Bushfire Consulting

Bushfire Management Plan

Project: BBS 23227

BARRON BUILDING SURVEYING

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Midlands Road, Mt Horner
WA 6525

Client

Mineral Resources

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

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A. Disclaimer and Limitation

This assessment has been completed in accordance with *AS 3959* and *WA State Planning Policy SPP3.7* for the sole purpose of calculating the potential Bushfire Hazard to the proposed.

A fire event is in most cases, unpredictable and can be influenced by many factors. Some of these factors include, but are not limited to, temperature, wind speed, wind direction, humidity, the slope of the land, vegetation fuel load, growth, planting or the level of implementation and maintenance of fire prevention measures and the construction of additional structures upon the property that are not included as part of this assessment. If you are concerned or notice that factors have changed, a review of this management or assessment should be undertaken.

As permitted by the law and to its greatest extent, Barron Building Surveying (Chadwick Barron) and its associated employees exclude all liability whatsoever for: damage, loss, injury, death or claim to any property and/or person caused by a fire regardless of how that fire was caused and errors and/or omissions in this report with the client expressly acknowledging that such exclusion of liability is reasonable in all circumstances.

This assessment, recommendation and development of Bushfire Management Plan (BMP) does not in any way certify that the proposed structure(s) have been constructed in accordance with the assessed BAL rating. In providing this report as part of a development application or building license the client and landowner acknowledges that they understand, approve and will comply with all requirements to maintain the separation distances detailed in this report. Furthermore, the client/landowner acknowledges and accepts all responsibility in maintaining the required Asset Protection Zone.

This report is valid for 12 months only from the date of issue and supersedes all previous assessment if not noted otherwise.

Document Control

Author	Company	Revision Notes	Date and Number
Chadwick Barron	Barron Building Surveying	Draft DA Submission v1	November 2023
Chadwick Barron	Barron Building Surveying	DA Submission	6th December 2023

B. Executive Conclusion

The seating of the proposed permanent Operation Camp development is only partially located within the Bushfire Prone Area, whereas the remainder of the Plant and Wells areas are not located within the Bushfire Prone Area (as per the DFES mapping). This Bushfire Management Plan has been completed due to precautionary principle of *State Planning Policy SPP3.7 Clause 2.5*.

The management strategy is to reduce the overall bushfire risk to the proposed development area and the surrounding community, which can be achieved by managing the bushfire risk within the development zone. This will be accomplished through the design of onsite fire services for firefighting, installation of Assets Protection Zone (APZ) and enforced by the additional management strategies. The managed strategies are based on an acceptable solution within the *State Planning Policy SPP3.7* guidelines.

The seating of the camp outline and accessways has provided adequate space to install an Asset Protection Zone (APZ) within the development zone/lease area. This will allow a good balance between both potential bushfire risk, land use and economical benefit.

C. Assessment Methods/Processes

Method of assessment is to determine the type of classifiable vegetation that may have a potential hazard to the proposed development areas, being Lot 3561, 3588 Irwin WA 6525. This will be undertaken by using method one assessment as per *AS 3959* and comprise of an assessment against the *State Planning Policy SPP3.7 Clause 2.5 and 5.4* as an acceptable solution. This will be determined using all reference documents and liaising with stakeholders and other consultants as required.

D. Acknowledgement by Stakeholder/Owners

As the Stakeholders for which this Bushfire Management Plan has addressed and has been assessed, We/I understand the proposed development and confirm and agree with the executive conclusion, outputs, and management strategies of this Bushfire Management Plan. I shall comply with this report, and I am aware and understand the requirements set out within this Bushfire Management Plan and must ensure it is fulfilled in its entirety.

STAKEHOLDER/OWNER NAME	OWNER POSTAL ADDRESS	SIGNATURE(S)	DATE

ISSUED DETAILS						
Author/Company		Barron Building Surveying BSC Reg 93 Bushfire Consultant	Person	Chadwick Barron	Signature	Date 06/12/2023

1. Proposal Details

PROPERTY DESCRIPTION	
Address of Development	Lot 3561 & 3558, Irwin WA 6525
Local Government Area	Shire of Irwin
Proposal	Proposed Gas Plant Facility and Operation Camp
Town Planning Scheme	Scheme 5

1.1 Site Location

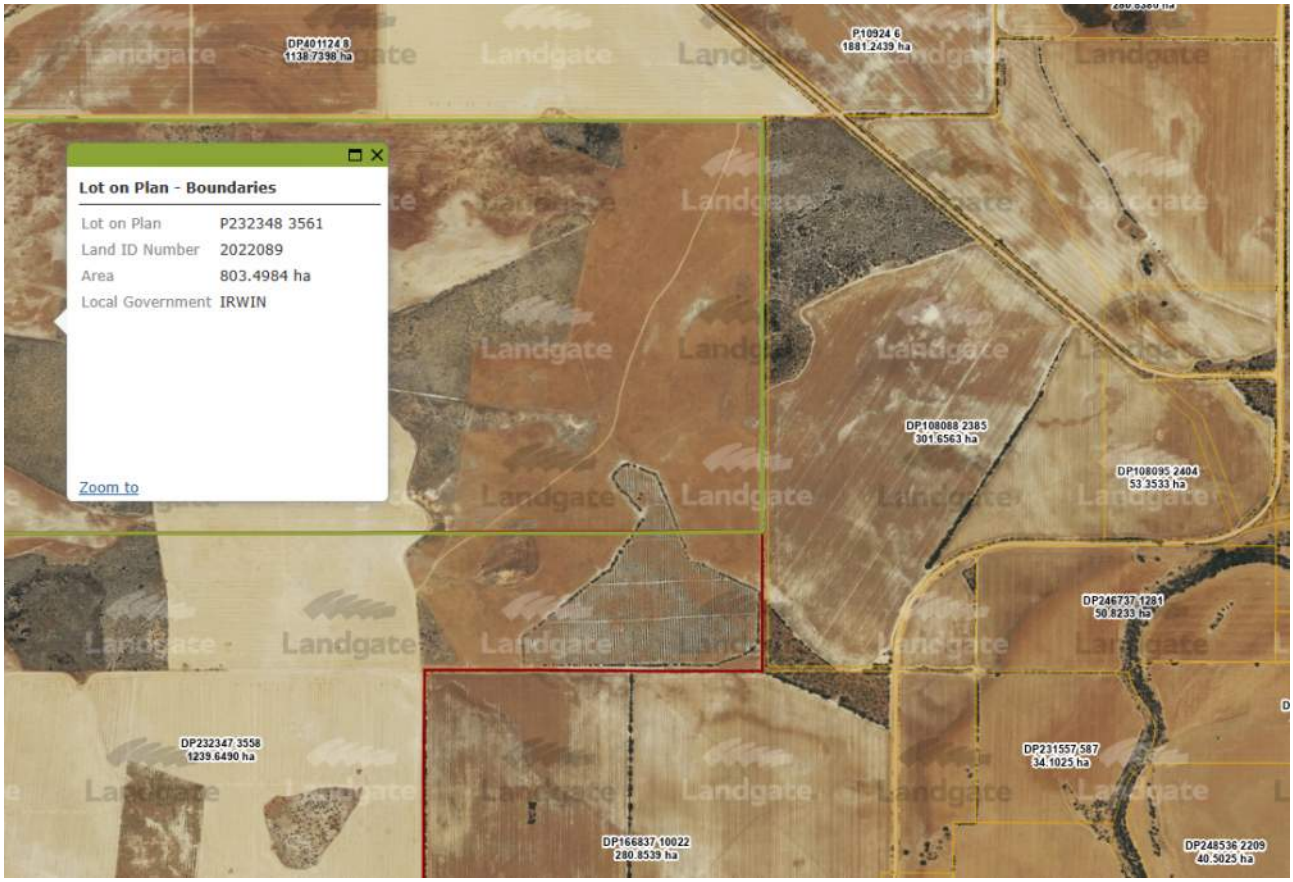


Figure 1 Site Location

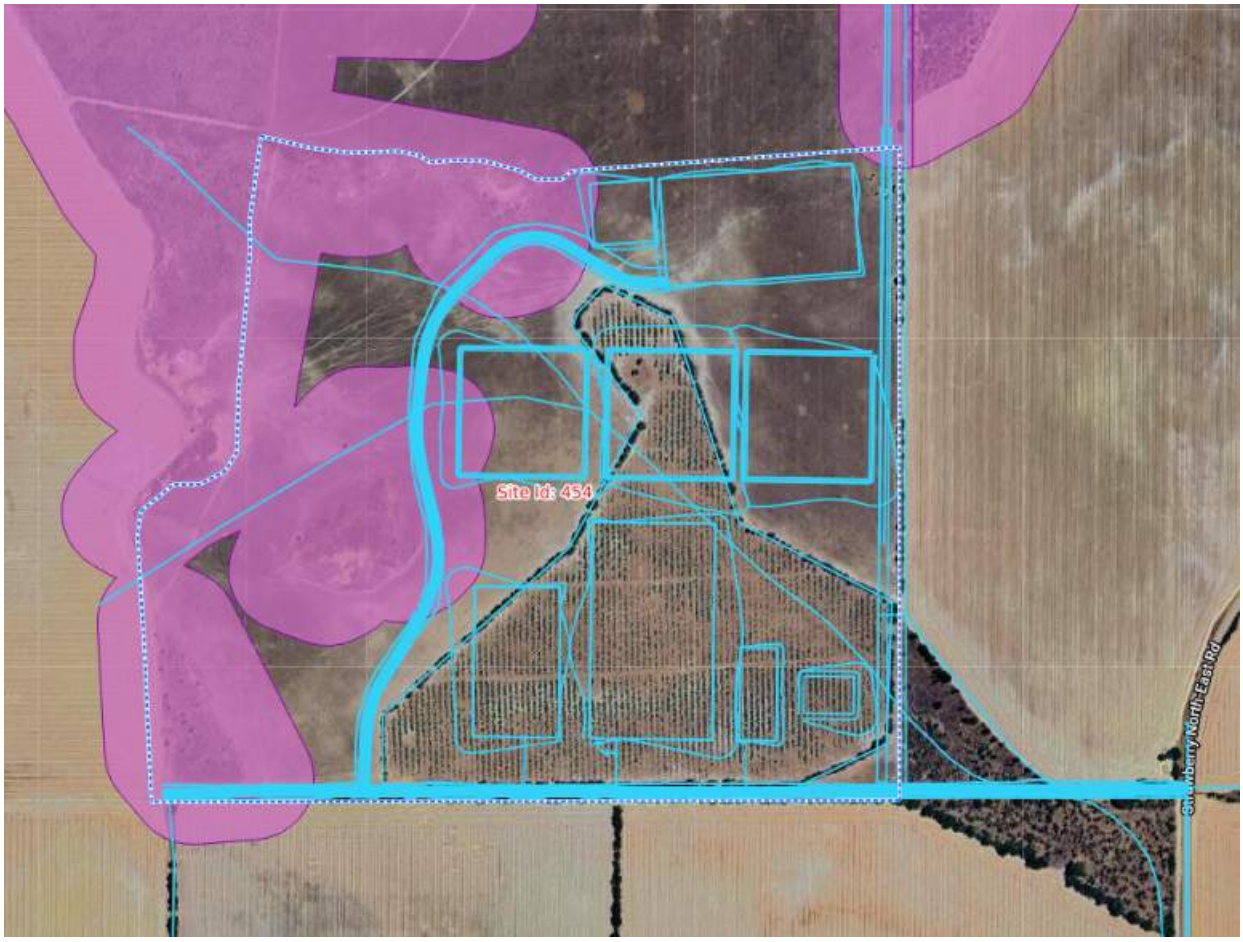


Figure 2 DFES Mapping Screen Shot Draft Map (Dec 2023)

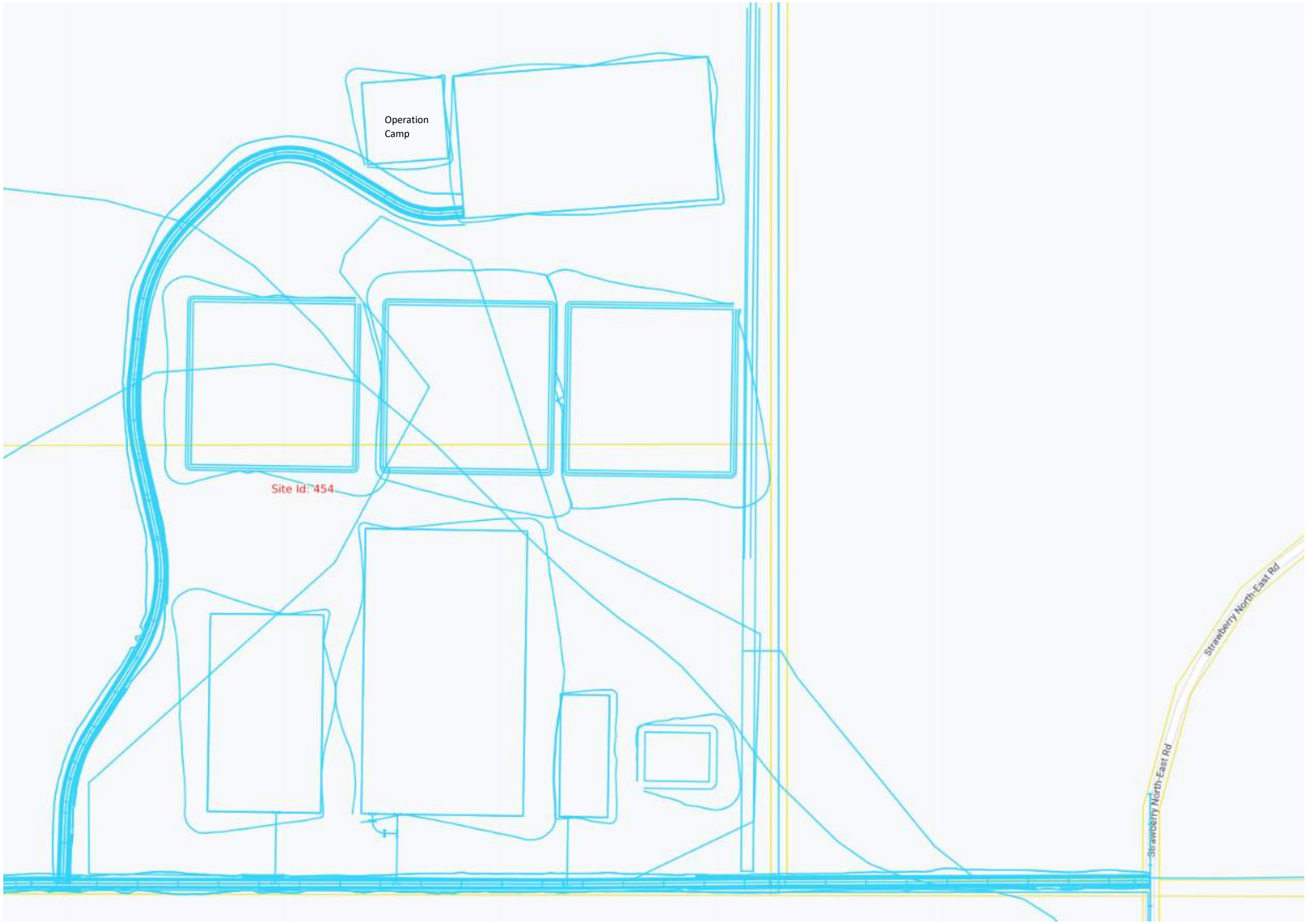


Figure 3 Site Layout Plan Dec 1 (A3 Page)

2. Environment Considerations

The proposed development is located within the administration area of the Shire of Irwin. The development of the site is for a Proposed Gas Plant and Operation Camp. The site has been investigated for Flora survey and will be complete late 2023 for consideration.

