • No adverse impact on flood flows

Issues / considerations	Tolerable flood risk impact	Acceptable flood risk impact
Rural residential		
1. Can development occur on site outside the high flood risk area 2. Can Council assume responsibility for riparian corridors to ensure they are not built upon 3. Sufficient warning time and evacuation processes/infrastructure 4. Sufficient risk / landscape knowledge / awareness in community 5. Level of vulnerability of community members	• Rural residential sites should be able to tolerate some risk across the site • No over floor flooding for new buildings at the DFL + freeboard at 2100 • Structural design of buildings occurs as per requirements (i.e., MP 3.5 /planning scheme requirements) (noting that in higher risk areas it may be technically or financially infeasible to construct the building) • Isolation and access limitations do occur below the DFL • Vulnerable uses avoided unless outside of defined risk areas and subject to suitable built form and evacuation parameters (including shelter in place) • No adverse impact on flood flows • Intervention in flood flows requires a Flood Impact Assessment • Ensure the flood warning time is adequate • Community education/ awareness on what is tolerable	• No property impact at the DFL + freeboard at 2100 • No on-ground flooding at the DFL + freeboard at 2100 (i.e., lot levels above the set levels) • Structural design of buildings occurs as per requirements (i.e., MP 3.5 /planning scheme requirements) (noting that in higher risk areas it may be technically or financially infeasible to construct the building) • Isolation and access limited only where events above the DFL occur with ability to reach an arterial road for evacuation • Limited restrictions for vulnerable uses • No adverse impact on flood flows

Issues / considerations	Tolerable flood risk impact	Acceptable flood risk impact
Commercial		
1. Ability to feasibly construct a commercial premises that can withstand flood and align with street and heritage context 2. Structural mitigation in place or committed to reduce the risk 3. Sufficient warning time and evacuation processes/infrastructure 4. Sufficient risk / landscape knowledge / awareness in community 5. Level of vulnerability of community members 1. Desire for urban development to influence/change land form & flood behaviour (greenfield only)	*Development in existing areas (redevelopment or infill):* • Some over floor flooding for new buildings is tolerated • Isolation and access limitations do occur below the DFL • Pervious surfaces and softscape areas that are able to be flooded • Vulnerable uses avoided unless outside of defined risk areas and subject to suitable built form and evacuation parameters • No adverse impact on flood flows • Intervention in flood flows requires a Flood Impact Assessment • Ensure the flood warning time is adequate • Community education/ awareness on what is tolerable	*Development in existing areas (redevelopment or infill) or Development in greenfield contexts:* • No property impact at the DFL + freeboard at 2100 • No on-ground flooding at the DFL + freeboard at 2100 (i.e., lot levels above the set levels) • Code includes structural design requirements for class 6-8 buildings that mirror that of the BCA • Isolation and access limited only where events above the DFL occur • Code includes requirements for car parking • Strong restrictions for vulnerable uses • No adverse impact on flood flows

Issues / considerations	Tolerable flood risk impact	Acceptable flood risk impact
Industrial		
1. Ability to feasibly develop an industrial premises that can withstand flood + limit land form & flood behaviour change to accommodate the use 2. Structural mitigation in place or committed to reduce the risk 3. Sufficient warning time and evacuation processes/infrastructure 4. Sufficient risk / landscape knowledge / awareness in community	*Development in existing areas (redevelopment or infill) :* • Some over floor flooding for new buildings is tolerated • Isolation and access limitations do not occur below the DFL without a business continuity plan • Pervious surfaces and softscape areas that are able to be flooded • Flood immunity for hazardous materials is the 0.2% AEP • Vulnerable uses avoided unless outside of defined risk areas and subject to suitable built form and evacuation parameters • No adverse impact on flood flows • Intervention in flood flows requires a Flood Impact Assessment • Ensure the flood warning time is adequate • Ensure ability for alternative power supply	*Development in existing areas (redevelopment or infill) or Development in greenfield contexts:* • No property impact at the DFL + freeboard at 2100 • No on-ground flooding at the DFL + freeboard at 2100 (i.e., lot levels above the set levels) • Code includes structural design requirements for class 6-8 buildings that mirror that of the BCA • Isolation and access limited only where events above the DFL occur • Strong restrictions for vulnerable uses • No adverse impact on flood flows

Issues / considerations	Tolerable flood risk impact	Acceptable flood risk impact
Emerging community		
1. Can development occur on site outside the high flood risk area 2. Can council assume responsibility for riparian corridors to ensure they are not built upon 3. Are infrastructure requirements – drainage, road immunities, etc. feasibly able to be constructed 4. Is isolation and limited access acceptable in new subdivision areas 5. Is existing lot fragmentation likely to result in piecemeal development 6. Sufficient risk / landscape knowledge / awareness in community 7. Level of vulnerability of community members	• Should strive to achieve acceptable risk level • Vulnerable uses avoided unless outside of defined risk areas and subject to suitable built form and evacuation parameters • Intervention in flood flows requires a Flood Impact Assessment • Ensure the flood warning time is adequate	• No property impact at the DFL + freeboard at 2100 • No on-ground flooding at the DFL + freeboard at 2100 (sufficient trunk drainage infrastructure required to manage flows) • No over floor flooding for new buildings • Isolation and access limited to events above the DFL with ability to reach an arterial road for evacuation • Higher flood risk areas dedicated to Council as riparian corridors • Lot layouts facilitate and do not frustrate evacuation (i.e., no piecemeal subdivision) • Vulnerable uses located outside the floodplain • No adverse impact on flood flows

Issues / considerations	Tolerable flood risk impact	Acceptable flood risk impact
Community facilities		
1. Does Council wish to place higher value infrastructure / buildings in these areas 2. Does Council wish to have lower resilience standards for development within community facilities zoned land	• Council accepts financial liability of recurrent events on council owned property/facilities at lower standards of service • Council accepts potential community / industry concern over lower standards for public infrastructure versus private development • Vulnerable uses avoided unless outside of defined risk areas and subject to suitable built form and evacuation parameters • No over floor flooding for new buildings for a Community use containing valuable items at the DFL + freeboard at 2100 (e.g., art gallery, library, museum) • Intervention in flood flows requires a Flood Impact Assessment • Ensure the flood warning time is adequate	• Council considers standards for public versus private development

Issues / considerations	Tolerable flood risk impact	Acceptable flood risk impact
Open space/Environmental management and conservation/Recreation		
1. Does Council wish to place higher value infrastructure / buildings in these areas (noting that costs of reconstruction for most recreational activities are exempt from State/Federal reconstruction funding under the Disaster Recovery Funding Arrangements) 2. Does Council wish to have lower resilience standards for development within open space / recreation zoned land?	• Council accepts financial liability of recurrent events on council owned property/facilities at lower standards of service • Council accepts potential community / industry concern over lower standards for public infrastructure versus private development • Vulnerable uses avoided unless outside of defined risk areas and subject to suitable built form and evacuation parameters • Intervention in flood flows requires a Flood Impact Assessment • Ensure the flood warning time is adequate	• Limits open space and recreation facilities • Council considers standards for public versus private development

5.2.1 Unmitigated risk tolerability

Table 5-3 represents tolerability levels to flood hazard risk relative to the identified levels of untreated risk exposure for each zone group. These represent existing levels of tolerability without mitigation or planning intervention.

As part of the Flood Risk Assessment, a spatial analysis was undertaken using the mapping of flood hydraulic risk (or 'FR') to determine the relative exposure (by area m^2 and %) and risk tolerability for each zone group (see Section 4.1.4 of this report).

Table 5-3: Unmitigated risk tolerability by land use zone group for flood hazard

Zone group	Very high risk (FR5)	High risk (FR4)	Medium risk (FR3)	Low risk (FR2)	Very low risk (FR1)
Urban residential	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Centres/Mixed use	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Industry	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Rural residential	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable
Open space/ Environmental management and conservation	Tolerable	Acceptable	Acceptable	Acceptable	Acceptable
Rural	Intolerable	Tolerable	Tolerable	Acceptable	Acceptable
Sport and recreation	Intolerable	Tolerable	Tolerable	Acceptable	Acceptable
Community facilities	Intolerable	Intolerable	Intolerable	Tolerable	Tolerable
Emerging community	Intolerable	Intolerable	Intolerable	Acceptable	Acceptable
Special purpose	Intolerable	Intolerable	Tolerable	Acceptable	Acceptable

5.3 Planning pathways

To translate the flood and coastal risk assessment outcomes and recommendations into risk-informed local land use policy directions, there are seven (7) planning pathway options which can be considered in the context of the:

- inundation risk;
- intended settlement and growth outcomes for a particular zone; and
- intended land use response commensurate with the level of risk.

These are accept / manage the risk, clarify existing policy, built form mitigation, settlement scale mitigation led growth, stop risk increases in existing areas, avoid, or transition away from the risk, as shown in **Figure 5-2** below. This then provides the pathway options to develop an appropriate planning response relative to the risk for the planning scheme.

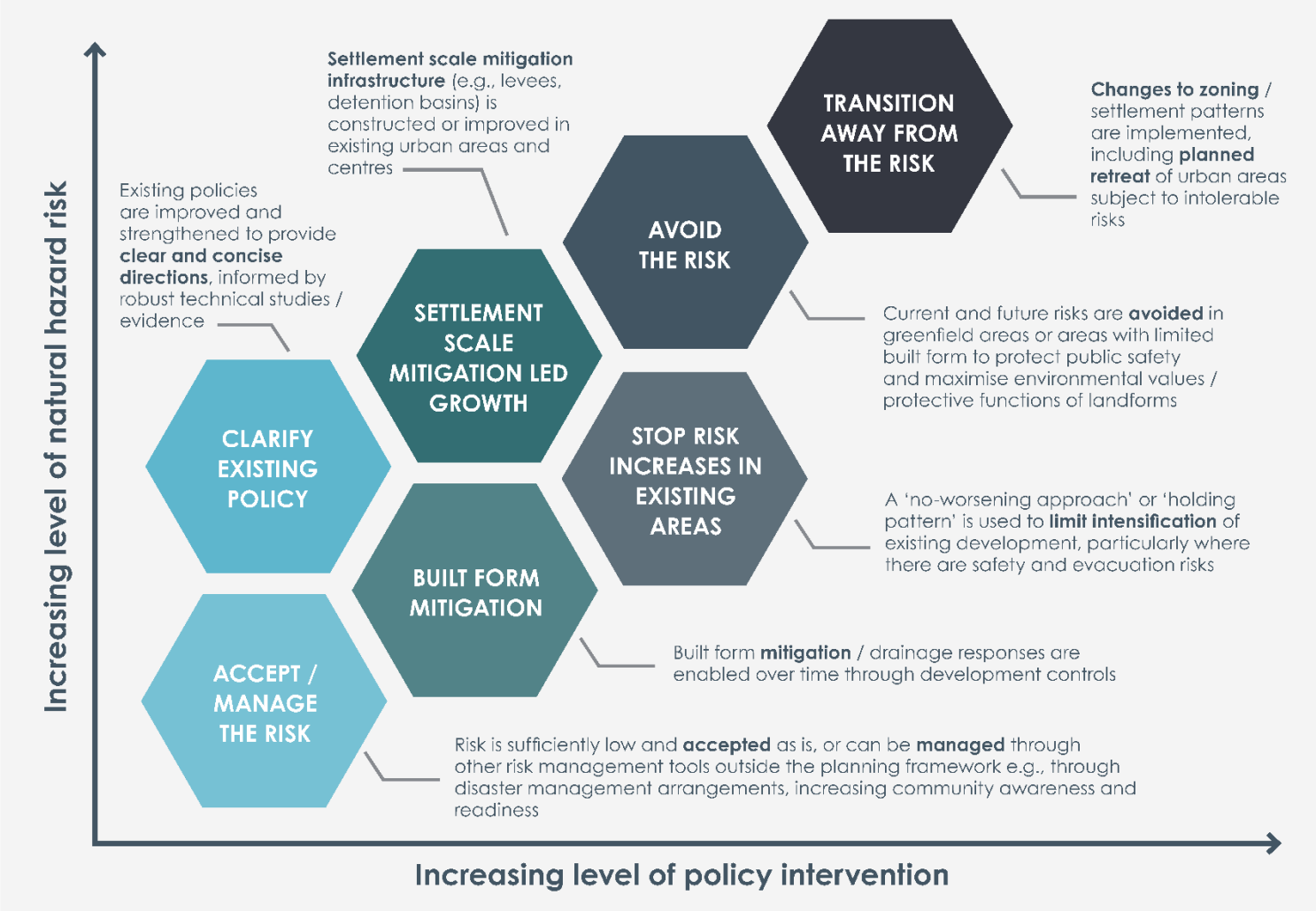


Figure 5-2: Planning pathways to guide land use and zoning policy responses

5.4 Spatial policy response

Planning must consider, in the context of inundation risk, whether the zone allocated can reflect the land use capacity of that land commensurate with the inundation risk. In this way there is no misunderstanding about how the land can be used. SPP 2017 states that (emphasis added):

'*Overlays should be compatible with and not operate either individually or cumulatively to prevent or restrict land from being used for the purpose for which it has been zoned.*' (p14)

A consideration of the planning pathway options of accept / manage the risk, clarify existing policy, built form mitigation, settlement scale mitigation led growth, stop risk increases in existing areas, avoid or transition away from the risk at the settlement scale will inform a consideration of the existing zoning framework commensurate with the inundation risk and therefore the spatial appropriateness and compatibility of intended land uses relative to risk.

5.4.1 Flood risk spatial policy response

Table 5-4 sets out a summary of the planning pathway responses by risk category across the region's settlement framework for flood risk. It is important to note that the application of the planning pathway options is considered through a spatial / locational lens to identify where particular flood risk policies and land use compatibility is most pertinent. The spatial policy response seeks to align the zoning framework to the proposed flood risk policies to ensure that a policy tension is not unintentionally created.

Table 5-4: Guiding flood risk spatial planning pathways by zone groups

OVERARCHING POLICY POSITION

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Policy position	• **AVOID** new development. • **STOP** the intensification or expansion of existing urban uses (except for flood compatible uses i.e., waterfront and marine) • Actively **TRANSITION** away from risk i.e., rezone part of the land to Environmental management and conservation zone or Limited development zone. • Consider the use of Flood resilient precincts[10] in locations where innovative design solutions and/or site-specific mitigation measures can be implemented, or **SETTLEMENT SCALE MITIGATION** solutions are identified to mitigate the flood risk i.e., redevelopment locations. • To preserve the flow paths and conveyance functions, no excavation works/no filling should occur. • Strict land use permissibility: o No intensification of existing uses o No new urban development o No vulnerable uses, accommodation activities or tourist activities o No greenfield expansion o No rural industry o Suitable for open space, parks and low intensity development with low built form needs, sacrificial built form, or rural land uses o No hazardous material.	• **AVOID** new development. • **STOP** the intensification or expansion of existing urban uses (except for flood compatible uses i.e., waterfront and marine). • Consider the use of Flood resilient precincts in locations where innovative design solutions and/or site-specific mitigation measures can be implemented, or **SETTLEMENT SCALE MITIGATION** solutions are identified to mitigate the flood risk i.e., redevelopment locations. • To preserve the flow paths and conveyance functions, no excavation works/no filling should occur. • Strict land use permissibility: o No intensification of existing uses o No new urban development o No vulnerable uses, accommodation activities or tourist activities o No greenfield expansion o No rural industry o Suitable for open space, parks and low intensity development with low built form needs, sacrificial built form, or rural land uses o No hazardous material.	• **MITIGATE** to an acceptable or tolerable level. • Manage risk through siting and resilient built form and building materials. • Encourage reduction in existing risk by adapting/improving existing development over time. • Consider the use of Flood resilient precincts in locations where innovative design solutions and/or site-specific mitigation measures can be implemented, or **SETTLEMENT SCALE MITIGATION** solutions are identified to mitigate the flood risk. • No vulnerable uses for flood hazard. • Development controls for excavation and filling. • Rural industry only where no other reasonable alternative site. • No hazardous material for flood hazard. • No greenfield expansion.	• **ACCEPT / MANAGE** with a strong focus on resilient built form and building materials. • Development controls for excavation and filling. • Vulnerable uses are limited and supported by a flood emergency management plan[11] that can preferably meet a requirement for a rising road evacuation route to beyond the PMF. • Mitigate hazardous material.	• **ACCEPT / MANAGE** with a strong focus on resilient built form and building materials. • Vulnerable uses are limited and supported by a flood emergency management plan. • Mitigate hazardous material.

