

KHS ECOLOGY & BUSHFIRE

Bushfire Assessment Report

*Hornsby Park Embellishment project,
REF components: Old Man's Valley, Quarry Void
Bushland Connections and Crusher Plant precincts*



April 2023 Tender Issue

Prepared for: Clouston Associates and Hornsby Shire Council

Prepared by: KHS Ecology & Bushfire Pty Ltd

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Prepared for:	Clouston Associates design team
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Method/Approach	The bushfire protection measures will be a performance solution for the recreational (non-residential) nature of the proposal. The final decision on bushfire protection measures required for the development will be the responsibility of Hornsby Shire Council and the NSW Rural Fire Service, informed by this report and the relevant Clouston Associates and other specialists design plans.
Declaration	I declare that this Bushfire Assessment Report has been prepared in accordance with the requirements of the current legislated document <i>Planning for Bush Fire Protection</i> 2019, as far as practical and based on the information provided by Clouston Associates and the design team. To the best of my knowledge the information presented is accurate within the scope required and as relevant to the location and type of development.  Dr Kate Hammill <i>Graduate Diploma in Bushfire Protection (WSU), PhD BSc Hons (USyd)</i> KHS Ecology & Bushfire Pty Ltd Ecologist and Bushfire Consultant M: 0407021472 E: KHSecologybushfire@bigpond.com

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Executive Summary

Hornsby Shire Council is intending to transform the Hornsby Quarry site into a new major parkland reserve, to be known as the Hornsby Park. The parklands will include a range of new facilities for passive and active recreation, including sports fields and amenities, walking tracks and lookouts, mountain bike trails, a canopy skywalk, playgrounds, picnic areas as well as overnight accommodation and outdoor events venues.

Clouston Associates is the principal design consultant for the project, known as the Hornsby Park Embellishment (HPE) project. The HPE is being undertaken in stages, with some components being addressed through an EP&A Act Part 5 Review of Environmental Factors (REF) process and a later stage through a Development Application (DA). Note that the later DA stage of the project is not addressed in this report.

The REF components of the HPE project comprise facilities and landscaping at four main precincts.

- **Precinct A, Old Man's Valley**– The first entry point for most visitors in the eastern part of the site with an orientation space, playing fields, play equipment and picnic area, and amenities building cluster and staff/maintenance depot (refer to plans in **Appendix A**). This precinct has carparking space and is proposed to be accessible by a public road from.
- **Precinct B, Quarry Void**– Parkland in the quarry centre to include lawns and a wetlands/freshwater lake, amenity buildings, circular paths and lift access and on the northern loop road (refer to plans in **Appendix B**). This precinct is proposed to be accessible by management road only, not a public road.
- **Precinct C, Bushland connections**– Native forest areas and paths connecting the various precincts, including Canopy Skywalk and new walking and mountain bike tracks connecting to existing mountain bike tracks and bushwalks (Berowra Valley National Park) (refer to plans in **Appendix C**). This precinct is proposed to be accessible to the public by walking and mountain bike tracks only.
- **Precinct F, Crusher Plant**– Located in the southern part of the site and centred around the old crusher plant building, remnant of the quarry workings, with passive recreation open space, connections with skywalk, and walking and mountain bike tracks, and car park and terrace (refer to plans in **Appendix H**). This precinct is proposed to be accessible to the public by walking and mountain bike tracks as well as via Quarry Road.

This Bushfire Assessment Report aims to set out the how the HPE design (for the REF scope) meets the aims and objectives of *Planning for Bush Fire Protection 2019* (PBP), as far as relevant for the recreational nature of the current proposed facilities and site layout. The proposed amenities and maintenance buildings are Class 5-9 buildings under the National Construction Code (NCC), and Class 10b for the Canopy Skywalk. These buildings do not include any accommodation or major public venues of greater than 500m² floor area and are thus not considered to be Special Fire Protection Purpose (SFPP) for bushfire protection purposes.

The following objectives of PBP Chapter 8 'Other Development' are relevant to Class 5-9 buildings and need to be addressed.

- *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.*

This report outlines the following BPMs that are proposed and achievable for the proposed site layout.

- **Asset Protection Zone.** APZ setbacks are to be established to building clusters in Old Man's Valley and Quarry Void precincts to distances commensurate with 'Residential', where possible. This approach is relevant to commercial and industrial developments on bush fire prone land, as stated in PBP Chapter 8 'Other Development'. The APZ have been determined in **section 2.6** of this report and mapped in **Figure 2-8** and **Figure 2-9**. A formalised APZ is not applied to Precinct C Bushland Connections due to this being a transitional recreational area and surrounded by environmental constraint existing forest vegetation. Building fire safety and construction will contribute to bushfire risk mitigation in this area (refer to **Figure 2-10**). A formalised APZ is not applied to Precinct F Crusher Plant due to no new buildings currently proposed, although the landscaped areas provide the opportunity for a low fuel managed zone to future buildings when required (refer to **Figure 2-11** and **Appendix H**).
- **Construction.** Bushfire protection to all proposed buildings at Old Man's Valley and Quarry Void parkland precincts will be provided by the general fire safety construction provisions of the NCC and utilisation of non-combustible materials. The bushfire construction standards set out in AS3959 can be used as a guide for buildings that are offices or other habitable spaces, but are not mandatory for the type of use (being non-residential) and will be unsuitable for certain buildings, such as storage spaces where ventilation is a requirement.
- **Access.** The bushfire access and water supply plan in **Appendix F** illustrates the vehicle access and There is an effective loop road providing egress away from the areas of higher bushfire risk areas on the northern and western side of the site, towards lower risk on the east and south. Roads and turning areas are to be constructed to the specifications set out in Table 5.3b of PBP 2019, where possible, which is outlined in **section 3** of this report.
- **Water supply.** Water supply for fire-fighting can be provided by extension of the reticulated water system into the Old Man's Valley and Quarry Void precincts, and provision of fire hydrants to AS 2419.1 plus addition 'bushfire' hydrants approximately every 150m to 200m separation where there are vehicle manoeuvre points in the road network, at road junctions and roundabouts. Static water supply will be provided at the carpark near the maintenance depot, which is at the end of the public road in the Old Man's Valley precinct, providing a 20,000L dedicated fire-fighting water supply in a strategic location. The bushfire access and water supply plan is shown in **Appendix F**.
- **Electricity services.** These should be underground, where practical, and for overhead powerlines, the vegetation managed to distances specified in ISSC3 *Guidelines for Managing Vegetation Near Power Lines*.
- **Gas supply** is not proposed to be installed; all barbeques will be electric. If there is any requirement for bottled gas supply such as at the maintenance depot, all gas cylinders need to be installed so as they are clear of flammable material to a distance of 10m and shielded from the hazard, and all pipes and connections must be metal, and consistent with AS/NZS 1596:2014 *The storage and handling of LP Gas*.
- **Landscaping** will need to be consistent with APZ requirements and provide low flammability design elements and plantings. The landscaping design needs to accommodate shading and heat amelioration in the plaza and recreational areas, as shown in the design drawings in **Appendix G**.

This is considered to be in balance with the bushfire protection objectives for the site, given the other BPMs proposed. Appropriate site maintenance including a rigorous garden maintenance program across the site to manage fuel loads will be crucial to achieving bushfire risk mitigation.

- **Emergency management planning.** Emergency management planning is not finalised as part of this report. A Bush Fire Emergency Management and Evacuation Plan will need to be prepared for the proposed site, to address the site layout and use including expected numbers of visitors. The road circulation and water supply provide the basis for emergency procedures for the relocation/evacuation of people in the event of an emergency. It will also need to consider the landscape risks associated with bushfire in the adjoining natural areas, including Berowra Valley National Park.

The bushfire protection measures outlined in this report address Precinct A Old Man's Valley, Precinct B Quarry Void, Precinct C Bushland Connections and Precinct F Crusher Plant in relation to the objectives of PBP. At this stage there are proposed Class 5-9 buildings and Class 10b structures, but no residential or accommodation buildings. Emergency procedures to be developed for the site will be an additional and importance bushfire safety measure, which is not covered in this report. The adequacy of BPMs and details for implementation will need to be confirmed as part of the REF review process and specified in the design and construction detail for the project.

Important Note:

*The maps in this report in **Figure 2-8, Figure 2-9, Figure 2-10 and Figure 2-11** are provided as indicative layouts for project planning and design purposes only. Exact distances and location of buildings, roads, APZ extents, water supply and hydrant locations, among other features, is subject to the final site design detail and construction drawings. Bushfire safety will ultimately be best achieved by site operational and emergency procedures appropriate to the level of risk and number of visitors on the site.*

List of Abbreviations

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018, Construction of Buildings in Bushfire Prone Areas
BAL	Bushfire Attack Level
BC Act	Biodiversity Conservation Act 2016
BFSa	Bush Fire Safety Authority
BPAD	Bushfire Planning and Design (Accreditation Scheme)
BPM	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
CEEC	Critically Endangered Ecological Community
Council	Hornsby Shire Council
DA	Development Application
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	(Federal) Environmental Protection and Biodiversity Conservation Act 1999
FDI	Fire Danger Index
FPAa	Fire Protection Association of Australia
HCEP	Habitat Creation and Enhancement Plan (Hornsby Quarry)
HPE	Hornsby Park Embellishment
IPA	Inner Protection Area
kW/m ²	Kilowatts per metre square
NCC	National Construction Code
PBP	Planning for Bush Fire Protection 2019
REF	Review of Environmental Factors (Part 5 EP&A Act assessment)
RF Act	Rural Fires Act 1997
RFS	NSW Rural Fire Service
SFPP	Special Fire Protection Purpose
SWS	Static Water Supply
VMP	Vegetation Management Plan (Hornsby Quarry)

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1 Introduction and context

1.1 Background

Hornsby Shire Council is intending to transform the Hornsby Quarry site into a new major parkland reserve with a range of facilities for local residents and visitors, to be named Hornsby Park. The project is referred to as the Hornsby Park Embellishment (HPE) project. Clouston Associates is the principal design consultant for the project and is preparing the design for Hornsby Park. The approved Master Plan for the site is shown in **Figure 1-1**.

The main use of Hornsby Park will be for recreational enjoyment with the following facilities being proposed, across a number of precincts:

- Play areas and sporting fields;
- Elevated walkway and scenic viewpoints;
- Mountain bike trails and bushwalking;
- Swimming areas at the Quarry Void;
- Food & beverage facilities;
- Adventure recreation (e.g. ropes course);
- History and immersion.

Clouston Associates is coordinating and integrating a range of specialist studies as part of the design process. KHS Ecology & Bushfire Pty Ltd is part of the Clouston Associates consultant team and has been engaged to provide advice on the bushfire protection requirements and to prepare this report. The current HPE project components are being assessed under Part 5 of the EP&A Act through a Review of Environmental Factors (REF).

The site has been identified as Bush Fire Prone Land (BFPL) under the Hornsby Local Environmental Plan 2013 in accordance with the Rural Fires Act 1997 (**Figure 1-2**).

The HPE design components addressed in the REF and considered in this bushfire assessment are as follows.

- **Precinct A, Old Man's Valley**– The first entry point for most visitors in the eastern part of the site with an orientation space, playing fields, play equipment and picnic area, and amenities building cluster and staff/maintenance depot (refer to plans in **Appendix A**). This precinct has carparking space and is proposed to be accessible by a public road from.
- **Precinct B, Quarry Void**– Parkland in the quarry centre to include lawns and a wetlands/freshwater lake, amenity buildings, circular paths and lift access and on the northern loop road (refer to plans in **Appendix B**). This precinct is proposed to be accessible by management road only, not a public road.
- **Precinct C, Bushland connections**– Native forest areas and paths connecting the various precincts, including Canopy Skywalk and new walking and mountain bike tracks connecting to existing mountain bike tracks and bushwalks (Berowra Valley National Park) (refer to plans in **Appendix C**). This precinct is proposed to be accessible to the public by walking and mountain bike tracks only.
- **Precinct F, Crusher Plant**– Located in the southern part of the site and centred around the old crusher plant building, remnant of the quarry workings, with passive recreation open space, connections with skywalk, and walking and mountain bike tracks, and car park and terrace (refer to

plans in **Appendix H**). This precinct is proposed to be accessible to the public by walking and mountain bike tracks as well as via Quarry Road.

A design statement and bushfire analysis diagrams, prepared by Clouston Associates in conjunction with the considerations in this report, are presented in **Appendix E-G**. Other components of the HPE project will be addressed in a future Development Application (DA) stage, including Southwest Precinct and Western Building development components. There will be linkages between the bushfire protection measures outlined in this report and additional measures addressing future HPE development components (i.e. cafes and commercial facilities and any accommodation) that will be assessed through a DA process.

1.2 Site location

Hornsby Quarry site comprises 59 hectares of bushland and cleared land located within Hornsby Local Government Area (LGA). The site is located between the Hornsby town centre to the east and Berowra Valley National Park to the west, with residential areas adjoining to the north and south. The land is zoned RE1- Public Recreation under the Hornsby Local Environmental Plan 2013.

Access is via Quarry Road in the south and Bridge Road off Peats Ferry Road on the east side, with a fire trail on the western side between Rosemead Road and Berowra Valley National Park. The surrounding development consists of residential development (mainly to the north and south), high density residential and mixed-use development to the east including Hornsby TAFE, and vegetated areas (north, west and south).

1.3 Relevant plans and documents

The following plans and documents have been used to inform this assessment.

- HORNSBY PARK MASTER PLAN, Approved Masterplan Issue J, prepared by Clouston Associates, 13/07/2021 (**Figure 1-1**).
- HORNSBY PARK EMBELLISHMENT WORK - LANDSCAPE DRAWINGS FOR REF Tender Issue, prepared by Clouston Associates, 30/09/2022.
- HORNSBY PARK EMBELLISHMENT Bushfire analysis diagrams (prepared by Clouston Associates, August 2022).
- HORNSBY PARK EMBELLISHMENT FIRE ACCESS PLAN ISSUE C, prepared by Clouston Associates, September 2022.
- HORNSBY PARK EMBELLISHMENT Crusher Plant Design Concept Issue C, prepared by Clouston Associates, 27/09/2022.
- *Hornsby Park Visitation Study*, prepared by URBIS for Hornsby Shire Council, November 2021.
- *Hornsby Quarry Rehabilitation: Vegetation Management Plan and Habitat Creation and Enhancement Plan*, report prepared by Hornsby Shire Council and Gecko Environment Management 2020 (revision C dated 30/07/2021).
- *Planning for Bush Fire Protection 2019* (NSW Rural Fire Service 2019, www.rfs.nsw.gov.au).

Design details and bushfire analysis diagrams for the project, prepared by Clouston in conjunction with the inputs from this bushfire assessment, are included at **Appendix F-G**.

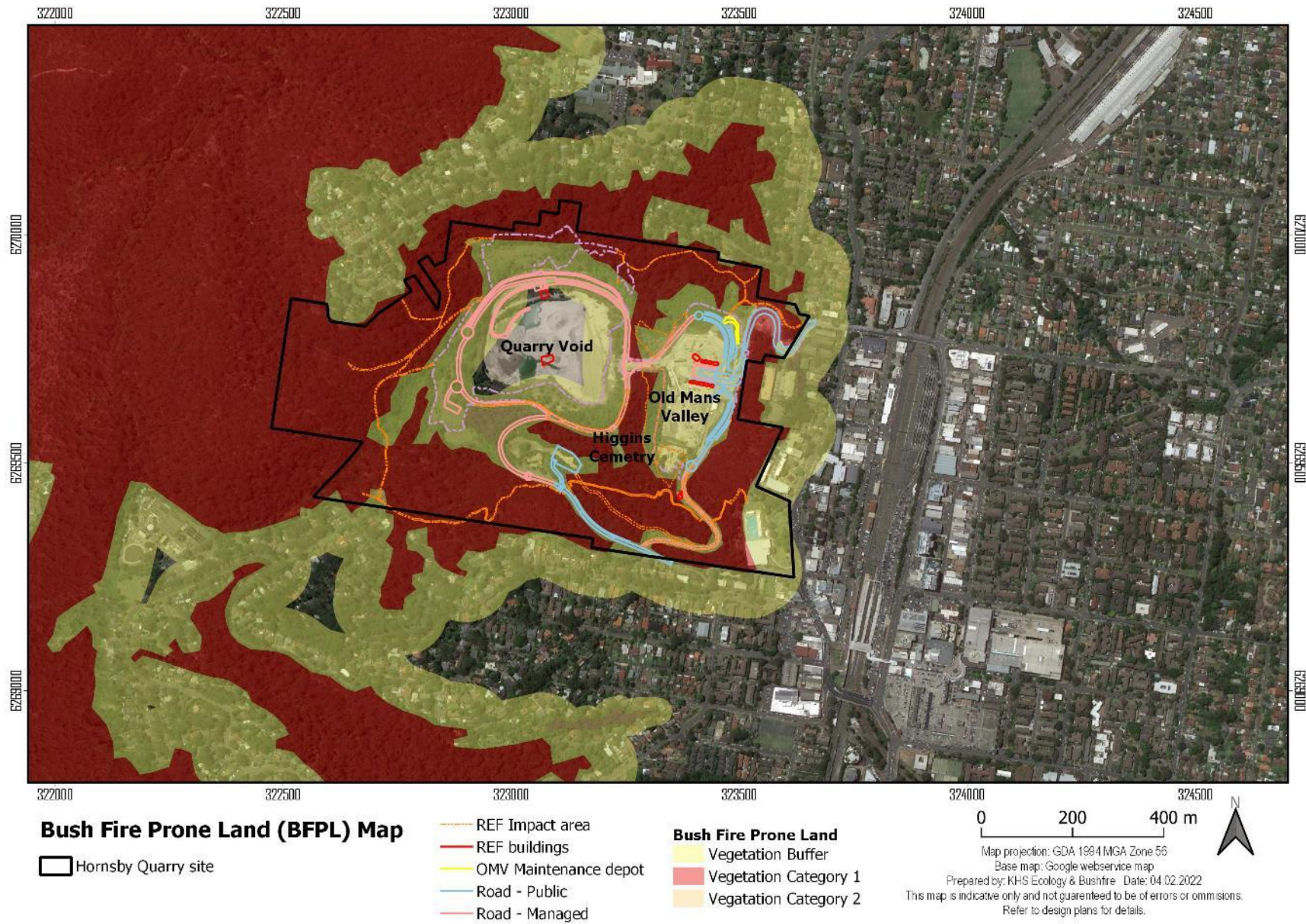
Figure 1-1. Hornsby Park Master Plan, Overall Master Plan (prepared by Clouston Associates, Issue J, 13/07/2021).

HORNSBY PARK MASTER PLAN - PART A



OVERALL MASTER PLAN

Figure 1-2. Bush Fire Prone Land map at the Hornsby Quarry site.



1.4 Regulatory context

Environmental Planning and Assessment Act 1979

Section 10.3 of the EP&A Act provides for the preparation of Bush Fire Prone Land (BFPL) maps under Local Environment Plans (LEP). The BFPL map is a trigger for certain planning requirements for developments to address bushfire protection. In this case, the site is on Bush Fire Prone Land mapped under the Hornsby LEP (refer to **Figure 1-2**).

Section 4.14 of the EP&A Act requires development on BFPL to address the requirements of the document '*Planning for Bush Fire Protection*', prepared by the Rural Fire Service (RFS). '*Planning for Bush Fire Protection*' 2019 (PBP 2019) is the current legislated document, adopted on 4 March 2020. In this case the site is on Bush Fire Prone Land mapped under *Hornsby Local Environment Plan 2013* (**Figure 1-2**). The development is therefore required to address the requirements of PBP 2019, as relevant to the location and type of development being proposed.

Rural Fires Act 1997

Due to the site being on bush fire prone land (shown in **Figure 1-2**), the HPE design and facilities are required to address the relevant NSW bushfire protection requirements including the *Rural Fires Act 1997* and related standards, codes and guidelines, as far as relevant to the location, type of development and intended use of the site.

The RF Act section 100B provides for the requirement to obtain a Bush Fire Safety Authority (BFSa) from the RFS for developments that are residential or rural residential subdivision or special fire protection purpose (assessed as integrated development). The current proposal will be assessed through an REF process and is not a subdivision or special fire protection purpose development. The project is not required to be referred to the RFS if Council is satisfied that the proposal meets the aims and objectives of *Planning for Bush Fire Protection 2019* (PBP 2019). However, due to the size and complexity of the site Council may still referral to the RFS for advice.

National Construction Code

Bushfire requirements for construction are included in the National Construction Code (NCC) primarily for residential buildings and special fire protection purpose developments. The NCC does not provide specific bushfire performance requirements for Class 5 to 9 buildings (offices, shops, factories, warehouses, public carparks and other commercial and industrial facilities). However, PBP does require all buildings on Bush Fire Prone Land to be able to withstand bushfire and Class 5 to 9 buildings are therefore considered on a case-by-case basis. In this case, the general fire safety construction provisions of the NCC is proposed in conjunction with separation of buildings from the bushfire hazard vegetation by providing a residential-equivalent asset protection zone.

