Appendix I
Bushfire management plan

Land and environment consultants

Bushfire management plan

Bowen Pipeline Project | Burdekin pump station | Barry Road | Kirknie | Queensland
Prepared for Bowen Pipeline Company Pty Ltd | 28 March 2024

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Bushfire management plan

Final

Report 23116 | Bowen Pipeline Company Pty Ltd | 28 March 2024

Approved by Robert Janssen

Position Managing principal

Signature 

Date 28 March 2024

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Version	Date	Prepared by	Reviewed by
Draft	21 December 2023	R. Janssen	LEC
Final	28 March 2024	R. Janssen	LEC

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Appendix

Appendix 1 Site plan and intake structure arrangement plan

Appendix 2 Radiant heat exposure assessment

Appendix 3 Bushfire overlay code assessment

Disclaimer

Notwithstanding the precautions adopted in this report, it should always be remembered that bushfires burn under a range of conditions. An element of risk, no matter how small always remains, and although AS 3959-2018 is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any building will withstand bushfire attack on every occasion.

It should be noted that upon lodgement of a development proposal, State Government, council and/or the fire service may recommend additional construction requirements.

Although every care has been taken in the preparation of this report, Land and Environment Consultants Pty Ltd accept no responsibility resulting from the use of the information in this report.

1 Introduction

Land and Environment Consultants Pty Ltd (**LEC**) was engaged to prepare a bushfire management plan (**BMP**) for the Burdekin pump station component (**proposed Burdekin pump station**) of the Bowen pipeline project, located at lot 57/SP236356 (**the site**) which is accessed from Barry Road, Kirknie.

A ministerial infrastructure designation (**MID**) is being sought for the Bowen pipeline project in accordance with the Queensland *Planning Act 2016.*

The site is identified as a bushfire hazard area by the Queensland State Planning Policy (**SPP**) *Bushfire prone area map* (**SPP bushfire prone area map**). As a result, compliance with the example bushfire overlay code (**Bushfire overlay code**) in the *Natural Hazards, Risk and Resilience – Bushfire, State Planning Policy State Interest guidance material* (DSDMIP 2019) (**SPP guidance material – bushfire***)* is relevant to the proposed Burdekin pump station component of the MID being sought for the Bowen pipeline project.

This BMP has been prepared in accordance with *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019a) (**Bushfire resilient communities**) which was prepared by the Queensland Fire and Emergency Services (**QFES**) to provide technical guidance for the implementation of the SPP guidance material – bushfire.

This BMP documents the bushfire hazard assessment of the site and demonstrates how the proposed Burdekin pump station will comply with the Bushfire overlay code. It includes:

- an introduction (this section) and description of methods and information resources used for the preparation of this BMP;
- description of the site and proposed Burdekin pump station;
- bushfire hazard assessment;
- identification of bushfire hazards associated with the site and proposed Burdekin pump station;
- radiant heat exposure assessment;
- a plan for mitigating bushfire hazards; and
- assessment of the proposed Burdekin pump station against the Bushfire overlay code.

1.1 Method

To meet requirements of the SPP guidance material – bushfire and Bushfire resilient communities, the following tasks were undertaken:

- review of the SPP bushfire prone area map in the SPP interactive mapping system (DSDILGP 2023) and the Queensland regional ecosystem map, vegetation hazard class (**VHC**) map and severe fire weather map in the QFES online mapping system (QFES 2023) (**Catalyst**);
- review of fire history data in the North Australia and Rangelands Fire Information online mapping system (DISER 2023) (**NAFI**);
- inspection of land within 100 metres (**m**) of the proposed Burdekin pump station for vegetation characteristics, current land management practices, slope and evidence of previous fires;
- bushfire hazard assessment in accordance with the method in Bushfire resilient communities;
- radiant heat exposure assessment using the Fire Protection Association of Australia *BAL calculator V4.9* (**BAL calculator**) which models the 'method 2' bushfire attack level assessment procedure in the *Australian Standard* (AS 3959-2018) *Construction of buildings in bushfire prone areas;* and
- assessment of the proposed Burdekin pump station against the Bushfire overlay code.

Aerial imagery of the site and measuring tools were accessed online from Google Earth and the Queensland Globe to assist with validating observations and measurements made during the site assessment.

1.2 Suitably qualified person

This BMP was prepared by Robert Janssen who is a suitably qualified and experienced bushfire management consultant.

Robert is the managing principal at LEC and has over 25 years of experience in bushfire planning and operations. He has prepared BMPs for residential, commercial and industrial property developments, utilities, government facilities and conservation estates.

Robert's formal qualifications as an environmental scientist and consulting experience are coupled with 10 years of experience as a nationally accredited fire-fighter with the national parks and wildlife service in New South Wales and Queensland.

2 Description of the site and proposed Burdekin pump station

This chapter provides a description of the site and proposed Burdekin pump station.

2.1 Site description

The location of the site is shown in Figure 2.1. The site is 8.34 hectares (**ha**) and has frontage to Barry Road along its southern boundary.

The site is cleared of bushland vegetation and currently used for cropping.

The northern and eastern boundaries of the site adjoin land used for cropping. The southern boundary adjoins Barry Road and a combination of grassland and bushland vegetation. The western boundary adjoins an embankment of the Burdekin River which has bushland vegetation.

2.2 Proposed Burdekin pump station

The Bowen pipeline project is a 114 kilometre (**km**) pipeline from the Burdekin River to south-west of Bowen. It will include four pump stations along the pipeline, one of which is the proposed Burdekin pump station.

The site plan and intake structure arrangement plan for the proposed Burdekin pump station are provided in Appendix 1. They show the proposed layout of the pump station, intake structure, access pad to submersible pumps and valve pit, control building and switch room, substation, access tracks and coffer dam.

Access and egress for the proposed Burdekin pump station is via Barry Road.

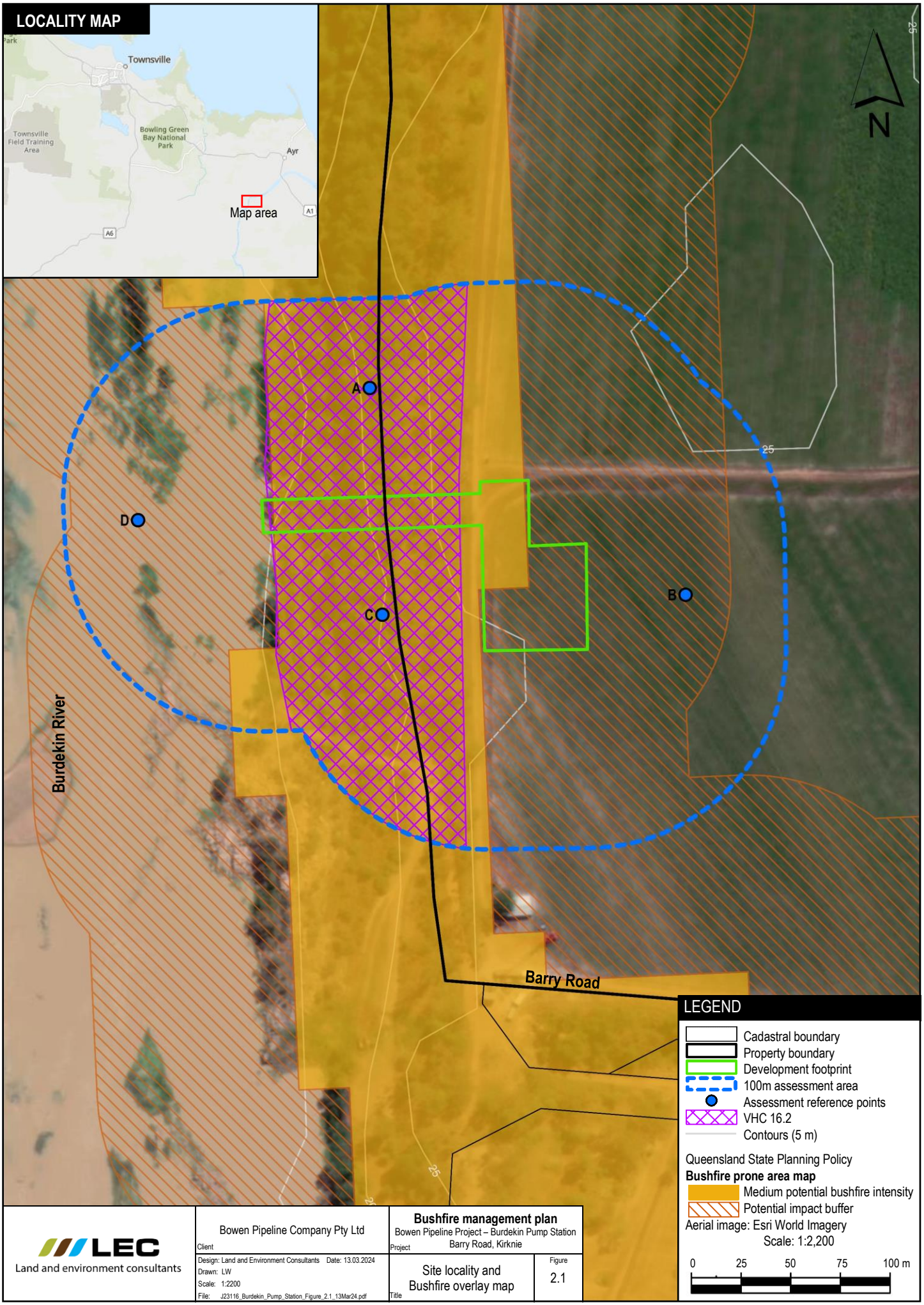
The proposed Burdekin pump station will be occasionally occupied by people.

2.3 State Planning Policy bushfire prone area map

The SPP bushfire prone area map for the site is shown in Figure 2.1 and indicates the site is affected by the potential impact buffer from the medium potential bushfire intensity area which is associated with the bushland vegetation on the embankment of the Burdekin River.

Verification of the bushfire prone areas shown in the SPP bushfire prone area map is provided via the bushfire hazard assessment in Chapter 3.

Please note, in this BMP the terms ‘bushfire prone area’ and ‘bushfire hazard area’ have the same meaning. Both terms mean an area of vegetation that is determined to have a potential bushfire intensity ≥ 4,000 kilowatts/m (**kW/m**) and the land within 100 m of this vegetation.



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Client	Bowen Pipeline Company Pty Ltd
Project	**Bushfire management plan** Bowen Pipeline Project – Burdekin Pump Station Barry Road, Kirknie
Design: Land and Environment Consultants Date: 13.03.2024 Drawn: LW Scale: 1:2200 File: J23116_Burdekin_Pump_Station_Figure_2.1_13Mar24.pdf	Figure 2.1
Title	Site locality and Bushfire overlay map

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3 Bushfire hazard assessment

This chapter provides details about the desktop review, site inspection and bushfire hazard assessment.

3.1 Severe fire weather

The severe fire weather map in Catalyst indicates the 5 % annual exceedance probability forest fire danger index (**FFDI**) for the site is 59. This FFDI value has been used for the potential bushfire intensity calculations in Section 3.4 and the radiant heat exposure assessment in Section 5.3.

3.2 Fire history

Fire history data in NAFI indicates that no fires have occurred within 1 km of the site during the past 20 years.

3.3 Site inspection

LEC inspected land within 100 m of the proposed Burdekin pump station on 18 November 2023. Observations were recorded about current land use and management, vegetation characteristics, the slope of land and evidence of previous fires.

The locations of assessment reference points used for the bushfire hazard assessment are shown in Figure 2.1. Table 3.1 provides a summary of observations from the site inspection and notes about the bushfire hazard assessment of assessment reference points. Examples of bushland vegetation within the assessment area are shown in Photographs 3.1-3.3.

Table 3.1 Site observations

Assessment reference point	Catalyst VHC	Ground truthed VHC	Notes
A	VHC 16.2 *Eucalyptus dominated woodland on drainage lines and alluvial plains* (**VHC 16.2**) and VHC 16.3 *Shrubland associated with eucalyptus woodlands on drainage lines* (**VHC 16.3**).	VHC 16.2	A 100+ m wide corridor of bushland vegetation on the embankment of the Burdekin River.
B	VHC 38.5 *Discontinuous irrigated cropping and horticulture* (**VHC 38.5**).	VHC 38.4 *Continuous dryland cropping and horticulture* (**VHC 38.4**).	Land used for cropping.
C	VHC 16.2 and VHC 16.3	VHC 16.2	A 100+ m wide corridor of bushland vegetation on the embankment of the Burdekin River.
D	VHC 43.6 *Water bodies or very low vegetation cover* (**VHC 43.6**)	VHC 43.6	Burdekin River.



Photograph 3.1 VHC 16.2 at A and C



Photograph 3.2 VHC 38.4 at B



Photograph 3.3 VHC 43.6 at D

3.4 Potential bushfire intensity calculations

The potential bushfire intensity of assessment reference points was determined using the Queensland Public Safety Business Agency *Potential Bushfire Intensity Calculator* (version November 2014) which is an Excel spreadsheet calculator that models the bushfire hazard assessment method in Bushfire resilient communities.

Bushfire resilient communities define bushfire hazard classes as follows:

- very high – potential bushfire intensity > 40,000 kW/m;
- high – potential bushfire intensity 20,000-40,000 kW/m;
- medium – potential bushfire intensity 4,000-20,000 kW/m; and
- non-bushfire hazard – potential bushfire intensity < 4,000 kW/m.

Results of the potential bushfire intensity calculations which determine the bushfire hazard class of assessment reference points shown in Figure 2.1 are presented in Table 3.2.

Table 3.2 Potential bushfire intensity

Assessment reference point	VHC	Potential fuel load (tonnes/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
A	VHC 16.2	11.6	16	14,592	Medium
B	VHC 38.4	3.8	1	566	Non-bushfire hazard class
C	VHC 16.2	11.6	16	14,592	Medium
D	VHC 43.6	0	0	0	Non-bushfire hazard class

Notes 1 Potential fuel load taken from Bushfire resilient communities.

3.5 Bushfire hazard areas

Results of the potential bushfire intensity calculations in Table 3.2 confirm the site is within a bushfire hazard area, ie medium potential bushfire intensity area at assessment reference points A and C, shown in Figure 2.1. Therefore, compliance with the Bushfire overlay code is relevant to the proposed Burdekin pump station component of the MID being sought for the Bowen pipeline project.

4 Bushfire hazards associated with the site

This chapter identifies bushfire hazards associated with the site.

4.1 Fire danger season

The fire danger season at the site starts in August, peaks in September and will begin to fall when consistent summer rainfall occurs. Typically, the worst fire weather conditions will be experienced during the fire danger season when the wind direction is from the north or west.

An FFDI of 59 will be associated with hot, dry and windy conditions. If a bushfire starts and takes hold under these conditions, it will be difficult to control and fast moving in large areas of bushland vegetation.

4.2 Fire history

As discussed in Section 3.2, fire history data indicates no fires have occurred within 1 km of the site during the past 20 years. On this basis, it is considered unlikely the proposed Burdekin pump station will be directly exposed to bushfire attack in the future.

4.3 Potential directions of bushfire attack

Although unlikely, the proposed Burdekin pump station could be exposed to bushfire attack from assessment reference points A and C, shown in Figure 2.1, where hazardous vegetation occurs.

Although assessment reference point B is identified as a non-bushfire hazard class in Section 3.4, VHC 38.4 which occurs in this area is identified in Bushfire resilient communities as having continuous fuel and being grassfire prone. Therefore, it is considered relevant that this BMP considers grassfire attack from this area.

Bushfire and grassfire attack scenarios on the proposed Burdekin pump station are further analysed in Section 5.3.

4.4 Potential bushfire hazards from adjacent land use

The fire history data indicates the adjacent land uses, ie cropping and livestock grazing, are not a bushfire hazard to the proposed Burdekin pump station.

4.5 Water and access for emergency services

The site is accessible via public roads which can accommodate emergency service vehicles, but it does not have access to a mains water supply or a reticulated hydrant system.

5 Bushfire hazards associated with the proposed Burdekin pump station

This chapter identifies potential bushfire hazards associated with the proposed Burdekin pump station.

5.1 Siting and design

The proposed Burdekin pump station will be designed to mitigate the risk of bushfire hazards determined by the bushfire hazard assessment in this BMP:

- an asset protection zone (**APZ**) will be formalised around infrastructure to ensure that it is maintained in perpetuity;
- an appropriately designed fire-fighter water supply outlet point will be provided adjacent to an access road; and
- access roads will be designed to provide efficient access and egress for emergency services and occupants.

5.2 Land uses

The proposed Burdekin pump station does not involve vulnerable uses, community infrastructure for essential services or the storage or handling of hazardous materials in the context of bushfire hazard which are defined in Table 7 of the SPP guidance material – bushfire.

5.3 Radiant heat exposure

The Bushfire overlay code provides guidance about the acceptable level of radiant heat exposure for development within bushfire hazard areas. It requires development to be setback from hazardous vegetation by a distance which achieves a radiant heat flux level ≤ 29 kW/m^2 at the development footprint of buildings and infrastructure.

As discussed in Section 4.3, although unlikely, the proposed Burdekin pump station could be exposed to bushfire attack from assessment reference point A and C, shown in Figure 2.1, and grassfire attack from assessment reference points B. The radiant heat profile of these bushfire and grassfire attack scenarios were analysed using the BAL calculator. Inputs used in the BAL calculator and results are provided in Appendix 2.

Results of the radiant heat exposure assessment in Appendix 2 have been used in Section 6.1 to specify the width of the setback from hazardous vegetation, ie the APZ, to achieve a radiant heat flux level ≤ 29 kW/m^2 at the development footprint of buildings and infrastructure.

6 Bushfire mitigation plan

This chapter identifies mitigation measures that must be implemented as part of the proposed Burdekin pump station to comply with the Bushfire overlay code.

It is the total of the mitigation measures in this chapter that will reduce the risk of bushfire hazard to a tolerable level. Failure to implement all actions in their entirety could result in an increased level of exposure to bushfire hazards.

6.1 Asset protection zone

An APZ must be established and maintained around the development footprint of buildings and infrastructure as shown in Figure 6.1.

The APZ must be identified in site plans and survey plans.

The APZ must consist of hardstand areas, ie gravel, asphalt or concrete, or grass which is maintained at a nominal height of 10 centimetres.

Woody regrowth, ie trees or shrubs, weeds and vegetation debris must be removed from the APZ at regular time intervals during the calendar year.

6.2 Fire-fighter water supply

A fire-fighter water supply outlet point must be provided adjacent to an access road within the site. It is anticipated that it will be connected to a water reservoir within the pump station infrastructure. However, if this is not possible, the outlet point must be connected to a dedicated on-site fire-fighter water supply tank which is made from concrete or metal and has a minimum capacity of 20,000 litres.

If a fire-fighter water supply tank is required, it must be kept full of water and must not be used for activities other than bushfire management.

We recommend contacting the local Rural Fire Brigade (**RFB**) to confirm the standard local RFB fittings which should be used at the fire-fighter water supply outlet point.