[10] Flood resilient precincts can be used to enable a more flexible and innovative design response to mitigate flood risk to a tolerable level. For example, there may be specific areas of the LGA that are subject to intolerable levels of risk, but the land is also highly valuable and/or critical to the economic prosperity or functioning of the locality / land use e.g., the CBD or key infill / redevelopment locations. In this case, a 'Flood resilient precinct' can be applied to the spatial area and shown on the overlay mapping, with specific assessment benchmarks included in the code to ensure greater flexibility in managing flood risk.
[11] Flood emergency management plans are considered operational tools only and should not be used to justify an approval of a vulnerable use in an at risk location.

URBAN RESIDENTIAL

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Intolerable**	**Intolerable**	**Tolerable**	**Acceptable**	**Acceptable**
Policy position	**TRANSITION** WHERE LESS THAN 250 m² DEVELOPABLE AREA, OTHERWISE **AVOID / STOP RISK INCREASES**	**AVOID / STOP RISK INCREASES**	**MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• No intensification of development. • No new development • No extensions to dwellings. • Priority of maintaining hydraulic function. • Consider use of Environmental management and conservation zone or Limited development zone to stop risk increases. • Subdivision does not occur. • Resilient built form and building materials. • No vulnerable uses occur.	• No intensification of development. • No new dwellings or extensions to dwellings occur. • Priority of maintaining hydraulic function. • Consider use of Environmental management and conservation zone or Limited development zone to stop risk increases. • Subdivision does not occur, unless there is sufficient accessible area outside of very high, high and moderate risk area on future lots, and flood free access can be achieved. • Resilient built form and building materials. • No vulnerable uses occur.	• Manage risk through siting and resilient built form and building materials. • Allow building improvements / extensions to dwellings (including new dwellings) where risk can be mitigated through siting and built form. • Subdivision can occur, subject to minimum flood free land and access requirements. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate. • No greenfield expansion.	• Manage risk through resilient built form and building materials. • Allow building improvements / extensions to dwellings (including new dwellings) where risk can be mitigated through siting and built form. • Subdivision can occur, subject to minimum flood free land and access requirements. • Vulnerable uses are limited and supported by a flood emergency management plan.	• Allow building improvements / extensions to dwellings. • Subdivision can occur. • Vulnerable uses are limited and supported by a flood emergency management plan.

CENTRES/MIXED USE

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Intolerable**	**Intolerable**	**Tolerable**	**Acceptable**	**Acceptable**
Policy position	**AVOID / STOP RISK INCREASES**	**AVOID / STOP RISK INCREASES** FIRST, THEN **MITIGATE**	**MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• Limit on new development. • No vulnerable uses, accommodation activities or tourist activities occur. • Resilient built form and buildings materials. • Consider the use of Flood resilient precincts for principal / major centres, where suitable. • No vulnerable uses occur.	• Limit on new development, and development only occurs where it is demonstrated that avoidance of the area of risk is not possible and the risk can be adequately mitigated. • No vulnerable uses, accommodation activities or tourist activities occur. • Resilient built form and building materials. • Consider the use of Flood resilient precincts for principal / major centres, where suitable.	• Manage risk through siting and resilient built form and building materials. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate.	• Manage risk through resilient built form and building materials. • Vulnerable uses are limited and supported by a flood emergency management plan.	• Vulnerable uses are limited and supported by a flood emergency management plan.

INDUSTRY

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Intolerable**	**Intolerable**	**Tolerable**	**Acceptable**	**Acceptable**
Policy position	**AVOID / STOP RISK INCREASES**	**AVOID / STOP RISK INCREASES** FIRST, THEN **MITIGATE**	**MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• Limit on new development. • Resilient built form and building materials. • No vulnerable uses occur. • No hazardous material.	• Limit on new development, and development only occurs where it is demonstrated that avoidance of the area of risk is not possible and the risk can be adequately mitigated. • Resilient built form and building materials. • No vulnerable uses. • No hazardous material.	• Limit on new higher impact development, and development only occurs where it is demonstrated that avoidance of the area of risk is not possible, and the risk can be adequately mitigated. • Manage risk through siting and resilient built form and building materials. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate. • No hazardous material.	• Manage risk through resilient built form and building materials. • Vulnerable uses are limited and supported by a flood emergency management plan. • Hazardous material areas achieve appropriate flood immunity.	• Vulnerable uses are limited and supported by a flood emergency management plan. • Hazardous material areas achieve appropriate flood immunity.

RURAL RESIDENTIAL

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Intolerable**	**Intolerable**	**Tolerable**	**Acceptable**	**Acceptable**
Policy position	**TRANSITION** WHERE LESS THAN 600 m² DEVELOPABLE AREA, OTHERWISE **AVOID / STOP RISK INCREASES**	**TRANSITION** WHERE LESS THAN 600 m² DEVELOPABLE AREA, OTHERWISE **AVOID / STOP RISK INCREASES**	**MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• No intensification of rural living. • No dwellings, ancillary buildings and built structures occur. • Priority of maintaining hydraulic function. • Building siting on lot provides vehicle access with no more than a low degree of flood hazard to the road frontage. • Consider use of Environmental management and conservation zone or Limited development zone to stop risk increases when no POD exists. • No vulnerable uses occur.	• No intensification of rural living. • No dwellings, ancillary buildings and built structures occur. • Priority of maintaining hydraulic function. • Building siting on lot provides vehicle access with no more than a low degree of flood hazard to the road frontage. • Consider use of Environmental management and conservation zone or Limited development zone to stop risk increases when no POD exists. • No vulnerable uses occur.	• No intensification of rural living. • Limit on siting dwellings, ancillary buildings and structures on the part of the land subject to medium risk, unless mitigation can be demonstrated. • Building siting on lot provides vehicle access with no more than a low degree of flood hazard to the road frontage. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate.	• Manage risk through resilient built form and building materials. • Vulnerable uses are limited and supported by a flood emergency management plan.	• Vulnerable uses are limited and supported by a flood emergency management plan.

OPEN SPACE/ENVIRONMENTAL MANAGEMENT AND CONSERVATION

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Tolerable**	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**
Policy position	**AVOID**	**AVOID**	**MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• Maintain as open space or conservation land. • Maximise protection of environmental values. • Commercial, residential, and vulnerable uses do not occur.	• Maintain as open space or conservation land. • Maximise protection of environmental values. • Commercial, residential, and vulnerable uses do not occur.	• Maintain as open space or conservation land. • Maximise protection of environmental values. • Commercial and residential uses manage risk through siting and resilient built form and building materials. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate.	• Maintain as open space and conservation land. • Maximise protection of environmental values • Vulnerable uses remain functional and are limited and supported by a flood emergency management plan.	• Maintain as open space and conservation land. • Maximise protection of environmental values • Vulnerable uses are limited and supported by a flood emergency management plan.

RURAL

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Tolerable**	**Tolerable**	**Tolerable**	**Acceptable**	**Acceptable**
Policy position	**AVOID / STOP RISK INCREASES**	**AVOID / STOP RISK INCREASES**	**MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• Maintain as rural land. • Protect conveyance functions and flood storage capacity. • Allow rural uses relative to flood risk. • No dwellings, ancillary buildings and built structures occur. • Provide vehicle access with no more than a low degree of flood hazard to the road frontage or shelter in place. • No vulnerable uses, accommodation activities or tourist activities occur. • No hazardous material.	• Maintain as rural land. • Protect conveyance functions and flood storage capacity. • Allow rural uses relative to flood risk. • No dwellings, ancillary buildings and built structures occur. • Provide vehicle access with no more than a low degree of flood hazard to the road frontage or shelter in place. • No vulnerable uses, accommodation activities or tourist activities occur. • No hazardous material.	• Maintain as rural land. • Protect conveyance functions and flood storage capacity. • Dwellings, ancillary buildings and structures are not sited on the part of the land subject to medium risk, unless no other location is suitable and available, and mitigation can be demonstrated. • Manage risk through siting and resilient built form and building materials. • Provide vehicle access with no more than a low degree of flood hazard to the road frontage or shelter in place. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate. • No hazardous material.	• Maintain as rural land. • Manage risk through resilient built form and building materials. • Vulnerable uses, community uses and critical uses and uses involved in emergency management are limited and supported by a flood emergency management plan. • Hazardous material areas achieve appropriate flood immunity.	• Vulnerable uses, community uses and critical uses and uses involved in emergency management are limited and supported by a flood emergency management plan. • Hazardous material areas achieve appropriate flood immunity.

SPORT AND RECREATION

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Intolerable**	**Tolerable**	**Tolerable**	**Acceptable**	**Acceptable**
Policy position	**ACCEPT** LOW INTENSITY PARK INFRASTRUCTURE, OTHERWISE **AVOID** FIRST, THEN **MITIGATE**	**ACCEPT** LOW INTENSITY PARK INFRASTRUCTURE, OTHERWISE **AVOID** FIRST, THEN **MITIGATE**	**MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• Maintain as recreation and open space land. • No built form. • Limit on recreational assets considering recurrent reconstruction costs. • priority on maintaining hydraulic function. • No vulnerable uses occur.	• Maintain as recreation and open space land. • Limit on new buildings / structures and recreational assets considering recurrent reconstruction costs, unless no other location is suitable and available, and mitigation can be demonstrated. • priority on maintaining hydraulic function. • No vulnerable uses occur.	• Maintain as recreation and open space land. • Manage risk to buildings / structures and recreational assets through siting and resilient built form and building materials. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate.	• Maintain as recreation and open space land. • Manage risk to buildings / structures and recreational assets through resilient built form and building materials. • Vulnerable uses are limited and supported by a flood emergency management plan.	• Vulnerable uses are limited and supported by a flood emergency management plan.

COMMUNITY FACILITIES

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Intolerable**	**Intolerable**	**Intolerable**	**Tolerable**	**Tolerable**
Policy position	**AVOID**	**AVOID**	**AVOID** FIRST, THEN **MITIGATE**	**MITIGATE**	**ACCEPT / MANAGE**
	• Limit on new community infrastructure development. • No buildings and built structures to be sited on the part of the land subject to very high risk. • No vulnerable uses occur. • No hazardous material.	• Limit on new community infrastructure development, and development only occurs where it is demonstrated that avoidance of the area of risk is not possible. • No buildings and built structures to be sited on the part of the land subject to high risk. • No vulnerable uses occur. • No hazardous material.	• Development is sited and designed to maintain function during and immediately after a flood event. • Resilient built form and building materials. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate. • No hazardous material.	• Manage risk through resilient built form and building materials. • Development is sited and designed to maintain function during and immediately after a flood event. • Vulnerable uses are limited and supported by a flood emergency management plan. • Hazardous material areas achieve appropriate flood immunity.	• Development is sited and designed to maintain function during and immediately after a flood event. • Vulnerable uses are limited and supported by a flood emergency management plan. • Hazardous material areas achieve appropriate flood immunity.

EMERGING COMMUNITY

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Unmitigated Risk Tolerability	**Intolerable**	**Intolerable**	**Tolerable**	**Acceptable**	**Acceptable**
Policy position	**AVOID**	**AVOID**	**AVOID** FIRST, THEN **MITIGATE**	**ACCEPT / MANAGE**	**ACCEPT / MANAGE**
	• Development avoids areas of very high risk. • Priority given to protecting natural conveyance functions and flood storage capacity. • Very high risk areas transition to Open space zone or Environmental management and conservation zone • Building siting on lot provides vehicle access with no more than a low degree of flood hazard to the road frontage. • No vulnerable uses occur.	• Development avoids areas of high risk. • Priority given to protecting natural conveyance functions and flood storage capacity. • High risk areas transition to Open space zone or Environmental management and conservation zone. • Building siting on lot provides vehicle access with no more than a low degree of flood hazard to the road frontage. • No vulnerable uses occur.	• Development avoids areas of medium risk unless no other location is suitable and available, and mitigation can be demonstrated. • Priority given to protecting natural conveyance functions and flood storage capacity. • New lots meet the DFL. • Building siting on lot provides flood free access to the road frontage. • Type 1 vulnerable uses do not occur. Type 2 vulnerable uses are first avoided or mitigated to a tolerable level where appropriate.	• New lots meet the DFL. • Vulnerable uses are limited and supported by a flood emergency management plan.	• Vulnerable uses are limited and supported by a flood emergency management plan.

OVERLAY CODE CONSIDERATIONS

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Policy position	• All development (excluding class 10a) proposed on land subject to very high flood risk requires a minimum of code assessment. • Class 10a accepted development subject to requirements (maximum GFA) • Zoning is representative of the risk tolerability.	• All development (excluding class 10a) proposed on land subject to high flood risk requires a minimum of code assessment. • Class 10a accepted development subject to requirements (maximum GFA) • Zoning is representative of the risk tolerability. • Include Local plan assessment benchmarks representative of the pathway policy response and risk tolerability for that local area.	• Dwelling house and Dual occupancy (excluding class 10a) are accepted development subject to requirements. • All other development proposed on land subject to medium flood risk requires a minimum of code assessment. • Zoning is representative of the risk tolerability. • Include Local plan assessment benchmarks representative of the pathway policy response and risk tolerability for that local area.	• Development (excluding class 10a) proposed on land subject to low flood risk requires a minimum of accepted subject to requirements. • Vulnerable uses on land subject to low flood risk requires a minimum of code assessment.	• Vulnerable uses on land subject to very low flood risk requires a minimum of code assessment.

OTHER RISK TREATMENT AND SUPPORTING GOVERNANCE MEASURES

	VERY HIGH RISK (FR5)	HIGH RISK (FR4)	MEDIUM RISK (FR3)	LOW RISK (FR2)	VERY LOW RISK (FR1)
Policy position	• Resilient built form actions – guidance material and property modification responses. • Community awareness – communication strategies about the flood risk and demonstrating how people can prepare for and respond to flood events. • Disaster management – emergency management arrangements and procedures to inform preparation, response and recovery efforts. • Landscape management – natural floodplain solutions such as revegetation and waterway naturalisation. • Infrastructure mitigation – physical flood engineering measures such as dams, levees and detention basins to adjust the behaviour of flood waters.	• Resilient built form actions – guidance material and property modification responses. • Community awareness – communication strategies about the flood risk and demonstrating how people can prepare for and respond to flood events. • Disaster management – emergency management arrangements and procedures to inform preparation, response and recovery efforts. • Landscape management – natural floodplain solutions such as revegetation and waterway naturalisation. • Infrastructure mitigation – physical flood engineering measures such as dams, levees and detention basins to adjust the behaviour of flood waters.	• Management of existing risks still required through other risk treatment mechanisms – but future risk increases likely arrested due to application of planning controls. • Resilient built form actions – guidance material and property modification responses. • Community awareness – communication strategies about the flood risk and demonstrating how people can prepare for and respond to flood events.	• Resilient built form actions – guidance material and property modification responses. • Community awareness – communication strategies about the flood risk and demonstrating how people can prepare for and respond to flood events.	• Resilient built form actions – guidance material and property modification responses. • Community awareness – communicate on strategies about the flood risk and demonstrating how people can prepare for and respond to flood events.

5.5 Land use policy response

Different land uses can fall across multiple land use planning zones. For example, vulnerable uses can include child care centres, community residence, hospitals, residential care facilities and retirement facilities and may be permitted within a residential or commercial zone. Similarly, community activities and emergency services are also permitted across multiple zones.

