PO Box 1020
Penrith NSW 2751
Tel: 02 4744 5800
Mob: 0425 833 893
info@bfcs.com.au
www.bfcs.com.au
ACN: 161 040 295

BUSHFIRE CONSULTING SERVICES PTY LTD
Designing Bushfire Protection Measures

2024
Bush Fire Assessment Report

in relation to the proposed
Data Centre

at: 43-61 Turner Road Gregory Hills
Lots 14, 15, 16 & 17 DP 28024

(subject site)

Contents

Document Tracking

Item	Detail
Project Name	Bush Fire Assessment Report, proposed Data Centre
Project Address	Lots 14, 15, 16 & 17 DP 28024 43-61 Turner Road Gregory Hills
Client Name	Arup
Project Number	J24/0122
Plan Reference	Plans by Greenbox, project Donovan, Job number 240002, Drawing Number SSDA-A-054 issue H, dated 11/09/2024
Prepared by	Laura Richards
Approved by	Catherine Gorrie

Bushfire Consulting Services Pty Ltd Contact Details	
Catherine Gorrie	Managing Director
Office Number	02 4744 5800
Mobile Number	0425 833 893
Email	info@bfcs.com.au

Document Control

Version	Primary Author	Description	Date Completed
1	Laura Richards	Draft	11/03/2024
2	Catherine Gorrie	Draft for Client review	14/03/2024
3	Catherine Gorrie	Draft- Inclusion of Client's comments	18/04/2024
4	Catherine Gorrie	Revised Plans	25/09/2024
5	Catherine Gorrie	Draft to include clarification on ember protection	15/10/2024

Copyright

Disclaimer

Any recommendation or advice expressed in this report is made in good faith and in accordance with the relevant legislation for bushfire prone development in New South Wales. Bushfire Consulting Services Pty Ltd has endeavoured to ensure that the information in this document is correct. However, many factors outside our current knowledge or control affect the recipient's needs and project plans. Bushfire Consulting Services Pty Ltd does not warrant or represent that the document is free from error or omissions and does not accept liability for any errors or omissions. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. To the fullest extent possible Bushfire Consulting Services Pty Ltd excludes any express or implied warranty as to condition, fitness, merchantability or suitability of this document and limits its liability for direct or consequential loss at Bushfire Consulting Services Pty Ltd option to re-supplying the document or the cost of correcting the document. In no event shall Bushfire Consulting Services Pty Ltd responses to questions or any other information in this document be deemed to be incorporated into any legally binding agreement without the express written consent of an officer of Bushfire Consulting Services Pty Ltd.

It should be borne in mind that the measures recommended in this report cannot guarantee that a building will survive a bushfire event on every occasion. This is due to the degree of vegetation management, the unpredictable behaviour of bushfires and extreme weather conditions. As such, the author is not liable to any person for any damage or loss whatsoever which has occurred or may occur in relation to the person taking action or not taking action based on the recommendations of this report.

NOTE: This bush fire assessment shall remain valid for 12 months from the date of issue.

Executive Summary

Bushfire Consulting Services was commissioned by Arup to provide a bush fire assessment for a proposed Data Centre at Lots 14, 15, 16 & 17, DP 28024, 43-61 Turner Road Gregory Hills. The subject site is mapped as designated bush fire prone land by Camden Council and is located within 100 metres of bush fire prone (hazardous) vegetation.

The proposal is a form of "other non-residential" development and, as such, this report makes recommendations in accordance with the aim and objectives of Chapter 1 and 8 of the NSW RFS document '*Planning for Bush Fire Protection*' (PBP) (NSWRFS 2019). The recommendations address these objectives including:

- afford buildings and their occupants protection from exposure to a bush fire
- provide for a defendable space to be located around buildings
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevents 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
- ensure that utility services are adequate to meet the needs of firefighters
- Provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation
- Provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development
- Provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building
- Provide for the storage of hazardous materials away from the hazard wherever possible

Where all recommendations are implemented, the report concludes that the proposal can comply with the aim and objectives of PBP.

