



# **APPENDIX R**

## Bushfire Risk Assessment



# STRATEGIC BUSHFIRE STUDY

## Clarrie Hall Dam Raising

State Significant Infrastructure – SSI 65020460

Tweed Shire NSW

August 2024

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## EXECUTIVE SUMMARY

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EMM Consulting Pty Limited (EMM) has engaged Cool Burn Fire and Ecology (Cool Burn) to prepare a Strategic Bushfire Study for the Clarrie Hall Dam Raising Project, located in Doon Doon, approximately 15km south-west of Murwillumbah and 4km south-west of Uki in the Tweed Shire Local Government Area (LGA).

Tweed Shire Council propose to raise the wall of Clarrie Hall Dam by 8.5m to a height of 70m Australian Height Datum (AHD) (RL 70m). This will increase the capacity of the dam from 16,000 megalitres (ML) to approximately 42,300 ML (the Proposal).

Due to increasing demand for water as a result of projected population growth and the increasing uncertainty of water supply yield associated with climate change, there is a requirement to augment the Tweed District water supply by 2028.

The purpose of the Proposal is to ensure water security for the Tweed Shire region until at least 2065.

To support the Environmental Impact Statement (EIS), and adequately address the Secretary's Environmental Assessment Requirements (SEARs), the Proposal requires a Strategic Bushfire Study to assess the likely risks to *health and safety* emanating from bushfire, both naturally occurring, or resultant from activities associated with the construction or operation of the dam.

Construction will involve works on the dam wall and associated infrastructure at the northern end of the dam, and McCabes Bridge at the southern end of the dam, as well as various other related activities. Temporary workers accommodation for an estimated peak workforce of 180 people will be required for construction. Two temporary workers accommodation locations have been identified at the concept stage and assessed/included in this report.

The Strategic Bushfire Study has been prepared to identify the extent to which the proposed development conforms with or deviates from the relevant provisions of Planning for Bushfire Protection 2019 (PBP 2019). Construction activities for the Proposal have been assessed under Chapter 8 (Other Development) of PBP 2019. The non-habitable components of the project infrastructure demonstrate how the Bushfire Protection Measures satisfy the aims and objectives of PBP 2019. The proposed temporary workers accommodation facility options are considered as habitable development under PBP 2019 as it would result in an increased residential density, and the performance of the temporary workers accommodation facilities have been assessed against the principles and criteria of Chapter 5 (Residential and Rural Residential Subdivision) acknowledging Chapter 8.2.1 of PBP 2019.

The entire Proposal Area lies within Bushfire Prone Land (or within a buffer area) and has had an active fire history. The Proposal is located (in general) on the lower slopes within the landscape. Vegetation is predominantly Wet Sclerophyll Forest, Grassland and Forested Wetlands formations.

Bushfire Protection Measures (BPMs) for the Proposal include provisions relating to Asset Protection Zones (APZ), landscaping, construction, access, water supply and utilities, and emergency management arrangements:

- A standard 15m APZ has been recommended for all non-habitable Class 5-8 and Class 10 structures associated with construction and operation of the dam to mitigate intense radiant heat and avoid direct flame zone to achieve maximum bushfire attack level BAL40, and to offer a minimum defendable space for firefighting operations.
- APZs for each proposed accommodation facility option would achieve a radiant heat level 29kW/m<sup>2</sup> or less and bushfire attack level BAL29.
  - The proposed workers accommodation facility (WFA#1) on Kyogle Road achieved the smallest APZ setback distances due to minor slopes and (primarily) Grassland vegetation surrounding the location (APZ setbacks 10m – 20m).
  - The proposed accommodation facility on Clarrie Hall Dam Road (WFA#2) has increased slopes and is impacted by the close proximity of Forest vegetation (APZ setbacks 10m – 20m).

Standard access and water supply recommendations have been provided and would satisfy the performance criteria of PBP 2019. The Study notably identifies that the proposed accommodation facility on Clarrie Hall Dam Road is located on a no through road, increasing the risk to life and safety for workers if evacuation is required and for attending firefighting personnel, and subsequently a higher reliance on the emergency management and evacuation planning would be necessary.

Emergency management planning is required prior to construction and must address the construction and operation stages. It is recommended that an emergency management plan (EMP) be prepared in accordance with the NSW Rural Fire service (RFS) Guide to Developing a Bushfire Emergency Management and Evacuation Plan (2014) and implemented for the lifetime of the project. The EMP should detail the mitigation measures associated with the construction and operation of the Proposal, and relevant recommendations made in this report. A separate and site specific An EMP should be developed for the temporary workers accommodation, with a detailed focus on situational awareness and evacuation.

Early consultation with the NSW RFS is encouraged and recommended by this report. Engagement and liaison with local RFS brigades (1st attending brigades – Uki and Kunghur) should also occur preceding the emergency management and evacuation planning.

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# 1. INTRODUCTION

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EMM Consulting Pty Limited (EMM) has engaged Cool Burn Fire and Ecology (Cool Burn) to prepare a Strategic Bushfire Study for the Clarrie Hall Dam Raising, located in Doon Doon, approximately 15km south-west of Murwillumbah and 4km south-west of Uki in the Tweed Shire Local Government Area (LGA).

Cool Burn is recognised by the Fire Protection Association Australia (FPAA) as a suitably qualified consultant in bushfire risk assessment.

## 1.1 BACKGROUND

Clarrie Hall Dam was constructed in 1983 by the NSW Department of Public Works and is owned and operated by Tweed Shire Council for the primary purpose of providing a drinking water supply to the Tweed Shire region. Tweed Shire Council propose to raise the wall of Clarrie Hall Dam by 8.5m to a height of 70m Australian Height Datum (AHD) (RL 70m). This will increase the capacity of the dam from 16,000 megalitres (ML) to approximately 42,300 ML (the Proposal).

Due to increasing demand for water as a result of projected population growth and the increasing uncertainty of water supply yield associated with climate change, there is a requirement to augment the Tweed District water supply by 2028.

The purpose of the Proposal is to ensure water security for the Tweed Shire region until at least 2065.

To support the Environmental Impact Statement (EIS), and adequately address the Secretary's Environmental Assessment Requirements (SEARs), the Proposal requires a Strategic Bushfire Study to assess the likely risks to *health and safety* emanating from bushfire, both naturally occurring, or resultant from activities associated with the construction or operation of the dam.

## 1.2 PROPOSAL OVERVIEW

Clarrie Hall Dam is located on Doon Doon Creek, a third-order stream forming a tributary of the Tweed River. The dam is located in Doon Doon, approximately 15km south-west of Murwillumbah and 4km south-west of Uki in the Tweed Shire Local Government Area (LGA) (*Figure 1*). The dam has a catchment area of approximately 60 square kilometres and a storage capacity of 16,000ML.

Access to the dam wall and spillway area is from Clarrie Hall Dam Road, which runs south from Kyogle Road. The southern extent of Clarrie Hall Dam is accessed from Crams Farm, located off Commissioners Creek Road.

The majority of the Doon Doon sub-catchment of the Tweed River Catchment consists of rural and agricultural land uses (more than 70% of land is zoned 1a Rural).

Construction will involve works focused on and around the dam wall and associated infrastructure at the northern end of the dam, and due to increased water levels, McCabes Bridge at the southern end of the dam.

Temporary workers accommodation will be required for construction due to a lack of available options in nearby townships. Two temporary workers accommodation locations have been identified at the concept stage for an onsite workers accommodation facility.

A summary of the works has been provided in the subsections below<sup>1</sup>. Further detail on the Proposal can be found in Section 3 of the EIS.

### 1.2.1 Operational Works

A summary of the dam wall infrastructure works and ancillary works is detailed below:

- Increasing the base width of the valley-side abutment and raising the crest of the concrete faced rockfill embankment to RL 70m
- Constructing a new concrete lined spillway higher on the west abutment
- Extending the upstream concrete face to the new crest height
- Raising the intake tower and access bridge
- Constructing a new section of the Clarrie Hall Dam Road to provide access to the east abutment of the dam wall
- Establishing new recreation and operational facilities including an amenities block, public shelters, viewing areas, interpretation signage, paths, car parks, landscaping, security fences, lighting, monitoring equipment and a boat ramp
- Upgrading the intersection of Clarrie Hall Dam Road and Kyogle Road
- Replacing McCabes Bridge over Doon Doon Creek
- Realigning an approximately 1,000 metre section of Commissioners Creek Road
- Removing or reconstructing impacted infrastructure and facilities at Crams Farm
- Realigning overhead power lines and Telstra assets.

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<sup>1</sup> Source: EIS Proposal summary.

