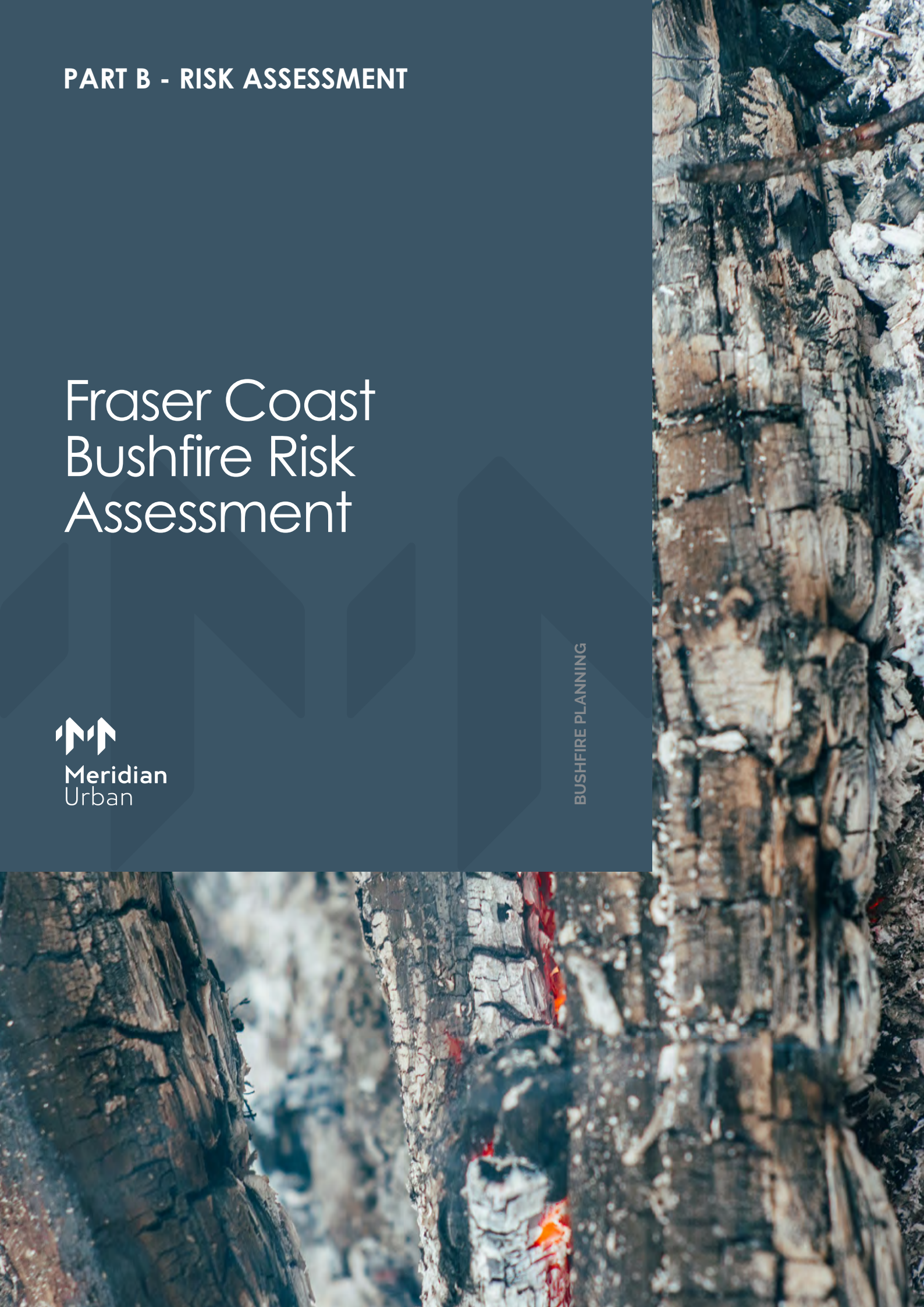
PART B - RISK ASSESSMENT

Fraser Coast Bushfire Risk Assessment

Meridian Urban

BUSHFIRE PLANNING



QUALITY STATEMENT

PROJECT MANAGER	PROJECT TECHNICAL LEAD
Laura Gannon	Laura Gannon
PREPARED BY	
SE/LG/FR	8/12/2022
CHECKED BY	
Sam Evans	8/12/2022
REVIEWED BY	
Laura Gannon	9/12/2022
APPROVED FOR ISSUE BY	
Laura Gannon	9/12/2022

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FPAA NSW BPAD Accreditation No. 33131

Member Planning Institute of Australia
Member Fire Protection Association of Australia
Member International Association of Wildland Fire
Member Natural Hazard Mitigation Association (USA)
Member Association of Fire Ecology

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Acknowledgement of Country

We acknowledge the Traditional Owners and custodians of the Fraser Coast region which extends through the traditional lands and waters of the Butchulla (Badtiala) and Kabi Kabi (Gubbi Gubbi) people.

We pay respect to Elders past, present and future.

We recognise and honour their ancient cultures, and their connection to land, sea and community. We recognise First Nations continued dedication to the management of healthy Country.

DISCLAIMER

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This report is prepared for the benefit of the named Client only. No third party may rely upon any advice or work completed by Meridian Urban in relation to the services, including this report, except to the extent expressly agreed in writing by Meridian Urban.

The client acknowledges and agrees that Meridian Urban has not created or contributed to the creation or existence of this hazard and the Client indemnifies Meridian Urban for claims arising out of or resulting from a bushfire event except to the extent attributable to the negligence of Meridian Urban.

The Client agrees that the Consultant shall have no liability in respect of any damage or loss incurred as a result of bushfire.

Part B – Fraser Coast Bushfire Risk Assessment

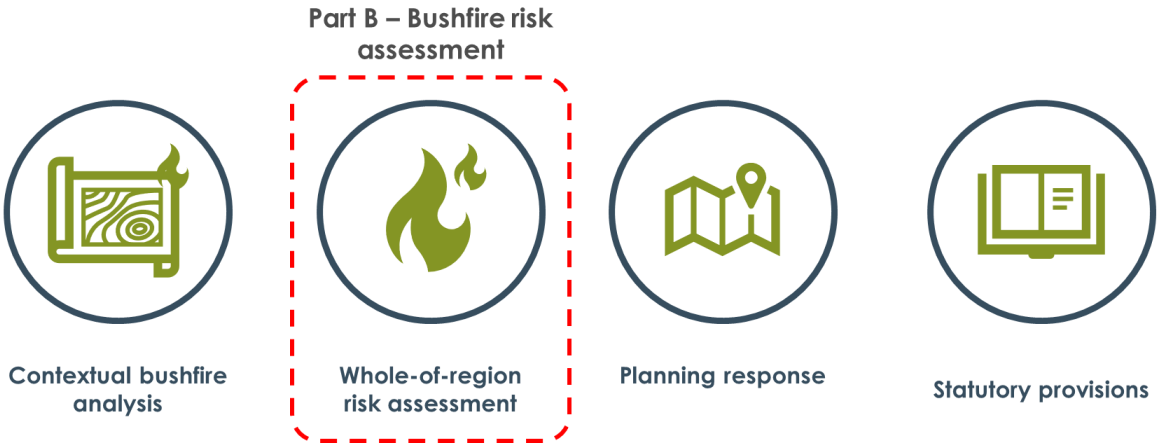
CONTENTS

1 Introduction

The intent of this Part B - Bushfire risk assessment is to examine and understand the potential nature of bushfire risk to people, property and the environment across the Fraser Coast region now, and into the future.

This risk assessment focusses on the potential likelihood and consequence of bushfire risk across the Fraser Coast region, insofar as it relates to strategic land use planning, having regard to factors of exposure, vulnerability and tolerability.

The Fraser Coast Bushfire Risk Assessment project comprises four component reports:



This whole-of-region risk assessment seeks to inform Council's strategic land use planning approach to the Fraser Coast region, adopting a risk-informed evidence base upon which to consider potential strategic land use planning options.

It achieves this by adopting risk-based principles to determine appropriately risk-informed zoning and other strategic planning controls.

This fit-for-purpose risk assessment is prepared pursuant to the current *State Planning Policy July 2017* (SPP), and the State interest guidance materials which are required to be appropriately integrated into a local planning instrument. This fit-for-purpose seeks to satisfy the requirements of the SPP and its guidance materials in relation to bushfire hazard and risk considerations.

The risk assessment process is based upon that set out by the *National Emergency Risk Assessment Guideline* (NERAG) and in accordance with AS/NZS ISO 31000 – Risk Management, having regard to the critical elements of likelihood, exposure, vulnerability, tolerability and consequence with consideration of existing and potential future risk exposure framed by an analysis of:

- Risks to people
- Risks to property
- Risks to infrastructure
- Potential cascading environmental and economic risks.

2 Risk assessment scope

The purpose of this landscape-scale strategic risk assessment is to assess the nature of bushfire risk associated with the Fraser Coast region and to recommend land use planning controls for Council's consideration when reviewing the Fraser Coast Planning Scheme which responds to the specific bushfire risk profile of the area.

The broader bushfire risk analysis, of which this risk assessment forms part, will develop cutting edge, locally refined and pragmatic land use planning approaches to bushfire risk management to enhance the protection of the Fraser Coast community from the threat of natural hazard.

This risk assessment forms Part B of the bushfire risk analysis. The planning response options report scheme provisions development forms Part C, whilst the preparation of planning scheme provisions will follow as Part D. .

This risk assessment adopts a risk-based land use planning lens in the critical analysis of the magnitude of potential risk likelihood, exposure, vulnerability, tolerability and consequence having regard to a range of scenarios to test a variety of risk outcomes, and mitigation and treatment opportunities. This process seeks to inform Council decision making in relation the review of the Fraser Coast Planning Scheme, having regard to the risk profile of the Fraser Coast region.

This approach seeks to satisfy the current State Planning Policy (SPP) and its guidance materials prepared by the State government, which together articulate the suite of bushfire hazard and risk considerations which are required to be appropriately considered as part of strategic planning activities in Queensland.

2.1 Assumptions, limitations and exclusions

2.1.1 Risk assessment assumptions and exclusions

The following assumptions and exclusions apply to this risk assessment:

- It is assumed the evidence sources utilised to inform this risk assessment are accurate and up-to-date, and can be reasonably relied upon for the purposes of its application.
- This risk assessment is not a bushfire management plan.
- It may offer options or recommendations for Council consideration as part of strategic land use planning processes pursuant to its obligations under the SPP. It does not make any decisions in relation to land use.
- It is assumed a range of other planning-related issues are likely to be taken into account as part of Council's consideration of the observations made by this risk assessment.
- This risk assessment seeks to analyse the extent of bushfire risk relevant to the Fraser Coast region with respect to the existing situation and potential future risk, based upon a series of defined scenarios. This assessment makes no inference as to the probability of any scenario coming to fruition.
- Any scenarios adopted for the purpose of this assessment are hypothetical only, designed to test a range of potential risk profiles, mitigation options and residual risk profiles to determine potential 'optimal' options having regard to bushfire risk.
- This assessment does not incorporate any traffic modelling or analysis with regard to bushfire emergency evacuation, and remains qualitative in this regard only.

2.1.2 Mapping data assumptions and limitations

This risk assessment was undertaken on the basis of the following data assumptions and limitations:

- Data sources are as provided by Council and as made publicly available, refer to **Appendix A** for further detail.
- In order to derive dwelling exposure in urban areas, the following considerations were taken into account:
    - There is no known publicly available dataset that accurately identifies residential buildings within medium to high density zoned urban areas (such as Hervey Bay and Maryborough).
    - Council provided a building outline dataset, dated to September 2021. The dataset was joined with rating data to provide an indication of land use. This dataset was filtered by categories of 'Residential' and 'Rural/Primary Production'.
    - Data inputs were excluded where there was an area less than 10m^2. It was acknowledged that not all building outlines had a residential purpose and large sheds, undercover parking spaces or storage spaces may have been captured.
    - The filtered building outline dataset was overlapped with the bushfire prone area dataset to determine exposure.
    - To establish how many potential dwellings per parcel, a unique value was created in the cadastral dataset (state-wide DCDB) by combining the lot and plan values. The building outline dataset was converted to a point and spatially joined with the cadastre dataset to determine the number of building points per parcel.
    - The product of this spatial join was queried to review the number of building outlines per parcel. Instances where there were more than 10 building outlines per parcel were reviewed to determine if the parcels were related to aged care, holiday parks, or lifestyle communities.
    - The data was further queried to identified the largest building outline per parcel and to vet potential duplications.
    - The dataset indicated a potential total of 40,434 residential zoned dwellings (note, this does not distinguish between occupied and non-occupied).
- Aged care facilities are derived from geocoded addresses from the Australian Institute of Health and Welfare. Council also provided aged care facility data which was aligned with the underlying cadastral boundaries to form a cadastral assessment.
- Road exposure is based on a road centreline and considers higher order roads only and does not consider local streets, laneways or other minor roads.

3 Guiding methodologies

In order to appropriately inform strategic land use planning controls, a fit-for-purpose bushfire risk assessment is necessary in order to examine potential risk and the nature of potential risk-responsive planning controls to address the various aspects of bushfire risk across the Fraser Coast region.

3.1 Objectives and priorities

The objectives and priorities of this fit-for-purpose risk assessment are:

1. The delivery of ***risk-informed land use planning*** policy, strategy and statutory controls for consideration when revising the Fraser Coast Planning Scheme.
2. The ***quantification of risk*** across the Fraser Coast region to formulate policy and strategy responses across the spectrum of:
    - Avoid
    - Mitigate
    - Accept
    - Transfer.
3. The identification of any ***potential acceptable or tolerable risk opportunities*** where development could be considered subject to statutory provisions. This includes understanding how land management and other bushfire protection measures can be undertaken to facilitate potential development having regard to risk to life and property.
4. Identification of the relevant ***strategic and statutory planning provisions*** which may be considered in response to the above matters.

3.2 Principles

The principles of this risk assessment serve as the foundation which guide the approach and implementation of methodologies. This risk assessment is:

- evidence-based
- stakeholder-led, guided by specialist expertise
- locally contextualised
- fit-for-purpose
- both quantitative and qualitative in assessment
- guided by benchmarks to appropriately determine 'acceptable risk'
- transparent to ensure integrity of process
- aligned with the strategic planning requirements of SPP and its guidance materials.

3.3 Process

As established above, this risk assessment process is undertaken through the specific lens of risk-based land use planning and using the processes outlined by the *National Emergency Risk Assessment Guidelines* (NERAG) published by the Australian Institute for Disaster Resilience (AIDR) as well as AS/NZS ISO 31000:208 Risk Management: principles and guidelines (ISO 31000).

This process aligns with that required by the SPP and its guidance materials.

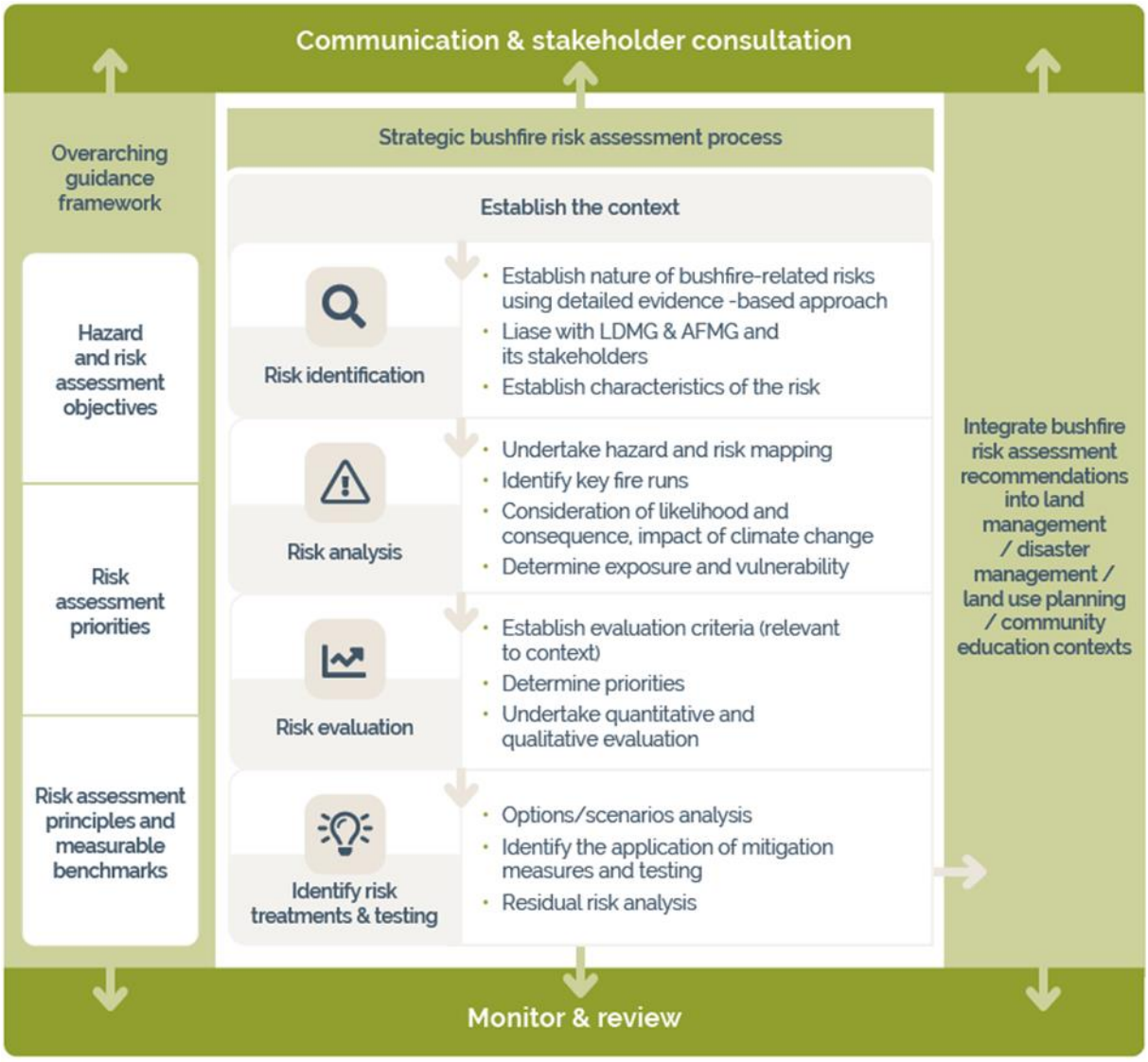


Figure 3-1 – Fit-for-purpose risk assessment framework in accordance with NERAG

Pursuant to NERAG and AS/NZS ISO 31000, the essential first stage of any natural hazard risk assessment process is establishing the context to understand the policy and regulatory environment, the physical environment, weather and climatic trends and event history (AIDR, 2017). The contextual analysis that underpins this risk assessment is contained in Part A.

How risk is considered by strategic land use planning processes accords with the NERAG framework but attracts different procedures than may otherwise be applied in operational contexts. This is an important distinction to make.

The AIDR Land Use Planning for Disaster Resilient Communities Handbook identifies how risk management procedures are applied in strategic land use planning contexts, outlined below.

