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11-Nov 2020

Macquarie Park Data Centre

Environmental Impact Statement

November 2020

Stockland

Macquarie Park Data Centre
Environmental Impact Statement
November 2020

Prepared by

AECOM Australia Pty Ltd.

Declaration

This EIS has been prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulations 2000*

Environmental assessment prepared by

Role	Environment Lead	Lead EIS Author	EIS Author	EIS Author
Name	Jamie McMahon	Liam Buxton	Ben Collins	Jessica Zickar
Position	Associate Director – Environmental Scientist	Senior Environmental Planner	Environmental Scientist	Environmental Scientist
Qualifications	BEnvSc (Hons)	BSc (Hons), MURP, MPIA	BEnv, BLaw	BSc (Land and Heritage Management) MEnvSc (Distinction)
Address	Level 21, 420 George Street, Sydney, NSW, 2000			

Applicant and land details

In respect of	The Trust Company Limited ACN 004 027 749 as custodian for Stockland Trust Management Limited ACN 001 900 741 as trustee for Advance Property Fund
Applicant	c/- AECOM Australia Pty Ltd
Applicant address	AECOM Australia Pty Ltd Level 21, 420 George Street, Sydney, NSW, 2000
Land to be developed	Lot 1 Deposited Plan 633221, located at 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park
Proposal	The Proposal involves the construction and operation of a data centre.

Environmental Impact Statement

An Environmental Impact Statement (EIS) is attached. The EIS assesses the environmental impacts of this Proposal and includes the matters referred to in Secretary's Environmental Assessment Requirements provided to the Applicant on 29 June 2020 under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*.

Declaration

I certify that the contents of the EIS, to the best of my knowledge, has been prepared as follows:

- In accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*
- In accordance with the requirements of the *Environmental Planning and Assessment Regulations 2000; and State Environmental Planning Policy (State and Regional Development) 2011;*
- The statement contains all available information that is relevant to the environmental assessment of the proposed development; and
- The information contained in this report is neither false nor misleading.

Signature:  Date: 11 November 2020

Name: Jamie McMahon

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Terms and acronyms used in this EIS

Term / Acronym	Description
Symbols	
°C	Degrees Celsius
$kgCO_2$-e/GJ	Emission factor for calculating direct emissions. Refer to quantity of a given greenhouse gas emitted per unit of energy
µg/L	Micrograms per litre
$µg/m^3$	Micrograms per cubic metre
A	
A Weighted decibels [dB(A)]	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
ABMA	Asbestos materials assessment
ABS	Australian Bureau of Statistics
ACM	Asbestos Containing Material
AHDDA	Aboriginal Heritage Due Diligence Assessment
AHIMS	Aboriginal Heritage Information Management System
AHU	Air handling units
AHD	Australian Height Datum
AMP	Asbestos Management Plan
ASS	Acid Sulfate Soils
AVD	Average vehicle delay
AQIA	Air quality impact assessment
ARI	Average recurrence interval
B	
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
BAM	Biodiversity Assessment Method
BaP	Benzo(a)pyrene
BDAR	Biodiversity Development Assessment Report
BH	Borehole
BTEXN	Benzene, toluene, ethylbenzene, xylenes and naphthalene
BoM	Bureau of Meteorology
BC Act	Biodiversity Conservation Act 2016 (NSW).
BDAR	Biodiversity assessment report
C	

Term / Acronym	Description
CAQMP	Construction Air Quality Management Plan
CBD	Central Business District
CCTV	Closed-circuit television
CEMP	Construction environmental management plan
CICL	Cast iron cement lined pipe
CLM Act	Contaminated Land Management Act 1997 (NSW)
CEMP	Construction Environmental Management Plan
CNVS	Construction noise and vibration strategy
CNVMP	Construction noise and vibration management plan
CO	Carbon monoxide
CPTED	Crime prevention through environmental design
CoPC	Contaminants of Potential Concern
CRAC	Computer room air conditioning units
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSWMP	Construction Soil and Water Management Plan
Cth	Commonwealth
CTMP	Construction Traffic Management Plan
D	
DA	Development Application
Day	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
Db	Decibel - the measurement unit of sound.
DBYD	Dial Before You Dig
DCP	*City of Ryde Development Control Plan 2014*
DoAWE	Department of Agriculture, Water and the Environment
DOS	Degree of saturation
DP	Deposited Plan
DPIE	NSW Department of Planning, Industry and Environment
E	
EES	NSW Environment, Energy and Science Group
EIS	Environmental impact statement
ENM	Excavated Natural Material
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EP&A Regulation	Environmental Planning and Assessment Regulation 2000 (2000).
EPI	Environmental Planning Instrument
EPA	NSW Environment Protection Authority

Term / Acronym	Description
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPL	Environment Protection Licence
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
Evening	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
F	
FFMP	Flora and Fauna Management Plan
FM Act	Fisheries Management Act 1994 (NSW)
Frequency [*f*]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
FRNSW	Fire and Rescue NSW
FSR	Floor Space Ratio
FTE	Full-time equivalent
FTP	Framework travel plan
G	
GDE	Groundwater Dependent Ecosystems
GFA	Gross floor area
GHG	Greenhouse gas
GIS	Geographic Information System
GLC	Ground level concentration
GP	Gross pollutants
GPS	Global positioning system
H	
Heritage Act	Heritage Act 1977 (NSW)
I	
ICNG	Interim Construction Noise Guideline
IACA	Institute of Australian Consulting Arborists
IAQM	UK Institute of Air Quality Management
IBRA	Interim Biogeographic Regionalisation for Australia
IBL	Internal bitumen lined
IES	Integrated Environment Solutions
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*

Term / Acronym	Description
K	
K	Hydraulic conductivity
km/h	Kilometres per hour
KTP	Key threatening process
L	
L/sec	Litres per second
L_{10}	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L_{10}.
L_{90}	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L_{90}.
LALC	Local Aboriginal Land Council
LED	Light-emitting diode
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LLDPE	Linear low-density polyethylene
LOS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
LGA	Local Government Area
LSPS	Planning Ryde – Draft Local Strategic Planning Statement 2019
L_{max}	The maximum sound pressure level measured over the measurement period.
L_{min}	The minimum sound pressure level measured over the measurement period.
M	
m^2	Metres squared
mg/l	Milligrams per litre
MLALC	Metropolitan Local Aboriginal Land Council
mm/s	Millimetres per second
MNES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
N	
NABERS	National Australian Built Environment Rating System
NAPL	Non-aqueous phase liquid
NCA	Noise catchment area. The noise environment at each of the sensitive receivers within a noise catchment area is considered to be similar to the unattended monitoring location within that NCA.
NEPM	National Environment Protection Measure
NFPA	National Fire Protection Association
Night	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
NML	Noise Management Levels
NO_2	Nitrogen dioxide

Term / Acronym	Description
NPfI	Noise Policy for Industry
NVIA	Noise and vibration impact assessment
NVMP	Noise and Vibration Management Plan
O	
O_3	Ozone
OCPs	Organochlorine pesticides
OEH	NSW Office of Environment and Heritage (formerly) now: Heritage NSW
OPPs	Organophosphorus pesticides
OSD	Onsite detention
P	
PADs	Potential Archaeological Desposits
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PCT	Plant Community Type
PG	Packaged goods
PHA	Preliminary Hazard Analysis
$PM_{2.5}$	Particulate matter with particles that have a diameter of 2.5 micrometres or less
PM_{10}	Particulate matter with particles that have a diameter of 10 micrometres or less
PMF	Probable maximum flood
PMST	Protected Matters Search Tool
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
PSD	Permissible site discharge
PUE	Power Usage Effectiveness
R	
RBL	Rating background level: the overall background level for each day, evening and night period for the **entire length** of noise monitoring.
RFS	NSW Rural Fire Service
RL	Reduced level
Roads Act	*Roads Act 1993*
RtS	Response to Submissions Report
Ryde LEP	*Ryde Local Environmental Plan 2014*
S	
SA2	Statistical Area Level 2
SCL	Steel cement lined
SCM	Substitute cementitious materials
SDS	Safety Data Sheet
SEARs	Secretary's Environmental Assessment Requirements

Term / Acronym	Description
SEPP	State Environmental Planning Policies
SEPP 33	*State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*
SEPP 55	*State Environmental Planning Policy No 55 – Remediation of land*
SIDRA	Signalised & unsignalised Intersection Design and Research Aid – a single intersection modelling software
SO_2	Sulphur dioxide
Spoil	Material excavated as part of the construction phase of the Proposal
SRD SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
SSD	State Significant Development
SWMP	Soil and Water Management Plan
T	
TCLP	Toxicity characteristic leaching procedure
TECs	Threatened Ecological Communities
TN	Total nitrogen
TP	Total phosphorous
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
TSS	Total suspended solids
TZV	Theoretical Zone of Visibility
V	
VC	Vitrified Clay
VDVs	Vibration Dose Values
Vegetation SEPP	*State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*
VENM	Virgin Excavated Natural Material
VIA	Visual Impact Assessment
VIS	NSW Vegetation Information System
VOCs	Volatile organic compounds
VPA	Voluntary Planning Agreement
W	
WELS	Water Efficiency Labelling and Standards
WM Act	*Water Management Act 2000*
WMP	Waste Management Plan
WSUD	Water sensitive urban design
WoNS	Weeds of National Significance

Executive Summary

Stockland Trust Management Limited as trustee for Advance Property Fund (Stockland) is seeking development consent to construct a data centre (the Proposal) at 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park (the Site). The Proposal includes associated earthworks and the establishment of a new local road (Road 22).

The Site is located in Macquarie Park and sits adjacent commercial properties to the southwest and the southeast. The Site is located within a B7 Business Park Zone under the Ryde Local Environmental Plan 2014 (Ryde LEP). The surrounding areas contain a mix of B4 Mixed Use and B3 Business Park land uses.

The Proposal comprises the construction and operation of a data centre. This includes the construction of a five-storey, 45 metre building with associated earthworks, parking, driveways, security guardhouse, fencing, landscaping and servicing. During operation the Proposal would operate on a 24 hour, seven day a week basis, employing up to 50 people.

The Proposal is identified as State Significant Development (SSD) under the EP&A Act by virtue of meeting thresholds defined in the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) (see **Chapter 4 (Strategic and Statutory Context)**) for further detail).

The Proposal has been borne out of detailed internal consideration of a range of alternatives and options for achieving the outcome of secure data storage. This has included consideration of the viability of a greater number of smaller facilities or alternative locations within NSW, Australia or globally.

While other arrangements and designs for the Proposal are possible, the proposed arrangement is deemed optimal for this location based upon functionality, long term financial viability, off-site amenity impacts and architectural merit.

The Proposal is deemed justified in this location and in this arrangement as it would:

- Support the growth of data storage and hosting in NSW
- Provide critical infrastructure for the growth for the digital economy within NSW and more broadly
- Directly contribute to the important role that Macquarie Park plays as an innovation district within the broader Eastern Economic Corridor, as identified by the Greater Sydney Commission
- Provide up to 350 – 400 jobs during construction and approximately 50 jobs during operation, all within Sydney's 'global economic corridor'
- Be located within an area of low susceptibility to potential amenity impacts arising during construction and operation
- Be located within close proximity of key customers and utility and transport infrastructure
- Present the most rational method of developing a new data storage facility according to the operator's specific requirements
- Provide for the advantageous, orderly and economic use of land in an area subject ongoing commercial regeneration.

The Proposal comprises stage 2 of Stockland's broader M_Park development. Concept development consent for the broader M_Park site was granted in December 2019. Since that time the Proposal has replaced three buildings previously proposed for the southern portion of the site. Accordingly an Amending development application to the concept DA has been lodged by Stockland.

The Proposal has been assessed against relevant legislative policy and strategic planning documents and has been found to be consistent with the objectives and spirit of these documents. Permissibility for the Proposal is provided by *State Environmental Planning Policy (Infrastructure) 2007*, with the project being deemed State significant by virtue of *State Environmental Planning Policy (State and Regional Development) 2011*. The Proposal is consistent with the requirements of *Ryde Local Environmental Plan 2014,* employing incentive provisions under Section 6.9 of this policy to achieve a

height of 45 metres in a location mapped under the Ryde LEP (pursuant to map sheet HOB_004) to have a maximum building height of 30 metres. The gross floor area of the Proposal is 12,069.70 m^2, which is consistent with the Gross Floor Area allocated to the building under the Amended Masterplan DA, which complies with the incentive Floor Space Ratio control across the M_Park site.

Consultation

Table ES-1 sets out the communications and engagement activities conducted and scheduled by Stockland throughout the preparation of this EIS.

Table ES-1 Overview of community and stakeholder engagement

Media	Description
Proposal email	Stockland has established and manages a dedicated community email account to provide interested members of the community and stakeholders with an opportunity to ask questions and provide feedback about the Proposal.
Website	Stockland has established a dedicated M_Park website.
Online community information session	Facilitated by Elton Consulting, the online community information session provided an opportunity for the community and stakeholders to meet the project team, hear more about the Proposal, ask questions and provide feedback.
Community and stakeholder letterbox drop	A postcard providing information about the Proposal and invitation to the online community information session was distributed to 2,524 residential and business neighbours.
Proposal collateral	Postcard, presentation, key messages and FAQs.
Key stakeholder meetings	Stockland has scheduled to present at the next ordinary meeting of the Macquarie Park Forum in November 2020. An invitation has also been extended to Forum members for a one-on-one interaction with the project team.

A community information session was hosted on 12 October 2020, which included a question and answer session with panellists. One community member attended the session. No other correspondence has been received from any businesses or community members as part of the consultation process.

One stakeholder response was received during the agency consultation period, from Transport for NSW. This response declined any further consultation until the EIS was finalised and referred back to comments provided at the SEARs stage.

Visual impact assessment

A study area of 1 kilometre from the boundary of the site was selected to assess the visual impacts of the Proposal. This distance is considered conservative given the relatively flat site and surrounds and the high level of visual screening provided by the adjacent buildings and mature trees.

Four viewpoints were assessed as part of this assessment, all located on Khartoum and Talavera Roads. Changes to the view from public places due to the Proposal would only occur along Talavera Road and Khartoum Road within the vicinity of the Proposal. Four viewpoints were used to assess the impact to visual amenity due to the Proposal and found that the changes resulted in assessments between Negligible to Moderate to Low, as shown in **Table ES-2**.

Table ES-2 Summary of visual impact assessment

Viewpoint	Sensitivity	Magnitude	Overall rating
Viewpoint No. 1	Low	Low	Low
Viewpoint No. 2	Low	Negligible	Negligible
Viewpoint No. 3	Low	Moderate	Moderate to low

Viewpoint	Sensitivity	Magnitude	Overall rating
Viewpoint No. 4	Low	Low	Low

The highest rating was returned from Viewpoint 3, which was due to the higher magnitude of the change than the sensitivity of the receptors. The proximity of the Proposal to the viewpoint (directly opposite the road) and the change in height of the Proposal built form from the existing built form on the site were important factors relating to this rating.

Geology, soils and contamination

Construction works could result in potential soil, surface water or groundwater contamination from the following activities, if unmitigated:

- Spills of oils, fuels or chemicals from plant and equipment within the construction footprint
- Importing or backfilling of excavations with spoil which could result in exposure of construction workers and surrounding human and ecological receptors to potential harm if the spoil happened to be contaminated
- Stockpiling of potentially contaminated spoil
- Contaminated material entering onsite or nearby stormwater drainage systems and groundwater.

The risk of contamination impacts associated with existing contaminated materials onsite (i.e. all points above except for spills) is considered to be low.

Potential operational impacts for the Proposal may arise as a result of the storage of diesel to support the diesel-operated generators within the Proposal Site. The main risks associated with this activity are accidental spills during refuelling or leaks from the storage container. Leaks and spills of fuels can:

- alter the chemistry and composition of receiving surface water and groundwater sources
- contaminate local natural areas
- affect human health

Without mitigation, the risks associated with leaks or spills of diesel fuel upon the receiving environment could be high. With management and mitigation measures in place, the operation phase of the Proposal is not likely to present ongoing impacts associated with geology, soils or contamination.

Transport and Traffic

Public transport

It is not expected that construction workers would disrupt the ordinary functioning of public transport through their commute to the Proposal Site. Accordingly, the Proposal's construction phase would have a negligible effect upon public transport in the area and regionally.

The impact of these additional people on the public transport during the operational phase (estimated as approximately 25 people, or half of the operational workforce), would be negligible in the context of the workers within the commercial offices and warehouse that would be replaced by the development.

Road network and traffic

At peak construction phases, the Proposal is anticipated to generate up to 50 heavy vehicle movements per day, i.e. 25 entering and 25 leaving. Approximately 150 light vehicle movements per day are expected. In the context of the many thousands of vehicles travelling on the arterial roads that would be utilised by construction traffic, the addition of up to 200 vehicles from the Proposal staggered throughout the day is not considered to be significant.

During operation the project would be expected to generate:

- 22 vehicles per hour during the AM peak
- 18 vehicles per hour in the PM peak

Given the very small number of additional vehicles associated with the operation of the Proposal, and noting that these would replace existing operational movements associated with the existing development, the contribution of these private vehicles to local and regional congestion on the existing road network is expected to be negligible.

Parking, bicycle and pedestrian network

It is anticipated that sufficient parking space would be available on Site during construction.

During construction, traffic controllers would manage the movement of pedestrians and cyclists along the Talavera Road shared-use path fronting the Site, allowing heavy vehicles to exit and enter safely. This would cause very minor and temporary delays to the movements of cyclists and pedestrians, but would ensure their safety.

The operational facility would provide a total of 48 car parking spaces within the Site. Given the proximity of the Proposal to public transport, and the staggered working times of employees, this amount of parking is considered to be sufficient to accommodate all staff who use private vehicles to commute to and from the Proposal.

The introduction of Road 22 would result in a gap in the continuous shared-use path along Talavera Road. Pedestrians and cyclists would be required to come to a stop before safely crossing Road 22 to the other side of Talavera Road. Kerb ramps would be available on both sides of the shared path to facilitate safe and inclusive access across Road 22.

Noise and vibration

Background noise levels were monitored at a total of two locations to identify the existing noise environment throughout the adjacent area. Appropriate construction noise management levels and operational noise trigger levels were established based on the existing noise levels.

A construction noise assessment was conducted in accordance with the *Interim Construction Noise Guideline* (DECC, 2009). Three distinct construction stages were used in a computer-based noise model to determine the predicted noise levels generated from the Proposal. Construction noise impacts were assessed at residential receivers surrounding the Proposal, as well as non-residential receivers.

The assessment of noise associated with the construction of the Proposal indicates some exceedances of the noise management levels at the most affected sensitive receivers during certain activities. The magnitude and number of exceedances are very low and are within the accepted range of the *Noise Policy for Industry*.

Measures have been recommended to mitigate the construction noise impact at nearby sensitive receivers.

Air quality

Construction activities would be expected to generate a small amount of dust and vehicle emissions. Given existing background concentrations and the distance to high and medium sensitivity receptors, the sensitivity to human health effects for annual average PM_{10} was rated as low. The potential risks for the overall project were found to be “Medium” to “Low” for construction activities.

Modelling of the operation of the Proposal demonstrated that all pollutants comply with regulatory limits under all modelling conditions and operating modes. NO_2 concentrations were predicted to be elevated close to the NSW EPA criteria (predicted to reach approximately 78%). All other pollutants were well below their respective criteria with the exception of $PM_{2.5}$, which exceeded its 24-hour average criteria due to elevated background concentrations. The relative contribution from the generators for $PM_{2.5}$ was low with a maximum contribution to $PM_{2.5}$ of approximately 1.2 $\mu g/m^3$. There were no additional exceedances predicted as a result of the operation of the generators due to $PM_{2.5}$ and as such it was not deemed to be of concern. Annual average pollutant concentrations (NO_2 and

$PM_{2.5}$) were well below levels of concern and did not add significantly to the background pollutant concentrations.

Non-Aboriginal Heritage

The Proposal would not involve the removal or demolition of any buildings, as these will have been removed by a separate development consent. The Proposal Site is not located in the immediate vicinity of any items of non-Aboriginal heritage significance. The opportunity for both direct and indirect impacts to the heritage items is therefore extremely low.

Earthworks required for the Proposal would result in relatively deep excavation of up to nine metres at one end to accommodate a level site for the data centre. Although the archaeological potential of the Proposal Site is very low, the potential of uncovering items that are archaeologically significant cannot be completely ruled out. The implementation of appropriate mitigation measures would reduce the extent of impact that excavation works would have on unexpected heritage items.

Overall, the Proposal is expected to have a negligible impact to non-Aboriginal heritage during the construction phase

Listed heritage items are not located in positions where the normal operations of the Proposal could result in direct impacts to those heritage items or their level of significance. In addition, the Proposal would not be located in the view line of any of the abovementioned heritage items and would not impede on the view to those heritage items. As such the Proposal would have a negligible impact upon non-Aboriginal heritage during its operational phase.

Aboriginal Heritage

During the construction phase of the Proposal, excavations would be undertaken to create a level surface to appropriately build the structure and for concrete foundations to be installed. Considering the nature of landform and the extent of past disturbances across the Proposal Site, as well as the results of MLALC consultation and past Aboriginal assessments for the surrounding area, the overall archaeological sensitivity of land within the Proposal Site is considered to be low. The potential for impacts to Aboriginal objects to occur during works is likewise assessed as low.

The operation of the Proposal would not result in any ongoing impacts to Aboriginal heritage.

Measures have been recommended to mitigate any unforeseen construction impacts on items of Aboriginal Heritage significance.

Biodiversity

The total area of all vegetation to be removed for the construction of the Proposal has been estimated conservatively as about 500 m^2. The majority of this vegetation exists within the landscaped gardens bordering the existing carpark and buildings within the Proposal Site.

No TECs or threatened flora species listed under the BC or EPBC Acts have been identified within the biodiversity study area. No impacts to TECs or threatened flora species are anticipated as a result of the construction of the Proposal.

The removal of vegetation for the construction of the Proposal would comprise a minor ecological impact based the avoidance measures which have been incorporated into the design of the Proposal, the small degree of overall coverage that would be removed, the relatively low ecological and habitat value of existing vegetation at the Proposal Site, the availability of similar quality vegetation in the surrounding area, and the provision of replacement landscape plantings.

No threatened fauna species listed under the BC or EPBC act have been identified within the biodiversity study area. Impacts to threatened fauna species would be limited to a minor reduction in foraging habitat for highly mobile species such as birds and bats. In the context of the abundance of similar vegetation available in the region this impact is considered to be negligible.

Loss of vegetation and fauna and flora habitat would occur as a result of the Proposal due to unavoidable vegetation clearance. However, the construction of the Proposal has been designed to limit vegetation clearance as far as practicable and where feasible existing trees would be retained.

As a result, impacts on vegetation have been limited to about 500 m^2, most of which is already highly modified and comprised of planted native and exotic species.

Wildlife and habitat connectivity is not anticipated to be affected by the construction of the Proposal.

The Proposal is considered unlikely to exacerbate the presence of pests, weeds or pathogens during construction or operation. Indirect impacts associated with vehicle movements, lighting and noise are expected to be largely consistent with existing development at the Site.

A BDAR waiver was prepared for the Proposal and submitted to the Department of Planning, Industry, and Environment (DPIE) on 1 October 2020. A response in the form of a BDAR waiver was provided by DPIE on 21 October 2020.

Greenhouse Gas and Energy Efficiency

Scope 1, Scope 2 and Scope 3 GHG emissions associated with diesel fuel consumption were estimated based on design sizing of backup generators, fuel-burn rates and anticipated operational procedures.

Emissions associated with electricity consumption were estimated using a 3D dynamic thermal energy model of the facility. The resulting prediction for electrical energy consumption for the ultimate data centre capacity is estimated to be 311,315 MWh per annum, of which 280,320 MWh is attributed to IT equipment. Based on estimated decarbonisation of the NSW electricity grid over 50 years, the total GHG emissions are predicted to be 4,281,000 tonnes CO_2 of which 4,240,400 tonnes are attributable to imported grid electricity.

Sustainability measures have been proposed for further consideration during design development.

Hazard and risk

Potential hazards and risks during construction would include:

- On-site storage, use and transport of dangerous goods and hazardous substances
- Rupture of, or interference with, underground utilities
- Exposure to hazardous materials and any contaminated soils during construction works.

Where the above hazards and risks are allowed to occur without mitigation, or occur due to lack of mitigation measures, the potential impact to both human health and the environment is considered to be high. However, the implementation of the mitigation measures provided would substantially reduce the chances of these hazards and risks occurring. In addition, if in the rare event that they do occur, the mitigation measures in place would reduce the severity of that hazard and or risk upon the receiver.

Potential hazards and risks during the operation of the Proposal would be associated with:

- The on-site storage and use of dangerous goods and hazardous substances
- Building fire.

A preliminary risk screening was undertaken for dangerous goods and hazardous substances that would be located on the Proposal Site during the operation phase (refer Section 15.2.3). The storage of those materials does not exceed the screening threshold to be considered under SEPP 33.

The storage of diesel fuel would be in suitably constructed fuel tanks located underground. The chosen fuel tanks would be designed to meet the applicable standards to prevent spill, leak or damage, reducing the potential for contamination or for the diesel fuel to be a source of fire. The potential for impacts from the storage of dangerous goods and hazardous substances within the operational phase of the Proposal is low.

The risk of a building fire occurring is anticipated to be relatively low, given the design of the building and the fire protection measures in place.

Land use

The entire construction footprint for the Proposal would be located within the permanent operational footprint, comprising the southern half of Lot 1 in DP 633221. For this reason, no property acquisition or temporarily lease arrangements would be required for the construction of the Proposal, and no property impacts outside of the Site are anticipated.

During construction, the Site would be used for construction activities and the establishment of construction laydown, storage, and site offices. While this would represent a change in current land use at the Site, this would be temporary in nature and limited to the duration of the construction period.

The operation of the Site as a data centre would be consistent with the objectives of the B7 Business Park Zone under the Ryde LEP and the City of Ryde Development Control Plan 2014 as it would provide a commercial office, future employment opportunities and facilities that would meet the requirements of businesses and workers at the Site. The Proposal would also contribute to the economic function of the Macquarie Park Corridor through its operational life, as the data centre is anticipated to be a successful business venture that would contribute to the commercial diversity of the Corridor and expand employment opportunities within the high tech-industry.

The Proposal would also incorporate the principles of ecologically sustainable development into its design and operation. This would further fulfil the objectives outlined in the City of Ryde Development Control Plan 2014, Macquarie Park Corridor.

Infrastructure

During the construction of the Proposal, connection to any existing utilities would be limited to the use of electricity and communications to service the site offices, use of potable water for construction activities, and access to and from the Proposal Site using the existing road network. All other utility connections would be formally established during the commissioning of the Proposal.

The energy usage required to provide power to site offices during construction is likely represent a lower burden on the power grid than the former use of the Proposal Site as a complex of office and commercial premises. As such, this is unlikely to represent a burden on the existing power network.

For these reasons, this construction impact assessment has been limited to impacts upon potable water use and the existing road network.

During operation the combination of the Ausgrid connection, diesel generators and underground fuel storage tanks is anticipated to meet the power needs that would be required for the operation of the Proposal. In addition, no requirement to upgrade the existing power network to support the operation of the Proposal is anticipated.

In the short term, the operational water needs of the Proposal would meet the limitations set by Sydney Water. In addition, the long-term water needs of the Proposal are expected to be offset by water capture and recycling. Overall, the operational water demands of the Proposal would meet the requirement of Sydney Water and are not anticipated to unduly burden the existing potable water network over time. It is not anticipated that any upgrades to the existing Sydney Water potable water network would be required to support the operation of the Proposal.

All stormwater collected on site would be treated onsite and directed to the existing stormwater network. No stormwater would be released to the sewage mains.

Given the proximity of the Proposal to this existing sewer main the Proposal is not expected to overburden the existing wastewater network and it is not anticipated that an upgrade to Sydney Water's wastewater infrastructure would be required.

The wealth of communications connections available at the Site are anticipated to meet the needs of the Proposal. In addition, no requirements to upgrade the existing communications network are anticipated.

As the operation of the Proposal would only contribute a small quantity of daily vehicle movements, and as a new road would be delivered to facilitate access to the Proposal, the potential for the Proposal to adversely impact nearby road infrastructure would be negligible.

Social impacts

Amenity impact associated with traffic, noise, air quality and the visual environment were considered. Based upon the low levels of impact assessed for each of these aspects within their respective parts of this EIS overall amenity impacts during construction and operation were deemed to be negligible.

The Proposal would not adversely affect community cohesion during either construction or operation on the basis that it would replace an existing facility on private property.

Economic benefits associated with the Proposal include job creation, generation of income and supply of goods and services. Economic costs associated with the development of the Proposal include the direct capital cost, infrastructure costs and ongoing operation costs. The assessment concludes that based on these factors the overall magnitude of economic impact is considered to be low positive.

The Proposal was assessed against the key principles of Crime Prevention through Environmental Design (CPTED). Given the highly secure nature of the site, including 24 hour security, fencing and CCTV the potential for the Proposal to contribute to or encourage crime in the local area is very low.

Groundwater, surface water and flooding

The construction of the proposal would have the potential to intersect with groundwater. Provided mitigation measures are implemented the potential for broader quality or quantity impacts upon groundwater are considered to be low.

Provided that the appropriate management measures are implemented during construction, and any discharge criteria specified by City of Ryde Council is achieved, impacts to surface water during construction are expected to be manageable.

Any redistribution of flood flows during construction would not substantially affect the performance of downstream drainage infrastructure, due to the small size of the Proposal Site in the context of the wider catchment. Any potential flooding impacts during construction would be adequately managed through the mitigation measures identified

During operation it was identified that while some minor disruption of flow regime may occur within the perched aquifer as a result of the Proposal, no impacts to regional groundwater flow are anticipated.

There is also a small potential for water quality impacts through accidental fuel or chemical spills from maintenance equipment. It is considered that with the implementation of suitable management measures the likelihood for accidental spills from these activities to result in water quality impacts would be low.

The long-term establishment of the data centre building on the Site would have the potential to affect local overland flow paths. However, any redistribution of flows as a result of the presence of the data centre building would not substantially change the performance of downstream drainage infrastructure, due to the small size of the Proposal Site in the context of the wider catchment, and as all surface water migrating across the site would be suitably captured and managed by the proposed stormwater system.

Waste management

All waste generated during construction would be removed from site as required by licensed contractors. In order to avoid potential issues associated with odour generation, decreased visual amenity and creating environments that attract animals/pest species waste removal would occur at regular intervals, or sooner as and when required. A Construction Waste Management Plan would be prepared and implemented as part of the CEMP for the Proposal.

With the implementation of these plans and the management measures it is not anticipated that construction waste management activities for the Proposal would pose a significant risk to the environment or human health.

The operational phase of the Proposal is anticipated to generate data storage facility operational equipment waste (e-waste), office waste and domestic waste/waste generated by workers. These wastes would be dealt with at offsite licensed waste facilities, including landfill in some cases.

With the implementation the management measures provided in **Chapter 22 (Environmental Management)** it is not anticipated that construction waste management activities for the Proposal would pose a significant risk to the environment or human health.

Cumulative impacts

The potential for the Proposal to result in cumulative impacts alongside other major development proposed in the area was assessed in terms of transport, biodiversity and social and economic

impacts. All other factors were considered to result in negligible impact for the project alone and hence did not provide for any residual impacts that could combine with that of other nearby development.

Based on the generally low degree of residual impact for transport, biodiversity and social and economic impacts the potential for cumulative impacts alongside other projects in the general area of the Proposal is considered to be negligible to low.

1.0 Introduction

1.1 Purpose of this report

This Environmental Impact Statement (EIS) has been prepared in accordance with the relevant provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act). It has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the Department of Planning, Industry and Environment (DPIE) on *29 June 2020* and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW) (EP&A Regulation).

In accordance with Division 4.7 of the EP&A Act, this EIS presents an assessment of all potential environmental issues identified during the planning and assessment of the Proposal (as defined below). The assessment considers the areas directly or indirectly affected by construction and operation of the Proposal, as relevant to each technical assessment.

Alongside the applicant's community consultation and stakeholder engagement program), public exhibition of the EIS gives the community, government agencies and other interested parties an understanding of the Proposal and provides the opportunity to comment on the Proposal. Stockland will consider this feedback in the further development of the Proposal and will respond to issues raised through the preparation of a Response to Submissions Report (RtS). Further details on the assessment process for the Proposal are provided in **Chapter 4 (Strategic and statutory context)**.

1.2 Proposal overview

The Trust Company Limited ACN 004 027 749 as custodian for Stockland Trust Management Limited ACN 001 900 741 as trustee for Advance Property Fund ABN 24 976 581 817 (Stockland) is seeking development consent to construct a data centre (the Proposal) at 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park (the Site). The Proposal includes associated earthworks and the establishment of a new local road (Road 22).

The Proposal is identified as State Significant Development (SSD) under the EP&A Act by virtue of meeting thresholds defined in the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) (see **Chapter 4 (Strategic and statutory context)** for further detail).

Stockland is committed to working with key stakeholders, including State government agencies and Ryde City Council, to deliver a high-quality development which generates economic benefits and employment for Macquarie Business Park and the residents and visitors of the North District.

1.3 Proposal objectives

In developing the Proposal, Stockland seeks to:

- Provide data storage for customers, with specific focus on customers located within the Sydney basin
- Connect this data storage with other facilities worldwide to increase both the volume and redundancy of data storage
- Maintain compatibility with the surrounding environment and local context
- Construct and operate the Proposal in a sensitive and responsible manner, including in relation to the health and safety of staff and the environment.

1.4 Proposal need and benefits

Our society and economy have undergone a rapid transition over the past 25 years as they increasingly turn towards digital technology. Beginning with simple communication tools such as email, the internet and its array of applications has rapidly grown to the point where few elements of modern life do not in some way involve digital communications and transfer or storage of data. This includes a

range of digital tools that now replace a variety of previously ‘analogue’ activities such as watching TV and recorded video, navigating, banking and even socialising.

The growth of these technologies brings with it a requirement for an increase in size and capability of the underpinning physical infrastructure. This infrastructure is a critical part of keeping people connected to vital services in an increasingly digitised society.

The need for this infrastructure has been recently brought into stark contrast by the Covid-19 pandemic. In the interests of the health and welfare of the entire community people were directed to work from home as far as possible, resulting in an unprecedented increase in our reliance on digital infrastructure. During this time the ease with which large portions of the economy were able to rapidly switch to working remotely has demonstrated a previously untested resilience in the economy and society overall, greatly reducing the worst of the economic impacts that may have otherwise been experienced.

This rapid switch, and the growth of the digital economy, has been largely facilitated by the remote hosting and centralised storage of data. This includes not only the hosting of websites and email, but a range of increasingly common personal and business tools and applications, including social media, file storage, mapping and navigation, video and audio conferencing, entertainment and a wide variety of e-commerce services and applications.

The Proposal seeks to construct and operate a critical element of the expanding digital economy through the provision of a facility for the purpose of data storage.

The Proposal would provide a clear benefit in society’s ongoing digital transformation in that it would:

- Provide a secure location for the storage of data within the Sydney basin i.e. close to important users/customers
- Increase the speed of digital access to people in Sydney and NSW generally
- Contribute to the security of sensitive data by avoiding offshore hosting
- Provide an additional location for the backup and redundancy of data stored elsewhere
- Increase global resilience by providing for the storage of data within a physical location, the Sydney Basin, that benefits from few major physical disruptors such as natural disasters, as well as stable governance and social order.

The above benefits would apply to the vast majority of NSW’s residents who use digital services on a daily basis. The development would also benefit Australia more generally, as well as other users around the world.

1.5 Proposal alternatives

1.5.1 Do nothing

The do-nothing approach would not fulfil Stockland’s objectives for the development. Specifically, it would not increase the volume of data storage, nor would it provide for local storage or enhanced resilience through the distributed storage of data.

In terms of the site, the ‘do nothing’ scenario would fail to contribute to an enhancement of the local area through the regeneration of this part of Macquarie Park. This scenario would retain the existing decades-old development within the site, which is becoming increasingly redundant in the context of the changing architectural design and function of modern commercial developments.

1.5.2 Development at an alternative site

As outlined above, a site selection process was undertaken for the development. This process focused on the key requirements of this type of infrastructure, including proximity to physical services such as optic fibre networks, utilities and transport. It also considered data security and potential stressors. Whilst other locations within the Sydney basin were shortlisted as part of this process, these were not deemed to offer the benefits unique to this location, such as:

- Close proximity to future customers and the ‘global economic corridor’ of Sydney

- Connection to the emerging Macquarie Park Innovation District
- Availability of key services and infrastructure, particularly digital connections
- Market availability of a suitable development site
- A local context with a range of similar existing development, reducing the sensitivity of receptors to potential amenity impacts.

1.5.3 Proposal design

The Proposal has been borne out of detailed internal consideration of a range of alternatives and options for achieving the outcome of secure data storage. This has included consideration of the viability of a greater number of smaller facilities or alternative locations within NSW, Australia or globally.

The Proposal is based upon a standardised proprietary design. This design has been prepared with a view to the construction of a similar layout building in geographically distinct locations. The advantages of this approach are a reduction in design costs, site familiarity for staff and the ability to take advantage of economies of scale though the procurement of standardised hardware and other equipment.

While other arrangements and designs for the Proposal are possible, the proposed arrangement is deemed optimal for this location based upon functionality, long term financial viability, off-site amenity impacts and architectural merit.

1.5.4 Site selection

As the digital economy increases in scale and importance, issues of speed and security are becoming increasingly relevant. Whilst historically many digital services were typically hosted from a centralised server in a single physical location, the need to serve content swiftly has necessitated new ways of operating. This includes the expansion of ‘content distribution networks’ where identical information is hosted in multiple locations around the globe. When requested by a user, the nearest location hosting the data is directed to serve the information, decreasing the lag time between request and delivery.

In the emerging digital economy key users are also becoming more sensitive to data theft by commercial competitors or foreign agents. This has led to some organisations placing restrictions on the physical location in which certain digital information may be held. For example, Australian government agencies may specify that all data must be hosted on servers physically located within Australia.

In light of these sensitivities Stockland identified the need for the construction of a data centre in NSW, specifically in Sydney. In order to select a specific site, the following criteria were applied. The site needed to be located:

- Within the Sydney basin
- Close to key customers
- Within a suitably sized and serviced parcel of land
- Close to key digital (optic fibre) backbones
- Within proximity to travel and transport networks for operational staff
- In a location with high resilience and lower sensitivity to amenity impacts
- In a geotechnically stable location
- In an area less susceptible to natural disasters or other shocks or stresses such as terrorism.

The site selection process assessed a number of different locations within Sydney. Some of these sites were deemed unsuitable for a variety of reasons, with others being shortlisted. From the shortlist, the site was deemed most appropriate.

1.5.5 Justification of preferred option

The Proposal is deemed justified in this location and in this arrangement as it would:

- Support the growth of data storage and hosting in NSW
- Provide critical infrastructure for the growth for the digital economy within NSW and more broadly
- Directly contribute to the important role that Macquarie Park plays as an innovation district within the broader Eastern Economic Corridor, as identified by the Greater Sydney Commission
- Provide up to 350 – 400 jobs during construction and approximately 50 jobs during operation, all within Sydney's 'global economic corridor'
- Be located within an area of low susceptibility to potential amenity impacts arising during construction and operation
- Be located within close proximity of key customers and utility and transport infrastructure
- Present the most rational method of developing a new data storage facility according to the operator's specific requirements
- Provide for the advantageous, orderly and economic use of land in an area subject ongoing commercial regeneration.

1.6 Proposal capital investment value

The estimated capital investment value of the Proposal is $263,626,022.00.

1.7 Proponent details

The details of the Proponent are provided in **Table 1-1**.

Table 1-1 Proponent details

Name	The Trust Company Limited ACN 004 027 749 as custodian for Stockland Trust Management Limited ACN 001 900 741 as trustee for Advance Property Fund ABN 24 976 581 817 (Stockland)
Postal address	Level 25, 133 Castlereagh Street, Sydney NSW 2000
ABN	43 000 181 733
Nominated contact	Frank Ianni
Contact details	02 9035 2694
Site owner	The Trust Company Limited ACN 004 027 749 as custodian for Stockland Trust Management Limited ACN 001 900 741 as trustee for Advance Property Fund ABN 24 976 581 817 (Stockland)

1.8 Structure of EIS

The Structure of this EIS is as follows:

- Executive summary and glossary
- Chapter 1 Introduction
- Chapter 2 Location and strategic context
- Chapter 3 Proposal description
- Chapter 4 Strategic and statutory context
- Chapter 5 Stakeholder and community engagement
- Chapters 6-21 Environmental assessment

- Chapter 22 Environmental management
- Chapter 23 References

1.9 Secretary's Environmental Assessment Requirements

Prior to obtaining the SEARs, a meeting was held with the DPIE on 20 May 2020 to discuss the Proposal and to confirm that the SEARs could be issued.

An application to obtain SEARs was submitted on 1 June 2020 (Reference: SSD-10467), accompanied by a scoping report for the Proposal. The SEARs were subsequently issued by the DPIE on 29 June 2020 and are addressed throughout the contents of this EIS and relevant appendices.

The full SEARs as issued, along with where and how each item has been addressed, are included as **Appendix A** to this EIS. All relevant chapters prepared to address one or more components of the SEARs contain an overview of the requirements and how it is addressed within the chapter.

2.0 Location and strategic context

2.1 Secretary's Environmental Assessment Requirements

Table 2-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to general issues and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 2-1 SEARs - General

SEARs requirements	
General requirements	**How addressed**
The EIS must include: An accurate history of the site, including the relationship between the proposed development and the Concept Development (LDA 2017/0547) and any other consent or complying development certificate that apply to the land The EIS must also be accompanied by: High quality files of maps and figures of the subject site and proposal	Detail of the history of the site, including general information about historical land uses and recent development approval history is provided in **Sections 2.2.4** and **2.2.5**. In addition, **Section 2.2.5** provides an overview of the relationship of this proposed development with LDA 2017/0547. Detailed figures of the subject site, including its regional setting, local setting and land zoning is provided within this and other chapters of this EIS.

2.2 Site location, context and characteristics

2.2.1 Site location

The Site is located on land legally designated as Lot 1 in DP 633221, local address 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park (see **Figure 2-1** below). The Site is located in the suburb of Macquarie Park, which is part of the City of Ryde Local Government Area (LGA).

The Site area (by title) is 3.003 hectares, with a northwest frontage (181.05 metres) facing Khartoum Road, and a northeast frontage (165.96 metres) facing Talavera Road. The proposed development will only occupy the south eastern portion of the Site, to approximately 50 percent of the total Site area (see **Figure 2-1** below).

Vehicular access to the Site is currently provided off Khartoum Road and Talavera Road via two existing 8 metres wide, dual direction crossings. An additional vehicular access point and service lane is provided on the south western corner of the site, also off Khartoum Road. This additional access point is approximately 6 metres wide and provides singular vehicle direction around the southern boundary of the Site.

2.2.2 Site context

The Site is located in Macquarie Park and sits adjacent commercial properties to the southwest and the southeast. The Site is located within a B7 Business Park Zone under the *Ryde Local Environmental Plan 2014* (Ryde LEP). The surrounding areas contain a mix of B4 Mixed Use and B3 Business Park land uses. **Figure 2-2** below provides an illustration of where these zones are located relative to the Site.

The surroundings of the Site are characterised by a mix of lower density older warehouse and office spaces, and higher density office buildings more recently developed. This is the manifestation of an urban area which is in transition between an ageing and a newer urban fabric.

More broadly, the Site is located approximately 12 kilometres northwest of the Sydney central business district (CBD), approximately 850 metres southeast of Macquarie University, and 550 metres southeast of Macquarie Shopping Centre, measured along Talavera Road. The Site is also located approximately 600 metres northwest of Lane Cove Road and the on-ramp to the M2 motorway, also

measured along Talavera Road. **Figure 2-3** below provides an illustration of the Site boundary and the local context.

Macquarie Park metro station is located approximately 750 metres southwest of the Site, and Macquarie University metro station is located approximately 750 metres northwest of the Site. The Site is also serviced by high frequency bus services along Talavera and Khartoum Roads, with one bus stop along each of the Site frontages. The surrounding area is characterised by commercial buildings and land uses, consistent with the character of Macquarie Park as a business precinct.

2.2.3 Site characteristics

The Site is currently owned by Stockland and is occupied by two multi storey commercial and warehouse buildings, leasing floor space to several businesses. The two buildings are located towards the centre of the Site, in a campus fashion, and surrounded by at-grade car parking. The two buildings are similar in form and shape, featuring white and grey facades with external pillars. The largest footprint building is two storeys high, comprising office and warehouse spaces. The smallest footprint building is six storeys high containing mainly office spaces.

Vehicle access to the Site is via two driveways along Talavera Road, and three driveways along Khartoum Road. There are two bus stops adjacent to the Site, one on each of the roads, and there is also a shared cycle path which runs along Talavera Road.

The Site slopes from west (high) to east (low), from a level of approximately 59 metres Australian Height Datum (AHD) to approximately 48 metres AHD with a constant slope gradient of about six per cent between these points, creating a need to carry out earthworks to establish a level building site. The surrounding land morphology generally slopes down towards the east and the Lane Cove River, which is located approximately 900 metres northeast of the Site, measured along Khartoum Road. The car parking and external landscaped areas surrounding the buildings include mature landscaping trees and hedging. The trees form somewhat of a buffer between the property and the adjacent roads, footpaths and cycle path.

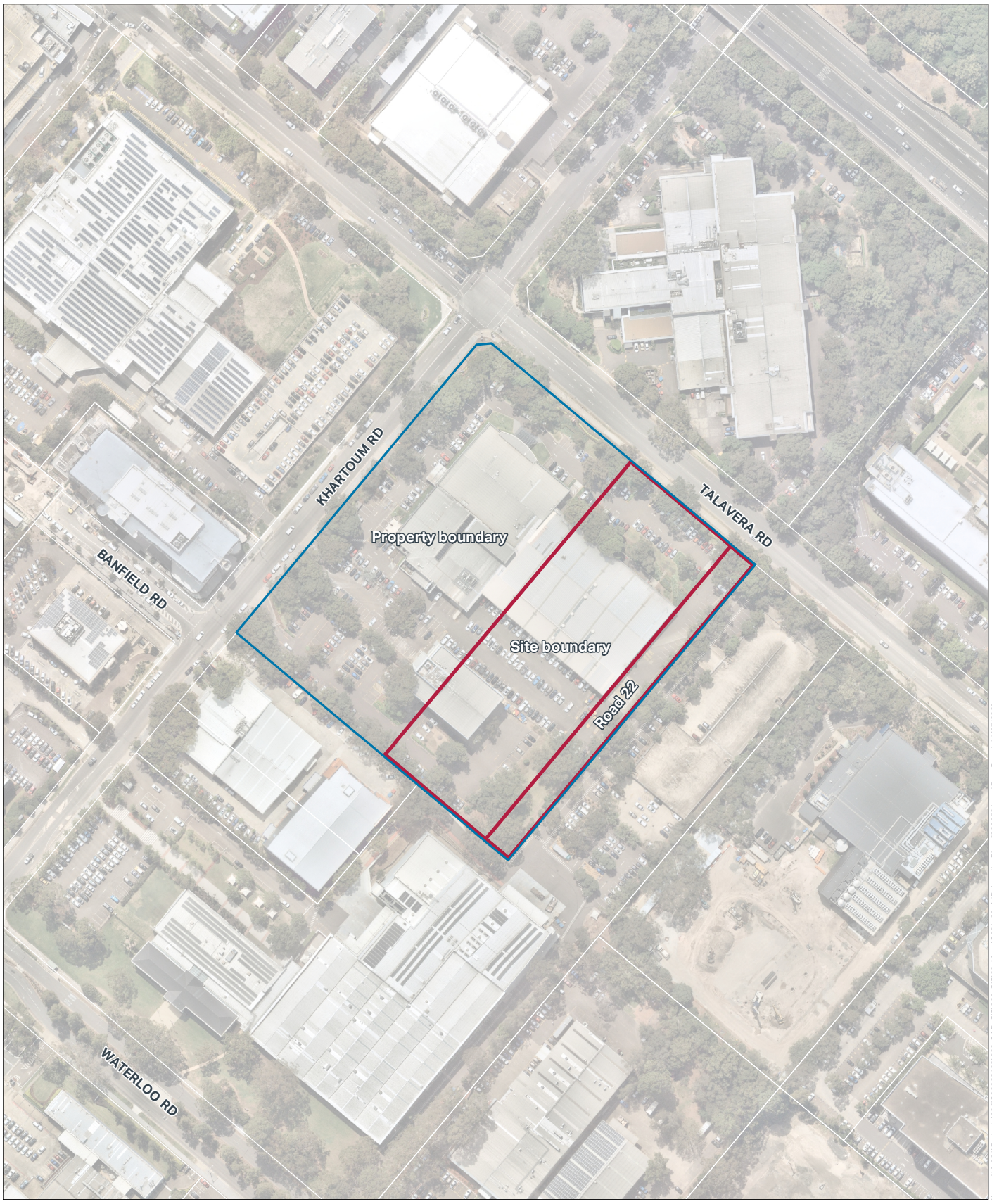


Figure 2-1 Site Location

N 0 50 100 m

AECOM

Legend

- Site boundary and Road 22
- Property boundary

\\ausyd1\p0011\Projects\60\6X106628\1\900_CAD_GIS\920_GIS\02_Maps\G001_02_AAP_LocationPlan_20200501.mxd Date Saved: 14/07/2020

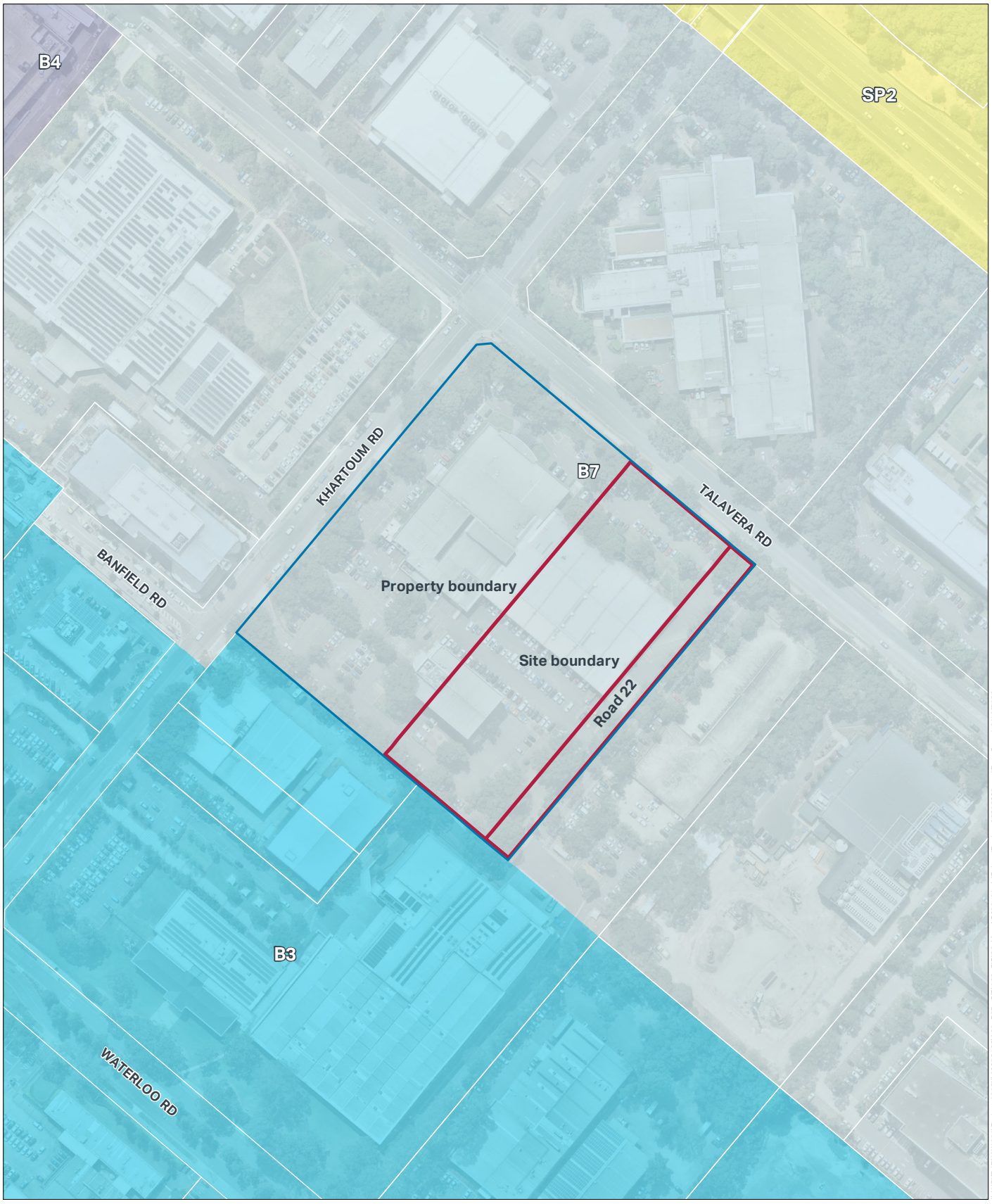


Figure 2-2 Nearby Land Use Designations

N

0 50 100 m

AECOM

Legend

Site boundary and Road 22

Property boundary

LEP Land Zoning

B3 Commercial Core

B4 Mixed Use

B7 Business Park

SP2 Infrastructure

Source: Imagery © Nearmap, 2020.

Figure 2-3 Site Context

AECOM

Legend

- Site boundary
- Property boundary
- Watercourse

Source: Imagery © Nearmap, 2020.

2.2.4 Site history

Aboriginal people inhabited the Sydney basin for thousands of years prior to the arrival of Europeans. The northern coastal area of Sydney was home to the Guringai people, western Sydney was home to the Dharug clans, and southern Sydney was inhabited by the Dharawal clans. The City of Ryde Council area is commonly accepted to be Wallumedegal country (various spellings).

Prior to European settlement the Site was likely to have been characterised by vegetation predominantly consisting of Eucalypt Open Forest vegetation. Such vegetation would have consisted of a variety of Eucalypts, Corymbias and Angophoras with an understorey typically dominated by shrubs, or a variable grass component.

A search of historical aerial imagery of Sydney in 1943 indicates the Site, and its local context, was previously characterised by large properties in a farmland setting.

The development of Macquarie Park as an urban setting was largely associated with the establishment of Macquarie University in the mid to late 1960s. The architectural style of the existing buildings within the Site indicates the Site would have been developed in the 1970s or 1980s, meaning the structures are currently approaching 40 years of life. A search of historical aerial imagery indicates the neighbouring property to the southeast of the Site was redeveloped in 2012 for its current use. It was previously an at-grade car park.

2.2.5 Development history

A search of City of Ryde development application (DA) Tracker, with reference in 11-17 Khartoum Road indicates several internal fit outs and alterations occurred within the existing facilities since the commencement of record in 2009. The search for records regarding address 33-39 Talavera Road did not return results.

Table 2-2 City of Ryde DA Tracker results for 11-17 Khartoum Road

Application	Address	Lodgement Date	Description	Type	Determination
LDA2009/0189	11 Khartoum Rd MACQUARIE PARK NSW 2113	1/05/2009	Internal fit out inter-tenancy wall including full height partitioning & associated services Suite 3.01, Level 3	Development Application	Approved
LDA2009/0190	11 Khartoum Rd MACQUARIE PARK NSW 2113	1/05/2009	Fit out of inter tenancy walls, including full height partitioning & associated services, Suite 3.02, level 3,	Development Application	Approved
LDA2010/0263	11 Khartoum Rd MACQUARIE PARK NSW 2113	31/05/2010	Alterations to commercial Suite 2, Level 3 – fit out.	Development Application	Approved
LDA2014/0444	11 Khartoum Rd MACQUARIE PARK NSW 2113	8/10/2014	Alterations and additions to existing commercial building and new signage.	Development Application	Approved

Application	Address	Lodgement Date	Description	Type	Determination
LDA2015/0295	11 Khartoum Rd MACQUARIE PARK NSW 2113	25/06/2015	Alterations and additions to existing commercial building and associated signage.	Development Application	Approved
LDA2016/0343	11 Khartoum Rd MACQUARIE PARK NSW 2113	22/07/2016	Internal fit out and change of use to workplace training facility.	Development Application	Approved
LDA2016/0482	11 Khartoum Rd MACQUARIE PARK NSW 2113	29/09/2016	Installation of new signage.	Development Application	Approved
LDA2017/0456	11 Khartoum Rd MACQUARIE PARK NSW 2113	2/11/2017	One non illuminated Site identification / directional sign.	Development Application	Approved
LDA2017/0547	11 Khartoum Rd MACQUARIE PARK NSW 2113	21/12/2017	Concept Development Application for the entire development and approval of physical works in Stage 1.	Development Application	JRPP Approved
LDA2019/0145	11 Khartoum Rd MACQUARIE PARK NSW 2113	16/05/2019	Proposed water tank, pump house and booster assembly to supply the upgrade fire sprinkler system.	Development Application	Approved
MOD2020/0046	11 Khartoum Rd MACQUARIE PARK NSW 2113	18/03/2020	Section 4.55(1A) to LDA 2017/0547, which sought various modifications to the detailed approval of Building A, arising from design development.	Section 4.55(1A) Modification	Approved

Application	Address	Lodgement Date	Description	Type	Determination
MOD2020/0091	11 Khartoum Rd MACQUARIE PARK NSW 2113	22/05/2020	Section 4.55(2) to modify the Water NSW General Terms of Approval, relating to Condition 32 of LDA 2017/0547. The modification sought to remove the requirement for a 'tanked' basement.	Section 4.55(2) Modification	Approved
LDA2020/0229	11 Khartoum Rd MACQUARIE PARK NSW 2113	30/06/2020	Amending DA made to LDA 2017/0547, which amends the masterplan approval/structure plan and enables the data centre use on the site.	Amending DA	Pending
LDA2020/0284	11 Khartoum Rd MACQUARIE PARK NSW 2113	08/09/2020	Development application to demolish the existing warehouse component of the Chubb building on site.	Development Application	Pending
MOD2020/0184	11 Khartoum Rd MACQUARIE PARK NSW 2113	07/09/2020	Section 4.55(1A) modification to amend the ground floor layout of Building A to accommodate medical centre tenant, together with other design development changes.	Section 4.55(1A) Modification	Pending

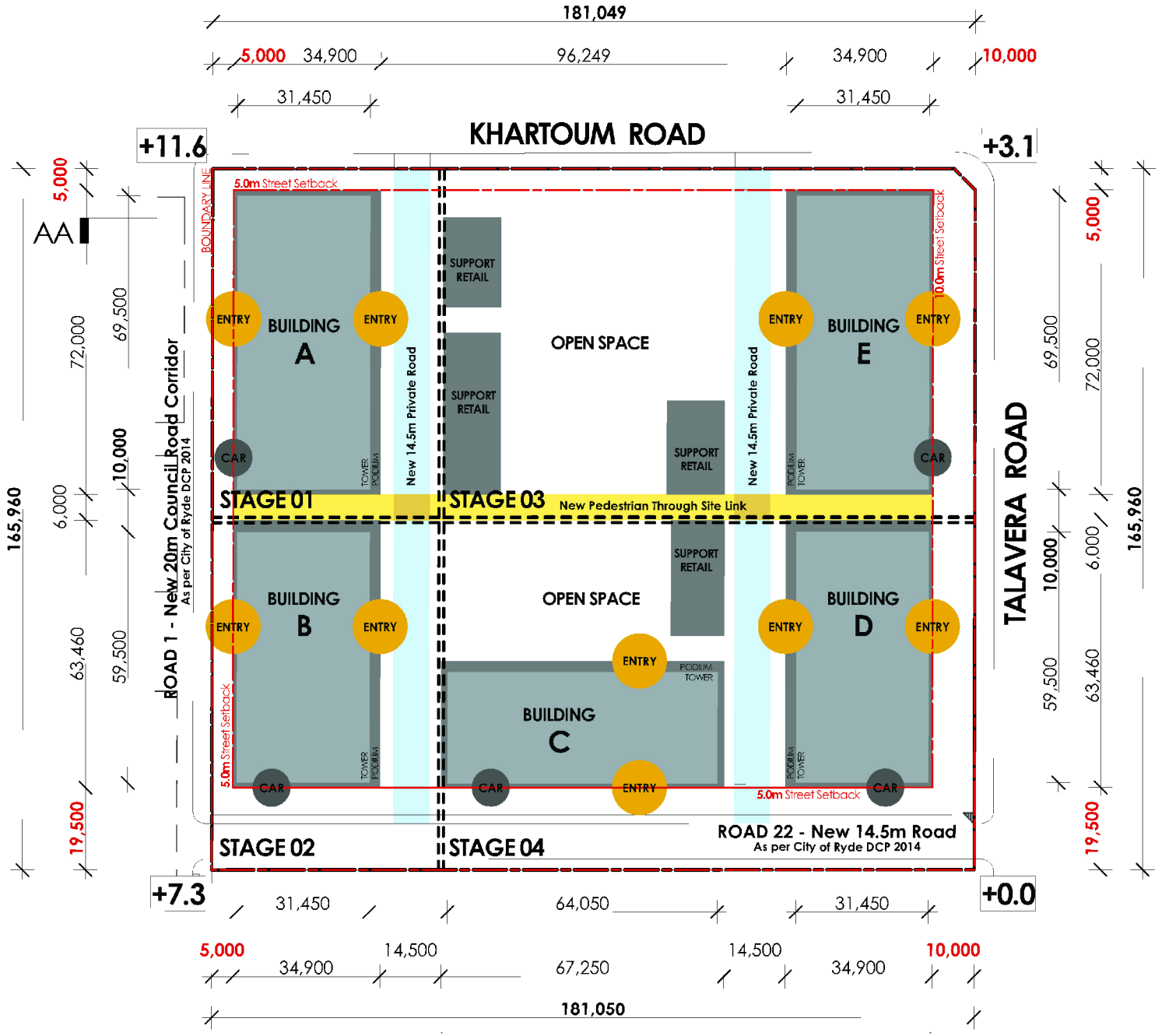
2.2.5.1 Concept development application

It is evident from the development history of the site (refer to **Table 2-2**), that the Proposal forms part of a broader concept development application (LDA 2017/0547), which was determined by the Sydney North District Planning Panel on 4 December 2019.

The approved concept development application (LDA 2017/0547) included the design parameters such as building envelopes, building layout, parking, roads, open space, as well as staging of the future development of the site. More specifically, the concept development application included:

- The building envelopes for five commercial offices to a maximum height of 44.5 m.
- Four retail and support pavilions around a central publicly accessible open space.
- Basement parking for 987 vehicles.
- The provision of a new public road, two private roads and a pedestrian through site link.

For context, the concept development layout plan, as originally approved, has been provided as **Figure 2-4**.



AECOM

0 20 40 m

FIGURE 2-4:
ORIGINAL CONCEPT DEVELOPMENT AND STAGING PLAN

Reproduced from Concept Proposal (LDA2017/0547), Project No 21716, Drawing CP-13, prepared by fitzpatrick+partners on 20 December 2017.

Source:

In order to accommodate this Proposal, the concept approval is currently subject to an Amending DA for the whole Site. Part of the Amending DA would involve an amendment to the concept plan to reflect the new building envelope relating to this Proposal (described as Building B). A description of the Amending DA, which was lodged with Ryde Council in May 2020, is provided below.

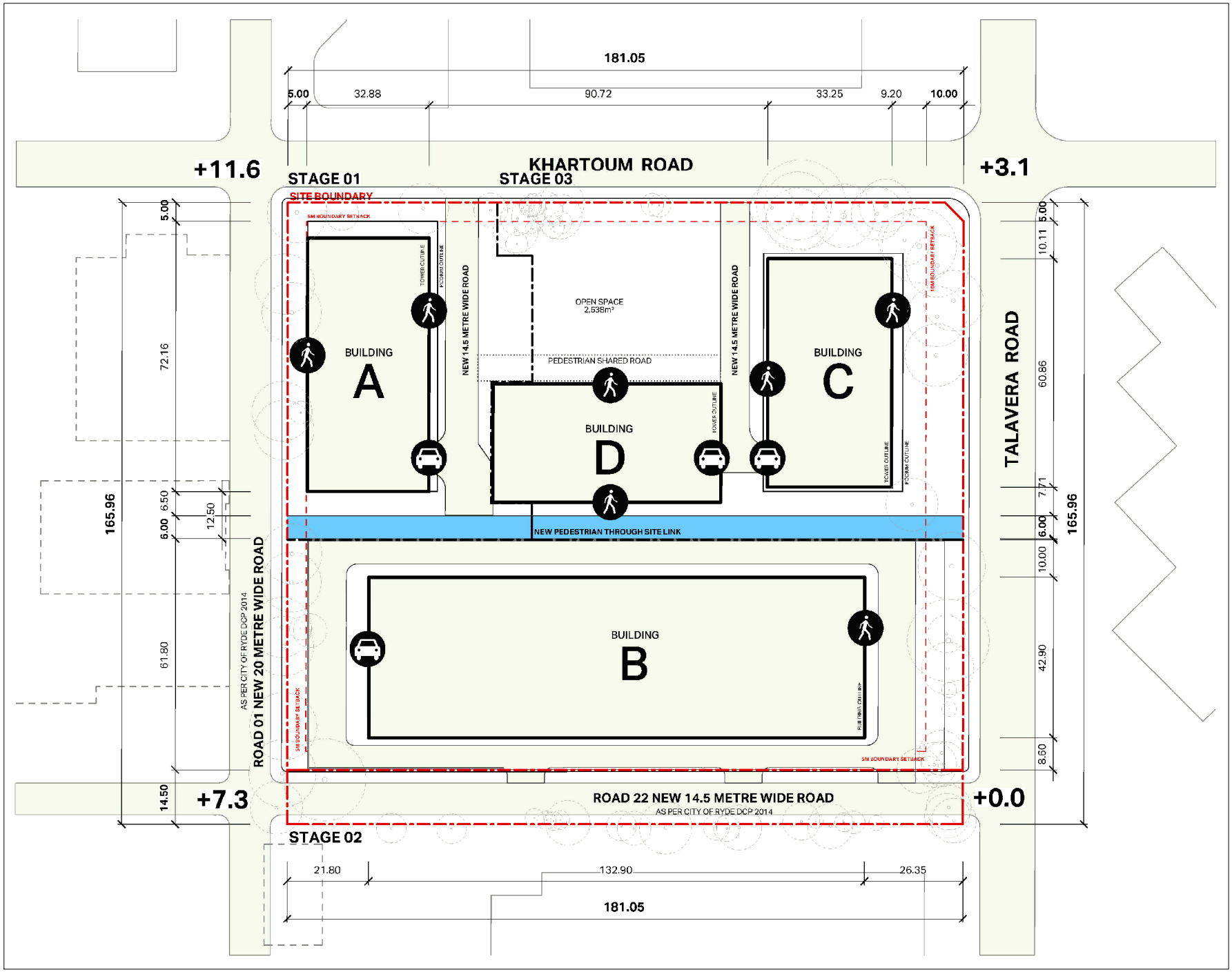
> *The Amending DA seeks Concept approval for land uses, building envelopes, overall gross floor area together with high level site planning considerations such as site access, layout and staging.*
>
> *The application amends LDA2017/0547 in so far as it:*
>
> - *Merges approved Building B, C and D to create one enlarged Building B, which will accommodate a storage premises (data centre).*
> - *Reconfigures/renames approved Building E to become Building C.*
> - *Introduces new Building D between Building A and Building C.*
> - *No change to Building A.*
>
> *Specifically, the Amending DA seeks Concept approval for:*
>
> - *Three commercial office buildings and one storage premises (data centre) building that would (apart from Building A on Khartoum Road) be subject to future DA approvals.*
> - *A total floor space of 55,129 m^2 comprising commercial office, data centre and retail uses.*
> - *Varying building heights up to 45 metres.*
> - *Interconnected basement car parking for Buildings A, C and D.*
> - *New internal private roads.*
> - *New Road 22 along the south-west boundary of the site connecting to Talavera Road.*
> - *New pedestrian through-site link connecting to Talavera Road and future Road 1.*
> - *Indicative landscape concept for a central publicly accessible open space.*
> - *Associated infrastructure and servicing works.*

The Amending DA will utilise the provisions of Section 4.17 of the EP&A Act, such that at the issuance of a development consent for the application, LDA 2017/0547 will be amended to reflect the updated master plan incorporating the building envelope for this Proposal. The amended concept development plan has been provided as **Figure 2-5**.

The detail contained within Amending DA predominantly relates to Stage 1. This is supported by section 4.22(5) of the EP&A Act, which states that the consent authority does not need to consider the likely impacts of carrying out the development that may be the subject of subsequent development applications.

In light of this deferral, the Amending DA (to LDA 2017/0547) provides approval for the building envelope of the data centre within the broader property at 11 Khartoum Road, Macquarie Park. Whereby, specific detail regarding Stage 2 is contained within this Proposal (refer to **Chapter 3 Proposal Description**).

This EIS has been prepared because the development of the data centre in its own right will trigger the relevant monetary threshold under the *State Environmental Planning Policy (State and Regional Development) 2011*, requiring the submission of a State Significant Development Application.



0 20 40 m

FIGURE 2-5:
AMENDED CONCEPT DEVELOPMENT AND STAGING PLAN

Reproduced from Amended Concept DA, Project Number 550002, Drawing DA-015, prepared by 3XN on 13 May 2020.

Source:

3.0 Proposal description

3.1 Secretary's Environmental Assessment Requirements

Table 3-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to general issues and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 3-1 SEARs - General

SEARs requirements	
General requirements	**How addressed**
The EIS must include: A detailed description of the development, including: Likely staging of the development Plans of any proposed building works Infrastructure upgrades or items required to facilitate the development, including measures to ensure these upgrades are appropriately maintained The EIS must also be accompanied by: High quality files of maps and figures of the subject site and proposal	This chapter provides a detailed description of the development. Likely staging is provided in **Section 3.4.1**. This provides the name of each stage of the development and a brief description of works to be undertaken in that stage. Plans of the proposed building works and high quality figures are provided in Appendix B, **Figure 3-1** and **Figure 3-2** which show an overview of the works and the proposed design in the existing setting respectively. Infrastructure upgrades/requirements are detailed in **Sections 3.3.2**, **3.3.3** and **3.3.4**. Each of those sections outline the existing infrastructure components and how the Proposal integrates with those. Detailed figures of the subject site, including its regional setting, local setting and land zoning are provided within this and other chapters of this EIS.