## 1.2.2 Construction Works

Site offices, compounds, laydown areas and other facilities will be required during construction. A summary of the construction works is detailed below:

- Constructing access roads to construction areas and establishing the construction site
- Re-establishing the quarry and haul roads used to construct the existing dam
- Establishing a concrete batching plant and areas for materials stockpiling
- Establishing construction compounds including site offices, compounds and temporary workers accommodation.

Two scenarios have been proposed for the location and arrangement of the temporary workers accommodation facility and the concrete batching plant:

- Scenario 1 – Accommodation facility at site 1, Concrete Batching Plant at site 2
- Scenario 2 - Accommodation facility at site 2, Concrete Batching Plant at site 1.

The two locations are further discussed below in *Section 1.2.3*, with emphasis given to the performance of the accommodation facility location. The site compound will be located at the dam wall.

## 1.2.3 Project Workforce and Temporary Workers Accommodation

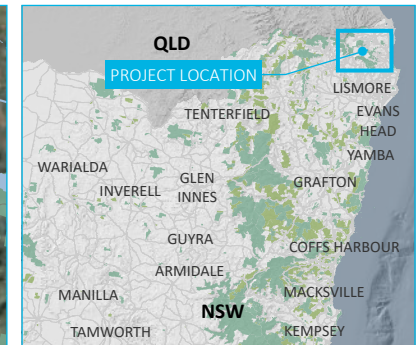
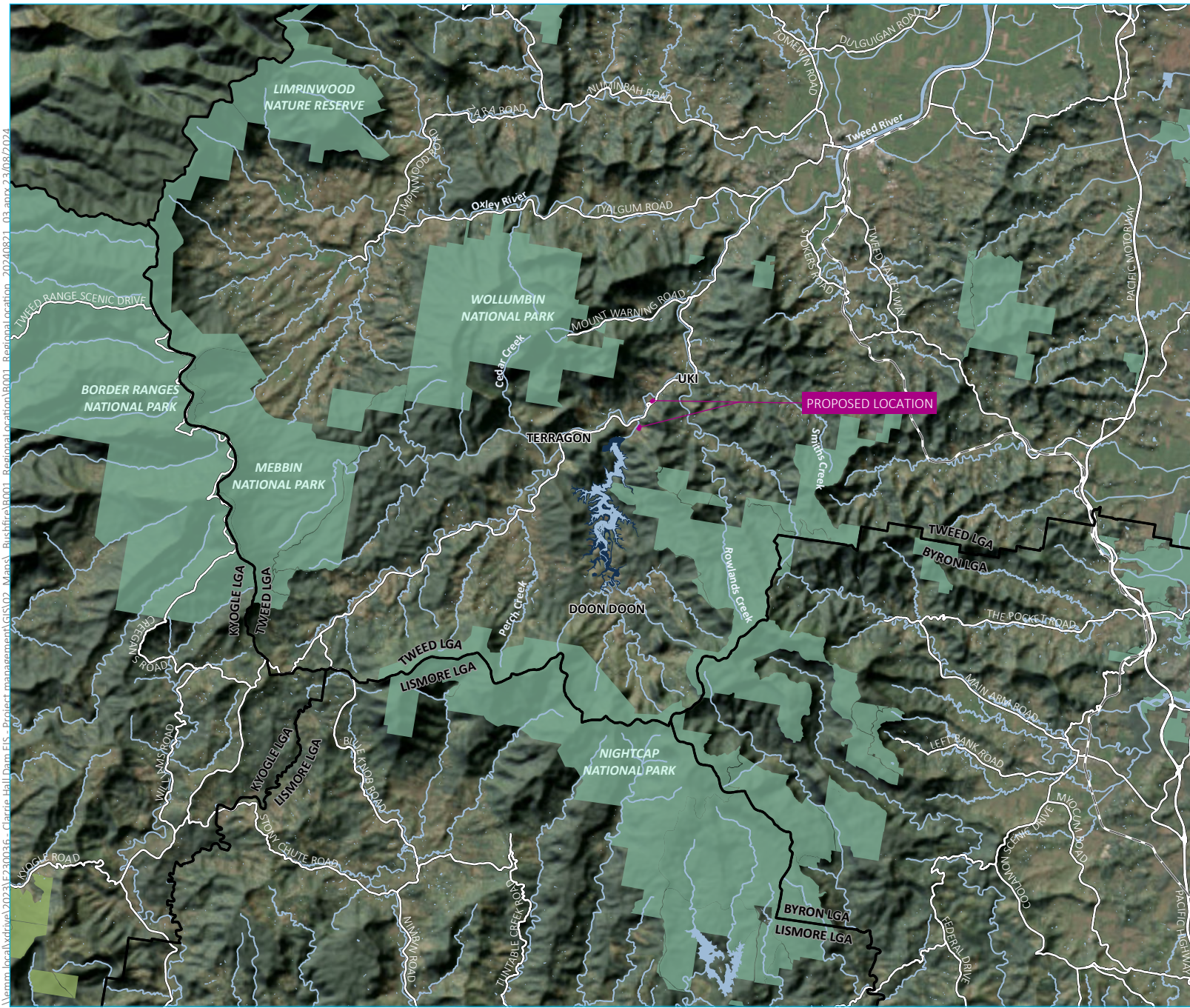
An estimated peak workforce of 180 people has been estimated based on the concept design construction schedule. It is estimated that a temporary workers accommodation facility for up to 120 personnel would be required during construction. An area of approximately 12,000 square metres would be required for cabins, facilities and a car parking area. The concept design includes two proposed locations for the temporary workers accommodation facility (WFA#) (*Figure 1*):

- WFA1 is located at the junction off Tarcoola Lane, approximately 900m north of Clarrie Hall Dam Road
- WFA2 is located along Clarrie Hall Dam Road, approximately 300m south of the junction with Kyogle Road.

The temporary workers accommodation facility, considered as increased residential development from a bushfire planning perspective, will be assessed separately to the rest of the Proposal due to:

- The land use (introduction and accommodation of people in a bushfire prone area)
- A potentially heightened level of risk to life and safety of occupants and
- More detailed emergency management and evacuation requirements.

This is further discussed below in *Section 2.3.2*. The concrete batching plant will be constructed at the site not chosen for the accommodation facility.



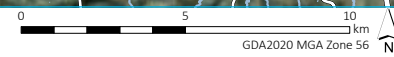
- KEY**
- Proposed workers accommodation/concrete batching plant
  - Proposed construction disturbance footprint
  - Existing environment
  - Rail line
  - Major road
  - Named watercourse
  - Waterbody
  - NPWS reserve
  - State forest
  - Local government area
- INSET KEY**
- Major road
  - NPWS reserve
  - State forest

Location

Clarrie Hall Dam EIS  
 Bushfire Hazard Assessment  
 Figure 1



Source: EMM (2024); KBR (2024); ABS (2021); DCSSS (2023); ESRI (2024); GA (2009)



I:\emmm\local\drive\2023\F230036 - Clarrie Hall Dam EIS - Project management\GIS\02 - Maps\ Bushfire\B001 - Regional location\_20240821\_03.aprx 23/08/2024

## 1.3 PURPOSE AND SCOPE OF THIS DOCUMENT

The Proposal will be assessed as State Significant Infrastructure (SSI 65020460) under State Environmental Planning Policy (Planning Systems) 2021. Accordingly, an Environmental Impact Statement (EIS) is required for the Proposal under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Strategic Bushfire Study has been prepared as part of the EIS to assess the potential bushfire risk and associated impacts from constructing and operating the Proposal (the scope). It addresses the SEARs issued by the Secretary of the Planning, Housing and Infrastructure (DPHI) which were issued on 31 May 2024.

The Study:

- Addresses the SEARs relevant to bushfire under the Key Issue of Health and Safety, listed in *Table 1* below
- Describes the existing environment with respect to bushfire
- Assesses the impacts of constructing and operating the project on bushfire risk
- Recommends measures to mitigate and manage the impacts identified.

**Table 1: Planning Secretary’s Environmental Assessment Requirements**

Planning Secretary’s Environmental Assessment Requirements – SSI 65020460	Section
<b>Key Issue – Health and Safety</b>	
1. The Proponent must demonstrate that the proposed works would comply with Dam Safety NSW and Dam Safety NSW Board advice, and the statutory requirements of the Dams Safety Act 2015, Dams Safety Regulation 2019.	EIS Section 6.13
2. The Proponent must assess the potential health impacts of the proposal, in accordance with the current guidelines.	EIS Section 6.13
3. Preparation of a bush fire assessment report that identifies the extent to which the proposed development conforms with or deviates from provisions of the Planning for Bush Fire Protection 2019 (Rural Fire Service (RFS) 2019).	This report
4. The Proponent must assess the likely risks of the proposal to public safety, paying particular attention to visitor safety and access, bushfire risks and the handling and use of dangerous goods.	Section 3
5. The Proponent must identify potential ignition sources during construction, and detail proposed bush fire protection measures for the development, including fire suppression capabilities.	Section 3.25, Section 4
6. The Proponent must address proposed emergency management, evacuation and access, and contingency measures, and whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES.	Section 4.7, EIS Section 6.13

## 2. ASSESSMENT METHODOLOGY

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### 2.1 BUSHFIRE PLANNING

The Strategic Bushfire Study has been prepared for the long-term and ongoing planning for the dam raising Proposal, covering design and approvals principles, construction, and operation.