Planning for Bush Fire Protection 2019

Planning for Bush Fire Protection 2019 (PBP) (NSW Rural Fire Service 2019) is the primary instrument for achieving the legislated bushfire protection requirements in NSW. This includes a combination of site planning measures and building construction, which are set out in the 'Acceptable Solutions' described in PBP 2019. The measures are referred to as 'bushfire protection measures' (BPM). The Acceptable Solutions described in PBP for each BPM are the primary means to achieve compliance for residential and subdivision developments.

Acceptable solutions are primarily defined for residential development and Special Fire Protection Development (SFPP), although the bushfire protection objectives are still applicable to all developments proposed on bush fire prone land. Performance solutions are required where a development does not, or cannot due to constraints, address the acceptable solutions of PBP. In these situations, BPMs are designed on a case-by-case basis to suit the site location and use in relation to bushfire risk.

The HPE project is a complex proposal with a range of uses and building types spread over a relatively large site. The project includes buildings for maintenance and recreation use, and as yet does not include the future commercial, educational and accommodation buildings nor any large buildings that would be used for major public events at the scale applicable to SFPP¹. The current proposal is therefore considered to be a 'other' development (not residential or SFPP) and the provisions in PBP 2019 Chapter 8 'Other Development' are relevant (refer to objectives below).

The mixed recreational use of the site requires the BPMs to provide a performance solution to address the objectives and intent of PBP, as far as relevant and practical for the site location, design and range of uses. The proposed BPMs are set out in **section 3** of this report. The BPMs address provision of asset protection zones, building fire safety, access, water supplies and services installed so that they do not exacerbate bushfire risk.

1.5 Bushfire protection objectives

The overarching objectives in Chapter 1 of PBP are relevant to all developments on bush fire prone land in NSW, including the current project. The overall objectives of PBP, as stated, are to:

- *afford buildings and their occupants protection from exposure to a bushfire;*
- *provide for a defensible space to be located around buildings;*
- *provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;*
- *ensure that appropriate operational access and egress for emergency service personnel and occupants is available;*
- *provide for ongoing management and maintenance of BPMs; and*
- *ensure that utility services are adequate to meet the needs of firefighters.*

The objectives of PBP Chapter 8 'Other Development' are specifically relevant and have been considered in this report. These objectives are:

- *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 bushfire;*

¹ There are no tourist accommodation facilities or large (>500 m²) public buildings within the REF components addressed in this report. It is understood that the development does include any buildings that fall within the SFPP category of bushfire development, nor require the additional protection requirements for SFPP developments at this stage of the project. Future development at the site may include accommodation or SFPP and, if so, the project will need to address measures for bushfire protection at that time, to build on the measures outlined in this report.

- 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.

The objective above, in relation to *emergency and evacuation arrangements for occupants of the development* is addressed in this report through the site layout and roads design but is not yet covered by a specific emergency plan, which it is understood will be prepared as a separate document.

1.6 Methods and approach

For the current proposed recreational and maintenance use of the site, there is no suite of acceptable solutions defined in PBP. The proposed BPMs therefore need to be tailored to the design. The BPMs need to be tailored to the site design in relation to the objectives of PBP as a 'Performance Solution'. Consideration is needed of the site location, the achievable roads and circulation strategy and infrastructure requirements, as well as environmental constraints.

The proposed BPMs set out in this report respond to the constraints and advantages of the overall site design, aiming for measures that are practical and achievable and appropriate to the building class and intended use of the site. This includes suitable setbacks from hazard vegetation for protection of buildings, emergency vehicle access, fire-fighting water supplies, and services that do not increase the risk of fire ignitions. The proposed location and numbers of visitors and staff expected to be present on site at any one time will also need to be considered.

The BPMs outlined in this report aim to address the bushfire protection principles stated in Chapter 1 of PBP, which are summarised below.

- **Asset Protection Zones (APZ)** – to minimise the impact of radiant heat and direct flame contact by separating development from bush fire hazards. The Asset Protection Zones (APZ) around buildings has been determined through the use of the APZ distances from Table A1.12.2 of PBP for residential development, which is stated in PBP as the preferred approach (refer to PBP statement mentioned above).
- **Access** – designed to enable appropriate access and egress for the public and firefighters;
- **Construction** – commensurate with the level of bushfire attack, as determined by the APZs provided on site around buildings.
- **Siting and design** – the location of roads, buildings and facilities is constrained by the site terrain, disturbance history and biodiversity values, as well as the design objectives, and aims to integrate these attributes as best as possible.
- **Landscaping** – to be designed to facilitate ongoing maintenance, safe access and defensible space free of bushfire fuel, and to minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers.
- **Services** – to provide adequate water supplies for bush fire suppression operations and ensure electricity and gas services do not pose an ignition risk or exacerbate bushfire risk; and
- **Emergency and evacuation planning** – to provide emergency procedures appropriate to the level of risk and use of the site, including operational procedures linked to fire danger and site closure and/or early relocation of occupants at certain thresholds of predicted fire danger. The overall site emergency management plan will be addressed in a separate document, which will need to consider the whole-of-site design and uses of the future Hornsby Quarry Parklands.

In designing the performance solution for the project, the statement in PBP relevant to commercial and industrial development has been considered for new buildings, where practical, that *'the provisions within*

Chapter 7 [of PBP, Residential Infill Development] should be used as a base for the development of a package of measures’.

It is noted that the proposed bushfire protection measures set out in this report have been designed with a view to integration with the future further development at the site. It is envisaged that the current design can accommodate future bushfire safety as additional components are included at the site. This would be subject to future additional bushfire assessment and design development through a DA process.

1.7 Consultation

This report has been prepared in conjunction with discussions and design input of the Clouston Associates and Hornsby Shire Council project team. Peer review of this report has been undertaken by Dr Grahame Douglas, in September 2022.

Further consultation with the NSW Rural Fire Service and relevant stakeholders is expected to be undertaken as part of the Hornsby Shire Council REF review process under a Part 5 EP&A Act assessment. This will occur as the project progresses.

2 Site analysis

2.1 Proposed development and uses

The proposed Hornsby Park new facilities will provide for primarily passive and active recreation, with sports fields and associated infrastructure, outdoor events, overnight accommodation, walking and mountain bike trails, lookouts, playgrounds, picnic areas and outdoor assembly areas. The site includes a number of proposed precincts which are summarised in **Table 2-1**. The concept design is shown in **Figure 2-1** (precinct locations) and **Figure 2-2** (precinct proposed uses).

*NOTE: This report addresses the partial development of the site of the REF components only, as summarised in **Table 2-1**. Any future development on the site and additional facilities such as cafes, accommodation or education centres would be subject to additional bushfire assessment and BPMs, including a whole of site bushfire emergency management plan that considers the full scope of uses and building types at the site.*

The HPE project components being addressed through the REF process are Precinct A, B, C, and F and these components only are addressed in this bushfire assessment report. The proposed buildings (in the REF component) comprise amenities, maintenance depot and a lift, which are Class 5-9 buildings under the National Construction Code (NCC). There will be outdoor assembly areas including playing fields, walking tracks and lookouts which need to be considered through bushfire emergency procedures and access, in relation to the total capacity of peak numbers and safety of visitors at the site at any particular time.

- **Precinct A, Old Man’s Valley** – The first entry point for most visitors; with an orientation space, playing fields, play equipment and picnic area, and amenities building cluster. The Old Man’s Valley precinct includes amenities buildings in the plaza with landscaping and shading created by a canopy of trees. The maintenance depot includes one building, being the staff lunchroom/ office/ general storage. The remainder of the maintenance depot will include areas for green waste and natural resources storage, which will need to be managed to minimise bushfire potential. Site plans for the Old Man’s Quarry are provided in **Appendix A** of this report,
- **Precinct B Quarry Void** – Parkland precinct including the lift building for access into the Quarry Void base and a wetlands/freshwater lake amenity buildings, circular paths and lift access. The Quarry

Void precinct also includes buildings associated with the Quarry Void lift consisting of office, kiosk, storage and services. Site plans for the Quarry Void are included in **Appendix B** of this report.

- **Precinct C, Bushland connections**— with native forest areas and paths connecting the various precincts, including Canopy Skywalk and new walking and mountain bike tracks connecting to existing mountain bike tracks and bushwalks (Berowra Valley National Park). The main built structure is the Canopy Skywalk, and otherwise this area contains paths and mountain biking tracks. Site plans for the Bushland connections layout are included in **Appendix C**.
- **Precinct F, Crusher Plant** – Located in the southern part of the site and centred around the old crusher plant building, remnant of the quarry workings, with passive recreation open space, connections with skywalk, and walking and mountain bike tracks, and car park and terrace (refer to plans in **Appendix H**). This precinct is proposed to be accessible to the public by walking and mountain bike tracks as well as via Quarry Road.

There are no proposed residential buildings nor accommodation facilities (Class 1 to 4) for the current proposed development. All public buildings are less than 500m² in floorspace. The provisions of PBP 2019 Chapter 6 'Special Fire Protection Purpose Developments' therefore do not apply to the REF components.

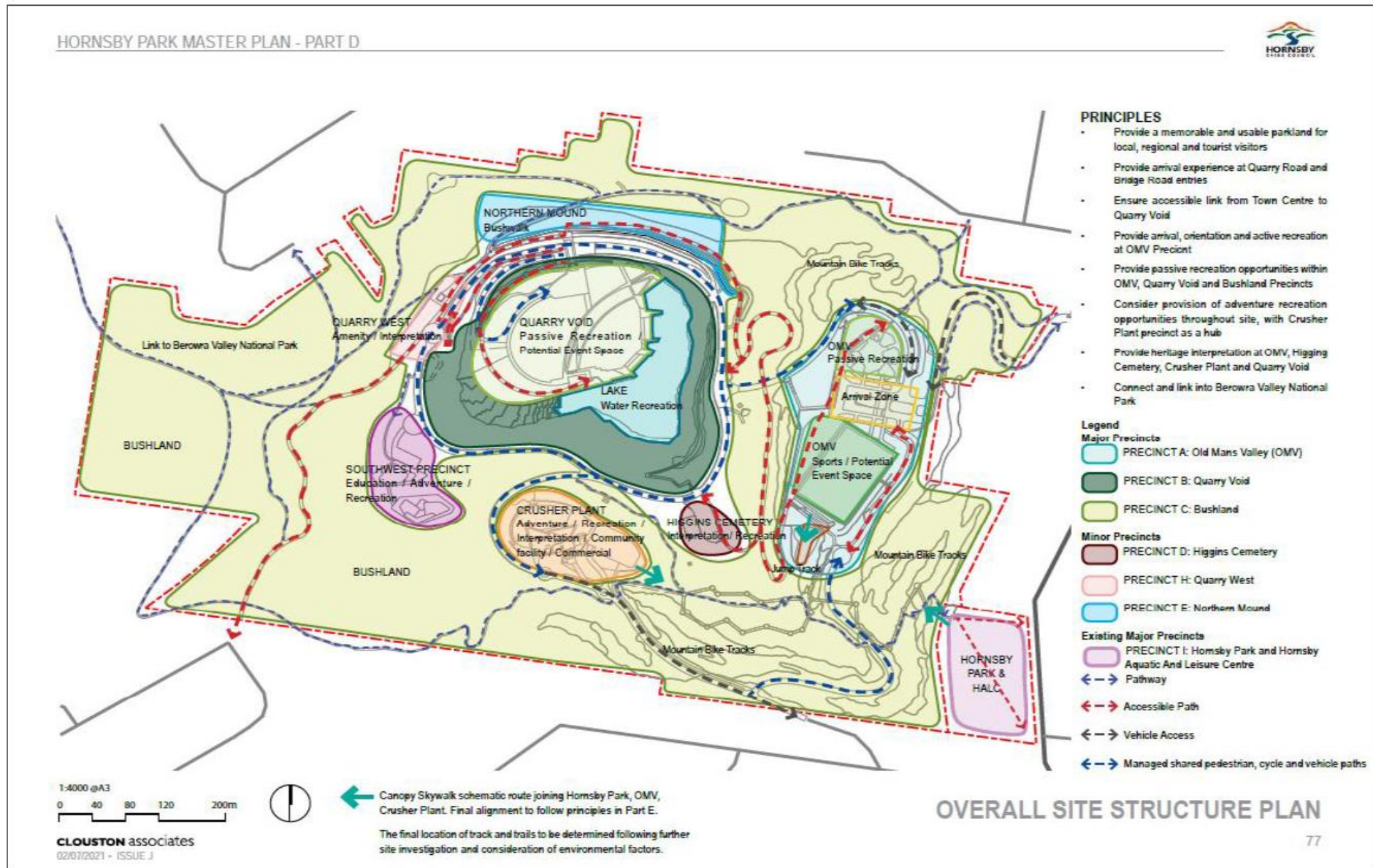
Table 2-1. Proposed precincts, development type and bushfire protection approach.

Precinct	Description of facilities	NCC Building Class	REF or DA	Bushfire protection approach
Precinct A Old Man's Valley (Major precinct)	Sports fields, carparks, outdoor events, café, playground, picnic areas, amenity buildings, visitor assembly and orientation buildings, community/commercial buildings, Maintenance depot contains staff lunchroom/office, general storage, machinery and chemical storage, green waste and natural resources storage.	Class 9b – Amenities and sports buildings Class 8 – Maintenance/workshop buildings Class 6 – Café (DA component)	REF (excluding café and commercial buildings)	Performance Solution. Address general objectives of the PBP, as far as suitable for the development design and site use. Also address PBP Chapter 8 'Other Development' objectives by a suite of measures suited to the site use and level of risk.
Precinct B Quarry Void (Major precinct)	Events, amenities and outdoor assembly spaces, café, picnic areas, access lift	Class 9b – Lift and associated building with office, kiosk, storage and services Class 6 – Café (DA component)	REF (excluding café and commercial buildings)	
Precinct C Bushland (Major precinct)	Passive and active recreation, tracks, trails and lookouts	Class 10b – Canopy Skywalk	REF	
Precinct F Crusher Plant (Major precinct)	Passive and active recreation, lookouts, events, community/commercial buildings, carparks	Class 5-8	REF (excluding commercial buildings)	
Precinct D Higgins Cemetery (Minor precinct)	Passive recreation, rest areas	No buildings	REF	As above
Precinct E Northern Mound (Minor precinct)	Passive recreation, lookouts, tracks and trails	No buildings	REF	As above
Precinct G South West Precinct (Major precinct)	Overnight accommodation, camping, utility and amenity buildings, passive, and active recreation	Class 5-8, also Class 3 accommodation depending on design	DA	Not addressed in this report. PBP Chapter 6 'Special Fire Protection Purpose'
Precinct H Quarry West (Minor precinct)	Community/commercial buildings, passive and active recreation, tracks and trails, viewing platforms	Class 5-8	DA	Not addressed in this report. PBP Chapter 8 'Other Development' objectives

Figure 2-1. Hornsby Parkland precinct concept plan (Clouston Associates 2021).



Figure 2-2. Hornsby Parkland precinct concept plan and proposed uses (Clouston Associates 2021).



2.2 Visitation modelling

The visitation study prepared by URBIS in November 2021 outlines the potential use of the site and expected visitation patterns (URBIS 2021). The visitation study has used data from other similar recreational sites in Greater Sydney to examine and predict potential visitation at the future HPE site. The analysis also considers the population attributes of the Hornsby area and likely visitation by different sectors of the community and to the different precincts within the future Hornsby Parkland. Visitation is an important consideration for bushfire risk and public safety in terms of numbers and location of people that could be on the site at any one time, and their potential exposure to bushfire risk.

The visitation study makes the following findings on the type, pattern and quantity of visitation expected at Hornsby Park, for recreation.

- Visitation would typically occur from around 6am to 6pm, decreasing after 6pm, with a peak that would vary during that period, depending on the day of the week, season, and programming of events among other factors.
- Most visitors are expected to be local residents, with around 80% of visitors expected to be people from the local catchment, relative to 18% expected to be from outside the catchment including tourists.
- Residents that live within the walking distance of the site are expected to have the highest repeat level of usage at 10-17 visits per year per person, relative to around 3 visits per year per person for a local driving resident.
- Total visitation from bespoke uses identified for the site as being mountain biking, adventure recreation and outdoor cinema is estimated to be around 111,000 visits per annum.

In summary, the expected visitation at the future Hornsby Parkland is substantial per annum, as indicated by the numbers modelled by URBIS and reproduced below in **Figure 2-3**. It is anticipated that there will be close to one million visitors per year to the site across all use areas.

The visitation patterns and expected peak numbers are an important consideration in relation to bushfire risk and public safety. The key scenario to manage for is a situation where a large number of people are present at the time of approach of an unexpected bushfire, which may originate either within the site or off site. The access and operation arrangements for the site will need to address public safety in this kind of extreme scenario. The BPMs outlined in this report seek to minimise the risk to public safety through appropriate hazard setbacks around built assets, building fire construction standards, bushfire construction standards, in addition to adequate access roads (for emergency ingress and egress) and fire-fighting water supply. Further measures as part of site operational procedures are not addressed in this report, but will be needed to optimise preparedness and public safety in the event of an unexpected fire.

Figure 2-3. Predicted visitation per annum for a base case scenario for 2026 and 2036 (reproduced from the Hornsby Park Visitation Study, URBIS 2021)

	Visits based on Total Park Benchmarks and Distributions			
	2026		2036	
	Visits	Share (%)	Visits	Share (%)
Walking Local Residents	202,100	24%	260,600	26%
Driving Local Residents	100,700	12%	110,100	11%
Regional Residents	378,600	44%	420,200	42%
Local Workers	19,500	2%	21,800	2%
Total Catchment Visits	700,900	82%	812,700	82%
Remainder Greater Sydney	85,500	10%	99,100	10%
Domestic Tourists	42,700	5%	49,600	5%
International Tourists	25,600	3%	29,700	3%
Total Beyond Catchment	153,800	18%	178,400	18%
Total Annual Visits	854,700	100%	991,100	100%

Note: Figures rounded to nearest 100, may include rounding errors

Source: TfNSW; Near; Urbis

Hornsby Park Visitation Study

2.3 Road network

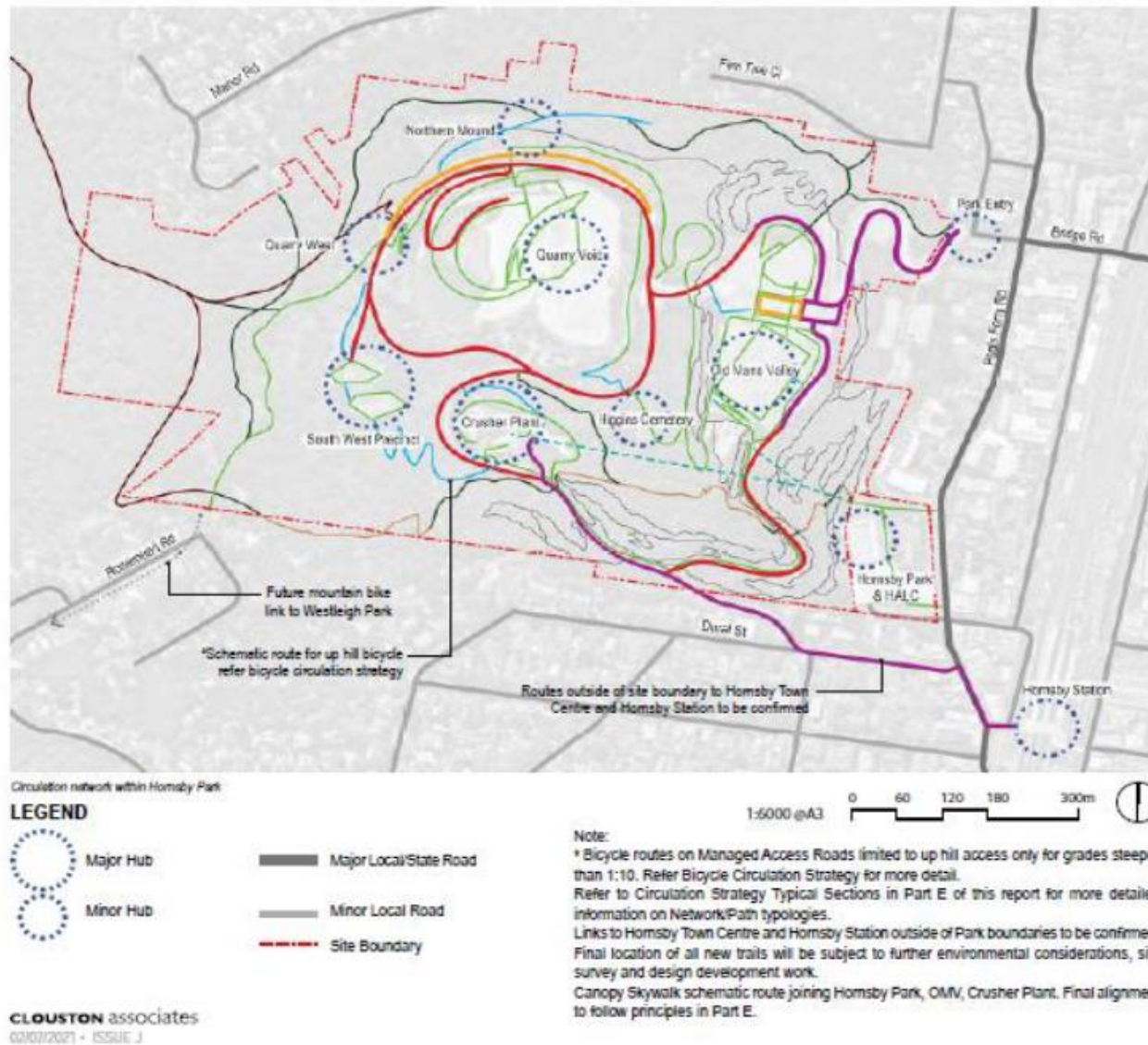
The HPE Master Plan proposes a circulation network strategy shown in the concept diagram in **Figure 2-4**. The plans shown in **Appendix D** and **Appendix F** are also relevant and specific to bushfire. The road network will provide for different road widths and loops suitable for different sized vehicles depending on the location and terrain constraint. Some road widths are limited by the steep contours of the quarry cutting. In broad terms, the proposed internal road network consists of the following.