In accordance with the *Bushfire Management Plan – BAL Contour Template* prepared by the *Department of Planning, Lands and Heritage (2018)*, this BMP has considered *Table 1 Environment Consideration* which shows these results from publicly available databases.

Table 1 Environment Consideration

Department of Biodiversity, Conservation and Attractions (DBCA)	
• RAMSAR Wetlands (**DBCA-010**)	Not within development envelope.
• Threatened and Priority Flora (**DBCA-036**)	Priority species and locally significant vegetation types located within the development envelope.
• Threatened Ecological Communities (**DBCA-038**)	Not within development envelope.
Department of Planning, Lands and Heritage	
• Bush Forever Areas 2000 (**DOP-071**)	Not considered as the development envelope is not located on the Swan coastal plain.
Department of Water and Environmental Resources (DWER)	
• Clearing Regulations – Environmentally Sensitive Areas (**DWER-046**)	Not within development envelope.
• Swan Bio-plan Regionally Significant Natural Areas 2010 (**DWER-070**)	Not considered as the development envelope is not located on the Swan coastal plain.
Department of Primary Industries and Regional Development (DPIRD)	
• Conservation Covenants Western Australia (**DPIRD-023**) – This data needs to be requested through the DAFWA Geographic Information Services team and requires permission from the Commissioner for Soil and Land before they can be supplied.	Not considered, however, this is unlikely as it is land that is set aside for conservation. Data will be requested.

2.1 Re-vegetation/Landscape Plans

The development/lease area will be managed and cleared under the *Mining and Petroleum Act* and will be completed under a clearing permit regulation. The site area clearing must be kept to a minimum to minimise the effect on the existing shrubland breakaway vegetation to the West.

It is proposed, as an additional management strategy, that the APZ be installed 20m outward of the camp area. The justification is that this will reduce fuel load and decrease the bushfire risk and would be undertaken as per *Environmental Protection Act 1986 (Clearing of Native Vegetation) Regulations 2004*, *r51 schedule 6 cl 1 & 9*.

3. Bushfire Assessment Results

3.1 Assessment Inputs

The collection of input data is to identify the vegetation classification and Bushfire Hazard Levels for justification of the proposed development. Onsite assessment and data collection has taken place and clarifies the results in *Table 2 Hazard Level Table and BAL Level* with the BMP including hazard levels, BAL contour plans and slope determination. These figures and tables show all classifiable vegetation within 150m of the development areas and the impact on each allotment.

3.1.1 Topography

The allotment is located on coastal plain vegetation on coastal ridges and low wetland areas. The table below shows the slopes as determined by *AS 3959* figures being, up slope or down slope.

Development Area	North	East	South	West
Operational Camp	Downslope >0 to 5 degrees	All upslopes and flat land (0 degrees)	Downslope >0 to 5 degrees	All upslopes and flat land (0 degrees)

3.1.2 Vegetation Classification Assessment

All vegetation within 150m of the site/proposed development has been classified in accordance with *AS 3959* Clause 2.2.3.1, *Department of Planning Visual Guide for Bushfire Risk Assessment* and the *Fire and Emergency Services Authority Visual Fuel Load Guide*. Each distinguishable type of vegetation has been plotted to show the potential Bushfire Attack Level (BAL Contour) and Bushfire Hazard Levels. There are two main vegetation structures within the fringe of each development area, the vegetation classification has considered the overall predominant vegetation type within the plot. There are vegetation classification differences in *AS 3959* compared to the botanical vegetation description and the BMP vegetation types are based on *AS 3959.*

Refer to *Appendix 1* for vegetation photo data related to the locations plotted on *Figure 4 Photo Location Map (A3* Page) *and Figure 5 Photo Location Map Aerial*.

Table 2 Hazard Level Table and BAL Level

Operational Camp			
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
1	Class G Grassland Snow pasture, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland. NOTE: Grassland managed in a minimal fuel condition and non-curing cropland is regarded as low threat vegetation for the purposes of Clause 2.2.3.2.	Downslope >0 to 5 degrees	Moderate
		BAL Level of seated Buildings	BAL – 12.5
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
2	Class D Scrub Closed Shrub in poor soil fertility or shallow soils; >30% foliage cover. Shrubs >2 m high. Typical of coastal areas and tall heaths up to 6 metres in height. Shrub dominated by Banksia, Melaleuca or Leptospermum with heights of up to 6 metres.	Downslope >0 to 5 degrees	Extreme
		BAL Level of seated Buildings	BAL – 12.5
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
3	Class G Grassland Snow pasture, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland.	Downslope >0 to 5 degrees	Moderate
		BAL Level of seated Buildings	BAL – 12.5
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
4	Excludable – Clause 2.2.3.2(f) Woodland area on low depression area. Trees 10 to 20m high with grassing under story, some cluster of shrubs.	All upslopes and flat land (0 degrees)	Extreme
		BAL Level of seated Buildings	BAL – LOW
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
5	Excludable – Clause 2.2.3.2(f) Proposed access road is part of the development to be cleared and managed to Low threat vegetation.	All upslopes and flat land (0 degrees)	Extreme
		BAL Level of seated Buildings	BAL – LOW

Vegetation Plot	Vegetation Classification	Effective Slope under Classified Vegetation affecting the Hazard and BAL levels	Hazard Level
6	Class G Grassland Snow pasture, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland. The line of tree vegetation within plot area is less than 10% and combination of Open Shrubland and snow pasture, predominate vegetation for bushfire risk is snow pasture.	Downslope >0 to 5 degrees	Moderate
		BAL Level of seated Buildings	BAL – 12.5 onto roadway
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
7	Class G Grassland Snow pasture, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland.	All upslopes and flat land (0 degrees)	Moderate
		BAL Level of seated Buildings	BAL – LOW
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
8	Class C Shrubland Shrubs <2 m high; greater than 30% foliage cover. Understory's may contain grass. Acacia and Casuarina, areas on rocky breakaway ridge areas.	All upslopes and flat land (0 degrees)	Moderate
		BAL Level of seated Buildings	BAL – 12.5 onto roadway
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
9	Class G Grassland Snow pasture, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland.	All upslopes and flat land (0 degrees)	Moderate
		BAL Level of seated Buildings	BAL – LOW
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
10	Class C Shrubland Shrubs <2 m high; greater than 30% foliage cover. Understory's may contain grass. Acacia and Casuarina, areas on rocky breakaway ridge areas.	All upslopes and flat land (0 degrees)	Moderate
		BAL Level of seated Buildings	BAL – LOW

Vegetation Plot	Vegetation Classification	Effective Slope under Classified Vegetation affecting the Hazard and BAL levels	Hazard Level
11	Class C Shrubland Shrubs <2 m high; greater than 30% foliage cover. Understory's may contain grass. Acacia and Casuarina, areas on rocky breakaway ridge areas.	All upslopes and flat land (0 degrees)	Moderate
		BAL Level of seated Buildings	BAL – 12.5
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
12	Class G Grassland Snow pasture, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland.	All upslopes and flat land (0 degrees)	Moderate
		BAL Level of seated Buildings	BAL – 12.5
Vegetation Plot	**Vegetation Classification**	**Effective Slope under Classified Vegetation affecting the Hazard and BAL levels**	**Hazard Level**
0	Excludable – Clause 2.2.3.2(f) Proposed managed area of development site to contain building, roadways and APZ areas.	Mixed	Low
		BAL Level of seated Buildings	BAL – LOW

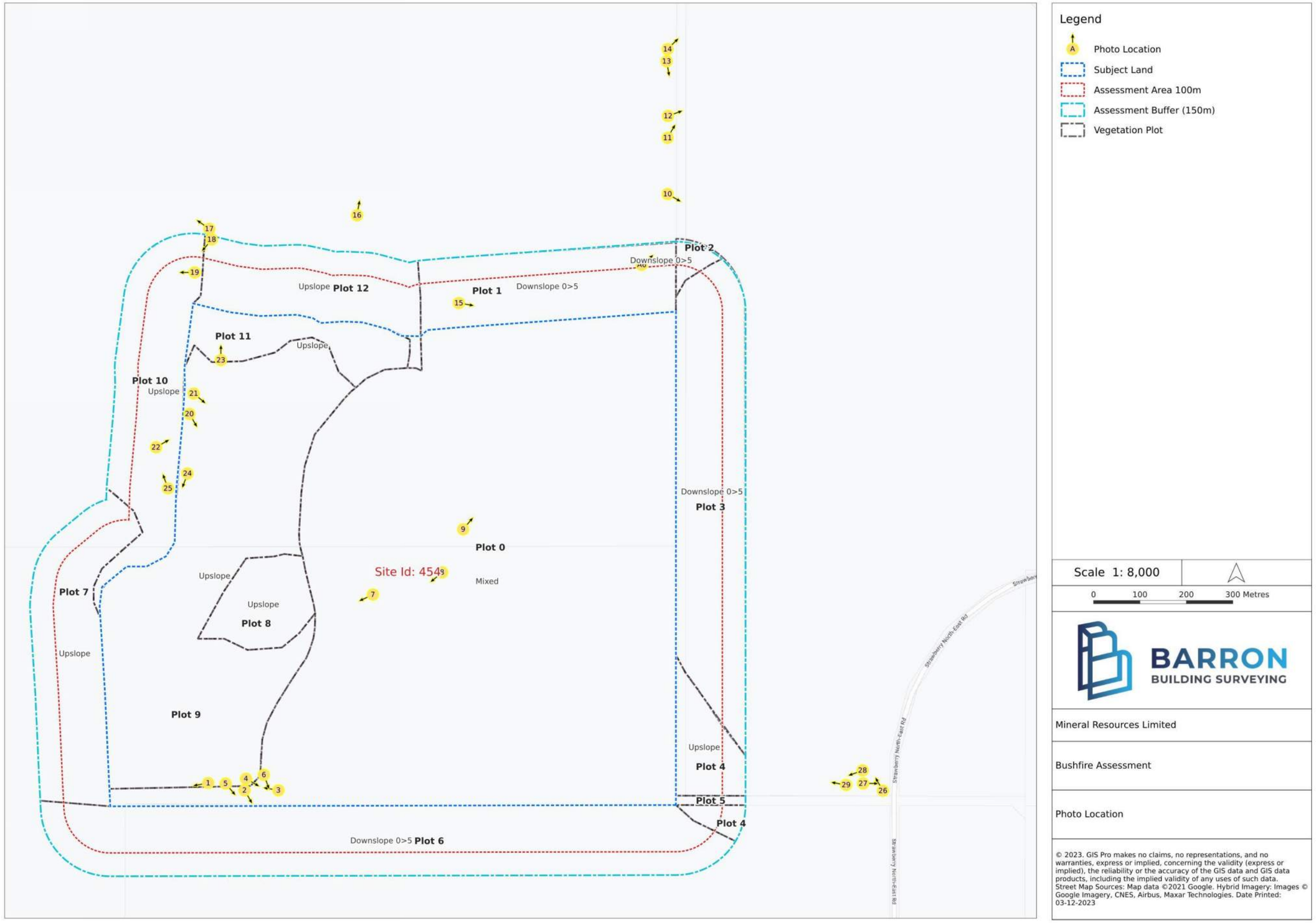


Figure 4 Photo Location Map (A3 Page)

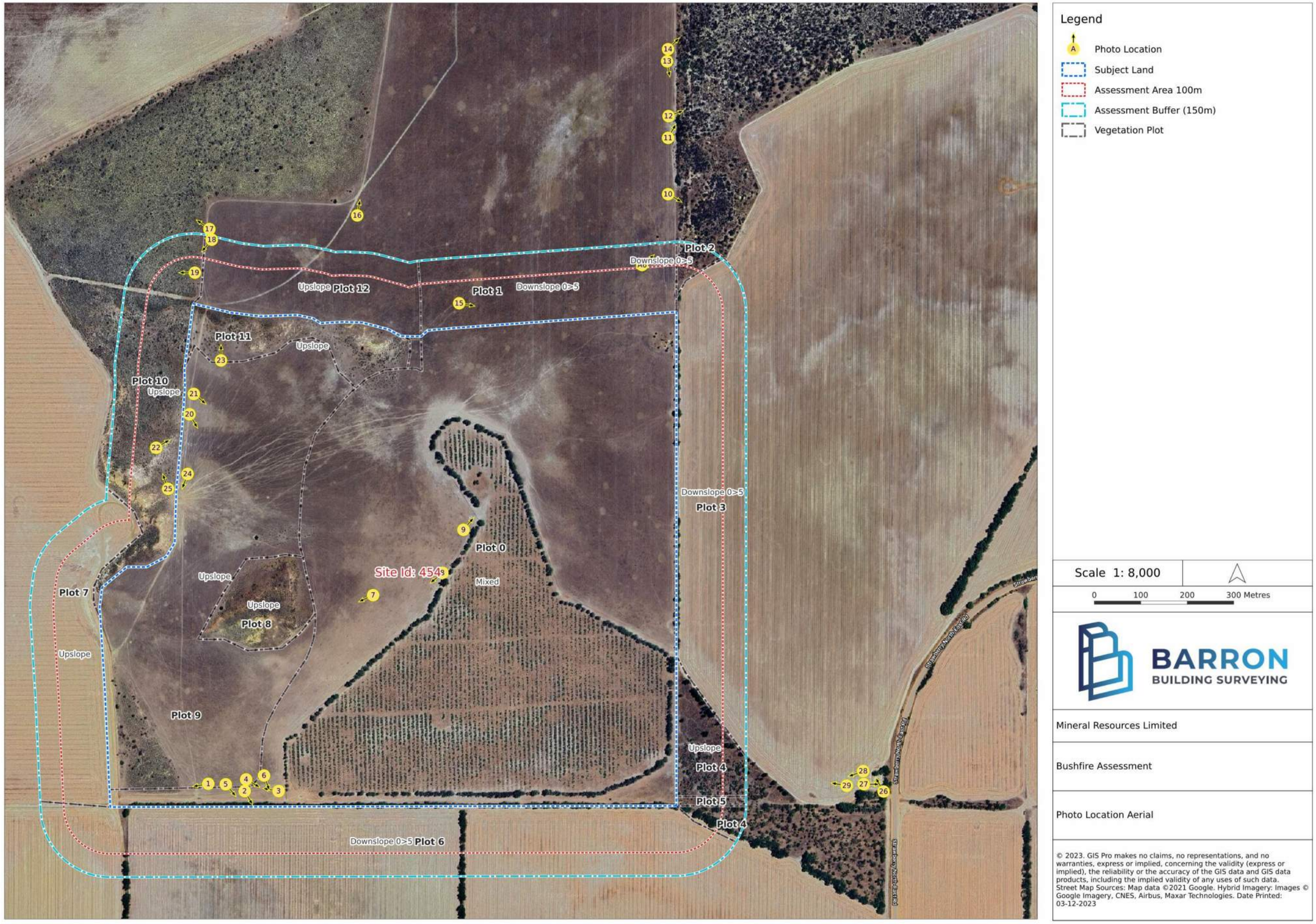


Figure 5 Photo Location Map Aerial (A3 Page)