The outcomes of the land use response considerations will then inform the identification of whether specific land uses warrant special consideration within the flood overlay's assessment benchmarks. The policy positions are intended to be reflected in the tables of assessment and overlay code's assessment benchmarks in terms of determining inundation risk compatibility and built form and design responses for various land uses.

The overall policy responses will be considered within the context of the:

- intended settlement and growth outcomes for the Townsville LGA;
- level of flood risk and tolerability to risk;
- vulnerability of users at risk, including their ability to evacuate during an event;
- risks associated with the loss of essential services during an event.

The following **Table 5-5** provides the consideration of the proposed land use activity groups or definitions in the context of natural hazards, noting it is important to consider these groups and definitions across natural hazards.

Land uses and land use activity groups will also be considered as 'new', 'extensions' or 'material change of use (internal fit-out changes only)', 'operational work', 'building work' and 'reconfiguring a lot' to reflect different types of development as follows:

- 'New' refers to new development involving a material change of use being proposed on land, whether this be vacant land or land that has been subject to demolition;
- 'Extensions' means there is an existing use on the land and a development proposal is seeking to extend or add a building or structure (whether attached or detached);
- 'Material change of use (internal fit-out changes only)' e.g., for a business or industrial activity, relates to a change in tenancy/use of the premises where there are no external works or structural changes proposed – only internal fit-out changes/alterations;
- 'Operational work' refers to development involving the excavation of land;
- 'Building work' refers to building work not involving a material change of use; and
- 'Reconfiguring a lot' refers to the subdivision of a lot into new lots.

Table 5-5: Proposed land use activity groups / definitions for consideration for natural hazards – Flood risk

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
Accommodation activities	Not applicable – separate use definitions included	The Planning Regulation provides the following definition: ***accommodation activity*** *means—* *(a) caretaker's accommodation; or* *(b) a community residence; or* *(c) a dual occupancy; or* *(d) a dwelling house; or* *(e) a dwelling unit; or* *(f) a home-based business; or* *(g)a multiple dwelling; or* *(h) nature-based tourism; or* *(i) a relocatable home park; or* *(j) a residential care facility; or* *(k) a resort complex; or* *(l) a retirement facility; or* *(m) rooming accommodation; or* *(n) rural workers' accommodation; or* *(o) short-term accommodation; or* *(p) a tourist park; or* *(q) workforce accommodation.* *Note—Some uses included within the Accommodation activities group, are identified as Vulnerable land uses (i.e., Nature-based tourism, Relocatable home park, Residential care facility, Resort complex, Retirement facility, Rooming accommodation, Short-term accommodation and a Tourist park), warranting a separate policy consideration and therefore have been excluded from the Accommodation activities group for the purpose of considering the tolerability of land uses.*	***Accommodation activities for flood hazard*** include any of the following: • Caretaker's accommodation; • Community residence; • Dual occupancy; • Dwelling house; • Dwelling unit; • Home-based business (except for home based childcare); • Multiple dwelling; • Rural workers' accommodation; • Workforce accommodation; • Accommodation activities ancillary to other uses. *Note—Tourist activities for flood hazard are considered separately to Vulnerable land uses for flood hazard as they may require alternate policy responses / considerations. Tourist activities generally relate to the short term population, whereas Accommodation activities generally relate to the resident population.*
Centre activities	Not applicable – separate use definitions included	The Planning Regulation provides the following definition: ***urban activity***—	***Centre activities for flood hazard*** include any of the following: • Adult store;

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
		(a) means the use of premises for an urban purpose; but *(b) does not include—* *(i) a community activity; or* *(ii) indoor recreation; or* *(iii) residential development; or* *(iv) a sport and recreation activity; or* *(v) a tourist activity.*	• Bar; • Club (other than small scale); • Food and drink outlet; • Function facility; • Health care services; • Nightclub entertainment facility; • Office; • Service industry; • Shop; • Shopping centre; • Showroom; • Theatre; • Veterinary services; • Any other land use for an urban purpose not already included as a Vulnerable land use, Community use, Accommodation activity, Industry activity or Sport and recreation activity.
Industry activities	Not applicable – separate use definitions included	The Planning Regulation provides the following definition: ***industry activity*** *means—* *(a) an extractive industry; or* *(b) a high impact industry; or* *(c) a low impact industry; or* *(d) a marine industry; or* *(e) a medium impact industry; or* *(f) a research and technology industry; or* *(g) a service industry; or* *(h) a special industry; or* *(i) a warehouse.*	***Industry activities for flood hazard*** include any of the following: ***Higher impact industry:*** • Extractive industry; • High impact industry; • Special industry; ***Lower impact industry:*** • Low impact industry; • Marine industry; • Medium impact industry; • Research and technology industry;

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
			• Service industry; • Warehouse.
Sport and recreation activities	Not applicable – separate use definitions included	The Planning Regulation provides the following definition: ***sport and recreation activity*** *means—* *(a) a major sport, recreation and entertainment facility at which events are carried out mainly outdoors; or* *(b) a motor sport facility at which the motor sports are carried out mainly outdoors; or* *(c) outdoor sport and recreation; or* *(d) tourist accommodation, or accommodation for employees, that is ancillary to a use stated in paragraphs (a) to (c); or* *(e) a commercial use that is ancillary to a use stated in paragraphs (a) to (c).* *Note—Accommodation activities are identified as vulnerable uses, warranting a separate policy consideration and therefore have been excluded from the Sport and recreation activities group for the purpose of considering the tolerability of land uses.*	***Sport and recreation activities for flood hazard*** include any of the following: • Indoor sport and recreation; • Major sport, recreation and entertainment facility; • Motor sport facility; • Outdoor sport and recreation; • Commercial use that is ancillary to the uses stated above.
Tourist activities	Not applicable – separate use definitions included	The Planning Regulation provides the following definition: ***tourist activity*** *means—* *(a) nature-based tourism; or* *(b) a resort complex; or* *(c) a tourist attraction; or* *(d) a tourist park; or* *(e) tourist accommodation, or accommodation for employees, that is ancillary to a use stated in paragraphs (a) to (d); or* *(f) a commercial use that is ancillary to a use stated in paragraphs (a) to (d).*	***Tourist activity for flood hazard*** *means—* • Hotel; • Nature-based tourism; • Resort complex; • Short-term accommodation; • Tourist attraction; • Tourist park; • Tourist accommodation, or accommodation for employees, that is ancillary to a uses stated above;

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
			• Commercial use that is ancillary to a use stated above. *Note—Tourist activities for flood hazard are considered separately to Vulnerable land uses for flood hazard as they may require alternate policy responses / considerations. Tourist activities generally relate to the short term population, whereas Accommodation activities generally relate to the resident population.*
Rural activities	Not applicable – separate use definitions included	The Planning Regulation provides the following definition: ***rural activity*** *means—* *(a) an agricultural supplies store; or* *(b) animal husbandry; or* *(c) animal keeping; or* *(d) aquaculture; or* *(e) cropping; or* *(f) an intensive animal industry; or* *(g) intensive horticulture; or* *(h)a permanent plantation; or* *(i) a roadside stall; or* *(j) a rural industry; or* *(k) rural workers' accommodation; or* *(l) a wholesale nursery; or* *(m) a winery.* *Note—Rural worker's accommodation is included in accommodation activities definition.*	***Rural activities for flood hazard*** include any of the following: • Agricultural supplies store; • Animal husbandry; • Animal keeping; • Aquaculture; • Cropping; • Intensive animal industry; • Intensive horticulture; • Permanent plantation; • Roadside stall; • Rural industry; • Wholesale nursery; • Winery.
Vulnerable uses	Not applicable – not defined	Vulnerability to natural hazards is about the potential to be harmed by the natural hazard. With regards to land use planning, it is about the nature of some land uses which, because of the types of occupants within those uses are more vulnerable to be harmed by the natural hazard. For example, some occupants may be more vulnerable to natural hazards because:	***Vulnerable uses for flood hazard*** means the following land uses: ***Vulnerable use type 1:*** • Detention facility; • Relocatable home park; • Rooming accommodation; • Residential care facility; • Retirement facility;

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
		• they may be less aware of the natural hazard impacts and unfamiliar with the area; or • they may have reduced capacity to evacuate and respond adequately to the natural hazard threat; or • they may have unique evacuation requirements and/or present operational difficulties for evacuation and or management; or • given their evacuation requirements, they may place additional burdens on disaster management operations and/or recovery capacity; or • there may be significant communication barriers; or • supervision during a natural hazard event may be difficult. The SPP takes an "evacuation" focus making reference to regulating development in natural hazard areas to ensure that, amongst other matters: *(5) Development in natural hazard areas:* *(a) supports, and does not hinder disaster management capacity and capabilities* The SPP guideline makes specific mention to explicitly elevating vulnerable land uses as requiring a different policy application. Specifically, where land is included in a flood hazard area there should be a consideration of the choice of zone/locally specific provisions and whether the risks associated with flood can	***Vulnerable use type 2:*** • Childcare centre; • Community care centre; • Educational establishment; • Home-based business where for home based child care; • Place of worship. *Note—Tourist activities are considered separately to Vulnerable land uses as they may require alternate policy responses / considerations.*

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
		be mitigated to acceptable or tolerable levels for those uses, considering: • the flood scenario under which the use will cease to function effectively and the likelihood of such an event; • the consequences of and community tolerance to loss of a community service during and immediately after a flood hazard event; • whether the use will place additional burden on government disaster management operations or on recovery capacity; and • the degree of sensitivity of the use to property loss or damage. As a minimum these uses should be located outside areas affected by the DFE: • uses catering to vulnerable persons requiring unique evacuation requirements (such as hospitals, education establishments, childcare centres, aged care accommodation, nursing homes, and high-security correctional centres); and • expansion of the above existing uses in these areas unless evacuation solutions and resilient design can be achieved.	
Critical infrastructure / Essential community infrastructure	Not defined. Flood hazard overlay code and Coastal environment overlay code reference flood immunity for	Critical infrastructure has a different policy response to that of vulnerable uses, in line with the SPP. The SPP includes the following specific state interest policy for the State interest – natural hazards, risk and resilience: *(6) Community infrastructure is located and designed to maintain the required level of*	***Critical infrastructure for flood hazard*** means the following land uses: • Emergency services; • Hospital; • Major electricity infrastructure;

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
	community services and facilities including: • Emergency services; • Hospitals and associated facilities; • Major electricity infrastructure; • Emergency/ evacuation shelters; • Fire and police stations; • Storage of valuable records or items of historic/cultural significance (e.g. libraries, galleries); • Aeronautical facilities; • Telecommunication facilities; • Substations; • Water treatment plants; • Regional fuel storage; • Food storage warehouse; • Retirement facility and residential care facility; • Sewerage treatment plants (requiring licensing as an environmentally relevant activity).	*functionality during and immediately after a natural hazard event.* As such, whilst all uses should avoid flood hazard areas, critical infrastructure may be able to occur where it is demonstrated that it can function during and after an event. The SPP guideline further provides that where land is included in a flood hazard area there should be a consideration of the choice of zone/locally specific provisions and whether the risks associated with flood can be mitigated to acceptable or tolerable levels for those uses, considering: • the flood scenario under which the use will cease to function effectively and the likelihood of such an event; • the consequences of and community tolerance to loss of a community service during and immediately after a flood hazard event; • whether the use will place additional burden on government disaster management operations or on recovery capacity; and • the degree of sensitivity of the use to property loss or damage. The following examples are provided: • community infrastructure that will perform an important role and be required to function during and immediately after a	• Renewable energy facility; • Substation; • Telecommunications facility; • Utility installation.

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
		flood hazard event (also consider other uses that may need to perform a role during or after a flood event, for example showgrounds and sports facilities can perform an active role in flood response and recovery, serving as emergency accommodation and recovery staging points). • expansion of the above existing uses in these areas unless evacuation solutions and resilient design can be achieved. The SPP further defines critical infrastructure as: ***Essential community infrastructure*** *includes:* *(a) emergency services infrastructure;* *(b) emergency shelters;* *(c) police facilities;* *(d) hospitals and associated facilities;* *(e) power stations and substations;* *(f) major switch yards;* *(g) communications facilities;* *(h) sewage treatment plants; and* *(i) water treatment plants.* It is noted that not all the above are defined uses under the Planning Regulation.	
Community uses	Premises used for providing artistic, social or cultural facilities and community support services to the public and may include the ancillary preparation and provision of food and drink.	The SPP guideline also makes reference to community infrastructure that protects valuable equipment and artefacts (such as museums, libraries, art galleries, archives). Consideration should therefore be given to a specific policy response for these types of uses. Specifically with regards to ensuring that the siting and design of such uses consider the	No change.

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
		location and/or storage of valuable equipment and artefacts above the defined flood level for example. It is noted that the Planning Regulation defines community uses as: ***community use*** *means the use of premises for—* *(a)providing artistic, social or cultural facilities or community services to the public; or* *(b)preparing and selling food and drink, if the use is ancillary to the use in paragraph (a).* Examples of a community use— art gallery, community centre, community hall, library, museum As such, a separate definition is not required for this use.	
Hazardous material	Not applicable – not defined	The SPP requires a specific policy response for managing hazardous materials in flood hazard areas. Specifically, the SPP includes the following state interest policy for the State interest – natural hazards, risk and resilience, amongst other matters: *(5) Development in natural hazard areas:* *(c) avoids risks to public safety and the environment from the location of the storage of hazardous materials and the release of these materials as a result of a natural hazard.* The SPP includes the following definitions related to hazardous materials and hazardous chemicals that should be considered:	***Hazardous material for flood hazard*** means any one of the following: ***Dangerous goods*** see the definition of dangerous goods in the *Work Health and Safety Act 2011*, schedule 1, part 1, item 1(6). ***Hazardous chemicals flood hazard threshold*** including: • a hazardous chemical listed in schedule 11 of the Work Health and Safety Regulation 2011 in a quantity that exceeds a threshold quantity stated in column 5 of schedule 11; • a chemical classified as hazardous to the aquatic environment under the Australian Dangerous Goods (ADG) code in the Acute I or Chronic I category that exceeds 2500 litres or kilograms;

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
		Dangerous goods *see the definition of dangerous goods in the Work Health and Safety Act 2011, schedule 1, part 1, item 1(6).* ***Hazardous chemicals flood hazard threshold*** *means any of the following:* • *a hazardous chemical listed in schedule 11 of the Work Health and Safety Regulation 2011 in a quantity that exceeds a threshold quantity stated in column 5 of schedule 11;* • *a chemical classified as hazardous to the aquatic environment under the Australian Dangerous Goods (ADG) code in the Acute I or Chronic I category that exceeds 2500 litres or kilograms;* • *a chemical classified as hazardous to the aquatic environment under the ADG code in the Chronic II category that exceeds 10,000 litres or kilograms;* • *a chemical classified as hazardous to the aquatic environment under the ADG code and assigned to Packing Group III that exceeds 10,000 litres or kilograms;* • *a chemical classified as hazardous to the aquatic environment under the Globally Harmonised System of Classification and Labelling of Chemicals that exceeds 10,000 litres or kilograms.* ***Hazardous material*** *means a substance with potential to cause harm to persons, property or the environment because of one or more of the following:* • *the chemical properties of the substance;* • *the physical properties of the substance;*	• a chemical classified as hazardous to the aquatic environment under the ADG code in the Chronic II category that exceeds 10,000 litres or kilograms; • a chemical classified as hazardous to the aquatic environment under the ADG code and assigned to Packing Group III that exceeds 10,000 litres or kilograms; • a chemical classified as hazardous to the aquatic environment under the Globally Harmonised System of Classification and Labelling of Chemicals that exceeds 10,000 litres or kilograms. ***Hazardous material*** is a substance with potential to cause harm to persons, property or the environment because of one or more the following: • the chemical properties of the substance; • the physical properties of the substance; • the biological properties of the substance. Without limiting the first paragraph, all dangerous goods, combustible liquids and chemicals are hazardous materials. *Note—definition from the Dangerous Goods Safety Management Act 2001.*

Land use activity group	Townsville City Plan	Policy context	Proposed Risk Assessment Land Use Activity Group / definition
		• *the biological properties of the substance.* The practical implementation of a policy response related to avoiding risks to public safety and the environment from the location of the storage of dangerous goods, hazardous materials and hazardous chemicals requires clarity with regards to the type, nature and/or quantity of the substance.	