Table 1 – Parallels between land use planning and risk management procedures (Source: AIDR, 2020)

Risk management procedure	Land use planning procedure
Establishing the context	Visioning, overarching desired futures
Risk assessment	Analysis of the circumstances and problems / opportunities
Selection of risk treatment options	Identification of planning alternatives and evaluation and selection of them
Risk treatment implementation	Planning implementation.
Ongoing communication and consultation	Communication and consultation
Ongoing monitoring and review	Monitoring effects and adjusting

3.4 An integrated approach

This risk assessment also incorporates an integrated and multi-disciplinary approach to the consideration and quantification of bushfire risk.

While this risk assessment is planning-based in its focus, it is necessary to consider the multitude of disciplines and mitigation approaches beyond land use planning that combined, enhance overall bushfire resilience.

This approach fundamentally recognises that it is not the role of strategic land use planning to necessarily avoid or reconcile all aspects of risk, but to contemplate the magnitude of risk in varying scenarios to consider how the quantum of mitigation measures may reduce risk exposure, or not, and whether such risk can reasonably be expected to limit risk to life, property and the environment to an acceptable or tolerable level.

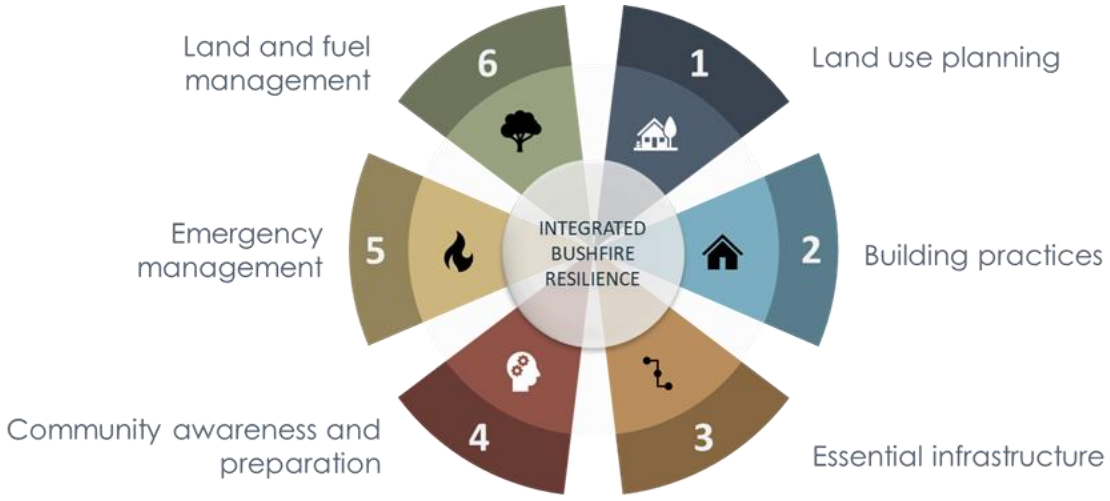


Figure 3-2 – An integrated approach to bushfire resilience

As part of this integrated approach, this risk assessment has regard to the Queensland Emergency Risk Management Framework prepared by Queensland Fire and Emergency Services (QFES). This framework is intended to be contemplated by multi-disciplinary approaches, including land use planning activities.

While the framework diverges in certain respects from NERAG, the overarching framework remains similar. This risk assessment has regard to the provisions of the Queensland Emergency Risk Management Framework, to that extent possible.

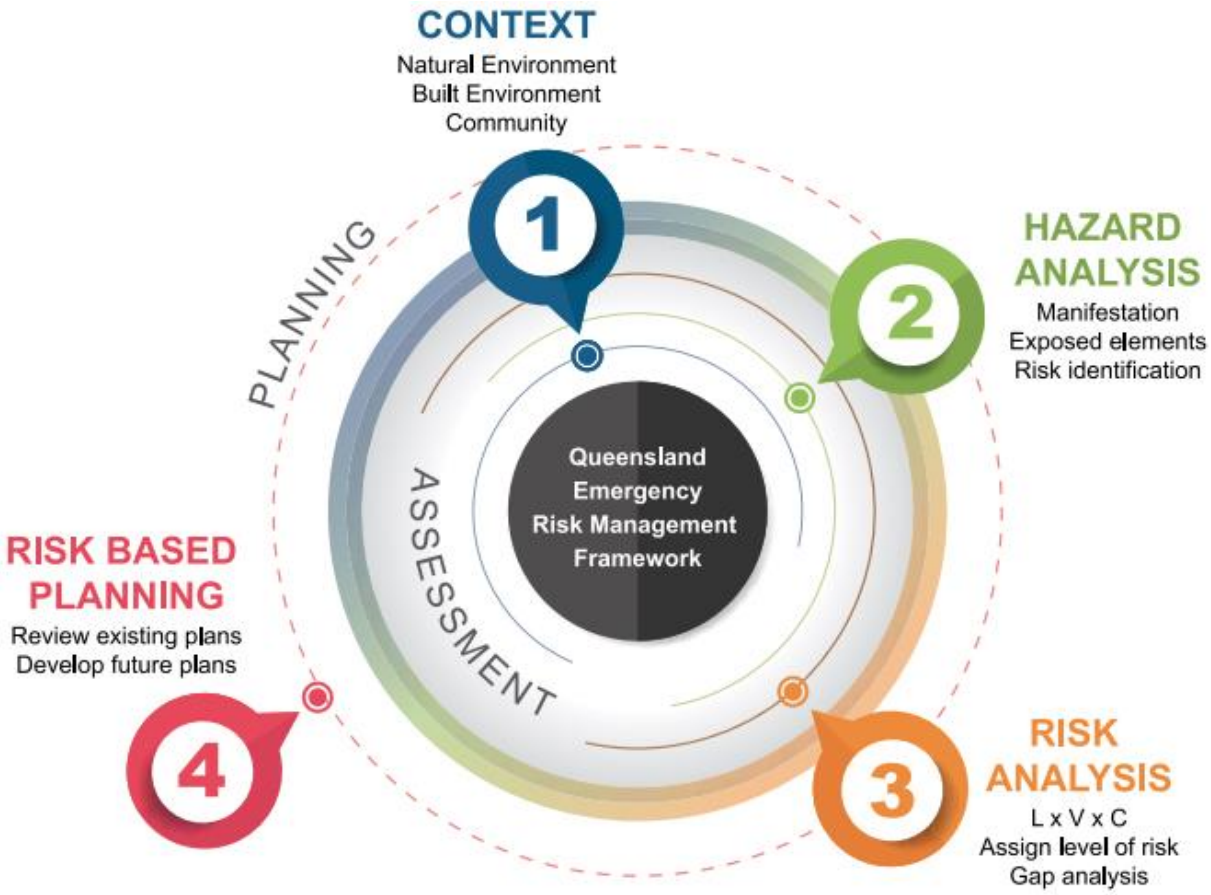


Figure 3-3 – The Queensland Emergency Risk Management Framework (Source: QFES, 2018)

3.5 Project technical stakeholders

A series of stakeholder engagement activities were undertaken as part of the technical development of this work, alongside Fraser Coast Regional Council as the project sponsor.

The purpose of this engagement was to gather the required technical input from various stakeholders in order to prepare the work, and test methodologies and findings.

An overview of the technical stakeholder engagement is outlined below.

Table 2 – Summary of project stakeholder engagement

Engagement	Project stakeholder	Date	Description
Project inception meeting	Council	29 August 2022	Project inception, project management requirements, objectives and principles, and approaches to engagement.
Field inspection	Council	12 September 2022	Visiting identified townships to inspect and verify degree of

Engagement	Project stakeholder	Date	Description
			bushland interface with urban settlements.
Project management meetings	Council	Ongoing	Ongoing project management meetings were held with Council to discuss matters which arose during the risk assessment.

3.6 State interest compliance

In 2017 the current SPP came into statutory effect. Further to the SPP are several non-statutory guidance documents:

- Integrating state interests in planning schemes – Guidance for local government (November 2021)
- Integrating building works into planning schemes – Guidance for local government (October 2020)
- Natural hazards, risk and resilience state interest – Bushfire – Example planning scheme assessment benchmarks (May 2021)
- Bushfire resilient communities – technical reference guide for the State planning policy State interest 'Natural hazards, risk and resilience – bushfire' (October 2019).

This risk assessment considers the SPP and its guidance material as a consolidated package of State expectations with regard to satisfaction of the State interest for bushfire hazard, risk and resilience.

One of the key additions to the current SPP and its guidance material which sets it apart from previous editions is the requirement for fit-for-purpose risk assessments for the natural hazards which continue a State interest, including bushfire. This process aims to ensure that bushfire risk is appropriately considered as part of strategic planning activities, having regard to the nature of potential risk rather than mere compliance with statutory bushfire protection measures.

State interest policy two (2) for natural hazards, risk and resilience establishes the expectations of a fit-for-purpose risk assessment which guide how the strategic consideration of bushfire risk is to be integrated into strategic planning processes. These include:

- the characteristics of the bushfire hazard in the area
- the relevant fire and fire weather history of the area
- the population and land uses currently exposed to bushfire hazard
- the anticipated growth of the community and the options for accommodating that growth
- the location of current and proposed community infrastructure and services
- the suitability of existing studies to inform the risk assessment
- the potential social, economic and environmental impacts that would result from a bushfire event

- local and district disaster management planning, including emergency response and recovery capacities.

The *Integrating state interests in planning schemes guidance material* establishes three steps for a risk assessment to follow:

- Step 1 – Hazard identification (to address State interest policy 1)
    - Including identification and local refinement of hazard mapping.
    - This risk assessment has identified the State-wide bushfire prone area mapping as being appropriate to meet State interest policy 1.
- Step 2 – Risk analysis (to address State interest policy 2)
    - Including the identification of risk (including the level of exposure, sensitivity and vulnerability) and acceptability of that risk (including whether the risk is acceptable, tolerable or intolerable).
    - This risk assessment includes a risk analysis in the following sections.
- Step 3 – Risk response (to address State interest policies 2 and 4)
    - Based on the outcomes of the risk assessment, preferred land use planning strategies are developed.
    - The risk response forms Part C of this project.
    - The planning scheme provisions preparation forms Part D of this project.

The *Bushfire Resilient Communities Technical Reference Guide* prepared by QFES articulates a further ten (10) policy positions with regard to land use planning for bushfire hazard in Queensland. These are specifically addressed in the following section.

The risk assessment responds to the requirements of the SPP and state interest guidance materials, with relevant policies of the Bushfire Resilient Communities Technical Reference Guide also functioning as the 'acceptable risk criteria' benchmarks for the assessment, as outlined below.

3.7 Acceptable risk criteria and benchmarking

The determination of outcomes which represent 'acceptable' or 'tolerable' risk versus 'intolerable' risk, and those measures, treatments and controls which might assist in achieving mitigated residual risk, must be measured against a set of benchmarks, or risk acceptability criteria. This provides clarity and transparency of assessment against key criteria.

The acceptable risk criteria established for this risk assessment are derived from the Bushfire Resilient Communities Technical Reference Guide policies.

Due to the multiplicity of criteria, this enables a clear measurement of risk across multiple factors, being the core principles which strategic planning outcomes are sought to satisfy. It clearly articulates the suite of standards which strategic planning outcomes are expected to meet.

This risk assessment adopts a principles-based approach to the determination of 'acceptable or tolerable' risk, being that risk which is considered within the risk tolerance appetite of land use planning authorities, or which is considered sufficiently low that it is deemed acceptable.

The approach adopted aligns with that of the 'ALARP' principle relating to risk tolerance levels set out by both the Australian Institute of Disaster Resilience 2020 Land Use Planning for Disaster Resilient Communities Handbook, and the 2016 Planning Institute of Australia publication, the National Land Use Planning Guidelines for Disaster Resilient Communities.

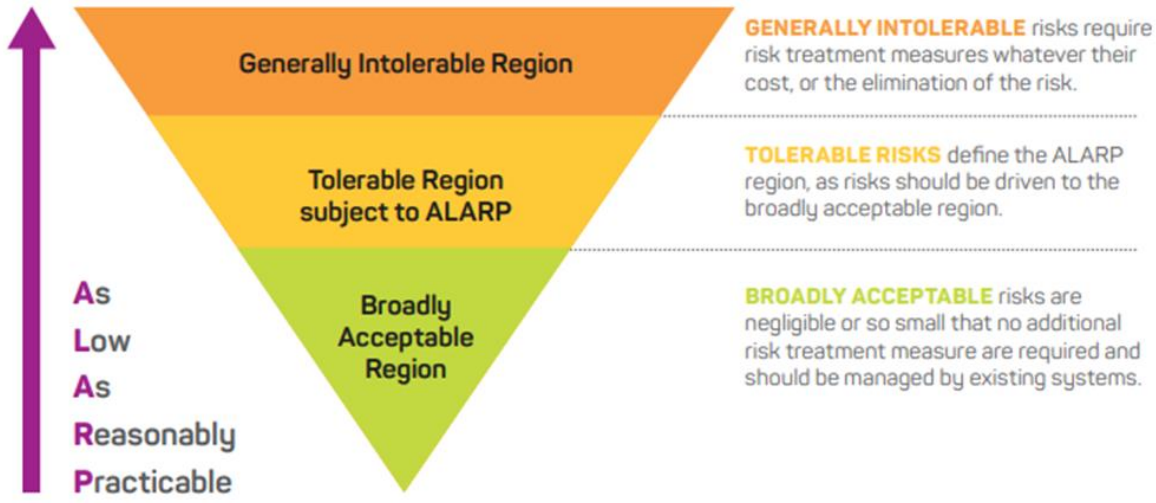


Figure 3-4 – The 'ALARP' principle for risk tolerance (Source: AIDR, 2020)

It is likely the assessment of strategic planning options against these benchmarks may not be 'black or white' or a clear 'pass or fail'. This is because qualitative and contextual considerations which extend beyond the contemplation of bushfire risk, relating to other strategic planning matters, are likely to apply.

To this end, this acceptable risk methodology adopts the 'traffic light' methodology of the ALARP approach, where the quantum of quantitative and qualitative aspects of the risk assessment are considered against a system which indicates potential levels of risk acceptability or tolerability.

Table 3 – Risk acceptance / tolerability benchmark assessment system

Risk benchmark	Description as per SPP 2017
Acceptable	A risk that, following an understanding of the likelihood and consequences, is sufficiently low to require no new treatments or actions to reduce risk of the natural hazard further. Individuals and society can live with this risk without feeling the necessity to reduce the risk any further.
Tolerable, subject to treatment	A risk that, following an understanding of the likelihood and consequences, is low enough to allow the exposure to the natural hazard to continue, and at the same time high enough to require new treatments or actions to reduce risk. Society can live with this risk but believes that as much as is reasonably practical should be done to reduce the risks further.
Intolerable	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.

The determination of risk acceptability or tolerance is essential in the consideration of appropriate risk-informed strategic planning, land use allocation and development controls which are needed to respond to the nature and potential level of risk, as part of the contemplation of Planning Scheme controls.

It must be noted that risk levels vary across the landscape, thus a place-based approach is required which considers specific locations across the Fraser Coast region.

The following table outlines the risk acceptability / tolerability benchmarks against which risk is to be analysed and evaluated, relative to different risk treatment options. It is informed by the strategic land use policies set out in the Bushfire Resilient Communities Technical Reference Guide prepared by QFES.

The consideration of policy options represents the final step of the risk assessment process, having regard to the potential planning-based risk treatment options, set out in **Part C** of this report.

Table 4 – Acceptable risk criteria and benchmarks against which residual risk is measured for this assessment

BRC Policy	QFES policy approaches which guide acceptable and tolerable risk
Mapping	Mapping is robust and locally relevant.
Fit-for-purpose risk assessment	A fit-for-purpose risk assessment informs plan-making or amendments to achieve an acceptable or tolerable level of risk to people and property in bushfire prone areas.
Avoidance, or mitigate to an acceptable or tolerable level	The planning scheme or amendments following a risk assessment are based on the principle of avoidance as the first priority, and then mitigation of the risk to an acceptable or tolerable level.
Disaster management	Disaster management capacity and capabilities are maintained to mitigate the risks to people and property to an acceptable and tolerable level.
Urban design	Lot and neighbourhood layout and design mitigates the risks to people and property to an acceptable and tolerable level.
Vulnerable uses	Vulnerable uses are not located in bushfire prone areas unless there is an overwhelming community need for the development of a new or expanded service, there is no suitable alternative location and site planning can appropriately mitigate the risk.
Revegetation, rehabilitation and land management	Revegetation and rehabilitation avoids an increase in the exposure or severity of bushfire hazard.
Hazardous activities and storage	Development does not locate buildings or structures used for the storage or manufacture of materials that are hazardous in the context of a bushfire within a bushfire prone area unless there is no suitable alternative location.
Protective functions	The protective function of vegetation arrangements that can mitigate bushfire risk are maintained.
Community infrastructure	Community infrastructure for essential services is not located in bushfire prone areas unless there is an overwhelming community need for the development of a new or expanded service and there is no suitable alternative location, and further, the infrastructure can be demonstrated to function effectively during and immediately after a bushfire event.

3.8 Geographic extent

This risk assessment relates to the Fraser Coast Region local government area, as identified in Part A – Contextual Analysis.

In order to provide alignment between this Risk Assessment and support the review of the Fraser Coast Planning Scheme, eight local precincts have been used as a basis for the analysis to provide contextualisation of how bushfire hazard manifests in different localities across the Fraser Coast region.

The precincts have been adapted from precincts utilised for the Coastal Hazard Adaptation Strategy and from the inundation risk amendments project which is being undertaken concurrently by Council. A map of the precincts is provided below in Figure 3-5.

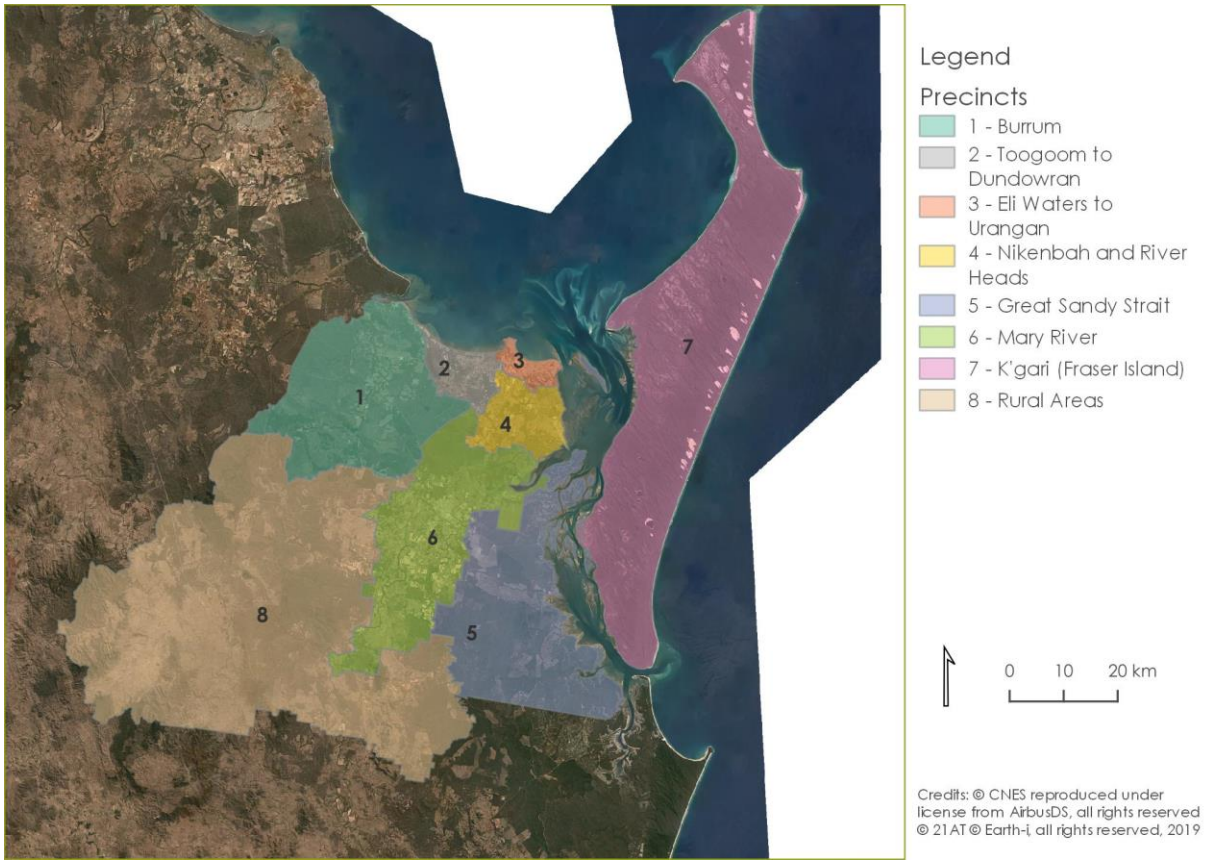


Figure 3-5 – Fraser Coast local precincts

3.9 Bushfire prone areas mapping

To inform this risk assessment, the existing state-wide bushfire prone areas (BPA) mapping has been utilised.