- Public two-way roads of typical width 9-13m (required to be a minimum trafficable width 8m), maximum gradient 1:8, accessing the site from the northeast at Bridge Road, downslope to Old Man's Valley, also via Quarry Road to the Crusher Plant. These roads are indicated by the purple line in **Figure 2-4**.
- Managed Access Road, typical width 7m (required to be a minimum trafficable width 5.5m), maximum gradient 1:7 joining with the two-way road down to the Quarry Void via a loop road both around and into the Quarry Void parkland precinct. These roads are indicated by the red line in **Figure 2-4**.
- Some shared roads (pedestrian, bicycles and management vehicles), indicated by the yellow line in **Figure 2-4**.

A key access feature of the road network is the perimeter road around the Quarry Void that links to two egress points to the public road network to the north-east and the south-east and allows for emergency evacuation away from the direction of highest bushfire risk in the west.

This report outlines the main requirements for access for bushfire protection (for road widths, grade) for the proposed road network for the REF component. It is anticipated that the whole-of-site access strategy will be further detailed as part of the DA stage of the HPE project which will include all precincts.

Figure 2-4. Proposed roads and circulation strategy (Clouston Associates 2021)



CIRCULATION NETWORK STRATEGY

The circulation network strategy provides a site-wide overview of all the paths, tracks, trails, walkways and roads within the park and how they interact together to form an integrated circulation network. Internal connections within the circulation network are focused on hubs and external links to the surrounding streets, Town Centre and Berowra Valley National Park.

First time and returning visitors should be able to easily navigate the site regardless of the mode of transport used to travel to and around site. All managed access roads are to be shared zones with reduced vehicle speeds. Specific information on pedestrian, bicycle and vehicle circulation can be found on the following pages. For additional detailed information refer to specific circulation type strategies and precinct sections of this report.

CIRCULATION NETWORK

NETWORK TYPES	TYPICAL COMPONENTS
Two-way Road Typical widths 9-13m Max 1:8 gradient	Two lane road Separated bicycle [*] / pedestrian path
Managed Access Road Typical widths 7m Max 1:7 gradient	Shared pedestrian / bicycle [*] / managed vehicles
Shared Road Typical widths 4m Max 1:20 gradient	Shared pedestrian / bicycle / managed vehicles
Accessible Path Typical widths 3-4m Max 1:20 gradient	Shared pedestrian / bicycle path
Bush Trail Typical widths 1-2m Max 1:5 gradient	Pedestrian path
General Path Typical widths 2-3m Max 1:2.5 gradient	Pedestrian path including stairs
Heritage Stairs and trail Typical widths 2-3m Max 1:2 gradient	Pedestrian trail including existing sandstone stairs
Canopy Skywalk Typical widths 2-3m Max 1:14 gradient	Pedestrian canopy walkway
Rosemead Trail links Typical widths 2-3m Max 1:10 gradient	Shared pedestrian / bicycle
Mountain Bike Tracks Typical widths 0.5-1m Max 1:2 gradient	Mountain bike only

CIRCULATION NETWORK STRATEGY

2.4 Native vegetation

Vegetation surveys and mapping have been completed for the site in a number of phases, by Kleinfelder Australia in 2017 (**Figure 2-5**), by GHD in 2019 (**Figure 2-6**) and subsequently in conjunction with the National Trust in relation to refining the vegetation restoration areas and management zones for the site (**Figure 2-7**).

Two vegetation communities have been identified at the site, in various condition states, as well as exotic (non-native) vegetation and areas without vegetation (mainly the quarry void). The vegetation communities are:

- **Blackbutt Gully Forest** - Equivalent Plant Community Type (PCT) *Smooth-barked Apple – Turpentine – Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region.*
- **Blue Gum Diatreme Forest** - Equivalent Plant Community Type (PCT) *Sydney Blue Gum – Blackbutt – Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion.*

For bushfire assessment purposes, these vegetation communities are consistent with 'Forest' hazard, including areas that will be regenerated or restored to forest.

2.5 Biodiversity values and management

The Hornsby Quarry has particularly high-value biodiversity that needs to be considered as a matter of priority in all elements of the project design. This includes the need to consider a minimal impact approach to the bushfire protection measures (notably the Asset Protection Zones), as far possible in the context of life and property protection objectives. Alternative solutions in some cases for some assets will be needed to minimise areas required for vegetation clearing or management that would be in conflict with the existing vegetation and biodiversity management priorities for the site.

The Blue Gum Diatreme Forest identified within the study area is part of the *Blue Gum High Forest in the Sydney Basin Bioregion* Critically Endangered Ecological Community (CEEC) listed under the NSW *Biodiversity Conservation Act 2016*, and the *Blue Gum High Forest of the Sydney Basin Bioregion* CEEC listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Hornsby Shire Council has an existing Biodiversity Offset Strategy (Hornsby Shire Council, July 2020). The offsets defined in that study have been allocated to mitigate impacts of existing works to date, mainly the earthworks stabilisation works. It is understood that all remaining areas of native vegetation at the site, in any condition state, are not to be cleared for further development works, or modified for any purpose such as an asset protection zone, without further offsetting. There are no additional areas of **Blue Gum Diatreme Forest** (*Blue Gum High Forest* CEEC) on the site or elsewhere in the Hornsby Shire that could provide like-for-like offsets for any further impacts. It is therefore understood that any proposed fuel management requirement to protect buildings on the site (i.e. asset protection zones) need to be achieved within the existing proposed disturbance footprint. Where this is not possible, alternative measures will need to be considered, such as shielding from the hazard, moving buildings further from the hazard or limited the use of buildings (e.g. no flammable materials stored at certain maintenance depots).

A Vegetation Management Plan and Habitat Creation and Enhancement Plan (VMP and HCEP) has prepared by Hornsby Shire Council & Gecko Environment Management, July 2020 (revised July 2021), as part of the implementation of the above-mentioned Biodiversity Offset Strategy. The VMP and HCEP set out the areas identified as the biodiversity offsets and the vegetation / habitat management zones and actions required

for conservation and restoration. Through the implementation of the VMP and HCEP, Council's aim is to ensure the following outcomes:

- protection of the native vegetation onsite with specific reference to the unique Blue Gum Diatrema Forest and connection with the Berowra Valley National Park
- restoration and conservation of the connectivity of native vegetation and habitat corridors in-perpetuity
- sustainably establish native vegetation and associated ecological processes to a condition representative of the surrounding plant communities, with particular emphasis in areas where there has been major disturbance or areas that require stabilisation works.

This bushfire assessment aims to align with these objectives, by considering the management zones identified in the VMP and HCEP (shown in **Figure 2-7**).

In summary, the bushfire protection measures for the site need to consider a minimal impact approach and avoid the requirement for clearing of existing native vegetation and the TEC, including areas planned for regeneration. These areas are considered to be 'environmental constraint' in this assessment.

Figure 2-5. Vegetation communities and condition states at the Hornsby Quarry site (Kleinfelder 2017).

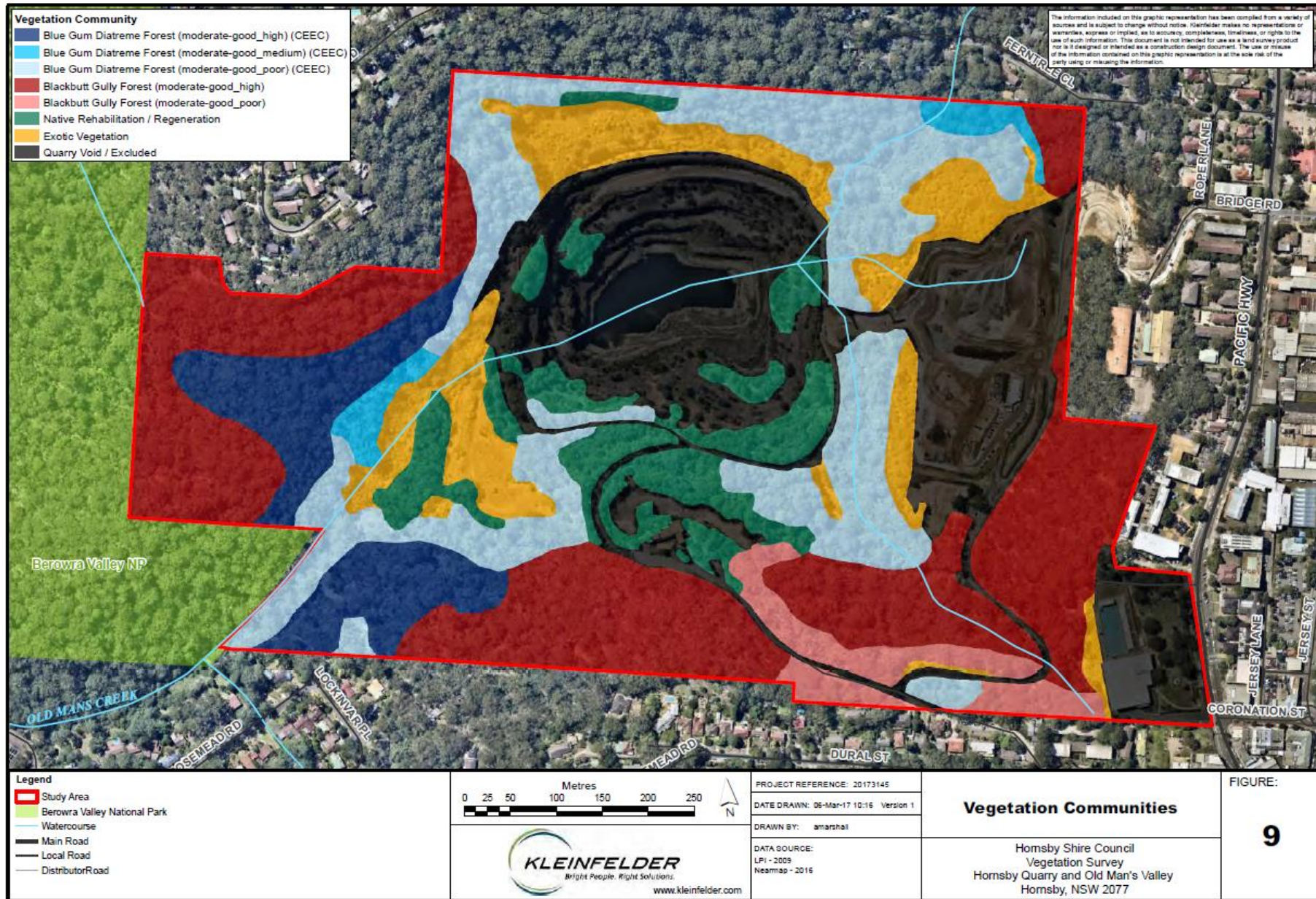


Figure 2-6. Vegetation communities and condition states at the Hornsby Quarry site (GHD 2019).

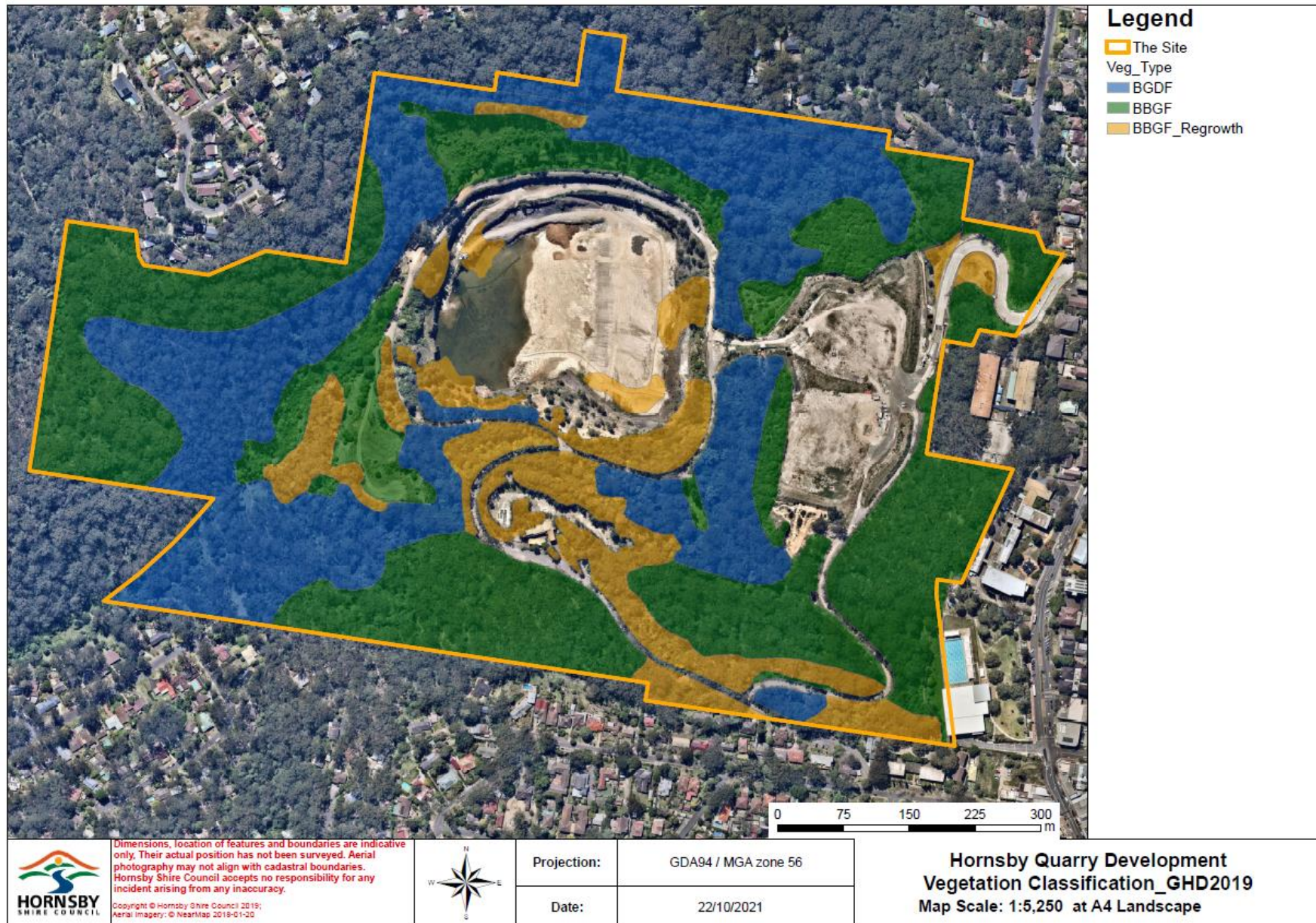
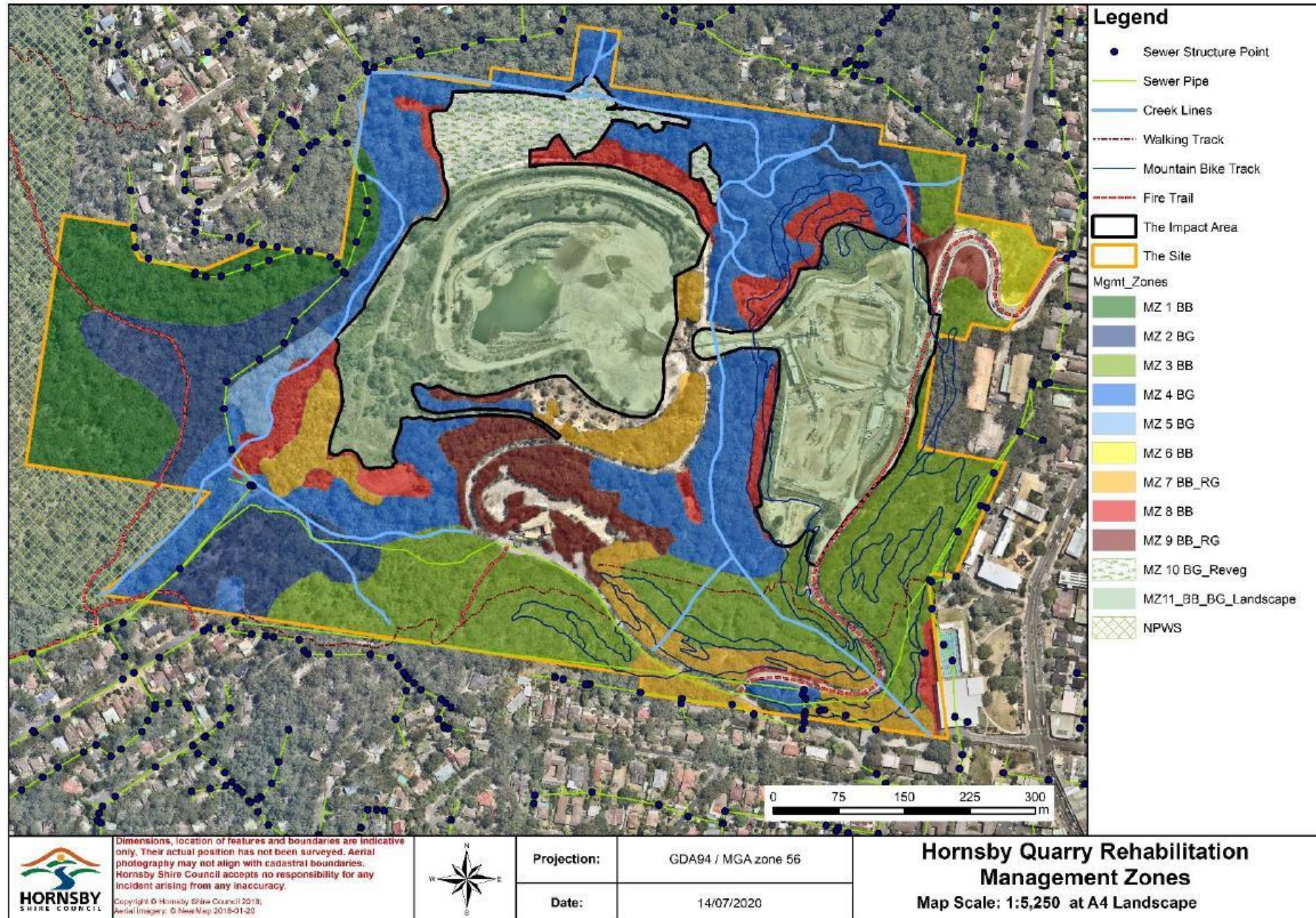


Figure 2-7. Hornsby Quarry Rehabilitation Management Zones (Hornsby Shire Council & Gecko Environmental Management, July 2020, updated July 2021).



2.6 Bushfire hazard assessment

The site bushfire hazard assessment, outlined below, has focussed on determining the APZ to the HPE buildings equivalent to residential, as set out in PBP Table A1.12.2. PBP states that, for industrial and commercial development (Class 5- 8 buildings) such as the amenities and maintenance depot buildings, the provisions for residential development are taken as a base; this approach has been applied here for the HPE proposal.

The site assessment of vegetation and slope (bushfire hazard assessment) following the method in Appendix 1 of PBP has been applied to each building cluster within Precinct 1 Old Man's Valley and Precinct 2 Quarry Void. The following inputs are relevant to the assessment:

- The site is located in the Greater Sydney bushfire district with an applicable FFDI of 100, requiring use of Table A1.12.2 of PBP for determining the APZ.
- The hazard vegetation comprises 'Forest' hazard in areas with existing and regenerating native vegetation, comprising the Blackbutt Gully Forest and Blue Gum Diatreme Forest, including VMP management zones that are intended to be revegetated.
- Other hazard vegetation will include elements in landscaped areas around buildings, which will need to be maintained to low fuel standards, where these are located within the proposed APZs.
- Slope has been determined according to the relevant slope category based on the SIX maps contours and the HPE project plans. The slope refers to the approach of a potential bushfire, whereby a 'Downslope' hazard provides for an uphill run of fire towards the asset.