The bushfire protection planning includes a review of the proposed development against the following guidelines, legislation, and regional information:

- NSW *Rural Fires Act 1997* (RF Act)
- NSW RFS Planning for Bushfire Protection 2019 (PBP 2019)
- Australian Standard (AS) 3959-2018 Construction of buildings in bushfire-prone areas
- Bushfire Risk Management Plans (BFRMP) for the Local Government Area (LGA)
- Bushfire history (SEED geo-mapping).

### 2.2 PLANNING FOR BUSH FIRE PROTECTION 2019

The Study aims to address the requirements of the SEARs Key Issue of *Health and Safety / Risks for Bushfire* in accordance with the provisions of Planning for Bushfire Protection 2019 (PBP 2019). PBP 2019 is applicable to all development on bush fire prone land (BFPL) in NSW and all development on bush fire prone land must satisfy the aims and objectives of PBP 2019. The overall aim of PBP 2019 is to provide for the protection of life (including firefighters) and to minimise impacts on property from the threat of bush fire.

State Significant Infrastructure Proposals are exempt from requiring a Bushfire Safety Authority. However, there is a requirement to identify the extent to which the proposed development conforms with or deviates from the relevant provisions of PBP 2019 in accordance with the response from the NSW RFS in the Request for Secretary's Environmental Assessment Requirements (December 2023).

To comply with PBP 2019, the Proposal would require the following conditions to be met:

- Satisfy the aim and objectives of PBP 2019
- Consider the requirements and recommendations listed within PBP 2019 for the specific purpose for the development -
  - Chapter 2.4.2 State significant development and infrastructure
  - Chapter 8 Other development, and Chapter 8.2.12 increased residential density
- Detail appropriate Bushfire Protection Measures (BPM's) that satisfy the relevant performance criteria.

PBP 2019 states the objective for the strategic planning study is to identify whether proposed development is appropriate at the location, commensurate with the identified bush fire risk on a landscape (macro) scale.

The broad principles which apply to a strategic bushfire study are:

- Ensuring land is suitable for development in the context of bush fire risk
- Ensuring new development on bushfire prone land will comply with PBP 2019
- Minimising reliance on performance-based solutions
- Providing adequate infrastructure associated with emergency evacuation and firefighting operations
- Facilitating appropriate ongoing land management practices.

## 2.3 APPLYING PBP 2019 TO THE PROPOSAL

The Study will assess the proposed construction and operational areas, structures and facilities (all non-habitable infrastructure) separate to the two proposed workers accommodation facilities (habitable structures), as further discussed below.

### 2.3.1 Construction and operational areas

The construction and operational areas for all development works will be assessed under Chapter 8 (Other Development) of PBP 2019. Industrial development is assessed through the aim and objectives of PBP 2019 (Chapter 1) and a suitable package of BPMs proposed commensurate with the assessed level of risk.

Buildings of Class 5 to 8 (as per National Construction Code 2022 (NCC)), which includes all demountable offices, the concrete batching plant, will be assessed under Chapter 8.3.1 of PBP 2019.

All Class 10 structures which includes storage sheds and containers, amenities facilities, and public shelters, will be assessed under Chapter 8.3.2. The NCC does not provide for any bush fire specific performance requirements for these particular classes of buildings. As such Australian Standard (AS) 3959 (Construction of buildings in bushfire prone areas) and the National Association of Steel Housing (NASH) Standard are not considered as a set of Deemed to Satisfy provisions, however compliance with AS 3959 and the NASH Standard must be considered when meeting the aims and objectives of PBP 2019. Whilst bushfire is not captured in the NCC, the following objectives will be applied in relation to access, water supply and services, and emergency and evacuation planning:

- To provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation

- To provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development
- To provide adequate services of water for the protection of buildings during and after the passage of bush fire
- To locate gas and electricity so as not to contribute to the risk of fire to a building; and provide for the storage of hazardous materials away from the hazard wherever possible.

### 2.3.2 Temporary Workers Accommodation

The proposed temporary workers accommodation facility options are considered under PBP 2019 as long-term accommodation (providing accommodation for more than 6 weeks in duration) and an increased residential density. Increased resident densities in bushfire prone areas may heighten the level of risk to the occupants. The presence of additional habitable dwellings can impact on the evacuation and sheltering of residents during a bushfire. Therefore, the performance of the temporary workers accommodation facilities will be assessed against the same principles and criteria of Chapter 5 (Residential and Rural Residential Subdivision, although not requiring an approval from the NSW RFS), acknowledging Chapter 8.2.1 of PBP 2019.

## 3. STRATEGIC BUSHFIRE STUDY

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### 3.1 SITE DETAILS AND LAND USE

Clarrie Hall Dam is located on Doon Doon Creek, 15km south-west of Murwillumbah, and is approximately 60km northwest of Byron Bay in NSW. The dam embankment and main construction area is accessed off Clarrie Hall Dam Road, which is a single entry and exit road accessed from Kyogle Road.

The upgrade of McCabes Bridge and associated site compound is proposed to be located on Commissioners Creek Road, accessed off Doon Doon Road. Access to Doon Doon Road and Commissioners Creek Road is by Kyogle Road only, with no alternative exit.

The proposed temporary workers accommodation facility locations are on Kyogle Road (WFA1), and Clarrie Hall Dam Road (WFA2) (*Figure 1*).

The Project Area includes the construction footprint of all works and ancillary activities subject to disturbance, including the construction office complex and proposed temporary workers accommodation. It is assumed The Proposal Area includes a nominal buffer >140m around all construction and development to appropriately assess the bushfire threat, consistent with PBP 2019. The Locality considers a 5km surrounding area.

Clarrie Hall Dam is open for recreational uses such as bushwalking, nature appreciation (bird watching, nature photography), picnicking, recreational fishing, sailing, canoeing, kayaking and rowing, and electric powered boats, and special uses approved by council. Such activities introduce people to bushfire prone areas and appropriate assessment and mitigation measures should be applied.

### 3.2 BUSHFIRE LANDSCAPE ASSESSMENT

A bushfire landscape assessment considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader (macro) surrounding landscape.

#### 3.2.1 Weather

Clarrie Hall Dam is located within the Far North Coast region of NSW where the climate is warm and subtropical. Climatology includes:

- Annual average rainfall of 2199 millimetres (mm) with February averaging the highest rainfall (326mm) and September the lowest (57mm) (Doon Doon Weather Station #58019)

- Average maximum temperature for summer is 29.3°C, and average minimum temperature for winter is 9.1°C (Murwillumbah Weather Station #58158)
- The Far North Coast and Tweed Shire LGA has an accepted fire danger rating (Fire Danger Index (FDI)) of 80 (NSW RFS Community Resilience, May 2017).

The bush fire season generally runs from September through November although statutorily extends to March most seasons due to hot summer temperatures and strong coastal winds. Prevailing winds associated to the bushfire peak season are north to north westerly winds with high temperatures and low humidity. Worst seasons occur after prolonged periods of drought (Far North Coast Bushfire Management Plan 2017).

Over the expected lifespan of the Proposal, the climate is projected to change, potentially resulting in more days of higher fire danger than previously experienced, and projected Fire Danger Rating (FDR) exceeding current levels (Douglas, G. 2017). Planning for long term infrastructure should include consideration of the potential for increased fire danger and potentially higher fire frequencies.

### 3.2.2 Bushfire Prone Land

Bushfire Prone Land (BFPL) is land identified and mapped by Council, and certified by the Commissioner of the RFS, that can support a bushfire or is subject to bushfire attack. Bushfire prone land maps provide a trigger for development assessment provisions. Any land parcels affected must apply the legislative requirements for developing and building on bushfire prone lands.

The entire Proposal Area lies within BFPL or within a buffer area. The defined buffer area for Category 1 vegetation is 100m, and for Category 3 vegetation it is 30m. The construction and operational areas for the dam are within Category 1 BFPL or the buffer area (*Figure 2*). Category 1 vegetation is considered to be the highest risk for bushfire and is generally associated to Forest, Woodland, and Heath vegetation (RFS 2015).

