Travers

bushfire & ecology

bushfire protection assessment

Proposed Data Centre
Warehouse / distribution centre

Lot 1 DP 1151370
1 Sirius Road, Lane Cove West

State Significant Development (SSD)

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Bushfire Protection Assessment

Proposed Data Centre
Lot 1 DP 1151370
1 Sirius Road, Lane Cove West

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Disclaimer:

This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person, including the client, then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be relied upon as meaning it reflects any advice by this firm. The report does not suggest or guarantee that a bush or grass fire will not occur and or impact the development. This report advises on matters published by the NSW Rural Fire Service in their guideline *Planning for Bush Fire Protection 2006* and other advice available from that organisation.

The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

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EXECUTIVE SUMMARY

A bushfire protection assessment has been undertaken for the construction of a data centre within Lot 1 DP 1151370, No. 1 Sirius Road, Lane Cove West.

This bushfire report has been prepared by *Travers bushfire & ecology* on behalf of Greenbox Architecture and will be submitted to the *NSW Department of Planning and Environment (DP&E)* to form part of overall package to respond to the Secretary's Environmental Assessment Requirements (SEARs).

The proposed development is considered state significant (SSD). As a result, the NSW Department of Planning and Environment (DPE) is responsible for assessing the development application, with the Minister for Planning being the consent authority. The SSD is exempt from requiring a bushfire safety authority (BFSA) and is not required to be assessed under s4.14 of the *Environmental Planning & Assessment Act 1979 (EPA Act).*

The DPE has issued SEARs (application no. SSD 9741).This includes the requirement to address the following specific matters in relation to bushfire:

- details of the storage of any flammable materials
- an assessment against the requirements of *Planning for Bushfire Protection 2006*
- a description of measures to ensure the proposal will not increase the bushfire risk to adjoining lands.

The proposed distribution centre (i.e. industrial development) is identified within *PBP* as being 'other development'. The NSW Rural Fire Service (RFS) stipulate that 'other development' applications should satisfy the aims and objectives of *PBP*, propose a combination of bushfire protection measures and provide evidence that the intent of each measure can be satisfied.

This assessment has found that bushfire can potentially affect the proposed data centre from the forest, remnant forested wetland and grassland vegetation located to the south-west, west, north and north-east resulting in possible flame, ember and radiant heat attack.

This assessment has concluded that the proposed development will provide compliance with the aims and objectives of *PBP*, with the implementation of the following combination of bushfire protection measures:

- The new data centre building will comply with *AS3959 (2009) Construction of buildings in bushfire prone areas (BAL FZ & BAL 40)*. Whist this standard generally does not apply to industrial development, it has been used in this instance due to the high economical risk associated with the development and need for the data centre to maintain operation during potential bushfire events.

- Strategic location of building elements susceptible to bushfire risk. This includes locating diesel tanks underground in a 4 hour capsule (i.e. no direct exposure) and locating vulnerable roof equipment outside of flame contact zones.

- Management of the vegetation surrounding the building to ensure the new building is provided with asset protection zones and a defendable space for firefighting operations.

- Provision of a fire trail, where topography allows, to ensure firefighting access along the northern boundary and to the east and west of the site. This will also provide access to the electrical easement adjoining the site to the west.

- Provision of firefighting access to the roof with hydrants located at strategic locations (refer Figure 3.1).

- Hydrant points on roof and along road (in flame zone locations) are provided with a 2m high defence wall (via concrete parapet extension) at 60m centres along the perimeter of the building to provide safety for fire fighters. .

- Preparation of a bushfire emergency evacuation plan to address the bushfire risk and to outline procedures to follow during a bushfire event. This will include the establishment of an emergency planning committee responsible for implementing evacuation procedures.

GLOSSARY OF TERMS

APZ	Asset protection zone
AS1596	*Australian Standard – The storage and handling of LP Gas*
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2009*
BAL	*Bushfire attack level*
BSA	bushfire safety authority
BCA	*Building Code of Australia*
BSA	Bushfire safety authority
DPE	Department of Planning and Environment
EEC	Endangered ecological community
EP&A Act	*Environmental Planning & Assessment Act 1979*
FDI	Fire danger index
IPA	Inner protection area
LGA	Local government area
m	Metres
OPA	Outer protection area
PBP	*Planning for Bush Fire Protection 2006*
RFS	NSW Rural Fire Service
SEARs	Secretary's environmental assessment requirements
SSD	State Significant Development

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Introduction 1

Travers bushfire & ecology has been requested to undertake a bushfire protection assessment for the construction of a data centre within Lot 1 DP 1151370, No. 1 Sirius Road, Lane Cove West.

The proposed development is located on land mapped by *Lane Cove Council* as being bushfire prone. This triggers a formal assessment against the provisions of *Planning for Bush Fire Protection 2006 (PBP).* The proposed development is considered state significant development (SSD). As a result, the NSW Department of Planning and Environment (DPE) is responsible for assessing the development application with the Minister for Planning being the consent authority.

1.1 Aims of the assessment

The aims of the bushfire protection assessment are to:

- address the requirement of the Secretary's Environmental Assessment Requirements (SEARs) to demonstrate the project's compliance with *Planning for Bush Fire Protection (PBP) 2006*
- review the bushfire threat to the landscape
- undertake a bushfire attack assessment in accordance with *PBP*
- provide advice on mitigation measures, including the provision of asset protection zones (APZs), construction standards and other specific fire management issues
- review the potential to carry out hazard management over the landscape.

1.2 Project synopsis

The proposal involves the construction of a data centre within Lot 1 DP 1151370 (refer Figure 1.1). Identified as a warehouse / distribution centre, the proposed facility will be operated 24/7 and will provide cloud computing services to its clients.

Approval is sought for the development and associated works as follows:

- A 5 storey data centre building comprising 34,282m^2 of gross floor area with associated plant and equipment (refer Figures 1.2-1.6). This consists of;
    - Basement;
        - Plant room as well as fuel / water storage. Fuel storage includes three (3) subfloor diesel tanks - which are considered to be low risk (underground in a 4 hour capsule).
    - Ground and First Floor;
        - Data Hall A and Data Hall B.
    - Second Floor;

    - Second floor comprises of an ancillary office and Data Hall B.

  - Roof Plan;
    - Roof comprises of roof plant.

- Electrical substation and associated infrastructure;
- Maximum building height up to 24m; and
- Associated works including landscaping, earthworks, and servicing upgrades.

Data centre operations and procedures

Once the development project is fully commissioned and handed over to the operations team, staff and contractors manage the ongoing health and safety of the site. This includes the implementation and management of a thorough maintenance program. Established robust tools, systems and procedures will ensure the site remains compliant with government regulations and best in class global standards for data centre operations.

The main facets of the Data Centre operations are as follows:

- Minimising unplanned outages and critical equipment failures through well documented management processes and procedures;
- Reducing operating risks including those related to security; and
- Providing continuous customer support on a 24x7x365 basis.

Access

Access to the proposed development will be provided from an existing road extending from Sirius Road in the east with staff car parking provided within the southern portion of the site. An internal road network will be constructed to provide vehicular access to both the southern and northern building façades, terminating in the north-east.

Secondary emergency egress points for firefighting operations are provided via 4m wide fire trails which run parallel to the northern building façade. Fire trails will provide access to the eastern and western building facades, with the western trail also servicing the electrical transmission tower external to the sites western boundary. Each fire trail will terminate with a 'T-turning' or 'Y-turning' head. Roof access will also be available for firefighting services in the event of an emergency with enclosed concrete stairs permitting safe pedestrian egress exit routes located towards Sirius Road.

Schedule 1 shows the proposed extent of the proposed development and bushfire protection measures, including APZs.

1.3 Secretary's Environmental Assessment Requirements (SEARs)

The DPE has issued SEARs (application no. SSD 9741).This includes the requirement to address the following specific matters in relation to bushfire:

- an assessment against the requirements of *Planning for Bushfire Protection 2006*
- details of the storage of any flammable materials
- a description of measures to ensure the proposal will not increase the bushfire risk to adjoining lands.

This report has been prepared to address the bushfire hazard posed to the development and to address the aims and objectives outlined in *Planning for Bush Fire Protection (PBP) 2006.*

The proposed data centre is adjoined by forest, remnant forested wetland and grassland vegetation to the south-west, west, north and north-east, which does expose the development to potential flame, ember and radiant heat attack. The bushfire risk posed by this vegetation is reduced by the presence of saline wetland and Lane Cove River which is not considered bushfire prone. As a result the fire run potential has been reduced with full flame widths of 100m not expected.

The proposed development however is located in close proximity to the site boundaries therefore exposing some building facades to potential flame zone contact. Therefore the bushfire risk has been mitigated with the provision of asset protection zones to ensure defendable space is achieved incompliance with the aims and objectives and performance criteria outlined in PBP.

In addition the majority of the building will be constructed to comply with BAL FZ and the proposal will provide for increased provision of water supply, access, fire trails, hydrants and evacuation are detailed within Section 3 of this report.

Proposed flammable materials are restricted to the storage of diesel fuel. Diesel tanks are to be located underground in a 4 hour capsule. As a result these tanks will have no direct exposure to potential bushfire attack and will not pose an increased risk to the development or the adjoining land.

In addition the proposed development and the associated asset protection zones will reduce the bushfire risk posed to adjoining land through further management of vegetation, increased access to the perimeter of the site and through the provision of fire hydrants to aid in firefighting operations.