3.2 Overview and key components

Table 3-2 provides an overview of the key elements of for the Proposal. These elements comprise the proposed development for which development consent is sought under this State Significant Development Application (SSDA).

Table 3-2 Details of the Proposal

Proposed use	Storage of data
Built form	Five storey concrete structure with associated vehicular circulation and landscaping areas. The main structure would not exceed 45 metres in height.
Proposed development	Data centre, including: • All parking and internal roads/vehicle access within the Proposal Site, including retaining walls, inground services (including fuel tanks), road signage and line marking and security gates / fences • The structure of the building including the loading dock, fire stairs, lifts (servicing every floor), services trenches, awnings and a landscaped "lid" situated above the internal road/vehicle access along the north-western façade of the building • All façades including aluminium louvres, aluminium articulated panels, balustrade / screening to upper external decks, awning cladding and brickwork around openings on ground level • Waterproofing to roof level

	• Insulation to meet the Building Code of Australia (BCA) Section J requirements • Essential services within the building including connection to power, lighting, ablutions/bathrooms (to all floors), sprinkler protection, mechanical ventilation, water supply and waste connection, stormwater and onsite stormwater detention connection - All services would meet the minimum requirements to satisfy the applicable provisions under the BCA to allow the building to be occupiable - In addition to meeting the minimum requirements under the BCA, all bathrooms would be completely functional • Mezzanine levels within Levels 1-4 with fire rated steel structure • A selection of internal walls configured to suit wet wall construction, services room layouts, sprinklers and above ceiling services installation • All external doors including glazed entry, fire doors and roller shutters • Mechanical and electrical equipment to support the future operation of data storage equipment, including emergency backup generators on all floors • Construction and operation of Road 22
Operations and management	The facility would be constructed by Stockland and operated by a lessee. The Site would be operated on a 24-hour, 7 day a week basis.
Gross floor area	12,069.70 m^2
Utility redundancy	Five underground diesel storage tanks that would accommodate approximately 360 kL of diesel fuel in total. These diesel storage tanks would supply fuel to 18 x 2400 kW and 1 x 600 kW diesel generators. The future installation and operation of data storage equipment would be undertaken in a phased approach and would be subject to separate approvals under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Lithium-ion battery units would be installed progressively alongside data storage equipment and would be located with each of the main data halls.
Access	The Site would be accessed by cars on a daily basis. Articulated and non-articulated trucks would also be required to access the Site from time to time. Operational vehicular access to the Site would be via proposed Road 22, which runs broadly east-west off Talavera Road according to Section 4.5 of the *City of Ryde Development Control Plan* (DCP) *2014 (Macquarie Park Corridor)*. This road would be developed by Stockland prior to the commencement of operation of the Data Centre. The construction of Road 22 is included as part of this Proposal.
Bulk earthworks	Construction activities associated with the Proposal will commence with excavation of the site. The site will be mostly in cut with perimeter retaining walls around the west, south and eastern boundaries. Approximate volume between existing surface and the proposed finished surface is: • Unadjusted cut: 45,877 m^3 • Unadjusted fill: 4 m^3. Additional earthworks for specific Proposal components including (but not limited to) landscaping, building slab and fuel tanks would require an additional 4,017 m^3 of material to be cut, resulting in a total cut of 48,890 m^3.
Demolition	No demolition is proposed as part of this Proposal.
Car parking	The Proposal provides for 48 car spaces, located outside the building footprint and within the Site boundary.
Employment	The data centre will accommodate up to 50 staff during normal operations, operating on a shift basis to serve the facility 24 hours a day, seven days a week

Services and infrastructure	Existing services and utility infrastructure in the nearby vicinity will be extended, adapted and augmented to meet the demands of the Proposal.

3.3 Detailed Proposal description

The development for which consent is sought (i.e. as described in **Table 3-2**) can be summarised as the data centre building, internal access roads, Road 22 and the essential services required allow for the building to be occupiable and to prepare the building to operate as a data centre once fitted out in later phases. This includes the provision of mechanical and electrical equipment to support future data hall fit outs e.g. diesel backup generators.

The remainder of the fit out of the building to allow it to be completely functional as a data centre would occur in a phased approach. Fit out works beyond the scope outlined in **Table 3-2** do not form part of the works being sought for development consent under this SSDA and would be subject to separate development approvals (likely via Complying Development Certificates in accordance with *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*).

Despite the scope of the consent being restricted to the above elements, the environmental assessment of the Proposal has been prepared based upon the final, fully operational data centre. That is, this EIS assesses the Proposal in its fully operational capacity with all data storage equipment and associated infrastructure in place and operating. This approach has been taken to ensure that the full impact of the operational facility is considered holistically at the SSD stage.

The following sections of this chapter describe the fully operational data centre. This, combined with the detail in **Table 3-2**, forms the basis upon which environmental impacts have been assessed throughout the remainder of this EIS, including within all technical appendices.

3.3.1 Data centre

3.3.1.1 External layout and design

The site for the proposed data centre is a rectangular shape, allowing the design of the data centre to maximise the economic and amenity value of the site. The siting of the data centre within the lot promotes security, fluidity for vehicular access and simplifies operational requirements, including deliveries and maintenance. The layout and design also aims to minimise the extent of environmental impacts, particularly visual impacts, by integrating with the broad 'grid' pattern of urban development throughout Macquarie Park more generally.

Externally, the data centre would be simple in form, featuring a consistent palette of materials and colours to provide visual cohesion throughout the site. The intent with the façade is a folded aluminium panel fixed to a structural steel frame above an awning at level one of the building.

The steel frame supports both the aluminium cladding and the hebel wall panel (situated behind the aluminium panel), proposed to sit within the concrete frame of the building structure.

The perimeter awning would be constructed of the same aluminium material, on a structural steel frame, clad on three sides. Under this awning, it is proposed to use a brick façade to the ground level.

Final, selected external finishes would be durable, high-quality, low maintenance materials that comply with applicable standards whilst also maintaining a high degree of visual and design appeal. The final form and design of the data centre would blend into the rapidly modernising shape and design of surrounding office/commercial buildings within Macquarie Park.

Figure 3-1 shows the layout of the data centre within the site, while **Figure 3-2, Figure 3-3, Figure 3-4, Figure 3-5, Figure 3-6** shows the indicative design and proposed materials to be used. Further details of the materials used in the façade, including example images, are included in **Chapter 6 (Visual Impact Assessment)**.

Figure 3-1 Site Layout

N 0 50 100 m

AECOM

Legend

- Site boundary
- Property boundary
- Road 22
- Building footprint
- Parking area
- No Parking area
- Guard house
- Vehicle circulation area around building

Figure 3-2 Indicative design of the Proposal

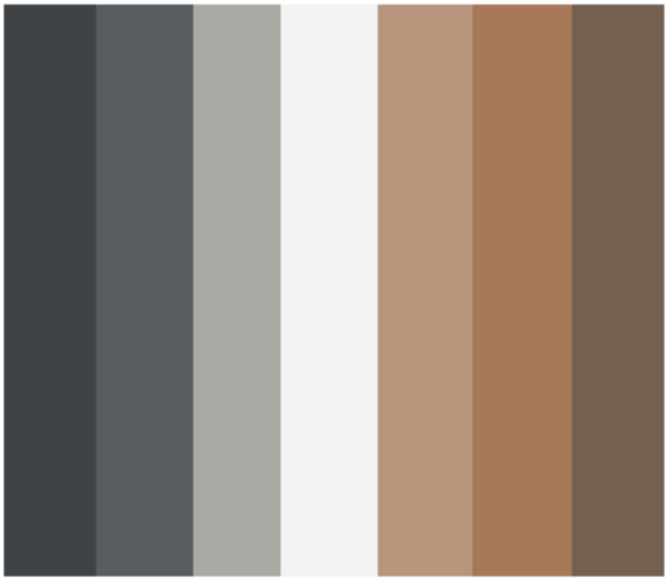


Figure 3-3 Indicative external colour palette

Figure 3-4 Indicative aluminium panel layout

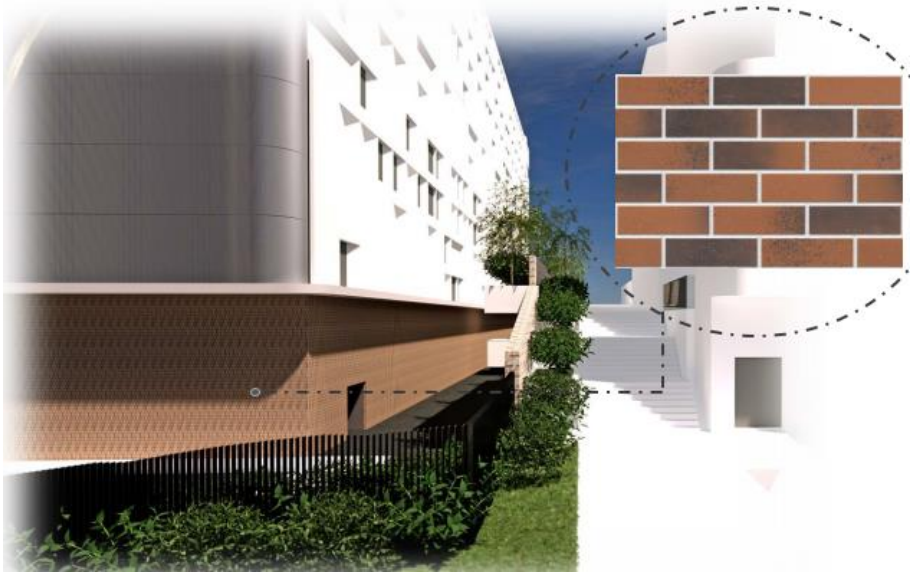


Figure 3-5 Indicative brick layout

Figure 3-6 Indicative aluminium louvres layout

3.3.1.2 Internal

The data centre includes five data halls, on levels one to five. All of these data halls would be fitted out with data hardware in a staged manner over time. The specific nature of the data hardware would vary depending on customer requirements, though is likely to include rows of racks. In addition to this the Proposal would contain space for general office use including open workspaces, offices, meeting rooms, bathrooms, kitchens and the like.

The data centre would also contain fire protection equipment including a fire pump room and services as detailed in **Chapter 15 (Hazard and Risk)**.

3.3.1.3 Landscaping

Landscaping would be provided, as outlined in the landscape plans included at **Appendix C**. Significant trees along Talavera Road to be retained. Additional plants used in landscaping would be native and consist of the following:

- Trees:
  - *Angophora costata* (Smooth-barked apple)
  - *Corymbia maculata* (Spotted gum)
  - *Tristaniopsis laurina* (Water gum)
- Large shrubs:
  - *Callistemon 'Hot Pink'* (Bottlebrush)
  - *Grevillea 'Honey Gem'* (Grevillea)
  - *Kunzea ambigua* (Tick bush)
  - *Syzigium australe 'Elite'* (Lilly pilly)
  - *Pittosporum revolutum* (Yellow pittosporum)
- Small shrubs, grasses and ground cover:
  - *Westringia fruticosa 'Blue Heaven'* (Coastal rosemary)
  - *Leptospermum 'Pink Cascade'* (Tea tree)
  - *Grevillea rosmarinifolia 'Scarlet Sprite'* (Grevillea)
  - *Doryanthes excelsa* (Gymea lily)
  - *Banksia spinulosa 'Bush Candles'* (Banksia)
  - *Grevillea lanigera 'Mount Tamboritha'* (Woolly grevillea)
  - *Lomandra 'Tanika'* (Lomandra)
  - *Westringia fruticosa 'Mundi'* (Coastal rosemary).

Landscaping is proposed along the site boundary adjacent to Talavera Road, sections of the boundary adjacent to Road 22, and near the building entrance. Landscaping has been designed to enhance the presentation of the Proposal to surrounding land uses and amongst the existing streetscape generally. The landscaping aims to soften the bulk and scale of the operational form of the building, particularly when viewed south-east along Talavera Road.

In addition to the above, landscaping would also be provided on the elevated landscape structure situated at the rear of the proposed building envelope of the Proposal. The landscaping would be consistent with the plantings and detail outlined above.

3.3.1.4 Access, circulation and parking

Access

The Site is located in an opportune position on Talavera Road, which is a four lane, bi-directional key road in Macquarie Park. It is situated close to the Talavera Road and Lane Cove Road entry/exit

ramps of the M2 Motorway, as well as public transport including bus stops, Macquarie University Station and Macquarie Park Station. When operational, the data centre would face south-east, resulting in the site's primary frontage being oriented towards proposed Road 22, which would be constructed as part of the Proposal.

Vehicles would access Road 22 via left or right turns from a new non-signalised intersection on Talavera Road. Once on Road 22, there are three access points to the Site:

1. Main entry/exit – the furthest point from Talavera Road along Road 22
2. Truck exit – middle of the three access locations along Road 22
3. Secondary access – closest point from Talavera Road along Road 22.

Access point 1 is a two-way driveway that accommodates entry for light and heavy vehicles. It is only available as an exit for light vehicles. Concurrent vehicle entry and exit movements cannot be accommodated under the planned arrangement due to site constraints. Access point 2 serves as an exit point for heavy vehicles only, as heavy vehicle turning movements cannot be accommodated by access point 1. Access point 3 is provided for emergency, maintenance and construction vehicle access only, with the security gate at this location being kept closed during normal operations.

Circulation

The site is rectangular, which allows for the flow of vehicles around the building in a one-way, anti-clockwise direction. This allows for movements to be clear and direct, reducing the extent of unnecessary time spent in a vehicle within the operational site and improving security as vehicle movements are obvious and can be monitored accordingly. This also improves site safety by providing a predictable direction for circulating traffic.

Vehicle tracking modelling was undertaken to determine the feasibility of the site for vehicle manoeuvrability in terms of access and circulation. Modelling was undertaken, and the design updated to allow for:

- Entry and exit of vehicles up to 19 metres in length: where the vehicle has accessed the site via a right turn into access point 1 and has been denied entry, it consequently exits via access point 2
- Entry and exit of vehicles up to 19 metres in length: where the vehicle has accessed the site via a right turn into access point 1, and access has been granted, then the vehicle circulates the building in an anti-clockwise direction and exits the site via access point 1 (vehicles up to 12.5 m) or access point 2 (vehicles 12.5 m to 19 m)
- Entry and exit of a typical light vehicle into/out of access point 1
- A 12.5 metre heavy rigid vehicle travelling in an anti-clockwise direction around the building and reversing into the loading dock
- A 300 tonne mobile crane entering the site from access point 3, circulating the building in an anti-clockwise direction and exiting the site via access point 2.

Parking

A total of 48 operational car parking spaces would be provided, being a combination of 90 degree angle parking and parallel parking. It is noted that the amending DA for M_Park has specified that the number of parking spaces would be 48. However subsequent design amendments have created one additional parking space. Three spaces would be designated as "small car" spaces and are located along the northern face of the building. One accessible parking space is provided at the southeast corner of the building.

The amount of parking supplied for the Proposal is consistent with the generally low operational staffing needs of a data centre facility.

3.3.2 Road 22

A new public road is proposed to be established along the south-eastern boundary of the site. This road, proposed Road 22, would be a cul-de-sac until the neighbouring properties are developed according to the City of Ryde DCP (Macquarie Park Corridor). Road 22 would eventually connect to

other future roads within the precinct that would effectively divide the existing block into four smaller blocks.

Road 22 would feature a six metre wide carriageway and a 2.5 metre wide parking bay on one side. The side where parking would made available will be further refined through consultation with City of Ryde Council, however this is likely to be the northern side of the road.

3.3.3 Other infrastructure

Stormwater drainage

On-site detention of stormwater is required in addition to connections to existing Council stormwater drainage assets. On-site detention would be provided in the form of underground storage tanks, to a total capacity of 551 m^3. A high early discharge chamber has been incorporated into the design of the system to optimise its performance.

Potable water

The Site's primary main would connect an existing source on the north side of Talavera Road, with a secondary main connecting to an existing source on the west side of Khartoum Road.

The depths and position of the existing mains are currently unknown. Further investigation will be undertaken to determine the exact layout and confirm the potential impacts of the proposed design on the existing network.

Wastewater

The existing Sydney Water wastewater network in the vicinity of the project site includes:

- Sewer main on the south side of Talavera Road
- Sewer main located in private property on the south side of the Site.

At time of this report, Stockland is in the process of determining the connection points for the Site in conjunction with Sydney Water. The existing sewer main on the south side of the project site is located within private property and is at a higher elevation than the Site. It is currently proposed to connect to the existing sewer main on the south side of Talavera Road.

The depths and position of the existing mains are unknown. Further investigation will be undertaken to determine the exact layout and confirm the potential impacts of the proposed design on the existing network.

Other utilities

A combined services plan has been developed for the Proposal, illustrating utility service routes throughout the Site (refer **Appendix D**). The plan includes information about:

- Drainage connection
- Sewer connections
- Potable water connections
- Underground fuel storage
- Fire services.

Underground fuel storage tanks would be located on the site to supply the diesel generators. The total volume of these tanks would be approximately 360 kilolitres.

3.3.4 External security

The perimeter of the site would feature a 2.4 metre high security fence along the entirety of the boundary, except at entry and exit points, which would have 2.4 metre high gates. Where retaining walls are proposed, the fence would be positioned on top of the retaining wall.

A small security guard station would be constructed at the entrance to the site, between access points one and two, to monitor incoming and outgoing persons and vehicles. This building would be located adjacent to the southern boundary of the Site.

3.4 Construction of the Proposal

The construction methodology is based on preliminary designs and would be further refined during the detailed design phase.

3.4.1 Construction methodology

The construction of the Proposal would include:

- The data centre
- Accessways around the data centre and associated parking
- Road 22 (a future public road)
- Earthworks, excavation and retaining walls
- All other ancillary facilities outlined in **Table 3-2**.

Following construction, the Proposal would undergo commissioning and testing. Stockland aims to commence construction in 2021, with operation to commence in 2023. Key construction activities are detailed in the following sections.

Note that the demolition of buildings currently present within the Site would be undertaken under a separate development application to be lodged with City of Ryde Council. This would be undertaken before any works associated with the proposal are undertaken.

3.4.1.1 Enabling works

Enabling works for the Proposal would be carried out to prepare the site for construction and to provide protection to the surrounding public. Enabling works would include:

- **Site preparation:** establishing sediment and erosion control measures, establishing marked no go areas, site clearing, installing security fencing, establishing laydown areas, establishing construction amenities (including offices, lunchrooms, storage areas, and washrooms)
- **Provision of construction power:** installing on site generators until power can be sourced from the existing distribution system
- **Bulk earthworks:** levelling the Proposal Site, including the corridor for Road 22 by cutting and filling as required.

  The Proposal Site will be mostly in cut with perimeter retaining walls around the west, south and eastern boundaries. The volume between the existing surface and the proposed surface has been estimated to inform an earthworks strategy for the site. Further design development is required to inform the bulk earthworks volumes and the estimate provided for the concept design stage is indicative only. The approximate volume of material to be generated to create a level-building surface and to facilitate Road 22 is between 52,000 m^3 and 60,000 m^3, with approximately 49,000 m^3 to 57,000 m^3 to be removed from the Proposal Site.

  Additional earthworks for specific Proposal components including (but not limited to) landscaping, building slab and fuel tanks would require an additional 4,017 m^3 of material to be cut, resulting in a total cut of 48,890 m^3.

3.4.1.2 Structural, civil, mechanical and electrical works

Following the enabling works the following would be completed:

- Site drainage and underground utilities would be installed
- Concrete foundations and slabs for the data centre and ancillary components such as the fire pumproom and guard station would be formed
- Road 22 and ancillary infrastructure such as drainage and footpaths would be constructed
- Construction, installation and connection of aboveground civil, mechanical and electrical plant, equipment and structures, including the data centre and the road area around the data centre
- Internal fitout, which may progress in several stages and over an extended period.

3.4.1.3 Commissioning

The commissioning phase will include any testing and defect rectification required to transition from construction to operational phase. Commissioning will include the operation of all elements of the Proposal along with safety, quality, and environmental management systems and processes.

3.4.1.4 Demobilisation and landscaping

At the completion of construction, all remaining temporary construction amenities and facilities would be removed from site. Landscaping would be undertaken in accordance with the site landscaping plan (**Appendix D**).

3.4.2 Materials, stockpiling and laydown areas

Materials, stockpiling and laydown areas would be designated during the detailed design and pre-construction phase along with:

- Spoil handling and storage
- Dangerous goods storage
- Workshop and equipment storage
- On-site parking
- Construction compounds with site offices and staff amenities
- Site access and egress.

The locations of these areas would be outlined with the Construction Environmental Management Plan (CEMP) to be prepared by the contractor prior to commencement of construction. All of these areas would be located within the boundaries of the site and would not disrupt public access to otherwise publicly accessible locations.

Construction laydown areas, hardstand and car parking would be compacted and sheeted as required. All areas would have adequate drainage and erosion controls installed.

3.4.3 Construction plant and equipment

The following is an indicative list of the plant and equipment that would be used to construct the Proposal. The equipment list would be further refined during detailed design.

Table 3-3 Indicative plant and equipment for construction

Equipment to be used during construction	
Compactors	Excavators
Concrete agitators	Graders
Concrete trucks	Hand tools
Delivery trucks	Line marking equipment
Diesel generators	Mobile cranes
Dump trucks	Vacuum trucks
Elevated work platforms	Welding equipment

3.4.4 Construction traffic

Initial access to the construction site would be via existing access points along Talavera Road. To prevent long traffic queues and disruptions to traffic generally, construction vehicles would enter and exit the site via left turns in and out only. Once constructed, Road 22 would provide the access point for the site, particularly during the internal fitout stage of construction. Access arrangements via Road 22 are outlined in **Section 3.3.1.4**.

Construction traffic would be generated from the delivery of plant, equipment and materials and the removal of spoil from the site. At the peak of the construction phase, it is estimated that the works

would generate up to 50 heavy vehicles and 150 light vehicles daily during the peak construction phases Construction traffic would be advised to follow the most direct routes to the site, avoiding local roads as far as practicable. Construction workers would be encouraged to use public transport if feasible, given the proximity of the site to public transport stops including bus stops along Talavera Road, Macquarie University Station and Macquarie Park Station.

A Construction Traffic Management Plan (CTMP) would be prepared and implemented prior to the commencement of construction.

3.4.5 Construction hours

The construction activities would be carried out during standard construction hours, as defined by the *Interim Construction Noise Guideline*:

- 7am to 6pm Monday to Friday
- 8am to 1pm Saturdays
- no work on Sundays or public holidays

Note that in response to the Covid-19 crisis the Minister for Planning and Public Spaces published an order on 31 March 2020 permitting construction activities to be undertaken on Saturdays, Sundays and public holidays, with the exception of certain noisy activity such as rock breaking. Should this order still be active once construction commences these provisions may be utilised.

Under normal circumstance, activities that may be undertaken outside of standard construction hours would be undertaken in accordance with an Out of Hours Works procedure and include:

- Transporting of oversized equipment to site
- Emergency situations where work is required to prevent harm to persons or property
- Commissioning and operational testing.

3.4.6 Water management

Construction would require water for excavation, dust suppression, revegetation, and materials preparation and use. Accessways and construction areas would be watered to supress dust, with the frequency of watering dependent on weather conditions.

Surface water would be managed during construction through implementation of safeguards as discussed in **Chapter 19 (Surface water, flooding and water use)**. These measures would be in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004). A site-specific Soil and Water Management Plan (SWMP) would be prepared prior to construction to minimise and manage potential impacts.

3.5 Operation of the Proposal

3.5.1 Operational hours

The Proposal would operate 24-hours, seven days a week for the carrying out of activities associated with a data centre facility. This includes loading and unloading of equipment and office operations.

3.5.2 Employment

On completion of the Proposal, it is estimated that the Proposal would accommodate up to 50 full-time staff. It is expected that approximately 35-40 people would be present in the building during normal business hours with other staff working shifts throughout the night and weekends.

3.5.3 Operational activities

The operation of the data centre would involve:

- Maintenance of data storage and management equipment
- General office activities
- Delivery of goods

- Waste removal.

While not part of normal operation, diesel generators may need to be changed occasionally should one or more units fail. This would be done using a crane located within the vehicle circulation space.

4.0 Strategic and statutory context

4.1 Secretary's Environmental Assessment Requirements

Table 4-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to general issues and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 4-1 SEARs - General

SEARs requirements	
General requirements	**How addressed**
The EIS must include: • Consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments Statutory and strategic context: • Detailed justification for the proposal and the suitability of the site • Detailed justification the proposed land use is permissible with consent • Details of any proposed consolidation or subdivision of land • Detailed description of the history of the site, including the relationship between the proposed development and the Concept Development (LDA 2017/0547) • Demonstration that the proposal is consistent with the Concept Development (LDA 2017/0547) • Demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justifications for any inconsistencies. This includes, but is not limited to: - State Environmental Planning Policy (Infrastructure) 2007 - State Environmental Planning Policy (State and Regional Development) 2011 - Greater Sydney Region Plan: A Metropolis of Three Cities - Our Greater Sydney 2056: North District Plan - Future Transport Strategy 2056	Relevant environmental planning instruments have been considered in **Section 4.3.4** and **Section 4.3.5**. These sections outline the environmental planning instruments and provide information about how they apply to the development. Justification for the project and suitability is provided in **Chapter 1 (Introduction)** The proposed land use and its permissibility is outlined in **Sections 4.3.2.1** and **4.3.5.1** No consolidation or subdivision of land is proposed. Detail of the history of the site, including general information about historical land uses and recent development approval history is provided in Sections 2.2.4 and 2.2.5 of **Chapter 2 (Location and strategic context)**. In addition, Section 2.2.5 of **Chapter 2 (Location and strategic context)** provides an overview of the relationship of this proposed development with LDA 2017/0547. The Proposal is identified as 'Building B' on the amended concept DA for the broader site. The type and operation of the Proposal has been considered when preparing the concept DA, providing for consistency in both directions. All relevant planning strategies, environmental planning instruments, adopted precinct plans, draft precinct plans and management plans have been investigated and their relevance/applicability detailed throughout this chapter.

4.2 Strategic context

4.2.1 Greater Sydney Region Plan – A Metropolis of Three Cities

The Greater Sydney Commission's *A Metropolis of Three Cities* ("the Plan") was published in March 2018. This document is the regional plan for managing the growth of Greater Sydney. The Plan divides the Greater Sydney Region into three Cities:

- The Western Parkland City
- The Central River City
- The Eastern Harbour City.

The proposed development sits on the north-western edge of The Eastern Harbour City.

The Plan aims to ensure that planning and land use of the Greater Sydney Region is equitable and sustainable across all the three Cities with a vision target set to 2056. The Plan discusses Macquarie Park's role as part of the Eastern Economic Corridor, described as the State's greatest economic asset contributing two-thirds of NSW's economic growth in the 2015-16 financial year.

The Plan also refers to Macquarie Park as part of the Epping and Macquarie Park Urban Renewal Corridor. Within the Macquarie Park Urban Renewal Area, the Department of Planning, Industry and Environment (DPIE) is undertaking strategic investigations into new community facilities, improved public space, residential development in proximity to transport links as well as the generation of employment opportunities.

Macquarie Park is also nominated as one of nine centres to accommodate additional commercial office precincts.

The Proposal is in the geographic heart of the Macquarie Park Urban Renewal Corridor, as indicated by **Figure 4-1**. It aligns with the vision of the Eastern Economic Corridor in that the development will facilitate the provision of jobs and economic activity and be well connected to transport links.

4.2.2 Our Greater Sydney 2056: North District Plan

Our Greater Sydney 2056: North District Plan ('the North District Plan') was finalised by the Greater Sydney Commission and publicly released with the Region Plan in March 2018. The North District Plan covers the City of Ryde Local Government Area (LGA). It describes Macquarie Park as the largest non-CBD office market in Australia, set to become Australia's fourth largest commercial precinct by 2030. It identifies that Macquarie Park has 854,254 square metres of office floor space as at January 2014 and continues to develop. Macquarie Park has grown as a major centre for knowledge-intensive employment, which now accounts for one-third of jobs in Macquarie Park.

In 2016, Macquarie Park was estimated to accommodate approximately 58,500 jobs. Wholesale trade, professional, scientific and technical services and information, media and telecommunications are significant employment sectors in the centre.

The NSW Government is currently directly facilitating economic activity in the Eastern Economic Corridor. This activity includes strategic centres at Macquarie Park, Chatswood, St Leonards and North Sydney as part of the Harbour CBD and Epping to Macquarie Park urban renewal area, illustrated in **Figure 4-2**.

Actions for the Macquarie Park Centre, detailed in the North District Plan, aim to strengthen Macquarie Park through approaches that:

- Enable additional capacity for commercial floor space and maintain a commercial core
- Improve urban amenity as the centre transitions from business park to a vibrant commercial centre, including reducing the impact of vehicle movements on pedestrian and cyclist accessibility
- Deliver a finer grain road network to enhance pedestrian connections and provide new access points
- Promote design excellence in urban design by upgrading public areas

- Deliver an innovation ecosystem in Macquarie Park, capitalising on the relationship with Macquarie University and nearby high-tech and medical corporations
- Improve public transport connections to Parramatta and the District's other strategic centres, including the Northern Beaches Hospital.

The Proposal would contribute to the objectives set out in the North District Plan by supporting the economic growth through the co-location of key digital infrastructure with some of Australia's largest and most innovative technology businesses.

The Proposal would align with the key planning priorities identified in the North District Plan as outlined in **Table 4-2**.

Table 4-2 Relevant North District Plan Planning Priorities

North District Plan Planning Priority	Comment
Planning Priority N1 - Planning for a city supported by infrastructure	The proposed development would improve the accessibility to the site and supply new IT infrastructure to the Greater Sydney Region.
Planning Priority N8 - Eastern Economic Corridor is better connected and more competitive	The proposed development would contribute to enhance the competitiveness of the Eastern Economic Corridor.
Planning Priority N10 - Growing investment, business opportunities and jobs in strategic centres	The proposed development would contribute to improve investments and business opportunities in Macquarie Park strategic centre.
Planning Priority N12 - Delivering integrated land use and transport planning and a 30-minute city	The proposed development would supply new jobs in the strategic centre of Macquarie Park that will help to achieve the 30-minute city.
Planning Priority N13 - Supporting growth of targeted industry sectors	The proposed development would support the growth of the changing technology industry sector by improving the accessibility to high-tech equipment.
Planning Priority N15 - Protecting and improving the health and enjoyment of Sydney Harbour and the District's waterways	The proposed development would incorporate stormwater quality controls to protect nearby waterways.
Planning Priority N21 - Reducing carbon emissions and managing energy, water and waste efficiently	The proposed development incorporates ecologically sustainable development (ESD) initiatives including rainwater harvesting for irrigation and toilet flushing and solar power.
Planning Priority N22 - Adapting to the impacts of urban and natural hazards and climate change	The proposed development incorporates best practice initiatives to mitigate possible impacts from noise and air pollution.

4.2.3 NSW Innovation Precincts

In September 2018, the NSW Innovation and Productivity Commission released *NSW Innovation Precincts* as a framework to inform the decision making of organisations involved in the development of innovation precincts in NSW. Within that document, innovation precincts are described as areas where place-based innovation is occurring across a range of sectors including health, education, science and business services. The document highlights how innovation precincts have the potential to provide significant benefits to the NSW economy as place-based concentrations of business, knowledge-intensive institutions and entrepreneurs. Macquarie Park is identified as an innovation precinct.

A global literature review and analysis of local and international case studies undertaken as part of the preparation of the *NSW Innovation Precincts* framework identified seven success factors for high performing innovation precincts: market drivers; competitive advantage; collaboration, amenity;

enterprise culture; leadership; and infrastructure. In this instance, infrastructure refers to physical, transport and digital infrastructure that supports research, innovation activity, business connectivity and economic prosperity within and outside of the precinct.

As an innovation precinct, Macquarie Park is centred around Macquarie University, which includes a state-of-the-art purpose-built academic precinct, as well as the Australian Hearing Hub and Macquarie University Hospital. The adjacent Macquarie Business Park has more than 180 large international and 200 small businesses.

An industry led initiative, the Macquarie Park Innovation District, was created by key stakeholders in 2015 to leverage their competitive advantage in life sciences, health and pharmaceuticals, biotechnology and digital technology. In line with the *NSW Innovation Precincts* document, the Macquarie Park Innovation District has been established as a place where innovation can and has occurred across a variety of sectors.

The innovation economy has a heavy focus on online and digital transactions and interactions, relying on essential infrastructure, such as high-speed network connections and comprehensive data storage. Macquarie Park has a strong history of contributing to the provision of digital technology and infrastructure, serving not just metropolitan Sydney but, more broadly, all of Australia. In doing so, it elevates the performance of Macquarie Park by delivering infrastructure as one of the seven success factors necessary for a thriving innovation precinct.

4.2.4 Future Transport Strategy 2056

Future Transport Strategy 2056 ('the Strategy') was released by Transport for NSW in conjunction with the Greater Sydney Region Plan and North District Plan in March 2018. The Strategy provides a 40-year vision for the NSW transport system aligned with the land use planning initiatives outlined within the Region and District Plans.

The key project identified in the Strategy within Macquarie Park is the upgrade of the Macquarie Park Interchange at Macquarie University station. This would include road upgrades, bus infrastructure improvements and pedestrian and safety improvements (0-10 years Greater Sydney Committed Initiatives). These upgrades will deliver faster, more efficient and more reliable travel times through the Macquarie Park area for buses and all road users, improve pedestrian safety and access with new and improved crossing facilities, and provide long-term ongoing benefits for key bus corridors and local bus services through improved and upgraded bus priority infrastructure.

During this same period, investigations would be conducted into an east-west public transport connection from Mona Vale to Macquarie Park along the A3 corridor (0-10 years Greater Sydney Initiatives for Investigation).

In the longer term, the strategy provides for the connection of Macquarie Park and Hurstville via Mass transit / train link between Macquarie Park and Hurstville via Rhodes (20+ years Greater Sydney Initiatives for Investigation).

In addition, the Strategy aims to extensively grow and improve the existing Greater Sydney principal bicycle network. Currently, Macquarie Park features one principle bicycle network linking the precinct to Chatswood. By 2056, the Strategy targets to directly link Macquarie Park to Rhodes, Epping and indirectly to Hornsby and Greater Parramatta.

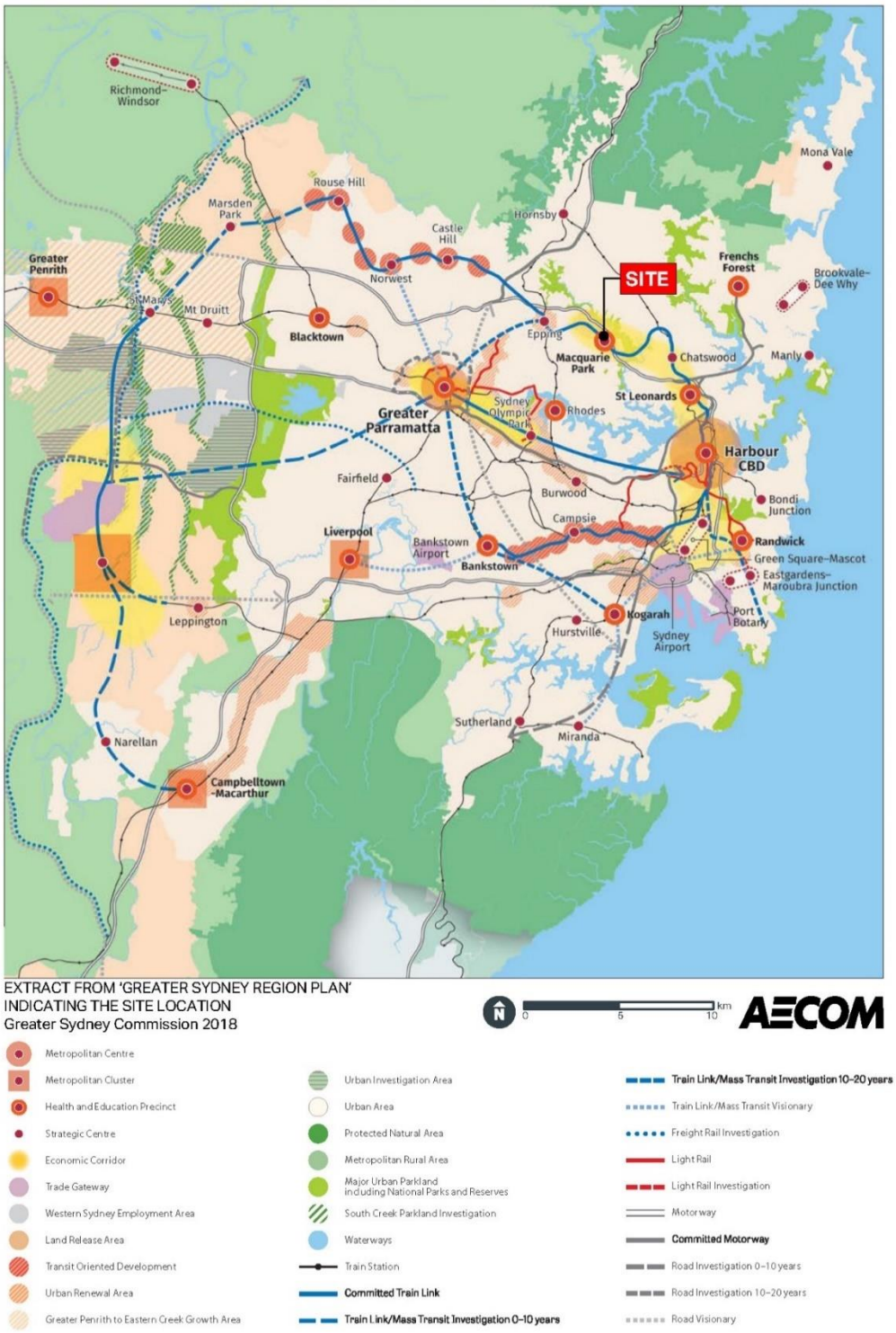


Figure 4-1 A Metropolis of Three Cities – Greater Sydney Region Plan excerpt indicating the location of the site

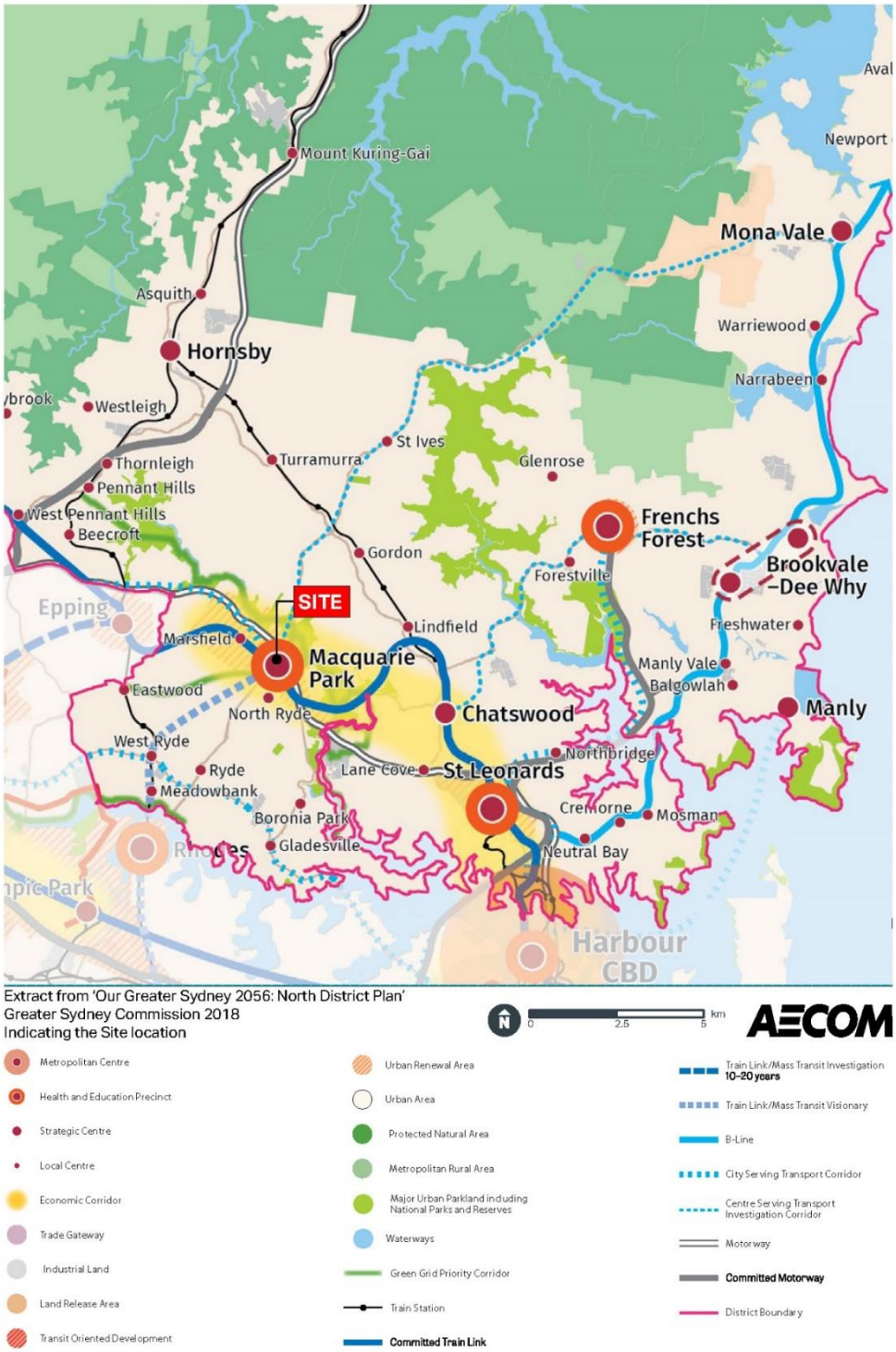


Figure 4-2 Our Greater Sydney 2056: North District Plan excerpt indicating the location of the Site

4.3 Statutory Context

This chapter reviews the key Commonwealth and State legislation, as well as the State, regional and local planning policies that apply to the Proposal.

4.3.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A) Act regulates development in NSW. The EP&A Act is supported by the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and a number of Environmental Planning Instruments (EPIs), which include State Environmental Planning Policies (SEPPs) and Local Environment Plans (LEPs). Part 4 of the EP&A Act establishes a framework for assessing development, categorising it as either 'exempt development', 'complying development', 'development that requires consent', or 'prohibited development'. The term 'development' is defined under Section 1.5 of the EP&A Act.

4.3.1.1 Overview

The site is located in Macquarie Park in the City of Ryde LGA. Development of this site for the proposed data centre is governed by the application of the EP&A Act. The following EPIs are considered relevant to the proposal and have been considered:

- EP&A Regulation
- *State Environmental Planning Policy (State and Regional Development) 2011*
- *State Environmental Planning Policy (Infrastructure) 2007*
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2018*
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*
- *State Environmental Planning Policy No. 55 – Remediation of Land*
- *Ryde Local Environmental Plan 2014*

Furthermore, under Section 4.15(1)(a)(iii) of the EP&A Act, the proposed development must consider:

- *Any planning agreement that has been entered into under s.7.4 of the EP&A Act.*

Each relevant EPI and matter for consideration as identified under Section 4.15 of the EP&A Act are discussed in further detail in **Section 4.3.4**. It is important to note however, that because the Proposal is considered State Significant Development (SSD) (refer to **Section 4.3.2.2**), the *City of Ryde Development Control Plan 2014* (DCP) does not apply. Consequently, this EIS does not include an assessment against Section 4.15(1)(a)(ii) of the EP&A Act. Notwithstanding this exemption, the relevant sections of the DCP have been considered to review the consistency of the Proposal with the City of Ryde's expectations for the area. In addition, Council's views have been considered in a broader context as part of the amending masterplan development application (DA) review.

4.3.2 Matters of Consideration

In determining a development application, the consent authority must take into consideration the matters listed under Section 4.15(1) of the EP&A Act. The table below identifies each matter of consideration listed under Section 4.15(1) and the location where each matter is addressed in this Environmental Impact Statement (EIS).

Table 4-3 Matters of Consideration under Section 4.15(1) of the EP&A Act

Section 4.15(1) Requirement	Document Reference
The provisions of any of the following that apply to the land to which the development application relates:	
Any environmental planning instrument, and	**Section 4.3.4**
Any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed	At the time of lodgement of this State Significant Development Application there were no draft EPIs

Section 4.15(1) Requirement	Document Reference
instrument has been deferred indefinitely or has not been approved), and	that are relevant to the Proposal or subject site.
Any development control plan, and	**Section 4.3.7.1**
Any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter under section 7.4, and	**Section 4.3.8**
The regulations (to the extent that they prescribe matters for the purpose of this paragraph), and	This EIS has been prepared in accordance with Schedule 2 of the EP&A Regulation.
The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality, and	**Chapters 6 – 21 (environmental assessment chapters)**
The suitability of the site for the development, and	**Chapters 2 (Location and strategic context), 3 (Proposal description) and 6-21 (environmental assessment chapters)**
Any submissions made in accordance with this Act or the regulations, and	**Chapter 5 (Stakeholder and community engagement)**
The public interest.	**Chapters 5 (Stakeholder and community engagement) and 18 (Social and economic)**

4.3.2.1 Permissibility

The permissibility of the Proposal is governed by Clause 27 of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP). This clause provides that development for the purposes of storage premises used for the storage of data and related information technology hardware may be carried out by any person with consent on land in a prescribed zone. The Proposal is located on land zoned B7 Business Park under the *Ryde Local Environmental Plan 2014* (Ryde LEP), which is a specified land use zone within the meaning of a prescribed zone for this clause. As such the Proposal is considered to be permissible with development consent.

4.3.2.2 Planning approval pathway

Section 4.36 of the EP&A Act outlines development that is considered SSD. This section of the Act notes that a development can be declared SSD by an EPI (such as a SEPP) or by the NSW Minister for Planning and Public Spaces (the Minster). Developments are declared SSD if they meet the requirements of *State Environment Planning Policy (State and Regional Development) 2011* (SRD SEPP).

The Proposal is classified as SSD pursuant to Clause 8 of the SRD SEPP, on the basis that it is permissible with consent at the Site and it meets the requirements of Clause 25 of Schedule 1 in that:

> *The project is for the purpose of storage premises used for the storage of data and related information technology hardware that has a capital investment value of more than $50 million.*

Section 4.12(8) of the EP&A Act states that a "*development application for State significant development is to be accompanied by an environmental impact statement prepared by or on behalf of the applicant in the form prescribed by the regulations."* Schedule 2 of the EP&A Regulation sets out the requirements of an EIS and requires that the content of an EIS is '*subject to the environmental assessment requirements that relate to the EIS'*. Environmental assessment requirements are typically sought through an application for Secretary's Environmental Assessment Requirements (SEARs) submitted to the NSW Department of Planning, Infrastructure and Environment (DPIE). This document constitutes the proponent's response to the SEARs prepared for this Proposal (see **Appendix A**).

In line with Section 4.5 of the EP&A Act, the consent authority for the Proposal would be the NSW Minister for Planning and Public Spaces or the Independent Planning Commission (in the case of greater than 50 public objections to the application, local council objection, and/or reportable political donations made by the proponent in the two years prior to lodgement). As noted in Section 4.40 of the EP&A Act, SSD applications are evaluated and determined in line with the requirements of Section 4.15 of the EP&A Act. Matters for consideration include relevant EPIs, likely impacts to the built and natural environment and social and economic impacts, submissions made on the application, site suitability and the public interest.

4.3.2.3 State significant development

Sections 4.41 and 4.42 of the EP&A Act identify authorisations that are not required for a SSD Proposal, and authorisations that cannot be refused if necessary, for carrying out a SSD respectively.

Environmental approvals that do not apply to or in respect of SSD, but which have been considered in the preparation of this EIS are listed in **Table 4-4**.

Table 4-4 Approvals not required under section 4.41

Approval	Comment
A permit under section 201 of the *Fisheries Management Act 1994*	The Proposal would not involve dredging or reclamation works.
A permit under section 205 of the *Fisheries Management Act 1994*	No works are proposed in waterways. The Proposal would not impact on key fish habitat.
A permit under section 219 of the *Fisheries Management Act 1994*	No works are proposed in waterways. The Proposal would not result in the blockage of fish passage.
An approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*	No non-Indigenous items were identified to occur on the site or surrounding properties according to Ryde LEP and/ or the State heritage register.
An Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974*	The overall archaeological sensitivity of land within the Proposal area is considered to be low. The potential for impacts to Aboriginal objects to occur during works is likewise assessed as low. An Aboriginal heritage impact permit is not required.
A bushfire safety authority under section 100B of the *Rural Fires Act 1997*	The site is not located on bushfire prone land.
A water use approval (section 89), a water management work approval (section 90) or an activity approval (other than an aquifer interference approval) (section 91) of the *Water Management Act 2000*	The Proposal would not involve taking of groundwater during construction works (aquifer interference). Notwithstanding, an assessment of potential impacts to surface and groundwater is contained in **Chapter 19 (Groundwater, surface water, flooding and water use)**.

Table 4-5 discusses each of the approvals that must be applied consistently under Section 4.42 of the EP&A Act. Whereby authorisation of the following approvals cannot be refused if it is necessary for carrying out SSD.

Table 4-5 Approvals required under section 4.42

Approval	Comment
An aquaculture permit under section 144 of the *Fisheries Management Act 1994*	The Proposal would not involve aquaculture therefore no aquaculture permit would be required.
An approval under section 15 of the *Mine Subsidence Compensation Act 1961*	The Proposal is not located within a mine subsidence district.
A mining lease under the *Mining Act 1992*	The Proposal does not require a mining lease and would not be undertaken within a lease area.

Approval	Comment
A production lease under the *Petroleum (Onshore) Act 1991*	The Proposal would not involve petroleum production.
An Environment Protection Licence (EPL) under Chapter 3 of the *Protection of the Environment Operations Act 1997* (POEO Act) (for any of the purposes referred to in section 43 of that Act)	The Proposal is not classified as a scheduled activity under the POEO Act. Consequently, an EPL is not required for the Proposal.
Consent under section 138 of the *Roads Act 1993*	The Proposal requires a new access point to connect the Proposal to the road network (Talavera Road). Approval under the *Roads Act 1993* would be obtained to connect proposed Road 22 to Talavera Road.
A licence under the *Pipelines Act 1967*	The Proposal would not involve installation of pipelines to/ from the site and therefore a license would not be required. Natural gas services required for the Proposal would be via connections from existing services/

4.3.2.4 Concept development application

Consent was granted for a concept development application (the Concept Development) on 4 December 2019 over the entire 30,030 m^2 site (i.e. the entire lot). The approval included design parameters such as building envelopes, building layouts, parking, roads, open space as well as staging of the future development of the site. The Concept Development includes the building envelopes for five commercial offices to a maximum height of 44.5 metres, and four retail and support pavilions around a central publicly accessible open space area. Basement parking will be provided for 987 vehicles. The proposal also includes a new public road (Road 22), two private roads and a pedestrian through site link. The total approved gross floor area is 59,769 m^2.

Stage 1 works for the Concept Development include the demolition of the existing south-western building, construction of a 10 storey mixed use commercial and retail building ("Building A") with three levels of basement car parking, construction of a portion of the internal 14.5 metres private road connecting to Khartoum Road, construction of a portion of the pedestrian through site link and associated landscaping.

Since this approval a modification to the Stage 1 works for Building A has been lodged with Ryde Council and is currently under assessment. In addition, an Amending Development Application was lodged with City of Ryde Council in May 2020 to amend the Concept Development to reflect the new use and building envelope of the proposed data centre on the site (referred to as Building B and the subject of this SSDA).

The Amending DA will utilise the provisions of Section 4.17 of the EP&A Act, such that at the issuance of a development consent for the application, LDA 2017/0547 will be amended to reflect the updated concept master plan incorporating the data centre use and building envelope.

As part of the 'detailed' component of LDA 2017/0547, consent was granted for the demolition of the building located on the south western portion of the site (where Building A is sited). On 8 September 2020, a Development Application was lodged with Ryde City Council to demolish the warehouse component of the other building on-site (located to the North). The commercial office component of this building will be retained until a future stage of development.

As part of the Amending DA, the application included a summary of amendments to the conditions of consent set out in Park 1 - Concept Approval for LDA 2017/0547. To ensure this Proposal is consistent, the relevant conditions have been considered with a discussion regarding compliance provided in **Table 4-6**.

Table 4-6 Compliance with conditions to amended Concept Approval (LDA2017/0547)

Condition	Description	Compliance
Condition 1	Concept Development Application	This Proposal satisfies the requirement of Condition 1, as it relates to Stage 2 of the Concept Approval.
Condition 2	Approved Plans/ Documents	This Proposal is consistent with the approved plans and documents as stated within Condition 2.
Condition 3	Matters Not Approved – Concept DA Plan	This Proposal seeks consent for the development activities detailed within **Chapter 3 (Proposal Description)** of this EIS**.**
Condition 4	Floor space ratio for total site	The Concept Approval (as amended) has consent for the development of up to 59,769 m^2 of gross floor area. As stated within **Chapter 3 (Proposal Description)** the GFA for the Proposal is 12,069.70 m^2. Compliance against clause 4.4 and 4.5 of the Ryde LEP is provided in **Section 1.3.5.3** of this EIS.
Condition 5	Building Height	The building height for the Proposal is 45 m, which is compliant with Condition 5 (as amended).
Condition 10	Car Parking Spaces and Dimensions	The Proposal includes the provision of 48 car spaces, which is compliant with Condition 10. Compliance with the City of Ryde's DCP is provided in **Appendix E (DCP Compliance Table).**
Condition 17	Stormwater Details	A stormwater plan has been prepared for this Proposal and is discussed in **Chapter 19 (Groundwater, Surface Water and Flooding)** of this EIS.
Condition 18	Crime Prevention Through Environmental Design	This Proposal has provided an assessment of the CPTED design principles and is contained in **Chapter 18 (Social and Economic)** of this EIS.
Condition 20	Waste Collection	This Proposal has demonstrated compliance with Councils waste collection requirements through the preparation of a Waste Management Plan, which is provided in **Appendix F (Waste Management Plan)** of this EIS. Further discussion regarding waste management is provided in **Chapter 20 (Waste Management)** and **Appendix E (DCP Compliance Table)** of this EIS.
Condition 21	Landscaping	A landscape plan has been prepared for this Proposal and is provided in **Appendix C (Landscape Plan)** of this EIS.

4.3.3 Integrated development

Development that requires one or more approvals listed under Section 4.46 of the EP&A Act is defined as 'integrated development'. Of importance to this SSDA is Section 47 of the POEO Act which relates to 'scheduled activities'. An activity that is 'scheduled' triggers the requirement for an EPL.

4.3.4 Environmental planning instruments

The SEPPs relevant to the Proposal, or the land to which it relates, and have been considered as part of this EIS are outlined in **Section 4.3.1.1**. Each of those SEPPs are considered further in the following sections.

4.3.4.1 State Environmental Planning Policy (State and Regional Development) 2011

An aim of the SRD SEPP is to identify development that is SSD. Whereby, development is declared to be SSD for the purpose of the EP&A Act if:

a. *The development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act; and*

b. *The development is specified in Schedule 1 or 2 [of the SRD SEPP].*

It has been established in **Section 4.3.2.1**, that the Proposal is permissible with consent under Part 4 of the EP&A Act, pursuant to Clause 27 of the ISEPP. As such, the Proposal meets the first test of Clause 8 under the SRD SEPP to be considered SSD.

Item 25 under Schedule 1 of the SRD SEPP relates to '*data storage*', where development for the purpose of storage premises used for the storage of data and related information technology with a CIV of more than $50 million. **Chapter 1 (Introduction)** states that the Proposal is expected to have a CIV of $263,626,022.00. As a result, the Proposal meets the requirements of Item 25 under Schedule 1, given that the purpose of the Proposal is for a data centre with a CIV of greater than $50 million. It is evident that the Proposal has satisfied the requirements under Clause 8 of the SRD SEPP and is considered SSD for the purpose of the EP&A Act.

Notably, on the basis that the Proposal constitutes SSD, Clause 11 of the SRD SEPP stipulates that development control plans (such as the DCP) do not apply. Nevertheless, the DCP has been considered as part of this EIS and discussed in **Appendix E**.

4.3.4.2 State Environmental Planning Policy (Infrastructure) 2007

The aim of the ISEPP is to facilitate the effective delivery of infrastructure across the State. Clause 27 under the ISEPP relates to development for the purpose of storage premises used for the storage of data and information technology. The site is zoned B7 Business Park under the Ryde LEP, which is considered a prescribed zone. According to Clause 27 of the ISEPP, development for the purpose of data storage (i.e. data centres) is permissible with consent in a prescribed zone; in this case being B7 Business Park. Consequently, the Proposal is permissible with consent under Part 4 of the EP&A Act.

4.3.4.3 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

The aims of the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Vegetation SEPP) are to protection to biodiversity values of tress and other vegetation in non-rural areas of the State and to preserve the amenity of non-rural areas of the State through the preservation of tress and other vegetation. Clause 7(1) of the Vegetation SEPP states that '*a person must not clear vegetation in any non-rural area of the State to which Part 3 applies without the authority conferred by a permit granted by the Council*'. In addition, Clause 7(2) further states that '*a person must not clear native vegetation in any non-rural area of the State that exceeds the biodiversity offset scheme threshold without the authority conferred by an approval of the Native Vegetation Panel under Part 4'.*

It has been established under **Section 4.3.2.3** that because the Proposal is considered SSD, the Ryde DCP does not apply to this Proposal. As such, a permit under Part 3 of the Vegetation SEPP is not considered relevant as it requires the application of the DCP.

Instead, Part 4 has been considered as it relates to approval by the Native Vegetation Panel for clearing native vegetation in non-rural areas. The Proposal is located within a highly modified brownfield urban environment, which has been historically cleared and no remnant vegetation is present. An initial assessment has been carried out (**Chapter 13 (Biodiversity)**) that indicates the

development would not take place in an area of significant biodiversity value, nor would it have a significant direct or indirect effect on biodiversity values, such as:

- Threatened species or ecological communities, or
- Other values prescribed in the *Biodiversity Conservation Regulation 2017*.

As such, it is considered unlikely that the Proposal would have a significant impact on any biodiversity values prescribed by the *Biodiversity Regulations 2017*. In light of this assessment, approval from the Native Vegetation Panel (under Part 4) is not required to support this SSDA.

4.3.4.4 State Environmental Planning Policy No. 33 Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) outlines the approach used in NSW for planning and assessing the risks and hazards associated with industrial development proposals. Through this policy, the permissibility of a proposal is linked to its safety and pollution control performance. SEPP 33 applies to any proposals that fall under the policy's definition of 'potentially hazardous' or 'potentially offensive industry'.

For development proposals classified as '*potentially hazardous industry'* the policy establishes a comprehensive test by way of a preliminary screening assessment and preliminary hazard analysis (PHA) to determine the risk to people, property and the environment. The preliminary screening assesses the storage of specific dangerous goods classes that have the potential for significant offsite effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with respect to storage depot locations, as well as transport to and from the site.

To support the intended operation of the data centre, there will be 360 kilolitres of diesel fuel and a number of lithium ion batteries stored onsite to service the Proposal. The materials considered to be dangerous goods under the *Australian Code for the Transport of Dangerous Goods by Road & Rail* that would be stored at the Proposal Site do not exceed the SEPP 33 thresholds. Accordingly, SEPP 33 does not apply and a PHA is not required.

4.3.4.5 State Environmental Planning Policy No. 55 Remediation of Land

The objects of *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) are to provide a State-wide planning approach for the remediation of contaminated land and to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. SEPP 55 restricts consent authorities from issuing development consent on land that may be contaminated, unless the consent authority is satisfied that the land in question is suitable for the development proposed to be carried out or would be suitable if appropriate remediation is undertaken. The Site is not on the list of NSW Contaminated Sites Register and does not appear on the Contaminated Land: Record of Notices.

Chapter 7 (Geology, soils and contamination) details the risk of existing contamination within the Proposal Site and the potential for the Proposal to result in contamination impacts to any receiving environments. Based on previous contamination investigations for the Proposal Site, the risk of contamination is considered to be low.

4.3.5 Ryde Local Environmental Plan 2014

The Proposal is located within the Ryde LGA, which is subject to the application of the Ryde LEP. The Ryde LEP aims to make local environmental planning provisions for land in Ryde in accordance with the relevant standard environmental planning instrument under Section 3.20 of the EP&A Act. The clauses that have been considered in this EIS include:

- Clause 2.3 – Zone objectives and land use table
- Clause 4.3 – Height of buildings
- Clause 4.4 – Floor space ratio
- Clause 4.5B – Macquarie Park corridor
- Clause 6.1 – Acid sulfate soils

- Clause 6.2 – Earthworks
- Clause 6.4 – Stormwater management
- Clause 6.6 – Environmental sustainability
- Clause 6.9 – Development in Macquarie Park corridor

Each relevant clause of the LEP is discussed in further detail in the following sections.

4.3.5.1 Zone objectives and land use table

The site is zoned B7 Business Park under the Ryde LEP, which contains the following objectives:

- *To provide a range of office and light industrial uses*
- *To encourage employment opportunities*
- *To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area*
- *To encourage industries involved in research and development.*

It has been established in **Section 4.3.2.1** of this EIS that the Proposal is permissible with consent in the B7 Business Park zone, pursuant to the Clause 27 of the ISEPP. Notwithstanding, the Proposal should also be considered consistent with the objectives of the B7 Business Park land use zone on the basis that:

- It will provide additional employment opportunities (detailed in **Chapter 3 (Proposal description)** and **18 (Social and economic)**; during both and construction and operation of the data centre
- The Proposal will provide a complimentary service offering to Macquarie Business Park, as well as the broader Australian information technology sector; through the provision of additional data storage
- The nature of the development will support research and development through the secure storage of information technology
- Road 22 will provide additional connection to enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.

In light of the above, the Proposal is permissible with consent in the B7 Business Park land use zone, as well as being consistent with the relevant objectives.

4.3.5.2 Height of buildings

Clause 4.3 of the Ryde LEP relates to maximum building height, whereby the height of a building on any land is not to exceed the maximum height shown for the land on the relevant map.

The site is mapped under the Ryde LEP (pursuant to map sheet HOB_004) to have a maximum building height of 30 metres. The Proposal has a proposed maximum building height of less than 45 metres and is contained wholly within the envelope proposed under the Amending Concept DA (LDA2020/229). A height of less than 45 metres is compliant with the prescribed maximum building height; with the application of the incentives contained under Clause 6.9 of the Ryde LEP. As per Clause 4.6(8) of the Ryde LEP, any contravention to the incentive building height controls, in clause 6.9 of Ryde LEP, is not permitted. As a result, the Proposal is compliant with Clause 4.3 of the Ryde LEP.

4.3.5.3 Floor space ratio

Floor space ratio (FSR) is governed throughout the Ryde LGA through the application of Clause 4.4 of the Ryde LEP. The objectives of Clause 4.4 is to provide effective control over the bulk of future development and to allow appropriate levels of development for specific areas. Map sheet FSR_004 of the Ryde LEP shows the site as having a FSR of 1.0:1.0. The site has a total area of 12,963 m^2, which correlates to a maximum gross floor area (GFA) of 25,925 m^2. However, the site is afforded additional FSR through the application of Clause 6.9 of the Ryde LEP. The Proposal has a proposed GFA of

12,069.70 m^2, which is less than the prescribed maximum, including the application of the incentive provisions. As a result, the project is considered compliance with Clause 4.4 of the 4.4 of the LEP.

In addition, the GFA of the Proposal complies with the indicative allocation nominated under the Amending Concept DA (LDA2020/229), which proposed a compliant FSR across the entire master planned site.

4.3.5.4 Macquarie Park corridor

Clause 4.5B of the Ryde LEP relates to development for land mapped within the Macquarie Park corridor, which includes the Site. The objectives of Clause 4.5B for development on land zoned B7 Business Park is:

- *To provide for the daily convenience needs of employees and visitors,*
- *To ensure that development supports the needs of businesses and organisations in the area.*

Specifically, clause 4.5B(4) states that '*despite any other provisions of this* [LEP] *development consent must not be granted for the erection of a building on land in Zone B7 Business Park in the Macquarie Park corridor for the purpose of a function centre, neighbourhood shop, registered club or restaurant or café unless the total floor space of the building will not exceed:*

a. 500 square metres for each individual land use, or

b. An area equivalent to 5% of the site area for each individual use,

whichever is greater.

It is important to note that, neither land use identified within Clause 4.5B of the Ryde LEP is proposed to form part of this development. As such, although considered, this clause of the Ryde LEP is not relevant to the application of this Proposal.

4.3.5.5 Acid sulfate soils

The objective of Clause 6.1 of the Ryde LEP is to ensure that development does not disturb, expose or drain acid sulfate soils (ASS) and cause environmental damage. This site is not mapped under the LEP to be affected by ASS. As a result, the application of Clause 6.1 of the Ryde LEP is not considered relevant to this Proposal.

4.3.5.6 Earthworks

The objective of Clause 6.2 of the Ryde LEP is to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land. Whereby, Clause 6.2(2) details the circumstance in which development consent is not required for earthworks, being:

a. The earthworks are exempt development under this Plan or another applicable environmental planning instrument, or

b. The earthworks are ancillary to development that is permitted without consent under this Plan or to development for which development consent has been given.

The earthworks proposed to ensure a suitable building envelope does not constitute exempt development and is not considered ancillary to development that is permitted without consent under the Ryde LEP. Consequently, prior to granting consent, the consent authority must consider the matters contained in Clause 6.2(3) of the Ryde LEP. Compliance against these matters has been provided in **Table 4-7**.

Table 4-7 Earthworks - matters of consideration

Matter of consideration	Compliance
The likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development	The Proposal would not disrupt or cause a detrimental effect on drainage patterns or soil stability

Matter of consideration	Compliance
The effect of the development on the likely future use or redevelopment of the land	The Proposal is unlikely to adversely affect the future use of redevelopment of the land.
The quality of the fill or the soil to be excavated, or both	There is a low potential for existing soils to be contaminated (refer **Chapter 7 (Geology, soils and contamination)**). Any fill material not originating from the site to be used would be virgin excavated natural material (VENM) or excavated natural material (ENM).
The effect of the development on the existing and likely amenity of adjoining properties	The Proposal is considered to be appropriate with regard to potential effects on amenity. The impact on amenity as a result of the development is further discussed in **Chapters 6 (Landscape and visual)**, **9 (Noise and vibration)** and **10 (Air quality).**
The source of any fill material and the destination of any excavated material	Fill material not originating from the site to be used would be VENM or ENM. Where excavated material would not be reused on site, it would be tested, and the presence of any unexpected contaminants would be confirmed prior to disposal offsite. Where spoil is found to be contaminated it would be disposed of at a waste disposal facility licensed to accept its' resulting classification; pursuant to the Waste Management Plan (WMP) provided in **Appendix F**.
The likelihood of disturbing relics	The Proposal has a low likelihood of disturbing relics. Further discussion is provided in **Chapters 11 (Non-Indigenous heritage)** and **12 (Indigenous heritage)**.
The proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area	The Proposal is not located nearby any waterway and with mitigation measures in place, would not impact any waterway, drinking water catchment or environmentally sensitive area (refer **Chapters 7 (Geology, soils and contamination)**, **13 (Biodiversity)** and **19 (Groundwater, surface water, flooding and water use)**).
Any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development	A consolidated list of mitigation measures to avoid, minimise or mitigate the impacts of the development (including impacts as a result of earthworks) is located in **Chapter 22 (Environmental management).**

The Proposal is considered to be compliant with the matters contained in clause 6.2(3) of the Ryde LEP.

4.3.5.7 Stormwater management

Clause 6.4 of the Ryde LEP applies to all land in residential, business and industrial zones. Given that the site is zoned B7 Business Park (as discussed in **Section 4.3.5.1**), consideration has been afforded to this clause. The objective of Clause 6.4 of the Ryde LEP is to minimise the impacts of urban stormwater on land to which this clause applies and on adjoining properties, native bushland and receiving waters. Importantly, development consent must not be granted to land on to which this clause applies unless the consent authority is satisfied that the proponent has complied with Clause 6.4(3) of the Ryde LEP. In light of this requirement, the proposed development has been assessed against the criterion contained under Clause 6.4(3) of the Ryde LEP, which is provided in **Table 4-8**.

Table 4-8 Compliance against stormwater management criterion

Matter of consideration	Compliance
Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development—	
Is designed to maximise the use of water permeable surfaces on the land having regard to the soil	Following the completion of construction of the Proposal, all disturbed areas would be reinstated and 'made-good'. No significant ground disturbance during operation is

Matter of consideration	Compliance
characteristics affecting onsite infiltration of water, and	anticipated. Any ground disturbance during operation is likely to be limited to maintenance and gardening activities. As such, for water that would be collected by the proposed stormwater drainage network or the Proposal, most pollutants are likely to originate from the following: • The roof areas of the Proposal • Landscaped areas (sediment and possible nutrients) • Outdoor parking areas • Road/vehicle circulation areas. To limit the potential for water collected from these areas to result in downstream water quality impacts, a treatment device train will be to be incorporated into the design of the stormwater network for the Proposal. The proposed treatment train is further discussed in **Chapter 19 (Groundwater, surface water, flooding and water use)**, specifically, **Section 19.4.2**.
Includes, if practicable, onsite stormwater retention for use as an alternative supply to mains water, groundwater or river water, and	An onsite water detention system in the form of underground storage will be provided as part of the Proposal, with a minimum storage capacity of 551 m^3. A high early discharge chamber has also been incorporated into the onsite detention (OSD) arrangement for the Proposal to optimise the design of the onsite detention system. All final OSD components will be designed in accordance to DCP Stormwater Management Technical Guidelines.
Avoids any significant adverse impact of stormwater runoff on adjoining properties, native bushland and receiving waters, or if that impact cannot be reasonably avoided, minimises and mitigates the impact.	Stormwater quality management measures would be implemented to further support the City of Ryde Council. stormwater pollution reduction targets These measures would include: • Prohibition of release of dirty water into drainage lines and/or waterways • Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) would be undertaken on a regular basis to identify any potential spills or deficient silt curtains or erosion and sediment controls. • Water quality control measures would be implemented to prevent any construction materials (e.g. concrete, grout, sediment etc) entering drain inlets or waterways. Further stormwater management and mitigation measures are provided in **Chapter 19 (Groundwater, surface water, flooding and water use)**.