The Grasslands at the southern end of the dam, and along Clarrie Hall Dam Road and Kyogle Road, are classified as Category 3 BFPL. Category 3 is considered to be medium bushfire risk. The proposed temporary workers accommodation facilities and all site/construction compounds are situated in Category 3 vegetation or within the buffer area.

The broader surrounding landscape is characterised by large tracts of Category 1 vegetation on steep and elevated areas, with flatter low lying areas and valleys containing Category 3 vegetation.

### 3.2.3 Vegetation

Vegetation surrounding the Clarrie Hall Dam is predominantly native forest characterised by Wet Sclerophyll Forest and Forested Wetland formations (Keith, 2004), interspersed with pasture grasslands (Grassland) associated with agricultural practices ([geo.seed.nsw.gov.au](http://geo.seed.nsw.gov.au)).

The proposed temporary workers accommodation facility WFA1 along Kyogle Road is located over Grassland with planted vegetation recorded along the roadside (EMM 2024). Forested Wetland occurs to the north and northeast associated with the Tweed River, and Wet Sclerophyll Forest occurs upslope to the east and southeast on the other side of Kyogle Road.

Clarrie Hall Dam Road traverses Grassland to the east with Wet Sclerophyll Forest present along the ridges extending down towards the road and WFA2, and Forested Wetlands to the west along Doon Doon Creek.

Further south around the proposed McCabes Bridge site compound and offices on Doon Doon Road, the vegetation is a mixture of Grassland associated to historical clearing and agriculture, and Wet Sclerophyll Forest associated with remnant bushland parcels, and riparian and road corridors. Elevated fuel loads are present within the road corridor, a result of unmanaged grasses and weeds and edge effects.

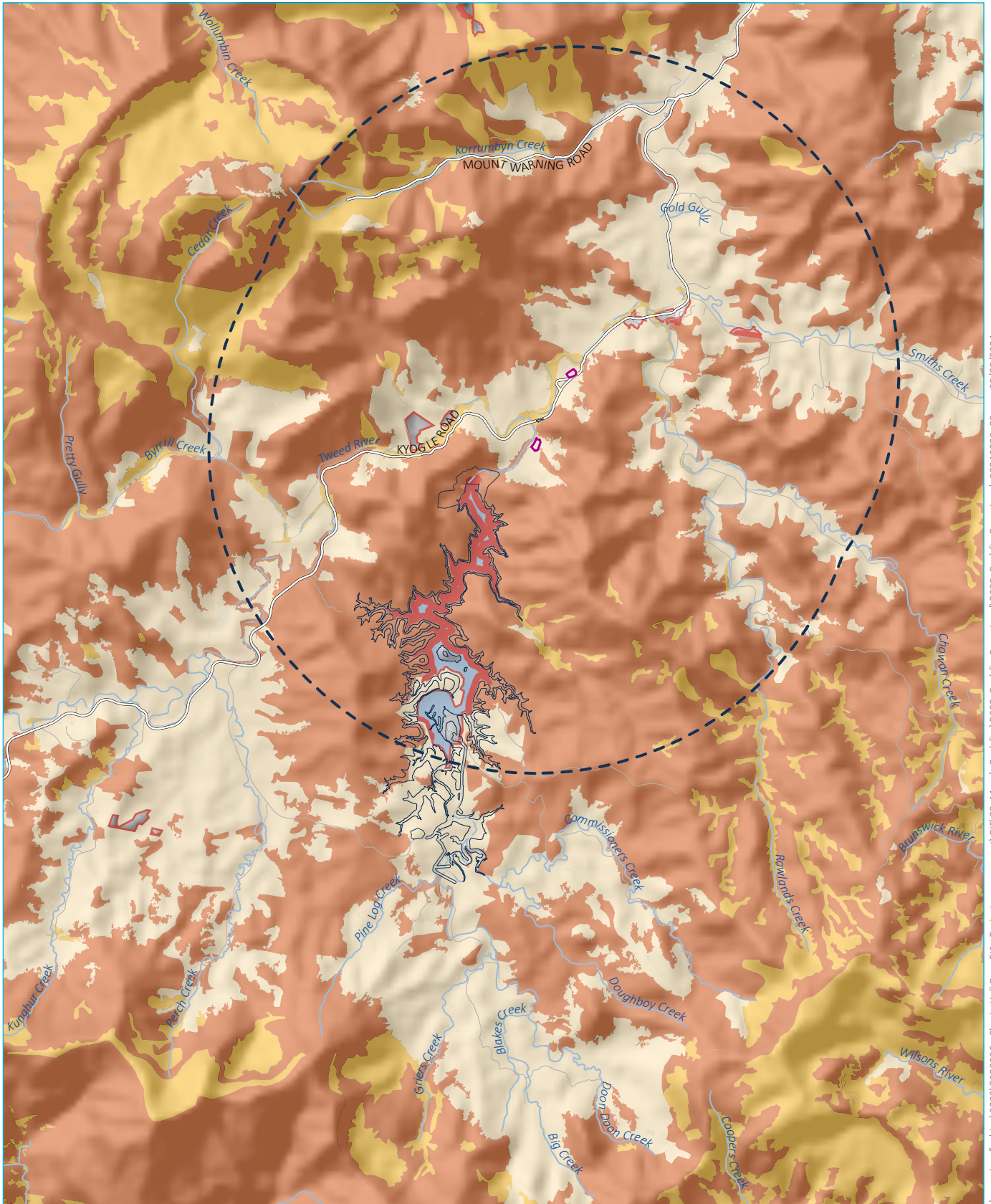
Vegetation details specific to the proposed temporary workers accommodation facilities, as they relate to the Bushfire Attack Level (BAL) and Asset Protection Zone setbacks, are further detailed in *Section 4.2*. Vegetation mapping is provided in *Figures 3.1* and *3.2* (EMM 2024).

### 3.2.4 Topography

The northern end of the dam is characterised by mild to steep slopes between 5° and 20°. The slopes from the dam and embankment are upslope (the hazard / bushfire prone vegetation lies upslope) in all directions. Clarrie Hall Dam Road traverses through flatter terrain with mild undulation following Doon Doon Creek. Slopes are generally of a western aspect towards Doon Doon Creek and range between 0 - 5° and 10 - 15°.

The southern end of the dam is of a generally flatter topography, with undulation occurring between the various creek tributaries and slopes tending east and north progressing down Doon Doon Road towards the base of the dam.

Slope details specific to the proposed temporary workers accommodation facilities, as they relate to the Bushfire Attack Level (BAL) and Asset Protection Zone setbacks, are further detailed in *Section 4.2*. Contour mapping is provided in *Figures 3.1* and *3.2* (EMM 2024).



Source: EMM (2024); KBS (2024); DCSSS (2023); NSW rfs (2024); GA (2011)