The site bushfire hazard assessment is summarised in **Table 2-2**, for each of the building precincts. The bushfire assessment for each building cluster is mapped in **Figure 2-8** and **Figure 2-9**, with the proposed residential equivalent APZ to buildings. **Figure 2-10** shows the Precinct C Bushland area where there is no proposed APZ due to environmental constraint of the existing native forest vegetation. A discussion of the hazard assessment and proposed APZ is provided below.

Precinct A, Old Man's Valley:

Old Man's Valley precinct is exposed to 'Forest' hazard vegetation within 140m of buildings, with the greatest hazard to the northwest to southwest where there is downslope forest vegetation. To achieve the residential equivalent APZ to the buildings, the separation distance from the Forest hazard needs to be 24m to the North, East and South and 36 m to the West.

For the Old Man's Valley amenities cluster, these distances are readily achieved within the proposed plaza and landscaped areas as shown in **Figure 2-8**.

The Old Man's Valley Maintenance depot is closer to the hazard to the north. An equivalent residential APZ has been mapped around the proposed building (the combined staff building and storeroom) and is largely contained within existing disturbed areas, as shown in **Figure 2-8**. A portion of the APZ on the eastern side extends into the VMP MZ9, which is intended for revegetation of Blackbutt Gully Forest. Revegetation within the proposed APZ in MZ9 (if approved) will need to consider low fuel requirement for bushfire protection.

Precinct B, Quarry Void lift and associated building:

The Quarry Void precinct has reduced exposure to bushfire risk due to the size of the existing cleared areas and the main hazard vegetation being generally upslope. To achieve an equivalent residential APZ to the Quarry Void lift and associated buildings, the separation distance from the Forest hazard needs to be 24m on all sides. This is able to be achieved within the existing cleared and disturbed areas, bounded by the road on

the north side and the quarry proposed recreational area to the south (refer to **Figure 2-9**). Future landscaping and planting around the building within the quarry void needs to consider low fuel load design required for bushfire protection.

Precinct C, Bushland:

The Canopy Skywalk tower within Precinct C is exposed to bushfire hazard due to the surrounding forest vegetation (refer to **Figure 2-10**). An APZ is not proposed to the Canopy Skywalk building due to environmental constraint and the existing VMP requirement for conservation management of the forest vegetation on the site (refer to **section 2.5**). Bushfire risk mitigation is proposed to be achieved by the non-combustible building fire construction and emergency procedures addressing public safety.

Precinct G, Crusher Plant:

The recreational site proposed at Precinct F around the old Crusher Plant is exposed to bushfire hazard due to the surrounding forest vegetation (refer to **Figure 2-11**). An APZ is not currently proposed due to their being no new proposed buildings as well as the considerations of environmental constraint and VMP requirement for conservation management of the forest vegetation on the site (refer to **section 2.5**). Bushfire risk mitigation is proposed to be achieved by the non-combustible building fire construction and emergency procedures addressing public safety. The proposed landscaped areas will provide low-fuel zones that can be identified as APZ if future development at this precinct warrants this measure (such as to a café).

Landscape bushfire risk

The site is exposed to landscape bushfire risk from the adjoining Berowra Valley National Park and other bushland areas around the site. Severe, extreme and catastrophic bushfire weather conditions are typically associated with strong winds from the north to north west, which drive fire in an easterly to south easterly direction. The level of exposure to extensive landscape-level bushland areas and bushfire hazard differs in different precincts across the site. This will need to be considered in the whole-of-site bushfire emergency management plan, including safer ingress and egress routes that can be used by the public and fire fighters in the event of a bushfire emergency.

Table 2-2. Summary of the site bushfire hazard assessment and the proposed APZ to buildings, based on residential APZ in Table A1.12.2 of PBP.

Precinct / Building	Dominant hazard type	Slope category	Residential APZ	Achievable APZ
Old Man’s Valley - Amenities building cluster				
North	Non-hazard to 70m to NW, then Forest	All upslope / Flat land	24 m	Nearest hazard is 70m to the NW of buildings, within VMP MZ4, MZ8 and MZ9, and then >100m separation to the NE towards the Maintenance Depot and entry road.
East	Non-hazard to 60m, then Forest	All upslope / Flat land	24 m	Nearest hazard is 60m to the East, within MZ3 and MZ9.
South	Non-hazard to 140m	All upslope / Flat land	24 m	Non-hazard due to existing cleared and disturbed land in Old Man’s Valley precinct.
West	Non-hazard to 90m, then Forest	Downslope >5-10deg	36 m	Nearest hazard beyond impact area is downslope to the west in MZ4 between Old Man’s Valley and the Quarry Void.
SUMMARY:	APZ of 24m to 36m around the amenities buildings is achieved within the proposed Old Man’s Valley plaza, subject to combination of low-fuel planting and hard landscaping surfaces.			
Old Man’s Valley - Maintenance depot staff room				
North/ Northwest	Non-hazard to 8m, then Forest	All upslope / Flat land	24 m	Existing non hazard within the cleared and disturbed land proposed for the Maintenance depot yard provides adequate APZ to the north.
East	Non-hazard to 25m, then Forest	All upslope / Flat land	24 m	Existing non hazard within the cleared and disturbed land including the main access road provides the majority of the APZ. A small extent of MZ 9 will need to be managed as low fuel within the APZ.
South	Non-hazard to 140m	All upslope / Flat land	24 m	Existing non hazard within the Old Man’s Valley precinct provides the APZ on the south site; any planting within landscaping areas must not provide a fuel path for fire to spread to buildings.
West	Non-hazard to 80m, then Forest	Downslope >5-10deg	36 m	Proposed impact areas provide adequate APZ on the west side to a distance of 80m non-hazard; any planting within landscaping areas must not provide a fuel path for fire to spread to buildings.
SUMMARY:	APZ of 24m to 36m around the staff/store building is achieved within the proposed Old Man’s Valley Maintenance depot area, subject to low-fuel landscaping and management of potential flammable resource/storage materials.			
QUARRY VOID - Lift tower				
North	Non-hazard to 43m, then Forest	All upslope / Flat land	24 m	Non hazard upslope to the north to the far side of the internal road.
East	Disjunct patches of Forest	Flat land	24 m	Landscaping within the Quarry Void parklands needs to be maintained to low fuel loads within a 24m APZ.
South	Non-hazard in Quarry Void	Flat land	24 m	Landscaping within the Quarry Void parklands needs to be maintained to low fuel loads within a 24m APZ.
West	Disjunct patches of Forest	Flat land	24 m	Landscaping within the Quarry Void parklands needs to be maintained to low fuel loads within a 24m APZ.
SUMMARY:	APZ of 24m around the lift and associated buildings is achieved within the proposed Quarry Void precinct and roads, subject to combination of low-fuel landscaping.			

Figure 2-8. Bushfire hazard assessment for Old Man's Valley, with proposed APZ to the amenities building cluster and maintenance depot (staff/store room) building.

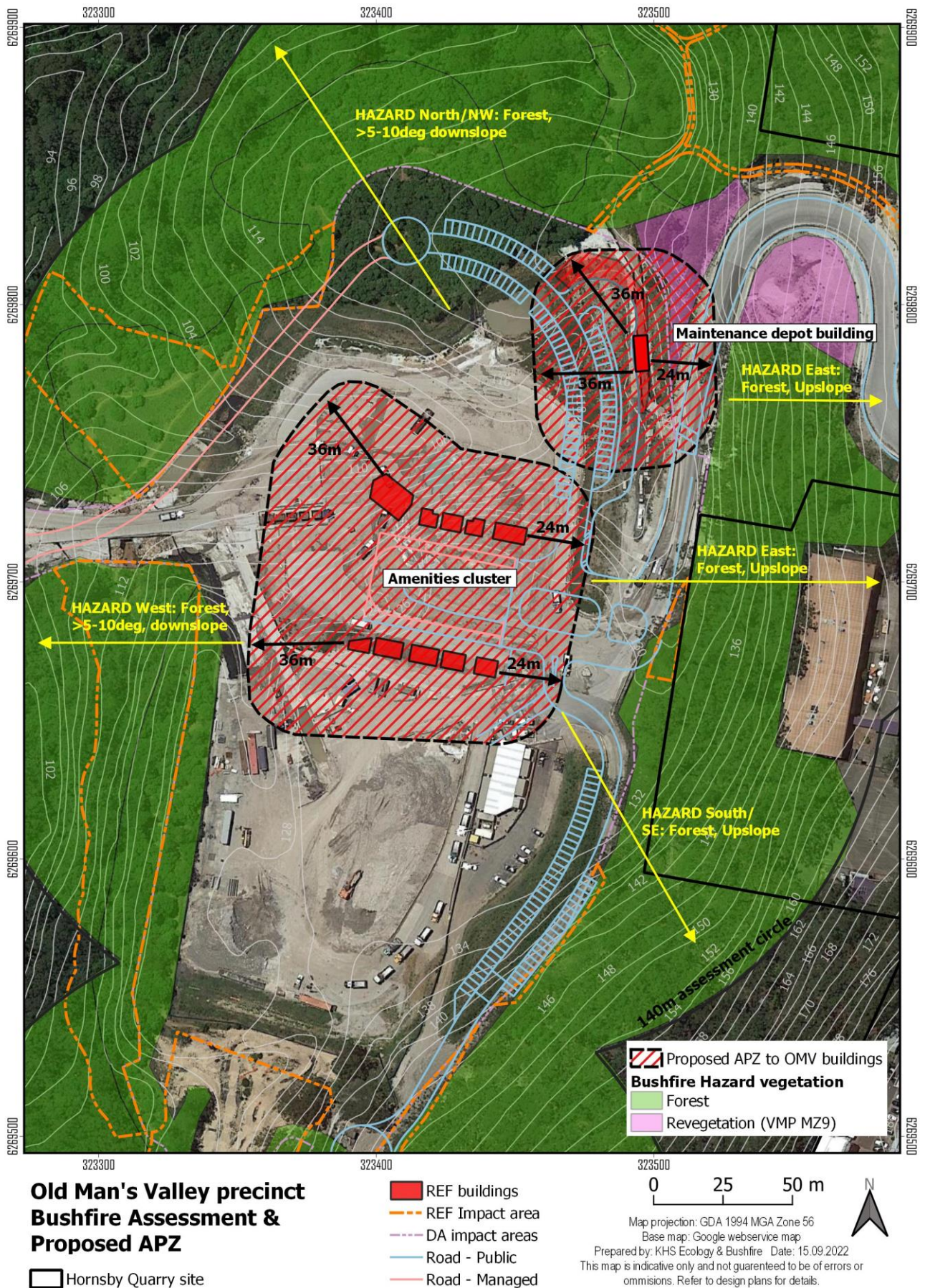


Figure 2-9. Bushfire hazard assessment for Quarry Void, with proposed APZ to the lift tower.

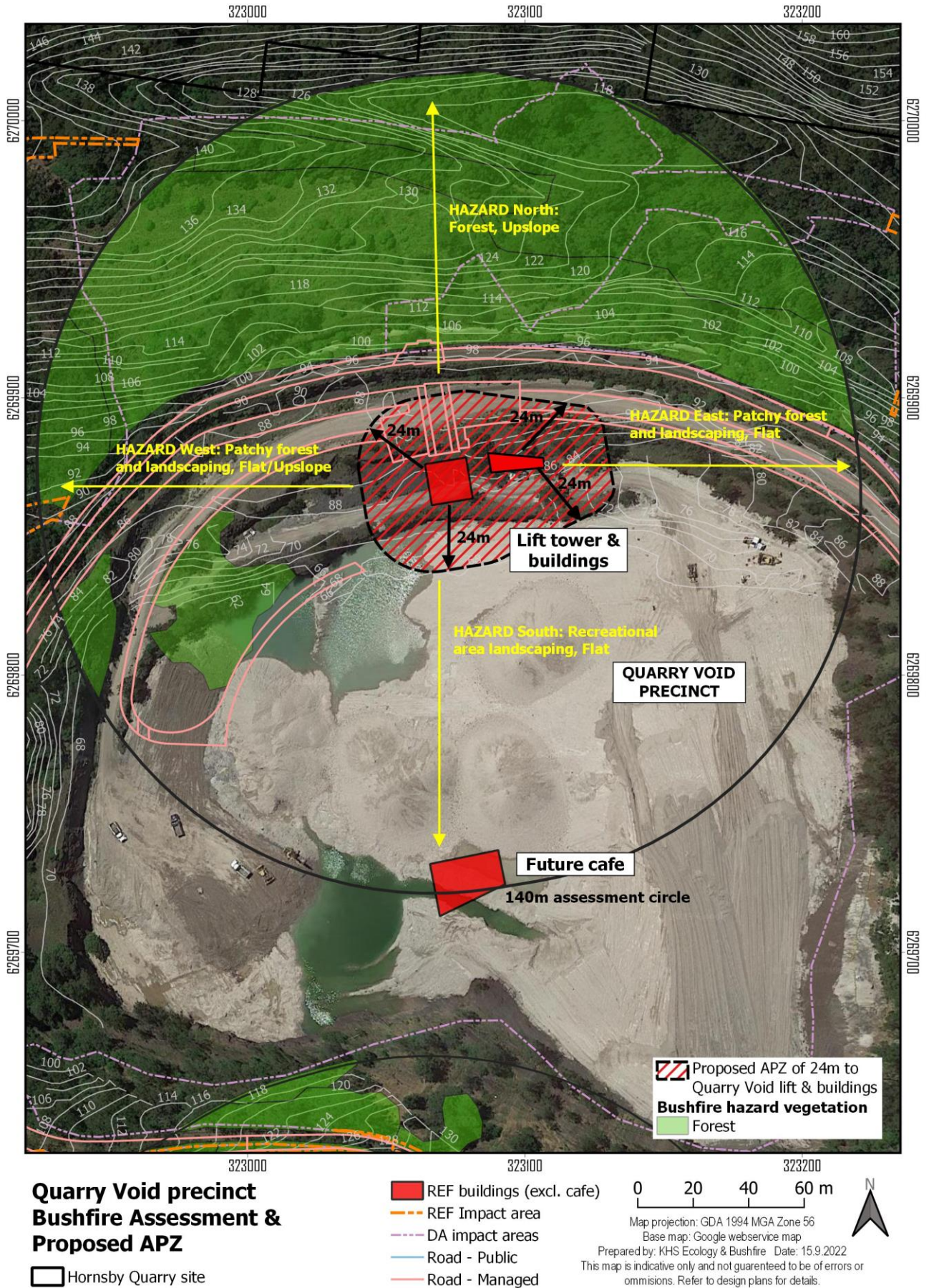


Figure 2-10. Bushfire hazard assessment for Precinct C Bushland, there is no proposed APZ to the Canopy Skywalk structure due to environmental constraint.

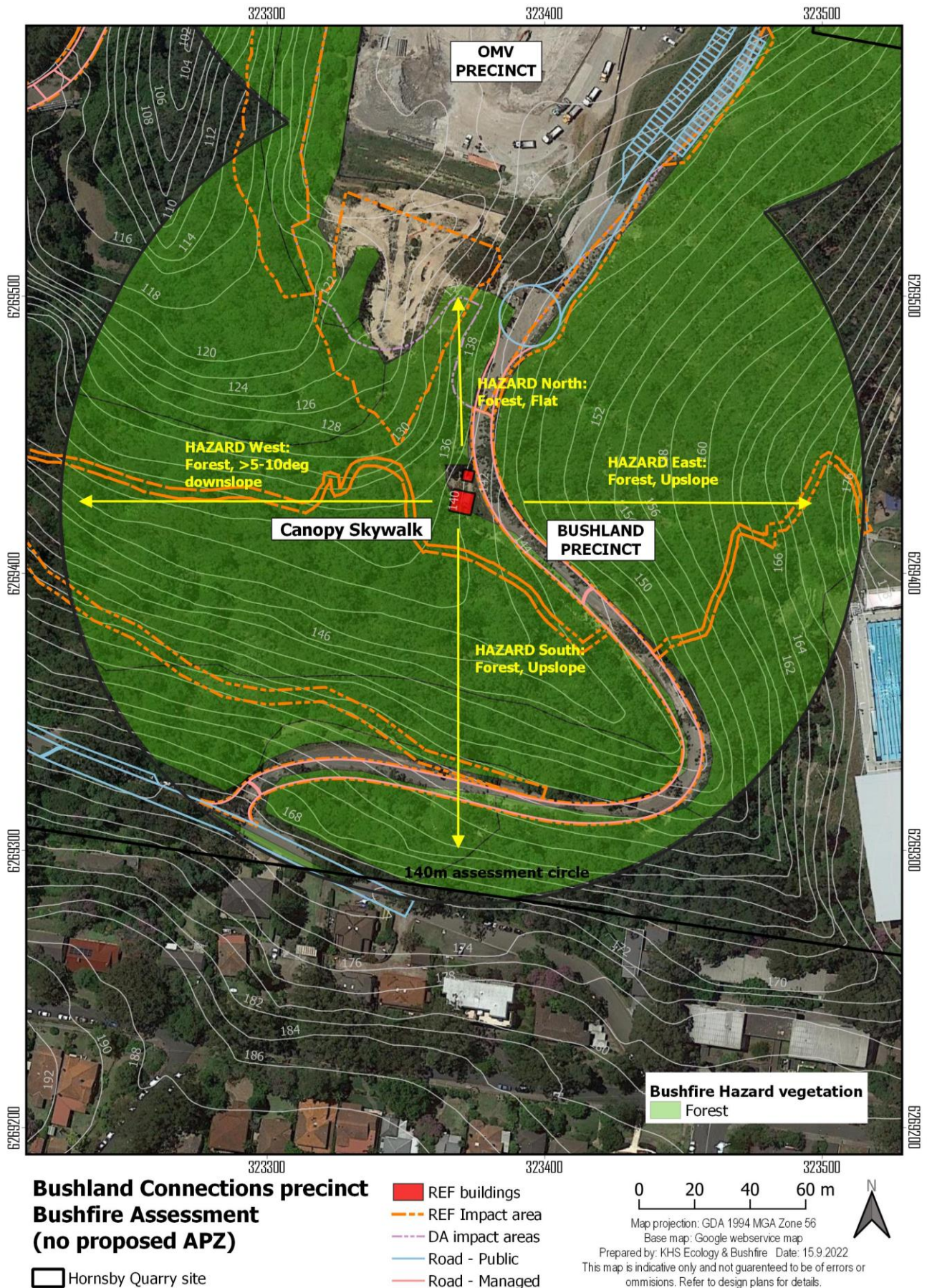
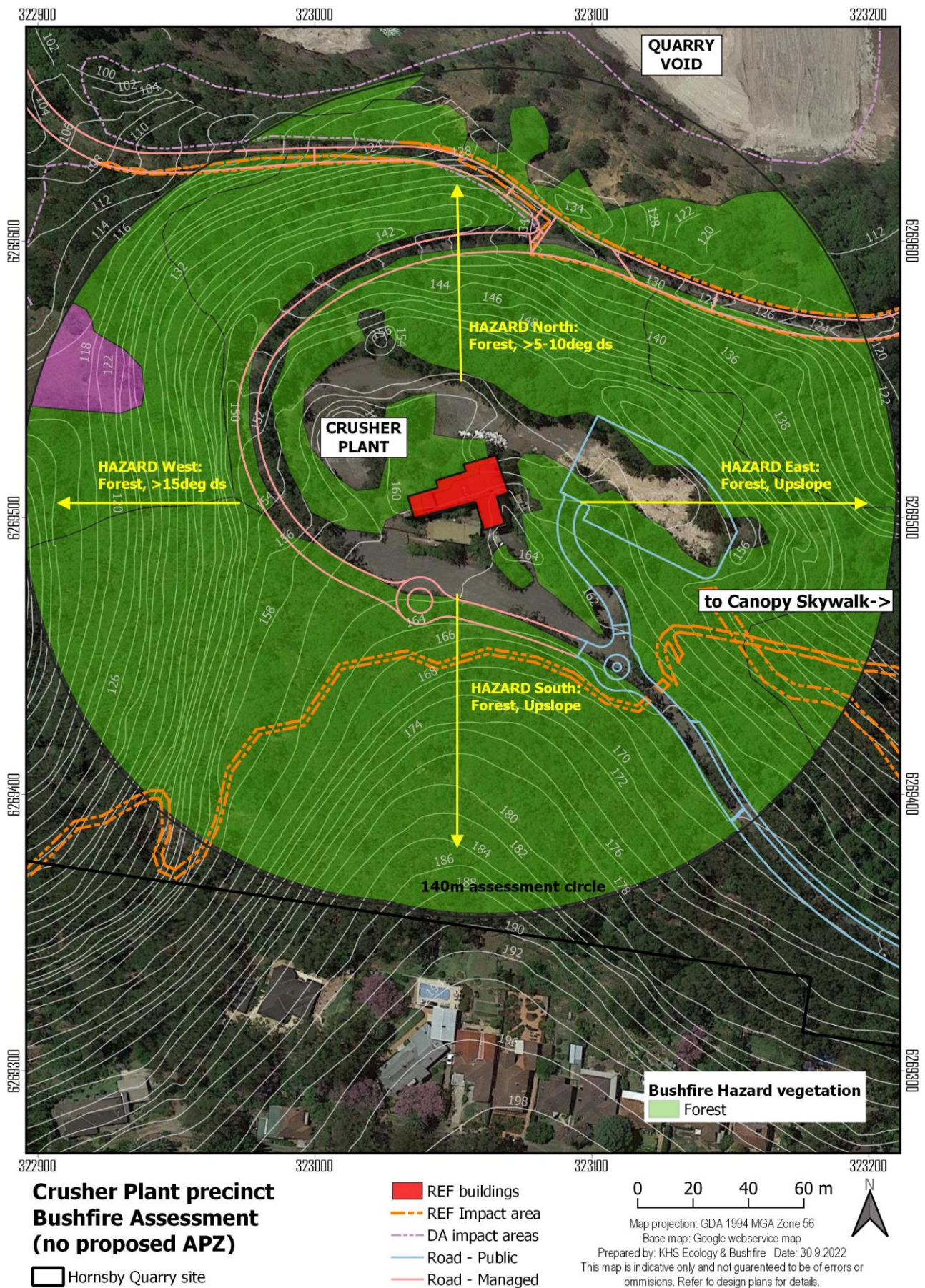


Figure 2-11. Bushfire hazard assessment for Precinct F Crusher Plant, there is currently no proposed APZ due to environmental constraint and no new buildings proposed.



