Response to RFI

APPLICATION FOR MATERIAL CHANGE OF USE – HIGH IMPACT INDUSTRY – IMPACT ASSESSABLE, LOT 1 RP742982 AND LOCATED AT 75 BOUGAINVILLE STREET, BROOKHILL

JVS Planning
8 Nugent Court, Kirwan Qld
PH: 0428136814
E:jvsplanning@gmail.com

JVS Planning

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

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JVS Planning

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

Ref: MCU:75 Bougainville

22 August 2025

Chief Executive Officer
Townsville City Council
PO Box 1268
Townsville Qld 4810

Attention: Planning and Development

Dear Sir/Madam

RE: MCU24/0084 - RESPONSE TO RFI - MATERIAL CHANGE OF USE FOR HIGH IMPACT INDUSTRY LOCATED AT 75 BOUGAINVILLE STREET, BROOKHILL, - LOT 1 RP742982

1: Introduction

Thank you for the Request for Further Information dated 17 September 2024. It is noted the Information request included four (4) request items. However, negotiations during the response period reduced the number of request items to a single item, that being Request Item 4 – Bushfire Hazard Assessment. The following details the outcomes of Request Items 1 – 3 and represents a response to that single Request Item 4.

2: Request Item 1 – Traffic Impact Assessment

The applicant is requested to submit a Traffic Impact Assessment report demonstrating that the existing transport infrastructure is appropriate for the traffic generated, having regard to the safety and efficiency of the transport network, and the functions and characteristics identified of the road hierarchy.

Reason
To demonstrate compliance with Performance Outcome PO1 of the Transport impact, access and parking code of the Townsville City Plan.

Response

The applicant demonstrated that as Bougainville Street between the Flinders Highway and Stuart Creek is within the Medium impact industry zone, the TIA was not required. Accordingly, advice was received that this Request Item was not required and issued in error. See email from Shelly Sharma dated 8 October 2024 in Attachment 1 below.

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

3: Request Item 2 – Suitability of Existing Crossover/Culvert on Stuart Creek

The applicant is requested to submit a report providing engineering assessment of the existing crossover/culvert over Stuart Creek including any works that may be required to service the development. The report must be certified by a suitably qualified Registered Professional Engineer of Queensland (RPEQ).

Reason
To demonstrate compliance with Performance Outcome PO5 of the Transport impact, access and parking code of the Townsville City Plan.

Response

The applicant provided photographic evidence of the current state of the crossover/culvert and demonstrated it is in good repair. Accordingly, advice was received that this Request Item was not required and could be appropriately conditioned. See email from Shelly Sharma dated 8 October 2024 in Attachment 1 below.

Figure 1 – Depth of concrete over culvert

Figure 2 – Culvert causeway

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

Figure 3 – Culvert long view

Figure 4- Culvert causeway

4: Request Item 3 – Site Access and Driveway

The applicant is requested to provide a plan clearly indicating the areas where vehicles are proposed to be driven. Aerial views indicates that upon entry vehicles do not remain within the site. Instead, the vehicles enter the site, exit into the unnamed road before re-entering the site.

Reason
To demonstrate compliance with Performance Outcome PO5 of the Transport impact, access and parking code of the Townsville City Plan.

Response

The applicant provided advice and demonstrated that the requirement for an alternative access is cost prohibitive as not only does Bougainville Street not align with the unnamed road across Stuart Creek, the subject site is the only property that can be accessed via the existing Bougainville Street alignment. Accordingly, advice was received that this Request Item was not required and could be appropriately conditioned. See email from Shelly Sharma dated 8 October 2024 in Attachment 1 below.

JVS Planning

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

5: Request Item 4 – Bushfire Hazard Assessment

The applicant is requested to provide a Bushfire hazard assessment completed by a suitably qualified person as per the requirements of SC6.8 Mitigating bushfire hazard planning scheme policy.

Reason
To demonstrate compliance with Bushfire Hazard Overlay Code of the Townsville City Plan.

Response

A Bushfire hazard assessment was undertaken by Eco Systems Management (AUST) Pty Ltd and is attached as a response to this request item. See Attachment 2 below.

6: Conclusion

The above represents the applicant's response to the RFI issued by Council on 17 September 2024 and represents a full and final response to the request items.

If you have any queries please do not hesitate to contact me on 0428136814.

Regards

Jeff Smith

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

Attachment 1

Hi Jeff,

Apologies for delay in finalising this information. I just wanted to make sure that undue requirements and expenses are not placed on the development, as you had advised last time we spoke. After further discussion with the Engineering Coordinator, I can advise the following including works required as a minimum:

Request Item 1 – Traffic Impact Assessment: TIA not required.

Request Item 2 – Suitability of Existing Crossover/Culvert on Stuart Creek: Please include a commentary with photos in your response. A condition will be recommended (and plan marked) that the access driveway including culvert will be maintained by the developer and a property notation included to reflect this.

Request Item 3 – **Site Access and Driveway**: Existing arrangement acceptable. However, plan will be marked to install four guideposts as shown in screenshot below to comply with Austroads requirements.

Request Item 4 – **Bushfire Hazard Assessment**: To be submitted by the applicant.

Let me know if any concerns.

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

JVS Planning

A: 8 Nugent Court, Kirwan QLD
E: jvsplanning@gmail.com
T: 0428136814

Attachment 2

BUSHFIRE HAZARD ASSESSMENT AND MANAGEMENT PLAN

75 BOUGAINVILLE STREET, ROSENEATH (1RP742982)

TECHNICAL REPORT 7-6-23

Technological Solutions for Sustainable Natural Resource Management

Ecosystems Management (Aust) Pty Ltd
ACN: 168 049 885
38 Darling Road
Jensen
QLD 4818

STATEMENT OF QUALIFICATION

This Bushfire Hazard Assessment Report has been prepared by Marcia Griebenow. I have 19 years' experience in bushfire management and environmental management, practicing in Victoria, New South Wales and Queensland. I have a Bachelor of Environmental Science (Management) from Charles Sturt University, and the Postgraduate Diploma in Bushfire Protection from the University of Western Sydney.
I am suitably qualified and experienced to undertake Bushfire Hazard Assessment and prepare recommendations for bushfire management planning and construction requirements in bushfire prone areas.

Marcia Griebenow BEnvSc GradDip (Bushfire Protection) MEIANZ

LIMITATION AND DISCLAIMER.

This report has been prepared by Ecosystems Management (Aust) Pty Ltd (EMA) with all reasonable skill, care and diligence. This report is for the exclusive use of **Chop N Chip Tree Fellas** or their nominated agent. It is the responsibility of the client to implement this plan, and its associated recommendations. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from EMA. EMA accepts no responsibility to any party in respect of any matters outside the agreed scope of the work, and accepts no liability for implementation of recommended management actions using management plans prepared by other parties.

DOCUMENT CONTROL

Reference	Rev	Date	Prepared	Authorised	Approved
7-50-26_RP_BMP_75 BougainvilleSt_Roseneath_v1.0	1.0		Michael Sears	Marcia Griebenow	

DISTRIBUTION

Recipient	Organisation	Version	Copies	Date
		1.0	**1**	

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1. INTRODUCTION

Ecosystems Management (Aust) Pty Ltd (EMA) has been engaged to undertake a Bushfire Hazard Assessment, and subsequently prepare a Bushfire Management Plan (BMP) for Lot 13 on Plan RP886737 in Alligator Creek, to support a Material Change of use application to Townsville City Council for High Impact Industry use of the site.

According to the Townsville City Council Bushfire Hazard Mapping, the subject lot is identified as being within both Medium and High bushfire hazard areas. Under the Townsville City Council planning scheme, land encumbered under the Bushfire Hazard mapping overlay must have a Bushfire Hazard Assessment conducted to ensure that the development does not increase the risk to life, property, community and the environment in accordance with the purpose of the Bushfire Hazard Overlay Code. Where sufficient hazard is identified, a Bushfire Management Plan is required to manage the identified risk.

This bushfire hazard assessment is prepared with regard to:

- *8.2.2 – Bushfire Hazard Overlay Code* of the Townsville City Council Planning Scheme,
- State Planning Policy guidance material

2. PROPOSED DEVELOPMENT

The proposal is for the Material Change of use under the requirements of the Townsville City Plan to allow for High Impact Industry use of the site. The use of the site for the proposed High Impact Industry is established and ongoing, with the Material Change of Use being retrospective. As such, the site is representative of the operation ongoing, outside of any changes require to be made to meet the requirements of the Townsville City Plan.

3. DEVELOPMENT APPROVAL AND CONDITIONS

Development approval is sought under state planning legislation. The relevant planning scheme under state planning legislation is the Townsville City Council Planning Scheme (Townsville City Plan, 2014). This Bushfire Management Plan addresses the requirements 8.2.2 – Bushfire Hazard Overlay Code.

3.1. STATE PLANNING POLICY

The State Planning Policy (SPP) addresses development in relation to the risk from natural hazards, by establishing planning constraints based on a statewide risk assessment. Where local government planning schemes do not prepare a bushfire hazard overlay code specifically for their LGA, planning controls default to the statewide hazard mapping and the SPP requirements for development in bushfire prone areas.

The Queensland Government has produced a technical manual (**Bushfire Resilient Communities** (QFES, 2019)) to support the state planning policy, describing the methodology used for statewide hazard mapping and providing a guideline for preparing localized bushfire hazard area maps.

3.2. PLANNING SCHEME

The property is encumbered by the Bushfire Hazard Overlay (Planning scheme map OM02.0) across its eastern section, and therefore requires assessment against the Bushfire Hazard Overlay Code. Figure 1 shows the subject property with reference to the Bushfire Hazard Overlay.

FIGURE 1 SUBJECT SITE WITH MEDIUM AND HIGH BUSHFIRE HAZARD (TCC, 2014)

3.3. AUSTRALIAN STANDARDS

The City Plan recommends consideration of AS3959-2009 (Construction of buildings in bushfire prone areas) (SAA, 2011) when evaluating the bushfire hazard for a development application. The standard has been reviewed with a major revision released in 2018, and subsequently amended in 2020. AS3959-2018 is further referred to in this bushfire hazard assessment. AS3959 defines levels of construction for dwellings, aimed at achieving construction resilience to the impacts of bushfire intensity and behaviour. AS3959 is called up by the National Construction Code (NCC, 2019), under the *Building Act 1975*, when constructing a dwelling in a *designated bushfire prone area*, and generally has little to do with evaluating the bushfire hazard associated with development approvals for reconfiguration of a lot or material change of use. State planning policy technical guidance material provides the necessary methodology for evaluation of bushfire hazard in the context of addressing risk associated with planning approvals, and subsequently, the methodology described in AS3959 will not be referenced further in this hazard assessment and management plan.

4. BUSHFIRE HAZARD ASSESSMENT

This section contains the information required to complete the Bushfire Hazard Assessment. Principal factors influencing fire behaviour are bushfire fuels, fire weather and topography (slope).

Fire will spread faster, with higher intensity, when travelling upslope. Conversely, rate of spread and potential intensity is lower when traveling downhill. High fuel loads (particularly fine fuels such as grass and small (< 6mm diameter) twigs and branches) will promote a faster rate of spread and higher intensity than a lower fuel volume; longer grass will promote higher intensity and rate of spread than shorter grasses.

4.1. SITE DESCRIPTION

4.1.1. LOCATION

The subject site is currently comprised of a single Lot totalling 11.48ha, located 12km south south east of Townsville City centre. The subject site is accessed from Bougainville Street, which connects closely to the Flinders Highway to the west as the main transport link for the area (see Site Location Map in Appendix A).

To the west the site is bounded by the naturally vegetated watercourse reserve for Stuart Creek, with rural residential land parcels, typically in a state of moderate management and having reduced fuel loads overall. To the south the site directly borders the operational area of Roseneath Quarry, which is devoid of bushfire fuels. To the east and north the subject site connects contiguously with areas of natural or naturalised vegetation that are present on the greater land parcel containing the Roseneath Quarry.

The subject site is identified as being on the eastern extent of the Roseneath suburb, on the boundary of the change in landscape type, with the residential area extending to the west of the site, featuring an overall managed landscape featuring lower presence of bushfire fuels. Encompassing this to the north, east, and south are large areas of natural or naturalised vegetation, which are ultimately contiguous with the Bowling Green Bay National Park. The Roseneath Quarry does provide a significant break in this naturalised vegetation, with large areas in close proximity to the south and east that do not contain any bushfire fuels.

4.1.2. PROPOSED DEVELOPMENT AND OPERATION

The proposal is for the Material Change of use under the requirements of the Townsville City Plan to allow for High Impact Industry use of the site. The use of the site for the proposed High Impact Industry is established and ongoing, with the Material Change of Use being retrospective. As such, the site is representative of the operation ongoing, outside of any changes require to be made to meet the requirements of the Townsville City Plan.