Compliance Summary

This Assessment has been Certified by: Catherine Gorrie BPAD-Level 3 Accredited Practitioner FPAA Cert No: BPAD20751	
Does this development comply with the aim and objectives of PBP?	Yes
Is referral to the NSW Rural Fire Service (RFS) required?	No

Assessment Requirements	Where addressed	Page Number
If the development is on mapped bush fire prone land, or a bush fire threat is identified on or adjoining the site, provide a bush fire assessment that details proposed bush fire protection measures and demonstrates compliance with Planning for Bush Fire Protection	Section 6 Bush Fire Attack Assessment	page 16
	Section 7 Relevant objectives of PBP	page 21
	Section 9 Recommendations	page 25

List of Abbreviations

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018, *Construction of Buildings in Bushfire Prone Areas*
BAL	Bushfire Attack Level
BPAD	Bushfire Planning and Design (Accreditation Scheme)
BPMs	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
Council	Camden Council
DA	Development Application
DEM	Digital Elevation Model
EP&A Act	*Environmental Planning and Assessment Act – 1979*
FDI	Fire Danger Index
FPAA	Fire Protection Association of Australia
IPA	Inner Protection Area
kW/m^2	Kilowatts per metre squared
LiDAR	Light Detection and Ranging
LPMA	Land & Property Management Authority
NCC	National Construction Code
PBP	*Planning for Bush Fire Protection 2019*
RF Act	*Rural Fires Act – 1997*
RFS	NSW Rural Fire Service
SIX	Spatial Information Exchange

1. Introduction

This report has been commissioned by Arup to provide a bush fire assessment for a proposed Data centre at Lots 14, 15, 16 & 17 DP 28024, 43-61 Turner Road Gregory Hills.

The subject property is "bushfire prone land" as per the local Council bushfire prone land map (Figure 3) as defined by section 10.3 (s10.3) of the *Environmental Planning & Assessment Act* (EP&A) 1979 and therefore the requirements stipulated by legislation apply to any new development on the site.

Planning for Bush Fire Protection 2019 (Chapter 8) describes this type of development as "other non-residential development" and therefore the aim and objectives of Chapter 1 and 8 of PBP are applicable.

The bush fire assessment and recommendations are derived from the Rural Fire Service document *Planning for Bush Fire Protection 2019*.

2. Purpose of this Report

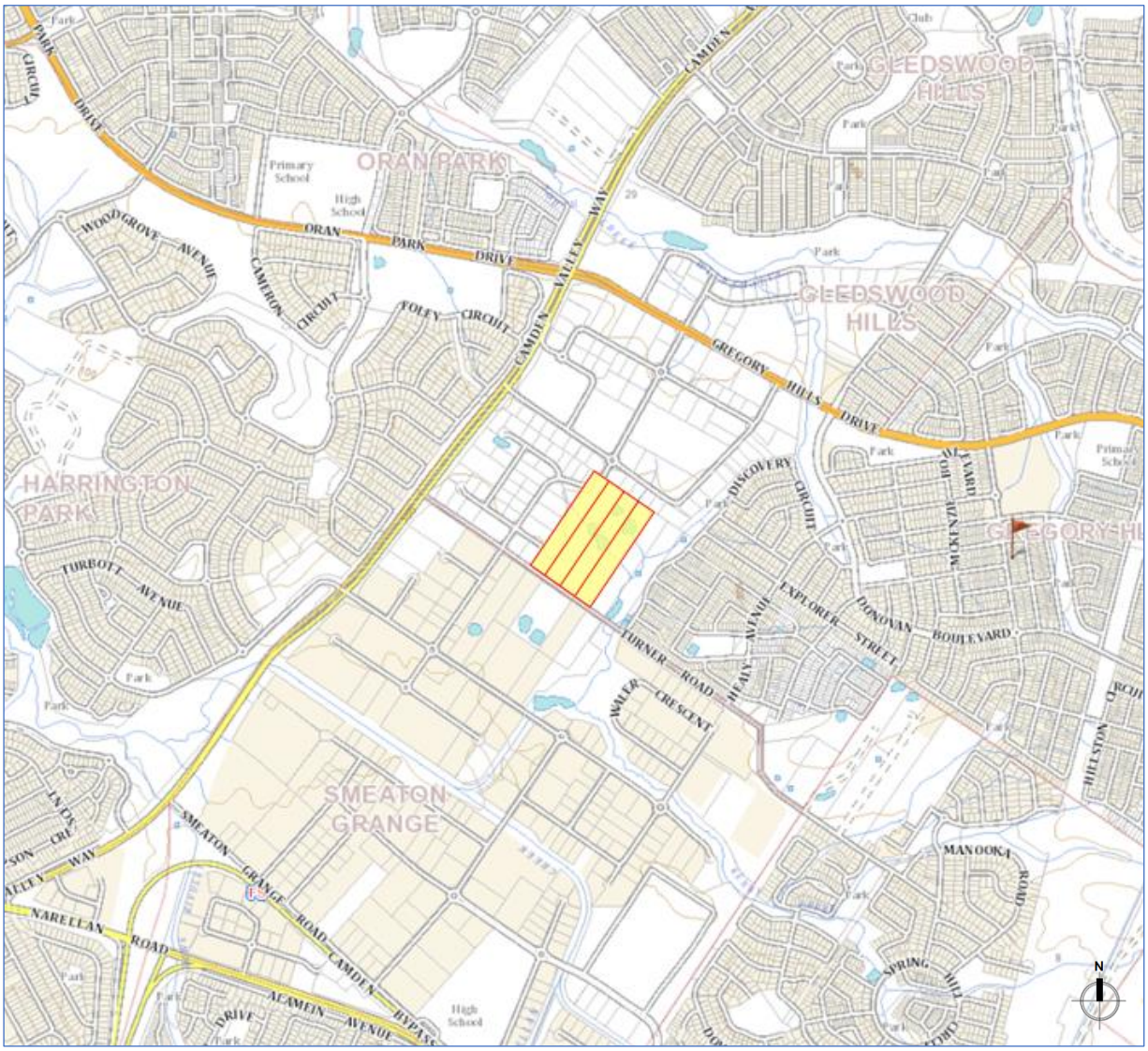
The purpose of this report is to provide the owners, the Consent Authority and the Certifier with a description of the proposed development as well as the vegetation type, slope and any other factors influencing the likely bushfire behaviour, sufficient to show that the development will be protected from the likely bushfire threat as outlined in current legislation.