The Proposal is considered to be compliant with the matters contained in Clause 6.4(3) of the Ryde LEP.

4.3.5.8 Environmental sustainability

The objective of Clause 6.6 of the Ryde LEP is to ensure that development on land in a business or industrial zone embraces principles of quality urban design and is consistent with principles of best practice environmentally sensitive design. In order to enforce this objective, development consent must not be granted on land in a business zone if the development is 1,500 m^2 in GFA (or greater), unless the consent authority is satisfied with the compliance of the criterion contained under Clause 6.6(2) of the Ryde LEP. An assessment has been undertaken against Clause 6.6(2), on the basis that

the site is zoned B7 Business Park (discussed in **Section 4.3.5.1**) and the project has a GFA greater than 1,500 m^2 (discussed in **Section 4.3.5.3**). This assessment is provided in **Table 4-9**.

Table 4-9 Environmental sustainability - matters of consideration

Matter of consideration	Compliance
Development consent must not be granted to development on land in a business or industrial zone if the development is 1,500 square metres in gross floor area or greater unless the consent authority is satisfied that the development has regard to the following—	
Water demand reduction, including water efficiency, water recycling and minimisation of potable water usage	Sustainability measures with regard to reduction in water demand is discussed in **Chapter 14** (**Greenhouse Gas and Energy Efficiency**). Ultimately, it is recommended that the collection of rainwater and treated stormwater with potential for reuse in cool tower systems, toilet flushing and/ or irrigation be implemented, where practical and feasible.
Energy demand reduction, including energy generation, use of renewable energy and reduced reliance on mains power	The Proposal requires a large amount of constant and reliable energy in order to support the development. As such, it is not feasible for the project to include means for renewable generation or storage. Instead the Proposal would connect to the existing Ausgrid line, located immediately adjacent to the Site, at Talavera Road.
Indoor environmental quality, including daylight provision, glare control, increased outside air rates, thermal comfort	Intelligent design and material selection ensure that thermal comfort is not entirely achieved by a mechanical means. Passive design initiatives such as performance glazing, shading and use of insulation will reduce demand on mechanical air conditioning systems resulting in a reduction of energy consumption and greenhouse gas emissions (further discussed in **Chapter 14**).
A reduction in new materials consumption and use of sustainable materials, including recycled content in concrete, sustainable timber and PVC minimisation	Adhesives, sealants, flooring and paint products will be ideally selected to contain low or no VOCs and all engineered timber products used in exposed or concealed applications are specified to contain low or no formaldehyde, where possible. The Proposal will aim to remove all PVC. Products shall be selected, where appropriate, based on their recycled content, end of life recyclability and product stewardship agreements.
Emissions reduction, including reduced flow to sewer and light pollution	Design opportunities have been explored and implemented to reduce the Proposals impact on the environment. A comprehensive list a management and mitigation measures has been provided in **Chapter 22**, which illustrates emissions reduction strategies recommended in order to reduce the impact of the Proposal on the existing environment.
Transport initiatives to reduce car dependence such as providing cycle facilities, car share and small vehicle parking spaces	The Proposal is located in proximity to a number of public transport alternatives to support ride sharing alternatives. In addition, the proponent will consider the inclusion of electric vehicle charging infrastructure, with the inclusion of renewable supply to enable carbon neutral private transportation.
Land use and ecology, including reduced topsoil removal and contaminated land reclamation.	Earthworks is required as part of site preparation activities to ensure a suitable building envelope for the Proposal. A Waste Management Plan (**Appendix F**) has been prepared to support the Proposal, which illustrates where material (including topsoil) will be reused. All contaminated land that is encountered during construction will also be appropriately managed, pursuant to the WMP.

4.3.5.9 Development in Macquarie Park corridor

The site is mapped in 'Precinct 1' within the Macquarie Park corridor (refer to Ryde LEP map sheet MPC_004). As a result, Clause 6.9 of the Ryde LEP must be considered as part of this development application. The objective of Clause 6.9 of the Ryde LEP is to encourage additional commercial development in Macquarie Park Corridor co-ordinated with an adequate access network and recreation areas. By the application of Clause 6.9 of the Ryde LEP, the consent authority may approve development with a height and FSR that does not exceed the increased building height and FSR identified on the '*Macquarie Park Corridor Precinct Incentive Maps'*. A summary of the incentive provisions and how they have been applied is provided in **Table 4-10**.

Table 4-10 Macquarie Park development incentive summary

Control	Standard LEP	Incentive provision	EIS reference
Maximum building height	30 m	45 m	**Section 4.3.5.2**
Floor space ratio	1.0:1.0	2.0:1.0	**Section 4.3.5.3**

4.3.6 Other NSW legislation

4.3.6.1 Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development (described in section 6(2) of the *Protection of the Environment Administration Act 1991*).

Section 7.9 of the BC Act states that a development application for SSD is to be accompanied by a biodiversity development assessment report (BDAR) (as defined under Section 7.1 of the BC Act), unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values. Further guidance is provided under Section 7.9(3), which denotes that the EIS, which accompanies any such application, is to include the biodiversity assessment required by the environmental assessment requirements (i.e. SEARs).

Reference is made to Item 14 of the SEARs issued by DPIE, which relates to biodiversity assessment requirements. Item 14 states:

> *Biodiversity – including an assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.*

By virtue of this requirement, the proponent has elected to prepare a BDAR waiver to negate the requirement of completing a BDAR. The BDAR waiver is discussed in **Chapter 13 (Biodiversity)**, as well as being provided as **Appendix G**.

4.3.6.2 Contaminated Land Management Act 1997

The general object of the *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated enough to require regulation under Division 2 of Part 3. A search of the NSW Environment Protection Authority (EPA) contaminated land database (undertaken on 2 July 2020) confirmed that the site is not listed as a significantly contaminated site under the CLM Act. As a result, no further attention is afforded to the CLM Act for the purpose of this development application.

4.3.6.3 Protection of the Environment Operations Act 1997

The objects of the POEO Act is to rationalise, simplify and strengthen the regulatory framework for environment protection, among others contained under Section 3 of the POEO Act. Chapter 3 of the POEO Act outlines the specific circumstances under which an EPL must be obtained.

Of importance to this Proposal, is Section 49 of the POEO Act, which applies to activities where Schedule 1 indicates that a licence is required for to carry on the activity, but not for the premises at which the activity is carried on.

Relevant to this Proposal is Item 9 under Schedule 1 of the POEO Act, which relates to 'chemical storage'. For the purpose a scheduled activity, '*chemical storage'* includes petroleum products storage, which is defined as '*the storage or packaging of petroleum products in containers, bulk storage facilities or stockpiles'*. Whereby, the trigger for petroleum products storage is development that has the capacity to store more than 2,000 tonnes; other than liquefied gas.

As discussed in **Chapter 3 (Proposal description)**, the Proposal includes the provision of up to 360 kilolitres of diesel fuel. The '*Guide to Australian Energy Statistics'* (Commonwealth Department of the Environment and Energy, 2017) provides the conversion rate that is accepted by the EPA and DPIE; whereby one tonne of diesel equates to 1,182 litres (or 1.182 kL). Upon application of this conversion rate, the total amount of fuel proposed as part of this Proposal is approximately 304 tonnes. This is significantly less than the scheduled activity requirement under the POEO Act of 2,000 tonnes. As a result, the Proposal will not require an EPL with respect to Item 9 under Schedule 1 of the POEO Act.

For completeness, Item 17 of Schedule 1 under the POEO Act relates to 'electricity generation'. Importantly however, this clause does not apply to the generation of electricity by means of electricity plant that is emergency stand-by plant operating for less than 200 hours per year. It has previously been identified that the Proposal includes the 19 diesel generators. The purpose of these generators is to provide redundancy, in the event external power fails. As such, these generators are only required, and would only be used to power the facility, in the event of complete power failure from the external grid; fulfilling the requirement for 'stand by' utility infrastructure. During times of stable external supply of electricity, the generators will only operate during scheduled maintenance events. On this basis, the Proposal is highly unlikely to exceed the 200 hour limit on the generation of electricity by means of electricity plant that is emergency stand-by plant and will therefore not require an EPL.

4.3.6.4 Roads Act 1993

An object of the *Roads Act 1993* (Roads Act) is to confer certain functions (in particular, the function of carrying out road work) on Transport for NSW and on other roads authorities; among others. Section 7 of the Roads Act defines the respective road authorities depending on the classified of road. Of relevance to this Proposal is Talavera Road, which is a local road under the Roads Act. The Council of a local government area is the roads authority for all public roads within the area, other than:

- Any freeway or Crown road, and
- Any public road for which some other public authority is declared by the regulations to be the roads authority.

Section 138 of the Roads Act relates to works and structures, whereby *a person must not erect a structure or carry out a work in, on or over a public road… otherwise than with the consent of the appropriate road's authority*.

As detailed in **Chapter 3 (Proposal Description)**, the Proposal involves the connection of Road 22 to Talavera Road, to provide access to the site. As such, an approval under Section 138 of the Roads Act is required to be obtained from Ryde Council (being the roads authority) prior to the commencement of any work in, on or over Talavera Road.

4.3.7 Commonwealth legislation

4.3.7.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to developments and activities that have the potential to impact on *Matters of National Environmental Significance'* (MNES) protected under the EPBC Act.

Part 3 of the EPBC Act states that an action, which has, would have, or is likely to have a significant impact on a MNES may not be undertaken without prior approval of the Commonwealth Minister for Environment. The EPBC Act identifies the following as MNES, for which Ministerial approval is required should they be subject to a significant impact:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (including RAMSAR wetlands);
- Listed threatened species and ecological communities;
- Listed migratory species protected under international agreements;
- Protection of the environment from nuclear actions; and
- Commonwealth marine areas.

The EPBC Act also protects the environment within which any action is proposed to be undertaken, or where an action would affect Commonwealth land.

Considering the characteristics and the site and the fact that it is highly disturbed and within a business park, no significant impacts on any MNES as a result of the Proposal are expected to occur. Notwithstanding, biodiversity impacts (including MNES) have been considered as part of this EIS and discussed in **Chapter 13 (Biodiversity)**.

4.3.8 Development control plan

Section 4.15(1)(a)(iii) of the EP&A Act requires the consent authority to consider any development control plan (DCP) that is relevant to the development. As noted in **Section 4.3.4.1**, given that the Proposal constitutes SSD the DCP does not need to be considered as part of this development application. Notwithstanding this exemption, the relevant sections of the DCP have been considered to ensure that the development is consistent with the City of Ryde's expectations for the area. The relevant sections of the DCP are:

- Section 4.5 – Macquarie Park Corridor
- Section 7.1 – Energy smart, water wise
- Section 7.2 – Waste minimisation and management
- Section 8.1 – Construction activities
- Section 8.2 – Stormwater and flood plan management
- Section 8.3 – Driveways
- Section 8.5 - Public civil works
- Section 9.1 - Signage
- Section 9.2 Access for people with disabilities
- Section 9.3 – Parking controls
- Section 9.5 – Tree preservation.

As assessment of the Proposal against these sections has been provided in **Appendix E**.

4.3.9 Voluntary planning agreements

Section 4.15(1)(a)(iiia) of the EP&A Act requires the consent authority to consider any planning agreement that has been entered into under Section 7.4 of the Act, or any draft planning agreement that a developer has offered to enter into under Section 7.4.

A Voluntary Planning Agreement (the original agreement) was executed between the proponent, The City of Ryde (Council) and Sydney North Planning Panel (LDA Consent Authority) on 2 December 2019 in relation to LDA 2017/0547 (refer to **Section 4.3.2.4**). The objective of the original agreement was to facilitate the delivery by the proponent of the contributions comprising (as detailed within Schedule 3 of the original agreement):

a. The construction and dedication to Council of the Road Land;

b. The construction of the Road Land Works and dedication of the Road land as public road; and

c. The carrying out of the Public Domain Works.

Since the execution of the original agreement, the proponent has lodged an application (LDA2020/229) with the City of Ryde to modify LDA2018/0547 (concept development). To support this modification the proponent prepared a letter of offer, dated 16 March 2020, to vary the original agreement (variation offer). The purpose of the variation offer is for the proponent to make and offer under section 7.4 of the EP&A Act; pursuant to clauses 5.3 and 12 of the original agreement.

It is noteworthy that the variation offer continues to exclude the payment of Sections 7.11 and 7.12 contributions.

5.0 Engagement

5.1 Secretary's Environmental Assessment Requirements

Table 5-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to consultation and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 5-1 SEARs - Consultation

SEARs requirements	
Consultation	**Where addressed**
During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with: • City of Ryde Council; • Transport for NSW; • Fire and Rescue NSW; • Sydney Water; • Ausgrid; • Environment, Energy and Science Group; • Environment Protection Authority. The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	This Chapter discusses the consultation activities conducted throughout the preparation of this EIS, specifically: • State agencies and relevant stakeholders is contained in **Section 5.4** & **5.6** • Community consultation provided in **Section 5.5**.

5.2 Approach to consultation

Consultation between the proponent and various stakeholders is an ongoing process. The Proposal specific consultation has included:

- Liaison with government agencies, including those identified within the SEARs; and
- Targeted consultation with community reference groups.

5.3 Engagement approach and objectives

The aim of the consultation for the Proposal has been, and remains, to:

- Identify relevant stakeholders;
- Identify key issues, latent issues and sensitivities surrounding the Proposal;
- Improve awareness of the proposed works and understand concerns;
- Maintain accurate and timely communication concerning the Proposal and approvals process; and
- Ensure that government agencies are engaged in the planning and approvals process.

5.4 Government agency identification and consultation

5.4.1 Scoping and early engagement

Stockland prepared a Scoping Report in accordance with the *Scoping an Environmental Impact Statement – Draft Environmental Impact Assessment Guidelines* (DPIE, 2017), which was subsequently lodged to DPIE on 29 May 2020. The Scoping Report was prepared to seek Secretary's Environmental Assessment Requirements (SEARs) for the Proposal. During the preparation of the SEARs, DPIE consulted with the relevant stakeholder that are summarised in **Section 5.4.2**. In response to this consultation, each relevant stakeholder provided input into the preparation of the SEARS; requesting Stockland to address their specific concerns. **Appendix A** provides a summary of the relevant government issues, as contained within their SEARs input letter, and includes a reference to where the corresponding issues have been addressed, discussed, considered and either accommodated or discounted.

5.4.2 Stakeholder engagement

In addition to consultation with the DPIE, the SEARs for the Proposal (refer to **Appendix A**) stated that the proponent must engage in consultation with the following government agencies:

- City of Ryde Council
- Transport for NSW
- Fire and Rescue NSW
- Sydney Water
- Ausgrid
- Environment, Energy and Science Group
- Environment Protection Authority.

To meet the requirements of the SEARs, letters have been sent to these agencies to provide information regarding the Proposal and to provide each agency with the opportunity to submit comments on the assessment process. These consultation letters have been compiled in **Appendix Q**.

This letter outlined the Proposal and provided contact details for AECOM if any further comments or requirements needed to be forwarded for the Environmental Impact Statement (EIS). Consultation undertaken with government stakeholders is outlined in **Table 5-2**.

Table 5-2 Consulted government agencies and authorities

Department	Consultation method	Response provided
City of Ryde Council	Letter and meeting	Yes
Transport for NSW	Letter	Yes
Fire and Rescue NSW	Letter	No
Sydney Water	Letter	No
Ausgrid	Letter	No
Environment, Energy Science Group	Letter	No
Environment Protection Authority	Letter	No

Transport for NSW was the only State agency that responded to the consultation letter. Transport for NSW responded by email on 20 September 2020, which indicated that they had reviewed the consultation letter and noted that no additional comments are required at that time. Instead TfNSW (like other agencies) will defer a response until they have conducted a formal assessment following lodgement of the EIS.

5.4.3 City of Ryde Council

Stockland have engaged with Ryde Council over the past three years to realise a shared vision for the site. This initially culminated in the December 2019 approval of LDA2017/0547 following a two-year assessment process.

During the preparation of this EIS, Stockland concurrently embarked on an 'Amending DA' process to facilitate an amended masterplan design, inclusive of the Proposal. Pre-lodgement meetings occurred on 29 January 2020 and 20 February 2020, together with formal post-lodgement sessions on 23 July 2020 (Urban Design Review Panel) and 17 August 2020 (with Council DA staff). Various other informal post lodgement teleconferences occurred between Council and the Stockland design team to discuss/resolve specific design related concerns. In response to the comments received from Council after lodging the Amending DA, the following changes were incorporated into the scheme, which are consistent with the documentation prepared as part of this EIS:

- Replanning of the data centre fence line, including the incorporation of additional landscape planting and buffers/setbacks to existing mature trees to ensure their viable retention.
- An elevated landscape extension structure over the hard stand area between the data centre and the proposed adjacent structure to the north of the site.

Overall, the documentation contained within this EIS is largely consistent with the expectations set through extensive engagement with Ryde Council at the Concept DA stage.

5.5 Community consultation

Elton Consulting was engaged by Stockland to provide stakeholder and community consultation services in relation to the Proposal. The purpose of this engagement was to:

- Update the community and stakeholders about M_Park, including the vision and masterplan.
- Raise awareness amongst site neighbours of Stage 2 as the next stage of M_Park.
- Reduce the risk of misinformation about potential project impacts and demonstrate that these have been considered in planning and design.
- Provide an early opportunity for interested stakeholders and community to hear more about the plans, ask questions and provide feedback.
- Communicate the project's commitment to transparency in the engagement, planning and development process.
- Satisfy the SEARs and comply with legislative requirements.

5.5.1 Engagement overview

Table 5-3 sets out the communications and engagement activities conducted and scheduled by Stockland throughout the preparation of this EIS.

Table 5-3 Overview of community and stakeholder engagement

Media	Description
Proposal email	Stockland has established and manages a dedicated community email account to provide interested members of the community and stakeholders with an opportunity to ask questions and provide feedback about the Proposal.
Website	Stockland has established a dedicated M_Park website.
Online community information session	Facilitated by Elton Consulting, the online community information session provided an opportunity for the community and stakeholders to meet the project team, hear more about the Proposal, ask questions and provide feedback.

Media	Description
Community and stakeholder letterbox drop	A postcard providing information about the Proposal and invitation to the online community information session was distributed to 2,524 residential and business neighbours.
Proposal collateral	Postcard, presentation, key messages and FAQs.
Key stakeholder meetings	Stockland has scheduled to present at the next ordinary meeting of the Macquarie Park Forum in November 2020. An invitation has also been extended to Forum members for a one-on-one interaction with the project team.

5.5.2 Engagement outcomes

A community information session was hosted on 12 October 2020, which included a questions and answer session with panellists. Given the low number of questions that were asked by the participants, the Elton Consulting facilitator asked several questions that were identified as being of potential interest to stakeholders. A summary of the key discussion points is summarised in **Table 5-4**.

Table 5-4 Summary of key discussion points from community information session

Question	Response
What are the benefits of the data centre?	The data centre will provide local secure storage infrastructure for businesses and the community. With more people than ever using digital platforms as a result of the COVID-19 pandemic, this is critical.
What parking is being provided?	Stage 2, Building B, is anticipated to provide employment for up to 50 staff and will accommodate 48 individual vehicle spaces. Parking provisions are considered compliant with relevant guidelines and controls. The Proposal would also include end of trip facilities and bicycle racks.
Will the data centre be noisy?	Detailed noise modelling has been undertaken, which indicates that the data centre's operations would not result in any noise exceedances for site neighbours. Further discussion is provided in **Chapter 9 (Noise and vibration)**.
What will you do to mitigate construction noise?	A construction noise management plan would be prepared and include management and mitigation measures such as strict working hours in accordance with EPA requirements. Importantly, machines would only be used during certain times of the day to minimise noise impacts.
When do you expect the data centre to be operational?	Subject to approval by DPIE, Stockland anticipate construction to finish in late 2022 and the Proposal to be operational by early 2023.

The Consultation Outcomes Report for the proposal is included as **Appendix Q**.

5.6 Metropolitan Local Aboriginal Land Council (MLALC) consultation

Consultation for the Aboriginal archaeological due diligence assessment (ADDA) prepared for this Environmental Impact Statement was undertaken with MLALC. Field representative Selina Timothy participated in the fieldwork and provided a separate report noting that no sites or potential archaeological deposits (PADs) were identified within the Proposal Site. The report further addresses the previously undocumented cultural significance of the wider landscape containing the Proposal Site and provides recommendations relating to cultural heritage. Results, including consultation outcomes of the ADDA is provided in **Chapter 12 (Indigenous heritage)**.

5.7 Exhibition

The EIS will be placed on exhibition by DPIE for a minimum of 28 days. Submissions made during the exhibition of the EIS would be addressed within the submissions report to be prepared as part of the

assessment process for the Proposal. This process provides further opportunity for public and government agency involvement and participation in the planning and assessment process.

5.8 Consultation during construction and operation

5.8.1 Construction

As part of the construction phase, a Construction Environmental Management Plan (CEMP) would be developed (refer **Chapter 22 (Environmental Management)**). The CEMP would include relevant sub-plans for the management of specific environmental issues. Those sub-plans establish a means of consultation throughout the construction phase. In addition to CEMP sub-plans, this EIS recommends a number of safeguards and management measures aimed at mitigating any anticipated and unforeseen environmental impacts. Some of those safeguards and management measures include requirements around consultation during the construction phase.

Those consultation activities are summarised below in **Table 5-5**.

Table 5-5 Consultation to be undertaken during construction of the Proposal

Requirement for consultation	Consultation to be undertaken
CEMP sub-plans	
Construction Traffic Management Plan (CTMP)	• Ongoing consultation/coordination with relevant stakeholders (Ryde City Council and Transport for NSW) as relevant to manage impacts • Requirements and methods to consult and inform the local community of impacts on the local road network • Plans for pedestrian and cyclist detours including communicating changes to pedestrian and cycling routes, provision of linemarking and signage
Construction Noise and Vibration Management Plan (CNVMP)	• A complaint handling process • Overview of community consultation required for identified high impact works
Mitigation Measures	
Traffic (TT3)	Informing the community about any changes to traffic conditions including vehicle movements and anticipated effects on the surrounding road network
Noise and vibration (NV2)	Periodic notification (monthly letterbox drop or equivalent), website, Proposal Infoline, Construction Response Line, email distribution list and community and stakeholder meetings
Non-Aboriginal heritage (NAH1)	Consultation with an archaeologist and Heritage NSW in the event of encountering unanticipated archaeological deposits
Aboriginal heritage (AH2)	Consultation with a heritage specialist in the event of an unexpected find of Aboriginal heritage items
Hazards and Risk (HR4)	Consultation with relevant utility providers in relation to underground utilities within the Proposal Site
Social and Economic (SE1)	All businesses, residential properties and other key stakeholders (e.g. local councils, shopping centre management) affected by the Proposal will be notified at least five working days prior to commencement of construction. The notification will include: • Details of the Proposal • Construction period and construction hours • Contact information for Proposal management staff Complaint and incident reporting and how to obtain further information
Surface water (SW3)	Undertake consultation with City of Ryde Council prior to connecting to existing stormwater drainage system

5.8.2 Operation

Consultation during the operation phase of the Proposal would be limited to ongoing discussions with Fire and Rescue NSW as the data halls would be fitted out in a phased manner over time. Fire and Rescue NSW would be made aware of the numbers of batteries present within the Proposal at any one time.

6.0 Landscape and visual

6.1 Secretary's Environmental Assessment Requirements

Table 6-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to landscape and visual impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 6-1 SEARs – Landscape and visual

SEARs requirements	
Urban design and visual	**Where addressed**
This EIS must include: A visual impact assessment (including photomontages and perspectives) of the development layout and design (buildings and storage areas), including staging, site coverage, setbacks, open space, landscaping, height, colour, scale, building materials and finishes, façade design, signage and lighting, particularly in terms of potential impacts on: • Nearby public and private receivers; and • Significant vantage points in the broader public domain.	An assessment of the visual impact is provided in **Section 6.4 of this EIS**, as well as Sections 4.1 and 4.4 of the VIA in **Appendix H**.
Consideration of the layout and design of the development having regard to the surrounding vehicular, pedestrian and cycling networks.	Addressed in **Section 6.2** of this is EIS, and Section 1.5 of the VIA in **Appendix H**.
Detailed plans showing suitable landscaping which incorporates endemic species.	Address within **Chapter 3 (Proposal description)** of this EIS**,** and Section 1.5 of the VIA in **Appendix H**.

6.2 Visual impact assessment

This chapter provides a summary of the Visual Impact Assessment (VIA) technical report that has been prepared for the Proposal. The assessment has been undertaken with consideration of relevant legislation, policies, guidelines and methodology; further discussed in Section 1 of the VIA. The full Visual Impact Assessment report is included in **Appendix H**.

The study area was determined in consideration of the following:

- Topography of the surrounding landscape
- Number and complexity of land uses surrounding the Proposal
- The visual containment of the Proposal due to the scale of the Proposal in comparison to surrounding built form and vegetation.

A study area of 1 kilometre from the boundary of the site was selected to assess the visual impacts of the Proposal. This distance is considered conservative given the relatively flat site and surrounds and the high level of visual screening provided by the adjacent buildings and mature trees. The extent of the VIA study area is shown on **Figure 6-1**. A site inspection was undertaken as part of the VIA on 29 June 2020. The purpose of the inspection was to:

- Identify views from sensitive visual receptors within publicly accessible locations; and
- Undertake site photography and to record key views.

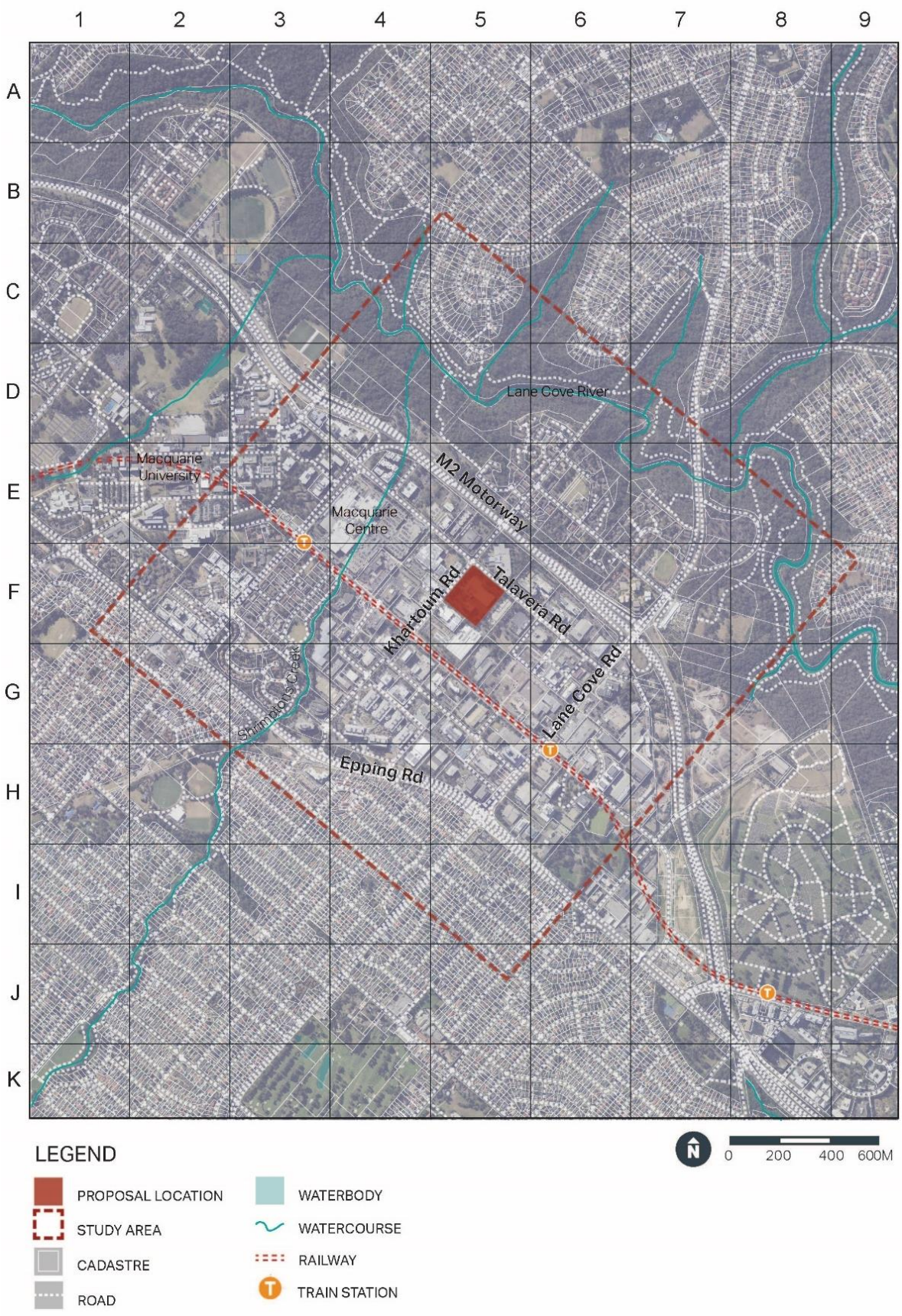


Figure 6-1 VIA study area

A preliminary desktop assessment of the visual resources in the VIA study area was undertaken to complete an environmental baseline assessment and inform the scope of the site inspection. As part of this desktop assessment, existing available data was gathered and reviewed, including:

- Proposal architectural and landscape design information
- Design information for M_Park Concept Development
- Base information on existing environmental conditions, including Geographic Information System (GIS) mapping
- Available information on sensitive visual receptors and surrounding receptor locations
- Reporting on heritage items and issues in the surrounding area
- Google Earth and Google Street View information.

The information collected by the preliminary desktop assessment and site inspection was then compiled to provide a broad description of the landscape in the VIA study area, and to identify key visual elements and features relevant to the Proposal, including site setting, topography, land use and heritage values.

6.2.1 A**ssumptions**

The Proposal would be constructed within the M_Park development site; therefore, the VIA has considered these changes rather than assessing the data centre as an individual change within the existing site.

The VIA was undertaken using the following assumptions:

- The Proposal will be constructed as Stage 2 of the amended concept development application. Notwithstanding, for the purpose of the VIA the cumulative impact of the entire concept plan has been considered (i.e. Building C and D)
- While the detailed design of M_Park is ongoing, for the purposes of VIA assessment the Proposal has been assessed as per the architectural and landscape design included in the amended Development Application (DA) package and Stockland's response to Council's RFI package, sent on 2 October 2020; reference is made to **Appendix B (Architectural Plans)** and **Appendix C (Landscape Plan)**
- It is unknown how much of Stage 1, 2 and 3 of the M_Park project would overlap in construction, therefore visual receptors have been selected based on those existing in the surrounding landscape under existing conditions. Receptors within the proposed M_Park development have not been used as it is assumed the Proposal would be constructed concurrently with other M_Park buildings
- It is assumed that landscaping (including trees) would be included on at least one verge of the proposed Road 22, as per the Ryde DCP 2014
- The visual impact of the Proposal will be assessed within the public domain only. It is acknowledged that there are several high-rise developments within the surrounding area, particularly with the ongoing development of Macquarie Park. Theoretical change in views from nearby high-rise developments are briefly discussed but not assessed.

6.3 Existing environment

6.3.1 Site context

Macquarie Park has undergone significant development over the past 15 years. The surrounding area is characterised by commercial buildings and land uses consistent with the character of Macquarie Park as a business precinct. Large multi storey commercial buildings within landscaped grounds are typical of the area, with onsite parking provided. Individual business parks with multiple large multi-use buildings are also common. The Site is currently owned by Stockland and is occupied by two multi storey commercial and warehouse buildings leasing floor space to several businesses. The two buildings are located towards the centre of the Site, and surrounded by at-grade car parking. The

largest footprint building is two storeys high, comprising office and warehouse spaces. The smallest footprint building is six storeys high containing mainly office spaces. The Site would not be open to the public, however, the site planning of the greater M_Park development has integrated the proposed development within the existing road and footpath network and increased the permeability of the site to pedestrian and vehicular traffic. The proposed Road 22 (as required by the DCP would contribute to this integration, joining up with the future Road 01 which would pass to the west of M_Park. A new pedestrian pathway running to the north of the ProposalProposal assists in pedestrian permeability of the greater development site.

6.3.2 Topography

The Site slopes from west (high) to east (low), from a level of approximately 59 metres Australian Height Datum (AHD) to approximately 48 metres AHD with a constant slope gradient of about six per cent between these points. The surrounding land morphology generally slopes down towards the east and the Lane Cove River, which is located approximately 900 metres north-east of the Proposal **Figure 6-2**.

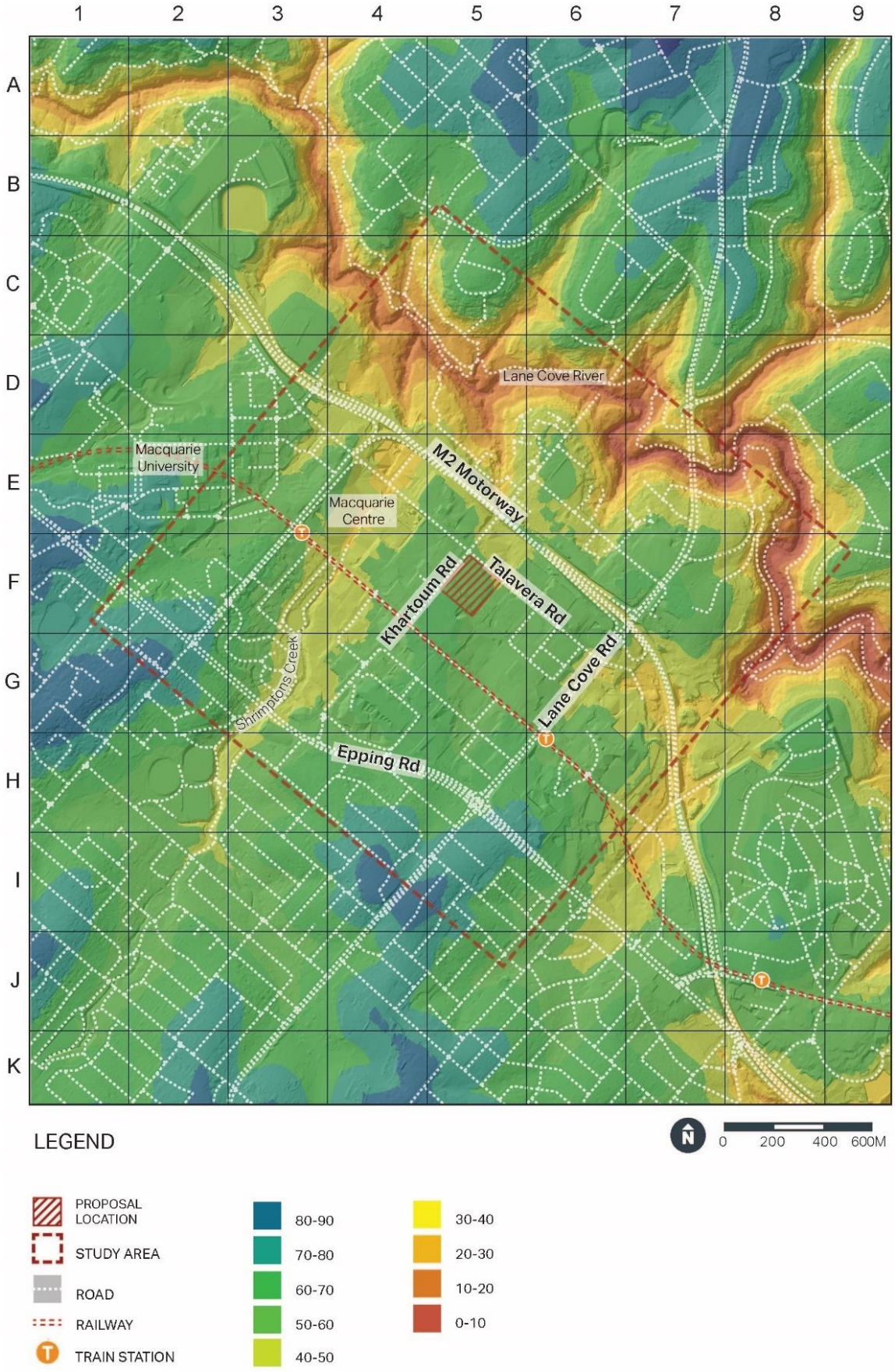


Figure 6-2 Topography within the study area (Source: AECOM)

6.4 Impact assessment

6.4.1 Methodology

The evaluation of potential effects on visual amenity is based on the sensitivity of the viewpoint (and the visual receptors it represents) to change, and the magnitude of change arising from the Proposal that is likely to occur.

The sensitivity of each viewpoint is a function of:

- The occupation or activity of the people experiencing the view at particular locations;
- The extent to which their attention or interest may therefore be focussed on the views and the visual amenity they experience at particular locations, e.g.:
    - People who are engaged in outdoor recreation where their attention or interest is likely to be focused on views and the visual amenity they experience, are likely to be more sensitive to a proposed change in that view rather than;
    - People at their place of work whose attention may be focused on their work, not on their surroundings, and where the setting is not important to the quality of working life.
- Value attached to the view experienced, e.g.:
    - In relation to heritage assets, or through planning designations; or
    - Indicators of value attached to views, e.g. through appearing on tourist maps, or provision of facilities for their enjoyment (such as parking places, sign boards and interpretative material).

The magnitude of change to views and visual amenity depends on the:

- Size or scale of change in the view regarding the:
    - Loss or addition of features in the view and changes in its composition;
    - Degree of contrast or integration of any new features with the existing landscape, in terms of form, scale and mass, line, height, colour and texture; and
    - Nature of the view of the proposed development in terms of amount of time it would be experienced, and whether the views would be full, partial or glimpses.
- Geographical extent of the visual effect with different viewpoints including the:
    - Angle of view in relation to the main activity of the receptor;
    - Distance of the viewpoint from the proposed development; and
    - Extent of area over which the changes would be visible.
- Duration and reversibility of visual effects, e.g.:
    - Duration in terms of short term (0-5 years), medium term (6-15 years) or long term (16-30+ years); and
    - Reversibility with regard to the prospects and practicality of a proposed change being reversed in say a generation, e.g. housing can be considered permanent, but wind energy developments for example are often argued to be reversible since they have a limited life, and could eventually be removed and the land reinstated (GVIA3).

6.4.2 Visibility of the project

Figure 6-3 shows the theoretical zone of visibility (TZV) of the Proposal. Due to the relatively flat topography of the site and surrounds, if no vegetation or built form were present the Proposal would potentially be seen from distances over 1.5 kilometres. However, the landscape surrounding the Proposal is vegetated with mature trees along the streets, as well as several landmarks that would limit these distance views. These landmarks include:

- The M2 Motorway is fringed by vegetation and noise walls which would limit any views from public spaces from the east and north-east;

- The dense vegetation associated with the Lane Cove National Park would limit any views east of the Lane Cove River;
- Epping Road has several areas where the road corridor is raised above the surrounding landscape in order to cross other road corridors, such as Lane Cove Road. In these areas views to the Proposal would be screened by the road corridor; and
- Within Macquarie Park there are several taller developments where built form would screen views to the Proposal from publicly accessible areas. This, along with mature streetscape vegetation, would limit views to the Proposal.

Views from public areas to the Proposal would be limited to the streets adjacent to the Proposal itself, namely to Talavera Road and Khartoum Road (where views to the Proposal may be seen between the built form within the M_Park development).

Distance views to the Proposal from private residences may be seen from several locations. **Figure 6-4** shows the maximum building height within the study area where views to the Proposal may be seen. In addition to these areas there are several tall residential towers in the area that might see changes to their views due to the Proposal.

6.4.3 Representative viewpoints

Four viewpoints have been chosen to represent the change in views from publicly accessible areas due to the Proposal. These are shown in **Figure 6-4**. The rationale for choice of viewpoints is as follows:

- **Viewpoint 1: 8 Khartoum Road**
  This viewpoint was selected to represent the change in views seen from the footpath in front of 8 Khartoum Road. The viewpoint also approximates views seen from this building, which is the head office of Fuji Xerox and also houses a bakery café at street level.
- **Viewpoint 2: Intersection of Khartoum and Talavera Roads**
  This viewpoint was selected to illustrate the change seen by pedestrians on Khartoum and Talavera Roads.
- **Viewpoint 3: 40-52 Talavera Road**
  This viewpoint was selected to represent the change in views seen from the footpath adjacent to the Gate A entry to 40-52 Talavera Road. The viewpoint also approximates the view seen from within the property, which contains several commercial enterprises such as Edwards Lifesciences and a childcare centre.
- **Viewpoint 4: Talavera Corporate Centre**
  This viewpoint was selected to assess the change in view from the footpath at 26 Talavera Road adjacent to the pedestrian entry to the site. The viewpoint will also approximate the change in views seen from within the centre, which houses several commercial offices.

Of the above viewpoints, one was selected from which to produce an artists impression of the changes (Viewpoint 3). This viewpoint lies directly opposite the street frontage of the Proposal and would receive views to the changes from close proximity. It is anticipated that views to the Proposal from the other viewpoints would be substantially screened by built form and vegetation (both existing and approved within M_Park). Receptors from all viewpoints were not anticipated to be particularly sensitive, and no increased sensitivities or values were identified which would have required the creation of artists impressions to illustrate the changes.

There are no parks or public recreational locations that would see changes in the view to the Proposal. While receptors at other locations may potentially see changes, these would be from private property rather than from public areas.

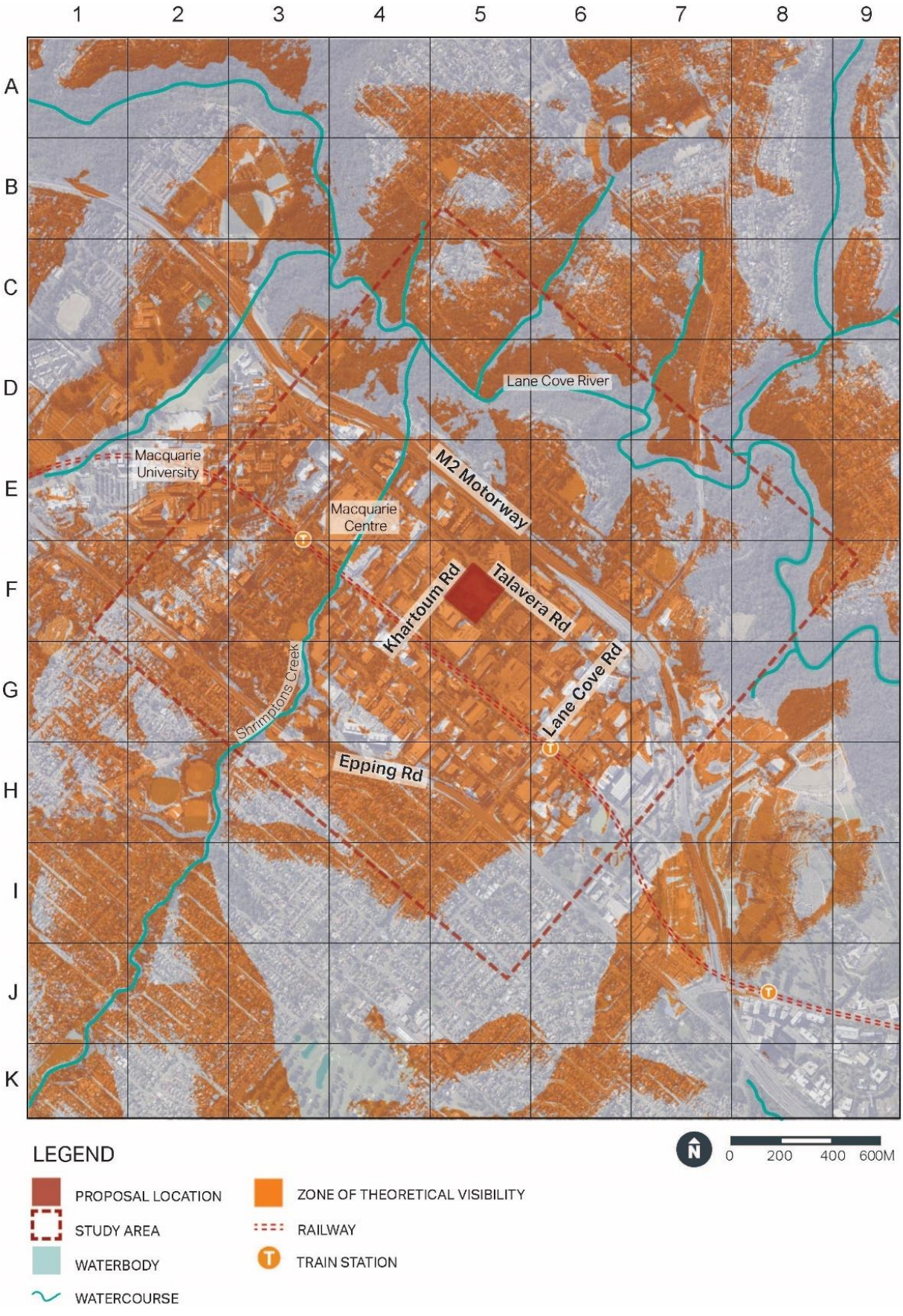


Figure 6-3 Theoretical Zone of Visibility map (Source: AECOM)

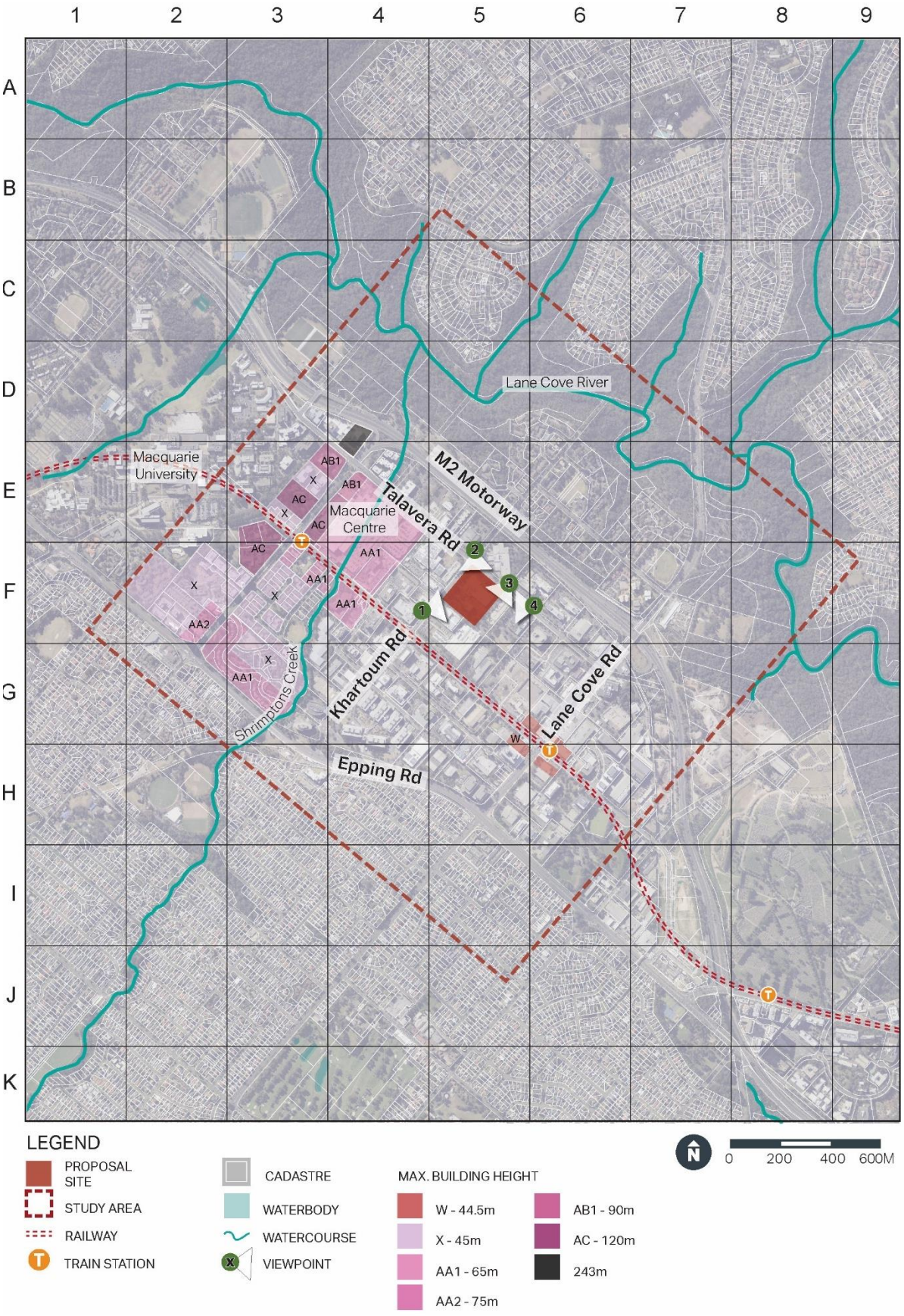


Figure 6-4 Representative viewpoints for visual impact assessment and nearby building height (Source: AECOM)

6.4.4 Assessment of viewpoints

Table 6-2 Assessment of viewpoints

Viewpoint/ Receptor	Sensitivity	Anticipated change	Magnitude of change
Viewpoint No. 1 This view is taken from the south-eastern corner of 8 Khartoum Road, Macquarie Park, looking south towards the Proposal. The receptors at this location include commuters and passers-by, as well as employees and visitors to 8 Khartoum Road.	• Receptors experiencing the view at this location would be passers-by on Khartoum Road and employees or visitors to 8 Khartoum Road. • Receptors at this location are unlikely to have their attention focussed on the view from this viewpoint, as they would be passing the location on foot or by vehicle. • The value attached to the view experienced is anticipated to be low as this area is a business park. It does not have recreational or heritage value. • The visual amenity of landscape within private lots in the area is of a high quality, with mature trees and shrubs being the primary element within the views along the roads. This mature landscaping visually minimises the built forms within this area, providing receptors with a softened, green street outlook.	The view to the Proposal from this viewpoint would change once M_Park has been developed. However, this change would primarily be due to the overall M_Park built form and landscaping positioned to the north of the Proposal rather than due to the Proposal itself. A small portion of the Proposal would be seen in the background of the view and only along this proposed road corridor. Most of the bulk of the built form of the Proposal would be screened from view by Building A, Building C and D, landscaping along the 14.5 metre road, within the central courtyard and along the pedestrian pathway north of the Proposal within the M_Park development.	• The scale of the Proposal would be larger than the scale of the existing built form within Macquarie Technology Park but would be similar in size to the proposed buildings within M_Park • The Proposal would be mostly screened by built form and landscaping within M_Park and would be seen in the background of the view. • The change would be only visible within a small proportion of the view and would be difficult to see by receptors passing the site at speed

Viewpoint/ Receptor	Sensitivity	Anticipated change	Magnitude of change
Viewpoint No. 2 From this viewpoint the receptor gets views both south along Talavera Road and west along Khartoum Road. Receptors at this location include commuters and passers-by (pedestrians, cyclists, motorists) travelling southwards on Talavera Road.	• Receptors experiencing the view at this location would be passers-by on Talavera Road and Khartoum Road at this location. • Receptors at this location are unlikely to have their attention focussed on the view from this viewpoint, as they would be passing the location on foot or by vehicle. • The value attached to the view experienced is anticipated to be low as this area is a business park. It does not have recreational or heritage value. • The visual amenity of landscape within private lots in the area is of a high quality, with mature trees and shrubs being the primary element within the views along the roads.	The M_Park development would be seen on the opposite side of the intersection replacing the existing Macquarie Technology Park. Mature trees on the corner of the block would be retained and integrated into the landscaped edge surrounding Building C. Due to the height of Building C and the lower level on which the Proposal would be constructed, it is unlikely that even the roof of the Proposal would be seen from this location. Landscaping along Talavera Road adjacent to the Proposal (including the retention of existing mature trees) would appear as a continuation of the green landscaped edge along the road corridor and would not be discernible as a new feature within the landscape.	As the built form of the Proposal would not be seen from this location and the landscaping would appear as a replacement of similar green edging to the road corridor, the magnitude of change is considered Negligible from this viewpoint.
Viewpoint No. 3 This viewpoint is positioned adjacent to Gate A leading into 40-52 Talavera Road and is the closest public viewpoint to the Proposal. The receptors at this location include commuters and passers-by, as well as employees and	• Receptors experiencing the view at this location would be passers-by on Talavera Road and employees or visitors to 40-52 Talavera Road. • Receptors at this location are unlikely to have their attention focussed on the view from this viewpoint, as they would be passing the location on foot or by vehicle. • The value attached to the view experienced is anticipated to be low as this area is a business park. It does not have recreational or heritage value.	From this location the Proposal would be clearly seen on the opposite side of Talavera Road to the viewpoint. A view along Road 22 would be seen, with landscaping along the southern side of the road. The fencing and entry point, signage, lighting and landscaping would be seen replacing the existing open landscaped site, with the data centre building rising from within the hardstand area inside the site. The built form is much taller than the existing development but would be partially screened by existing trees preserved within the frontage.	• The size of the built form of the Proposal would be taller than the existing development, resulting in the addition of a feature to the landscape. The Proposal would be visibly separated by security fencing around the perimeter of the site with less landscaping than existing developments in the area. • Due to the height of the Proposal, the built form would be less easily screened by trees (both existing retained trees and proposed trees within the frontage of the site) than the existing built form.

Viewpoint/ Receptor	Sensitivity	Anticipated change	Magnitude of change
visitors to 40-52 Talavera Road.	• The visual amenity of landscape within private lots in the area is of a high quality, with mature trees and shrubs being the primary element within the views along the roads.	This viewpoint is the only viewpoint where lighting within the site would be clearly seen at night. Tall, directional lighting would light the hardstand area surrounding the site rather than up lighting the façade. This would result in the bulk of the building visually receding at night, but the parking area surrounding the building being illuminated similar to that within other commercial properties within Macquarie Park.	• The Proposal would be viewed at close range by receptors, however, receptors that would get the closest views to the Proposal at this viewpoint would be passing the site either on foot or by car and would therefore only get a short view of the changes. • The Proposal would take up a substantial proportion of the view seen by passers-by, but a smaller portion of the view from within 40-52 Talavera Road, which would also be screened by perimeter vegetation within the development. • The ProposalProposal would be visibly separated by security fencing around the perimeter of the site with less landscaping than existing developments in the area. The dark palisade security fencing would be a change to the open, unfenced existing condition, but would be positioned behind planting and an existing row of trees, which would reduce the visibility of the fencing from the street. The fencing, while a new element along this site frontage, already exists in the surrounding area.

Viewpoint/ Receptor	Sensitivity	Anticipated change	Magnitude of change
Viewpoint No. 4 The view from this viewpoint comprises a view along Talavera Road to the north towards the Proposal from the footpath adjacent to the pedestrian entry to Talavera Corporate Centre. The receptors at this location include commuters and passers-by, as well as employees and visitors to Talavera Corporate Centre.	• Receptors experiencing the view at this location would be passers-by on Talavera Road heading north and employees or visitors to the Talavera Corporate Centre at 26 Talavera Road. Receptors at this location are unlikely to have their attention focussed on the view from this viewpoint, as they would be passing the location on foot or by vehicle. • Receptors in the top floors of the buildings within the centre are likely to have clear views over the treetops to the Proposal due to the elevation of and orientation of the buildings. • The value attached to the view experienced is anticipated to be low as this area is a business park. • The visual amenity of landscape within private lots in the area is of a high quality, with mature trees and shrubs being the primary element within the views along the roads.	Looking north along the road corridor receptors are likely to seen the addition of the Proposal building behind a large amount of existing (retained) tall vegetation both on Talavera Road and within the neighbouring commercial properties. The top of the project building would be potentially seen poking out above the canopy of the trees. The front façade of the proposed building would be unlikely to be seen along Talavera Road due to the retention of trees and the proposed landscaping fronting the Proposal, with the landscaping seen as a continuation of the band of trees and shrubs along Talavera Road.	• The scale of the Proposal would be larger than the scale of the existing built form within Macquarie Technology Park. The Proposal would comprise a new building within the view, however, only the top portion of the building would be seen poking above the existing trees on Talavera Road and within neighbouring commercial properties • The Proposal would be mostly screened by built form and landscaping within M_Park and would be seen in the middle to background of the view. • Receptors seeing the view from upper storeys of the Talavera Commercial Centre would potentially receive clear views to the Proposal over the treetops.

6.4.5 Shadows

Shadows cast by the proposed building have been assessed through the provision of 3D modelling of the building within the landscape. This model was prepared to account for local topography as well as other buildings within the M-Park development. The model does not account for shadows generated by adjacent buildings or vegetation.

Shadows were calculated for the times of year where shadows are longest (21 June) and shortest (21 December). Shadows were also calculated for different times of day, being 9am, midday and 3pm. See **Appendix O** for the full suite of shadow diagrams. Shadows at 3pm on 21 June are shown in **Figure 6-5** below, with shadows at 3pm on 21 December shown in **Figure 6-6**.

Figure 6-5 Shadows generated by the development at 3pm on 21 June

Figure 6-6 Shadows generated by the development at 3pm on 21 December

As can be seen above the influence of shadows from the building are generally limited with the worst case scenario, 21 June, only slightly covering the adjacent building to the southeast (which is also a data centre).

6.4.6 Summary of impact

The extent of sensitivity and magnitude are each assessed and graded as being High, Moderate, Low or Negligible. A matrix is used to combine the ratings for sensitivity and magnitude to provide an overall 'Significance of Visual Effects' rating, described as being High, High-Moderate, Moderate, Moderate-Low, Low or Negligible in relation to the existing environment (refer **Table 6-3**).

Table 6-3 Visual impact assessment matrix

	Magnitude				
Sensitivity		High	Moderate	Low	Negligible
	High	High	High to moderate	Moderate	Negligible
	Moderate	High to moderate	Moderate	Moderate to low	Negligible
	Low	Moderate	Moderate to low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Changes to the view from public places due to the Proposal would only occur along Talavera Road and Khartoum Road within the vicinity of the Proposal. Four viewpoints were used to assess the impact to visual amenity due to the Proposal and found that the changes resulted in assessments between Negligible to Moderate to Low, as shown in **Table 6-4**.

Table 6-4 Summary of visual impact assessment

Viewpoint	Sensitivity	Magnitude	Overall rating
Viewpoint No. 1	Low	Low	Low
Viewpoint No. 2	Low	Negligible	Negligible
Viewpoint No. 3	Low	Moderate	Moderate to low
Viewpoint No. 4	Low	Low	Low

The highest rating was returned from Viewpoint 3, which was due to the higher magnitude of the change than the sensitivity of the receptors. The proximity of the Proposal to the viewpoint (directly opposite the road) and the change in height of the Proposal built form from the existing built form on the site were important factors relating to this rating.

6.4.1 The Proposal within the approved M_Park development

The change in design between the approved and proposed M_Park development includes the reduction of buildings from 5 to 4 and the reconfiguration of buildings within the site (refer **Figure 6-7**).

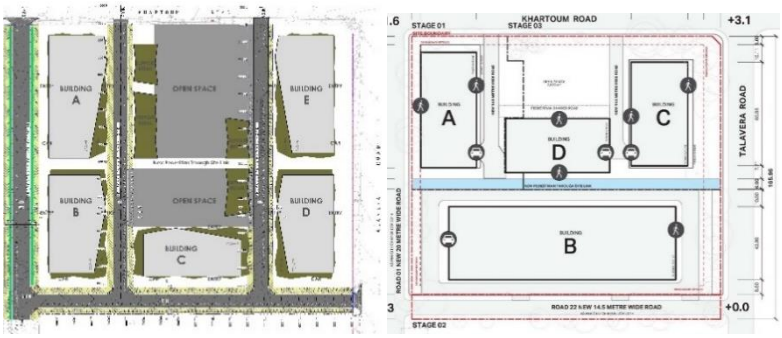


Figure 6-7 The comparison in the approved building arrangement of M_Park (left) with the proposed (right) (Source: Stockland)

While the changes appear (particularly in plan) as an increase in the bulk and scale of built form within the site, from publicly accessible areas (i.e. Khartoum Road and Talavera Road) the change would be less apparent and comprise the following:

- from Khartoum Road the frontages of buildings in the north east and north west corners of the site remain, separated by an internal open space;
- the open space between these buildings would be visually 'shortened' when viewed from Khartoum Road by the shifting of the building in the central portion of the site northwards, resulting in the placement of Building D in the proposed plan;
- Building B in the proposed plan would be predominantly screened by Buildings A, D and C from Khartoum Road and a landscape buffer along the northern edge of Building B;
- from Talavera Road the building frontages seen would be similar in both approved and proposed plans, with the majority of the bulk of the proposed Building B positioned behind the 'short' façade of the building (i.e. the building is viewed along its shorter frontage);
- Building B is positioned further back from Talavera Road than the approved plan, resulting in the retention of existing mature trees which would partially screen the building from the road and visually reduce the bulk and scale of the building.

For these reasons, it is considered that the change in building number and arrangement from the approved to proposed development design within M_Park would not result in a large change to the visual amenity of the site from the public realm.

6.4.2 M_Park within Macquarie Park

Macquarie Park has undergone steady development to become a commercial and economic hub within Sydney. Many corporate headquarters are located within the suburb resulting in the area having a reputation for its high-tech industrial business. The Macquarie Investigation Area is currently the focus of a study being conducted by the NSW Department of Planning, Industry and Environment to deliver a high-level strategic master plan, indicating that the area could be subject to further change.

The area surrounding the Proposal comprises large scale large development lots arranged within a wide street grid. Development lots typically contain several multi storey commercial buildings set within landscaped grounds with onsite parking.

The arrangement of large buildings within a landscaped 'park' setting is typical of existing campuses in Macquarie Park. While it is typically larger than the older buildings in the suburb, Building B positioned within M_Park is considered similar in scale and bulk to other newer developments, such as the Macquarie Square development on Waterloo Road. Within this context, the Proposal within the greater M_Park development is considered visually appropriate.

6.5 Safeguards and management measures

Mitigation measures that would be implemented for the Proposal to address potential landscape and visual impacts are listed in **Table 6-5**.

Table 6-5 Summary of safeguards and management measures

ID	Mitigation measure	Timing
VIA1	The retention of trees along Talavera Road assist in partially screening the proposed built form, helping to 'bed down' the data centre into the landscape.	During construction and operation
VIA2	The inclusion of screening shrubs within the frontage of the building on Talavera Road reduce the visual prominence of the security fencing and partially screen and soften the building from the public realm	During construction
VIA3	The provision of a landscaped 'lid' along the northern side of the site, which would visually soften and screen the built form when viewed from the north.	During operation,
VIA4	Proposed landscaping along Road 22 and Talavera Road includes trees that, when mature, will reduce the visual scale of the building from the public realm as well as from private properties surrounding the Proposal site.	During design and construction
VIA5	The articulated façade design reduces the visual scale of the building.	During design and construction
VIA6	The lighting of the site at the boundary with downward facing lights reduces the visual prominence of the building at night.	During construction and operation

7.0 Geology, soils and contamination

7.1 Secretary's Environmental Assessment Requirements

Table 7-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to geology, soils and contamination impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 7-1 SEARs – Geology, soils and contamination

SEARs requirements	
Geology, soils and contamination	**Where addressed**
The EIS must include: Contamination A detailed assessment of the extent and nature of any contamination of the soil, groundwater and soil vapour, in accordance with State Environmental Planning Policy No. 55 – Remediation of Land	Assessment of contamination of soil and groundwater is provided in **Section 7.3**. Other detail concerning groundwater is available in **Chapter 19 (Groundwater, surface water, flooding and water use**).
An assessment of potential risks to human health and the environmental receptors in the vicinity of the site	Assessment of risks to human health and the environment is provided in **Section 7.3**.
A description and appraisal of any required mitigation and monitoring measures	Mitigation measures are outlined in **Section 7.4.**
Consideration of whether the site is suitable for the proposed development.	Detail of the historical uses of the site and existing contamination potential is provided in **Section 7.2**.
Soils A description of the proposed erosion and sediment controls during construction.	Proposed erosion and sediment controls are outlined in **Section 7.4.**

7.2 Existing environment

7.2.1 Topography

The Site slopes from west (high) to east (low), from a level of approximately 59 metres Australian Height Datum (AHD) to approximately 48 metres AHD with a constant slope gradient of about six per cent between these points.

The site and surrounding area are situated on a regional ridge with higher topographical areas to the south, dipping generally to the north towards Shrimptons Creek, approximately 500 metres west of the Proposal Site, east and west (Golder Associates, 2017).

7.2.2 Geology and soils

The Proposal Site is located within the Sydney basin and is underlain by the Triassic age Ashfield Shale of the Wianamatta Group Bedrock, which is comprised of black to dark-grey shale and laminate (Sydney Basin, 1:100,000 Geological Map, 1983).

A review of the Department of Planning, Industry and Environment (DPIE) NSW Soil and Land Information online mapping tool (eSPADE) indicates that the Proposal Site is located on land mapped within two soil landscapes:

- Glenorie Soil Landscape:
  - soils range from plastic silty clays and heavy clays at the lower soil horizons through to friable loams, silt loams and silty clay loams towards the upper horizons.

  - these soils typically present as high soil erosion hazards, contain impermeable highly plastic soil and are moderately reactive.

- Lucas Heights Soil Landscape:
  - soils range from heavy clays and sandy clays at the lower soil horizons through to loose sandy loams towards the upper horizons.
  - these soils typically present as stony soils with low soil fertility and low available water capacity.

A review of the following databases was undertaken to determine the potential for acid sulfate soils (ASS) to be present within the Proposal Site:

- *Ryde Local Environmental Plan 2014:*
  - no ASS mapping available for the Proposal Site or surrounds – indicates that there is no potential for ASS to be located within the Proposal Site.
- Australian Soil Resource Information System (from CSIRO):
  - extremely low probability of occurrence of ASS
  - low probability of occurrence of ASS
- DPIE ASS spatial data (available on ePlanning Spatial Viewer):
  - not mapped as containing ASS

Based on the above searches, it can be reasonably concluded that ASS will not be encountered within the Proposal Site.

There is no land salinity data available for the Proposal Site. However, the Glenorie Soil Landscape profile indicates that salinity may be associated with two soil horizons below the surface layer of soil.

7.2.3 Site history

Publicly available development approval history for the Proposal site spans back to 2009, This demonstrates that it has been used to accommodate an office/commercial building for over a decade. Using historical imagery from Spatial services NSW it has been identified that the Proposal site featured the following land uses:

- 1940s: small rural/agricultural lot containing several buildings with a mix of cleared land and pockets of vegetation
- 1950s: no considerable change from the 1940s image
- 1960s: no considerable change from the 1940s image
- 1970s: large warehouse-type building located in the central part of the Proposal Site with associated parking
- 1980s: the centrally located warehouse-type building appears to have been expanded to encompass two buildings with a roof that connects both
- 1990s: no considerable change from the 1980s aerial image
- 2000s: the roof or awning between the two buildings has been demolished and the Proposal Site is in its current configuration.

7.2.4 Site ownership

Golder Associates (2017) detail the ownership history of the property that the Proposal Site is located within. The property has been previously owned by private proprietors, from at least 1912 to 1965-66, including a farmer, civil servant, poultry farmer and a fruit grower. Following this, it has been owned by a number of businesses, with a range of tenants occupying the property for commercial purposes from 1982.

7.2.5 Previous environmental investigations

Preliminary In Situ Waste Classification for Proposed Buildings B, C and D

A Preliminary In Situ Waste Classification for Proposed Buildings B, C and D at 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park was undertaken by Douglas Partners in July 2020. For the purpose of this report, the area described as Building B is the location of the Proposal.

The extent of this borehole and soil sample based investigation considered that the depth of excavation required for development of the Site may be up a reduced level (RL) of 42 metres, meaning 42 metres below the existing adopted datum for the Site. A total of 27 locations were sampled as part of the investigation, as shown on **Figure 7-1**. These samples were collected from areas across the Site that were determined likely to represent fill and natural soil conditions. This approach was undertaken to deliver an accurate overview of existing site conditions. Following the collection of samples, the materials were then analysed for their composition. Any materials determined not to consist of virgin excavated natural materials (VENM) were then subjected to the six step procedure outlined in the *NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste, November 2014* (EPA, 2014).

The results of this investigation indicated that materials underlying the Site are comprised (listed from surface to greatest depth):

- Asphaltic Concrete
- Concrete
- Fill
- Clay / Silty Clay
- Shale / Siltstone / Laminite / Sandstone Bedrock.

The fill materials encountered where then assessed according the six step procedure outlined by the EPA Waste Classification Guidelines. The results of this assessment concluded that no asbestos-containing materials (ACM), clinical or related waste, or waste tyres were observed in the test pits. Asbestos was also not detected by the analytical laboratory analysis of fill samples. In addition, the fill was not observed to contain or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances, corrosive substances, coal tar, batteries, lead paint, dangerous goods containers or any putrescible waste. All contaminant concentrations that were measured from the fill samples were within the limiting criteria defined in EPA Waste Classification Guidelines, with the exception of Chromium in a sample taken from one borehole (BH206, at a depth of between 0.1 and 0.2 metres). Toxicity characteristic leaching procedure (TCLP) analysis was undertaken for this exceedance. The TCLP analysis indicated very low leachability potential in this sample. Therefore, the material has been classified as General Solid Waste, and is not considered to require special treatment.

It is noted that a total petroleum hydrocarbons (TPH) detection was encountered in borehole (BH) 207 at a depth of between 2.0 and 2.1 meters above the generally accepted background limits. TPH describes a large family of several hundred chemical compounds that originate as crude oil.

The source of this TPH detection is unknown. As such, the material in the vicinity of BH207 has been excluded classification as VENM.