FIGURE 2 SITE USAGE PLAN (DOCUMENT ID 25706984, VERSION 1, C&B DESIGNS, 2024)

4.2. TOPOGRAPHY AND HYDROLOGY

The subject site is located within a suburb of Townsville, situated separately to the south south east of the main urban agglomeration. The local area is characterised by the Townsville Plains regional land type meeting foothills associated with the great dividing range. The subject site occurs within a transitional area, with the flat plains area meeting an area of foothills consisting of numerous low peaks. The closest low peak is 400m to the north east of the subject site, with areas of increased slope beginning within the sites eastern extent. There is significant slope in the broader landscape,

with the slopes of Mt Stuart beginning 2.5km to the west, and the slopes of Mt Elliot beginning 11.5km to the south east.

The subject site itself is overall flat across the majority of its area, with localised slope associated with the drainage lines and dam present onsite. This changes in the eastern section of the site, with areas of steep slope rising sharply from the flat plains area (see Topography and Hydrology Map in Appendix A). This area is utilised operationally as the drop off point for the dewatering of hydrovac mud/soils, with the slope allowing for outflow of separated water.

Slope across subject majority of the site is within the range of 0 to 3 degrees, with highly localised areas of slope greater than 20 degrees associated with drainage features and embankments. The steeper slope identified in the eastern extent of the site ranges from 10 to 35 degrees, with the majority of slope below 20 degrees, and steeper slope highly localised. This area slopes upward to the east, away from the proposed operational area.

State-wide drainage mapping shows no watercourses intersecting the subject site. Stuart Creek runs parallel and adjacent to the subject sites western boundary, and is identified as a perennial watercourse with a stream order of 5 running south to north. This drainage line forms part of the Ross River Basin, continuing to drain north before draining north into Cleveland Bay.

To accurately reflect the influence of slope on bushfire behaviour across the landscape, a smoothed slope model (as specified in Leonard et al 2014) it utilised for bushfire hazard calculations. This may exclude very localised slope areas that may be shown in the Topography and Hydrology Map in Appendix A which would have no effect on bushfire hazard.

4.3. FIRE WEATHER

Fire weather refers to the suite of conditions that contribute to the propagation of bushfire. This includes temperature, humidity, rainfall, days since rain and wind. The nearest Bureau of Meteorology weather station is Townsville Aero (Station number 032040, located at Townsville Airport (BOM, 2024)).

The site is within the dry tropics region of northern Queensland. This area is characterised by wet summers and dry winters. The wet season may commence as early as November, and officially ends in April. The fire season is usually recognised as the period from June, until the commencement of the wet season (which may be variable).

4.3.1. TEMPERATURE

Mean maximum temperatures occur in December (31.6 ^{o}C), and mean minimum temperatures occur in July (13.8 ^{o}C) (Figure 3).

4.3.2. HUMIDITY AND RAINFALL

The climate can generally be classified as humid, with the minimum humidity occurring in June with a mean 3pm relative humidity of 51%. Mean 3pm humidity reaches a maximum in February at 67% (Figure 4).

Rainfall is lowest during July, August and September, with 67% of the annual rainfall occurring in January, February and March (Figure 4). Significant drying of grasses and increased leaf drop can be observed throughout September and October, as soil moisture declines. Evaporation (Figure 5) increases towards the end of the dry season as daily temperatures and solar exposure increase. Low humidity and increased drying from wind exacerbates grass and fine fuel curing through the dry season.

4.3.3. WIND

The predominant winds throughout the year are from the north east and east (Figure 6). These winds are moist, rather than dry, and therefore have a lesser drying effect on fine fuels in the region. Occasionally dry winds come from the west and south west; however, these are less common and do not persist for more than a couple days at a time. Wind strength is highest towards the end of the dry season, increasing the rate at which fine fuels may dry (Figure 4).

Wind direction and strength is also a consideration for fire suppression in terms of bushfire behaviour. A bushfire will travel quicker in strong winds, and potentially demonstrate higher intensity due to the increase in air availability to the seat of the fire. Higher strength winds through September to November can increase fire danger across the Townsville region.

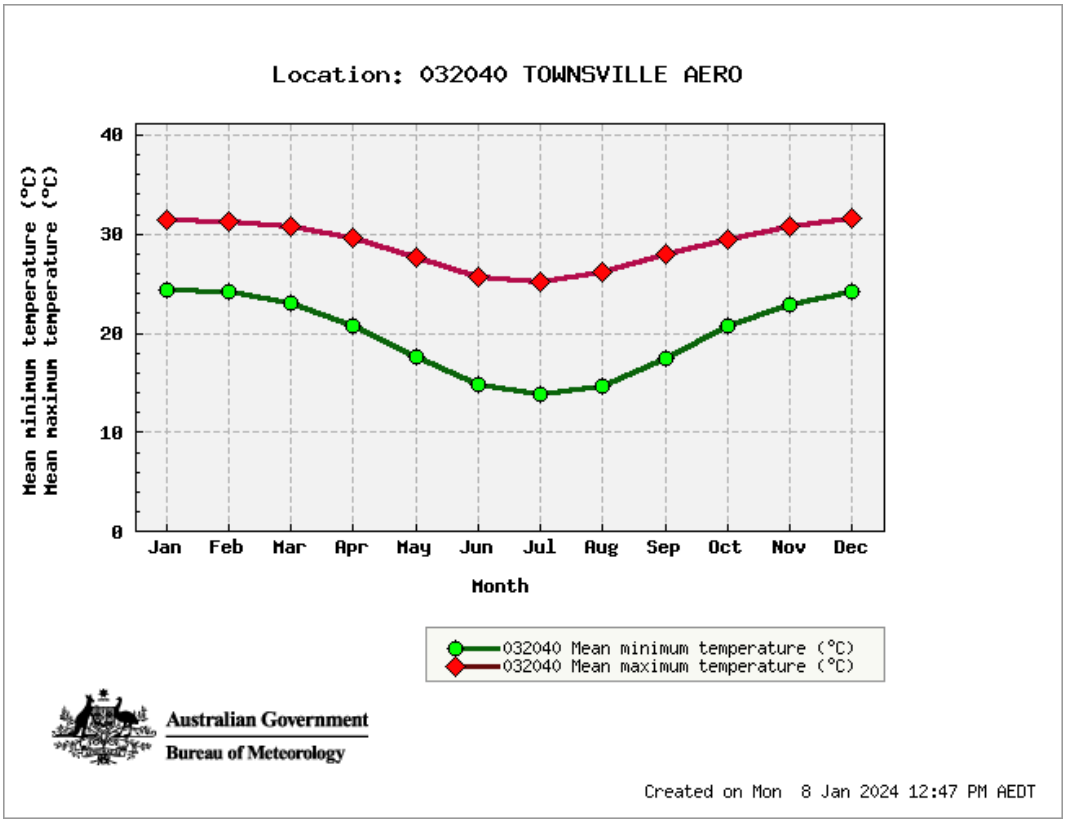


FIGURE 3 MEAN MAX AND MEAN MIN TEMPERATURES FOR TOWNSVILLE AERO (STATION 032040) (BOM, 2024)

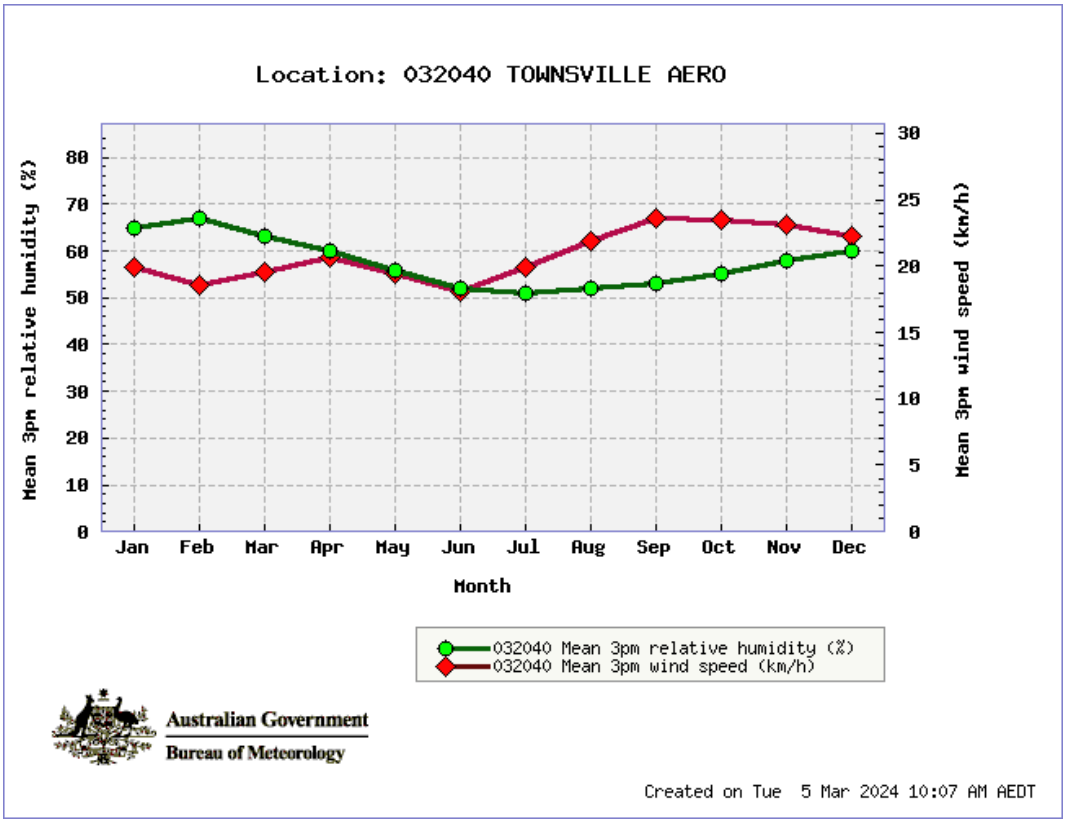


FIGURE 4 MEAN 3PM RH AND MEAN 3PM WIND SPEED (STATION 032040) (BOM, 2024)

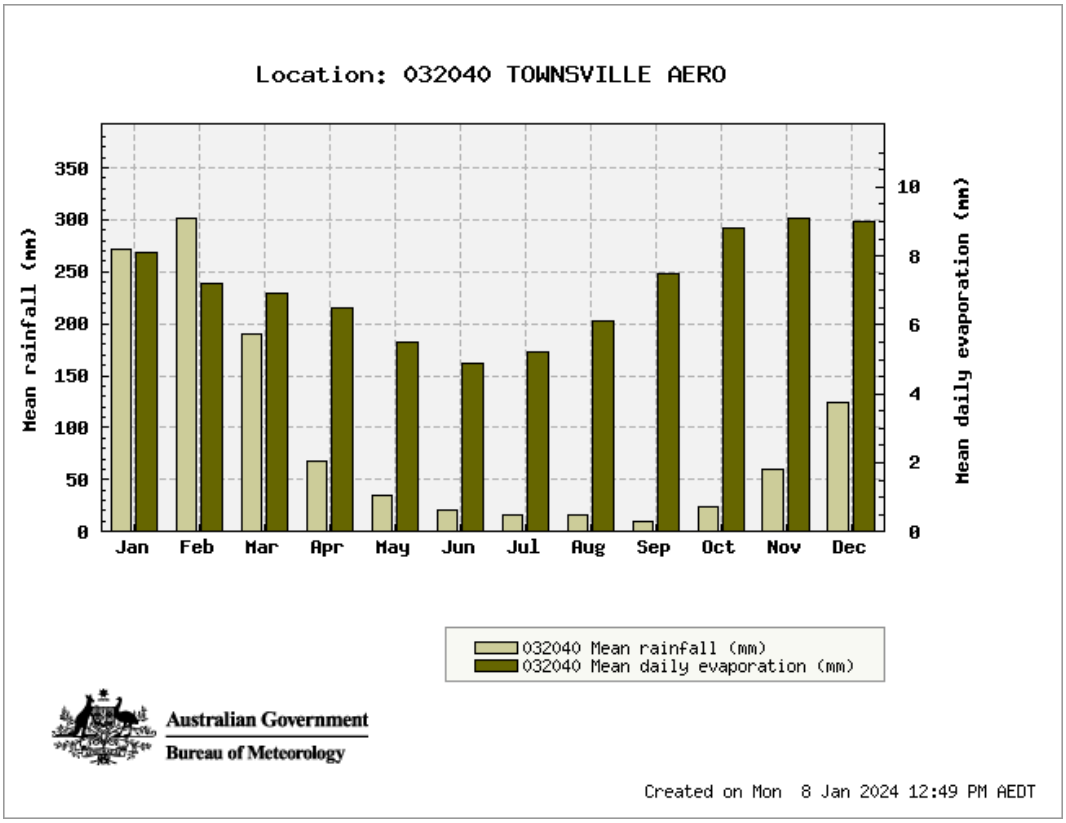


FIGURE 5 MEAN DAILY EVAPORATION (MM) AND MEAN MONTHLY RAINFALL (STATION 032040) (BOM, 2024)