5.5.1 Flood risk land use policy response

Table 5-6 sets out a summary of the flood risk land use policy response and recommendation by land use or land use activity group, as reviewed and accepted by Council. As noted, the policy positions are intended to be reflected in the tables of assessment and overlay code's assessment benchmarks in terms of determining inundation risk compatibility and built form and design responses for various land uses.

Table 5-6: Land use policy response by flood risk category

ACCOMMODATION ACTIVITIES – NEW

- Caretaker's accommodation
- Community residence
- Dual occupancy
- Dwelling house
- Dwelling unit
- Home-based business (except for home based childcare)
- Multiple dwelling
- Rural workers' accommodation
- Workforce accommodation
- Accommodation activities ancillary to other uses.

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)**	**Intolerable**	Development to establish a new land use, buildings or lots involving residential or accommodation activities do not occur.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes mitigation measures relating to the protection of people and property, evacuation and FEMPs. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**Option 1: Strict avoidance**
MEDIUM RISK (FR3) **LOW RISK (FR2)**	**Tolerable**	Development to establish a new land use, buildings or lots involving residential or accommodation activities is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
VERY LOW RISK (R1)	**Acceptable**	Development to establish a new land use, buildings or lots involving residential or accommodation activities is permitted.	Not applicable.	**As proposed**

CENTRE ACTIVITIES - NEW

- Adult store
- Bar
- Club (other than small scale)
- Food and drink outlet
- Function facility
- Health care services
- Nightclub entertainment facility
- Office
- Service industry
- Shop
- Shopping centre
- Showroom
- Theatre
- Veterinary services
- Any other land use for an urban purpose not already included as a Vulnerable land use, Community use, Accommodation activity, Industry activity or Sport and recreation activity

Flood risk Level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
Market or other temporary use in open areas only				
VERY HIGH RISK (FR5) **HIGH RISK (FR4)**	**Tolerable**	Development to establish a Market or other temporary use in areas of open space is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions ensure the proposed use complies with relevant mitigation measures relating to the protection of people and property, evacuation and avoidance of identified overland flow paths.	**As proposed**
All other Centre uses				
VERY HIGH RISK (FR5)	**Intolerable**	Development to establish a new land use, buildings or lots involving business activities is avoided. (Excludes a Market or other temporary use in open areas)	**Option 1: Strict avoidance** No acceptable outcome (AO) is provided. Performance outcome (PO) provides for strict avoidance (other than for identified exceptions). **Option 2: Avoidance or mitigation** AO provides for strict avoidance (other than for identified exceptions). PO includes mitigation measures relating to the protection of people and property, evacuation and Flood Emergency Management Plans (FEMPs). Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**Option 2: Avoidance or mitigation**
HIGH RISK (FR4)	**Intolerable**	Development to establish a new land use, buildings or lots involving business activities is avoided. (Excludes a Market or other temporary use in open areas as they are not regulated under the planning scheme).		
MEDIUM RISK (FR3) **LOW RISK (FR2)**	**Tolerable**	Development to establish a new land use, buildings or lots involving business activities is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
VERY LOW RISK (FR1)	**Acceptable**	Development to establish a new centres activity is permitted.	Not applicable.	**As proposed**

CENTRE ACTIVITIES – INTERNAL FIT-OUT CHANGES ONLY

- Adult store
- Bar
- Club (other than small scale)
- Food and drink outlet
- Function facility
- Health care services
- Nightclub entertainment facility
- Office
- Service industry
- Shop
- Shopping centre
- Showroom
- Theatre
- Veterinary services
- Any other land use for an urban purpose not already included as a Vulnerable land use, Community use, Accommodation activity, Industry activity or Sport and recreation activity

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)** **MEDIUM RISK (FR3)**	**Tolerable**	Change of use is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions ensure the proposed change in use: • does not increase the risk to people and property from flood hazard; • does not reduce the ability for vehicles and emergency services to access and evacuate the site; • incorporates resilient building materials, where applicable; • complies with requirements for storing and handling hazardous materials and hazardous chemicals, where applicable.	**As proposed**
LOW RISK (FR2) **VERY LOW RISK (FR1)**	**Acceptable**	Change of use is permitted.	Not applicable.	**As proposed**

INDUSTRY ACTIVITIES – NEW

- Extractive industry *
- High impact industry *
- Low impact industry
- Marine industry
- Medium impact industry
- Research and technology industry
- Service industry
- Special industry *
- Warehouse

** Higher impact uses*

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)** **MEDIUM RISK (FR3)** **(Higher impact uses)**	**Intolerable**	Development to establish a new land use, buildings or lots involving industrial activities is avoided.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes mitigation measures relating to the protection of people and property, evacuation and FEMPs. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**Option 2: Avoidance or mitigation**
MEDIUM RISK (FR3) **(Lower impact uses)** **LOW RISK (FR2)**	**Tolerable**	Development to establish a new land use, buildings or lots involving industrial activities is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
VERY LOW RISK (FR1)	**Acceptable**	Development to establish a new industry activity is permitted.	Not applicable.	**As proposed**

INDUSTRY ACTIVITIES – INTERNAL FIT-OUT CHANGES ONLY

- Extractive industry
- High impact industry
- Low impact industry
- Marine industry
- Medium impact industry
- Research and technology industry
- Service industry
- Special industry
- Warehouse

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5)	Tolerable	Change of use is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions ensure the proposed change in use: • does not increase the risk to people and property from flood hazard; • does not reduce the ability for vehicles and emergency services to access and evacuate the site; • incorporates resilient building materials, where applicable; • complies with requirements for storing and handling hazardous materials and hazardous chemicals, where applicable.	**As proposed**
HIGH RISK (FR4)				
MEDIUM RISK (FR3)				
LOW RISK (FR2)				
VERY LOW RISK (FR1)	**Acceptable**	Change of use is permitted.	Not applicable.	**As proposed**

SPORT AND RECREATION ACTIVITIES – NEW

- Indoor sport and recreation
- Major sport, recreation and entertainment facility
- Motor sport facility
- Outdoor sport and recreation
- Commercial use that is ancillary to the uses stated above

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5)	**Intolerable**	Development to establish a new land use, buildings or lots involving recreation and environmental activities (other than for identified exceptions, being a Park or other outdoor use in areas of open space) should be limited, priority of maintaining hydraulic function.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance (other than for identified exceptions). **Option 2: Avoidance or mitigation** AO provides for strict avoidance (other than for identified exceptions). PO includes mitigation measures relating to the protection of people and property, evacuation and FEMPs. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**Option 2: Avoidance or mitigation**
HIGH RISK (FR4) **(Outdoor sport and recreation only)**	**Tolerable**	Development to establish a new land use, buildings or lots involving recreation and environmental activities (other than for identified exceptions, being a Park or other outdoor use in areas of open space) is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
MEDIUM RISK (FR3)				
LOW RISK (FR2)				
VERY LOW RISK (FR1)	**Acceptable**	Development to establish a new sport and recreation activity is permitted.	Not applicable.	**As proposed**

SPORT AND RECREATION ACTIVITIES FOR A PARK OR OTHER OUTDOOR USE IN OPEN SPACE AREAS ONLY – NEW AND EXTENSIONS

- Indoor sport and recreation
- Major sport, recreation and entertainment facility
- Motor sport facility
- Outdoor sport and recreation
- Commercial use that is ancillary to the uses stated above

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)**	**Tolerable**	Development to establish a Park or other outdoor recreation and environmental use in areas of open space is permitted. All buildings and structures, park equipment, and recreational assets should be located on part of the land that is outside very high risk and high risk areas. Environmental values of natural areas are to be maintained.	Assessment provisions ensure the proposed use complies with relevant mitigation measures relating to the protection of people and property, and flood storage and conveyance.	**As proposed**
MEDIUM RISK (FR3) **LOW RISK (FR2)**	**Acceptable**	Development to establish a Park or other outdoor recreation and environmental use in areas of open space is permitted. Environmental values of natural areas are to be maintained.	Assessment provisions ensure the proposed use complies with relevant mitigation measures relating to the protection of people and property, and flood storage and conveyance.	
VERY LOW RISK (FR1)	**Acceptable**	Development to establish a new or extend a sport and recreation activity involving a park or other outdoor use in areas of open space is permitted.	Not applicable.	**As proposed**

TOURIST ACTIVITIES – NEW

- Hotel
- Nature-based tourism
- Resort complex
- Short-term accommodation
- Tourist attraction
- Tourist park
- Party house
- Tourist accommodation, or accommodation for employees, that is ancillary to a use stated above
- Commercial use that is ancillary to a uses stated above

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)**	**Intolerable**	Development to establish a new land use, buildings or lots involving tourism activities is avoided.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes mitigation measures relating to the protection of people and property, evacuation and FEMPs. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**Option 1: Strict avoidance**
MEDIUM RISK (FR3) **LOW RISK (FR2)**	**Tolerable**	Development to establish a new land use, buildings or lots involving tourism or entertainment activities is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
VERY LOW RISK (FR1)	**Acceptable**	Development to establish a new tourist activity is permitted.	Not applicable.	**As proposed**

RURAL ACTIVITIES – NEW

- Agricultural supplies store
- Animal husbandry
- Animal keeping
- Aquaculture
- Cropping
- Intensive animal industry
- Intensive horticulture
- Permanent plantation
- Roadside stall
- Rural industry
- Wholesale nursery
- Winery

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)**	**Tolerable**	Development to establish a new land use involving rural activities is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk. New dwellings, buildings and structures should be located on part of the land that is outside very high and high risk flood areas. Development to establish a new land use involving rural activities is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions relating to resilient built form and design, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
MEDIUM RISK (FR3) **LOW RISK (FR2)**	**Tolerable**	Development to establish a new land use involving rural activities is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
VERY LOW RISK (FR1)	**Acceptable**	Development to establish a new tourist activity is permitted.	Not applicable.	**As proposed**

VULNERABLE USES – NEW

Vulnerable Use Type 1

- Detention facility
- Relocatable home park
- Rooming accommodation
- Residential care facility
- Retirement facility

Vulnerable Use Type 2

- Childcare centre
- Community care centre
- Educational establishment
- Home-based business where for childcare
- Place of worship

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)** **MEDIUM RISK (FR3)** **(Type 1)**	**Intolerable**	Development to establish a new land use, buildings or lots involving a vulnerable use is avoided.	No AO is provided. PO provides for strict avoidance.	**As proposed**
MEDIUM RISK (FR3) **(Type 2)** **LOW RISK (FR2)** **VERY LOW RISK (FR1)**	**Tolerable**	Development to establish a new land use, buildings or lots involving a vulnerable use is limited.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes mitigation measures relating to the protection of people and property, evacuation and FEMPs. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**Option 2: Avoidance or mitigation**

CRITICAL INFRASTRUCTURE – NEW

- Emergency services
- Hospital
- Major electricity infrastructure
- Renewable energy facility
- Substation
- Telecommunications facility
- Utility installation

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)** **MEDIUM RISK (FR3)**	**Intolerable**	Development to establish a new land use, buildings or lots involving critical infrastructure does not occur	No AO is provided. PO provides for avoidance unless certain provisions relating to ongoing functionality of the infrastructure and maintenance of essential site access are complied with. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**
LOW RISK (FR2) **VERY LOW RISK (FR1)**	**Tolerable**	Development to establish a new land use, buildings or lots involving critical infrastructure is avoided, unless applicable provisions of the Flood risk overlay code are complied with to mitigate the risk.	No AO is provided. PO provides for avoidance unless certain provisions relating to ongoing functionality of the infrastructure and maintenance of essential site access are complied with. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant. Assessment provisions prioritise lower risk areas for development.	**As proposed**

COMMUNITY USE – NEW

Premises used for providing artistic, social or cultural facilities and community support services to the public and may include the ancillary preparation and provision of food and drink.

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)** **MEDIUM RISK (FR3)**	**Intolerable**	Development to establish a new land use, buildings or lots involving a community use does not occur.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes mitigation measures relating to the protection of property. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant.	**Option 1: Strict avoidance**
LOW RISK (FR2)	**Tolerable**	Development to establish a new land use, buildings or lots involving a community use is permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	AO provides for strict avoidance. PO includes mitigation measures relating to the protection of property. Other assessment provisions relating to resilient built form and design, access, flood storage and conveyance, environmental values and public safety apply, where relevant.	**As proposed**
VERY LOW RISK (FR1)	**Acceptable**	Development to establish a new community use is permitted.	Not applicable.	**As proposed**

DEVELOPMENT THAT INVOLVES HAZARDOUS MATERIAL – NEW

- Dangerous goods
- Hazardous chemicals flood hazard threshold
- Hazardous material

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) HIGH RISK (FR4) MEDIUM RISK (FR3)	Intolerable	Development that involves the storage and handling of hazardous materials (in the context of flood hazard) is avoided.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes mitigation measures relating to ensuring that the storage of hazard materials is located on the lowest risk area possible and designed and located to be resilient up to and including the DFE.	**Option 1: Strict avoidance**
LOW RISK (FR2) VERY LOW RISK (FR1)	Tolerable	Development that involves the storage and handling of hazardous materials (in the context of flood hazard) is permitted subject to mitigation.	Assessment provisions include mitigation measures relating to ensuring that the storage of hazard materials is located on the lowest risk area possible and designed and located to be resilient up to and including the DFE.	**As proposed**

ALL – EXTENSIONS

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)**	**Intolerable**	Only minor extensions for existing uses should occur, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions ensure extensions: • do not increase the risk to people and property from flood hazard; • do not result in the intensification of the use on the site; • do not reduce the ability for vehicles and emergency services to access and evacuate the site; • do not indirectly or cumulatively impact on flows upstream, downstream or on adjacent premises; • incorporate resilient building materials, where applicable.	**As proposed**
MEDIUM RISK (FR3)	**Tolerable**	Extensions for existing uses are permitted, provided development proposals comply with the applicable provisions of the Flood risk overlay code to mitigate the risk.	Assessment provisions ensure extensions: • do not increase the risk to people and property from flood hazard; • do not reduce the ability for vehicles and emergency services to access and evacuate the site; • do not indirectly or cumulatively impact on flows upstream, downstream or on adjacent premises; • incorporate resilient building materials, where applicable.	**As proposed**
LOW RISK (FR2) **VERY LOW RISK (FR1)**	**Acceptable**	Extensions for existing uses are permitted.	Not applicable.	**As proposed**

OPERATIONAL WORK

Filling or Excavation

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) **HIGH RISK (FR4)**	**Tolerable**	The flood storage capacity of a site and flood flow conveyance through a site should be maintained or improved. Strict controls are required for the excavation of land. Filling and excavation only occurs to mitigate flood impacts in lower risk areas. Filling or excavation protects flood storage and conveyance functions and does not result in any increase in flood risk or flood hazard to properties external to the site.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO requires that filling or excavation only occurs to reduce impact of flood in lower risk areas. PO includes requirements relating to the preparation of a hydraulic assessment report by a REPQ that demonstrates the development will maintain or improve the flood storage capacity of the site, and the development avoids flood flow paths, and does not result in any increase in flood risk or flood hazard to properties external to the site by adversely impact on flood levels and flow velocities.	**Option 2: Avoidance or mitigation**
MEDIUM RISK (FR3)	**Tolerable**	The flood storage capacity of a site and flood flow conveyance through a site should be maintained or improved. Filling or excavation protects flood storage and conveyance functions and does not result in any increase in flood risk or flood hazard to properties external to the site.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes requirements relating to the preparation of a hydraulic assessment report by a REPQ that demonstrates the development will maintain or improve the flood storage capacity of the site, and the development avoids flood flow paths, and does not result in any increase in flood risk or flood hazard to properties external to the site by adversely impact on flood levels and flow velocities.	**Option 2: Avoidance or mitigation**
LOW RISK (FR2) **VERY LOW RISK (FR1)**	**Tolerable**	The flood storage capacity of a site and flood flow conveyance through a site should be maintained or improved. Major filling or excavation protects flood storage and conveyance functions, and Natural Assets/Environmental Importance, and does not result in any increase in flood risk or flood hazard to properties external to the site.	Assessment provisions ensure a hydraulic assessment report by a REPQ is prepared that demonstrates the development involving major earthworks will maintain or improve the flood storage capacity of the site, and the development avoids flood flow paths, and does not result in any increase in flood risk or flood hazard to properties external to the site by adversely impact on flood levels and flow velocities.	**As proposed**