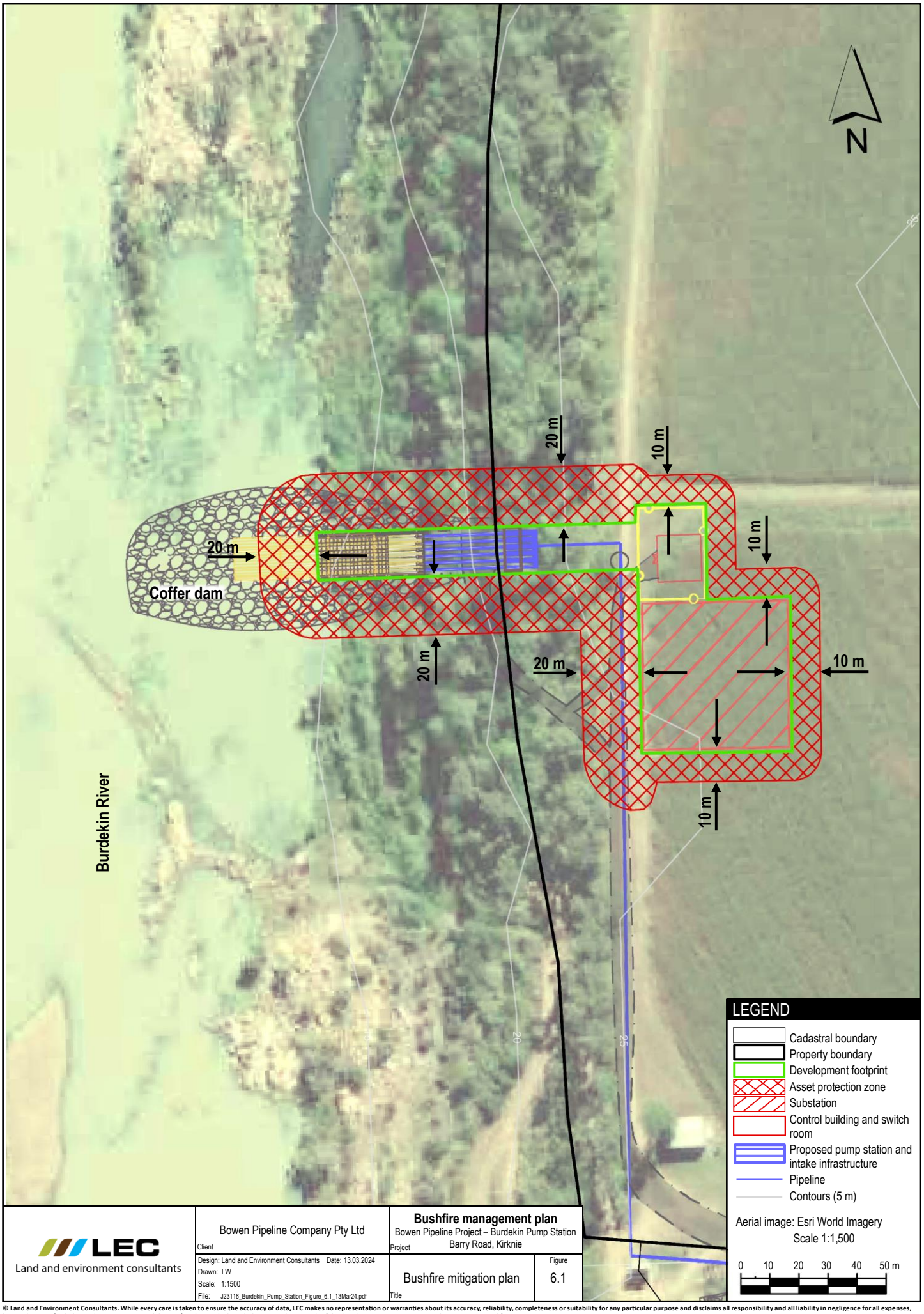
All above ground pipes, valves and fittings used for the fire-fighter water supply outlet point must be made of metal.

A hardstand area which is designed for a heavy rigid RFB vehicle to park must be located within 4 m of the fire-fighter water supply outlet point.

The fire-fighter water supply outlet point must be identified by reflective wayfinding signage which is installed along the access road.

6.3 Access and egress

The access road must be designed and constructed to accommodate a heavy rigid RFB vehicle in accordance with the design guidelines in *Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots* (QFES 2019b) which defers to the *Road Planning and Design Manual – 2nd Edition* (DTMR 2013) for load bearing capacity, geometry and turning radii.



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Client: Bowen Pipeline Company Pty Ltd	Project: **Bushfire management plan** Bowen Pipeline Project – Burdekin Pump Station Barry Road, Kirknie	
Design: Land and Environment Consultants Date: 13.03.2024 Drawn: LW Scale: 1:1500 File: J23116_Burdekin_Pump_Station_Figure_6.1_13Mar24.pdf	Title: Bushfire mitigation plan	Figure: 6.1

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7 Conclusion

This BMP was prepared by a suitably qualified person and is in general accordance with the SPP guidance material – bushfire and Bushfire resilient communities.

A bushfire hazard assessment determined the site is affected by bushfire hazard and the proposed Burdekin pump station component of the MID being sought for the Bowen pipeline project is subject to compliance with the Bushfire overlay code.

Mitigation measures that must be implemented as part of the proposed Burdekin pump station are specified in Chapter 6. With the implementation of these mitigation measures the proposed Burdekin pump station is considered compliant with the Bushfire overlay code as demonstrated in Appendix 3.

References

Department of Industry, Science, Energy and Resources (DISER) 2023, *North Australia and Rangelands Fire Information mapping,* accessed online at https://www.firenorth.org.au/nafi3/, December 2023

Queensland Department of State Development, Infrastructure, Local Government and Planning (DSDILGP 2023) *State Planning Policy Interactive Mapping System*, accessed online at https://spp.dsdip.esriaustraliaonline.com.au/geoviewer/map/planmaking, December 2023

Queensland Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) 2019, *Natural hazards, risk and resilience – Bushfire, State Planning Policy – state interest guidance material*, December 2019

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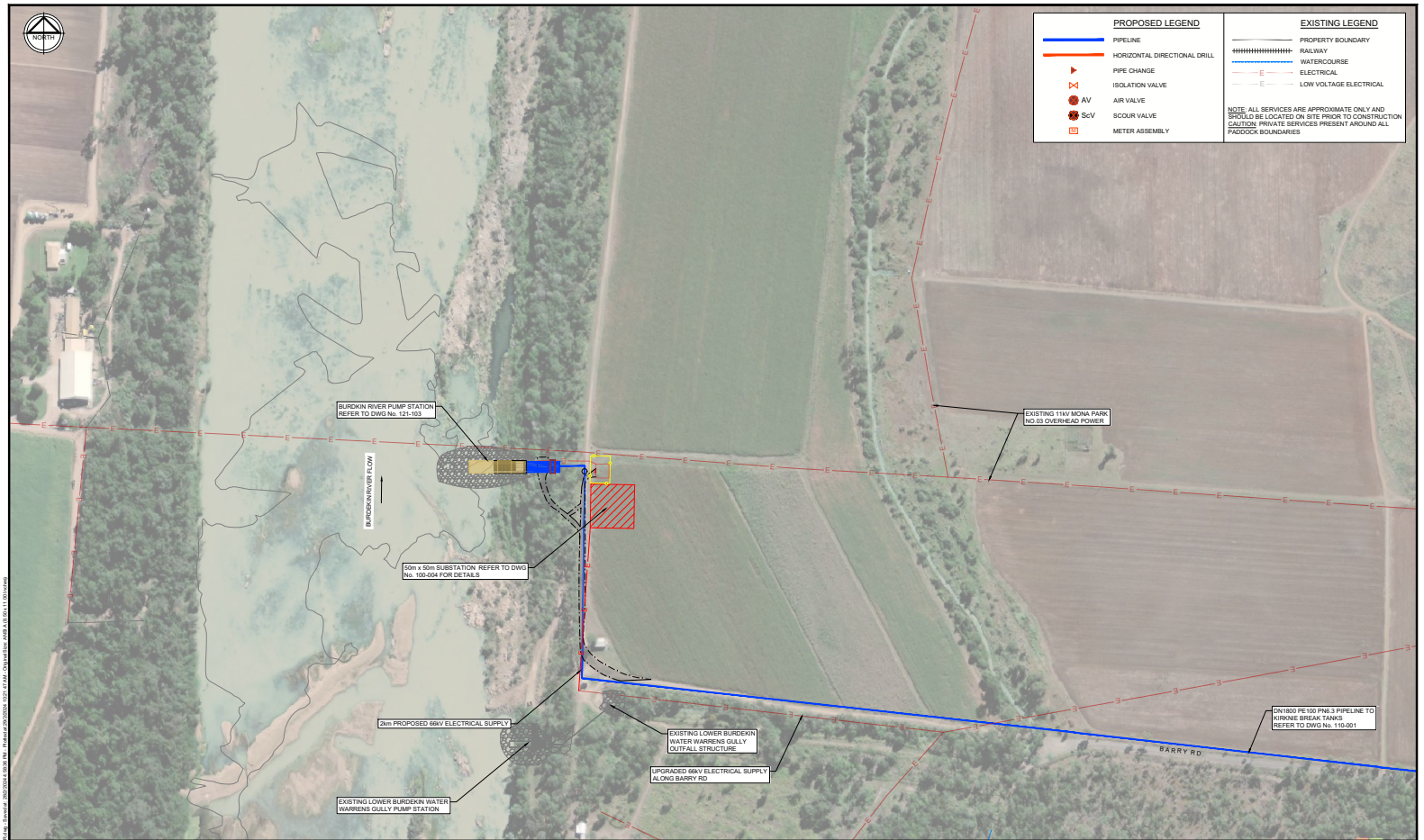
Queensland Fire and Emergency Service (QFES) 2019a, *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'*, October 2019

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Queensland Fire and Emergency Services (QFES) 2023, *Catalyst – Sustainable development mapping system*, QFES Sustainable Development Unit, accessed online at https://catalyst.qfes.qld.gov.au/sdu/ via user login, December 2023

Standards Australia Limited (Standards Australia) 2018, *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas*, Fourth edition, November 2018

Appendix 1 Site plan and intake structure arrangement plan



PLAN VIEW
SCALE 1:2000 (A1)

PRELIMINARY
NOT FOR CONSTRUCTION

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
03	28/02/2024	BL	DM	CLIENT AMENDMENTS FOR SUBMISSION
02	15/02/2024	BL	DM	FINAL ISSUE
01	18/12/2023	BL	DM	PRELIMINARY DRAFT ISSUE

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APPROVED:	DM
DATE:	24/10/2023
PROJECT REF:	27KBRBOWENP2

CLIENT: **BOWEN PIPELINE COMPANY**
DETAILED BUSINESS CASE

PROJECT:
BURDEKIN RIVER PUMP STATION
GENERAL ARRANGEMENT

DRAWING No. 121-101 | SHEET 1 OF 3 | REVISION 03

Drawing File: J:\PROJECTS\27KBRBOWENP2\121-101 &GA.dwg, Layout:A1, 28/02/2024 4:09:56 PM, Plotted:28/02/2024 10:21:47 AM, Orig.Size:841mm, ANSI A (ll) 34 x 11.00(inches)



PHOTO 1: EXAMPLE OF COFFER DAM AND INTAKE STRUCTURE BEING CONSTRUCTED UPSTREAM OF SITE



PHOTO 2: EXAMPLE OF INTAKE STRUCTURE AND VALVE PIT BEING CONSTRUCTED UPSTREAM OF SITE



PHOTO 3: EXAMPLE OF INTAKE STRUCTURE AND VALVE PIT BEING CONSTRUCTED UPSTREAM OF SITE

NORTH

BURDEKIN RIVER FLOW

RIP-RAP WITH GEOTEXTILE FINISHED SURFACE TO SUIT RIVER BANK

ACCESS PAD TO SUBMERSIBLE PUMPS AND VALVE PIT

VALVE ACCESS PIT. TO BE ACCESSIBLE AT REASONABLE WATER LEVEL. FINISHED LEVEL TBC AT DETAILED DESIGN

MANIFOLD WITH INDIVIDUAL ISOLATION VALVES

PROPOSED PUMP STATION AND INTAKE STRUCTURE. REFER TO DWG 131-102

PROPOSED ELECTRICAL CONDUIT

EXISTING 11kV OVERHEAD ELECTRICAL

CONTROL BUILDING AND SWITCHROOM ON SILTS ABOVE FLOOD LEVEL

FLOWMETER PIT

CONSTRUCTION COFFER DAM, DEPTH TO MATCH EXISTING SURFACE 4,500m² AREA

TEMPORARY ACCESS TRACK/ HARDSTAND PAVEMENT, APPROX. 3m WIDE 250m² AREA

DN1800 PE100 PN6.3 MAINLINE TO KIRKNIE BREAK TANKS

PROPOSED 50m x 50m SUBSTATION REFER TO DWG No. 121-101

ACCESS TRACK TO MATCH EXISTING HEADLAND

PROPOSED LEGEND

- PIPELINE
- HORIZONTAL DIRECTIONAL DRILL
- PIPE CHANGE
- ISOLATION VALVE
- AV AIR VALVE
- ScV SCOUR VALVE
- METER ASSEMBLY

EXISTING LEGEND

- PROPERTY BOUNDARY
- RAILWAY
- WATERCOURSE
- ELECTRICAL

NOTE: ALL SERVICES ARE APPROXIMATE ONLY AND SHOULD BE LOCATED ON SITE PRIOR TO CONSTRUCTION CAUTION: PRIVATE SERVICES PRESENT AROUND ALL PADDOCK BOUNDARIES

-5 0 5 10 15 20 25 50m

SCALE 1: 500 ORIGINAL SIZE: A1

OVERALL PLAN VIEW
GENERAL ARRANGEMENT OF HEADWORKS
SCALE 1:500 (A1)

CONCRETE HEAD WALL WITH HAND RAILING

HARDSTAND AREA FOR ACCESS TO PUMPS AND VALVE PIT

ACCESS VALVE PIT WITH COVER AND HANDRAILS. REFER TO DWG 131-102.

6 x SUBMERSIBLE PUMPS WITH 720kW MOTORS EACH. REFER TO DWG131-102.

CONTROL BUILDING. REFER TO DWG. 131-102.

ASSUMED FLOOD LEVEL 26.0m

G.L 24.0 m

HEADWALL SCREEN, TO PREVENT FISH AND DEBRIS ENTERING PUMPING CHAMBER

EXTENT OF COFFER DAM FOR CONSTRUCTION APPROXIMATELY 10m OFFSET FROM APRON.

40m OF DN1800 PE100 PN8.0 PIPELINE TOP OF BANK

SUMMER LOW W.L 8.2 m

DN1800 MANIFOLD TO SINGLE PIPELINE

IL 5.7 m

6 x DN750 PE100 PN12.5 PUMP DISCHARGE

APPROXIMATELY 65m

CONCRETE FILL WALL AND TRENCH AROUND BOX

SECTION VIEW A
GENERAL ARRANGEMENT OF HEADWORKS
NTS

BURDEKIN RIVER PUMP STATION DUTY

FLOWRATE	TOTAL HEAD	TOTAL ABSORBED POWER
311 ML/day	70m	3,615 kW

PRELIMINARY
NOT FOR CONSTRUCTION

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
03	29/02/2024	BL	DM	CLIENT AMENDMENTS FOR SUBMISSION
02	15/02/2024	BL	DM	FINAL ISSUE
01	16/12/2023	BL	DM	PRELIMINARY DRAFT ISSUE

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DATE:	24/10/2023
PROJECT REF:	27KBRBOWENP2

CLIENT: **BOWEN PIPELINE COMPANY**
DETAILED BUSINESS CASE

PROJECT: BURDEKIN RIVER PUMP STATION
INTAKE STRUCTURE ARRANGEMENT

DRAWING No. 121-103 | SHEET 3 OF 3 | REVISION 03

Drawing No. - 27KBRBOWENP2-121-101 (A1H-100) - BURDEKIN.dwg - Scale:nil - 05/03/2024 6:09:56 PM - Plotted:05/03/2024 10:03:34 AM - Plotted By:- AHD A1 (594 x 841mm)

Appendix 2 Radiant heat exposure assessment

Bushfire attack from VHC 16.2

- Forest fire danger index - 59
- Vegetation - VHC 16.2 *Eucalyptus dominated woodland on drainage lines and alluvial plains*
- Understorey fuel load – 11.1 tonnes/hectare (**t/ha**)
- Total fuel load – 11.6 t/ha
- Effective slope – 16° down slope
- Site slope – 0° slope
- Flame width – 100 m
- Flame temperature – 1,090 Kelvin (**K**)

Note Inputs used for the radiant heat exposure assessment are in accordance with Section 7.3 of *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire 2019* (**Bushfire resilient communities**).

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Calculated December 8, 2023, 4:58 pm (MDc v.4.9)

J23116

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	59	Rate of spread	2.37 km/h
Vegetation classification	Woodland	Flame length	16.79 m
Understorey fuel load	11.1 t/ha	Flame angle	52 °, 62 °, 70 °, 74 °, 76 ° & 82 °
Total fuel load	11.6 t/ha	Elevation of receiver	6.61 m, 7.41 m, 7.89 m, 8.07 m, 8.15 m & 8.31 m
Vegetation height	n/a	Fire intensity	14,206 kW/m
Effective slope	16 °	Transmissivity	0.868, 0.848, 0.82, 0.794, 0.781 & 0.722
Site slope	0 °	Viewfactor	0.6025, 0.4491, 0.3039, 0.2064, 0.1678 & 0.0454
Flame width	100 m	Minimum distance to < 40 kW/m²	13.8 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	18.4 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	26.6 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	37 m
		Minimum distance to < 10 kW/m²	43.5 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Grassfire attack from VHC 38.4

- Forest fire danger index – 59
- Equivalent grassfire danger index - 88
- Vegetation – VHC 38.4 *Continuous dryland cropping and horticulture*
- Understorey fuel load – 3.8 t/ha
- Total fuel load – 3.8 t/ha
- Effective slope – 1° slope
- Site slope – 0° slope
- Flame width – 100 m
- Flame temperature – 1,090 K

Note Inputs used for the radiant heat exposure assessment are in accordance with Section 7.3 of Bushfire resilient communities.