The existing state-wide BPA mapping which supports the SPP was prepared in 2014. The mapping was updated in 2017 however, this update related only to South East Queensland without change to its application in Fraser Coast.

The State's current bushfire hazard mapping methodology was released in 2014 and prepared by the CSIRO in conjunction with QFES. The methodology is set out in the following documents:

- *New Methodology for State-wide Mapping of Bushfire Prone Areas in Queensland*
- *Estimating the Potential Bushfire Hazard of Vegetation Patches and Corridors: An enhancement of Queensland's methodology for State-wide mapping of bushfire prone*
- *Bushfire Resilient Communities technical reference guide*.

The mapping methodology is based upon potential fire line intensity using the MacArthur Mk 5 Forest Fire Danger Meter and inputs of total fuel load and effective slope to derive a potential rate of fire spread. A 100m 'buffer' area is also applied under the SPP (replicating the approach under AS3959:2018 – Construction of Buildings in Bushfire Prone Areas), being the zone in which ember attack and radiant heat remain most relevant, adjacent to the actual hazard.

The State-wide mapping methodology comprises four (4) hazard classes:

1. Medium potential bushfire intensity;
2. High potential bushfire intensity;
3. Very high potential bushfire intensity; and
4. Potential impact buffer (100m).

Refer to Part A – Contextual Analysis for region-wide mapping imagery.

3.9.1 Verification process

Pursuant to the provisions of the Bushfire Resilient Communities technical reference guide which constitutes guidance material under the SPP, local verification of the current State-wide BPA mapping has been undertaken for the Fraser Coast region, as part of this Bushfire Risk Analysis.

This process considers the accuracy of data inputs and the resultant bushfire hazard class categories, primarily relating to fireline intensity.

The state-wide BPA mapping is commonly used to form the bushfire overlay mapping for planning schemes across the state.

The State-wide BPA mapping is regularly updated by QFES. As such, it may be the case the State-wide BPA mapping is updated following this risk assessment and prior to revising the Fraser Coast planning scheme. Any updates are likely to incorporate the latest Regional Ecosystem dataset. Having regard to this risk assessment it is considered unlikely that updated mapping (based on the existing methodology) would result in any significant changes to the risk profiles identified by this risk assessment. This matter was discussed with the Department and QFES during the preparation of this assessment.

A BPA reliability assessment report has been prepared in August 2022 and is attached at **Appendix B**. It confirms the current 2014 mapping meets a satisfactory level of accuracy to inform this risk assessment, noting that some discrepancies were identified. Overall however,

these discrepancies are limited in number and unlikely to have a material impact on the broader context of the risk assessment.

A recommendation of this risk assessment is that Council works alongside the State government as part of ongoing updates and amendment processes supporting the State-wide BPA mapping.

Updated mapping is not considered to likely change the strategic outcomes observed by this risk assessment.

4 Risk identification methodology

This section describes the methodology undertaken for the risk identification component of the Risk Assessment.

The Queensland Disaster Management Arrangements (QDMA), Queensland Emergency Risk Management Framework (QERMF) and Queensland Strategy for Disaster Resilience (QSDR) identify the broad framework for the consideration of risks from natural hazards in Queensland.

This section largely relates to Process 1 of the QERMF.

Figure 4-1 – Process 1 of the QERMF (Source: QFES, 2018)

From resilience to recovery, five (5) lines of operation guide the types of risk which are contemplated by formal processes, and which are adopted for the purposes of this risk assessment. This also aligns with the approach adopted by NERAG.

Figure 4-2 – Resilience and recovery lines of operation (Queensland Government, 2019)

In order to understand the nature of potential risks associated with bushfire hazard across the region, a quantitative GIS-based analysis of hazard mapping was first performed. This process was conducted using the current 5 per cent annual exceedance probability (AEP) (generally equivalent to a 1 in 20 year annual return interval (ARI)) climate-adjusted state-wide bushfire prone areas mapping prepared by the Queensland Government, contained within the SPP Interactive Mapping System.

The mapping outlined above is based on fireline intensity hazard classes. These classes seek to illustrate, based on specific data inputs, the potential magnitude of bushfire hazard based upon a calculation of fireline intensity.

Fireline intensity is a measure of fire intensity at the fire front. It is measured as the amount of energy released per metre width of the fire edge (CSIRO, 2013).

As noted by Leonard et al. (2014) '*at a landscape scale, the preferred metric for indicating the potential severity of these impact mechanisms is fireline intensity. Fireline intensity is a standardised measure of the rate that an advancing head fire would consume fuel energy per unit time per unit length of fire front introduced by Byram (1959)*'.

Pursuant to research conducted by Tolhurst, dwelling loss rates are observed to increase where fireline intensity exceeds 30,000 kW/m. As noted earlier by this Bushfire Risk Analysis, increased house loss is also observed in events where FFDI exceeds 50. Direct firefighting is not possible where fireline intensity exceeds 3,500 kW/m.

As per the State's bushfire prone areas mapping methodology, the potential bushfire intensity classes are:

Table 5 – Potential bushfire intensity classes and fireline intensity ranges as per the state-wide mapping methodology (Source: CSIRO, 2014)

Potential bushfire intensity class	Potential fireline intensity
1. Very high (potential intensity)	40,000+ kW/m
2. High (potential intensity)	20,000 – 40,000 kW/m
3. Medium (potential intensity)	4,000 – 20,000 kW/m

Where fireline intensity is below 4,000 kW/m (including for grassfire), the potential bushfire intensity is considered low and is removed from consideration for land use planning in Queensland.

For each of the mapping approaches identified above, the GIS-based data analytics has considered:

1. The extent of mapped bushfire hazard relative to the planning cadastre
2. The 100 metre bushfire hazard buffer (area in which radiant heat and ember attack may occur around bushfire hazard areas)
3. A 500 metre and 700 metre hazard buffer extent, based on house loss research from bushfire events across Australia
4. The settlement pattern (zoning) as per the Fraser Coast Planning Scheme.

Critical to the analysis of risk, existing Australian research reveals that 80-90 per cent of property loss occurs within 100 metres of the bushland interface, and this is the basis for current planning and building policy and regulation across Australia.

Additionally, comprehensive data interrogation performed by CSIRO demonstrates that 85 per cent of bushfire fatalities in 260 events from 1901 to 2011 have occurred within the first 100 metres of the bushland interface, including persons attempting to evacuate (Blanchi et al. 2012).

Recent research finds that dwelling and property loss can and does routinely occur beyond this 100 metre extent.

The findings handed down by the National Natural Disaster Arrangements Royal Commission following the 2019-2020 'Black Summer' fire season identified that almost all of the dwellings lost during those events were located within 500m of bushland.

In the 2003 Canberra bushfires, and other events over time, property and dwelling loss has occurred within circa 700m of the bushland interface in urban contexts (Leonard & Blanchi, 2012; McAneney & Chen, 2004 and Ahern & Chladil, 1999). This is particularly relevant given recent bush fire disasters across the globe which have penetrated urban areas.

To this end, consideration of flame contact, radiant heat flux and ember attack surrounding bushfire hazard sources to 100 metres, 500 metres and 700 metres (representing the full or maximum extent of loss observed to date in Australia) has been considered by this risk assessment.

It is noted the 100 metre extent remains the basis of planning policy in Queensland and across Australia. This report does not suggest a change to this but rather, seeks to consider the context of the broader landscape around bushfire prone areas for a fulsome consideration of potential bushfire risk.

Table 6 – Indicative distances between hazardous vegetation and loss from bushfire for severe events (Source: Leonard et al. 2014, Leonard & Blanchi, 2009, McAneney et al. 2009, Ahern & Chladil, 1999)

Bushfire attack mechanism	Typical upper distance for 80% of all house losses (m)	Typical upper distance for house ignition from forest (m)	Maximum reach (km)
Primary ember attack	100	500-700	10
Radiant heat exposure	70	160	N/A
Flame contact / exposure	50	100	N/A

The above analysis was conducted for the entire Fraser Coast region and for each Local Area as per Section 3.8, for localised refinement of analysis and observations.

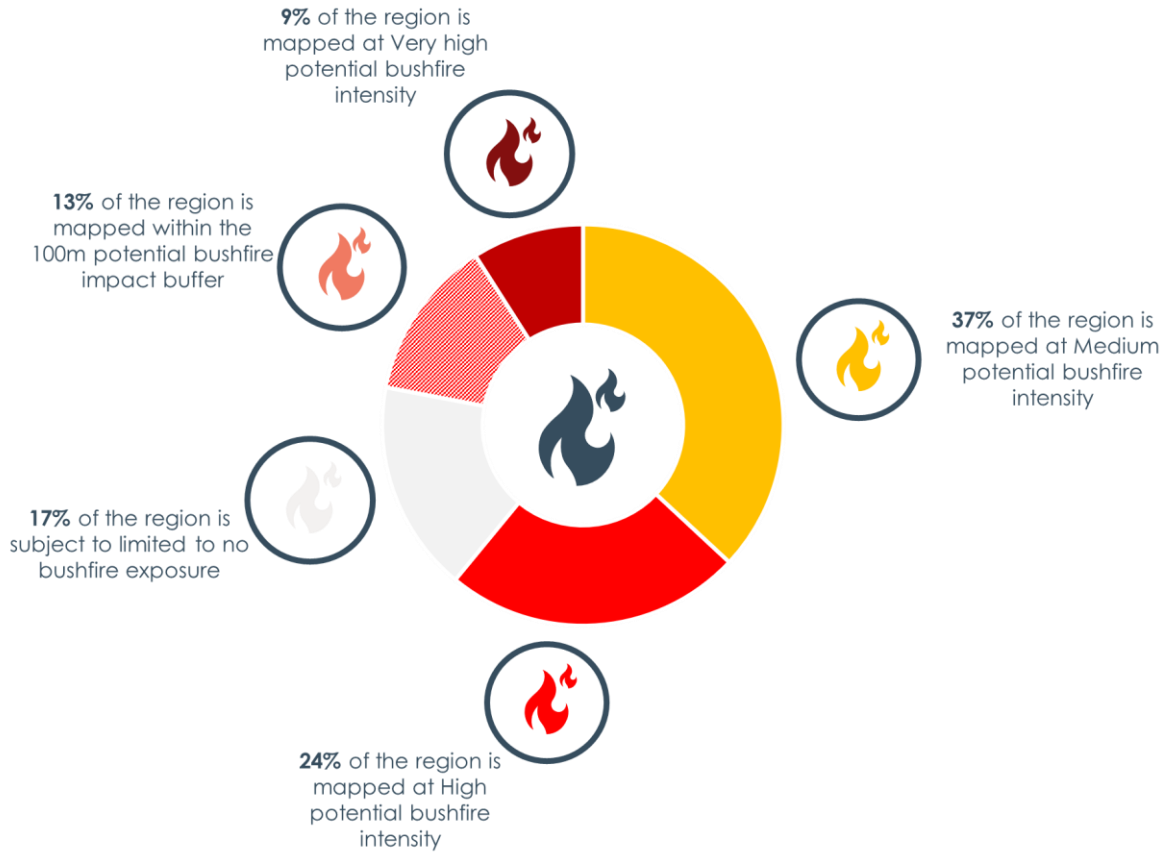
5 Region-wide risk identification

This section provides an overview of the key aspects of the spatial analysis which informed this risk assessment. Comprehensive summaries of the data analysis undertaken are provided at **Appendix C** and relevant mapping is provided at **Appendix D**.

A whole-of-region overview of identified bushfire hazard exposure and vulnerability is provided, culminating in the identification of strategic-level risks which are further explored throughout the risk evaluation process.

5.1 Fraser Coast region exposure and vulnerability

Of the 701,120 hectares of zoned land within the Fraser Coast region, **83 per cent is identified as being subject to potential bushfire hazard** including both the bushfire intensity area and potential bushfire impact buffer. This is comprised of land within the Very High, High, Medium potential bushfire intensity areas and the 100 metre buffer.



Further analysis of the potential bushfire hazard mapping indicates that in addition to the 83 per cent of the region that is subject to potential bushfire hazard (including within the 100 metre potential impact buffer), 98 per cent is either directly within the bushfire hazard area or within 700 metres of the hazard area. This is relevant as **the 100 metre and 700 metre buffers represent the typical upper distance of for building ignition from ember attack** as previously explained.

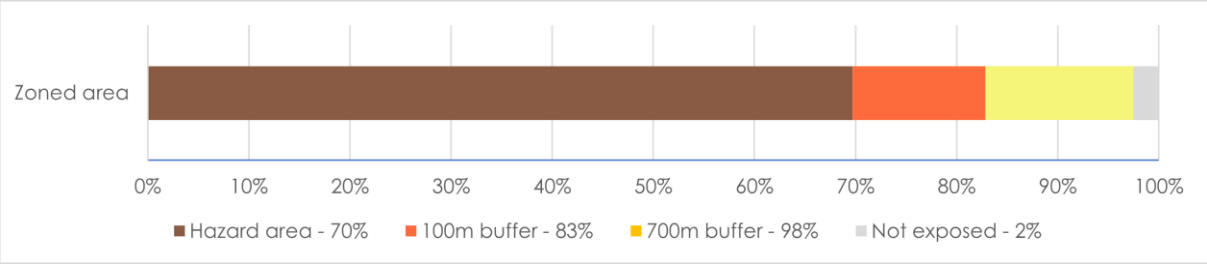


Figure 5-1 – Zoned land subject to bushfire hazard within the Fraser Coast region

5.1.1 Land use zones

Potential bushfire hazard mapping (including up to the 100 metre potential impact buffer) has been analysed using the existing Planning Scheme zones. This provides an understanding of where potential bushfire hazard is present within the region as it relates to land uses and gives an insight as to potential risks and vulnerabilities.

The results demonstrate high levels of potential bushfire hazard across a number of land uses including rural land, environmental land and rural living land. This level of exposure in these land zones is to be expected by virtue of the land use intent for these zones.

Notably, land zoned for community facilities is also subject to high levels of potential bushfire hazard however, this is likely due to the nature of some community facility zoned parcels including the rail line and other large land parcels.

Residential land and employment land were subject to moderate levels of exposure to potential bushfire hazard.

Medium and high impact industry are also moderately exposed, largely owing to their general location on the edge of urban areas to provide necessary industrial buffer distances to local sensitive receptors. This pattern of land use allocation, which is accepted practice, introduces bushfire exposure considerations for such activities.

Figure 5-2 – Exposure of zoned land by land use category within Fraser Coast region

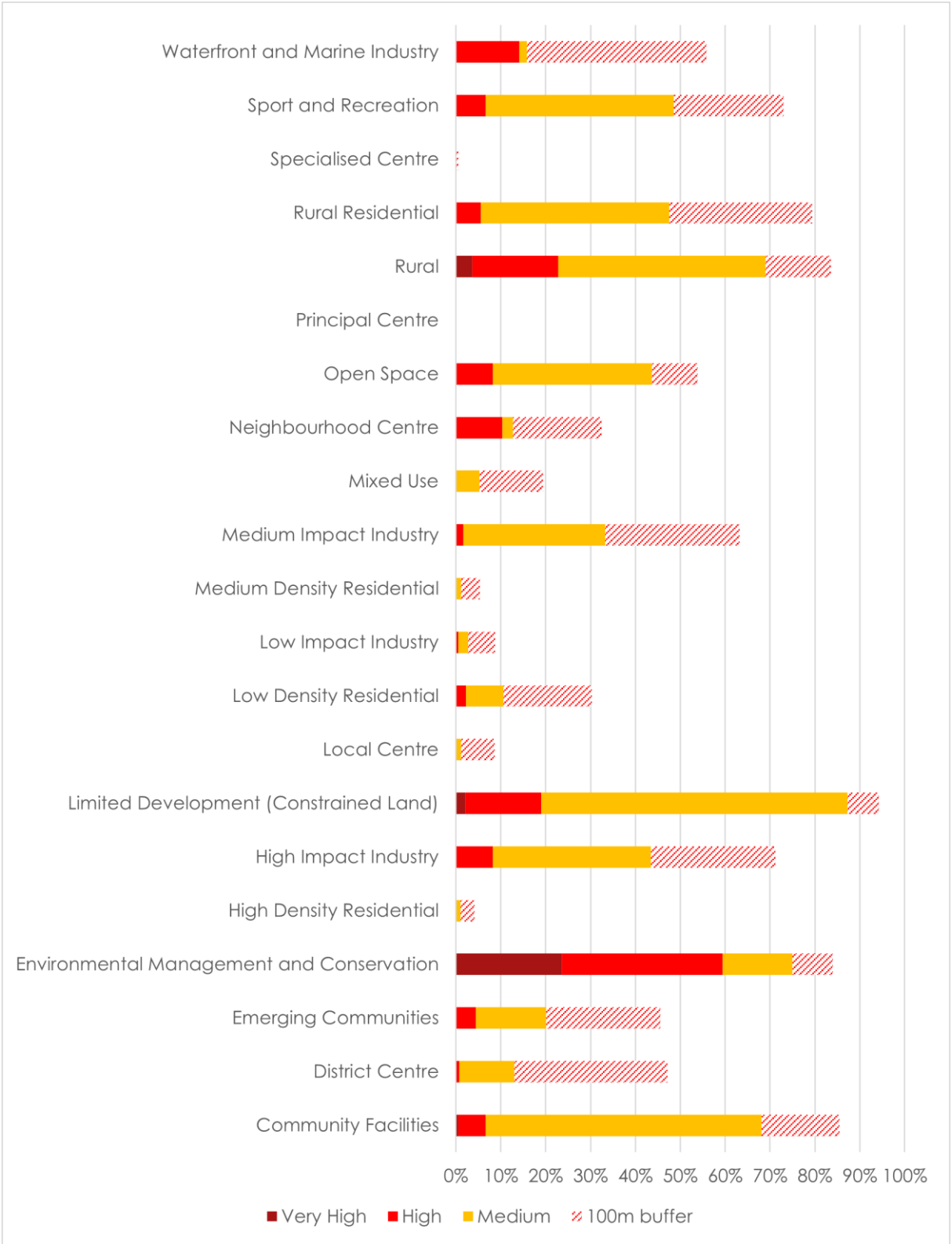


Figure 5-3 – Exposure of existing land use zones to potential bushfire hazard

5.1.2 Dwellings and residents

Of the 40,434 residential dwellings considered for this analysis, an estimated 8,812 (22 per cent) are exposed to potential bushfire hazard (including within the 100 metre buffer).