BUILDING WORK NOT INVOLVING A MATERIAL CHANGE OF USE

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5) HIGH RISK (FR4) MEDIUM RISK (FR3) LOW RISK (FR2)	Tolerable	All buildings in a flood risk area should be designed and constructed to ensure that the building resist flotation, collapse or significant permanent movement resulting from the action of hydrostatic, hydrodynamic, erosion, scour and other actions, in accordance with the building assessment provisions for the Queensland Development Codes.	Statements that a designation /declaration has been made under the Building Regulation related to building work regulated under the planning scheme are included, to ensure the application of the Queensland Development Code Mandatory Requirements 3.5 – Construction of buildings in flood hazards areas. Assessment provisions relating to the design and construction of buildings are included for classes of buildings and sites not otherwise covered by the Queensland Development Code Mandatory Requirements 3.5 – Construction of buildings in flood hazards areas.	**As proposed**
VERY LOW RISK (FR1)	Tolerable	Building work not involving a material change of use is permitted.	Not applicable.	**As proposed**

RECONFIGURING A LOT

Flood risk level	Level of existing tolerability	Broad policy response	Proposed Flood risk overlay code options	Recommended option (Council direction)
VERY HIGH RISK (FR5)	**Intolerable**	Subdivision other than boundary realignments does not occur, unless each lot has a minimum area of flood free land outside of very high, high and moderate risk area, each lot takes access from a flood resilient road and the development is supported by measures to mitigate isolation to people and property from a flood event. New lots should also be fit for purpose and able to be used for the intended purpose.	**Option 1: Strict avoidance** No AO is provided. PO provides for strict avoidance. **Option 2: Avoidance or mitigation** AO provides for strict avoidance. PO includes requirements relating to minimum flood free land, flood resilient access, mitigating isolation, and ensuring lots are fit for purpose and able to be used for the intended purpose. Other assessment provisions relating to flood storage and conveyance, access, environmental values and public safety apply, where relevant.	**Option 1: Strict avoidance**
HIGH RISK (FR4)				
MEDIUM RISK (FR3)	**Tolerable**			**Option 2: Avoidance or mitigation**
LOW RISK (FR2)	**Tolerable**	Subdivision permitted, with a consideration of a minimum area of flood free land outside of very high, high and moderate risk area, each lot takes access from a flood resilient road and the development is supported by measures to mitigate isolation to people and property from a flood event. New lots should also be fit for purpose and able to be used for the intended purpose.	Assessment provisions include requirements for: • minimum flood free land; • flood resilient access; • mitigating isolation; • ensuring the new lots are fit for purpose and able to be used for the intended purpose.	**As proposed**
VERY LOW RISK (FR1)	**Tolerable**	Subdivision is permitted.	Not applicable.	**As proposed**

6 City Plan benchmarked review

6.1 SPP compliance review

The SPP 2017 has come into effect since the adoption of the Townsville City Plan in 2014 and requires a risk-based land use planning response.

Risk-based planning requirements within the SPP 2017 involve a step-change in practice from a hazard-based approach – for both Councils and the private sector. Core to this is the expectation that hazard risk is now calibrated through the planning scheme – from the strategic framework, changes to zoning (if needed) that responds to the tolerability for inundation risk based on expected land uses, to the overlays and code provisions that address more than just built form requirements.

The benchmarked review of the Townsville City Plan will (see **Figure 6-1**):

- **Itemise** regulatory and SPP 2017 requirements (or benchmarks) for the integration and translation of flood risk considerations into the Townsville City Plan;
- **evaluate** the compliance of the existing flood overlay in the Townsville City Plan with regulatory and SPP 2017 requirements;
- **identify** any gaps and actions that may be required to ensure compliance with regulatory and SPP 2017 requirements;
- **prepare** recommendations for Council's consideration.

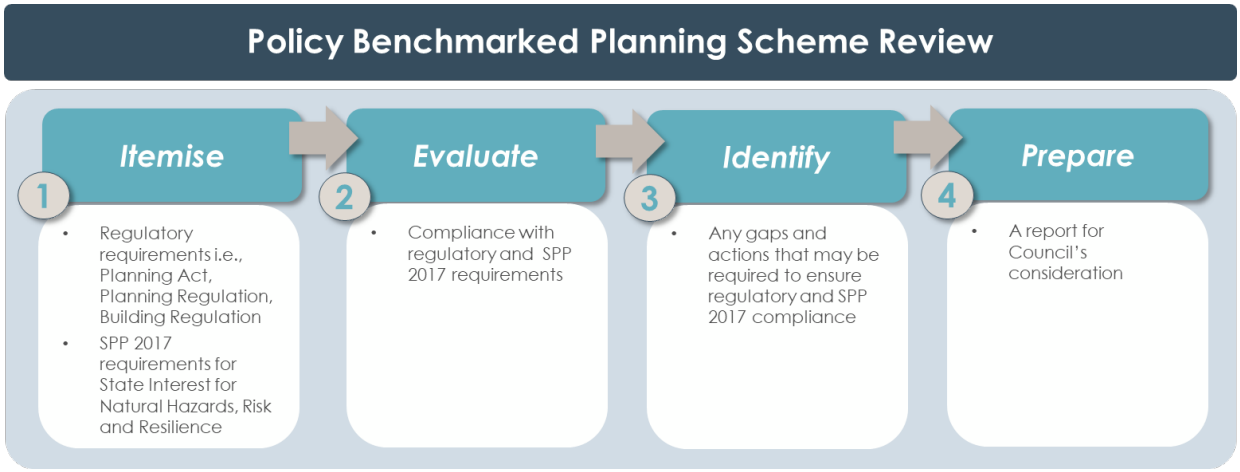


Figure 6-1: Approach for gap analysis review for SPP compliance

The following **Table 6-1** provides a compliance scale to represent the outcomes of the review of the Townsville City Plan.

Table 6-1: Compliance scale

Key	Description
★★★★	Satisfactory.
★★★	Satisfactory, however there is potential enhancement work that could be undertaken to assist with the integration of the SPP state interest policies into land use planning.
★★	Supplementary work is required to enable integration and subsequent amendments to the planning scheme.
★	Not yet commenced and is a gap and/or does not comply with the SPP guideline document requirements.

Table 6-2 provides a summary of the compliance review of the Townsville City Plan against the SPP state interest policies for *Natural hazards, risk and resilience* as it relates to flood.

Table 6-2: SPP compliance review – Flood

State Planning Policy	Recommendations	Status
Policy 1 – Natural Hazard areas are identified	The Townville City Plan displays Flood hazard mapping across the entire region with localised flood studies showing a categorised approach of low, medium and high hazard. The balance of the LGA areas, which are generally non-urban, are mapped as a further investigation area. The mapping does not advise a risk level.	✓ Complies
Policy 2 – A fit for purpose risk assessment is undertaken to identify and achieve acceptable or tolerable risk	The treatment of flood hazard in the Townville City Plan either through mapping or regulatory controls does not present risk levels and a risk assessment has not been incorporated into the policy response.	✗ Underway
Policy 3	Not applicable for flood.	
Policy 4 – Development avoids the natural hazard area, and where it is not possible to avoid, mitigates the risk to an acceptable or tolerable level	The Townville City Plan makes a number of statements about avoiding increases in risk and creating a settlement pattern that avoids areas of natural hazards, especially within the Strategic framework. The Townsville City Plan provides that the intensification of development is avoided in the high hazard areas. The Townsville City Plan does not incorporate the terminology or outcomes of reducing risk to an acceptable or tolerable level or apply specific avoidance or mitigation measures other than floor levels.	✓ Partially complete
Policy 5 – Development in natural hazard areas supports and does not hinder disaster management capacity and capability, avoids increase in exposure or severity of the hazard, avoids risk to public safety and environment from storage of hazardous materials and their release, and maintains the protective function of landforms and vegetation that can mitigate risk	The Townsville City Plan is silent on ensuring that development does not hinder disaster management capacity and capability. The Strategic framework requires that development is buffered from waterways and wetlands to allow for natural hydrological (including flood-related) processes to function. The Flood hazard overlay code assessment benchmarks seek to ensure that development does not result in adverse impacts or worsen the flood characteristics outside the development site. There is an opportunity to strengthen the assessment benchmarks to protect and maintain riparian corridors and ensure the maintenance of the protective functions of the floodplain. The Flood hazard overlay code assessment benchmarks make reference to ensuring that public safety and the environment are not detrimentally impacted by flooding on hazardous materials manufactured or stored in bulk. There is an opportunity to	✓ Partially complete

	require risks to be avoided from the storage of hazardous materials in the floodplain in the Strategic framework.	
Policy 6 – Community Infrastructure is located and designed to maintain the required level of functionality during and immediately after a natural hazard event	The Strategic framework is silent on ensuring that Community infrastructure is able to function during and after an event. Ensuring the function of emergency management and vulnerable community services during and after an event is mentioned within the Flood hazard overlay code overall outcomes and assessment benchmarks. These aspects should also be mentioned within the Strategic framework. Critical infrastructure/ Essential community infrastructure and Vulnerable uses are not defined. It is recommended that Council consider defining Critical infrastructure/ Essential community infrastructure and Vulnerable uses within the Townsville City Plan. It is also recommended that Council consider avoiding Vulnerable uses within flood hazard areas.	✓ Partially complete
Policy 7	Not applicable for flood	
Policy 8	Not applicable for flood	
Policy 9	Not applicable for flood	

Table 6-3 provides the review of the existing flood provisions within the Townsville City Plan against the relevant SPP guideline document requirements for the approach to plan-drafting related to the state interest – *National hazards, risk and resilience* for flood and coastal hazard risk.

Table 6-3: SPP guideline plan-drafting benchmarked review – Flood

SPP guideline document benchmark	Townsville City Plan overview	Benchmark review	Satisfaction with SPP requirements	Recommendations
Establish strategic outcomes that align with the state interest and inform provisions through the balance of the planning scheme				
1. Do strategic outcomes acknowledge the role in factors such as climate change in the need to respond to natural hazards for current and future development?	• Strategic intent 3.2.4 Environmentally sustainable future (emphasis added): *An environmentally sustainable future requires strong and connected biological communities and fully functioning ecological processes. This will provide for a more robust and* ***resilient landscape capable of withstanding minor and even extreme natural disturbances.*** • Strategic theme 3.5 Environmentally sustainable future, Strategic outcome 3.5.1: (6) *Risk to life, property and ecosystems as a result of natural hazards is minimised, and development is managed to respond to the likely impacts of* **climate change.**	• The Strategic intent mentions the landscape in the context of natural hazards. • The Strategic outcomes mention both climate change and natural hazards as matters to respond to rather than acknowledging the relationship of climate change to natural hazards in the future. • Despite identification of climate change and natural hazard risks in the Strategic outcomes, climate change is not reflected in Specific outcomes under the Natural hazard element 3.5.5. • Specific outcomes relating to flood (3.5.5.1) do not acknowledge climate change. • Land use strategies in section 3.5.5.1, focus on avoidance of risk increase based on current settlement patterns.	★★	• Review the Strategic framework to ensure that the link between risk from natural hazards and climate change is more explicit. • Review the Strategic framework to ensure a consistency in policy and reference to climate change. • The Townsville City Plan takes an avoidance position which is commendable but focusses on present day. Consider the opportunity to reference to future risk or climate change, depending on the preferred policy position of incorporating future flood hydraulic risk mapping as per the FRA and/or including climate change factors as a built form response for the defined flood level.
2. Do strategic outcomes acknowledge the interrelationship of different parts of the water cycle in the management of flood, such as urban and rural development adopting best practice water catchment planning, using water sensitive design and climate responsive building?	• Strategic outcomes focus on water quality. • The Specific outcomes for Strategic element 3.5.3 Integrated water cycle management and ecosystem health requires that: *(4) Development is buffered from waterways and wetlands, with a buffer width sufficient to: …* *(c) allow for* ***natural hydrological (including flood-related)*** *processes to function effectively and unimpeded.* *(10) Best practice water sensitive urban design (adapted to the Dry Tropics environment) and integrated water cycle management responding to regionally specific climate and water quality characteristics are to form the basis for engineering standards.*	• The Strategic theme of Environmentally sustainable future and associated element of Integrated water cycle management and ecosystem health provides for water cycle management.	★★★★	
3. Do strategic outcomes acknowledge the presence of flood hazard areas in the planning scheme area? The response to flood involves avoidance and mitigation, given the extensive urban development and infrastructure investment that has already occurred in the floodplain.	Specific outcomes 3.3.2.1 for infill development in the City shape and housing element 3.3.2 provide: *(6) Development in North Ward facilitates medium density residential choices within a high amenity environment. Development is primarily focussed on walkable, mixed use village nodes, with a pedestrian-friendly, active frontage along The Strand. Built form reinforces gateway corridors along Gregory and Landsborough Streets,* ***but does not intensify uses in areas subject to likely flooding or storm surge risk****. Buildings exceeding 5 storeys in height do not occur in the Medium density residential zone fronting The Strand. Open space and strong visual connections are maintained between Castle Hill and The Strand (Figure 3.3 – North Ward strategy plan).* • Strategic intent 3.2.4 provides:	• Flood hazard is acknowledged in several places in the Strategic framework as well as in particular areas. • Specific avoidance and mitigation responses, strategies or principles are not clearly articulated and there is an inconsistency in language. The overarching position of the Townsville City Plan appears to be that hazards are managed. For example, 3.5.5.1 (specific outcome) says 'avoiding ***increases*** to risk' and only 'avoids' ***wherever possible*** in Strategic outcome 3.2.4. • The term 'likely flooding' in the North Ward Specific outcome is not defined and it is noted that there are no corresponding performance outcomes or benchmarks to achieve the stated position of '*not intensifying*' development at North Ward. • The statement at 3.5.5.2 infers where land is already zoned, development can proceed.	★★	• Review the Strategic framework to ensure there is a consistency in policy and language throughout i.e., consistency in avoiding the intensification of development in high flood risk areas. • Review the Strategic framework to ensure that clear flood risk strategies are provided throughout, for specific areas and growth scenarios: CBD and environs, infill development, greenfield developments, and Island, Beach and mountain townships etc. • Review the Strategic framework to ensure that there is clarity on areas where there is a strict avoidance in high risk areas versus where there are areas
4. Do strategic outcomes promote a risk-responsive settlement pattern that avoids inappropriate development in flood hazard areas?			★★	

SPP guideline document benchmark	Townsville City Plan overview	Benchmark review	Satisfaction with SPP requirements	Recommendations
	*Exposure of communities to natural hazards, such as bushfire, landslide, **flood** and coastal risks such as storm surge and sea level rise, will be avoided wherever possible.* • Strategic outcomes 3.5.1 does not mention the individual natural hazards such as flood, providing: *(6) Risk to life, property and ecosystems as a result of natural hazards is minimised, and development is managed to respond to the likely impacts of climate change.* • Specific outcomes – Natural Hazards element 3.5.5 states the following specific outcomes: 1. *New development in areas subject to bushfire, landslide or flooding hazard is compatible with the nature of the hazard.* 2. *Development does not materially increase the extent or the severity of natural hazards, and the safety of people is maintained and damage to property is minimised.* 3. ***The settlement pattern avoids further expansion of urban and rural residential uses into hazard areas.*** 4. ***Significant areas of Townsville are already established within the floodplains of the Ross and Bohle Rivers.** Within these areas, the flood risk **will be managed by avoiding intensification of development in high hazard areas** and ensuring development is compatible with the hazard in other areas.* • The Natural Hazards element land use strategy 3.5.5.2 states: *'Flood hazard overlays and **underlying zoning provisions direct development** so that it will be compatible with the hazard and the desired character for the area.'*			that Council will accept development in high risk areas, providing that: *Where the intensification of development cannot be avoided, that development mitigates the risk to an acceptable or tolerable level.* • Review the Strategic framework to ensure that language is consistent and certain/ measurable i.e., reference should be made to flood risk (which is mapped) or the respective flood risk categories as per the overlay, and reference to ambiguous terms such as "likely" removed.
5. Do strategic outcomes identify land for future flood hazard mitigation works and protect this land from development where it may prevent the delivery of this function?	• Strategic intent at 3.2.4 states: *'The shape of the city has been determined in part to **avoid expansion** into sensitive and vulnerable areas and corridors.'* • 3.5.2 Natural assets states: *(6) Corridors and buffers are of a width which provides for:* *(d) maintenance of the hydrological functions of the waterway or wetland;* • 3.5.3 Integrated water cycle management and ecosystem health states: *(4) Development is buffered from waterways and wetlands, with a buffer width sufficient to:* *(c) allow for natural hydrological (including flood-related) processes to function effectively and unimpeded.*	• The Strategic framework includes statements about the importance of natural corridors and systems, however is limited in its statements of future land preservation. • There is an opportunity to review the Strategic framework to include reference to areas within the floodplain where flood storage and conveyance functions are to be protected.	★★★	• Review the Strategic framework to: o Include reference to protecting flood storage and conveyance functions of the floodplain o Identify any known specific areas where flood storage and conveyance functions within the floodplain are important and should be maintained and protected across the City, supported by mapping.