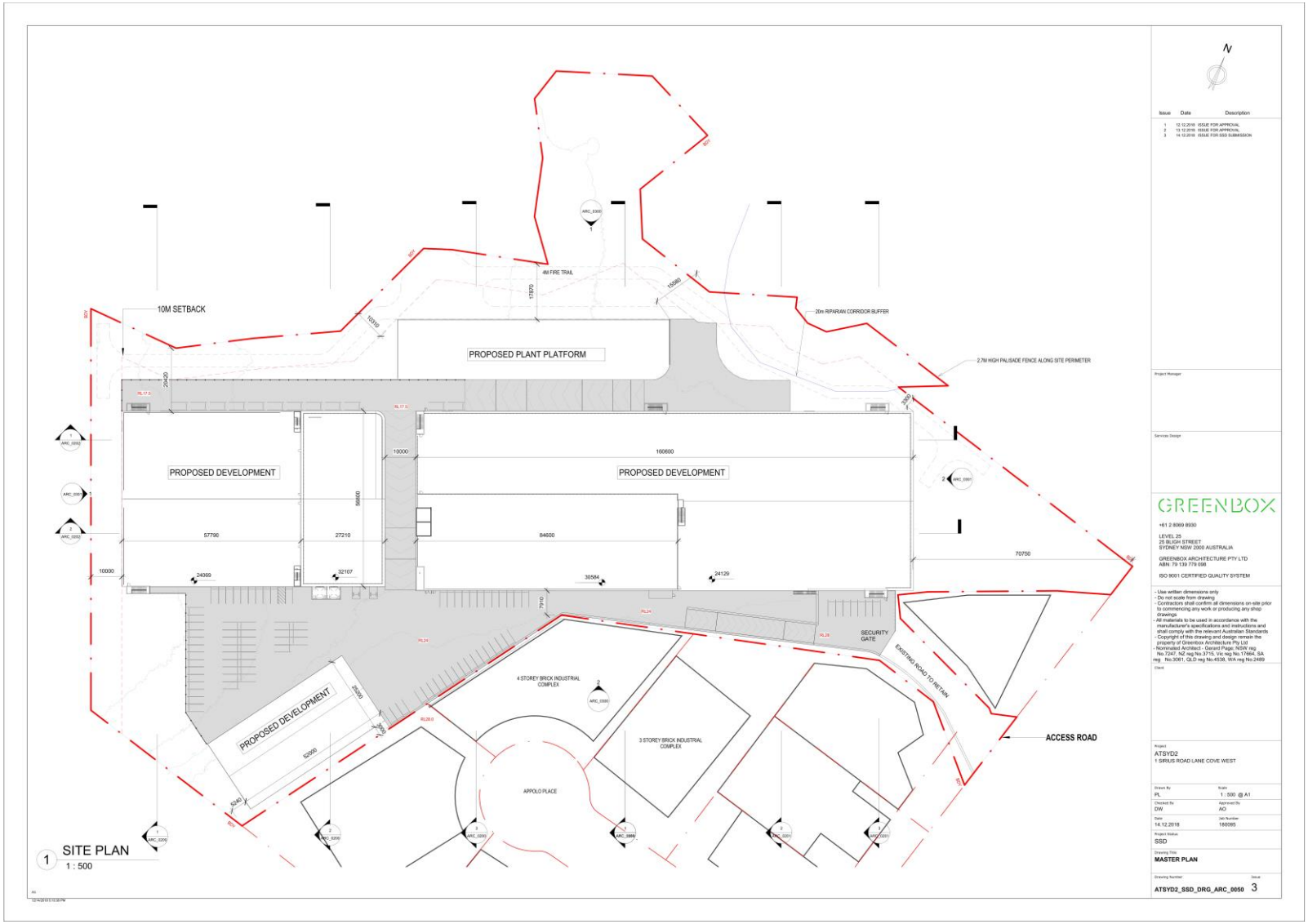


Figure 1.1 – Masterplan
(source: Greenbox, dated 14.12.2018, drawing no. ATSYD02_SSD_DRG_ARC_0050 Issue 3)

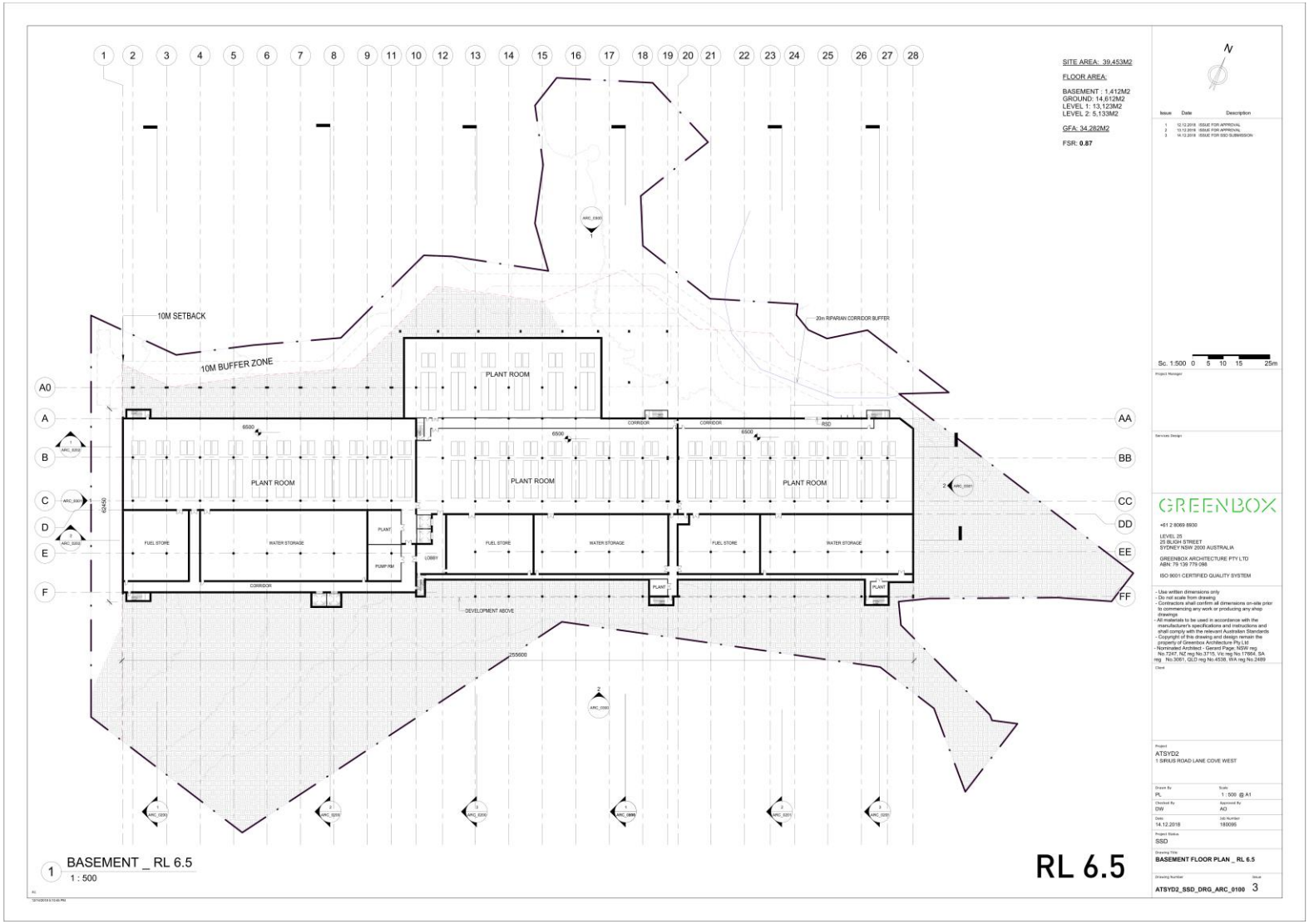


Figure 1.2 – Basement floor plan
(source: Greenbox, dated 14.12.2018, drawing no. ATSYD02_SSD_DRG_ARC_0100 Issue 3)