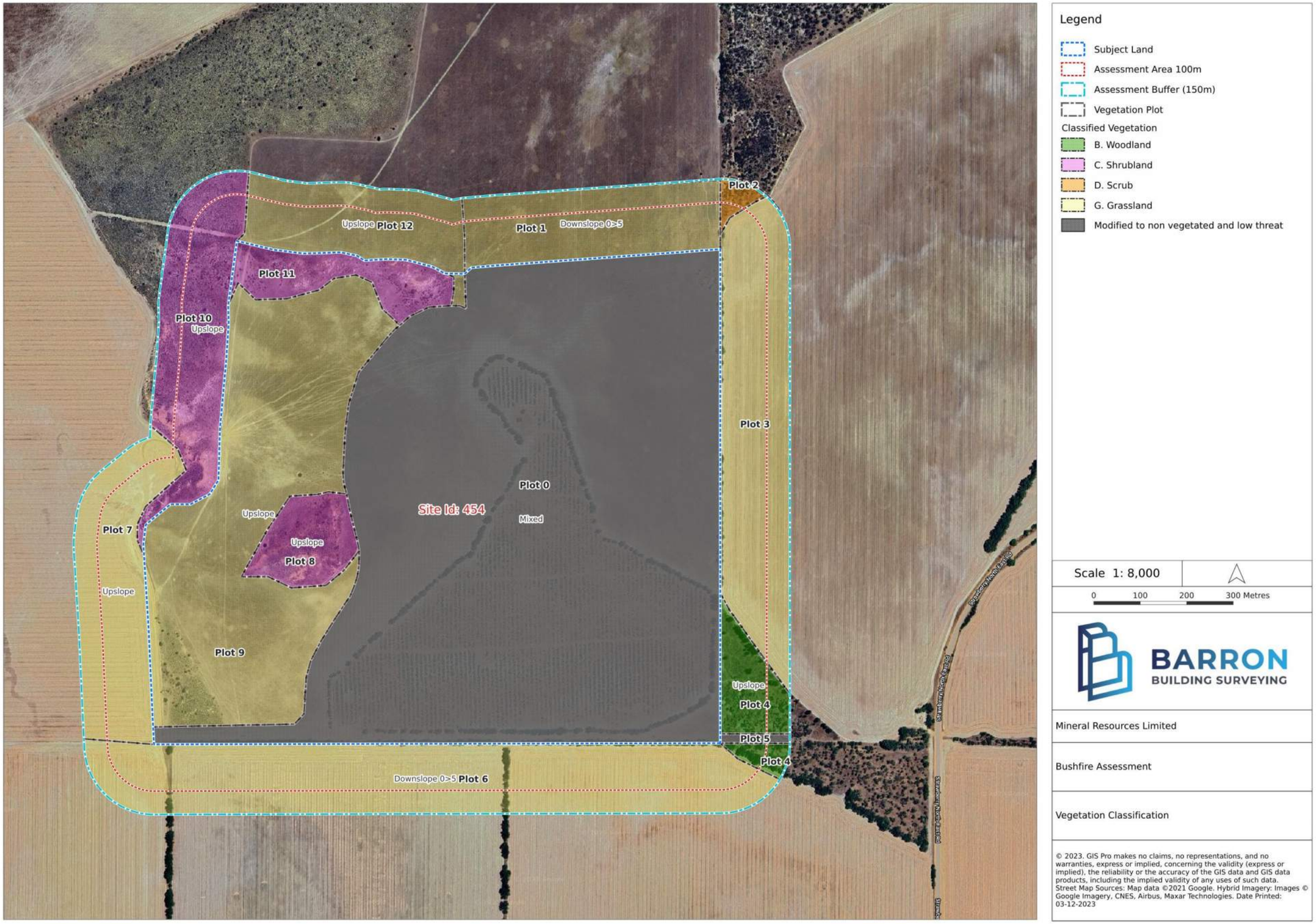


Figure 6 Vegetation Classification Mapping (A3 Page)

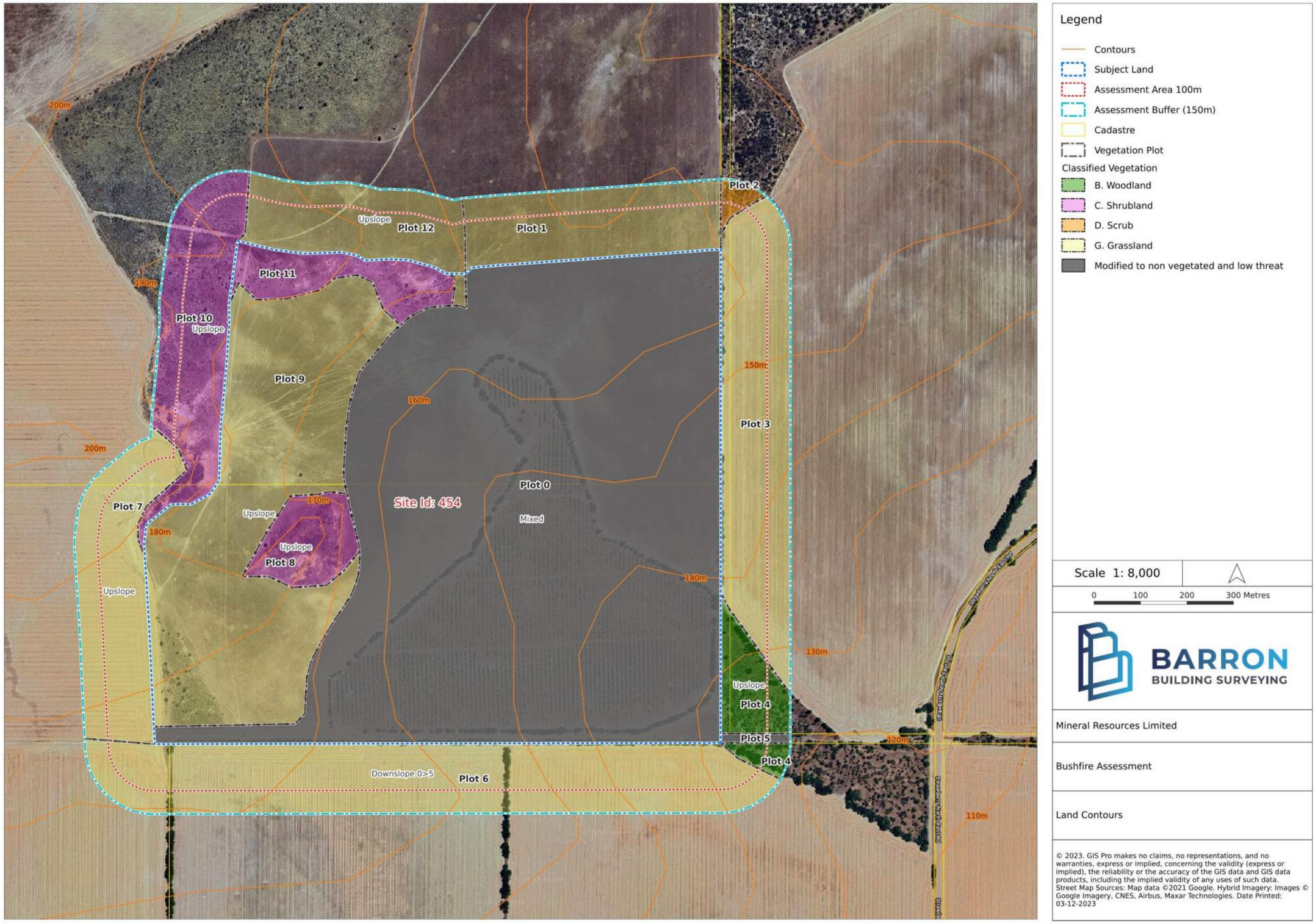


Figure 7 Slope and Contours (A3 Page)

3.2 Bushfire Assessment Outputs

The potential bushfire impact to the proposed development has been determined by classifying the vegetation type and slope beneath the vegetation as per *AS 3959 s2.2.5*.

The potential Bushfire Hazard has been determined as per *Guidelines for Planning in Bushfire Prone Areas Table 3.* The bushfire impact is as per *Table 2 Hazard Level Table and BAL Level.*

Bushfire contour mapping has been produced to show the impact of bushfire ember attack into the development areas. The fire danger index for this site has been determined in accordance with *AS 3959 Table 2.1 (FDI 80)*. The BAL Contour mapping is shown in Figure 10 Bushfire BAL Contour Development Site (A3 Page). Utilising this mapping will form part of the development of the internal design layout and placement of internal roadways, fire breaks and APZ's which determine the output of the management strategies.

Table 3: BHL and classified vegetation (as per AS-3959)

HAZARD LEVEL	CHARACTERISTICS
Extreme	• Class A: Forest • Class B: Woodland (05) • Class D: Scrub • Any classified vegetation with a greater than 10 degree slope
Moderate	• Class B: Open woodland (06), Low woodland (07), Low open woodland (08), Open shrubland (09)* • Class C: Shrubland • Class E: Mallee/Mulga • Class G: Grassland, including sown pasture and crops • Vegetation that has a low hazard level but is within 100 metres of vegetation classified as a moderate or extreme hazard, is to adopt a moderate hazard level.
Low	• Low threat vegetation may include areas of maintained lawns, golf courses, public recreation reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks. • Managed grassland in a minimal fuel condition (insufficient fuel is available to significantly increase the severity of the bushfire attack). For example, short-cropped grass to a nominal height of 100 millimetres. • Non-vegetated areas including waterways, roads, footpaths, buildings and rock outcrops.

Figure 8 SPP3.7 Table 3 Hazard Levels

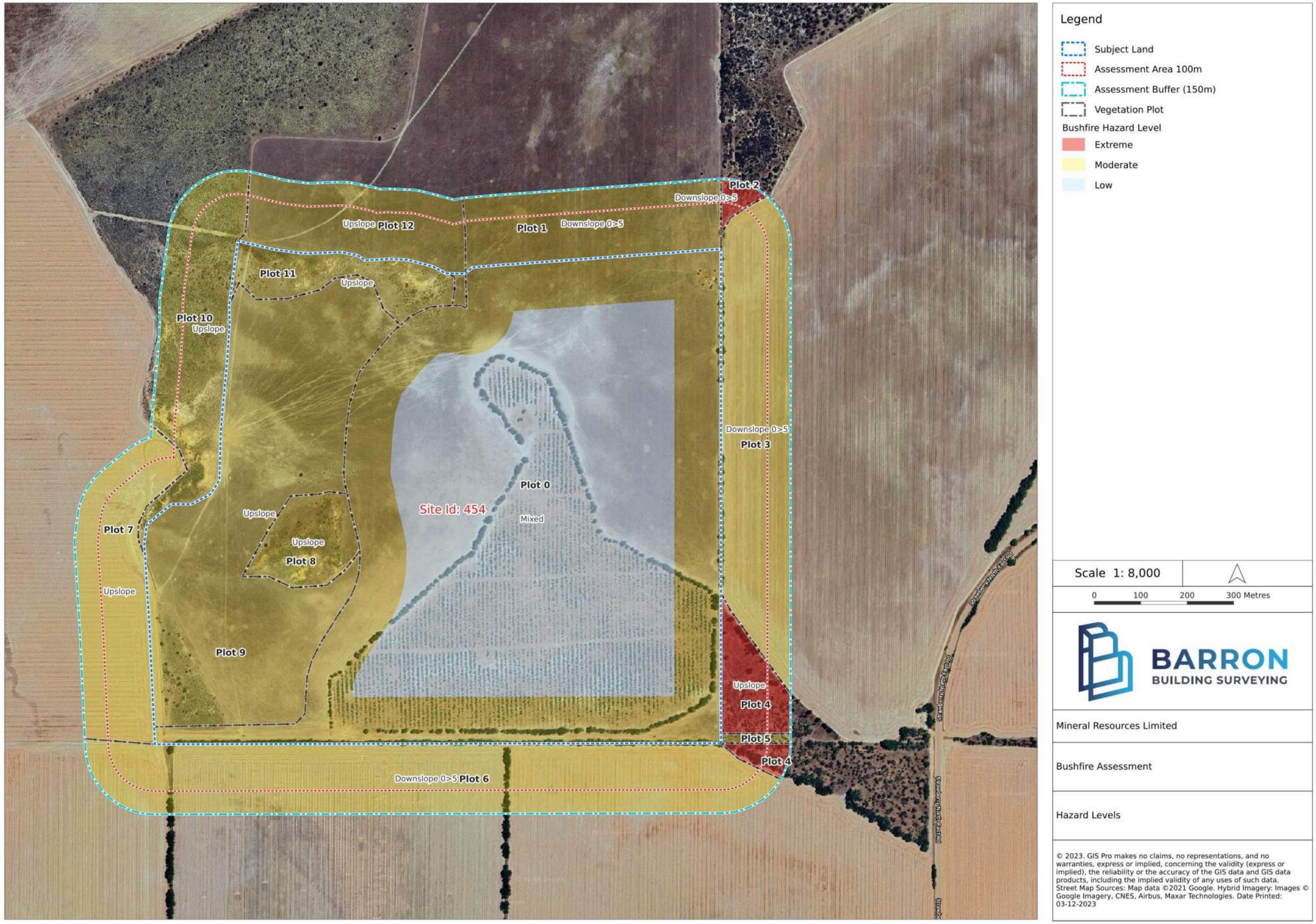


Figure 9 Hazard Level Mapping (A3 Page)