	SPP guideline document benchmark	Townsville City Plan overview	Benchmark review	Satisfaction with SPP requirements	Recommendations
6.	Where appropriate development may occur in flood hazard areas, do strategic outcomes promote strategies to mitigate risks associated with that development to an acceptable or tolerable level, to protect the safety of people, property and the environment?		• The Strategic framework does not convey the concepts of acceptable, tolerable or intolerable risk. • The Flood hazard overlay mapping is hazard based.	★	• Review the Strategic framework and update it to make reference to ensuring development mitigates the risk to an acceptable or tolerable level.
7.	Do strategic outcomes specifically discourage development in the flood hazard area where this may: Place additional burdens on disaster management capacity, the community and government? Risk disruption to the effective functioning of essential community infrastructure or vulnerable uses during and immediately after a hazard event? Result in the loss of valuable property? Increase the severity of the flood event?	• Specific outcome 3.5.5.1 for Natural hazards states: *(2) Development does not materially increase the extent or the severity of natural hazards, and the safety of people is maintained and damage to property is minimised.*	• The Strategic framework is silent on managing the impacts of development on disaster management and emergency services. • The Strategic framework is silent on ensuring that Community infrastructure is able to function during and after an event. • Ensuring the function of emergency management and vulnerable community services during and after an event is mentioned within the Flood hazard overlay code overall outcomes and assessment benchmarks. These aspects should also be mentioned within the Strategic framework. • Critical infrastructure/ Essential community infrastructure and Vulnerable uses are not defined. It is recommended that Council consider defining Critical infrastructure/ Essential community infrastructure and Vulnerable uses within the Townsville City Plan. It is also recommended that Council consider avoiding Vulnerable uses within flood hazard areas. • The Strategic framework seeks to ensure that development does not materially increase the risk of the hazard and the Flood hazard overlay code assessment benchmarks seek to ensure that development does not result in adverse impacts on the environment or worsen the flood characteristics outside the development site.	★	• Review the Strategic statement to include reference to ensuring that development does not place additional burdens on disaster management capacity. • Review the Strategic framework to ensure that there are clear policy statements for any specific land uses that require careful management in a flood risk area, or that should be avoided in a flood risk area i.e., Residential uses, Critical infrastructure/ Essential community infrastructure and Vulnerable uses.
8.	Do strategic outcomes support development that is compatible with maintaining the natural functions of the floodplain and the retention of existing riparian vegetation that can mitigate some risks (for example, stream bank erosion) from flooding?	• Strategic intent at 3.2.4 states: *'The shape of the city has been determined in part to **avoid expansion** into sensitive and vulnerable areas and corridors.'* • 3.5.2 Natural assets states: *(6) Corridors and buffers are of a width which provides for:* *(d) maintenance of the hydrological functions of the waterway or wetland;* • 3.5.3 Integrated water cycle management and ecosystem health states: *(4) Development is buffered from waterways and wetlands, with a buffer width sufficient to:* *(c) allow for natural hydrological (including flood-related) processes to function effectively and unimpeded.* • Specific outcomes – Natural Hazards element 3.5.5 states the following specific outcomes: *Significant areas of Townsville are already established within the **floodplains of the Ross and Bohle Rivers**. Within these areas, the flood risk will be*	• Flood is identified as a natural hydrological process in waterways and wetlands which should be buffered from development. • The floodplain is not specifically mentioned except in a reference to development on the Ross and Bohle floodplains at 3.5.5.1. • There is an opportunity to strengthen the Strategic framework policies to ensure the maintenance of the protective functions of the floodplain, not just corridors and buffers.	★★★	• Review the Strategic framework to strengthen the connection between protecting and maintaining floodplain functions and natural landforms.

SPP guideline document benchmark	Townsville City Plan overview	Benchmark review	Satisfaction with SPP requirements	Recommendations
	managed by avoiding intensification of development in high hazard areas and ensuring development is compatible with the hazard in other areas.			
Prepare state interest specific mapping				
9. Does planning scheme mapping identify the location of and (where appropriate) refine flood hazard areas in the planning scheme area (and otherwise, identify areas where no flood information is available)?	• The Flood hazard overlay identifies flood hazard areas of low, medium and high hazard (OM-06.1). • It also identifies further investigation areas of medium hazard.	• The mapping is not a risk-based approach.	★★	• Update the Flood hazard overlay mapping with the revised Flood risk mapping, informed by the Flood Risk Assessment.
Articulate outcomes for areas by allocating zones and locally specific provisions (such as overlays and local plans)				
When updating a settlement pattern or changing a land use intent: 10. Does the choice of zone/locally specific provisions avoid allocating land for new urban development in areas of unacceptable flood hazard and discourage expansion and intensification of inappropriate urban settlement in existing areas of flood hazard?	• 8.2.6.2 Purpose *The purpose of the Flood hazard overlay code is to **manage** development outcomes in flood hazard areas so that risk to life, property, community, economic activity 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**.* • The purpose of the Flood hazard overlay code will be achieved through the following overall outcomes: *(a) development is compatible with the nature of the flood hazard **except where there is an overriding need** for the development in the public interest and **no other site is suitable** and reasonably available for the proposal;* *(b) where development is not compatible with the nature of the flood hazard, and there is an overriding need for the development in the public interest and no other site is suitable and reasonably available for the proposal:* *(i) development **minimises as far as practicable** the adverse impacts from the hazard; and* *(ii) does not result in **unacceptable risk** to people or property;* *(c) **wherever practicable,** facilities with a role in emergency management and vulnerable community services are located and designed to function effectively during and immediately after flood hazard event;* *(d) development maintains the safety of people and **minimises** the potential damage to property from flood events on the development site; and* *(e) **development does not result in adverse impacts on people's safety, the environment or the capacity to use land within the floodplain**.* • The Natural Hazards element land use strategy 3.5.5.2 states: *'Flood hazard overlays and **underlying zoning provisions direct development** so that it will be*	• Planning must consider, in the context of flooding, whether the zone allocated can reflect the land use capacity of that land commensurate with the flood risk. In this way, there is no misunderstanding about how the land can be used. The SPP states that "Overlays should be compatible with and not operate either individually or cumulatively to prevent or restrict land from being used for the purpose for which it has been zoned". • The Strategic framework strategy 3.5.5.2 indicates that once land is zoned, flood hazard can be managed. • The Townsville City Plan appears to not utilise zoning i.e., Limited development zone, or apply a split zone in locations of hazard to discourage expansion and intensification of inappropriate urban settlement in existing areas of high flood hazard. • The Flood hazard overlay code overall outcomes do not specifically limit development in areas of high flood hazard but limits any development in the high hazard area at PO3. • The Flood hazard overlay code does not make reference to the compatibility of certain development types to the respective flood hazard category i.e., whether vulnerable uses and residential accommodation activities should be avoided in high flood hazard areas. • The case study at 6.1.2 illustrates the tension between zones and land use intent. • It is further noted that the terminology in the Flood hazard overlay code is not carried forward from the Strategic framework and new concepts are introduced. For example, "unacceptable risk" is mentioned in the Flood hazard overlay code overall outcomes, and not mentioned in the Strategic framework.	★ ★ ★	• Undertake a zoning check to identify urban land impacted by intolerable flood risk that cannot be mitigated and should be avoided, and review the respective zoning of that land to ensure the risk is compatible with the envisaged land uses. • As part of the translation of flood risk into the Townsville City Plan, identify land use tolerability to risk, and ensure that land use compatibility by risk level is reflected in the Flood hazard overlay code where necessary i.e., whether vulnerable uses and residential accommodation activities should be avoided in high flood risk areas. • Review the Strategic framework and Flood hazard overlay code purpose and overall outcomes and assessment benchmarks to ensure there is a consistency in language and policy intent.
When updating a settlement pattern or changing a land use intent: 11. Does the choice of zone/locally specific provisions support anticipated development types that would not be of a form that is likely to result in increases in water-flow velocity or flood levels or increase the potential for damage on the site or to other properties?				
Where land is included in a flood hazard area: 12. Does the choice of zone/locally specific provisions consider the uses envisaged by each zone and whether the risks associated with flood can be mitigated to acceptable or tolerable levels for those uses?				

SPP guideline document benchmark	Townsville City Plan overview	Benchmark review	Satisfaction with SPP requirements	Recommendations
	compatible with the hazard and the desired character for the area.'			
Set categories of development and categories of assessment				
13. Do the categories of development and categories of assessment reflect the level of risk and vulnerability of the use?	• There are two Tables of assessment: o Low hazard areas which is a blanket "no change" for all development except code assessment for: Emergency services; or Hospital; or Special industry; or High impact industry; or Residential care facility; or Retirement facility; or Major electricity infrastructure; or Air services. o Medium and high hazards which elevates most low intensity development from Accepted to Accepted subject to requirements as well as maintaining code assessment for the above list.	• The Tables of assessment differentiate between development in a low hazard area, and medium and high hazard area, which are dealt with together. • Dwelling houses, dual occupancy and community residence are elevated to Accepted subject to requirements in the medium and high hazard area. • Vulnerable uses are not defined.	★★	• As part of the translation of flood risk into the Townsville City Plan, identify land use risk tolerability and review the Tables of assessment and ensure that: o Levels of assessment for development are commensurate with the level of risk for the land use o Include a definition and assessment level for vulnerable uses o Aspects of development specific to the SPP are captured i.e., development involving the storage of hazardous materials.
14. Are aspects of development that may impact on, or be impacted by, flood hazard assessable?			★	
Where for development involving the storage of significant amounts of hazardous material in a flood hazard area: 15. Is development assessable?		• The Tables of assessment do not reference development involving the storage of hazardous material in a flood hazard area. • Assessable assessment benchmarks are provided for development which involves the manufacture or storage of hazardous materials under the Flood hazard overlay code (AO/PO9).	★	
Prepare assessment benchmarks that deliver the outcomes				
Where in areas of potential flood risk: 16. Do assessment benchmarks require site-based investigations?	AO3.1 New buildings are located outside high hazard areas identified on overlay map OM-06.1 or 06.2. AO4.1 Floor levels for residential buildings are 300mm above the defined flood level. ***Editor's note—****In medium hazard — further investigation area, a flood assessment in accordance with the Flood hazard planning scheme policy no. SC6.7 may be needed to establish the defined flood level.* ***PO9 - Editor's note****—To adequately assess the impacts of development on flooding regimes, applicants may need to have a hydrological and hydraulic assessment carried out by a suitably qualified and experienced hydrologist or engineer.*	• It is unclear when a site-based investigation is required. • The Flood hazard overlay code provides that a further study **may** be required but in the investigation areas which are areas where a level 2 study is not available. This only applies to assessable development. Accepted development (dwelling houses and dual occupancies) can proceed in areas of any risk without need for further investigation. • The Flood hazard overlay code **may** require further investigations at AO7 to demonstrate no worsening outside the site. • There is no benchmark to require a further study when creating new lots.	★★	• Review the Flood hazard overlay code to provide clarity of when and what type of site-based investigation is required, commensurate with the level of risk and land use. Any site based hydrological or hydraulic assessment should be carried out by a suitably qualified and experienced RPEQ.
Where land is included in low, medium and/or high risk flood hazard areas: 17. Do assessment benchmarks: a. Set thresholds such as finished floor levels for development, where appropriate? b. Contain strategies so development does not affect floodplain behaviour in a way that may increase the number of people at risk to an	• For Accepted development subject to requirements and assessable development AO1.2 (a) floor levels for habitable rooms are 300mm above the defined flood level. (b) floor levels of all non-habitable rooms (other than class 10 buildings) are above the defined flood event • For Assessable development On existing lots	• The Flood hazard overlay code sets floor levels in all hazard categories for habitable rooms and residential uses (where they are assessable) which is 300mm above the defined flood event. • The Flood hazard overlay code sets floor levels for all non-habitable buildings which is above the defined flood event • The Flood hazard overlay code is silent on ensuring that development does not hinder disaster management capacity and capability.	★★	• Review the Flood hazard overlay code and include an assessment benchmark related to protecting and maintaining waterways, riparian corridors and wetlands, and ensure the maintenance of the protective functions of the floodplain. • Review the Flood hazard overlay code and: o Consider the circumstances where evacuation safety and