This assessment includes an analysis of the hazard, threat and subsequent risk to the development and provides recommendations that satisfy the aim and objectives of Planning for Bush Fire Protection.

3. Location

The site is located and known as Lots 14, 15, 16 & 17 DP 28024, 43-61 Turner Road Gregory Hills. The property is part of the Camden local government area.

Figure 1. Location Map. Source: LPMA SIX Viewer (NSW Government 2024a)



Approximate Site location outlined in red

Figure 2. Aerial Map. Source: LPMA SIX Viewer (NSW Government 2024a)

Approximate Site location outlined in red

Figure 3. Bushfire Prone Land Map. Source: NSW Government Planning Portal (NSW Government 2024b)

Vegetation Buffer

Vegetation Category 2

Vegetation Category 3

Approximate Site location outlined in yellow

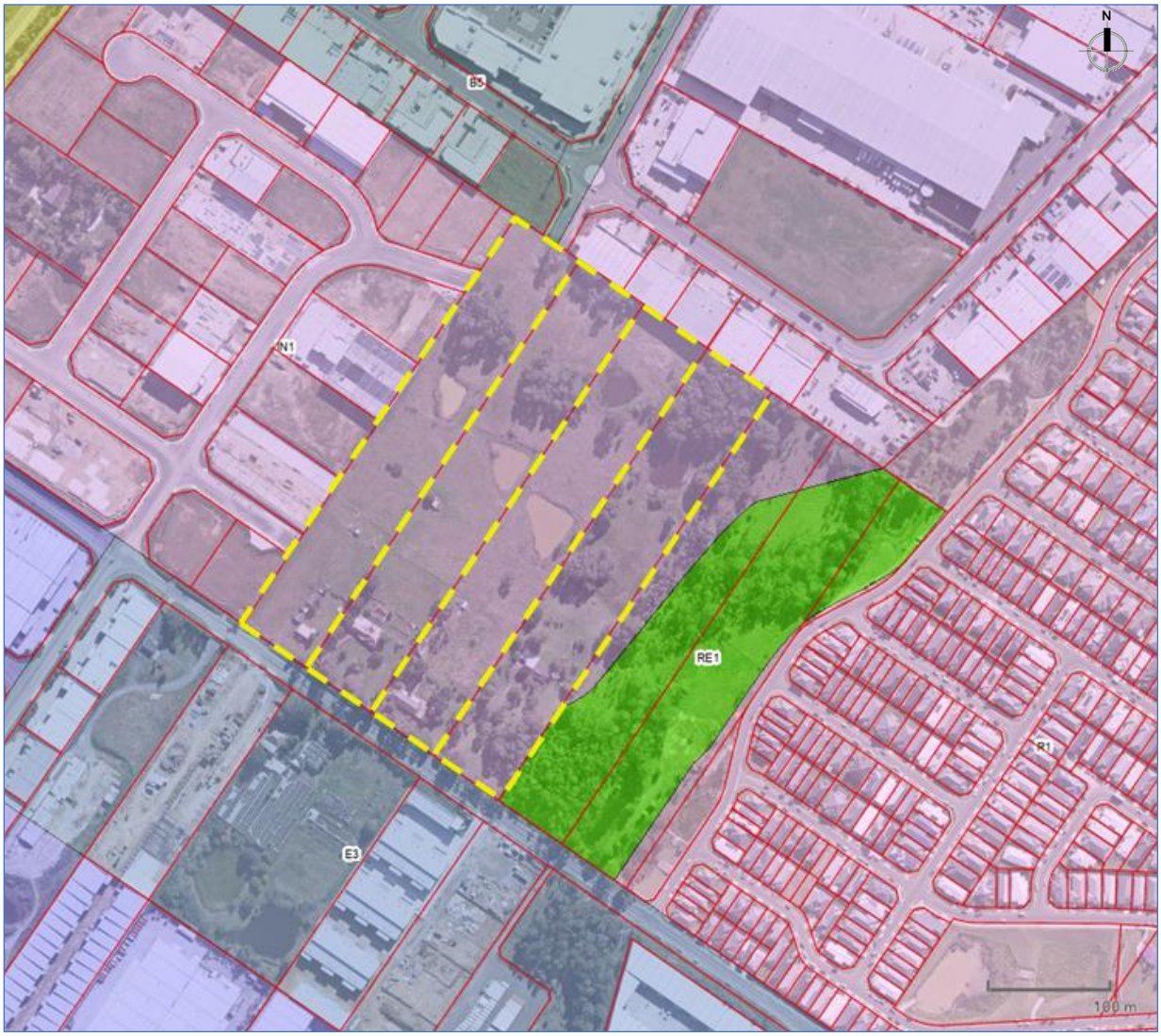
4. Property Description

The property is comprised of Lots 14, 15, 16 & 17 DP 28024, 43-61 Turner Road Gregory Hills, covering approximately 10ha in area (Figure 2). It is bounded by industrial and residential allotments in each direction and Turner Road to the approximate southwest. It currently contains a single occupancy development comprising a single storey dwelling, to be demolished.

4.1 Zoning

The land is zoned IN1 under State Environmental Planning Policy (Precincts—Western Parkland City) 2021. Adjacent lands to the southeast are zoned RE1, adjacent lands to the southwest are zoned E3 and adjacent lands to the northeast and northwest are zoned B5. (Figure 4).

Figure 4. Zoning Map. Source: NSW Government Planning Viewer (NSW Government 2024b)



Approximate Site location outlined in yellow

IN1: General Industrial
B5: Business Development
E3: Productivity Support
E4: General Industrial
SP2: Classified Road
RE1: Public Recreation
R1: General Residential

4.2 Biodiversity Values