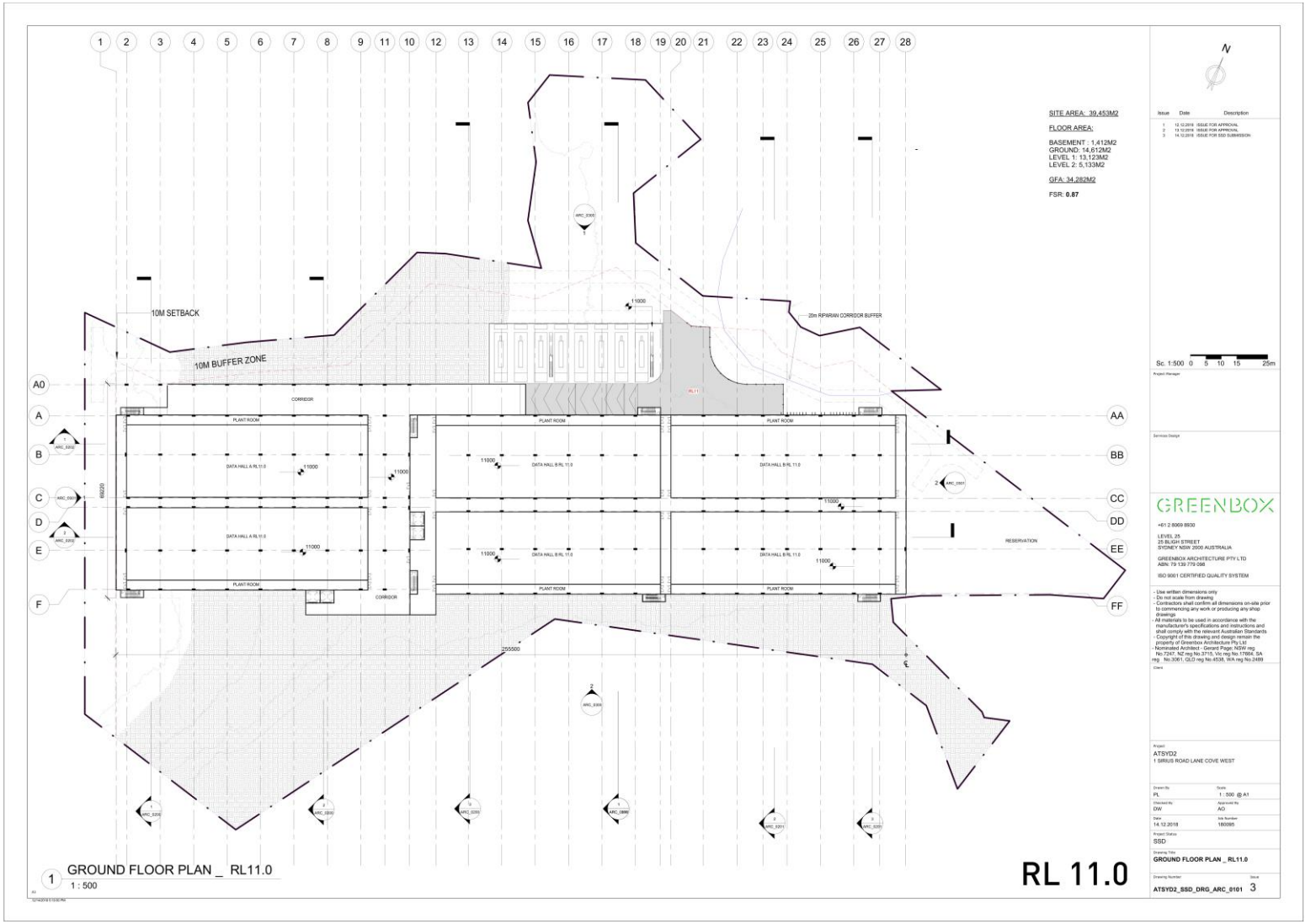


Figure 1.3 – Ground floor plan
(source: Greenbox, dated 14.12.2018, drawing no. ATSYD02_SSD_DRG_ARC_00101 Issue 3)

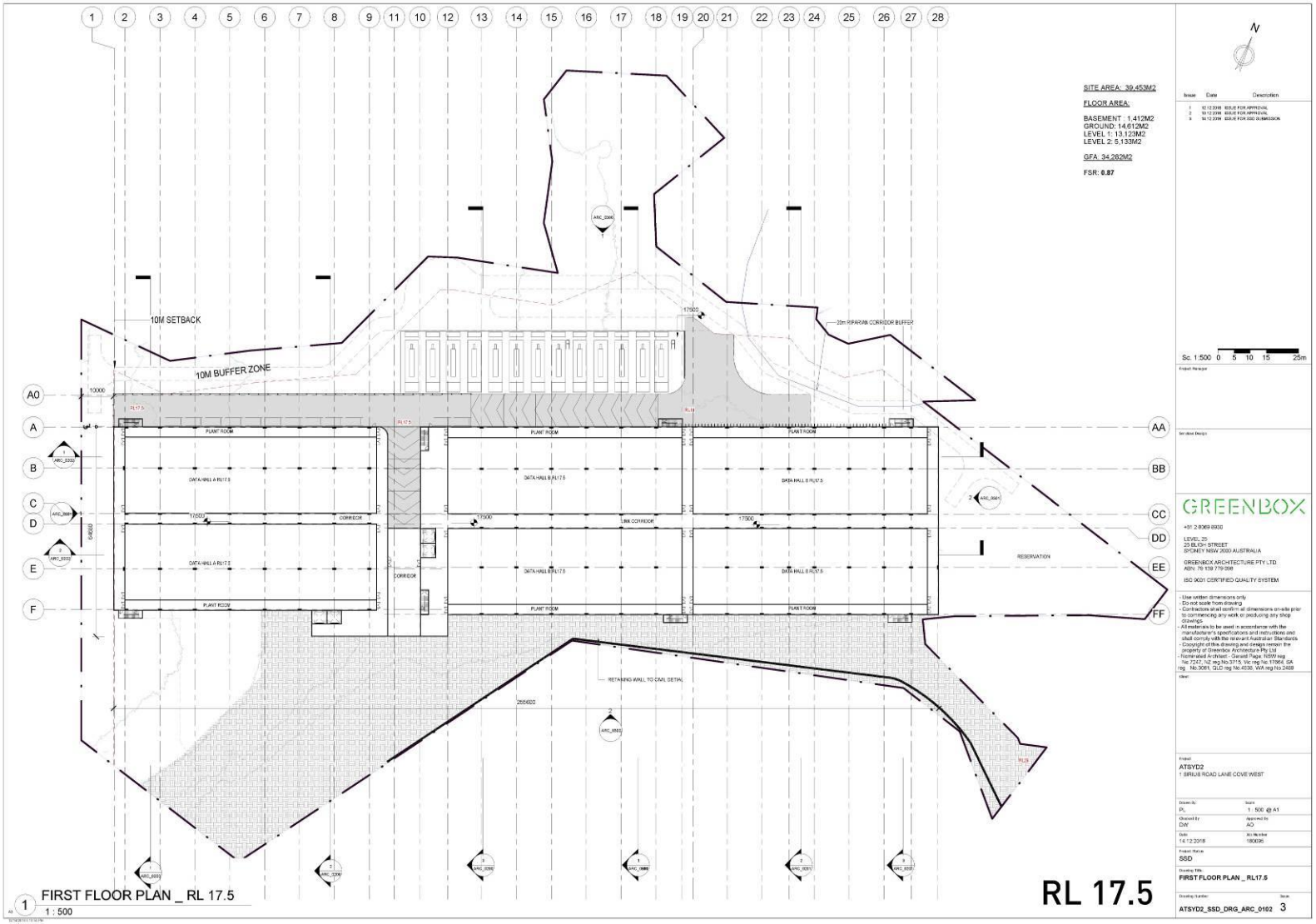


Figure 1.4 – First floor plan
(source: Greenbox, dated 14.12.2018, drawing no. ATSYD02_SSD_DRG_ARC_0102 Issue 3)

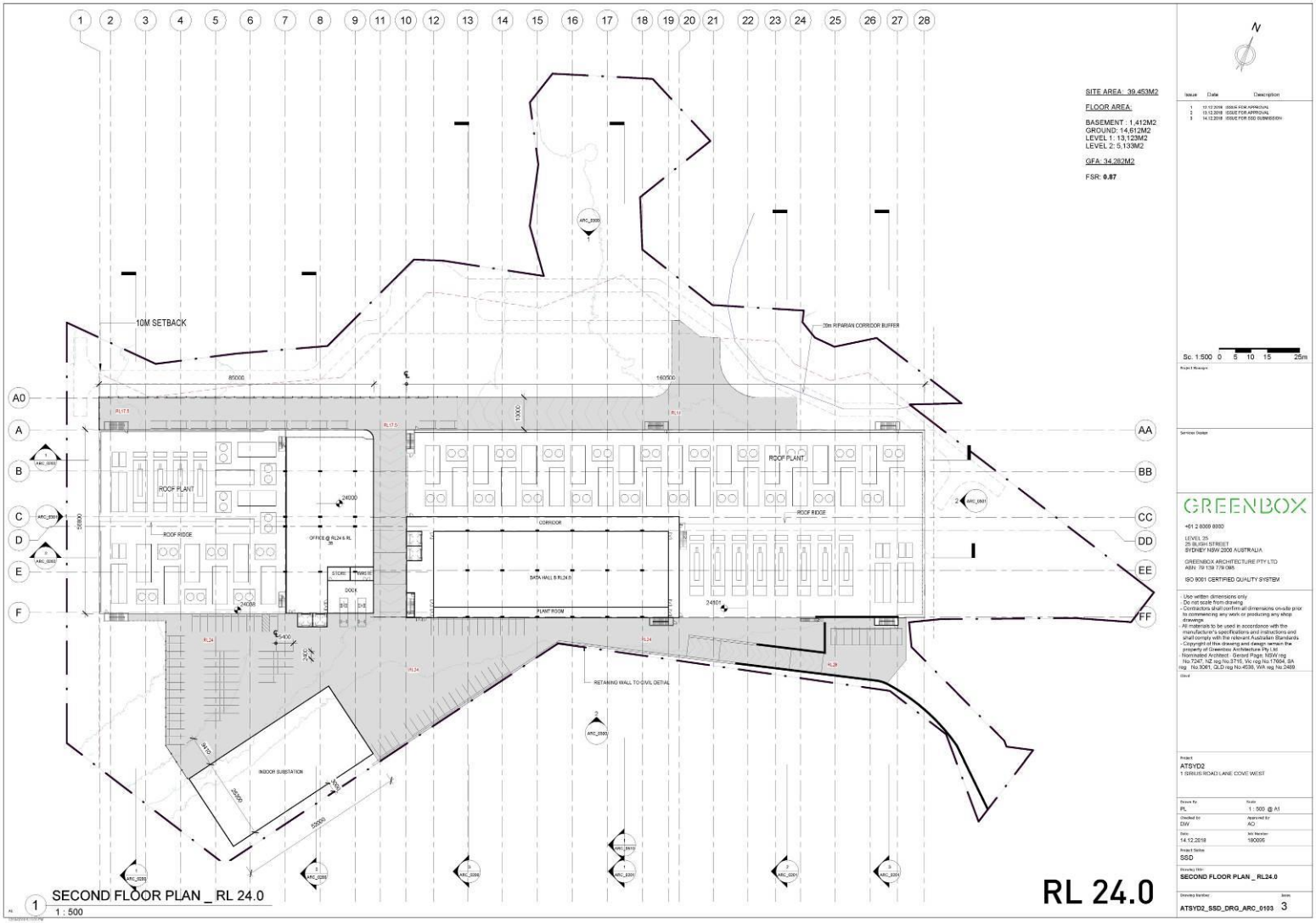


Figure 1.5 – Second floor plan
(source: Greenbox, dated 14.12.2018, drawing no. ATSYD02_SSD_DRG_ARC_0103 Issue 3)