FLAMESOL
FPA AUSTRALIA

Calculated March 28, 2024, 10:26 am (MDc v.4.9)

J23116

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Grassland Fire Danger Index	88	Rate of spread	12.25 km/h
Vegetation classification	Grassland	Flame length	5.84 m
Understorey fuel load	3.8 t/ha	Flame angle	54 °, 64 °, 73 °, 78 °, 80 ° & 86 °
Total fuel load	3.8 t/ha	Elevation of receiver	2.36 m, 2.62 m, 2.79 m, 2.85 m, 2.87 m & 2.91 m
Vegetation height	n/a	Fire intensity	24,065 kW/m
Effective slope	1 °	Transmissivity	0.89, 0.881, 0.866, 0.848, 0.837 & 0.762
Site slope	0 °	Viewfactor	0.5846, 0.4296, 0.2858, 0.193, 0.1561 & 0.043
Flame width	100 m	Minimum distance to < 40 kW/m²	4.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	6.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	10.1 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	14.9 m
		Minimum distance to < 10 kW/m²	18.3 m

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Elevation of receiver - Douglas & Tan, 2005

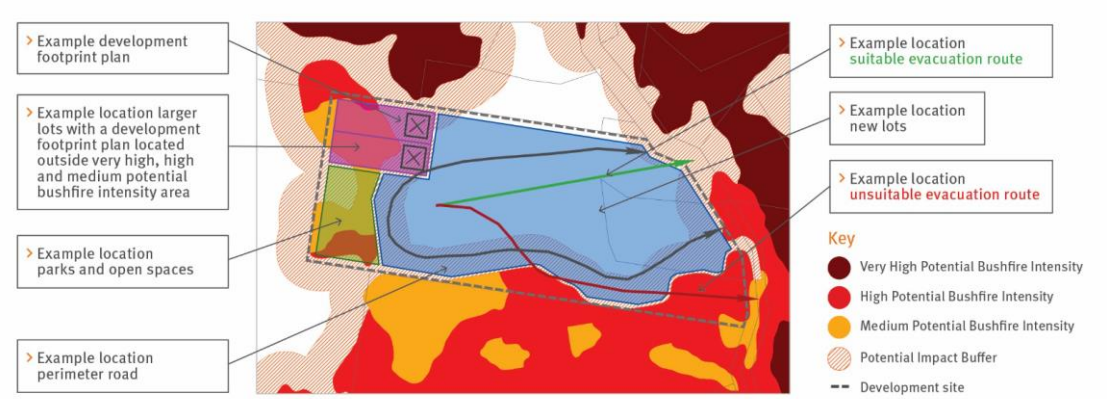
Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Appendix 3 Bushfire overlay code assessment

Performance outcomes	Acceptable outcomes	Compliance assessment
Section A **Reconfiguring a lot (RaL) – where creating lots of more than 2,000 square metres**		
PO1 The subdivision layout: (a) enables future buildings to be located away from slopes and land forms that expose people or property to an intolerable risk to life or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	**AO1.1** A development footprint plan is identified for each lot that avoids ridgelines, saddles and crests where slopes exceed 15 per cent.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
	AO1.2 A development footprint plan is identified for each lot that is separated from the closest edge to the adjacent mapped medium, high or very high potential bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all development footprint plan boundaries; or (b) a distance that achieves a radiant heat flux level of 29 kW/m2 or less at all development footprint plan boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
PO2 The subdivision layout enables: (a) future buildings to be located as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) future site access to be located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions.	**AO2** A development footprint plan is identified for each lot that: (a) is located within 60 metres of the street frontage; and (b) sited to enable a route between the development footprint plan and the street frontage with a gradient that does not exceed of 12.5 per cent.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
Section B		
Reconfiguring a lot (RaL) – where creating lots of 2,000 square metres or less		
PO3 The subdivision layout: (a) avoids creating lots on slopes and land forms that expose people or property	**AO3.1** The subdivision layout results in lots that are sited so that they are separated from the closest edge to the adjacent mapped medium,	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
to an intolerable risk to life or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	high or very high potential bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all lot boundaries; or : (b) a distance that achieves a radiant heat flux level of 29 kW/m^2 or less: (i) at the building envelope, if identified at RaL stage; or (ii) where a building envelope is not identified, at all lot boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. Note – For staged developments, temporary separation areas may be absorbed as part of subsequent stages. Note - Existing cleared areas external to the site may only be used in calculating necessary separation where tenure ensures that the land will remain cleared of hazardous vegetation (for example the land is a road, watercourse or highly managed park in public ownership).	
	AO3.2 The subdivision layout does not create lots that are within bushfire prone areas and on ridgelines, saddles and crests where slopes exceed 15 per cent (roads and parks may be located in these areas).	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
Section C		
Reconfiguring a lot (RaL) – where creating more than 20 lots		
PO4 The subdivision layout is designed to minimise the length of the development perimeter and number of lots exposed to hazardous vegetation. Note – For example, avoid finger-like subdivision patterns or substantive vegetated corridors between lots.	**AO4** No acceptable outcome is prescribed	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
PO5 The subdivision layout provides for adequate access and egress and safe evacuation routes, to achieve an acceptable or tolerable risk to people.	**AO5.1** The subdivision layout: (a) avoids the creation of bottle-neck points in the movement network within the development (for example, avoids hourglass patterns); and (b) ensures the road network has sufficient capacity for the evacuating population.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
	AO5.2 The subdivision layout ensures evacuation routes: (a) direct occupants away from rather than towards or through areas with a greater potential bushfire intensity; and (b) minimise the length of route through bushfire prone areas. Refer Figure 5.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
 *Figure 5 – Subdivision layout and evacuation routes*		
PO6 The subdivision layout provides adequate buffers between hazardous vegetation and development. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient*	**AO6.1** The subdivision layout results in an asset protection zone being located to create a separation area from adjacent mapped medium, high or very high potential bushfire intensity areas.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
	AO6.2 The asset protection zone is comprised of: (a) parks and open spaces; and/or (b) lots greater than 2000 square metres; and/or (c) public roads (termed perimeter roads). Note – Parks and open space may be	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
communities document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	located within the mapped medium, high and very high potential bushfire intensity areas to create a separation between the development and the balance of the bushfire prone area. Note – Portions of lots greater than 2000 square metres may be located within the mapped medium, high and very high potential bushfire intensity areas. Refer Figure 5.	
	AO6.3 Where the asset protection zone includes lots greater than 2000 square metres a development footprint plan is identified for each lot that is located in accordance with AO1.2.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
PO7 Parks or open space provided as part of the asset protection zone do not create additional bushfire prone areas. Note –The undertaking of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO7** Where the asset protection zone includes parks or open spaces, they: (a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, cultivated gardens and nature strips; or (b) are designed to ensure a potential available fuel load is maintained at less than eight tonnes/hectare in aggregate and with a fuel structure that remains discontinuous. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
PO8 Perimeter roads are accessible for fire-fighting vehicles, to facilitate emergency access and operational space for fire- fighting, maintenance works and hazard reduction activities.	**AO8.1** Where the asset protection zone includes a perimeter road it: (a) has a two-lane sealed carriageway clear of hazardous vegetation; and (b) is connected to the wider public road network at both ends and at intervals of no more than 200 metres; and (c) does not include design elements that may impede access for fire-fighting and	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
	maintenance for fire- fighting purposes (for example traffic calming involving chicanes).	
	AO8.2 Where the subdivision contains a reticulated water supply, the road network and fire hydrants are designed and installed in accordance with: (a) *Fire Hydrant and Vehicle Access Guidelines for residential, commercial and industrial lots*, Queensland Fire and Emergency Services, 2015, unless otherwise specified by the relevant water entity; and (b) the *Road Planning and Design Manual 2nd edition*, Department of Transport and Main Roads, 2013.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.
Section D		
Reconfiguring a lot (RaL) – where creating additional lots for the purpose of residential development and a reticulated water supply is not provided.		
PO9 The subdivision layout provides for perimeter roads or fire trail and working areas that are accessible by the type of fire-fighting vehicles servicing the area, to facilitate emergency access and operational space for fire-fighting, maintenance works and hazard reduction activities.	**AO9.1** The subdivision layout includes: (a) a fire trail and working area designed and constructed in accordance with the design parameters in Table 6 that separates the residential lot or development footprint plan from adjacent mapped medium, high or very high potential bushfire intensity areas; or (b) a perimeter road designed and constructed in accordance with AO8.1. Refer Figure 6.	**Not applicable** The proposed Burdekin pump station does not involve the reconfiguring a lot.

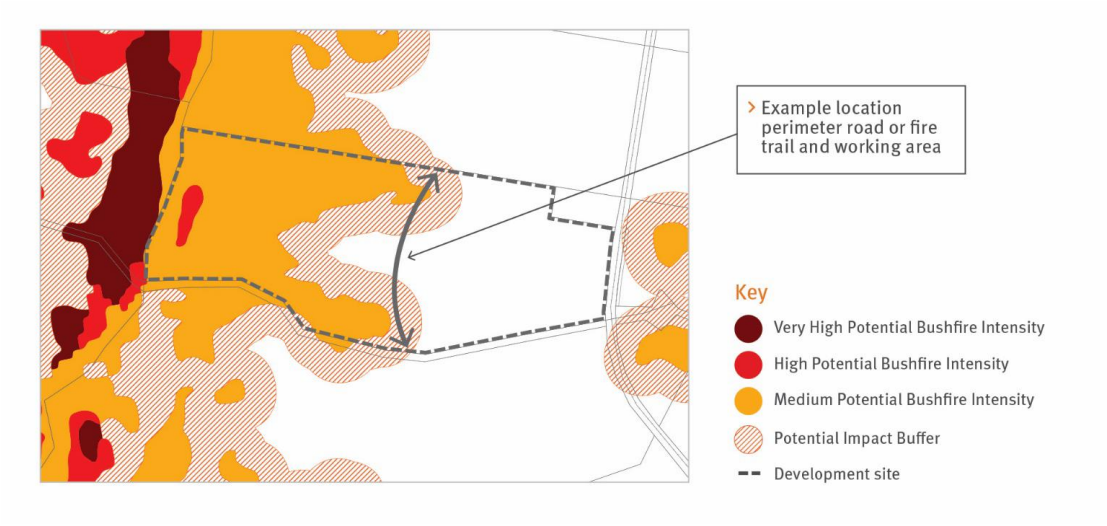
<table>
<tr><th>Performance outcomes</th><th>Acceptable outcomes</th><th>Compliance assessment</th></tr>
<tr><td colspan="3"> 

Figure 6 – Siting of fire trail and working area</td></tr>
<tr><td colspan="3">Section E</td></tr>
<tr><td colspan="3">Material change of use</td></tr>
<tr><td rowspan="2">PO10
Site layout achieve an acceptable or tolerable risk to people.
Landscape or open space provided as part of the development:
(a) acts as a buffer between hazardous vegetation and development; and
(b) does not create additional bushfire prone areas.
Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.</td><td>AO10.1
Site layout places the landscape and open spaces within the site between premises and adjacent mapped medium, high or very high potential bushfire intensity areas.
Refer Figure 7.</td><td>Complies with PO10
Section 6.1 of the bushfire management plan (BMP) requires an asset protection zone (APZ) to be established around the development footprint of buildings and infrastructure.
The APZ will provide a buffer between hazardous vegetation and development and will not create additional bushfire prone areas.</td></tr>
<tr><td>AO10.2
This landscaping and open space comprises protective landscape treatments that:
(a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses and cultivated gardens; or
(b) are designed to ensure a potential available fuel load is maintained at less than 8 tonnes/hectare in aggregate and that fuel structure remains discontinuous.
Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-</td><td>Complies with PO10
Refer to the above response.</td></tr>
</table>

Performance outcomes	Acceptable outcomes	Compliance assessment
	cropped grass to a nominal height of 10 centimetres.	

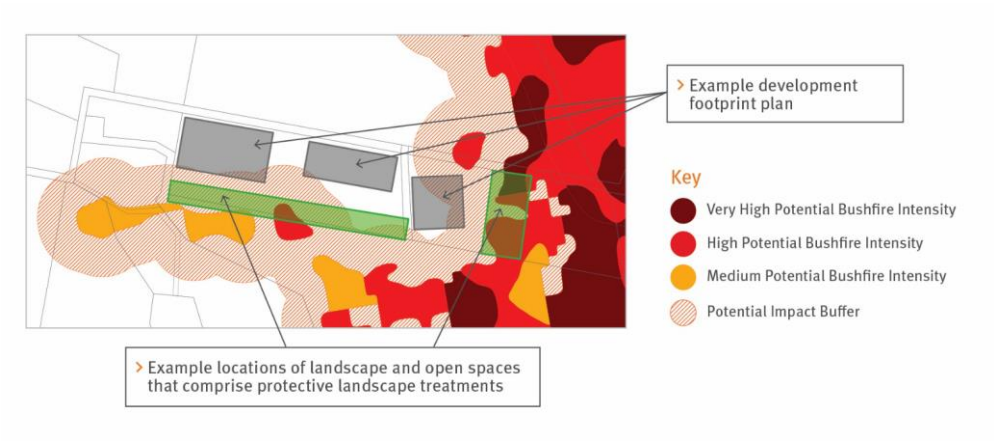


Figure 7 – Siting of protective landscape treatments

PO11 The development establishes evacuation areas, to achieve an acceptable or tolerable risk to people.	**AO11** If in an isolated location, development establishes direct access to a safe assembly/evacuation area. Note – Guidance on identifying safe evacuation areas is contained in the QFES *Bushfire resilient communities* document.	**Not applicable** The proposed Burdekin pump station will not be permanently occupied.
PO12 If on a lot of over 2,000 m^2, where involving a new premises or an existing premises with an increase in development footprint, development: (a) locates occupied areas as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) ensures vehicular access is located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions	**AO12** No acceptable outcome is prescribed.	**Complies with PO12** Section 6.3 of the BMP requires access roads to be designed and constructed to accommodate a heavy rigid Rural Fire Brigade (**RFB**) vehicle in accordance with *Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots 2019*) which defers to the *Road Planning and Design Manual – 2nd Edition 2013* for load bearing capacity, geometry and turning radii.
PO13 Development is located within a reticulated water supply area or includes a dedicated static water supply that is available solely for fire-fighting purposes and can be accessed by fire-fighting vehicles. Note – Swimming pools, farm ponds and dams are not considered reliable sources of static water supply in Queensland due	**AO13** No acceptable outcome is prescribed	**Complies with PO13** The proposed Burdekin pump station will include a dedicated fire-fighter water supply that is accessible to the RFB personnel and vehicles. Design specifications for the fire-fighter water supply are provided in Section 6.2 of the BMP.

Performance outcomes	Acceptable outcomes	Compliance assessment
to regular drought events. Note for Local Government – Information on how to provide an appropriate static water supply, may form a condition of a development approval. For further information on preferred solutions refer to the QFES *Bushfire resilient communities* document.		
PO14 Vulnerable uses listed in Table 7 are not established or intensified within a bushfire prone area unless: (a) there is an overriding need in the public interest for the new or expanded service the development provides; and (b) there are no other suitable alternative locations within the required catchment; and (c) site planning can appropriately mitigate the risk (for example, siting ovals for an educational establishment between the hazardous vegetation and structures. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome	**AO14.1** No acceptable outcome is prescribed.	**Complies with PO14** The proposed Burdekin pump station does not involve a vulnerable use.
PO15 Community infrastructure providing essential services listed in Table 7 are not established within a bushfire prone area unless: (a) there is an overriding need in the public interest for the new or expanded service the development provides (for example, there are no other suitable alternative locations that can deliver the required level of service or meet emergency service response times during and immediately after a bushfire event); and (b) the infrastructure can function effectively during and immediately after a bushfire event. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in	**AO15** No acceptable outcome is prescribed.	**Complies with PO15** The proposed Burdekin pump station does not involve community infrastructure providing essential services.

Performance outcomes	Acceptable outcomes	Compliance assessment
demonstrating compliance with this performance outcome.		
PO16 Development avoids or mitigates the risks to public safety and the environment from the manufacture or storage of materials listed in Table 7 that are hazardous in the context of bushfire to an acceptable or tolerable level. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome. Editor's note – In addition to the requirements of this code the *Work Health and Safety Act 2011* and associated Regulation and Guidelines, the *Environmental Protection Act 1994* and the relevant building assessment provisions under the *Building Act 1975* contain requirements for the manufacture and storage of hazardous substances. Information is provided by Business Queensland on the requirements for storing and transporting hazardous chemicals, available at: www.business.qld.gov.au/running-business/protecting-business/risk-management/hazardous-chemicals/storing-transporting.	**AO16** No acceptable outcome is prescribed.	**Complies with PO16** The proposed Burdekin pump station does not involve the manufacture or storage of materials that are hazardous in the context of bushfire.
Section F		
Where involving an asset protection zone		
PO17 Asset protection zones are designed and managed to ensure they do not increase the potential for bushfire hazard. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO17.1** Landscaping treatments within any asset protection zone comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres. OR	**Complies with AO17.1** Specifications for the design and maintenance of APZ are provided in Section 6.1 of the BMP and will result in a low level of discontinuous bushfire and grass fire fuel.
	AO17.2 Landscaping management within any asset protection zone maintains a: (a) potential available fuel load	**Complies with AO17.2** Refer to response to AO17.1.

Performance outcomes	Acceptable outcomes	Compliance assessment
	which is less than eight tonnes/hectare in aggregate; and (b) fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	
Section G		
Where planning provisions or conditions of approval require revegetation or rehabilitation		
PO18 Revegetation or rehabilitation areas are designed and managed to ensure they do not result in an unacceptable level of risk or an increase in bushfire intensity level. Note – The undertaking of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO18.1** Required revegetation or rehabilitation: (a) is located outside of any asset protection zone; or (b) maintains a potential available fuel load which is less than eight tonnes/hectare in aggregate and fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with acceptable outcome (b).	**Not applicable** The proposed Burdekin pump station does not include revegetation or rehabilitation.
	AO18.2 Revegetation or rehabilitation of areas located within mapped medium, high or very high potential bushfire intensity areas, revegetate and rehabilitate in a manner that maintains or reduces the existing fuel load. OR Revegetation or rehabilitation of areas located within the mapped potential impact buffer area, revegetate and rehabilitate in a manner that maintains or reduces the existing fuel load. Note – The preparation of a vegetation management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	**Not applicable** The proposed Burdekin pump station does not include revegetation or rehabilitation.

Table 6 – Fire trail and working area design parameters

Parameter	Provisions
Width	Contains a width of at least 20 metres including: 1. A trafficable area (cleared and formed);

Parameter	Provisions
	a. with a minimum width of 4 metres than can accommodate a rural firefighting vehicle b. with no less than 4.8 metres vertical clearance from canopy vegetation c. with no adjacent inhibiting embankments or retaining walls 2. A working area each side of the trafficable area: a. with a minimum width of 3 metres each side b. cleared of all flammable vegetation greater than 10 centimetres in height 3. The balance (i.e. 10 metre width) managed vegetation area: a. sited to separate the trafficable area from adjacent mapped medium, high or very high potential bushfire intensity areas managed vegetation b. comprising managed vegetation clear of major surface hazards.
Access	Access is granted in favour of the local government and Queensland Fire and Emergency Services Note – this access is commonly granted in the form of a easement that is to be maintained by the grantor.
Egress	Contains trafficable vehicle routes in to low hazard areas, every 200 metres

Table 7 – Vulnerable uses, community infrastructure for essential services and materials that are hazardous in the context of bushfire hazard

Group	Uses
Vulnerable uses	*childcare centre, community care centre, detention facility, educational establishment, hospital, nature-based tourism, relocatable home park, rooming accommodation, residential care facility, resort complex, retirement facility, tourist park*
Community infrastructure for essential services	*educational establishment, emergency services, hospital*
Hazardous materials in the context of bushfire hazard	Hazardous chemicals that are present at the levels or in the quantities that would constitute the use being a hazardous chemical facility Hazardous materials that are present in the quantities in the Work Health and Safety Regulation, schedule 15

Land and environment consultants

Bushfire management plan

Bowen Pipeline Project | Kirknie break tanks | Heatley Road | Kirknie | Queensland
Prepared for Bowen Pipeline Company Pty Ltd | 22 May 2024

Land and Environment Consultants Pty Ltd
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Bushfire management plan

Final

Report 23116 | Bowen Pipeline Company Pty Ltd | 22 May 2024

Approved by Robert Janssen

Position Managing principal

Signature 

Date 22 May 2024

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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Document control

Version	Date	Prepared by	Reviewed by
Draft	24 April 2024	R. Janssen	LEC
Final	22 May 2024	R. Janssen	LEC

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Appendix 1 Site plan

Appendix 2 Radiant heat exposure assessment

Appendix 3 Bushfire overlay code assessment

Disclaimer

Notwithstanding the precautions adopted in this report, it should always be remembered that bushfires burn under a range of conditions. An element of risk, no matter how small always remains, and although AS 3959-2018 is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any building will withstand bushfire attack on every occasion.