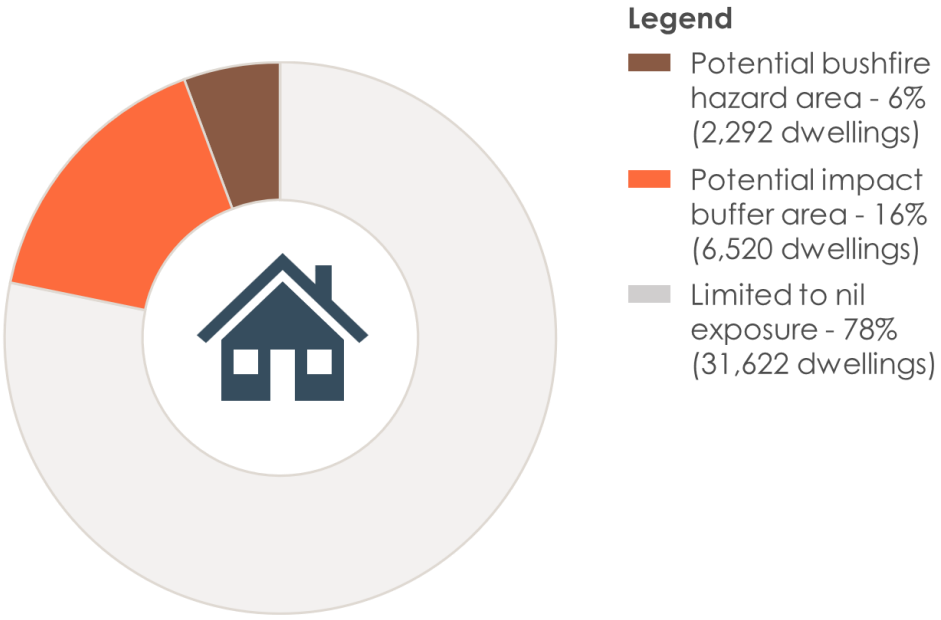


Figure 5-4 – Residential dwelling exposure within Fraser Coast region

Of the 8,812 dwellings exposed to potential bushfire hazard:

- 2,292 (26 per cent of exposed dwellings and 6 per cent of the total residential stock of the region) are within the potential hazard area
- the majority (6,520 dwellings, equating to 74 per cent of exposed dwellings and 16 per cent of the total residential stock of the region) are within the potential impact buffer (100 metre buffer) area.

As identified in Part A – Context Analysis, it is relevant to note that the current Fraser Coast Planning Scheme designates only the potential bushfire hazard area (comprising the medium hazard, high hazard and very high hazard bushfire areas) as part of the 'designated bushfire prone area' for the purposes of triggering assessment against AS3959. This designation does not include the potential impact buffer. As discussed above, approximately 16 per cent of all dwellings within the Fraser Coast region are within the potential impact buffer area.

Under the current provisions of the Planning Scheme, these dwellings may not have required assessment against or compliance with AS3959. This potentially elevates built form vulnerability across the region as it currently stands.

5.1.3 Vulnerable facilities and essential community infrastructure

Vulnerable facilities (such as aged care facilities, childcare centres and schools) may present an increased vulnerability to bushfire hazard due to the nature of the activity, difficulty of evacuation or the abilities of the facility occupants. The following table provides an overview of the potential bushfire hazard exposure (including the 100 metre buffer) to vulnerable facilities.

Table 7 – Summary of vulnerable facility exposure within the Fraser Coast region

Vulnerable facility	Number of facilities exposed to potential bushfire hazard
Aged care	1 (of 15 in total)
Childcare facilities	3 (of 22 in total)
Schools	11 (of 38 in total)
Higher education facilities	1 (of 3 in total)
Hospitals	0 (of 5 in total)
Correctional facilities	1 (of 1 in total)

Essential community infrastructure (such as services infrastructure) plays an important role in ensuring essential services are provided to the community. The following table provides an overview of the potential bushfire hazard exposure (including up to the 100 metre buffer) to essential community infrastructure.

Table 8 – Summary of essential community infrastructure exposure within the Fraser Coast region

Essential community infrastructure	Number of facilities exposed to potential bushfire hazard
Electrical zone substations	12 (of 20 in total)
Sewer treatment plants	4 (of 8 in total)
Sewer pump stations	58 (of 154 in total)
Water treatment plants	4 (of 4 in total)
Water pump stations	12 (of 22 in total)

Locations of the above facilities and assets are included at **Appendix D**.

5.1.4 Roads and evacuation network

Roads and road connectivity are critical to evacuation of residents and access for emergency services during and after an event. Roads within 100 metres of mapped bushfire hazard may experience reduced visibility due to smoke, dense ember attack and varying levels of potential radiant heat exposure. In some cases, they may also experience flame contact. These effects can also occur beyond 100 metres however, it is largely the threat of potential flame contact and extreme radiant heat which land use planning should consider.

63% of the key road network is exposed to potential bushfire hazard

For the purpose of this assessment, the key road network (comprising only the higher order roads) is considered. Of the key road network, 63 per cent is identified within the potential bushfire hazard exposure area (including up to the 100 metre buffer).

Highways (83 per cent) and rural arterial roads (81 per cent) are identified as being most exposed with significant portions being mapped within the potential bushfire hazard exposure area. Additionally, there is moderate exposure to the collector and distributor network of roads.

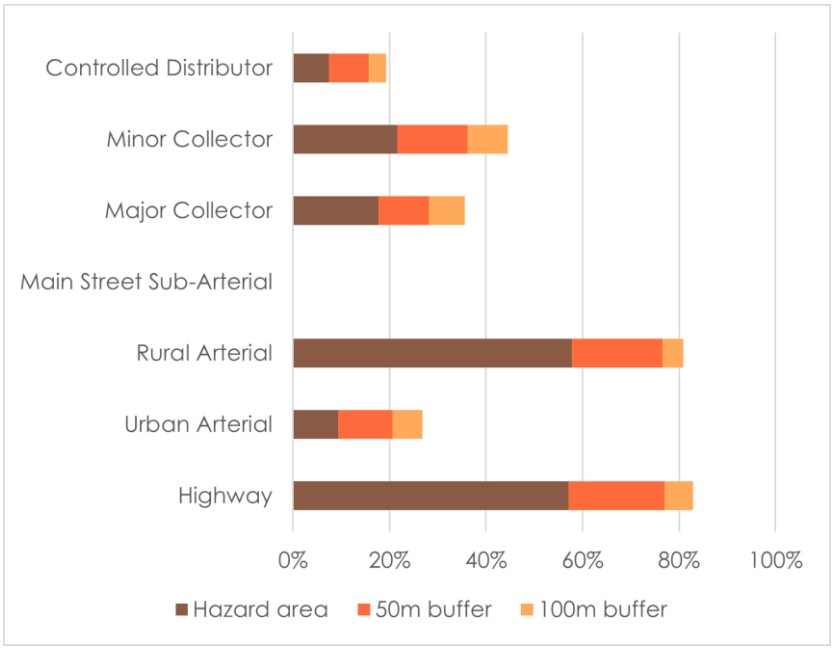


Figure 5-5 – Exposure of key road network to potential bushfire hazard

5.1.5 Key findings – Summary of existing exposure and vulnerability

Based on the data above, the following observations are relevant to potential bushfire hazard exposure within the Fraser Coast region:

- Almost one quarter (22 per cent) of all residential dwellings and the region's population are within 100 metres of potential bushfire hazard.
- The majority of zoned land, including urban and rural zones, within the Fraser Coast region (83 per cent) is identified as exposed to potential bushfire hazard (including the 100 metre buffer). Over 97 per cent of zoned land within the region is within 700 metres of mapped potential bushfire hazard.
- A large portion of rural residential zoned land (79 per cent) is identified as being exposed to potential bushfire hazard (including up to the 100 metre buffer).
- A moderate portion of residential zoned land (32 per cent) is identified as being exposed to potential bushfire hazard (including the 100 metre buffer). More specifically, the following residential zones include higher levels of exposure as follows:
    - Emerging communities (46 per cent)
    - Low density residential (30 per cent).
- The majority of Rural zoned land (84 per cent) is exposed to potential bushfire hazard (including the 100 metre buffer).
- Almost the entirety of the Limited development zone (constrained land) (94 per cent) is exposed to potential bushfire hazard (including the 100 metre buffer).
- Land within the Community facilities zone is also identified as highly exposed with 85 per cent exposed to potential bushfire hazard (including the 100 metre buffer).
- Nearly half of all employment zoned land (44 per cent) is exposed to potential bushfire hazard (including up to the 100 metre buffer). More specifically, this includes the following zones which are overrepresented:
    - High impact industry zoned land (71 per cent)

- Medium impact industry zoned land (63 per cent)
- Waterfront and marine industry zoned land (56 per cent)
- District Centre zoned land (47 per cent).

- Almost half of recreation and open space zoned land (46 per cent) is identified within 100 metres of potential bushfire hazard.
- the majority of vulnerable facilities are located outside of the potential bushfire hazard area. Of note, 11 schools, three childcare facilities and one aged care are identified as potentially exposed.
- Based on the data available, a moderate proportion of essential community infrastructure across the region is exposed to potential bushfire hazard including the following:
  - Over half of all electrical zone substations
  - Half of all sewer treatment plants
  - Over a third of all sewer pump stations
  - All water treatment plants
  - Over half of all water pump stations.
- A sizeable portion of the key road network (63 per cent) is identified as exposed to potential bushfire hazard (including up to the 100 metre buffer). Notably, the following aspects of the road network are exposed:
  - Highways (83 per cent)
  - Rural arterial roads (81 per cent)
  - Minor collector roads (45 per cent)
  - Major collector roads (36 per cent).

5.1.6 Summary of identified risks

Based on the analysis of this data, the following risk observations are identified for the Fraser Coast region. These strategic-level risks form the basis against which further consideration of issues are explored throughout the evaluation component of this risk assessment.

Risk No.	Identified strategic-level risk	Type of risk
1	Almost one quarter of the existing residential dwelling stock is exposed to potential bushfire hazard, which can reasonably imply one quarter of the region's population. Exposure is likely to grow into the future on a cumulative basis, based on existing use rights, as well as the existing and proposed settlement strategy for the region. The existing planning scheme does not currently include the potential impact buffer as part of the designated bushfire prone area for building works purposes. This has likely exacerbated exposure and potential vulnerability of the existing built form given that new development would not have been constructed having regard to the hazard.	Human and social Built environment
2	The existing Planning Scheme does not designate land within the Potential impact buffer as part of the designated bushfire prone area for the Building Code of Australia and Queensland	Human and social

	Development Code which may have resulted in a proportion of residential development which is subject to bushfire hazard not having triggered assessment against or compliance with AS3959.	Built environment
3	Lands zoned for or capable of accommodating future growth are exposed to potential bushfire hazard, particularly the Rural residential and Emerging communities zones.	Human and social Built environment
4	Risk from grassfire (including on rural lands and agricultural cropping lands), and short, sharp interface fire events.	Human and social Built environment Roads and transport
5	Policy tensions between bushfire hazard protection, as a factor of growth and development, and environmental values have and are likely to continue to generate conflict at the urban bushland interface.	Human and social Built environment
6	High portions of parts of the region's employment generating zoned land are exposed to potential bushfire hazard including both High impact industry, Medium impact industry, Waterfront and marine industry and District centre zones.	Economic
7	A high portion of rural zoned land is exposed to potential bushfire hazard across the region.	Economic
8	Portions of the recreation and open space network are exposed to potential bushfire hazard across the region.	Human and social Built environment
9	Some vulnerable facilities are identified as being subject to potential bushfire hazard.	Human and social Built environment
10	A moderate portion of essential community infrastructure is exposed to potential bushfire hazard particularly across the electricity, water and sewerage networks.	Built environment Economic
11	Parts of the evacuation network may be compromised in a fire event and may impact the ability to evacuate in certain locations, under certain conditions, especially along highways and the rural arterial roads. The evacuation network risks are amplified by the number of coastal communities serviced by single road access, and exposed the landscape-scale fire runs.	Human and social Roads and transport
12	Hazard exposure may change in certain locations over time to higher hazard classes, and increased fire weather as a result of climate change.	Environmental

6 Bushfire risk analysis

This section provides a detailed analysis of the identified land use planning related risks relating to bushfire hazard across the Fraser Coast LGA.

6.1 QERMF Analysis

The risk analysis methodology aligns, and indeed follows, the risk analysis methodologies and matrices set out by the QERMF, as illustrated below.

Figure 6-1 - Process 2 of the QERMF (Source: QFES, 2018)

6.1.1 Analysis of overall risk likelihood

This risk assessment seeks to support long-term land use planning. As such, the approach of this risk assessment assumes bushfire events and impact are expected to occur within the region.

The table below outlines the event likelihood definitions, as per the QERMF.

Likelihood Table		
Historical Likelihood	**Likelihood Level**	**Definition**
Has occurred 3 or more times in the last year or at least each year over the last 5 years	**Almost Certain**	Almost certain to occur in most cases
Has occurred twice in the last 5 years	**Likely**	Likely chance of occurring in most cases
Has occurred twice in the last 10 years	**Possible**	Might occur in most cases
May occur, and has occurred once in the last 20 years	**Unlikely**	Not expected to occur in most cases
May only occur in exceptional circumstances or has occurred only once in the last 50 years or more	**Rare**	Will only occur in exceptional circumstances and has not occurred in most cases

Figure 6-2 - QERMF even likelihood table

Different parts of the region have experienced bushfire events over time. One of the limitations in determining likelihood accurately is the availability of complete event data dating back over decades, and how historical trends may change into the future as a result of climate change. The table below considers the potential for fire impact, rather than fire occurrence.

This acknowledges from a land use planning perspective, it is the likelihood of impact of bushfire on values (people, dwellings, infrastructure assets) that is most critical to consider, rather than the probability of fire occurring at all.

Table 9 - Likelihood assessment as per QERMF

Spatial context	Likelihood of bushfire impact
Fraser Coast LGA	Likely

6.1.2 Analysis of overall risk vulnerability

In terms of vulnerability, the Fraser Coast LGA as a whole is typified by housing stock which was constructed prior to the introduction of AS3959 standards in Queensland, and largely prior to current planning provisions.

However, in some growth areas (also higher risk locations for bushfire attack), the majority of development is recent and is likely to be constructed to AS3959 standards and to adopt bushfire-responsive urban design parameters.

From a socio-demographic perspective, as outlined in Part A – Context Analysis, the region's population comprises:

- almost double the State average of persons aged 65 years and over (28.6 per cent for the region compared with 16.1 per cent for Queensland)
- a substantially higher proportion of persons with a profound or severe disability requiring assistance compared with the State average (10.8 per cent for the region compared with 6.0 per cent for Queensland)

Whilst the above factors are present, the number of vulnerable facilities within the exposed area do not represent a significant proliferation. Notwithstanding, residents in private dwellings must be considered. Based on Appendix 2 of the QERMF, the bushfire prone area contains some vulnerable populations (as opposed to large numbers) given the absence of a proliferation of exposed aged care facilities which would otherwise amplify vulnerability.

The assessment of vulnerability below considers vulnerability across the entire LGA.

Table 10 – Vulnerability assessment based on Appendix 2 of the QERMF

Spatial context	Vulnerability assessment
Fraser Coast LGA	Moderate

6.1.3 Analysis of overall risk consequence

Consequence is considered on balance of the extent of people, dwellings and assets which are exposed. Bushfire events impacting more densely populated communities will sustain immediate impacts such as the loss of property, and possibly life. Bushfire events in the rural areas of the region can also yield high, long term economic losses.

The ability to evacuate to safety is relatively achievable for much of the region though some locations are exposed to challenges in this regard.

Table 11 – Assessment of risk consequence as per Appendix 3 of the QERMF

Consequence typology	Summary of risk consequence aspects	Consequence assessment
People	Life loss has occurred in the region in the past as a result of bushfire in Toolara State Forest in 1991.	Moderate

Consequence typology	Summary of risk consequence aspects	Consequence assessment
	Despite the widespread nature of the 2020 fires on K'gari, no loss of life was experienced in this event.	
Financial and economic	A moderate proportion of the region's economic / employment lands are subject to potential bushfire and grassfire hazard however, the region's economy is highly diversified and impacts are likely to be point specific rather than widespread.	Moderate
Community and social	There are several community facilities, sporting and open space zoned lots in the hazard risk area. Whilst built form associated with these land uses may not be intense, often they are high value assets which in some cases, are not covered by Disaster Recovery Funding Arrangements if lost to bushfire. In addition, the region includes a number of isolated communities which are susceptible to bushfire hazard (including the Great Sandy Strait communities, Glenwood and Bauple Estate), due to the nature of these communities it is considered that bushfire could have significant impact on affected communities.	Major
Governance and infrastructure	Critical infrastructure and vulnerable facilities exposed to bushfire hazard are limited in number, but may produce a level of community disruption should impact occur.	Moderate
Environment	Intense, hot bushfires have the potential to impact ecological functions. However, higher risk impacts stem more from inappropriate fire regimes (too frequent or infrequent fire in the landscape) than one-off bushfire events.	Major

6.1.4 Level of risk

The QERMF provides a fit-for-purpose risk matrix which incorporates the assessment of vulnerability, in addition to likelihood and consequence factors.

The QERMF risk matrix is as follows:

Table 12 - Risk matrix as per Appendix 4 of the QERMF

Likelihood (X)		Rare (1)					Unlikely (2)					Possible (3)					Likely (4)					Almost Certain (5)				
Vulnerability (Y)		V.Low (1)	Low (2)	Mod (3)	High (4)	Extr (5)	V.Low (1)	Low (2)	Mod (3)	High (4)	Extr (5)	V.Low (1)	Low (2)	Mod (3)	High (4)	Extr (5)	V.Low (1)	Low (2)	Mod (3)	High (4)	Extr (5)	V.Low (1)	Low (2)	Mod (3)	High (4)	Extr (5)
Consequence (Z)	INSIGNIFICANT (1)	VL1	VL2	VL3	L4	L5	VL2	VL3	L4	L5	L6	VL3	L4	L5	L6	M7	L4	L5	L6	M7	M8	L5	L6	M7	M8	H9
	MINOR (2)	VL2	VL3	L4	L5	L6	VL3	L4	L5	L6	M7	L4	L5	L6	M7	M8	L5	L6	M7	M8	H9	L6	M7	M8	H9	H10
	MODERATE (3)	VL3	L4	L5	L6	M7	L4	L5	L6	M7	M8	L5	L6	M7	M8	H9	L6	M7	M8	H9	H10	M7	M8	H9	H10	H11
	MAJOR (4)	L4	L5	L6	M7	M8	L5	L6	M7	M8	H9	L6	M7	M8	H9	H10	M7	M8	H9	H10	H11	M8	H9	H10	H11	E12
	CATASTROPHIC (5)	L5	L6	M7	M8	H9	L6	M7	M8	H9	H10	M7	M8	H9	H10	H11	M8	H9	H10	H11	E12	H9	H10	H11	E12	E13

Key: V.L= Very low; L = Low; M = Medium; H = High; E = Extreme

Scale: 1 (lowest) to 13 (highest)

Table 3 - Risk Matrix

Having regard to the assessment of likelihood (of impact), vulnerability and consequence for the Fraser Coast region, the overall risk levels from a land use planning perspective for the Fraser Coast LGA is outlined below.