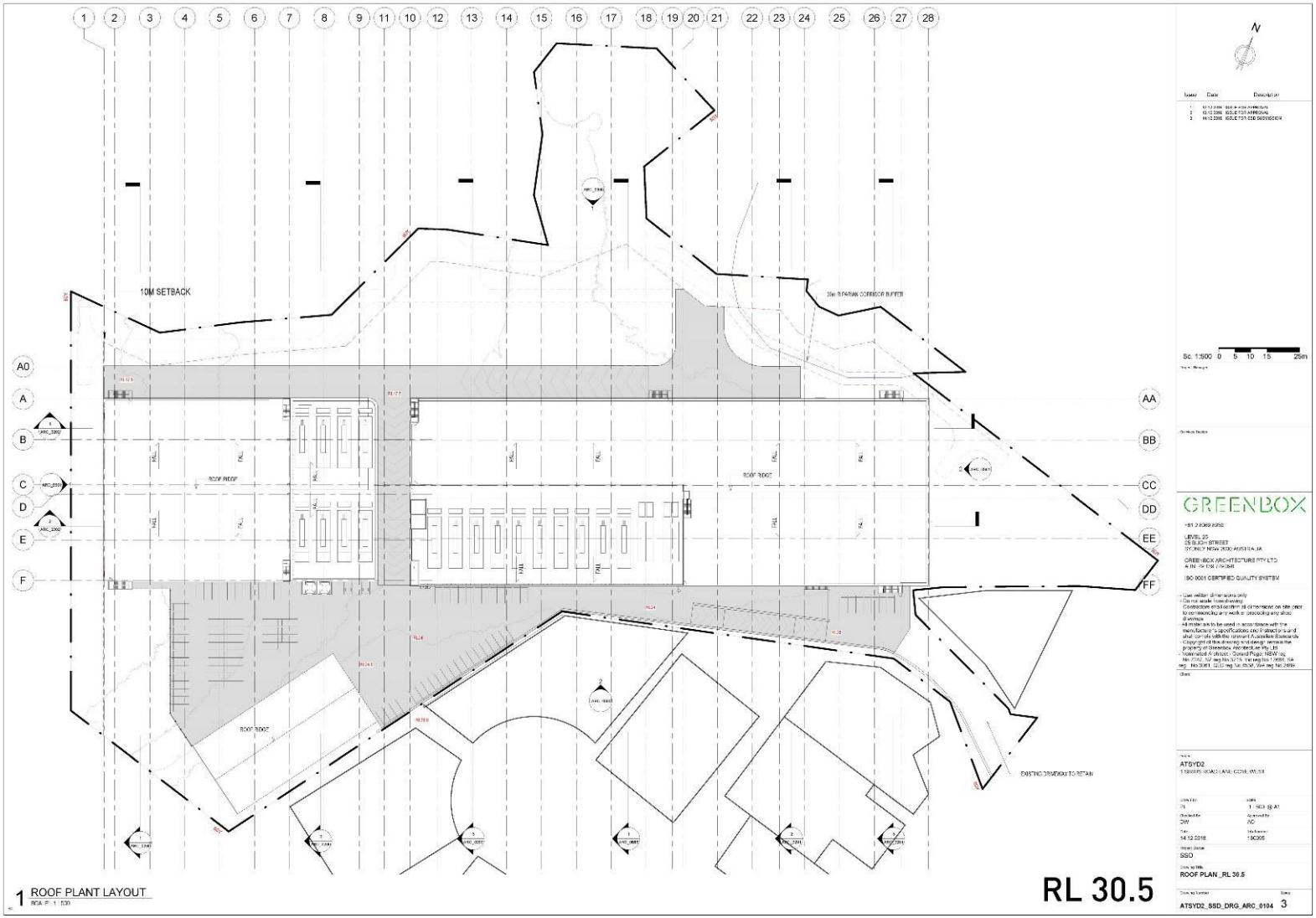


Figure 1.6 – Roof plan
(source: Greenbox, dated 18.12.2018, drawing no. ATSYD02_SSD_DRG_ARC_0104 Issue 3)

1.4 Information collation

To achieve the aims of this report, a review of the information relevant to the property was undertaken prior to the initiation of field surveys. Information sources reviewed include the following:

- Request for Secretary's Environmental Assessment Requirements – Proposed Data Centre prepared by Willow Tree Planning, dated 19 November 2018
- Tree Impact Assessment Report prepared by *Travers bushfire & ecology*, dated December 2018
- Vegetation Management Plan prepared by *Travers bushfire & ecology*, dated December 2018
- Masterplan, level and elevation plans prepared by *GreenBox Architecture Pty Ltd* , Ref ATSYD02_SSD_DRG_ARC_0050 dated 14.12.2018
- Site detail and contour plan prepared by *Strata Survey,* ref 1833det-03, dated 08/07/2005
- *Nearmap* aerial photography
- Topographical maps DLPI of NSW 1:25,000
- Australian Standard 3959 *Construction of buildings in bushfire-prone areas (AS3959)*
- *Planning for Bush Fire Protection 2006 (PBP) (RFS).*

An inspection of the proposed development site and surrounds was undertaken by Nicole van Dorst to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bushfire measures and a visual appraisal of bushfire hazard and risk were also undertaken.

1.5 Site description

The subject site is located within the Lane Cove Light Industrial Area, to the west of Sirius Road and east of Lane Cove River/Lane Cove National Park, within the local government area (LGA) of Lane Cove.

The site, formally identified as Lot 1 DP 1151370, is currently undeveloped and is interspersed with vegetation and rocky outcrops. The site is adjoined to the north-west, north-east and south-west by a mixture of forest, remnant forested wetland and grassland vegetation, with saline wetland and mangroves (associated with Lane Cover River) providing a fire break (>100m) from further vegetation to the west and north.

Existing access to the site is provided via the Sirius Road to the east. It is also noted that an electricity transmission tower is located within close proximity to the site with overhead power lines running in a north to south direction adjacent to the western site boundary.

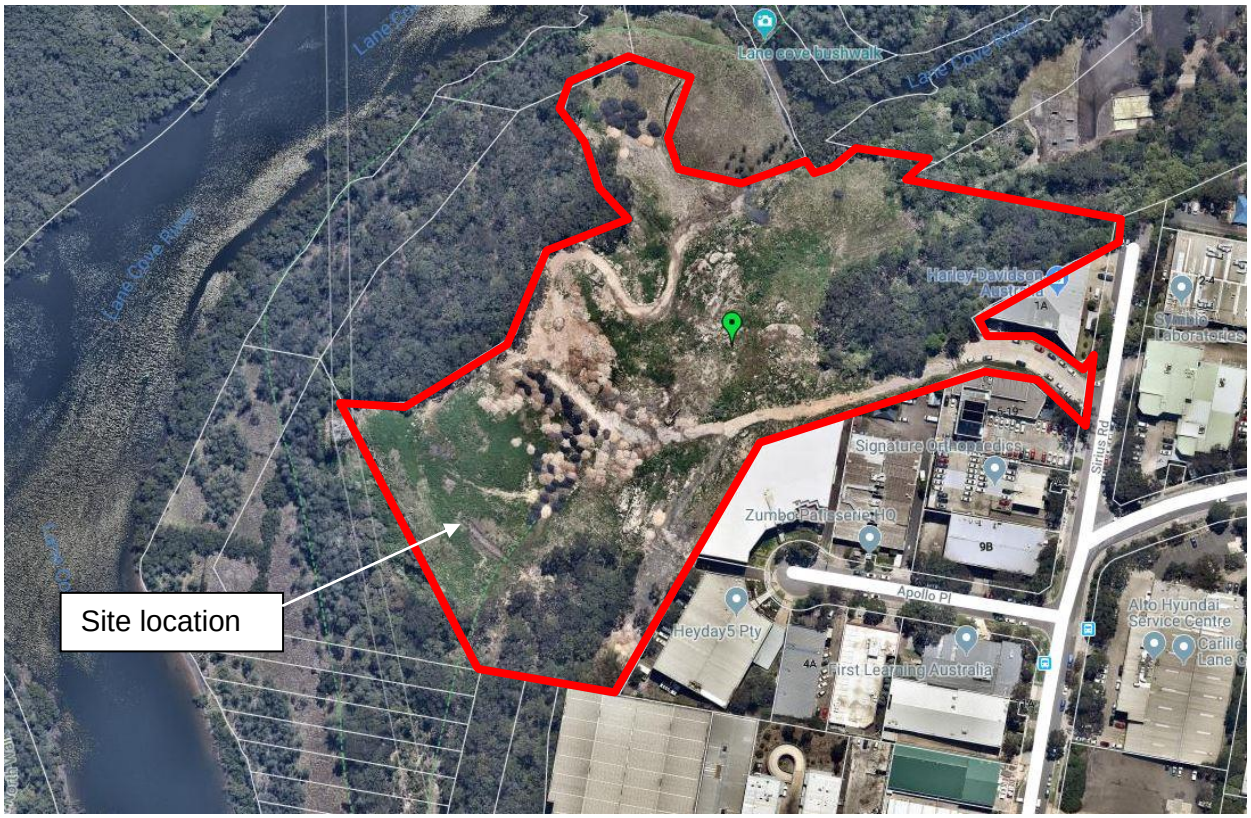


Figure 1.7 – Aerial appraisal
(source: Nearmap, 2018)

1.6 Legislation and planning instruments

1.6.1 Environmental Planning and Assessment Act (EP&A Act)

The *EP&A Act* governs environmental and land use planning and assessment within New South Wales. It provides for the establishment of environmental planning instruments, development controls and the operation of construction controls through the *BCA*.