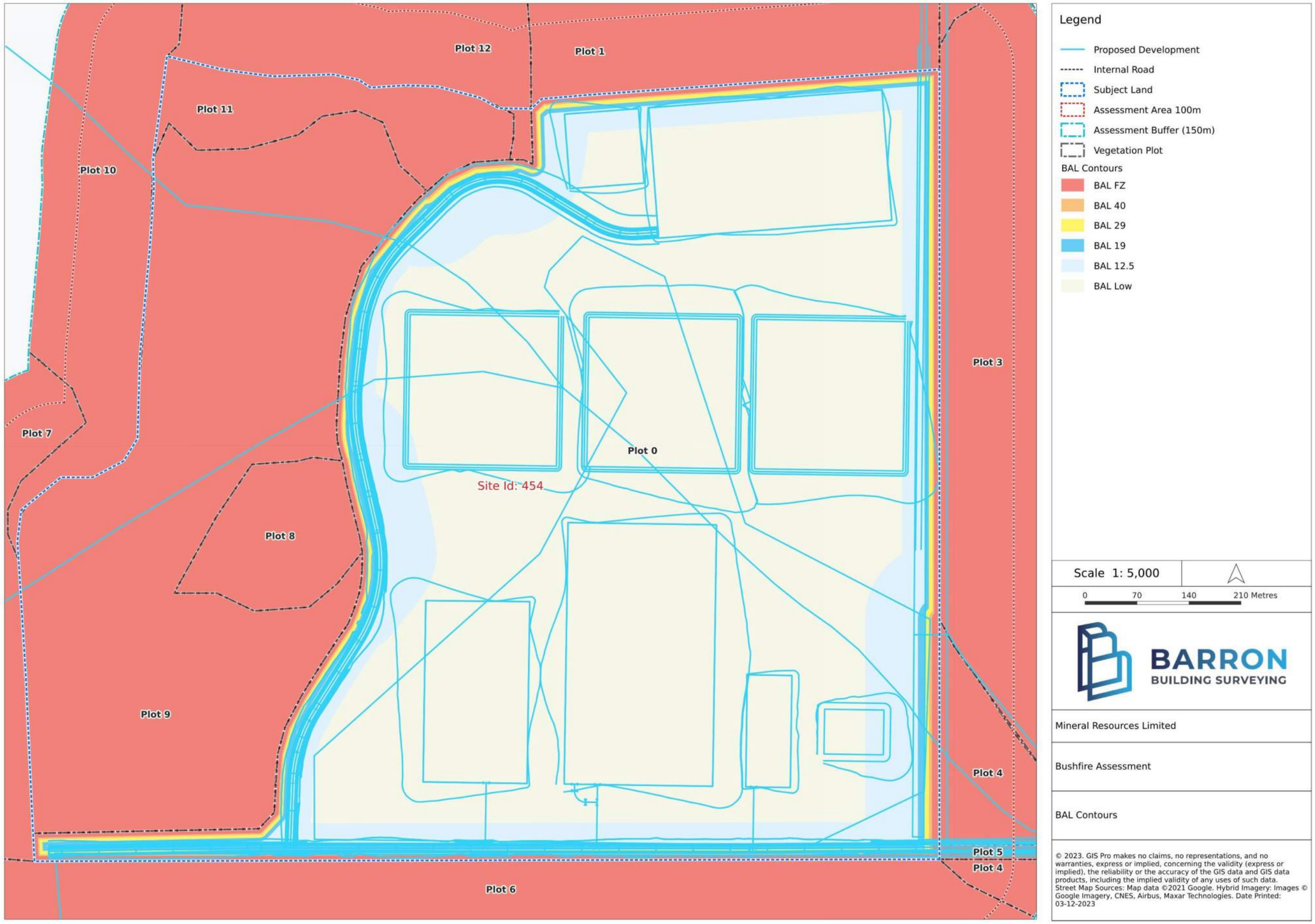


Figure 10 Bushfire BAL Contour Development Site (A3 Page)

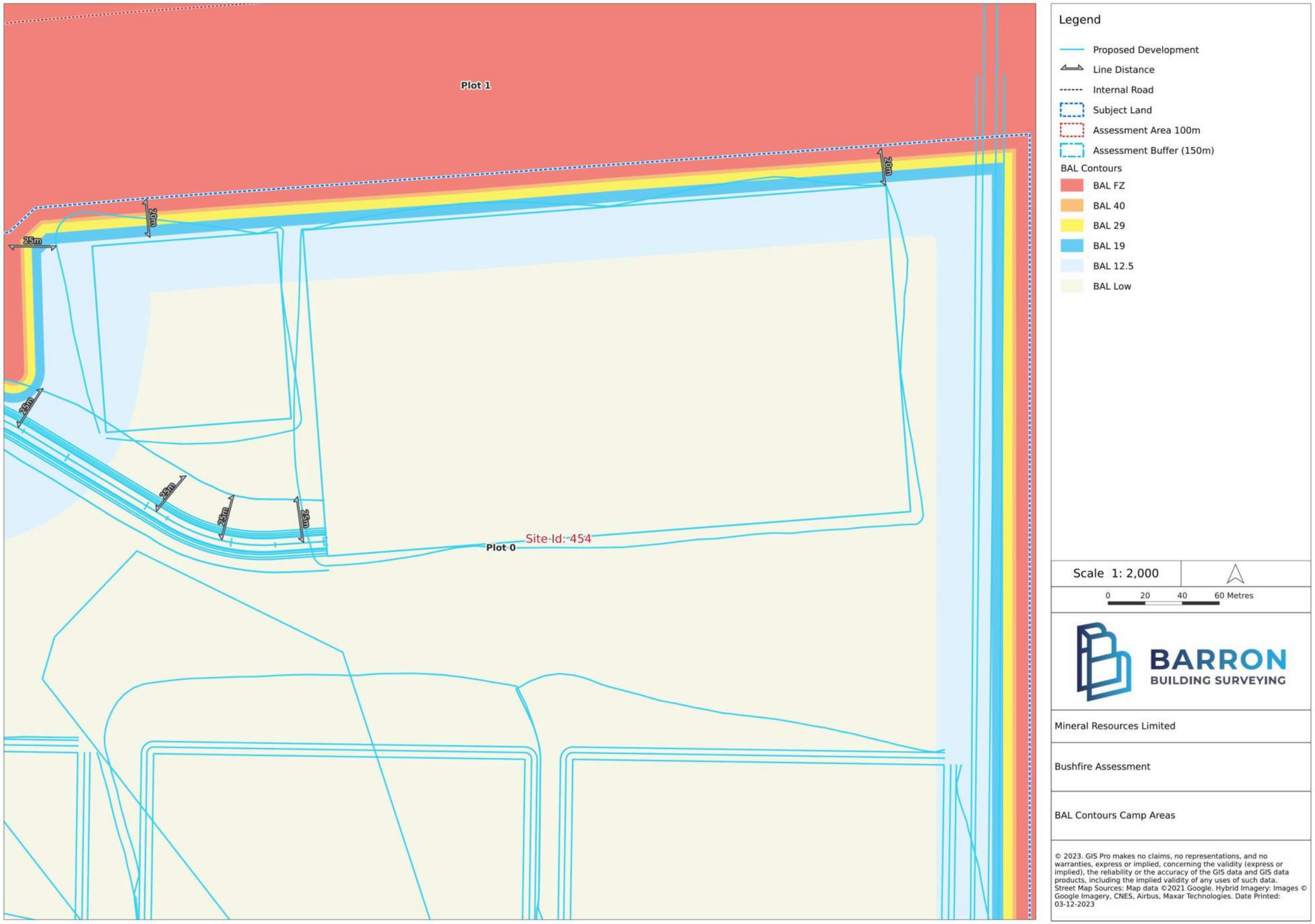


Figure 11 Bushfire BAL Contour Camp Locations Buildings (A3 Page)

4. Identification of Bushfire Hazard Issues

The other identified hazard issues other than bushfire, is that the proposed development area is located within the general farming locality of Irwin which is not provided with scheme water.

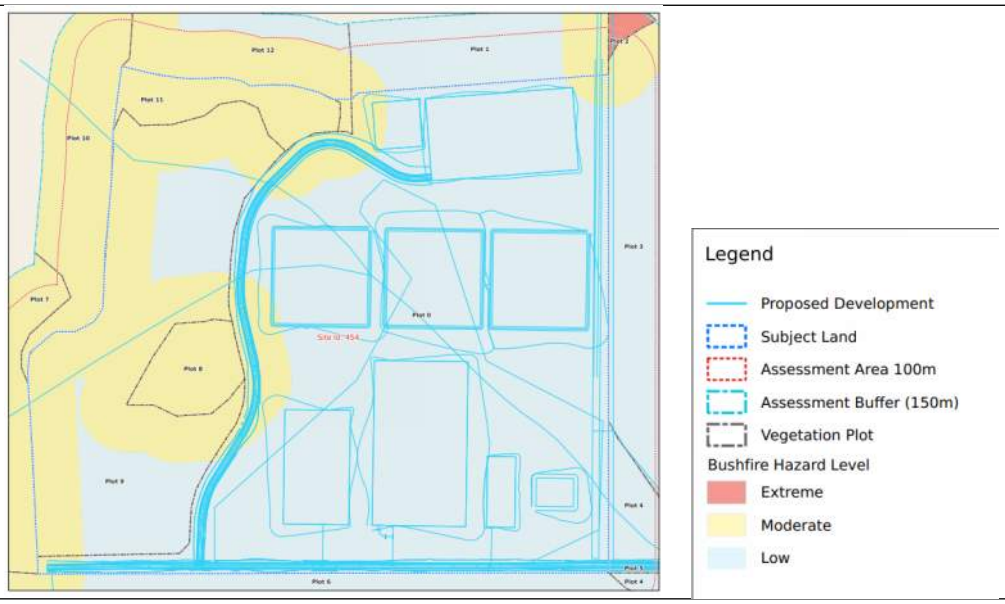
5. Assessment against Bushfire Protection Criteria

Objectives

- Avoid any increase in the threat of bushfire to people, property, and infrastructure.
- Reduce vulnerability to bushfire.
- Ensure that all level of planning documents consider bushfire protection requirements and include specified bushfire protection measures.
- Achieve an appropriate balance between bushfire risk management measures and other environmental issues.

The bushfire management measures required to achieve the acceptable solutions of the relevant bushfire protection criteria have been discussed through this report and are presented and summarised in *Table 3 SPP3.7 Solution Compliance Table* and described in the *Additional Management Strategies*.
Table 3 SPP3.7 Solution Compliance Table is based on the *State Planning Policy SPP3.7 - Guidelines for Planning in Bushfire Prone Areas Version 1.4 Appendix 4, Bushfire Protection Criteria.* The details for the acceptable solution of the *State Planning Policy SPP3.7*, are commented on and show how the development is addressing the bushfire risk.

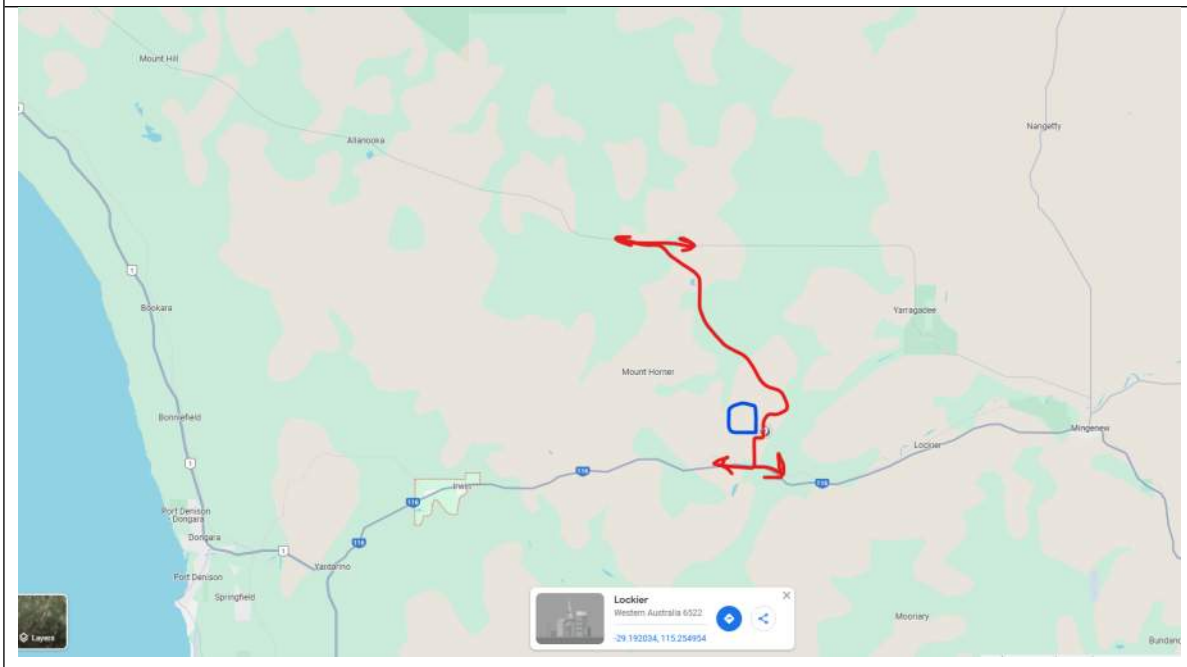
Table 3 SPP3.7 Solution Compliance Table

ELEMENT 1: LOCATION	
PERFORMANCE PRINCIPLE P1	**PROPOSED ACCEPTABLE SOLUTIONS** A1.1 Development location
STATEMENT OF COMPLIANCE	
The proposed habitable land use areas will be located to the North of the development site and will consist of an Operation Camp. The Operation Camp is seated just within the edge of the Bushfire Prone Area as per DFES mapping Figure 2 DFES Mapping Screen Shot Draft Map (Dec 2023). The BMP has assessed the vegetation surrounding the camp area as a precaution principle even though the remaining development areas are not in Bushfire Prone Areas. The Operation Camp has been seated within a BAL 12.5 outcome and Moderate risk level. It is important to mention, vegetation plots 8, 10, and 11 have been identified as the only areas at risk of bushfire according to the DFES mapping. These plots have been specifically mapped to demonstrate the potential outcome relating to these areas. Please refer to the Figure below for a comparison against the assessment method completed as a precautionary measure.	
	