Table 13 – Assessment of risk level in accordance with the risk matrix at Appendix 4 of the QERMF

Spatial context	Bushfire risk level
Fraser Coast LGA	Moderate (M8)

This risk assessment relates to bushfire risk for land use planning and relates to matters of planning, settlement and building policy and strategy. The risk analysis has not been prepared for the purposes of disaster management and does not represent an appraisal of asset-based vulnerability or exposure.

Likelihood and consequence of course various across the LGA. From a land use planning perspective, it is therefore important to consider the risk profile of each precinct in order to provide a more clear picture of the land use planning-relate risks relating to different locations of the Fraser Coast LGA.

6.2 Local precinct risk analysis

The local precincts illustrated in Section 3.8 are used as a basis for the localised risk analysis to provide a more granular appraisal of the nature of bushfire hazard and risk relative to each precinct across the Fraser Coast region. These precincts are identified as:

- Burrum and Cherwell
- Toogoom and Dundowran
- Eli Waters and Urangan
- Nikenbah and River Heads
- Great Sandy Strait
- Mary River
- K'gari Fraser Island
- Rural areas.

For each precinct, a series of risk elements has been considered in order to derive a risk rating for land use planning consideration. These include:

- Fuel hazard:
  - Bushfire hazard area (intensity class and extent)
  - Bushfire hazard buffer (relative to intensity class and extent)
- Assets and exposure:
  - Residential
  - Employment lands
  - Vulnerable uses
  - Infrastructure
  - Access and egress
  - Expected growth.

A tiered risk analysis was performed using the matrix methodology set out below, using a qualitative assessment approach drawn from quantitative data.

Table 14 - Local area framework risk analysis matrix

LUP risk criteria inputs	LUP risk score				
	Low	Moderate	High	Very High	Extreme
Hazard	Extent less than 15%	Medium	High	Very High	
Buffer	Extent less than 5%	Moderate	High	Very High	
Residential	Low	Moderate	High	Very High	Extreme
Employment lands	Low	Moderate	High	Very High	Extreme
Vulnerable uses	Low	Moderate	High	Very High	Extreme
Infrastructure	Low	Moderate	High	Very High	Extreme
Access and egress		> Two access roads	Two access roads	One access road	No access roads
Expected growth	Nil	Low	Medium	High	Very High

Using the tiered risk analysis approach, a risk ranking specifically for land use planning consideration has been identified for each local area within the framework, as per the map overpage and the risk dashboard table which follows.

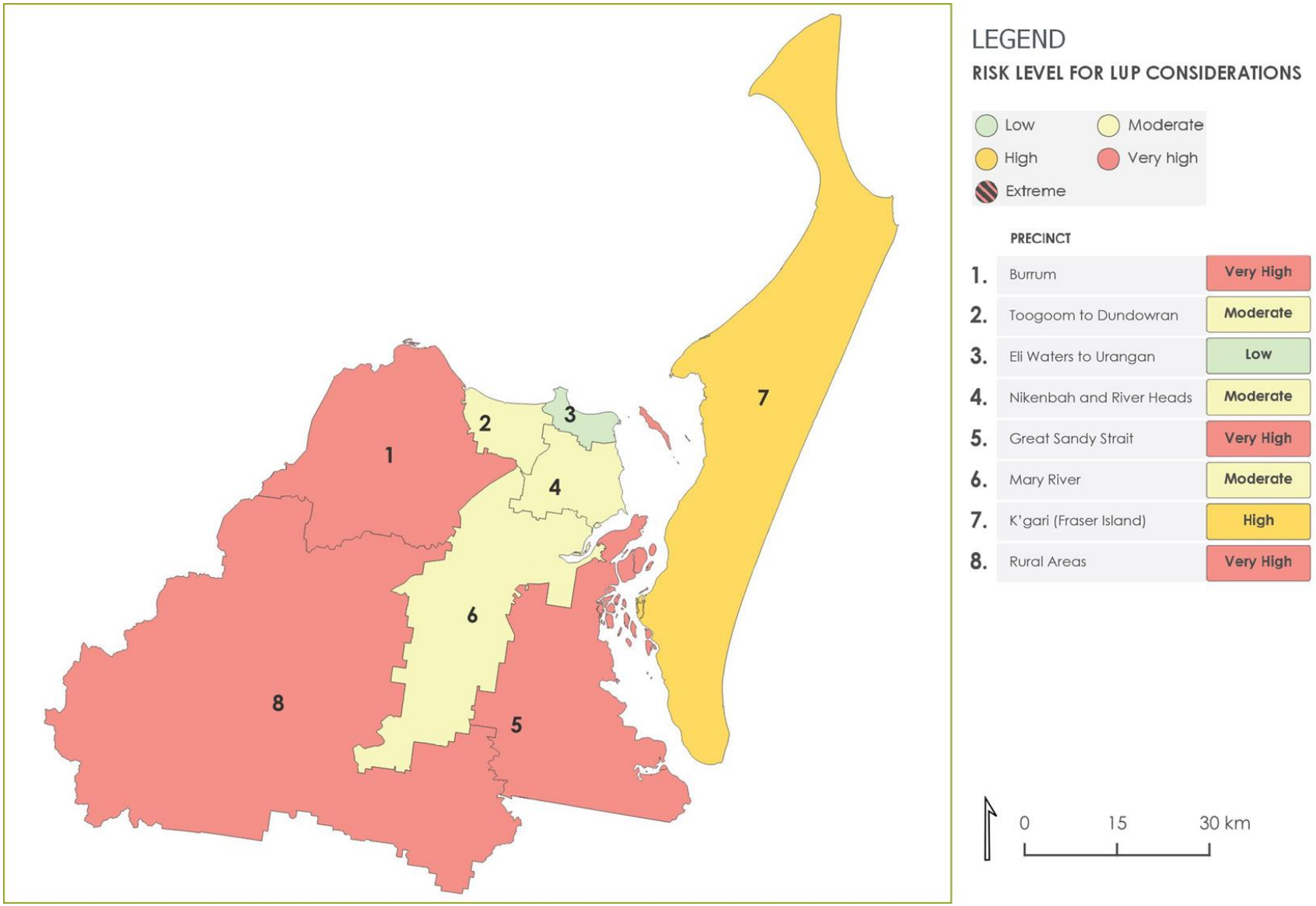


Figure 6-3 - Map of precinct land use risk planning profiles


Low
Moderate
High
Very high
Extreme
LEGEND - Risk level
FUEL HAZARD
ASSETS AND EXPOSURE
Hazard
Buffer
Residential
Employment lands
Vulnerable uses
Infrastructure
Access and egress
Expected growth
PRECINCT
Risk level for LUP consideration
1. Burrum
Very High
2. Toogoom to Dundowran
Moderate
3. Eli Waters to Urangan
Low
4. Nikenbah and River Heads
Moderate
5. Great Sandy Strait
Very High
6. Mary River
Moderate
7. K'gari (Fraser Island)
High
8. Rural Areas
Very High

7 Bushfire risk evaluation

The following evaluation of bushfire risk relevant to the Fraser Coast LGA is explored in two contexts:

1. region-wide strategic risks
2. precinct risk, aligned with the eight local precincts.

7.1 Region-wide strategic risk evaluation

As outlined at Section 5, a number of regionally-relevant strategic risk factors are identified, relative to land use planning. This section evaluates the context of these issues at the region-wide scale whilst the following section provides detailed precinct profiles, aligned to the local precincts specific in Section 3.8.

7.1.1 Population and property exposure

Identified risk: Almost one quarter of the existing population and residential dwelling stock is exposed to potential bushfire hazard. Exposure is likely to grow into the future on a cumulative basis, based on existing use rights, as well as the existing and proposed settlement strategy for the region.

Type of risk: Human and social; Built environment.

A proportion of the region's residential areas are exposed to potential bushfire hazard. This includes a moderate proportion of residential zoned land within urban settlements and a significant proportion of rural residential zoned lands, including a number of existing regional townships. Identified growth areas (such as Burrum Heads, Craignish and Wondunna, for example) also include areas exposed to potential bushfire hazard.

Outside of identified growth areas, areas across the region may experience a level of development uplift as a result of existing use rights where minimum lot size provisions allow further reconfiguration of existing (largely rural residential) allotments over time, as well as changes in land use.

83 per cent of the region is mapped as subject to potential bushfire hazard, including 70 per cent that is within the potential hazard area and 13 per cent within the 100 metre hazard buffer.

32 per cent of the region's residential zoned land is identified as being subject to potential bushfire hazard, as well as 79 per cent of the region's rural residential zoned land, accounting for approximately a quarter of the region's current population and building stock. Additionally, there are a number of settlements that are subject to higher levels of exposure to bushfire hazard including Pacific Haven, Glenwood, Bauple and the Great Sandy Strait communities.

Notably, growth areas are identified in bushland interface areas that are subject to potential bushfire hazard. As such, it is anticipated that these figures will continue to grow as the region's urban interface with bushfire hazard expands. This is discussed in further detail in the following section.

As highlighted by the vulnerability assessment and data contained in Part A – Context Analysis, the region comprises a population with an average age well above the State average, and higher proportion of persons with a profound disability and requiring assistance. Whilst vulnerable uses are not particularly prevalent in the mapped bushfire prone area, a proportion of these vulnerable populations reside in exposed areas and in dwellings which may not be constructed in accordance with AS3959 or maintain adequate asset protection zones.

The physical ability for some residents to evacuate, which may be compounded by broader exposure of evacuation routes for certain communities, may amplify aspects of vulnerability

and exposure. In locations where access and egress is constrained, the potential for further residential growth requires analysis as part of the planning response.

Exposure of persons and property to bushfire hazard is not unique to the Fraser Coast region. However, for some locations in the region the nature of exposure has the potential to exacerbate existing demand and burden on emergency services, and land managers. Planning tools (of varying strength) can be deployed to improve outcomes.

Aside from potential risk to life, from a human and social (community) perspective the risk to property is a significant consideration, and protection of property and assets as residual risk is transferred to end users.

The Insurance Council of Australia identifies that approximately 1 in 20 properties across Australia are not insured, approximately 70 per cent of properties are under-insured and about two-thirds of renters do not have contents insurance (Wynne, 2017).

One of the critical issues in this regard is that 'insured value' should not just cover the construction or purchase price, but must take into account current building standards, demolition, potential asbestos removal and site clean-up. The recent 2019-20 New South Wales Bushfire Inquiry identified that costs to re-build to new standards could be as high as an additional $100,000 (Owens & O'Kane, 2020). Many policy holders do not take this into account.

In a recent inquiry directed by the Commonwealth Government, the Australian Competition and Consumer Commission (ACCC) (2020) established that as disaster events continue, insurers are using more refined data and sophisticated pricing techniques which can result in insurance unaffordability for some consumers, over time. It also found that reforms to land use planning and building standards can help reduce risks and costs over the longer term.

7.1.2 Exposure of growth areas

Identified risk: Lands zoned for or capable of acommodating future growth are exposed to potential bushfire hazard, particularly the Rural residential and Emerging community zones.

Type of risk: Human and social; Built environment.

The region includes a number of growth areas on the urban fringe including at Craignish, Nikenbah, Wondunna, St Helens and Burrum Heads. In addition, expansion of rural residential areas could occur at Oakhurst and Tinana as well as moderate expansion at Glenwood and Poona due to current minimum lot size provisions. These growth areas will, over time, generate increased population and property exposure to bushfire hazard.

The provisions of the SPP require that intolerable risk is avoided, and other risks are mitigated to a tolerable or acceptable level. This policy position is one which seeks to ensure high risk outcomes are avoided through planning schemes, including the identification of land for future growth.

The Emerging community zone identifies land for longer-term investigation which may or may not be appropriate for urban zoning. Of the Emerging community zoned land in the Fraser Coast, approximately 45 per cent is within 100 metres of bushfire hazard.

While overall exposure of Emerging community zoned land is considered moderate, there are some areas within the region that are subject to higher exposure notably including at Burrum Heads and Wondunna which is discussed in more detail below.

Rural residential zoned land also provides opportunity for future growth via the subdivision of underutilised land where minimum lot sizes permit. Currently, planning provisions establish a minimum lot size of 2 hectares within Rural residential areas with the exception of Oakhurst and Tinana which have provisions for smaller lots of 1 hectare and in some places 4,000m².

While in many instances, further subdivision is considered unlikely due to lot layout and current minimum lot sizes, there are some areas identified through the precinct risk evaluation where further subdivision could occur.

There are some locations where Council may consider tools to limit the potential for Rural residential lots to be subdivided including at Glenwood, the Great Sandy Strait Communities and Pacific Haven. This must be weighed up as part of the planning response.

7.1.3 Grassfire hazard

Identified risk: Risk from grassfire (including on rural lands and agricultural cropping lands), and short, sharp interface fire events.

Type of risk: Human and social; Built environment; Roads and transport.

Grassfire events can lead to property loss in locations which are not subject to the State-wide BPA mapping. This is because, from a policy perspective, grassfire is not deemed to be a planning consideration in Queensland given its lower fireline intensity and limited ability to generate ember attack of a level likely to pose a risk to property. As grassfire hazard is not mapped, it also does not trigger assessment of AS3959 or the application of building measures.

However, grassfire can be very fast moving, with significant rate of spread. These events can generate short, sharp emergencies and which can be destructive.

The continuity of grassland fuels where it adjoins woodlands or bushland can give rise to the ability for fire to run across paddocks and rural lands. Under more severe weather conditions, even paddock stubble can burn and carry fire.

Community education campaigns may assist to ensure grassfire events are reported quickly to emergency services, ensuring residents and primary producers remain vigilant to the threat of potential grassfire in the region.

7.1.4 Competing policy interests

Identified risk: Policy tensions between bushfire hazard protection, as a factor of growth and development, and environmental values have and are likely to continue to generate conflict at the urban bushland interface.

Type of risk: Human and social; Built environment.

The consideration of bushfire hazard in a planning context is often required on balance with other planning interests which include vegetation management (including vegetation clearing), protection of biodiversity and ecosystem rehabilitation.

In the first instance, clear policy positions can assist development assessment processes where vegetation removal is required. In particular, clarity in relation to environmental values and assets which require protection and retention. This may include matters of local and state environmental significance or protected vegetation. Uncertainty can arise where development applications seek clearing for the purpose of bushfire protection. Policy tension can arise between the objectives of bushfire protection and those of biodiversity protection where competing values are present.

Noting the exposure of potential growth areas in the existing planning scheme, this policy tension is likely to arise. For incremental development in existing rural residential areas, for example, processes are in place under the State Development Assessment Guidelines to support the navigation of these issues during the development assessment phase. A suite of tools can be implemented by Council to address these matters via strategic planning processes.

7.1.5 Exposure of employment-generating land

Identified risk: High portions of the region's employment generating zoned land are exposed to potential bushfire hazard including High impact industry, Medium impact industry, Waterfront and marine industry and District centre zones.

Type of risk: Economic.

Over 6,000 registered businesses exist or operate within the Fraser Coast region (Australian Bureau of Statistics, 2021). The Fraser Coast region produces an estimated $4.59 billion of Gross Regional Product, with over 35,000 employed persons (Economy.id, 2022).

Economic productivity is spread across the region with valuable agricultural production lands and plantation lands contributing to the local economy and employment. These areas are not immune to bushfire or grassfire threat, which can lead to crop loss and loss and damage to property, buildings and equipment.

Agricultural losses from bushfires in Queensland and Australia more broadly is also continuing to grow. These losses come with far-reaching socio-economic impacts which lengthen community recovery timeframes, and can lead to devastating consequences for agricultural businesses which are often family-owned enterprises.

Impact on agricultural enterprises also carries significant cascading economic impacts of associated industries such as transport, logistics and manufacturing. This further extends to other dependant industries.

Pursuant to the Australian Disaster Resilience Index, many primary production districts across Australia are over-exposed to economic risk as a result of disasters, ostensibly related to limited economic diversity and primacy of agricultural activities.

Regulatory exemptions exist for certain works associated with vegetation management to reduce exposure which primary producers can implement without the need for approval.

Beyond agricultural production, large portions of industrial zoned land on the outskirts of Maryborough and Hervey Bay are also subject to potential bushfire hazard. Where these facilities result in the storage of hazardous materials or involve the operation of heavy machinery that could be subject to higher fire risk, additional planning provisions should be included to ensure the safe storage of materials and operation of machinery.

District centre zoned land at Urangan and Kawungan is also exposed to potential bushfire hazard.

7.1.5.1 Recovery and reconstruction

Geoscience Australia (2021) estimates the current potential reconstruction cost of property loss within the local government area at over $23 billion, with a contents value of almost $2.5 billion.

This value is likely to increase substantially over time.

The cost of damage or loss to public assets, critical infrastructure and essential services extends beyond the above amount and can translate into extended recovery timeframes which can also extend beyond bushfire impacts to communities.

Queensland's exposure to bushfire threat is changing over time, as climate change influences fire weather and vegetation characteristics, and development as the urban bushland interface continues to expand.

Millions of dollars in recovery costs have been expended by local, State and Commonwealth governments over recent years in response to the past several fire seasons experienced in Queensland.

At 2017, the total cost of disasters across Queensland was $11 billion per year representing 60 per cent of the total economic cost of disaster over the preceding ten years. Under a medium emission scenario, disaster costs from 2020-2060 are estimated to reach $492 billion (Deloitte Access Economics, 2021). Queensland also receives the highest allocation of Commonwealth resilience funding (2013/14 – 2016/17) at $12 million (Deloitte Access Economics, 2017).

Estimates of the costs of the 2019-20 Australian bushfires are at approximately $100 billion, incorporating both tangible and intangible costs (Read & Denniss, 2020).

Deloitte Access Economics (2017) estimated the tangible impact of the Victorian Black Saturday bushfires at $3.1 billion in 2015 dollars, with intangible costs at more than $3.9 billion.

Governments of all levels are increasingly exposed to economic risks stemming from bushfire and other disaster events. Understanding risk exposure and investing in building resilience to reduce disaster risk are key opportunities to reduce the magnitude of potential loss.

It is incumbent upon business owners and operators to take all appropriate steps to mitigate against impact and loss from natural hazard events, protecting business operations and continuity.

The 2020 Royal Commission identified the role of strategic land use planning in considering the risk posed by natural hazards, and the preparation and implementation of settlement policy which seeks to avoid or otherwise limit continued hazard exposure and increase of risk, as part of a shared responsibility approach to project life and property, invest in resilience, and limit future recovery and reconstruction costs and impacts.

7.1.6 Rural land exposure

Identified risk: A high portion of rural zoned land is exposed to potential bushfire hazard across the region.

Type of risk: Economic.

Approximately 84 per cent of rural lands and 79 per cent of rural living lands is exposed to potential bushfire hazard. High levels of exposure across these zones is to be expected however, the potential impacts cannot be discounted. Much of the rural zoned lands is also income generating land, contributing to the economic vitality and diversity of the region. It is also employment-generating lands, helping to support the socio-economic wellbeing of the region's population. Rural living lands are an extension of this however, the nature of risk is more focussed on property loss and potential for life loss.