3 Bushfire protection measures

PBP requires the provision of a suite of bushfire protection measures (BPMs) to protect life and property for all developments on bush fire prone land. The required and/or acceptable BPMs depend on the location, the proposed use, and type and potential number of occupants. Distinctions are made between residential development and non-residential, as set out in PBP.

The BPMs proposed for the HPE project are described below and seek to address each of the broad measures required for bushfire protection: APZ, construction, access, water supply, electricity and gas services, landscaping.

In this case, the development is for a recreational use and the following specific objectives of PBP Chapter 8 'Other Development' have been considered:

- *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 bushfire.*
- *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.*

It is noted that the objective 'To provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development' is not addressed specifically in this report in relation to emergency procedures. It is anticipated this will be covered in further documentation (an emergency plan) to be prepared at a later date.

3.1 Asset Protection Zones

Objective

To provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings and locations where the people will gather and access the site.

Proposed design solution

The HPE layout has identified building envelopes for Class 5 to 8 buildings within the Precinct A, Old Man's Valley and Precinct B Quarry Void parkland areas. The residential APZ requirements of PBP have been applied to these buildings as a reasonable measure, despite these buildings not being residential. The proposed APZ to buildings is described below and mapped in **Figure 2-8**.

Precinct A, Old Man's Valley: A 'Residential' APZ can be readily achieved to the amenities building cluster within the existing cleared and disturbed areas proposed to be the plaza. The separation distance from the Forest hazard is proposed to be 24m to the North and East and 36 m to the West as shown in **Figure 2-8**. The proposed APZ to the maintenance depot (staff room building only) is also achievable to similar distances, also shown in **Figure 2-8**. Landscaping and building construction will need to be designed to minimise the risk of fire spread and ignition of buildings. Vegetation management (revegetation) within the VMP MZ9 within the proposed APZ will need to be consistent with low fuel requirements for an APZ.

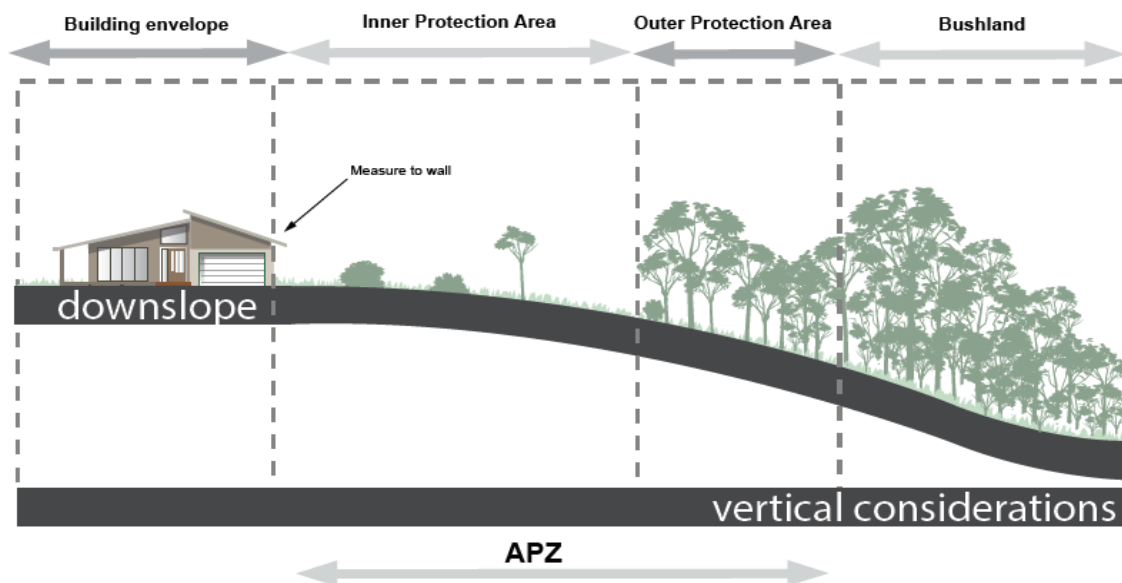
Precinct B, Quarry Void: A 'Residential' APZ, can be readily achieved within the existing cleared and disturbed areas around the proposed building precinct, providing a separation distance from the Forest hazard of 24m on all sides (refer to **Figure 2-9**). Landscaping and building construction will need to be designed to minimise the risk of fire spread and ignition of buildings.

Precinct C, Bushland Connections: No APZ is proposed to the tower structures due to the presence of significant forest vegetation which is environmental constraint (i.e. cannot be cleared or managed for low fuel loads) (**Figure 2-10**). Constructed elements in Precinct C Bushland Connections, including the skywalk and lift building will need to integrate building fire protection measures such that these built structures do not contribute to fire ignition and bushfire risk. Bushfire protection is to be achieved through fire construction of built structures and also addressed through the whole-of-site emergency procedures.

Precinct F, Crusher Plant: No APZ is proposed to the current scope of development at the Crusher Plant due to the presence of significant forest vegetation which is environmental constraint (**Figure 2-11**). Constructed elements will need to integrate building fire protection measures such that these built structures do not contribute to fire ignition and bushfire risk. Bushfire protection is to be achieved through fire construction of built structures and also addressed through the whole-of-site emergency procedures.

A schematic of the general appearance of an APZ is shown in **Figure 3-1** (reproduced from PBP). Future landscaped areas will need to be consistent with APZ requirements for low fuel loads and effective maintenance, including in landscaped areas immediately around buildings. This will need to include non-flammable design elements and plantings to achieve less than 15% vegetation coverage of trees and shrubs. Trees can be included in the APZ, however these need to be either ornamental low flammability species or native trees that are well separated and consider the ultimate size of trees. Preferably there are few grasses and grass-like plants (such as *Lomandra* species) so as to minimise fine fuels and reduce the flammability of garden areas generally. Shrubs such as banksias and other broad-leaf natives are suitable. Ongoing vegetation maintenance, such as routine mowing/slashing and ground fuels removal will be required at least as an annual basis in the APZ, ideally prior to the fire season, in August.

Figure 3-1. Schematic illustration of the APZ, including IPA and OPA (PBP 2019, Appendix 4).



3.2 Construction standard

Objective

The general objective relevant to construction is *to afford buildings and their occupants protection from exposure to a bushfire*. This is normally applied to residential and SFPP buildings.

Of particular relevance to the current project are the following statements in PBP section 8.3.1 (relevant to buildings of Class 5 to 8) and section 8.3.10 (relevant to commercial and industrial development):

'... compliance with AS 3959 and the NASH Standard must be considered when meeting the aims and objectives of PBP.'

'The general fire safety construction provisions of the NCC are taken as acceptable solutions however construction requirements for bush fire protection will need to be considered on a case-by-case basis.'

'The provisions within Chapter 7 [Residential Infill] should be used as a base for the development of a package of measures. Each development will be assessed on its own individual merits.'

Proposed design solution

The HPE buildings in the current scope address non-flammable building construction, as far as practical, whilst also considering the architectural and functional design requirements, notably the amenities buildings in the Old Man's Valley plaza.

Bushfire protection to all proposed buildings at Old Man's Valley and Quarry Void parkland precincts will be provided by the general fire safety construction provisions of the NCC and utilisation of non-combustible materials. This includes fire safety construction including fire doors, fire extinguishers, building fire alarms. Bushfire risk will also be minimised through the use of non-flammable construction materials with attention given to avoiding gaps at joins and metals screens fitted to external penetrations for ember protection (such as air conditioning, vents, weepholes). The bushfire construction standards set out in AS3959 can be used as a guide for buildings that are offices or other habitable spaces, but are not mandatory for the type of use (being non-residential) and will be unsuitable for certain buildings, such as storage spaces where ventilation is a requirement.

The innovative design of the amenities buildings in the Old Man's Valley plaza uses non-flammable construction materials that do not contribute to risk of ignition. This includes a mix of steel and masonry that comprise a non-flammable design that will not contribute to ignition potential. These structures also provide a form of radiant heat barrier in the event of an unexpected bushfire affecting the site.

The construction of the amenities buildings is to be considered as a specific case in the context of the design objectives and bushfire analysis diagrams presented in **Appendix G**.

Built structures in the Bushland Connections and Crusher Plant precinct, including the skywalk and lift building, and Crusher Plant precinct, will need to integrate building fire protection measures such that these built structures do not pose a risk of fire ignition. This can be achieved through building fire safety measures as per the relevant building fire safety Australian Standards.

3.3 Access

Objective

Key access objectives for access for bushfire protection are: *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.*

Proposed design solution

The road network aims to achieve the access specifications set out in PBP 2019 Table 5.3b for subdivision. This level of access would provide an appropriate level of the routine operation/management and emergency bushfire access to the site. It is noted that the presence of the Blue Gum High Forest Critically Endangered Ecological Community limits the alignment and available width of road corridor in some areas.

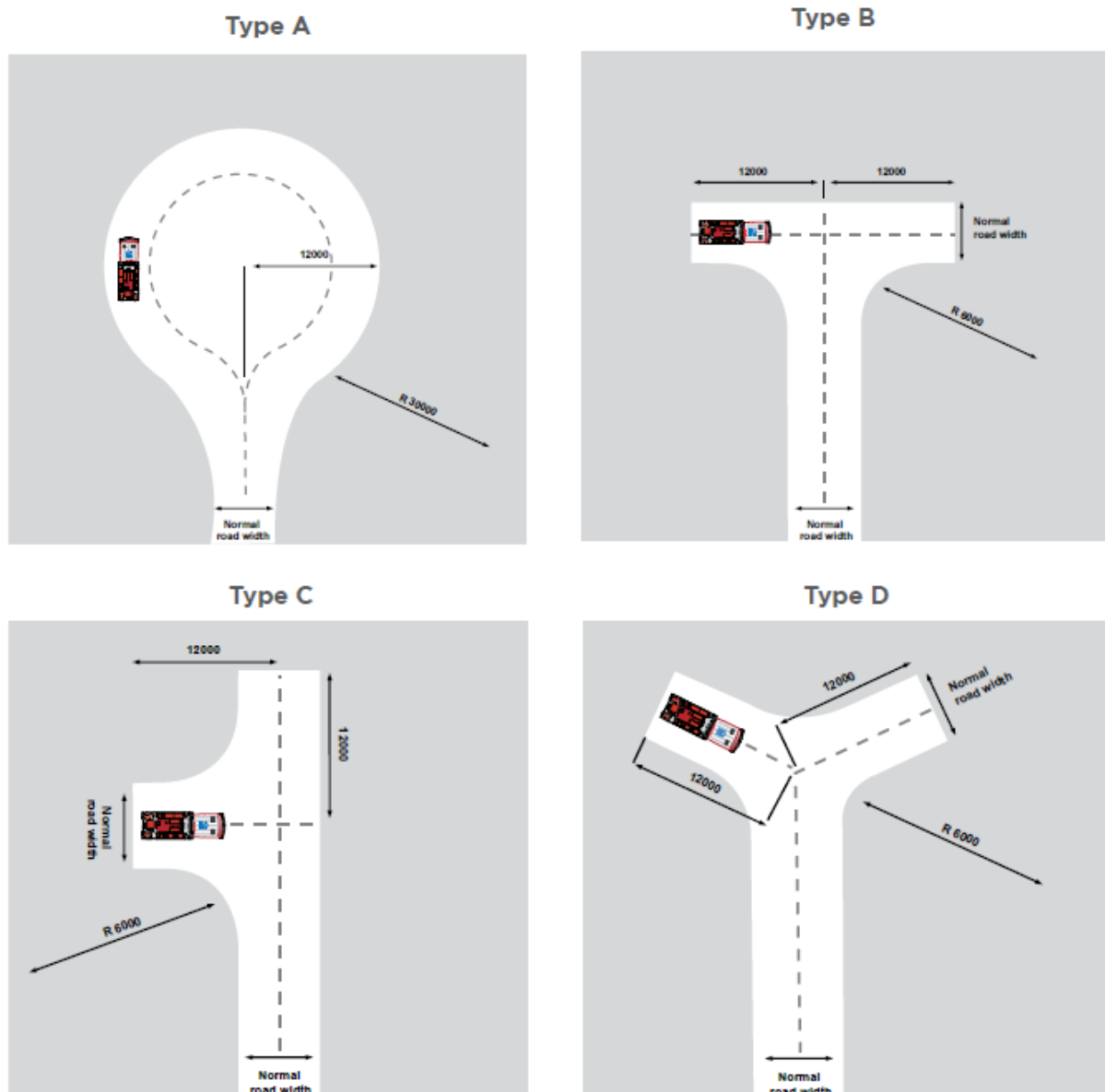
The proposed road network is shown in **Appendix D** (road network) and **Appendix F** (bushfire access and water supply plan). It is proposed to have multiple turning areas, passing bays and an effective perimeter road around the site. These road features provide significant bushfire advantage and access for emergency vehicles, consistent with PBP, as far as practical for the site constraints.

All details for the road network and emergency access will be specified in the engineering design plans. The following road configurations will be provided consistent with PBP 2019 Table 5.3b for access.

- Access to dedicated bushfire static water supply and reticulated hydrants to be in accordance with PBP, as shown in the plan included in **Appendix F**.
- All turning bays and road ends to provide equivalent manoeuvre areas with one of the options shown in **Figure 3-2**.
- Roads provide passing bays of trafficable width 6m, every 200m (approximately), which includes intersections and roundabouts.
- The main access is via Peats Ferry Road on the east upslope side with alternative access provided by the southeast exit to Quarry Road / Dural Street.
- Maximum grade for sealed road does not exceed 15 degrees and for unsealed roads does not exceed 10 degrees.
- Minimum vertical clearance of 4m to any overhanging vegetation or other obstruction.
- Other road dimensions for curves and cross fall to be consistent with Table 5.3b of PBP 2019.
- Fire trails within the subject site to be in accordance with NSW RFS Fire Trail Standards, where relevant.

Overall, the site is exposed to significant bushfire threat but does provide opportunities for lower-exposure areas for safe operation of emergency services personnel in the event of an emergency. This includes large paved landscaping areas, carparking spaces, play areas and sports fields and the Quarry Void with the large lake.

Figure 3-2. Vehicle turning options consistent with PBP 2019 (reproduced from Appendix 3 of PBP 2019).



3.4 Water supply

Objective

To provide adequate services of water for the protection of buildings during and after the passage of bushfire.

Proposed design solution

Provision of fire-fighting water supply is to be provided by a combination of reticulated supply and a dedicated bushfire tank for static water supply (SWS). The bushfire access and water supply plan are shown in **Appendix E** and **Appendix F**. This includes:

- Fire hydrants spacing, design, sizing and water pressure at the Old Man's Valley precinct and the Quarry Void precinct have been designed to be consistent with AS 2419.1 *Fire hydrant installations – System design, installation and commissioning* for buildings. Additional hydrants have also been included to address the bushfire supply requirements over and above those required by AS 2419.1.

These 'bushfire' hydrants are located at positions on along the road network where there is vehicle manoeuvre space, utilising intersections and roundabouts. For the details of the water supply, refer to the relevant Hydraulic Service Site Plan and Pipe Reticulation design, prepared by JHA Consulting Engineers.

- A static water supply (SWS) tank of 20,000L, located on the road network at the northern end of the Old Man's Valley play and plaza precinct, with a DN65 fire hydrant outlet/ Storz fitting for connection by RFS. This will be a dedicated bushfire supply, which provides a back-up to the reticulated supply in the event of an emergency. The location and volume of bushfire SWS is guided by the requirements in Table 7.4a and 5.3c of PBP. Strategic location of SWS tanks has been included in the design, as shown in **Appendix E**.
- An addition (non-potable) supply of 100,000L, which is a header tank for non-potable reuse on the site, located the Old Man's Valley plaza western end, installed away from buildings and any retaining walls so as not to impact on structures. This is primarily a landscaping irrigation supply.
- The Quarry Void lake which is an additional SWS and would be available for bushfire fighting use, including refilling of tankers. Suitable vehicle access is provided near the lake for tanker refilling, subject to appropriate road design detail.

3.5 Electricity and gas supply

Objective

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.

Proposed design solution

The intent is to locate and install electricity and gas services so as to limit the possibility of ignition of surrounding bush land or the fabric of buildings, and to avoid exacerbating bushfire risk from potential explosion of gas tanks affected by bushfire.

Electricity services will be installed within the reticulated water supply trenches (separated as required by the relevant supply authorities) and will be underground. The exception is where the supply needs to be mounted on the skywalk tower and lift tower. In these situations, the electricity supply will need to be encased in fire rated cover/conduit. In addition, where electricity supply is not underground, the vegetation surrounding the electricity lines must be managed to clearance distances specified in *ISSC3 Guidelines for Managing Vegetation Near Power Lines*.

No gas services are proposed. All barbeques in the picnic areas will be electric. If there is any requirement for bottled gas supply such as at the maintenance depot, all gas cylinders need to be installed so as they are clear of flammable material to a distance of 10m and shielded from the hazard, and all pipes and connections must be metal, and consistent with *AS/NZS 1596:2014 The storage and handling of LP Gas*.

For further details, refer to relevant electrical plans prepared by JHA Consulting Engineers.

3.6 Landscaping

Objective

The relevant objectives for landscaping are: *to provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings; and provide for ongoing management and maintenance of BPMs.*

Proposed design solution

Landscaping for bushfire protection aims to reduce/avoid fuel connectivity and thereby prevent flame impingement on buildings, as well as provide fuel-free defensible space for property protection.

Landscaped areas and parkland plantings around buildings need to be designed and managed so as to not contribute to the spread and impact of bushfire. This includes use of non-flammable materials such as paving, pebbles, rock walls near and around buildings, and use of low flammability plantings such as low-growing groundcover natives, succulent-leaved plants, species with broad leaves in non-flaky bark such as *Persoonia* (geebung), *Banksia* and *Grevillea* species, or mesic rainforest species.

Appropriate landscaping in bushfire prone areas can reduce fire spread, filter embers and reduce wind speed by minimising fine-fuels in the planting design, planting windbreaks and providing hard landscaping features in strategic areas. These design considerations have been integrated in the landscaped areas at the Old Man's Valley, Quarry Void and Crusher Plant precincts, which all have paved areas, open grass areas, roads and paths.

The landscaping design at Old Man's Valley has a mosaic of planted areas, gravel, paving and non-flammable elements, as illustrated in the bushfire analysis diagrams in **Appendix G**. Importantly, the project design intent is to provide tree planting for mitigating the urban heat island effect and also for its interpretive value, and from the bushfire mitigating point of view that suggesting There is a need to consider the landscaping design which includes extensive planting of eucalypt trees (Blue Gum *Eucalyptus saligna*) intended to form a high canopy over the long term for shading and heat control in a public use and playground area. This is described in the 'Design Intent Statement' in **Appendix G**. The diagrams include an analysis of canopy coverage over time in the plaza, planting details with open areas and hard surface areas forming fuel breaks, amongst planted gardens.

The planting schedule in high visitation areas and in the APZ around buildings (will need to adopt low-flammability principles with few grasses and grass-like plants (such as *Lomandra* species) so as to minimise fine fuels and reduce fire spread potential. Shrubs such as banksias and other broad-leaf natives are suitable.

Effective maintenance in landscaped areas and immediately around buildings will also be crucial over the life of the development. Ongoing vegetation maintenance is to include removing fine fuels prior to the fire season in August as well as routine mowing/slashing throughout the fire season.