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT	
PERFORMANCE PRINCIPLE P2	**PROPOSED ACCEPTABLE SOLUTIONS** A2.1 Asset Protection Zone (APZ)
STATEMENT OF COMPLIANCE	
The BMP has been prepared as a precautionary principle and will install managed land areas within the leased area that will have an APZ installed to manage the bushfire risk to the camp area. Also, Mineral Resources has included an APZ area along the access path, this will allow the accessway to be seated with BAL 12.5 to Low with a Hazard Level of Moderate. Refer to Bushfire BAL Contour Camp Locations Buildings (A3 Page) and Figure 10 Bushfire BAL Contour Development Site (A3 Page) showing the BAL outcomes. Figure 11 & Figure 12 showing the location of the Asset Protection Zones.	

ELEMENT 3: VEHICULAR ACCESS	
PERFORMANCE PRINCIPLE P3i	**PROPOSED ACCEPTABLE SOLUTIONS** A3.1 Public roads
STATEMENT OF COMPLIANCE	
Construction of the roadway access, located on the South-East corner of the allotment, will be designed and installed to satisfy the requirements of Local Government.	

PERFORMANCE PRINCIPLE P3i	**PROPOSED ACCEPTABLE SOLUTIONS** A3.2a Multiple access routes
STATEMENT OF COMPLIANCE	
Lot 3558 can be reached via the road located at the South-East corner of Strawberry North-East Road. The road spans 460m and at the intersection with Strawberry North-East Road, there are two options for travel. One can head North towards Allanooka and East Yarragadee, or head South onto Midlands Road towards Irwin or East Mingenew. It is important to note that the main access roadway is not situated in a Bushfire Prone Area.	



Bushfire Prone Areas

PERFORMANCE PRINCIPLE	PROPOSED ACCEPTABLE SOLUTIONS
P3i	A3.2b Emergency access way
STATEMENT OF COMPLIANCE	
None proposed for this development.	

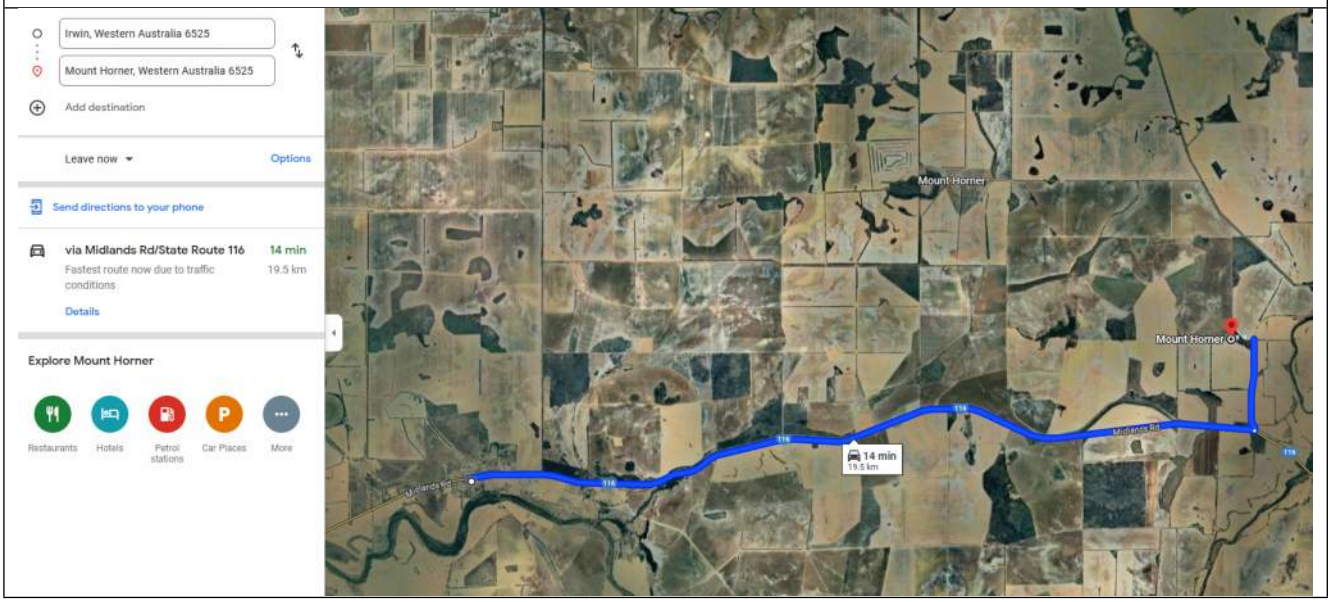
PERFORMANCE PRINCIPLE	PROPOSED ACCEPTABLE SOLUTIONS
P3i	A3.3 Through-roads
STATEMENT OF COMPLIANCE	
N/A	
PERFORMANCE PRINCIPLE	**PROPOSED ACCEPTABLE SOLUTIONS**
P3ii	A3.4a Perimeter roads
STATEMENT OF COMPLIANCE	
N/A	
PERFORMANCE PRINCIPLE	**PROPOSED ACCEPTABLE SOLUTIONS**
P3iii	A3.4b Fire service access route
STATEMENT OF COMPLIANCE	
N/A - Noted that the access way will be constructed to allow for large vehicle movement, due to the site infrastructure requirements.	

PERFORMANCE PRINCIPLE	PROPOSED ACCEPTABLE SOLUTIONS
P3iv	A3.5 Battle-axe access legs
STATEMENT OF COMPLIANCE	
N/A	

PERFORMANCE PRINCIPLE P3iv	PROPOSED ACCEPTABLE SOLUTIONS A3.6 Private driveways
STATEMENT OF COMPLIANCE	
The length of the driveway leading to the camp areas is located within BAL Low to BAL 12.5 hazard level areas. To increase access for site operations and to achieve an acceptable outcome for vehicle movement, Mineral Resources will implement additional management strategies which comply, by installing passing bays every 200m as per Appendix 3. The camp areas will be located on a new internal roadway. Access to the site is restricted to Authorised Persons, who are aware of the access route by the provision of routine site induction methods under the Work Safe Regulations. The proposed internal access road is deemed a suitable solution to meet the performance principle for the camp area.	

ELEMENT 4: WATER	
PERFORMANCE PRINCIPLE	**PROPOSED ACCEPTABLE SOLUTIONS** A4.1 Identification of future water supply
STATEMENT OF COMPLIANCE	
N/A	

PERFORMANCE PRINCIPLE P4	PROPOSED ACCEPTABLE SOLUTIONS A4.2 Provision of water for firefighting purposes
STATEMENT OF COMPLIANCE	
The proposed development site will be provided with optimal fire services for the operation requirements of the Plant and Camp area and will include provisions for Local Brigade access. It is proposed that the fire services system design be communicated through the relevant authority at construction stage for approval. The design and location will be agreed to by Department Fire and Rescue Services (DFES) and Local Government delegates. This BMP has included strategies for the implementation. It is noted that Irwin Fire Brigade is located 14 minutes away from the site entry. The fire design system should consider the equipment capability of the Local Brigade and onsite first intervention measures.	



6. Responsibilities for Implementation and Management of Bushfire Measures

6.1 Additional Management Strategies

The proposed development has been designed to include management strategies that are acceptable under the *State Planning Policy SPP3.7 Guidelines for Planning in Bushfire Prone Areas Version 1.4.*

1. Developers listed as having responsibility under this Bushfire Management Plan have endorsed it and provided future owners on transfers of land a complete copy of the current Bushfire Management Statement for their information.
2. All new habitable buildings that the developers have responsibility for, are designed and constructed in full compliance with the requirements of the *WA Building Act 2011* and the referenced *Building Code of Australia (BCA)*, and with any identified additional requirements of the relevant Local Government. For any Class 1, 2, or 3 buildings and associated Class 10a buildings or decks, this will include compliance with *AS 3959 Construction of Buildings in Bushfire Prone Areas (2018 as amended)* and/or for Class 1 buildings, the *National Association of Steel Housing – (NASH) Standard – Steel Framed Construction in Bushfire Prone Areas*, whereby construction standards corresponding to the assessed BAL will be applied.
3. Lodge a Section 70A (Transfer of Land Act 1893) notification on the certificate(s) of title of the proposed lot(s). Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state 'The lot(s) is/are in a bushfire prone area and (if applicable) are subject to a Bushfire Management Statement'. This shall alert the purchasers of land and successors in title of their responsibilities (*SPP3.7 s6.10 and 'Guidelines' s4.6.4 and s5.3.2*).
4. Asset Protection Zone to be installed and managed as per *State Planning Policy SPP3.7 Guidelines for Planning in Bushfire Prone Areas V1.4, Schedule 1 (*refer to *Appendix 2*). The Asset Protection Zone shall be of width of no less than 20m around the Operation Camp.
5. Asset Protection Zone to be placed and maintained on the Western and Northern side of the internal access roadways to the Operation Camp to no less than 25m off the centre line of the roadway.
6. If vegetation planting is to take place within the Asset Protection Zone area, it shall be installed to meet the requirements of *State Planning Policy SPP3.7* (refer to *Appendix 2*).
7. Insufficient fuel available to significantly increase the severity of the bushfire attack e.g, short, cropped grass to nominal height of 100mm as per *AS 3959 s2.2.3.2 (e) and (f)*. Where any existing or planned re-vegetation has been assessed as "low threat" (meeting *AS 3959 s2.2.3.2* requirements) and excluded from classification, then this area will be managed to continue to meet those requirements and enable the buildings to retain their determined BAL ratings.
8. Dedicated fire services system to be provided for the proposed development on Lot 3558 or Lot 3561, accessed for fire-fighting purposes only and constructed in agreement with DFES operation requirements guidelines and Local Government.
9. A fire map/plan shall be placed and made available in a visibly marked all-weather accessible sealed container, or on a sign, at the front of the allotment entry and where required to Lot 3558 Water Tank location.
10. Clear access path of 6m shall be maintained and managed so firefighting appliances can move within and around the allotment.
11. Maintain Asset Protection Zone (APZ) to the distance required as per *Figure 11 Bushfire BAL Contour Camp Locations Buildings (A3 Page)* and *Figure 12 Bushfire Asset Protection Zone Operation Camp (A3 Page)*.
12. Internal access road to Operation Camp shall be constructed to incorporate *Appendix 3 State Planning Policy SPP3.7 Guidelines for Planning in Bushfire Prone Areas V1.4, E3.6 Private Driveways.*

6.2 Responsibilities for Implementation and Management of the Bushfire Measures

This section relates to the responsibilities of the developer(s), landowner(s) and Local Government with regards to the initial implementation and ongoing maintenance of the required actions.

- The requirements are to be set out in a table(s) and provide the following:
  - the required initial and ongoing actions and any associated works that need to be undertaken
  - provision for those proposals that will be staged
  - responsibilities – separately identified and assigned to the developer(s), landowner(s) and Local Government, as applicable
  - for each responsible entity, the actions are to be assigned a number
  - the required timing of the actions.

Table 4 Implementation Actions

DEVELOPER/LESSEE– PRIOR TO ISSUE OF TITLES	
No.	**Implementation Action**
1.	A notification, pursuant to Section 165 of the *Planning and Development Act 2005* or Section 70A of the *Transfer of Land Act 1893*, is to be placed on the certificates of title of the lots advising of the existence of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan), and/or as required by the Western Australian Planning Commission. The notification is to state as follows: *"This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land".* This is to alert potential purchasers of the land and successors in title of their responsibilities regarding bushfire mitigation and hazard management.
2.	Access to Lot 3558 is to be constructed in accordance with the standards agreed to by Local Government and constructed to the Guidelines for Subdivisions Development (IPWEA Subdivision Guidelines), Liveable Neighbourhoods, Austroads Standards and/or any applicable standards for the local government area.
3.	Dedicated fire services system to be provided for the proposed development on Lot 3558 or Lot 3561, accessed for fire-fighting purposes only and constructed in agreement with DFES operation requirements guidelines and Local Government.
4.	A fire map/plan shall be placed and made available in a visibly marked all-weather accessible sealed container, or on a sign, at the front of the allotment entry and where required to Water Tank location and fire services.
DEVELOPER/LESSEE – PRIOR TO/AS PART OF DEVELOPMENT APPROVAL	
No.	**Implementation Action**
1.	Access to Lot 3558 is to be constructed in accordance with the standards agreed to by Local Government and constructed to the Guidelines for Subdivisions Development (IPWEA Subdivision Guidelines), Liveable Neighbourhoods, Austroads Standards and/or any applicable standards for the local government area.
2.	Future development is required to address *State Planning Policy 3.7 – Guidelines for Planning in Bushfire Prone Areas* by installing Asset Protection Zone(s) to the standards stated in this BMP to achieve the intended BAL outcomes.

3.	Dedicated fire services system to be provided for the proposed development on Lot 3558 or Lot 3561, accessed for fire-fighting purposes only and constructed in agreement with DFES operation requirements guidelines and Local Government.
4.	All new buildings to be designed and constructed in full compliance with the requirements of the WA *Building Act 2011* and the referenced *Building Code of Australia (BCA)*, and with any identified additional requirements of the relevant Local Government. For any Class 1, 2, or 3 buildings and associated Class 10a buildings or decks, this will include compliance with *AS 3959 Construction of Buildings in Bushfire Prone Areas* (2018 as amended) and/or for Class 1 buildings, the *National Association of Steel Housing – (NASH) Standard – Steel Framed Construction in Bushfire Prone Areas*, whereby construction standards corresponding to the assessed BAL will be applied.
5.	A fire map/plan shall be placed and made available in a visibly marked all-weather accessible sealed container, or on a sign, at the front of the allotment entry and where required to Water Tank location and fire services.
6.	Asset Protection Zone to be placed and maintained on the Western and Northern side of the internal access roadways to the Operation Camp to no less than 25m off the centre line of the roadway.
7.	All Asset Protection Zone to be installed and managed as per *State Planning Policy SPP3.7 Guidelines for Planning in Bushfire Prone Areas V1.4, Schedule 1 (*refer to *Appendix 2*). The Asset Protection Zone shall be of width of no less than 20m around the Operation Camp.
8.	Internal access road to Operation Camp shall be constructed to incorporate *Appendix 3 State Planning Policy SPP3.7 Guidelines for Planning in Bushfire Prone Areas V1.4, E3.6 Private Driveways*.
OCCUPIER/LESSEE – ONGOING	
No.	**Implementation Action**
1.	Maintain all required low threat areas (e.g. lots, APZs, etc.) to the standards stated in this BMP to achieve the intended BAL outcomes.
2.	Comply with the relevant Local Government annual firebreak notice issued under *s33 of the Bush Fires Act 1954.*
3.	Maintain all Asset Protection Zones to meet the requirements of *State Planning Policy SPP3.7* (refer to *Appendix 2*).
5.	Maintain Asset Protection Zone (APZ) to the distance required as per *Figure 11 Bushfire BAL Contour Camp Locations Buildings (A3 Page)* and *Figure 12 Bushfire Asset Protection Zone Operation Camp (A3 Page).*
6.	Maintain fire services system for the proposed development area on Lot 3558 or Lot 3561 for fire-fighting purposes.
LOCAL GOVERNMENT – ONGOING MANAGEMENT	
No.	**Implementation Action**
1.	Maintain road verges in a low threat minimal fuel condition as per *AS 3959*.