It should be noted that upon lodgement of a development proposal, State Government, council and/or the fire service may recommend additional construction requirements.

Although every care has been taken in the preparation of this report, Land and Environment Consultants Pty Ltd accept no responsibility resulting from the use of the information in this report.

1 Introduction

Land and Environment Consultants Pty Ltd (**LEC**) was engaged to prepare a bushfire management plan (**BMP**) for the proposed Kirknie break tanks component (**proposed Kirknie break tanks**) of the Bowen pipeline project, located in the south-eastern corner of lot 3/RP867595 (**the site**) which is accessed from Old Fort Road, Kirknie.

A ministerial infrastructure designation (**MID**) is being sought for the Bowen pipeline project in accordance with the Queensland *Planning Act 2016.*

The site is identified as a bushfire hazard area by the Queensland State Planning Policy (**SPP**) *Bushfire prone area map* (**Bushfire prone area map**). As a result, compliance with the example bushfire overlay code (**Bushfire overlay code**) in the *Natural Hazards, Risk and Resilience – Bushfire, State Planning Policy State Interest guidance material* (DSDMIP 2019) (**SPP guidance material – bushfire***)* is relevant to the proposed Kirknie break tanks component of the MID being sought for the Bowen pipeline project.

This BMP has been prepared in accordance with *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019a) (**Bushfire resilient communities**) which was prepared by the Queensland Fire and Emergency Services (**QFES**) to provide technical guidance for the implementation of the SPP guidance material – bushfire.

This BMP documents the bushfire hazard assessment of the site and demonstrates how the proposed Kirknie break tanks will comply with the Bushfire overlay code. It includes:

- an introduction (this section) and description of methods and information resources used for the preparation of this BMP;
- description of the site and proposed Kirknie break tanks;
- bushfire hazard assessment;
- identification of bushfire hazards associated with the site and proposed Kirknie break tanks;
- radiant heat exposure assessment;
- a plan for mitigating bushfire hazards; and
- assessment of the proposed Kirknie break tanks against the Bushfire overlay code.

1.1 Method

To meet requirements of the SPP guidance material – bushfire and Bushfire resilient communities, the following tasks were undertaken:

- review of the Bushfire prone area map in the SPP interactive mapping system (DSDILGP 2024) and the Queensland regional ecosystem map, vegetation hazard class (**VHC**) map and severe fire weather map in the QFES online mapping system (QFES 2024) (**Catalyst**);
- review of fire history data in the Queensland Globe (DR 2024);
- inspection of land within 100 metres (**m**) of the proposed Kirknie break tanks for vegetation characteristics, current land management practices, slope and evidence of previous fires;
- bushfire hazard assessment in accordance with the method in Bushfire resilient communities;
- radiant heat exposure assessment using the Fire Protection Association of Australia *BAL calculator V4.9* (**BAL calculator**) which models the 'method 2' bushfire attack level assessment procedure in the *Australian Standard* (AS 3959-2018) *Construction of buildings in bushfire prone areas;* and
- assessment of the proposed Kirknie break tanks against the Bushfire overlay code.

Aerial imagery of the site and measuring tools were accessed online from Google Earth and the Queensland Globe to assist with validating observations and measurements made during the site assessment.

1.2 Suitably qualified person

This BMP was prepared by Robert Janssen who is a suitably qualified and experienced bushfire management consultant.

Robert is the managing principal at LEC and has over 25 years of experience in bushfire planning and operations. He has prepared BMPs for residential, commercial and industrial property developments, utilities, government facilities and conservation estates.

Robert's formal qualifications as an environmental scientist and consulting experience are coupled with 10 years of experience as a nationally accredited fire-fighter with the national parks and wildlife service in New South Wales and Queensland.

2 Description of the site and proposed Kirknie break tanks

This chapter provides a description of the site and proposed Kirknie break tanks.

2.1 Site description

The location of the site is shown in Figure 2.1. It is 1,600 m^2 and is accessed from Old Fort Road, which is a gravel track.

There is no reliable water at the site which is surrounded by bushland vegetation.

2.2 Proposed Kirknie break tanks

The Bowen pipeline project is a 114 kilometre (**km**) pipeline from the Burdekin River to south-west of Bowen. The proposed Kirknie break tanks is located between the Burdekin River pump station and the Inkerman pump station and will ensure zero backflow into the pipeline system. The site plan for the proposed Kirknie break tanks is provided in Appendix 1.

The proposed Kirknie break tanks consist of two 1.8 mega litre (ML) break tanks, level indicator transducers and power supply which will be located within a fenced compound.

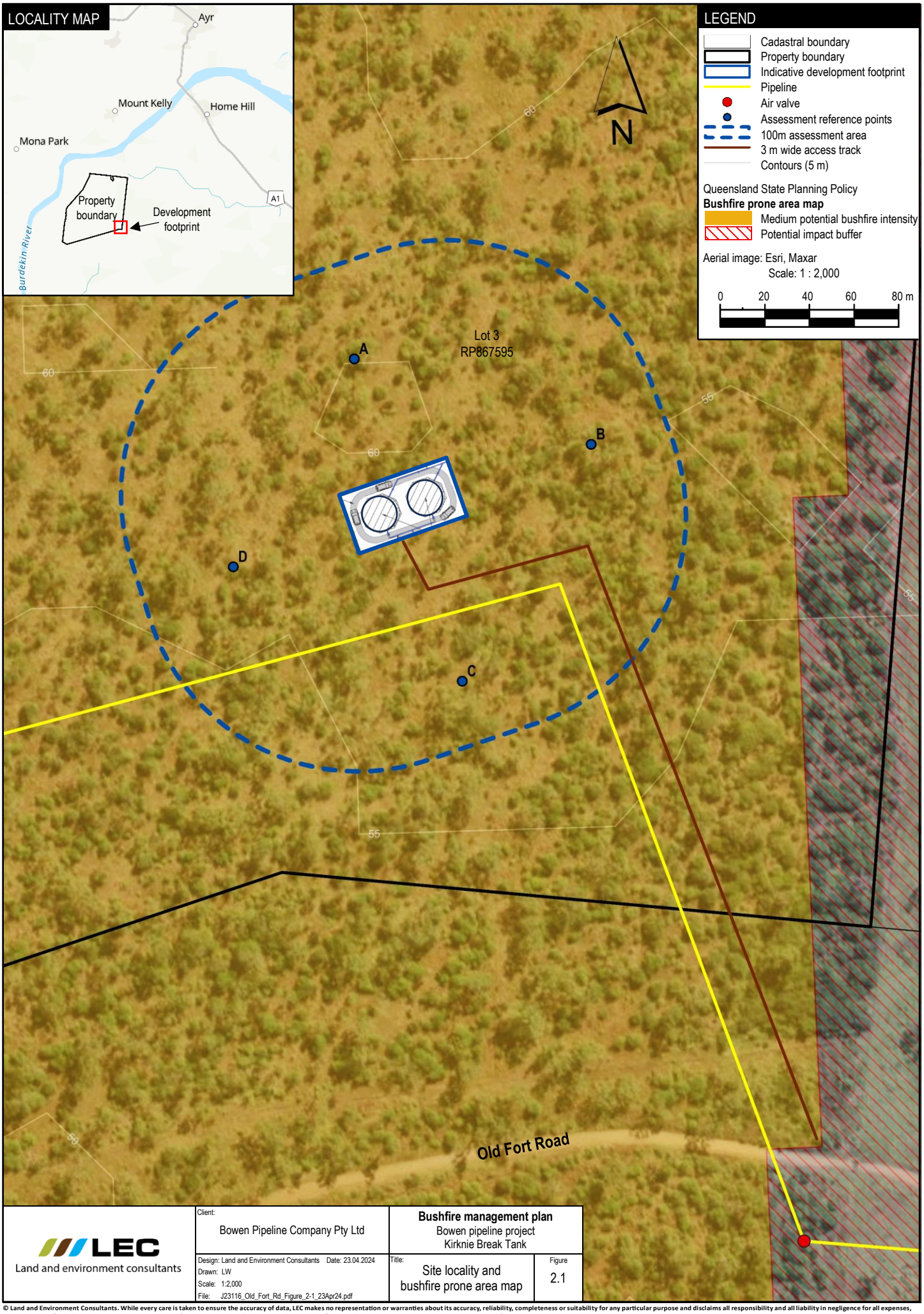
The proposed Kirknie break tanks will be accessed via a new 400 m long vehicle access track from Old Fort Road. The service vehicle access track will extend into the fenced compound and around the break tanks.

2.3 Bushfire prone area map

The Bushfire prone area map for the site is shown in Figure 2.1 and indicates the proposed Kirknie break tanks are affected by a medium potential bushfire intensity area.

Verification of the bushfire prone areas shown in the Bushfire prone area map is provided via the bushfire hazard assessment in Chapter 3.

Please note, in this BMP the terms ‘bushfire prone area’ and ‘bushfire hazard area’ have the same meaning. Both terms mean an area of vegetation that is determined to have a potential bushfire intensity ≥ 4,000 kilowatts/m (**kW/m**) and the land within 100 m of this vegetation.



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Client: Bowen Pipeline Company Pty Ltd	**Bushfire management plan** Bowen pipeline project Kirknie Break Tank	
Design: Land and Environment Consultants Date: 23.04.2024 Drawn: LW Scale: 1:2,000 File: J23116_Old_Fort_Rd_Figure_2-1_23Apr24.pdf	Title: Site locality and bushfire prone area map	Figure 2.1

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3 Bushfire hazard assessment

This chapter provides details about the desktop review, site inspection and bushfire hazard assessment.

3.1 Severe fire weather

The severe fire weather map in Catalyst indicates the 5 % annual exceedance probability forest fire danger index (**FFDI**) for the site is 58. This FFDI value has been used for the potential bushfire intensity calculations in Section 3.4 and the radiant heat exposure assessment in Section 5.3.

3.2 Fire history

Fire history data indicates that numerous fires have occurred within 1 km of the site during the past 20 years.

3.3 Site inspection

LEC inspected land within 100 m of the proposed Kirknie break tanks on 30 March 2024. Observations were recorded about current land use and management, vegetation characteristics, the slope of land and evidence of previous fires.

The locations of assessment reference points used for the bushfire hazard assessment are shown in Figure 2.1. Table 3.1 provides a summary of observations from the site inspection and notes about the bushfire hazard assessment of assessment reference points. An example of the bushland vegetation within the assessment area is shown in Photograph 3.1.

Table 3.1 Site observations

Assessment reference point	Catalyst VHC	Ground truthed VHC	Notes
A	VHC 18.2 *Dry eucalyptus woodlands on sand or depositional plains* (**VHC 18.2**)	VHC 18.2	Bushland vegetation
B	VHC 18.2	VHC 18.2	Bushland vegetation
C	VHC 18.2	VHC 18.2	Bushland vegetation
D	VHC 18.2	VHC 18.2	Bushland vegetation



Photograph 3.1 Example of VHC 18.2 at assessment reference points A, B, C and D

3.4 Potential bushfire intensity calculations

The potential bushfire intensity of assessment reference points was determined using the Queensland Public Safety Business Agency *Potential Bushfire Intensity Calculator* (version November 2014) which is an Excel spreadsheet calculator that models the bushfire hazard assessment method in Bushfire resilient communities.

Bushfire resilient communities define bushfire hazard classes as follows:

- very high – potential bushfire intensity > 40,000 kW/m;
- high – potential bushfire intensity 20,000-40,000 kW/m;
- medium – potential bushfire intensity 4,000-20,000 kW/m; and
- non-bushfire hazard – potential bushfire intensity < 4,000 kW/m.

Results of the potential bushfire intensity calculations which determine the bushfire hazard class of assessment reference points shown in Figure 2.1 are presented in Table 3.2.

Table 3.2 Potential bushfire intensity

Assessment reference point	VHC	Potential fuel load (tonnes/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
A	VHC 18.2	14.4	1	4,662	Medium
B	VHC 18.2	14.4	1	4,662	Medium
C	VHC 18.2	14.4	1	4,662	Medium
D	VHC 18.2	14.4	1	4,662	Medium

Notes 1 Potential fuel load taken from Bushfire resilient communities.

3.5 Bushfire hazard areas

Results of the potential bushfire intensity calculations in Table 3.2 confirm the proposed Kirknie break tanks is within a bushfire hazard area, ie a medium potential bushfire intensity area. Therefore, compliance with the Bushfire overlay code is relevant to the proposed Kirknie break tanks component of the MID being sought for the Bowen pipeline project.

4 Bushfire hazards associated with the site

This chapter identifies bushfire hazards associated with the site.

4.1 Fire danger season

The fire danger season at the site starts in August, peaks in September and will begin to fall when consistent summer rainfall occurs. Typically, the worst fire weather conditions will be experienced during the fire danger season when the wind direction is from the north or west.

An FFDI of 58 will be associated with hot, dry and windy conditions. If a bushfire starts and takes hold under these conditions, it will be difficult to control and fast moving in large areas of bushland vegetation.

4.2 Fire history

As discussed in Section 3.2, fire history data indicates fires have occurred within 1 km of the site during the past 20 years. On this basis, it is considered likely the proposed Kirknie break tanks will be exposed to bushfire attack in the future.

4.3 Potential directions of bushfire attack

The proposed Kirknie break tanks could be exposed to bushfire attack from all directions, ie assessment reference points A, B, C, and D, shown in Figure 2.1, where hazardous vegetation occurs.

4.4 Potential bushfire hazards from adjacent land use

The fire history data indicates the adjacent land uses, ie cropping and livestock grazing, are a potential bushfire hazard to the proposed Kirknie break tanks. These land uses could involve hot works which has potential to cause an unplanned bushfire ignition.

4.5 Water and access for emergency services

The public road access to the site is via a gravel track which has limited wayfinding signage. This situation could make it difficult for out of area fire-fighters to efficiently navigate to the site.

The site does not have access to a reliable water supply for fire-fighting.

5 Bushfire hazards associated with the proposed Kirknie break tanks

This chapter identifies potential bushfire hazards associated with the proposed Kirknie break tanks.

5.1 Siting and design

The proposed Kirknie break tanks will be designed to mitigate the risk of bushfire hazards determined by the bushfire hazard assessment in this BMP:

- an asset protection zone (**APZ**) will be formalised around infrastructure to ensure that it is maintained in perpetuity;
- an appropriately designed fire-fighter water supply outlet point will be provided adjacent to an access road; and
- access roads will be designed to provide efficient access and egress for emergency services.

5.2 Land uses

The proposed Kirknie break tanks do not involve vulnerable uses, community infrastructure for essential services or the storage or handling of hazardous materials in the context of bushfire hazard as defined in Table 7 of the SPP guidance material – bushfire.

5.3 Radiant heat exposure

The Bushfire overlay code provides guidance about the acceptable level of radiant heat exposure for development within bushfire hazard areas. It requires development to be setback from hazardous vegetation by a distance which achieves a radiant heat flux level ≤ 29 kW/m^2 at the development footprint of buildings and infrastructure.

As discussed in Section 4.3, the proposed Kirknie break tanks could be exposed to bushfire attack from all directions, ie assessment reference point A, B, C, and D, shown in Figure 2.1. The radiant heat profile of these bushfire attack scenarios was analysed using the BAL calculator. Inputs used in the BAL calculator and results are provided in Appendix 2.

Results of the radiant heat exposure assessment in Appendix 2 have been used in Section 6.1 to specify the width of the setback from hazardous vegetation, ie the APZ, to achieve a radiant heat flux level ≤ 29 kW/m^2 at the development footprint of infrastructure.

6 Bushfire mitigation plan

This chapter identifies mitigation measures that must be implemented as part of the proposed Kirknie break tanks to comply with the Bushfire overlay code.

It is the total of the mitigation measures in this chapter that will reduce the risk of bushfire hazard to a tolerable level. Failure to implement all actions in their entirety could result in an increased level of exposure to bushfire hazards.

6.1 Asset protection zone

An 8 m wide APZ must be established and maintained around infrastructure within the compound fence as shown in Figure 6.1. The position of the compound fence must be adjusted to fully contain the APZ.

The APZ must be identified in site plans and survey plans.

The APZ must consist of hardstand areas, ie gravel, asphalt or concrete, or grass which is maintained at a nominal height of 10 centimetres.

Woody regrowth, ie trees or shrubs, weeds and vegetation debris must be removed from the APZ at regular time intervals during the calendar year.

6.2 Access and egress

The access track must be designed and constructed to accommodate a heavy rigid RFB vehicle in accordance with the design guidelines in *Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots* (QFES 2019b) which defers to the *Road Planning and Design Manual – 2nd Edition* (DTMR 2013) for load bearing capacity, geometry and turning radii.

The access tracks must have a trafficable surface width of at least 3.5 m.

A reversing bay turnaround area measuring 6 m wide and 8 m deep must be located on the access track outside of the compound fence. It will provide a turnaround area for fire-fighters who do not have access to the turnaround within the site compound and a hardstand area to access the fire-fighter water supply outlet point specified in Section 6.3.

A passing bay with a widened trafficable surface width of at least 6 m for a length of at least 20 m must be installed at the mid-point of the access track from Old Fort Road.

6.3 Fire-fighter water supply

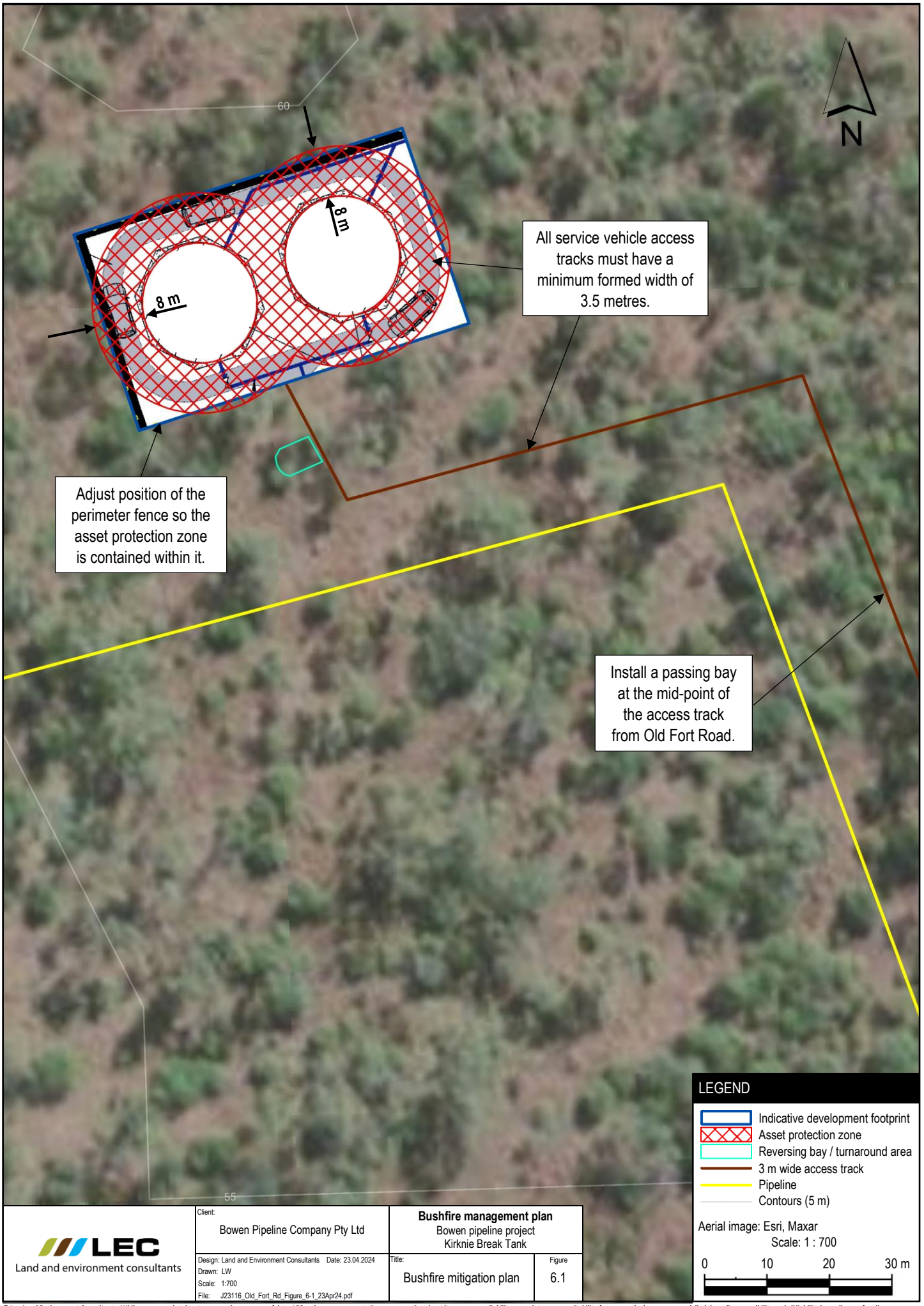
A fire-fighter water supply outlet point must be provided within 4 m of the reversing bay turn around area specified in Section 6.2. It is anticipated that it will be connected to a water reservoir or pipeline within the site's infrastructure. However, if this is not possible, the outlet point must be connected to a dedicated on-site fire-fighter water supply tank which is made from concrete or metal and has a minimum capacity of 10,000 litres.