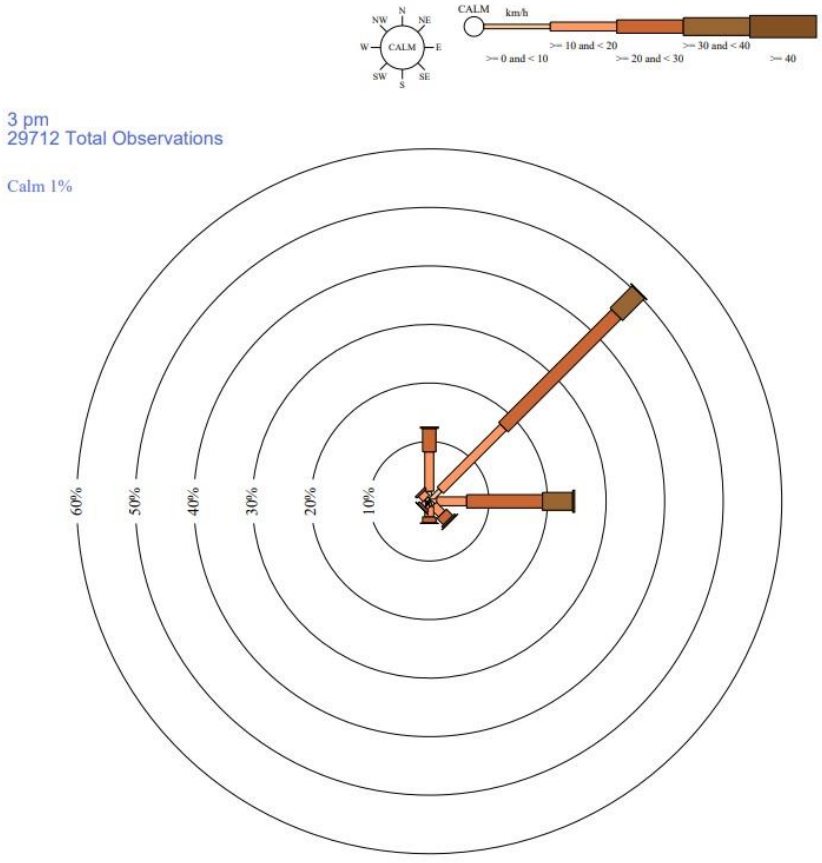


FIGURE 6 ROSE OF WIND DIRECTION VERSUS WIND SPEED IN KM/H (01 NOV 1940 TO 10 AUG 2022) (STATION 032040). (BOM, 2024)

4.3.4. CONTINENTAL EFFECTS OF SEASONAL VARIATION

While climate averages provide an overview of the weather characteristics contributing to identified fire seasons, and annual trends that influence the general expected severity of a given season, nationwide weather patterns effect the extreme fire weather conditions experienced from time to time in different parts of the country.

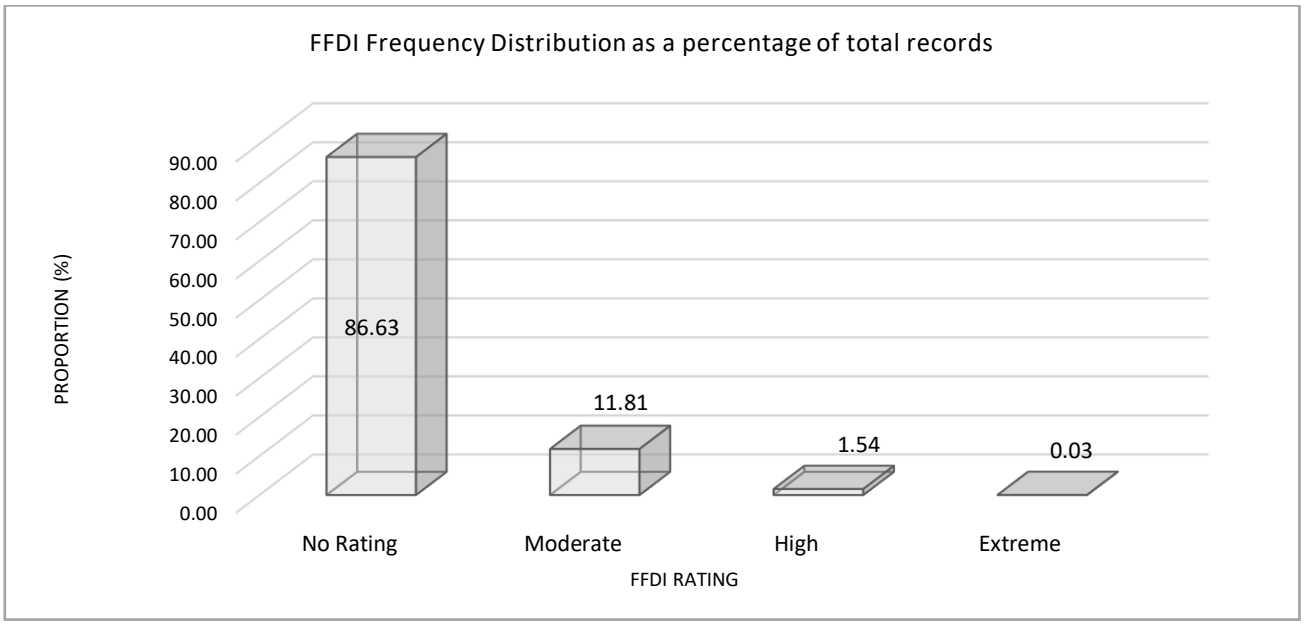
While the conditions generally experienced in the region can be described as dry, with hot summers and cold winters, widespread national weather patterns such as prolonged drought or persistent rainfall deficits, particularly in the interior, can influence the weather in all regions, resulting in the occurrence of extreme conditions that can (and have) resulted in Severe and Extreme fire weather conditions (using the now superseded QFES fire danger rating system), such as those experienced in the summer of 2018 - 19 (Mills, 2019). Mills paper discusses current research into fire weather trends in south east and coastal Queensland, acknowledging a recent trend in increasing extreme conditions over the last 20 years. This intimates that bushfire management planning should be conservative to minimise underestimation of risk associated with development.

4.3.5. FIRE DANGER INDEX

The Fire Danger Index (FDI) was developed to provide an indicator to fire managers of the probability of being able to contain and extinguish a fire once it started in a forest environment. FDI is calculated using inputs including recent rainfall, soil dryness, temperature, humidity and windspeed. The higher the FDI, the lower the probability of containment or extinguishment within 24 hours of the fire starting.

AS3959-2018 identifies an applicable FDI of 40 for Queensland, which falls into the classification of High fire danger under the new Australian Fire Danger Rating System (AFDRS), effective from September 2022. Fire hazard modelling in Queensland by CSIRO (Leonard et al, 2014) has mapped FDI across the state. FDI varies across the Townsville LGA, from 48 in the north, to 59 in the south. An FDI of 56 applies to the subject site in Roseneath.

It is noted that tropical climates exhibit different fire behaviour and fire weather characteristics to southern parts of Australia, with less frequent occurrences of extreme fire weather conditions. Subsequently, a review of historical fire weather data (Lucas, 2009) shows that while High (FDI 24 < 49) and Extreme (FDI 50 < 99) fire weather does occur in the Townsville area, these are infrequent and not prolonged occurrences (Graph 1 shows frequency distribution of FFDI over 43 years of records, according to the AFDRS). There are no records of fire weather reaching the classification of 'Catastrophic' or an FDI exceeding 100, which is experienced more frequently in southern parts of Australia and is correlated with the occurrence of significant bushfire events in the southern states. This observation is supported by research undertaken by Tropical Savannas CRC (2001), for various locations across northern Australia including Rockhampton (QLD) and Katherine (NT), which both have similar annual rainfall to Townsville.



GRAPH 1 FFDI FREQUENCY DISTRIBUTION

4.4. VEGETATION AND BUSHFIRE FUELS

Vegetation structure and arrangement are significant drivers of fire behaviour. Fuel hazard is described as the combined effect of fine surface fuels, elevated fuels and bark hazard in the ignition and propagation of fire. Traditional methods of fuel assessment require the individual assessment of all three fuel types to determine the Potential Fuel Load (PFL), described in tonnes per hectare (tph). This fuel weight can then be used to determine the potential fireline intensity (PFI) in terms of kW/m.

The methodology endorsed by the Queensland Government is described in the technical reference guide ***Bushfire Resilient Communities*** (QFES, 2019). This methodology builds on the state wide bushfire hazard modelling method published by CSIRO in 2014 (Leonard et al. 2014). Leonard et al identified potential total bushfire fuel loads for Queensland Herbarium regional ecosystem vegetation classifications and aggregated these into Vegetation Hazard Classes (VHC) (which also includes the canopy fuel weight), and was subsequently refined with detailed vegetation bushfire fuel data in 2017 (Newnham et al. 2017).

Vegetation hazard class mapping considers horizontal connectivity of bushfire fuels; VHCs with a continuous fuel load generally support continuous flame spread, whereas VHCs with discontinuous fuels may interrupt or retard the progress of a fire front. In terms of crown fire development, vegetation communities with little to no elevated fuels connecting surface fuels to bark and canopy fuels will limit the potential for crown fire development, whereas significant volumes of near surface fuels (grasses >1m high) and elevated fuels promote flame advancement into the canopy. Small patches of higher fuel load VHCs within a larger landscape of lower fuel load VHCs (up to 1ha), will locally increase fire intensity and rate of spread, however, will not significantly influence the overall bushfire hazard in the wider landscape.

Broad Vegetation Groups (BVG) and Vegetation Hazard Classes (VHC) within or adjacent to the subject site are listed in Table 1. The potential fireline intensity is calculated (using flat ground) to provide context to the influence of fuel load on potential intensity.

TABLE 1 BVG AND VHC ASSOCIATED WITH THE SUBJECT SITE AND ITS SURROUNDING AREA

Broad Vegetation Group	BVG Description	Vegetation Hazard Class	Class Description	Total PFL (tph)	Potential Fireline Intensity (kW/m)
9b and 9e	Moist to dry eucalypt open forests to woodlands usually on coastal lowlands and ranges.	9.2	Moist to dry eucalypt woodland on coastal lowlands and ranges	17.2	9534
22c	Melaleuca spp. open forests and woodlands on seasonally inundated lowland coastal swamps and fringing drainage lines (Palustrine wetlands)	22.1	Melaleuca open forests on seasonally inundated lowland coastal swamps	28.4	24,722
-	-	40.4	Low grass or tree cover in rural areas	5	837
-	-	43.6	Water bodies, or very low vegetation cover	0	0

Very high (potential intensity) 40,000+kW/m	High (potential intensity) 20,000 – 40,000kW/m	3. Medium (potential intensity) 4,000 – 20,000kW/m	4. Low Hazard < 4,000 kW/m

*Potential Fireline Intensity is calculated using the methodology in *Bushfire Resilient Communities* (QFES, 2019)

4.4.1. BUSHFIRE FUEL HAZARD

A site evaluation of bushfire fuel hazard was undertaken across the subject site. This was conducted to validate the vegetation mapping and modelled PFL across the site. The results of field assessment are summarised in Table 2.

Vegetation hazard class mapping has been evaluated against aerial photography and considered in the context of the field assessment results. Generally, the vegetation within 100m of a site is considered for vegetation hazard assessment.

VHC mapping has been edited to more accurately reflect vegetation structure and extent in the landscape surrounding the subject area. It is noted that the available aerial photography was captured in October 2024, and following the inspection of the site and its surrounding area is regarded as accurately representing the current land use and condition of the area. Vegetation hazard class mapping is shown in the Vegetation Hazard Class map in Appendix A, depicting the post development landscape, as clearing and maintenance of vegetation present will occur across the subject site to enable construction and ongoing use.

While there are small areas of varying vegetation cover dispersed across the landscape, many are limited to 1 hectare in size or lower, or are formed as narrow corridors less than 100m in width within another vegetation type. These small patches and corridors do not materially influence the likely bushfire behaviour assocaited with the dominant vegetation type, and have therefore not been mapped individually in the vegetation hazard class mapping, but have been aggregated with the surrounding dominant vegetation type as appropriate.

Additionally, small patches of vegetation less than 1ha and narrow corridors of vegetation less than 75m in width surrounded by area of no or discontinuous bushfire fuels have been excluded in their entirety as per the methodology specified in *Leonard, J., Opie, K. (2017) Estimating the potential bushfire hazard of vegetation patches and corridors. CSIRO, Australia*.

TABLE 2 FUEL HAZARD ASSESSMENT SUMMARY

Mapped VHC (PFL)	Observations / Discussion
9.2 **(17.2 tph)**	This vegetation type is currently dominant across the majority of the subject site, and is contiguous with vegetation of the same type to the north and east of the subject site. The overstory within this vegetation type is typical of this vegetation hazard class, consisting almost entirely of eucalypt species, with *Eucalyptus platyphylla* being dominant, and other species such as *Corymbia dallachiana*, *Casuarina sp.*, and non-native species having occasional occurrence. The understory, however, is not typical of this vegetation hazard class, consisting of mostly non-native species. *Leucaena* regrowth is dominant in dense understory stands across a significant areas of the site. The site does form a habitat matrix, with areas evidencing an overall greater open woodland structure amongst denser woodland patches, with grasses and herbaceous species being the dominant understory. On the slopes present at the eastern extent of the site the understory alters to a more scrubby composition, with *Ziziphus mauritiana* abundant. At the time of survey at the end of the dry season a moderate to high, cured fuel load was observed as present. For the purposes of assessing pre-development hazard these areas will be regarded as being VHC9.2 woodland.