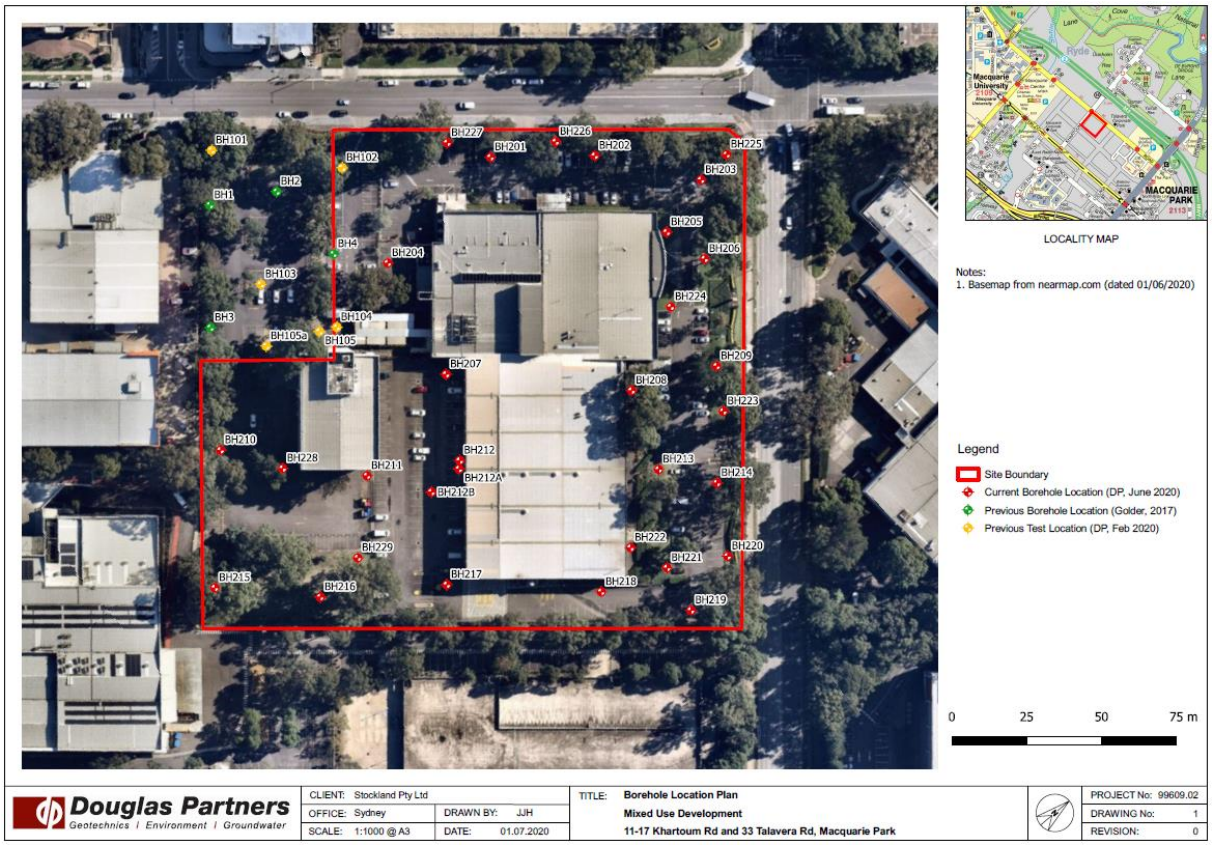


Figure 7-1 Preliminary In Situ Waste Classification location of boreholes (Douglas Partners, 2020)

As part of an asbestos building materials assessment (ABMA) for 11-17 Khartoum Road carried out in 2013, ACM were identified in the following equipment/locations:

- Friable asbestos in fire doors and heater banks
- Non-friable asbestos in friction pads, gaskets and electrical backing boards.

Recommendations for the site were to encapsulate exposed sections of gasket residue located on a condenser pipework flange within rooftop plant room and appropriate labelling of ACM at the site.

Further to the ABMA, CBRE engaged Prensa Pty Ltd to complete an Asbestos Management Plan (AMP) to assist with the management of the ACM at the site. The AMP was generic in nature and provides a framework for the future management of the ACM at the site.

7.2.6 NSW Environment Protection Authority registers

A search of the NSW Environment Protection Authority (EPA) contaminated land record using the suburb search parameter of “Macquarie Park” and “North Ryde” revealed no records of registered contaminated land within the suburb of Macquarie Park.

A search of the NSW EPA-managed *Protection of the Environment Operations Act 1997* (POEO Act public register for licenses, applications, notices, audits and pollution studies and reduction programs, at Macquarie Park and North Ryde identified registered sites with existing licenses (e.g. not surrendered) within 250 metres of the Proposal Site as shown in **Table 7-2**.

Table 7-2 Licensed activities under the POEO Act within 250 metres of the Proposal Site

Licence number	Licensee	Address	Activity	Distance	Direction
6891	Astra Zeneca Pty Ltd	10-14 Khartoum Road, North Ryde	Pharmaceutical and veterinary products production	215 metres	North-west
21247	Metro Trains Sydney Pty Ltd (underground railway line)	47 Tallawong Road, Rouse Hill (note – this is the address of the Licensee)	Railway activities: railway infrastructure operations	169 metres	South-west

A review of the same register for activities that have been subject to a license, notice, audit or pollution study and reduction program, but has since been surrendered, revoked or expired indicates that none within 250 metres of the Proposal Site would be considered likely to present a risk to the Proposal.

7.2.7 Site inspection

A site inspection was undertaken by Golder Associates on 14 March 2017. The key findings relating to geology soils and contamination on site are:

- Diesel generator supported by a 1,000 litre aboveground diesel tank located within a self-contained steel clad unit is located within the wider property
- Small volumes of cleaning and chemicals are located at the property
- A grease trap is located on site to support the café and operates under a trade waste agreement
- A tenant of the existing building generates minor volumes of medical waste from its operations as a medical clinic which is collected by a licensed third party for disposal at an appropriate waste disposal facility.

7.2.8 Existing contamination potential

Potential for contamination has been identified by Golder Associates (2017) and is based on historical and current activities at the Proposal Site. **Table 7-3** illustrates the potential for contamination.

Table 7-3 Potential for contamination and sources

Activity	Potential sources of contamination	Potential contaminants of concern	Risk of contamination
Farming and associated agricultural activities	Storage and use of pesticides, herbicides, fertilisers and fuels	Organochlorine pesticides (OCPs) Organophosphate pesticides (OPPs) Nutrients from fertilisers Heavy metals Total Recoverable Hydrocarbons (TRH) Polycyclic Aromatic Hydrocarbons (PAHs) Benzene, Toluene, Ethylbenzene and Xylenes (BTEXN)	Low – impacts would likely be limited to the surface of the site, which is now mostly sealed with concrete and bitumen.

Activity	Potential sources of contamination	Potential contaminants of concern	Risk of contamination
Existing aboveground diesel storage tank	Storage and handling of diesel	TRH, BTEXN, PAH, heavy metals	Low – the tank is contained with appropriate spill containing measures in place. Also, there was no evidence of spills or leaks at the time of the inspection (Golder Associates, 2017).
Medical clinic	Storage and handling of medical waste	A variety of medical waste streams– clinical, cytotoxic, infectious, corrosive and hazardous (both solid and liquid) Solvents, adhesives	Low – this is reportedly appropriately contained and disposed of.
Filling activities	Imported fill material	TRH, TPC PAHs, BTEX, heavy metals, OCPs, asbestos	Low – fill material is likely limited to the filled and raised areas of the site, constructed sometime between 1982 and 1991. As the site is predominately sealed, there is low risk of exposure to any potential contaminated material. TPH detection was encountered within a small section (10 centimetres) of BH 207, above the generally accepted background limits. As such, Given this exceedance was only detected in one location, and in a very small sample area, the risk of contamination is still considered low.
Construction of buildings	Asbestos building materials	Asbestos	Low - This is currently being managed by an AMP.

7.3 Potential impacts

7.3.1 Construction phase

Potential impacts associated with geology, soils and contamination associated with the construction phase of the Proposal are described in the following sections.

7.3.1.1 Contamination

Construction works could result in potential soil, surface water or groundwater contamination from the following activities, if unmitigated:

- Spills of oils, fuels or chemicals from plant and equipment within the construction footprint
- Importing or backfilling of excavations with spoil which could result in exposure of construction workers and surrounding human and ecological receptors to potential harm if the spoil happened to be contaminated
- Stockpiling of potentially contaminated spoil
- Contaminated material entering onsite or nearby stormwater drainage systems and groundwater.

The risk of contamination impacts associated with existing contaminated materials onsite (i.e. all points above except for spills) is considered to be low, as outlined in **Table 7-3**. This table has considered existing sources of potential onsite contamination and concluded that each source has a low risk rating.

7.3.1.2 Soils

Excavation and other earthworks, if not adequately managed, could result in the following impacts:

- Erosion of exposed soil
- Dust generation from excavation and vehicle movements over exposed soil
- Increase in sediment loads entering the stormwater systems and/or local runoff.

These may affect the quality of nearby sensitive environmental receptors, particularly downstream surface water environments and human receptors. These impacts can be readily managed in with standard management and mitigation measures and as such are considered to be negligible to minor.

7.3.2 Operational phase

Potential operational impacts for the Proposal may arise as a result of the storage of diesel to support the diesel-operated generators within the Proposal Site. The main risks associated with this activity are accidental spills during refuelling or leaks from the storage container. Leaks and spills of fuels can:

- alter the chemistry and composition of receiving surface water and groundwater sources

  Altering the chemistry and composition of those water sources can result in both short-term and long-term environmental affects depending on the amount of fuel that has been introduced. In the short-term, this impact may result in impacts such as the destruction of aquatic flora and fauna and the disruption of the local food chain. Ongoing leaks or spills, or significant volumes of material entering the receiving water may permanently alter the ecosystem within the water and surrounds as the waters become inhabitable for species within those waters

- contaminate local natural areas

  If the fuel were to migrate into natural areas offsite, it may result in soil contamination and the altering of biodiversity processes within that area. This has the potential to result in the destruction of flora and fauna and if the material is significant enough affect the ongoing functioning of the localised ecosystem.

- affect human health

  The prevalence of diesel fuel in surrounding environments including land and waters increases the risk of human exposure and ingestion.

Without mitigation, the risks associated with leaks or spills of diesel fuel upon the receiving environment could be high.

With management and mitigation measures in place, the operation phase of the Proposal is not likely to present ongoing impacts associated with geology, soils or contamination.

7.4 Safeguards and management measures

Mitigation measures that would be implemented for the Proposal to address potential geology, soil and contamination impacts are listed in **Table 7-4**.

Table 7-4 Summary of safeguards and management measures

ID	Mitigation measure	Timing
SC1	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The Plan will identify all reasonably foreseeable risks relating to soil erosion and water pollution associated with undertaking the Proposal, and describe how these risks will be managed and minimised during construction. This will include arrangements for managing pollution risks associated with: • management of fuels, chemicals used in the Proposal • management and handling of waste and litter generated during construction • identification and management of contaminated soils • identification and management and monitoring during and post-construction • response to spillage or contamination on the site and adjoining areas.	Prior to and during construction
SC2	A site-specific Erosion and Sediment Control Plan would be prepared and implemented in accordance with the (*Managing Urban Stormwater: Soils and Construction – Landcom, 2004*) (Blue Book). The Erosion and Sediment Control Plan would be established prior to the commencement of construction and be updated and managed according to the activities occurring during construction.	Prior to and during construction
SC3	Erosion and sediment control measures would be established prior to site establishment activities and would be maintained and regularly inspected during construction (particularly following rainfall events) to ensure their ongoing functionality. Erosion and sediment control measures would be maintained and left in place until construction is complete and areas are stabilised	Prior to and during construction

ID	Mitigation measure	Timing
SC4	The CEMP for the Proposal would include procedures for waste disposal and tracking including testing and disposal of fill, soil and bedrock in accordance with the NSW EPA (2014) Waste Classification Guidelines and applicable provisions under the POEO Act. Work, health and safety controls to prevent exposure of construction workers to contamination would be implemented in accordance with the requirements of the *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2017*	Prior to and during construction
SC5	The CEMP would also include an AMP and an unexpected finds procedure. Unexpected finds refers to contamination that is excavated during construction that was not anticipated based on the findings of the investigations	Prior to and during construction
SC6	Should groundwater be encountered during excavation works it would be managed in accordance with the requirements of the Waste Classification Guidelines (EPA, 2014) and Transport for NSW Water Discharge and Reuse Guidelines	During construction
SC7	Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area	During construction
SC8	Hydrocarbons and chemicals such as fuels, lubricants and oils would be stored on-site in dedicated facilities such as secure sheds, containers, storage tanks and proprietary hazardous substance cupboards, and in accordance with the applicable Safety Data Sheet (SDS)	During construction
SC9	Spill kits appropriate to products used on site must be readily available	During construction
SC10	Spills of fuel, oil, chemicals or the like would be cleaned up immediately, and the site environmental manager would be notified of the location of the incident, extent of the incident and type of material spilled	During construction
SC11	Diesel fuel storage tanks would be designed in accordance with the relevant safety standard for fuel storage tanks so as to prevent leaks. In addition, operational measures would be in place to control the refuelling of the tanks, lowering the risk of spills occurring	During design and operation

8.0 Transport and Traffic

8.1 Secretary's Environmental Assessment Requirements

Table 8-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to transport and traffic impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 8-1 SEARS – Transport and traffic

SEARs requirements	
Traffic and access	**Where addressed**
The EIS must include: • details of all traffic types and volumes likely to be generated during construction and operation (light and heavy vehicles, public transport, pedestrian and cycle trips), including a description of key access routes for each transport mode	**Section 8.4.1** details the effects that the Proposal would have on traffic related issues during construction. This section details the number of light and heavy vehicles that would be generated and outlines their potential effects on the existing road network. This section also outlines potential impacts on public transport and active transport. Access routes are detailed in **Figure 8-4**. **Section 8.4.2** details the affect that that the Proposal would have on traffic related matters during its operational phase.
• an assessment of the predicted impacts of this traffic on the safety and capacity of the surrounding road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar modelling. SIDRA files and a discussion of the calibration/validation process should be provided as part of this assessment	**Section 8.1.1** details the reasons for traffic modelling such as SIDRA not being carried out for the Proposal.
• details of the largest vehicle anticipated to access and move within the site, including swept path analysis	**Section 8.4.2.3** details the size of the largest vehicle that would access the Proposal Site, while **Appendix P** contains the swept-path analysis.
• details of the number of car parking spaces, including justification regarding the level of car parking to be provided on the site	Details of operational parking spaces is provided in **Section 8.4.2.4**.
• detailed plans of the internal road network, parking arrangements and proposed pedestrian and cyclist facilities (including end of trip facilities), in accordance with the relevant Australian Standards	Plans for the internal road network, parking arrangements and proposed pedestrian and cyclist facilities are shown on **Figure 8-5**.
• details of any new roads or access points required for the development.	Details of Road 22 and access points are available in Chapter 3 (Proposal description) and **Section 8.4.2.3**.

8.1.1 Approach

Single intersection models are used at isolated intersections or where the effects of coordination are not required to be modelled explicitly. SIDRA is the most commonly used single intersection modelling software in NSW (Roads and Maritime Services (now Transport for NSW), 2013). This modelling is

used to inform the assessment of project-related effects upon the performance of isolated intersections.

SIDRA modelling was undertaken to support the concept development application (LDA2017/0547) for 11 Khartoum Road, Macquarie Park (Ason Group, 2018). That development proposed to contribute approximately 444 additional vehicles during the AM peak and 355 vehicles during the PM peak. As part of that assessment a 2031 future base case scenario was developed. To assess the impact of that proposed development, the traffic to be generated from that development was applied to the 2031 future base case scenario. that the majority of intersections nearby the Proposal Site would operate at the same Level of Service (LOS) in both the “2031 Base Case” and “2031 Base Case plus concept development” scenarios, albeit with slight increases in average vehicle delay (AVD).

The peak of the construction phase of the Proposal is anticipated to generate 200 construction-related vehicles per day, consisting of 50 heavy vehicle and 150 light vehicle movements which includes construction staff arriving by personal vehicles (refer to **Section 8.4.1**). It is acknowledged that this would result in a temporary increase in traffic numbers within the surrounding road network and at intersections leading toward the Proposal Site. The effect of construction vehicles upon the surrounding road network and at intersections is further alleviated as:

- The arrival and departure of construction-related vehicles would be distributed throughout the day and would not entirely occur during peak travel times
- The majority of construction would be carried out during standard construction hours. Relevantly this means that many construction-related vehicles would arrive onsite prior to 7:00am and leave site after 6:00pm. These arrival and departure times are slightly outside of the beginning of peak road travel times on the road network surrounding the Proposal between 7:00am – 8:00am and 5:00pm – 6:00pm respectively
- A Construction Traffic Management Plan (CTMP) would be developed prior to the commencement of construction, which would detail measures to control the effect of construction-related traffic on the road network surrounding the Proposal Site (refer **Section 8.5**).

It is therefore considered that SIDRA modelling is not required to assess the construction traffic-related effects on the existing road network surrounding the Proposal Site.

The operational phase of the Proposal would provide ongoing employment for 50 staff and has the parking capacity to accommodate 48 vehicles. The number of employees electing to commute to and from the Proposal via private vehicles is anticipated to be less than 48 as a result of its proximity to public transport options (refer **Section 8.4.2**). The Proposal would also include end of trip facilities and bicycle racks which makes active transport a viable commuting option in addition to public transport.

Employees using private vehicles to get to work would have somewhat staggered arrival and leaving times (that may not coincide with peak traffic periods) given the 24/7 operation of the facility. Therefore, it is not anticipated that, of the remaining number of employees who use private vehicles to commute to and from the Proposal Site would be arriving and leaving during peak travel times.

The introduction of Road 22 would create an unsignalised intersection between Road 22 and Talavera Road. All three driveways for the data centre are proposed off Road 22, avoiding the need for accesses off Talavera Road. This would likely reduce the potential for queuing and congestion along Talavera Road. This is especially relevant for heavy vehicles, which would otherwise be required to slow down to a stop on Talavera Road prior to proceeding through the security gates.

Given the very small number of additional vehicles associated with the operation of the Proposal, and noting that these would replace existing movements associated with the existing operational development at the site, the contribution of these private vehicles to local and regional congestion on the existing road network is expected to be negligible. Accordingly, it is not considered necessary to undertake a quantitative assessment of the effect of operational traffic generated by the Proposal. Further detail about operational impacts is provided in **Section 8.4.2**.

8.2 Methodology

A Traffic Impact Assessment Report was undertaken by Ason Group as part of the concept development application for the development of 11 Khartoum Road, Macquarie Park (Ason Group,

2018) (LDA2017/0547). In addition, a Traffic Impact Assessment was also carried out for the amended concept development application for that property (Colston Budd Rogers & Kafes Pty Ltd, 2020) (LDA2020/0229).

Those assessments were used to inform the assessment of traffic and transport impacts of the Proposal.

8.2.1 Intersection performance

As part of Traffic Impact Assessment Report (Ason Group, 2018) SIDRA Intersection modelling was undertaken to determine the existing road network performance of:

- Talavera Road / Khartoum Road
- Waterloo Road / Khartoum Road.

To determine the effect of the development of 11 Khartoum Road as a whole, SIDRA modelling was also undertaken for the intersections in **Section 8.2.2**.

To assess the performance of relevant intersections, SIDRA modelling outputs and the following performance measures were used:

- *Degree of Saturation* (DOS) - DOS is defined as the ratio of demand (arrival) flow to capacity. It is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity, above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity).
- AVD - Delay represents the difference between interrupted and uninterrupted travel times through an intersection and is measured in seconds per vehicle. Delays include queued vehicles accelerating and decelerating from/to the intersection stop lines, as well as general delays to all vehicles travelling through the intersection. The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service.
- LOS - This is a comparative measure that provides an indication of the operating performance, based on AVD. For signalised and roundabout intersections, LOS is based on the average delay to all vehicles, while at priority controlled intersections LOS is based on the worst approach delay.

The recommended baseline LOS criteria is derived from *Guide to Traffic Generating Developments* (Roads and Traffic Authority, 2002).

Table 8-2 Traffic performance criteria

Level of Service	Average delay per Vehicle (sec/veh)	Traffic signals, roundabout
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode
F	More than 70	Unsatisfactory and requires additional capacity.

8.2.2 Study road network

In consultation with Ryde City Council, the following intersections were determined to comprise the study road network of the Traffic Impact Assessment Report:

- Lane Cove Road / Talavera Road
- Talavera Road / Hitech Access Road / Gateway 2000 Access Road
- Talavera Road / Road 22
- Talavera Road / Existing Talavera Site Access
- Talavera Road / Khartoum Road
- Khartoum Road / Northern Site Access (existing)
- Khartoum Road / Central Site Access (existing)
- Khartoum Road / Southern Site Access (existing)
- Khartoum Road / Waterloo Road

8.2.3 Growth rates

The traffic modelling assessment (Ason Group, 2018) adopted the horizon year of 2031 which corresponds with the delivery of Bus Priority and Capacity Improvements for Macquarie Park upgrades. In consultation with NSW Roads and Maritime Service (now Transport for NSW), Ason Group identified anticipated growth rates within the Macquarie Park corridor up to 2026. Those growth rates were adopted up to 2031 and are considered a “worst-case scenario”. The growth rates generally range from 0.8-2.6 per cent, per annum. Using these growth volumes, the traffic volumes in the study road network was determined and forms the “2031 Base Case” assessment scenario.

8.2.4 Traffic generation

A traffic survey of 8 Khartoum Road, Macquarie Park was undertaken (Ason Group, 2018) to develop a ‘trip per parking space rate’. The traffic survey indicates that 8 Khartoum Road, Macquarie Park experiences the following average parking space trip rates:

- 0.45 AM peak trips per parking space
- 0.36 PM peak trips per parking space.

Those peak trips per parking space rates were adopted to inform the Traffic Impact Assessment Report for the wider concept development, and have been adopted for this Proposal.

8.3 Existing environment

8.3.1 Public transport

The Proposal Site is favourably sited nearby bus and Metro stops, resulting in public transport being a readily-available transport mode to and from the Proposal Site. There is an abundance of bus stops near the Proposal Site. **Table 8-3** details the bus stops located within 250 metres of the Proposal Site, and the bus services that use those stops.

Table 8-3 Bus stops within 250 metres of the Proposal Site

Bus stop	Bus services	Approximate distance from Proposal Site (metres)
Talavera Road after Khartoum Road (ID: 211379)	294 – Macquarie University to City Wynyard 506 – Macquarie University to City Domain via East Ryde 562 – Gordon to Macquarie University 565 – Chatswood to Macquarie University	90

Bus stop	Bus services	Approximate distance from Proposal Site (metres)
	572 - Turramurra to Macquarie University via South Turramurra & West Pymble 575 – Hornsby to Macquarie University via Turramurra	
Talavera Road at Khartoum Road (ID: 211374)	294, 506, 562, 565, 572, 575 (refer to service descriptions in the above row)	95
Khartoum Road after Talavera Road (south) (ID: 211375)	259 - Macquarie Centre to Chatswood via Macquarie Park & North Ryde 292 - Marsfield to City Erskine St via Macquarie Park 294, 506, 562, 565, 572, 575 (refer to service descriptions in the first row)	140
Khartoum Road before Talavera Road (south) (ID: 211378)	259, 292, 294, 506, 562, 565, 572, 575 (refer to service descriptions in the above rows)	150
Khartoum Road after Talavera Road (north) (ID: 2113198)	259, 292, 572 (refer to service descriptions in the above rows)	165
Khartoum Road before Talavera Road (north) (ID: 2113197)	259, 292, 572 (refer to service descriptions in the above rows)	160
Khartoum Road after Waterloo Road (ID: 2113214)	259, 292, 294, 506, 562, 565, 572, 575 (refer to service descriptions in the above rows)	220
Khartoum Road before Waterloo Road (ID: 2113215)	259, 292, 294, 506, 562, 565, 572, 575 (refer to service descriptions in the above rows)	225
15 Talavera Road (ID: 211373)	294, 506, 562. 565, 572, 575 (refer to service descriptions in the above rows)	230

In addition to bus stops, the Proposal Site is located approximately 600 metres (as the crow flies) north-west of Macquarie Park Metro Station (approximately 14-minute walk) and approximately 815 metres (as the crow flies) south-east of Macquarie University Metro Station (approximately 12-minute walk). During weekdays, commuters travelling from Chatswood to Macquarie Park Station and Macquarie University Station and from Tallawong Station to Macquarie University Station and Macquarie Park Station can access a Metro service every four minutes during the AM and PM peak, and every 10 minutes outside of peak. **Figure 8-1** illustrates the abundance of public transport options available for access to the Proposal Site.

Figure 8-1 Public transport stops near the Proposal Site

N 0 100 200 m

AECOM

Legend

- Site boundary and Road 22
- Property boundary
- Metro station
- Bus stop
- Railway

8.3.2 Road network and traffic

The existing road network surrounding the Proposal Site consists of a mix of unclassified local roads through to classified main state roads and is illustrated on **Figure 8-2**. The Proposal Site is located within a block of properties that is bounded by Talavera Road along the north-east, Lane Cove Road along the south-east, Waterloo Road along the south-west and Khartoum Road along the north-west. Apart from Lane Cove Road, which itself forms part of a major arterial road in Sydney, the two closest arterial roads are Epping Road to the south and the M2 Motorway to the north.

Talavera Road is an unclassified local road with a north-west to south-east alignment, parallel to the alignment of the M2 Motorway for which Ryde City Council is the relevant road authority. It provides links between Lane Cove Road at the south-east and Herring Road at the north-west. Talavera Road is a four-lane, bi-directional road with a posted speed limit of 50 km/h and has limited on-street parking.

Lane Cove Road is classified as a State road and forms one of the major north-south arterial links in Sydney for which Transport for NSW is the relevant road authority. It provides connectivity to the wider arterial road network, including Epping Road, Ryde Road, M2 Motorway, Victoria Road and Devlin Street. Lane Cove Road is generally a six-line bi-directional road with a posted speed limit of 70 km/h.

Waterloo Road is an unclassified local road with a north-west to south east alignment, parallel to the alignment of Talavera Road for which Ryde City Council is the relevant road authority. It provides links between Lane Cove Road at the south-east and Herring Road at the north-west. Waterloo Road is a four-lane, bi-directional road with a posted speed limit of 50 km/h and has limited on-street parking.

Khartoum Road is an unclassified local road with a north-east to south-west alignment for which Ryde City Council is the relevant road authority. It provides a link between Talavera Road and Waterloo Road and is a four-lane, bi-directional road with a posted speed limit of 50 km/h. Ticketed kerbside parking is generally permitted on both sides of the road with 12-hour parking restrictions between 7 am and 7 pm.

These major roads provide key links into Macquarie Park and carry large volumes of traffic each day. Vehicles travelling along these roads either via Macquarie Park to other destinations or with Macquarie Park as their destination leads to traffic congestion, directly affecting speeds and reliability of travel (Arup, 2015). **Table 8-4** provides the average daily traffic volumes on key roads approaching Macquarie Park for 2018. While 2019 and 2020 data is available, 2018 data was used as traffic count locations for that year are closer to the Proposal Site. Further, 2020 data is not likely to represent usual traffic scenarios as a result of decreased traffic levels due to the Coronavirus (COVID-19) pandemic.

Table 8-4 Average daily traffic volumes on key roads approaching Macquarie Park (Transport for NSW, 2018)

Location	Volume and direction 1	Volume and direction 2	Combined
Lane Cove Road (50 metres south of Ryde Road)	42,825 (northbound)	44,053 (southbound)	86,878
Lane Cove Road (20 metres south of Coxs Road)	25,894 (northbound)	Unavailable	51,788 (estimate)
Epping Road (50 metres north of Yarwood Street)	17,748 (eastbound)	Unavailable	35,496 (estimate)
Epping Road (130 metres south of Rivett Road)	21,366 (eastbound)	24,471 (westbound)	45,837

Figure 8-2 Road network surrounding the Proposal Site

N

0 100 200 m

AECOM

Legend

- Site boundary and Road 22
- Property boundary
- Motorway
- Primary road
- Local road

Source: Imagery © Nearmap, 2020.

8.3.2.1 Existing intersection performance

Under existing conditions, intersections surrounding 11 Khartoum Road, Macquarie Park operate within an acceptable LOS (Ason Group, 2018). It is important to note however, that the intersection of Khartoum Road / Talavera Road is operating at capacity during the AM peak. The existing intersection performance is summarised below in **Table 8-5**.

Table 8-5 Existing intersection performance

Intersection	Period	DOS	AVD	LOS
Waterloo Road / Khartoum Road	AM	0.511	15.1 seconds	B
	PM	0.546	16.8 seconds	B
Khartoum Road / Talavera Road	AM	1.006	57.1 seconds	E
	PM	0.807	38.7 seconds	C

8.3.2.2 Traffic generation

Traffic volume surveys were undertaken at each of the vehicle egress points to 11 Khartoum Road, Macquarie Park, being three driveways along Khartoum Road and two driveways along Talavera Road (Ason Group, 2018). The survey indicates that the property currently generates 144 vehicles per hour during the morning peak and 100 vehicles per hour during the evening peak.

8.3.3 Access

Existing vehicle access to the Proposal Site is available from:

- Two driveways with security boom gates on Talavera Road
- Three driveways with security boom gates on Khartoum Road.

8.3.4 Parking

A limited amount of on-street parking is available on both sides of Talavera Road, fronting the Proposal Site. Parking bays are ticketed and have restrictions of five hours parking duration between 10:00 am and 3:00 pm Monday to Friday. In addition, there is also a limited number of ticketed on-street parking on Khartoum Road. The south-eastern side of Khartoum Road has parking restrictions of 12 hours between 7:00 am and 7:00 pm Monday to Friday, while the north-western side is generally restricted to two hours.

The Proposal Site is currently occupied by a commercial office and warehouse complex with associated at-grade parking. Parking covers a large proportion of the site with approximately 385 spaces available across the full lot i.e. within the footprint of the entire lot.

8.3.5 Bicycle and pedestrian network

There are extensive bicycle and pedestrian connections around the Proposal Site that provide links between key interchanges such as Metro stations and bus stops (refer **Figure 8-3**). These include:

- A line-marked, off-road dedicated shared path along the southern side of Talavera Road (fronting the Proposal Site). This path provides a safe and direct bicycle and pedestrian route within Macquarie Park, linking to public transport infrastructure, the Macquarie Centre and the M2 Motorway (for bicycles)
- A pedestrian path on the northern side of Talavera Road
- Pedestrian paths on both sides of Khartoum Road, similarly linking the Proposal Site to important destinations within Macquarie Park, particularly public transport stops.

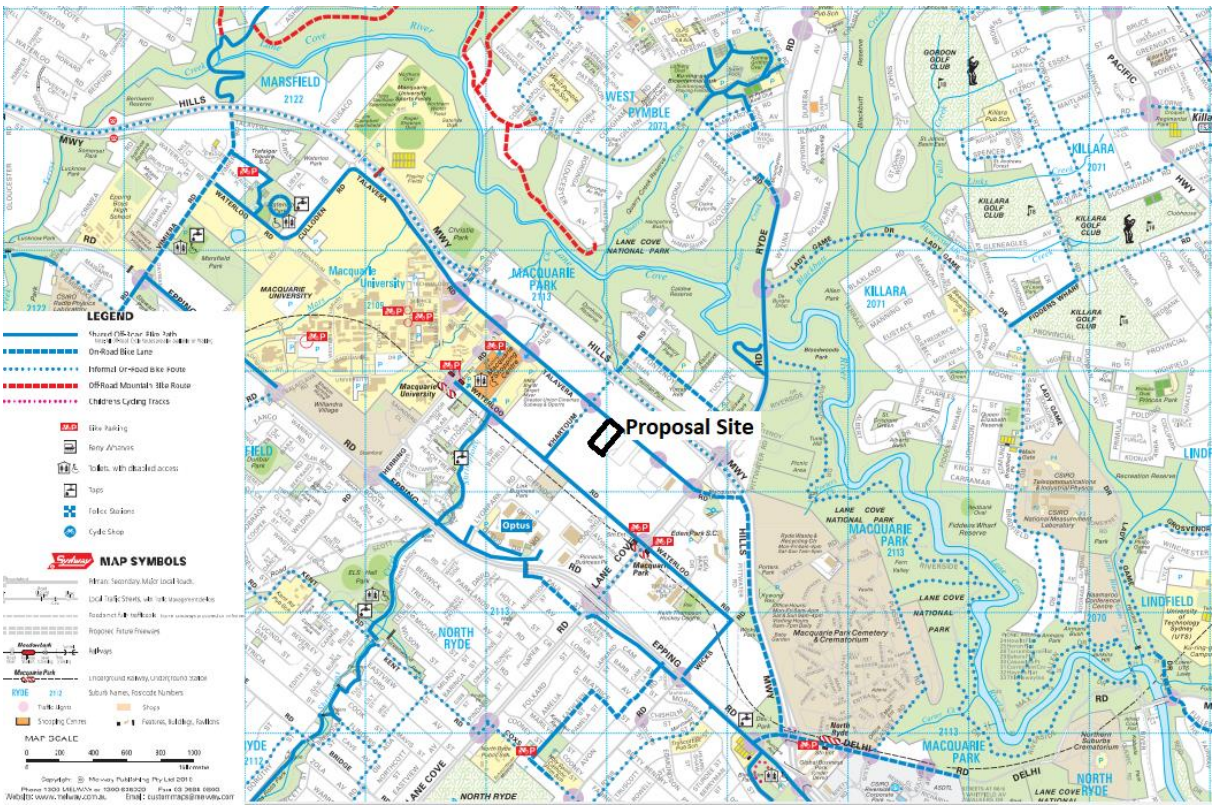


Figure 8-3 Active transport network around Proposal Site (Source: https://www.ryde.nsw.gov.au/Recreation/Cycling)

8.4 Potential impacts

8.4.1 Construction phase

8.4.1.1 Public transport

The availability of public transport interchanges nearby the Proposal Site, including bus stops and two Metro stations, creates an opportunity for construction workers to use public transport to access the Proposal Site as reasonable and feasible. It is estimated that there would be a peak of approximately 250 staff on-site at any one time during construction. It is anticipated that a large proportion of construction staff would utilise public transport to travel to and from the Proposal Site. This would result in a slight increase in the number of people occupying space on public transport options to and from Macquarie Park.

According to Transport for NSW, current extended peak travel times (as a result of COVID-19) for Metro, heavy rail network trains, buses and light rail are:

- 6:30am – 10:00am
- 3:00pm – 7:00pm.

Provided that the majority of construction works would be undertaken during standard weekday construction hours (7:00am – 6:00pm), it is likely that staff travelling on public transport would coincide with peak travel times, which are busier times in terms of people per mode of transport. It is noted that the social distancing recommendations of the COVID-19 pandemic has resulted in more people working from home and therefore less people commuting to work. During the pandemic, impacts upon public transport would therefore be less noticeable in comparison to pre-pandemic travel.

Not all construction staff commuting to the Proposal Site via public transport are expected to travel to the Proposal Site using the same mode of transport, or from the same region, given the availability of both buses and the Metro line. As construction staff using public transport are likely to be spread across different buses and Metro trains, their presence on the respective public transport options would not contribute to an unusual sense of overcrowding on the particular mode of transport. It is not

expected that construction workers would disrupt the ordinary functioning of public transport through their commute to the Proposal Site. Accordingly, the Proposal's construction phase would have a negligible effect upon public transport in the area and regionally.

8.4.1.2 Road network and traffic

At peak construction phases, the Proposal is anticipated to generate up to 50 heavy vehicle movements per day, i.e. 25 entering and 25 leaving. Heavy vehicle routes would avoid local roads and utilise the most direct routes to the Proposal Site as reasonable and feasible and in accordance with the CTMP to be developed for the Proposal. Construction vehicles can access Talavera Road directly from the M2 Motorway, reducing the extent of local traffic generated within Macquarie Park and other nearby arterial roads. In addition, Talavera Road can be directly accessed directly from Lane Cove Road. Construction vehicles travelling to Macquarie Park via Epping Road are able to access Talavera Road via Herring Road or via Lane Cove Road. The exact construction vehicle movements would be determined in consultation with the construction contractor and mandated by the CTMP. Indicative construction vehicle routes are illustrated in **Figure 8-4**.

Given the Proposal Site's unique position in proximity to public transport it is expected that the number of individual construction staff using private, light vehicles to access the Proposal Site would be less than a similar project where public transport options are limited. In addition, it is anticipated that carpooling within light vehicles would be available for construction staff travelling to and from the Proposal Site. On that basis, it is anticipated that the Proposal would generate up to 75 light vehicles arriving and 75 light vehicles leaving the Proposal Site in a day.

As described in **Section 8.3.2**, Macquarie Park already experiences a significant volume of daily weekday traffic. In addition, movements onto Talavera, particularly from Lane Cove Road during AM and PM peak hours, are high. It is therefore expected that approach roads to the Proposal Site that would be utilised by construction traffic, including the M2 Motorway, Lane Cove Road, Epping Road and Herring Road, would already be subject to some degree of traffic congestion during these times.

Construction works would contribute approximately 200 additional vehicles per day, comprised of 50 heavy and 150 light vehicles, to the road network. It is noted that, while the majority of those vehicles would access and leave the Proposal Site during peak traffic hours in the morning and afternoon, some vehicle movements would be undertaken off-peak when congestion is substantially lower. In addition, it is not expected that all construction vehicles would be arriving at and leaving the Proposal Site within close timeframes of each other and would, for the most part, be reasonably staggered and therefore limit the potential to cause congestion.

In the context of the many thousands of vehicles travelling on the arterial roads that would be utilised by construction traffic, the addition of up to 200 vehicles from the Proposal staggered throughout the day is not considered to be significant. Despite this, it is recognised that ultimately, construction vehicles for the Proposal would temporarily contribute to existing localised traffic congestion on roads surrounding the Proposal Site and would therefore have a minor, negative impact upon the existing traffic network. Those impacts would be appropriately mitigated through the measures detailed in **Section 8.5**.

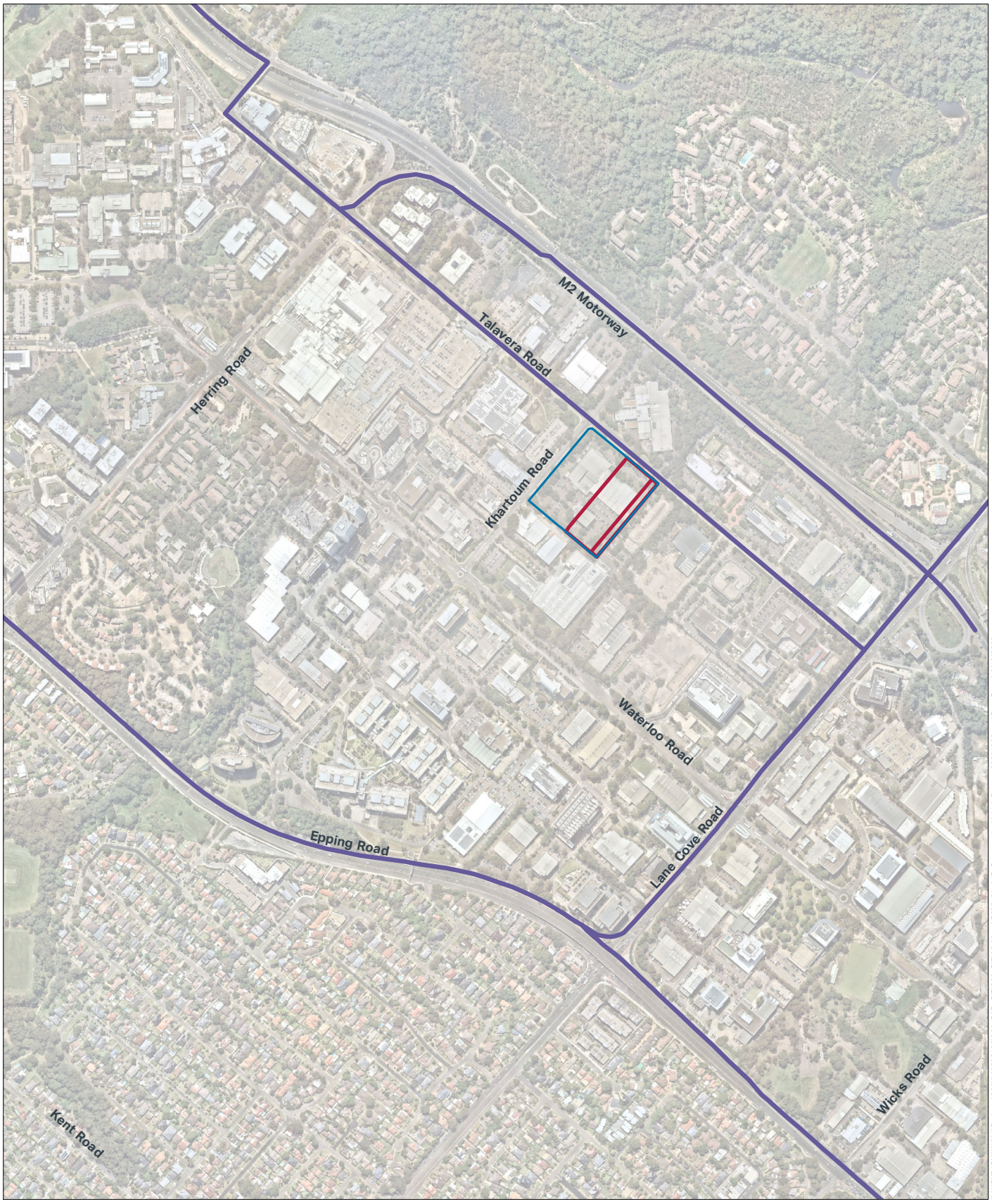


Figure 8-4 Indicative construction vehicle routes for the Proposal

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0 100 200 m

AECOM

Legend

- Site boundary and Road 22
- Property boundary
- Indicative construction vehicle route

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8.4.1.3 Access

Initial access to the construction site would be via existing access points along Talavera Road. During early stages of construction, the Proposal Site would be cleared of buildings and would be readily accessible by all construction vehicles required to access the site. Construction vehicles would enter and exit the site via left turns and right turns into the Proposal Site.

During the later stages of construction, Road 22 would provide the primary access point for the Proposal Site, particularly during the later fitout stages of construction.

Vehicles would access Road 22 from a new non-signalised intersection on Talavera Road. Once on Road 22, there are three access points to the Site:

1. Main entry/exit – the furthest point from Talavera Road along Road 22
2. Truck exit – middle of the three access locations along Road 22
3. Secondary access – closest point from Talavera Road along Road 22.

Access point 1 is a two-way driveway that accommodates entry for light and heavy vehicles. It is only available as an exit for light vehicles. Concurrent vehicle entry and exit movements cannot be accommodated under the planned arrangement due to site constraints. Access point 2 serves as an exit point for heavy vehicles only, as heavy vehicle turning movements cannot be accommodated by access point 1. Access point 3 is provided for emergency, maintenance and construction vehicle access only, with the security gate at this location being kept closed during normal operations.

The operation of the above access points would be somewhat flexible during construction within the bounds of safety for staff and the public.

As the construction progresses, manoeuvrability around the site would change as a result of the building. **Section 8.4.2.3** details manoeuvrability around the Site during the operational phase, which is relevant to later construction stages. In summary, the Proposal Site has adequate space to accommodate vehicles up to 19 metres long, rigid vehicles 12.5 metres long and 300-tonne mobile cranes.

8.4.1.4 Parking

It is anticipated that sufficient parking space would be available within the Proposal Site during construction. Limited on-street parking may be available along Talavera Road for construction staff. Construction staff would be encouraged to travel to site via public transport or car-pool to limit impacts on available parking facilities surrounding the Proposal Site.

8.4.1.5 Bicycle and pedestrian network

To facilitate safe and efficient heavy vehicle movement to and from the Proposal Site, suitably qualified traffic controllers would be utilised. The traffic controllers would temporarily manage the movement of pedestrians and cyclists along the Talavera Road shared-use path fronting the Proposal Site to allow heavy vehicles to exit and enter safely. This would cause very minor and temporary delays to the movements of cyclists and pedestrians, but would ensure their safety.

Road 22 would not be open to pedestrians or cyclists during construction of the road or the Proposal. Temporary pedestrian and cyclist detours (to be developed as part of the CTMP) would be in place along the shared-use path on Talavera Road during the construction of Road 22 to ensure the safety of pedestrians and cyclists.

8.4.2 Operation phase

8.4.2.1 Public transport

The Proposal is not anticipated to affect the public transport network in its operational phase. Staff within the data centre would be encouraged to utilise public transport to travel to work. Those staff would likely access public transport options from different regions. The impact of these additional people on the public transport (estimated as approximately 25 people, or half of the operational workforce), would be negligible in the context of the workers within the commercial offices and warehouse that would be replaced by the development.

8.4.2.2 Road network and traffic

Intersection performance

To assess the impact of the Proposal upon the performance of the surrounding intersections, it is important to understand what the performance of the surrounding intersections would look like in the "2031 Base Case" assessment scenario and the "2031 Base Case plus concept development" assessment scenario. The "2031 Base Case plus concept development" scenario adds the anticipated traffic generation from the original concept development of the site (LDA2017/0547) to the "2031 Base Case" assessment scenario.

Using the average parking space trip rates outlined in **Section 8.2.4**, a total of 987 parking spaces (LDA2017/0547) would generate the following peak hourly traffic volumes:

- 444 vehicles per hour during the AM peak
- 355 vehicles per hour during the PM peak

Having regard to the existing traffic volumes generated from the site (refer **Section 8.3.2.2**), the unamended concept development would have increased traffic generation by 300 vehicles per hour in the AM peak and 255 vehicles per hour in the PM peak.

Intersection performance of the "2031 Base Case" assessment scenario and the "2031 Base Case plus concept development" is presented below in **Table 8-6**.

Table 8-6 Intersection performance under the "2031 Base Case" and "2031 Base Case plus concept development" scenarios

Intersection	Period	2031 Base Case		2031 Base Case plus concept development	
		Average Vehicle Delay (seconds)	Level of Service	Average Vehicle Delay (seconds)	Level of Service
Lane Cove Road / Talavera Road	AM	81.1	F	101.1	F
	PM	101.3	F	102.8	F
Talavera Road / Hitech Access / Gateway 2000 Access	AM	32.5	C	32.9	C
	PM	20.1	B	20.1	B
Talavera Road / Road 22	AM	84.3	F	90.5	F
	PM	128.7	F	1,120.6	F
Talavera Road / Khartoum Road	AM	174.4	F	241.6	F
	PM	121.4	F	144.0	F
Khartoum Road / Northern Site Access	AM	23.4	B	24.4	B
	PM	28.3	B	36.4	C
Khartoum Road / Central Site Access	AM	26.9	B	26.6	B
	PM	23.9	B	35.1	C
Khartoum Road / Southern Site Access	AM	24.0	B	25.1	B
	PM	21.0	B	23.9	B
Waterloo Road / Khartoum Road	AM	29.2	C	49.9	D
	PM	181.6	F	187.4	F

Table 8-6 identifies that the majority of intersections nearby the Proposal Site would operate at the same LOS in both the "2031 Base Case" and "2031 Base Case plus concept development" scenarios, albeit with slight increases in AVD. The key exceptions to that are:

- Talavera Road / Road 22 – experiences a large increase in AVD during the PM peak

- Khartoum Road / Northern Site Access – experiences a reduction in LOS from B to C in the PM peak
- Khartoum Road / Central Site Access – experiences a reduction in LOS from B to C in the PM peak
- Waterloo Road / Khartoum Road – experiences a reduction in LOS from C to D in the PM peak

The large increase in AVD during the PM peak at the intersection of Talavera Road / Road 22 during is primarily due to the increased traffic volumes along Talavera Road and the necessity for right turners (South Approach of Road 22) to cross 4 lanes.

It is clear the Base 2031 projections with projected growth results in network congestion and intersection underperformance however this approach does not accurately account for the evolving nature of the Macquarie Park precinct and the public transport infrastructure projects.

Traffic modelling indicates a number of intersections are forecast to operate above operational capacity in the forecast year 2031. It is evident that even without the subject development, intersections were found to operate at Level of Service F at the year 2031 and that upgrades are required irrespective of any future development at 11 Khartoum Road, Macquarie Park.

It is noted that the effect of the concept development upon the surrounding road network would reduce slightly in line with the reduction in required parking spaces from 987 to 765 as part of the amended concept development application (LDA2020/0229). Under the amended concept development application scenario, traffic generation from the site would be reduced by around 100 vehicles per hour (344 total) during the AM peak and around 80 vehicles per (275 total) hour during the PM. This would result in a slight reduction in traffic effects on the surrounding road network.

Relationship to Proposal

As a standalone development, the Proposal would accommodate 48 car parking spaces and up to 50 staff. Using the average parking space trip rates outlined in **Section 8.2.4**, the Proposal would generate approximately:

- 22 vehicles per hour during the AM peak
- 18 vehicles per hour in the PM peak

Modelling undertaken for significantly greater volumes of traffic generation for the overall concept development of 11 Khartoum Road, Macquarie Park shows minimal changes to LOS and AVD of the surrounding road network compared to the “2031 Base Case” assessment scenario. Having regard to the results of that modelling, the addition of 22 and 18 vehicles per hour during the AM and PM peak periods respectively, would have a negligible effect on the surrounding traffic network.

The location of the Proposal nearby public transport stops including two Metro stations and a number of bus stops also creates an opportunity for staff members to use public transport for commuting to and from work. The viability of public transport use to commute to and from the site is likely to discourage staff members from using private vehicles to commute to and from the Proposal.

Use of public transport and the staggered arrival times of staff because of the 24/7 operation of the Proposal would likely result in a small proportion of staff members of the Proposal choosing to travel via private vehicles during peak morning and afternoon travel times.

Given the very small number of additional vehicles associated with the operation of the Proposal, and noting that these would replace existing operational movements associated with the existing development, the contribution of these private vehicles to local and regional congestion on the existing road network is expected to be negligible.

Deliveries

In addition to regular staff members, the Proposal would occasionally require the delivery of supplies and/or materials and the removal waste etc. These deliveries and removals would utilise different types of vehicles, however the largest anticipated vehicle would be a 19 metre-long articulated truck.

Deliveries and removals are not anticipated to be common, and where reasonable and feasible would be scheduled to occur outside peak travel times.

Road 22

Road 22 would be developed as a cul-de-sac road stemming off Talavera Road as part of this Proposal. In the future Road 22 would eventually link to other, similar local roads to be created as part of other nearby projects in accordance with the Macquarie Park DCP. The effect that these new linkages would create upon the traffic network would need to be assessed as part of those developments.

Road 22 would provide the main access point to the Proposal. The road is expected to service only the data centre initially, with other connections coming on line as part of future developments. Given the small number of buildings and businesses the road would service (and noting the very small number of vehicles associated with the Proposal) congestion on this road, or at the intersection with Talavera Road is expected to be negligible.

Road 22 would become a local road and as it does contribute to or provide a key arterial link around Sydney or Macquarie Park, the addition of this road is not expected to create induced demand for the road network, as it does not necessarily contribute to better overall traffic conditions on the wider road network.

8.4.2.3 Access

Operational access would be consistent with the access arrangements detailed in **Section 8.4.1.2** following the establishment of Road 22.

The site is rectangular, which allows for the flow of vehicles around the building in a one-way, anti-clockwise direction. This allows for movements to be clear and direct, reducing the extent of unnecessary time spent in a vehicle within the operational site and improving safety as vehicle movements are obvious, low speed and predictable.

A swept path analysis (refer **Appendix P**) was undertaken to determine the feasibility of the site for vehicle manoeuvrability in terms of access and circulation. Modelling was undertaken for:

- Entry and exit of vehicles up to 19 metres in length where the vehicle has accessed the site via a right turn into access point 1, has been denied entry, and consequently exits via access point 2
- Entry and exit of vehicles up to 19 metres in length where the vehicle has accessed the site via a right turn into access point 1, access has been granted, the vehicle circulates the building in an anti-clockwise direction and exits the site via access point 1 (vehicles up to 12.5 metres long) or access point 2 (vehicles between 12.5 metres and 19 metres long)
- Entry and exit of a typical light vehicle into/out of access point 1
- A 12.5 metre long heavy rigid vehicle travelling in an anti-clockwise direction around the building and reversing into the loading dock
- A 300 tonne mobile crane entering the site from access point 3, circulating the building in an anti-clockwise direction and exiting the site via access point 2.

This swept path analysis shows that for each of the above scenarios, the Proposal Site has adequate space to accommodate each of the above movements. In addition, the Proposal, through its traffic movements, would not impact on private property access near the site during the operational stage.

8.4.2.4 Parking

A total of 48 car parking spaces would be provided within the site, being a combination of 90 degree angle parking and parallel parking. Three of these spaces would be designated as “small car” spaces and are located along the northern face of the building. One accessible parking space is provided at the southeast corner of the building. Given the proximity of the Proposal to public transport, and the staggered working times of employees, this amount of parking is considered to be sufficient to accommodate all staff who use private vehicles to commute to and from the Proposal.

The internal road network, parking arrangements and proposed pedestrian and cyclist facilities is illustrated on **Figure 8-5**.

8.4.2.5 Bicycle and pedestrian network

The introduction of Road 22 would result in a gap in the continuous shared-use path along Talavera Road. Pedestrians and cyclists would be required to come to a stop before safely crossing Road 22 to the other side of Talavera Road. Kerb ramps would be available on both sides of the shared path to facilitate safe and inclusive access across Road 22.

It is noted that at the completion of the Proposal, Road 22 would be a no-through road. The traffic entering and exiting Road 22 would be mostly for the Proposal and would therefore be relatively low. As a result, the potential for safety issues arising from pedestrians and cyclists crossing this road is expected to be low.

The Proposal would include bicycle racks and end of trip facilities. The availability of bicycle storage and end of trip facilities would ultimately encourage the use of active transport methods to travel to and from the Proposal during its operational phase.

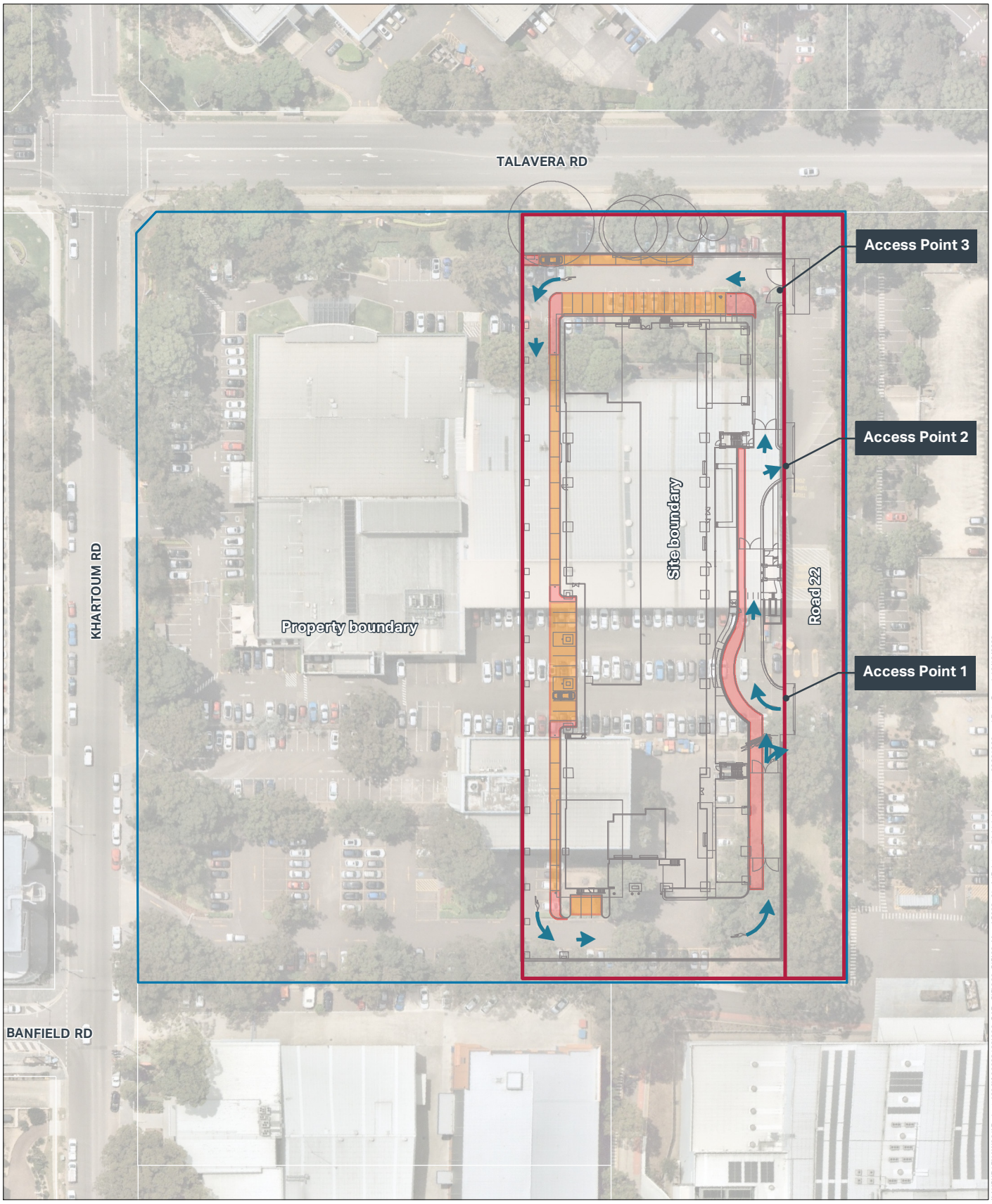

Figure 8-5 Carparking, internal road layout and active transport facilities for the Proposal

0 20 40 m

AECOM

Legend

- Site boundary and Road 22
- Property boundary
- Parking area
- No Parking area
- Vehicle movement direction

Source: Imagery © Nearmap, 2020.

8.5 Safeguards and management measures

Mitigation measures that would be implemented for the Proposal to address potential transport and traffic impacts are listed in **Table 8-7**.

Table 8-7 Summary of safeguards and management measures

ID	Mitigation measure	Timing
TT1	A CTMP will be prepared and implemented as part of the construction environmental management plan (CEMP). The CTMP will include: • Confirmation of haulage routes • Ongoing consultation/coordination with relevant stakeholders (Ryde City Council and Transport for NSW) as relevant to manage impacts • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms • Plans for pedestrian and cyclist detours including communicating changes to pedestrian and cycling routes, provision of linemarking and signage	Prior to and during construction
TT2	A Framework Travel Plan (FTP) will be prepared and implemented as part of the Proposal. The FTP will include: • Strategies and procedures and an Action Plan to meet a 40 percent public transport/ 60 percent private transport target for the Proposal for journey-to-work trips • Information about infrastructure connections to the nearby footpath, bicycle and public transport networks	Prior to and during construction and operation
TT3	Communication would be provided to the community to inform them of changes to or traffic conditions including vehicle movements and anticipated effects on the surrounding road network	Prior to and during construction
TT4	Access for emergency vehicles would be maintained in accordance with relevant requirements. Emergency services would be advised of all planned changes to traffic arrangements prior to applying the changes	During construction

9.0 Noise and vibration impacts

9.1 Secretary's Environmental Assessment Requirements

Table 9-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to noise and vibration impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 9-1 SEARs – Noise and vibration

SEARs requirements	
Noise and Vibration	**Where addressed**
The EIS must include: • A quantitative noise and vibration impact assessment (NVIA) of the development during construction and operation (including testing of the back-up generators). The NVIA must be undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority guidelines and include and assessment of potential impacts to nearby sensitive receivers and cumulative impacts of surrounding development.	A NVIA was prepared to by suitably qualified acoustic engineers in accordance with the relevant Environment Protection Authority Guidelines. The NVIA assesses potential noise and vibration impacts of the Proposal during the construction and operational phases, as well as cumulative impacts as a result of this Proposal and surrounding developments. The NVIA is appended to this EIS (refer **Appendix J**). This chapter of the EIS summarises the findings of the NVIA. The impacts of the Proposal are outlined in **Section 9.4**.
Proposed mitigation, management and/ or monitoring measures.	Mitigation, management and/or monitoring measures are discussed in **Section 9.5**

9.2 Noise and vibration impact assessment

A NVIA has been prepared as part of the EIS (**Appendix J**). The purpose of the NVIA is to identify potential impacts of the Proposal and to outline mitigation measures relating to noise and vibration during and construction and operation of the Proposal. Specifically, the objectives of the NVIA are to:

- Establish the existing background noise levels in the vicinity of the Proposal
- Establish construction noise management levels and vibration limits that would apply to the Proposal
- Predict noise and vibration levels at nearby residential and other sensitive receivers due to the construction of the Proposal
- Predict environment noise and vibration levels at nearby residential and other sensitive receivers due to the operation of the Proposal
- Predict noise levels from additional off-site construction traffic generated by the Proposal recommend mitigation measures, where necessary, to reduce and manage noise and vibration impacts from the Proposal to comply with established noise management levels and vibration limits.

9.3 Existing environment

The Site is located within the Macquarie Park Corridor adjacent to other existing commercial properties to the southwest and the southeast. The Proposal would occupy the south east portion of the site, being around 50 per cent of the total area of the lot. It is understood that other commercial buildings would occupy the north western portion of the site. These building have been assessed as commercial receivers for the purpose of the NVIA.

More broadly, the Site is located approximately 12 kilometres northwest of the Sydney CBD, approximately 850 metres southwest of Macquarie University, and 325 metres southeast of Macquarie Shopping Centre.

Residential and non-residential receivers potentially affected by the construction and operation of the Proposal are located in the suburbs of Macquarie Park and Marsfield. Representative sensitive receivers in proximity to the site is presented in **Figure 9-1**. To assist in determining noise management levels for the receivers surrounding the Proposal, two noise catchment areas (NCA) were identified as part of the NVIA.

For the purpose of undertaking construction noise impact assessment, the noise environment at each residential receiver within an NCA is considered to have a similar noise environment, considering the proximity to existing major noise sources. For operational noise assessments, noise levels are predicted and assessed. The locations of the assessment receivers, along with the associated land use, are provided in **Table 9-2**.

Table 9-2 Receiver locations

Assessment receiver	NCA	Address	Usage
Residential receivers			
R1	NCA 1	32 Khartoum Road, Macquarie Park	Residential
R2	NCA 1	33 Khartoum Road, Macquarie Park	Residential
R3	NCA 1	7 Tasman Place, Macquarie Park	Residential
R4	NCA 1	35-39 Fontenoy Road (West), Macquarie Park	Residential
R5	NCA 1	35-39 Fontenoy Road (East), Macquarie Park	Residential
R6	NCA 1	101-107 Waterloo Road (North), Macquarie Park	Residential
R7	NCA 1	101-107 Waterloo Road (South), Macquarie Park	Mixed Use
R8	NCA 2	80 Waterloo Road, Macquarie Park	Mixed Use
R9	NCA 2	82-84 Waterloo Road, Macquarie Park	Mixed Use
R10	NCA 2	16 Cottonwood Crescent, Macquarie Park	Mixed Use
R11	NCA 2	384-386 Lane Cove Road, Macquarie Park	Commercial
R12	NCA 2	112 Talavera Road, Macquarie Park	Mixed Use
Non-residential receivers			
N1	-	11-17 Khartoum Road (North), Macquarie Park	Commercial
N2	-	11-17 Khartoum Road (South), Macquarie Park	Commercial
N3	-	Excelsia College, 63-71 Waterloo Road, Macquarie Park	Educational
N4	-	North Ryde Early Learning Centre, 24 Talavera Road, Macquarie Park	Childcare centre
N5	-	Macquarie University (School of Engineering), 44 Waterloo Road, Macquarie Park	Educational
N6	NCA 1	Marriot Hotel, 7-11 Talavera Road, Macquarie Park	Commercial

Figure 9-1 NCAs and noise monitoring locations

Long-term unattended measurements at two locations were undertaken to establish the existing ambient and background noise environment at potentially affected receivers in the vicinity of the Proposal site. A summary of the measurement data is presented in **Table 9-3**.

Table 9-3 Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels

Measurement Date	L_{A90} Background Noise Levels, dB(A)			L_{Aeq} Ambient Noise Levels, dB(A)		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
Unit 6, 37 Khartoum Road, Macquarie Park (NCA1)						
Tuesday 10 March 2020	-	46	-	56	58	53
Wednesday 11 March 2020	45	46	37	56	58	50
Thursday 12 March 2020	45	46	38	56	56	52
Friday 13 March 2020	45	43	40	60	54	49
Saturday 14 March 2020	50	46	38	59	57	50
Sunday 15 March 2020	46	44	38	57	57	51
Monday 16 March 2020	48	45	37	59	59	52
Tuesday 17 March 2020	46	43	36	58	66	51
Wednesday 18 March 2020	44	43	39	53	55	50
Thursday 19 March 2020	44	42	38	55	54	50
Friday 20 March 2020	-	-	-	55	-	50
Rating background level (RBL)/Log Average	**45**	**45**	**38**	**57**	**59**	**51**
7 Booth Street, Marsfield (NCA2)						
Tuesday 10 March 2020	-	42	-	60	54	52
Wednesday 11 March 2020	42	42	32	55	55	47
Thursday 12 March 2020	-	41	34	53	51	45
Friday 13 March 2020	41	41	33	52	51	51
Saturday 14 March 2020	-	42	34	53	52	47
Sunday 15 March 2020	-	41	32	54	53	45
Monday 16 March 2020	46	44	33	56	52	46
Tuesday 17 March 2020	42	42	29	55	62	45
Wednesday 18 March 2020	42	41	34	55	52	45
Thursday 19 March 2020	-	-	-	-	-	44
RBL/Log Average	**42**	**42**	**33**	**55**	**56**	**47**

Notes:

1. Day is defined as 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.
2. Evening is defined as 6pm to 10pm Monday to Sunday and Public Holidays.
3. Night is defined as 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

9.4 Potential impacts

9.4.1 Construction noise and vibration

9.4.1.1 Construction noise

A construction noise and vibration impact assessment has been completed for the Proposal. Whilst the development is likely to be completed in multiple stages the assessment has considered a worst-case scenario for the three most noise and vibration intensive stages. The construction scenarios that have been assessed as part of the NVIA are:

1. Site establishment and enabling works
2. Foundations, and
3. Frame and facade.

The NVIA has summarised the outcome of the modelling and reported the number of residential and non-residential properties in each NCA where the noise management levels (NML) are likely to be exceeded during construction. A summary of these results related to residential receivers is provided in **Table 9-4**, with non-residential receivers shown in **Table 9-5**.

Table 9-4 Number of residential buildings where noise levels may exceed NMLs

Scenario	Number of receptors experiencing an exceedance of NML			Highly Affected >75 dB(A)
	1-10 dB(A)	11-20 dB(A)	>20 dB(A)	
NCA1				
Site establishment and enabling works	1	0	0	0
Foundations - Impact piling	63	0	0	0
Frame and Facades	0	0	0	0
NCA 2				
Site establishment and enabling works	0	0	0	0
Foundations - Impact piling	3	0	0	0
Frame and Facades	0	0	0	0

Table 9-5 Number of non-residential buildings where noise levels may exceed NMLs

Scenario	Number of receptors experiencing and exceedance of NML		
	1-10 dB(A)	11-20 dB(A)	> 20 dB(A)
Site establishment and enabling works	3	3	0
Foundations - Impact piling	8	3	0
Frame and Facades	3	0	0

It is evident that a number of the construction activities are expected to exceed the noise management levels at various times during the Proposal's construction. Noise from the impact piling phase is the most noise intrusive. This is due to the use of large plant and nature of the activities. No exceedance of the NML was recorded for scenario three, being 'frame and facades'.

It is important to note that the majority of the noise exceedance for construction activity is between 1-10 dB(A), with only six receptors experiencing exceedances of the NML between 11-20 dB(A). No scenarios generated exceedances greater than 20 dB(A).

9.4.1.2 Construction vibration

Vibration-intensive works that were considered as part of the NVIA included the use of the following items:

- Vibratory rollers
- Piling rigs, and
- Jackhammers.

The minimum working distances of these items of equipment to nearby receivers is summarised in **Table 9-6**. These distances are based on recommendations of the Transport for NSW *Construction Noise and Vibration Strategy* (CNVS).

Table 9-6 Recommended minimum working distances for vibration intensive plant

Plant	Rating/Description	Minimum working distance	
		Cosmetic damage	Human response
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 metres	15 metres
	< 100 kN (Typically 2-4 tonnes)	6 metres	20 metres
	< 200 kN (Typically 4-6 tonnes)	12 metres	40 metres
	<300 kN (Typically 7-13 tonnes)	15 metres	100 metres
Piling Rig	≤800 mm	2 metres nominal	4 metres
Jackhammer	Handheld	1 metre nominal	Avoid contact with structure

Based on the construction activities assessed for the proposed development, works are unlikely to occur within the any of the above minimum working distances. If these minimum working distances are complied with no adverse impacts from vibration intensive works are likely in terms of human response or cosmetic damage.

9.4.2 Operational noise

The Proposal includes several of components that would emit noise on a day to day basis during operation. These include:

- Air handling units (AHU)
- Relief air fans
- Computer room air conditioning units (CRAC), and
- Back-up generators (which would run only intermittently).

Based on the noise sources operational noise levels from the Proposal were predicted at nearby noise sensitive receivers, using SoundPLAN 8.0 (industry standard) noise modelling software, as part of the NVIA. The following assumptions were adopted to support the operational noise modelling:

Normal operations

- All 64 AHUs, 324 Relief air fans, 16 CRAC units operating at full capacity
- During all periods of the day, and
- Neutral weather conditions and adverse weather conditions including:
  - 3 m/s wind from source to receiver
  - F class temperature inversion with a 2 m/s drainage wind.

Periodic testing operations

- All 64 AHUs, 324 Relief air fans, 16 CRAC units operating at full capacity
- One back-up generator operating at full capacity (worst case generator considered i.e. the nearest)
- During daytime only, and
- Neutral weather conditions and adverse weather conditions including:
  - 3 m/s wind from source to receiver
  - F class temperature inversion with a 2 m/s drainage wind.

The predicted noise levels at residential receivers has been summarised in **Table 9-7**.