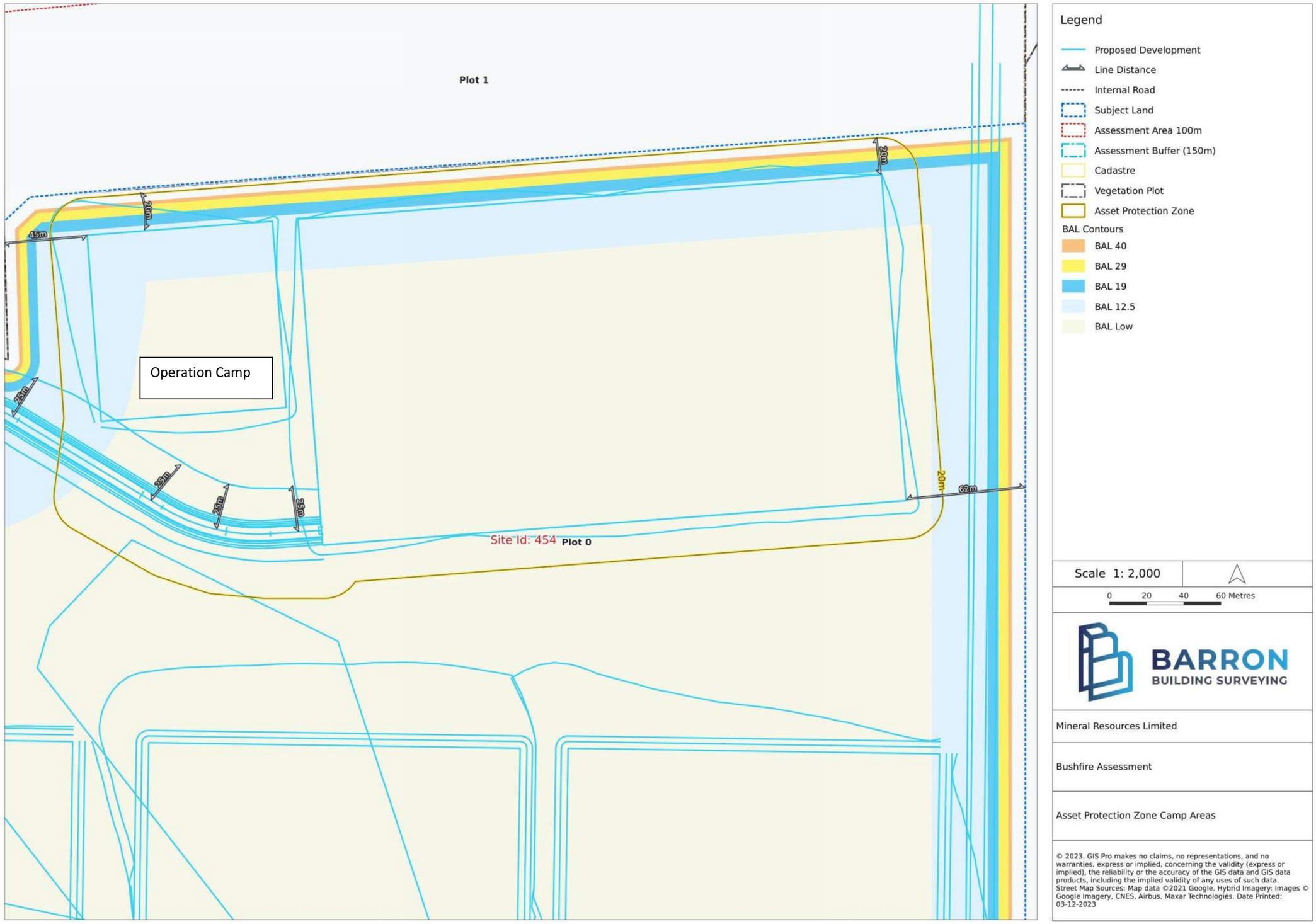


Figure 12 Bushfire Asset Protection Zone Operation Camp (A3 Page)

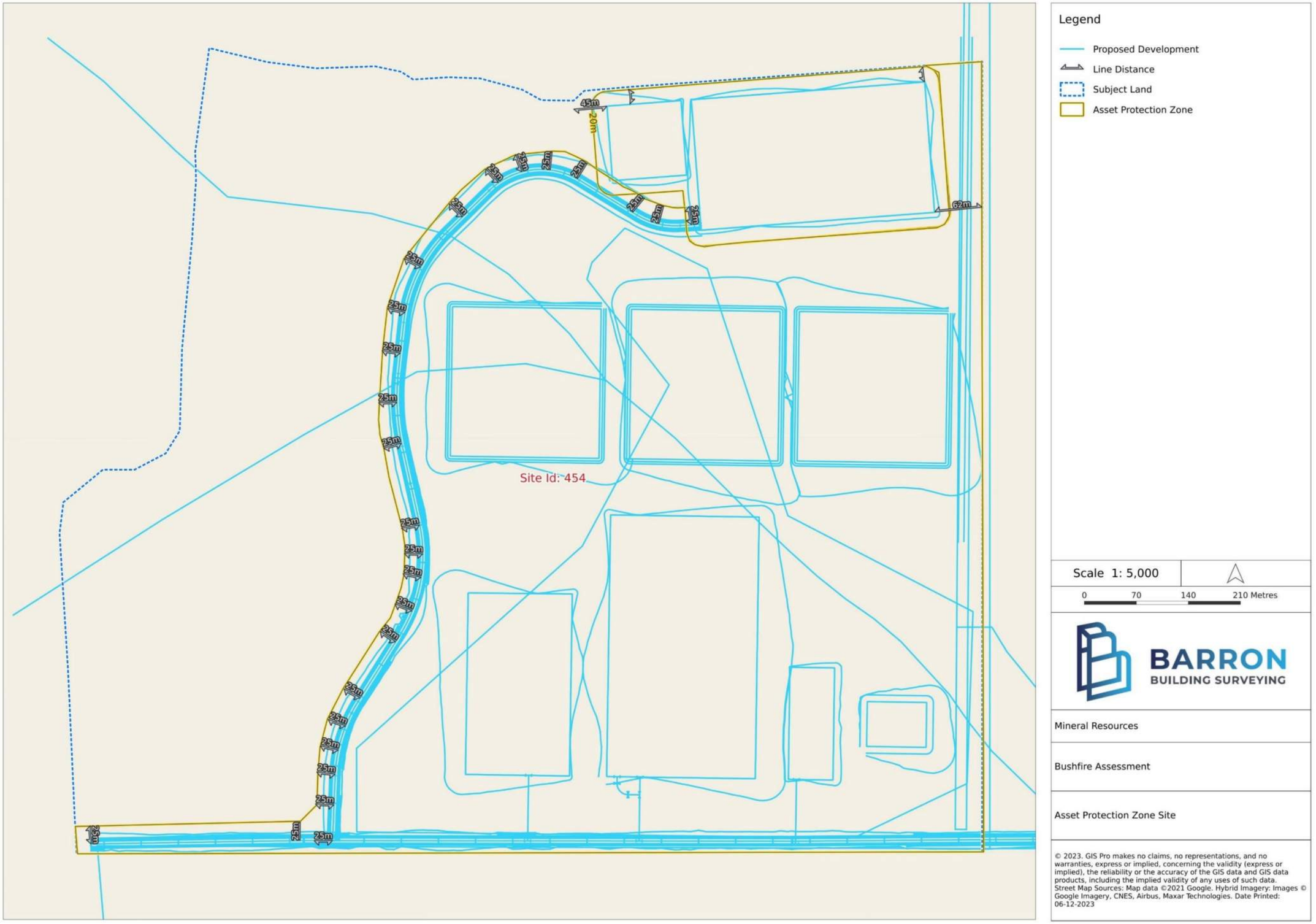


Figure 13 Bushfire Asset Protection Zone Site (A3 Page)

7. Bushfire Attack Level Certificate

Bushfire Attack Level (BAL) Certificate Confirmation of Asset Protection Zone Installed Determined in accordance with AS 3959					
Property Details and Description of Works					
Address Details	Unit no	Street no	Lot no 3561	Street Name / Plan Reference Burma Road	
	Suburb Irwin			State WA	Postcode 6525
Local Government Area	Shire of Irwin				
Main BCA Class of the building		Use(s) of the building			
Description of the building or works	Proposed Gas Plant Operations Camp.				

Determination of Highest Bushfire Attack Level

AS 3959 Assessment Procedure	**Vegetation Classification**	**Effective Slope**	**Separation Distance installed APZ**	**BAL**
Method 1	Select Classification	Select Slope		Select BAL
Shield Provision				

Bushfire Consultant Details

Name		
Company Details		
I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959 (Incorporating Amendments 1, 2 and 3).	*Authorized Practitioner Stamp*	

Reliance on the assessment and determination of the Bushfire Attack Level contained in this certificate should not extend beyond a period of 12 months from the date of issue of the certificate. If this certificate was issued more than 12 months ago, it is recommended that the validity of the determination be confirmed with the Accredited Practitioner and where required an updated certificate issued.

8. Bushfire Management Confirmation

Confirmation of Additional Management Strategies have been Implemented

Property Details and Description of Works

Address Details	Unit no	Street no	Lot no 3561 & 3558	Street Name / Plan Reference Burma Road	
	Suburb Irwin			State WA	Postcode 6525
Local Government Area	Shire of Irwin				
Description of the BMP	Proposed Gas Plant Operations Camp.				

Person Details

Name		
Company Details		
I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Management Plan Additional Strategies have been completed to substantially satisfy the commencement of the Development.	*Authorized Practitioner Stamp*	

Bushfire Consulting

Photographic Appendix 1

Project: BBS 23227

Barron Building Surveying

City Hive, 184 Marine Terrace
Geraldton WA 6530
0476 000 842
chadwick@bbswa.com.au
www.bbswa.com.au

Property Address

Lot 3561, & 3588

Mt Horner WA 6525

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

This photographic evidence is supplied in support of the Bushfire Assessment - Bushfire Management Plan BBS 23227. Each photo has been taken to identify the vegetation type and slope under the classifiable vegetation plots. Referred to in each photo heading or ID numbers.

Contents

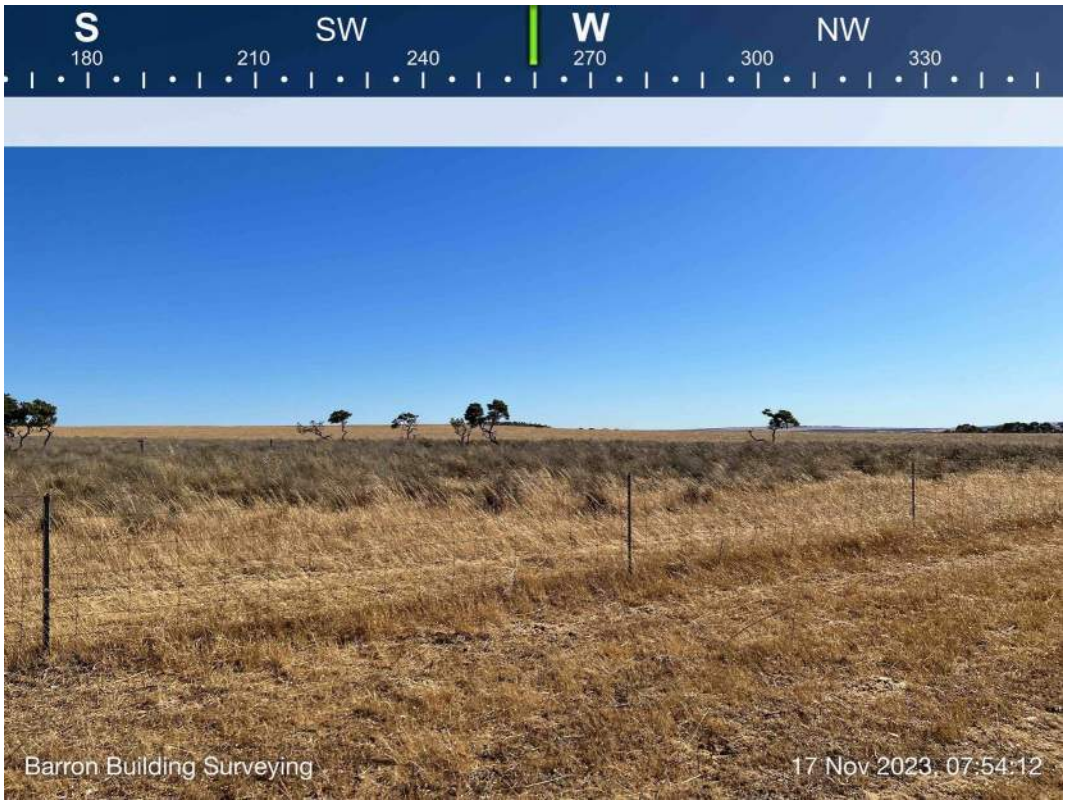


Photo Location No. 1

Plot 9 - Vegetation Classification - Class G Grassland – Sown pasture G-26

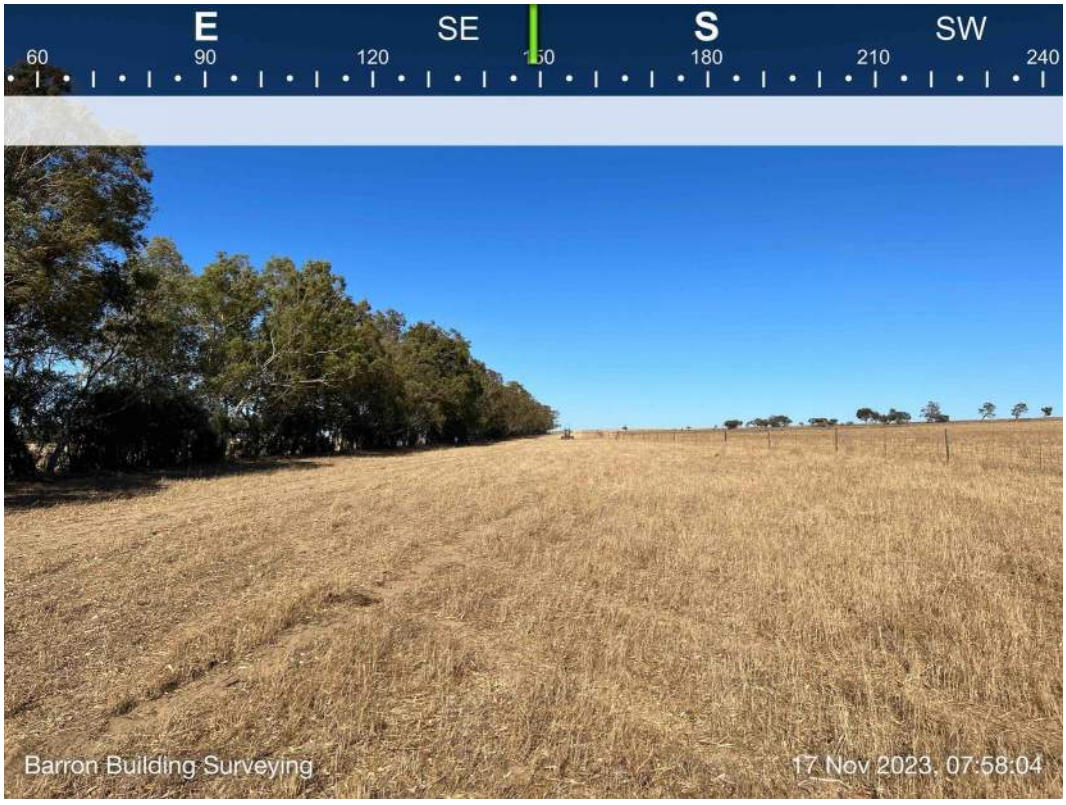


Photo Location No. 2

Plot 9 - Vegetation Classification - Class G Grassland – Sown pasture G-26

Plot 0 Access point driveway point.