PLATE 1 - VIEW OF 9.2 WOODLAND ADJACENT TO OPERATIONAL AREA, WITH CHANGE IN UNDERSTORY TYPE EVIDENT

PLATE 2 – VIEW OF 9.2 WOODLAND ENCOMPASSING PART OF THE OPERTAITONAL AREA

<table>
<tr><th>Mapped VHC (PFL)</th><th>Observations / Discussion</th></tr>
<tr><td colspan="2"> 
PLATE 3 – VIEW OF DENSE LEUCAENA UNDERSTORY, IDENTIFIED CENTRALLY ON THE SUBJECT SITE
 
PLATE 4 – VIEW OF UNDERSTORY MORE TYPICAL OF THE DEFINED 9.2 HAZARD CLASS</td></tr>
<tr><td colspan="2"> 
PLATE 5 – VIEW OF GRASSY UNDERSTORY MORE PRAVELENT TOWARD THE EAST OF THE SUBJECT SITE
 
PLATE 6 – VIEW OF 9.2 WOODLAND TRANSITIONING TO A MORE SCRUBBY UNDERSTORY ON THE SLOPES AT THE EASTERN EXTENT OF THE SITE</td></tr>
<tr><td>22.1
(28.4 tph)</td><td>This vegetation hazard class is identified as present along the western boundary of the subject site, forming a buffer to the Stuart Creek watercourse.

The species composition of this vegetation group is somewhat more variable than typical for this vegetation hazard class, with a significant presence of Casuarina cunninghamiana and eucalypt species within the overstory. There is additionally a dense shrubby understory present, with some grasses additionally present at ground level. It is also noted that there is a moderate accumulation of fallen deadwood.

While the reduced presence of melaleuca species in the overstory acts to reduce the hazard of this vegetation somewhat, the dense understory and accumulation of bushfire fuels nevertheless result in a similar total fuel per hectare. As such, for the purposes of assessing pre-development hazard these areas will be regarded as being VHC22.1 woodland.</td></tr>
</table>

Mapped VHC (PFL)	Observations / Discussion
 PLATE 7 - VIEW NORTH ALONG STUART CREEK, WITH BUFFERING 22.1 WOODLAND AND WOODY DEBRIS BUILDUP VISIABLE	 PLATE 8 - VIEW SOUTH ALONG STUART CREEK, WITH BUFFERING 22.1 WOODLAND
40.4 **(5.0 tph)**	This vegetation classification is associated with the operational and residential areas of the subject site, as well as being prevalent across the broader landscape to the west of Stuart Creek, and present to the south of the site. Within the subject site, these areas are typically identified as low grass or scrub cover with occasional trees present within the operational areas, however, in some areas this classification has been used where there is a buildup of deposited vegetative material from the operational activity that is within proximity to adjacent vegetation types. It is additionally noted that a significant fire was present within the main mulch pile of the operational activity during the onsite assessment, highlighting the potential risk in this regard. The landowner of the subject site identified this fire as being triggered by arson, and the difficulty of fire suppression once dense mulch piles have caught alight.
 PLATE 9 - VIEW WEST ALONG THE MAIN ENTRANCE ROUTE TO THE SITE, PASSING THROUGH THE STUART CREEK WATERCOURSE.	 PLATE 10 – NORTH THROUGH THE OPERATIONAL AREA, WITH MULCH STORAGE STOCKPILES PRESENT.

Mapped VHC (PFL)	Observations / Discussion
 **PLATE 11 - VIEW EAST ALONG THE SOUTHERN BOUNDARY OF THE SITE, WITH VEGETATED BOUNDARY BETWEEN THE TWO LAND PARCELS CURRENTLY IMPACTED BY THE RECENT FIRE.**	 **PLATE 12 - VIEW NORTH WITHIN THE SUBJECT SITE SHOWING A SIGNIFICANT CLEARED AREA FOR THE STORAGE OF MULCH AND RECEIVED GREENWASTE.**
 **PLATE 13 - VIEW WEST WITH A PILE OF AGED MULCH FINES IN CLOSE PROXIMITY TO WOODLAND VEGETATION, AND MANAGED GRASS SURROUNDING.**	 **PLATE 14 - VIEW WEST SHOWING THE TRANSITIONAL AREA FROM THE MULCH STORAGE AREA TO THE HYDROVAC MUD PONDS.**
43.6 **(0 tph)**	This vegetation hazard classification is identified for water bodies or significant areas devoid of vegetation, and in the context of the subject site applies to the dam area only.

Mapped VHC (PFL)	Observations / Discussion

PLATE 5 -VIEW NORTH ACROSS THE DAM AREA PRESENT ON THE SUBJECT SITE, AT LOW CAPACITY DURING THE HEIGHT OF THE DRY SEASON, AND HIGH WATER MARK IDENTIFIED AT THE TOP OF THE EMBANKMENT.

4.5. FIRE HISTORY AND IGNITION SOURCES

QPWS fire history mapping is available through the Queensland Spatial Catalogue. This data includes records from 1937 in the wider local area, and from 1930 across Qld, and shows that the subject site has not been subject to an uncontrolled fire or unplanned burn in this time. This dataset generally focuses on fires within the public land estate, or fires that originate within the public land estate, and therefore does not provide a definitive fire history record for this location, however due to the proximity to the Mt Stuart recreational and military training area immediately west of the Roseneath settlement, and the Bowling Green Bay National Park further to the east, there is potential that widespread bushfire events have been recorded. The QPWS fire history shows no fires in proximity to the subject site, with the closest fire event recorded 5.5km to the north east of the site, within the Townsville State Development Area.

The Northern Australian Fire Information service (NAFI) conducts satellite image analysis for fire scars, developing a 23-year dataset showing fire history across northern Australia. This data is mapped on a 250m grid, consistent with the resolution of the satellite imagery use. The NAFI data shows the site has been subject to burning on two instances within the 23-year observation period, with the most recent being in 2011. The NAFI dataset overall identifies fire as being infrequent in the area east of the Flinders Highway and South of the Bruce Highway (which includes the subject site), but has been widespread on the one or two occasions it has occurred within this area during the recording period. West of the Flinders Highway, Mt Stuart is identified as burning annually, with the area burnt highly variable from year to year. There is an additional area to the north of the Bruce Highway (and south of the Townsville State Development Area) that also burns on a frequent basis, and with varied burn area presentation.

Bushfire in the area is typically associated with either natural ignitions during the dry season, or with planned burns for bushfire fuel management. It is acknowledged that some significant fire events in the regional context have been associated with negligent or malicious ignition. Other potential sources of ignition are likely to be associated with operational activities involving earthworks machinery, construction activities (including hot work) and vegetation management activities (slashing etc).

Discussion with the landowner of the subject site identified occasional historic fire impacts, with one instance of bushfire occurring across the entire local landscape, but more frequently with bushfire limited to the slopes of the hill to the east and not being present on the subject site.

It is additionally noted that a significant fire was present within the main mulch pile of the operational activity during the onsite assessment, highlighting the additional risk of the operation in regard to bushfire. The landowner of the subject site identified this fire as being triggered by arson, and the further identified the difficulty of fire suppression once dense mulch piles have caught alight.

4.6. BUSHFIRE HAZARD

Bushfire prone land is defined as land that could support a significant bushfire, or be subject to significant bushfire attack (Leonard et.al. 2014). Bushfire attack manifests as ember attack, radiant heat impact and/or direct flame attack.

The degree of severity of bushfire behaviour or bushfire attack is described in terms of Potential Fire-line Intensity. Potential Fire-line Intensity is calculated using inputs describing vegetation fuel loads (tonnes per hectare [tph]), slope (degrees) and FFDI as a descriptor of likely weather conditions thus:

$$FI = 0.62\, W^2\, FFDI \exp\left(0.069\theta\right) \qquad \text{(Equation 1)}$$

Where:

FI = Fireline Intensity (kW/m)

W = Potential Fuel Load (tph)

θ = Maximum Landscape Slope (degrees)

FFDI = Fire Weather Severity

The bushfire hazard class is derived by classifying the resultant Potential Fire Line Intensity output from the hazard modelling process (Table 3).

TABLE 3 BUSHFIRE HAZARD CLASSES CORRESPONDING TO POTENTIAL FIRE-LINE INTENSITY (FROM LEONARD ET.AL. 2014).

Potential Bushfire Intensity Class	***Potential Fire-line Intensity***
1. Very high (potential intensity)	40,000+kW/m
2. High (potential intensity)	20,000 – 40,000kW/m
3. Medium (potential intensity)	4,000 – 20,000kW/m
4. Low Hazard	< 4,000 kW/m

Bushfire hazard classification or threat level across the property and within the surrounding landscape (in terms of potential bushfire intensity) is Medium to High (see Modelled Bushfire Hazard map in Appendix A). The subject site is currently considered bushfire prone, but the proposed development will result in the developed areas (including the entirety of the subject site as per the final design) being regarded as Low Hazard. Adjacent land parcels do additionally feature areas of Medium and High bushfire hazard, which should be considered in development. The developed site (according to the planning report by JVS Planning) will be within the 100m potential impact buffer of an area mapped as bushfire prone.

The median potential fireline intensity associated with the mapped Medium Bushfire Hazard vegetation associated with the site is 10,215 kW/m, which is central to the range of values classified as Medium bushfire hazard (4000 kW/m to 20,000 kW/m).

The median potential fireline intensity associated with the mapped High Bushfire Hazard vegetation associated with the site is 35,369 kW/m for VHC 9.2 woodland on the steep slopes located at the east of the site, and 32,580 kW/m for VHC 22.1 open forests associated with Stuart Creek, which are at the higher end of the range of values classified as High bushfire hazard (20,000 kW/m to 40,000 kW/m).

4.6.1. ASSET PROTECTION ZONE (APZ) CALCULATION

State planning policy guidance material requires a achievement of a maximum radiant heat profile of 29kW at the development footprint extent, or a minimum 20m APZ. Whilst these paramters are intended for consideration with reconfiguration of a lot rather than material change of use developments, the nature of materials handled and stored on this site (green waste and timber mulch) are considered a high risk for bushfire impacts, including ember attack and

flame contact. In this location a 20m APZ will exceed the minimum requirements to achieve 29 kW/m^2 radiant heat profile, and also provide a defendable space for active protection of resouces assets within the site in the event of a bushfire in moderate fire weather conditions at the site.

To support this assertion, the Asset Protection Zone calculator has been used to establish the potential radiant heat flux impact on site infrastructure for high and medium bushfire hazard vegetation hazard classes.

The maximum heat flux exposure (which defines the minimum asset protection zone distance) can be calculated using the *SPP-Bushfire-APZ-Width-Calculator.xlsm* produced by QFES. The QFES APZ calculator is issued with the following disclaimer by QFES:

DISCLAIMER: Fire-line intensity and radiant heat calculations where effective slope exceeds 20 degrees (downslope) or 15 degrees (upslope) may be unreliable. In these locations, specialist assessment is warranted.

Please note that this calculator has been modified to enable low intensity heat flux values to be identified, even when the associated vegetation type is typically identified as low risk and would otherwise be regarded as BAL-LOW.

These calculations identify the minimum acceptable asset protection zone for each identified vegetation class, they do not stipulate the BAL construction requirements of AS3959.