Table 9-7 Predicted noise levels at residential receivers, dB(A)

Assessment receiver	Weather conditions	Normal operations			Back-up generator testing		
		Predicted level	Criterion[1]	Compliance	Predicted level	Criterion[2]	Compliance
R1	Neutral	40	43	Yes	46	50	Yes
	3 m/s wind	41			46		
	Inversion	41			46		
R2	Neutral	41	43	Yes	47	50	Yes
	3 m/s wind	43			47		
	Inversion	43			47		
R3	Neutral	43	43	Yes[3]	48	50	Yes
	3 m/s wind	44			48		
	Inversion	44			49		
R4	Neutral	41	43	Yes	50	50	Yes
	3 m/s wind	42			50		
	Inversion	42			50		
R5	Neutral	41	43	Yes	47	50	Yes
	3 m/s wind	42			48		
	Inversion	42			48		
R6	Neutral	38	43	Yes	38	47	Yes
	3 m/s wind	39			40		
	Inversion	40			40		
R7	Neutral	38	43	Yes	40	47	Yes
	3 m/s wind	39			41		
	Inversion	39			41		
R8	Neutral	37	38	Yes	44	47	Yes
	3 m/s wind	38			45		
	Inversion	38			45		
R9	Neutral	36	38	Yes	43	47	Yes
	3 m/s wind	37			43		

Assessment receiver	Weather conditions	Normal operations			Back-up generator testing		
		Predicted level	Criterion[1]	Compliance	Predicted level	Criterion[2]	Compliance
	Inversion	37			44		
R10	Neutral	20	38	Yes	24	47	Yes
	3 m/s wind	21			24		
	Inversion	21			25		
R11	Neutral	33	38	Yes	40	47	Yes
	3 m/s wind	34			41		
	Inversion	34			41		
R12	Neutral	29	43	Yes	30	50	Yes
	3 m/s wind	29			31		
	Inversion	29			31		

Notes:
1. Night-time criterion to represent the worst-case scenario
2. Daytime criterion as back-up generators would be testing during the daytime only
3. Exceedances of up to 2 dB are considered negligible. They would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.

Based on the results outlined in **Table 9-7** it is evident that the noise levels at all receivers comply with the criteria under neutral weather conditions. Under adverse weather conditions noise levels at R6 exceed the night-time criterion by up to 2 dB(A) and noise levels at R3 and R7 exceed the night-time criterion by up to 1 dB(A). The *Noise Policy for Industry* (NPfI) states that exceedances of up to 2 dB are negligible and would not be discernible by the average listener and therefore do not warrant receiver-based treatments or controls. It is noted that these exceedances occur under worst-case weather conditions only.

The predicted noise levels at non-residential receivers, based on the same operational assumptions, have been reproduced in **Table 9-8**.

Table 9-8 Predicted noise levels at non-residential receivers, dB(A)

Assessment receiver	Weather conditions	Normal operations			Back-up generator testing		
		Predicted level	Criterion	Compliance	Predicted level	Criterion	Compliance
N1	Neutral	65	63	Yes[1]	65	68	Yes
	3 m/s wind	65			65		
	Inversion	65			65		
N2	Neutral	62	63	Yes	63	68	Yes
	3 m/s wind	63			63		
	Inversion	63			63		
N3	Neutral	48	58	Yes	57	58	Yes
	3 m/s wind	49			57		
	Inversion	49			57		
N4	Neutral	43	58	Yes	52	58	Yes
	3 m/s wind	44			53		
	Inversion	44			53		
N5	Neutral	40	58	Yes	47	58	Yes
	3 m/s wind	41			48		
	Inversion	41			48		
N6	Neutral	37	48[2]	Yes	41	63[3]	Yes
	3 m/s wind	38			41		
	Inversion	38			41		

Notes:
1. Exceedances of up to 2 dB are considered negligible. They would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.
2. Night-time criterion
3. Daytime criterion

It can be seen that noise levels at all non-residential receivers, with the exception of N1 comply with the criteria under all weather conditions. N1 is considered acceptable according to the 2 dB(A) allowance made by the NPfI.

For completeness, the NVIA also considered the impact of traffic movements. The NVIA concluded that, based on the existing traffic noise levels on the adjacent roads and the very small number of operational vehicle movements (less than 50 per day), the operation impact of the data centre on road traffic noise is predicted to be insignificant.

9.5 Safeguards and management measures

Given that some NMLs are likely to be exceeded during construction, reasonable and feasible noise mitigation measures and work practices would need to be considered. Where receivers are predicted to be 'noise affected' the *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009) states that all feasible and reasonable works practices should be applied to meet the NMLs.

Mitigation measures that would be implemented for the Proposal to address potential noise and vibration impacts are listed in **Table 9-9**.

Table 9-9 Summary of safeguards and management measures

ID	Mitigation measure	Timing
NV1	A construction noise and vibration management plan (CNVMP) is to be prepared for each stage of the Proposal's construction. The CNVMP should include: • Identification of nearby residences and other sensitive land uses • Description of approved hours of work • Description and identification of all construction activities, including work areas, equipment and duration • Description of what work practices (generic and specific) would be applied to minimise noise and vibration • A complaint handling process • Noise and vibration monitoring procedures, and • Overview of community consultation required for identified high impact works.	Prior to and during construction
NV2	Periodic notification (monthly letterbox drop or equivalent), website, Proposal Infoline, Construction Response Line, email distribution list and community and stakeholder meetings	Prior to construction
NV3	All employees, contractors and subcontractors are to receive an environmental induction	Prior to and during construction
NV4	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors	During construction
NV5	Attended vibration measurements are recommended at the commencement of vibration generating activities to determine site specific minimum working distances. Vibration intensive work should not proceed within the minimum working distances unless a permanent vibration monitoring system is installed approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS etc.) when vibration levels are approaching the peak particle velocity objective	During construction
NV6	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods. Consideration should be given to avoiding examination periods	During construction
NV7	High noise and vibration generating activities (eg rock breaking) may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block	During construction
NV8	Use quieter and less vibration emitting construction methods where feasible and reasonable. Equipment would be regularly inspected and maintained to ensure it is in good working order	During construction

ID	Mitigation measure	Timing
NV9	The noise levels of plant and equipment must have operating sound power or sound pressure levels that would meet the predicted noise levels Noise emissions should be considered as part of the selection process	During construction
NV10	• Avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver • The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. • Plant used intermittently to be throttled down or shut down • Plant and vehicles to be turned off when not in use. • Noise-emitting plant to be directed away from sensitive receivers	During construction
NV11	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site	During construction
NV12	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work	During construction
NV13	• Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. • Select site access points and roads as far as possible away from sensitive receivers • Dedicated loading/unloading areas to be shielded if close to sensitive receivers • Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible	During construction
NV14	• Schedule and route vehicle movements away from sensitive receivers and during less sensitive times • Limit the speed of vehicles and avoid the use of engine compression brakes • Maximise on-site storage capacity to reduce the need for truck movements during sensitive times	During construction
NV15	Where possible reduce noise from mobile plant through additional fittings including: • Residential grade mufflers • Damped hammers such as “City” Model Rammer Hammers • Air parking brake engagement is silenced	During construction
NV16	The use of less vibration-intensive methods of construction or equipment is preferred where practical to reduce the potential for cosmetic damage. All equipment should be maintained and operated in an efficient manner, in accordance with manufacturer’s specifications, to reduce the potential for adverse vibration impacts	During construction
NV17	Attended vibration measurements are undertaken when work commences, to determine site-specific minimum working distances. Vibration intensive work should not proceed within the minimum working distances unless a permanent vibration monitoring system is installed around one metre from the building footprint, to warn	During construction

ID	Mitigation measure	Timing
	operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.	
NV18	Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.	During construction
NV19	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.	During construction

9.5.1 Monitoring program

In addition to the safeguards and management measures, a monitoring program should be developed which includes attended measurements at the commencement of construction stages, as well as in response to any complaints.

The measurements should be conducted in accordance with the procedures outlined in Australian Standard AS 1055 *Acoustics – Description and measurement of environmental noise* and in accordance with methods outlined in the *Noise Policy for Industry*.

The following monitoring schedule has been recommended in the NVIA and reproduced in **Table 9-10**.

Table 9-10 Construction noise monitoring schedule

Schedule Day	Action
During first month of construction	Complete one round of operator-attended 15-minute noise monitoring at site boundaries and closest residences
	Carry out equipment noise level checks on all critical items of plant and issue Equipment Noise Certificates
During subsequent months of construction period	Carry out equipment noise level checks on any new (untested) items of critical plant and issue Equipment Noise Certificates

As part of the monitoring program the following information should be included in the quarterly reports:

- Field calibration results (before and after measurements)
- Measurement times and dates
- Qualitative description of the noise environment during the measurements
- L_{A1}, L_{Aeq} and L_{A90} levels
- Meteorological conditions during the measurements, and
- Estimation of or recorded noise contribution from other major noise sources.

A system of records which provides full documentation of all noise monitoring results, complaint handling and responses to non-compliances should be established and maintained.

10.0 Air quality

10.1 Secretary's Environmental Assessment Requirements

Table 10-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to air quality impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 10-1 SEARs – Air quality

SEARs requirements	
Air quality	**Where addressed**
The EIS must include: • An assessment of the air quality impacts of the development during construction and operation, prepared in accordance with the relevant Environment Protection Authority guidelines.	An air quality impact assessment (AQIA) was prepared to assess the affects upon air quality that have the potential to arise during the construction and operational phases of the Proposal. The AQIA was prepared in accordance with and in regard to: • *National Environment Protection (Ambient Air Quality) Measure (Cth)* as amended (2003) • *Protection of the Environment Operations Act 1997 (NSW)* • *Protection of the Environment (Clean Air) Regulation 2010* • NSW EPA Approved Methods for both dispersion modelling and air pollutant sampling methods An assessment of air quality impacts (both construction and operation) is provided in **Section 10.2** of this EIS and Section 10 of the AQIA.
Scenarios which assess construction works, realistic operations, back-up generator testing and a justified worst-case scenario.	Section 6.0 of the AQIA
Justification for the proposed back-up power source and any alternatives considered.	Section 2.3 of the AQIA
An assessment of emissions from the back-up generators against the standards of concentration outlined in the Protection of the Environment Operations (Clean Air) Regulation 2010 (including, but not limited to, polycyclic aromatic hydrocarbons (PAHs) and oxides of nitrogen (NO_x) impacts).	Section 3.2.2 and Section 9.1.3 of the AQIA
An assessment of criteria pollutants in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2016).	Section 8.0 and Section 10.0 of the AQIA
Details of any mitigation, management and monitoring measures (including for back-up generators_ required to ensure compliance with section 128 of the *Protection of the Environment Operations Act 1997*.	Management and mitigation measures are outlined in **Section 10.5** of this EIS and Section 10.1.4 of the AQIA.

10.2 Air quality impact assessment

AECOM was commissioned to undertake an AQIA for the Proposal to be constructed at 11 Khartoum Road, Macquarie Park. The AQIA report provided in Appendix I assesses the potential air quality emissions associated with the Data Centre construction activities and the operation of the Data Centre emergency generators.

The objective of the AQIA is to address the requirements of the SEARs issued by the Department of Planning industry and Environment (DPIE).

10.3 Existing environment

The air pollutants of prime interest in NSW are ozone, NO_2 and particulates, with regional levels of certain pollutants approaching or exceeding the national standards prescribed in the National Environment Protection Measure (NEPM) for Ambient Air Quality. When operating, the Data Centre emergency generators are expected to generate substantial levels of Nitrogen Dioxide (NO_2) and particulates (along with smaller quantities of volatile organic compounds (VOC), carbon monoxide (CO) and polycyclic aromatic hydrocarbons (PAH)). NO_2, CO and particulates need to be considered cumulatively with existing background concentration, necessitating an analysis of the background air pollutant concentrations.

Background air pollution is characterised through ambient monitoring undertaken by DPIE at locations throughout the Sydney basin. The closest monitoring station to the Data Centre is the Macquarie Park monitoring station situated at the Macquarie University Sporting Fields approximately 1.8 kilometres to the north northwest of the Data Centre building. This station measures a range of pollutants relevant to this study including:

- Oxides of Nitrogen (including NO_2)
- CO
- Ozone (O_3)
- PM_{10} particulate matter
- $PM_{2.5}$ particulate matter.

Data covering the last three calendar years for the Macquarie Park monitoring station have been extracted from the DPIE online data portal and haven been summarised in **Table 10-2**.

Table 10-2 Macquarie Park Ambient Monitoring Data Summary

Pollutant	Averaging Period	Concentration (µg/m^3)		
		2017	2018	2019
NO_2	1 Hour Max	69.6	56.4	48.9
	Annual Average	9.9	10.5	10.1
O_3	1 Hour Max	178.4	170.5	239.1
	4 Hour Max	155.3	157.8	179.8
CO	1 Hour Max	805.0	5060.0	6785.0
	8 Hour Max	591.4	2694.3	4010.6
PM_{10}[1]	Annual Average	15.1	17.4	20.0
$PM_{2.5}$	24 Hour Maximum	24.1	58.4	152.0
	24 Hour Criteria Exceedances	0	4	19
	Annual Average	6.3	7.0	9.3

1. PM_{10} Data only included for use in construction impact assessment

Monitoring data from the Macquarie Park station shows that NO_2 and CO levels in the ambient environment are well below both current criteria and future criteria; with the maximum short term NO_2 concentration consisting of only 28 per cent of the existing criteria and 42 per cent of the lowest expected future criteria (expected post 2025 criteria). CO concentrations reached a maximum of 23 per cent of the one-hour average CO criterion for the 2019 monitoring year. This value was attributed to the 2019-20 bushfire season which exhibited a much higher than maximum CO concentration for 2017 and 2018, which was 1,035 $\mu g/m^3$ or three per cent of the one-hour average CO criterion.

Particulate concentrations show that levels of dust in the ambient environment around Macquarie Park are elevated with exceedances of short-term PM_{10} and $PM_{2.5}$ criteria noted in both 2018 and 2019. These exceedances are attributed to unusual events like bushfires (particularly in 2019) and dust storms which occurred in both 2018 and 2019. Particulate concentrations during unusual events should not be used as indicators of long term peak particulate concentrations and compliance with EPA criteria.

10.4 Potential impacts

10.4.1 Construction assessment

Construction activities would be expected to generate a small amount of dust and vehicle emissions. Potential impacts from dust generation during construction have been assessed using the UK Institute of Air Quality Management (IAQM), 2014 *Guidance on the assessment of dust from demolition and construction*. The IAQM methodology assesses the risk of impacts associated with demolition and construction without the application of any mitigation measures. The assessment provides a classification of the risk of dust impacts which then allows the identification of appropriate mitigation measures commensurate with the level of risk.

An initial screening assessment was undertaken to identify whether there were any human receptors within 350 metres of the boundary or within 50 metres of the route used by construction vehicles. Construction activity magnitudes and dust sensitivities for the different construction activities are provided in **Table 10-3** and are based on the following assumptions:

- Earthworks volume for a construction site between 52,000 m^3 and 60,000 m^3 with approximately 49,000 m^3 to 57,000 m^3 to be exported from the site
- Construction activities for the Data Centre building alone is expected to be over 100,000 m^3 of building volume
- Track out for the site is expected to consist of from 10-50 heavy vehicle loads per day during the construction period.

Table 10-3 Summary of unmitigated risk assessment for data centre construction activities

Activity	Step 2A: Potential for dust emissions	Step 2B: Sensitivity of area		Step 2C: Risk of unmitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health
Demolition	Medium	Medium	Low	Medium	Low
Earthworks	Medium	Medium	Low	Medium	Low
Construction	Large	Medium	Low	Medium	Low
Track out	Medium	Medium	Low	Low	Low

There are a small number of high sensitivity residential and medium sensitivity commercial buildings within 350 metres from the construction site boundary. The high sensitivity receptors however were located greater than 100 metres from the construction site and the medium sensitivity receptors less than 20 metres from the construction footprint, resulting in an overall dust soiling sensitivity rating of medium.

Given the background concentration of 17.4 $\mu g/m^3$ and the distance to high and medium sensitivity receptors, the sensitivity to human health effects for annual average PM_{10} was rated as low. The potential risks for the overall project were found to be “Medium” to “Low” for construction activities.

10.4.1.1 Non-construction source emissions

The source of non-construction dust emissions during the Proposal construction phase would be due to the combustion of diesel fuel by heavy vehicles, mobile construction equipment and stationary equipment such as diesel generators. Emissions are expected to depend on the nature of the emissions source i.e. size of the equipment, usage rates, duration of operation etc. Pollutants emitted by construction vehicles include CO, particulate matter (PM_{10} and $PM_{2.5}$), NO_2, sulphur dioxide (SO_2), VOCs, and PAHs.

Given the typically transitory nature of construction site mobile equipment, vehicle numbers and the commonly applied mitigation measures expected to be incorporated into the operation of the equipment, adverse air quality impacts from the operation of construction equipment are not expected. On this basis, no further quantification of the potential impacts has been undertaken.

10.4.2 Operation assessment

The area surrounding the proposed data centre is best characterised as a mixture of commercial buildings and high-rise residential towers which are bordered by low-rise residential areas beyond approximately 300 metres – 800 metres from the data centre site. Within the commercial / high rise residential area close to the data centre site, there are a large number of buildings which range in height from approximately five metres to over 40 metres in elevation. The buildings create a highly complex urban canyon region complicating the analysis of plume dispersion. In addition, the buildings on the data centre site itself are expected to form a new urban canyon which also has the potential to affect the dispersion of plumes generated from the testing of the data centre diesel generators.

Given the potential urban canyons and complex air flows formed around the Proposal, the use of a complex dispersion model able to predict concentrations in the near field is required. The common models used for complex modelling scenarios (AERMOD and CALPUFF) do not perform well within 100 metres, in highly complex terrain or around buildings and therefore an alternative model is proposed. Given its ability to provide dispersion concentrations on micro-scale grids within complex building environments, the GRAL model has been used for this assessment.

The results of the dispersion modelling have been presented through predicted concentrations at sensitive receptors and concentration contours for the worst-case emission hours. The following points should be noted when viewing the results:

- Results presented in **Table 10-4** show the predicted pollutant concentrations for the operation of the Data Centre facility. The highest pollutant concentrations predicted for either the 15 minute or one-hour operation of a single generator has been presented

- Concentrations for the different pollutants have been reported as either the maximum concentration (NO_2, CO and $PM_{2.5}$) or the 99.9th percentile concentration (Acetaldehyde, Benzene, Formaldehyde, Toluene, Xylene and PAH as benzo(a)pyrene (BaP)), as per the requirements in the NSW EPA reporting requirements from the Approved Methods for Modelling
- The predicted ground level concentrations have been compared against the relevant air quality criteria for the modelled pollutants. Results are expressed as the maximum incremental ground level concentrations predicted at a receptor location (either sensitive receptor or at or beyond the boundary) for comparison with the EPA criteria
- The results in **Table 10-4** represents ground level receptor concentrations only. Receptor concentrations for all receptor levels modelled (0.5 metres, five metres, 10 metres and 15 metres above ground level) have been included as Appendix E of the AQIA).

It is critical to the assessment to understand that as the Data Centre emergency generators do not operate continuously, the statistics for comparison with the NSW EPA criteria need to be carefully calculated to ensure the results are both representative of worst-case conditions, but also are not unrealistically high.

Table 10-4 Proposal Predictions

Pollutant	Averaging Time	CAT Engine		Cummins Engine		Criteria	Reference
		Maximum ground level concentration (GLC)	Cumulative	Maximum GLC	Cumulative		
NO_2	1 Hour Max	185.6	193.1[1]	187.7	195.2[1]	246	NSW EPA
	Annual	5.4	15.9	6.0	16.5	62	NSW EPA
$PM_{2.5}$	24 Hour Max	1.3	58.4[1]	1.2	58.4[1]	25	NSW EPA
	Annual	0.007	7.0	0.006	7.0	8	NSW EPA
CO	1 Hour Max	188	5248	117.8	5,177.8	30,000	NSW EPA
	8 Hour Max	70.5	2765	44.2	2,738.5	10,000	NSW EPA
VOC							
Acetaldehyde	99.9th Percentile	0.00067	-	0.0072	-	42	NSW EPA
Benzene		0.021	-	0.23	-	29	NSW EPA
Formaldehyde		0.0021	-	0.023	-	20	NSW EPA
Toluene		0.0075	-	0.081	-	360	NSW EPA
Xylene		0.0052	-	0.056	-	190	NSW EPA
PAH as BaP	99.9th Percentile	0.0000028	-	0.000030	-	0.4	NSW EPA

1. Cumulative concentration calculated using contemporaneous background data

The results contained in Section 10.2 of the AQIA, show that all pollutants comply with regulatory limits under all modelling conditions and operating modes. NO_2 concentrations were predicted to be elevated close to the NSW EPA criteria (predicted to reach approximately 78%). All other pollutants were well below their respective criteria with the exception of $PM_{2.5}$, which exceeded its 24-hour average criteria due to elevated background concentrations. The relative contribution from the generators for $PM_{2.5}$ was low with a maximum contribution to $PM_{2.5}$ of approximately 1.2 $\mu g/m^3$. There were no additional exceedances predicted as a result of the operation of the generators due to $PM_{2.5}$ and as such it was not deemed to be of concern. Annual average pollutant concentrations (NO_2 and $PM_{2.5}$) were well below levels of concern and did not add significantly to the background pollutant concentrations.

10.5 Safeguards and management measures

Emissions of air pollutants from construction activities can be mitigated using a range of physical or operational measures designed to minimise both the generation and transport of pollutants away from source of the emissions. In terms of dust emissions from the Proposal, the objective of the mitigation measures is to ensure the Proposal meets a range of air quality performance outcomes. If the outcomes are met, it is expected that the Proposal would achieve an acceptable level of dust generation for the construction activities and minimise adverse impacts on surrounding receptors (receptors refer to residential premises, hospitals, schools etc).

The air quality performance outcomes for the construction phase of the Proposal are as follows:

- Reduction in visible dust moving across the construction footprint boundary
- Limit unnecessary vehicle combustion emissions
- Reduce soil track out onto public roads
- Minimal complaints from receptors in relation to dust emissions.

The performance outcomes would be addressed through the development of a Construction Air Quality Management Plan (CAQMP). A list of mitigation measures which would be implemented as a minimum to achieve the above performance outcomes are provided below in **Table 10-5**. Note that this list of measures is a minimum requirement for the Proposal and additional measures may be required to further reduce potential dust emissions.

Table 10-5 Summary of safeguards and management measures

ID	Mitigation measure	Timing
AQ1	Daily construction activities should be planned to take into account the expected weather conditions for each workday. Regular dust observations to be undertaken of active excavation or stockpiling areas. Aim is to ensure visible dust is not moving offsite and that any areas needing additional measured be identified early. Records of observations should be compiled to enable the demonstration that dust is being managed in an ongoing manner. Records should include (as a minimum) the following: • observation date and time • area being inspected • level of dust being generated • meteorological conditions when observation occurred • mitigation measures undertaken.	During construction
AQ2	Minimise exposed surfaces, such as stockpiles and cleared areas, including partial covering of stockpiles where practicable.	During construction
AQ3	Implement dust suppression measures on exposed surfaces, such as watering of exposed soil surfaces, dust mesh, water trucks and sprinklers to minimise dust generation.	During construction

ID	Mitigation measure	Timing
AQ4	Establish defined site entry and exit points to minimise tracking of soil on surrounding roads. Use wheel washes or shaker grids where the risk of off-site track out of dirt is identified.	During construction
AQ5	Cover heavy vehicles entering and leaving the site to prevent material escaping during transport.	During construction and operation
AQ6	Keep vehicles and construction equipment operating on site well maintained and turned off when not operating (minimise idling on the site).	During construction and operation
AQ7	Minimise the handling of spoil when excavating and loading of vehicles.	During construction

11.0 Non-Aboriginal heritage

11.1 Secretary's Environmental Assessment Requirements

Table 11-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to non-Aboriginal impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 11-1 SEARs – Non-Aboriginal heritage

SEARs requirements	
Aboriginal and non-Aboriginal cultural heritage	**Where addressed**
The EIS must include: • An assessment of potential impacts on State and local heritage items in the surrounding area	An assessment of potential impact of State and local heritage items is provided in **Section 11.3** of this chapter.

11.2 Existing environment

11.2.1 Desktop searches

A desktop search of relevant heritage registers was undertaken to determine whether non-Aboriginal heritage items are located at or around the Proposal. This involved a search of the following heritage registers:

- World Heritage List
- National Heritage List
- Commonwealth Heritage List
- Register of the National Estate (non-statutory)
- NSW State Heritage Register
- *Ryde Local Environmental Plan 2014* (Ryde LEP).

The results of these searches are presented below in **Table 11-2**. This indicates that no items of non-Aboriginal heritage significance exist within the Proposal Site. The register search was extended beyond the Proposal Site to 1.5 kilometres to establish if there were surrounding registered items or conservation areas that may be affected by the Proposal. These items are also presented in **Table 11-2**.

Table 11-2 Non-Aboriginal heritage items nearby the Proposal

Heritage register	Item	Distance from Proposal	Significance
World heritage list	N/A	N/A	N/A
National heritage list	N/A	N/A	N/A
Commonwealth heritage list	N/A	N/A	N/A
Register of the National Estate (non-statutory)	N/A	N/A	N/A
NSW State Heritage Register	Macquarie Ice Rink	725 metres	State – Interim Heritage Order

Heritage register	Item	Distance from Proposal	Significance
Ryde LEP	Lane Cove National Park	Varies – closest point is approximately 500 metres	Local – Item Number 59 and 60
	Macquarie University (ruins)	Approximately 750 metres	Local Item Number 10
	Macquarie Park Cemetery and Crematorium	1.4 kilometres	Local – Item Number 44

11.2.2 Historical context

Aboriginal people inhabited the Sydney basin for thousands of years prior to the arrival of Europeans. The northern coastal area of Sydney was home to the Guringai people, western Sydney was home to the Dharug clans, and southern Sydney was inhabited by the Dharawal clans. The City of Ryde Council area is commonly accepted to be Wallumedegal country (various spellings).

The suburbs known today as North Ryde and Macquarie Park were formed from the Field of Mars Common, an area of 5,050 acres (2,044 hectares) declared in 1804 by Governor King as one of six ‘commons’ in the Colony, to be used for the grazing of livestock by local residents. The Common followed the path of the Lane Cove River and consisted mainly of heavily timbered bush.

A regular grid pattern of streets was laid out and the land away from the river was subdivided into small farms of between 0.4 and 1.6 ha, with areas reserved for open space and special purposes such as the Northern Suburbs Cemetery, established in 1922.

Most of the area remained in small rural holdings which was formalised by the creation of the County of Cumberland’s Planning Scheme in 1949 and which identified the area as part of Sydney’s Green Belt. By the mid-1960s there was increasing demand for the release of land for development and much of Macquarie Park was zoned to provide a light industrial ‘business park’ for scientific and technological industries that would support the newly established Macquarie University (Heritage NSW, 2020).

Today, Macquarie Park is a hub for innovation and employment and supports a range of industries including technology, communications, pharmaceuticals, health, education and various retail sectors (City of Ryde, 2019).

Publicly available development approval history for the Proposal Site spans back to 2009. This history indicates that the site has been used to accommodate an office/commercial building for over a decade. Using historical imagery from Spatial services NSW has identified that the Proposal Site featured the following land uses:

- 1940s: small rural/agricultural lot
- 1950s: no considerable change
- 1960s: no considerable change
- 1970s: large warehouse-type building
- 1980s: expanded warehouse-type building
- 1990s: no considerable change
- 2000s: reduction in size to main building – layout matches current.

11.2.3 Archaeological potential

The Proposal Site has been subject to extensive excavation and earthworks from the 1970s. These earthworks would have likely removed any potential non-Aboriginal heritage items that may have existed beneath the existing ground level. Accordingly, there is very low potential for significant non-Aboriginal archaeological remains to be present.

11.3 Potential impacts

11.3.1 Construction phase

The Proposal would not involve the removal or demolition of any buildings, as these will have been removed by a separate development consent. The Proposal Site is not located in the immediate vicinity of any items of non-Aboriginal heritage significance. The opportunity for both direct and indirect impacts to the heritage items outlined in **Table 11-2** is therefore extremely low.

Earthworks required for the Proposal would result in relatively deep excavation of up to nine metres at one end to accommodate a level site for the data centre. Although the archaeological potential of the Proposal Site is very low, the potential of uncovering items that are archaeologically significant cannot be completely ruled out. The implementation of mitigation measures detailed in **Section 11.4** would reduce the extent of impact that excavation works would have on unexpected heritage items.

Overall, the Proposal is expected to have a negligible impact to non-Aboriginal heritage during the construction phase.

11.3.2 Operation phase

If approved, the Proposal would result in the establishment of a 45 metre high building. Listed heritage items outlined in **Table 11-2** are not located in positions where the normal operations of the Proposal could result in direct impacts to those heritage items or their level of significance. In addition, the Proposal would not be located in the view line of any of the abovementioned heritage items and would not impede on the view to those heritage items. As such the Proposal would have a negligible impact upon non-Aboriginal heritage during its operational phase.

11.4 Safeguards and management measures

The safeguards and management measures outlined below in **Table 11-3** would apply to this Proposal to manage any unanticipated impacts of the Proposal upon non-Aboriginal heritage.

Table 11-3 Summary of safeguards and management measures

ID	Mitigation measure	Timing
NAH1	In the event that any unanticipated archaeological deposits are identified within the project site during construction, works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the Project Manager and the Environment and Planning Manager so they can assist in co-ordinating the next steps, which are likely to involve consultation with an archaeologist and Heritage NSW. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location	During construction
NAH2	The Construction Environmental Management Plan (CEMP) should include stop work procedures to manage activities in the unlikely event that intact archaeological relics or deposits are encountered.	During construction

12.0 Aboriginal heritage

12.1 Secretary's Environmental Assessment Requirements

Table 12-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to Aboriginal heritage impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 12-1 SEARs – Aboriginal heritage

SEARs requirements	
Aboriginal and non-Aboriginal cultural heritage	**How addressed**
The EIS must include: • Identification and assessment of potential impacts on Aboriginal cultural heritage values, including a description of any measures to avoid, mitigate and/or manage any impacts. Justification for reliance on any previous Aboriginal Cultural Heritage Assessment Report or other heritage assessment for the site must be provided	An assessment of potential impacts on Aboriginal cultural heritage values has been carried out through an Aboriginal Heritage Due Diligence Assessment (**Appendix K**) which is summarised in **Section 12.3**. The assessment concluded that the overall archaeological sensitivity of land within the Proposal Site is considered to be low. The potential for impacts to Aboriginal objects to occur during works is likewise assessed as low (refer **Section12.4**). This EIS did not rely upon previous Aboriginal Cultural Heritage Assessment Reports or other heritage assessments.

12.2 Methodology

This EIS has considered the SEARs provided as per Section 4.12(8) of the *Environmental Planning and Assessment Act 1979* and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* under Application #SSD-10467 for the Proposal. Those requirements stated in relation to heritage that there should be "identification and assessment of potential impacts on Aboriginal cultural heritage values, including a description of any measures to avoid, mitigate and/or manage any impacts. Justification for reliance on any previous Aboriginal Cultural Heritage Assessment Report or other heritage assessment for the site must be provided".

The Department of Planning, Industry and Environment (DPIE) provided further clarification on the SEARs via email on 23 July 2020, noting the highly disturbed nature of the site. As such DPIE recommended that a suitably qualified professional be engaged to undertake an assessment of the proposed development and any potential impacts upon Aboriginal cultural heritage values or objects, including a description of any measures to avoid, mitigate and/or manage any impacts. The assessment was recommended to:

- include sufficient detail that is proportional to the predicted impacts;
- be informed by any previous Aboriginal Cultural Heritage Assessment Reports prepared for the site or other projects in the surrounding area (if available); and
- justify the level of consultation undertaken with Aboriginal people, at a minimum including direct consultation with the relevant Local Aboriginal Land Council (LALC) and a site inspection (where possible, noting COVID-Safe workplace requirements).

An Aboriginal Heritage Due Diligence Assessment (AHDDA) was prepared by AECOM to identify and assess both known Aboriginal sites and areas of archaeological potential that could potentially be affected by the Proposal. The AHDDA included:

- A search of the Aboriginal Heritage Information Management Service (AHIMS) database;
- Background research into the historical development of the Proposal Site using primary and secondary historical sources, as relevant and available;
- Consultation with the Metropolitan Local Aboriginal Land Council (MLALC) regarding the Aboriginal cultural values of the Proposal Site; and
- A site inspection undertaken on 15 September 2020 by AECOM archaeologist Dr Darran Jordan and MLALC representative Selina Timothy.

The results of the findings of the AHDDA have been used to inform the assessment of impacts to Aboriginal heritage within this Environmental Impact Statement.

12.3 Existing environment

12.3.1 Landscape context

Consideration of the landscape context of the Proposal Site is based on the proposition that the nature and distribution of Aboriginal archaeological materials are closely connected to the environments in which they occur. Environmental variables such as topography, geology, hydrology and the composition of local flora and fauna communities will have played an important role in influencing how Aboriginal people moved within and utilised their respective Country.

The topography of the Proposal Site has been heavily modified by development. It is likely that prior to modifications for development in this area it would have been predominantly midslope, rather than the current mix of slopes and flats. Although midslopes can contain Aboriginal sites, as they can occur in any landform, the gradient is more indicative of past use as a transitory area rather than for habitation. The Site is not, therefore, identified as being an archaeologically sensitive area in relation to landform.

No watercourses are present within the Proposal Site or in its immediate vicinity, although watercourses are present in the surrounding region. The closest named water source is Shrimptons Creek, a first order tributary of Terrys Creek. The lack of a permanent water source within or in close proximity to the Proposal Site suggests that the area is not archaeologically sensitive.

There are no known sources of raw material within the bounds of the Proposal Site known or likely to have been utilised in stone tool manufacture.

The intensive development activity that has previously occurred within the Proposal Site is likely to have resulted in high levels of disturbance to the soil deposits across the Proposal Site.

The Proposal Site has been cleared of all vegetation during past development, with the only vegetation currently present consisting of regrowth trees and garden plantings around the periphery of the property and in a grassed area in the southern-most corner of the property, used as a recreation and lunch area for staff at the current facility. The extensive nature of past impacts is such that the exact nature of the original native vegetation cannot be determined.

From the 1990s to the 2010s the Proposal Site had already been subject to high levels of ground disturbance to clear the area, construct industrial buildings and their associated infrastructure, as well as roads and car park areas around and connecting the facilities. It is likely that the high levels of past disturbance would have destroyed or disturbed any Aboriginal sites that may have been present within this area.

12.3.2 AHIMS

An AHIMS search for registered sites within the vicinity of the Proposal Site was completed on 10 July 2020 (AHIMS Search #519478) (see Appendix A of the AHDDA (**Appendix K**)). The search consisted of a seven kilometres by 12 kilometres (84 km^2) search area centred on the Proposal Site.

A total of 102 sites were identified in the search results, comprising 23 rockshelters, 21 areas of Potential Archaeological Deposit (PAD), 19 art sites, 11 grinding groove sites, nine middens, eight

engravings, five artefact scatters and four isolated artefacts. There were also two sites that had been reassessed since their initial recording and redesignated “Not a Site” (i.e., not of Aboriginal origin).

It should be noted that past experience has shown that the AHIMS database has errors and omissions, meaning that relevant sites need to be ground tested for verification, however there are no previously recorded sites within the bounds of the Proposal Site. The next nearest site to the Proposal Site is 700 metres to the east, being 45-6-2653. A summary of all AHIMS sites located within 1.5 kilometres of the Proposal Site is summarised in the AHDDA (**Appendix K**).

12.3.3 Previous Aboriginal Heritage Investigations

Available data, including the results of searches of the AHIMS database, indicate that very few Aboriginal archaeological investigations have been carried out in the general vicinity of the Proposal Site, with none in the Proposal Site itself. This is due to the high levels of disturbance caused by past development, with it having been developed since at least 1978 as an industrial area. The two most relevant past assessments are summarised in the AHDDA (**Appendix K**).

12.3.4 Consultation

Consultation for this Aboriginal archaeological due diligence assessment was undertaken with MLALC. Field representative Selina Timothy participated in the fieldwork and provided a separate report noting that no sites or PADs were identified within the Proposal Site. A summary of the findings of that report is available in the AHDDA, while the full report is appended to the AHDDA as “Appendix B” (refer **Appendix K**).

12.3.5 Visual Inspection

A site inspection of the Proposal Site was undertaken by Principal Archaeologist Dr Darran Jordan on 15 September 2020. The Proposal Site was found to be highly modified and disturbed. No Aboriginal objects or areas of PAD were identified during the inspection.

MLALC representative Selina Timothy attended the inspection on the day and did not note any sites or specific areas of cultural value within the Proposal Site. Selina noted however, that the area would in the past have been part of a connected cultural landscape used by Aboriginal people, as attested by the presence of previously recorded sites in the surrounding region, particularly those associated with nearby waterways like Shrimptons Creek and the Lane Cove River.

The following key observations were made during the site inspection:

No Aboriginal objects or areas of PAD were identified

Archaeological sensitivity and ground integrity across the Proposal Site were confirmed as being low due to a combination of non-sensitive landform areas and high levels of past disturbance.

12.4 Potential impacts

12.4.1 Construction phase

During the construction phase of the Proposal, excavations would be undertaken to create a level surface to appropriately build the structure and for concrete foundations to be installed. Considering the nature of landform and the extent of past disturbances across the Proposal Site, as well as the results of MLALC consultation and past Aboriginal assessments for the surrounding area, the overall archaeological sensitivity of land within the Proposal Site is considered to be low. The potential for impacts to Aboriginal objects to occur during works is likewise assessed as low.

12.4.2 Operation phase

The operation of the Proposal would not result in any ongoing impacts to Aboriginal heritage

12.5 Safeguards and management measures

Mitigation measures that would be implemented for the Proposal to address potential Aboriginal heritage impacts are listed in **Table 12-2**.

Table 12-2 Summary of safeguards and management measures

ID	Mitigation measure	Timing
AH1	All construction staff should undergo a heritage induction, including information such as the importance of Aboriginal cultural heritage material and places to the Aboriginal community, as well as the legal implications of removal, disturbance and damage to any Aboriginal site	Prior to and during construction
AH2	In the event that Aboriginal items, including possible human skeletal material (remains), are unexpectedly identified during works, all works in the area must cease immediately and a heritage specialist be consulted to assess the significance of the unexpected find and determine appropriate measures to follow. A stop work procedure relating to Aboriginal heritage should be included within the Proposal's construction management plan and presented during the heritage induction	during construction

13.0 Biodiversity

This chapter provides an assessment of the biodiversity impacts associated with the Proposal.

Table 13-1 sets out the Secretary's Environmental Assessment Requirements (SEARs) relevant to biodiversity, and where these requirements have been addressed in this Environmental Impact Statement (EIS).

Table 13-1 SEARs – Biodiversity

SEARs Requirement	Where and addressed
Biodiversity	**How addressed**
An assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.	A BDAR waiver has been prepared for the Proposal, seeking an exemption from the requirement to prepare a BDAR for the Proposal. The BDAR waiver is provided in **Appendix L** and is discussed in more detail in **Section 13.1.1** An assessment of potential biodiversity impacts during the construction of the Proposal is provided in **Section 13.3**. An assessment of potential biodiversity impacts during the operation of the Proposal is provided in **Section 13.3.2**.

13.1 Assessment approach

13.1.1 Legislative and policy context

The biodiversity assessment has been undertaken in accordance with the following legislation and statutory planning instruments:

- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Biodiversity Conservation Act 2016* (BC Act)
- *Water Management Act 2000* (WM Act)
- *Biosecurity Act 2015*
- *Fisheries Management Act 1994.*

Under the EPBC Act, an action (or project) that may have a significant impact on a matters of national significance (MNES) is to be referred to the Department of Agriculture, Water and the Environment (DoAWE) for determination as to whether or not it is a controlled action. If deemed a controlled action the project is assessed under the EPBC Act for approval and can only proceed with the approval of the Commonwealth Minister for the Environment. As the Proposal is unlikely to have a significant impact on MNES referral to DoAWE for approval is not required. An assessment of the potential for the Proposal to impact MNES is provided in this chapter.

Policies and guidelines

The SEARS for the Proposal specify that an assessment of the Proposal's biodiversity impacts include the preparation of a BDAR, except where a waiver for preparation of a BDAR has been granted.

A BDAR waiver was prepared for the Proposal and submitted to the Department of Planning, Industry, and Environment (DPIE) on 1 October 2020. A response in the form of a BDAR waiver was provided by DPIE on 21 October 2020.

As such, for the purpose of assessing the potential biodiversity impacts of the Proposal, the completion of a BDAR is not required.

Despite a BDAR not being required, this biodiversity assessment has been prepared to quantify and describe the biodiversity values within the site construction boundary, to assess the potential for biodiversity impacts as a result of the construction and operation of the Proposal and, where required, provide appropriate management measures to avoid, reduce or mitigate any identified impacts.

13.1.2 Methodology

Biodiversity study area

For the purposes of this biodiversity assessment, the biodiversity study area comprises the Proposal Site and a 200 metre area surrounding the Proposal Site. A 200 metre buffer has been applied to provide an assessment of potential indirect biodiversity impacts. Indirect biodiversity impacts that have been investigated as part of this assessment include potential changes to the existing noise environment, changes to local air quality, and light spill.

Desktop assessment

A desktop assessment was undertaken to establish the existing conditions within the biodiversity study area. Searches were conducted to determine the potential presence of threatened species, populations or ecological communities listed under the BC Act, FM Act, and the EPBC Act.

The desktop assessment included a review of the following information sources, databases and aerial photography and spatial datasets:

- Atlas of NSW Wildlife (200 metre radius search) (Environment, Energy and Science Group (EES), 2020)
- EPBC Act Protected Matters Search Tool (PMST) (one kilometre radius search) (DoAWE, 2020)
- Vegetation of South East NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al, 2010)
- Biometric vegetation types of the Shoalhaven, Eurobodalla and Bega Valley local government areas geographic information system (GIS) layer (Office of Environment and Heritage (OEH), 2013)
- NSW Vegetation Information System (VIS) (VIS classification database) (OEH, 2015a)
- A review of Google Street View photography
- Bureau of Meteorology Atlas of Groundwater Dependent Ecosystems (Bureau of Meteorology (BoM), 2020)
- NSW Threatened Species Profile Database (OEH, 2015b).

A number of previously prepared reports for studies conducted within or immediately adjacent to the biodiversity study area and immediate surrounds were also reviewed as part of the desktop assessment.

Utilising the information sources detailed above, an assessment of the potential direct and indirect impacts of construction and operation on biodiversity in and around the Proposal Site was undertaken. Where required, appropriate mitigation and management measures were then identified to avoid or minimise impacts on biodiversity that may arise as a result of the construction and operation the Proposal.

The Proposal is located within a heavily urbanised environment characterised by ongoing commercial and light industrial development. The design of the Proposal has considered and adopted impact avoidance and minimisation strategies. As such, the subsequent likelihood for potential impacts on terrestrial vegetation, fauna and their associated habitats is considered to be minimal. For these reasons a targeted biodiversity field survey has not been undertaken for the Proposal.

13.2 Existing environment

13.2.1 Landscape features

The landscape features within the biodiversity study area have been identified in accordance with Section 4.3 of the Biodiversity Assessment Method (BAM) (requirements for site based developments).

Bioregions and landscapes

The biodiversity study area is located within the Pittwater Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the Sydney Basin IBRA bioregion. The boundary at which the Cumberland IBRA subregion commences is located about 500 metres south of the Proposal Site, near Epping Road. Generally, the geological features of the Pittwater IBRA subregion comprise Triassic Hawkesbury Sandstone with thin ridge cappings of Ashfield Shale, Narrabeen sandstones in valleys and along the coast, and Quaternary coastal sands. Soils across the subregion comprise deep yellow earths or rocky outcrop on plateau tops, uniform and texture contrast soils on sandstones and shale slopes, loamy sands in alluvium along creeks, clean quartz sands with moderate shell content on beaches and frontal dunes, and organic sands and muds in estuaries. Reflective of this variety of soils and topographical landscape features, vegetation communities through the Pittwater IBRA subregion are equally diverse and range from tall forests of Sydney blue gum and blackbutt or turpentine and grey ironbark on shale ridge caps, to mangrove and saltmarsh communities in tidal estuaries.

While vegetation across the Pittwater IBRA subregion is diverse, the area is also characterised by significant urbanisation. Vegetation communities in the region are generally preserved within interspersed areas of remanent vegetation, or within national parks' managed lands, such as the nearby Lane Cove National Park which, at its closest point, is situated about 400 metres north of the Proposal, on the northern side of the M2 Motorway.

The Proposal Site occurs within the Pennant Hills Ridges Mitchell Landscape. The biodiversity study area also comprises areas mapped as Port Jackson Basin Mitchell Landscape, to the east, south and west of the Proposal Site.

Waterways

Waterways within the vicinity of the Proposal include:

- Lane Cove River, located about 720 metres north of the Proposal
- Shrimptons Creek (a tributary of the Lane Cove River), located about 500 metres west of the Proposal
- Porters Creek (a tributary of the Lane Cove River) located about one kilometre east of the Proposal.

The Lane Cove River has a catchment area of over 95 square kilometres, commencing in the north western Sydney suburb of Thornleigh. The river flows in a general south easterly direction to its confluence with the Parramatta River, to which it is a major tributary. The Lane Cove River is also mapped at Key Fish Habitat under the *Fisheries Management Act 1994.* There are no streams or wetlands within the Proposal Site or biodiversity study area.

Habitat connectivity

The potential habitat within the Proposal Site is considered to have a low degree of connectivity to other areas of habitat due to the presence of heavy urbanisation. Habitat within the biodiversity study area generally occurs as planted native and exotic species within the largely urban environment of residential, commercial and industrial land uses.

About 720 metres north of the biodiversity study area, the Lane Cover River and associated Lane Cove National Park provides a significant habitat corridor in the broader landscape. However, the Proposal would be isolated from this area by the M2 motorway, which acts as a physical barrier to fauna movement, with the exception of highly mobile species. These species typically comprise large, flight capable species with relatively large foraging and breeding territories, such as the Grey-headed Flying-fox (listed as vulnerable under the BC Act and the EPBC Act).

The planted trees and gardens surrounding the site may also provide some connectivity for mobile species such as the Grey-headed Flying-fox and birds that can use the resources available in urban areas.

Areas of outstanding biodiversity values

There are no areas of outstanding biodiversity value, as declared by the Minister, within the Proposal Site or biodiversity study area.

The closest area of outstanding biodiversity value to the Proposal consists of Little Penguin Critical Habitat, located some 15 kilometres east of the biodiversity study area, at Manly.

13.2.2 Native vegetation

Vegetation communities

The PMST was used to identify MNES or other matters protected under EPBC Act. The search took in a one kilometre radius area, centred on the defined biodiversity study area. A report from the PMST (generated on 27 July 2020) indicated that seven threatened ecological communities (TECs) may occur or would be likely to occur within one kilometre of the biodiversity study area, including:

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion
- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community
- Coastal Upland Swamps in the Sydney Basin Bioregion
- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion
- Turpentine-Ironbark Forest of the Sydney Basin Bioregion
- Western Sydney Dry Rainforest and Moist Woodland on Shale.

To provide context and to verify the results of the PMST search, a review of the OEH Native Vegetation of the Sydney Metro Area map data was undertaken to investigate the potential for TECs within the biodiversity study area. The following vegetation communities, or Plant Community Types (PCTs) were identified within the biodiversity study area:

- Smooth-barked Apple - Red Bloodwood - Blackbutt tall open forest on shale sandstone transition soils in eastern Sydney (PCT ID: 1814), located about 70 metres north east of the Proposal Site, between Talavera Road and the M2 Motorway
- All other vegetation within the biodiversity study area is mapped as Urban Native and Exotic Cover.

The PCT Smooth-barked Apple - Red Bloodwood - Blackbutt tall open forest on shale sandstone transition soils in eastern Sydney is not listed as a TEC under the BC Act or the EPBC Act. No recognised PCT occurs within the Proposal Site itself, which is listed under this mapping as ‘Urban native and exotic’.

Areas mapped as Urban Native and Exotic Cover within the site were reviewed against current and historical aerial mapping, and google street view photography (where available) to verify the reduced potential for ecologically significant vegetation (or otherwise) at the Proposal Site.

Results of this investigation indicate that there is a very limited potential for naturally occurring remnant native vegetation to present at the Proposal Site. A review of historical aerial mapping that demonstrates that widespread historic vegetation clearing has been undertaken across the biodiversity study area, and that the mature trees at the Proposal Site would be unlikely to represent remnant vegetation. In exception to this, 1943 aerial mapping indicates that up to three mature street trees on Talavera Road, and a small stand of mature trees to the rear, and to the south east corner of the Proposal Site, may have a limited potential to be representative of remnant vegetation. However it is noted that given the highly urbanised and disturbed nature of the surrounding environment, these trees are not likely to carry a very high ecological value, and the possibility they represent true remnant vegetation is somewhat low.

Street trees and garden plantings appear to include native species (such as Gymea Lily, *Melaleuca*, *Casuarina*, *Angophora*, *Corymbia* and *Eucalyptus*). The remainder of the vegetation at the Proposal Site consists of planted exotic trees, shrubs and other landscaping plants.

Threatened flora species

The PMST search undertaken for the Proposal in July 2020 identified 47 listed threatened species and that may occur or are known to occur, or whose habitat may occur or is known to occur within one kilometre of the biodiversity study area. This list comprises both threatened flora and fauna species.

To provide context and to verify the results of the PMST search, a search of the NSW Office of Environment and Heritage BioNet Atlas was undertaken to identify any recorded observations of threatened flora within the biodiversity study area. The results of the BioNet search did not identify any recorded threatened flora species within the biodiversity study area. Looking beyond the biodiversity study area, no recorded threatened flora species were found within 400 metres of the Proposal Site.

13.2.3 Invasive flora

Some opportunistic weeds may occur in garden beds, alongside buildings and the roadside. However, for the most part, planted areas within the Proposal Site appear to be highly landscaped and the potential for any significant populations of weeds, including Weeds of National Significance (WoNS) is low.

13.2.4 Fauna species and populations

As outlined above, the PMST search undertaken for the Proposal in July 2020 identified 47 listed threatened species that may occur or are known to occur, or whose habitat may occur or is known to occur within one kilometre of the biodiversity study area. This list comprises both threatened flora and fauna species.

To provide context and to verify the results of the PMST search, a search of the NSW Office of Environment and Heritage BioNet Atlas was undertaken to identify any recorded observations of threatened fauna within the biodiversity study area. The results of the BioNet search did not identify any threatened fauna species within the biodiversity study area. The closest recorded threatened fauna species to the Proposal Site include:

- Little bentwing bat (*Miniopterus australis*), about 300 metres north of the Proposal Site, above the M2 Motorway
- Masked Owl (*Tyto novaehollandiae*) about 350 metres east of the Proposal Site
- Grey-headed Flying-fox (*Pteropus poliocephalus*) about 400 metres west of the Proposal Site.

13.2.5 Fauna habitat

The biodiversity study area generally consists of planted native and exotic trees and planted landscape gardens, surrounded by buildings, roads, pathways and maintained grass.

Areas of potential fauna habitat in the biodiversity study area mostly occur within residential and commercial property gardens and public parks, and are largely comprised of non-native vegetation or other native vegetation not naturally occurring in the Sydney Basin.

Whilst there is a typically a greater proportion of flowering plants in these areas compared to what would naturally occur, the nature of the vegetation assemblage in the biodiversity study area represents a poor replacement for the habitat that would have been provided by native vegetation prior to urbanisation. This is apparent when comparing the biodiversity study area to the relatively close Lane Cove National Park.

No hollow-bearing trees or nests have been observed within the Proposal Site, nor have any significant habitat features such as ground litter, logs, rock outcrops, or waterbodies. In addition, no threatened plant or animal species have been recorded within the biodiversity study area and none of the land in or around the biodiversity study area is listed as critical habitat for any species.

Some flowering trees and shrubs that may provide suitable foraging for some fauna species have been observed within the Proposal Site. For example, when in flower or when seeding, the *Eucalyptus*, *Angophora*, *Corymbia*, *Casuarina* and *Melaleuca* species at the Proposal Site may

provide foraging habitat for some bird and bat species. However, it is expected that the urban nature of biodiversity study area and Proposal Site is more likely to support common urban-adapted native species such as noisy miners, lorikeets, Australian magpies, common garden skinks, and brush-tailed possums.

13.2.6 Groundwater dependent ecosystems

Groundwater Dependant Ecosystems (GDEs) are ecosystems whose current species composition, structure and function are reliant on a supply of groundwater as opposed to surface water. In Australia, most ecosystems have little to no dependence on groundwater, although the full understanding of the role of groundwater in maintaining ecosystems is generally poor. The exception to this is wetland communities, for which it is thought that most have some level of dependence on groundwater resources.

GDEs are generally classified into six categories:

- Terrestrial vegetation – forests and woodland which develop a permanent or seasonal dependence on groundwater, often by extending roots into the water table
- Base Flow in streams – aquatic and riparian ecosystems that exist in or adjacent to streams that are fed by groundwater base flow
- Aquifer and cave systems – aquatic ecosystems that occupy caves or aquifer
- Wetlands – aquatic communities and fringing vegetation that depend on groundwater fed lakes and wetlands
- Estuarine and near shore marine ecosystems – various ecosystems including mangroves, salt marsh and seagrass, whose ecological function has some dependence on groundwater discharge
- Terrestrial fauna – fauna species assemblages reliant on groundwater for drinking water.
- Not apparently dependant – acknowledges some ecosystems, particularly wetland and riparian vegetation, might superficially appear to be groundwater dependent while in fact they are dependent entirely on surface flows and or rainfall.

A search of GDEs in the vicinity of the biodiversity study area was undertaken using the BoM Atlas of Groundwater Dependent Ecosystems. The results of this search identified that the closest area of mapped GDE is located about 520 metres north of the Proposal Site and comprises terrestrial vegetation – Hinterland Sandstone Gully Forest, located within Lane Cove National Park.

13.2.7 Invasive fauna

Given the biodiversity study area is disturbed and in close proximity to urban areas it is probable that animal pests (listed as significant pest animals in NSW) would occur; most likely of which may include:

- *Vulpes vulpes* (European Red Fox)
- *Oryctolagus cuniculus* (European Rabbit)
- *Felis catus* (Feral Cat).

13.3 Impact assessment

13.3.1 Construction

13.3.1.1 Vegetation

Threatened flora species and ecological communities

No TECs or threatened flora species listed under the BC or EPBC Acts have been identified within the biodiversity study area. No impacts to TECs or threatened flora species are anticipated as a result of the construction of the Proposal.

Vegetation removal

Construction of the Proposal would require the removal of a small amount of vegetation.

The total area of all vegetation to be removed for the construction of the Proposal has been estimated conservatively as about 500 m^2. The majority of this vegetation exists within the landscaped gardens bordering the existing carpark and buildings within the Proposal Site. These landscaped gardens include juvenile through to mature tree, shrub and small flowering species, which are mostly exotic, or planted-native in origin.

Vegetation removal for the Proposal would also include the removal of some street trees and some mature trees that may be naturally occurring. However, the vegetation that would be removed as part of the Proposal is not known to be representative of any endangered ecological communities and no threatened species would be affected.

Where possible, where they do not compromise security by providing climb points, existing trees would be retained. It is possible however that some trees may require removal. The extent of removal of mature trees for the project would comprise about 85 trees. Of these trees that would be removed, only about 29 are considered to be of high retention value, based on the Institute of Australian Consulting Arborists (IACA) Tree, Assessment Rating System.

As part of the Proposal, landscaping would be provided along the site boundary adjacent to Talavera Road, sections of the boundary adjacent to Road 22, and near the building entrance (refer to the Landscape Plan attached as **Appendix C**). The plants selected for landscaping would be a mix of native trees, shrubs grasses and groundcovers and would include the following species:

- Trees:
  - *Angophora costata* (Smooth-barked apple)
  - *Corymbia maculata* (Spotted gum)
  - *Tristaniopsis laurina* (Water gum)
- Large shrubs:
  - *Callistemon 'Hot Pink'* (Bottlebrush)
  - *Grevillea 'Honey Gem'* (Grevillea)
  - *Kunzea ambigua* (Tick bush)
  - *Syzigium australe 'Elite'* (Lilly pilly)
  - *Pittosporum revolutum* (Yellow pittosporum)
- Small shrubs, grasses and ground cover:
  - *Westringia fruticosa 'Blue Heaven'* (Coastal rosemary)
  - *Leptospermum 'Pink Cascade'* (Tea tree)
  - *Grevillea rosmarinifolia 'Scarlet Sprite'* (Grevillea)
  - *Doryanthes excelsa* (Gymea lily)
  - *Banksia spinulosa 'Bush Candles'* (Banksia)
  - *Grevillea lanigera 'Mount Tamboritha'* (Woolly grevillea)
  - *Lomandra 'Tanika'* (Lomandra)
  - *Westringia fruticosa 'Mundi'* (Coastal rosemary).

The landscaping plan has been primarily designed to enhance and compliment the visual amenity of the Proposal. However, strong consideration has also been afforded to selecting native species that would complement the general vegetation characteristics of the study area, would provide a reasonably diverse selection of species that are representative of multiple vegetation layers (ground covers, shrubs, understory and canopy species), and would provide potential foraging resources for native fauna that may occur within the study area.

The removal of vegetation for the construction of the Proposal would comprise a minor ecological impact based the avoidance measures which have been incorporated into the design of the Proposal,

the small degree of overall coverage that would be removed, the relatively low ecological and habitat value of existing vegetation at the Proposal Site, the availability of similar quality vegetation in the surrounding area, and the provision of replacement landscape plantings.

Groundwater dependent ecosystems

As discussed in **Section 13.2.6**, the closest area of mapped GDE is located about 520 metres north of the Proposal Site within Lane Cove National Park and comprises terrestrial vegetation – Hinterland Sandstone Gully Forest.

As discussed in more detail in **Chapter 19 (Groundwater, surface water and flooding)**, groundwater levels across the Proposal Site are anticipated to be between about 5.8 metres and 9.9 metres depth below ground surface. Average groundwater depth is about 7.6 metres below ground surface, and groundwater quality is generally good (Douglas Partners, 2020). In addition, a review of available reports that have been previously conducted in the water resource study area indicates a relatively low to moderate groundwater flow is experienced in the vicinity of the Proposal, and that groundwater in this location is likely associated with perched seepage and is not representative of a permanent or regional groundwater table (Douglas partners, 2020).

During the construction of the Proposal, some dewatering would be required. During the initial excavation phase, dewater flow rate may be as high as 8.1 megalitres per year. However, it is anticipated that groundwater levels would stabilise following this initial excavation associated with the construction of the Proposal, to reflect the calculated average of 2 megalitres per year. This level of dewatering is considered minimal. For context, the Proposal would be exempt from requiring a Water Access License from Water NSW, which is only required for works which would be expecting to dewater a minimum of 3 megalitres per year. In addition, the construction of the Proposal is not anticipated to result in impacts to groundwater quality. The potential for the Proposal to impacts groundwater during construction and operation is discussed in more detail in **Chapter 19 (Groundwater, surface water and flooding (Sections 19.3 and 19.4 respectively)).**

Impacts to GDEs are not anticipated as a result of the construction of the Proposal for the following reasons:

- No GDEs have been identified within the Proposal Site
- The groundwater table is likely to be associated with perched seepage and is not anticipated to be representative of a permanent or regional groundwater table, therefore it is unlikely that the GDE located about 520 metres north of the Proposal Site would be reliant on the body of groundwater the Proposal would intersect
- The construction of the project is not anticipated to require any significant dewatering; or result in any changes to existing groundwater conditions and as such is not anticipated to result in any impacts to groundwater levels, availability or quality (refer to **Chapter 19, Groundwater, surface water and flooding**).

13.3.1.2 Fauna

Threatened fauna

No threatened fauna species listed under the BC or EPBC act have been identified within the biodiversity study area. Impacts to threatened fauna species would be limited to a minor reduction in foraging habitat for highly mobile species such as birds and bats. In the context of the abundance of similar vegetation available in the region this impact is considered to be negligible.

Habitat

Loss of vegetation and fauna and flora habitat would occur as a result of the Proposal due to unavoidable vegetation clearance. However, the construction of the Proposal has been designed to limit vegetation clearance as far as practicable and where feasible existing trees would be retained.

As a result, impacts on vegetation have been limited to about 500 m^2, most of which is already highly modified and comprised of planted native and exotic species.

No hollow-bearing trees or nests have been observed within the Proposal Site, nor have any important habitat features such as ground litter, logs, rock outcrops, or waterbodies been identified on the

Proposal Site. In addition, no threatened plant or animal species have been recorded within the biodiversity study area, and none of the land in or around the biodiversity study area is listed as critical habitat for any species. It is expected that the urban nature of biodiversity study area and Proposal Site is more likely to support common urban-adapted native species.

As discussed above, landscaping would be provided that would include a diversity of native species that include species at all functional strata. Species have also been selected that would provide potential foraging resources for native fauna that may occur within the study area. For example, species and varieties of *Callistemon*, *Grevillea* and *Syzigium*, including garden varieties of these species, are known to provide potential foraging resources for urban-adapted native bird species such as rainbow lorikeets, red wattle birds, New Holland honeyeaters, and noisy miners. Small shrubs, such as varieties of Westringia, are known to provide suitable habitat for small insectivorous urban bird species such as willy wag-tails, superb fairy wrens and spotted pardalotes. Native grasses such as *Lomandra* can also provide habitat for common urban reptiles and amphibians.

It is considered that the provision of this landscaping would generally complement or provide a suitable replacement for any loss of vegetation as it would provide suitable foraging and habitat resources for common urban-adapted native species, generally commensurate to the existing habitat conditions at the Proposal Site.

Wildlife connectivity corridors

Wildlife and habitat connectivity is not anticipated to be affected by the construction of the Proposal as the Proposal Site is buffered from areas of ecological corridor potential by urban development, fragmented vegetation, and most significantly, the M2 Motorway. The M2 motorway acts as a physical barrier between the Proposal Site and the relatively nearby Lane Cove National Park, and would restrict the movements of all but the most mobile of species. In addition, the Proposal is site-based, and any vegetation removal would be limited in quantity and minor in geographical extent and is not likely to fragment habitat or disrupt wildlife connectivity. As such, any biodiversity links in the broader area will not be severed or otherwise compromised by the construction of the Proposal.

Injury and mortality

The construction of the Proposal would involve the movement of plant and machinery around the Proposal Site, as well as some vegetation removal.

While it has been demonstrated that the habitat potential within the site is low, and no threatened species have been recorded within the biodiversity study area, nor are likely to occur at the Proposal Site, it is possible that some urban-adapted native species may be present onsite.

During vegetation clearing, some mobile species (such as birds) may be able to move away quickly. Other species may be slower to move or may not relocate at all, such as some small reptiles and insects, potentially resulting in injury or mortality of some individuals.

While the overall likelihood of injury or mortality arising from construction is considered to be low, management measures have been provided that include pre-clearing surveys and other pre-clearing and clearing protocols. With the implementation of these management measures the potential for fauna injury or mortality would be reduced.

Given the generally low value of native fauna habitat within the Proposal Site, the highly urban-adapted suite of species likely to be present, and safeguards and management measures to be implemented, the potential for injury and mortality during construction of the Proposal is considered minimal.

13.3.1.3 Invasive flora and fauna

Weeds

Some opportunistic weeds may occur within the Proposal Site, however planted areas within the Proposal Site appear to be well maintained and the potential for any significant populations of weeds, including WoNS is likely to be low.

The movement of vehicles and personnel can have the potential to facilitate the spread of weeds. However, given the site is located in an urban context, would be limited in terms of weeds present, and as no movement of vehicles would occur outside of established roads or the designated construction

footprint of the Proposal, the potential for weeds to be spread by vehicle and worker movement is considered to be negligible.

The removal of vegetation from the Site would have the potential to facilitate the spread of weeds should weed species be transported and disposed of offsite. In order to manage potential for the spread or introduction of weeds, a weed management plan would be developed and implemented. The weed management plan should consider suitable protocols during vegetation removal to identify and separate weed and native species and to prevent the potential spread of weeds further afield during disposal.

Should appropriate measures be implemented however the overall weed impact associated with the construction phase of the Proposal is considered to be minimal.

Pests

As discussed above, given the biodiversity study area is disturbed and within an urban area it is probable that pest animals would occur. Such species likely to be present include European red fox, feral cats and rabbits. Predation by foxes and cats and competition and habitat impacts by rabbits are listed as Key Threatening Processes (KTP) under the EPBC Act and BC Act.

The construction of the Proposal would not involve vegetation removal to the extent that the movement of predators into otherwise uncleared or undisturbed vegetation would be facilitated. The Proposal is also unlikely to increase the abundance of foxes or cats, introduce them into new areas, or increase predation pressure on native fauna.

The presence of rabbits in an area can result in increased competition for foraging and habitat resources, increase soil erosion by burrowing and increase the presence of species such as foxes. The Proposal is not likely to increase the presence of rabbits within the biodiversity study area as only a small amount of vegetation clearance is proposed, and would occur in an otherwise highly urbanised setting.

13.3.1.4 Pathogens

The following pathogens of concern are known to exist within the region:

- *Uredo rangelli* (Myrtle Rust)
- *Phytophthora cinnamomi* (Phytophthora)
- *Batrachochytrium dendrobatidis* (Chytrid Fungus).

Myrtle Rust is an air-borne plant fungus spread by movement of contaminated material, that attacks the young leaves, shoot tips and stems of Myrtaceous plants eventually causing plant death. Myrtle rust is identified as a KTP under the EPBC Act and BC Act. Phytophthora is a soil-borne fungus capable of causing vegetation dieback by attacking the roots of native plants. Spores can be spread over large areas by water, and by movement of contaminated material, including traces on animals, humans/shoes, vehicles and machinery. ‘Dieback caused by Phytophthora’ is a listed KTP under the EPBC Act and BC Act. No plant pathogens have been identified or are likely to occur within the biodiversity study area given its highly urbanised nature.

Chytrid fungus is a water-borne fungus that affects amphibians, causing a range of symptoms including lethargy, emaciation, skin sloughing and death. It is spread by cross contamination of water bodies and improper handling of frogs. Chytrid fungus is identified as a KTP under the EPBC Act and BC Act. No waterways have been identified in the biodiversity study area, and it is unlikely that frogs would be encountered on site in any substantial numbers during construction. Regardless, management measures have been provided in the instance of an ‘unexpected find’ of threatened fauna and frogs. This will include the implementation of frog hygiene protocols in the unlikely instance that any are encountered. As such it is unlikely the construction of the Proposal would spread contamination of Chytrid fungus within or outside of the biodiversity study area.

It is unlikely that pathogens would have a significant impact on flora and fauna as a result of the construction of the Proposal.

13.3.1.5 Indirect impacts

Increases in noise, vibration and light spill during construction may have the potential to result in indirect impacts to biodiversity.

Impacts from indirect noise and vibration impacts within the biodiversity study area may include:

- The behaviours of nocturnal birds and mammals (such as the brush-tailed possum) may be affected by daytime construction noise
- Common species of bats that use sound to navigate can be impacted, however this would most likely be limited to times around dawn and dusk
- Diurnal birds may be indirectly affected by construction noise.

Changes to the availability of light as a result of vegetation clearance can potentially impact both flora and fauna species. The potential impacts are likely to be a result of:

- Altering light regimes affecting plant growth
- Altering light regimes (particularly night-lighting) affecting fauna behaviours or navigation.

The construction of the Proposal could also result in the potential for some resident native fauna to temporarily avoid areas within and directly adjacent to the proposed modifications due to the presence of people, vehicles, noise and light.

The construction of the Proposal would be limited to standard (daytime) work hours, as described in **Chapter 2 (Proposal description)**. Generally, areas within the biodiversity study area that may be subject to noise, vibration and light impacts during construction of the Proposal, already experience altered noise, vibration and light conditions. This is attributed to the existing urban nature of the biodiversity study area, associated with high traffic and the high degree of existing human use. In addition, noise and vibration impacts associated with the construction of the Proposal will be temporary and limited to the construction phase of the Proposal.

As such, the potential for indirect impacts to biodiversity would be low.

13.3.2 Operation

Direct and indirect impacts

The Proposal would operate 24-hours, seven days a week for the carrying out of activities associated with a data centre facility, including:

- Maintenance of data storage and management equipment
- General office activities
- Delivery of goods
- Waste removal.

The Proposal would operate within a highly developed and urbanised environment, and would be consistent with existing and planned land uses for the biodiversity study area.

In addition, these described operational activities for the Proposal are generally minor in nature, would not involve ground disturbance, vegetation clearing, industrial operations, or any other invasive actions that are anticipated to result in any significant direct or indirect impact to biodiversity.

Noise, vibration and light spill impacts during operation would be relatively consistent with existing conditions and would be unlikely to have a significant effect on diurnal and nocturnal birds or mammals.

As such, impacts to biodiversity are not anticipated as a result of the operation of the Proposal.

13.4 Safeguards and management measures

The implementation of management measures would reduce the potential biodiversity impacts of the Proposal to the greatest extent practicable.

The relevant biodiversity impacts and associated management measures and safeguard protocols are provided in **Table 13-2**.