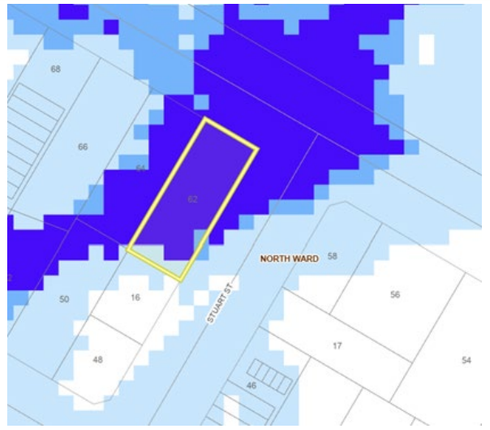
SPP guideline document benchmark	Townsville City Plan overview	Benchmark review	Satisfaction with SPP requirements	Recommendations
intolerable level or cause or contribute to increase in the level of risk on surrounding people and property? c. Contain siting, design and transport infrastructure requirements that: i. Enable people to safely shelter in place (depending on the nature of the risk)? ii. Enable the safe self-evacuation of occupants and visitors from the hazard area? iii. Provide for effective disaster response and recovery, such as safe and efficient access and operation for emergency services and the supply of essential goods and services? d. Require the retention or enhancement of riparian corridors and vegetation that provide a protective function during flood events, maintain the natural function of the floodplain and potentially reduce the need for built mitigation infrastructure? e. Consider requiring evacuation routes and the provision of LGIP infrastructure as potential mitigation measures?	AO4.1 Floor levels for residential buildings are 300mm above the defined flood level. AO4.2 Floor levels of non-residential buildings (other than class 10 buildings) are above the defined flood level. PO2 Development in **high** hazard areas does not significantly impede the flow of flood waters through the site or worsen flood flows external to the site; and PO7 Development within high and medium hazard areas does not directly, indirectly or cumulatively worsen flood characteristics outside the development site, having regard to: (a) increased scour and erosion; or (b) loss of flood storage; or (c) loss of or changes to flow paths; or (d) flow acceleration or retardation; or (e) reduction in flood warning times.	• The Strategic framework requires that development is buffered from waterways and wetlands to allow for natural hydrological (including flood-related) processes to function. The Flood hazard overlay code assessment benchmarks seek to ensure that development does not result in adverse impacts or worsen the flood characteristics outside the development site. There is an opportunity to strengthen the assessment benchmarks to protect and maintain riparian corridors and ensure the maintenance of the protective functions of the floodplain. • The Flood hazard overlay code assessment benchmarks make reference to ensuring that public safety and the environment are not detrimentally impacted by flooding on hazard materials manufactured or stored in bulk. There is an opportunity to require risks to be avoided from the storage of hazardous materials in the floodplain in the Strategic framework.		routes should be considered, including any relevant disaster management plans or sub-plans approved by Council o Consider the circumstances where shelter in place would be considered appropriate including any relevant disaster management plans or sub-plans and requirements for Flood Emergency Management Plans o Ensure safe access is provided to the development, including ensuring any built structures are located on a site where they can be safely accessed.
Where for development in a flood hazard area involving vulnerable uses and essential community infrastructure that must continue operating during or after a flood event: 18. Do assessment benchmarks require development to be located above the height of the PMF or other known extreme event to achieve the highest practical level of flood immunity?	• Overall outcome statement (c) states that: *'wherever practicable, facilities with a role in emergency management and **vulnerable community services** are located and designed to function effectively during and immediately after flood hazard event;'* PO8 *Facilities with **a role in emergency management and vulnerable community services** are able to function effectively during and immediately after flood events.*	• Ensuring the function of emergency management and vulnerable community services during and after an event is mentioned within the Flood hazard overlay code overall outcomes and assessment benchmarks. • The Flood hazard overlay code requires a range of minimum floor levels in the immunity tables and nominates assessable development for a limited number of land uses (which include land uses that would be considered vulnerable uses and essential community infrastructure), however there is no benchmark for these land uses other than the floor level requirements. • Critical infrastructure/ Essential community infrastructure and Vulnerable uses are not defined within the Townsville City Plan. • Assessment benchmarks do not seek to avoid Vulnerable uses the flood hazard area. • Council should consider avoiding Vulnerable uses within flood hazard areas. Vulnerability to natural hazards is about the potential to be harmed by the natural hazard. With regards to land use planning, it is about the nature of some land uses which, because of the types of occupants within those uses are more vulnerable to be harmed by the natural hazard. For example, some occupants may have reduced capacity to evacuate and respond adequately to	★★	• Develop a definition for Critical infrastructure/ Essential community infrastructure and Vulnerable uses within the Townsville City Plan. • Review the Flood hazard overlay code and strengthen and make explicit the policy position on Critical infrastructure/ Essential community infrastructure and Vulnerable uses through: o Setting clear assessment benchmarks which may include matters other than floor levels such as evacuation o Setting permissibility in flood risk areas. • Review the Flood immunity table to ensure that it provides for the DFEs and floor levels for the full range of land uses, including Residential, Industrial and Commercial land uses.
Where for development in a flood hazard area involving essential community infrastructure: 19. Do assessment benchmarks contain siting, design and access standards to achieve the required level of functionality during and immediately after a flooding hazard event?			★★	

SPP guideline document benchmark	Townsville City Plan overview	Benchmark review	Satisfaction with SPP requirements	Recommendations
		the natural hazard threat and given their evacuation requirements, they may place additional burdens on disaster management operations and/or recovery capacity i.e., retirement facilities. • Critical infrastructure has a different policy response to that of Vulnerable uses, in line with the SPP. The SPP includes the following specific State interest policy for the State interest – natural hazards, risk and resilience: *(6) Community infrastructure is located and designed to maintain the required level of functionality during and immediately after a natural hazard event.* As such, whilst all uses should avoid flood hazard areas, critical infrastructure may be able to occur where it is demonstrated that it can function during and after an event.		
Where for development in a flood hazard area for community infrastructure that protects valuable equipment and artefacts: 20. Do assessment benchmarks require this development to be located above the height of the DFE?		• The Flood hazard overlay code does not provide assessment benchmarks for protecting items of community value during a flood event. • The SPP guideline makes reference to community infrastructure that protects valuable equipment and artefacts (such as museums, libraries, art galleries, archives). • Consideration should be given to a specific policy response for these types of uses. Specifically with regards to ensuring that the siting and design of such uses consider the location and/or storage of valuable equipment and artefacts above the defined flood level for example. • The Planning Regulation defines community uses and therefore a separate definition is not required for this use.	★	• Review the Flood hazard overlay code and provide an assessment benchmark that addresses Community uses, and protecting items of value to the community.
Where for development involving the storage of significant amounts of hazardous material in a flood hazard area: 21. Do assessment benchmarks include design measures so that hazardous materials are not exposed to flood waters and/or are appropriately sealed to avoid the release of hazardous materials as a result of a flood hazard event and evacuation plans to safely remove hazardous materials to alternative sites are in place in the event of a flood?	PO9 Public safety and the environment are not adversely affected by the detrimental impacts of flooding on **hazardous materials manufactured or stored in bulk**. AO9.1 Development **does not involve** the manufacture or storage of hazardous materials within a high flood hazard area identified on overlay map OM-06.1 or 06.2. AO9.2 Within the **low or medium** flood hazard area identified on overlay map OM-06.1 or 06.2, structures used for the manufacture or storage of hazardous materials in bulk are designed to prevent the intrusion of flood waters up to at least a 0.2% AEP flood event.	• The Flood hazard overlay makes a clear policy statement on hazardous materials as an acceptable solution. • The Flood hazard overlay nominates a minimum "structure" immunity to 0.2% as an acceptable solution. • It is noted that hazardous material is not defined within the Townsville City Plan. • The SPP provides the following definitions which should be considered and terminology reviewed and updated within the corresponding assessment benchmarks as required: o **Hazardous material** o **Dangerous goods** o **Hazardous chemicals flood hazard threshold.** These definitions provide clarity on the type and quantities of materials, chemicals and goods which classify them as hazardous, and therefore reference to "bulk" can be removed.	★★	• Develop a definition for Hazardous material, which references and defines dangerous goods and hazardous chemicals flood hazard threshold and review and update the corresponding assessment benchmarks as required. • Review and update the Flood immunity table to ensure that it provides the DFEs and floor levels for development manufacturing hazardous materials, and also for the storage of hazardous materials. • Review the Townsville City Plan and strengthen the policy related to the storage of hazardous material in flood hazard areas in the strategic framework, tables of assessment, and overall outcomes.

6.1.1 Flood Case Study – 62 Paxton Street North Ward

The below property is highlighted as a case study for the current Townsville City Plan function only in the context of flood. No other matters have been considered for this site.

Table 6-4: Flood hazard overlay code case study - 62 Paxton Street

Element	Discussion
Property description: • 62 Paxton Street, North Ward • 1010m² • Medium density residential • The site is not in a specific precinct • Existing land use: Low set post war home • Approximately 90% of the site is impacted by High flood hazard **Development proposal** • Site intensification from a dwelling house to Multiple dwelling units	  
Part 5 – Tables of Assessment	Multiple dwellings in the Medium density zone – Code assessment, compliant with height requirements. Flood hazard overlay (high and medium hazard) – No change to the level of assessment.
Part 7 – Zone Codes	Medium density zone code – No provisions that relate to assessment in the context of flood.
Part 8 – Overlay	Flood hazard overlay code: 1. *The purpose of the code will be achieved through the following overall outcomes:* (a) *development **is compatible** with the nature of the flood hazard except where there is an overriding need for the development in the public interest and no other site is suitable and reasonably available for the proposal;* (b) *where development is not compatible with the nature of the flood hazard and there is an overriding need for the development in the public interest and no other site is suitable and reasonably available for the proposal:* (i) *development **minimises** as far as practicable the adverse impacts from the hazard; and* (ii) *does not result in **unacceptable risk t**o people or property;*

Element	Discussion
	(c) wherever practicable, facilities with a role in emergency management and vulnerable community services are located and designed to function effectively during and immediately after flood hazard event; *(d) development maintains the safety of people and minimises the potential damage to property from flood events on the development site; and* *(e) development does not result in adverse impacts on people's safety, the environment or the capacity to use land within the floodplain.* **Summary** – Compatibility is not defined or indicated. Even where the development may be incompatible, it can still proceed as long as development satisfies the overriding need test, there is no other suitable land, and impacts are minimised. There is no mention of avoidance of intensification of particular land uses, such as Residential activities, in the high flood hazard area. Of note: **PO3** Development **does not intensify use in high hazard** areas, in order to avoid risks to people and property. **Editor's note—**High hazard areas are those likely to experience deep and/or fast moving water in a defined flood event. / **AO3.1** New buildings are **located outside high hazard areas** identified o **AO3.2** New lots or roads are not created within high hazard areas iden **AO3.3** Sites for non-permanent accommodation such as tents, cabins c located outside the high hazard areas identified on overlay map **Summary:** This PO provides a very strong policy position that the development proposal should not occur. Notwithstanding, the development proposal does not have capacity on the site to locate outside the high hazard area. How does this PO interplay with the purpose statement (b)? It is further noted, that PO3 does not apply to Accepted Development, and there are no corresponding Accepted development subject to requirements POs or AOs that restrict development from occurring in high hazard areas. It is noted that Dual occupancy would be an intensification on this lot, but it remains Accepted development subject to requirements when in the high hazard flood area. The policy position is not clearly articulated through all levels of the Flood hazard overlay code, resulting in a potential conflict in the assessment benchmarks. That is, the purpose statement infers development can occur, where the benchmark is a clear no in some cases (PO3), and a yes in others (AO1.2). Further, the SPP guideline provides that zones to be allocated according to development potential: ***12. Where land is included in a flood hazard area:*** *Does the choice of zone/locally specific provisions consider the uses envisaged by each zone and whether the risks associated with flood can be mitigated to acceptable or tolerable levels for those uses?* Consideration should be given to the types of land uses and their development potential commensurate with the level of flood risk.

6.2 Building matters in planning schemes

The planning system maintains a natural relationship with the building assessment provisions. Planning schemes set out whether development can occur in an area whereas BAPs detail how to build. Generally, it is not appropriate to include BAPs in a planning scheme. However, there are instances where no BAPs apply including:

- The MP3.5 controls for the construction and design of buildings in a designated flood hazard area do not apply to Class 5 – Business, Class 6 – Commercial, Class 7 – Industry, and Class 8 – Industry buildings.
- There are no BAPs specific to withstanding storm tide inundation or coastal erosion, noting that a designated flood hazard area does not include areas subject to storm surge and therefore MP3.5 would not apply on land subject to flood hazard and storm surge.

The following tables provide a review of the Townsville City Plan having regard to building matters regulated under planning schemes for flood hazard.

It is noted that BAPs will be required to be developed and included as part of the Flood hazard overlay code and/or the Coastal environment overlay code, where areas are subject to storm tide inundation, and where part of the designated flood hazard area is also subject to storm tide inundation, or alternate options investigated.

The following tables provide a review of the Townsville City Plan having regard to building matters regulated under planning schemes for flood hazard.

Table 6-5: Designation of an area liable to flooding

Building Regulation 2021 – Section 8 Designation of area liable to flooding	Townsville City Plan overview – Section 1.6 Building work regulated under the planning scheme	Considerations for the Townsville City Plan
(1) A local government may in a planning scheme, temporary local planning instrument under the Planning Act or by resolution— **(a) designate all or part of its area as a flood hazard area; and**	Flood hazard **Note-** In accordance with section 13 (2) of the *Building Regulation 2006*, the following designation is made under section 13 of the *Building Regulation 2006* for the Flood hazard area in the Townsville City Plan (planning scheme). Flood hazard area – **Note-** In accordance with section 13 (4) of the *Building Regulation 2006*, the Flood hazard area was designated on 27 October 2014. | Schedule 2 – Development constraints overlay map OM-06.1 and OM-06.2 (Flood hazard) | Section 32(a) BA and section 13(1)(a) BR; and QDC MP 3.5 – Construction of buildings in flood hazard areas	It is recommended that Council make a new resolution that designates the 'flood hazard area' as per the updated risk mapping from the Flood Risk Assessment.
(b) declare the following matters for all or part of the designated flood hazard area— **(i) the defined flood level;**	Defined flood level (DFL) | Schedule 1, Table SC1.2.2 Administrative Definitions "defined flood level' and Table 8.2.6.3(a) Flood overlay code, Editor's Note, PO1 and PO4 | Section 32(a) BA and section 13(1)(b)(i) BR; and QDC MP 3.5 – Construction of buildings in flood hazard areas Defined flood level – The flood level relative to the Australian Height Datum (AHD) of the 1% AEP flood. *Editor's note—This will vary between locations.*	In accordance with the SPP guideline, considering climate change and the need to respond to natural hazards for current and future development, it is recommended that Council updates and declares the defined flood to be: The flood level relative to the Australian Height Datum (AHD) of the 1% AEP flood considering climate change at 2100.
(ii) the maximum flow velocity of water;		The Maximum flow velocity (MFV), for all or part of a flood hazard area, is a flow velocity of water that is reasonably expected to be the maximum flow velocity of water for all or part of the area. Council should consider designating the maximum flow velocity of water (per lot) otherwise the need for a site-based flood study would be required to determine it in order for the building designers/ engineers to be able to use the acceptable solutions of the ABCB code called up by MP3.5. An option is for Council to determine all areas above and below the 1.5m/s threshold (based on the modelling) of the acceptable solution/ deemed to satisfy provisions, and then map all areas above or below that number. The Building Regulation, section 13 provides that inactive flow or backwater area means all or part of a flood hazard area where the maximum flow velocity of water is not likely to be greater than 1.5m/s. That section allows a local government to declare an inactive flow or backwater area for all or part of a flood hazard area.
(iii) an inactive flow or backwater area;		
(iv) a freeboard that is more than 300mm;		

(v) the finished floor level of class 1 buildings built in all or part of the flood hazard area.	The finished floor level of class 1 buildings built in all or part of the flood hazard area | Table 8.2.6.3(a) Flood hazard overlay code | Section 32(a) BA and section 13(1)(b)(v) BR; and QDC MP 3.5 – Construction of buildings in flood hazard areas AO1.2 Where development is located within another hazard area shown on overlay map OM-06.1 or 06.2: (a) **floor levels of all habitable rooms are a minimum of 300mm above the defined flood level**; (b) **floor levels of all non-habitable rooms (other than class 10 buildings) are above the defined flood event**; (c) parking spaces associated with non-residential development are located outside the high hazard areas identified on overlay map OM-06.1 or 06.2; and *Editor's note—Class 10 buildings are identified under the Building Code of Australia and includes carports and outbuildings.*	Currently a freeboard of 300mm above the defined flood level is provided for habitable rooms, and above the defined flood event for all non-habitable rooms. Noting that the flood immunity may vary depending on the nature of the land use, it is recommended that a freeboard of at least 300mm be declared for all development above the defined flood level as what would be provided in the flood immunity table. The SPP guideline provides that a suitable freeboard be selected based on local circumstances. Noting that in some areas, flood information may be less precise, and a higher freeboard may be necessary to address uncertainties in modelling and climate change.
(3) If the local government makes a designation or declaration under subsection (1), the local government must state in the planning scheme, temporary local planning instrument under the Planning Act or resolution, that the designation or declaration is made under this section. Note— **QDC part 3.5 applies to the carrying out of particular building work carried out wholly or partly within a flood hazard area and a defined flood level is declared by a local government for the area.**	Defined flood level (DFL) | Schedule 1, Table SC1.2.2 Administrative Definitions "defined flood level' and Table 8.2.6.3(a) Flood overlay code, Editor's Note, PO1 and PO4 | Section 32(a) BA and section 13(1)(b)(i) BR; and QDC MP 3.5 – Construction of buildings in flood hazard areas	Reference is made to QDC MP3.5 in Table 1.6.1 which sets out the building assessment provisions and designations in the planning scheme. Notwithstanding, to remove any doubt, it is recommended that the following note be provided in section 1.6 and also in the Flood hazard overlay code: *Note—* *QDC part 3.5 applies to the carrying out of particular building work carried out wholly or partly within a flood hazard area and a defined flood level is declared by a local government for the area.*