TABLE 4 ASSET PROTECTION ZONE CALCULATOR – VHC9.2 ON OVERALL FLAT AREAS OF SITE

Bushfire Asset Protection Zone Width Calculator			
VARIABLE DESCRIPTION	**VARIABLE**	**UNITS**	**VALUE**
Input Values			
FIRE WEATHER SEVERITY	**FDI**		56.00
VEGETATION HAZARD CLASS	**VHC**	-	9.2 Moist to dry eucalypt woodland on coastal lowlands and ranges
REMNANT STATUS	**-**	-	Remnant
SLOPE TYPE (UPSLOPE OR DOWNSLOPE)	**ST**	-	Downslope
EFFECTIVE SLOPE UNDER THE HAZARDOUS VEGETATION	**eSlope**	degrees	3.00
SLOPE BETWEEN SITE AND HAZARDOUS VEGETATION	**θ**	degrees	3.00
DISTANCE OF THE SITE FROM HAZARDOUS VEGETATION	**d**	m	16.50
Output Values			
SURFACE FUEL LOAD	**-**	t/ha	11.40
NEAR SURFACE FUEL LOAD	**-**	t/ha	3.50
BARK FUEL LOAD	**-**	t/ha	1.30
ELEVATED FUEL LOAD	**-**	t/ha	1.00
TOTAL OVERALL FUEL LOAD	**W**	t/ha	17.20
TOTAL SURFACE FUEL LOAD	**w**	t/ha	14.90
POTENTIAL FIRE LINE INTENSITY	**I**	kW/m	10944
RADIANT HEAT FLUX	**q**	kW/m^2	28.36
BUSHFIRE ATTACK LEVEL (AS 3959-2018)	**BAL**	-	BAL 29

TABLE 5 ASSET PROTECTION ZONE CALCULATOR – VHC9.2 ON UPSLOPED AREAS OF SITE

Bushfire Asset Protection Zone Width Calculator			
VARIABLE DESCRIPTION	**VARIABLE**	**UNITS**	**VALUE**
Input Values			
FIRE WEATHER SEVERITY	**FDI**		56.00
VEGETATION HAZARD CLASS	**VHC**	-	9.2 Moist to dry eucalypt woodland on coastal lowlands and ranges
REMNANT STATUS	**-**	-	Remnant
SLOPE TYPE (UPSLOPE OR DOWNSLOPE)	**ST**	-	Upslope
EFFECTIVE SLOPE UNDER THE HAZARDOUS VEGETATION	**eSlope**	degrees	20.00
SLOPE BETWEEN SITE AND HAZARDOUS VEGETATION	**θ**	degrees	20.00
DISTANCE OF THE SITE FROM HAZARDOUS VEGETATION	**d**	m	14.00
Output Values			
SURFACE FUEL LOAD	**-**	t/ha	11.40
NEAR SURFACE FUEL LOAD	**-**	t/ha	3.50
BARK FUEL LOAD	**-**	t/ha	1.30
ELEVATED FUEL LOAD	**-**	t/ha	1.00
TOTAL OVERALL FUEL LOAD	**W**	t/ha	17.20
TOTAL SURFACE FUEL LOAD	**w**	t/ha	14.90
POTENTIAL FIRE LINE INTENSITY	**I**	kW/m	8898
RADIANT HEAT FLUX	**q**	kW/m^2	27.83
BUSHFIRE ATTACK LEVEL (AS 3959-2018)	**BAL**	-	BAL 29

TABLE 6 ASSET PROTECTION ZONE CALCULATOR – VHC22.1

Bushfire Asset Protection Zone Width Calculator			
VARIABLE DESCRIPTION	**VARIABLE**	**UNITS**	**VALUE**
Input Values			
FIRE WEATHER SEVERITY	**FDI**		56.00
VEGETATION HAZARD CLASS	**VHC**	-	22.1 Melaleuca open forests on seasonally inundated lowland coastal swamps
REMNANT STATUS	**-**	-	Remnant
SLOPE TYPE (UPSLOPE OR DOWNSLOPE)	**ST**	-	Downslope
EFFECTIVE SLOPE UNDER THE HAZARDOUS VEGETATION	**eSlope**	degrees	10.00
SLOPE BETWEEN SITE AND HAZARDOUS VEGETATION	**θ**	degrees	10.00
DISTANCE OF THE SITE FROM HAZARDOUS VEGETATION	**d**	m	23.00
Output Values			
SURFACE FUEL LOAD	**-**	t/ha	15.40
NEAR SURFACE FUEL LOAD	**-**	t/ha	8.00
BARK FUEL LOAD	**-**	t/ha	3.00
ELEVATED FUEL LOAD	**-**	t/ha	2.00
TOTAL OVERALL FUEL LOAD	**W**	t/ha	28.40
TOTAL SURFACE FUEL LOAD	**w**	t/ha	23.40
POTENTIAL FIRE LINE INTENSITY	**I**	kW/m	17740
RADIANT HEAT FLUX	**q**	kW/m^2	28.41
BUSHFIRE ATTACK LEVEL (AS 3959-2018)	**BAL**	-	BAL 29

TABLE 7 ASSET PROTECTION ZONE CALCULATOR – VHC40.4

Bushfire Asset Protection Zone Width Calculator			
VARIABLE DESCRIPTION	**VARIABLE**	**UNITS**	**VALUE**
Input Values			
FIRE WEATHER SEVERITY	**FDI**		56.00
VEGETATION HAZARD CLASS	**VHC**	-	40.4 Continuous low grass or tree cover
REMNANT STATUS	**-**	-	Remnant
SLOPE TYPE (UPSLOPE OR DOWNSLOPE)	**ST**	-	Downslope
EFFECTIVE SLOPE UNDER THE HAZARDOUS VEGETATION	**eSlope**	degrees	3.00
SLOPE BETWEEN SITE AND HAZARDOUS VEGETATION	**θ**	degrees	3.00
DISTANCE OF THE SITE FROM HAZARDOUS VEGETATION	**d**	m	5.50
Output Values			
SURFACE FUEL LOAD	**-**	t/ha	0.50
NEAR SURFACE FUEL LOAD	**-**	t/ha	4.00
BARK FUEL LOAD	**-**	t/ha	0.50
ELEVATED FUEL LOAD	**-**	t/ha	0.00
TOTAL OVERALL FUEL LOAD	**W**	t/ha	5.00
TOTAL SURFACE FUEL LOAD	**w**	t/ha	4.50
POTENTIAL FIRE LINE INTENSITY	**I**	kW/m	961
RADIANT HEAT FLUX	**q**	kW/m^2	26.88
BUSHFIRE ATTACK LEVEL (AS 3959-2018)	**BAL**	-	BAL-LOW

4.6.2. BUSHFIRE SCENARIO

The site is located in a moderately developed landscape, characterised by rural and rural residential land uses. The historical record confirms the occurrence of bushfire in the wider regional landscape, most frequently associated with vegetated sites contiguous with the Mt Stuart reserve and training areas to the west of the site, and with the area of natural vegetation located to the south of the Townsville state development area. There have historically been large, widespread bushfire events that have impacted the site area, but these have been infrequent and associated with large regional events. It is anticipated that the recent and ongoing development of the Townsville area will act to inhibit such widespread bushfire events in the local landscape, with the increased focus on active risk mitigation of the overall landscape through the implementation of fire breaks and bushfire fuel minimisation. The presence of the Flinders Highway to the west and Bruce Highway to the north provide significant de facto firebreaks separating the Roseneath area from the two most regular areas of bushfire occurrence in the local landscape. The Roseneath settlement itself to the west of the site, and the Roseneath Quarry to the south and east of the subject site, both exhibit low bushfire fuel presence and limit the ability of a fire front to approach the site from these directions.

The development area is considered to feature medium and high risk areas, and as such there is the potential for bushfire impacts to operational areas of the site from adjacent medium and high-risk bushfire areas within the 100m hazard buffer for potential bushfire effects. Suitable asset protection zones as specified will be required to minimise the risk of potential impacts, however, bushfire is still likely to impact the site to some extent if present in the adjoining landscape due to the surrounding vegetation types and the nature of activities undertaken on the site.

The bushfire season is considered to peak in September and October, when mean daily evaporation increases and mean 3pm humidity is at its lowest for the year. Wind direction during these months is dominant from the north east, with a smaller proportion of strong winds from the north and from the east. This gives a consistent likelihood of bushfire front development directed generally to the south west. The subject site is within an area of flat ground, with slope rising to the north east. This would have the effect of not accelerating any fire front approaching directly from the north, or slowing the approach of any bushfire from the north-east.

For a bushfire to actively threaten the site, it must have an ignition point to the north of the site in conjunction with a northerly wind. This would result in the fire firstly burning downslope, and then across the flat ground area prior to contacting the subject site, and as such reduce the intensity of the approaching fire front and delay its propagation into the site's retained vegetation.

It is highly unlikely that bushfire resulting from any other direction would successfully approach the subject site due to the barriers to bushfire propagation surrounding the subject site, and remaining small areas of bushfire fuels being unaligned with prevailing winds and unlikely to sustain a fire front, however ember attack at this site has a high likelihood of igniting stockpiled material when fire danger index is high or above.

In the context of likely ignition sources, accidental ignitions are most likely associated with roadways or rural activities that entail 'hot work', or use of ground engaging implements. In context of the site, the public road network does not provide access to any areas of medium or high bushfire risk, being limited to the east of the subject site, and bounded by cleared rural and agricultural land.

5. RISK ASSESSMENT

Risk Assessment requires identification of hazard, determination of likelihood, vulnerability and consequence. A matrix is used to derive risk, based on these factors. The process used in this risk assessment is documented in the **Queensland Emergency Risk Management Framework (QERMF) Risk Assessment Process Handbook** (QFES, 2018). The use of a risk matrix also facilitates the evaluation of management measures to demonstrate risk reduction.

The risk matrix implemented in the **QERMF** rates risk from Very Low (0) to Catastrophic (13). The risk assessment for proposed use rates at 4 (Low), prior to implementation of bushfire management measures, and risk is reduced to 3 (Very Low) and after evaluation of bushfire management measures.

Table 8 addresses the risk posed by bushfire, firstly in the absence of any mitigation measures, and then demonstrates the risk reduction based on proposed measures, which are detailed on the Bushfire Management Plan map.

HAZARD
Hazard is the identification of potential, regardless of any other factors.

The preliminary hazard assessment undertaken as part of this Bushfire Hazard Study for the pre-development condition of the site has identified **Low, Medium and High Hazard** across different parts of the site, with the significant contributing factors to this hazard being slope and vegetation classification.

The preliminary hazard assessment undertaken as part of this Bushfire Hazard Study for the post-development condition of the site has identified resultant **Low Hazard** for all operational areas, and a suitable surrounding area to mitigate bushfire impacts, with the significant contributing factor to this change in hazard being the removal of bushfire fuels present in the defined Asset Protection Zone.

LIKELIHOOD
Likelihood is a description of the probability of an event occurring. It is commonly presented in terms of Annual Exceedance Probability (AEP), based on the number of events that have occurred over a period of time. In order to establish likelihood for identified at risk assets, fire history information is necessary. Fire history indicates two unplanned burns affecting the subject site in the 23 year record period from 2000 to 2023. This is reflected identically within the immediate landscape surrounding the subject site, with no additional bushfire events recorded within the surrounding contiguous landscape. As such, an Annual Exceedance Probability (AEP) of 1% to <10% applies to the site, with the overall likelihood being **Unlikely**.

VULNERABILITY
Vulnerability is an assessment of the resilience of a community or asset to the identified hazard. It considers service interruption and reconstruction capacity and cost, options for evacuation, topographical features as barriers to addressing the hazard, occupant capacity for preparedness and response, and emergency services capacity.

- The proposed development does constitute essential infrastructure, constituting non-essential industrial use only.
- The proposed development will not increase the permanent population, nor the vulnerable population, of the site. The proposed development will result in the temporary visitation of the site by a working population to facilitate transport of materials, which will cease in high risk conditions.
- The defined operational area will be situated in low hazard areas only, and is able to provide suitable setbacks to reduce any radiant heat flux to less than 29kW/m^2.
- The subject site has a single route of egress from the immediate area, and is designed to facilitate regular heavy vehicle movements.
- The wider Townsville area has sufficient emergency facilities to cope with a significant bushfire event if it occurs, and firefighting services are able to mobilise in the area to prevent ingress of bushfire into residential areas.

While bushfire has the potential to impact the proposed operational use, the property is considered to have **low vulnerability** to the impacts of bushfire.

CONSEQUENCE
The consequence is a description and measure of the impact of a potential event on people, finance and economy, community, public administration and the environment. The degree of interruption of daily routines, loss of life or property, cost of recovery and resources required for this, and continuation of services (such as electricity and waste management), and damage to environmental values is evaluated on a scale of severity. Mitigation measures should be aimed at reducing this consequence.

In the event of a bushfire, it is likely that the threat will be known ahead of time, and the site able to be evacuated or actively defended if necessary. As such it is likely that only minor injuries would occur, if any. Bushfire would result in a short-term interruption to the operational use of the site, with any disruption lasting significantly less than one year for the reconstruction of the operational area and the restoration of the scenic amenity of the site. A bushfire event would not result in decreased community connectivity, or in the emotional or psychological impacts typically associated with damage and temporary disuse of a residential environment. Bushfire impacts at this site would not affect public

administration. Minor damage to environmental values may occur, but no ecosystems or species of significance are identified within the subject site.

The Consequence of bushfire impact at the site (in the absence of any mitigation measures) is considered to be **Minor**.

Mitigation measures are discussed in the next section, and the risk assessment is summarised in Table 8.

5.1. MITIGATION MEASURES

5.1.1. ASSET PROTECTION ZONE AND STRATEGIC FUEL MANAGEMENT

The principal measure is to create distance between the proposed development and bushfire prone vegetation to ensure that the radiant heat flux generated is 29kW/m^2 or lower. This is achieved by managing bushfire fuels (via mowing/slashing of ground level vegetation, and removal of fallen deadwood) in the immediate vicinity of the development, with the intent to reduce the bushfire hazard of the adjacent vegetated areas.

The minimum distance required for strategic bushfire fuel management required to achieve this for this site is:

- 16.5m for VHC 9.2 Eucalypt Woodland on flat ground
- 14.0m for VHC 9.2 Eucalypt Woodland upslopes
- 23.0m for VHC 22.1 Melaleuca Open Forest
- 5.5m for VHC 40.4 continuous grass and tree cover.