A search of the NSW Office of Environment and Heritage's Biodiversity Values Map has been carried out which indicates land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. It may be necessary to engage an accredited assessor to apply the Biodiversity Assessment Method (the BAM) to assess the impacts of the proposed development.

Figure 5: Biodiversity Values Map: NSW Government Planning Viewer (NSW Government 2024b)

https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

Approximate Site location outlined in yellow

Biodiversity Values

4.3 The Proposal

The proposal is for the construction of a data centre comprising of data halls, mechanical and electrical equipment rooms, offices, substation, security gatehouse, other ancillary support spaces, and external/rooftop, mechanical and electrical equipment.

A summary of the proposal's key features includes:

- Construction of a two storey data centre comprising:
    - 2 data halls including fitout of IT Racks and equipment, associated cabling and supporting services
    - 27 backup generators
    - With an IT capacity of about 53 megawatts (MW).
- Construction of a guard house
- Infrastructure comprising civil, stormwater and drainage works and utilities servicing and connections.
- Diesel storage capacity of about 900 kilo litres (kL)
- High voltage substation incorporating 132/22 kilovolt (kV) transformers and associated switching and control buildings.
- 68 standard car parking spaces (of which five would have EV charging), 2 car parking spaces compliant with the *Disability Discrimination Act 1992*, 10 shared bicycle parking spaces.
- Hours of operation being on a 24 hours per day, 7 days per week basis.

5. Site Assessment

Bushfire Consulting Services Pty Ltd attended the site on 23 February 2024. The assessment relates to the new development shown in the site plans (reference Appendix 1 below). The NSW Spatial Services mapping website has also been used as a reference (NSW Government 2023a), and '*Ocean Shores to Desert Dunes*' by David Keith (Keith 2004), in determining the vegetation type.