The proposed development is considered SSD. As a result, DPE is responsible for assessing the development application, with the Minister for Planning being the consent authority. The SSD is exempt from requiring a BSA and is not required to be assessed under s4.14 of the *EP&A Act.*

1.6.2 Bushfire prone land

Bushfire prone land maps provide a trigger for the development assessment provisions. The proposed development is located on land that is mapped by *Lane Cove Council* as being bushfire prone (refer Figure 1.8).

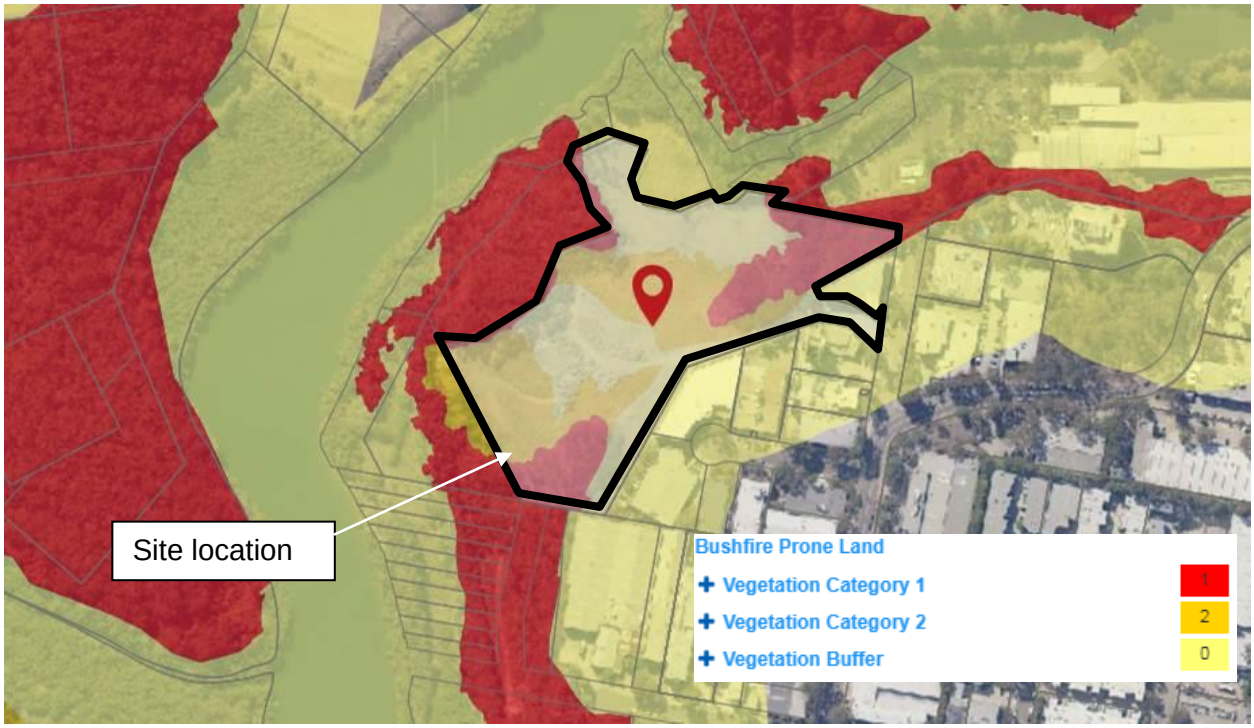


Figure 1.8 – Bushfire prone land map
(source: Planning Portal, 2018)

1.6.3 Lane Cove Local Environmental Plan 2009

A LEP provides for a range of zonings which list development that is permissible or not permissible, as well as the objectives for development within a zone.

The site is zoned according to the Lane Cove Local Environmental Plan 2009 as IN2 Light Industrial (refer Figure 1.9).

Figure 1.9 – Bushfire prone land map
(source: Planning Portal, 2018)

The proposal, including the provision of APZs, would seek to comply with the objectives of the proposal.

1.6.4 Planning for Bush Fire Protection 2006 (PBP)

Bushfire protection planning requires the consideration of the RFS planning document entitled *PBP. PBP* provides planning controls for building in bushfire prone areas as well as guidance on effective bushfire protection measures.

PBP outlines the bushfire protection measures required to be assessed for new development in bushfire prone areas. The range of bushfire protection measures include:

- asset protection zones (APZs)
- building construction and design
- access arrangements
- water supply and utilities
- landscaping, and
- emergency management arrangements.

PBP stipulates that applications that are not residential / rural subdivision, SFPPs or residential infill should:

- note the range of available bushfire protection measures (refer dot points above)
- satisfy the aims and objectives of *PBP;* and
- propose an appropriate combination of bushfire protection measures, with evidence that the intent of each measure (with reference to Sections 4.1.3 and 4.2.7 of *PBP*) is satisfied (refer Section 3 below).

1.6.5 Building Code of Australia (BCA) and the Australian Standard AS3959 Construction of buildings in bushfire-prone areas 2009 (AS3959)

The *BCA* is given effect through the *EP&A Act* and forms part of the regulatory environment of construction standards and building controls. The *BCA* outlines objectives, functional statements, performance requirements and deemed to satisfy provisions.

In NSW, the construction of buildings in bushfire prone areas relates to Classes 1, 2, 3, 4 and Class 9 buildings that are a special fire protection purpose *(SFPP)* or a Class 10a building or deck associated with the aforementioned building classes. The design and construction manual for the deemed to satisfy requirements is the Australian Standard *AS3959 Construction of buildings in bushfire-prone areas 2009 (AS3959)*. These classes of buildings must therefore be constructed in accordance with *AS3959*.

The *BCA* does not provide for any bushfire specific performance requirements for commercial and industrial buildings (Classes 5–8) and, as such, *AS3959* does not apply as a set of deemed to satisfy provisions. The general fire safety construction provisions are taken as acceptable solutions.

1.7 Environmental and cultural constraints

1.7.1 Environmental

Travers bushfire & ecology prepared a Tree Impact Assessment Report and Vegetation Management Plan for the proposal.

These reports recommend revegetation within areas outside of the asset protection zone as well as rehabilitation of the riparian corridor (20m buffer) to the north-east of the development.

1.7.2 Cultural

A basic search was conducted on the Aboriginal Heritage Information System (AHIMS). The results show that there are no identified Aboriginal sites of significance within Lot 1 DP 1151370 or within 50m of the site.

Bushfire Threat Assessment

2

Bushfire protection planning requires the consideration of the RFS planning document entitled *Planning for Bush Fire Protection 2006* (*PBP*). *PBP* provides planning controls for building in bushfire prone areas, as well as guidance on effective bushfire protection measures.

The policy aims to provide for the protection of human life (including fire fighters) and to minimise impacts on property and the environment from the threat of bushfire, while having due regard to development potential, on site amenity and protection of the environment. More specifically, the aims and objectives for all development (including industrial and commercial buildings) located on bushfire prone land should:

1. afford occupants of any building adequate protection from exposure to a bushfire.
2. provide for a defendable space to be located around buildings.
3. provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition.
4. ensure that safe operational access and egress for emergency service personnel and residents is available.
5. provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ.
6. ensure that utility services are adequate to meet the needs of fire fighters (and others who may assist in bushfire fighting).

Development in bushfire prone areas requires consideration of the overall threat upon a site and the way occupants of a site are potentially able to cope in the event of a bushfire.

To assess the bushfire threat that is likely to occur and thus affect the subject site, a review of the elements that comprise the overall threat needs to be completed. These elements include the potential hazardous landscape that may affect the site, the subsequent extent of the bushfire risk and the expected level of vulnerability that is likely to affect occupants and / or fire fighters.

2.1 Hazardous fuels

PBP guidelines require the identification of the predominant vegetation formation in accordance with David Keith (2004) to determine APZ distances. The hazardous vegetation is calculated for a distance of at least 140m from a proposed building envelope.

The hazardous vegetation within 140m of the proposed Data Centre development consists:

- Dry sclerophyll forest to the south-west (refer Photo 1 & 2), north-west (refer Photo 3) & north-east (Photo 4)
- Remnant forested wetland located to the west (refer Photo 5)
- Remnant / exotic vegetation located to the north-east (refer Photo 6).
- Grassland to the north (refer Photo 7).

Photo 1 & 2 – Forest vegetation located to the south-west

Photo 3 – Forest to the north-west (left of photo)

Photo 4 – Forest to the north-east

Photo 5– Remnant forested wetland located to the west

Photo 6– Remnant / exotic vegetation to the north-east

Photo 7– Grassland to the north

The saline wetland and mangrove swamps associated with Lane Cover River are not mapped as bushfire prone and are unable to sustain a fire, therefore effectively providing a fire break and limiting fire run potential.

2.2 Effective slope

The effective slope is assessed for a distance of up to 100m. Effective slope refers to that slope which provides the most effect upon likely fire behaviour.

The effective slope within the hazardous vegetation is:

- 5 – 10 degrees downslope within the forest to the south-west;
- 5 – 10 degrees downslope within the remnant forested wetland to the west;
- 0- 5 degrees downslope within the forest to the north;
- Level within the unmanaged grassland to the north;
- 0- 5 degrees downslope within the remnant / exotic vegetation to the north-east; and
- 0- 5 degrees cross slope within the forest to the east.

2.3 Bushfire attack assessment

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Sydney region. Table 2.1 provides a summary of the bushfire attack assessment.

Note: There are no predetermined minimum APZ requirements for industrial / warehouse development under *PBP*. The distances provided in Column 5 (of Table 2.1), coupled with the provision of access and fire trails will provide appropriate defendable space for the data centre. The defendable space is designed to allow fire fighters room and safety to fight fires. Setbacks depicted in bold (column 6) represents potential flame contact on the building.