A rigorous garden maintenance program would be required to manage fuel accumulation over time and to ensure the landscaped areas are maintain to be have discontinuity of ground fuel to reduce/prevent fire spread. In this case, a greater tree canopy coverage than would normally apply to an APZ is required for shading and heat amelioration for visitors, which is appropriate given the site is non-residential and needs to be suitable for public use in summer.

3.7 Emergency management

Objective

The key objective is *to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development.*

Proposed design solution

Specific emergency and evacuation (and relocation) arrangements covering potential bushfire emergency scenarios are not address in this report.

However, emergency access is provided for by the road circulation design with passing bays and water supply points, as well as the landscaping design which provides large open areas away from immediate bushfire hazard. This includes large paved landscaping areas, carparking spaces, play areas and sports fields and the Quarry Void with the large lake. Overall, the site is exposed to bushfire threat but does provide opportunities for lower-exposure areas for safe operation of emergency services personnel in the event of an emergency.

It is understood that the 'Bush Fire Emergency Management and Evacuation Plan' will be prepared at a later date to cover bushfire safety for the site. An emergency plan is warranted for the site overall, due to the potentially large number of visitors that may be present at any one time. The emergency plan would need to address emergency evacuation arrangements for the proposed development types at each precinct, potential number of visitors, and the location and layout. The plan would be consistent with the RFS document 'A guide to developing a bush fire emergency management and evacuation plan (NSW Rural Fire Service 2014).

Key concepts for consideration in developing the plan include the following.

- Stakeholder consultation including local government and emergency services.
- Analysis of expected numbers and types of visitors to Hornsby Park and the scale of planned events (e.g. refer to the Urbis 2021 visitation study).
- Timing of events through the year and restrictions during the bushfire period.
- Closure of the site based on Fire Danger Rating (FDR) or bushfire threat in the broader landscape, including triggers and notification process and procedures.
- Access / egress routes for emergency services including transport options, routes and pick up areas and considering timeframes to evacuate and landscape fire risk.
- Ensure emergency routes are identified by signage and managed to provide a relatively safe path that is well separated from the bushfire hazard.;
- Refuge arrangements in the event that a fire approaches without warning and evacuation is unsafe.
- Additional emergency procedures would be needed if the site is to be used for larger outdoor events, addressing the considerations in section 8.3.8 of PBP 2019 for outdoor events.

4 Summary and conclusion

The BPMs outlined in this report are intended to provide a set of optimum and achievable solutions to address the requirements of PBP for Class 5 to 8 buildings proposed for the Old Man's Valley and Quarry

Void precincts at Hornsby Park. As noted in section 1.5 of this report, the overarching objectives of PBP as well as Chapter 8 'Other Development' objectives are relevant and have been addressed as far as practical in the BPMs outlined in section 3 of this report.

In summary, the following BPMs have been, or will be, integrated into the design and construction current proposed REF components of the HPE project.

- **Asset Protection Zone.** APZ setbacks are to be established to building clusters in OLD MAN'S VALLEY and Quarry Void precincts to distances equivalent to the residential requirement. This approach is taken appropriate for commercial and industrial development on BFPL, as stated in PBP Chapter 8 'Other Development'. The APZ have been determined in **section 2** of this report and mapped in **Figure 2-8** and **Figure 2-9**. An APZ is not proposed for Precinct C due to environmental constraint. It is noted that the Blue Gum Diatreme Forest at the site is as part of the *Blue Gum High Forest in the Sydney Basin Bioregion* CEEC and APZs need to avoid impacts to the existing forest areas.
- **Construction.** General fire safety construction will contribute to bushfire risk mitigation across the site. Bushfire protection to all proposed buildings at Old Man's Valley and Quarry Void parkland precincts will be provided by the general fire safety construction provisions of the NCC and utilisation of non-combustible materials. This includes fire safety construction including fire doors, fire extinguishers, building fire alarms. Bushfire risk will also be minimised through the use of non-flammable construction materials with attention given to avoiding gaps at joins and metals screens fitted to external penetrations for ember protection (such as air conditioning, vents, weepholes). The bushfire construction standards set out in AS3959 can be used as a guide for buildings that are offices or other habitable spaces, but are not mandatory for the type of use (being non-residential) and will be unsuitable for certain buildings, such as storage spaces where ventilation is a requirement.
- **Access.** The bushfire access and water supply plan in **Appendix F** illustrates the vehicle access and There is an effective loop road providing egress away from the areas of higher bushfire risk areas on the northern and western side of the site, towards lower risk on the east and south. Roads and turning areas are to be constructed to the specifications set out in Table 5.3b of PBP 2019, where possible, which is outlined in **section 3** of this report.
- **Water supply.** Water supply for fire-fighting can be provided by extension of the reticulated water system into the Old Man's Valley and Quarry Void precincts, and provision of fire hydrants to AS 2419.1 plus addition bushfire hydrants approximately every 150m to 200m separation where there is vehicle manoeuvre points in the road network. Static water supply at the end of the public road in the Old Man's Valley precinct provides a 20,000L dedicated fire-fighting water supply in a strategic location. Exact locations are subject to detailed engineering design plans.
- **Electricity services** should be underground, where practical, and for overhead powerlines, the vegetation managed to distances specified in ISSC3 *Guidelines for Managing Vegetation Near Power Lines*.
- **Gas supply** is not proposed to be installed; all barbeques will be electric. If there is any requirement for bottled gas supply such as at the maintenance depot, all gas cylinders need to be installed so as they are clear of flammable material to a distance of 10m and shielded from the hazard, and all pipes and connections must be metal, and consistent with AS/NZS 1596:2014 *The storage and handling of LP Gas*.

- **Landscaping** will need to be consistent with APZ requirements and provide low flammability design elements and plantings. The landscaping design needs to accommodate shading and heat amelioration in the plaza and recreational areas, as shown in the design drawings in **Appendix G**. This is considered to be in balance with the bushfire protection objectives for the site, given the other BPMs proposed.
- **Emergency management planning.** Emergency management planning is not finalised as part of this report. A Bush Fire Emergency Management and Evacuation Plan will need to be prepared for the proposed site, to address the site layout and use including expected numbers of visitors. The road circulation and water supply provide the basis for emergency procedures for the relocation/evacuation of people in the event of an emergency. It will also need to consider the landscape risks associated with bushfire in the adjoining natural areas, including Berowra Valley National Park.

Overall, it is concluded that the bushfire protection measures proposed design for the Precinct A Old Man's Valley, Precinct B Quarry Void and Precinct C Bushland Connections address the objectives of PBP to an acceptable level. The final decision on the adequacy of BPMs and any other requirements for bushfire protection will be determined by Hornsby Shire Council as the consent authority, in conjunction with advice from the RFS.

Important Note:

*The maps in this report in **Figure 2-8, Figure 2-9, Figure 2-10 and Figure 2-11** are provided as indicative layouts for project planning and design purposes only. Exact distances and location of buildings, roads, APZ extents, water supply and hydrant locations, among other features, is subject to the final site design detail and construction drawings. Bushfire safety will ultimately be best achieved by site operational and emergency procedures appropriate to the level of risk and number of visitors on the site.*

5 References

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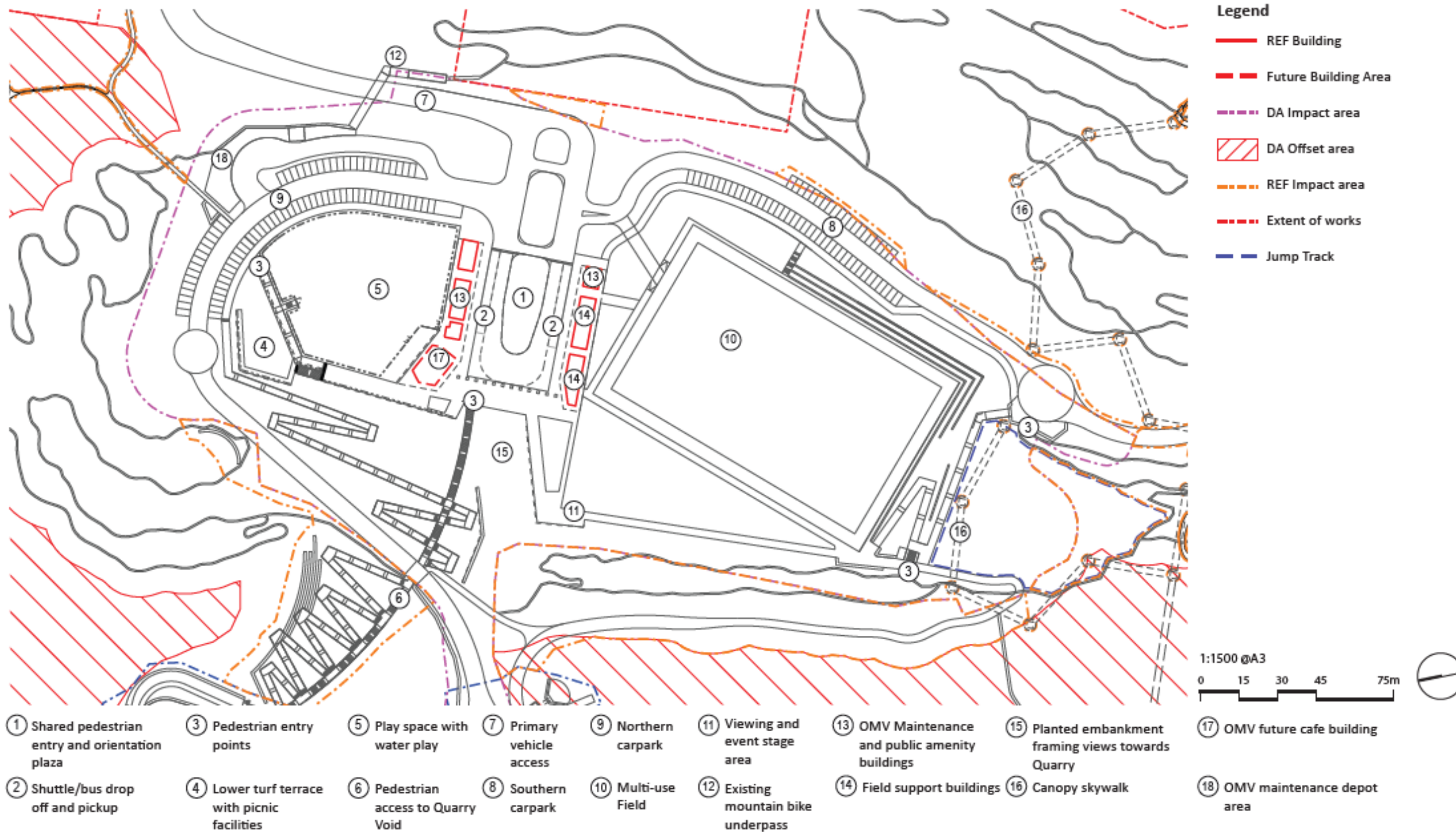
Appendix A. Old Man's Valley concept plans

Source: HORNSBY PARK EMBELLISHMENT REF REPORT - VERSION 1.0, S20-0043 HPE-REF-LA-R01, Issue C 17/01/2022 (page 12, 13) and updated Old Man's Valley Maintenance Depot layout provided 15/02/2022

Hornsby Park- Embellishments



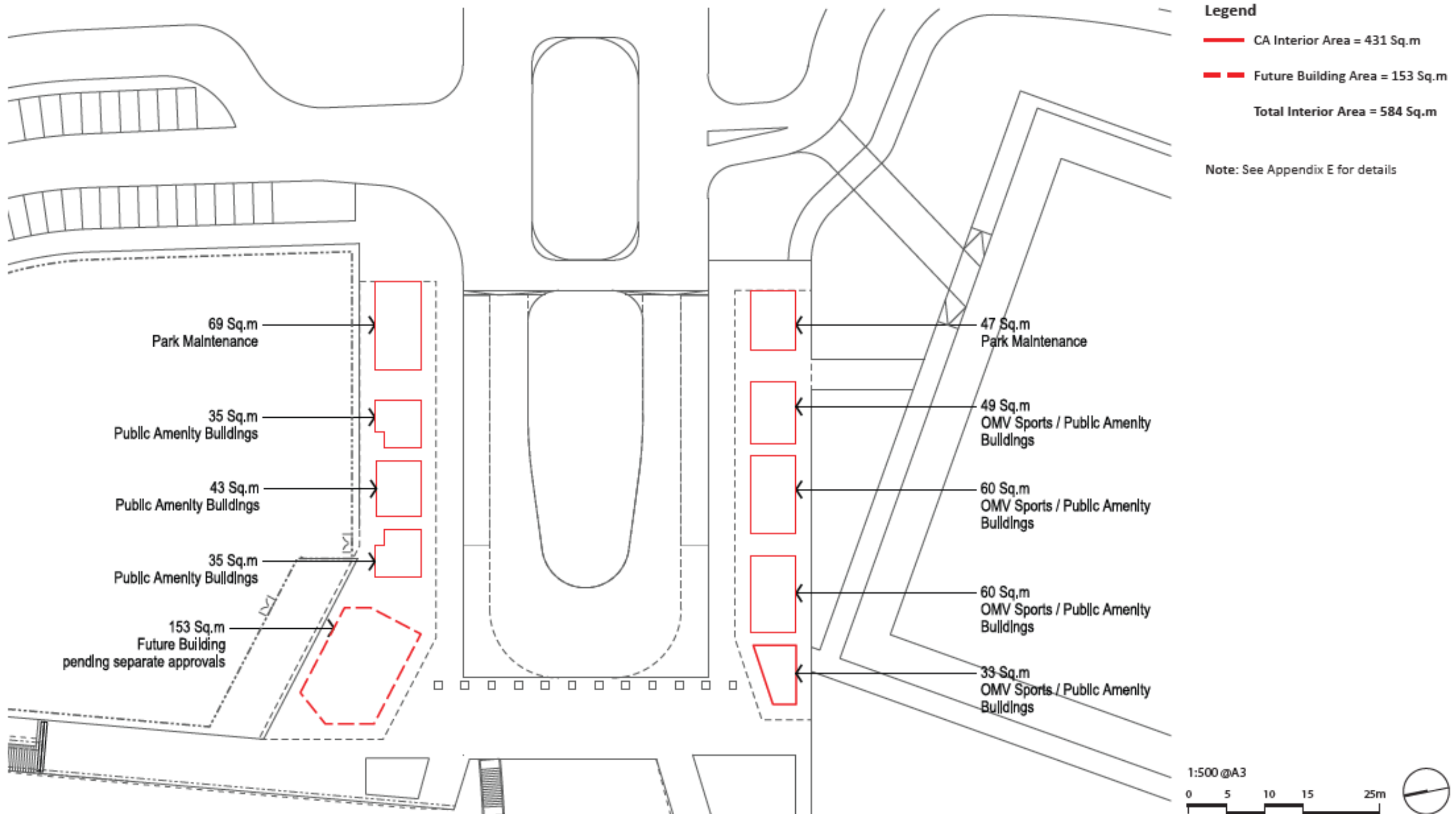
Overall OMV Plan

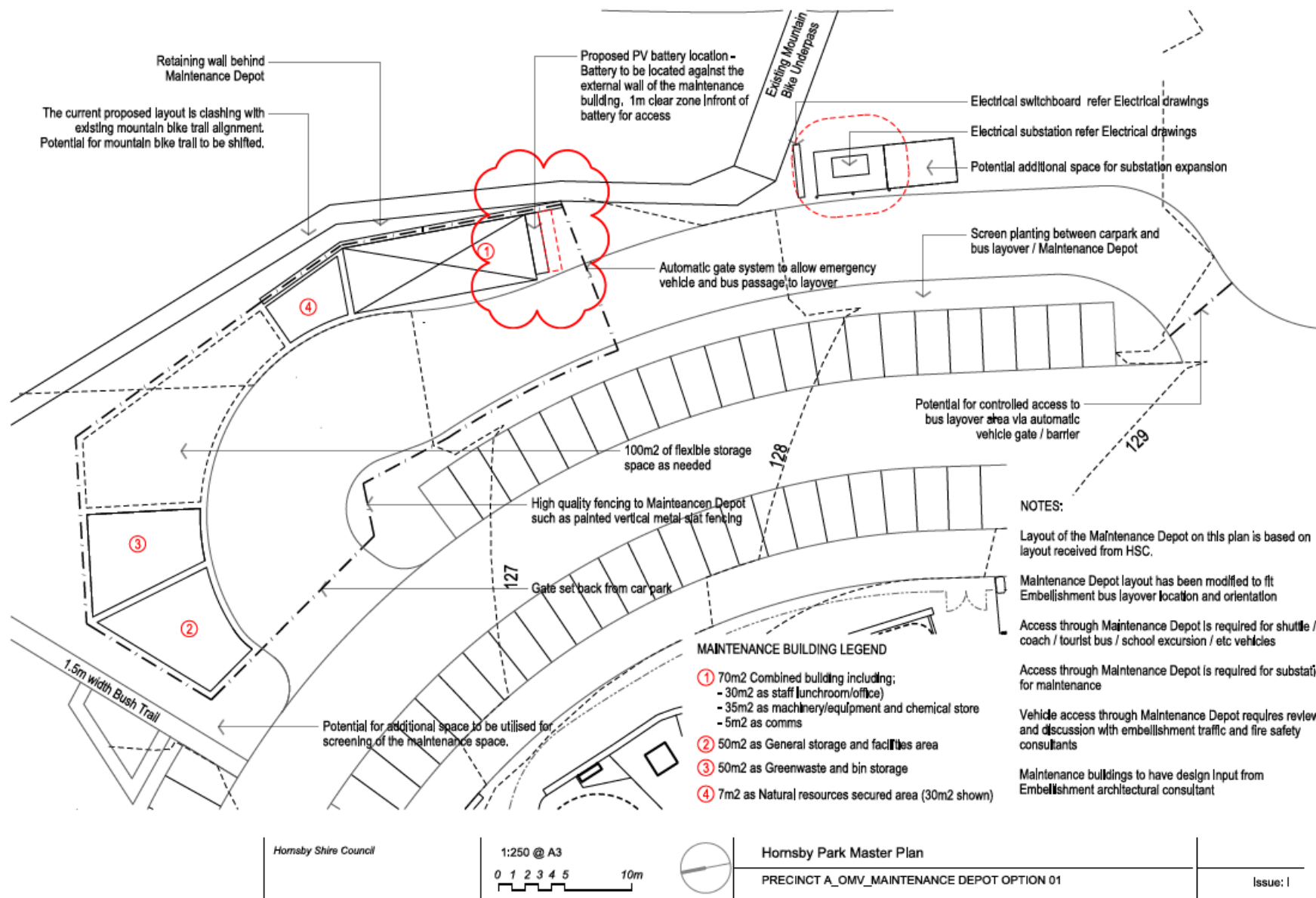


Hornsby Park- Embellishments



OMV Buildings





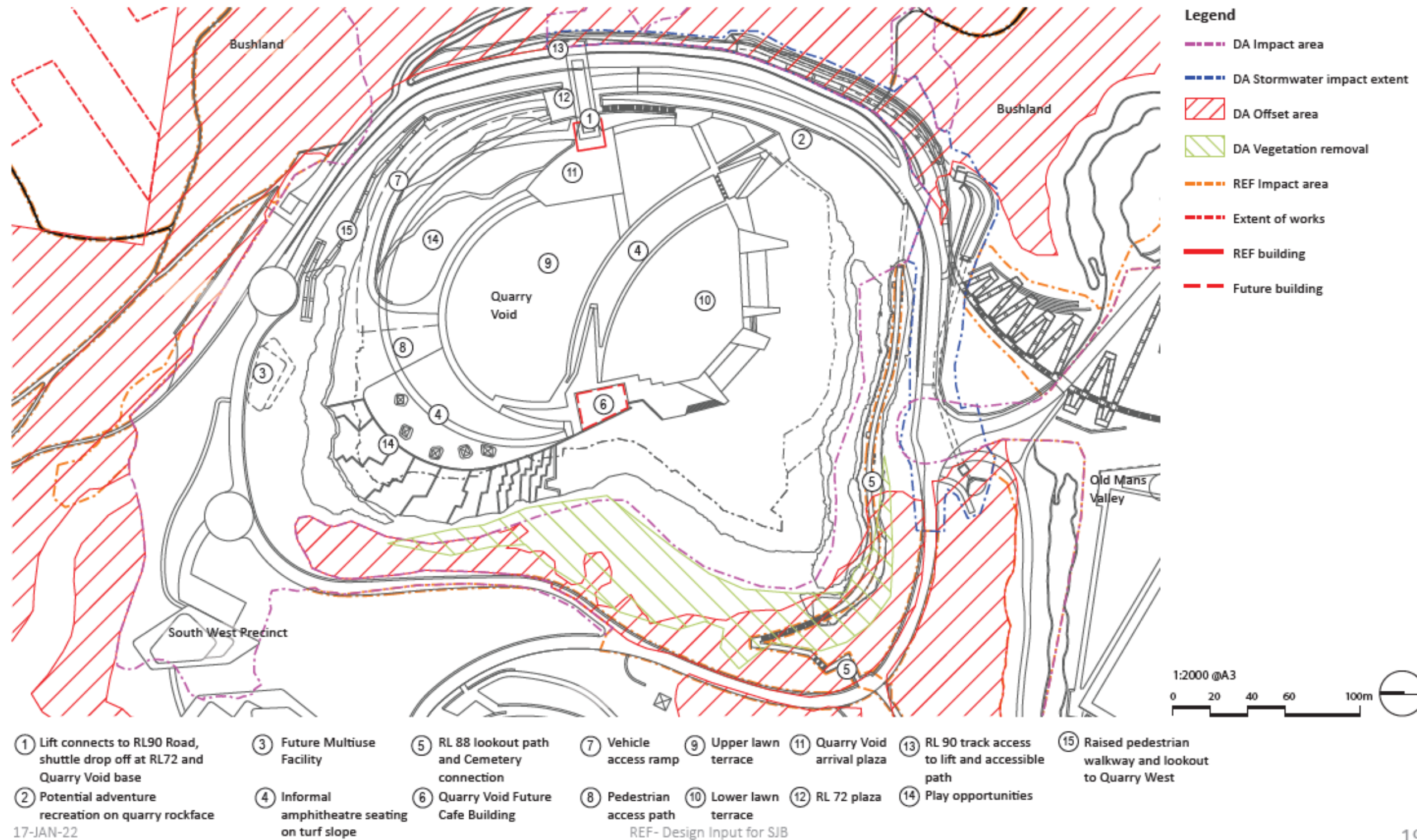
Appendix B. Quarry Void concept plan

Source: HORNSBY PARK EMBELLISHMENT REF REPORT - VERSION 1.0, S20-0043 HPE-REF-LA-R01, Issue C 17/01/2022 (page 19)