6. Bush Fire Attack Assessment

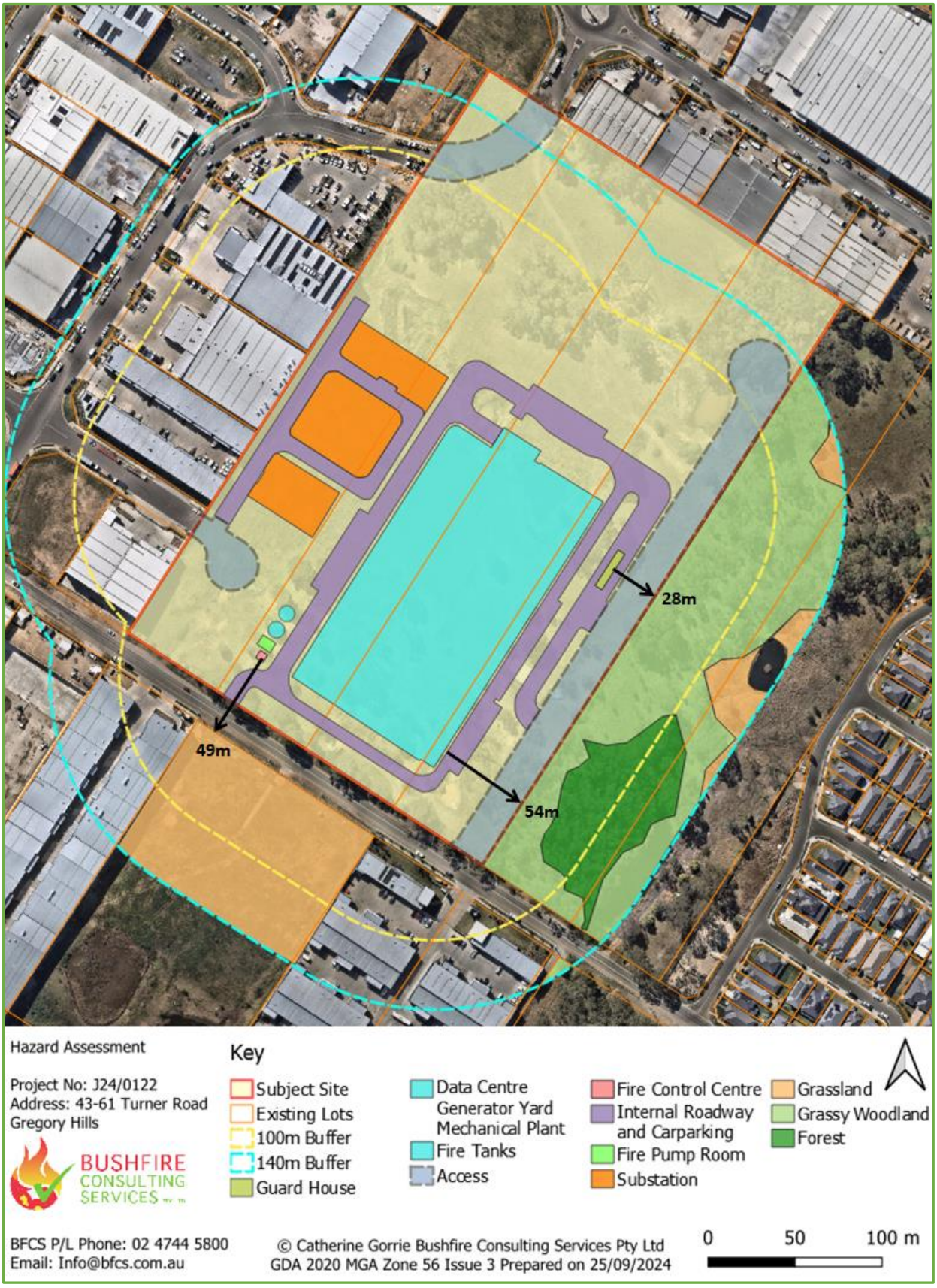
6.1 Determine Vegetation Formations

The hazardous vegetation formations for each aspect of the development within 140m of the asset have been identified according to Keith (2004). The bushfire threat emanates from bushland located to the southeast and southwest of the subject buildings. This vegetation is external to the subject site boundaries.

Where mixes of vegetation formations are located together, the vegetation formation providing the greater hazard is used for the purpose of this assessment. The combination of vegetation and slope that yields the worst-case scenario has been used.

Based on a site visit and determination of vegetation formation using the Keith (2004) Identification Key, the primary bushland vegetation having the potential to affect the subject building is most representative of Woodland to the southeast and Grassland to the southwest.

Figure 6. Hazardous vegetation affecting the subject building. Source: NearMap (2024) with overlays by BFCS P/L. Aerial Photography date: 3/09/2024



6.2 The effective slope

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the level of radiant heat flux. The effective slope of the land from the new building for a distance of 100m is derived from a site assessment combined with the most detailed contour data available. The slope is then categorised into one of following classes, relative to the location of the hazard:

all upslope vegetation (considered 0 degrees)

>0 to 5 degrees downslope vegetation

>5 degrees to 10 degrees downslope vegetation

>10 degrees to 15 degrees downslope vegetation, and

>15 degrees to 20 degrees downslope vegetation.