Table 2.1 – Bushfire attack assessment

Aspect	Vegetation formation within 140m of development	Effective slope of land	Calculated flame length	Defendable space provided (metres)
Data centre				
South-east	Managed land / industrial development	N/A	N/A	N/A
South-west	Forest	Level	18.6m flame length	**10**
	Remnant forested wetland (refer Note 1)	5-10^{0D}	13.64m flame length	
North	Forest	0-5^{0D}	25.03m flame length	**20**-52
	Grassland	Level	7.47 flame length	38
	Remnant / exotic vegetation (refer Note 2)	0-5^{0D}	10.1 flame length	**3.5**
East	Forest	0-5^{0D} Crossslope	25m flame length	25
Indoor substation (southern property boundary)				
South-west	Forest	5-10^{0D}	34.1m	**15**
North, east and west	Managed land / industrial development	N/A	N/A	>100
Office				
South-west	Forest	Level	18.6m flame length	74
West	Remnant forested wetland (refer Note 1)	5-10^{0D}	13.64m flame length	69
North	Forest	0-5^{0D}	25.03m flame length	25
	Grassland	Level	7.47 flame length	>50
North-east	Forest	0-5^{0D} Crossslope	25m flame length	100
Plant Platform				
North-west	Forest	0-5^{0D}	25.03m flame length	**10**
North	Grassland	Level	7.47 flame length	15
East	Forest	0-5^{0D} Crossslope	25m flame length	>100

*Notes: * Slope is either 'U' meaning up slope or 'C' meaning cross slope or 'D' meaning down slope*

Note 1*: PBP* describes remnant vegetation as a parcel of vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 50m. The vegetation to the west exhibits these qualities and therefore the threat posed is considered low and APZ setbacks for this aspect are the same as for the rainforest category outlined in *PBP*.

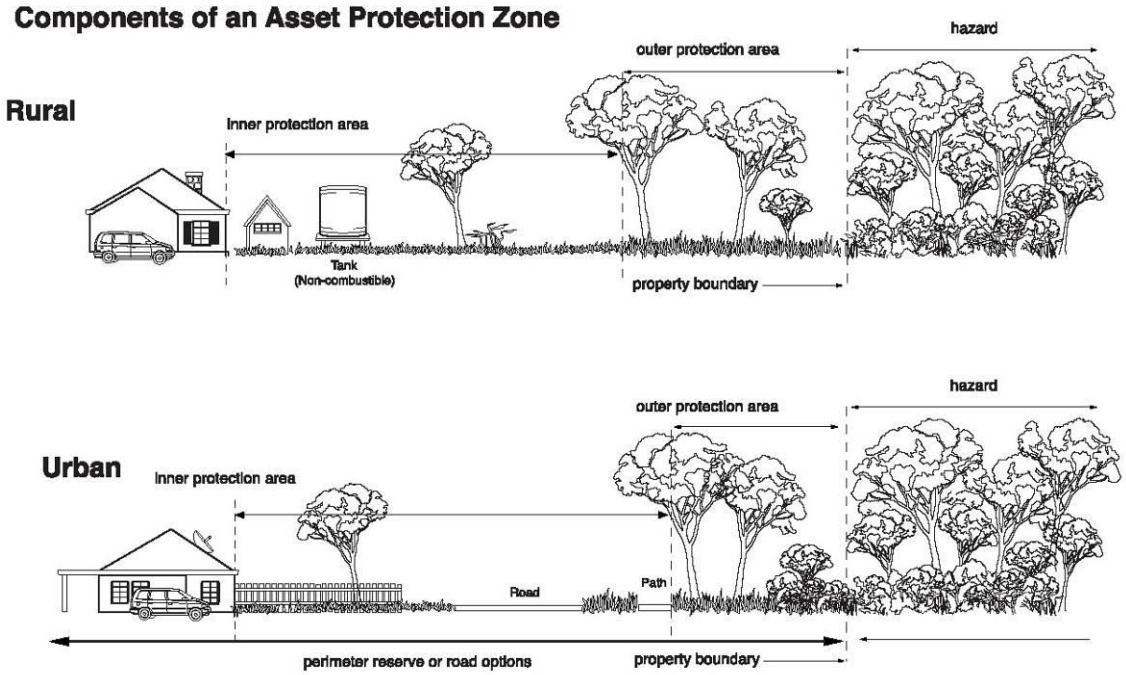
Note 2: *Community Resilience Fast Fact 2/08* outlines the requirements for the assessment of Exotic vegetation. The vegetation to the north-east is dominated by woody weeds lantana and Privet (i.e. >70% canopy cover) and therefore the corresponding vegetation type is 'rainforest'. As a result the threat posed is considered low and APZ setbacks for this aspect are the same as for the rainforest category outlined in *PBP*.

Specific Protection Issues

3

3.1 Asset protection zones

APZs are areas of defendable space separating hazardous vegetation from buildings. The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the building. A typical APZ and therefore defendable space is graphically represented below:



APZs and progressive reduction in fuel loads (Source: RFS, 2006)

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the *RFS* performance criteria.

The APZs provided for the commercial development are to comply with the aims and objectives of PBP. These include:

1. afford occupants of any building adequate protection from exposure to a bushfire.
2. provide for a defendable space to be located around buildings.
3. provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition.
4. provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ.

In accordance with *PBP,* appropriate defendable space, coupled with the provision of access and building construction requirements has been provided to comply with the aims and

objectives listed above, which include providing occupants with adequate protection from bushfire and upgrade in building construction to prevent material ignition.

Table 3.1 outlines the proposal's compliance with the performance criteria for APZs.

Table 3.1 – Performance criteria for asset protection zones (*PBP* guidelines pg. 19)

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Radiant heat levels at any point on a proposed building will not exceed 29kW/m^2	APZs are provided in accordance with Appendix 2 APZs are wholly within the boundary of the development site	☐	☑	Refer Section 2.3. Whilst radiant heat level exposure on the data centre & indoor substation exceeds 40kW/m^2 a defendable space has been provided for fire fighting operations and the data centre building will be constructed to withstand flame attack.
APZs are managed and maintained to prevent the spread of fire towards the building	In accordance with the requirements of *Standards for Asset Protection Zones* (RFS 2005)	☑	☐	The APZ consists of landscaped areas, roads and turf areas.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated	The APZ is located on lands with a slope of less than 18^o	☐	☑	APZs are located on slopes exceeding 18^o. Refer Note 1 below.

Note 1 - APZs on steep land. The APZ does encroach upon land with slopes >18 degrees. In accordance with the acceptable solutions under PBP APZ's are to be avoided were slopes are greater than 18 degrees due to potential problems and practicality associated with maintenance and the potential for crown fires to develop.

The impact of crown fires developing and impacting the development is negated by the angle of the slope and potential fire run which will direct fire intensity away from the development. In addition the area earmarked for APZ management is restricted (for the most part) to rocky escarpments that do not require the removal of tree species.

In terms of the practicality and soil stability, this is negated by the rock benches (particularly in the south) which provides a natural terrace therefore preventing soil erosion. It is recommended however that a geo-technical report is prepared for the steep APZ areas where they exceed 18 degrees to ensure site stability.

Generally maintenance of the APZ within the steep land (>18 degrees) will be undertaken using hand machinery only. Tree removal on slopes of >18 degrees would be subject to the geotechnical report but it is assumed the sandstone geological landscape can be protected by suitable treatments recommended in their report. At this stage it is to be assumed that stability can be provided and APZ management can go ahead as planned. Typically in the APZ tree canopies should be separated by 2-5 metres.

3.2 Building protection

The BCA does not provide any bushfire specific requirements for Classes 5-8 industrial / buildings. The general fire safety construction provisions are taken as acceptable solutions.

PBP recommends that bushfire construction standards for Classes 5-8 buildings should be considered on a case by case basis. Bushfire construction recommendations are dependent on the level of bushfire risk and the provision of adequate access opportunities.

Whilst the bushfire risk is reduced by the presence of saline wetland and the Lane Cove River the proposed size of the data centre, limited setbacks and high commercial / economical risk associated with the development does necessitate that additional bushfire protection measures are incorporated into the building design to prevent material ignition via the following measures;

- The data centre will be constructed using concrete and will comply with BAL FZ & 40 as outlined in *AS3959 (2009) – Construction of buildings in bushfire prone areas*.
- The office portion of the site (on the second floor) is to comply with BAL 29.
- The indoor substation (southern portion of site) is to comply with BAL FZ for the southern and western elevations and BAL 40 for the northern and eastern facades.
- The mounted roof equipment (considered to be vulnerable) has been positioned outside of areas exposed to flame zone. This equipment includes diesel gen sets (within a metal container, purpose built), water cooled chillers, and Power Train Units (PTUs) in metal containers, as well as the associated pipework which is all sheaved in metal.
- Service openings will be screened with a metal mesh (aperture of 2mm). This may impact on required airflow quantities and should therefore be engineered to ensure efficiency.
- Fire exists and stairs in flame zone areas are to be enclosed with fire rated doors and seals.
- Diesel tanks have been located underground in a 4 hour capsule and therefore has no direct exposure.
- The plant platforms (northern portion of site) are not enclosed. The equipment is provided over the two (2) levels. The equipment should withstand flame contact as it is contained within metal containers, only metal clad pipework is exposed.

3.3 Hazard management

The APZ consists of car parking and road access as well as landscaped areas. The APZ is to be managed in accordance with RFS guidelines *Standards for Asset Protection Zones* (RFS, 2005) with landscaping to comply with Appendix 5 of *PBP*. A summary of the guidelines for managing APZs are attached as Appendix 1 to this report.