Photo Location No. 3

Plot 9 - Vegetation Classification - Class G Grassland – Dense sown pasture G-25

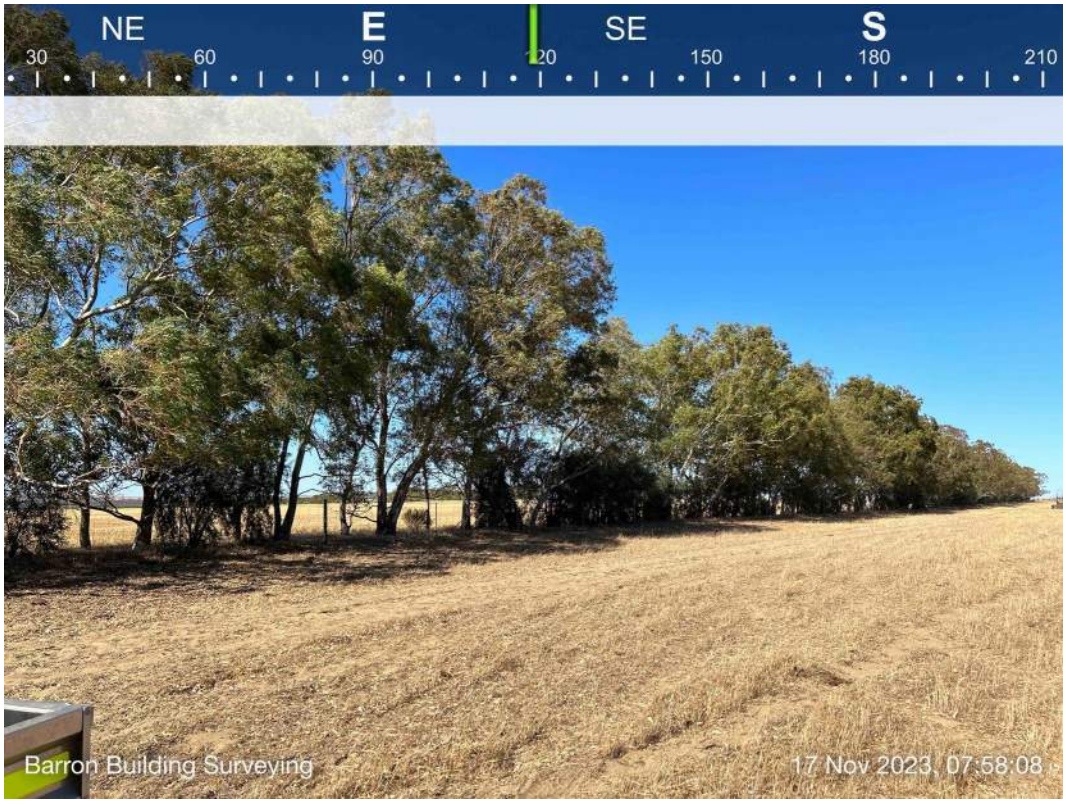


Photo Location No. 4

Plot 0 - Vegetation Classification - Class G Grassland - Low open woodland G-08

Photo Location No. 5

Plot 1 - Vegetation Classification – Tree Highest tree of Tall Gums.

Photo Location No. 6

Plot 0 - Vegetation Classification - Class G Grassland - Low open woodland G-08

Photo Location No. 7

Plot 8 - Vegetation Classification - Class C Shrubland - Open heath C-11

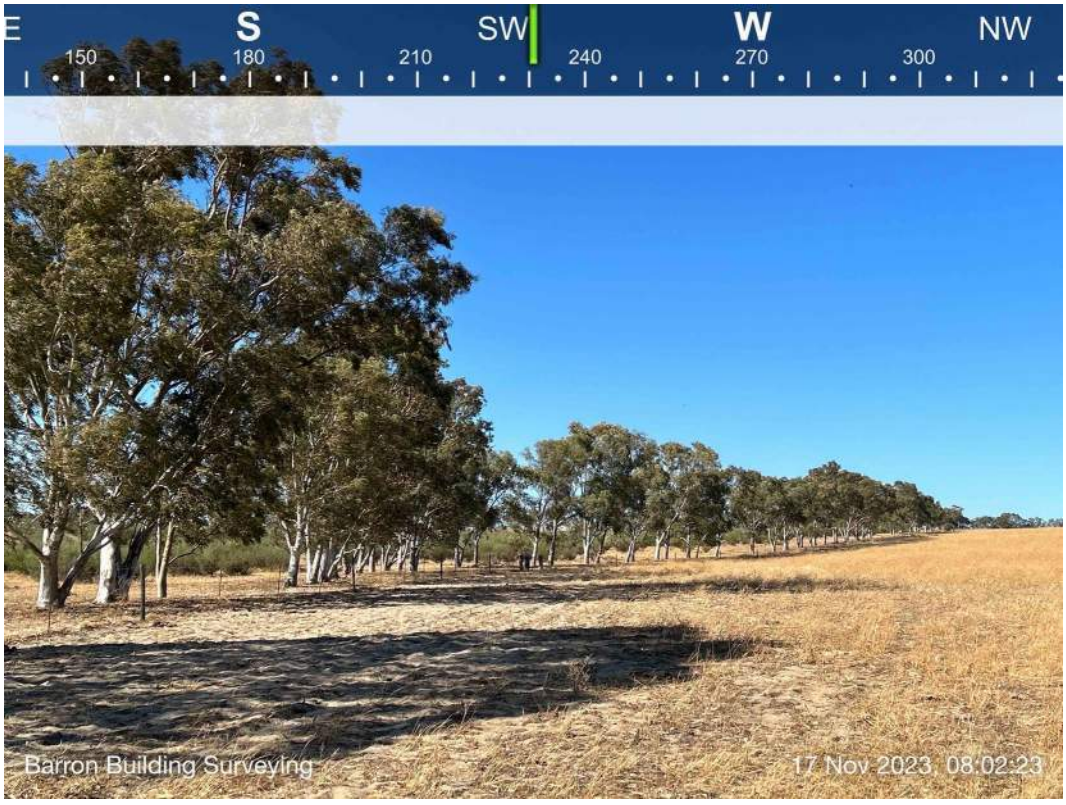


Photo Location No. 8

Plot 0 - Vegetation Classification - Class G Grassland - Low open woodland G-08

Photo Location No. 9

Plot 3 - Vegetation Classification - Class G Grassland - Low open woodland G-08

Photo Location No. 10

Plot 2 - Vegetation Classification - Class D Scrub - Closed scrub (Tall heaths) D-13

Photo Location No. 11

Plot 2 - Vegetation Classification - Class D Scrub - Closed scrub (Tall heaths) D-13

Photo Location No. 12

Plot 2 - Vegetation Classification - Class D Scrub - Closed scrub (Tall heaths) D-13

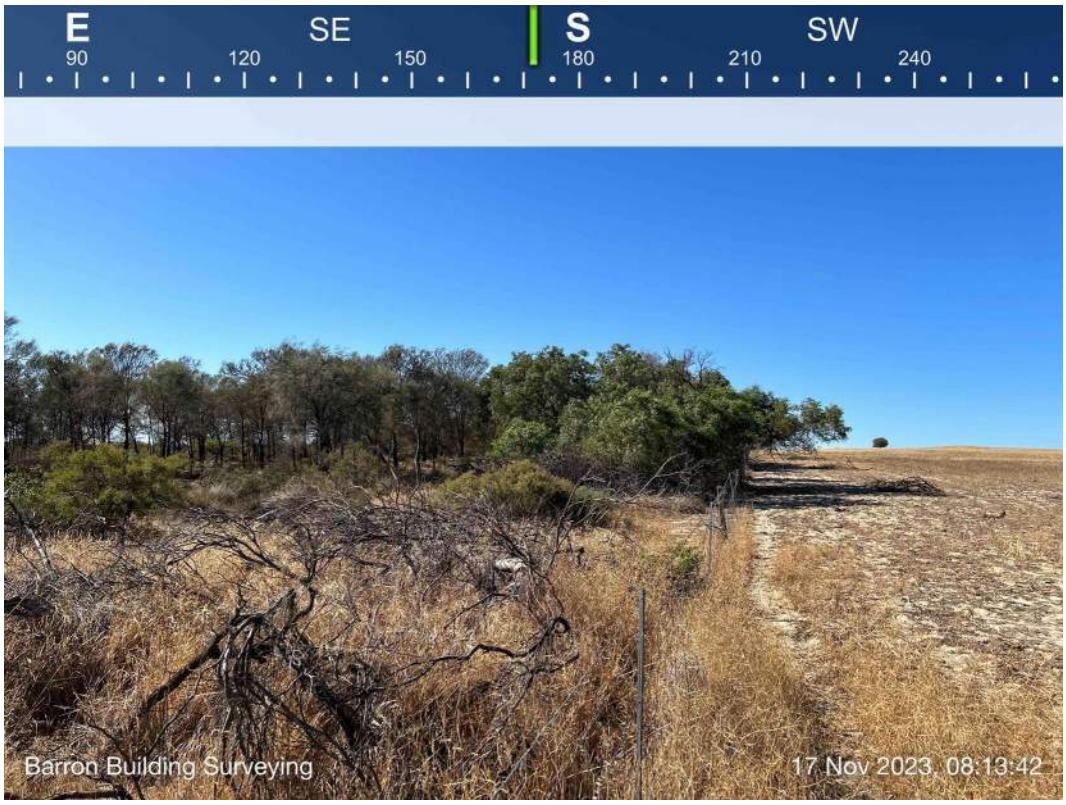


Photo Location No. 13

Plot 2 - Vegetation Classification - Class D Scrub - Closed scrub (Tall heaths) D-13 Left side.

Photo Location No. 14

Plot 2 - Vegetation Classification - Class D Scrub - Closed scrub (Tall heaths) D-13

Photo Location No. 15

Plot 3 - Vegetation Classification - Class G Grassland – Dense sown pasture G-25 in the distance.

Photo Location No. 16

Plot 1 - Vegetation Classification - Excludable - 2.2.3.2(a) >100m from site

---

Photo Location No. 17

Plot 20 - Vegetation Classification - Class C Shrubland - Low shrubland C-12

Photo Location No. 18

Plot 10 - Vegetation Classification - Class C Shrubland - Low shrubland C-12

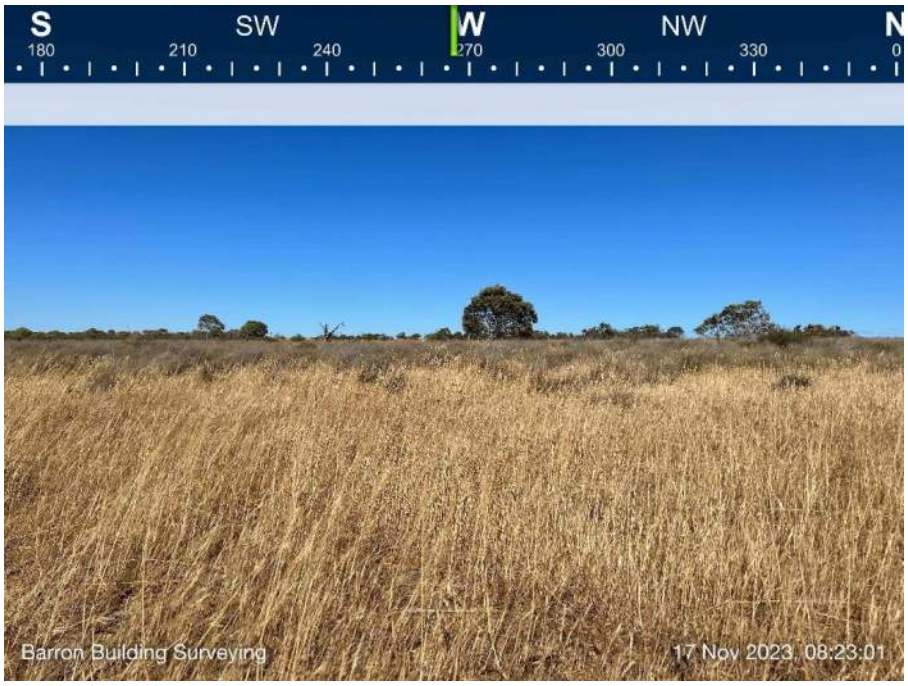


Photo Location No. 19

Plot 10 - Vegetation Classification - Class C Shrubland - Low shrubland C-12

Photo Location No. 20

Plot 9 - Vegetation Classification - Class G Grassland – Sown pasture G-26 Plot 8 in distance zoom in Photo point.