However, as ember attack is the highest risk to the proposed operation, rather than heat flux impact to a structure, (and VHC 22.1 vegetation being more than 20 m away from the operational area) the following asset protection zone is stated:

- **20.0m for all operational areas and vegetation types**

This asset protection zone (APZ) should be established as a fuel managed area with slashed/mowed grass to below 30cm, the removal of understory fuels within an open woodland structure, and a mineral earth fire break within the APZ. Woody and herbaceous weeds should be controlled through herbicide application to reduce annual fuel loads associated with praxelis and chinee apple.

5.1.2. WATER SUPPLY

The subject site currently utilises a domestic water tank supply from a bore water source. These water tanks are located near the existing dwelling on the property.

It is necessary for a static 25,000L tank to be installed in proximity to the operational area, for firefighting purposes only. This supply must be serviced by a firefighting pump to ensure adequate volume and pressure for firefighting purposes, with couplings compatible for use by RFS.

It is suggested that this supply could be situated adjacent to the operational area and dam area, to enable easy access for firefighting purposes and allow this supply to be filled from recovered dam water, rather than impacting on the bore water supply. This water supply must be maintained and full at all times.

5.1.3. ACCESS AND EGRESS

The current access road is suitable for regular heavy vehicle access, and is thus suitable for firefighting vehicle access. It is recommended that the good condition of the current access road be maintained, and vegetation prevented from encroaching to ensure safe egress in the event of a fire on site.

5.1.4. MANAGEMENT OF GREENWASTE AND MULCH STOCKPILES

Following the incidence of fire present on the subject site during the bushfire hazard assessment, there is the risk that any future ignition event may result in further significant fire events for the site. With consideration that the cause of this recent event was intentionally lit, gated access to the property is recommended to prevent after hours access by unauthorised persons.

The ignition event may be as a result of bushfire spreading toward stockpiled material and impacting operations, or from a fire starting within a stockpile and spreading out across the site or beyond through surrounding bushfire fuels.

It is required that stockpiles be managed as per Queensland Government Guideline: Prevention of fires in stockpiles (ESR/2020/5506) or as updated from time to time. It is currently available online: www.des.qld.gov.au/policies?a=272936:policy_registry/cm-gl-waste-stockpile-fire-external.pdf.

Key recommendations from this guideline will include ensuring stockpiles do not exceed 4m in heigh or 20m in width, allow firefighting access down both sides, are arranged in a manner to minimise the likelihood of fire spread, provide separation that allows for firefighting intervention, features separating walls/revetments, and have permanently marked limits to control stockpile size.

TABLE 8 RISK ASSESSMENT

	Risk Assessment Prior to Controls						Risk Assessment after Implementation of Measures				
Development	**Hazard**	**Likelihood**	**Vulnerability**	**Consequence**	**Risk**	**Mitigation Measures**	**Hazard**	**Likelihood**	**Vulnerability**	**Consequence**	**Residual Risk**
High Impact Industry Use	Medium	Unlikely	Low	Minor	Low (4)	APZ areas maintained at 20m around operational footprint. Installation of a 25,000L water tank reserved for firefighting purposes, provided with firefighting pump and fire hose. All landscaping and planting to be undertaken with regard to low hazard planting choices. All future buildings subject to National Construction Code compliance and AS3959.	Low	Unlikely	Very Low	Minor	Very Low (3)

6. BUSHFIRE HAZARD OVERLAY CODE

Townsville City Council Planning Scheme Overlay Code 8.2.2 defines the performance criteria for developments relating to bushfire hazard mitigation, and identifies acceptable outcomes. These performance criteria and acceptable outcomes are described in Table 9. Management actions are described to achieve the performance criteria.

TABLE 9 TOWNSVILLE CITYPLAN 2014 OVERLAY CODE 8.2.2 PERFORMANCE CRITERIA

Performance outcomes	Acceptable outcomes		Solution
PO1 Development maintains the safety of people and property.	No acceptable outcome is nominated.		The location and configuration of the proposed operational area is able to effectively allow for an asset protection zone to be established that ensures a defendable space appropriate to the nature of risk at the site is maintained. The bushfire history shows infrequent occurrence of bushfire within the subject site, associated with wider events only, and the current bushfire scenario indicating that a bushfire front is either unlikely to impact the site, or otherwise approach the site at a slower rate and reduced intensity. The proposed development does not comprise any vulnerable use, and does not increase either the resident population or resident vulnerable population of the site.
PO2 Highly vulnerable development does not occur in high hazard areas unless there is an overriding need for the development in the public interest and no other site is suitable and reasonably available for the proposal.	AO2 The following uses are not located in a high bushfire hazard area: • child care centre; or • detention facility; or • educational establishment; or • emergency services; or • hospital; or • industry activities involving manufacture or storage of hazardous materials in bulk; or • multiple dwelling; or	• residential care facility; or retirement facility; or • relocatable home park; or • rooming accommodation; or • shopping centre; or • short-term accommodation; or • telecommunications facility; or • tourist park; or • tourist attraction; or • transport depot; or • utility installation.	The proposed use does not constitute any highly vulnerable development.

Performance outcomes	Acceptable outcomes	Solution
PO3 Development mitigates the risk of bushfire hazard through the siting and design of the development. Editor's note—In demonstrating compliance with this performance outcome, applicants should be aware that setbacks and buffers for fire management purposes are in addition to any buffers or setbacks required for ecological purposes and are located outside of areas of ecological significance to the greatest extent possible. Regard should also be given to AS3959-2009.	No acceptable outcome is nominated.	The location and configuration of the proposed operational area is able to effectively allow for an asset protection zone to be established that ensures a defendable space appropriate to the nature of risk at the site is maintained. The bushfire history shows infrequent occurrence of bushfire within the subject site, associated with wider events only, and the current bushfire scenario indicating that a bushfire front is unlikely to impact the site. The proposed operational area is located within an area of flat ground, with any approaching fire from the direction of prevailing wind required to traverse downslope, reducing its rate of spread and fireline intensity. The provision of water supply for firefighting purposes provides resources for active protection or defence of the site with respect to bushfire.
PO4 Development provides for an adequate and accessible water supply for firefighting purposes.	AO4.1.1 The development is connected to a reticulated water supply where within a water supply area. OR AO4.1.2 Where outside a water supply area a tank water supply is provided, at least one tank is within 100m of a class 1, 2, 3 or 4 building which has fire brigade fittings.	The proposed operational area will be provided with a 25,000L static water supply dedicated for firefighting purposes and equipped with fire brigade fittings and firefighting water pump.
PO5 Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on hazardous materials manufactured or stored in bulk.	AO5 Development does not involve the manufacture or storage of hazardous materials within a high or medium bushfire hazard area as identified on overlay map OM-02.	The development does not involve the manufacture or storage of hazardous materials.

Performance outcomes	Acceptable outcomes	Solution
PO6 Facilities with a role in emergency management and vulnerable community services are able to function effectively during and immediately after bushfire events.	No acceptable outcome is nominated.	The proposed development does not involve emergency management or vulnerable community services, nor is it involved in the support of these functions.
PO7 Additional lots are not created in bushfire hazard areas.	AO7 Development does not involve the creation of additional lots in areas mapped as high or medium hazard on overlay map OM-02.	Not applicable – no new lots created.
PO8 Development is designed to allow for efficient emergency access to buildings for fire-fighting appliances, including by avoiding long, narrow access arrangements. Editor's note—PO8 and PO9 will be relevant where development is located adjacent or near to hazard areas.	No acceptable outcome is nominated.	Not applicable – no new lots created, suitable access in place.
PO9 Development provides a fire break which also facilitates adequate access for firefighting and emergency vehicles, and safe evacuation. Editor's note—PO8 and PO9 will be relevant where development is located adjacent or near to hazard areas.	AO9.1 Lot boundaries and development sites are separated from hazardous vegetation by a distance of 20m where adjacent to high hazard areas and 10m where adjacent to medium hazard.	Not applicable – no new lots created, suitable access in place.
	AO9.2 The separation area mentioned in AO9.1 contains a fire access trail that: • has a minimum cleared and formed width of 6m; • has vehicular access at each end; • provides passing bays and turning areas for fire-fighting appliances; and	Not applicable – no new lots created, suitable access in place.

Performance outcomes	Acceptable outcomes	Solution
	are either located on public land, or within an access easement that is granted in favour of council and QFRS.	
	AO9.3 Roads and trails: have a maximum gradient of 12.5%; and do not involve a cul-de-sac. Editor's note—Applicants should also be aware that Part 9 of the planning scheme sets out additional requirements for the construction of roads and other operational works associated with reconfiguration.	Not applicable – no new lots created, suitable access in place.

7. BUSHFIRE MANAGEMENT PLAN

A bushfire management plan (BMP) has been prepared to address the identified bushfire hazard associated with the reconfiguration of Lot 1RP742982. Bushfire risk mitigation measures associated with the design and construction of the subdivision are shown in Appendix A – Bushfire Management Measures.

This bushfire management plan is intended to address the hazard associated with the site in its final developed form, and during the construction of the proposed facilities, to demonstrate the ability to achieve bushfire management objectives required under the planning framework.

The Queensland Disaster Management Guideline (QFES, 2017) utilises and defines the Prevention, Preparedness, Response and Recovery (PPRR) approach to natural hazard risk identification, mitigation, response and recovery. The guideline is written to address disaster management from the State level to the Local Government level, and should be applied in general terms to maintain consistency with emergency response organisations and enable integration with local government bushfire management planning where relevant.

7.1. PREVENTION

Prevention is the prescription and implementation of measures to reduce the likelihood of an event occurring or reducing the severity of an event should it occur. In addressing prevention, the specific hazard must be identified to develop objective, measurable and achievable mitigation measures.

7.1.1. SITE DESIGN

Appropriate site design is principal in reducing the likelihood or severity of a bushfire event. This is achieved by strategic placement of infrastructure and assets, roads and asset protection zones to provide adequate separation distances or defendable space for infrastructure subject to bushfire hazard. Defendable space requirements are relevant to the degree of hazard and explicit radiant heat impacts modelled on identified hazard.

7.1.2. FUEL MANAGEMENT MEASURES

FUEL MANAGEMENT ZONES

Fuel management zones are areas within the landscape that are managed to minimise or remove bushfire fuels, providing a defendable space, and linear separation from the main bushfire threat. Fire breaks may be located within Asset Protection Zones.

FIRE BREAK

A fire break is a strategically located linear fuel break intended to obstruct the path of a fire, provide an anchor point for back burning and active fire suppression. Fire breaks may be located close to assets (such as around a property boundary) or may be located in a strategic location in the landscape (such as at the foot of a slope, or in proximity to key infrastructure) to inhibit the passage of a fire into difficult terrain or a higher risk area.

STRATEGIC FUEL MANAGEMENT ZONE

Strategic fuel management zones (SFMZ) are areas around an asset where fuels are managed by slashing, mowing or fuel reduction burning to minimise the total volume of fine fuels with two primary objectives:

- reducing the likelihood of a fire igniting and developing, and
- in the event a fire does develop, minimising potential rate of spread and intensity of a going fire.

Fire breaks may be classified as SFMZs, as they are frequently associated with fire management access trails that facilitate both maintenance activities and active fire suppression.

ASSET PROTECTION ZONE

Asset Protection Zones are areas closer to an asset, where landscaping and fuel management is quite intensive, and consists of tree maintenance, lawn maintenance, selective removal or placement of large plants (trees and shrubs) to minimise canopy connectivity. The objectives of the APZ are:

- Provide separation distance from the bushfire hazard

- Provide a defendable space where active fire suppression may be undertaken.
- An area from where backburning may be conducted.

FUEL MANAGEMENT TECHNIQUES

There are numerous fuel management techniques that can be applied across a site to achieve fire prevention and preparedness objectives, described in detail in **Table 10**. These techniques can be applied to varying degrees, in specific ways or as general prescriptions dependent on the nature of the site and the hazard.

TABLE 10 FUEL MANAGEMENT TECHNIQUES

Action	Description
Slashing	Slashing is the maintenance of grasses to a height of 10cm or less. This can be achieved with a tractor drawn slasher or with brush cutters (whipper snipper) in areas with limited or difficult access.
Mowing / Whipper Snipping	Mowing is a more managed 'lawn' state, maintained at a height 5cm or less.
Raking or manual removal of fine fuels	Raking and removal of fine dead fuels <6mm in diameter.
Lopping / pruning	Removal of low hanging branches, thinning of canopy, selective removal of branches overhanging buildings or connecting the canopy with other trees.
Ploughing / Grading	Preparation of mineral earth fire breaks by ploughing / grading. Erosion management may be required either by surface sheeting with stable cover material (gravel) or hard landscaping permanent access features (walking trails).
Grazing	Grazing is an effective fuel reduction technique for large areas of grass fuels. The most effective application is to stock with a high number of beasts for a short period (days) to knock down the bulk of fine fuels.
Fuel Reduction Burning	Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

7.2. PREPAREDNESS

Preparedness is the implementation of operational management plans to achieve the prevention objectives. Annual maintenance prior to the commencement of the fire season, training, community awareness and where appropriate, mutual aid agreements between organisations and agencies with common interests in asset protection and community safety that may work together across tenure in the event of a disaster event.