**KEY**

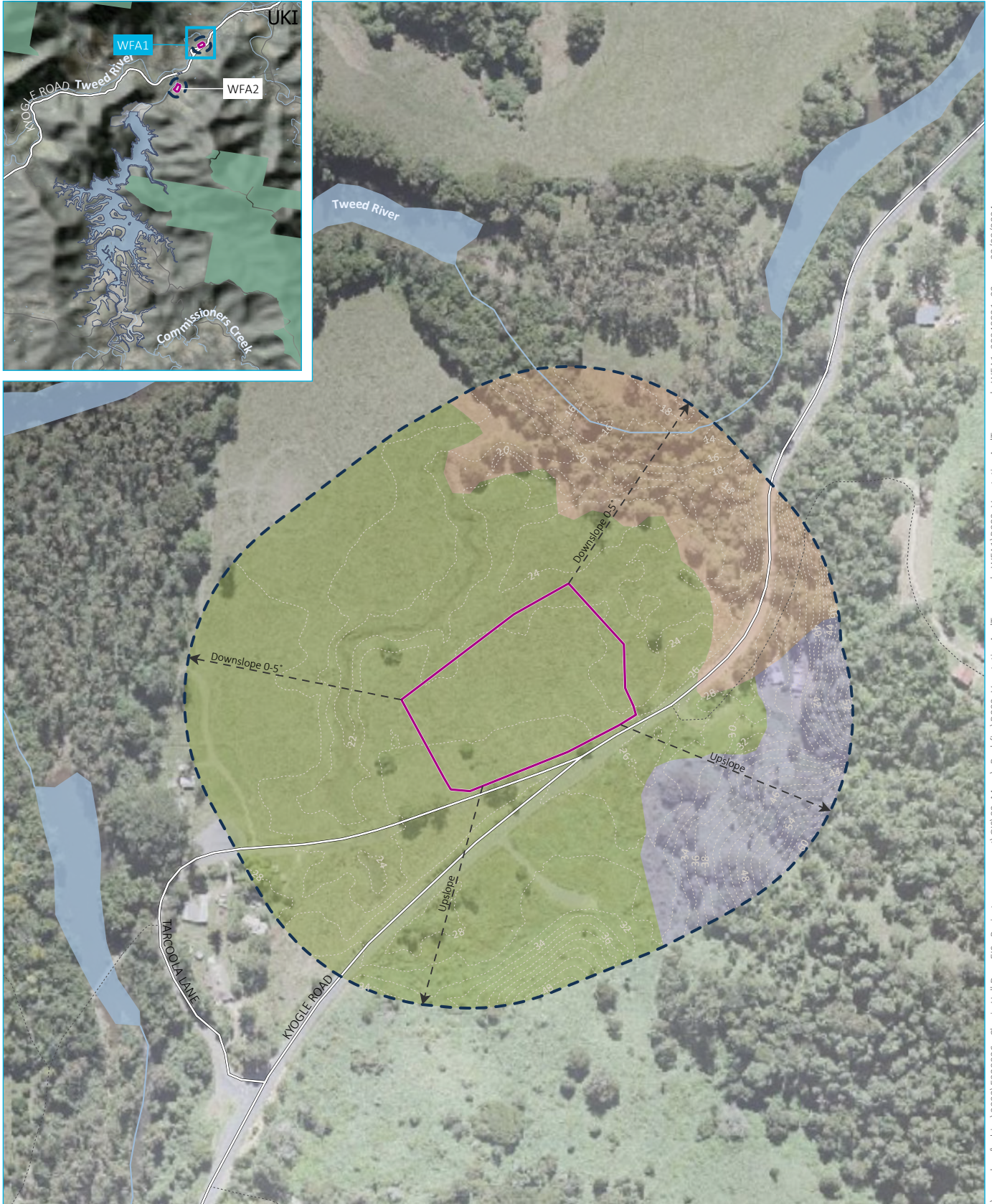
- |                                                        |                      |
|--------------------------------------------------------|----------------------|
| Proposed workers accommodation/concrete batching plant | Existing environment |
| Proposed location 5 km buffer                          | Major road           |
| Proposed construction disturbance footprint            | Minor road           |
| <b>Bushfire prone land</b>                             | Named watercourse    |
| Vegetation buffer                                      | Waterbody            |
| Vegetation category 1                                  |                      |
| Vegetation category 2                                  |                      |
| Vegetation category 3                                  |                      |

Bushfire prone land

Clarrie Hall Dam EIS  
 Bushfire Hazard Assessment  
 Figure 2



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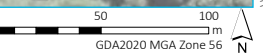


Source: EMM (2024); KBS (2023); DCSSS (2023); Sixmaps (2024); Coolburn (2024)

**KEY**

- Proposed workers accommodation/concrete batching plant
- Proposed construction disturbance footprint
- 140 m proposed location buffer
- Topographic contour (2 m interval)
- Slope direction (degree)  
Note: arrow indicates the effective slope beneath the classified vegetation ie. direction of fire run.
- Vegetation formation  
Forested wetland
- Wet sclerophyll forest
- Grassland
- Existing environment
- Major road
- Vehicular track
- Named watercourse
- Waterbody
- NPWS reserve (refer to inset)

Vegetation formations and contours  
WFA1 - Kyogle Road



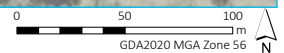
Clarrie Hall Dam EIS  
Bushfire Hazard Assessment  
Figure 3.1



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Source: EMM (2024); KBS (2023); DCSSS (2023); Sixmaps (2024); Coolburn (2024)



**KEY**

- ▭ Proposed workers accommodation/concrete batching plant
- Proposed construction disturbance footprint
- 140 m proposed location buffer
- Topographic contour (2 m interval)
- Slope direction (degree)  
Note: arrow indicates the effective slope beneath the classified vegetation ie. direction of fire run.

- Vegetation formation
- Forested wetland
- Wet sclerophyll forest
- Grassland
- Existing environment
- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve (refer to inset)

**Vegetation formations and contours  
WFA2 - Clarrie Hall Dam Road**

Clarrie Hall Dam EIS  
Bushfire Hazard Assessment  
Figure 3.2



\\emmm.local\drive\2023\E230036 - Clarrie Hall Dam EIS - Project management\GIS\02\_Maps\Bushfire\B004\_VegetationAndTopography\WFA2\_20240821\_04.aprx 23/08/2024

### 3.2.5 Fire History and Ignition

The main sources of ignition in the Far North Coast Bushfire Management Committee (BFMC) area are fire escape from legal or illegal fires (mainly prior to the introduction of the bush fire danger period), arson, and lightning strikes, resulting in, on average, 460 bushfires annually within the Committee area (Far North Coast BFRMP 2017).

Several large fires have impacted the Locality and have burnt vegetation down to Clarrie Hall Dam Road and the current dam embankment<sup>2</sup>. The following fires have occurred within 1km of the Proposal Area:

- Kyogle Road Fire – burnt >220ha of Forest north and west of the dam, down to the water line in some areas including the Proposal Area in 2019
- Gumboot Fire – burnt 607ha of Forest to the north and east of the dam down to the dam embankment in 2007/08
- Wildfire – burnt 736ha of Forest to the edge of the eastern side of the dam in 1992/93
- Wildfire – burnt 389ha of Forest across the Byrill Ridge to the west of the dam in 1991/92
- Wildfire – burnt 618ha of Forest and Grassland south of the dam in 1980/81
- Wildfire – burnt 13ha of Forest on the eastern edge of the dam within Mount Jerusalem National Park in 1974/75
- Wildfire – burnt 153ha of Forest and Grassland in the southeastern area of the dam in 1971/72.

## 3.3 IMPACTS AND CHANGES TO BUSHFIRE RISK

The risk profile of the Clarrie Hall Dam is unlikely to be significantly altered by the raising of the dam embankment. The notable difference will be during construction where high risk activities could result in an increased risk of ignition. High risk activities include but aren't limited to hot works (e.g., grinding and welding), vegetation slashing, and vehicles traversing long grass.

Ignition sources should be identified and managed for high risk activities through Emergency Management Planning (*Section 4.7*), a Construction Environmental Management Plan (CEMP), and the Health and Safety systems of the contractor and individual sub-contractors. This should include restrictions to activities on elevated FDR days and during Total Fire Bans (TOBANS) (i.e. permitting requirements or a ban on specific activities). Additional measures to be incorporated into the CEMP include (but aren't limited to) designated smoking areas and cigarette disposal, appropriate refuelling locations, appropriate storage and signage of hazardous and flammable materials, and testing of electrical equipment (test and tag).

At the southern end of the dam, electrical infrastructure will be realigned. Bushfire risk is to be assessed and managed by the utility company performing these services.

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<sup>2</sup> Source: NSW Bushfire History ([geo.seed.nsw.gov.au](http://geo.seed.nsw.gov.au))

Positive impacts arising from the Proposal will include the establishment of appropriate vegetation setbacks, also known as Asset Protection Zones, as well as prescribed landscaping and management. Upgrades to civil infrastructure will support access requirements for emergency services that may be required to attend a bushfire event at the dam or in the area, and water resources established for bushfire protection during construction should remain if appropriate. The increased level of site observation may also aid in early detection of ignition.

There is the risk that arson could occur (such as the burning of a stolen car) although it is unlikely that this risk will increase as a result of construction or operational activities. Security measures should be incorporated as deemed appropriate by TSC.