The APZ is situated on slopes exceeding 18 degrees. In terms of the practicality and soil stability, this is negated by the rock benches (particularly in the south) which provides a natural terrace therefore preventing soil erosion. It is recommended however that a geo-technical report is prepared for the APZ areas to ensure site stability.

TBE have undertaken a review of the landscape plan prepared by *Geoscapes Landscape Architects (DWG no: LSK – 00)* and can confirm that this plan complies with the requirements of Appendix 5 of *PBP*.

3.4 Access for fire fighting operations

Access to the development will be provided via Sirius Road in the east with staff car parking provided within the southern portion of the site. An internal road network will be constructed to provide vehicular access to both the southern and northern building façades, terminating in the north-east. This road is greater than 6.5m wide therefore complies with *PBP 2006*.

Additional emergency egress points for firefighting operations will be provided via a 4m wide fire trail which runs parallel to the northern building façade. Fire trails will provide access to the eastern and western building facades, with the western trail also servicing the electrical transmission tower external to the sites western boundary. This trail will terminate with a 'T-turning' or 'Y-turning' head. Roof access will also be available for firefighting services in the event of an emergency with enclosed concrete stairs permitting safe egress exit routes located towards Sirius Road. The proposed access complies with the aims and objectives of *PBP*.

The pre-DA lodgement notes issued by Lane Cove Council (dated 26th November 2018) states that only one access / egress route appears possible for the site and as a consequence the site may not fulfil access requirements for emergency services.

PBP outlines the requirement for a secondary access road for public roads if that road is likely to be cut by fire or for dwellings that are located more than 200m from a public through road. In this circumstance the access road to the site is not a public road and will be used by staff and/or emergency services vehicles only. The evacuation route is through the centre of the property and adjacent to the southern boundary away from the direct threat of bushfire. Additional access for firefighting operations has been provided via the proposed fire trail network in compliance with the aims and objectives of PBP.

3.5 Water supplies

Town reticulated water supply is available to the development in the form of an underground reticulated water system. As depicted in Figure 3.1 hydrants will be located along the internal road, fire trails and on the roof which will also offer access points for firefighting operations. Hydrant points on roof and along road (in flame zone locations) are provided with a 2m high defence wall (via concrete parapet extension) at 60m centres along the perimeter of the building to provide safety for fire fighters. Proposed internal hydrants are to comply with *PBP.* The acceptable solutions are:

Table 3.2 – Performance criteria for reticulated water supplies (*PBP* guidelines pg. 27)

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Water supplies are easily accessible and located at regular intervals.	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	☑	☐	Can be made a condition of consent
	Fire hydrant spacing, sizing and pressures comply with *AS2419.1*. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority, once development has been completed. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles.	☑	☐	Can be made a condition of consent

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
	Hydrants are not located within any road carriageway	☑	☐	Can be made a condition of consent
	All above ground water and gas service pipes external to the building are metal, including and up to any taps.	☑	☐	Can be made a condition of consent
	The provisions of public roads are met.	☑	☐	Hydrants will be located outside of parking bays.

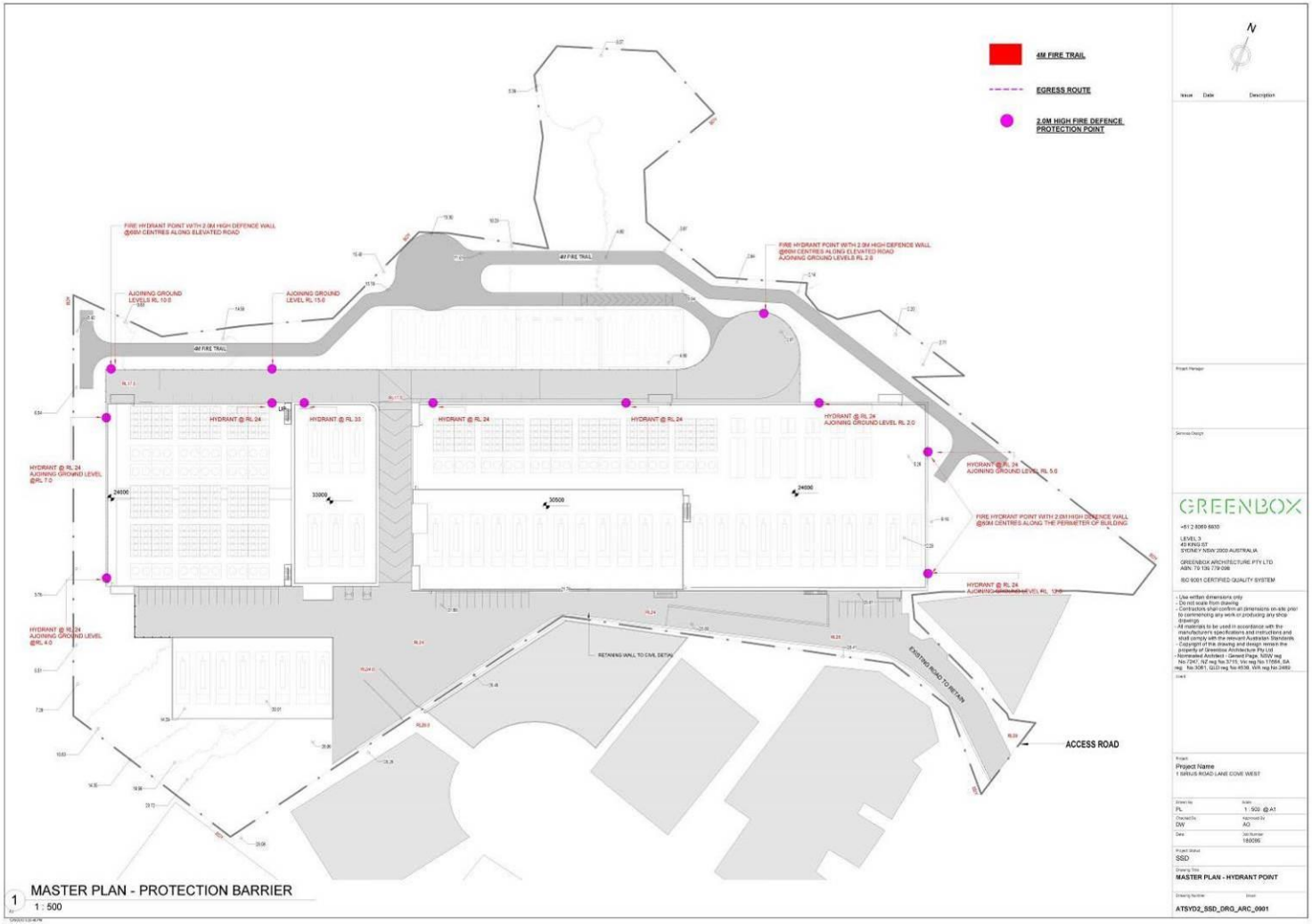


Figure 3.1 – Hydrant locations

3.6 Gas supply

There is no intended gas supply for the project.

3.7 Electricity

Table 3.4 outlines the required performance criteria for the sites electricity supply.

Table 3.4 – Performance criteria for electricity services (*PBP* guidelines pg. 27)

Performance criteria	Acceptable Solutions	Acceptable solution	Performance solution	Comment
Location of electricity services limit the possibility of ignition of surrounding bushland or the fabric of buildings Regular inspection of lines in undertaken to ensure they are not fouled by branches.	Where practicable, electrical transmission lines are underground	☑	☐	Can be made a condition of consent
	Where overhead electrical transmission lines are proposed: • Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas: and • No part of a tree is closer to a power line than the distance set out in accordance with the specification in *Vegetation Safety Clearances* issued by *Energy Australia* (NS179, April 2002)	☑	☐	Can be made a condition of consent

3.8 Emergency and evacuation planning

PBP does not require the preparation of evacuation plans for industrial, warehouse developments. However due to the bushfire risk posed to the site and the potential economic impact on the data centre if bushfire were to affect its operations it is recommended that an evacuation plan is prepared. This will outline the procedures and triggers for evacuation and the contact details for the emergency services.

Table 3.5 outlines the required performance criteria for the proposal's emergency procedures

Table 3.5 – Performance criteria for emergency and evacuation planning (*PBP* guidelines pg.39)

Performance criteria	Acceptable solutions	Complies
An emergency and evacuation management plan is approved by the relevant fire authority for the area.	An emergency / evacuation plan is prepared consistent with the *RFS* Guidelines for the Preparation of Emergency / Evacuation Plan. *Note: The applicant should provide a copy of the above document to the local Bush Fire Management Committee for their information prior to the occupation.*	Complies - can be made a condition of consent.
Suitable management arrangements are established for consultation and implementation of the emergency and evacuation plan.	An emergency planning committee is established to consult with staff in developing and implementing and emergency procedures manual. Detailed plans of all emergency assembly areas including onsite and offsite arrangements as stated within *AS3745* are clearly displayed, and an annual trial emergency evacuation is conducted.	Complies - can be made a condition of consent.

Conclusion & Recommendations 4

4.1 Conclusion

A bushfire protection assessment has been undertaken for the construction of a data centre within Lot 1 DP 1151370, No. 1 Sirius Road, Lane Cove West.

This assessment has found that bushfire can potentially affect the proposed data centre from the forest, remnant forested wetland and grassland vegetation located to the south-west, west, north and north-east resulting in possible flame, ember and radiant heat attack.

This assessment has concluded that the proposed development will provide compliance with the aims and objectives of *PBP*, with the implementation of the following combination of bushfire protection measures:

- The new data centre building will comply with *AS3959 (2009) Construction of buildings in bushfire prone areas (BAL FZ & BAL 40)*. Whist this standard generally does not apply to industrial development, it has been used in this instance due to the high economical risk associated with the development and need for the data centre to maintain operation during potential bushfire events.