7.2.1. OPERATIONAL DESIGN

FUEL MANAGEMENT STRATEGY – OPERATIONAL DESIGN

The fuel management strategy is shown on the **Bushfire Management Measures** in Appendix A. The principal objective is to achieve fuel managed areas that form Asset Protection Zones appropriate to the size and configuration of each aspect of the proposed operational area, consistent with the objectives of the state planning policy.

TABLE 11 ASSET PROTECTION ZONES (APZ)

APZ	Specification
Boundary APZ	Asset protection zones are identified for the properties adjacent to the current boundary of the subject site and neighbouring land. Minimum Asset Protection Zones have been established using the APZ width calculator and are relevant to the adjacent vegetation type. However, as ember attack is the highest risk to the proposed operation, rather than heat flux impact to a structure, the following asset protection zone is stated: • **20.0m for all operational areas and vegetation types**

STOCKPILE MANAGEMENT

It is understood that the proposed use will operate under ERA 62 - resource recovery and transfer facility operation.

As such, it is required that stockpiles be managed as per Queensland Government Guideline: Prevention of fires in stockpiles (ESR/2020/5506) or as updated from time to time. It is currently available online: www.des.qld.gov.au/policies?a=272936:policy_registry/cm-gl-waste-stockpile-fire-external.pdf.

Key recommendations from this guideline include:

- Storage and stockpiles of combustible wastes should be limited in size and volume appropriate to the waste material, fire risks, building design and installed fire safety systems.
- The maximum height of any stockpile must not exceed 4 metres.
- The uncontained vertical face of any stockpile (i.e. any face not retained by a masonry wall) should recede on a slope no greater than 45° to minimise the risk of collapse and fire spread.
- The storage method and arrangement of stockpiles should minimise the likelihood of fire spread and provide separation which allows for firefighting intervention.
- A separating masonry wall, revetment or pen should extend at least 1 metre above the stockpile height and at least 2 metres beyond the outermost stockpile edge.
- The maximum width of an external stockpile should be 20 metres if access is provided for a Queensland Fire and Emergency Service (QFES) vehicle down both sides of the stockpile and 10 metres if access is provided down one side of the stockpile only.
- Stockpile boundary limits should be permanently marked to identify limits, maintain separation distances and control stockpile volume.
- The separation distance between individual external stockpiles and between stockpiles and fire-risk features should be calculated in accordance with the storage method, length of stockpile and the fire risk of materials.
- Covered areas attached to buildings or structures should not encroach into the separation distance unless protected by an automatic fire system.

WATER SUPPLY

The development is not connected to the reticulated water network, the operational area must be provided with 25,000L dedicated firefighting water supply. Water tanks must be accessible to vehicles, and provided with both a firefighting water pump and fittings compatible with Rural Fire Service standards.

ACCESS AND EGRESS

Roads providing access to all operational areas must be 6m wide to allow passage of vehicles in both directions, and maintained to provide this width of passage at all times.

OPERATIONAL FIRE PROCEDURES

Fire procedures must be developed for the proposed operation. These procedures should identify:

- Management of stockpiles to prevent fire – including defining stockpile sizes, maximum volumes for the site, turnover frequency of piles to dissipate heat, monitoring of piles for fire, and security of the site to prevent unapproved access.

- Monitoring of bushfire risk and active bushfire events in the local area.
- Preparation in response to high bushfire risk, or bushfire presence in the local area.
- When stay and defend or evacuation will be implemented in response to an approaching bushfire.
- Stages of communication to other operators accessing and utilising the site for material movements.
- When intervention by emergency services is required.

7.2.2. DEVELOPMENT AND OPERATIONAL RISKS

Development and operational activities must be cognisant of bushfire conditions, particularly during the fire danger period. APZ should be established as part of the site early works program, providing primary bushfire mitigation and protection to the site during the course of development. Minimum bushfire hazard mitigation measures for operational activities are detailed in Table 12.

TABLE 12 HAZARD MITIGATION FOR OPERATIONAL ACTIVITIES

Activity	Rationale	Required Actions
General Requirements	The absence of a reticulated water supply suitable for firefighting purposes requires a static supply be available at all times. Cigarette butts are a common cause of fire ignition. Restriction of smoking to a 'safe' location, and provision of butt disposal containers removes this risk from the site.	A static water supply must be available on site at all times during of the site. Water supply must be a minimum of 25,000L, equipped with a firefighting pump and hoses. Smoking must be restricted to designated smoking areas associated with workplace amenities, provided with appropriate waste receptacles for cigarette butts.
Hot Work (e.g. grinding)	Activities such as grinding and welding produce hot swarf and sparks that may ignite light weight fuels under hot, dry conditions. Records indicate that grinding and welding accidents are responsible for a high proportion of accidental fire ignitions.	Do not undertake hot work on days of total fire ban. Where hot work is undertaken in an outdoors location, place shielding around the work site to limit the release of hot swarf and sparks. Avoid working in close proximity to dry grass, rubbish or other fine fuels. Do not undertake hot works in proximity to flammable and combustible materials (chemicals/ fuels/ oils). A fire extinguisher or water supply must be on hand at the site of hot works to knock down any accidental ignitions immediately. Use of screens to prevent sparks travelling beyond the work zone is recommended.
Storage of flammable and combustible materials.	Flammable and combustible materials can accelerate fire behaviour; causing a controllable ignition to become uncontrollable, quickly and unnecessarily.	Only store required minimum quantities of flammable and combustible materials at the work site. Store flammable and combustible materials in designated areas, removed from bushfire prone vegetation and ignition sources.
Mobile power supplies/ lighting towers.	Generator plant can produce sufficient heat (or sparks) to ignite fine fuels (grass) in hot, dry conditions.	Ensure all grass and other flammable vegetation is removed for at least 2m around all mobile power supplies, lighting towers and other self-powered mobile plant.
Training & Awareness	It is the responsibility for the owner or occupier of a site to	Personnel should be trained in the use of fire extinguishers.

Activity	Rationale	Required Actions
	contain any fire started within that property. Every effort must be made to contain any fire caused by operational activities within the worksite area. Personnel are considered to be able bodied and have capacity to take action against a fire ignition caused by construction activities.	Fire awareness on days of high fire danger or when undertaking hot works must be addressed in prestart meeting discussions and toolbox talks. Plant operators should be trained in dry firefighting techniques.

7.3. RESPONSE

Bushfire response is generally considered the specific actions in response to an immediate bushfire threat, either from outside the site or within the site.

Where the fire threat is from outside the site, the objective is to prevent it from entering the property; where fire occurs within the site, the objective is to protect other site assets, and prevent the spread of the fire outside of the site.

7.3.1. IGNITION SOURCE ON SITE

It is considered that an ignition onsite will be triggered by a specific activity, most likely associated with operational activities.

- Report the emergency to 000, and secure the site until emergency services arrive.
- Evacuate non-essential personnel to the onsite muster point.
- Attempt direct attack methods if possible (direct water application or extinguisher) or contain with a mineral earth fire break.
- Where a fire onsite is within greenwaste or mulch stockpiles, the pile should be pulled apart to separate the burning material from the rest of the pile. Drench with water to extinguish or cool the burning material. Do not push burning material into larger piles.
- Undertake necessary asset protection including the relocation of mobile plant away from fire area as possible/practical.

7.3.2. IGNITION SOURCE OFF SITE

Where a fire approaches the property from the surrounding landscape, it is considered that this will be a larger, going fire and direct attack methods using available resources onsite are unlikely to be effective or safe.

- Report the emergency to 000, and secure the site.
- Evacuate non-essential personnel.
- Undertake direct attack measures as necessary to prevent any onsite ignitions
- Undertake asset protection as necessary to prevent damage to onsite infrastructure and ignition of stockpiles.

7.3.3. RURAL FIRE SERVICE

In regard to bushfire response, the volunteer Rural Fire Service Queensland is the primary response agency. For structural fires, the nearest QFRS brigade is Wulguru.

The site is additionally located at the boundary of the Oak Vally Fire Warden District (Rural Fire Service (RFS)). Contact details for emergency reporting and direct brigade contact are listed in Table 13.

TABLE 13 EMERGENCY AND FIRE STATION CONTACT DETAILS

To report a bushfire, or for any other emergency	**000**
General enquiries – Oak Valley Fire Warden - Rural Fire Brigade (Volunteer)	0407 140 005

Public education, property bushfire management plans, planned burn permits etc.	
Wulguru Fire Station (24 Hr)	07 4778 4313
Townsville Fire Station (24 Hr)	07 4796 7480

7.4. RECOVERY

Disaster recovery can be complex and sometimes a lengthy process. It is described simply as the restoration of normal operations.

Recovery of the site from a bushfire event will depend on the level of impact on the landscape, equipment and infrastructure.

1. Ensure fire area is safe and extinguished (burn area blacked out)
2. Identification of damage to assets or infrastructure
3. Reinstatement of essential services (water, electricity) as necessary,
4. Secure hazards in work area or public access areas (removal of any hazards caused by bushfire, such as burnt trees at risk of falling over, etc).
5. Reinstatement of bushfire hazard mitigation measures that were damaged or expended during the fire event (ensure fire breaks are clear of material that may contribute to bushfire activity (fallen trees etc).
6. Safe access and egress from the site is re-established, or conversely, access to the site is restricted.

8. CONCLUSIONS & RECOMMENDATIONS

8.1. BUSHFIRE HAZARD ASSESSMENT AND RISK ASSESSMENT

An assessment of the site and its surrounding environment has demonstrated that while there are areas of bushfire hazard across the subject site identified as medium and high, the area situating the proposed operational works is identified as Low Hazard. The operational site is identified as being in a suitable position in the landscape, and is able to achieve a separation distance from all classified vegetation to ensure a less than 29kW/m^2 heat flux impact to all operational areas, and allow for increased Asset Protection Zone to decrease the risk of ember attack to stockpiles.

The risk assessment identifies that the proposed use and the nature of the proposed development at the subject site carries a low degree of risk even in the absence of appropriate bushfire management (based on current management and condition of the site), with risk reduced to very low where mitigation measures are undertaken. The application of fit for purpose mitigation measures effectively minimises the risk associated with bushfire at the site, through separation distance from native vegetation and bushfire fuel minimisation within the operational site.

Establishing the proposed development according to bushfire management measures, and engagement with local bushfire brigades will ensure the establishment of a safe and well prepared site.

8.2. BUSHFIRE HAZARD OVERLAY CODE

The proposal is demonstrated to comply with the Bushfire Hazard Overlay Code.

8.3. BUSHFIRE MANAGEMENT PLAN

A Bushfire Management Plan has been prepared for the site, to support the mitigation measures indicated through risk assessment. Bushfire mitigation measures are intended to be practical, achievable and result in minimal impact to the development and operation of the site.

8.4. RECOMMENDATIONS

The following recommendations are made to support the development of the site, achieve bushfire hazard mitigation with minimal impact to future occupants of the development, and ensure the development meets the objectives of the Bushfire Hazard Overlay Code:

8.4.1. BUSHFIRE MANAGEMENT PLAN

Development of the site should be conducted with reference to the measures indicated in this bushfire management plan. Site practicalities may require alterations to bushfire mitigation measures to be made; this may be done in consultation with suitably qualified persons or the local Rural Fire Service as appropriate.

8.4.2. MANAGEMENT OF OPERATIONAL USE

Design of site operations should consider all aspects of the Queensland Government Guideline: Prevention of fires in stockpiles (ESR/2020/5506), to minimise risk of fire associated with the stored material, and incorporate additional management measures suitable to the materials stored.