## 4. BUSHFIRE PROTECTION MEASURES

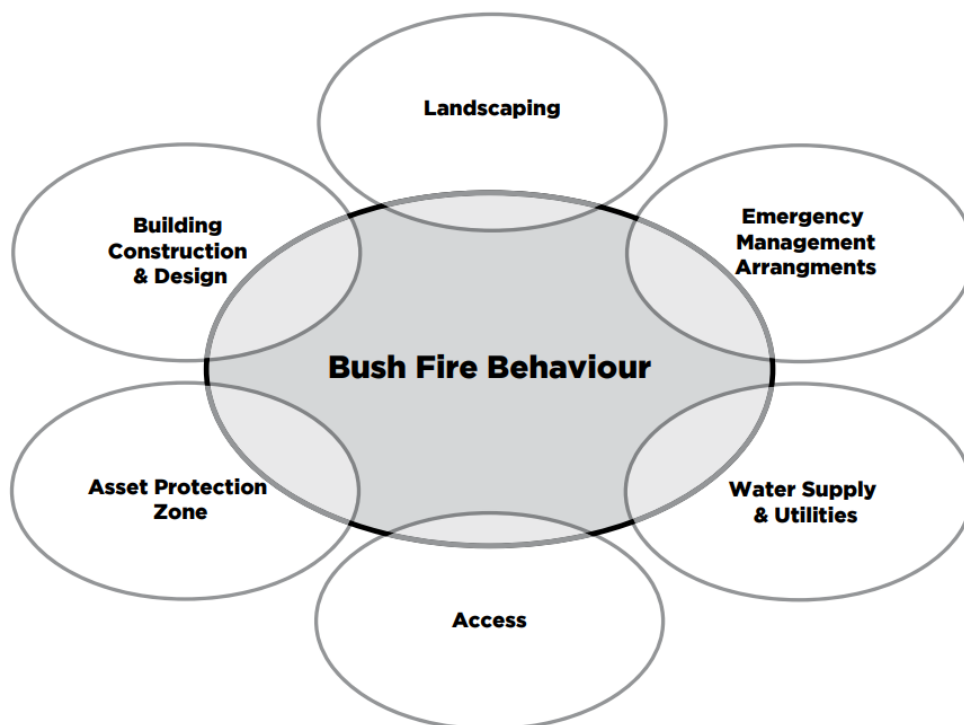
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### 4.1 APPLICATION

The *construction and operational areas* for all development works will be assessed under Chapter 8 (Other Development) of PBP 2019. The *proposed temporary workers accommodation facilities* will be assessed against the principles and criteria of Chapter 5 (Residential and Rural Residential Subdivision), acknowledging Chapter 8.2.1 of PBP 2019.

The Bushfire Protection Measures (BPMs) for the Proposal includes provisions relating to (Plate 1):

- Asset Protection Zone (APZ) and easement landscape management actions (including, but not limited to slashing, mowing, landscaping & garden maintenance and fire breaks) required to protect assets and prevent the spread of fire
- Building and construction requirements, commensurate with the purpose/use and constructions of the structures and, where applicable, the quantified bushfire attack level (BAL) ratings
- Access provisions (e.g. public access, property access and fire trails)
- Water supply and utilities (power) provisions
- Emergency management arrangements, consistent with the relevant emergency services requirements.



**Plate 1: Bushfire Protection Measures**

## 4.2 ASSET PROTECTION ZONES

The APZ is a fuel-reduced, physical separation between structures / assets and bushfire hazards, which would provide sufficient space and maintain reduced fuel loads to ensure radiant heat level exposure is below critical limits and prevent direct flame contact to any Project related structure.

An APZ also allows emergency services access and provides a safer area for firefighters to defend assets. Additionally, an APZ provides an area to prevent any fire occurring within structures (e.g. electrical fire) to ignite and spread into the surrounding vegetation and subsequently be the cause for a bushfire.

APZs will require establishment and maintenance around all buildings, significant infrastructure, and other structures in accordance with Appendix 4 PBP 2019 for an Inner Protection Area and the RFS Standards for Asset Protection Zones (see Landscaping *Section 4.3* below). The recommended APZs for the Proposal are described per application area below and illustrated in *Figures 4.1* and *4.2*.

### **Construction and operational areas**

APZs around the construction and operational areas are specific to buildings, and significant infrastructure as deemed appropriate by the TSC commensurate to the risk of loss. APZs aren't considered necessary around open areas of construction such as quarries and earthworks including haul roads, conversely these areas can be used to form a particular APZ to support asset protection. The APZs should be designed to be within the disturbance footprint to avoid any additional clearing of vegetation, this may involve micro-siting of offices for example, or a detailed assessment to reduce the modelled APZ for that particular asset may be considered (i.e., is clearing 5m of additional vegetation commensurate to the value / risk of loss of a temporary storage unit).

The APZs for constructional and operation areas have been provided in *Table 2*. A 15m APZ is recommended for all structures, where feasible. Notably, APZs may be constrained by environmental values including the clearing of native vegetation.

There are no specified APZ performance criteria in PBP 2019 for such structures however the intent is to meet the objective and offer a defensible space and to mitigate intense radiant heat and direct flame zone (i.e. BAL flame zone (FZ)). A minimum 15m APZ will achieve the objective, as per Table A1.12.6 of PBP 2019 for an FDI 80 region. If the APZ is constrained, then tolerable risk must be assessed (i.e. the cost of additional clearing assessed against the risk of losing the asset).

**Table 2: Asset Protection Zones – Construction and Operational Areas**

Area / Structure	Asset Protection Zone
Class 5 – 8 buildings including all offices and the concrete batching plant, and significant infrastructure including the dam embankment.	A 15m APZ where possible is recommended for such buildings and infrastructure due to the proximity and distribution of bushfire prone vegetation around the construction footprint. The APZ must be wholly within the boundaries of the development footprint and can include areas cleared for construction works such as lay down areas. It must be maintained for the duration of the construction activity, and for the life of the dam for any operational area.
Class 10 structures including all sheds, containers, other storage spaces, amenities facilities, public shelters, and fences.	A minimum 15m APZ is recommended around these structures. The APZ must be wholly within the boundaries of the development footprint be maintained for the duration of the construction activity, and for the life of the dam for any operational facilities. Where the opportunity to increase this distance arises, due to disturbance or clearing associated to the Proposal, this option should be considered to reduce the risk of loss during a bushfire event.

**Proposed temporary workers accommodation facilities**

To determine the appropriate APZ setbacks for the proposed temporary workers accommodation facility, as per Method 1 of AS 3959 *Construction of building in bushfire prone areas*, the bushfire assessment methodology assesses the vegetation classification on and surrounding the site out to 140 metres in accordance with the system for classification of vegetation contained in PBP 2019 and detailed in Section 3.2.3 above. The methodology then assesses the slope of the land supporting bushfire prone vegetation on and surrounding the temporary workers accommodation facility out to 100 metres from the boundaries of the facility. APZ setbacks are then identified as per Table A1.12.3 of PBP 2019 (FDI 80 region), to achieve a radiant heat level 29kW/m<sup>2</sup> or less, known as Bushfire Attack Level (BAL) BAL 29.

The results of this assessment, and the APZs required for each temporary workers accommodation facility, have been provided in Table 3.

**Table 3: Asset Protection Zones – Proposed Temporary workers accommodation facilities**

Temporary workers accommodation facility	Vegetation	Slope	Asset Protection Zone Table A1.12.3 of PBP 2019
WFA1 Kyogle Road	Forested Wetland	Northeast Downslope 0-5°	10m
	Wet Sclerophyll Forest	Southeast Upslope	20m
	Grassland	Southwest Upslope	10m
	Grassland	Northwest Downslope 0-5°	11m

Temporary workers accommodation facility	Vegetation	Slope	Asset Protection Zone Table A1.12.3 of PBP 2019
WFA2 Clarrie Hall Dam Road	Wet Sclerophyll Forest	Northeast Upslope	20m
	Wet Sclerophyll Forest	Southeast Upslope	20m
	Forested Wetland	Southwest Downslope 0-5**	10m
	Forested Wetland	Northwest Downslope 10-15°	17m

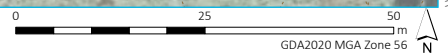
\*Slope assessment acknowledges the increased gradient along Doon Doon Creek bank, the effective slope has been assessed on the average slope between the vegetation and WFA2.

Establishment and maintenance of the above APZs will ensure that radiant heat exposure to the perimeter accommodation structures will not exceed 29kW/m<sup>2</sup>, based on existing vegetation and slope. All APZs should be wholly within the boundaries of the development, unless it can be assured that maintenance will meet the acceptable standards for the life of the project (i.e. sealed road surface).

Considering implementation of the above recommendations, the Proposal has capacity to meet the acceptable solutions for APZ in PBP 2019.



Source: EMM (2024); KBS (2023); DCSSS (2023); Sixmaps (2024); Coolburn (2024)



**KEY**

- |                                                        |                               |
|--------------------------------------------------------|-------------------------------|
| Proposed workers accommodation/concrete batching plant | Existing environment          |
| Proposed construction disturbance footprint            | Major road                    |
| Indicative asset protection zone (APZ)                 | Named watercourse             |
| APZ offset distance                                    | Waterbody                     |
| Topographic contour (2 m interval)                     | NPWS reserve (refer to inset) |

**Asset protection zones (APZ)**  
WFA1 - Kyogle Road

Clarrie Hall Dam EIS  
Bushfire Hazard Assessment  
Figure 4.1

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Source: EMM (2024); KBS (2023); DCSSS (2023); Sixmaps (2024); Coolburn (2024)

**KEY**

- Proposed workers accommodation/concrete batching plant
- Proposed construction disturbance footprint
- Indicative asset protection zone (APZ)
- APZ offset distance
- Topographic contour (2 m interval)
- Existing environment
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve (refer to inset)

**Asset protection zones (APZ)  
WFA2 - Clarrie Hall Dam Road**

Clarrie Hall Dam EIS  
Bushfire Hazard Assessment  
Figure 4.2



\\emmm.local\drive\2023\E230036 - Clarrie Hall Dam EIS - Project management\GIS\02\_Maps\Bushfire\B007\_APZ\WFA2\B007\_APZ\WFA2\_20240821\_03.aprx 23/08/2024

## 4.3 LANDSCAPING

The Proposal will require vegetation clearing within the construction footprint. Where vegetation is retained or reinstated (revegetation), it will require appropriate landscape management.