Table 13-2 Safeguards and management measures – Biodiversity

Ref	Mitigation measure	Timing
BIO1	A Flora and Fauna Management Plan (FFMP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP) to identify potential impacts and to define management and mitigation measures. All workers should be inducted as to the requirements detailed in the FFMP.	Pre-construction and construction
BIO2	All vegetation removal will be limited to the minimum extent necessary to construct the Proposal. Measures to further minimise the need for vegetation removal will be investigated during detailed design and implemented where practicable and feasible.	Pre-construction and construction
BIO3	Areas of vegetation to be retained will be demarcated prior to the commencement of works to protect from damage. This may include fencing or flagging trees or vegetation to be protected, establishment of root protection zones and establishment of no-go zones, where relevant and practical.	Pre-construction and construction
BIO4	If unexpected threatened species are discovered, an expected find protocol will be implemented, which at a minimum should include: • Stop works immediately • Notification of the find to the environment manager • Determination of appropriate mitigation measures in consultation with the environment manager (including relevant re-location measures) • Any handling of fauna would be carried out by appropriately licenced or experienced person and undertaken in accordance with relevant guidelines • Implementation of frog hygiene protocols (if required) • Updating of biodiversity offset requirements (if required).	Pre-construction and construction
BIO5	Pre-clearing surveys will be undertaken by a suitably qualified ecologist to identify the presence of: • Vegetation that may exhibit important habitat features • Threatened flora and fauna.	Pre-construction and construction

Ref	Mitigation measure	Timing
BIO6	Where practical, vegetation clearing will be staged to allow for fauna that may have the potential to be disturbed as a result of clearing activities to self-relocate.	
BIO7	Weeds within the Proposal Site will be actively managed prior to vegetation clearing. Cleared weed material will be disposed of to a facility licenced to receive green waste. Machinery and vehicles will be checked and/or cleaned to ensure that they come and go from Proposal Site in a weed free state.	Construction
BIO8	The identification of pathogens would be undertaken as part of pre-clearing inspections. In the event that pathogens are identified within the Proposal Site, appropriate mitigation measures would be identified and implemented.	Pre-construction and construction

14.0 Greenhouse gas and energy efficiency

14.1 Secretary's Environmental Assessment Requirements

Table 5-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to greenhouse gas (GHG) and energy efficiency impacts and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 14-1 SEARs – Greenhouse gas and energy efficiency

SEARs requirements	
Ecologically sustainable development	**Where addressed**
Ecologically sustainable development, including: A quantitative assessment of the potential Scope 1 and 2 greenhouse gas emissions generated by the development, prepared in accordance with the relevant guidelines.	A quantitative assessment of Scope 1 and 2 GHG emissions is discussed in **Section 14.2.3**. This has been drawn from the Sustainability and Greenhouse Gas Emissions technical report (AECOM 2020) (**Appendix M**).
A description of how the Proposal will incorporate the principles of ecologically sustainable development into the design, construction and ongoing operation of the data centre.	Discussed in **Chapter 3** and affirmed through the proposed sustainability measures discussed in **Section 14.3**.
Consideration of the use of green walls, green roofs and/ or cool roofs in the design of the data centre.	Discussed in **Chapter 6** and **Appendix M**.
A description of the measures to be implemented to minimise consumption of resources, especially energy and water.	Mitigation, management and/ or monitoring measures are discussed in **Section 14.3**.

14.2 GHG and energy efficiency assessment

GHG emissions attributable to the Proposal have been estimated over its lifecycle. Mitigation measures for reducing the GHG emissions and other environmental impacts have been identified (**Section 14.3**). Under this assessment, the following emissions scope has been assessed:

- Scope 1 related to direct emissions from sources within the boundary of the Proposal
- Scope 2 related to the emissions resulting from the consumption of imported electricity from the local electricity grid
- Scope 3 related to the indirect emissions attributable to losses through the electricity transmission and distribution network.

Sources of emissions estimated in this assessment include the following:

- Imported electricity consumed in the operation of the facility
- On-site diesel fuel consumption consumed in the monthly testing of backup diesel generators.

Emissions have been estimated on an annual basis under assumption of full and ultimate operational capacity and over a 50-year period.

14.2.1 Input data

Data used for the estimation of GHG emissions has been taken from the *National Greenhouse Accounts Factors* (August 2019), published by the Australian Government Department of the Environment and Energy. At the time of writing, this was the latest revision of these accounts factors and it is assumed that they are applicable to the estimates at commencement of operation. Emissions factors associated with relevant sources for the Proposal are outlined in **Table 14-2**.

Table 14-2 Emissions factors used in this assessment

Source	Emissions factors
Grid imported electricity	Scope 2: 0.81 $kgCO_2$-e/kWh Scope 3: 0.09 $kgCO_2$-e/kWh
Diesel fuel	Scope 1: CO_2: 69.9 $kgCO_2$-e/GJ CH_4: 0.1 $kgCO_2$-e/GJ N_2O: 0.2 $kgCO_2$-e/GJ

With respect to estimating emissions of an assumed facility life of 50 years, the decarbonisation of the electricity grid has been estimated based on linear interpolation and extrapolation of publicly announced government commitments related to renewable energy targets. Emission for the generation of electricity are projected to decline with increased renewable energy supply while emissions for distribution losses are held constant (as a conservative assumption, although likely also to decline), and diesel emissions are also held constant. **Figure 14-1** illustrates the assumed changes to these factors notionally between 2020 and 2070.

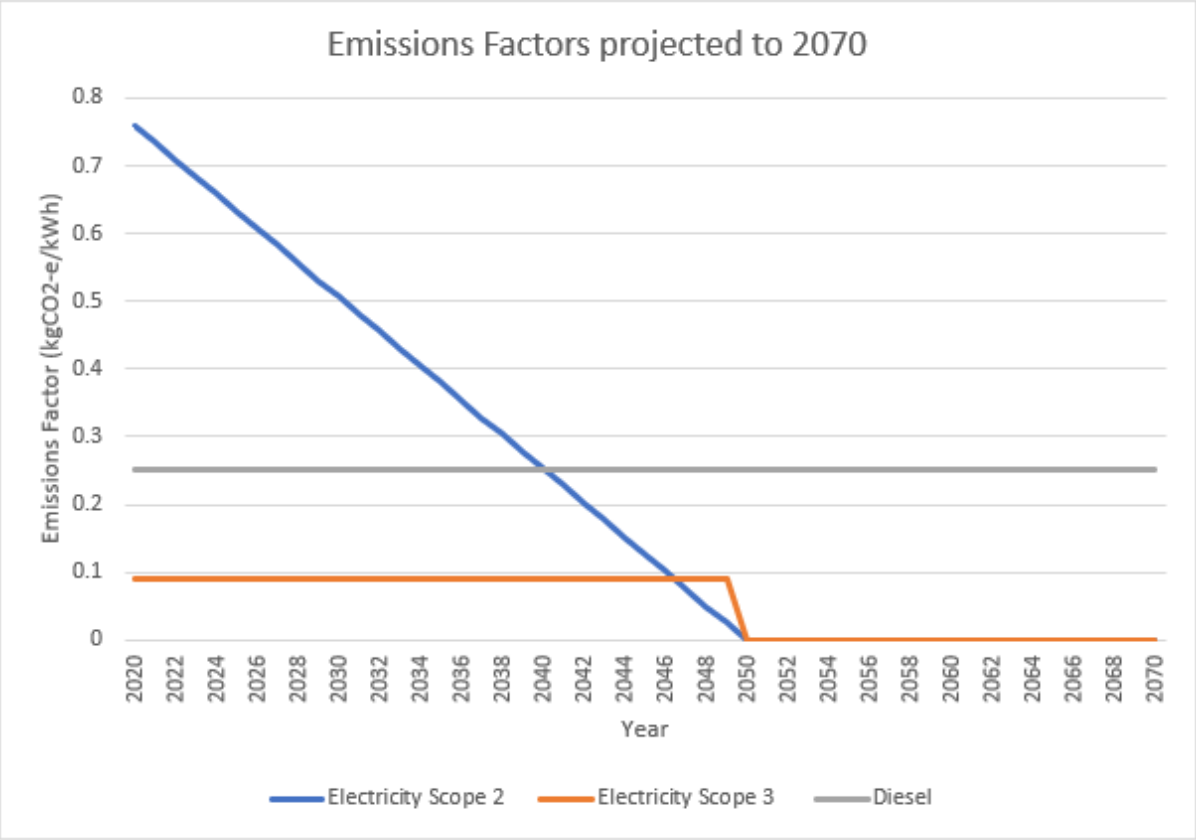

Figure 14-1 Projected decarbonisation of electricity grid and emissions factors adopted for asset lifetime GHG emissions

Other data has been taken from the *Annualized and Peak PUE Calculation Report* produced for the Proposal to assess the efficiency of the data centre with respect to energy used by IT equipment used to operate the facility (including lighting, ventilation, cooling etc.).

14.2.2 Estimation methods

GHG emissions associated with diesel fuel consumption were estimated based on design sizing of backup generators, fuel-burn rates and anticipated operational procedures.

Emissions associated with electricity consumption were estimated using a 3D dynamic thermal energy model of the facility.

14.2.3 GHG emissions estimate details

14.2.3.1 Emissions arising from diesel fuel consumption

Source of scope 1 emissions within the facility are the diesel generators which provide a backup source of electricity for the facility. In total, 18 x 2400kW and 1 x 600kW generators will produce scope 1 emissions as a result of monthly generator testing and during infrequent power outages. Generators are tested for operational readiness for 1 hour per month at an assumed load of 100% (as a conservative estimate of projected emissions). Each generator has a fuel-burn rate of 570L/hr resulting in 154 kL diesel fuel consumption annually.

14.2.3.2 Emissions arising from consumption of imported grid electricity

Scope 2 and 3 emissions are produced through the consumption of imported electricity from the national grid. Electrical energy consumption estimate is based on a detailed energy model created for the facility. This energy model is primarily produced to inform the likely Power Usage Effectiveness (PUE) ratio, a metric used to drive energy efficiency during design and operation and improve financial viability.

The energy model was created using a dynamic thermal energy simulation software product called Integrated Environment Solutions (IES). This industry recognised software meets necessary certification for use in simulating building energy consumption for the purposes of building code compliance under the National Construction Code and is therefore deemed appropriate for use in estimating associated GHG emissions.

A 3D geometric model of the facility, based on the architectural design, was created in IES to which the thermal performance parameters associated with the building fabric were applied. Each space was assigned profiles controlling internal artificial lighting and equipment loads, in addition to occupancy. Heating and cooling systems were added as per design documentation to satisfy internal comfort conditions for occupied areas such as offices, and functional conditions for data hall areas. Loads for the data hall are based on a full load for the ultimate facility construction at 100% loads on a 24 hour/7-day basis. In this way, a conservative estimate of annual emissions is yielded from the model.

Annual energy consumption is computed through an annual simulation of local weather conditions interacting with the simulation of building systems and building architectural systems. The building response is predicted in a time-marching simulation, stepping through a calendar year in 2 minute increments, reporting energy consumption on an hourly basis.

The resulting prediction for electrical energy consumption for the ultimate data centre capacity is estimated to be 311,315 MWh per annum, of which 280,320 MWh is attributed to IT equipment.

The emissions profile for the facility in its first year of operation has been derived from the energy consumption profile using the conversion factors published in the *National Greenhouse Accounts Factors 2019*. Following estimates of total emissions over 50 years have been estimated under the assumption of electricity grid decarbonisation based on published government policies related to renewable energy targets and commitments to be net zero emissions by 2050 for the NSW jurisdiction.

In the first year of operation, based on the 2019 emissions factors, approximate 281,000 tonnes CO_2 will be produced of which 280,180 tonnes are attributable to imported grid electricity. Based on estimated decarbonisation of the NSW electricity grid over 50 years, the total GHG emissions are predicted to be 4,281,000 tonnes CO_2 of which 4,240,400 tonnes are attributable to imported grid electricity.

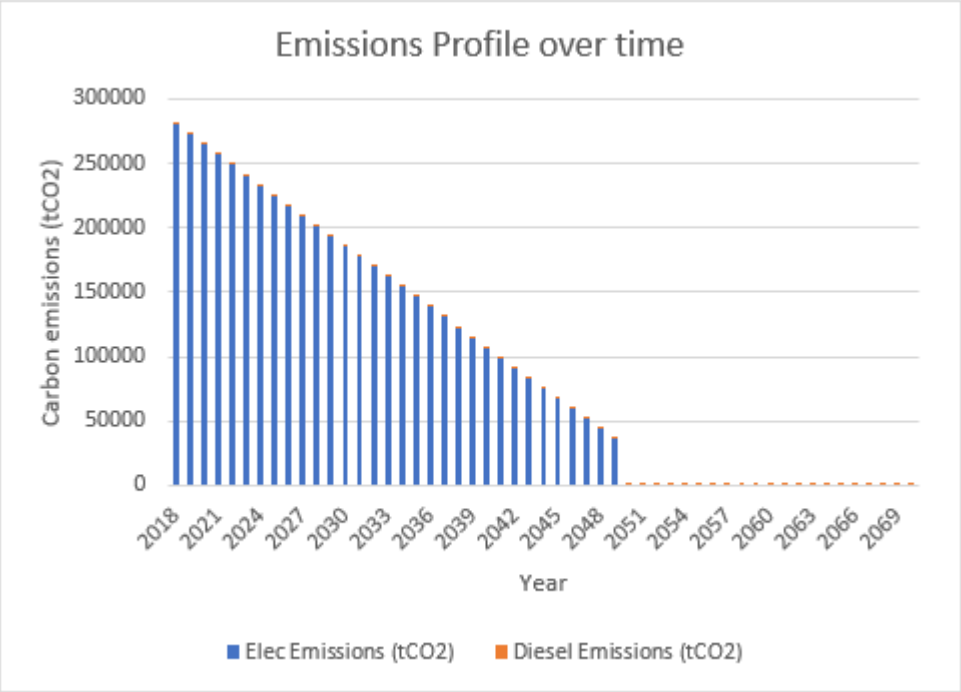

Figure 14-2 Emissions profile over asset life accounting for anticipated decarbonisation of NSW electricity grid

14.3 Sustainability measures

The proposed development has incorporated Ecologically Sustainable Design (ESD) initiatives within its design, and proposed measures for construction and operation.

Table 14-3 Summary of safeguards and management measures

ID	Mitigation measure	Timing
Resource efficiency measures		
GHG1	Passive systems including high performance insulation to facility walls, ceilings and roofs, and high-performance glazing to occupied spaces	During construction and operation
GHG2	High efficiency chilled water-cooling system	During operation
GHG3	Variable speed drives on all chilled water and condenser water pumps	During operation
GHG4	Energy efficient LED lighting throughout the facility	During construction and operation
GHG5	Sub-metering throughout the facility to help monitor and interpret energy consumption in operation and enable optimisation year-on-year	During construction and operation
GHG6	Where practical, selection of materials with low embodied materials such as concrete with high proportion of substitute cementitious materials (SCM)	During construction
GHG7	Procurement of renewable energy supply agreements to provide a portion of total facility energy demands	During construction and operation
NABERs energy rating		
GHG8	Based on the estimated design Power Usage Effectiveness (PUE) ratio, it is projected that the facility would be capable of achieving at least a 5 Star NABERS Energy rating for Data Centres.	During operation

ID	Mitigation measure	Timing
Water		
GHG9	High efficiency fixtures and fittings matching the highest WELS water efficiency labelling	During construction and operation
GHG10	Sub-metering of major water uses and sources	During construction and operation
GHG11	Collection of rainwater and treated stormwater with potential for reuse in cooling tower systems and/or toilet flushing and irrigation	During operation
GHG12	Collection of condensate from air handling systems	During operation
Landscape and ecology		
GHG13	For the main building green roofs were considered but not adopted due to risks related to water incursion which would compromise the security of IT and power equipment within the data halls. A green roof was however adopted for the elevated landscape structure over the driveway running along the northeastern face of the building. This structure would span the distance between the building itself and the retaining wall, but would not be attached to the building (to prevent water ingress).	During operation
Management practices		
GHG14	Building commissioning and tuning undertaken against internationally recognised standards such as ASHRAE Standard 150 and CIBSE Code M	During construction
GHG15	Contractor requirements to implement a best practice environmental management plan and undertake all construction under an ISO14001 certified environmental management system	During construction and operation
Transport		
GHG16	Consider the inclusion of electric vehicle charging infrastructure with the inclusion of renewable supply to enable carbon neutral private transportation.	During operation

15.0 Hazard and Risk

15.1 Secretary's Environmental Assessment Requirements

Table 15-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to hazards and risks and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 15-1 SEARs – Hazard and risk

SEARs requirements	
Hazard and risk	**How addressed**
The EIS must include: A preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and *Applying SEPP 33* (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the Proposal is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (DoP, 2011) and *Multi-Level Risk Assessment* (DoP), 2011	Preliminary risk screening has been provided in **Section 0**. The preliminary risk screening indicates that the Proposal is not potentially hazardous and therefore a PHA is not required.
Details regarding the location and number of back-up generators, diesel fuel storage tanks and lithium-ion batteries to be installed to service the development.	Details of the location and number of back-up generators, diesel fuel storage tanks and lithium ion batteries are outlined in **Chapter 3 (Proposal description)** and illustrated on **Figure 15-1**

15.2 Existing environment

15.2.1 Database searches

Online database searches of publicly available information were undertaken to determine if the Proposal Site is located in an area that would be subject to both natural or human-induced hazards and/or risks. An overview of the results of those searches is provided in **Table 18-2**.

Table 15-2 Outline of existing hazards and risks to the Proposal Site

Potential Hazard	Comment
Bushfire	A search of the NSW Rural Fire Service (RFS) bushfire-prone land mapping indicates that the Proposal Site is not located within or adjacent to land mapped as being bushfire-prone or within a buffer zone to such land.
Flood	A flood study report for Macquarie Park was prepared for the City of Ryde Council by Bewsher in April 2010. The Proposal Site falls within the Industrial Creek catchment. According to that flood study report, modelling of the probable maximum flood event shows that the Proposal Site is not located within land mapped

Potential Hazard	Comment
	as being subject to flood inundation in a worst-case flood event.
Landslide	A review of the spatial data set "*Environmental Planning Instrument – Landslide Risk*" indicates that the Proposal Site is not located on land mapped as being susceptible to landslide conditions.
Contamination and/or existing pollution	To inform an understanding of the condition of the Proposal Site in terms of potential contamination a search of the following databases was undertaken: • NSW Environment Protection Authority (EPA) contaminated land record • NSW EPA *Protection of the Environment Operations Act 1997* (POEO Act) public register (licenses, applications and notices). For both registers, a generalised search of "Macquarie Park" was performed so that potential records at or nearby the Proposal Site could be identified. The searches did not identify any records of registered contaminated sites at or nearby the Proposal Site, or parcels of land operating under an Environmental Protection Licence or subject to a notice such as a prevention notice under Section 96 of the POEO Act.
Acid sulfate soils	A review of the spatial data set "*Environmental Planning Instrument – Acid Sulfate Soils"* and acid sulfate soil mapping within the *Ryde Local Environmental Plan 2014* identified that the Proposal Site is not located within land mapped as having acid sulfate soil potential.

15.2.2 Previous land uses

Publicly available development approval history for the Proposal site, spans back to 2009, which demonstrates that it has been used to accommodate an office/commercial building for over a decade. Using historical imagery from Spatial services NSW has identified that the Proposal site featured the following land uses:

- 1940s: small rural/agricultural lot
- 1950s: no considerable change
- 1960s: no considerable change
- 1970s: large warehouse-type building
- 1980s: expanded warehouse-type building
- 1990s: no considerable change
- 2000s: reduction in size to main building – layout matches current

Since then, the Site has been used to facilitate the main use of the buildings on the land, being commercial/office uses.

Prior to the development of the Site for the primary use of a commercial/office use, the use of the land since European colonisation for rural/agricultural purposes may have introduced hazards and/or risks associated with soil contamination from the use of fuels, pesticides and fertilisers. An assessment of

the existing condition of underlying soils is provided in **Chapter 7 (Soils, groundwater and contamination)** and indicates that the risk posed by potential contaminants within the underlying soils is low.

15.2.3 Preliminary risk screening

State Environmental Planning Policy No. 33 – Hazardous and Offensive Developments (SEPP 33) outlines the approach used in NSW for planning and assessing the risk and hazards associated with industrial development proposals. Through the policy, the permissibility of a development proposal is linked to its safety and pollution control performance. SEPP 33 applies to any proposals that fall under the Policy's definition of 'potentially hazardous' or 'potentially offensive industry'.

For development proposals classified as 'potentially hazardous industry' the Policy establishes a comprehensive test by way of a preliminary screening assessment and PHA to determine the risk to people, property and the environment.

A guideline prepared for SEPP 33 (*Applying SEPP 33 – Hazardous and Offensive Developments*), serves as a guide for the steps to be taken in determining whether a proposal is potentially hazardous or offensive. It provides a list of threshold levels for the storage and transport of dangerous goods. Where the amount of material to be stored or transported exceeds that threshold, SEPP 33 is considered to apply to the Proposal, potentially requiring a PHA.

Table 15-3 presents the class of hazardous material under the *Australian Code for the Transport of Dangerous Goods by Road & Rail*, the amount of material to be stored and the SEPP 33 threshold for that material.

Table 15-3 Quantities of hazardous material to be stored and their SEPP 33 threshold level

Class	Material	Quantity to be stored	SEPP 33 threshold (kg)	Does SEPP 33 apply?
3 (PGIII**)	Diesel fuel	291,200 kg*	500,000	No
2.2	Nitrogen and aerosols (generic)	100 kg	N/A	No
8	Pest control products – corrosive substances	100 kg	5,000	No
9	Lithium ion batteries	Approximately 32,160 battery units	N/A	No

* based on a density of 0.832 kg/L for diesel fuel

** PG = Packaged goods

Based on the above, the materials considered to be dangerous goods under the *Australian Code for the Transport of Dangerous Goods by Road & Rail* that would be stored at the Proposal Site do not exceed the SEPP 33 thresholds. Accordingly, SEPP 33 does not apply and a PHA is not required.

15.3 Battery storage

All lithium ion batteries would be located entirely within equipment racking, spread over four levels within the building. There would be no other types of batteries stored as part of the operational phase of the Proposal. The batteries proposed to be used as part of the operational phase would have a weight of approximately 121,564 kilograms and have an energy storage capacity of 2 MWh.

15.4 Potential impacts

15.4.1 Construction phase

Potential hazards and risks during construction would include:

- On-site storage, use and transport of dangerous goods and hazardous substances
- Rupture of, or interference with, underground utilities

- Exposure to hazardous materials and any contaminated soils during construction works.

These hazards and risks are described further below.

Land uses and receivers for the potential impacts identified include Macquarie Park (nearby the Proposal Site), which features predominantly commercial and/or office uses commensurate with its land use zoning as B7 – Business Park.

Flooding risks, including inundation of the Proposal Site and excavation, have been addressed in **Chapter 19 (Surface water, flooding and water use)**. Climate change risks, including changes in the frequency of air temperature extremes, changes in mean and extreme rainfall, and changes in the frequency and intensity of storm events, are assessed **Chapter 14 (Climate change, greenhouse gas and energy efficiency)**.

15.4.1.1 On-site storage, use and transport of dangerous goods and hazardous substances

An indicative list of potentially hazardous materials anticipated to be used, stored and transported during construction of the Proposal is provided in **Table 15-4**, along with the relevant storage and transport thresholds established under *Applying SEPP 33*.

The thresholds in *Applying SEPP 33* represent the maximum quantities of hazardous materials that can be stored or transported without causing a significant off-site risk.

Low volumes of potentially hazardous materials, such as diesel, petrol, lubricants and paints, would be stored on-site. The volume required to be stored on-site would largely depend on the anticipated rates of consumption, with deliveries of dangerous goods coordinated to match consumption rates.

Storage, use and transport of dangerous goods have the potential to result in impacts to both human health and the environment. Those impacts could arise through the following means:

- Accidental spills
- Inappropriate storage and/or handling
- Inclement weather.

The extent of impact that this could have upon human health and/or the environment depends on the amount of material that receivers are exposed to, the action and time taken to rectify the issue and the type of material. Without mitigation, the potential impacts are considered to be moderate given the relatively small amount of dangerous goods and hazardous substances that would be stored at, used at and transported to and from the Proposal Site. However, through the mitigation measures outlined in **Section 0**, the likelihood of receivers being exposed to dangerous goods or hazardous materials used throughout the construction phase is substantially reduced. Accordingly, the potential impact is considered to be a minor, negative impact.

15.4.1.2 Rupture of, or interference with, underground utilities

Underground utilities may need to be adjusted to facilitate the construction of the Proposal. In addition, construction works would also involve provision of temporary power supply, at the Proposal Site.

Damage, rupture and/or failure to shut down or isolate underground utilities during construction of the Proposal has the potential to result in the following environmental hazards and risks:

- Release of untreated sewage and/or gas from a sewer main, and potential impacts on water mains and drains
- Release of natural gas from a gas main
- Release of large electrical currents through the ground surface from an underground electricity cable (known as earth potential rise).

Where the above hazards and risks are allowed to occur without mitigation, or occur due to lack of mitigation measures, the potential impact to both human health and the environment is considered to be high. However, the implementation of the mitigation measures outlined in **Section 0** would substantially reduce the chances of these hazards and risks occurring. In addition, if in the rare event that they do occur, the mitigation measures in place would reduce the severity of that hazard and or risk upon the receiver.

Table 15-4 Indicative list of hazardous materials potentially required during construction and applicable storage/transport thresholds

Material	Australian Dangerous Goods Code Class	Storage locations	Storage method	Applying SEPP 33 thresholds		
				Minimum Storage volume	Minimum storage distance from sensitive receivers	Transport (weekly)
Diesel	C1[1], 3 PG III[2]	Bunded area within the Proposal Site – to be confirmed by the construction contractor	20 litre drums/carry cans	Greater than 5 tonnes, if stored with other Class 3 flammable liquids	5 metres	Not applicable if not transported with Class 3 dangerous goods
Petrol	C1[1], 3 PG III[2]	Bunded area within the Proposal Site – to be confirmed by the construction contractor	20 litre drums	Greater than 5 tonnes, if stored with other Class 3 flammable liquids	5 metres	Not applicable if not transported with Class 3 dangerous goods
Lubricating and hydraulic oils and greases	C2	Bunded area within the Proposal Site – to be confirmed by the construction contractor	20 litre drums	N/A	N/A	Not applicable if not transported with Class 3 dangerous goods
Acetylene	2.1	Within secured cages away from sources of heat	Cylinders (up to 55 kilograms) in rack	Greater than 0.1 tonnes (100 kilograms)	15 metres	2 tonnes; 30 times per week
Cement	N/A	Within the Proposal Site – to be confirmed by the construction contractor	Bags/pallets (in containers)	N/A	N/A	Not subject to Applying SEPP 33 transport thresholds
Premix concrete	N/A	Within the Proposal Site – to be confirmed by the construction contractor	Bags/pallets (in container)	N/A	N/A	Not subject to Applying SEPP 33 transport thresholds

Material	Australian Dangerous Goods Code Class	Storage locations	Storage method	Applying SEPP 33 thresholds		
				Minimum Storage volume	Minimum storage distance from sensitive receivers	Transport (weekly)
Concrete curing compounds	3 PG III	Bunded area within the Proposal Site – to be confirmed by the construction contractor	20 litre drums	N/A	N/A	Not subject to Applying SEPP 33 transport thresholds
Concrete retardant	3 PG II	Bunded area within the Proposal Site – to be confirmed by the construction contractor	205 litre drums	Greater than 5 tonnes	5 metres	10 tonnes; 60 times per week
Shotcrete accelerator	3 PG III	Bunded area within the Proposal Site – to be confirmed by the construction contractor	1,000 litre intermediate bulk containers	Greater than 5 tonnes	5 metres	3 tonnes; 45 times per week
Epoxy glue	3 PG III	Within the Proposal Site – to be confirmed by the construction contractor	Small containers	Greater than 5 tonnes	5 metres	10 tonnes; 60 times per week
Coagulants	N/A	Bunded area within the Proposal Site – to be confirmed by the construction contractor	1,000 litre intermediate bulk containers	N/A	N/A	Not subject to Applying SEPP 33 transport thresholds
Acids	8 PG III	Bunded area within the Proposal Site – to be confirmed by the construction contractor	1,000 litre intermediate bulk containers	Greater than 25 tonnes	N/A	2 tonnes; 30 times per week

Material	Australian Dangerous Goods Code Class	Storage locations	Storage method	Applying SEPP 33 thresholds		
				Minimum Storage volume	Minimum storage distance from sensitive receivers	Transport (weekly)
Bases	8 PG III	Bunded area within the Proposal Site – to be confirmed by the construction contractor	1,000 litre intermediate bulk containers	Greater than 25 tonnes	N/A	2 tonnes; 30 times per week
Antiscalant	N/A	Bunded area within the Proposal Site – to be confirmed by the construction contractor	100 litre drums	N/A	N/A	Not subject to Applying SEPP 33 transport thresholds
Membrane preservative	8 PG III	Bunded area within the Proposal Site – to be confirmed by the construction contractor	10 litre drums	Greater than 50 tonnes	N/A	2 tonnes; 30 times per week
De-bonding agents	N/A	Bunded area within the Proposal Site – to be confirmed by the construction contractor	Drums/containers	N/A	N/A	Not applicable
Contaminated waste	Dependent on nature of material	Bunded area within the Proposal Site – to be confirmed by the construction contractor	Bunded areas or removed directly from site	Dependent on nature of material	Dependent on nature of material	Dependent on nature of material
Paint	N/A	Bunded area within the Proposal Site – to be confirmed by the construction contractor	20 litre drums	N/A	N/A	SEPP 33 transport thresholds

1 – Classified as C1 if not stored with other Class 3 flammable liquids

2 – Classified as 3PGIII if stored with other Class 3 flammable liquids.

15.4.1.3 Potential contamination

The main contaminants of potential concern that could be exposed during excavation works for the Proposal include:

- Organochlorine pesticides (OCPs)
- Organophosphate pesticides (OPPs)
- Nutrients from fertilisers
- Heavy metals
- Total Recoverable Hydrocarbons (TRH)
- Polycyclic Aromatic
- Hydrocarbons (PAHs)
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEXN)
- A variety of medical waste streams– clinical, cytotoxic, infectious, corrosive and hazardous (both solid and liquid)
- Solvents, adhesives
- Asbestos

Further information is provided in **Chapter 7 (Soils, groundwater and contamination)**.

Exposure to these contaminants could cause health and safety impacts on the community through inhalation, incidental ingestion, direct contact, and/or impacts on the environment through the contamination of land. The implementation of mitigation measures outlined in **Section 0** and **Chapter 7 (Soils, groundwater and contamination)**, would reduce the risk of uncontrolled releases of contaminated material. This would reduce the likelihood of that contaminated material affecting the receiving environment and/or human health. With mitigation, the impacts from potential contamination are considered to be negligible.

15.4.2 Operation phase

Potential hazards and risks during the operation of the Proposal would be associated with:

- The on-site storage and use of dangerous goods and hazardous substances
- Building fire.

These hazards and risks are described further in the following sections.

Flooding risks, including inundation of the Proposal Site and excavation, have been addressed in **Chapter 19 (Surface water, flooding and water use)**. Climate change risks, including changes in the frequency of air temperature extremes, changes in mean and extreme rainfall, and changes in the frequency and intensity of storm events, are assessed **Chapter 14 (Climate change, greenhouse gas and energy efficiency)**.

15.4.2.1 On-site storage and use of dangerous goods and hazardous substances

A preliminary risk screening was undertaken for dangerous goods and hazardous substances that would be located on the Proposal Site during the operation phase (refer **Section 0**). The storage of those materials does not exceed the screening threshold to be considered under SEPP 33.

The storage and handling of diesel fuel would be in accordance with *AS 1940: The Storage and handling of flammable and combustible liquids*. All diesel fuel would be stored in suitably constructed fuel tanks located underground. The chosen fuel tanks would be designed to meet the applicable standards to prevent spill, leak or damage, reducing the potential for contamination or for the diesel fuel to be a source of fire. The potential for impacts from the storage of dangerous goods and hazardous substances within the operational phase of the Proposal is low.

Figure 15-1 Location of back-up generators, diesel fuel storage tanks and lithium-ion batteries

N

0 50 100 m

AECOM

Legend

- Site boundary
- Property boundary
- Road 22
- Building footprint
- Diesel generator
- Underground fuel storage tank

Source: Imagery © Nearmap, 2020.

15.4.2.2 Building fire

Hazard Sources

Table 15-5 presents the notable and relevant hazards that may result in a building fire.

Table 15-5 Potential hazards to occupants associated with the building design

Hazard type	Details
Ignition sources	• Electrical and mechanical equipment malfunction • Repair and maintenance including hot works • Unauthorised smoking • Arson (minor forms) • Terrorism • Heating appliances malfunction • Kitchen appliances (e.g. microwave, refrigerator) • Battery system malfunction • Alternative electrical generation malfunction
Fuel sources	• • Electrical equipment e.g. switchboards, data racks • Rubbish bins • Furniture • Linings and coverings • Diesel generators • Landscaping vegetation

Hazard posed by Lithium-Ion Batteries

If overheated or overcharged, Lithium-ion batteries may suffer thermal runaway and cell rupture. In the context of lithium ion batteries, thermal runaway is connected to a process where exothermic reactions (reactions that produce heat) occur within the cell of the battery, which in turn result in additional exothermic reactions, ultimately resulting in a positive feedback cycle that continues to generate heat. At high temperatures, the material within the battery can ignite when exposed to the oxygen in the air.

This process can occur as a result of the battery being overcharged, exposed to excessive temperatures, external short circuits because of faulty wiring or internal short circuits due to cell defects. Where such an event occurs, it may result in a building fire.

Impact

The ultimate impact from a fire is very much dependent on the ignition source, available fuel sources for the fire, design elements of the building (including fire suppression systems) and response from emergency services. On this note, the Proposal is being designed in a way that would reduce the ability for a fire to ignite, and provide solutions to mitigate the ultimate impact of a building fire. Comment on design aspects is provided in **Section 15.5.1**.

15.5 Safeguards and management measures

15.5.1 Mitigation of fire risk through design and consultation

15.5.1.1 Context

The Proposal would be constructed in accordance with the Performance Requirements of the Building Code of Australia (BCA) and applicable Australian Standards that are required to be met in order to satisfy the Performance Requirements of the BCA. Consideration of other international standards such as those from the US National Fire Protection Association (NFPA) and FM Global have not been undertaken. It is considered that satisfying the requirements of the relevant Australian fire safety provisions and ongoing consultation with Fire and Rescue NSW would allow for hazards posed by lithium-ion batteries to be adequately managed and would avoid any potential conflicts between Australian and international requirements.

Where possible, the Proposal would meet the “Deemed-to-Satisfy” provisions of the BCA, which are prescriptive conditions, that, where achieved, demonstrate compliance with the BCA Performance Requirements. Where the prescriptive conditions are not met Performance Solutions that provide a tailored solution to meet the intended objective of the Performance Requirements would be and are in the process of being developed as part of the Construction Certificate Process.

The relevance of the above is that the fire safety elements of the Proposal are being designed in accordance with the BCA. The fire safety objectives of the BCA are generally specified in Sections C, D and E of the BCA. Non-compliances to the prescriptive BCA Deemed-to-Satisfy provisions for fire safety have been identified within the current design documents. As a result of those non-compliances, Performance Solutions have been developed via the fire engineering process to demonstrate compliance with the Performance Requirements. The acceptability of the Performance Solutions in relation to fire safety are subject to fire engineering analysis and ongoing consultation with Fire and Rescue NSW.

To ensure an acceptable level of fire safety is maintained for the Proposal a fire engineering report is currently being prepared in accordance with the International Fire Engineering Guidelines 2005 (IFEG). The fire engineering report is accompanied by a Fire Engineering Brief Questionnaire (FEBQ) submission to Fire and Rescue NSW. The FEBQ identifies the fire safety engineering matters to be addressed (departures from the BCA Deemed to Satisfy provisions), defines a trial fire safety strategy and proposed analysis methods and acceptance criteria. Consultation with Fire and Rescue NSW is ongoing as of 10 November 2020, in order to develop an acceptable level of fire safety.

15.5.1.2 Fire safety design measures – General

A summary of the fire safety measures that would be provided throughout the building and are subject to the FEBQ review is presented below.

Suppression system	Detection system	Facilities for emergency services
☐ CA16 (existing building)	☐ AS 3786:2014	☐ Emergency lifts
☑ AS 2118.1-2017	☐ AS 3786-1993 (existing building)	☐ Fire control centre
☐ AS 2118.1-2006	☑ AS 1670.1:2018	☑ Fire control room
☐ AS 2118.1-1999 (existing building)	☐ AS 1670.1:2015 (existing building)	☑ Perimeter vehicular access
☐ AS 2118.2-2010 (wall-wetting)	☐ AS 1668.1:2015	☐ Standby power supply system
☐ AS 2118.3-2010 (deluge)	☐ AS 1670.3-2018 (monitored)	**Occupant warning system**
☐ AS 2118.4-2012 (residential)	☐ AS 1670.3-2004 (existing building)	☑ Building occupant warning
☐ AS 2118.5-2006 (domestic)	☐ Smoke alarms	☑ EWIS
☑ AS 2118.6-2012 (combined)	☐ Heat alarms	☐ SSISEP
☐ FPAA101D (class 2 or 3)	☑ Smoke detectors	☑ Break glass unit

☐ FPAA101H (class 2 or 3)	☐ Heat detectors	☐ Visual / tactile alarm devices
☑ Fast response heads	☐ Flame detectors	**Signage**
☐ ESFR	☐ CO detectors	☑ Emergency lighting
☐ Storage mode sprinklers	☐ Multi-criteria fire detectors	☑ Exit and direction signs
☐ Gaseous suppression system	☑ Aspirated smoke detection	☐ Warning and operational signs
☐ Water mist system	☐ Beam detection	**Protection of openings**
Hydrant system	**Water supply**	☑
☐ AS 2419.1-2017	☑ Reticulated town main	☑ Smoke doors
☑ AS 2419.1-2005	☐ Private water main	☐ Solid core doors
☐ AS 2419.1-1994 (existing building)	☑ Onsite storage tank	☐ Fire windows
☐ Ordinance 70 (existing building)	☐ Gravity tank/reservoir	☐ Fire shutters
☑ External hydrants	☑ Dual supply	☐ Wall-wetting sprinklers
☑ Internal hydrants	**Smoke hazard management**	☐ Fire curtain
☐ Internal dry-riser (for Class 2/3)	☐ Zone smoke control	☐ Smoke curtain
☐ Street hydrant coverage only	☐ Purge system (existing building)	☐ Safety curtain for openings
☑ Hydrant booster assembly	☐ Smoke and heat vents	☑ Fire dampers
☑ Pumpset	☐ Smoke exhaust	☑ Smoke dampers
Firefighting equipment	☐ Smoke baffles	☐ Fire seals (intumescent)
☑ Portable fire extinguishers	☐ Ridge vents	☐ Hot smoke seals (>200ºC)
☐ Fire hose reels	☑ Stair pressurisation	☐ Medium temp. smoke seals
	☐ Impulse / jet fans (in carpark)	

- **Fire resistance and compartmentation**
    - Fire resistance and compartmentation within the building shall be in accordance with the Deemed to Satisfy provisions of the BCA Part C, except in relation to the following, which have been addressed as Performance Solutions and subject to consultation with Fire and Rescue NSW:
        - Fire Resistance Level
        - Floor area and volume limitations of the fire compartments containing the data halls and associated mechanical and electrical equipment
        - Air handling unit (AHU) chambers and generator enclosures that are not provided with sprinkler protection will not be separated from the sprinklered building areas
    - As part of the fire safety strategy, the following additional measures are proposed to be implemented:
        - All building areas are required to comprise concrete or plasterboard walls, floors and ceilings only
        - Storage and equipment within the data halls and associated mechanical and electrical equipment areas are not to exceed 4 metres above finished floor level
        - Diesel supply pipework is required to be provided with an automatic shutoff valve to operate upon activation of local heat detectors within the generator enclosures. The valves are to also be remotely operable manually from the Fire Control Centre, with the valves detailed on the block plans onsite

- **Egress:**
    - The Proposal would be served by direct exits to outside at ground floor and four fire-isolated stairways serving the levels above, discharging directly to the outside
    - Egress provisions shall be in accordance with the DtS provisions of the BCA Part D, except that the following variations have been addressed as a Performance Solution:
        - Extended travel distances
        - In the data halls, horizontal exits constitute greater than 50% of the total number of exits
        - The egress strategy for the proposed building includes the use of and fire-resisting walls for horizontal evacuation. Doorways within these walls will swing in the direction of egress for occupants travelling one way, however will swing against the direction of egress for occupants travelling in the opposite direction
        - Due to the locations of columns within the data centre hot aisles, pinch points along the paths of travel result in a minimum egress width of 750 millimetres in lieu of one metre
    - The following additional measures are required to be implemented as part of the fire safety strategy for the building:
        - The Proposal is to incorporate a simultaneous evacuation strategy with evacuation to occur upon activation of fire alarm anywhere throughout the building
- **Automatic smoke detection system**
    - The Proposal is to be provided with a smoke detection system throughout in accordance with BCA Specification E2.2a Clause 4 and *AS 1670.1-2018 – Fire Detection, Warning Control and Intercom Systems – System Design, Installation and Commissioning - Fire*, incorporating the following:
        - The Fire Control Centre (FCC) in accordance with BCA Specification E1.8 is to be located at the main entry of the building, and a sub-FCC is to be provided within the security building at the main site entry. The sub-FCC is to provide full functionality and control to the responding fire brigade
        - Multi-Aspirated Smoke Detection System (MASDS) is to be provided throughout the data halls and areas with high air-flow (e.g. plenums), with point-type detection provided throughout the remainder of the building (heat detection provided where there is a likelihood of spurious alarms)
        - As part of a performance solution, smoke detectors are to be omitted from within AHU ductwork
- **Emergency warning and intercommunication system (EWIS)**
    - The Proposal would be served by an EWIS throughout in accordance with BCA Clause E4.9 and *AS 1670.4 – 2018 – Fire Detection, Warning Control and Intercom Systems – System Design, Installation and Commissioning – Emergency,* the Master Emergency Control Panel (MECP) is to be located in the main entry lobby at Ground Floor as part of the FCC, with the sub-MECP located within the site security building
    - The following is incorporated into the design as part of Performance Solutions:
        - Speech intelligibility is not expected to be achieved in non-office areas of the building and it is not proposed to provide visual warning devices (strobes).
        - The Proposal is to incorporate a simultaneous evacuation strategy with evacuation to occur upon activation of fire alarm anywhere throughout the building

- **Fire alarm monitoring**
    - The Proposal is to be provided with fire alarm monitoring in accordance with BCA Specification E2.2a Clause 7 and AS 1670.3-2018 – *Fire Detection, Warning Control and Intercom Systems – System Design, Installation and Commissioning – Fire alarm monitoring*
- **Fire suppression systems**
    - The Proposal would be served by an automatic sprinkler system in accordance with BCA Part E and *AS 2118.1-2017 – Automatic fire sprinkler systems, General systems* and *AS 2118.6-2012 - Automatic fire sprinkler systems Combined sprinkler and hydrant systems in multistorey buildings*; critical areas of the building will be served by a pre-action system. The following variations have been addressed as a Performance Solution:
        - It is proposed to omit sprinklers from within AHU chambers within the plant areas and within generator enclosures on the external platforms.
    - The following additional measures are required to be implemented as part of the fire safety strategy for the project:
        - Sprinkler heads provided throughout the building are to be quick response type
        - Full sprinkler coverage is to be provided above the AHUs subject to the performance solution for omission of sprinklers
        - All sprinkler heads in the first row around the generator enclosures subject to the performance solution for omission of sprinklers are to be designed to be capable of operating simultaneously
- **Smoke hazard management**
    - As part of Performance Solutions, the following is applicable:
        - Due to the critical nature of the building and equipment, it is proposed to permit non-essential mechanical air handling systems to not shut down upon activation of the fire alarm within the building (and omit smoke detectors within the AHUs for this purpose)
        - It is proposed to omit zone smoke control from the building, and to permit stair pressurisation testing with two doors held open simultaneously only
- **Exit and signage and emergency lighting**
    - Emergency lighting and light-emitting illuminated exit signage is required to be provided throughout the building in accordance with BCA Clauses E4.2, E4.5, E4.6 and *AS 2293.1:2018 – Emergency lighting and exit signs for buildings*
- **Fire hydrant system**
    - The Proposal is to be provided with a fire hydrant system in accordance with BCA Clause E1.3 and *AS 2419.1-2005 – Fire hydrant installations*; this is part of the combined hydrant and sprinkler system in accordance with *AS 2118.6-2012 - Automatic fire sprinkler systems Combined sprinkler and hydrant systems in multistorey buildings*. The following variations have been addressed as a Performance Solution:
        - The booster will not be located at the main site entry or within site of the main building entry; the fire pump room will be located within 10 metres of the booster
        - Attack hydrants will be located within 10 metres of the external walls of the building
        - Full coverage of the data halls will be via two lengths of hose from the hydrants within fire stairs, in lieu of on-floor hydrants

- **First attack firefighting**
    - The Proposal is to be provided with portable fire extinguishers throughout as per the locations nominated by BCA Clause E1.6 and installed as per *AS 2444-2001 – Portable fire extinguishers and fire blankets, Selection and location*; the following variations have been addressed as a Performance Solution:
        - Fire hose reels will be provided within the loading dock and carparking spaces, however it is proposed to omit fire hose reels to the remaining areas of the Proposal
    - The following additional measures are required to be implemented as part of the fire safety strategy for the building:
        - Additional 5 kilogram CO_2 fire extinguishers are to be provided within four metres of the exits serving each compartment. The exit doors are to be provided with signage stating “NO FIRE HOSE REELS. USE FIRE EXTINGUISHER.” in characters not less than 50 millimetres high and in a colour contrasting with that of the background
- **Emergency lifts**
    - The building is to be served by emergency lifts in accordance with BCA Clause E3.4
- **Perimeter vehicular access**
    - The Proposal is to be served by a perimeter vehicular access route in accordance with the BCA Clause C2.4. Electronic security gates are to be controlled via the security building with an intercom provided for that purpose

15.5.1.3 Fire safety design measures – Lithium ion batteries

In addition to the general fire safety elements of the Proposal (refer Sections **15.5.1.1** and **15.5.1.2**), the design takes into account the intricacies associated with the presence of lithium-ion batteries within the Proposal.

Battery Management System

Battery units proposed as part of the Proposal are provided with a Battery Management System to prevent overheating or overcharging.

The battery system is developed to have numerous levels of safety monitoring within them so as to prevent issues that may generate fire. The Battery Management System would protect the battery system in the event of fault conditions.

The Battery Management System monitors parameters associated with faults that may generate a fire of a battery cell and is linked to a proprietary building management system user interface. Upon detection of battery cell imbalances or downstream electrical faults, the individual Battery Backup Unit shall shutdown. This would be displayed on the Battery Management System user interface.

Alarms and faults from the Battery Management System would also be monitored by the building management system, allowing building management to review any potential safety issues that may occur within the system. This would be included as an essential fire safety measure on the fire safety schedule for this building.

The likelihood of faults resulting in a fire occurring within the lithium-ion battery system is significantly reduced via the provision of the Battery Management System.

Building Code of Australia

The Proposal also takes into account BCA Clauses E1.10 and E2.3.

Clause E1.10 is applicable as additional measures need to be made to facilitate fire-fighting of a lithium-ion battery fire. The relative merits of the proposed design, in consideration to a lithium-ion battery fire scenario within the data hall, are presented below:

Identification of the risk:

- There are multiple mechanisms to identify a potential battery fire within the data halls:
    - Battery Management System and user interface
    - Manual cues
    - MASDS

Risk controls:

- First attack fire fighting
- Suppression system
- Fire brigade operations

Clause E2.3 - The BCA states:

Additional smoke hazard management measures may be necessary due to the —

a) special characteristics of the building; or

b) special function or use of the building; or

c) special type or quantity of materials stored, displayed or used in a building; or

d) special mix of classifications within a building or fire compartment, which are not addressed in Tables E2.2a and E2.2b.

As per the Guide to the BCA:

The intent of Clause E2.3 is to state that some special hazards may require additional hazard management measures.

The presence Lithium-Ion batteries within the data hall is not considered to warrant additional smoke exhaust measures above the BCA Deemed to Satisfy requirements. An Available Safe Egress Time/Required Safe Egress Time assessment is proposed to be undertaken which accounts for the battery system

15.5.2 General mitigation measures

Mitigation measures that would be implemented for the Proposal to address potential hazard and risk impacts are listed in **Table 6-5**.

Table 15-6 Summary of safeguards and management measures

ID	Mitigation measure	Timing
HR1	All hazardous substances that may be required for construction and operation would be stored and managed in accordance with the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005), *AS 1940: The Storage and handling of flammable and combustible liquids* (as applicable) the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning, 2011) the *Work Health and Safety Act 2011* (Commonwealth and NSW) and the requirements of the *Environmentally Hazardous Chemicals Act 1985* (NSW)	Construction and operation
HR2	Hazardous materials and special waste (such as asbestos – if detected) would be removed and disposed of in accordance with the relevant legislation, codes of practice and Australian Standards (including the *Work Health and Safety and Regulation 2011* (NSW))	Construction

ID	Mitigation measure	Timing
HR3	Construction site planning would ensure hazardous materials are stored appropriately and at an appropriate distance from receivers, in accordance with the thresholds established under *Applying SEPP 33*. Should the minimum buffers be unable to be maintained, either due to space constraints, the close proximity of sensitive receivers, or requirements to store volumes of hazardous materials in excess of storage thresholds, a risk management strategy would be developed on a case-by-case basis	Prior to and during construction
HR4	Risks associated with the rupture of underground utilities would be minimised by carrying out utility checks (such as Dial Before You Dig searches and non-destructive digging), consulting with relevant utility providers and, if required, relocating and/or protecting utilities in and around the Proposal prior to construction. Consultation with utility providers would commence during detailed design and continue during construction to mitigate the risk of unplanned and unexpected disturbance of utilities	Prior to and during construction
HR5	A Battery Management System is to be deployed to prevent overheating or overcharging of the lithium-ion batteries	Operation
HR6	The Battery Management System is to be connected to the essential power system for the building	Operation

15.5.3 Consideration of the interaction between measures

Mitigation measures in other chapters that are relevant to the management of hazard and risk impacts include:

- **Chapter 7 (Soils, groundwater and contamination)**, specifically measures which address potential contamination impacts from existing sources and from the Proposal, as well as the management of contaminated spoil
- **Chapter 8 (Transport and traffic)**, specifically measures which address construction vehicle movements and pedestrian access
- **Chapter 9 (Noise and vibration)**, specifically measures which address vibration impacts and the potential for structural damage from vibration
- **Chapter 10 (Air quality)**, specifically measures which address air quality impacts on surrounding receivers
- **Chapter 14 (Climate change, greenhouse gas and energy efficiency)**, specifically measures which address climate change risks such as extreme heat.
- **Chapter 19 (Surface water, flooding and water use)**, specifically measures which address flooding risks during construction and operation of the Proposal

16.0 Land use

This chapter provides an assessment of the land use impacts associated with the Proposal.

Table 13-1 sets out the Secretary's Environmental Assessment Requirements (SEARs) relevant to land use, and indicates where these requirements have been addressed in this Environmental Impact Statement (EIS).

Table 16-1 SEARs – Land use

SEARs Requirement	Where addressed
Land use	
General Requirements The EIS must include: Consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments.	Consideration of all relevant environmental planning instruments is provided in **Sections 16.2.2, 16.3**, and **16.5**. Consideration of other planning and statutory measures is included in **Chapter 4 (Strategic and Statutory Context)**.
Planning agreement/development contributions The EIS must provide demonstration that: Satisfactory arrangements have been or would be made to provide, or contribute to the provision of, necessary local infrastructure required to support the development.	Consideration of necessary local infrastructure required to support the development is discussed in detail in **Chapter 17 (Infrastructure)** and **Section 16.5** (regarding Road 22). Further information regarding the development history of the Site, and amendments to existing development approvals as part of the Proposal is provided in **Chapter 2 (Location and Strategic context)**.

16.1 Assessment approach

The assessment of land use impacts involved:

- Providing an overview of the existing environment with respect to land use and planning controls that apply to the Proposal, based on a review of existing land use zoning provisions from the *Ryde Local Environmental Plan 2014* (Ryde LEP), aerial imagery and other relevant environmental planning instruments (EPIs)
- Assessing the potential impacts of construction and operation on existing land uses in and around the Proposal
- Identifying appropriate mitigation and management measures to avoid or minimise impacts on land use that may arise as a result of the construction and operation the Proposal.

16.2 Existing environment

16.2.1 Location and setting

As discussed in **Chapter 2 (Site context**), the Proposal is located about 12 kilometres northwest of the Sydney CBD, about 890 metres south east Macquarie University Hospital, about 850 metres southeast of Macquarie University, and about 550 metres southeast of Macquarie Shopping Centre.

The Site is located on one lot of land, legally designated as Lot 1 in DP 633221. A detailed description and summary of development history of this parcel is provided in **Chapter 2 (Site context)**.

The Site is currently owned by Stockland and is occupied by an at-grade car parking area and two multi storey commercial and warehouse buildings that provide retail and office spaces available to lease.

The area surrounding the Site is generally characterised by large street blocks (up to about 370 metres in length), that are typically occupied by warehouse style large to medium sized business and retail

premises (multiple tenant and single tenant), a shopping mall (Macquarie Shopping Centre), office blocks, health care facilities, and education facilities. Associated parking towers, parking lots and landscaped areas accompany development in the area. This description is consistent with the land use designations in the vicinity of the Proposal, discussed in more detail below.

Macquarie Park metro station is located about 750 metres southwest of the Proposal, and Macquarie University metro station is located about 750 metres northwest of the Proposal. The Proposal area is also serviced by high frequency bus services along Talavera and Khartoum Roads. The location of bus stops and available bus routes in the vicinity of the Proposal is discussed in more detail in **Chapter 3 (Proposal description)**.

16.2.2 Land use and planning

The site is located in Macquarie Park in the City of Ryde LGA. Development of this site for the proposed data centre is governed by the application of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The following environmental planning instruments (EPI) are considered relevant to the Proposal and have been considered in the preparation of this EIS:

- EP&A Regulation
- *State Environmental Planning Policy (State and Regional Development) 2011*
- *State Environmental Planning Policy (Infrastructure) 2007*
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2018*
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*
- *State Environmental Planning Policy No. 55 – Remediation of Land*
- *Ryde Local Environmental Plan 2014.*

A detailed discussion regarding how each of the above EPIs are relevant to the Proposal is provided in **Chapter 4 (Strategic and statutory context)**.

Ryde Local Environmental Plan 2014

The Proposal is located within the Ryde LGA, which is subject to the application of the Ryde LEP. The Ryde LEP aims to make local environmental planning provisions for land in Ryde in accordance with the relevant standard environmental planning instrument under Section 3.20 of the Act. Relevant sections of the Ryde LEP have been considered so that the development is as consistent with the Ryde LEP as possible. The Ryde LEP clauses that have been considered in this EIS include:

- Clause 2.3 – Zone objectives and land use table
- Clause 4.3 – Height of buildings
- Clause 4.4 – Floor space ratio
- Clause 4.5B – Macquarie Park corridor
- Clause 6.1 – Acid sulfate soils
- Clause 6.2 – Earthworks
- Clause 6.4 – Stormwater management
- Clause 6.6 – Environmental sustainability
- Clause 6.9 – Development in Macquarie Park corridor.

A detailed discussion regarding how each of the above clauses of the Ryde LEP are relevant to the Proposal is provided in **Chapter 4 (Strategic and statutory context)**.

The Proposal is located within an area zoned as B7 Business Park Zone under the Ryde LEP. The immediate surrounding areas comprise a mix of B4 Mixed Use and B3 Business Park land uses, while the M2 Motorway located to the north of the Proposal is zoned SP2 Infrastructure, as shown on **Figure 16-1**.

The objectives of the B7 Business Park Zone under the Ryde LEP are as follows:

- To provide a range of office and light industrial uses
- To encourage employment opportunities
- To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area
- To encourage industries involved in research and development.

The project would be consistent with the objectives of the B7 Business Park Zone. This is discussed in more detail in **Section 16.5**.

NSW Priority Precinct Program

The “Priority Precinct Program”, was a 2012 NSW State Government initiative (previously known as “Urban Activation Precincts”), aimed at providing homes and jobs for Sydney’s growing population. As part of the initiative, potential precincts with good access to infrastructure, public transport and services and where development was economically feasible, were identified for further investigations. As part of this program, Herring Road, Macquarie Park was identified as suitable for further investigation.

To deliver the Herring Road, Macquarie Park precinct, a State Environmental Planning Policy (SEPP) was developed to allow for the amendment of the planning controls in the Ryde LEP. As a result, the area has seen a transition in development and land use priorities. In a land use context, this change is demonstrated in that warehouse and office premises in the area surrounding the Site are typically found at a lower density when compared to newer, more recently developed premises.

City of Ryde Development Control Plan 2014, Macquarie Park Corridor

As mentioned previously, the Proposal is located within the Macquarie Park Corridor. The Macquarie Park Corridor is described as one of Australia's ten largest office precincts and aims to be a core location for globally competitive businesses within greater Sydney.

Part 4.5 - Macquarie Park Corridor of the City of Ryde Development Control Plan (DCP) 2014 provides the guidelines, objectives, urban design guidelines and controls development in the Macquarie Park Corridor (City of Ryde, 2014). The DCP sets out the broad framework for development within the Macquarie Park Corridor, in support of the Ryde LEP 2014.

It is important to note however, that because the Proposal is considered SSD (refer to **Section 4.3.2.2**), the City of Ryde DCP does not apply. Notwithstanding this exemption, relevant sections of the Ryde DCP have been considered so that the development is as consistent with the City of Ryde’s expectations for the area as practicable. In addition, Council’s views have been considered in a broader context as part of the masterplan amendment DA review.

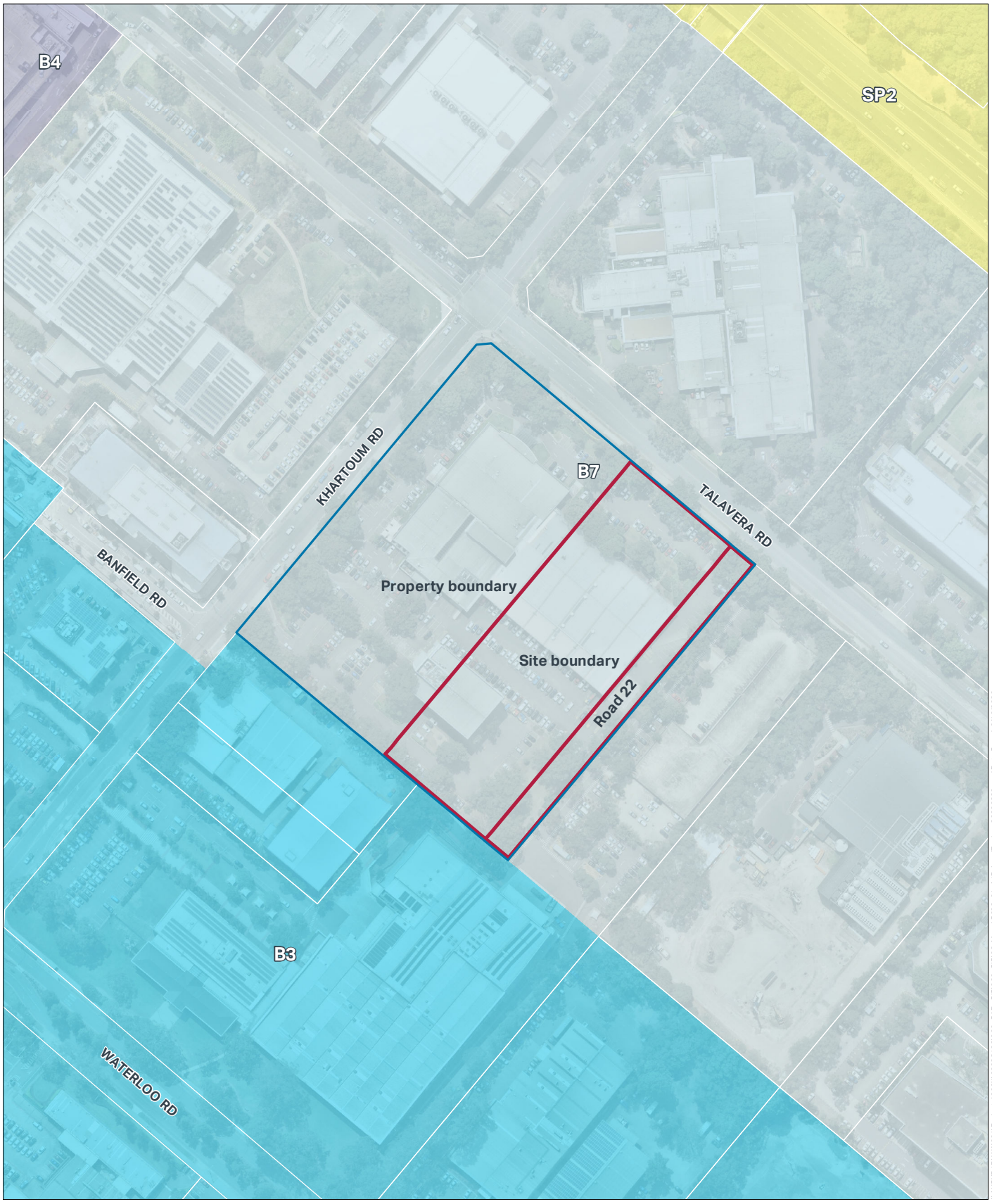

Figure 16-1 Land use surrounding the Proposal

Legend

- Site boundary and Road 22
- Property boundary

LEP Land Zoning

- B3 Commercial Core
- B4 Mixed Use
- B7 Business Park
- SP2 Infrastructure

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16.3 Voluntary Planning Agreement

As part of LDA2017/0547, Stockland entered into a Voluntary Planning Agreement (VPA), which set out a contributions schedule for the staging of infrastructure works, including:

- Construction of Road 22 which lies within the boundaries of the site and runs parallel to Khartoum Road
- Construction of civil works required to deliver Road 22 including, but not limited to, footpaths, landscape islands, kerb and gutter, asphalt roads, line markings and road and street signage
- Construction of the pedestrian through site link from Talavera Road connecting to a future road to be provided by the owner of Lot B in DP364963, being 7 Khartoum Road. An easement will be provided with the through site link in favour of Council
- Implementation of public art in accordance with the Arts Plan (Public Art Strategy).

The provision of these public benefit elements contributes to the recreation and connectivity of the precinct, satisfying Ryde LEP 2014, clause 6.9, and allowing the incentive building height and floor space ratio provisions to be achieved for the Proposal.

16.4 Construction impact assessment

The entire construction footprint for the Proposal would be located within the permanent operational footprint, comprising the southern half of Lot 1 in DP 633221. The northern portion of the Site would be used to construct “Stage one” of DA 2017/0547 which involves the demolition of the existing south-western office building, and the construction of a 10-storey mixed use commercial and retail building, a 14.5 metre private road connecting to Khartoum Road, a pedestrian link and landscaping. “Stage one” is distinct and separate from the Proposal and is subject to a separate planning approval. The distinction between the Proposal and “Stage one”, and a description of DA 2017/0547 and its amendments (approved and in progress, as they relate to the Proposal) is provided in more detail in **Chapter 2 (Site Context)**.

As mentioned previously, the land on which the Proposal would be located is currently owned by Stockland. For this reason, no property acquisition or temporarily lease arrangements would be required for the construction of the Proposal, and no property impacts outside of the Site are anticipated.

During the construction period, all existing tenants would cease commercial operations at the Site and all premises on the Site would be removed. This would be undertaken in a staged sequence of demolition works, commencing with the existing warehouse component of the existing building on the Site. Demolition of premises that are currently located across the broader M_Park project area would be undertaken via a separate development application (lodged with City of Ryde Council 8 September 2020). During construction, the Site would be used for construction activities and the establishment of construction laydown, storage, and site offices. While this would represent a change in current land use at the Site, this would be temporary in nature and limited to the duration of the construction period.

As this change in land use would be temporary, and as the purpose of construction is for the delivery of a Data Centre at the Site, this impact is considered to be minor. The operational land use outcomes of the Proposal are discussed in detail below.

No land use mitigation and management measures are proposed for the construction of the Proposal.

16.5 Operation impact assessment

Following the completion of construction and commissioning works, the Proposal would commence operation as a data centre. The operational data centre is anticipated to operate 24-hours, seven days a week. It estimated that the Proposal would accommodate up to 50 full-time staff who would be employed to carry out tasks associated with the operation of a data centre facility.

As part of the Proposal, an access road (Road 22) would be established along the south-eastern boundary of the Site. The proposed Road 22 would be a cul-de-sac until the neighbouring properties are developed. Road 22 would eventually connect to a future road within the precinct (Road 1).The

delivery of Road 22 would consider and comply with the relevant design guidelines provided in the City of Ryde Public Domain Technical Manual as far as it is practical to do so. Details regarding the design of Road 22 are provided in more detail in **Chapter 2 (Proposal description)**.

Road 22 would also provide parking bays on one side. It is anticipated that this parking would made available to the public. The provision of on street parking will be further refined during detailed design, in consultation with Ryde City Council. Private parking for workers would be provided in a designated parking area within the Site as part of the Proposal.

The operation of the Site as a data centre would be consistent with the objectives of the B7 Business Park Zone under the Ryde LEP and the City of Ryde Development Control Plan 2014 as it would provide a commercial office, future employment opportunities and facilities that would meet the requirements of businesses and workers at the Site. The Proposal would also contribute to the economic function of the Macquarie Park Corridor through its operational life, as the data centre is anticipated to be a successful business venture that would contribute to the commercial diversity of the Corridor and expand employment opportunities within the high tech-industry.

The Proposal would also directly meet the objectives of the Development Control Plan 2014 through the provision of an additional street (Road 22) that would help to reduce pressure on the existing road infrastructure, as demonstrated in **Chapter 8 (Traffic and Transport)**. In addition, it is anticipated that Road 22 would eventually connect to a future road within the precinct (Road 1) and would provide new opportunities for businesses and street frontages in the future.

As discussed in detail in **Chapter 3 (Proposal description)**, the Proposal would also incorporate the principles of ecologically sustainable development into its design and operation. This would further fulfil the objectives outlined in the City of Ryde Development Control Plan 2014, Macquarie Park Corridor.

16.6 Safeguards and management measures

As the Proposal is not anticipated to result in any significant property or land use impacts during construction or operation, no land use safeguards or management measures are proposed.

17.0 Infrastructure

This chapter describes the anticipated infrastructure needs of the Proposal and how these needs would be met. It also outlines mitigation measures relating to infrastructure, where required. Also considered are the potential impacts of the Proposal on existing utility infrastructure and service provider assets surrounding the Site.

Table 17-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to infrastructure, and where the requirements have been addressed in this EIS.

Table 17-1 SEARs – Infrastructure

SEARs requirements	Where addressed
Infrastructure	
Infrastructure requirements – including: A detailed written and graphical description of infrastructure required on the site (including any associated testing procedures), including a description of any arrangements to avoid locating infrastructure within public domain areas	This chapter, and **Appendix D (Combined Services Plan)**
Identification of any infrastructure upgrades required off-site to facilitate the development, including a description of any arrangements to ensure that the upgrades will be implemented in a timely manner and maintained	Road 22, while within the extent of the defined Proposal Site during construction, may be considered as offsite development during the operation of the Proposal. The delivery of Road 22 is discussed in **Chapter 3 (Proposal description)** and in **Section 17.4.5**. The provision of an infrastructure delivery and staging plan is discussed in **Section 17.6**
An infrastructure delivery and staging plan, including a description of how infrastructure on and off-site will be co-ordinated and funded to ensure it is in place prior to the commencement of construction	The provision of an infrastructure delivery and staging plan is discussed in **Section 17.6** and **Section 17.7**
An assessment of the impacts of the development on existing utility infrastructure and service provider assets surrounding the site, and a description of how any potential impacts would be avoided and minimised.	This chapter provides an assessment of the potential impacts of the Proposal on existing utility infrastructure and service provider assets surrounding the Site, and a description of how any potential impacts would be avoided and minimised. Management measures are provided in **Section 17.7**.

17.1 Assessment methodology

17.1.1 Study area

The infrastructure study area incorporates all built operational components on the Proposal Site that would draw upon infrastructure resources throughout the operational life of the Proposal. This includes:

- Power
- Potable water
- Wastewater
- Communications
- Access roads.

17.1.2 Methodology

A Combined Services Plan (AECOM, 2020) (**Appendix D**) was prepared for the 50% design for the Proposal. This document has been used as a key resource in the development of this chapter. This Plan was developed to determine the existing infrastructure utilities and service routes within the Site and surrounds, and considered the following:

- Water, wastewater, power/electrical, and fibre-optic service
- Potential connection points to existing utility infrastructure
- Potential arrangement of utility infrastructure that would be delivered within the Site, as part of the Proposal.

The Combined Services Plan was prepared using a review of publicly available information, including a series of Dial Before You Dig (DBYD) searches. This Plan also provides a graphical description of infrastructure required on the site.

This infrastructure chapter has been prepared in consultation with relevant utility providers including:

- Sydney Water
- Ausgrid
- Telstra.

As the Proposal would not require a natural gas supply for construction or operation, this utility service has not been considered in this chapter.

17.2 Existing environment

17.2.1 Power

The existing electrical power network in the vicinity of the Proposal Site has been identified based on DBYD reports and a review of the Ausgrid WebGIS. This review identified that Ausgrid provides existing power services to the Proposal Site and surrounding area. A possible connection point has been identified immediately adjacent to the Site, at Talavera Road.

No other energy service providers have been identified in immediate proximity to the Site.

17.2.2 Potable water

The existing Sydney Water potable network in the vicinity of the Proposal Site has been identified based on DBYD reports. Key existing potable water infrastructure includes:

- 200 millimetre cast iron cement lined (CICL) pipe, located on the northern side of Talavera Road
- A 750 millimetre steel cement lined/internal bitumen lined (SCL IBL) disconnected main (not currently connected to the network), located on the western side of Khartoum Road
- A 150 millimetre CICL, located on the western side of Khartoum Road

- Two 1200 millimetre SCL IBL trunk mains, located within Khartoum Road
- A 300 millimetre CICL trunk main located on the eastern side of Khartoum Road.

17.2.3 Waste water

The existing Sydney Water wastewater (sewage) network in the vicinity of the Proposal Site has been identified based on DBYD reports. Key existing wastewater infrastructure includes:

- A 225 millimetre Vitrified Clay (VC) sewer main, located on the southern side of Talavera Road
- A 225 millimetre VC sewer main, located in private property on the southern side of the Site.

17.2.4 Communications

Existing communications infrastructure in the vicinity of the Proposal Site has been identified based on DBYD reports. The results of this search indicated that the following providers of communication services have infrastructure in proximity to the Site, that may be available for the Proposal to connect to:

- AAPT/PowerTel
- AARNet Pty Ltd
- NBN Co
- Nextgen
- Optus and/or Uecomm
- PIPE Networks
- Telstra
- Verizon Business
- Vocus Communications.

17.2.5 Access roads

The Proposal is located within a block of properties that is bounded by Talavera Road along the north-east, Lane Cove Road along the south-east, Waterloo Road along the south-west and Khartoum Road along the north-west. Apart from Lane Cove Road, which itself forms part of a major arterial road in Sydney, the two closest arterial roads are Epping Road to the south and the M2 Motorway to the north.