- Strategic location of building elements susceptible to bushfire risk. This includes locating diesel tanks underground in a 4 hour capsule (i.e. no direct exposure) and located vulnerable roof equipment outside of flame contact zones.

- Management of the vegetation surrounding the building to ensure the new building is provided with asset protection zones and a defendable space for firefighting operations.

- Provision of a fire trail, where topography allows, to ensure firefighting access along the northern boundary and to the east and west of the site. This will also provide access to the electrical easement adjoining the site to the west.

- Provision of firefighting access to the roof with hydrants located at strategic locations (refer Figure 3.1).

- Hydrant points on roof and along road (in flame zone locations) are provided with a 2m high defence wall (via concrete parapet extension) at 60m centres along the perimeter of the building to provide safety for fire fighters.

- Preparation of a bushfire emergency evacuation plan to address the bushfire risk and to outline procedures to follow during a bushfire event. This will include the establishment of an emergency planning committee responsible for implementing evacuation procedures.

In this instance, it is considered that the proposal does comply with the specific aims and objectives of PBPs.

Objective 1 - Afford occupants of any building adequate protection from exposure to a bushfire.

A defendable space has been provided and the building will be constructed to withstand the predicted bushfire attack level. An evacuation plan will be prepared to ensure procedures are in place in the event of a bushfire.

Objective 2 - Provide for a defendable space to be located around buildings.

A defendable space of between 3.5m – 50m will be provided on the ground level of the development. Additional firefighting access will be provided via the roof with the provision of fire hydrants and a 2m high defence wall (via concrete parapet extension) at 60m centres along the perimeter of the building to provide safety for fire fighters.

Objective 3 - provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition.

Whilst a defendable space has been provided, some aspects of the data centre will be exposed to flame zone contact. As outlined in Section 3 the building will be constructed using concrete and will comply with the requirements outlined in AS3959 (2009) for the data centre building to prevent material ignition.

The proposed office (Level 2) is to comply with BAL 29. The indoor substation is to comply with BAL FZ for the southern and western elevations and BAL 40 for the northern and eastern facades.

Additional measures such as fire trails and hydrants will also aid to prevent material ignition.

Objective 4 - ensure that safe operational access and egress for emergency service personnel and residents is available

Adequate access for firefighting operations has been provided via the internal road and fire trail network, as well as access to the roof level of the building.

Objective 5 - provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ.

Fuel management of the APZ will be undertaken by the owner / operator of the data centre in accordance with the vegetation management plan and the landscape plan.

Objective 6 - ensure that utility services are adequate to meet the needs of fire fighters (and others who may assist in bushfire fighting).

Water supply, gas supply and electricity will comply with the aims and objectives of PBP.

Recommendation 1 - APZs are to be provided to the proposed development as identified in Schedule 1 attached. Fuel management within the APZs is to be maintained by regular maintenance of the landscaped areas, mowing / slashing in accordance with the guidelines provided in Appendix 1, and /or as generally advised by the RFS in their publications.

It is recommended that a geo-technical report is prepared for the APZ areas on slopes of >18 degrees to ensure site stability.

Recommendation 2 – The data centre will be constructed in compliance with *AS3959 (2009) – Construction of buildings in bushfire prone areas*, as outlined below:

- The data centre building is to be constructed using concrete and is to comply with BAL FZ & BAL 40.
- The proposed office is to comply with BAL 29.
- The indoor substation is to comply with BAL FZ for the southern and western elevations and BAL 40 for the northern and eastern facades.
- The mounted roof equipment (considered vulnerable to bushfire) has been positioned outside of areas exposed to flame zone. The equipment includes diesel gen sets (within a metal container, purpose built), water cooled chillers, and Power Train Units (PTUs) in metal containers, as well as the associated pipework which is all sheaved in metal.
- Service openings will be screened with a metal mesh (aperture of 2mm). This may impact on required airflow quantities and should therefore be engineered to ensure it works.
- Fire exists and stairs in flame zone areas are to be enclosed with fire rated doors and seals.
- Diesel tanks have been located underground in a 4 hour capsule and therefore has no direct exposure.
- The plant platforms (northern portion of site) are not enclosed with the equipment provided over the two (2) levels. The equipment is contained within metal containers, only metal clad pipework is exposed.

Recommendation 3 – Water & electricity supply is to comply with Section 4.1.3 of *PBP.*

Recommendation 4 – A bushfire emergency evacuation plan is to be prepared. This will outline the procedures for safe evacuation from the building and contact details for the emergency services.

REFERENCES

Australian Building Codes Board (2010) – *Building Code of Australia*, Class 1 and Class 10 Buildings Housing Provisions Volume 2

Chan, K.W. (2001) – *The suitability of the use of various treated timbers for building constructions in bushfire prone areas*. Warrington Fire Research

Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bush fire-prone areas*

Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change

Rural Fire Service (2006) - *Planning for bushfire protection – a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service

Rural Fire Service (2006) - Bushfire Attack Software on RFS web site

Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack.* RFS Development Control Service

Plan of Bushfire Protection Measures

S1

Legend

Aerial source: Nearmap

- Subject site (source: CAD)
- Contour (1m) (source: LiDAR)
- Gate (existing)
- Hydrant (existing)
- Unformed road/ access to easement
- Walking track
- Asset Protection Zone (APZ)

Proposed Development

- Access driveway
- Firetrail
- Office
- Data Centre
- Indoor substation & plant platform

Vegetation Formation

- Forest
- Forested Wetland
- Saline Wetland (not bushfire prone)

Riparian corridor

- 20m buffer
- 40m buffer

Bushfire Construction Standards

AS3959 (2009)*

- Flame zone (FZ)
- BAL 40
- BAL 29

0 40 80 m

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
1 Sirius Road, Lane Cove West 18AWE02_BF001_	18/12/2018 Issue 1 ATS	1:2,000 @A3 GDA 1994 MGA Zone 56

TITLE

Schedule 1 - Bushfire Protection Measures

Document Path: N:\GIS STORAGE\N Drive\18AWE02_SiriusRd_LaneCoveWest\MXDs\18AWE02_BF001_.mxd

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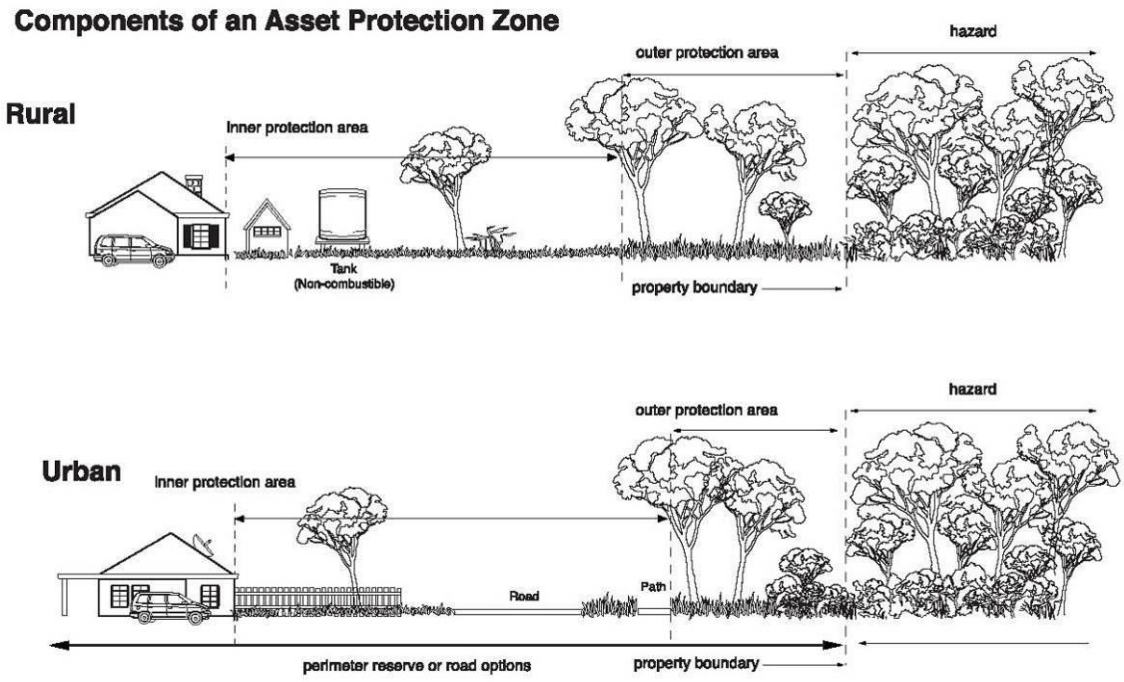
Management of Asset Protection Zones

A1

The RFS provides basic advice in respect of managing APZs through documents such as, *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 5 of *PBP*.

The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the building. The property is to be managed to IPA standards only. A typical APZ is graphically represented below:



APZs and progressive reduction in fuel loads (Source: RFS, 2006)

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the RFS performance criteria.

The following provides maintenance advice for vegetation within the IPA and OPA.

Inner Protection Area (IPA)
Fuel loads within the IPA are to be maintained so it does not exceed 4t/ha.

Trees are to be maintained to ensure;

- Canopy cover does not exceed 15%
- Trees (at maturity) do not touch or overhang the building

- Tree canopies (at maturity) should be well spread out and not form a continuous canopy
- There should be no unmanaged vegetation within 10m of windows, doorways, eaves and gutters
- Lower limbs should be removed up to a height of 2m above ground

Shrubs are to be maintained to ensure;

- Large discontinuities or gaps in vegetation
- Shrubs should not be located under trees
- Shrubs should be in clumps no greater than $5m^2$
- Shrubs should be no closer than 10 metres from an exposed window or door.

Grass is to be maintained to ensure:

- A height of 10cm or less
- Leaves and debris is removed.