Vegetation within the APZ, the construction and operational areas, and the temporary workers accommodation facility would be managed to the prescribed standards for an Inner Protection Area (IPA) as detailed in PBP 2019 Appendix 4, and below:

### **Trees**

- Tree canopy cover should be less than 15% at maturity
- Trees at maturity should not touch or overhang the building
- Lower limbs should be removed up to a height of 2m above the ground
- Tree canopies should be separated by 2 to 5m
- Preference should be given to smooth barked and evergreen trees.

### **Shrubs**

- Large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided
- Shrubs should not be located under trees
- Shrubs should not form more than 10% ground cover
- Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

### **Grass**

- Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height)
- Leaves and vegetation debris should be removed.

Maintenance of the APZ to IPA standards will be required for the duration of the construction activity, and for the life of the dam for any operational area. It is recommended that shrubs are avoided at the temporary workers accommodation facility to minimise risk, maintenance requirements and cost.

Landscaping requirements should be incorporated into a Vegetation Management Plan, to ensure the activities are delivered with regularity and the above criteria can be consistently achieved.

Considering implementation of the above recommendations, the Proposal has capacity to demonstrate the acceptable solutions for Landscaping in PBP 2019.

## 4.4 CONSTRUCTION

Bushfire Attack Level (BAL) is a means of measuring the ability of a building to withstand attack from bushfire. The BAL is defined in *Australian Standard AS 3959-2018 Construction of buildings in bushfire-prone areas* (AS 3959-2018).

There are no specific bushfire protection requirements for project-related infrastructure. The general fire safety construction provisions are taken as acceptable solutions however construction requirements for bushfire protection will need to be considered on a case-by-case basis (PBP 2019). Appropriate construction mitigation measures will be implemented to promote resilient structures.

Residential development (proposed temporary workers accommodation) assessed under Chapter 8 of PBP 2019 must also meet the requirements of Chapter 7 of PBP 2019. The increase in residential density does not require separate approval, however, the same principles and criteria associated with subdivisions in bush fire prone areas will apply. This includes ensuring an APZ based on a radiant heat threshold of 29kW/m<sup>2</sup> for any new dwellings, along with suitable provision for construction, access, water and landscaping.

Any temporary prefabricated demountable units associated to site offices and the temporary workers accommodation facility will be constructed to comply with Sections 3 and 5-7 of AS 3959-2018, or NASH Standard *National Standard Steel Framed Construction in Bushfire Areas – 2014* as appropriate, and Section 7.5 of PBP 2019<sup>3</sup>.

The maximum construction level allowable is BAL 29. This will be achieved with the establishment of APZs as per *Section 4.2 APZ*. This will apply to structures closest to the vegetation hazard and potentially not all structures will be within BAL 29; the BAL may reduce for structures that are further away from bushfire prone vegetation (if deemed necessary and subject to further assessment upon confirmation of the preferred WFA).

Implementation of the above recommendations will ensure the aims and objectives of PBP 2019 (Chapter 1) have been achieved.

## 4.5 ACCESS

The intent of access measures is to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area. The current access roads that will be used for the Proposal area described below:

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<sup>3</sup> This section details additional construction requirements adopted by PBP 2019 over and above some AS 3959-2018 and the NASH Standards (NSW variations).

- Kyogle Road – Kyogle Road runs across the north and down the west side of the Proposal Area, connecting Uki to Kunghur. It is an all weather sealed through road, approximately 8m in width. Notably, there are RFS brigades at both Uki and Kunghur. The proposed WFA1 is located on Kyogle Road.
- Clarrie Hall Dam Road – Access to the dam embankment construction and operational area, and proposed WFA2, will be provided from Clarrie Hall Dam Road that runs northeast from the dam, joining to Kyogle Road. Clarrie Hall Dam Road which is an all weather sealed road approximately 7m in width. It is a no through road terminating at the Clarrie Hall Dam. A lockable gate is present at the entry to Clarrie Hall Dam Road.
- Doon Doon Road and Commissioners Creek Road – The McCabes Bridge construction area and site compound is accessed via Doon Doon Road, which also joins on to Kyogle Road. Doon Doon Road is an all weather sealed road approximately 7m in width. It links on to Commissioners Creek Road for access to McCabes Bridge and the site compound. Doon Doon Road is a no through road.

These access roads are all public roads and will provide a >4m wide all weather carriageway for the life of the project.

The dam construction phase requires heavy vehicle access to support the transportation and storage of dam infrastructure along both Kyogle and Clarrie Hall Dam Road. It is recommended that this construction access is maintained for the life of the development. Similarly, Doon Doon Road is likely to support heavy vehicle traffic. As such, all access roads will be inherently capable of supporting Cat-1 fire vehicle access consistent with the following NSW RFS Fire Trail Standards (NSW RFS 2019):

- The width and capacity of the access provides for safe, reliable and unobstructed passage by a Cat 1 firefighting vehicle within acceptable operational limits:
  - The trafficable surface has a minimum width of 4m (planned double lane access).
  - The access has a minimum 4m height clearance overhead, free from any obstructions.
  - Curves inner radius 6m.
  - Crossfall less than 6 degrees.
  - Surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of 9 tonnes.
  - Turnaround provisions of 22m diameter or T junction at the termination of each access track and in position of the dedicated water supply tanks (requires verification).
  - Drainage and wet areas crossing are trafficable (where possible) or avoided.

The proposed temporary workers accommodation facility WFA2 is proposed on a no through road and the primary access is achieved through Forest, increasing the risk if evacuation is required. If WFA2 were to be progressed, the following recommendations are made:

- Access roads are to provide a minimum trafficable width of 6m (in accordance with Table 7.4a PBP 2019). Where this cannot be achieved, turning points and passing bays are established in accordance with the NSW RFS Fire Trail Standards (NSW RFS 2019).

A higher reliance on the emergency management and evacuation planning would be necessary, in particular evacuation triggers, as well as passive fire protection such as APZs.

Considering implementation of the above recommendations, the Proposal will meet the acceptable solutions for Access in PBP 2019.

## 4.6 WATER AND UTILITIES

The Proposal will provide adequate services of water for the protection of structures and suppression of bushfire and will locate gas and electricity so as not to contribute to the risk of fire.

Although the dam can provide sufficient volumes of water, appropriate access and connection would be necessary for attending fire services if this was to be considered an option.

A 20,000L water tank (static water supply) constructed of non-combustible material (steel or concrete) is recommended for construction operations and the temporary workers accommodation facility. One of these tanks must be established at the preferred temporary workers accommodation facility location, the other should be established at the site compound at the southern end of the dam. The tank at the temporary workers accommodation facility will be used independently of water requirements to support fire suppression around the facility (e.g. fire hoses and sprinkler systems). This will ensure a water supply is available for attending firefighting services.

Specific to the temporary workers accommodation facility, the static water and hydrant supply will be provided, and comply the following requirements of PBP 2019:

- A minimum 20,000L static water supply (above ground storage steel or concrete tank)
- Connections suitable for firefighting purposes located within the temporary workers accommodation facility, being 65 mm Storz outlets
- Any electrical water pumps feeding the tanks should have a secondary alternative in the event of power failure (i.e. diesel pumps)
- Any installed fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005
- Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005
- A fire hose reel system be constructed at the temporary workers accommodation facility in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005
- Unobstructed access to water supply points at all times

- All above-ground water service pipes are metal, including and up to any taps.

It is recommended that electricity and gas provisions to the temporary workers accommodation facility are installed to relevant standards and will limit the possibility of ignition of surrounding bushland or the fabric of buildings or structures, and these elements can be engineered into any future design scenarios.

The proposed water and services design for this development have capacity to meet the PBP 2019 performance criteria requirements.

## 4.7 EMERGENCY MANAGEMENT AND EVACUATION PLANNING

Emergency management is required prior to construction and will be relevant during construction, and operation stages.