If a fire-fighter water supply tank is required, it must be kept full of water and must not be used for activities other than bushfire management.

We recommend contacting the local Rural Fire Brigade (**RFB**) to confirm the standard local RFB fittings which should be used at the fire-fighter water supply outlet point.

All above ground pipes, valves and fittings must be made of metal.

The fire-fighter water supply outlet point must be identified by reflective wayfinding signage which is installed along the access track.



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Client: Bowen Pipeline Company Pty Ltd

Bushfire management plan
Bowen pipeline project
Kirknie Break Tank

Design: Land and Environment Consultants Date: 23.04.2024
Drawn: LW
Scale: 1:700
File: J23116_Old_Fort_Rd_Figure_6-1_23Apr24.pdf

Title: Bushfire mitigation plan

Figure: 6.1

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7 Conclusion

This BMP was prepared by a suitably qualified person and is in general accordance with the SPP guidance material – bushfire and Bushfire resilient communities.

A bushfire hazard assessment determined the site is affected by bushfire hazard and the proposed Kirknie break tanks component of the MID being sought for the Bowen pipeline project is subject to compliance with the Bushfire overlay code.

Mitigation measures that must be implemented as part of the proposed Kirknie break tanks are specified in Chapter 6. With the implementation of these mitigation measures the proposed Kirknie break tanks is considered to be compliant with the Bushfire overlay code as demonstrated in Appendix 3.

References

Queensland Department of Resources (DR) 2024, *Queensland Globe*, accessed online at https://qldglobe.information.qld.gov.au/, February 2024

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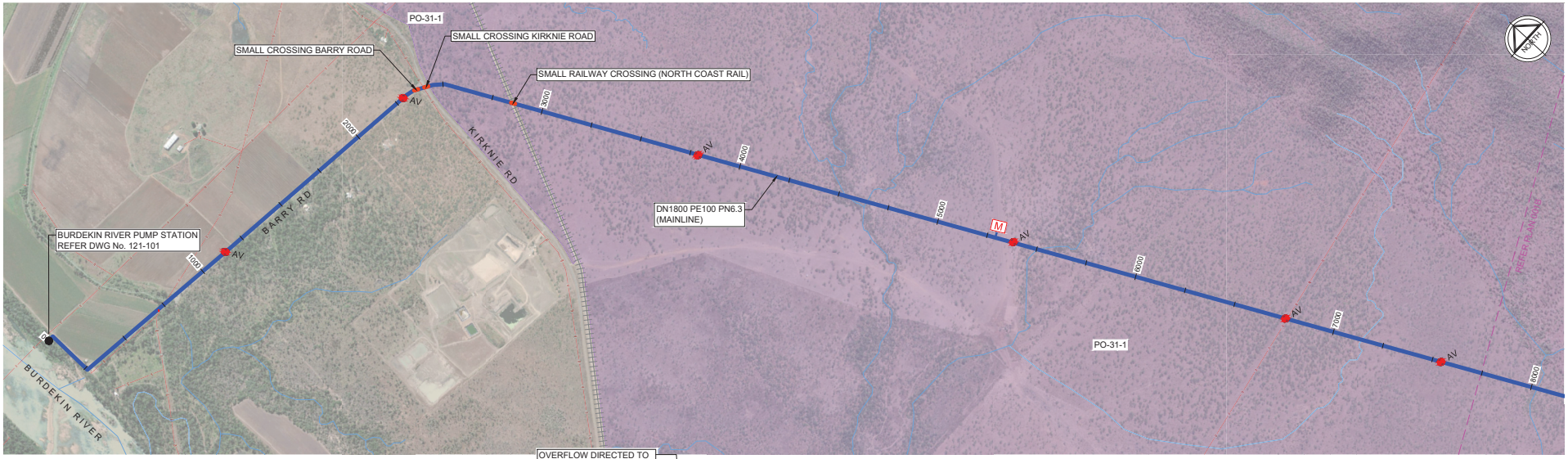
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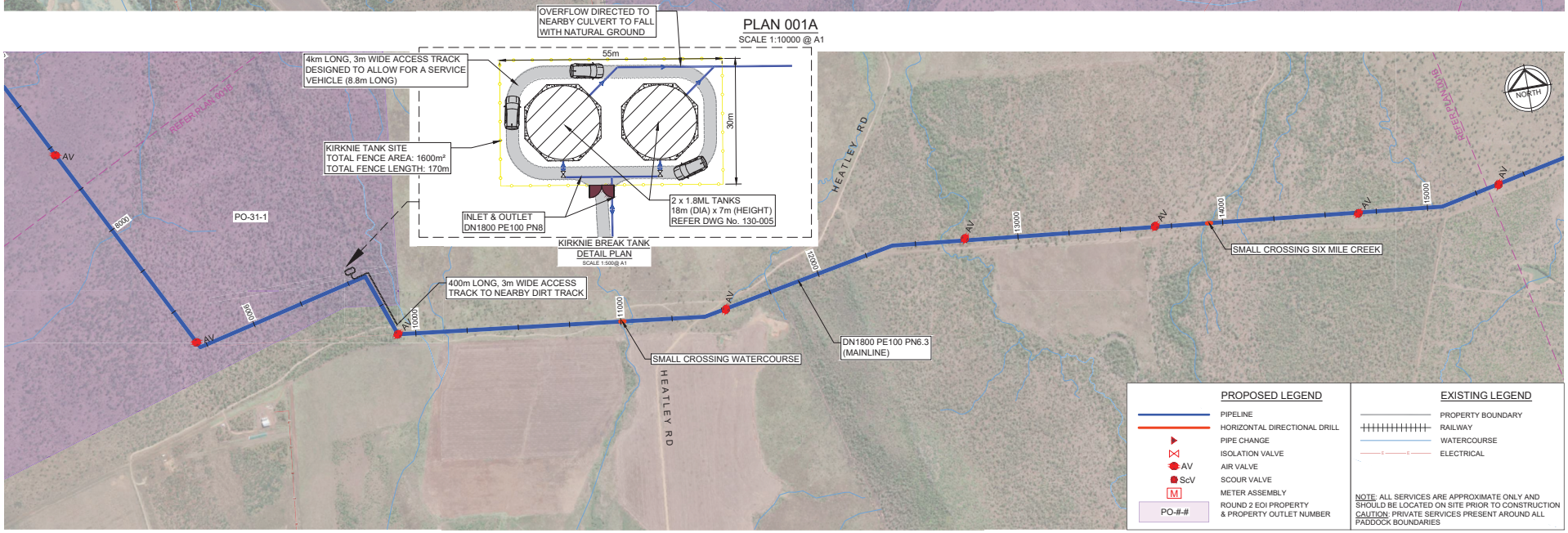
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Standards Australia Limited (Standards Australia) 2018, *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas*, Fourth edition, November 2018

Appendix 1 Site plan



PLAN 001A
SCALE 1:10000 @ A1



PLAN 001B
SCALE 1:10000 @ A1

PROPOSED LEGEND	
	PIPELINE
	HORIZONTAL DIRECTIONAL DRILL
	PIPE CHANGE
	ISOLATION VALVE
AV	AIR VALVE
ScV	SCOUR VALVE
M	METER ASSEMBLY
PO-#-#	ROUND 2 EOI PROPERTY & PROPERTY OUTLET NUMBER

EXISTING LEGEND	
	PROPERTY BOUNDARY
	RAILWAY
	WATERCOURSE
	ELECTRICAL

NOTE: ALL SERVICES ARE APPROXIMATE ONLY AND SHOULD BE LOCATED ON SITE PRIOR TO CONSTRUCTION
CAUTION: PRIVATE SERVICES PRESENT AROUND ALL PADDOCK BOUNDARIES

PRELIMINARY
NOT FOR CONSTRUCTION

-100 0 100 200 300 400 500 1000m
SCALE 1: 10000 ORIGINAL SIZE A1
SCALE 1: 20000 SIZE A3

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
03	28/02/2024	JT	BL	CLIENT AMENDMENTS FOR SUBMISSION
02	15/02/2024	JT	BL	FINAL ISSUE
01	18/12/2023	JT	BL	PRELIMINARY DRAFT ISSUE

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agribusiness, water & environment

Bowen Pipeline Company

KBR

SURVEY INFORMATION: MGA ZONE 55K ALL LEVELS ARE TO AHD
REFERENCED PLANS:

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The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

DES./DRAWN:	JT
CHECKED:	BL
APPROVED:	DM
DATE:	24/10/2023
PROJECT REF.:	27KBR0BOWENP2

CLIENT: BOWEN PIPELINE COMPANY
DETAILED BUSINESS CASE

PROJECT: PIPELINE PLANS
MAINLINE

DRAWING No. 110-001 | SHEET 1 OF 8 | REVISION 03

Drawing file: 27KBR0BOWENP2-110[2] (PIPELINES)-NO SOLVAR & UPDATED ALIGNMENT.dwg - Saved at: 1/3/2024 9:16:25 AM - Plotted at:1/3/2024 10:29:49 AM - Original Size: ISO full bleed A1 (841.00 x 594.00 MM)

Appendix 2 Radiant heat exposure assessment

Bushfire attack through VHC 18.2

- Forest fire danger index - 58
- Vegetation - VHC 18.2 – *Dry eucalypt woodlands on sand or depositional plains*
- Understorey fuel load – 10.4 tonnes/hectare (**t/ha**)
- Total fuel load –11 t/ha
- Effective slope – 1° slope
- Site slope – 0° slope
- Flame width – 100 m
- Flame temperature – 1,090 Kelvin (**K**)

Note Inputs used for the radiant heat exposure assessment are in accordance with Section 7.3 of *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire 2019* (**Bushfire resilient communities**).



Calculated April 23, 2024, 10:25 am (MDc v.4.9)

J23116

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	58	Rate of spread	0.77 km/h
Vegetation classification	Woodland	Flame length	6.36 m
Understorey fuel load	10.4 t/ha	Flame angle	54 °, 64 °, 73 °, 78 °, 80 ° & 85 °
Total fuel load	11 t/ha	Elevation of receiver	2.57 m, 2.85 m, 3.04 m, 3.11 m, 3.13 m & 3.16 m
Vegetation height	n/a	Fire intensity	4,407 kW/m
Effective slope	1 °	Transmissivity	0.889, 0.879, 0.863, 0.844, 0.833 & 0.758
Site slope	0 °	Viewfactor	0.5888, 0.4294, 0.2881, 0.194, 0.1572 & 0.0432
Flame width	100 m	Minimum distance to < 40 kW/m²	5.3 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	7.3 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	10.9 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	16.1 m
		Minimum distance to < 10 kW/m²	19.8 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

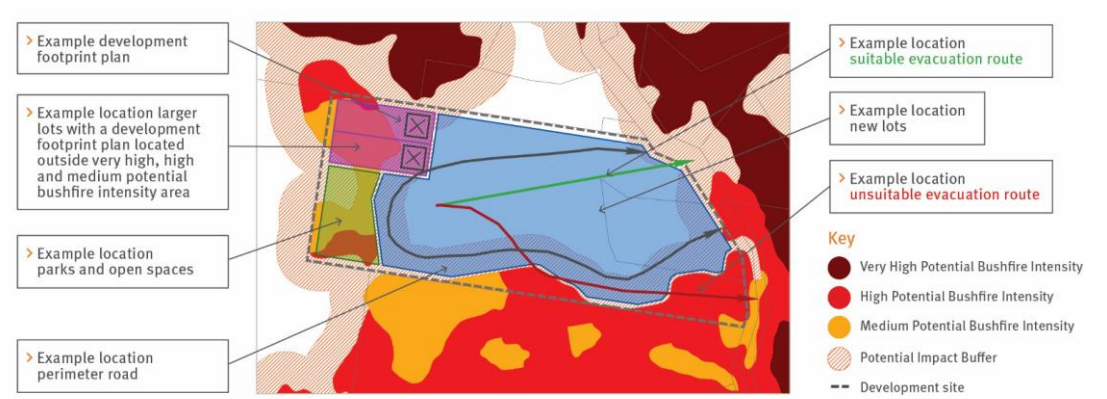
Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Appendix 3 Bushfire overlay code assessment

Performance outcomes	Acceptable outcomes	Compliance assessment
Section A **Reconfiguring a lot (RaL) – where creating lots of more than 2,000 square metres**		
PO1 The subdivision layout: (a) enables future buildings to be located away from slopes and land forms that expose people or property to an intolerable risk to life or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	**AO1.1** A development footprint plan is identified for each lot that avoids ridgelines, saddles and crests where slopes exceed 15 per cent.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
	AO1.2 A development footprint plan is identified for each lot that is separated from the closest edge to the adjacent mapped medium, high or very high potential bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all development footprint plan boundaries; or (b) a distance that achieves a radiant heat flux level of 29 kW/m2 or less at all development footprint plan boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
PO2 The subdivision layout enables: (a) future buildings to be located as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) future site access to be located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions.	**AO2** A development footprint plan is identified for each lot that: (a) is located within 60 metres of the street frontage; and (b) sited to enable a route between the development footprint plan and the street frontage with a gradient that does not exceed of 12.5 per cent.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
Section B		
Reconfiguring a lot (RaL) – where creating lots of 2,000 square metres or less		
PO3 The subdivision layout: (a) avoids creating lots on slopes and land forms that expose people or property	**AO3.1** The subdivision layout results in lots that are sited so that they are separated from the closest edge to the adjacent mapped medium,	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
to an intolerable risk to life or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	high or very high potential bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all lot boundaries; or : (b) a distance that achieves a radiant heat flux level of 29 kW/m^2 or less: (i) at the building envelope, if identified at RaL stage; or (ii) where a building envelope is not identified, at all lot boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. Note – For staged developments, temporary separation areas may be absorbed as part of subsequent stages. Note - Existing cleared areas external to the site may only be used in calculating necessary separation where tenure ensures that the land will remain cleared of hazardous vegetation (for example the land is a road, watercourse or highly managed park in public ownership).	
	AO3.2 The subdivision layout does not create lots that are within bushfire prone areas and on ridgelines, saddles and crests where slopes exceed 15 per cent (roads and parks may be located in these areas).	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
Section C		
Reconfiguring a lot (RaL) – where creating more than 20 lots		
PO4 The subdivision layout is designed to minimise the length of the development perimeter and number of lots exposed to hazardous vegetation. Note – For example, avoid finger-like subdivision patterns or substantive vegetated corridors between lots.	**AO4** No acceptable outcome is prescribed	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
PO5 The subdivision layout provides for adequate access and egress and safe evacuation routes, to achieve an acceptable or tolerable risk to people.	**AO5.1** The subdivision layout: (a) avoids the creation of bottle-neck points in the movement network within the development (for example, avoids hourglass patterns); and (b) ensures the road network has sufficient capacity for the evacuating population.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
	AO5.2 The subdivision layout ensures evacuation routes: (a) direct occupants away from rather than towards or through areas with a greater potential bushfire intensity; and (b) minimise the length of route through bushfire prone areas. Refer Figure 5.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
 *Figure 5 – Subdivision layout and evacuation routes*		
PO6 The subdivision layout provides adequate buffers between hazardous vegetation and development. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient*	**AO6.1** The subdivision layout results in an asset protection zone being located to create a separation area from adjacent mapped medium, high or very high potential bushfire intensity areas.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
	AO6.2 The asset protection zone is comprised of: (a) parks and open spaces; and/or (b) lots greater than 2000 square metres; and/or (c) public roads (termed perimeter roads). Note – Parks and open space may be	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
communities document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	located within the mapped medium, high and very high potential bushfire intensity areas to create a separation between the development and the balance of the bushfire prone area. Note – Portions of lots greater than 2000 square metres may be located within the mapped medium, high and very high potential bushfire intensity areas. Refer Figure 5.	
	AO6.3 Where the asset protection zone includes lots greater than 2000 square metres a development footprint plan is identified for each lot that is located in accordance with AO1.2.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
PO7 Parks or open space provided as part of the asset protection zone do not create additional bushfire prone areas. Note –The undertaking of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO7** Where the asset protection zone includes parks or open spaces, they: (a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, cultivated gardens and nature strips; or (b) are designed to ensure a potential available fuel load is maintained at less than eight tonnes/hectare in aggregate and with a fuel structure that remains discontinuous. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
PO8 Perimeter roads are accessible for fire-fighting vehicles, to facilitate emergency access and operational space for fire- fighting, maintenance works and hazard reduction activities.	**AO8.1** Where the asset protection zone includes a perimeter road it: (a) has a two-lane sealed carriageway clear of hazardous vegetation; and (b) is connected to the wider public road network at both ends and at intervals of no more than 200 metres; and (c) does not include design elements that may impede access for fire-fighting and	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
	maintenance for fire- fighting purposes (for example traffic calming involving chicanes).	
	AO8.2 Where the subdivision contains a reticulated water supply, the road network and fire hydrants are designed and installed in accordance with: (a) *Fire Hydrant and Vehicle Access Guidelines for residential, commercial and industrial lots*, Queensland Fire and Emergency Services, 2015, unless otherwise specified by the relevant water entity; and (b) the *Road Planning and Design Manual 2nd edition*, Department of Transport and Main Roads, 2013.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.
Section D		
Reconfiguring a lot (RaL) – where creating additional lots for the purpose of residential development and a reticulated water supply is not provided.		
PO9 The subdivision layout provides for perimeter roads or fire trail and working areas that are accessible by the type of fire-fighting vehicles servicing the area, to facilitate emergency access and operational space for fire-fighting, maintenance works and hazard reduction activities.	**AO9.1** The subdivision layout includes: (a) a fire trail and working area designed and constructed in accordance with the design parameters in Table 6 that separates the residential lot or development footprint plan from adjacent mapped medium, high or very high potential bushfire intensity areas; or (b) a perimeter road designed and constructed in accordance with AO8.1. Refer Figure 6.	**Not applicable** The proposed Kirknie break tanks does not involve the reconfiguring a lot.