Existing vehicle access to the Site is available from:

- Two driveways with security boom gates on Talavera Road
- Two driveways with security boom gates on Khartoum Road.

Talavera Road, on which the Proposal would be located, is an unclassified 7000 series road, for which Ryde City Council is the relevant road authority. Talavera Road is a four-lane, bi-directional road with a posted speed limit of 50 km/h, with limited on-street parking.

Khartoum Road is an unclassified local road for which Ryde City Council is the relevant road authority. It provides a link between Talavera Road and Waterloo Road and is a four-lane, bi-directional road with a posted speed limit of 50 km/h. Ticketed kerbside parking is generally permitted on both sides of the road adjacent to the Proposal Site.

Lane Cove Road is classified as a State road for which Transport for NSW is the relevant road authority. It provides connectivity to the wider arterial road network, including Epping Road, Ryde Road, the M2 Motorway, Victoria Road and Devlin Street. Lane Cove Road is generally a six-line bi-directional road with a posted speed limit of 70 km/h.

Waterloo Road runs parallel to the alignment of Talavera Road. It is an unclassified local road for which Ryde City Council is the relevant road authority. It provides links between Lane Cove Road at the south-east and Herring Road at the north-west. Waterloo Road is a four-lane, bi-directional road with a posted speed limit of 50 km/h, with limited on-street parking.

A detailed description of the existing road network beyond that described above, is provided in **Chapter 8 (Transport and Traffic)**.

17.3 Impact assessment

17.3.1 Construction

During the construction of the Proposal, connection to any existing utilities would be limited to the use of electricity and communications to service the site offices, use of potable water for construction activities, and access to and from the Proposal Site using the existing road network. All other utility connections would be formally established during the commissioning of the Proposal.

The energy usage required to provide power to site offices during construction is likely represent a lower burden on the power grid than the former use of the Proposal Site as a complex of office and commercial premises. As such, this is unlikely to represent a burden on the existing power network.

For these reasons, this construction impact assessment has been limited to impacts upon potable water use and the existing road network.

17.3.1.1 Potable water

The use of potable water would be required during the construction of the Proposal to support a number of construction activities, including concreting, dust suppression, and washing of hard surfaces, equipment and vehicles. In addition, a comparatively smaller amount of water would be used to service worker facilities (e.g. hand washing facilities).

A number of construction best practices would be implemented for the Proposal with regards to sustainable water use including using brooms instead of water for cleaning wherever possible, and using high-pressure low-volume trigger nozzles on hoses for wash down facilities to limit water consumption during construction.

Water use would be required for concreting activities to combine the cement and aggregate. The water used in concrete needs to be of a high quality as impurities can impact on the quality of the concrete and its overall strength. For this reason, potable water is highly suitable for this use. The majority of concrete that would be used to build the Proposal would be brought in from offsite using concrete mixing trucks. These trucks would be filled at a concrete batching plant. As such, while water usage for concrete is likely to comprise a significant portion of the Proposal's water needs during construction, this need would be fulfilled away from the Site, and would limit the total consumption of water at the Site.

As described previously, the existing Sydney Water potable network in the vicinity of the Proposal Site has been identified based on DBYD reports. It is proposed that the Proposal would connect to the existing 200 millimetre CICL on north side of Talavera Road. This would be the primary water main used to service the Proposal. The existing 150 millimetre CICL on west side of Khartoum Road would be utilised as a secondary main.

In consideration of the likely onsite water needs during construction, and with the implementation of best practice water saving measures, it is considered that connections to the 200 millimetre CICL on north side of Talavera Road and the 150 millimetre CICL on west side of Khartoum Road would sufficiently meet the construction needs of the Proposal.

17.3.1.2 Access roads

Chapter 8 (Transport and Transport) provides an assessment of the capacity of the existing local road network to respond to any additional traffic demands that may arise during the construction of the Proposal. A summary of this assessment is provided in this section.

The construction of the Proposal would contribute about 200 additional vehicles, comprised of heavy and light vehicles (construction vehicles), to the surrounding road network.

Construction vehicle routes would avoid local roads and utilise the most direct routes to the Site. Construction vehicles can access Talavera Road directly from the M2 Motorway, or directly from Lane Cove Road. Construction vehicles travelling to Macquarie Park via Epping Road are able to access Talavera Road via Herring Road or via Lane Cove Road. By utilising mainly arterial roads the impact

of construction traffic on the surrounding local road network would be limited. The exact construction vehicle movements would be determined in consultation with the construction contractor.

Daily weekday traffic movements along Talavera Road and throughout Macquarie Park generally are high, with congestion at some intersections during the AM and PM peak. In this context, the addition of 200 construction vehicle movements, staggered throughout the day, is not expected to result in a significant change to the current levels of congestion. Given the temporary nature of construction the Proposal would result in a minor adverse impact upon the existing local traffic network.

Any impacts of the Proposal on nearby road infrastructure would be minor. In addition, the implementation of safeguards and management measures provided in **Chapter 8 (Transport and Transport)**, and **Chapter 22 (Environmental management)**, would further reduce the potential for the Proposal to impact the local road network during construction.

17.4 Operation

17.4.1 Power

As described above, a review of available information identified that Ausgrid provides power services to the Proposal and surrounding area. No other energy service providers have been identified in immediate proximity to the Site. As such, the Proposal would connect to the existing Ausgrid line, located immediately adjacent to the Site, at Talavera Road.

To safeguard against potential power outages that may occur as a result of unforeseen disruptions to the electricity network (e.g. storm events, system overload outages, planned maintenance outages), an arrangement of 18 x 2400kW and 1 x 600kW back-up diesel generators are proposed as part of the Proposal. In the event of a power outage, the back-up diesel generators would engage, providing the power required to maintain the operation of the data centre.

Underground fuel storage tanks would also be constructed as part of the Proposal to supply fuel for the operation of the diesel generators. This would be constructed as an assemblage of main and spare tanks, with a total storage capacity of about 360 kL of diesel.

Additional backup power would be provided to allow for the continuous operation of the data centre during the time it would take for the diesel generators to engage. To accomplish this, each rack would be provided with its own lithium ion battery bank.

The combination of the Ausgrid connection, diesel generators and underground fuel storage tanks is anticipated to meet the power needs that would be required for the operation of the Proposal. In addition, no requirement to upgrade the existing power network to support the operation of the Proposal is anticipated.

17.4.2 Potable water

Following a review of the existing water main connection points in the vicinity of the Proposal, it is proposed that the Proposal would connect to the existing 200 millimetres CICL on north side of Talavera Road. This would be the primary water main used to service the Proposal. The existing 150 millimetres CICL on west side of Khartoum Road would be utilised as a secondary main. These water connections would also be used to provide water to the proposed fire water lines that would be incorporated into the Proposal.

Statements of available pressure and flow for these two existing mains were obtained from Sydney Water as shown in **Table 17-2** and **Table 17-3**.

Table 17-2 Statement of available pressure and flow for 150 mm CICL

Pressure & Flow Application Number: 770153
Your Pressure Inquiry Dated: 2019-11-26
Property Address: U 1/17 Khartoum Rd Macquarie Park NSW 2113

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Khartoum Road	Side of Street: West
Distance & Direction from Nearest Cross Street	120 metres South from Talavera Road
Approximate Ground Level (AHD):	59 metres
Nominal Size of Water Main (DN):	150 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	48 metre head
Minimum Pressure	37 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	37
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	1 6 12 18 26 30 40 50	38 38 38 37 36 35 33 30
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main) Maximum Permissible Flow	5 10 15 20 26 30 40 50 67	37 37 36 36 35 34 31 28 22

Table 17-3 Statement of available pressure and flow for 200 mm CICL

Pressure & Flow Application Number: 771839
Your Pressure Inquiry Dated: 2019-11-26
Property Address: U 1/17 Khartoum Rd Macquarie Park NSW 2113

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Talavera Road	Side of Street: North
Distance & Direction from Nearest Cross Street	100 metres East from Khartoum Road
Approximate Ground Level (AHD):	51 metres
Nominal Size of Water Main (DN):	200 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	56 metre head
Minimum Pressure	45 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	45
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	1 6 12 18 26 30 40 50	46 46 46 45 45 45 44 43
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5 10 15 20 26 30 40 50	45 45 44 44 44 43 42 41
Maximum Permissible Flow	118	32

Water usage requirements for the operation of the Proposal would be associated with the following:

- Operation of evaporative coolers
- Fire safety/fire prevention devices
- Landscaping maintenance
- Office worker facilities (handwashing, toilet flushing, drinking water, etc).

The maximum, worst case scenario water needs for the operation of the Proposal has been calculated as follows:

- Mechanical Peak Instantaneous flow, including the operation of the evaporative coolers (worst case) = 33.4 litres per second (average peak over a year = 21.8 litres per second)
- Fire Sprinklers = 50 litres per second

- Fire Hydrants = 30 litres per second
- Total = 113.4 litres per second.

According to Sydney Water, the Sydney Water pressure enquiry for the proposed main connection point (200 millimetre CICL) states a maximum permissible flow rate of 118 litres per second. This demonstrates that the maximum water needs of the Proposal could be met by this proposed connection

Water capture and recycling would be delivered as part of the Proposal to reduce the extent to which the Proposal would be wholly reliant on the existing potable water network. It is anticipated that recycled water captured from the roof of the building would be used in landscape maintenance applications, and to supplement the water needs of the operation of the evaporative coolers. The evaporative coolers are anticipated to comprise the majority of the operational water needs of the Proposal.

The Proponent is investigating opportunities to construct a wastewater treatment plant to service the Proposal in the long-term. It is likely that this would be provided at a later date, once the Proposal is operational and following the completion of the broader M_Park development. The construction of any future water treatment plant would be subject to a separate approval process. With the provision of a future water treatment plant, it is anticipated that recycled water would satisfy the majority of the water needs for the operation of the Proposal, in the long-term.

A review of expected water needs against the maximum water main pressures, and maximum permissible flow rates for fire prevention system demands for the 200 millimetre CICL and the 150 millimetre CICL, indicates that these connection points would adequately provide the potable water services required for the Proposal.

In the short term, the operational water needs of the Proposal would meet the limitations set by Sydney Water. In addition, the long-term water needs of the Proposal are expected to be offset by water capture and recycling. Overall, the operational water demands of the Proposal would meet the requirement of Sydney Water and are not anticipated to unduly burden the existing potable water network over time. It is not anticipated that any upgrades to the existing Sydney Water potable water network would be required to support the operation of the Proposal.

In addition, the Proponent has lodged a Section 73 Compliance Certificate with Sydney Water. The Proposal would seek to meet all requirements set out in the Notice of Requirements that would be provided by Sydney Water. By meeting these requirements, the Proposal will seek to provide the appropriate water services, and to protect Sydney Water pipes and assets.

17.4.3 Wastewater

Following a review of the existing wastewater connection points in the immediate vicinity of the Proposal, it is proposed that the Proposal would connect to the existing 225 VC sewer main, located on south side of Talavera Road, immediately adjacent to the Site.

The existing sewer main on the southern side of the Site is located within private property and is at a higher elevation than the Site. For these reasons, this sewer main has been excluded from consideration.

It is understood that during the operation of the Proposal, the daily employee capacity of the Data Centre would be limited to about 50 full-time staff. Inputs to the existing sewage system from workers using the building amenities would be within normal limits for the existing landuse at the Site and surrounding area as a mid-scale business premises.

Wastewater from the evaporative coolers would be unsuitable to divert to the stormwater network. All wastewater from the evaporative coolers would be collected and diverted to the Sydney Water wastewater network. Any disposal of wastewater from the evaporative coolers would meet all requirements set out in the Notice of Requirements that would be provided by Sydney Water, including those set out for wastewater, as part of the Section 73 Compliance Certificate.

All stormwater collected on site would be treated onsite and directed to the existing stormwater network. No stormwater would be released to the sewage mains.

Given the proximity of the Proposal to this existing sewer main, and as the burden on the existing sewer network would be in compliance with requirements provided by Sydney Water as part of the Section 73 Compliance Certificate Notice of Requirements, the Proposal is not expected to overburden the existing wastewater network and it is not anticipated that an upgrade to Sydney Water's wastewater infrastructure would be required. The existing wastewater network is anticipated to meet the needs of the Proposal.

In addition, as the existing 225 VC sewer main located on south side of Talavera Road is at a lower elevation to the Site, it is unlikely to require the installation of pumping equipment. Instead, wastewater may be gravity-conveyed.

17.4.4 Communications

The Proposal seeks to meet the needs of Sydney's ongoing digital transformation and expanding digital economy through the construction and operation of a new data storage facility for the purpose of providing a secure, resilient, local, and high performance data storage solution to the residents of Sydney, and NSW.

To meet the high performance the Proposal seeks to achieve, numerous high capacity communications connections to the Site would be required to support its operation.

As described in **Section 17.2.4**, up to nine communications providers have been identified within, or in immediate proximity to the Site. This includes several high-speed fibre optic networks. According to the Combined Services Plan, connection to communication networks would be able to be achieved within, or immediately adjacent to the Proposal Site. One connection option could be achieved through the northern component of the M_Park development (of which the Proposal forms a part) and three additional connection points could be achieved at Talavera Road, immediately outside of the Site boundary.

The wealth of communications connections available at the Site are anticipated to meet the needs of the Proposal. In addition, no requirements to upgrade the existing communications network are anticipated.

17.4.5 Access roads

Chapter 8 (Transport and Transport) provides an assessment of the capacity of the existing local road network to respond to any additional traffic demands that may arise during the operation of the Proposal.

A new public road (Road 22) is proposed to be delivered as part of the Proposal. The new road would be provided along the south-eastern boundary of the Site. Road 22 would be a cul-de-sac, until such a time as neighbouring properties are developed. At that point Road 22 would connect to proposed Road 1, which would be created in accordance with the Macquarie Park Corridor Development Control Plan (DCP). The effect that these new linkages would create upon the traffic network would be assessed as part of those developments.

All access points to the Proposal would be via Road 22. This road would, for the foreseeable future, only service the Proposal, with no other private access points for other properties currently proposed.

During operation of the Proposal, a small number of daily vehicle movement would be anticipated. These movements would accommodate up to 50 full-time staff, deliveries and waste collection services. Given that a proportion of staff would utilise public or active transport means to get to work, and that the need for deliveries is low, daily vehicle movements are expected to be around 50 vehicles per day.

Given the limited number of operational vehicle movements and the fact that Road 22 would not service any other properties, congestion on Road 22, or at its intersection with Talavera Road is expected to be negligible. Given the limited connectivity of Road 22 it is not expected to create induced demand for the road network.

As the operation of the Proposal would only contribute a small quantity of daily vehicle movements, and as a new road would be delivered to facilitate access to the Proposal, the potential for the Proposal to adversely impact nearby road infrastructure would be negligible.

In addition, the implementation of safeguards and management measures provided in **Chapter 8 (Transport and Transport)** and **Chapter 22 (Environmental management)**, would further reduce the potential for the Proposal to impact the local road network during operation.

17.5 Ecologically Sustainable Development

The Proponent is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of ecologically sustainable development (ESD). The principles of ESD are generally defined under the provisions of clause 7(4) of Schedule 2 to the EP&A Regulation as:

- The precautionary principle – If there are threats of serious or irreversible damage, a lack of full scientific uncertainty should not be used as a reason for postponing measures to prevent environmental degradation
- Intergenerational equity – the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
- Conservation of biological diversity and ecological integrity – the diversity of genes, species, populations and their communities, as well as the ecosystems and habitats they belong to, should be maintained or improved to ensure their survival
- Improved valuation, pricing and incentive mechanisms – environmental factors should be included in the valuation of assets and services.

The principles of ESD have been adopted by the Proponent throughout the development and assessment of the Proposal. **Chapter 14 (Greenhouse gas and energy efficiency)** includes an assessment of the impact of the Proposal on a range of environmental factors, including greenhouse gas emissions and climate change. **Chapter 14 (Greenhouse gas and energy efficiency)** lists mitigation measures that guide the incorporation of ESD principles into the detailed design, construction and operation of Proposal.

With the implementation of ESD principles at all stages of the Proposals lifecycle, any Proposal demands on existing infrastructure and utilities would be further reduced.

17.6 Infrastructure delivery and staging plan

An overview of indicative infrastructure delivery and staging is provided in **Chapter 3 (Proposal description)**. The Proposal is expected to commence construction in 2021, with operation to commence in December.

The Proposal would be delivered as follows (in order from commencement of construction to operation):

- Cessation of existing leases and departure of existing tenants
- Site preparation activities including set up of site hoarding and other public safety measures, establishment of construction and traffic management measures, installation of environmental controls
- Demolition of existing buildings (subject of a separate development application). This would be undertaken according to the draft staging plan for the overall M_Park development, which is discussed in more detail below
- Capping of existing services into the site
- Set up of construction compound and connection to relevant services that would be used for the construction of the Proposal, which have been discussed in **Section 17.3.1**
- Commence construction of Road 22, including the installation of stormwater infrastructure which would connect to the existing Council network
- Commence construction of data centre, including excavation and construction of buildings and hardstand areas (including internal circulation roads and car parking)
- Installation of security features, including fencing, and establishment of landscaped areas

- Connection to services, including potable water, wastewater, electricity and communications would be undertaken at relevant points during construction
- Following construction, the Proposal would undergo commissioning and testing. The commissioning phase would include any testing and defect rectification required to transition the Proposal from construction to operational phase. Commissioning will include testing all elements of the Proposal along with safety, quality, and environmental management systems and processes. Sign off from relevant infrastructure authorities to be obtained as relevant
- Following commissioning, the construction stage would be complete and the Proposal would officially commence full operation.

A detailed construction delivery and staging plan would be developed by the construction contractor prior to the commencement of construction. The detailed construction delivery and staging plan would describe the proposed dates of commencement, and anticipated duration of the construction of each key project element, against the anticipated operation target date.

A staging plan has been developed for the delivery of the overall M_Park development. According to this staging plan, the estimated construction timeframes across the proposed M_Park development are as follows:

- The construction of Building A would commence October 2020, and would be completed by around March 2022
- Demolition of the warehouse component currently located on the Site would be undertaken from around April to June, 2021
- Construction of the Proposal would be staged such that the southern portion of the Site would commence construction concurrently with these demolition works, from April to June 2021
- The remainder of the Proposal would commence construction following the completion of demolition works (from August 2021)
- The construction of the Proposal is anticipated to be completed by December 2022
- Demolition of existing buildings in the location of the Proposed buildings C and D is expected to commence around May 2022
- Construction of Building C is anticipated to be carried out from May 2022 to November 2023
- Construction of Building D is anticipated to be carried out from May 2022 to January 2024
- The entire M_Park Development is anticipated to be fully operational January 2024.

17.7 Safeguards and management measures

The implementation of management measures would reduce the potential infrastructure impacts of the Proposal to the greatest extent practicable.

The relevant potential infrastructure impacts and associated management measures and safeguard protocols are provided in **Table 17-4**.

Table 17-4 Safeguards and management measures – Infrastructure

Ref	Mitigation measures	Timing
IN1	The ongoing detailed design of the Proposal will incorporate ESD principals to the greatest extent practicable, to reduce the extent to which the Proposal would be required to draw upon electricity and water resources.	Detailed design

Ref	Mitigation measures	Timing
IN2	Construction best practices would be implement to reduce the water consumption of the Proposal during operation. This may include such actions as sweeping instead of hosing where possible, and use of high pressure low flow nozzles, auto stop-flow triggers on hoses and so on.	Construction
IN3	The construction and commissioning of Road 22 will be delivered prior to the operational phase of the Proposal to provide access to the Site and to improve the existing local road network.	Construction
IN4	A detailed construction delivery and staging plan would be developed by the construction contractor prior to the commencement of construction. The construction delivery and staging plan would describe the commencement and duration anticipated for the construction for each key project element, in detail. The construction and delivery staging plan will also provide details regarding commissioning of the Proposal. During the commissioning phase, utilities and infrastructure will be tested to confirm adequacy and operational quality.	Prior to construction

18.0 Social impacts

18.1 Secretary's Environmental Assessment Requirements

This chapter outlines the potential social and economic impacts associated with Proposal. These include direct and indirect impacts as outlined in **Section 18.5**.

The SEARs provided for the Proposal did not specifically outline any requirements for the assessment of social impacts. Despite this the following social impact assessment has been undertaken to understand potential construction and operational impacts and to inform future management of the Site.

18.2 Existing environment

The scale of the study area for the Proposal has been selected based on its likely area of social influence and consideration of the broader, more regional-scale impacts. This aims to account for aspects such as employment and other economic opportunities facilitated by the Proposal.

Specifically, the study area considers the Macquarie Park-Marsfield geographic area, defined by the Australian Bureau of Statistics (ABS) as a 'Statistical Area Level 2' (SA2).

The geographic extent of the Macquarie Park-Marsfield SA2 area, as well as the overall study area, is shown on **Figure 18-1**.

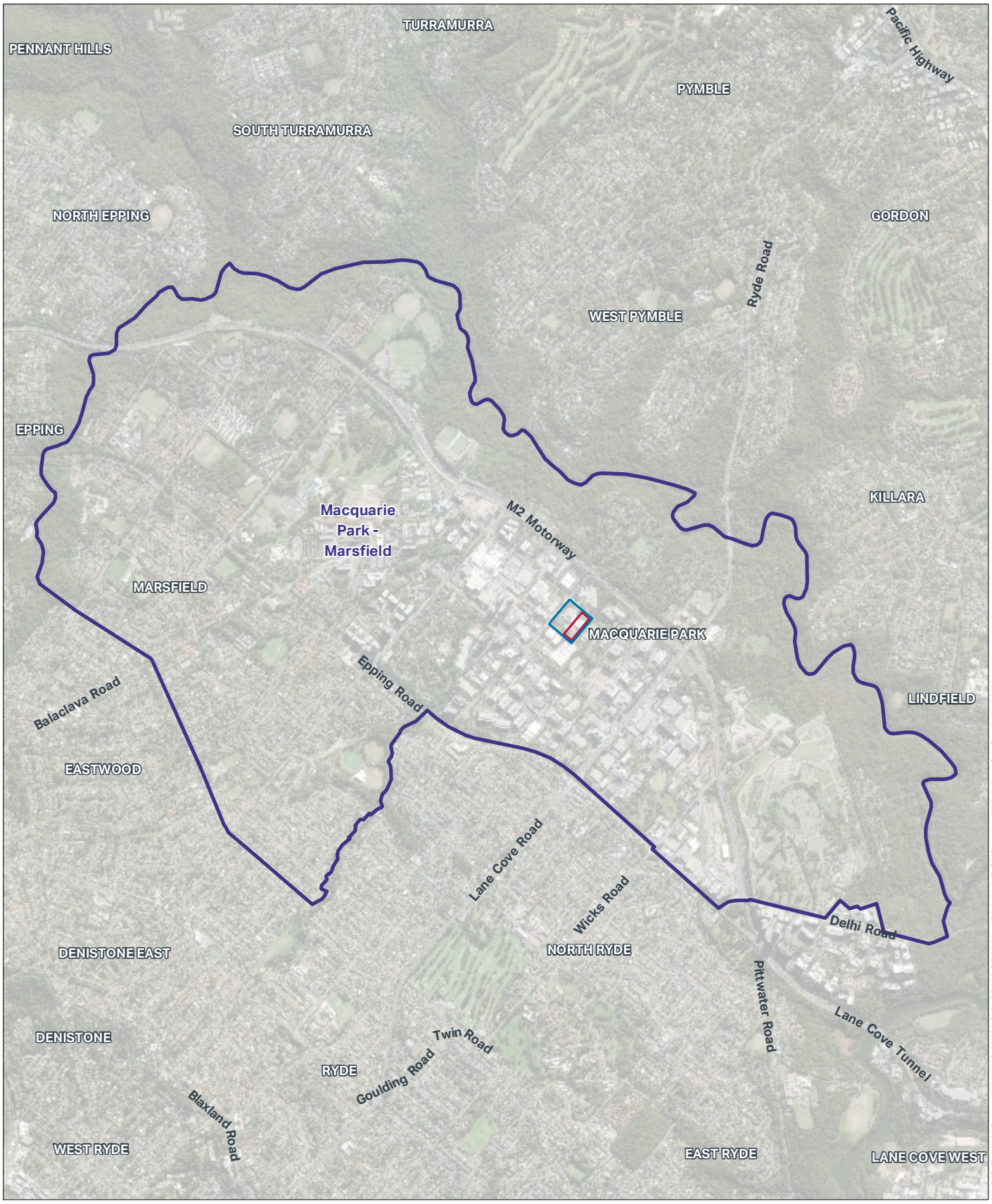

Figure 18-1 Macquarie Park-Marsfield SA2 area

N

0 400 800 m

AECOM

Legend

- Site boundary and Road 22
- Property boundary
- SA2 boundary
- Watercourse

18.2.1 Methodology

This social impact assessment has addressed the direct and indirect impacts and benefits of the Proposal by considering:

- Local amenity, including traffic, air quality, noise and the landscape and visual environment
- Property and land use within both the existing and future context
- A broad consideration of business impacts in the context of surrounding industry
- Community identity, values and cohesion
- Social impacts, including amenity, community identity and cohesion
- A broad consideration of economic consequences.

Social impacts may be evaluated quantitatively, such as the likely effects on future population growth and employment, or qualitatively, which may include community perceptions toward a proposal, environmental concerns and effect on cohesion. This assessment has utilised both approaches as appropriate and is based upon the degree and quality of available baseline data.

This assessment has employed a standardised matrix approach to the assessment of social and economic impacts. This approach considers both the sensitivity of the receptor and the magnitude of the specific impact. This includes consideration of the following factors:

- Spatial extent of the impact - the geographic area affected. This may be Proposal-only, local, suburb, regional or beyond
- Intensity/severity of the impact - the scale or degree of change from the existing condition
- Duration of the impact - the timeframe over which the impact would occur
- Sensitivity of the receptor - the susceptibility or vulnerability of people, receivers or receiving environments to adverse changes caused by the impact, or the importance placed on the matter being affected.

The significance of an impact is determined from the combination of the magnitude of impact and sensitivity of receptor, as shown in **Table 18-1**.

Table 18-1 Significance of social and economic impacts

		Magnitude			
		Negligible	Low	Moderate	High
Sensitivity	Negligible	Negligible	Negligible	Low	Medium
	Low	Negligible	Low	Medium	Medium
	Moderate	Negligible	Low	Medium	High
	High	Negligible	Medium	High	High

This assessment has been prepared primarily with reference to the existing social context of the Site.

18.3 Stakeholder consultation

This social impact assessment has been informed by stakeholder and community consultation undertaken for the Proposal including:

- Meetings with local councils and NSW Government agencies
- Consultation and briefings with the community generally, particularly surrounding landowners.

Issues raised during these consultations included:

- Understanding the scope of the Proposal

- Air quality impacts
- Dust and traffic generation during construction.

Further details regarding consultation undertaken for the Proposal (up to the exhibition of the Environmental Impact Statement (EIS)) are provided in **Chapter 5 (Stakeholder and community engagement)**.

18.4 Existing environment

18.4.1 Demographic profile

Detail of demographic indicators or relevance to the Proposal as derived from ABS 2016 census data is provided in **Table 18-2**. Demographic data for the Greater Sydney metropolitan area has also been provided to allow for comparison with the selected demographic indicators within the study area.

Table 18-2 Demographic information for study area precinct (ABS 2016)

	Macquarie Park-Marsfield	Greater Sydney
Population by age	• Population: **21,724** • Median age: 32 • 62.2 percent of people born overseas • Aboriginal and Torres Strait Islander population: 0.3 percent	• Population: **4,823,991** • Median age: 36 • 42.09 percent of people born overseas • Aboriginal and Torres Strait Islander population: 1.5 percent
Education and employment	• Completed year 12: 19.9 percent • People 15 and over with post school qualifications: 59.1 • Unemployment rate: 9 percent • Top four employment industries: - Computer System Design and Related Services: 6.1 percent - Higher Education: 4.7 percent - Cafes and Restaurants: 3.1 percent - Hospitals (except Psychiatric Hospitals): 2.9 percent	• Completed year 12: 17.3 percent • People 15 and over with post school qualifications: 49.7 percent • Unemployment rate: 6 percent • Top four employment industries: - Hospitals (except Psychiatric Hospitals): 3.4 percent - Computer System Design and Related Services: 2.5 percent - Cafes and Restaurants: 2.5 percent - Banking: 2.5 percent
Dwellings	• Separate house: 20.2 percent • Semi-detached, terrace, townhouse etc: 35.5 percent • Flat or apartment: 43.3 percent • Other: 0.1 percent	• Separate house: 56.9 percent • Semi-detached, terrace, townhouse etc: 14 percent • Flat or apartment: 28.1 percent • Other: 0.6 percent
Households	• Average household size: 2.2 • Average monthly rental payment: $1,880 • Average monthly mortgage payment: $2,167	• Average household size: 2.8 • Average monthly rental payment: $1,760 • Average monthly mortgage payment: $2,167
Income	• Median weekly household income: $1,645	• Median weekly household income: $1,750
Journey to work	Top three modes: • Car: 40.7 percent • Bus: 11.6 percent • Train: 11.3 percent	Top three modes: • Car: 52.7 percent • Train: 10.9 percent • Bus: 5.5 percent

The demographic profile in **Table 18-2** shows the total population of the study area is 21,724. The median age is slightly below that of the Greater Sydney area, being 32 compared to 36. The proportion of the population of people born overseas across the study area is higher than the Greater Sydney region, being around 60 percent compared with 40 percent.

Education levels and post-school qualifications in the study area are higher than the Greater Sydney average, however unemployment is lower in the study area than Greater Sydney. Common job types in the study area are consistent with the Greater Sydney area with the exception of Higher Education.

Almost half of the housing stock in the study area is a flat or apartment, being 43.3 percent. This is in contrast with Greater Sydney where only 28.1 percent is flat or apartments and over half of the housing stock is separate housing (being 56.9 percent).

Household size, in terms of number of people, is generally lower in the study area compared to Greater Sydney. Compared to Greater Sydney, median weekly household income is slightly lower in the study area which is $1,645 compared to $1,750 for Greater Sydney. Mortgage payments are the same for the study area and Greater Sydney, however rental payments are slightly higher in the study area compared to Greater Sydney.

The predominate mode of travel to work across the study area is by car (around 40.7 percent), being lower than the Greater Sydney average (52.7 percent). The proportion of people travelling to work by public transport is higher in the study area (about 22.9 percent) compared to Greater Sydney (about 16.4 percent).

18.4.2 Social infrastructure

Social infrastructure refers to the facilities, structures and services that support the physical, social, cultural or intellectual development or welfare of the community. This includes a range of physical facilities such as schools, medical centres, sporting and recreational facilities (including passive open space), community facilities, libraries, and the activities and programs that operate within them.

Given the commercial nature of the surrounding area, social infrastructure in the vicinity of the Site is quite extensive. A search radius of one kilometre has been used when outlining social infrastructure facilities in the area. These are listed in **Table 18-3**.

Table 18-3 Social infrastructure facilities located within one kilometre of the Site

Facility type	Facility	Distance from Site (metres)
Education	Guardian Childcare & Education Macquarie Park	163
	Greenwood North Ryde	360
	North Ryde Early Learning Centre	310
	Association of Christian Schools International	515
	Jason Swimming School Macquarie Park	550
	Only About Children Macquarie Park	560
	Early Learning Services	625
	Explore and Develop Macquarie Park	750
	Macquarie University	800
	Thrive Early Learning Centre	870
	Ainsworth building	910
Health / medical	Set in Motion Physiotherapist	30
	Wise Dental Macquarie Park	40
	Prevent Dental Macquarie Park	80
	David Ronberg	220

Facility type	Facility	Distance from Site (metres)
	John and Johnson Medical	250
	KINNECT Macquarie Park	265
	North Ryde Dentistry	275
	Healthcare Imaging Services	370
	Laverty Pathology	400
	Macquarie dentists	450
	Midas Dental	460
	Life-Style Clinic Sydney	600
	North Ryde Macquarie Park Dentist	615
	Head 2 Toe	495
	Macquarie Health Professionals	575
	Douglas Hanly Moir Macquarie Park Lab	590
	Histopath Diagnostic Specialists	790
	Kingdom Hearts Consulting	880
	General Practice at Macquarie University	970
Place of worship	Hillsong Church Macquarie Campus	650
	Trinity Chapel Macquarie	810
Aged care	Vitalcall	35
	Catholic Healthcare	325
Park / reserve	Yurrah Reserve	490
	Fontenoy Park	500
	Macquarie Park	550
	Eloeura Reserve	670
	Wilga Park	740
	Tuckwell Park	750
	Lane Cove National Park	855
	Tunks Hill Picnic Area	935
Hospitality (located outside of Macquarie Centre)	Versace Pizzeria	180
	Orchards Restaurant and Bar	530
	BATCH ZKK Cafe	585
	Go Hun Thai Take Away	620
	Hungry Baker OCS	625
	Sambal	640
	Café Boardroom	660
	Bluestone Espresso Bar	720
	SweetBuds by Nancy Walker	860
	Glasshouse Café Restaurant and Wine Bar	865

Facility type	Facility	Distance from Site (metres)
	Kin By Us	940
Retail	Macquarie Centre	320
	P.O.S.M	410
	McDonalds North Ryde	625
	7-Eleven North Ryde	630
	Edan Gardens	750
	AMD Far East	875
Accommodation	Courtyard by Marriott Sydney- North Ryde	550
	Holiday Inn Express Sydney Macquarie Park	575
	Meriton Suites North Ryde	600
	Quest Macquarie Park	980
Sports facilities	Good Vibes Fitness	515
	Anytime Fitness	550
	F45 Training Macquarie Park	560
	Crossfit Rush Hour Ryde	700

Please note, facilities located within Macquarie Centre have been included holistically with the Centre and have not been listed individually.

The study area is serviced by high frequency bus services along Talavera and Khartoum Roads, with one bus stop along each of the Site frontages. The nearest railway stations are Macquarie University Metro Station and Macquarie Park Metro Station, both approximately 750 metres from the Site.

Further information on site context is outlined in **Chapter 2 (Location and strategic context).**

18.4.3 Community values and cohesion

Community values refers to the set of principles or ethics that are generally shared by a community group such as residents, businesses or visitors in relation to their local area. This includes shared visions around the enhancement of quality of life or sense of place and the future identity of the community as a whole.

An important influence upon community values and identity is the sense of cohesion. This refers to the connections and relationships between individuals and their neighbourhoods. Levels of community cohesion and sense of belonging are said to be good where communities have access to a diverse range of local and regional infrastructure, barriers to movement are minimised and there are a variety of meeting places which encourage strong support networks.

While focusing primarily upon community values at the local government level, the unique nature of this Site and it's transforming context means that the social objectives contained within broader strategic plans should also be recognised. As such relevant elements of these overarching documents have been included below as they relate to the Proposal potential socio-economic effects. The consistency of the Proposal with these objectives is considered in **Section 18.5** below.

Greater Sydney Region Plan – A Metropolis of Three Cities

As outlined in the Greater Sydney Region Plan 2018 (the Region Plan), the Site is located within the Eastern Harbour City, which aims at building on the economic strength of the area whilst addressing liveability and sustainability.

The Region Plan refers to Macquarie Park as part of the Epping and Macquarie Park Urban Renewal Corridor which has a focus on introducing new community facilities, improved public space, residential development in proximity to transport links as well as the generation of employment opportunities.

Our Greater Sydney 2056: North District Plan

The North District Plan (the District Plan) outlines a range of 'planning priorities' for managing growth in the context of economic, social and environmental matters in order to achieve the 40-year vision for Greater Sydney.

The District Plan clearly places a distinct emphasis on the positive development of the social and economic aspects of the North District. A selection of the social and economic planning priorities include:

- N3 Providing services and social infrastructure to meet people's changing needs
- N4 Fostering healthy, creative, culturally rich and socially connected communities
- N6 Creating and renewing great places and local centres, and respecting the District's heritage
- N8 Eastern Economic Corridor is better connected and more competitive
- N9 Growing and investing in health and education precincts
- N17 Protecting and enhancing scenic and cultural landscapes
- N20 Delivering high quality open space.

NSW Innovation Precincts

The NSW Innovation Precincts identifies innovation precincts within NSW. An innovation precinct has developed around Macquarie University and Hospital with a focus on life sciences, health and pharmaceuticals and biotechnology.

The NSW Innovation Precincts outlines seven factors for globally significant precincts with one of the factors relating to amenity. Key characteristics for the amenity factor include:

- A sense of place and offers well-designed, safe and accessible public spaces
- A range of concentrated 'hot spots' for social interaction
- Access to affordable, diverse housing for workers and students
- Vibrant public and private spaces
- A balanced mix of commercial, research, education, childcare, community, civic, cultural, retail, entertainment and potentially residential uses
- Easy access for people to move around
- Flexible land-use regulations to allow high-quality public space repurposing, artistic events, a mix of innovative activities and help to meet the shifting infrastructure needs of fast-growing smaller firms and specific sectors.

Planning Ryde – Local Strategic Planning Statement 2020

The Planning Ryde – Local Strategic Planning Statement 2020 (the LSPS) outlines a 20-year vision for land use planning in the Ryde area. This document informs the Ryde Council Community Plan and includes a range of specific policy goals to improve the lives of residents and the environment. A selection of relevant policy goals, which have not already been identified, include:

- N1 Planning for a city supported by infrastructure
- N2 Working through collaboration
- N10 Growing investment, business opportunities and jobs in strategic centres
- N11 Retaining and managing industrial and urban services land
- N12 Delivering integrated land use and transport planning and a 30-minute city

- N14 Leveraging inter-regional transport connections
- N15 Protecting and improving the health and enjoyment of Sydney Harbour and the District's waterways
- N16 Protecting and enhancing bushland and biodiversity.

Our Vision for Ryde 2028 – Community Strategic Plan

The Ryde Community Strategic Plan has been developed through extensive consultation with the community and sets out various priorities under seven key outcomes, being:

- Our vibrant and liveable city
- Our active and healthy city
- Our natural and sustainable city
- Our smart and innovative city
- Our connected and accessible city
- Our diverse and inclusive city
- Our open and progressive city.

18.5 Potential impacts

18.5.1 Amenity

Amenity refers to the quality of a place, its appearance, feel and sound, and the way its community experiences the place. The Proposal has the potential to affect amenity as a result of changes to aspects such as traffic, noise, air quality and the visual environment. These aspects are assessed separately below.

Noise and vibration

Exposure to noise and vibration has the potential to create annoyance, intrude on daily activities or the enjoyment of these activities, interfere with concentration and memory, disrupt sleep and rest patterns and create or exacerbate health concerns.

The noise and vibration assessment undertaken for the Proposal groups surrounding receivers into two noise catchment areas (NCAs). The assessment predicted potential noise and vibration impacts from both the construction and operational phases of the Proposal. Predicted noise levels were compared to relevant noise amenity criteria for the Site.

Exceedances between 1 and 10 decibels (dB(A)) were returned for residential receivers and between 1 and 20 dB(A) for non-residential receivers during the construction phase of the Proposal. Where receivers are predicted to be 'noise affected' the *Interim Construction Noise Guideline* states that all feasible and reasonable works practices should be applied. It is recommended that a construction noise and vibration management plan (CNVMP) be prepared for construction of the Proposal. It is considered that the exceedances would be appropriately managed with relevant mitigation measures.

Minor exceedances of 1-2 dB(A) were retuned for residential receivers when operations were assessed under adverse weather conditions. One minor exceedance of 2 dB(A) was also returned for a non-residential receiver when operations were assessed under all weather conditions. The *Noise Policy for Industry* states that exceedances of up to 2 dB(A) are negligible.

Traffic generated from both construction and operation of the Proposal was assessed as being compliant with applicable criteria outlined in the NSW *Road Noise Policy*, being less than 2 dB(A).

Based on the indicative construction activities assessed for the Proposal, works are unlikely to occur within the minimum working distances and as such no vibration impacts would occur.

On the basis of the above the magnitude of noise amenity impacts is considered to be negligible. The sensitivity of receivers is moderate, and the overall socio-economic significance of noise amenity impacts is **negligible**.

Traffic

Changes to the level of traffic has the potential to affect amenity, with increased traffic giving rise to elevated noise and air quality impacts, as well as congestion and visual clutter. An increase in traffic volume also affects people's travel, including trip duration, wait times at intersections, road safety and access to properties and community infrastructure.

Predicted traffic impacts were assessed for the Proposal, specifically impacts to the local road network around the Site, including Talavera Road, Lane Cove Road, Waterloo Road and Khartoum Road.

Construction of the Proposal is anticipated to generate up to 200 construction-related vehicles per day, consisting of 50 heavy vehicle and 150 light vehicle movements. A Construction Traffic Management Plan would be developed prior to the commencement of construction, which would detail measures to control the effect of construction-related traffic on the surrounding road network. Operation of the Proposal would provide employment for 50 staff and has the parking capacity to accommodate 48 vehicles.

It is anticipated that a number of workers would use public transport to travel to Site given the availability of public transport interchanges in close proximity to the Proposal. Further, it is anticipated that workers (during construction and operation) would have staggered arrival and leaving times that would not necessarily coincide with peak traffic periods. Construction would be undertaken during standard hours (arriving before 7:00am and leaving after 6:00pm) and operation of the facility would be 24/7.

The introduction of Road 22 would create a non-signalised intersection with Talavera Road. All access for the Proposal is proposed off Road 22, which would substantially reduce the potential for queuing and congestion along Talavera Road.

On the basis of the above the magnitude of impacts is considered to be low. The sensitivity of receivers is moderate, and the overall socio-economic significance of traffic amenity impacts is **low**.

Visual amenity

The existing site is currently occupied by two multi storey commercial and warehouse buildings located towards the centre of the Site and surrounded by car parking. The largest footprint building is two storeys high, comprising office and warehouse spaces. The smallest footprint building is six storeys high containing mainly office spaces.

The main structure of the Proposal would be a five-storey concrete structure with associated vehicular circulation and landscaping areas.

The potential for changes in the landscape and visual environment to affect the amenity of a nearby receivers varies substantially according to the location of the receiver and their land use type e.g. residential or commercial. It is also influenced by the nature of the activities being undertaken and whether receivers are moving through the environment or are static.

Four viewpoints were used to assess the impact to visual amenity due to the Proposal The significance of the Proposal's impact on each is outlined below:

- Khartoum Road: low
- Intersection of Khartoum Road and Talavera Road: negligible
- Talavera Road: moderate to low
- Talavera Corporate Centre: low.

The highest rating was returned from Talavera Road due to the close proximity of the Proposal to the viewpoint (directly opposite the road) and the change in height of the Proposal from the existing building on the Site.

While the Proposal would be visible from several tall residential and commercial buildings, the change is considered to be minor due to the small proportion of the change, and the scale and form of the Proposal being similar to other buildings in the area.

The overall impact of the Proposal on the visual amenity of the area is considered to be low. The sensitivity of affected stakeholders is considered to be moderate, resulting in an overall **low** socio-economic significance.

Air quality

The construction and operation of the Proposal has the potential to increase dust and air emissions, and therefore affect amenity of the local environment. Nuisance dust generated from construction activities may affect dwellings and other nearby sensitive receivers. Increased dust can also reduce the capacity of the community to enjoy their local environment and can increase health risks for receivers, particularly those with respiratory and health issues such as asthma and allergies.

The air quality assessment for the Proposal considered the impacts of changes to air quality associated with the construction and operation of the Proposal. The impacts were assessed and considered cumulatively against background air quality data derived from an existing nearby air quality monitoring station.

The construction dust assessment methodology identified the risk of increased dust and air emissions from construction activities to be negligible with the application of appropriate mitigation measures in place to control construction dust.

The dispersion model used to assess the potential operational impacts did not identify any exceedances for any of the modelled pollutants under any of the operating modes of the current NSW EPA limits. If in the future the NSW EPA limits are reduced in line with the changes to the *National Environment Protection (Air Quality)* Measure (NEPM) (refer to **Chapter 10 (Air quality)**), then there may be the potential for short term exceedances of the nitrogen dioxide (NO_2) limits. If this is the case, additional works may be needed to reduce the emissions or modify the operational characteristics to prevent the potential for ground level exceedance of the new limit.

Given the results of the air quality impact assessment, there would be no recognisable change in amenity due to air quality. On this basis the magnitude of impact is considered to be negligible and the sensitivity of receivers is moderate. As such the overall socio-economic significance of air quality amenity impacts is **negligible**.

Overall amenity

Based on the above discussion, the overall magnitude of these impacts is considered low. The sensitivity of receivers within this area is considered to be moderate based upon their existing exposure to amenity impacts of the business nature of the area. As such the overall socio-economic impact of changes to local amenity associated with the Proposal would be **low**.

18.5.2 Property and land use

The Site is located within a B7 Business Park Zone under the *Ryde Local Environmental Plan 2014* (Ryde LEP) surrounded by a mix of B4 Mixed Use and B3 Business Park land uses. The surrounding area is characterised by commercial buildings and land uses, consistent with the character of Macquarie Park as a business precinct.

The Site is currently owned by Stockland and is occupied by two multi storey commercial and warehouse buildings leasing floor space to several businesses. The Proposal would be constructed by Stockland and operated by a lessee. The concept approval DA 2017/0547 for the Site is being revised to reflect the new building use and envelope relating to the Proposal.

The construction of the Proposal would temporarily alter the land use of the Site from a business premises to a construction site, however this would be limited to the construction time frame. During operation, the land use would change to that of a data centre. The operation of the Site as a data centre would be in line with its current use.

The presence of the data centre would remain consistent with the commercial land use of the Site and would not adversely influence the beneficial use of surrounding land.

On this basis the Proposal's magnitude of impact upon land use is considered to be low. The sensitivity of the receptor (the existing land use within the Site and other land uses on surrounding land) is deemed to be low, with the overall significance of impact being **low**.

18.5.3 Community values and cohesion

As outlined in **Section 18.4.3**, the Site and its surrounds are subject to a number of plans and policies. These cover strategic land use, infrastructure provision, urban design and community development, among others**. Table 18-4** assesses the Proposal against a selection of the community values identified in these plans and policies.

Table 18-4 Assessment of impacts to community values

Policy goal or intent	Potential impacts
Our Greater Sydney 2056: North District Plan	
• N3 Providing services and social infrastructure to meet people's changing needs • N4 Fostering healthy, creative, culturally rich and socially connected communities • N6 Creating and renewing great places and local centres, and respecting the District's heritage • N8 Eastern Economic Corridor is better connected and more competitive • N9 Growing and investing in health and education precincts • N17 Protecting and enhancing scenic and cultural landscapes • N20 Delivering high quality open space.	The Proposal would not prevent these planning priorities from being realised. The Proposal would support the Eastern Economic Corridor in becoming more competitive by providing a critical element for the expanding digital economy. The Proposal would support future development in the area through the provision of a data storage facility positioned close to digital connections. The Proposal would not affect the ongoing protection of biodiversity or heritage values and would have only a minor impact on visual amenity.
NSW Innovation Precincts	
• A sense of place and offers well-designed, safe and accessible public spaces • A range of concentrated 'hot spots' for social interaction • Access to affordable, diverse housing for workers and students • Vibrant public and private spaces • A balanced mix of commercial, research, education, childcare, community, civic, cultural, retail, entertainment and potentially residential uses • Easy access for people to move around • Flexible land-use regulations to allow high-quality public space repurposing, artistic events, a mix of innovative activities and help to meet the shifting infrastructure needs of fast-growing smaller firms and specific sectors.	Macquarie Park has been identified as an innovation district. The Proposal would not affect the realisation of the development of physical, social and cultural infrastructure on land surrounding the Site. The land use of the Site would remain consistent with that of existing commercial conditions.
Planning for Ryde – Local Strategic Planning Statement 2020	
• N1 Planning for a city supported by infrastructure	The Proposal provides digital benefits for the Sydney basin and would support the 'global economic corridor' of Sydney
• N2 Working through collaboration	The Proposal promotes collaborative working by providing benefits to NSW residents, Australia and the world
• N10 Growing investment, business opportunities and jobs in strategic centres	The Proposal would provide employment opportunities within Macquarie Park which is identified as a strategic centre

Policy goal or intent	Potential impacts
• N11 Retaining and managing industrial and urban services land	The Proposal would retain the existing land use of the Site
• N12 Delivering integrated land use and transport planning and a 30-minute city	The Site is located in an area serviced by a high frequency of bus services and near two Metro Stations
• N14 Leveraging inter-regional transport connections	The Site is located in an area serviced by multiple transport connections
• N15 Protecting and improving the health and enjoyment of Sydney Harbour and the District's waterways	The Proposal would not impact on the Sydney Harbour or nearby waterways
• N16 Protecting and enhancing bushland and biodiversity.	The Proposal would not impact on the protection of bushland or biodiversity.
Our Vision for Ryde 2028 – Community Strategic Plan	
• Our vibrant and liveable city • Our active and healthy city • Our natural and sustainable city • Our smart and innovative city • Our connected and accessible city • Our diverse and inclusive city • Our open and progressive city.	As with the broader plans above, the Proposal would not affect the ability of the ideals outlined in the community plan to be realised. As outlined elsewhere in this chapter and EIS, the Proposal's impacts upon amenity would be negligible to minor, while introducing a key piece of digital infrastructure within the business precinct.

18.5.4 Economic impacts

Economic benefits associated with the Proposal include:

- Job creation – elements of the Proposal would require major goods and services including excavation and earthmoving equipment, building materials and ongoing services such as transport. The Proposal would employ up to 400 full-time equivalent (FTE) positions during construction and up to 50 staff during normal operation. Where possible, employees would be sourced from the local area or region, as would major types of goods and services used.
- Generation of income – the Proposal would generate income within the local and wider community by providing income for direct and indirect employment, together with the multiplier effect of Proposal income expenditure. This would continue the support of the local community through a period of rapid and transformative change
- Supply of goods and services – local businesses would benefit from Proposal by providing the Proposal with general goods and services
- Data centre – the Proposal would provide a secure location for the storage of data resulting in an increased speed of digital access to clients in Sydney and NSW generally. This would enable and improve business and personal communications and transactions across the state and more broadly. The Proposal would also contribute to the security of sensitive data by avoiding offshore hosting.

Economic costs associated with the development of the Proposal include:

- Direct capital cost – the anticipated capital cost of the Proposal is in the order of $263 million
- Infrastructure costs – the Proposal would place demand on service infrastructure
- Monitoring – on-going testing of back-up generators and other monitoring works would be required.

On the basis of the above the overall magnitude of economic impact is considered to be low positive. The sensitivity of the receiver (local businesses and community) is considered to be high. As such the overall socio-economic significance of impact is **medium positive**.

18.6 Crime Prevention through Environmental Design

Crime Prevention through Environmental Design (CPTED) is a crime prevention strategy that focuses on the planning, design and structure of cities and neighbourhoods. It aims at reducing opportunities for crime by using design and place management principles.

The four key principles of CPTED include:

- **Surveillance**: relates to others being able to see what is happening in a location. Creation of inviting spaces, installation of windows, lighting, landscaping, deployment of guards and providing clear sightlines promote surveillance. Closed circuit television (CCTV) and other electronic means can also be used.
- **Access control**: the movement of people can be greatly affected by physical and symbolic barriers. Creating a small number of entrances, for example, increases opportunities for surveillance and reduces anonymity of visitors. Erecting fences and barriers, using landscaping techniques and biometric access measures can all be used for access control.
- **Territorial reinforcement**: simple cues in the built environment inform people about the nature of the environments that they routinely pass through and visit. A sign can denote movement from public to private space; conditions of entry can encourage particular behaviour and active maintenance that can discourage illegal activities are example measures of promoting territorial reinforcement.
- **Space management**: involves the formal supervision, control and care of the development. All space, even well planned and well-designed areas need to be effectively used and maintained to maximise community safety. Places that are infrequently used or show signs of damage and limited monitoring are commonly abused. Maintaining property, listing conditions of entry, removing graffiti and repairing damage immediately all contribute to effective space management.

Table 18-5 provides an analysis of design elements of the Proposal and their consistency with the CPTED principles.

Table 18-5 Comparison of the Proposal with CPTED principles

Principle	Design elements of the Proposal
Surveillance	The following surveillance design features have been adopted: • Limited vehicle access points to the Site provides increased natural surveillance • One-way flow of vehicles around they Site limits traffic flow improving security as vehicle movements are obvious and can be monitored accordingly • Placement of the building toward the centre of the Site reduces concealment opportunities such as alcoves or entrapment areas • A security guard station located at the entrance to the Site to monitor incoming and outgoing persons and vehicles • The building has been set back from the roadway to provide a buffer area • CCTV would be used to monitor the access points, fence lines, car parks and other areas of the Site • Landscaping has been designed to enhance the presentation of the Site • Placement and maintenance of landscaping plants and features to prevent providing cover or access for criminal activity Further consideration will also be given to: • Ambient lighting in the car park and around the building to promote feelings of safety and enhance vision • Signs indicating entrances, exits and emergency equipment around the facility should be illuminated and free from shrubbery • Areas that are monitored by CCTV cameras are complemented by appropriate lighting • Materials and fixtures are vandal resistant

Principle	Design elements of the Proposal
Access control	The following access control measures have been adopted: • Limited access points via Road 22 • Security fencing along the entirety of the Site boundary • No thoroughfare pathways through the Site to adjoining allotments Further consideration will also be given to: • Self-closing doors should be fitted to each external access door to reduce the risk of unauthorised access • During construction, plant and equipment areas to be secured
Territorial reinforcement	The following territorial reinforcement measures have been adopted: • The entrance is in a prominent position • Security fencing and entry and exit gates provide clear land ownership Further consideration will also be given to: • Appropriate signage throughout the Site to reduce confusion amongst workers (i.e. parking and direction of travel) and to reduce opportunities for excuses by intruders • Using international symbols to be more easily identified by people with an intellectual disability or people who have English as their second language
Space management	The following space management measures have been adopted: • Crime displacement is not expected to be a major concern as the land is currently utilised by similar development and is not subject to high levels of crime • Transport operates around the Site utilising taxis and local public transport such as bus and train • Landscaping will be maintained at regular intervals to promote a well-maintained Site • Responsibility for all tasks and maintenance clearly defined and understood Further consideration will be given to the following issues during operation of the Proposal: • Anti-graffiti coatings should be applied to vulnerable areas • A rapid maintenance program should be developed, documented and implemented to ensure site cleanliness, repair vandalism (graffiti) or damage occasioned to signs, building or furniture and monitor lighting • All staff are trained to identify and report potential problems immediately • Surveillance cameras are recorded and maintained as required • Regular audits of CPTED principles are conducted • Regular reviews into the circumstances of crime are conducted to identify changing or new CPTED problems, and the effectiveness of management systems in operation and opportunities for improvements

Based on the above analyses the Proposal would provide a secure facility that is highly consistent with CPTED principles. As such the Proposal is not likely to adversely affect crime levels in the Macquarie Park area, and may actually act to reduce the potential for crime in the general vicinity through active and casual surveillance of the facility and its surrounds by security and general staff.

18.7 Safeguards and management measures

Mitigation measures that would be implemented for the Proposal to address potential socio-economic impacts are listed in **Table 18-6**.

Table 18-6 Summary of safeguards and management measures

ID	Mitigation measure	Timing
SE1	All businesses, residential properties and other key stakeholders (e.g. local councils, shopping centre management) affected by the Proposal will be notified at least five working days prior to commencement of construction. The notification will include: • details of the Proposal • construction period and construction hours • contact information for Proposal management staff • complaint and incident reporting and how to obtain further information	Prior to construction
SE2	Complaints received from the community will be accepted, monitored and acted upon	Prior to and during construction
SE3	Local people, services and materials will be prioritised for the Proposal as far as practical	Prior to and during construction
SE4	Further consideration of the CPTED principles will be given for the construction and operational phases of the Proposal	Prior to and during construction and operation

18.7.1 Consideration of the interaction between measures

Mitigation measures in other chapters that are relevant to the management of socio-economic impacts include:

- **Chapter 6 (Landscape and visual)**, specifically measures which address visual impacts on surrounding receivers
- **Chapter 8 (Transport and traffic)**, specifically measures which address traffic impacts on surrounding receivers
- **Chapter 9 (Noise and vibration)**, specifically measures which address noise and vibration impacts on surrounding receivers
- **Chapter 10 (Air quality)**, specifically measures which address air quality impacts on surrounding receivers.

19.0 Groundwater, surface water and flooding

This chapter describes the existing groundwater, surface water and flooding conditions within the water resource study area (defined in **Section 19.1**) assesses potential construction and operation impacts of the Proposal, and outlines mitigation measures relating to groundwater, surface water and flooding, where required.

Table 19-1 sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to groundwater, surface water and flooding impacts, and where the requirements have been addressed in this EIS.

Table 19-1 SEARs – Groundwater, surface water and flooding

SEARs requirements	Where addressed
Groundwater, surface water and flooding	
Contamination – including: • A detailed assessment of the extent and nature of any contamination of the soil, groundwater and soil vapour, in accordance with State Environmental Planning Policy No. 55 – Remediation of Land • An assessment of potential risks to human health and the environmental receptors in the vicinity of the site • A description and appraisal of any required mitigation and monitoring measures • A consideration of whether the site is suitable for the proposed development.	• An assessment of the extent and nature of any contamination of groundwater provided in **Section 19.2.2** • **Chapter 7, Geology soils and contamination** provides an assessment of soil contamination • **Chapter 15, Hazards and risk** assesses and provides management measures in relation to the potential for risks to human health and environmental receptors • **Chapter 2 Location and strategic context** provides consideration of whether the site is suitable for the proposed development.
Soils and water – including: • An assessment of potential surface and groundwater impacts associated with the development • A detailed site water balance, including a description of the development's water demands and associated servicing requirements (including any water licensing requirements) • A description of the surface, stormwater and wastewater management systems, including on site detention, and measures to treat or reuse water • An indicative stormwater management plan prepared by a qualified engineer in accordance with relevant City of Ryde Council guidelines • Description of the measures to minimise water use and promote water sensitive urban design (WSUD) • A description of the proposed erosion and sediment controls during construction.	• An assessment of potential surface water impacts associated with the Proposal is provided in **Sections 19.3.2** (construction) and **19.4.2** (operation) • An assessment of potential groundwater impacts associated with the Proposal is provided in **Sections 19.3.1** (construction) and **19.4.1** (operation) • A description of the surface, stormwater and wastewater management systems, including on site detention, and measures to treat or reuse water is provided in **Section 19.3.2** and **Section 19.4.2** • Management measures, including requirements for a stormwater management plan, measures to minimise water use and promote water sensitive urban design (WSUD) and erosion and sediment controls during are provided in **Section 19.5**.

19.1 Assessment methodology

19.1.1 Legislative and policy context

This chapter has been prepared in accordance with, or consideration of the following legislation and statutory planning instruments

- *Water Management Act 2000*
- *Water Act 1912*.

This chapter has also been prepared in consideration of the following guidelines and policies:

- ANZECC Guidelines and Water Quality Objectives in NSW (NSW Department of Environment and Conservation (DEC 2006)
- Soil and Landscape Issues in Environmental Impact Assessment (DLWC, 2000)
- NSW Groundwater Dependent Ecosystems Policy (DLWC 2002)
- NSW Aquifer Interference Policy (DPI 2012)
- City of Ryde Water Sensitive Urban Design Guidelines (City of Ryde, 2015)
- City of Ryde Development Control Plan 2014, Part: 8.2 Stormwater Management Technical Manual (City of Ryde, 2014)
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) (referred to as the Blue Book) and Managing Urban Stormwater: Soils and Construction Volume 2A (DECC, 2008) (referred to as the Blue Book)
- *Australian Rainfall and Runoff* (Commonwealth of Australia, 2019).

19.1.2 Study area

The water resource study area incorporates the Shrimptons Creek, Industrial Creek and Porters Creek sub-catchments of broader Macquarie Park catchment, as shown on **Figure 19-1**. This area was selected based on the flooding and surface water flow regimes as defined in City of Ryde Floodplain Risk Management Study and Plan (Bewsher, 2010) and the Macquarie Park Floodplain Risk Management Study and Plan (Bewsher, 2011).

The study area recognises the types and locations of potential groundwater receptors (including nearby groundwater dependent ecosystems) and pathways by which they may be affected by the Proposal.

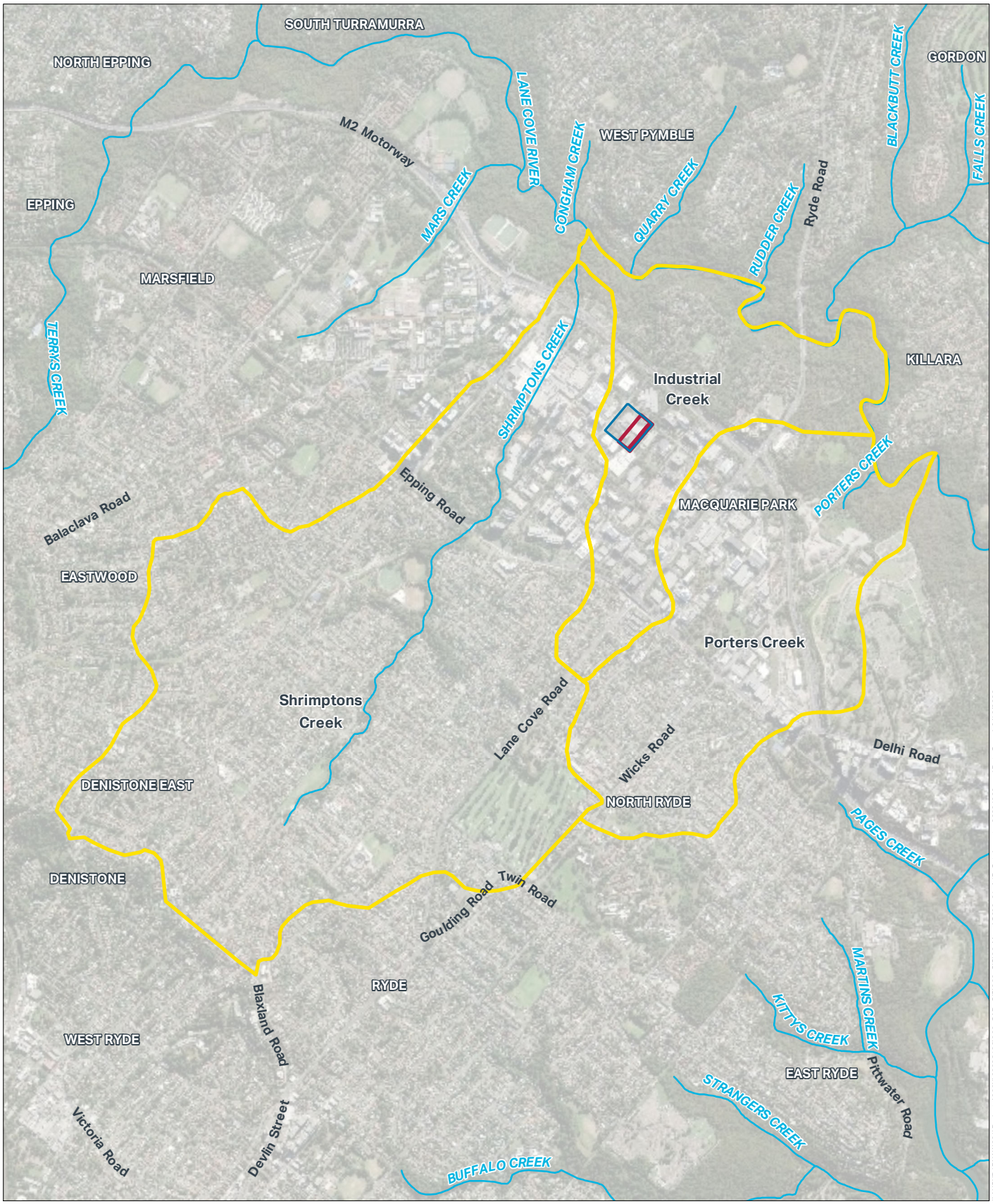

Figure 19-1 Water study area

N

0 0.5 1 km

AECOM

Legend

- Proposal Site boundary and Road 22
- Property boundary
- Catchment boundary and study area
- Watercourse

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19.1.3 Desktop assessment

19.1.3.1 Groundwater

A desktop review was completed to define the existing environment, to assess potential impacts to the groundwater environment in the water resource study area and develop appropriate mitigation and management measures where required. This included a review of the following publicly available datasets, maps, and registers:

- Phase 1 Environmental Site Assessment at 11-17 Khartoum Road & 33-39 Talavera Road, Macquarie Park, NSW (Golder Associates, 2017)
- NSW Water Register, which provides regional groundwater bore information including water licences, approvals, and environmental water
- 1:25,000, 1:100,000 and 1:250,000 scaled maps published by the NSW Geological Survey
- BoM National Atlas of Groundwater Dependant Ecosystems

In addition to the above, site-specific hydrogeological information was gathered from previous studies that have taken place within the groundwater study area for review, including:

- Geotechnical Investigation: 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park, NSW (Martens, 2020)
- Report on Geotechnical Investigation Buildings B, C and D 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park (Douglas Partners, 2020a)
- Dewatering Management Plan, Mixed Use Development 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park (Douglas Partners, 2020b)
- 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park Macquarie Technology Centre, Geotechnical Site Investigation Report (Golder, 2017)
- Macquarie University Central Courtyard Precinct Redevelopment EIS (Ethos Urban, 2018)
- Geotechnical investigation for the proposed refurbishment of the Macquarie University buildings W6A and W6B at Macquarie University (Capital insight, 2017).

A full list of resources used in the preparation of this chapter is provided in **Chapter 24 (References)**.

Chapter 13 (Biodiversity) addresses the potential impacts of the Proposal to Groundwater Dependent Ecosystems in detail. This assessment was prepared in consideration of the Risk Assessment Guidelines for Groundwater Dependent Ecosystems (Office of Water, 2012), and is provided as a summary in this chapter.

Field investigations

A geotechnical investigation was undertaken by Douglas Partners for 11-17 Khartoum Road and 33-39 Talavera Road that included the drilling of nineteen rock cored boreholes (BH201 to BH219), using geotechnical drilling rigs and ten hand augered boreholes (BH220 to BH229). Groundwater monitoring wells were installed at BH201, BH203, BH208, BH215 and BH218 and groundwater levels and in situ permeability testing was carried out in all wells. The ground surface levels and coordinates of the borehole locations were measured using a high precision differential global positioning system (GPS) with an accuracy of about 0.1 m (Douglas Partners, 2020a).This study encompasses both the Proposal Site as well as two other buildings associated with the broader M_Park proposed development. The location of the boreholes are shown on **Figure 19-2**, labelled as *'current borehole locations'*.

Golder Associates carried out a geotechnical investigation of the Building A site for the proposed M_Park development, immediately adjacent (north west) to the Proposal (Golder, 2017). The investigation included four rock cored boreholes, the installation of three monitoring wells as well as groundwater monitoring and laboratory testing. This study encompasses both the Proposal Site as well as two other buildings associated with the broader M_Park proposed development. The location of the boreholes used in the preparation of this field investigation are also shown on **Figure 19-2**, labelled as *'previous borehole location, (Golder Associates 2017)'*.

Douglas Partners have also prepared a Dewatering Management Plan for the proposed Building A, which would form part of the broader M_Park development. Due to the close proximity of this study to the Proposal, the results of these field investigations have also been considered. The location of the boreholes used in the preparation of this field investigation are also shown on **Figure 19-2**, labelled as *'previous borehole location, (DP February 2020)'*.

19.1.3.2 Surface water

Preliminary desktop review

A desktop review of existing information was undertaken to inform the qualitative assessment of surface water and flooding impacts from the Proposal. This also involved analysis of existing information to determine potential receptors, characterise the existing environment and identify potential issues.

Water quality modelling

Water quality modelling of the proposed development was undertaken using MUSIC Version 6.3.0 (AECOM, 2020). MUSIC models the transfer of pollutants through a stormwater drainage system and provides an aid in quantifying the effectiveness of the proposed stormwater quality treatment train. The water quality modelling was carried out in consideration of City of Ryde Council's guidelines and requirements as specified in City of Ryde's Stormwater Management Technical Manual and Part 8.2 of the *City of Ryde Development Control Plan 2014* (DCP).

The model was configured with rainfall data and source node parameters required by City of Ryde Council. Ocean Protect provided us with the configured source nodes and nodes for their treatment devices.

Impact assessment

Using the information gathered during the desktop assessment process and the results of water quality modelling assessment of the potential construction and operational impacts related to surface water quality was undertaken. This assessment was completed in consideration of the City of Ryde Water Management Strategy 2019, Stormwater Management Technical Manual, and Part 8.2 of the DCP.

Where required, appropriate measures to mitigate potential impacts have been provided.

19.1.3.3 Flooding

The method of assessment for flooding included:

- A desktop review of available data and existing flood studies/models, including:
  - Macquarie Park Floodplain Risk Management Study & Plan, Flood Study Report (Bewsher Consulting Pty Ltd, 2010)
  - Macquarie Technology Centre – Macquarie Park, Stormwater Management Report (Northrop, 2020)
- A quantitative assessment of the efficiency of the proposed flood mitigating design features of the Proposal, including the proposed stormwater system, in consideration of City of Ryde requirements
- A broad qualitative assessment of the impact the Proposal, and its proposed stormwater system, would have on flood behaviour and flood hazards
- Where required, appropriate measures to mitigate potential impacts have been provided.