It is recommended that an emergency management plan (EMP) be prepared in accordance with the NSW RFS Guide to Developing a Bushfire Emergency Management and Evacuation Plan (2014) and implemented for the lifetime of the project. The EMP should detail the mitigation measures associated with the construction and operation of the project, and relevant recommendations made in this report. The EMP should include:

- Detailed measures to identify, prevent, and mitigate fires igniting (ignition sources) e.g.:
  - hot works permits for works which may result in the ignition of fire
  - hot works not to be carried on Extreme or catastrophic Fire Danger Rating days or Total Fire Ban days, or when local authorities or the Site Manager deems weather conditions too dangerous
- Roles, responsibilities, and 24-hour emergency contact details including alternative telephone contact
- Inductions for construction personnel on bushfire risk management and other fire related risks that could present at the project site, the project bushfire contingency plan and emergency response procedures
- Availability of fire-suppression equipment, access, and water including site infrastructure plans and site access and internal road plans
- Location of hazards (physical, chemical, electrical) that will impact on the firefighting operations and procedures to manage any identified hazards during firefighting
- Storage, maintenance, and appropriate signage of fuels and other flammable materials
- Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate
- Situational awareness and evacuation planning, including:

- how situational awareness will be managed (bushfire alert levels, local fire weather information sources and details)
- fire response and evacuation matrix
- evacuation procedures, evacuation routes, and neighbourhood safer places
- Additional matters as agreed and required by the NSW RFS District Office.

A separate and site specific EMP should be developed for the temporary workers accommodation, with a detailed focus on situational awareness and evacuation.

Considering implementation of the above recommendations, the Proposal has capacity to demonstrate the acceptable solutions for emergency management and evacuation planning in PBP 2019.

## 4.8 CONSULTATION

In accordance with Chapter 2.4.2 of PBP 2019 (State Significant Development and Infrastructure), development applications do not require a Bushfire Safety Authority; the RFS will provide comment on the Proposal and the Strategic Bushfire Study during the public exhibition and agency review phase. However, given the scale of the Proposal, consultation with RFS is still encouraged and recommended by this report.

Early consultation with the Tweed Fire Control Centre is recommended. This report would be provided to the RFS for review and comment.

Engagement and liaison with local RFS brigades (1<sup>st</sup> attending brigades – Uki and Kunghur) should also occur preceding the emergency management and evacuation planning.

Consultation with the RFS, and other stakeholders regarding bushfire management and planning, can be ongoing and details of any consultation (meetings, workshops, etc.) should be recorded. A table has been provided in *Attachment 1* and this could be populated accordingly.

## 5. SUMMARY OF RECOMMENDATIONS

In summary, the broad principles which apply to a Strategic Bushfire Study have been demonstrated to find that:

- The site is suitable for development in the context of bushfire risk, but is constrained by environmental values
- The development on bushfire prone land can satisfy the aims and objectives PBP, but recognises some environmental impacts must be considered and approved
- The planning and design can avoid performance-based solutions
- The planning and design would provide for adequate infrastructure associated with emergency evacuation and firefighting operations.

The Strategic Bushfire Study doesn't provide comment on the preferred temporary workers accommodation, rather it details the performance of each proposed location against relevant performance criteria and the aims and objectives of PBP 2019.

The bushfire protection measures and recommendations made in this report have been summarised in *Table 4*. With the provisions of these recommendations, the Clarrie Hall Dam Raising Proposal has capacity to demonstrate the aims and objectives and specific performance criteria of PBP 2019.

**Table 4: Summary of Recommendations**

Bushfire Protection Measure	Section	Recommendations
Asset Protection Zone	4.2	<ul style="list-style-type: none"> <li>• A minimum 15m APZ is recommended for Class 5 – 8 buildings and significant infrastructure.</li> <li>• The APZ must be wholly within the boundaries of the development footprint and can include areas cleared for construction works such as lay down area.</li> <li>• APZ must be maintained for the duration of the construction activity, and for the life of the dam for any operational area.</li> <li>• A minimum 15m APZ is recommended for Class 10 structures including all sheds, containers, other storage spaces, amenities facilities, public shelters, and fences.</li> <li>• The APZ for the preferred temporary workers accommodation facility must align with the details for that facility as provided in <i>Table 3</i>.</li> <li>• All APZs will require establishment and maintenance in accordance with Appendix 4 PBP 2019 for an Inner Protection Area and the RFS Standards for Asset Protection Zones, these works should be detailed and delivered under a Vegetation Management Plan.</li> </ul>
Landscaping	4.3	<ul style="list-style-type: none"> <li>• Landscaping will be established and maintained in accordance with Appendix 4 PBP 2019 for an Inner Protection Area and the RFS Standards for Asset Protection Zones, these works should be detailed and delivered under a Vegetation Management Plan.</li> </ul>

Construction	4.4	<ul style="list-style-type: none"> <li>All buildings at the temporary workers accommodation facility will provide for minimum radiant heat and ember protection consistent with BAL 29 or less construction standards (AS3959-2018).</li> </ul>
Access	4.5	<ul style="list-style-type: none"> <li>All roads must maintain the following minimum requirements to provide safe, reliable and unobstructed passage by a Cat 1 firefighting vehicle           <ul style="list-style-type: none"> <li>The trafficable surface has a minimum width of 4 m (planned double lane access).</li> <li>The access has a minimum 4m height clearance overhead, free from any obstructions.</li> <li>Curves inner radius 6m.</li> <li>Crossfall less than 6 degrees.</li> <li>Surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of 9 tonnes.</li> <li>Turnaround provisions of 22m diameter or T junction at the termination of each access track and in position of the dedicated water supply tanks (requires verification).</li> <li>Drainage and wet areas crossing are trafficable (where possible) or avoided.</li> </ul> </li> <li>Access roads are to provide a minimum trafficable width of 6m. Where this cannot be achieved, turning points and passing bays are established in accordance with the NSW RFS Fire Trail Standards (NSW RFS 2019).</li> </ul>
Water and utilities	4.6	<ul style="list-style-type: none"> <li>A 20,000L static water supply tank, constructed of non-combustible material (steel or concrete), is provided for construction operations and temporary workers accommodation facilities</li> <li>One tank must be placed at the preferred temporary workers accommodation facility, the other tank should be established at the site compound at the southern end of the dam</li> <li>Connections suitable for firefighting purposes located within the temporary workers accommodation facility, being 65 mm Storz outlets</li> <li>Any installed fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005</li> <li>Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005</li> <li>A fire hose reel system be constructed at the temporary workers accommodation facility in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005</li> <li>Unobstructed access to water supply points at all times</li> <li>All above-ground water service pipes are metal, including and up to any taps.</li> <li>Electricity and gas provisions to the temporary workers accommodation facility are installed to relevant standards and will limit the possibility of ignition of surrounding bushland or the fabric of buildings or structures.</li> </ul>
Emergency management and evacuation	4.7	<ul style="list-style-type: none"> <li>An Emergency Management Plan (EMP) is developed that includes:           <ul style="list-style-type: none"> <li>Detailed measures to prevent or mitigate fires igniting e.g.:</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>○ hot works permits for works which may result in the ignition of fire</li> <li>○ hot works not to be carried on Extreme or catastrophic Fire Danger Rating days or Total Fire Ban days, or when local authorities or the Site Manager deems weather conditions too dangerous</li> <li>▪ Roles, responsibilities, and 24-hour emergency contact details including alternative telephone contact</li> <li>▪ Inductions for construction personnel on bushfire risk management and other fire related risks that could present at the project site, the project bushfire contingency plan and emergency response procedures</li> <li>▪ Availability of fire-suppression equipment, access, and water including site infrastructure plans and site access and internal road plans</li> <li>▪ Location of hazards (physical, chemical, electrical) that will impact on the firefighting operations and procedures to manage any identified hazards during firefighting</li> <li>▪ Storage, maintenance, and appropriate signage of fuels and other flammable materials</li> <li>▪ Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate</li> <li>▪ Situational awareness and evacuation planning, including:             <ul style="list-style-type: none"> <li>▪ how situational awareness will be managed (bushfire alert levels, local fire weather information sources and details)</li> <li>▪ fire response and evacuation matrix</li> <li>▪ evacuation procedures, evacuation routes, and neighbourhood safer places</li> <li>▪ Additional matters as agreed and required by the NSW RFS District Office.</li> </ul> </li> <li>• A separate and site specific EMP should be developed for the temporary workers accommodation with a detailed focus on situational awareness and evacuation</li> <li>• The EMPs should be provided to the RFS (Tweed Fire Control Centre) for review and comment</li> <li>• Engagement with Uki and Kunghur RFS should also occur as part of the Emergency Management and Evacuation Planning stage.</li> </ul>
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## 6. REFERENCES

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## ATTACHMENT 1. CONSULTATION

Stakeholder	Date	Agenda / Minutes / Outcomes and Actions