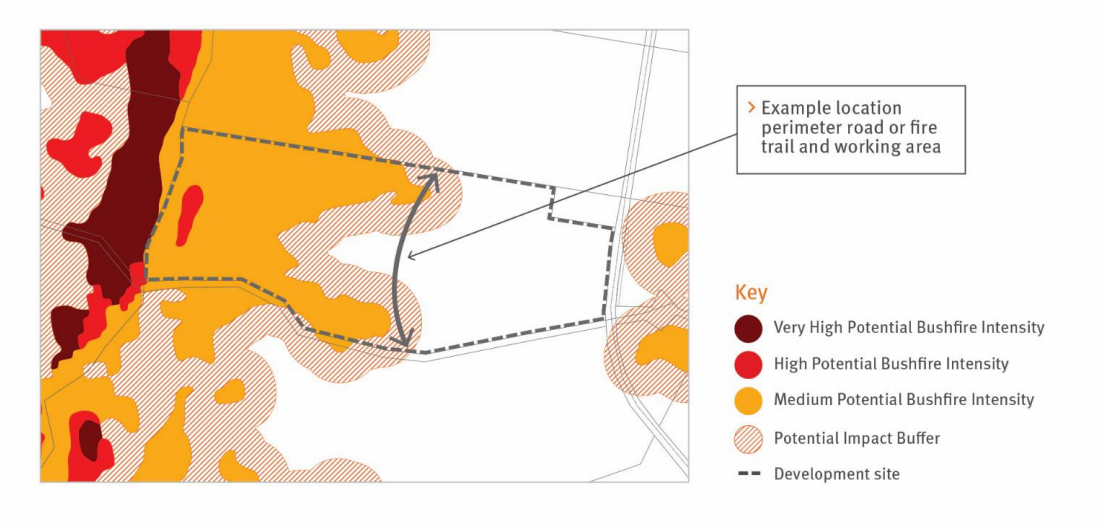
<table>
<tr><th>Performance outcomes</th><th>Acceptable outcomes</th><th>Compliance assessment</th></tr>
<tr><td colspan="3"> 

Figure 6 – Siting of fire trail and working area</td></tr>
<tr><td colspan="3">Section E</td></tr>
<tr><td colspan="3">Material change of use</td></tr>
<tr><td rowspan="2">PO10
Site layout achieve an acceptable or tolerable risk to people.
Landscape or open space provided as part of the development:
(a) acts as a buffer between hazardous vegetation and development; and
(b) does not create additional bushfire prone areas.
Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.</td><td>AO10.1
Site layout places the landscape and open spaces within the site between premises and adjacent mapped medium, high or very high potential bushfire intensity areas.
Refer Figure 7.</td><td>Complies with PO10
Section 6.1 of the bushfire management plan (BMP) requires an asset protection zone (APZ) to be established and maintained around infrastructure within the compound fence.
The APZ will provide a buffer between hazardous vegetation and development and will not create additional bushfire prone areas.</td></tr>
<tr><td>AO10.2
This landscaping and open space comprises protective landscape treatments that:
(a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses and cultivated gardens; or
(b) are designed to ensure a potential available fuel load is maintained at less than 8 tonnes/hectare in aggregate and that fuel structure remains discontinuous.
Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-</td><td>Complies with PO10
Refer to the above response.</td></tr>
</table>

Performance outcomes	Acceptable outcomes	Compliance assessment
	cropped grass to a nominal height of 10 centimetres.	

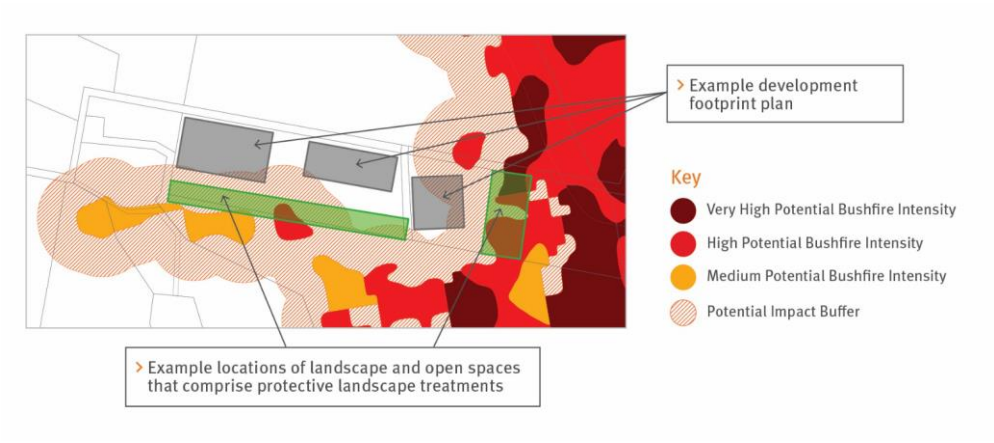


Figure 7 – Siting of protective landscape treatments

PO11 The development establishes evacuation areas, to achieve an acceptable or tolerable risk to people.	**AO11** If in an isolated location, development establishes direct access to a safe assembly/evacuation area. Note – Guidance on identifying safe evacuation areas is contained in the QFES *Bushfire resilient communities* document.	**Not applicable** The proposed Kirknie break tanks will not be permanently occupied.
PO12 If on a lot of over 2,000 m^2, where involving a new premises or an existing premises with an increase in development footprint, development: (a) locates occupied areas as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) ensures vehicular access is located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions	**AO12** No acceptable outcome is prescribed.	**Complies with PO12** Section 6.2 of the BMP requires access roads to be designed and constructed to accommodate a heavy rigid Rural Fire Brigade (**RFB**) vehicle in accordance with *Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots 2019* which defers to the *Road Planning and Design Manual – 2nd Edition 2013* for load bearing capacity, geometry and turning radii.
PO13 Development is located within a reticulated water supply area or includes a dedicated static water supply that is available solely for fire-fighting purposes and can be accessed by fire-fighting vehicles. Note – Swimming pools, farm ponds and dams are not considered reliable sources of static water supply in Queensland due	**AO13** No acceptable outcome is prescribed	**Complies with PO13** The proposed Kirknie break tanks will include a dedicated fire-fighter water supply that is accessible to the RFB personnel and vehicles. Design specifications for the fire-fighter water supply are provided in Section 6.3 of the BMP.

Performance outcomes	Acceptable outcomes	Compliance assessment
to regular drought events. Note for Local Government – Information on how to provide an appropriate static water supply, may form a condition of a development approval. For further information on preferred solutions refer to the QFES *Bushfire resilient communities* document.		
PO14 Vulnerable uses listed in Table 7 are not established or intensified within a bushfire prone area unless: (a) there is an overriding need in the public interest for the new or expanded service the development provides; and (b) there are no other suitable alternative locations within the required catchment; and (c) site planning can appropriately mitigate the risk (for example, siting ovals for an educational establishment between the hazardous vegetation and structures. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome	**AO14.1** No acceptable outcome is prescribed.	**Complies with PO14** The proposed Kirknie break tanks does not involve a vulnerable use.
PO15 Community infrastructure providing essential services listed in Table 7 are not established within a bushfire prone area unless: (a) there is an overriding need in the public interest for the new or expanded service the development provides (for example, there are no other suitable alternative locations that can deliver the required level of service or meet emergency service response times during and immediately after a bushfire event); and (b) the infrastructure can function effectively during and immediately after a bushfire event. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in	**AO15** No acceptable outcome is prescribed.	**Complies with PO15** The proposed Kirknie break tanks does not involve community infrastructure providing essential services.

Performance outcomes	Acceptable outcomes	Compliance assessment
demonstrating compliance with this performance outcome.		
PO16 Development avoids or mitigates the risks to public safety and the environment from the manufacture or storage of materials listed in Table 7 that are hazardous in the context of bushfire to an acceptable or tolerable level. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome. Editor's note – In addition to the requirements of this code the *Work Health and Safety Act 2011* and associated Regulation and Guidelines, the *Environmental Protection Act 1994* and the relevant building assessment provisions under the *Building Act 1975* contain requirements for the manufacture and storage of hazardous substances. Information is provided by Business Queensland on the requirements for storing and transporting hazardous chemicals, available at: www.business.qld.gov.au/running-business/protecting-business/risk-management/hazardous-chemicals/storing-transporting.	**AO16** No acceptable outcome is prescribed.	**Complies with PO16** The proposed Kirknie break tanks does not involve the manufacture or storage of materials that are hazardous in the context of bushfire.
Section F		
Where involving an asset protection zone		
PO17 Asset protection zones are designed and managed to ensure they do not increase the potential for bushfire hazard. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO17.1** Landscaping treatments within any asset protection zone comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres. OR	**Complies with AO17.1** Specifications for the design and maintenance of APZ are provided in Section 6.1 of the BMP and will result in a low level of discontinuous bushfire and grass fire fuel.
	AO17.2 Landscaping management within any asset protection zone maintains a: (a) potential available fuel load	**Complies with AO17.2** Refer to response to AO17.1.

Performance outcomes	Acceptable outcomes	Compliance assessment
	which is less than eight tonnes/hectare in aggregate; and (b) fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	
Section G		
Where planning provisions or conditions of approval require revegetation or rehabilitation		
PO18 Revegetation or rehabilitation areas are designed and managed to ensure they do not result in an unacceptable level of risk or an increase in bushfire intensity level. Note – The undertaking of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO18.1** Required revegetation or rehabilitation: (a) is located outside of any asset protection zone; or (b) maintains a potential available fuel load which is less than eight tonnes/hectare in aggregate and fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with acceptable outcome (b).	**Not applicable** The proposed Kirknie break tanks does not include revegetation or rehabilitation.
	AO18.2 Revegetation or rehabilitation of areas located within mapped medium, high or very high potential bushfire intensity areas, revegetate and rehabilitate in a manner that maintains or reduces the existing fuel load. OR Revegetation or rehabilitation of areas located within the mapped potential impact buffer area, revegetate and rehabilitate in a manner that maintains or reduces the existing fuel load. Note – The preparation of a vegetation management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	**Not applicable** The proposed Kirknie break tanks does not include revegetation or rehabilitation.

Table 6 – Fire trail and working area design parameters

Parameter	Provisions
Width	Contains a width of at least 20 metres including: 1. A trafficable area (cleared and formed);

Parameter	Provisions
	a. with a minimum width of 4 metres than can accommodate a rural firefighting vehicle b. with no less than 4.8 metres vertical clearance from canopy vegetation c. with no adjacent inhibiting embankments or retaining walls 2. A working area each side of the trafficable area: a. with a minimum width of 3 metres each side b. cleared of all flammable vegetation greater than 10 centimetres in height 3. The balance (i.e. 10 metre width) managed vegetation area: a. sited to separate the trafficable area from adjacent mapped medium, high or very high potential bushfire intensity areas managed vegetation b. comprising managed vegetation clear of major surface hazards.
Access	Access is granted in favour of the local government and Queensland Fire and Emergency Services Note – this access is commonly granted in the form of a easement that is to be maintained by the grantor.
Egress	Contains trafficable vehicle routes in to low hazard areas, every 200 metres

Table 7 – Vulnerable uses, community infrastructure for essential services and materials that are hazardous in the context of bushfire hazard

Group	Uses
Vulnerable uses	*childcare centre, community care centre, detention facility, educational establishment, hospital, nature-based tourism, relocatable home park, rooming accommodation, residential care facility, resort complex, retirement facility, tourist park*
Community infrastructure for essential services	*educational establishment, emergency services, hospital*
Hazardous materials in the context of bushfire hazard	Hazardous chemicals that are present at the levels or in the quantities that would constitute the use being a hazardous chemical facility Hazardous materials that are present in the quantities in the Work Health and Safety Regulation, schedule 15

Land and environment consultants

Bushfire management plan

Bowen Pipeline Project | Laydown area 3 | Balaam Road | Bowen | Queensland
Prepared for Bowen Pipeline Company Pty Ltd | 22 May 2024

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Bushfire management plan

Final

Report 23116 | Bowen Pipeline Company Pty Ltd | 22 May 2024

Approved by Robert Janssen

Position Managing principal

Signature 

Date 22 May 2024

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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Document control

Version	Date	Prepared by	Reviewed by
Draft	24 April 2024	R. Janssen	LEC
Final	22 May 2024	R. Janssen	LEC

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Appendix

Appendix 1 Site plan

Appendix 2 Bushfire overlay code assessment

Disclaimer

Notwithstanding the precautions adopted in this report, it should always be remembered that bushfires burn under a range of conditions. An element of risk, no matter how small always remains, and although AS 3959-2018 is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any building will withstand bushfire attack on every occasion.

It should be noted that upon lodgement of a development proposal, State Government, council and/or the fire service may recommend additional construction requirements.

Although every care has been taken in the preparation of this report, Land and Environment Consultants Pty Ltd accept no responsibility resulting from the use of the information in this report.

1 Introduction

Land and Environment Consultants Pty Ltd (**LEC**) was engaged to prepare a bushfire management plan (**BMP**) for proposed laydown area 3 (**proposed laydown area**) of the Bowen pipeline project, located within unallocated land associated with Balaam Road, Bowen (**the site**).

A ministerial infrastructure designation (**MID**) is being sought for the Bowen pipeline project in accordance with the Queensland *Planning Act 2016.*

The site is identified as a bushfire hazard area by the Queensland State Planning Policy (**SPP**) *Bushfire prone area map* (**Bushfire prone area map**). As a result, compliance with the example bushfire overlay code (**Bushfire overlay code**) in the *Natural Hazards, Risk and Resilience – Bushfire, State Planning Policy State Interest guidance material* (DSDMIP 2019) (**SPP guidance material – bushfire***)* is relevant to the proposed Laydown area component of the MID being sought for the Bowen pipeline project.

This BMP has been prepared in accordance with *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019a) (**Bushfire resilient communities**) which was prepared by the Queensland Fire and Emergency Services (**QFES**) to provide technical guidance for the implementation of the SPP guidance material – bushfire.

This BMP documents the bushfire hazard assessment of the site and demonstrates how the proposed laydown area will comply with the Bushfire overlay code. It includes:

- an introduction (this section) and description of methods and information resources used for the preparation of this BMP;
- description of the site and proposed laydown area;
- bushfire hazard assessment;
- identification of bushfire hazards associated with the site and proposed laydown area;
- a plan for mitigating bushfire hazards; and
- assessment of the proposed laydown area against the Bushfire overlay code.

1.1 Method

To meet requirements of the SPP guidance material – bushfire and Bushfire resilient communities, the following tasks were undertaken:

- review of the Bushfire prone area map in the SPP interactive mapping system (DSDILGP 2024) and the Queensland regional ecosystem map, vegetation hazard class (**VHC**) map and severe fire weather map in the QFES online mapping system (QFES 2024) (**Catalyst**);
- review of the fire scar mapping in the Queensland Globe (DR 2024);
- inspection of land within 100 metres (**m**) of the proposed laydown area for vegetation characteristics, current land management practices, slope and evidence of previous fires;
- bushfire hazard assessment in accordance with the method in Bushfire resilient communities; and
- assessment of the proposed laydown area against the Bushfire overlay code.

Aerial imagery of the site and measuring tools were accessed online from Google Earth and the Queensland Globe to assist with validating observations and measurements made during the site assessment.

1.2 Suitably qualified person

This BMP was prepared by Robert Janssen who is a suitably qualified and experienced bushfire management consultant.

Robert is the managing principal at LEC and has over 25 years of experience in bushfire planning and operations. He has prepared BMPs for residential, commercial and industrial property developments, utilities, government facilities and conservation estates.

Robert's formal qualifications as an environmental scientist and consulting experience are coupled with 10 years of experience as a nationally accredited fire-fighter with the national parks and wildlife service in New South Wales and Queensland.

2 Description of the site and proposed laydown area

This chapter provides a description of the site and proposed laydown area.

2.1 Site description

The location of the site is shown in Figure 2.1. The site is 2 hectares (**ha**) and adjoins the Bruce Highway and Balaam Road along its northern and western boundaries.

The site consists of bushland vegetation and is adjacent to cropping land to the north, east and west and bushland vegetation to the south.

2.2 Proposed laydown area

The Bowen pipeline project is a 114 kilometre (**km**) pipeline from the Burdekin River to south-west of Bowen. The proposed laydown area is located near Bowen and between the Salisbury Plains pump station and Delta pump station. The site plan for the proposed laydown area is provided in Appendix 1.

The proposed laydown area is temporary infrastructure that will involve layout yards, a pipe manufacturing facility and ancillary items. Activities at the site may include hot works and storage and handling of hazardous chemicals.

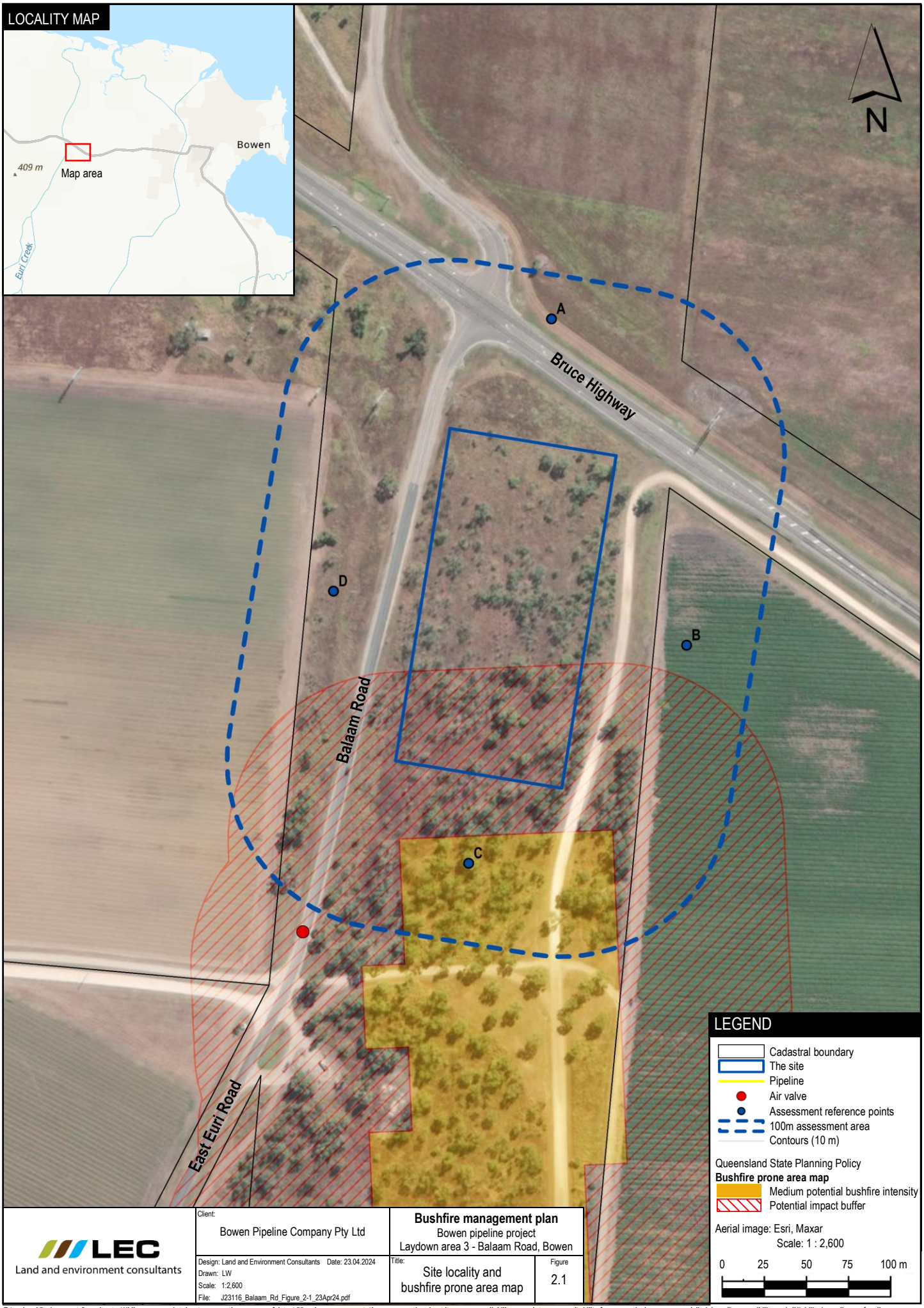
Access to the proposed laydown area will be via Balaam Road.