Photo Location No. 21

Plot 9 - Vegetation Classification - Class G Grassland – Sown pasture G-26 _ Plot 0 in distance midway

Photo Location No. 22

Plot 10 - Vegetation Classification - Class C Shrubland - Low shrubland C-12

Photo Location No. 23

Plot 11 - Vegetation Classification - Class C Shrubland - Low shrubland C-12

Photo Location No. 24

Plot 10 - Vegetation Classification - Class C Shrubland - Low shrubland C-12

Photo Location No. 25

Plot 10 - Vegetation Classification - Class C Shrubland - Low shrubland C-12

Photo Location No. 26

Plot 4 - Vegetation Classification - Excludable - 2.2.3.2(a) >100m from site Locate near Strawberry North eats Road entry.

Photo Location No. 27

Plot 4 - Vegetation Classification - Excludable - 2.2.3.2(a) >100m from site Location Near Strawberry Northeast.

Photo Location No. 28

Plot 4 - Vegetation Classification - Class B Woodland - Woodland B-05

Photo Location No. 29

Plot 2 - Vegetation Classification - Class D Scrub - Closed scrub (Tall heaths) D-13

Photo Location No. 30

Roadway and Strawberry and Midlands Rd

Photo Location No. 31

Roadway and Strawberry and Midlands Rd

Photo Location No. 32

Roadway and Strawberry and Midlands Rd

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

EXPLANATORY NOTES

Fine fuel load should be maintained to less than two tonnes per hectare, however this is often a subjective assessment. Reducing fuel load levels does not necessarily require the removal of existing vegetation. A combination of methods can be utilised to reduce fuel load such as raking, weed removal, pruning, mulching and/or the removal of plant material.

A simple method to estimate fuel load is to roughly equate one tonne of fuel load per hectare as 100 grams per square metre. For example, two tonnes per hectare of leaf litter is roughly 200 grams of leaf litter per square metre and eight tonnes per hectare is roughly 800 grams. Eucalyptus leaf litter is approximately 100 grams per handful, so two handfuls of litter per square metre will roughly equate to two tonnes per hectare. Different types of fine fuel, like mulch or pine needles may be more or less than a handful, however the 100 grams per square metre rule of thumb can still be used.

The landowner or proponent is responsible for maintaining an APZ in accordance with Schedule 1 - Standards for Asset Protection Zones. Ongoing maintenance of an APZ is usually enforced through the local government firebreak notice issued under section 33 of the *Bushfires Act 1954*, and/or through a condition of a development approval, which requires the implementation of measures identified within a BMP.

A copy of the firebreak notice and Schedule 1 should be included in a BMP specifically as a how-to guide for the landowner, and to demonstrate to decision-makers that the measures outlined in the BMP to achieve the appropriate BAL rating through provision and ongoing management of an APZ, can be implemented.

Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, it should be noted that fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation is unsafe.

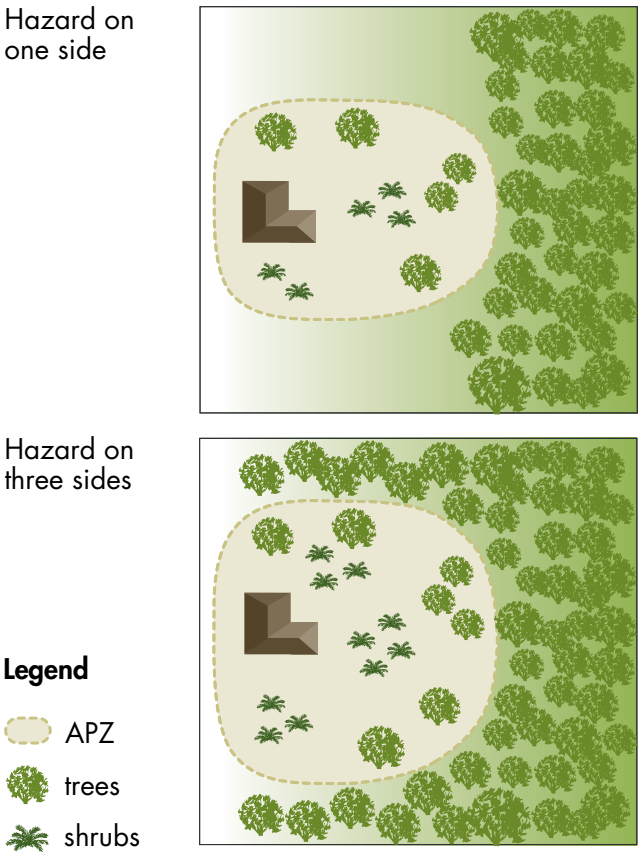


Figure 18: Design of Asset Protection Zone

Refer to Schedule 1: Standards for Asset Protection Zones

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

EXPLANATORY NOTES

E2 Landscaping and design of an asset protection zone

Landscaping, design, and maintenance of an APZ in a bushfire prone area can significantly improve the bushfire resilience of a building. An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that gives holistic consideration to how existing or proposed vegetation or non-combustible features interact with, or affect the building's bushfire resilience.

A well designed APZ provides a greater level of vegetation management within the first few metres of a building with, for example, less vegetation or inclusion of non-combustible materials. The vegetation within the remainder of an APZ can increase further away from the building with carefully considered plant selection and landscaping techniques.

Strategic landscaping measures can be applied, such as replacing weeds with low flammability vegetation (refer to E2 Plant Flammability) to create horizontal and vertical separations between the retained vegetation. The accumulation of fine fuel load from different plants is an important consideration for ongoing maintenance in accordance with Schedule 1. For example, when planting ground covers under deciduous trees within an APZ, the total fine fuel load prescribed in Schedule 1 will include any dead plant material from ground covers and leaf litter from the trees.

Plant density and final structure and form of mature vegetation should be considered in the initial landscaping stages. For example, clumps of sapling shrubs planted at a density without consideration of future growth, may increase the bushfire risk as a clump will quickly grow to exceed 5m^2. It should be noted that in some cases, a single shrub in a mature state may be so dense as to fill a 5m^2 clump alone.

The location of plants within an APZ is a key design technique. Separation of garden beds with areas of low fuel or non-combustible material, will break up fuel continuity and reduce the likelihood of a bushfire running through an APZ and subjecting a dwelling to radiant heat or direct flame contact. It is important to note, where mature trees are separated from a building by six metres, but the canopy has grown to extend or overhang a building, maintenance and pruning to remove the overhanging branches should be undertaken without the entirety of the tree being removed.

Mulches used within the APZ should be non-combustible. The use of stone, gravel, rock and crushed mineral earth is encouraged. Wood mulch >6mm in thickness may be used, however it is recommended that it is used in garden beds or areas where the moisture level is higher by regular irrigation. These materials could be sourced from non-toxic construction and demolition waste giving the added benefit of reducing the environmental impact of any 'hard landscaping' actions.

Combustible objects, plants, garden supplies such as mulches, fences made from combustible material, should be avoided within 10 metres of a building. Vines or climbing plants on pergolas, posts or beams, should be located away from vulnerable parts of the building, such as windows and doors. Non-flammable features can be used to provide hazard separation from classified vegetation, such as tennis courts, pools, lawns and driveways or paths that use inorganic mulches (gravel or crushed rock). Consider locating firewood stacks away from trees and habitable buildings.

Incorporation of landscaping features, such as masonry feature walls can provide habitable buildings with barriers to wind, radiant heat and embers. These features can include noise walls or wind breaks. Use of Appendix F of AS 3959 for bushfire resistant timber selection within areas of 29kW/m^2 (BAL-29) or below, or the use of non-combustible fencing materials such as iron, brick, limestone, metal post and wire is encouraged.

In addition to regular maintenance of an APZ, further bushfire protection can be provided at any time by:

- ensuring gutters are free from vegetation;
- installing gutter guards or plugs;
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps;
- trimming and removing dead plants or leaf litter;
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors;
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank; and/or
- following the requirements of the relevant local government section 33 fire break notice, which may include additional provisions such as locating wood piles more than 10 metres from a building.

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

EXPLANATORY NOTES

Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. As embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building, best practice recommends that objects within the APZ are moved away from the building prior to any bushfire event. Objects may include, but are not limited to:

- door mats;
- outdoor furniture;
- potted plants;
- shade sails or umbrellas;
- plastic garbage bins;
- firewood stacks;
- flammable sculptures; and/or
- playground equipment and children's toys.

E2 Plant flammability

There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- Fire resistant – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- Fire retardant – plants that may not burn readily or may slow the passage of a bushfire.
- Fire wise – plants that have been identified and selected based on their flammability properties and linked to maintenance advice and planting location within a garden.

Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire-retardant plant species that suit the environmental characteristics of an area. When developing a recommended plant species list, local governments should consult with ecologists, land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat.

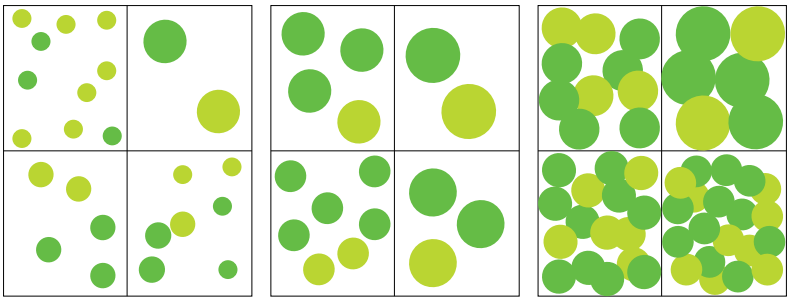
When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics:

- grow in a predicted structure, shape and height;
- are open and loose branching with leaves that are thinly spread;
- have a coarse texture and low surface-area-to-volume ratio;
- will not drop large amounts of leaves or limbs, that require regular maintenance;
- have wide, flat, and thick or succulent leaves;
- trees that have bark attached tightly to their trunk or have smooth bark;
- have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed);
- do not produce or hold large amounts of fine dead material in their crowns; and/or
- will not become a weed in the area.

Refer to the WAPC Bushfire and Vegetation Fact Sheet for further information on clearing and vegetation management and APZ landscaping, design and plant selection reference material.

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. **Figure 19:** Tree canopy cover – ranging from 15 to 70 per cent at maturity  15% 30% 70%
Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

EXPLANATORY NOTES

E3.6 Private driveways

In areas serviced by reticulated water, where the road speed limit is not greater than 70 km/h, and where the distance from the public road to the further part of the habitable building is no greater than 70 metres, emergency service vehicles typically operate from the street frontage.

In the event the habitable building cannot be reached by hose reel from the public road, then emergency service vehicles will need to gain access within the property. Emergency service vehicles will also need to gain access within the property, where access to reticulated water (fire hydrants) is not possible. In these situations, the driveway and battle-axe (if applicable) will need to be wide enough for access for an emergency service vehicle and a vehicle to evacuate.

Turnaround areas should be available for both conventional two-wheel drive vehicles of residents and Type 3.4 fire appliances. Turn-around areas should be located within 30 metres of habitable buildings. Circular and loop driveway design may also be considered. Note that the design requirements for a turn-around area for a private driveway or battle-axe differ to a cul-de-sac.

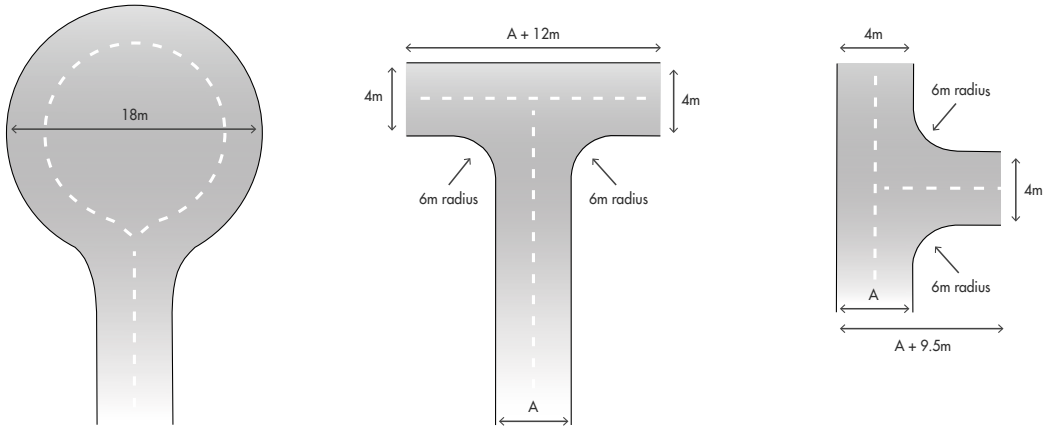


Figure 28: Design requirements for a turn-around area for a private driveway or battle-axe

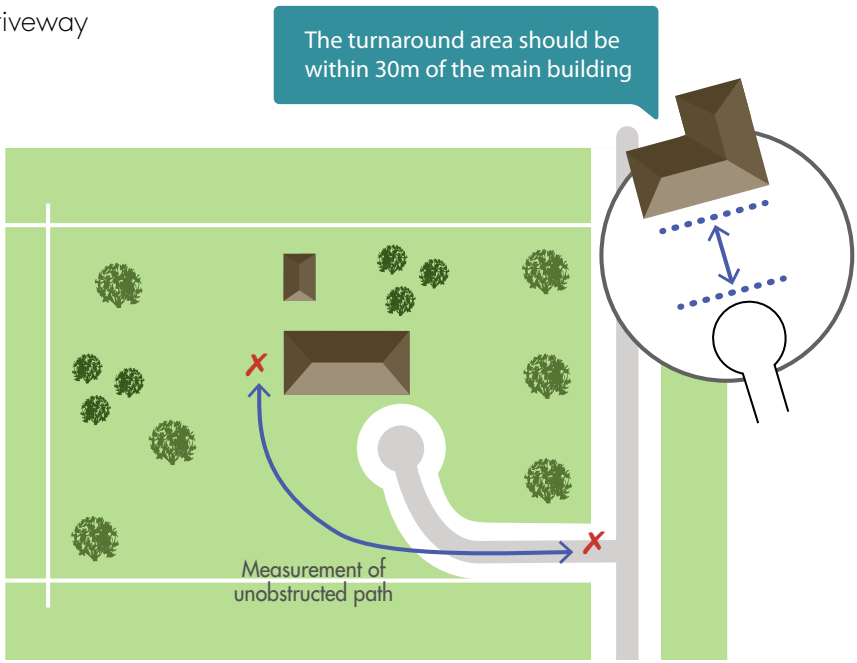


Figure 29: Design requirements for a private driveway where required under A3.6