1m DEM data is sourced from NSW Spatial Services which is captured using LiDAR and has a horizontal accuracy of 0.3m and vertical accuracy of 0.8m at 95%.

The effective slope has been measured manually on site over a distance of 100m from the proposed development where accessible, under the classified vegetation community constituting the hazard. The slope was found to be consistent with the topographical information from NSW Spatial Services LiDAR data.

Direction from Building Footprint	Slope Description
Northeast	N/A
Southeast	Downslope >0 - 5°
Southwest	Downslope >0 - 5°
Northwest	N/A

Figure 7. Slope Diagram. Source: NearMap (2024) and LiDAR (NSW Government 2024a) with overlays by BFCS P/L: Aerial Photography Date: 3/09/2024

SE ((90-88/41) x 1/tan = Downslope 2.3°

SW ((96-92)/53) x 1/tan = Downslope 4.3°

6.3 Fire Weather

The development is located in the Camden Council area, a part of the Greater Sydney Region, which has a [1]Fire Danger Index of 100.

6.4 Fire History

A review of the NSW National Parks and Wildlife Services Fire History data available on the NSW Government SEED database indicates recorded wildfires in

Figure 8: Fire History, Source SEED Maps NSW Government and overlays by BFCS Pty Ltd

Orange dashed circle is approximately 10km around the subject site, indicated with pink/yellow dot

https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU&runWorkflow=AppendLayerCatalog&CatalogLayer=SEED_Catalog.184.NSW%20Formation,SEED_Catalog.184.Plant%20Community%20Type,SEED_Catalog.184.NSW%20Class

[1] The Fire Danger Index (FDI) is a numerical rating that indicates the level of fire danger in a specific area. The FDI takes into account factors such as the chance of fire starting, its rate of spread, its intensity, the chance of a fire starting, and the difficulty potential for its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long and short-term drought effects

7. Relevant objectives of PBP

The objectives for buildings of Class 5-8 are outlined in PBP Chapter 1 and 8.

7.1 Objectives of Chapter 1 (PBP Part 1.1)

Objective	Comment
Afford buildings and their occupants protection from exposure to a bush fire	This non-habitable structure is separated from the hazard by sufficient distance of 28m, which affords buildings and their occupants protection from exposure to a bush fire when combined with ember protection of external building openings
Provide for a defendable space to be located around buildings	A defendable space of at least 10m is available around the building, which exceeds the requirements of PBP
Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings	The relevant FFDI (100), vegetation formation (Woodland to the southeast and Grassland to the southwest) and effective slope (Downslope >0-5°) have been matched using Table A1.12.2 of PBP, and the available separation distance between the building and the hazard of 28m to the southeast and 49m to the southwest, exceeds the minimum distance for APZs of 16m to the southeast and 12m to the southwest, indicating that direct flame contact on the building is not anticipated

Figure 9: Recommended APZ, Source NearMap (2024) and LiDAR (NSW Government 2024a) with overlays by BFCS P/L: Aerial Photography Date: 3/09/2024

Objectives of Chapter 1	(cont'd)
Ensure that appropriate operational access and egress for emergency service personnel and occupants is available	Can comply as road widths, curvatures and grades and swept paths enable appropriate operational access and egress for emergency service personnel and occupants
Provide for ongoing management and maintenance of BPMs	Normal property maintenance will ensure that BPMs are maintained
ensure that utility services are adequate to meet the needs of firefighters	Can comply, see above

7.2 Objectives of Chapter 8 (PBP Part 8.3.1)

Objective	Comment
Provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation	Can Comply, the lot has direct access to Central Hills Drive to the northeast and northwest, Turner Road to the southwest and White Cliffs Avenue to the northwest, which are all public roads. Internal access provides a minimum road width of approximately 10m, with hard surfaces around the development, sufficient for fire trucks and other emergency vehicles to enter and egress the lot in a forwards direction. Suitable access for fire-fighting vehicles and evacuation is available
Provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development	Can Comply, the need to formulate an emergency evacuation plan is suggested. To do so, occupants can complete a Bush Fire Safety Plan on the NSW RFS Website http://www.rfs.nsw.gov.au/ under publications / bushfire safety