The relationship with on-property land management in these cases is critical, noting such lands remain in private ownership where fuel management is the responsibility of property owners but for which support can be derived through local rural fire brigades.

7.1.7 Exposure of the recreation and open space network

Identified risk: Portions of the recreation and open space network are exposed to potential bushfire hazard across the region.

Type of risk: Human and social; Built environment.

Council assets including recreation and open space networks are exposed which, similar to rural zoned lands, is to be expected. Where these lands include bushfire hazard, Council maintain detailed bushfire management plans and practices to manage fuel loads and interface locations. Council may however benefit from a synthesised and coordinated approach to the fire management of its lands, pursuant to risk.

Public assets in these locations may include community infrastructure, playground equipment and other recreational assets. Cost recovery for reconstruction of some assets in these areas may be constrained under the current Disaster Recovery Funding Arrangements.

7.1.8 Vulnerable facilities and occupants

Identified risk: Some vulnerable facilities are identified as being subject to potential bushfire hazard.

Type of risk: Human and social; Built environment.

The concentration of vulnerable facilities within the primary urban centres of Hervey Bay and Maryborough appears to have largely avoided the proliferation of potentially vulnerable facilities within bushfire prone areas. Those that do appear within bushfire prone areas are dominated by educational facilities with a small number of child care centres and a single aged care facility and correctional facility.

It must be noted that aged care, nursing homes, respite facilities, child care centres and schools are not required to be assessed against AS3959, or be constructed to any bushfire protection standard. This will change from 2023 onwards under amendments to the National Construction Code which is a significant advancement with regards to building protection. However, this should not be seen as opportunity for these uses to locate in the bushfire prone area. A policy position of avoidance with regards to these uses should be retained.

This aspect must form an area of policy focus as part of the formulation of the new planning instrument.

7.1.9 Essential community infrastructure exposure

Identified risk: A moderate portion of essential community infrastructure is exposed to potential bushfire hazard particularly across the electricity, water and sewerage networks.

Type of risk: Built environment; economic.

A number of essential infrastructure assets are identified in the bushfire prone area, dominated largely by electricity, water and sewerage networks, many items of which are not under Council's jurisdiction. Exposure of selected water pump stations and all water treatment plants, coupled with exposure of some electrical substations in the region, may eventuate in cascading impacts during a fire event where power and water supply fail in certain areas. Whilst this remains a disaster management issue, planning controls can support the reliability of essential infrastructure by adopting a policy position, in the first instance, of avoiding the development of critical assets in bushfire prone areas. This is the expectation of the SPP and State interest for bushfire, and Council has options available to satisfy the SPP requirements in relation to essential infrastructure.

7.1.10 Risks to the evacuation network

Identified risk: Parts of the evacuation network may be compromised in a fire event and may impact the ability to evacuate in certain locations, under certain conditions, especially along highways and the rural arterial roads.

The evacuation network risks are amplified by the number of coastal communities serviced by single road access, and exposed the landscape-scale fire runs.

Type of risk: Human and social; Roads and transport.

Planning for bushfire evacuation is an immensely difficult task. Unlike flood and other events, bushfire events are not a 'known quantity'. There is no surety in when or where an ignition may occur, the direction it may spread, the extent of possible ember attack, etc.

The impact of smoke and limited visibility in emergency situations, coupled with wind impact, can lead to issues on the road network as residents attempt to evacuate. The

exposure of motorists to potential flame contact and radiant heat are also key considerations.

The extent of warning time and ability to evacuate to safety (including the aspects of access and egress) represent the most fundamental characteristics which determine risk to life in a land use planning context.

There are three key elements of relevance to land use planning:

1. The extent of warning time available (window of evacuation opportunity);
2. How the settlement pattern supports or enables:
    a. separation from hazard sources;
    b. urban intrusion of fire by built form;
    c. the act of community evacuation (processes); and
3. Evacuation destinations (designated evacuation centre or Neighbourhood Safer Place [NSP]).

AIDR Handbook 4: Evacuation Planning provides guidelines and considerations for developing community evacuation plans underpinned by an all-hazards approach. It uses the nationally recognised five stages of the evacuation process as a framework for planning an evacuation (AIDR, 2017).

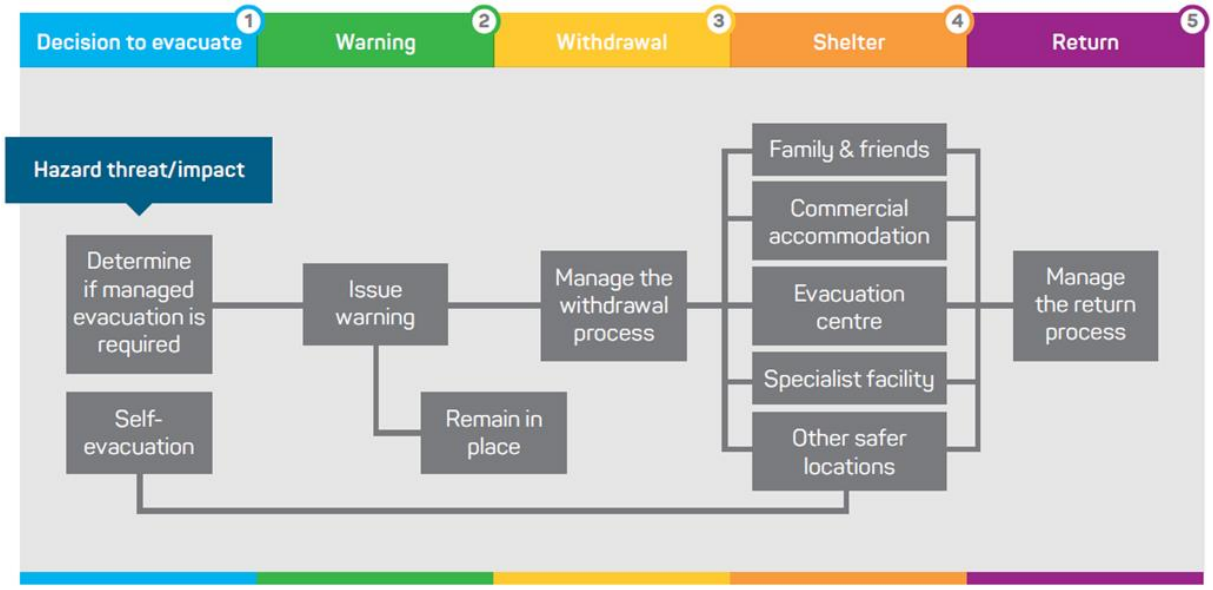


Figure 7-1 - The five stage evacuation process (Source: AIDR, 2017)

This risk assessment does not seek to determine specific evacuation windows for any event scenarios. Rather, the focus of this work is to examine the potential exposure of the higher order evacuation route network to inform potential Council decisions in relation to settlement policy and potential growth locations.

Current planning instruments and materials in Queensland do not, at this time, adequately articulate the characteristics of an effective and efficient evacuation network in relation to bushfire hazard. This risk assessment defines an evacuation network as including the following attributes (as a minimum):

- a network with capacity to support surge demand during evacuation (i.e. many residents leaving at once, with multiple vehicles departing from each household);

- a network which provides and support multiple egress options, in the event that one or more routes become non-trafficable;
- potential bottlenecks and pinch points in an emergency situation are identified via strategic processes and able to be mitigated; and
- roads at the interface are sufficiently wide to enable fire appliances to stand on the pavement and be operational (i.e. doors open and equipment deployed), and continue to allow for passing vehicles which may be leaving the area.

Regard for the above in advance of development growth enables the road network to appropriately support emergency evacuation, and mitigate potential risk to life to a tolerable level.

7.1.10.1 Fraser Coast region evacuation route network

To understand the potential impact of bushfire attack on the road network, to an extent where the evacuation network may become compromised, is largely determined by the potential for exposure to flame contact or extreme radiant heat.

Tree fall and road accidents are a separate issue, and these are difficult to model. However, there may be specific locations where risk of tree fall and accidents may present a risk to the evacuation capacity of the wider network. In terms of exposure of the key evacuation route network, the following table outlines the proportion of exposure across the LGA, with individual analysis of each precinct included at Section 7.2.

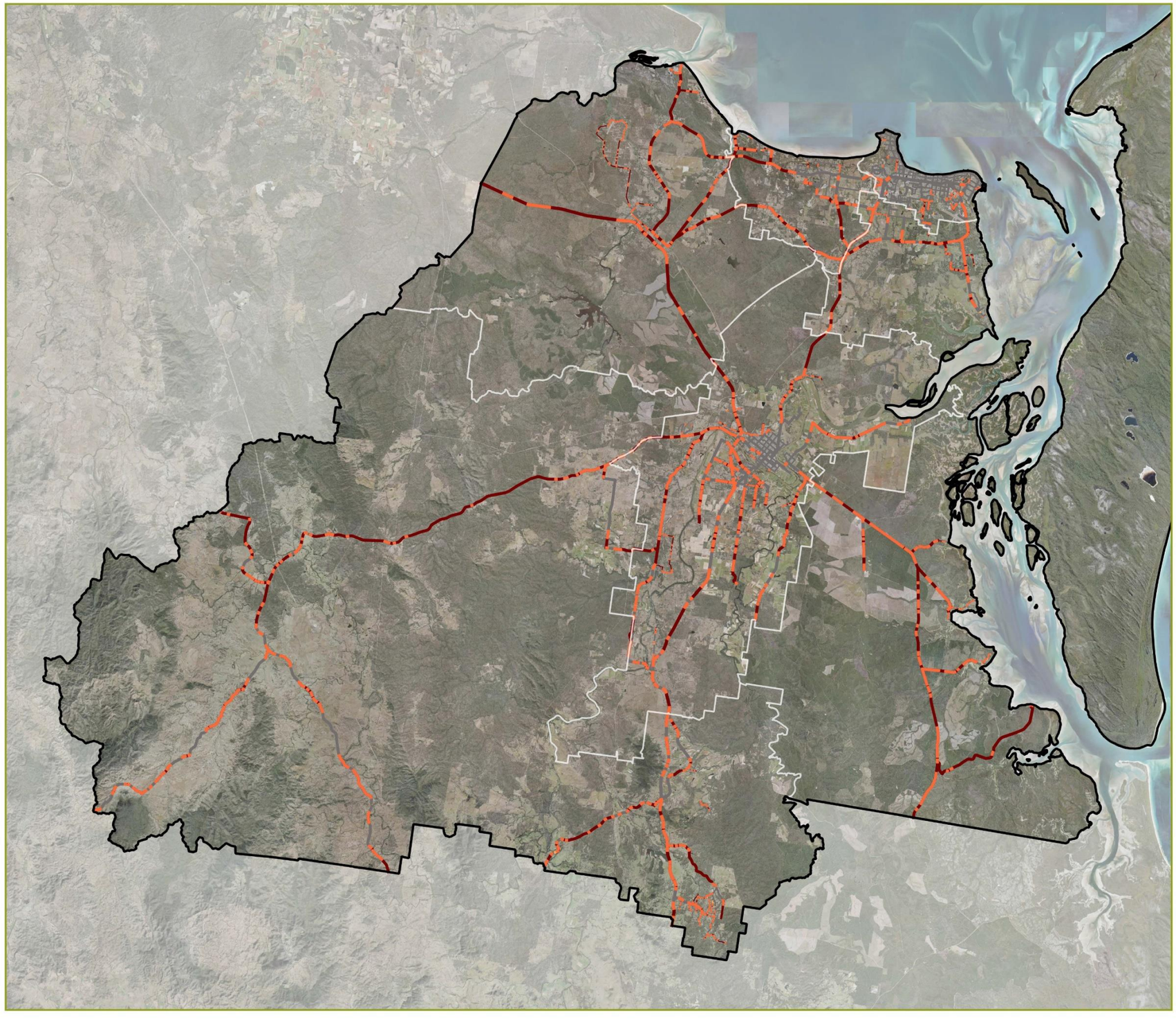
Table 15 - Summary of bushfire attach exposure to key evacuation routes

Region	Percentage of length of key evacuation route network		
	Flame contact	Radiant heat	Total
Fraser Coast LGA	42	16	58

NOTE: For the purposes of the above table, 'flame contact' relates to roads which traverse bushfire hazard and 'radiant heat' extends a distance of 50m from bushfire hazard. To this end, it is indicative only.

Most of the key routes across the region are subject to potential bushfire attack, with over half of the region's higher order road network potentially exposed. Those precincts where exposure to potential flame contact and radiant heat exceeds 50 per cent of the higher order road network include:

- Burrum and Cherwell (93%)
- Toogoom and Dundowran (55%)
- Nikenbah and River Heads (61%)
- Great Sandy Strait (91%)
- Mary River (53%)
- Rural Areas (69%).



FRASER COAST KEY ROAD EXPOSURE

FRASER COAST BUSHFIRE RISK ASSESSMENT

LEGEND

Exposed to Hazard	100m Buffer
Highway	Highway
Urban Arterial	Urban Arterial
Rural Arterial	Rural Arterial
Major Collector	Major Collector
Controlled Distributor	Controlled Distributor
Minor Collector	Minor Collector

50m Buffer	Not Exposed
Highway	Highway
Urban Arterial	Urban Arterial
Rural Arterial	Rural Arterial
Major Collector	Major Collector
Controlled Distributor	Controlled Distributor
Minor Collector	Minor Collector

0 5 10 15 20 km

Project No: 22-024 Map No: 1 of 1

Coordinate System: GDA 2020 MGA Zone 56
Printed at: A3
Creation Date: 08/12/2022

Meridian Urban

Overall, the region shows broad exposure for large stretches of the road network. In many instances, where these locations may be impacted in an event, alternative access and egress routes are likely to be available.

Despite the above, there are communities which are reliant on one route in and out, and other localities which are continuing to grow with limited strategic consideration of the evacuation route network through planning processes. In addition to strategic planning considerations, statutory options can also be considered to design with evacuation in mind from a grassroots perspective, and able to be embedded as part of the development controls included in the new planning scheme.

7.1.11 Climate change impacts

Identified risk: Hazard exposure may change in certain locations over time to higher hazard classes, and increased fire weather as a result of climate change.

Type of risk: Environmental.

Hazard exposure may change in certain locations over time to higher hazard classes, and increased fire weather, as a result of climate change. This risk relates to risk types which involve the environment.

Changes to vegetation attributes and overall fuel loads across the region are likely as the landscape responds to climatic and weather changes over time. This may mean that hazard classes may escalate, and fire weather conditions grow in frequency and intensity.

This may result in larger areas of the region being exposed to higher levels of hazard than compared with current conditions, as a result of increased or altered fuel loads and fire weather characteristics. Monitoring of these conditions will be required.

7.1.12 Bushfire buffer as trigger for building compliance

Identified risk: The existing Planning Scheme does not designate land within the Potential impact buffer as part of the designated bushfire prone area for the Building Code of Australia and Queensland Development Code which may have resulted in a proportion of residential development which is subject to bushfire hazard not having triggered assessment against or compliance with AS3959.

Type of risk: Human and social, Built environment.

The current Bushfire hazard overlay map includes the 100 metre Potential impact buffer. Despite this, the designation of bushfire prone area for the BCA and the QDC in Section 1.6 of the Planning Scheme only designates land within the medium hazard, high hazard or very high hazard area. The 100 metre potential impact buffer area does not form part of the designated bushfire prone area for the purposes of triggering assessment against or compliance with AS3959.

The buffer area is an area where bushfire attack extends beyond the mapped hazard to account for flame contact in high winds, radiant heat flux and ember attack, noting that most dwellings which are lot or damaged due to bushfire are located within 100 metre of hazard.

In the absence of this buffer, over time it may be the case that development applications have avoided the need for bushfire assessment, or the trigger of building provisions pursuant to AS3959. As an indicator, this risk analysis has identified that approximately 7,000 residential buildings are located within the Potential impact buffer area. This equates to approximately 16 per cent of all dwellings within the Fraser Coast region.

It is expected that a proportion of these will have triggered assessment and will be constructed in accordance with AS3959 relative to large-lot subdivisions. However, it may be the case that a high number of dwellings in these areas are not constructed in accordance with AS3959,

recognising that the local planning instrument and overlay mapping generally forms the trigger for AS3959 assessment and compliance.

7.2 Precinct risk evaluation profiles

A detailed analysis of each of the eight precincts has been undertaken, and summaries for each is provided as follows.

The summaries include the following detail:

- context of zone exposure
- residential exposure
- road (evacuation route) exposure
- vulnerable facilities and essential infrastructure
- qualitative exposure narrative
- qualitative risk narrative.

These summaries are expanded upon in **Part C – Land Use Planning Policy Analysis** with regard to the planning pathways available to each local area, based on their respective risk profiles.

Precinct 1 – Burrum

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	79,469	NA	15	72	0	1	7
Residential	794	0	4	29	0	6	23
Employment	23	0	3	20	0	16	27
Rural Living	1,560	0	3	55	0	2	33
Rural	68,780	0	16	73	0	1	6
Environmental	3,026	0	14	61	0	3	8
Community facility	4,982	0	5	72	0	3	11
Limited development	6	0	6	37	0	35	22
Recreation & open space	299	0	2	68	0	5	13

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	2,300	0	0.3	11	0	7	29

Road exposure

Total length	111km
Within the mapped hazard area	77%
Within 50m of hazard	16%

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	3	2
Essential community infrastructure	30	20

Land use summary

The Burrum and Cherwell precinct is predominately bushland and rural in nature with a number of forestry plantations across the landscape. The township of Burrum Heads is located on the coast at the mouth of the Isis River. There is opportunity for moderate urban expansion to the south of Burrum Heads under the current zoning framework. The townships of Howard and Torbanlea, located along the Bruce Highway, are low density in nature and include local supporting uses. The rural residential community of Pacific Haven is located on the eastern side of the Isis River includes lots which range from 2 – 4 hectares in size limiting the ability for increased intensification under current minimum lot sizes.

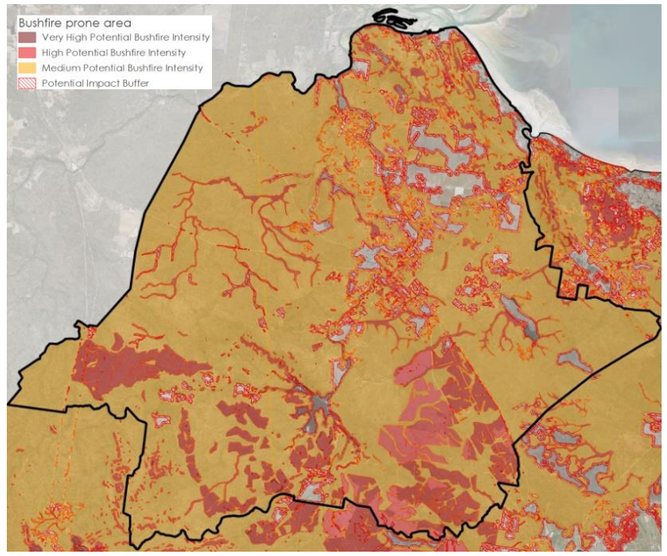
The precinct also includes important community infrastructure including the Lenthalls Dam in the south of the precinct and a water treatment plant in the east.