Hornsby Park- Embellishments



Quarry Void Plan



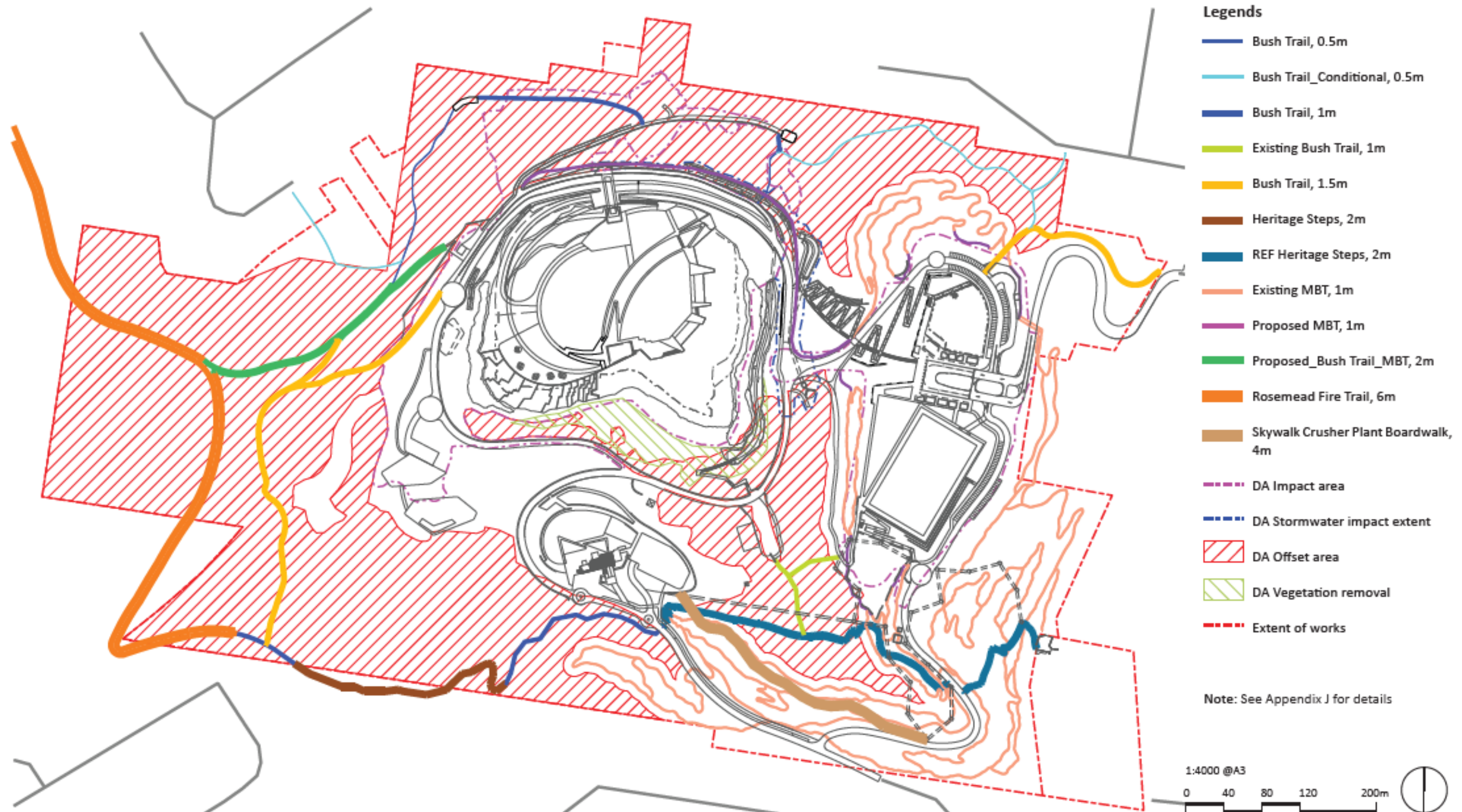
Appendix C. Bushland connections (tracks and trails and skywalk)

Source: HORNSBY PARK EMBELLISHMENT REF REPORT - VERSION 1.0, S20-0043 HPE-REF-LA-R01, Issue C 17/01/2022 (page 23)

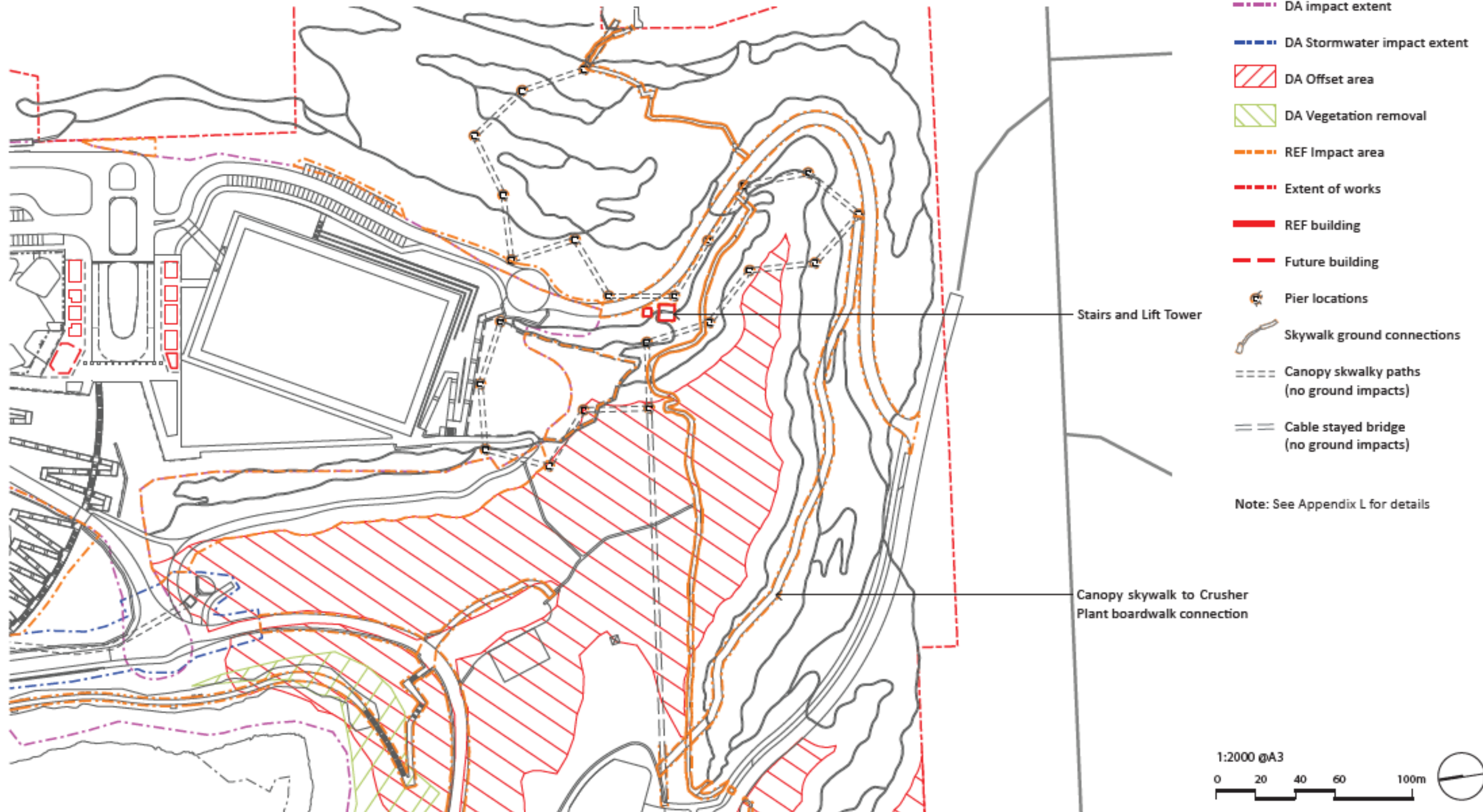
Hornsby Park- Embellishments



MTB Tracks and Bushwalking Trails



Canopy Skywalk (Including links to Crusher Plant)