Objective	Comment
Provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building	Can Comply, the development has a reticulated water supply, which meets PBP requirements for a fire fighting water supply There are several hydrants situated within Turner Road, White Cliffs Avenue, Central Avenue and Central Hills Drive Hydrants are to be provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning Where practical, electrical transmission lines are underground If applicable, reticulated or bottled gas is installed and maintained in accordance with *AS/NZS 1596:2014 - The storage and handling of LP Gas*, the requirements of relevant authorities, and metal piping is used, all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side, connections to and from gas cylinders are metal, polymer-sheathed flexible gas supply lines are not used, and above-ground gas service pipes are metal, including and up to any outlets
Provide for the storage of hazardous materials away from the hazard wherever possible	Can comply, as wherever possible, the storage of hazardous materials will be away from the hazard

8. Identify Construction Requirements

The NCC does not provide for any bush fire specific performance requirements for these particular classes of buildings. The general fire safety construction provisions of the NCC are taken as acceptable solutions, and AS 3959 and the NASH Standard are not considered as a set of Deemed-to-Satisfy provisions for this non-residential proposal. Ember protection is recommended for all external openings to buildings that house occupants or contain equipment that contributes to fire fighting efforts such as supply of electricity or water. Ember protection should consist of a material that is aluminium, corrosion resistant steel or bronze having maximum apertures of 2mm.

9. Recommendations

The following recommendations are made for the bushfire measures for the proposed Data Centre at Lots 14, 15, 16 & 17 DP 28024, 43-61 Turner Road Gregory Hills, and are based upon the relevant provisions of the NSW Rural Fire Service Guideline entitled *Planning for Bush Fire Protection 2019*.

1. Asset Protection Zones

At the commencement of the development, and in perpetuity, the site shall be managed as an Inner Protection Area (IPA) Asset Protection Zone from the development to the boundary to the southeast, southwest and northwest, and for a distance of 16m to the northeast, as outlined in PBP 2019 Appendix 4.

Trees

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

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings
- shrubs should not be located under trees

- shrubs should not form more than 10% ground cover
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation

Grass

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

2. Ember Protection

Provide ember protection to all external openings of buildings that house occupants or contain equipment essential to firefighting operations, such as electricity or water supply systems. This ember protection should consist of materials such as aluminium, corrosion-resistant steel, or bronze, with maximum apertures of 2 mm.

3. Electricity and Gas Services

Where practicable, electrical transmission lines are underground.

Where applicable, reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used.

All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side, connections to and from gas cylinders are metal.

Polymer-sheathed flexible gas supply lines are not used, and above-ground gas service pipes are metal, including and up to any outlets.

4. Hydrants

Hydrants are to be provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning.

5. Storage of Hazardous Materials

Wherever possible, the storage of hazardous materials will be away from the hazard.

6. Emergency and Evacuation Planning

The need to formulate an emergency evacuation plan is suggested. To do so, occupants can complete a Bush Fire Safety Plan on the NSW RFS Website http://www.rfs.nsw.gov.au/ under publications / bushfire safety.

10. Summary

This report consists of a bush fire assessment for the proposed development of a Data Centre at Lots 14, 15, 16 & 17 DP 28024, 43-61 Turner Road Gregory Hills. The report concludes that the proposed development is on designated bushfire prone land and the legislative requirements for development in bushfire prone areas are applicable.

This report has considered all the elements of bushfire attack and finds that the development satisfies the aim and objectives of 'Planning for Bush Fire Protection' 2019, subject to implementation of the recommendations made by this report.

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

This report is a bush fire assessment that provides the required information to assist local Council and the Rural Fire Service in determining compliance in accordance with Planning for Bush Fire Protection. The local Council is the final consenting authority and the construction of the building must comply with the recommendations included in the Council's conditions of consent.

Catherine Gorrie | Accredited Bushfire Planning and Design Practitioner

Fire Protection Association Australia BPAD-Level 3 (BPAD 20751)

(a person who is recognised by the NSW Rural Fire Service as a suitably qualified consultant in bush fire risk assessment)

Grad Dip Bushfire Protection (UWS 2010)

Diploma Environmental Health & Building Surveying (TAFE 2005)

Corporate Silver Member Fire Protection Association Australia

Bushfire Consulting Services Pty Ltd

P: (02) 4744 5800 | M: 0425 833 893

11. References

Keith D 2004, *Ocean Shores to Desert Dunes, the Native Vegetation of NSW and the ACT,* Department of Environment and Conservation, Sydney

NearMap 2023, *NearMap Photomap Aerial Imagery*, NearMap Australia, Barrangaroo, NSW

NSW Government 2023a, *NSW Spatial Services*, NSW Department of Finance, Services and Innovation.

NSW Government 2023b, *NSW Planning Portal*, NSW Department of Planning and Environment.

NSW Government 2023c, *Biodiversity Values Map*, NSW Department of Environment and Heritage.

NSW RFS 2019, *Planning for Bush Fire Protection*, NSW Rural Fire Service, Sydney.