2.3 Bushfire prone area map

The Bushfire prone area map for the site is shown in Figure 2.1 and indicates the site is affected by the potential impact buffer from the medium potential bushfire intensity area.

Verification of the bushfire prone areas shown in the Bushfire prone area map is provided via the bushfire hazard assessment in Chapter 3.

Please note, in this BMP the terms ‘bushfire prone area’ and ‘bushfire hazard area’ have the same meaning. Both terms mean an area of vegetation that is determined to have a potential bushfire intensity ≥ 4,000 kilowatts/m (**kW/m**) and the land within 100 m of this vegetation.



LEC
Land and environment consultants

Client: Bowen Pipeline Company Pty Ltd

Bushfire management plan
Bowen pipeline project
Laydown area 3 - Balaam Road, Bowen

Design: Land and Environment Consultants Date: 23.04.2024
Drawn: LW
Scale: 1:2,600
File: J23116_Balaam_Rd_Figure_2-1_23Apr24.pdf

Title: Site locality and bushfire prone area map

Figure 2.1

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3 Bushfire hazard assessment

This chapter provides details about the desktop review, site inspection and bushfire hazard assessment.

3.1 Severe fire weather

The severe fire weather map in Catalyst indicates the 5 % annual exceedance probability forest fire danger index (**FFDI**) for the site is 59. This FFDI value has been used for the potential bushfire intensity calculations in Section 3.4.

3.2 Fire history

Fire scar mapping in the Queensland Globe indicates numerous fires have occurred within 1 kilometre (**km**) of the site during the past 20 years.

3.3 Site inspection

LEC inspected land within 100 m of the site on 30 March 2024. Observations were recorded about current land use and management, vegetation characteristics, the slope of land and evidence of previous fires.

The locations of assessment reference points used for the bushfire hazard assessment are shown in Figure 2.1. Table 3.1 provides a summary of observations from the site inspection and notes about the bushfire hazard assessment of assessment reference points. Examples of vegetation within the assessment areas are provided in Photographs 3.1-3.4.

Table 3.1 Site observations

Assessment reference point	Catalyst VHC	Ground truthed VHC	Notes
A	VHC 38.5 *Discontinuous irrigated cropping and horticulture* (**VHC 38.5**)	VHC 38.4 *Continuous dryland cropping and horticulture* (**VHC 38.4**)	Grassland on the verges of the Bruce Highway and land used for cropping.
B	VHC 38.5	VHC 38.4	Land used for cropping.
C	VHC 9.2 *Moist to dry eucalypt woodland on coastal lowlands and ranges* (**VHC 9.2**)	VHC 9.2	100+ m wide corridor of bushland vegetation.
D	VHC 38.5	VHC 38.4	Grassland on the verges of Balaam Road and land used for cropping.



Photograph 3.1 VHC 38.4 at A



Photograph 3.2 VHC 38.4 at B



Photograph 3.3 VHC 9.2 at C



Photograph 3.4 VHC 38.4 at D

3.4 Potential bushfire intensity calculations

The potential bushfire intensity of assessment reference points was determined using the Queensland Public Safety Business Agency *Potential Bushfire Intensity Calculator* (version November 2014) which is an Excel spreadsheet calculator that models the bushfire hazard assessment method in Bushfire resilient communities.

Bushfire resilient communities define bushfire hazard classes as follows:

- very high – potential bushfire intensity > 40,000 kW/m;
- high – potential bushfire intensity 20,000-40,000 kW/m;
- medium – potential bushfire intensity 4,000-20,000 kW/m; and
- non-bushfire hazard – potential bushfire intensity < 4,000 kW/m.

Results of the potential bushfire intensity calculations which determine the bushfire hazard class of assessment reference points shown in Figure 2.1 are presented in Table 3.2.

Table 3.2 Potential bushfire intensity

Assessment reference point	VHC	Potential fuel load (tonnes/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
A	VHC 38.4	3.8	1	566	Non-bushfire hazard class
B	VHC 38.4	3.8	1	566	Non-bushfire hazard class

Table 3.2 Potential bushfire intensity

Assessment reference point	VHC	Potential fuel load (tonnes/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
C	VHC 9.2	17.2	1	11,595	Medium
D	VHC 38.4	3.8	1	566	Non-bushfire hazard class

Notes 1 Potential fuel load taken from Bushfire resilient communities.

3.5 Bushfire hazard areas

Results of the potential bushfire intensity calculations in Table 3.2 confirm the proposed laydown area is within a bushfire hazard area, ie medium potential bushfire intensity area. Therefore, compliance with the Bushfire overlay code is relevant to the proposed laydown area component of the MID being sought for the Bowen pipeline project.

4 Bushfire hazards associated with the site

This chapter identifies bushfire hazards associated with the site.

4.1 Fire danger season

The fire danger season at the site starts in August, peaks in September and will begin to fall when consistent summer rainfall occurs. Typically, the worst fire weather conditions will be experienced during the fire danger season when the wind direction is from the north or west.

An FFDI of 59 will be associated with hot, dry and windy conditions. If a bushfire starts and takes hold under these conditions, it will be difficult to control and fast moving in large areas of bushland vegetation.

4.2 Fire history

As discussed in Section 3.2, fire history data indicates numerous fires have occurred within 1 km of the site during the past 20 years. On this basis, it is considered possible the proposed laydown area could be exposed to bushfire attack in the future.

4.3 Potential directions of bushfire attack

The proposed Laydown area could be exposed to bushfire attack from assessment reference point C, shown in Figure 2.1, where hazardous vegetation occurs.

Although assessment reference points A, B and D are identified as a non-bushfire hazard class in Section 3.4, VHC 38.4 which occurs in these areas is identified in Bushfire resilient communities as having continuous fuel and being grassfire prone. Therefore, it is considered relevant that this BMP considers grassfire attack from these areas.

Bushfire and grassfire attack scenarios on the proposed laydown area are further analysed in Section 5.3.

4.4 Potential bushfire hazards from adjacent land use

The fire history data indicates the adjacent land use, ie cropping, is a potential bushfire hazard to the proposed laydown area. This land use could involve hot works which has potential to cause an unplanned bushfire ignition.

4.5 Water and access for emergency services

The site is accessible via public roads which can accommodate emergency service vehicles. It does not have access to a reliable water supply for fire-fighting.

5 Bushfire hazards associated with the proposed laydown area

This chapter identifies potential bushfire hazards associated with the proposed laydown area.

5.1 Siting and design

The proposed laydown area will be designed and operated to mitigate the risk of bushfire hazards determined by the bushfire hazard assessment in this BMP:

- an asset protection zone (**APZ**) will be formalised around storage and activity areas within the site;
- an appropriately designed fire-fighter water supply outlet point will be provided; and
- access will be provided for emergency service vehicles.

5.2 Land uses

The proposed laydown area does not involve vulnerable uses or community infrastructure for essential services as defined in Table 7 of the SPP guidance material – bushfire.

The proposed laydown area may include the storage and handling of hazardous chemicals. However, it is unlikely to be in volumes which would be consistent with the storage or handling of hazardous materials in the context of bushfire hazard as defined in Table 7 of the SPP guidance material – bushfire.

Manufacturing activities may involve hot works which have potential to cause a bushfire ignition.

5.3 Radiant heat exposure

The Bushfire overlay code provides guidance about the acceptable level of radiant heat exposure for development within bushfire hazard areas. It requires development to be setback from hazardous vegetation by a distance which achieves a radiant heat flux level ≤ 29 kW/m^2 at the development footprint.

Given the proposed laydown area is temporary infrastructure, an alternative solution to the Bushfire overlay code is proposed in this BMP. The alternative solution involves establishing an APZ with a nominal cleared width of 8 m around the perimeter of the proposed laydown area.

The APZ will minimise the impact of bushfire attack on storage and activity areas within the site and provide a defendable space for fire-fighters to operate. It will also assist with preventing activities within the site from causing a bushfire ignition.

6 Bushfire mitigation plan

This chapter identifies mitigation measures that must be implemented as part of the proposed laydown area to comply with the Bushfire overlay code.

It is the total of the mitigation measures in this chapter that will reduce the risk of bushfire hazard to a tolerable level. Failure to implement all actions in their entirety could result in an increased level of exposure to bushfire hazards.

6.1 Asset protection zone

An APZ must be established and maintained around the perimeter of the proposed laydown area as shown in Figure 6.1.

For the duration of the proposed laydown area's use, the APZ must have a mineral earth surface and be maintained free or weeds, grass or woody regrowth.

Storage or parking must not occur within the APZ.

6.2 Fire-fighter water supply

A dedicated fire-fighter water supply tank must be provided within the proposed laydown area. It must have a minimum capacity of 10,000 litres.

We recommend contacting the local Rural Fire Brigade (**RFB**) to confirm the standard local RFB fittings which should be used at the fire-fighter water supply outlet point.

A hardstand area which is designed for a heavy rigid RFB vehicle to park must be provided within 4 m of the fire-fighter water supply outlet point.

The fire-fighter water supply tank must be kept full of water and must not be used for activities other than bushfire management.

The fire-fighter water supply outlet point must be identified by reflective wayfinding signage which is installed along the driveway.

6.3 Access and egress

Driveways must be designed and constructed to accommodate a heavy rigid RFB vehicle in accordance with the design guidelines in *Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots* (QFES 2019b) which defers to the *Road Planning and Design Manual – 2nd Edition* (DTMR 2013) for load bearing capacity, geometry and turning radii.

6.4 Administrative controls

Activities at the proposed laydown area must be in accordance with QFES advice and warnings which are accessible online at https://www.qfes.qld.gov.au/Current-Incidents, via QFES social media, ie QFES Facebook and QFES X, or the local radio station.

Hot works must be performed in accordance with a hot works permit system.

Storage or handling of hazardous chemicals must be in accordance with *Managing risks of hazardous chemicals in the workplace – Code of Practice* (SWA 2020), applicable safety data sheets, and otherwise in accordance with Queensland *Work Health and Safety Act 2011* and its regulations.



LEC
Land and environment consultants

Client:
Bowen Pipeline Company Pty Ltd

Bushfire management plan
Bowen pipeline project
Laydown area 3 - Balaam Road, Bowen

Design: Land and Environment Consultants Date: 23.04.2024
Drawn: LW
Scale: 1:1,000
File: J23116_Balaam_Rd_Figure_6-1_23Apr24.pdf

Title:
Bushfire mitigation plan

Figure
6.1

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7 Conclusion

This BMP was prepared by a suitably qualified person and is in general accordance with the SPP guidance material – bushfire and Bushfire resilient communities.

A bushfire hazard assessment determined the site is affected by bushfire hazard and the proposed laydown area component of the MID being sought for the Bowen pipeline project is subject to compliance with the Bushfire overlay code.

Mitigation measures that must be implemented as part of the proposed laydown area are specified in Chapter 6. With the implementation of these mitigation measures the proposed laydown area is considered compliant with the Bushfire overlay code as demonstrated in Appendix 2.

References

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Queensland Department of Transport and Main Roads (DTMR) 2013, *Road Planning and Design Manual – 2nd Edition*, 2013

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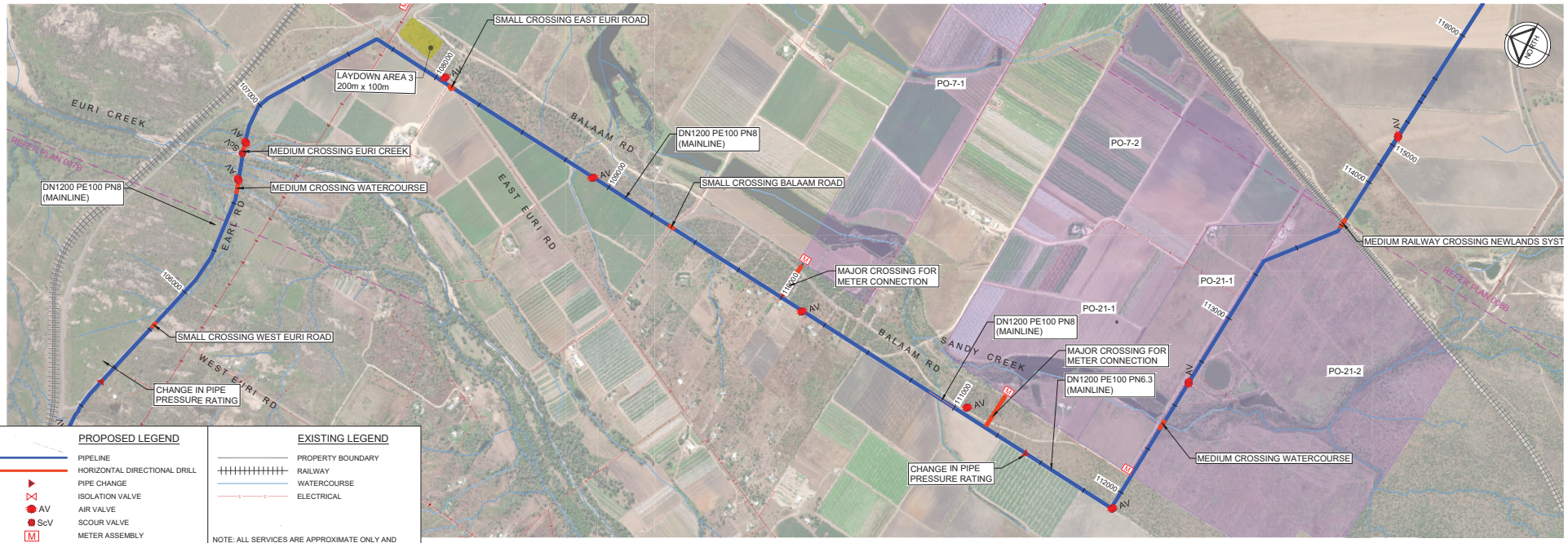
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Appendix 1 Site plan



PROPOSED LEGEND

- PIPELINE
- HORIZONTAL DIRECTIONAL DRILL
- PIPE CHANGE
- ISOLATION VALVE
- AV AIR VALVE
- ScV SCOUR VALVE
- M METER ASSEMBLY
- PO-#-# ROUND 2 EOI PROPERTY & PROPERTY OUTLET NUMBER

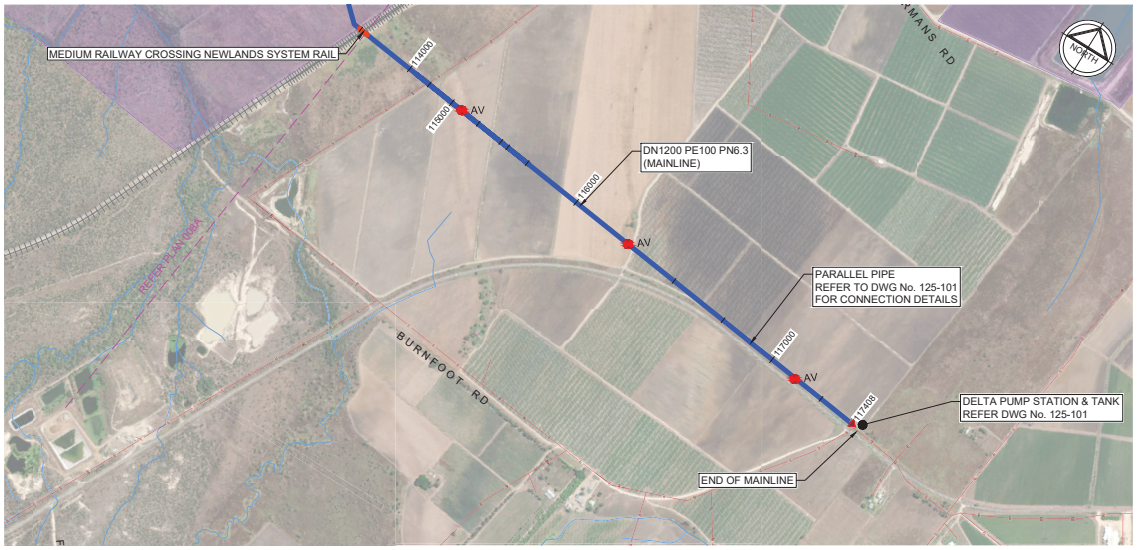
EXISTING LEGEND

- PROPERTY BOUNDARY
- RAILWAY
- WATERCOURSE
- ELECTRICAL

NOTE: ALL SERVICES ARE APPROXIMATE ONLY AND SHOULD BE LOCATED ON SITE PRIOR TO CONSTRUCTION
CAUTION: PRIVATE SERVICES PRESENT AROUND ALL PADDOCK BOUNDARIES

PLAN 008A

SCALE 1:10000 @ A1



PLAN 008B

SCALE 1:10000 @ A1

PRELIMINARY
NOT FOR CONSTRUCTION

-100 0 100 200 300 400 500 1000m

SCALE 1: 10000 ORIGINAL SIZE A1
SCALE 1: 20000 SIZE A3

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
03	28/02/2024	JT	BL	CLIENT AMENDMENTS FOR SUBMISSION
02	15/02/2024	JT	BL	FINAL ISSUE
01	18/12/2023	JT	BL	PRELIMINARY DRAFT ISSUE

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1300 746 466
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pinion ADVISORY
agribusiness, water & environment

Bowen Pipeline Company

KBR

SURVEY INFORMATION: MGA ZONE 55K
ALL LEVELS ARE TO AHD

REFERENCED PLANS:

DES./DRAWN: JT
CHECKED: BL
APPROVED: DM
DATE: 24/10/2023
PROJECT REF.: 27KBR0BOWENP2

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The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