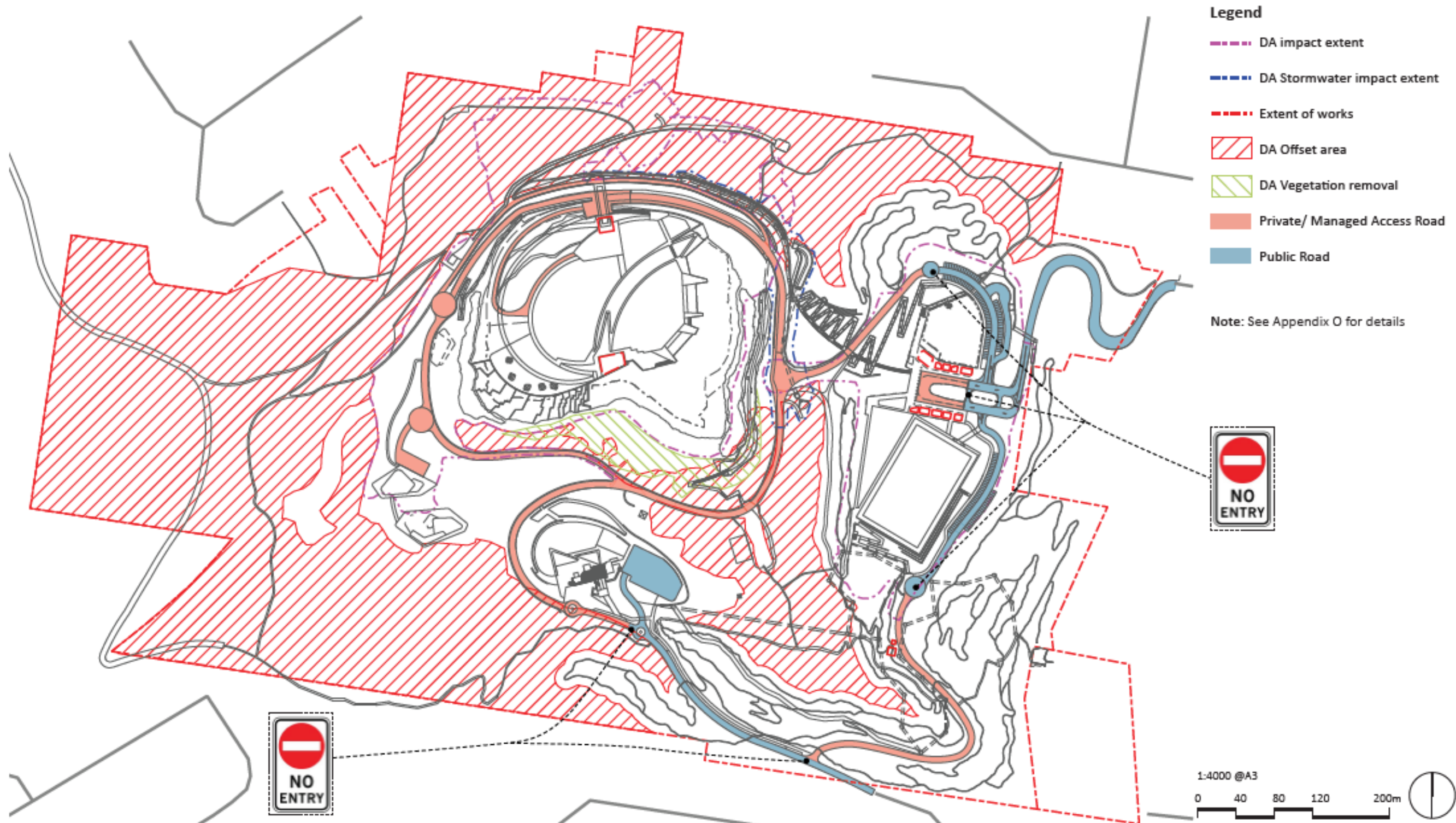


Appendix D. Internal road network

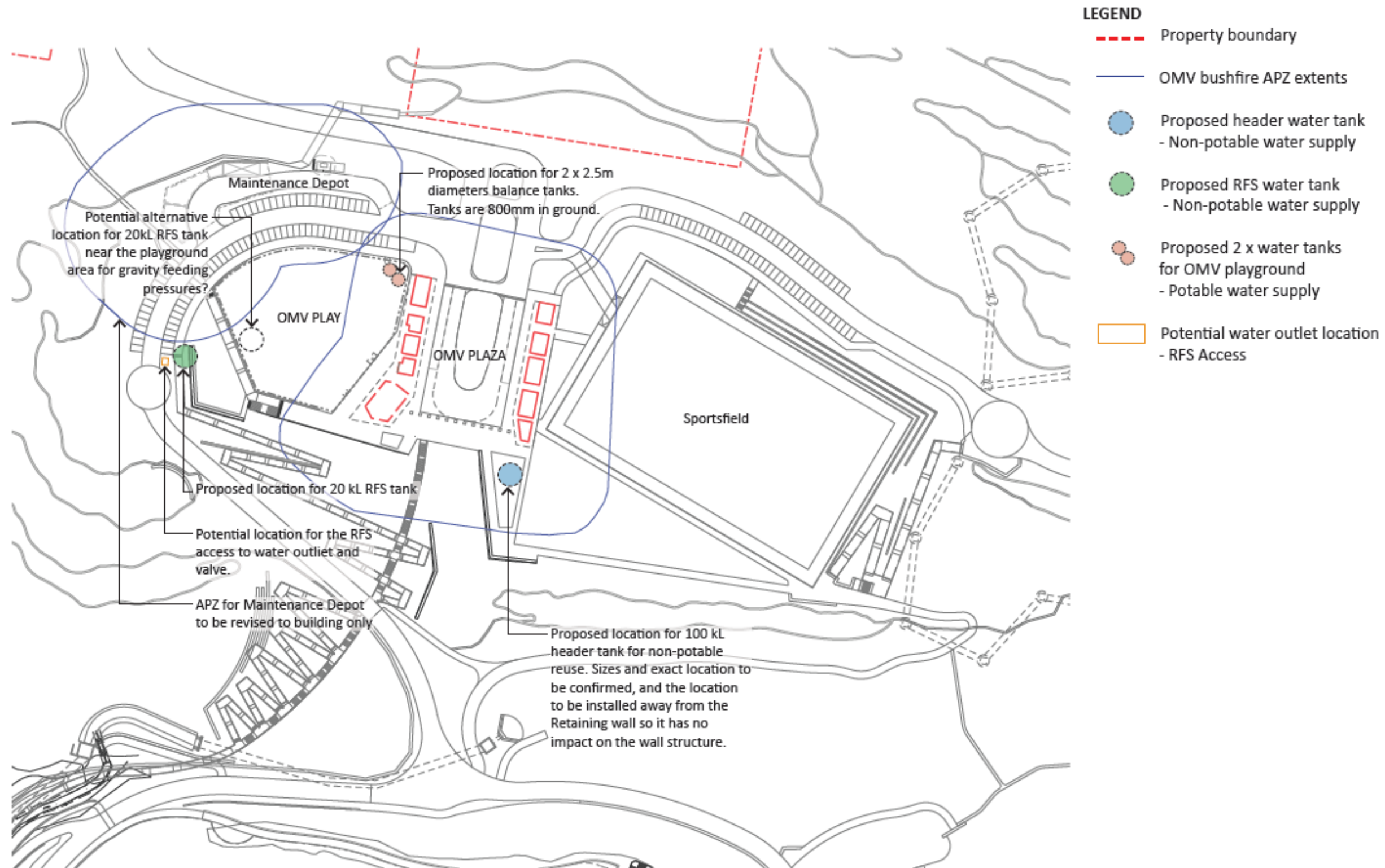
Hornsby Park- Embellishments



Internal Road Network



Appendix E. Bushfire SWS tank location



Client:
HORNSBY SHIRE COUNCIL

1:1500 @A3

0 15 30 45 75m



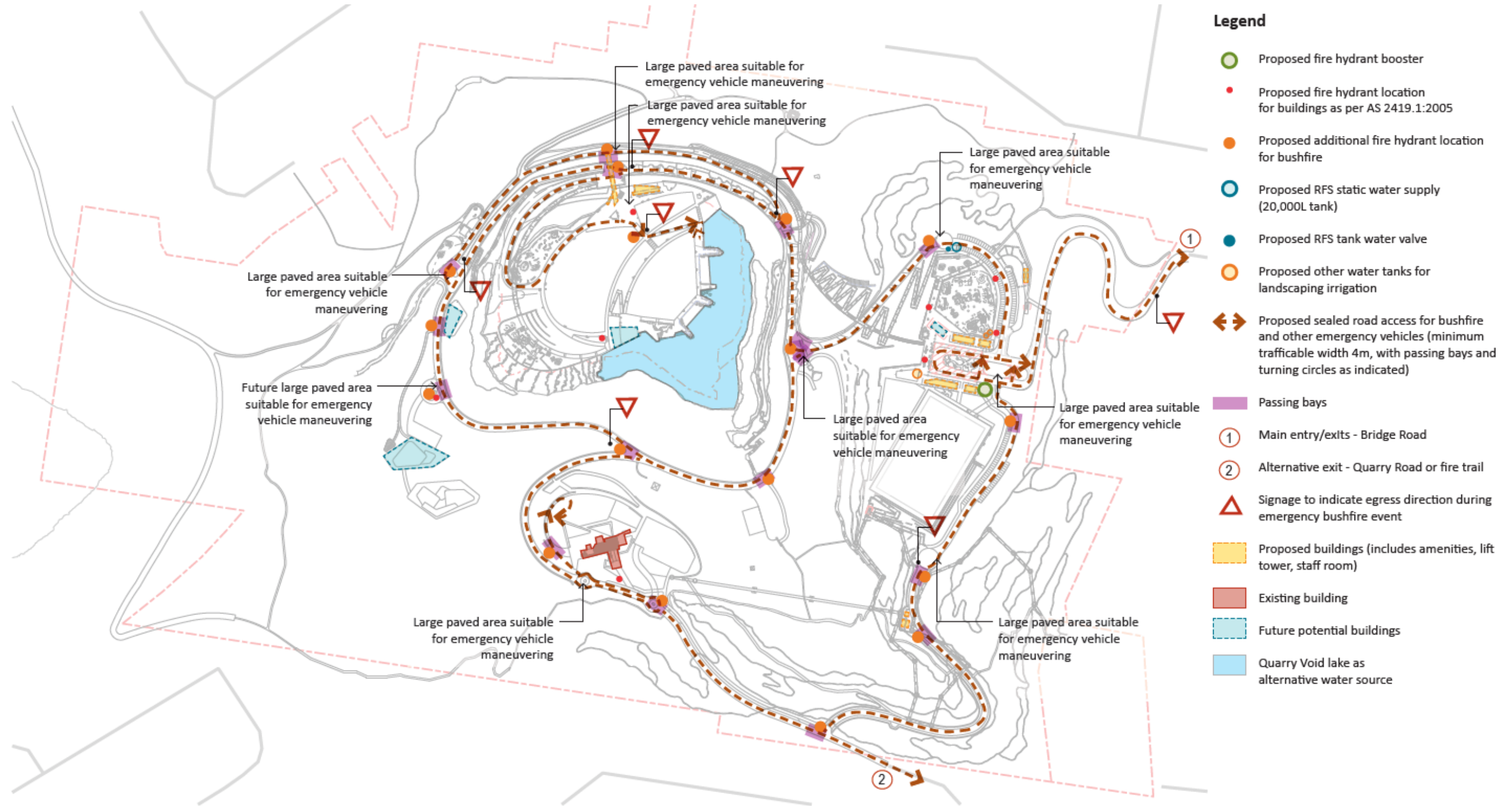
Hornsby Park Embellishment • Hornsby

OMV WATER TANK PROPOSED LOCATIONS FOR CONFIRMATION

S20-043 Sk 299

25/05/2022 Issue A

Appendix F. Bushfire access and water supply



Client:
HORNSBY SHIRE COUNCIL

1:4000 @A3



Hornsby Park Embellishment • Hornsby

FIRE ACCESS PLAN

S20-043 Sk 342

16/09/2022 Issue C



A MASS PLANTING TYPE 1 - LOW MASS PLANTING

Plant Mix Type 1

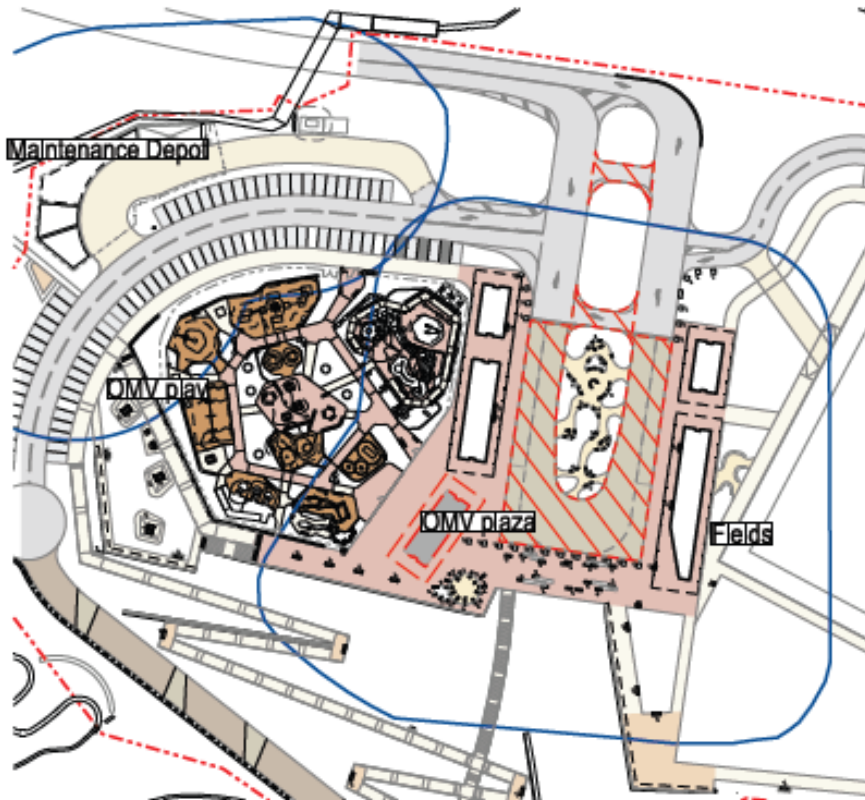
- Generally 0.3-1m high species
- Groundcovers and grass species
- Planted under tree canopies and in open areas
- Consists of mostly natives requiring open sun or partial shade
- Mix is based on either BGHF or BBGF depending on location
- Exotics in mix added as highlights of colour or texture plants



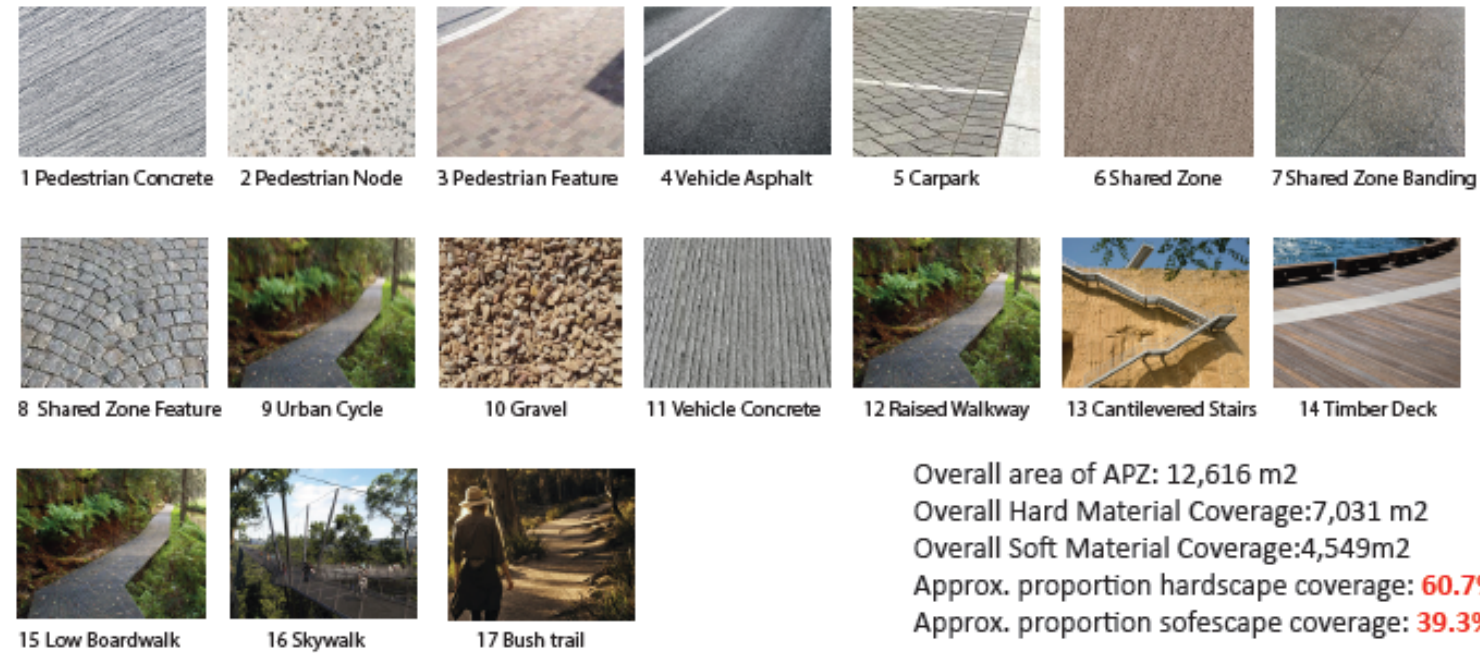
B MASS PLANTING TYPE 8 - OMV PLAZA MASS PLANTING

Mass Planting Type 8

- Generally 0.3-1m high species
- Bluegum "cathedral of trees"
- Native groundcovers and grasses due to bushfire concerns relating to shrub layers
- Ensure vehicle sightlines are not impeded within the plaza
- Opportunities for water interaction and water tolerant species



Paving Types



Overall area of APZ: 12,616 m²
 Overall Hard Material Coverage: 7,031 m²
 Overall Soft Material Coverage: 4,549 m²
 Approx. proportion hardscape coverage: **60.7%**
 Approx. proportion softscape coverage: **39.3%**



Client:
HORNSBY SHIRE COUNCIL

1:4000 @ A3

0 20 40 60 80 100

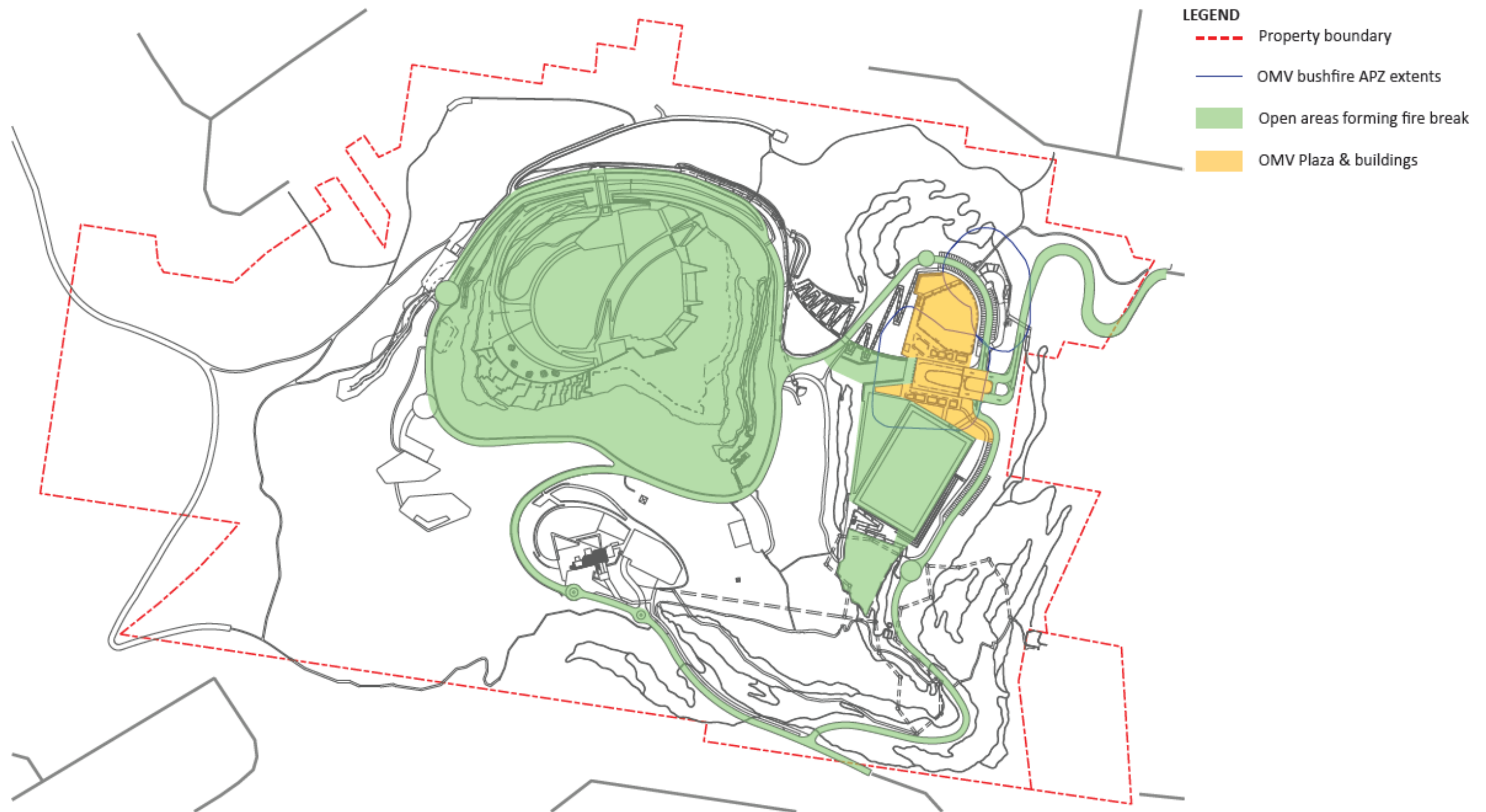
200m



Hornsby Park Embellishment • Hornsby

OMV Bushfire Ground Surface Coverage

S20-043 Sk 255



Client:
HORNSBY SHIRE COUNCIL

1:4000 @ A3

0 20 40 60 80 100

200m



Hornsby Park Embellishment • Hornsby

S20-043 Sk 256

OMV Bushfire APZ Coverage Analysis - Overall site existing fire break



Client:
HORNSBY SHIRE COUNCIL

1:1500 @A3
0 12 24 36 48 60m



Hornsby Park Embellishment • Hornsby

S20-043 Sk 257

OMV Bushfire APZ Coverage Analysis - OMV Canopy and Ground surface Coverage

LEGEND

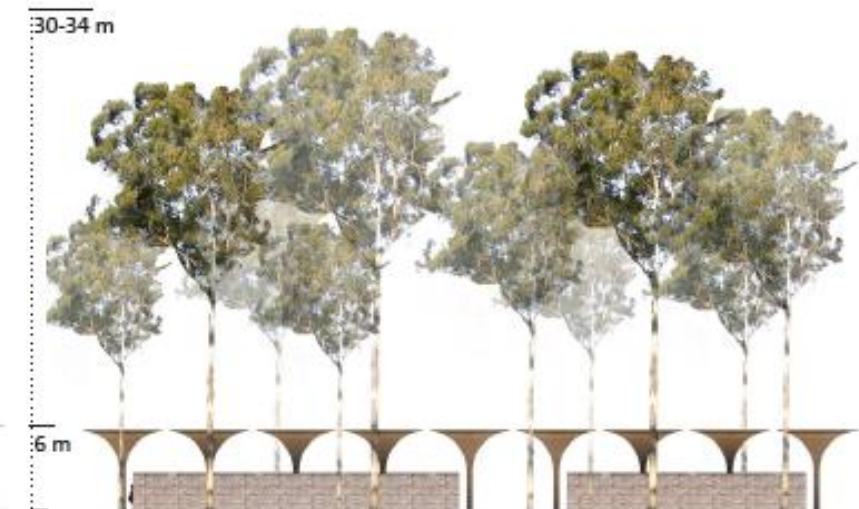
-  Proposed OMV Buildings
-  Proposed Canopy Coverage
-  OMV Bushfire APZ area
As per bushfire report



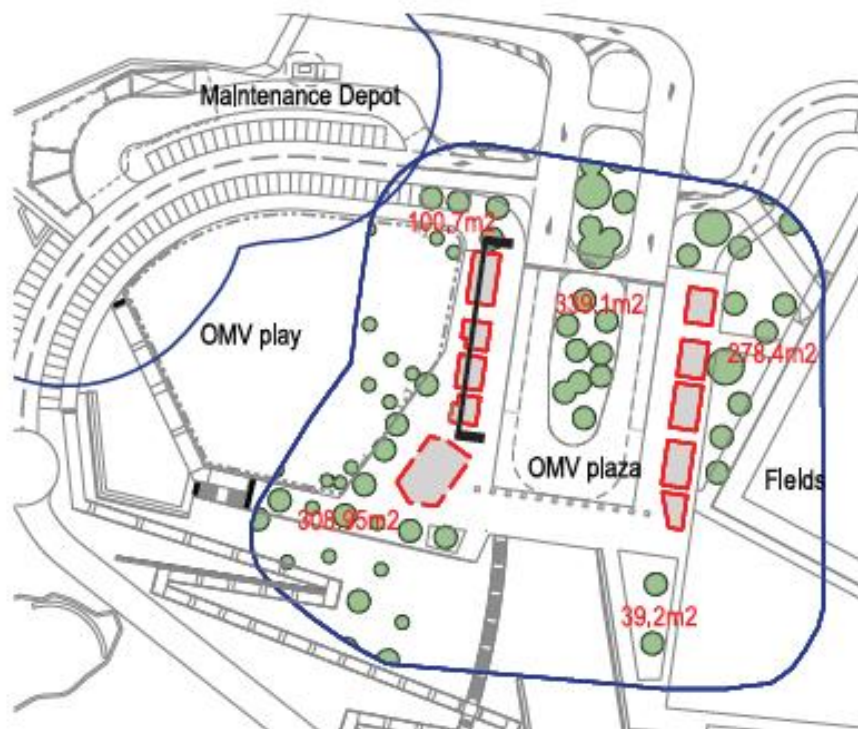
10 yrs canopy heights: 8-10 m



20 yrs canopy heights: 15 -20 m



50 yrs canopy heights: 30-34 m



Overall canopy coverage in 10 yrs: 3-8 m Dia.
Total tree quantities: 77
Overall canopy coverage: 1,066.35 m2
Total APZ area in OMV Plazal: 12,616m2
Overall Canopy coverage percentage: **8.45%**



Overall canopy coverage in 20 yrs: 5-15 m Dia.
Total tree quantities: 77
Overall canopy coverage: 3,499.24 m2
Total APZ area in OMV Plazal: 12,616m2
Overall Canopy coverage percentage: **27.7%**



Overall canopy coverage in 50 yrs: 10-20 m Dia.
Total tree quantities: 77
Overall canopy coverage: 5,770.34 m2
Total APZ area in OMV Plazal: 12,616m2
Overall Canopy coverage percentage: **45.73%**



Client:
HORNSBY SHIRE COUNCIL

Hornsby Park Embellishment • Hornsby

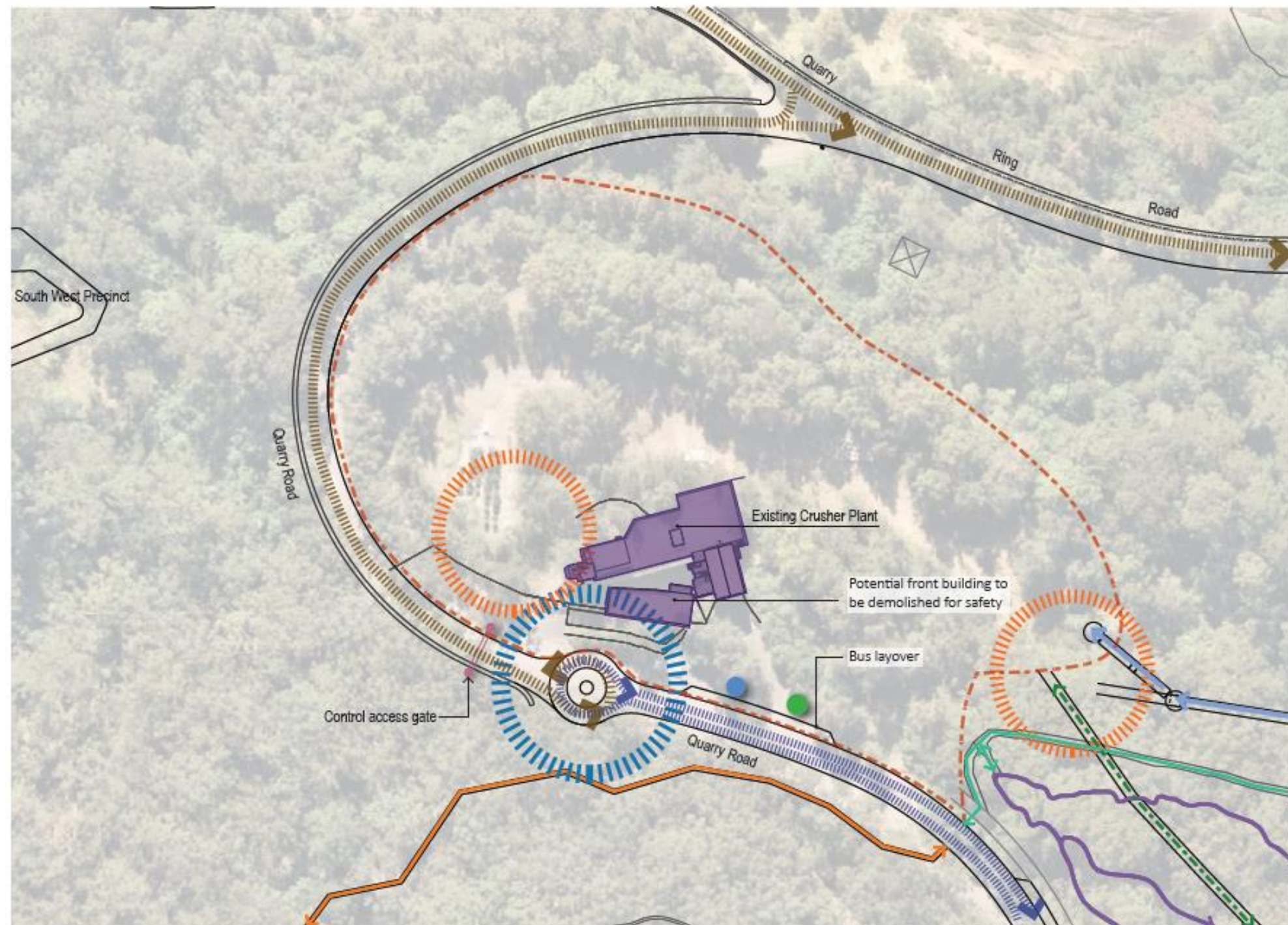
S20-043 Sk 258

OMV Bushfire APZ Coverage Analysis - OMV Plaza canopy coverage timeline

Appendix H. Crusher plant design concept

Source: HORNSBY PARK EMBELLISHMENT Crusher Plant Design Concept, Issue C 27/09/2022 (prepared by Clouston Associates, September 2022)

SITE ANALYSIS - ACCESS AND CIRCULATION



LEGEND

- Extent of works
- Existing buildings
- ⊙ Vehicle entry
- ⊙ Pedestrian entry
- |— Control access gate
- ⇄ Shuttle bus movement
- ⇄ Private car /STA bus movement
- ↔ Pedestrian access from CBD
Via skywalk
- ↔ MTB trails circulation
- ↔ Heritage steps access reuse (approved)
- ↔ Bush trail access
- - - Potential boardwalk access
- Potential STA bus drop-off area
- Potential kiss & ride spot

1:1000 @A3
0 10 20 30 50m



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CRUSHER PLANT - STRUCTURE PLAN