Standards Australia 2018, *Australian Standard AS 3959-2018 'Construction of Buildings in Bushfire Prone Areas'*, SAI Global, Australia.

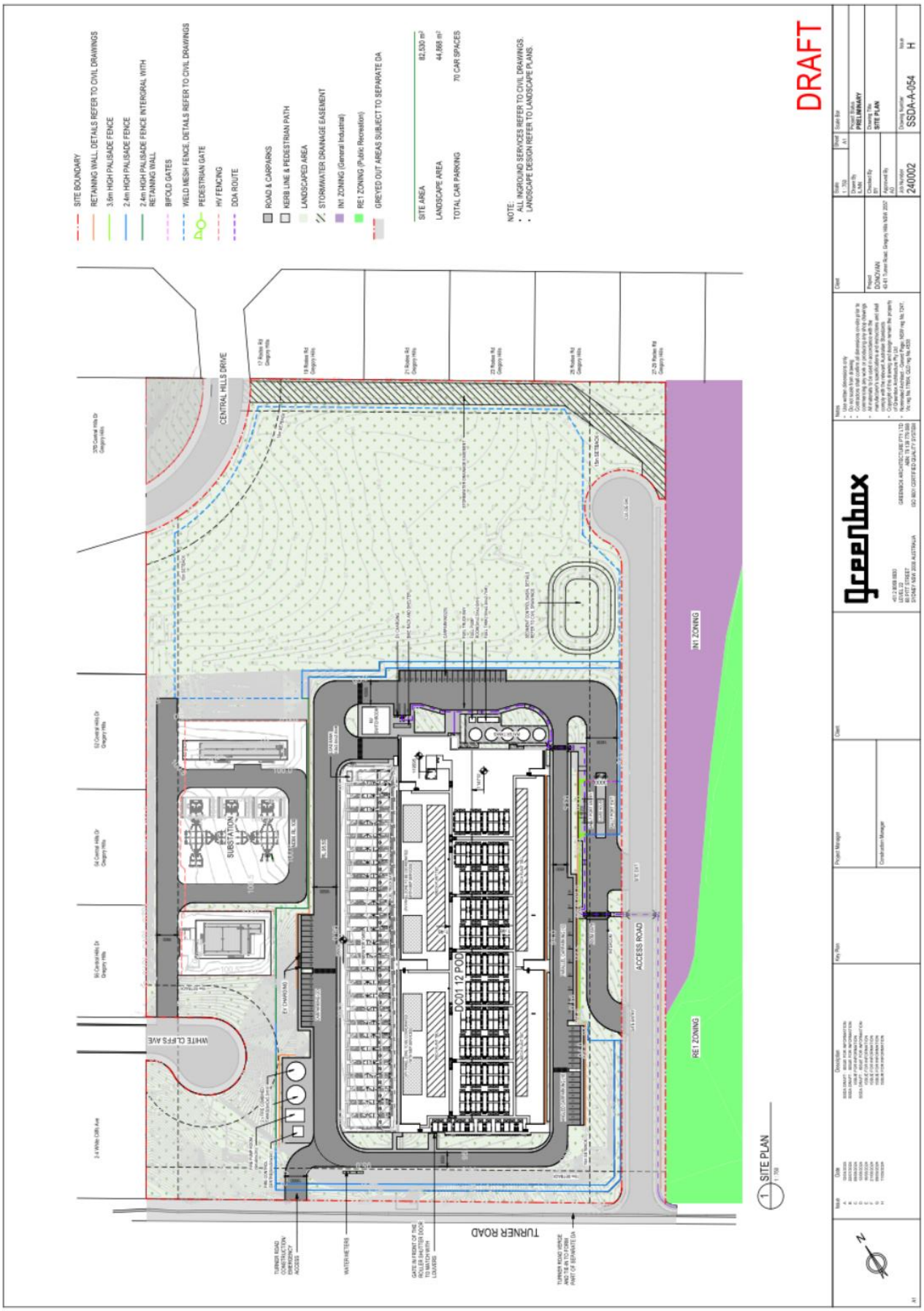
12. Legislation

Environmental Planning & Assessment Act 1979

Rural Fires Act 1997

Rural Fires Regulation 2013

Appendix 1 - Site Plan



Appendix 2 – Photos of Site and Surrounds

Source: BFCS P/L 23/02/2024

Subject site

Existing dwelling to be demolished

Vegetation within the subject site

Vegetation within the subject site

Vegetation within the subject site

Vegetation to the southeast of the subject site

Vegetation to the southeast of the subject site

Grassland to the southwest of the subject site

Grassland to the southwest of the subject site