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APPENDIX A – MAPS

BUSHFIRE HAZARD ASSESSMENT

75 Bougainville Street, Roseneath (1RP742982)

SITE LOCATION

Satelburg Street
Stuart Creek
Nadzab Street
Madang Street
Bougainville Street
Dick Creek
Road

Legend

- Property Boundaries
- 1RP742982
- Assessment Area (100m Buffer)
- Watercourses
- Roads

0 45 90 180
Meters
Coordinate System: GDA 1994 MGA Zone 55

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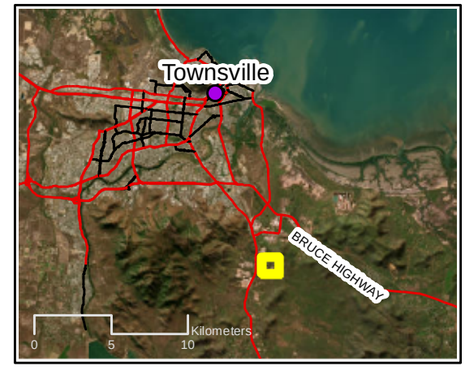

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Date Edited: 29/11/2024
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BUSHFIRE HAZARD ASSESSMENT

75 Bougainville Street, Roseneath (1RP742982)

TOPOGRAPHY AND HYDROLOGY

Legend

- Property Boundaries
- 1RP742982
- Assessment Area (100m Buffer)
- Watercourses
- Contours

Slope (Degrees)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- >20 degrees

0 50 100 200
Meters

Coordinate System: GDA 1994 MGA Zone 55

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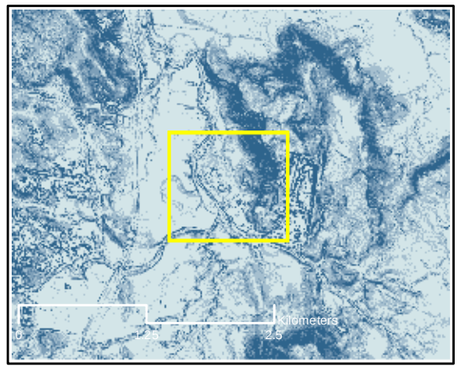
Slope derived from 1s DEM from Queensland LiDAR Data ©Queensland Government



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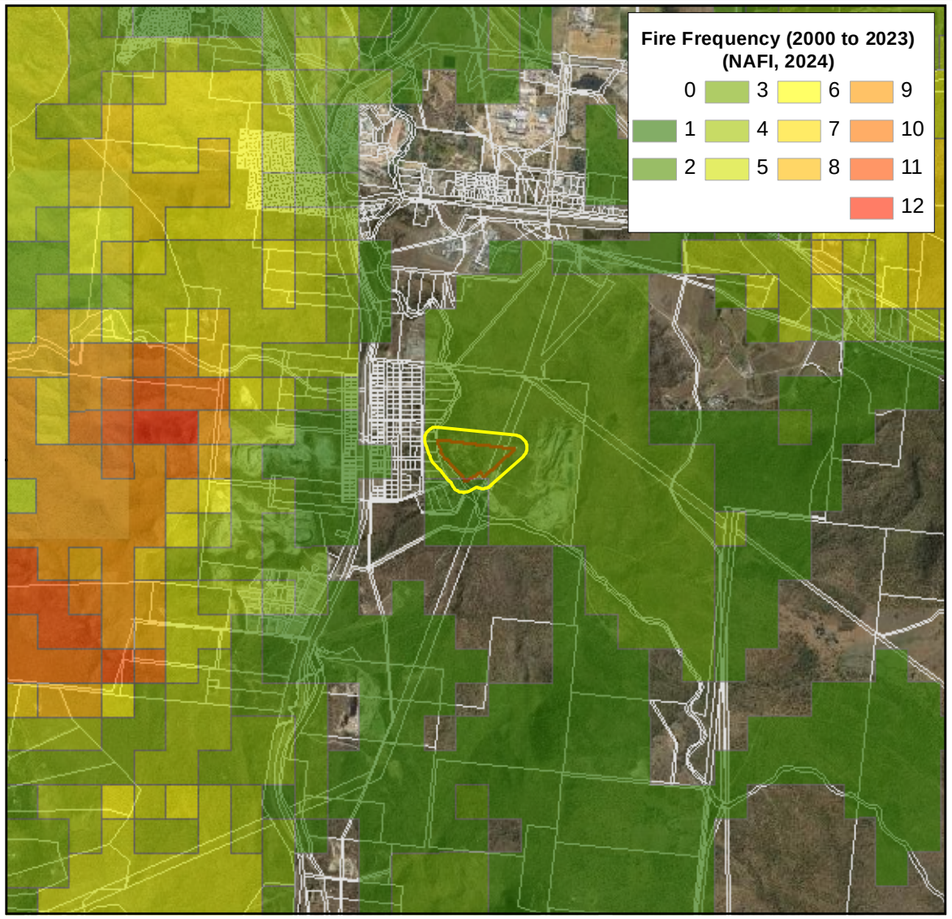
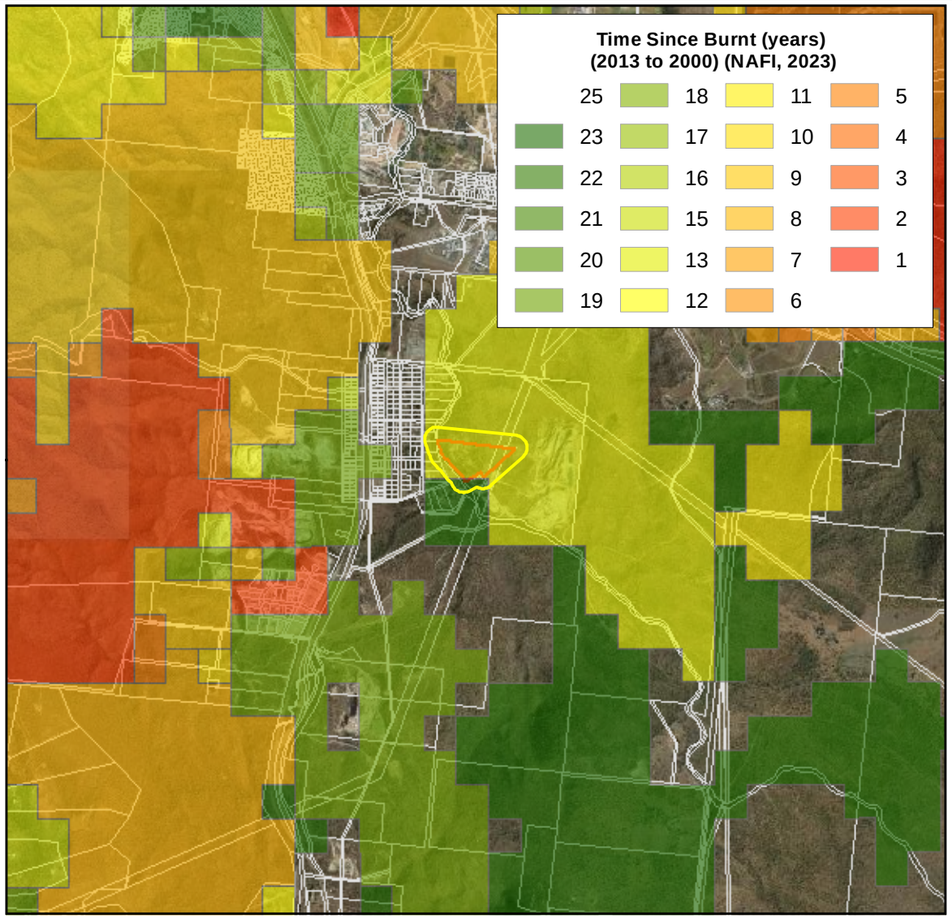
BUSHFIRE HAZARD ASSESSMENT

75 Bougainville Street, Roseneath (1RP742982)

FIRE HISTORY





Legend

PROP.QLD_CADASTRE_D...

Property Boundaries

LOTPLAN

1RP742982

Assessment Area (100m Buffer)

Highway (Arterial Road)

Local

Secondary (Sub Arterial)

0 0.5 1 2 3

Kilometers

Coordinate System: GDA 1994 MGA Zone 55

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Fire Frequency and Time since last burn from NAFI (2023)
Fire History (QPWS) © State of Queensland (Department of Environment and Science), 2023
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Version: 2.0
Date Edited: 17/12/2024
Edited by: MG

Document Path: Q:\7-50_Independent_HazardAssessment\7-50-26_BMP_75_BougainvilleSt_Roseneath_MCU\Mxd\7-50-26_BHA_FireHistory.mxd

BUSHFIRE HAZARD ASSESSMENT

75 Bougainville Street, Roseneath (1RP742982)

VEGETATION AND BUSHFIRE FUELS

Legend

- Property Boundaries
- 1RP742982
- Assessment Area (100m Buffer)

Vegetation Hazard Class

- 22.1 Melaleuca open forests on seasonally inundated lowland coastal swamps (28.4tph)
- 9.2 Moist to dry eucalypt woodland on coastal lowlands and ranges (17.2tph)
- 40.4 Low grass or tree cover in rural areas 5tph)
- 43.6 Water bodies or very low vegetation cover (0tph)

0 50 100 200
Meters

Coordinate System: GDA 1994 MGA Zone 55

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Version: 2.0
Date Edited: 17/12/2024
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BUSHFIRE HAZARD ASSESSMENT

75 Bougainville Street, Roseneath (1RP742982)

BUSHFIRE HAZARD MODEL

Legend

- Property Boundaries
- 1RP742982
- Assessment Area (100m Buffer)

Bushfire Hazard Model

- Medium Potential Bushfire Intensity (4,000 – 20,000kW/m)
- High Potential Bushfire Intensity (20,000 – 40,000kW/m)
- Potential Impact Buffer (100m)

0 50 100 200
Meters

Coordinate System: GDA 1994 MGA Zone 55

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Ecosystems Management (Aust) Pty. Ltd.
www.ecosystemsmanagement.au
admin@ecosystemsmanagement.au

Version: 2.0
Date Edited: 17/12/2024
Edited by: MG

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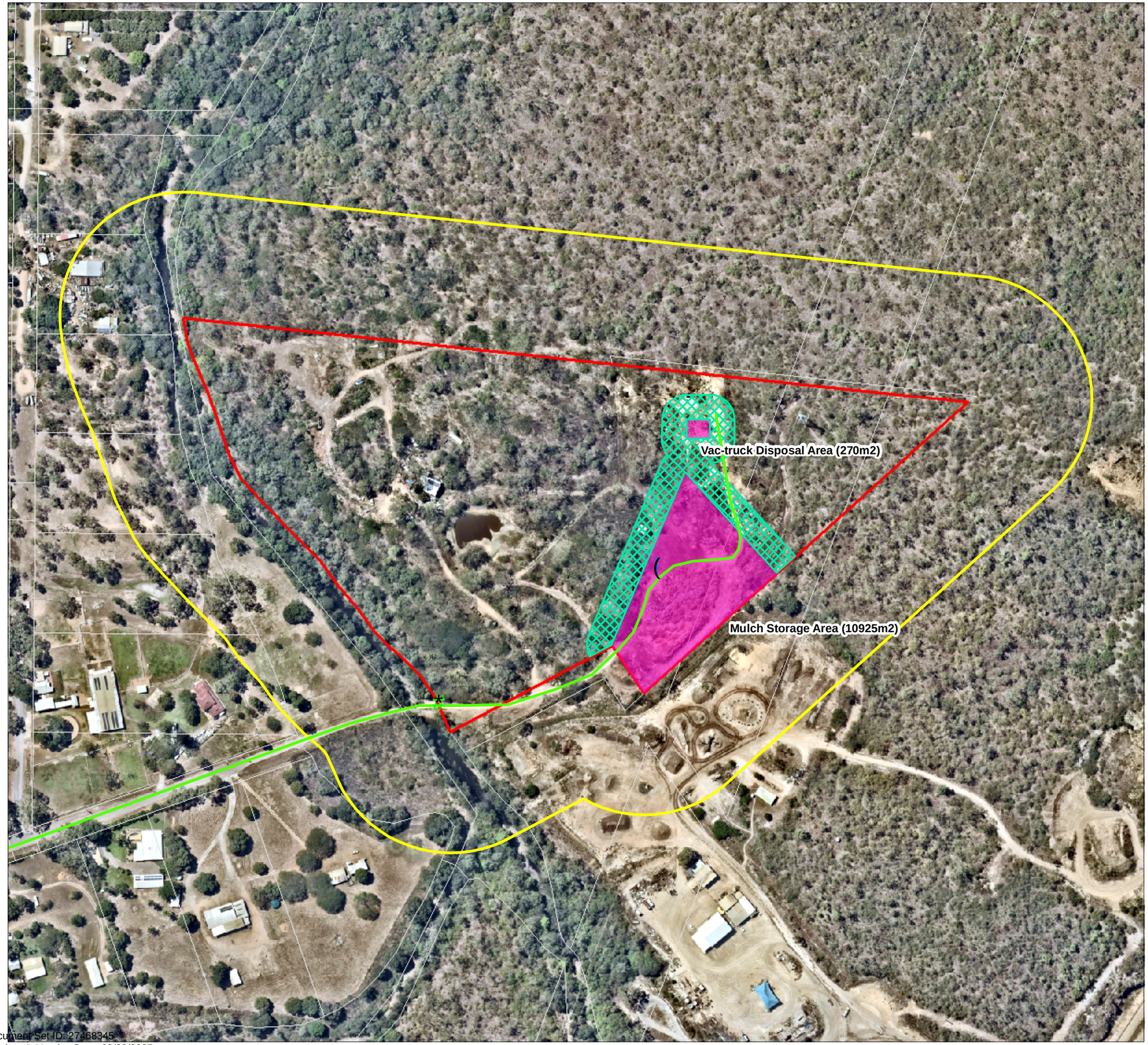
BUSHFIRE HAZARD ASSESSMENT

75 Bougainville Street, Roseneath (1RP742982)

BUSHFIRE MANAGEMENT PLAN



Legend

- Property Boundaries
- 1RP742982
- Assessment Area (100m
- Primary Access
- Emergancy Egress Point
- Operational Areas - Mow / Slash / Graze to <10cm (maintained through the fire danger period)
- Asset Protection Zone - understory and ground cover vegetation <30cm, and removal of fuel build-up (maintained through the fire danger period)
- 25kL Firefighting Water Storage

0 20 40 80 120 160

Meters

Coordinate System: GDA 1994 MGA Zone 55

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