Exposure summary

The precinct includes significant vegetated areas that results in largely consistent hazard connectivity across the majority of the precinct. The primary urban settlements of Burrum Heads, Howard and Torbanlea interface with vegetated areas which are identified as potential bushfire hazard which results in almost half of the precinct's dwelling stock within the bushfire prone area (including the 100 metre buffer).

The majority of the precinct's roads are exposed to potential bushfire hazard including Burrum Heads Road which provides the single point of vehicular access to the Burrum Heads community.

The precinct includes limited vulnerable facilities however, Torbanlea State School and a childcare centre at Burrum Heads are both exposed to potential bushfire hazard. A high proportion of essential community infrastructure is exposed to potential bushfire hazard including electricity and sewer networks as well as critical aspects of the water network including eight pump stations and both of the Burgowan and Howard water treatment plants.



Bushfire risk summary

Bushfire risk within this precinct is considered very high due to the combination of several risk factors including the extent of vegetation and its interface with residential lands and impact on the evacuation network.

The nature of vegetation within the area and its significant connectivity, is likely to contribute to heightened bushfire risk. The extent of residential exposure is high, particularly within interface areas of Burrum Heads, Howard and Torbanlea and within Pacific Haven. Coupled with the extent of the road network that is exposed as well as the potential for constrained water supplies for fire fighting further exacerbate the bushfire risk.

Growth within Pacific Haven through subdivision of existing residential lots should be avoided and expansion of Burrum Heads should be carefully managed through a master planning and structure planning process (avoiding ad hoc outcomes) to ensure risk to life and property is maintained at an acceptable or tolerable level.

Precinct 2 – Toogoom to Dundowran

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	12,019	0	15	42	0	8	13
Residential	1,433	0	5	4	0	12	10
Employment	151	0	2	28	0	10	21
Rural Living	733	0	12	40	0	13	20
Rural	7,791	0	18	44	0	8	14
Environmental	922	0	17	67	0	2	4
Community facility	365	0	19	55	0	5	11
Limited development	0	NA	NA	NA	NA	NA	NA
Recreation & open space	626	0	7	56	0	5	9

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	3,386	0	0.3	4	0	8	14

Road exposure

Total length	76 km
Exposed to hazard	37%
Within 50m of hazard	18%

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	1	0
Essential community infrastructure	16	6

Land use summary

The precinct is characterised by coastal communities located to the west of Hervey Bay. Opportunity for new residential development is located to the east of Dundowran Beach. The southern portion of the precinct is characterised by rural lands including some horticultural uses and lifestyle properties.

The precinct includes the Vernon Conservation Park in the south-east and part of the rural living settlement of Sunshine Acres which includes some larger lots greater than 4 hectares which may be capable of supporting growth.

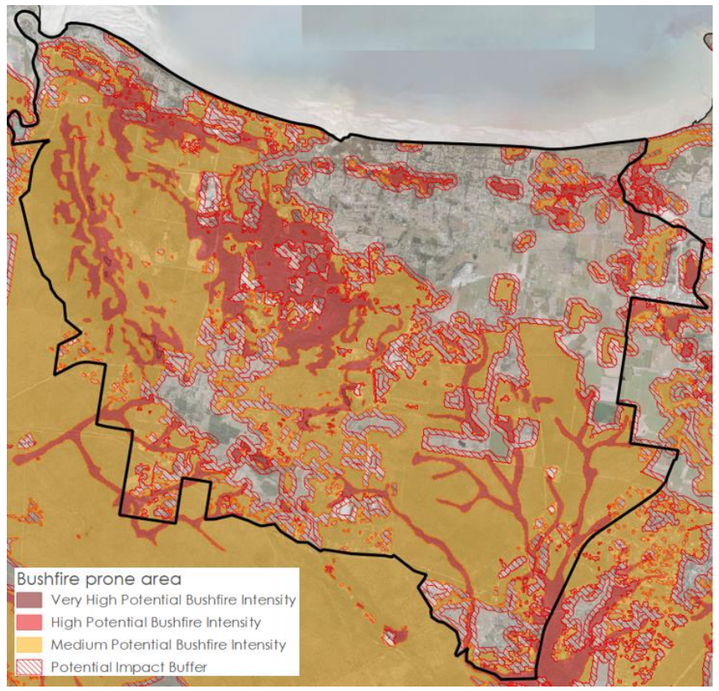
Exposure summary

Over half of the Toogoom and Dundowran precinct is subject to potential bushfire hazard. This area of potential hazard corresponds with the intact bushland landscape within the south and west of the precinct.

While topography remains largely flat throughout the precinct, the vegetation hazard classes south of Toogoom results in a higher classification of potential bushfire hazard interfacing with this community (Melaleuca open forests). There are some disturbed / fragmented patches of vegetation throughout the coastal residential areas. Combined, this results in moderate exposure of existing residential dwellings, with exposed dwellings predominately within the 100 metre buffer area.

Approximately 37 per cent of the roads in the area are within the mapped hazard area with an additional 18 per cent within 50 metres of hazard area and exposed to potential flame contact and radiant heat. This exposure occurs along all roads connecting the area to the broader Fraser Coast region, but is fragmented. The network into Hervey Bay is relatively unimpeded. The waste facility, sewerage treatment plant, several sewer pump stations, sewerage and water pump stations are exposed to potential bushfire hazard.

No vulnerable facilities are exposed to potential bushfire hazard.



Bushfire risk summary

Bushfire risk within the Toogoom and Dundowran precinct is moderate. The predominate hazard exposure occurs south and west of urban settlements with agricultural buffers fragmenting and buffering the area to an extent. Notwithstanding, a number of lifestyle and rural residential properties are subject to potential bushfire hazard within the south and south-east of the precinct.

The majority of dwellings subject to potential bushfire exposure within this precinct are within the 100 metre hazard buffer area highlighting the need for new dwellings to be assessed against and constructed in accordance with AS3959.

Land earmarked for greenfield development also includes bushfire hazard. Planning provisions for this area should contemplate a risk-responsive approach.

Precinct 3 – Eli Waters to Urangan

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	5,574	0	2	9	0	4	11
Residential	3,416	0	1	7	0	4	9
Employment	375	0	1	4	0	2	13
Rural Living	104	0	0	7	0	2	14
Rural	74	0	38	20	0	28	7
Environmental	238	0	3	6	0	9	14
Community facility	564	0	4	26	0	5	14
Limited development	130	0	0	8	0	0	36
Recreation & open space	673	0	4	14	0	6	9

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	19,081	0	0.3	2	0	3	6

Road exposure

Total length	160 km
Exposed to hazard	4%
Within 50m of hazard	6%

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	39	6
Essential community infrastructure	82	20

Land use summary

The Eli Waters and Urangan precinct comprises the primary urban extent of Hervey Bay. Hervey Bay is predominately low density, with some higher density built form located along the Esplanade fronting the ocean. A large amount of short term accommodation uses are located across the precinct. Commercial activities are located around the Pialba Principal Centre and the Urangan District Centre.

Opportunities for growth exist through the form of infill development in medium and high density areas, as well as greenfield opportunities within the southern part of the precinct.

Exposure summary

There is limited exposure of potential bushfire hazard within this precinct due to its largely developed urban environment. Some isolated patches of vegetation carrying potential bushfire hazard are located in Point Vernon, Pialba and Urraween in the north.

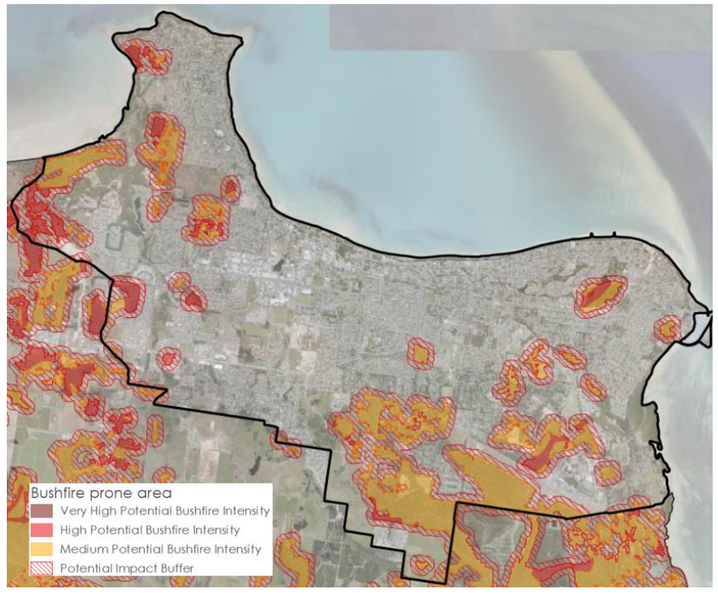
Some larger and more connected patches of vegetation are located in the south of the precinct adjoining the Hervey Bay Airport and across to the urban fringe communities of Wondunna and Urangan.

There is limited exposure to existing residential dwelling stock, the majority is located within the 100 metre hazard buffer and associated with bushland interface in Wondunna and Urangan.

Due to its urban function, the precinct includes a high proportion of vulnerable facilities. However, exposure of these facilities is relatively limited. There are however two childcare centres (at Urangan and Wondunna) which are within 100 metres of Medium potential bushfire hazard and three schools (at Urraween (x 2) and Wondunna) which are also within the 100 metre hazard buffer. An aged care facility at Urangan is also identified as being within the 100 metre hazard buffer however, upon closer inspection of this area it appears as though the vegetation subject to the potential hazard has been cleared as part of recent development.

With regard to essential community infrastructure, a number of sewer pump stations are identified as being subject to potential bushfire hazard as well as an electricity zone substation at Point Vernon which is within the the 100 metre hazard buffer. Critically however, no water infrastructure is identified as being exposed to potential bushfire hazard within the precinct.

Areas of exposure to the road network are largely limited with exposure primarily associated with isolated patches of Maryborough Hervey Bay Road.



Bushfire risk summary

Bushfire risk in this precinct is at the lower end of the spectrum due to the limited exposure across the breadth of the precinct. Notwithstanding, land identified as subject to future greenfield development in Wondunna and Urangan is subject to potential bushfire hazard. This is further considered as part of the planning response at Part C.

Precinct 4 – Nikenbah and River Heads

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	16,552	0	9	24	0	8	18
Residential	964	0	3	3	0	6	9
Employment	9	0	6	1	0	22	14
Rural Living	2,014	0	6	45	0	9	27
Rural	11,701	0	7	21	0	9	18
Environmental	641	0	48	14	0	8	2
Community facility	443	0	8	46	0	5	23
Limited development	18	0	0	45	0	0	46
Recreation & open space	761	0	18	40	0	5	10

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	1,944	0	1	14	1	9	21

Road exposure

Total length	59km
Exposed to hazard	40%
Within 50m of hazard	21%

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	1	0
Essential community infrastructure	8	4

Land use summary

The Nikenbah and River Heads precinct is largely rural in nature featuring some rural living areas at Sunshine Acres in the west and Booral in the east. The residential locality of River Heads is situated on the coast which also includes the River Heads Ferry Terminal.

Opportunities to cater for further residential expansion are located in the north in Nikenbah. There is also potential for some further subdivision of rural residential properties at Sunshine Acres.

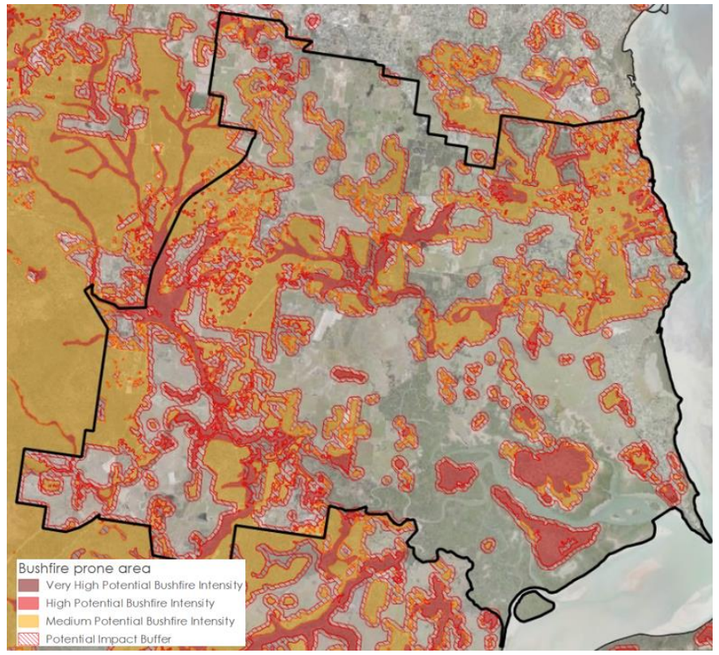
Exposure summary

Exposure in this area is moderate. Due to prevailing horticultural land uses, vegetation has been managed or cleared in large parts of the precinct. Significant areas of vegetation surround Sunshine Acres providing opportunity for bushfire to develop. Vegetation within the community of Booral is prevalent, particularly within and surrounding existing large lots.

There is high exposure to existing residential dwellings with approximately 46 per cent of all residential dwellings within the precinct exposed to potential bushfire hazard. The majority of these dwellings (31 per cent) are within the 100 metre buffer. Exposure of residential dwellings is primarily associated with the rural living communities of Sunshine Acres and Booral.

The road network is also subject to high exposure with approximately 40 per cent exposed directly to hazard and a further 21 per cent within 50 metres of hazard. Exposure of the road network includes River Heads Road and Booral Road which form the primary evacuation network in the precinct.

There are no vulnerable facilities exposed to bushfire hazard. There is moderate exposure to essential community infrastructure including to water pump stations at Booral and River Heads which are within the Medium potential hazard area and two sewer pump stations which are located in Nikenbah.



Bushfire risk summary

Bushfire risk within the Nikenbah and River Heads precinct is considered moderate. This is driven primarily due to the high levels of exposure to residential buildings and the road evacuation network.

Vegetation is generally managed for agricultural purposes within the precinct, limiting opportunities for large fire runs. However, significant vegetated corridors which could facilitate bushfire are associated with the rural living communities of Pacific Haven and Booral. Grassfire is also a risk. Minimum lot size provisions in these areas should be explored.

Residential dwellings subject to bushfire hazard are primarily within the 100 metre hazard buffer area. To ensure residential dwellings are constructed to appropriate standards planning provisions should ensure that the 100 metre hazard buffer is included in the designated bushfire prone area.

Greenfield land located at Nikenbah is subject to a level of bushfire hazard.

Precinct 5 – Great Sandy Strait

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	78,954	0	56	27	1	5	3
Residential	197	0	2	6	1	9	29
Employment	55	0	32	17	0	10	18
Rural Living	159	0	7	33	0	20	27
Rural	57,730	1	70	20	1	4	2
Environmental	10,680	0	20	26	0	7	11
Community facility	362	0	1	41	0	1	35
Limited development	9,7676	2	18	71	0	3	3
Recreation & open space	96	0	5	27	0	11	30

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	1,043	0	2	5	1	13	26

Road exposure

Total length	84km
Exposed to hazard	66%
Within 50m of hazard	24%

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	0	0
Essential community infrastructure	2	2

Land use summary

The Great Sandy Strait precinct is characterised by the small and isolated Great Sandy Strait communities of Maaroom, Boonooroo, Tuan, Poona and Tinnanbar which are located along the coast. Significant areas of native bushland and plantation dominate the balance of the precinct.

The Great Sandy Strait communities are predominately residential in nature with some supporting commercial uses and some short term accommodation uses. There is limited opportunity for growth within the Great Sandy Strait communities however, the community of Poona includes rural residential land subject to development approval for residential development.

The Hyne Tuan Timber Mill is also located central to the precinct.

Exposure summary

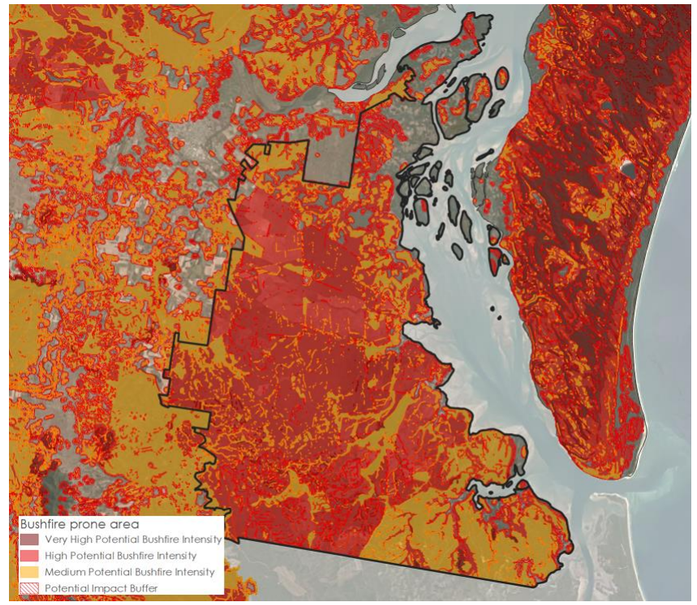
High and very high bushfire hazard is prevalent across the majority of the region. Due to the significant expanse of national park, plantations as well as dense heathlands, potential for substantial fire runs from the west, driven by hot winds from the continent's interior is considered high.

Exposure to residential building stock is very high, with almost half of all dwellings exposed, the vast majority of which are within the 100 metre hazard buffer. Exposure of residential dwellings is prevalent across all of the Great Sandy Strait communities.

Exposure to employment lands is also very high, with the Hyne Tuan Timber Mill exposed to bushfire hazard.

The road network exposure is extreme with almost the entire higher order road network either directly exposed (66 per cent) or within 50 metres of hazard (24 per cent). Boonooroo Road and Maryborough Cooloola Road provide the sole vehicular access and egress to the Great Sandy Strait communities and is subject to significant exposure, as are Maaroom Road (access to Maaroom), Boonooroo Road (access to Boonooroo and Tuan), Poona Road (access to Poona) and Tinnanbar Road (access to Tinnanbar).

Additionally, the precinct includes two electricity zone substations at the Hyne Tuan Timber Mill (note, data sources indicate two adjacent substations), both of which are within the 100 metre hazard buffer. There are no vulnerable facilities within the precinct aside from short term accommodation. No reticulated water supply is provided to the Great Sandy Strait communities.



Bushfire risk summary

Bushfire risk within the precinct is assessed as very high, driven primarily by significant vegetation coverage, connectivity and classification which can support landscape-scale fire runs toward the coast, leading to exposure of residential buildings and employment lands (forestry areas) within coastal communities. The bushfire risk is exacerbated by extreme risk to the road network which could compromise evacuation efforts in a bushfire event.

Further growth in this area should be arrested and mitigation strategies considered to manage existing risk levels within the Great Sandy Strait communities.

Precinct 6 – Mary River

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	75,007	1	6	41	0	5	17
Residential	2,778	0	1	13	0	3	20
Employment	834	0	2	26	0	4	18
Rural Living	3,982	0	2	33	0	2	27
Rural	63,741	1	6	43	1	5	17
Environmental	345	0	5	85	0	1	6
Community facility	2,111	3	5	54	1	4	14
Limited development	281	0	4	5	0	2	8
Recreation & open space	935	0	8	55	0	5	16

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	11,063	0	0.2	4	0	2	16

Road exposure

Total length	257km
Exposed to hazard	36%
Within 50m of hazard	17%

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	36	8
Essential community infrastructure	65	34

Land use summary

The Mary River precinct includes the principal centre of Maryborough which serves as the primary commercial centre of the Fraser Coast region. Opportunity for residential expansion is located to the north of Maryborough under current planning provisions.