CLIENT: BOWEN PIPELINE COMPANY
DETAILED BUSINESS CASE

PROJECT: PIPELINE PLANS
MAINLINE

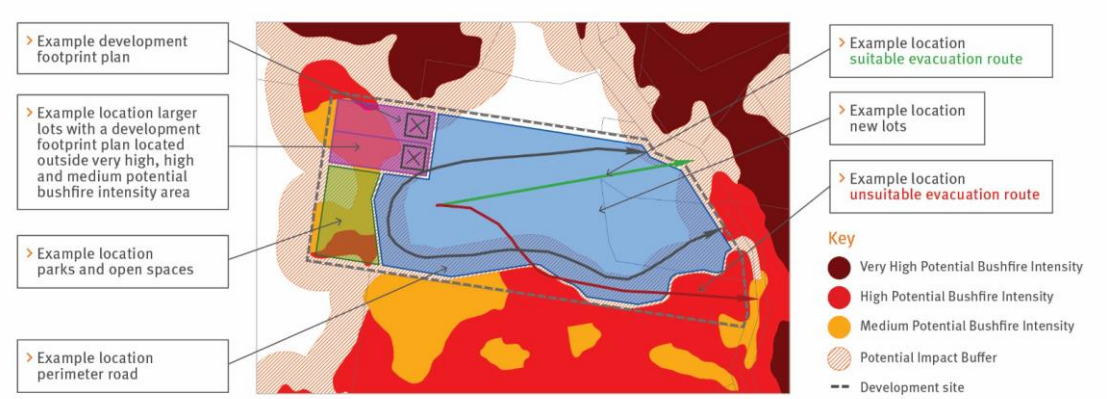
DRAWING No. 110-008
SHEET 8 OF 8
REVISION 03

Drawing File: 27KBR0BOWENP2-110[8]-(PIPELINES)-NO SCALE LOCKED ALIGNMENT.dwg, Saved at: 5/3/2024 12:19:16 PM, Plotted at 6/3/2024 10:19:11 AM, Original Size: ISO full bleed A1 (841.00 x 594.00 MM)

Appendix 2 Bushfire overlay code assessment

Performance outcomes	Acceptable outcomes	Compliance assessment
Section A **Reconfiguring a lot (RaL) – where creating lots of more than 2,000 square metres**		
PO1 The subdivision layout: (a) enables future buildings to be located away from slopes and land forms that expose people or property to an intolerable risk to life or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	**AO1.1** A development footprint plan is identified for each lot that avoids ridgelines, saddles and crests where slopes exceed 15 per cent.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
	AO1.2 A development footprint plan is identified for each lot that is separated from the closest edge to the adjacent mapped medium, high or very high potential bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all development footprint plan boundaries; or (b) a distance that achieves a radiant heat flux level of 29 kW/m2 or less at all development footprint plan boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
PO2 The subdivision layout enables: (a) future buildings to be located as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) future site access to be located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions.	**AO2** A development footprint plan is identified for each lot that: (a) is located within 60 metres of the street frontage; and (b) sited to enable a route between the development footprint plan and the street frontage with a gradient that does not exceed of 12.5 per cent.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
Section B		
Reconfiguring a lot (RaL) – where creating lots of 2,000 square metres or less		
PO3 The subdivision layout: (a) avoids creating lots on slopes and land forms that expose people or property	**AO3.1** The subdivision layout results in lots that are sited so that they are separated from the closest edge to the adjacent mapped medium,	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
to an intolerable risk to life or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	high or very high potential bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all lot boundaries; or : (b) a distance that achieves a radiant heat flux level of 29 kW/m^2 or less: (i) at the building envelope, if identified at RaL stage; or (ii) where a building envelope is not identified, at all lot boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. Note – For staged developments, temporary separation areas may be absorbed as part of subsequent stages. Note - Existing cleared areas external to the site may only be used in calculating necessary separation where tenure ensures that the land will remain cleared of hazardous vegetation (for example the land is a road, watercourse or highly managed park in public ownership).	
	AO3.2 The subdivision layout does not create lots that are within bushfire prone areas and on ridgelines, saddles and crests where slopes exceed 15 per cent (roads and parks may be located in these areas).	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
Section C		
Reconfiguring a lot (RaL) – where creating more than 20 lots		
PO4 The subdivision layout is designed to minimise the length of the development perimeter and number of lots exposed to hazardous vegetation. Note – For example, avoid finger-like subdivision patterns or substantive vegetated corridors between lots.	**AO4** No acceptable outcome is prescribed	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
PO5 The subdivision layout provides for adequate access and egress and safe evacuation routes, to achieve an acceptable or tolerable risk to people.	**AO5.1** The subdivision layout: (a) avoids the creation of bottle-neck points in the movement network within the development (for example, avoids hourglass patterns); and (b) ensures the road network has sufficient capacity for the evacuating population.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
	AO5.2 The subdivision layout ensures evacuation routes: (a) direct occupants away from rather than towards or through areas with a greater potential bushfire intensity; and (b) minimise the length of route through bushfire prone areas. Refer Figure 5.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
 *Figure 5 – Subdivision layout and evacuation routes*		
PO6 The subdivision layout provides adequate buffers between hazardous vegetation and development. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient*	**AO6.1** The subdivision layout results in an asset protection zone being located to create a separation area from adjacent mapped medium, high or very high potential bushfire intensity areas.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
	AO6.2 The asset protection zone is comprised of: (a) parks and open spaces; and/or (b) lots greater than 2000 square metres; and/or (c) public roads (termed perimeter roads). Note – Parks and open space may be	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
communities document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	located within the mapped medium, high and very high potential bushfire intensity areas to create a separation between the development and the balance of the bushfire prone area. Note – Portions of lots greater than 2000 square metres may be located within the mapped medium, high and very high potential bushfire intensity areas. Refer Figure 5.	
	AO6.3 Where the asset protection zone includes lots greater than 2000 square metres a development footprint plan is identified for each lot that is located in accordance with AO1.2.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
PO7 Parks or open space provided as part of the asset protection zone do not create additional bushfire prone areas. Note –The undertaking of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO7** Where the asset protection zone includes parks or open spaces, they: (a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, cultivated gardens and nature strips; or (b) are designed to ensure a potential available fuel load is maintained at less than eight tonnes/hectare in aggregate and with a fuel structure that remains discontinuous. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
PO8 Perimeter roads are accessible for fire-fighting vehicles, to facilitate emergency access and operational space for fire- fighting, maintenance works and hazard reduction activities.	**AO8.1** Where the asset protection zone includes a perimeter road it: (a) has a two-lane sealed carriageway clear of hazardous vegetation; and (b) is connected to the wider public road network at both ends and at intervals of no more than 200 metres; and (c) does not include design elements that may impede access for fire-fighting and	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.

Performance outcomes	Acceptable outcomes	Compliance assessment
	maintenance for fire- fighting purposes (for example traffic calming involving chicanes).	
	AO8.2 Where the subdivision contains a reticulated water supply, the road network and fire hydrants are designed and installed in accordance with: (a) *Fire Hydrant and Vehicle Access Guidelines for residential, commercial and industrial lots*, Queensland Fire and Emergency Services, 2015, unless otherwise specified by the relevant water entity; and (b) the *Road Planning and Design Manual 2nd edition*, Department of Transport and Main Roads, 2013.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.
Section D		
Reconfiguring a lot (RaL) – where creating additional lots for the purpose of residential development and a reticulated water supply is not provided.		
PO9 The subdivision layout provides for perimeter roads or fire trail and working areas that are accessible by the type of fire-fighting vehicles servicing the area, to facilitate emergency access and operational space for fire-fighting, maintenance works and hazard reduction activities.	**AO9.1** The subdivision layout includes: (a) a fire trail and working area designed and constructed in accordance with the design parameters in Table 6 that separates the residential lot or development footprint plan from adjacent mapped medium, high or very high potential bushfire intensity areas; or (b) a perimeter road designed and constructed in accordance with AO8.1. Refer Figure 6.	**Not applicable** The proposed laydown area does not involve the reconfiguring a lot.

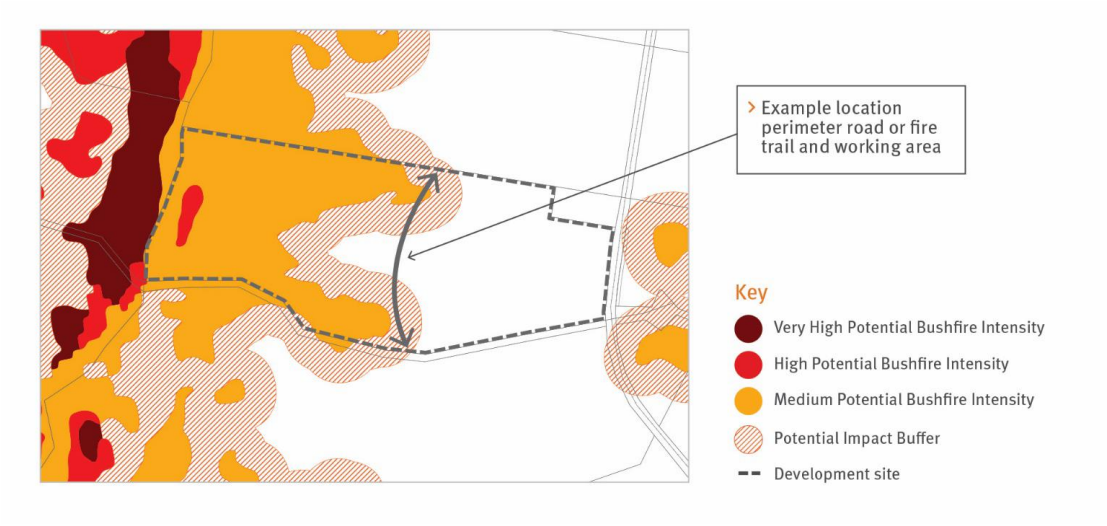
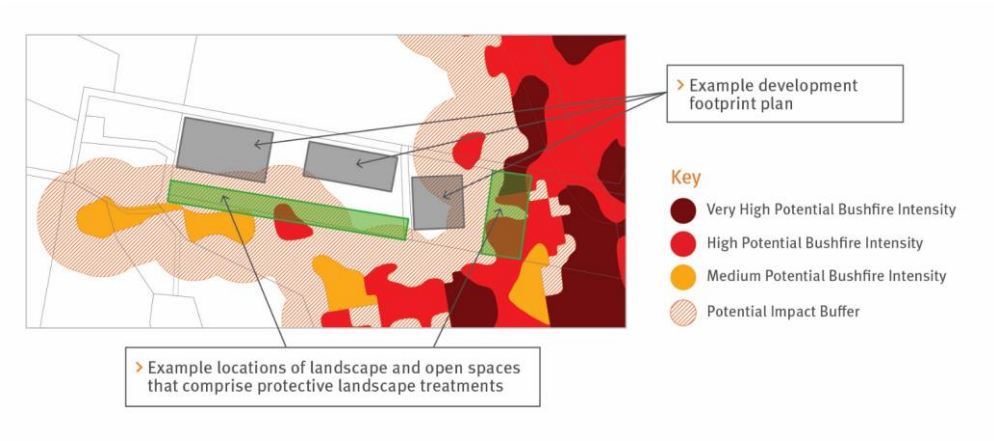
<table>
<tr><th>Performance outcomes</th><th>Acceptable outcomes</th><th>Compliance assessment</th></tr>
<tr><td colspan="3"> 

Figure 6 – Siting of fire trail and working area</td></tr>
<tr><td colspan="3">Section E</td></tr>
<tr><td colspan="3">Material change of use</td></tr>
<tr><td rowspan="2">PO10
Site layout achieve an acceptable or tolerable risk to people.
Landscape or open space provided as part of the development:
(a) acts as a buffer between hazardous vegetation and development; and
(b) does not create additional bushfire prone areas.
Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.</td><td>AO10.1
Site layout places the landscape and open spaces within the site between premises and adjacent mapped medium, high or very high potential bushfire intensity areas.
Refer Figure 7.</td><td>Complies with PO10
Section 6.1 of the bushfire management plan (BMP) requires an asset protection zone (APZ) to be established around the proposed laydown area.
The APZ will provide a buffer between hazardous vegetation and activities within the proposed laydown area and will not create additional bushfire prone areas.</td></tr>
<tr><td>AO10.2
This landscaping and open space comprises protective landscape treatments that:
(a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses and cultivated gardens; or
(b) are designed to ensure a potential available fuel load is maintained at less than 8 tonnes/hectare in aggregate and that fuel structure remains discontinuous.
Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-</td><td>Complies with PO10
Refer to the above response.</td></tr>
</table>

Performance outcomes	Acceptable outcomes	Compliance assessment
	cropped grass to a nominal height of 10 centimetres.	
 *Figure 7 – Siting of protective landscape treatments*		
PO11 The development establishes evacuation areas, to achieve an acceptable or tolerable risk to people.	**AO11** If in an isolated location, development establishes direct access to a safe assembly/evacuation area. Note – Guidance on identifying safe evacuation areas is contained in the QFES *Bushfire resilient communities* document.	**Not applicable** The proposed laydown area will not be permanently occupied.
PO12 If on a lot of over 2,000 m^2, where involving a new premises or an existing premises with an increase in development footprint, development: (a) locates occupied areas as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) ensures vehicular access is located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions	**AO12** No acceptable outcome is prescribed.	**Complies with PO12** Section 6.3 of the BMP requires driveways to be designed and constructed to accommodate a heavy rigid Rural Fire Brigade (**RFB**) vehicle in accordance with *Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots 2019* which defers to the *Road Planning and Design Manual – 2nd Edition 2013* for load bearing capacity, geometry and turning radii.
PO13 Development is located within a reticulated water supply area or includes a dedicated static water supply that is available solely for fire-fighting purposes and can be accessed by fire-fighting vehicles. Note – Swimming pools, farm ponds and dams are not considered reliable sources of static water supply in Queensland due	**AO13** No acceptable outcome is prescribed	**Complies with PO13** The proposed laydown area will include a dedicated fire-fighter water supply that is accessible to the RFB personnel and vehicles. Design specifications for the fire-fighter water supply are provided in Section 6.2 of the BMP.

Performance outcomes	Acceptable outcomes	Compliance assessment
to regular drought events. Note for Local Government – Information on how to provide an appropriate static water supply, may form a condition of a development approval. For further information on preferred solutions refer to the QFES *Bushfire resilient communities* document.		
PO14 Vulnerable uses listed in Table 7 are not established or intensified within a bushfire prone area unless: (a) there is an overriding need in the public interest for the new or expanded service the development provides; and (b) there are no other suitable alternative locations within the required catchment; and (c) site planning can appropriately mitigate the risk (for example, siting ovals for an educational establishment between the hazardous vegetation and structures. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome	**AO14.1** No acceptable outcome is prescribed.	**Complies with PO14** The proposed laydown area does not involve a vulnerable use.
PO15 Community infrastructure providing essential services listed in Table 7 are not established within a bushfire prone area unless: (a) there is an overriding need in the public interest for the new or expanded service the development provides (for example, there are no other suitable alternative locations that can deliver the required level of service or meet emergency service response times during and immediately after a bushfire event); and (b) the infrastructure can function effectively during and immediately after a bushfire event. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in	**AO15** No acceptable outcome is prescribed.	**Complies with PO15** The proposed laydown area does not involve community infrastructure providing essential services.

Performance outcomes	Acceptable outcomes	Compliance assessment
demonstrating compliance with this performance outcome.		
PO16 Development avoids or mitigates the risks to public safety and the environment from the manufacture or storage of materials listed in Table 7 that are hazardous in the context of bushfire to an acceptable or tolerable level. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome. Editor's note – In addition to the requirements of this code the *Work Health and Safety Act 2011* and associated Regulation and Guidelines, the *Environmental Protection Act 1994* and the relevant building assessment provisions under the *Building Act 1975* contain requirements for the manufacture and storage of hazardous substances. Information is provided by Business Queensland on the requirements for storing and transporting hazardous chemicals, available at: www.business.qld.gov.au/running-business/protecting-business/risk-management/hazardous-chemicals/storing-transporting.	**AO16** No acceptable outcome is prescribed.	**Complies with PO16** The proposed laydown area does not involve the manufacture or storage of materials that are hazardous in the context of bushfire. However, hazardous chemicals could be stored and handled at the site. Section 6.4 of the BMP requires the storage or handling of hazardous chemicals to be in accordance with *Managing risks of hazardous chemicals in the workplace – Code of Practice 2020*, applicable safety data sheets, and otherwise in accordance with Queensland *Work Health and Safety Act 2011* and its regulations.
Section F		
Where involving an asset protection zone		
PO17 Asset protection zones are designed and managed to ensure they do not increase the potential for bushfire hazard. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO17.1** Landscaping treatments within any asset protection zone comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres. OR	**Complies with AO17.1** Specifications for the design and maintenance of APZ are provided in Section 6.1 of the BMP and will result in a low level of discontinuous bushfire and grass fire fuel.
	AO17.2 Landscaping management within any asset protection zone maintains a: (a) potential available fuel load	**Complies with AO17.2** Refer to response to AO17.1.

Performance outcomes	Acceptable outcomes	Compliance assessment
	which is less than eight tonnes/hectare in aggregate; and (b) fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	
Section G		
Where planning provisions or conditions of approval require revegetation or rehabilitation		
PO18 Revegetation or rehabilitation areas are designed and managed to ensure they do not result in an unacceptable level of risk or an increase in bushfire intensity level. Note – The undertaking of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO18.1** Required revegetation or rehabilitation: (a) is located outside of any asset protection zone; or (b) maintains a potential available fuel load which is less than eight tonnes/hectare in aggregate and fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with acceptable outcome (b).	**Not applicable** The proposed laydown area does not include revegetation or rehabilitation.
	AO18.2 Revegetation or rehabilitation of areas located within mapped medium, high or very high potential bushfire intensity areas, revegetate and rehabilitate in a manner that maintains or reduces the existing fuel load. OR Revegetation or rehabilitation of areas located within the mapped potential impact buffer area, revegetate and rehabilitate in a manner that maintains or reduces the existing fuel load. Note – The preparation of a vegetation management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	**Not applicable** The proposed laydown area does not include revegetation or rehabilitation.

Table 6 – Fire trail and working area design parameters

Parameter	Provisions
Width	Contains a width of at least 20 metres including: 1. A trafficable area (cleared and formed);

Parameter	Provisions
	a. with a minimum width of 4 metres than can accommodate a rural firefighting vehicle b. with no less than 4.8 metres vertical clearance from canopy vegetation c. with no adjacent inhibiting embankments or retaining walls 2. A working area each side of the trafficable area: a. with a minimum width of 3 metres each side b. cleared of all flammable vegetation greater than 10 centimetres in height 3. The balance (i.e. 10 metre width) managed vegetation area: a. sited to separate the trafficable area from adjacent mapped medium, high or very high potential bushfire intensity areas managed vegetation b. comprising managed vegetation clear of major surface hazards.
Access	Access is granted in favour of the local government and Queensland Fire and Emergency Services Note – this access is commonly granted in the form of a easement that is to be maintained by the grantor.
Egress	Contains trafficable vehicle routes in to low hazard areas, every 200 metres

Table 7 – Vulnerable uses, community infrastructure for essential services and materials that are hazardous in the context of bushfire hazard

Group	Uses
Vulnerable uses	*childcare centre, community care centre, detention facility, educational establishment, hospital, nature-based tourism, relocatable home park, rooming accommodation, residential care facility, resort complex, retirement facility, tourist park*
Community infrastructure for essential services	*educational establishment, emergency services, hospital*
Hazardous materials in the context of bushfire hazard	Hazardous chemicals that are present at the levels or in the quantities that would constitute the use being a hazardous chemical facility Hazardous materials that are present in the quantities in the Work Health and Safety Regulation, schedule 15