Table 6-6: Consideration of building assessment provisions within a planning scheme

Building Act / Regulation	MP3.5	National Construction Code*	National standard basic design requirements*	Considerations for planning scheme provisions
8 Designation of area liable to flooding **(1) A local government may in a planning scheme, temporary local planning instrument under the Planning Act or by resolution—** (a) **designate all or part of its area as a flood hazard area; and** (b) **declare the following matters for all or part of the designated flood hazard area—** **(i) the defined flood level;** **(ii) the maximum flow velocity of water;** **(iii) an inactive flow or backwater area;** **(iv) a freeboard that is more than 300mm;** **(v) the finished floor level of class 1 buildings built in all or part of the flood hazard area.**	**Design and construction of buildings** **Performance requirement** P1A building must be designed, constructed, connected and anchored so that, in the event of a flood up to the DFL, it— (a) resists flotation, collapse or significant permanent movement, resulting from— (i) hydrostatic action; and (ii) hydrodynamic action; and (iii) erosion and scouring; and (iv) wind; and (v) any other action; and (b) safeguards occupants and other people against illness and injury caused by flood water affecting the building. **Acceptable Solution**	P2.1.2 Buildings in flood areas (a) A building in a flood hazard area must be designed and constructed, to the degree necessary, to resist flotation, collapse or significant permanent movement resulting from the action of hydrostatic, hydrodynamic, erosion and scour, wind and other actions during the defined flood event. (b) The actions and requirements to be considered to satisfy (a) include but are not limited to— *i. flood actions; and* *ii. elevation requirements; and* *iii. foundation and footing requirements; and* *iv. requirements for enclosures below the flood hazard level; and*	**2.3 Flood actions** General (a) Values of flood actions for use in design must be established that are appropriate for the type of structure or structural element, its intended use and exposure to flood action. (b) The flood actions must include, but not limited to, the following as appropriate: hydrostatic actions, hydrodynamic actions, debris actions, wave actions, erosion and scour. (c) The flood actions must be based on the DFE.	Ensure there is a clear statement in section 1.6 of the Townsville City Plan that a flood hazard area has been declared to instigate the application of MP3.5. Further to this, the following note should be included in the Flood risk overlay code to alert users that compliance with the BCA is required for all building work in a flood hazard area: *Note – The flood hazard area defined by this City Plan is taken to be the flood hazard area pursuant to section 8 of the Building Regulation 2021. QDC part 3.5 applies to the carrying out of particular building work carried out wholly or partly within a flood hazard area and a defined flood level is declared by a local government for the area.*

(2) The local government must, in designating a flood hazard area, comply with— (a) **a State planning policy; and** (b) **if a temporary State planning policy is in effect when the designation is made—the temporary State planning policy to the extent it applies in relation to the designation.** **(3) If the local government makes a designation or declaration under subsection (1), the local government must state in the planning scheme, temporary local planning instrument under the Planning Act or resolution, that the designation or declaration is made under this section.** **Note— QDC part 3.5 applies to the carrying out of particular building work carried out wholly or partly within a flood hazard area and a defined flood level is declared by a local government for the area.** **(4) The local government must keep a register of—** (a) **each flood hazard area designated by the local government; and** (b) **the date each area was designated as a flood hazard area.**	A1 The building complies with **sections 2.3, 2.5 - 2.8 and section 2.10 of the national flood standard**, and— (a) if the building is a class 1 building and the local government has declared, under section 13 of the Building Regulation 2006, the finished floor level for a class 1 building—the finished floor level of the building complies with the level declared; or (b) otherwise—the finished floor level of the building complies with **section 2.4 of the national flood standard.** *Note— Where A1 does not apply (refer to the provision in this part with the heading 'Limitations'), an alternative solution will be required in order to ensure it complies with P1. To formulate an alternative solution, the services of a competent person may be required.*	*v. requirements for structural connections; and* *vi. material requirements; and* *vii. requirements for utilities; and* *viii. requirements for occupant egress.*		
			2.4 Floor height requirements Unless otherwise specified by the appropriate authority- (a) the finished floor level of habitable rooms must be above the FHL; and (b) the finished floor level of enclosed non-habitable rooms must be no more than 1.0 m below the DFL. *Note: The structural provisions of this Standard are based on the DFL being a maximum of 1.0 m above the finished floor level of enclosed rooms. Therefore, if the appropriate authority permits more than 1.0 m, additional structural analysis should be undertaken.*	Ensure that the Townsville City Plan declares the finished floor level of a building (for both residential and non-residential land uses) with a freeboard that is more than 300mm.
			2.5 Footing system requirements The footing system of a structure must provide the required support to prevent flotation, collapse or significant permanent movement resulting from the flood actions specified in Section 2.3. Requirements related to geotechnical considerations, footing system depth, piers, posts, columns and piles, use of fill and use of slabs are included.	The Building Act, Building Regulation and MP3.5 (P1) regulate the structural design and construction of a building in flood hazard areas in relation to resisting flotation, collapse or permanent movement from the hydrostatic and hydrodynamic actions, erosion and scouring, wind and any other motion. P1 of MP3.5 does not apply to the construction of a new Class 5 – Business, Class 6 – Commercial, Class 7 – Industry or Class 8 – Industry buildings. Therefore the Flood hazard overlay code should include requirements for the structural design and construction of these building classes, inline with MP3.5/ NCC standards.
			2.6 Requirements for enclosures below the flood hazard level (FHL) (a) Any enclosure below the FHL must have openings to allow for automatic entry and exit of floodwater for all floods up to the FHL. (b) The openings must meet the following criteria- (i) doors and windows must not be counted as openings but openings can be installed in doors and windows; and (ii) there must be a minimum of two openings on different sides of each enclosed area; and (iii) the total net area of all openings must be at least 1% of the enclosed area; and (iv) openings must permit a 75 mm sphere to pass through; and (v) any opening covers must not impede the flow of water.	

			2.7 Requirements for structural attachments (a) Erosion control structures that are attached to the foundation or superstructure of the building must be structurally adequate and not reduce the structural capacity of the building during the DFE. Decks, patios, stairways, ramps and the like below the FHL that are attached to the building must be structurally adequate and not reduce the structural capacity of the building during the DFE.	
			2.8 Material requirements (a) Materials used for structural purposes and located below the FHL must be capable of resisting damage, deterioration, corrosion or decay taking into account the likely time the material would be in contact with flood water and the likely time it would take for the material to subsequently dry out. For the purposes of (a), materials used for structural purposes include loadbearing columns, bracing members, structural connections, fasteners, wall framing members and the like.	
			2.10 Requirements for egress Egress from a balcony, verandah, deck, door, window or the like must be available to allow a person in the building to be rescued by emergency services personnel, if rescue during a flood event up to the DFE is required.	
	Design and location of utilities **Performance requirement** P2 Utilities associated with a building, other than an electrical meter for a class 1 building, must be designed or located to reduce the effects of flood water on the utilities in the event of a flood up to the DFL. **Acceptable solution** A2 (1) Utilities associated with a class 1 building, other than an electrical meter for the building, are located above— (a) if the local government has declared, under section 13 of the Building Regulation, the finished floor level for a class 1 building—the level declared; or (b) otherwise—the flood hazard level. (2) Utilities associated with a building other than a class 1 building are located above the flood hazard level.		**2.9 Requirements for utilities** General (a) Utilities and related equipment, other than an electrical meter for the building, must not be placed below the FHL unless they have been designed specifically to cope with flood water inundation. Note: The location of electrical meters is regulated by the electrical authority. (b) Buried systems must be placed at a depth sufficient to prevent damage due to scour and erosion during the DFE. Exposed systems must be designed to withstand the flood related actions (buoyancy, flow, debris and wave).	This is about building-related utilities - switchboards etc. Reference to 'utilities' in the Townsville City Plan should refer to utilities infrastructure i.e., underground electrical networks, standalone substations, etc.

	Note— Electrical installations may be installed by a person only if the person is a licensed electrician. Electrical meters must be installed in accordance with electrical entity requirements. **Protection from backflow from sanitary drains** **Performance outcome** P3 A building with a sanitary drain must be protected from backflow so that in the event of a flood up to the DFL the effects of flood water on the building are reduced. **Acceptable solution** A3 (1) A building with a sanitary drain is protected from backflow by a reflux valve fitted between the building and— (a) if the building has an onsite sewerage facility—the on-site sewerage facility; or (b) otherwise—the connection point. (2) Also, a reflux valve fitted under subsection (1) is accessible for maintenance in accordance with AS3500.2:2003, section 4.5. *Note— A reflux valve may be fitted by a person only if the person is licensed to fit the valve under the Plumbing and Drainage Act 2002* ***Design and location of customer dedicated substations*** **Performance outcome** P4 A customer dedicated substation located in a building must be designed or located so its ability to function effectively is not affected by a flood event up to the DFL. Note— Under section 59(2)(a) of the Electricity Regulation 2006, an entity may require the owner of premises to provide space on the premises for a substation. **Acceptable solution** A4 A customer dedicated substation located in a building is located above the DFL.			

** The NCC performance requirements BP1.4 and P2.1.2 do not apply in Queensland, with building work in designated flood hazard areas regulated under the Building Act and MP3.5. Notwithstanding, MP3.5 calls up specific national flood standards as shown.*

7 Summary of key issues and recommendations

The following key issues and recommendations have been identified as part of the SPP and regulatory compliance review of the Townsville City Plan for flood:

Key matter	Summary of issues	Recommendations
Building matters in planning schemes	A planning scheme cannot include mandatory parts in the current parts of the Queensland Development Code, which includes MP3.5. For MP3.5 to be considered, the planning scheme must designate all or part of its LGA a "flood hazard area" and include a statement that a designation / declaration has been made under the Building Regulation. A planning scheme may designate a flood hazard area and declare a defined flood level, maximum flow velocity of water, inactive flow or backwater area, freeboard that is more than 300mm or finished floor level of Class 1 buildings built in all or part of the designated flood area.	There is an opportunity to review and update section 1.6 – Building matters in planning schemes of the Townsville City Plan to ensure the declaration of all matters pursuant to section 8 of the Building Regulation.
	There are no BAPs specific to withstanding storm tide inundation or coastal erosion, noting that a designated flood hazard area does not include areas subject to storm surge and therefore MP3.5 would not apply on land subject to flood hazard and storm surge. As a consequence, BAPs will be required to be developed and included as part of the Flood hazard overlay code and/or the Coastal environment overlay code, where areas are subject to storm surge, and where part of the designated flood hazard area is also subject to surge, or alternate options investigated.	Investigate options for managing the relationship between flooding and storm tide inundation in the Townsville Planning Scheme with the State.
Strategic framework	The Strategic framework of the Townsville City Plan sets the overarching policy positions for development. It is an assessment benchmark for impact assessable development and is considered the major element of the Townsville City Plan. Policy directions must be clearly articulated, particularly those that are considered highly important for protecting the community and ensuring appropriate development occurs. The current Strategic framework contains several provisions relating to flooding in general. In order to reflect the new risk-based planning approach undertaken, as well as the key policies in the SPP, a review and update of the Strategic framework is required. Suggested changes are proposed to provide additional policy direction for flood risk management across the City, as well as ensure key policies of the revised Flood hazard overlay code are	Review and update the Strategic framework in accordance with section 6.1 of this report.

	elevated and supported by a strong, clear vertical integration of provisions within the Townsville City Plan.	
Levels of assessment	The levels of assessment indicate the need for or the ease of compliance with regulatory provisions. They also dictate whether the community will be consulted with and whether they are able to appeal a decision. The extent to which the regulatory provisions can be applied without intervention are a primary consideration for assigning assessment levels. Low levels of assessment indicate a low-risk proposal where benchmarks can be applied and complied with relatively simply without the need for individual assessment. Higher levels of assessment indicate the need for alternative solutions and assessment manger review, or the need for public consultation. Further, the levels of assessment for the overlay can convey messages of suitable land uses which are foreseen in a risk area or locality. The tables of assessment can attribute an assessment level by hazard, risk or land use. Code assessment is used for tolerable and intolerable risk areas where mitigation is codified. While impact assessment may be triggered for inappropriate land uses. The SPP guidance requires the consideration of whether the categories of assessment reflect the level of risk and vulnerability of the land use. In particular, it notes that the impacts on vulnerable uses, reconfiguring a lot which facilitates the increases in population, significant earthworks which involve the redirection of existing overland flow paths and development that involves the storage of significant amounts of hazardous material or hazardous chemicals in a flood hazard area are fully considered.	As part of the translation of flood risk into the Townsville City Plan, identify land use risk tolerability and review the Tables of assessment and ensure that levels of assessment for development are commensurate with the level of risk for the land use.
Flood hazard overlay code	Overlays can alter the level of assessment for proposed land uses and will take precedence over zone provisions in the hierarchy of assessment benchmarks. A risk-based Flood risk overlay code and overlay map draws greater linkages to the underlying assessment of risk to calibrate land use and planning responses (strategic framework, settlement pattern, zoning, overlay and codes) to the identified levels of risk. The overarching policy intent for a revised Flood hazard overlay code is for development to not result in an unacceptable level of flood risk to people, property and the environment.	Review the Flood hazard overlay code in accordance with section 6.1 of this report to ensure compliance with the SPP. As part of the translation of flood risk into the Townsville City Plan, identify land use tolerability to risk, and ensure that land use compatibility by risk level is

		reflected in the Flood hazard overlay code. Review the Flood hazard overlay code to ensure that there are clear policy statements for any specific land uses that require careful management in a natural hazard / risk area, or that should be avoided i.e., Critical infrastructure/ Essential community infrastructure and Vulnerable uses.
Overlay mapping	Risk-based overlay maps for flood risk (which indicates the degrees of risk i.e., from very low risk to very high risk) provides for the spatial application of the flood hazard overlay code. It creates a 'footprint' that will help determine the appropriate land use response in certain areas relative to the risk, spatially identifying the locations relative to the overlay codes' assessment benchmarks which provide circumstances for example, where: • development can occur subject to controls such as the finished floor level of all habitable floor space being above the defined flood level and the additional required freeboard; • development may be able to occur subject to demonstrating that it does not result in an intolerable level of risk to people and property, and it does not hinder disaster management capacity and capabilities including providing for the safe self-evacuation of occupants and visitors to occur via identified evacuation routes; or • development should be avoided.	Review the flood risk assessment and consider the spatial representation of flood risk, considering: • Whether and how to display the full floodplain extent out to Probable Maximum Flood consistent with prevailing practice and used to indicate a floor level check and trigger land uses that are vulnerable uses • What flood risk levels should be identified (i.e., Very high – Very low) based on the flood risk categorisation.
Definitions	A number of flood related administrative definitions and defined activity groups are required to give effect to the flood hazard overlay code. New definitions are proposed to reflect current, best practice terminology for flood and coastal risk management.	Review and update the administrative definitions and consider the use of defined activity groups in Schedule 1 of the Townsville City Plan, in accordance with Table 5-6 of this report, to

		ensure alignment with the revised Flood hazard overlay code.
Planning scheme policy	The current Townsville City Plan includes a Flood hazard planning scheme policy to support application and interpretation of the Flood hazard overlay code. As part of the scope of work for this project, the Flood hazard planning scheme policy is to be reviewed and updated to align with the revised Flood hazard overlay code.	Review and update the Flood hazard planning scheme policy to ensure alignment with the revised Flood hazard overlay code.
Format and structure	For flood hazard, there is an inconsistency of use of terms and language across the different parts of the Townsville City Plan.	Review the Townsville City Plan to ensure there is a consistency in structure and language between the Strategic framework, purpose and overall outcomes and assessment benchmarks for flood and coastal hazards.

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