Rural living communities are located to the west of Maryborough at Oakhurst and to the south at Tinana. Current planning provisions facilitate reduced minimum lot sizes allowing for future expansion in these areas.

The community of Tiaro is located on the Bruce Highway in the southern part of the precinct. Tiaro acts as a service centre for outlying parts of the region as well as catering for through traffic on the Bruce Highway which intersects the precinct.

Other land uses within the precinct consist of predominately horticultural uses.

Exposure summary

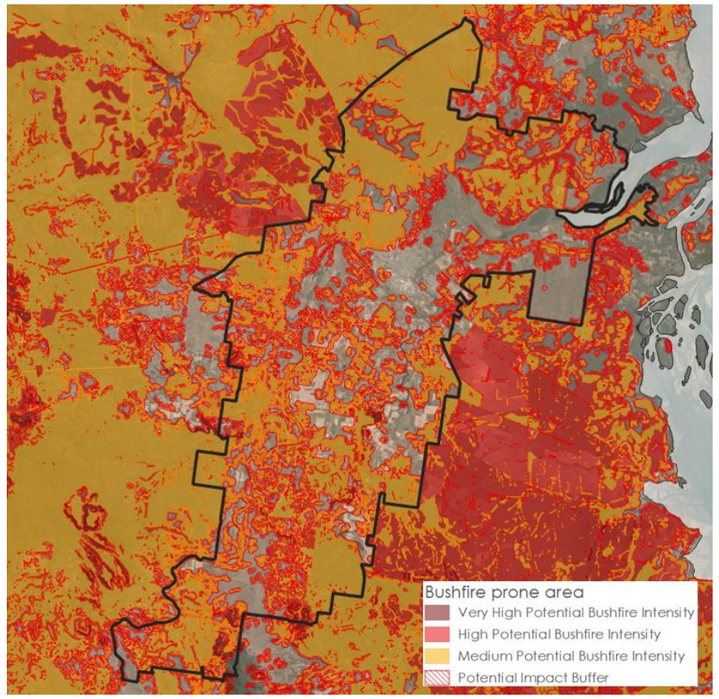
Bushfire exposure within the Mary River precinct is largely characterised by vegetation corridors resulting in large parts of the precinct subject to medium potential bushfire hazard.

There is moderate exposure to existing residential dwellings within the precinct with approximately 22 per cent of dwellings subject to potential bushfire hazard, the vast majority of which are within the 100 metre hazard buffer. Areas of residential exposure are limited to bushland interface areas surrounding Maryborough. Notably, rural living communities of Oakhurst and Tinana include higher levels of bushfire exposure.

Some vulnerable facilities within the precinct are subject to potential bushfire hazard including schools at Mungar and Tiaro as well as some schools within Maryborough. In addition, the Wide Bay Institute of TAFE at Oakhurst and the Maryborough Correctional Centre are also exposed.

A number of essential community infrastructure assets including over half of the distribution substations, sewer pump stations and half of the water treatment plants in the precinct are exposed to bushfire hazard.

Some of the road network is also exposed to potential bushfire hazard but availability of route options exists.



Bushfire risk summary

The bushfire risk level for land use planning purposes is considered moderate within the Mary River precinct. The precinct includes the principal centre of the Fraser Coast region with future growth anticipated surrounding this centre. This centre is also heavily flood exposed and thus, a balance between different hazard exposures is required.

Bushfire risk manifests through networked corridors and larger patches of bushland surrounding Maryborough and within outlying areas of Mungar and Tiaro. This expands to landscape-scale exposure between Maryborough and Hervey Bay, noting access between these communities can be cut during bushfire events.

Precinct 7 – K'gari (Fraser Island)

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	165,181	28	42	8	3	5	1
Residential	71	26	8	2	32	1	
Employment	8	0	34	7	0	16	0
Rural Living	0	NA	NA	NA	NA	NA	NA
Rural	134	2	53	8	2	16	0
Environmental	164,907	28	42	8	3	5	1
Community facility	49	1	24	10	0	23	15
Limited development	0	NA	NA	NA	NA	NA	NA
Recreation & open space	11	24	68	0	0	1	0

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	430	4	17	3	4	29	1

Road exposure

Total length	NA
Exposed to hazard	NA
Within 50m of hazard	NA

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	0	0
Essential community infrastructure	0	0

Land use summary

K'gari is predominately National Park land with only limited areas falling under Council jurisdiction for land use planning purposes. Kingfisher Bay Resort is located on the western side of the island however, it also does not come under the jurisdiction of the Planning Scheme being developed under the *Integrated Resort Development Act 1987*.

There are some isolated townships located on K'gari which are residential in nature and include short term accommodation uses as well as limited auxiliary services.

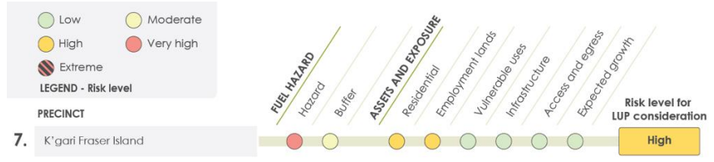
Exposure summary

The majority of K'gari is exposed to potential bushfire hazard, including high to very high potential bushfire intensity. Due to the small and isolated nature of settlements on K'gari, a high proportion of residential dwellings are exposed to potential bushfire hazard, including approximately 24 per cent within the mapped hazard area and an additional 34 per cent within the 100 metre buffer.

While there are no sealed, high order roads on K'gari, access around the island is reliant on unsealed roads which require four wheel drive vehicles.

There are no vulnerable facilities or essential community infrastructure identified through the risk analysis located on the island.

Bushfire risk summary



While Council's jurisdiction for land use planning purposes on K'gari is limited, the potential for bushfire risk is high. This is primarily owing to the expanse of vegetation on the island and its interface with the small and isolated townships and its biodiversity and ecological values.

Land use planning provisions should continue to manage bushfire risk in a risk-responsive manner to arrest the potential for future risk via new development.

Precinct 8 – Rural Areas

Zone exposure

Zones and zone groups	Area (ha)	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Local Area Total	265,797	7	12	47	1	3	10
Residential	78	0	40	9	1	29	10
Employment	23	0	1	14	0	10	33
Rural Living	2,411	1	10	48	0	10	19
Rural	233,189	6	12	47	1	3	11
Environmental	29,668	14	15	48	2	1	2
Community facility	409	0	13	64	0	4	15
Limited development	0	NA	NA	NA	NA	NA	NA
Recreation & open space	20	0	8	31	0	14	27

Note: Hazard area refers to the mapped bushfire prone area where VH = Very high potential area, H = High potential area, M = Medium potential area. Buffer area refers to the impact buffer area where VH = buffer to Very high potential area, H = buffer to High potential area and M = buffer to Medium potential area.

Residential exposure

	Total	Hazard Area (%)			Buffer Area (%)		
		VH	H	M	VH	H	M
Residential dwellings	1,373	0	11	28	0.4	20	30

Road exposure

Total length	219km
Exposed to hazard	51%
Within 50m of hazard	18%

Vulnerable facilities & essential infrastructure

	Total	Exposed
Vulnerable facilities	4	1
Essential community infrastructure	5	4

Land use summary

The Rural Areas precinct comprises the balance of the Fraser Coast region. The region is dominated by rugged bushland landscapes including areas of steep terrain, with agricultural uses and conservation areas throughout valley areas comprising a mix of managed land and some forested areas. Some small townships are located in the western part of the precinct including Brooweena and Aramara.

The lifestyle communities of Bauple and Glenwood are also located in the southern part of the precinct. Reticulated water is not provided to either township.

Bauple township includes some community uses as well as a primary school. Approximately 5 kilometres south-east of Bauple township is Bauple estate comprising approximately 330 residential dwellings on lots of around 1 hectare.

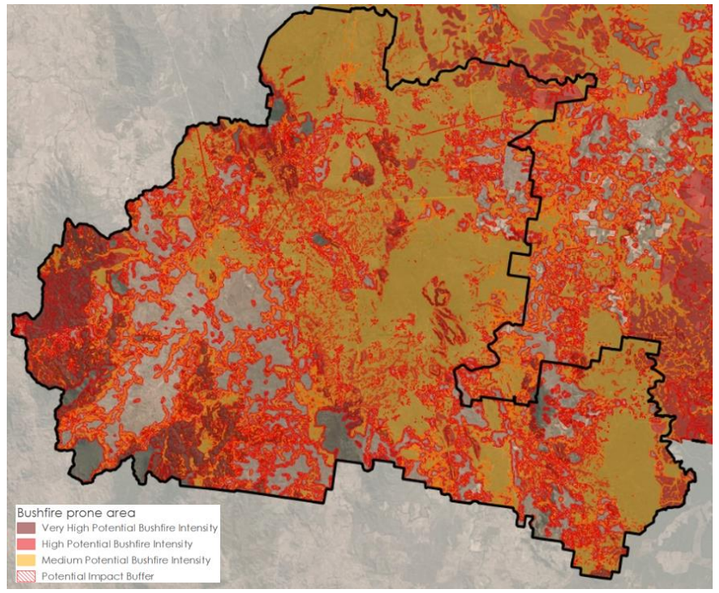
Glenwood is located on the Bruce Highway approximately 15 kilometres south of Bauple. The majority of lots within Glenwood are up to 1 hectare, limiting their ability to be further subdivided under current planning scheme provisions however, some larger lots which may cater for future subdivision are located on the edge of the community.

Exposure summary

Bushfire exposure within the Rural Areas precinct is largely associated with continuously vegetated landscapes spanning the majority of the precinct. The topography in parts of the precinct increases the potential bushfire risk in some locations including at Bauple and Glenwood. To the west, bushfire behaviour will be dominated by topography giving rise to large scale fire runs.

The vast majority (89 per cent) of residential dwellings within the precinct are exposed to potential bushfire hazard including 39 per cent within the bushfire hazard area and a further 50 per cent within the 100 metre hazard buffer. It is also noted that in Glenwood, a number of residential dwellings were observed to be informal in nature and likely to not be built to contemporary building standards.

Bauple State School is exposed to potential bushfire hazard. Similarly, the majority of the electricity infrastructure within the precinct is identified as exposed including zone substations in the north and south near the primary settlements. A high proportion of the precinct's road network is also exposed to potential bushfire hazard including all of the key roads. This includes the Bruce Highway. Additionally, the precinct includes a number of unsealed roads within and surrounding settlements which are also likely to be largely exposed.



Bushfire risk summary

Bushfire risk within the Rural Areas precinct is very high. This is largely driven by the significant areas of continuous vegetation within and surrounding the primary settlements. Bushfire risk is further driven by the exposure of residential dwellings which is considered extreme coupled with the fact that a proportion of dwellings in settlements such as Glenwood do not appear to be constructed to contemporary building standards. The lack of availability of reticulated water to these settlements further enhances risk.

Further growth of settlements in this area should be avoided and existing risk arrested through a series of land use controls.

8 Observations and recommendations

This section summarises the key observations and recommendations of this strategic land use planning-based risk assessment.

8.1 Risk assessment observations

The key observations drawn from the analysis and evaluation of potential bushfire related risks across the Fraser Coast region are summarised as follows:

- Overall, this risk assessment identifies expansive areas of potential bushfire hazard under the current State-wide bushfire prone areas mapping, particularly in relation to locations of continuous vegetation. While these locations do tend to be away from populated areas there are a number of small and isolated settlements which are subject to higher risk due to direct exposure to potential bushfire hazard and potential impacts on the evacuation network. More broadly, this landscape-scale hazard across the region has the potential to support large-scale fire activities under extreme fire weather conditions, capable of producing significant fire runs. The K'gari fire is a key example however, opportunity for campaign events of this scale also exists on the mainland.
- Characteristics that drive bushfire behaviour including fire weather and vegetation communities are continuing to evolve, translating to a higher likelihood of fire into the future as a result of climate change factors.
- Grassfire hazard is a particular threat across parts of the region including areas in the west and east of the LGA however, grassfire is not a mapped hazard. Where grassfire interacts with other fuel types (which are mapped), fire hazard is likely to occur in areas outside of mapped locations. These areas also do not trigger a planning or building response. Whilst grassfire hazard is not deemed a relevant planning matter by the State, it is a building matter. The lack of grassfire hazard mapping though disables the ability to trigger building construction requirements pursuant to AS3959.
- No precincts of the Fraser Coast region were identified as subject to 'Extreme' potential risk under this risk assessment.
- The precincts of the Fraser Coast region identified as subject to a very high bushfire risk profile, pursuant to the QERMF risk analysis matrices, include:
    - Burrum and Cherwell
    - Great Sandy Strait
    - Rural Areas.
- These locations experience elevated fire frequencies owing to surrounding landscape hazard coupled with the risk multipliers of exposed evacuation networks and exposure of existing residential dwellings, increasing the exposure of persons and property in these locations, over time. The socio-demographic profile of region suggests a higher number of potential vulnerable people may reside in these areas who may have difficulty evacuating. Road networks in some locations are not sealed, while some areas have no access to reticulated water supply. Arresting growing risk in these areas is necessary through a series of planning controls.
- The Burrum and Cherwell precinct includes land that is zoned as appropriate for future growth that is subject to potential bushfire risk, despite evacuation limitations.
- Emerging community zoned land at Wondunna, south of Hervey Bay is subject to potential bushfire hazard.

- The housing stock across the region is relatively aged, on proportion, and the majority are not constructed to AS3959 standard or current planning provisions. Many locations also do not include observable asset protection zones separating dwellings from the bushfire hazard.
- The consequence of fire in the region as a whole is identified as 'Moderate' having regard to the potential risks to life, property, infrastructure and economic values, pursuant to the QERMF methodology.
- Notwithstanding the above, the Fraser Coast has experienced significant change to fire weather over the past 70 years, as analysed by the Bureau of Meteorology. Into the future, the intensity and frequency of fire weather in the region will continue to grow as a result of climate change including lower rainfall, higher temperatures, more frequent drought conditions, more frequent hot nights and altered vegetation classifications (i.e. higher fuel loads).
- Over 30 per cent of the region's existing residential zoned lands and approximately 22 per cent of the region's existing housing stock (approximately a quarter of the region's population) are exposed to bushfire hazard. It is anticipated that this will continue to grow as a result of urban expansion into bushland interface areas at Burrum Heads, Wondunna, St Helens and Dundowran.
- Almost 80 per cent of the region's rural living zoned land is also exposed to potential bushfire hazard. Current planning scheme provisions limit the ability for these areas to be substantially developed further through minimum lot size provisions however, some opportunity for intensification occurs in some parts of Glenwood, Poona, Oakhurst and Tinana.
- Across the region, exposure of the key evacuation route network, consisting of the region's higher order roads, is also observed. In many locations, more than 50 per cent of the higher order road network is exposed to potential bushfire attack. Notably, a number of communities are subject to potential isolation in a bushfire event as their sole form of land-based transport is subject to exposure. These communities include Burrum Heads, Pacific Haven and the Great Sandy Strait communities.
- A spectrum of planning options exist to consider the hazard and risk profile for the precincts of the region, to be considered by Council as part of its settlement policy formulation underpinning the preparation of any new or amended planning scheme.
- Whilst some vulnerable facilities and essential community infrastructure assets are exposed across the region, the proportion is relatively low to moderate. Efforts to ensure this does not inadvertently increase as part of future growth of the region should be considered. Reliance on revised building requirements should not deter a policy of avoidance of these land uses into the future.
- Current Planning Scheme provisions exclude the 100 metre potential impact buffer area from the designated bushfire prone area meaning dwellings constructed in these areas do not require assessment against or compliance with AS3959. This is a major driver of increasing exposure and vulnerability of the residential building stock which the planning scheme must take specific and swift action to address to align with current State government guidance.

8.2 Risk assessment recommendations

The following table outlines the extent of recommendations identified by this risk assessment for further consideration as part of the preparation of an amended or new planning scheme.

Table 16 - Summary of risk assessment recommendations to inform policy, strategic and statutory planning approaches

ID	Recommendation
01	Work with the State government as part of ongoing updates and amendment processes supporting the State-wide BPA mapping to inform Council's overlay mapping.
02	Ensure all aspects of an amended or draft planning scheme maximise the linkages between planning and building processes.
03	Incorporate bushfire risk considerations as localised planning responses in very high risk localities, such as Burrum Heads, Pacific Haven, Bauple, Glenwood and the Great Sandy Strait communities. Using this framework, localised risk-responsive approaches can be adopted which move away from standardised / uniform hazard provisions.
04	Ensure zoning and other settlement policy decisions are informed by considerations for evacuation, having regard to: • the existing and potential exposure of the road network to bushfire attack • the ability to provide / retain multiple egress route options • the capacity of the road network to support emergency evacuation • road network design and construction • identifying and mitigating potential route bottlenecks during emergency evacuation. The demographics of the region and demographic projections should form a further dimension of these considerations.
05	Consider the implementation of statutory controls to regulate reconfiguring thresholds relative to the number of evacuation routes to ensure a grassroots approach to evacuation planning can be contemplated at development assessment stage.
06	Consider the integration of statutory controls which focus on mitigating the risk of urban fire intrusion for new settlement at the urban bushland / grassland interface.
07	Consider a policy of avoidance of vulnerable and sensitive facilities in the bushfire prone area across the region. Where such uses are necessary, contemplate the strength of statutory controls.
08	Explore the opportunity to introduce a definition of vulnerable uses (defined by the SPP guidance materials) to provide clarity to and strengthen the position of avoidance relating to the above recommendation.
09	Explore opportunities for statutory planning provisions to appropriately address the bushfire resilience of land uses and activities not subject to AS3959 including short term accommodation, tourist activities, fuel stations, sensitive uses, industrial

ID	Recommendation
	activities, hazardous activities, vulnerable facilities and critical infrastructure where these cannot be avoided in a bushfire prone area.
10	Ensure a new or amended planning scheme appropriately balances the competing planning policy issues of biodiversity and environmental protection with bushfire protection and mitigation.
11	Ensure any future master planning or structure planning processes for emerging community zoned land or growth areas are undertaken in line with bushfire resilient urban design principles which guide outcomes, on balance with ecological values. Ad hoc approaches that incrementally increase risk exposure over time should be avoided.
12	Ensure strong and calibrated consideration of bushfire hazard and risk across all parts of the draft planning scheme.
13	Consider amending the definition of the designated bushfire prone area in Section 1.6 of the current planning scheme to include the potential impact buffer area to ensure dwellings subject to radiant heat flux and ember attack are assessed against and comply with AS3959.

9 Policy development considerations summary

To advance the identification of policy pathways and directions, established by the specific risk profiles established by this risk assessment report, a number of considerations are required. These include:

- the recommendations of this bushfire risk assessment (Part B)
- the legislative and regulatory environment and relevant requirements for plan-making
- the State interests identified by the SPP and guidance materials, including the Bushfire Resilient Communities technical reference guide and example code. This includes:
    - the ten (10) policy positions established by the technical reference guide, which support an assessment of risk tolerability
    - section 13.1.4 Approach to plan-drafting under the 'Integrating state interests in a planning scheme' non-statutory guidance material
    - relevant content contained in the 'Drafting a planning scheme – Guidance for local governments' document.

The above considerations are set out in further detail in Part C of the Bushfire Risk Assessment project reporting.