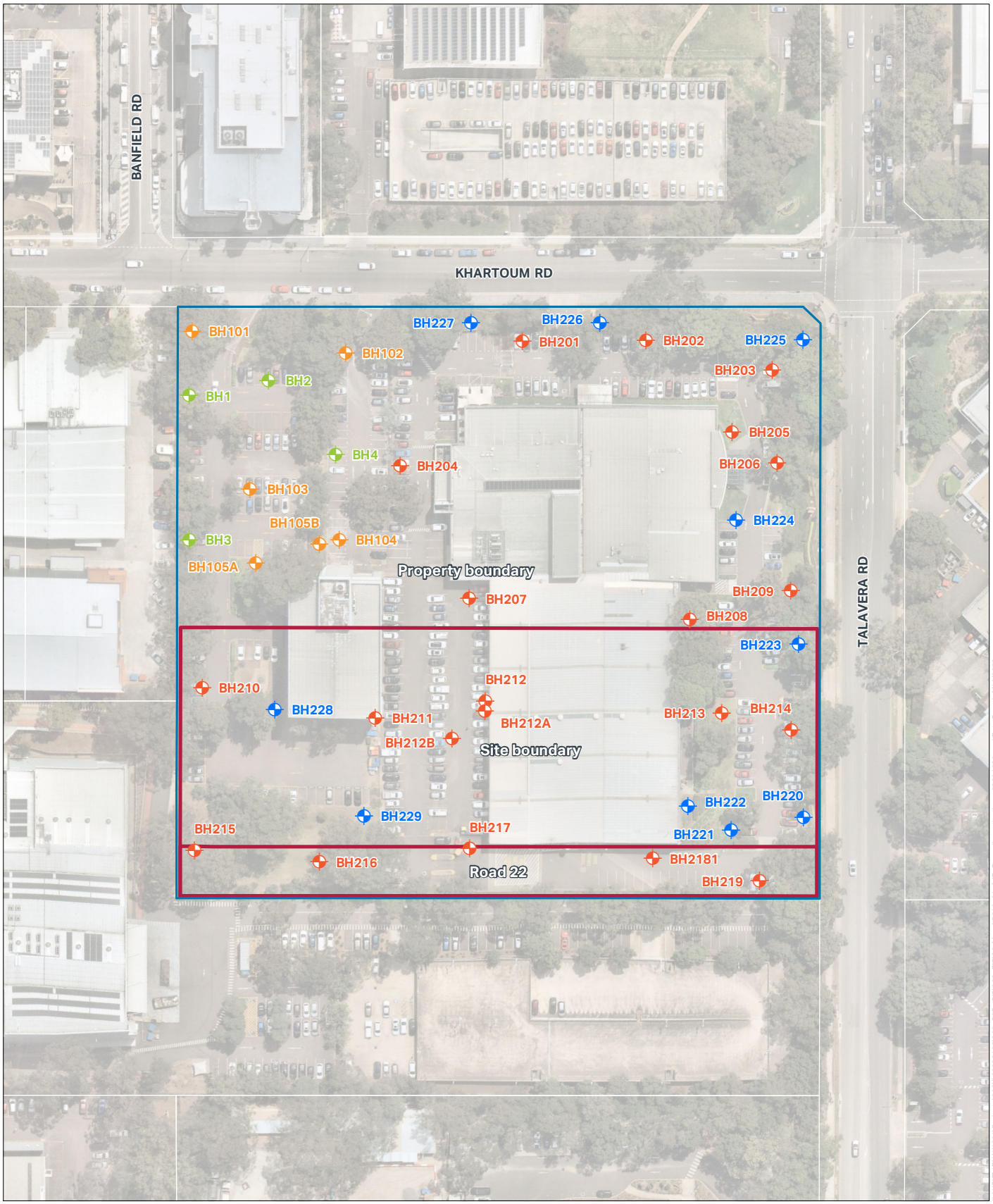

Figure 19-2 Location of boreholes

0 20 40 m

Legend

- Site boundary and Road 22
- Property boundary
- Current borehole location (DP, June 2020)
- Current hand augered borehole location (DP, June 2020)
- Previous borehole location (DP, February 2020)
- Previous borehole location (Golder Associates, 2017)

19.2 Existing environment

19.2.1 Landscape features

This section provides an overview of landscape features within the water resource study area as they relate to groundwater, surface water and flooding.

A detailed assessment of the existing geology, soils and contamination conditions at the Site is provided in **Chapter 7 (Geology, soils and contamination)**.

Drainage and topography

The existing elevation at the Site is between about 50 metres and 58 metres Australian Height Datum (AHD). The site slopes down from the south-west to the north-east. The site and surrounding area are situated on a regional ridge with higher topographical areas to the south, dipping generally to the north towards Shrimptons Creek.

The Site is generally undulating with a battered slope down towards Talavera Road. Water from the Site currently drains towards Lane Cove River via the existing stormwater drainage system.

Geology soils and contamination

This section provides an overview of landscape features within the water resource study area as they relate to groundwater, surface water and flooding. A detailed assessment of the existing geology, soils and contamination conditions at the Site is provided in **Chapter 7 (Geology, soils and contamination)**.

The Proposal is located within the Sydney basin and is underlain by the Triassic age Ashfield Shale of the Wianamatta Group Bedrock, which is comprised of black to dark-grey shale and laminate (Sydney Basin, 1:100,000 Geological Map, 1983).

The Proposal is located on land mapped within two soil landscapes:

- Glenorie Soil Landscape: Plastic silty clays and heavy clays at the lower soil horizons through to friable loams, silt loams and silty clay loams towards the upper horizons. These soils typically present as high soil erosion hazards, contain impermeable highly plastic soil and are moderately reactive
- Lucas Heights Soil Landscape: Heavy clays and sandy clays at the lower soil horizons through to loose sandy loams towards the upper horizons. These soils typically present as stony soils with low soil fertility and low available water capacity.

A review of *Ryde Local Environmental Plan 2014*, the Australian Soil Resource Information System (from CSIRO) and the DPIE acid sulfate soil (ASS) spatial data (available on ePlanning Spatial Viewer) indicated that no ASS are likely to be encountered at the Site, or within the Proposal Site.

A search of the NSW Environment Protection Authority (EPA) contaminated land record using the suburb search parameter of “Macquarie Park” and “North Ryde” revealed no records of registered contaminated land within the suburb of Macquarie Park.

The geotechnical report prepared by Golder Associates (2017) examined the potential for contamination at the Site in consideration of on historical and current activities at the Proposal Site. The result of this assessment concluded that for all potential sources of contamination and associated potential contaminants of concern the risk of contamination at the Site is low.

19.2.2 Groundwater

Depth and flow

Groundwater levels as measured at 10 of the 23 boreholes shown on **Figure 19-2** have been compiled in **Table 19-2**. The table shows that groundwater levels have been measured between about 5.8 metres and 9.9 metres depth below ground surface, with an average depth of about 7.6 metres below ground surface. The approximated regional groundwater level at the time of the 2020b Douglas and Partners field investigation is shown on cross sections provided in **Appendix N (Geotechnical investigation)**.

Groundwater flow rates have also been provided where available in **Table 19-2** (Douglas Partners, 2020a). Hydraulic conductivity (K) represents the ease with which water passes through a substrate, providing a measure of how fast groundwater is likely to be moving through an area. The permeability or hydraulic conductivity of various rock units varies in response to the type of substrate (pore size and pore connectivity) as well as features in the unit such as joints and fractures, along which groundwater will flow. Therefore, changes in the clay content of rock fractures, as well as their orientation and interconnection can cause changes in hydraulic conductivity.

According to geotechnical cross section prepared by Douglas and Partners (2020a), the components of the Proposal that would be constructed below the natural ground surface are likely to be located within fill and residual clay substrates, very low to low strength rock (largely represented by Ashfield Shale siltstone) and low to medium and variable strength, fractured rock (largely represented by Mittagong Formation sandstone).

The hydraulic conductivity of the geological layers underlying the proposed Building A component of the broader M_Park development has also been modelled (Douglas and Partners, 2020b). The results for fill and clay materials, siltstone and sandstone (measured about 80 metres north west of the Proposal) are provided in **Table 19-3**. These results are comparable to the ground water flow rates provided in **Table 19-2** for boreholes BH203, BH208 and BH215. Overall, the results presented in **Table 19-2** and **Table 19-3** indicate that groundwater flow rates at the Site can be described as relatively slow to moderate, and would equate to a groundwater inflow rate of about 2 mega litres per year, within the first year (Douglas and Partners 2020b).

Table 19-2 Groundwater levels and flow at 11 – 17 Khartoum Road and 33 - 39 Talavera Road

Location	Ground surface elevation (m AHD)	Elevation of groundwater (m AHD)	Depth to groundwater (m)	Flow rate (cm/hour)
BH1	59.8	50.33	9.47	
BH3	59.7	49.86	9.84	
BH4	56.3	49.54	6.76	
BH102	57.8	49.31	8.49	
BH104	54.95	48.97	6.16	
BH201	54.6	48.49	6.11	1.081
BH203	52.8	43.08	9.72	0.030
BH208	54.3	46.82	7.48	0.054
BH215	55.7	49.14	6.56	0.623
BH218	51.3	45.43	5.87	1.138

Table 19-3 Hydraulic conductivity of geological units found immediately adjacent to the Proposal (Douglas Partners. 2020b)

Model Layer	Typical Horizontal Hydraulic Conductivity (m/second)	Typical Vertical Hydraulic Conductivity (m/second)
Fill & Clay	1×10^{-8} (0.036 cm / hour)	1×10^{-8} (0.036 cm / hour)
Shale / Siltstone/ Laminite	1×10^{-6} (0.36 cm / hour)	1×10^{-6} (0.36 cm / hour)
Laminite and Sandstone	7×10^{-7} (0.252 cm / hour)	7×10^{-7} (0.252 cm / hour)

A review of available reports that have been previously conducted in the broader water resource study area (shown on **Figure 19-1**) indicated that at a regional scale, groundwater is typically present at depth within the underlying bedrock, consistently found at depths ranging from about five to 10 metres below ground surface (Ethos Urban, 2018, Douglas Partners, 2010, Douglas Partners, 2015).

However, in some instances, groundwater was found at depths as shallow as about 3.5 metres below ground surface (Douglas Partners, 2010). It is noted that groundwater levels in the regional area are likely to change with climatic conditions and other factors. It is possible that the water levels will temporarily rise during periods of heavy or prolonged rainfall and fall during dry periods.

A review of groundwater levels in the immediate vicinity of the Proposal and within the broader study area indicates that these records are likely to represent perched ephemeral water, and not the regional groundwater table, which is likely to be at greater depth (Douglas partners, 2020a).

Water quality

Water quality testing for a range of common contaminants including heavy metals, hydrocarbons, pesticides and oil and grease has been carried out for samples collected from BH102 and BH104 (Douglas Partners, 2020b). The results of this testing indicated that the concentrations of common contaminants are low in the groundwater in the study area, generally measured non detectable or close to non-detectable.

In contrast to this, concentrations of nickel and zinc were recorded at higher levels. This result can be attributed to typical background levels often found in an urban environment (Douglas Partners, 2020b). All groundwater quality test results fall within ANZECC (2000) Fresh and Marine Water Quality Guidelines and ANZG (2018) guidelines. A summary of the groundwater quality test results obtained by Douglas Partners (2020), compared against these guidelines is provided in **Table 19-4**.

Table 19-4 Summary of groundwater quality test results (Douglas Partners, 2020b)

	Guideline values -Freshwater (µg/L)		Sample Location	
Contaminate	**ANZECC (2000)**	**ANZG (2018)**	**BH102 (µg/L)**	**BH104 (µg/L)**
Arcenic (V)	13	13	1	2
Arcenic (III)	24	24	<0.1	<0.1
Cadmium	0.2	0.2	<1	<1
Chromium (III)	3.3	3.3	<1	<1
Chromium (VI)	1	1.0	<1	<1
Copper	1.4	1.4	<1	<1
Lead	3.4	3.4	<1	<1
Mercury	0.06	0.06	<0.05	<0.05
Nickel	11	11	52	84
Phenols	320	320	<50	<50
Benzene	950	950	<1	<1
Benzo(a)pyrene	0.1 [a]	0.1 [ab]	<0.1	<0.1
Naphthalene	16	16 [b]	<0.2	<0.2
Anthrancene	0.01 [a]	0.01 [ab]	<0.1	<0.1
Oil and Grease	N/A	N/A	<5000	<5000

a: insufficient data for reliable trigger value; unknown reliability or low reliability value used

b. ANZG (2018) Default Guideline Values for a slightly to moderately disturbed system based on 99% level of species protection (bioaccumulation)

Groundwater users

A review of the NSW Water Register regional groundwater bore information did not identify any registered bores within 500 metres of the Site.

Groundwater dependant ecosystems

A search of groundwater dependent ecosystems (GDEs) in the vicinity of the water resources study area was undertaken using the BoM Atlas of Groundwater Dependent Ecosystems. The results of this

search identified that the closest area of mapped GDE is located about 520 metres north of the Site and comprises terrestrial vegetation – Hinterland Sandstone Gully Forest, and is located within Lane Cove National Park.

Chapter 18 (Biodiversity) provides a detailed assessment of the existing ecological conditions at the Site (including groundwater dependant ecosystems).

19.2.3 Surface water

Waterways

Waterways within the vicinity of the Proposal include:

- Lane Cove River, located about 720 metres north of the Proposal
- Shrimptons Creek (a tributary of the Lane Cove River), located about 500 metres west of the Proposal
- Industrial Creek (a tributary of the Lane Cove River). Industrial Creek is not mapped on Google Maps, Six Maps, the Water Management (General) Regulation 2018 hydro line spatial data (NSW Department of Finance, Services & Innovation, 2018) or the NSW government e-planning map portal. It is estimated that Industrial Creek is located about 400 metres north west of the Proposal
- Porters Creek (a tributary of the Lane Cove River) located about one kilometre east of the Proposal.

Shrimptons Creek has a catchment area of about 5.5 km^2, and it flows from south to north through the Lane Cove National Park, to the Lane Cove River at Macquarie Park. According to the Strahler System for categorising waterways, the upper watercourse of Shrimptons Creek is a first-order stream, becoming a second-order stream downstream from the corner of Wilson and Leslie Streets, North Ryde.

Shrimptons Creek is located within an urban catchment, which is typified by a large ratio of impermeable surfaces, associated with urban development (such as roads, carparks and buildings). Urban catchment environments are generally associated with larger volumes of stormwater runoff which often results in poorer water quality when compared to waterways located in more 'natural' settings. The quality of stormwater runoff in the study area would be influenced by surface pollutants typical of urban catchments, including oils and hydrocarbons, heavy metals, chemicals (from spills, localised pesticide/herbicide application or inappropriate waste disposal), sediments and gross pollutants such as litter and other debris.

The water quality of Shrimptons Creek is poor. Stormwater derived rubbish has been observed within the waterway and discolouration, high turbidity, the presence of aquatic weeds and strong odours have been recorded during water quality testing of the creek (City of Ryde, 2012).

The Lane Cove River has a catchment area of over 95 km^2, commencing in the north western Sydney suburb of Thornleigh. The river flows in a general south easterly direction to its confluence with the Parramatta River, to which it is a major tributary.

The Lane Cove River catchment is described as a moderately to heavy urbanised catchment with remnant bushland occupying a large portion of the foreshore area. The river is known to receive large volumes of untreated stormwater runoff from residential, commercial and industrial areas during high rainfall events which can also have detrimental effects on water quality (Sydney Water, 2019).

The Lane Cove River is mapped at Key Fish Habitat under the *Fisheries Management Act 1994.* There are no streams or wetlands within the Site or biodiversity study area.

Existing Stormwater Management Infrastructure

Apart from drainage assets associated with Macquarie University, Epping Road, Lane Cove Road and the M2 Motorway, all of the stormwater drainage infrastructure within the suburb of Macquarie Park is owned by the City of Ryde Council (Brewsher, 2010).

Existing street drainage infrastructure in the water resource study area currently drains the majority of runoff towards Shrimptons Creek (Ethos Urban, 2018), however the stormwater collected at the Site is currently drained towards the Lane Cove River (AECOM, 2020). This water is mostly collected via a

series of stormwater pits located along Khartoum and Talavera Road. It is noted that the stormwater drainage on Khartoum Road connects to the existing stormwater drainage system on Talavera Road (Northrop, 2020).

19.2.4 Flooding

Historically, the suburb of Macquarie Park has been subject to a relatively high frequency of flood events, where Council records indicate that 13 flood events were experienced over a period of six years, between 1984 and 1990. In addition to this, more recent flood events have been recorded in 2003 and 2010 (Brewsher, 2011).

In accordance with NSW Government policy, the City of Ryde has prepared a Floodplain Risk Management Plan for Macquarie Park. The accompanying Flood Study to the Floodplain Risk Management Plan provides an assessment of existing flooding risk across Macquarie Park. Flood levels, flood velocities and the extent of flood inundation have been provided for floods with different probabilities of occurrence, including the 20 year and 100 year average recurrence interval (ARI) and the probable maximum flood (PMF) to determine the magnitude of the flood problem within the catchment, and to identify the main problem areas (Brewsher, 2011).

A map showing the extent of overall flood risk across Macquarie Park is provided on **Figure 19-3**. As shown on this map, the area immediately to the north east corner of the Proposal is located within an area mapped a low to medium flood precinct.

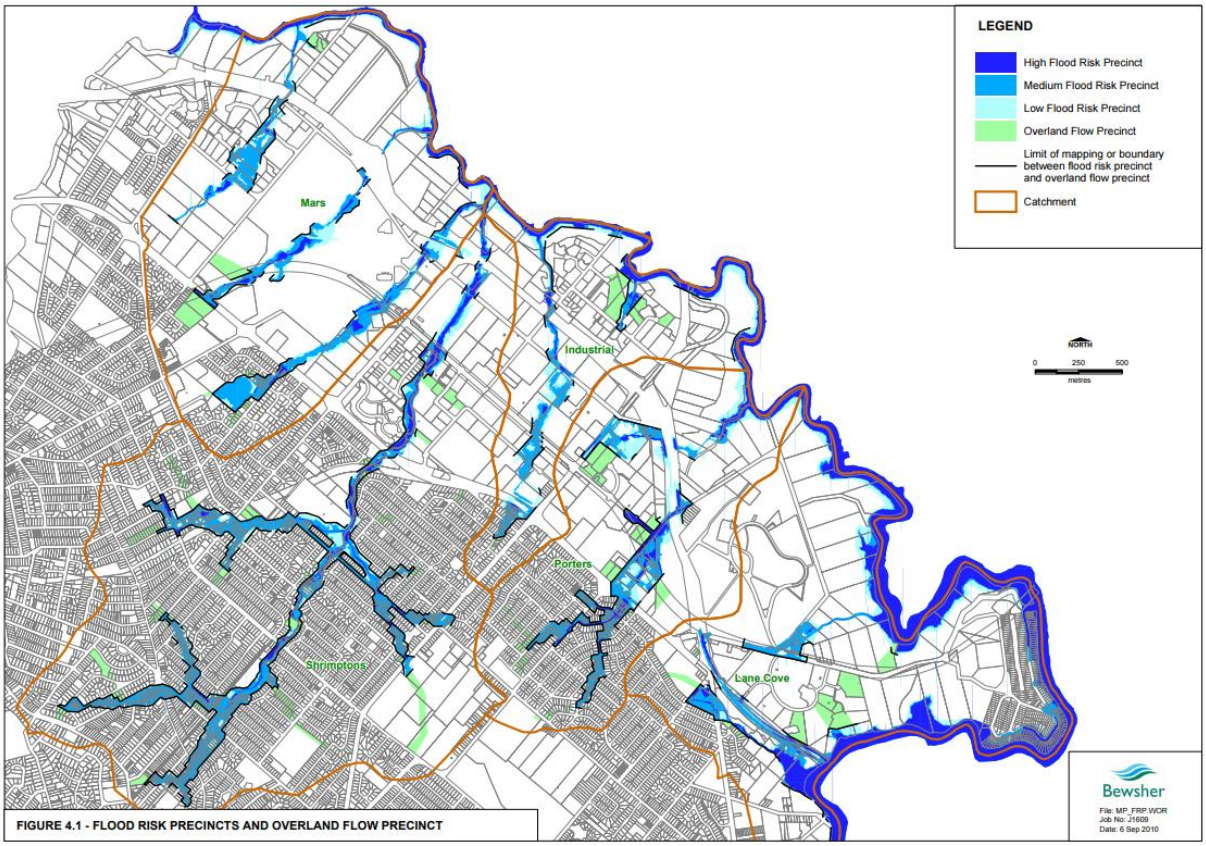

Figure 19-3 Flood risk map, Macquarie Park (Source: Brewsher, 2011)

A flood advice letter dated 14 September 2017 was received by AECOM from the City of Ryde. The letter outlines the existing extent of possible localised flooding for the 20 year and 100 year ARI flood events and the PMF, at and immediately nearby the Site.

The letter specifies that the eastern corner of 33 Talavera Road is subject to a medium risk of localised flooding. However, this would not be anticipated to extend into the Site as these flood waters would be contained within the road reserve. This is shown in more detail on **Figure 19-4** and in the corresponding **Table 19-5**.

Table 19-5 Flood level data - 33 Talavera Road (City of Ryde, 2017)

Location on map	20 year ARI flood (metres AHD)	100 year ARI flood (metres AHD)	Probable maximum flood
A	48.04	48.04	48.17
B	Nil	Nil	49.06
C	Nil	Nil	50.34
D	48.32	48.35	48.47

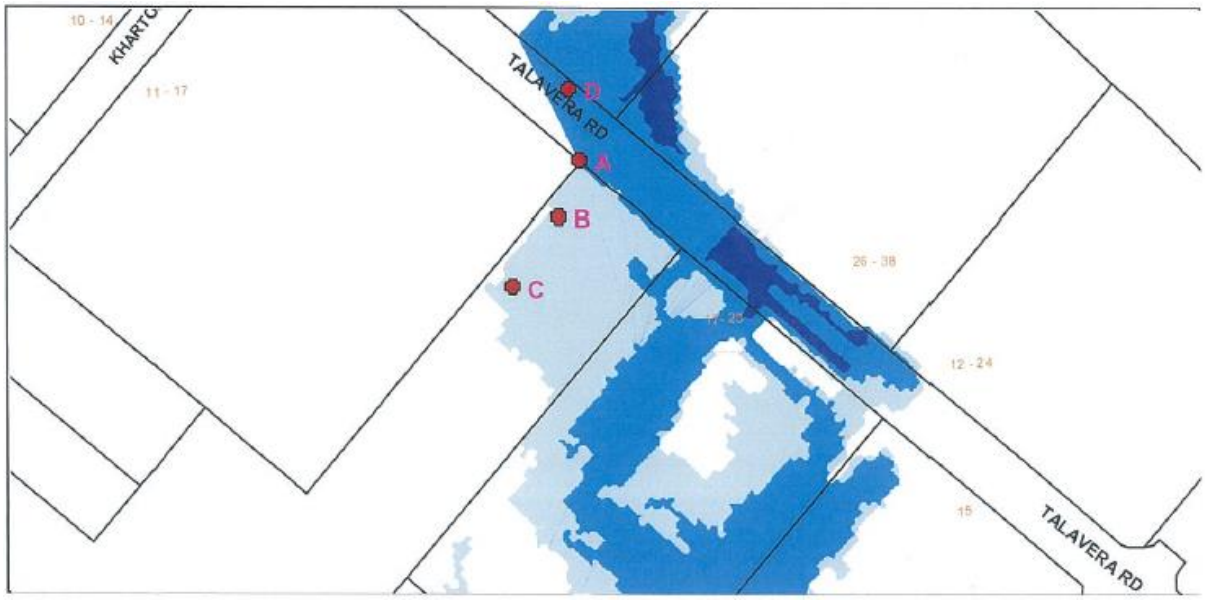

Figure 19-4 Flood level data - 33 Talavera Road (Source: City of Ryde, 2017)

19.3 Construction impact assessment

19.3.1 Groundwater

Level and flow

Groundwater would be intersected during the construction of the Proposal. This proposed activity is considered to be “disturbance” as defined by the *Water Management Act 2000* because it:

- Would penetrate the aquifer
- Would interact with groundwater in the aquifer (to some degree)
- May obstruct the flow of water in the aquifer.

NSW Aquifer Interference Policy provides standards to which the potential to impact groundwater should be considered. Under the categories in the Aquifer Interference Policy, the groundwater underlying the Proposal can be described as a “less productive groundwater source”. The following minimal impact considerations are outlined for less productive groundwater sources:

- Less than or equal to 10 percent cumulative variation in water table 40 metres from any high priority groundwater dependant ecosystem, high priority culturally significant site, or less than a two metre decline at any water supply work
- A cumulative pressure head decline of not more than a two metre at any water supply work
- Any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.

Excavating into and below the aquifer would have the potential to alter its hydraulic characteristics. As described previously, the groundwater levels in the study area are likely to represent a perched aquifer and levels would be associated with seepage flowing through bedding planes, fractures and joints in the rock (Douglas Partners, 2020a and 2020b).

It is not anticipated that groundwater would be extracted to supply water for the construction of the Proposal, however groundwater is likely to be extracted to dewater excavations for subsurface works in excess of five metres below the natural ground surface. Geotechnical cross sections undertaken for the Proposal indicate that the depths of excavations required for the Proposal are unlikely to intercept groundwater across the majority of the Site. Where the Proposal would intercept groundwater, this is likely to be limited to a depth of less than one metre.

Groundwater modelling has been undertaken for a similar proposed basement level and construction methodology at the site immediately adjacent to the Proposal (the M_Park project, building A). This assessment is considered to be reasonably applicable to the Proposal as existing conditions and proposed build features and construction methodologies are representative of those that are anticipated during the construction of the Proposal, albeit at a different location and at a slightly different depth. This groundwater modelling was undertaken by Douglas Partners (2020b) using 2D finite element hydrogeological software SEEP/W (a component of Geostudio 2019, Version 10.0.3, developed by GEOSLOPE International Ltd) to develop a two-dimensional (2D) numerical groundwater model. The results of this investigation determined that, for a similar proposed basement level and construction methodology at the site immediately adjacent to the Proposal, the anticipated average groundwater inflow rate would be about two megalitres per year depending on environmental conditions at the commencement of exaction activities (for example, rainfall events) (Douglas Partners, 2020b). However, it is anticipated that groundwater levels would stabilise following the initial excavation stage of the Proposal. Following groundwater stabilisation, groundwater seepage flows would be anticipated to abate during periods of dry weather, and would increase slightly following periods of wet weather (Douglas Partners, 2020b). It is noted that given the likely extent to which the Proposal would intercept groundwater is low, this estimation is highly conservative.

Any groundwater that would require to be dewatered during the construction of the Proposal would be collected and directed to the local stormwater system. The potential for impacts to surface water as a result of this is discussed in more detail in **Section 19.4.2**. As the likely groundwater inflow would be less than three megalitres per year, the Proposal is exempt from requiring a Water Access License from Water NSW however, a Water Supply Approval for construction dewatering would be required.

The Proposal would not alter the rate that rainfall will recharge the aquifer since it would not introduce any substantial new paved surface that would prohibit or significantly redirect recharge waters.

Groundwater quality

As described above, any groundwater that would require to be dewatered during the construction of the Proposal would be collected and directed to the local stormwater system. The potential for this to result in impacts to surface water quality is discussed in more detail in **Section 19.4.2**. While no significant downstream water quality impacts are anticipated, the suitability of the groundwater for disposal to stormwater would regardless be confirmed in consultation with the City of Ryde Council.

There is potential that accidental spills could result in impacts to the groundwater quality. Impacts to the quality of groundwater that would be intersected by the construction of the Proposal would be minimised by implementing standard safeguards such as:

- Avoiding the use of potentially harmful substances where practicable
- Placing barriers between any potential source(s) of contamination and the water table (such as using bunded areas to store chemicals)
- Handling potentially contaminating substances such as fuels, paints, etc, in accordance with relevant regulations.

With the implementation of the full list of management measures provided in **Section 19.5**, the risk of groundwater contamination due to accidental spills and leaks during the construction would be low.

Groundwater dependent ecosystems

The closest groundwater dependent ecosystems occurs in excess of 500 metres north of the Proposal. As discussed previously, in the location of the Proposal, the groundwater table is likely to be associated with perched seepage and is not anticipated to be representative of a permanent or regional groundwater table

For these reasons, the potential for the Proposal to impact groundwater dependent ecosystems during construction is considered to be negligible.

19.3.2 Surface water

Where sediments from construction areas enter receiving waterways, there is the potential to adversely impact water quality (e.g. by increasing turbidity, lowering dissolved oxygen levels, increasing nutrients and introducing pollutants). Potential impacts to the quality of stormwater runoff during construction could occur as a result of:

- Earthworks or movement of soil resulting in sediment laden stormwater runoff and sedimentation,
- The release of any unidentified in situ contaminated material within the soils on Site
- Contamination from accidental spillages of fuel, lubricants, effluent and other chemicals and materials used during construction
- Dewatering of open excavations during construction, particularly following periods of rainfall, at which time the groundwater may have greater potential to contain sediments and other pollutants mobilised by the rainfall.

The quality and quantity of the pollutants that may be generated during construction of the Proposal would be variable and subject to the soil profile, extent of disturbance, construction activities and climatic influences (e.g. rainfall and high wind). The key pollutants of concern from any unsealed construction areas would be sediment (e.g. total suspended solids), and accidental spillages. Other pollutants (such as increased nutrients) may also be bound to the sediment or present in dissolved form. Their concentrations would be variable but providing appropriate erosion and sediment controls are implemented, they are considered to pose a low risk to the surface water environment and human health during the construction phase of the Proposal.

As described above, any groundwater that would require to be dewatered during the construction of the Proposal would be collected and directed to the local stormwater system. As demonstrated in **Section 19.2.2**, the existing groundwater quality in the study area is generally good. As described in

Chapter 7 Soils, geology and contamination, there is little potential for the Proposal to encounter ASS or areas of historic contamination. As such, treatment of groundwater is not anticipated to be required prior to it being directed to stormwater, and the release of groundwater into the stormwater network is not anticipated to result in any downstream water quality impacts. Despite this the suitability of the groundwater for disposal to stormwater would regardless be confirmed in consultation with the City of Ryde Council.

In addition, given the existing poor water quality in the receiving waters identified in the study area (refer to **Section 19.2.3**) it would be unlikely that the Proposal would have the potential to significantly reduce water quality in the study area.

Provided that the appropriate management measures are implemented during construction (provided in **Section 19.5**), and any discharge criteria specified by City of Ryde Council is achieved, impacts are expected to be manageable.

19.3.3 Flooding

The Proposal would be located outside the one per cent AEP flood extent. During construction, inundation of the Proposal is unlikely, however, locations close to flood prone areas may have a minimal potential to experience localised flooding. According to the flood mapping, this includes a small localised area at the intersection of Talavera Road and the proposed Road 22.

Flooding within and around this area could present a safety hazard to construction personnel, cause damage or loss of materials and equipment, and could potentially lead to materials being washed offsite and into waterways downstream, resulting in environmental impacts. No stockpiles would be located within this area.

There is no potential for regional flooding impacts within the remainder of the Proposal site according to the flood mapping.

Construction activities associated with the Proposal also have the potential to change flood behaviour and impact on the surrounding environment if they are not mitigated. These include:

- Excavation works, utilities adjustments, and demolition works
- Modification or replacement of paved surfaces, including the construction of Road 22.

Construction works required for the Proposal may have the potential to affect local overland flow paths and existing minor drainage paths (including constructed drainage systems), by causing a minor redistribution of some stormwater flows. This could occur as a result of:

- Disruption of existing drainage networks during upgrade or replacement of drainage pits and pipes
- Excavations in which rainwater or dewatered groundwater may pool
- Establishment of construction ancillary facilities, including storage/stockpiling of materials
- Sediment released from site entering existing drainage assets/systems and causing blockages.

However, any redistribution of flows during construction would not substantially affect the performance of downstream drainage infrastructure, due to the small size of the Proposal Site in the context of the wider catchment.

Any potential flooding impacts during construction would be adequately managed through the mitigation measures identified in **Section 19.5**.

19.4 Operational impact assessment

19.4.1 Groundwater

Level and flow

Groundwater would not be extracted to supply water for the operation of the Proposal, however groundwater is likely to be encountered where the building structure is located in excess of five metres below the natural ground surface, particularly at the southern end of the site (Douglas and Partners, 2020a)

As described in **Section 19.3.1** groundwater modelling has been undertaken for a similar proposed basement level and construction methodology at the site immediately adjacent to the Proposal (building A of the M_Park project). The results of this investigation determined that, for a similar proposed basement level (relative to groundwater level) and construction at the site immediately adjacent to the Proposal, the anticipated average groundwater inflow rate over the long term life of the Proposal would be about 1.4 megalitres per year (Douglas Partners, 2020b).

Any section of the building which would be located below the exiting groundwater level would be tanked, in order to meet DA requirements stipulated by City of Ryde Council for the former M_Park package of works. In this instance, the Proposal would not require any dewatering during operation as no groundwater would seep into the building such that it would require disposal to the stormwater network. For this reason, it is not anticipated that groundwater levels would be affected by the operation of the Proposal.

The Proposal would not alter the rate that rainfall will recharge the aquifer since it would not introduce any substantial new paved surface that would prohibit or significantly redirect recharge waters.

Establishing a structure within the aquifer would have the potential to alter its flow direction by blocking or providing and obstacle to the natural flow path. As described previously, the groundwater levels in the study area are likely to represent a perched aquifer and levels would be associated with seepage flowing through bedding planes, fractures and joints in the rock (Douglas Partners, 2020b). As such, while some minor disruption of flow regime may occur within the perched aquifer as a result of the Proposal, no impacts to regional groundwater flow are anticipated.

Groundwater quality

There is a small potential that accidental spills or leaks could result in impacts to the groundwater quality should they seep into the underlying ground.

The proposed diesel tanks that would be delivered as part of the Proposal would be located in an impermeable and bunded area and would be constructed to relevant safety guidelines. This is described in more detail in **Chapter 7 (Geology, soils and contamination)**. As such, a leak originating from the diesel tanks that would have potential to affect groundwater quality is considered to be low.

With the implementation of management measures provided in **Section 19.5**, the risk of groundwater contamination due to accidental spills and leaks during operation would be negligible.

19.4.2 Surface water

Following the completion of construction of the Proposal, all disturbed areas would be reinstated and ‘made-good’. No substantial ground disturbance during operation is anticipated. Any ground disturbance during operation is likely to be limited to maintenance and gardening activities. As such, for water that would be collected by the proposed stormwater drainage network or the Proposal, most pollutants are likely to originate from the following:

- The roof areas of the Proposal
- Landscaped areas (sediment and possible nutrients)
- Outdoor parking areas
- Road/vehicle circulation areas.

To limit the potential for water collected from these areas to result in downstream water quality impacts, a treatment device train will be to be incorporated into the design of the stormwater network for the Proposal. This is discussed in more detail below.

All private developments in the City of Ryde are required to manage water quality control on site prior to discharging into Council’s stormwater system. The City of Ryde Council’s Stormwater Management Technical Manual sets out the water quality targets that are required of the Proposal. These are provided in **Table 19-6**.

Table 19-6 City of Ryde Council water quality targets (City of Ryde 2015)

Pollutant	Reduction Target (percent)
Gross Pollutants	90
Total Suspended Solids	85
Total Phosphorous	60
Total Nitrogen	45

To achieve the required pollutant reductions, a water quality treatment train is proposed to be delivered as part of the Proposal. This would involve:

- Primary treatment would occur within a 10 kilolitre rainwater tank and an Ocean Guard 200 filter (or similar) would be applied to the stormwater pits
- Secondary treatment would be provided by a filtration system, which may comprise a Storm Filter System that includes a Storm Filter Chamber and Psorb devices (or similar).

Water quality modelling of the proposed development has been undertaken using MUSIC Version 6.3.0, developed by eWater CRC. MUSIC enables the user to conceptualise the transfer of pollutants through a stormwater drainage system and it provides an aid in quantifying the effectiveness of the proposed stormwater quality treatment train. The MUSIC model was prepared for the Proposal to determine the capacity for the proposed treatment measures to achieve the pollutant removal targets as required by City of Ryde Council (**Table 19-6**)

Table 19-7 outlines the identified likely water collection and pollutant source points (source nodes) catchment parameters (area, and percentage of impervious surface), and modelled percentage of reduction in pollutant loads per treatment train item (treatment node).

Table 19-7 Water quality outcomes of the proposed stormwater treatment train for the Proposal

Source Node	Area (hectare)	Impervious	Treatment Node	Reductions (percent)			
				GP	TSS	TP	TN
Roof 1	0.43	100%	-	-	-	-	-
Roof 2	0.05	100%	**Rainwater Tank**	100	43.1	33.1	32.5
Ground (Landscaping)	0.07	0%	**Ocean Guard 200**	96.7	73.4	27.1	19
Outdoor Parking	0.06	100%					
Road (Vehicle Circulation Area)	0.34	100%					
All source nodes (combined)	0.95	80%	**SF Chamber**	100	67.9	21.9	11.2
All source nodes (combined)	0.95	80%	**PSorb**	100	85.2	68.5	46.1
Reductions at Receiving Node				**100**	**85.2**	**68.5**	**46.1**

Notes: GP = Gross pollutants. TSS = Total suspended solids. TP = Total phosphorus.TN = Total nitrogen.

Based on the results of the MUSIC model for the proposed stormwater treatment train for the Proposal, all City of Ryde Council's water quality targets would be achieved.

In addition to the above, as part of the Proposal a series of diesel storage tanks would be installed to supply fuel for backup generators, in the event of a network power outage. Petroleum based pollutants could be released to the stormwater drainage network in the unlikely event of a leak. It is more likely however that pollutants may results from accidental spills during refuelling of the tanks. The design of the diesel tanks would meet all applicable design criteria and safety standards, for this reason a major fuel leak would be considered unlikely. This is described in more detail in **Chapter 7 (Geology, soils**

and contamination). Regardless, the fuel tanks would be located within an impermeable, bunded area, such that leaks could be contained, limiting potential for any resultant pollutants from entering the stormwater system. In addition, all refuelling activities would be undertaken in an impermeable bunded area. Spill kits would also be provided within the fuel tank and refuelling areas. It is considered that with the implementation of suitable management measures, the likelihood for accidental spills that may be associated with refuelling activities to result in water quality impacts would be low.

There is also a small potential for water quality impacts through accidental fuel or chemical spills from maintenance equipment (such as ride-on mowers). It is considered that with the implementation of suitable management measures, the likelihood for accidental spills from these activities to result in water quality impacts would be low.

19.4.3 Flooding

The proposed location of the Proposal is outside of the mapped one percent AEP and PMF flood extents. In addition, the proposed finished floor level of the Proposal is designed to be above the PMF levels to limit the potential for damage during a flood. As the Proposal is located outside of the PMF extent, no impact to flow conveyance in floodways and/or flood storage areas is anticipated.

A site-wide approach to the management of stormwater has been adopted in developing the stormwater design for the Proposal. This approach has considered existing constraints and overland flow behaviours, water sensitive urban design initiatives, quantity of surface runoff, and opportunities to provide onsite retention for non-potable reuse.

The design has also considered City of Ryde Council's Stormwater Management Technical Manual (2014) requirements for the provision of onsite stormwater detention (OSD) for the Proposal. The OSD requirements for the Proposal have been calculated as per the City of Ryde DCP Stormwater Management Technical Guidelines, and is estimated to be 551 m^3. An onsite water detention system in the form of underground storage will be provided as part of the Proposal, with a minimum storage capacity of 551 m^3. A high early discharge chamber has also been incorporated into the OSD arrangement for the Proposal to optimise the design of the onsite detention system. All final OSD components will be designed in accordance to Ryde DCP Stormwater Management Technical Guidelines.

The DRAINS software package has been used to model the peak flowrates for the Proposal to determine the Permissible Site Discharge (PSD) during the major (one percent AEP) and minor (five percent AEP) storm events. A PSD of 459 litres per second (L/sec) has been adopted in accordance with Northrop's Stormwater Report for the Macquarie Park Development submitted for DA (Northrop, 2020). The results of this modelling is as follows:

- For the five percent AEP (with the implementation of the proposed stormwater network) the total water output to the City of Ryde Council managed storm water system would be about 427 L/sec
- For the one percent AEP (with the implementation of the proposed stormwater network) the total water output to the City of Ryde Council managed storm water system would be about 437 L/sec.

For both scenarios, the total stormwater outputs would be below the allowable PSD of 459 L/sec.

As such it is determined that the internal drainage system is designed to convey the 20 year (five percent AEP) and 100 year (one percent AEP) ARI storm event runoff from the site and the likelihood of the Proposal contributing to local flooding during operation would be low. Flood impacts to surrounding properties would also be negligible as the Proposal would be located outside the floodplain.

The long-term establishment of the data centre building on the Site would have the potential to affect local overland flow paths. However, this can be effectively managed through the utilisation of normal drainage measures and in addition, any redistribution of flows as a result of the presence of the data centre building would not substantially change the performance of downstream drainage infrastructure, due to the small size of the Proposal Site in the context of the wider catchment, and as all surface water migrating across the site would be suitably captured and managed by the proposed stormwater system.

19.5 Safeguards and management measures

The implementation of management measures would reduce the potential groundwater, surface water and flooding impacts of the Proposal to the greatest extent practicable.

The relevant potential groundwater, surface water and flooding impacts and associated management measures and safeguard protocols are provided in **Table 19-8**.

Table 19-8 Safeguards and management measures - Groundwater, surface water and flooding

ID	Management measure	Timing
GW1	A groundwater monitoring program will be prepared and implemented to confirm the existing conditions and to monitor groundwater levels and groundwater quality during construction. The groundwater monitoring program will be included as a subplan to the CEMP and will identify groundwater monitoring locations, performance criteria in relation to groundwater levels and groundwater quality, and potential remedial actions that would manage or mitigate any non-compliances with performance criteria. The frequency of this ground water monitoring should be implemented commensurate to the extent to which the Proposal would intercept groundwater. A minimum bi-annual frequency is recommended.	Prior to and during construction
GW2	Any diversion of groundwater to the existing stormwater network would take place in consultation with City of Ryde Council, and any tests required by council such as establishment of baseline pollutants would be implemented.	Prior to and during construction
SW1	A Construction Soil and Water Management Plan (CSWMP) would be developed to manage the soil and water issues relevant to the construction of the Proposal. This sub-plan would be part of the CEMP. The CSWMP would identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks would be addressed during construction. The CSWMP would include detailed erosion and sediment control measures to be implemented for the Proposal. These control measures would align with the management approaches outlined in *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004), *Managing Urban Stormwater: Soils and Construction Volume 2A* (DECC, 2008) (referred to as the Blue Book), the *Water Discharge and Reuse Guideline* (TfNSW, 2015c), *Concrete Washout Guideline* (TfNSW, 2015b), *Water Sensitive Urban Design Guideline* (TfNSW, 2017b) and *Chemical Storage and Spill Response Guideline* (TfNSW, 2015a).	Prior to and during construction

ID	Management measure	Timing
SW2	On-site retention or detention strategies would be implemented to manage permissible site discharge and reduce flood risk. Assessment of the permissible site discharge and minimum on-site detention volume as dictated by City of Ryde Council requirements would be confirmed during the detailed design.	Prior to and during construction
SW3	Undertake consultation with City of Ryde Council prior to connecting to existing stormwater drainage system.	Prior to and during construction
SW4	Stormwater treatment device/s / water sensitive urban design features would be provided as part of the Proposal	Prior to and during construction and operation
SW5	Stormwater quality management measures would be implemented to further support the City of Ryde Council stormwater pollution reduction targets These measures would include: • Prohibition of release of dirty water into drainage lines and/or waterways • As part of the regular site walk-overs that are conducted by construction supervisors, visual checks for potential water quality issues (i.e. turbidity, hydrocarbon spills/slicks), should be undertaken ,to identify any potential spills or erosion and sediment control issues • Water quality control measures would be implemented to prevent any construction materials (e.g. concrete, grout, sediment etc) entering drain inlets or waterways.	Construction and operation
SW6	Measures to manage accidental spills and leaks would be detailed in the site-specific emergency spill plan, included in the CEMP and implemented on Site.	Prior to and during construction
FL1	Stockpiles and storage areas would be located outside of mapped flood extents.	During construction
FL2	Works would cease in mapped or likely flood prone areas (such as un-stabilised excavated areas) when a severe weather warning is issued for the immediate area, and work sites would be secured accordingly.	During construction
FL3	Temporary drainage or drainage diversions would be installed so that stormwater function is not impeded during construction.	During construction

20.0 Waste

This chapter provides an assessment of the waste-related impacts associated with the Proposal. **Table 20-1** sets out the requirements as provided in the Secretary's Environmental Assessment Requirements (SEARs) relevant to waste and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 20-1 SEARs – Waste

SEARs requirements	
Waste	**Where addressed**
Details of the quantities and classification of all waste streams to be generated on site during the construction and operation of the development	Quantities and classification of waste streams during construction is provided in **Section 20.3** Quantities and classification of waste streams during operation is provided in **Section 20.5**
Details of waste storage, handling and disposal during the construction and operation of the development, including plans of waste storage and collection areas	Details of waste storage, handling and disposal, storage and collection during the construction is provided in **Section 20.3.2** Details of waste storage, handling and disposal, storage and collection during the operation is provided in **Section 20.5**.
Details of the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021.	Waste management measures are provided in **Section 20.7**.

20.1 Assessment methodology

20.1.1 Assessment approach

A qualitative desktop assessment has been carried out to estimate waste types and quantities, and to identify potential impacts and the appropriate management approach. This involved:

- Reviewing the regulatory framework for waste management
- Identifying potential waste generating activities during construction and operation
- Estimating the likely waste streams and volumes, including bulk earthworks and spoil balance
- Identifying the likely classification of waste streams in accordance with relevant legislation and guidelines
- Describing proposed management and handling techniques for key waste streams, including waste storage and collection, minimisation and re-use.

The waste types and quantities estimated in this chapter are indicative and have been identified for the purpose of determining potential waste management options. Although the quantities of waste actually generated by the Proposal may differ from the estimates made, the identified waste management options are likely to be appropriate for the final waste quantities.

20.2 Existing environment

The Site is currently characterised by commercial activities. Formerly, the tenants that previously occupied the Site were responsible for the management of waste generated by their businesses.

More broadly throughout the suburb of Macquarie Park, Ryde City Council provides a weekly residential kerbside waste collection service, a fortnightly kerbside recycling collection service and a fortnightly kerbside green waste collection service.

Ryde City Council also perform business waste collection as requested on application for a nominal fee.

There are a number of waste disposal location options for recycling and disposal of construction and operation waste generated by the Proposal. A large number or waste facilities across the greater Sydney area are licensed to accept general solid waste (putrescible) and general solid waste (non-putrescible). Specific facilities and collection contractors for the disposal of putrescible and non-putrescible general solid waste would be determined by the construction contractor and would be documented in the construction waste management plan once selected.

Recyclables generated during construction and operation of the project would be collected by an authorised contractor for off-site recycling. There are also a number of resource recovery facilities in Sydney. Recycling facilities for the Proposal would be determined by the contractor engaged to collect the material.

Special and hazardous wastes would be disposed of at appropriately licensed waste management facilities to be selected during detailed design of the Proposal and documented in the construction waste management plan once selected.

20.3 Construction waste

The construction phase of the Proposal is anticipated to generate the following broad waste streams:

- Site clearance wastes
- Construction waste.

20.3.1 Site clearance

In order to accommodate the Proposal, the existing built form will need to be demolished and the site prepared for a level foundation. Whilst the main demolition of building within the Site would be undertaken via a separate development application it is expected that the primary waste associated with these activities is to include building waste, green waste, excavated fill, soil and/or rock.

Construction activities associated with the Proposal will commence with excavation of the site. The site will be mostly in cut with perimeter retaining walls around the west, south and eastern boundaries. The volume between the existing surface and the proposed surface has been estimated to inform an earthworks strategy for the site. Further design development is required to inform the bulk earthworks volumes and the estimate provided for the concept design stage is indicative only. Approximate volume between existing surface and the proposed finished surface is:

- Unadjusted cut: 45,877 m^3
- Unadjusted fill: 4 m^3.

Additional earthworks for specific Proposal components including (but not limited to) landscaping, building slab and fuel tanks would require an additional 4,017 m^3 of material to be cut, resulting in a total cut of 48,890 m^3. Spoil comprising virgin excavated natural material (uncontaminated soil and crushed rock) would be managed in accordance with the waste management hierarchy. As a worst case, all spoil generated would be disposed offsite at a licensed waste facility (e.g. landfill). However, where possible, spoil would be reused onsite as part of the Proposal (as backfill, etc.), or reused on other project site/s or at a re-purposing facility, including in accordance with NSW Environment Protection Authority (EPA) Resource Recovery Order/s that may apply (where feasible).

The suitability of spoil to be reused onsite (or on alternate project site/s or at a re-purposing facility) would be confirmed during detailed design (e.g. through further contamination investigations and

identification of other viable sites). Note that spoil may be stockpiled onsite (e.g. within the ancillary facility areas) prior to reuse or disposal.

A summary of the site preparation activities anticipated to generate waste is provided in **Table 20-2**., along with the materials that may be produced, potential NSW EPA Resource Recovery Orders that may be applicable and likely waste classifications. Where a NSW EPA Resource Recovery Order exists for a specific waste material the opportunity to re-use the waste under that order should be considered prior to disposal.

Table 20-2 Potential site preparation waste types, classification and management methods

Waste types	NSW EPA Waste Classification	Proposed handling, treatment and/or disposal method
Green waste including timber, pine and particle board	General solid waste (non-putrescible) (garden waste)	Separated, some chipped and stored on-site for landscaping, remainder to landscape suppliers or off-site recycling; Stumps and large trees to land fill.
Clean fill	General solid waste (non-putrescible)	On-site reuse where possible. Where not possible, clean fill would be reused on other project site/s or at a re-purposing facility. The suitability of spoil to be reused onsite (or on alternate project site/s or at a re-purposing facility) would be confirmed during detailed design (e.g. through further contamination investigations and identification of other viable sites). Note that spoil may be stockpiled onsite (e.g. within the ancillary facility areas) prior to reuse or disposal.
Contaminated fill	To be classified subject to results of testing	In situ testing of soils in areas of potential contamination concern would be undertaken to determine the appropriate waste classification. Contaminated materials would be sampled and tested before being either being appropriately contained and disposed of at a suitably licenced offsite location or managed in situ where there is no unacceptable risk to human health or ecological values.
Excavated natural material (ENM) or Virgin excavated natural material (VENM)	General solid waste (non-putrescible)	On-site reuse of topsoil for landscaping of the site; off-site beneficial re-use or send to landfill site. Note that spoil may be stockpiled onsite (e.g. within the ancillary facility areas) prior to reuse or disposal.
Concrete	General solid waste (non-putrescible)	Off-site recycling for filling, levelling or road base.
Asbestos	Hazardous waste	Off-site disposal at licenced landfill facility.
Metals such as fittings, appliances and bulk electrical cabling, including copper and aluminium	General solid waste (non-putrescible)	Off-site recycling at metal recycling compounds and remainder to landfill.
General building materials (Gyprock or plasterboard, doors, windows, glass)	General solid waste (non-putrescible)	Off-site recycling and remainder to landfill.

20.3.2 Construction waste

A summary of the construction activities anticipated to generate waste is provided in **Table 20-3**, along with the materials that may be produced, potential NSW EPA Resource Recovery Orders that may be applicable and likely waste classifications. Where a NSW EPA Resource Recovery Order exists for a specific waste material the opportunity to re-use the waste under that order should be considered prior to disposal.

Table 20-3 Potential construction waste types, classification and management methods

Waste types	NSW EPA Waste Classification	Proposed handling, treatment and/or disposal method
Sediment fencing, geotextile materials	General solid waste (non-putrescible)	Reuse at other sites where possible or disposal to landfill
Concrete	General solid waste (non-putrescible)	Off-site recycling for filling, levelling or road base.
Bricks and pavers	General solid waste (non-putrescible)	Cleaned for reuse as footings; broken bricks for internal walls; crushed for landscaping or driveway use; off-site recycling.
Gyprock or plasterboard	General solid waste (non-putrescible)	Off-site recycling or returned to supplier.
Sand or soil	General solid waste (non-putrescible)	Off-site recycling.
Metals such as fittings, appliances and bulk electrical cabling, including copper and aluminium	General solid waste (non-putrescible)	Off-site recycling at metal recycling compounds and remainder to landfill.
Conduits and pipes	General solid waste (non-putrescible)	Off-site recycling.
Timber	General solid waste (non-putrescible)	Off-site recycling; chip for landscaping; sell for firewood. *Treated*; reused for formwork, bridging, blocking, propping or second-hand supplier. *Untreated*: reused for floorboards, fencing, furniture, mulched second-hand supplier, and remainder to landscape supplies.
Doors, windows and fittings	General solid waste (non-putrescible)	Off-site recycling at second-hand supplier.
Insulation material	General solid waste (non-putrescible)	Off-site disposal
Glass	General solid waste (non-putrescible)	Off-site recycling; glazing or aggregate for concrete production.
Asbestos	Hazardous waste	Off-site disposal at a licenced landfill facility.
Fluorescent light fittings and bulbs	Hazardous waste	Off-site recycling or disposal.
Paint	Hazardous waste	Off-site recycling or disposal.
Synthetic rubber or carpet underlay	General solid waste (non-putrescible)	Off-site recycling; reprocessed and used in safety devices and speed humps.
Ceramics	General solid waste (non-putrescible)	Off-site recycling at a crushing and recycling company.

Waste types	NSW EPA Waste Classification	Proposed handling, treatment and/or disposal method
Carpet	General solid waste (non-putrescible)	Off-site recycling or disposal; reused for landscaping or insulation.

20.4 Construction impact assessment

Potential impacts associated with construction waste for the project may include:

- Large volumes of spoil directed to landfill due to inadequate recycling and reuse
- Large volumes of waste being directed to landfill due to inadequate collection, classification and disposal of waste
- Contamination of soil, surface and/or groundwater from the inappropriate excavation, storage, transport and disposal of liquid and solid waste
- Risks to human health from the handling, storage, transport and disposal of contaminated waste (including asbestos) generated by the project
- Dust impacts due to incorrect storage, handling, transport and disposal of spoil
- Odour impacts due to incorrect storage, handling and transport
- Increased presence of pests due to incorrect storage, handling and transport.

As shown in **Table 20-2** and **Table 20-3** all waste generated during construction would be removed from site as required by licensed contractors. In order to avoid potential issues associated with odour generation, decreased visual amenity and creating environments that attract animals/pest species (e.g. rats and mice) waste removal would occur at regular intervals, or sooner as and when required.

A Construction Waste Management Plan would be prepared and implemented as part of the CEMP for the Proposal. A Sustainability Management Plan would also be developed outlining ways to optimise resource efficiency and waste management during construction. These plans would include consideration of the following performance outcomes:

- Waste from construction and operation of the Proposal is classified in accordance with the Waste Classification Guidelines (NSW EPA, 2014a)
- Waste types once classified are reviewed against appropriate guidelines to manage waste appropriately
- At least 80 percent (by volume) of non-contaminated spoil excavated during construction would be diverted from landfill, either by re-using suitable material on site or identifying other sites/re-purposing facilities where suitable material may be re-used
- Contaminated and asbestos contaminated wastes are safely disposed of in accordance with their relevant waste classification.

With the implementation of these plans and the management measures provided in **Section 20.7** it is not anticipated that construction waste management activities for the Proposal would pose a significant risk to the environment or human health.

20.5 Operational waste

The operational phase of the Proposal is anticipated to generate the following broad waste streams:

- Data storage facility operational equipment waste
- Office waste
- Domestic waste/waste generated by workers.

General and recycling waste generation will primarily occur in the office and amenities areas of the Proposal. Due to the expected operation of data centres, it is not anticipated that data centre rooms will produce any general or recycling waste. Waste that will be generated in the data halls and corridor

areas including electronic waste and packaging waste. This will be handled either through a separate contract for e-waste collection and recycling or by returning packaging materials to the product suppliers.

The City of Ryde's guidelines do not provide waste generation rates for operation activities for data centres. In the absence of waste generation rates provided by Council, the adopted waste generation rates for 'Office' presented in Appendix A of the NSW EPA Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial facilities has been applied. This rate equates to 16 litres of general waste and 12 litres of recycling waste per 100m^2 of floor area per day.

The estimated quantities of operational waste generated by the Proposal is provided in **Table 20-4**.

Table 20-4 Estimated quantities of operation waste and recycling

General waste (litres/week)	Recycling (litres/week)
208	156

In addition to the estimated quantities of waste and recycling listed in **Table 20-4,** the Proposal is anticipated to produce:

- Minimal quantities of green landscaping waste.
- Significant quantities of electronic waste or e-waste.
- Cardboard packaging waste from electronic products for the data halls.

Less than 100 litres of green waste is estimated to be generated per week. This waste will be taken by a landscaping contractor who will dispose of it at a garden organics processing facility.

The Proposal is likely to generate a substantial quantity of e-waste, which could exceed 240 litres per week. For this reason, a waste collection and recycling contract will be established to collect all e-waste for recycling and ensure it is not disposed of to landfill. Waste may be stored in the e-waste storage room or in a room designated for bulky hazardous wastes.

A summary of the likely waste types generated from the operation of the Proposal, along with their waste classifications and proposed management methods are provided in **Table 20-5**.

Table 20-5 Potential operational waste types, classification and management methods

Waste types	NSW EPA Waste Classification	Proposed handling, treatment and/or disposal method
Empty oil and other drums or containers, such as fuel, chemicals, paints, spill clean ups.	Hazardous waste: containers were previously used to store dangerous goods (Class 1, 3, 4, 5 or 8) and residues have not been removed by washing or vacuuming; General solid waste (non-putrescible): Containers have been cleaned by washing or vacuuming.	Transport to comply with the transport of Dangerous Goods Code applies in preparation for off-site recycling or disposal at licenced facility.
Batteries	Hazardous waste	Off-site recycling or disposal to landfill
Electronic waste	Hazardous waste	Off-site recycling or disposal to landfill
Printer toners and ink cartridges	Hazardous waste	Off-site recycling
Packaging materials, including wood, plastic, including stretch wrap or	General solid waste (non-putrescible)	Off-site recycling

Waste types	NSW EPA Waste Classification	Proposed handling, treatment and/or disposal method
LLDPE, cardboard and metals.		
Wooden or plastic crates and pallets	General solid waste (non-putrescible)	Re-used for similar projects, returned to suppliers, or off-site recycling.
Food waste	General solid waste (putrescible)	Compost on-site or dispose to landfill with general garbage.
Recyclable beverage containers (glass and plastic bottles, aluminium cans), steel cans	General solid waste (non-putrescible)	Co-mingled recycling at off-site licenced facility.
Clean paper and cardboard	General solid waste (non-putrescible)	Paper and cardboard recycling at off-site licenced facility.
General domestic waste generated by workers (soiled paper and cardboard, food, stuffs, polystyrene).	General solid waste (non-putrescible) mixed with General solid waste (putrescible)	Disposal at landfill.

20.6 Operational impact assessment

The Proposal would be designed and operated to achieve waste minimisation performance outcomes. As shown in **Table 20-4** the operation of the Proposal would contribute minor ongoing waste streams. Operational waste would be dealt with at offsite licensed waste facilities, including landfill in some cases.

With the implementation the management measures provided in **Section 20.7** it is not anticipated that construction waste management activities for the Proposal would pose a significant risk to the environment or human health.

20.7 Safeguards and management measures

The implementation of management measures would reduce the potential waste impacts of the Proposal to the greatest extent practicable.

A list of relevant waste impacts and the associated mitigation measures that would be implemented to address the impact are listed below in **Table 20-6**.

Table 20-6 Safeguards and management measures - Waste

ID	Management measure	Timing
W1	A Waste Management Sub-Plan would be prepared as part of the CEMP. The Sub-Plan would: • Identify requirements consistent with the waste and resource management hierarchy and cleaner production initiatives • Include relevant measures from the National Waste Policy: Less Waste, More Resources (Department of Agriculture, Water and the Environment, 2018) • Provide a framework so that resource efficiency is delivered through the design and construction practices • Provide consistent clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures • Outline procedures for stockpiling of wastes	During construction

ID	Management measure	Timing
	• Set out processes for disposal, including on-site transfer, management and the necessary associated approvals/permits. All waste generated would be regularly removed from site as required by licensed contractors, in order to avoid potential issues associated with odour, visual amenity and attracting animals/pest species • Outline that waste generated within the Proposal area would be segregated at source and suitably stored in designated waste management areas within the Proposal area • Include material tracking measures to track waste and recyclables generated from the Proposal and removed from the Proposal area. Material tracking records would include types, volumes and management measures for waste and resources arising from/used for the Proposal • Outline an unexpected finds protocol to manage the potential for unexpected finds during construction of the Proposal (i.e. asbestos or other hazardous materials) • Include a process for auditing, monitoring and reporting.	
W2	Stockpiled wastes would be: • Appropriately segregated to avoid mixing and contamination Appropriately labelled • Appropriately stored to minimise risk of erosion • Less than three metres in height with an appropriate height to length batter ratio (e.g. 1:3) • Isolated from surface water and stormwater drains.	During construction
W3	The following resource management hierarchy principles would be followed: • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery where possible) • Disposal is undertaken as a last resort.	During construction and operation
W4	Where a NSW EPA Resource Recovery Order exists for a specific waste material the opportunity to re-use the waste under that order should be considered prior to disposal. Current orders (and exemptions) are found on the NSW EPA website: https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/resource-recovery-framework/current-orders-and-exemption The current orders should be periodically reviewed during construction for applicability.	During construction and operation
W5	All waste would be assessed, classified, managed and disposed of (where they cannot be re-used) in accordance with the Waste Classification Guidelines (NSW EPA, 2014a).	During construction and operation
W6	Waste segregation bins would be located at various locations within the Proposal Site, if space permits, to facilitate segregation and prevent cross contamination.	During construction and operation

21.0 Cumulative impacts

This chapter provides an assessment of the potential cumulative impacts of the Proposal when considered alongside other developments in the surrounding area, in accordance with the Secretary's Environmental Assessment Requirements (SEARs).

Impacts from a project may be considered minor when regarded in isolation. However, where a project would occur concurrently with multiple other developments or activities, the cumulative impacts of these may be more substantial. For example, where more than one project is occurring in an area, this could result in cumulative construction traffic impacts on the local road network or cumulative construction noise impacts for nearby receivers.

Table 21-1 sets out the relevant to potential cumulative impacts of the Proposal and indicates where these requirements have been addressed in this Environmental Impact Statement (EIS).

Table 21-1 SEARs – Cumulative impacts

SEARs Requirement	
General requirements	**Where addressed**
A detailed description of the development, including, including likely interactions between the development and existing, approved and proposed operations in the vicinity of the site	A detailed description of the development, including, including likely interactions between the development and existing, approved and proposed operations in the vicinity of the site is provided in **Table 21-2**
A detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes.	**Table 21-3**, identifies likely key issues with regard to cumulative impacts. A detailed assessment of the key issues with regards to potential cumulative impacts during construction is provided in **Section 21.5**, and during operation in **Section 21.6**

21.1 Assessment approach

This cumulative impact assessment has been informed by the environmental assessment undertaken for the Proposal, as presented in **Chapters 6** to **Chapter 20** of this EIS. It has considered the potential adverse and beneficial impacts of the Proposal described in these chapters, and the management measures that would be implemented to avoid or reduce potential impacts.

The methodology used to assess the potential for cumulative impacts has involved a series of steps including the identification of nearby projects, a screening assessment to determine those projects which may interact with the Proposal in terms of potential for cumulative impacts, an assessment of potential cumulative impact, and the identification of management measures where required. The method used for each of these steps is provided in more detail in the following sections.

21.1.1 Identification of nearby projects

A search of publicly available information has been undertaken to identify existing and potential projects in the vicinity of the Proposal. This includes projects that are under construction, approved, or proposed. Resources used for this include:

- Department of Planning, Industry and Environment (DPIE) Major Projects Website (https://www.planningportal.nsw.gov.au/major-projects)
- City of Ryde's Major Development Applications and State Significant Projects on Exhibition webpage (https://www.ryde.nsw.gov.au/haveyoursay/Lets-Plan/Major-Development-Applications-and-State-Significant-Projects-on-Exhibition)

- A review of the “current projects” of other government agencies and private utility providers who may be undertaking works in the vicinity of the Proposal (including Sydney Water, Transport for NSW, and Ausgrid).

21.1.2 Screening

Screening of the identified projects was undertaken to investigate their potential to interact with the Proposal. If a project was assessed to have no likely relationship to the Proposal in terms of potential cumulative impacts, it was excluding from any ongoing consideration.

The approach to screening was based on understanding the likely residual impacts of the Proposal (i.e. those that exist after application of management and mitigation measures). Residual impacts that may be experienced are discussed in **Chapters 6** to **20** of this EIS. Where the assessment of an environmental issue found that there were no residual impacts, it is concluded that the Proposal would not contribute to any potential cumulative impacts for that issue, and these environmental issues have not been considered in the following sections.

Projects in the surrounding area that may affect the same receptors where residual impacts have been identified for the Proposal or may have an impact on the effectiveness of the other projects’ mitigation and management measures have also been considered as part of the screening process. This was achieved by taking into account the following:

- Location – projects in proximity to the Proposal where there is potential for impacts to spatially overlap (e.g. shared use of roads for construction access) (note that this includes consideration of the ‘study areas’ identified for the environmental issues assessed for the Proposal, which in some instances, can be wider than the Proposal Site itself)
- Timeframe and planning approval – only projects likely to be built concurrently with the Proposal have been included for detailed assessment. This includes projects currently under construction and/or projects that have received planning approval (as at the time of preparing this EIS). Projects at a conceptual or pre-approval stage were generally not able to be considered due to an absence of project and/or environmental impact details or development timeframes
- Scale – larger scale projects identified on the DPIE’s Major Projects website and City of Ryde Council’s Major Project development application register have been included as these are more likely to result in cumulative impacts.

21.1.3 Cumulative impact assessment and management measures

Identification and assessment of potential cumulative impacts was undertaken. This included an issue-specific cumulative assessment for the key environmental issues listed in the SEARs and considered in this EIS, taking into account any projects being undertaken, or proposed to be undertaken within the vicinity of the Proposal.

Where required, appropriate management measures have been identified. The identification of management measures has assumed that the management measures proposed for the Proposal in **Chapters 6 to 20** (and summarised in **Chapter 22 (Environmental Management)**) will be implemented in full. As such, the management measures provided in this chapter comprise strategic measures that may be implemented in coordination with other relevant developments to manage potential cumulative impacts.

21.2 Existing environment

21.2.1.1 Identification and screening of surrounding projects

A list of projects within the surrounding area and an initial screening is provided in **Table 21-2**. A rationale for why the project was included or excluded in the assessment, has also been provided.

Table 21-2 Screening of other known projects near the Proposal

Project and *Proponent*	Relative location	Proposed construction timeframe	Project details	Initial screening
Macquarie Uni - Central Courtyard Precinct *Macquarie University*	18 Wally's Walk, Macquarie Park, about 1.45 kilometres west of the Proposal	Unknown	This state significant development (SSD) project comprises the construction of a new central courtyard precinct for Macquarie Park University	This development would be undertaken 1.45 kilometres from the Proposal within Macquarie University. Potential for shared sensitive receivers with the Proposal is minimal. In addition, the scope of works is not likely to result in any significant offsite impacts. As such, this project is not expected to result in cumulative impacts with the Proposal and is not considered further.
New University Office and Laboratory Building *Macquarie University*	8-12 University Avenue, Macquarie University, about 1.4 kilometres west of the Proposal	Unknown Development Application approval was granted 21 September 2020	This SSD project comprises the construction of two buildings with a connected roof, and the use of the buildings for University related office, administration and laboratories and commercially leased office and laboratory spaces. In addition, 619 car parking spaces,140 bicycle parking spaces, end-of-trip facilities (lockers and showers) and associated landscaping, road and public domain works will be delivered	This development would be undertaken 1.4 kilometres from the Proposal within Macquarie University. Potential for shared sensitive receivers with the Proposal is minimal. In addition, the scope of works is not likely to result in any significant offsite impacts. As such, this project is not expected to result in cumulative impacts with the Proposal.

Project and *Proponent*	Relative location	Proposed construction timeframe	Project details	Initial screening
Ivanhoe Estate Masterplan *Aspire Consortium*	Ivanhoe Place, Macquarie Park, about 850 metres south west of the Proposal	Unknown Delivery is anticipated to be ongoing with the approval of future stages	The Masterplan establishes the framework for development on the site, as the overarching Concept Proposal to which all future detailed applications (such as this Stage 1 DA) will be pursuant	This development would be undertaken within 850 metres of the Proposal. As this development would be located in a relatively close proximity, and the same location as the closest residential receivers to the Proposal, there is potential for shared sensitive receivers. Depending on the timing of this development, there may be a potential for cumulative impacts.
Ivanhoe Estate Redevelopment, Concept / Stage 1 *Aspire Consortium*	Ivanhoe Place, Macquarie Park, about 850 metres south west of the Proposal	Unknown Development Application approval was granted 30 April 2020	This SSD project is part of the NSW Government Communities Plus program. These works are pursuant to the concurrent Ivanhoe Estate Masterplan and will allow for the timely staging and delivery of works across the Estate in accordance with the Ivanhoe Estate Masterplan	This development is related to the above development. As per the above, depending on the timing of this development, there may be a potential for cumulative impacts.
Kent Road Public School Redevelopment *Department of School Infrastructure NSW*	Herring Rd, Marsfield, about 1.8 kilometres south west of the Proposal	Unknown The project was determined on 30/08/2019. A modification to the project was determined on 01/06/2020	This SSD project comprises the construction of an extension to increase the capacity of Kent Road Public School. This would include construction of three new two to three-storey buildings, a canteen, administration facilities, and establishment of a new car drop off area	This development would be undertaken 1.8 kilometres from the Proposal. Potential for shared sensitive receivers with the Proposal is minimal. In addition, the scope of works is not likely to result in any significant offsite impacts. As such, this project is not expected to result in cumulative impacts with the Proposal.
242-244 Beecroft Road, Epping *Transport for NSW*	242-244 Beecroft Road, Epping, about 4.3 kilometres west of the Proposal	Unknown The project was determined on 22/07/2020	This SSD project would involve the delivery of a residential development, comprising three towers connected by two podium structures	This development is located 4.3 kilometres from the Proposal. Given this distance, this project is not expected to contribute to cumulative impacts with the Proposal.

Project and *Proponent*	Relative location	Proposed construction timeframe	Project details	Initial screening
159-161 Epping Road **Local Development Application No: MOD2020/0179** *159 Epping Road Pty Ltd*	159-161 Epping Road, Macquarie Park, about 1.5 kilometres west of the Proposal	Unknown The development application was approved 8/09/2020	The project will involve the construction of two 15-storey residential apartment buildings including: 317 apartments; 3 levels of basement car parking for 308 vehicles; and landscaping and site works.	This development would be undertaken 1.5 kilometres from the Proposal. Potential for shared sensitive receivers is minimal, however the Ivanhoe housing estate is located at the mid -way point between 159-161 Epping Road and the Proposal, as such there may be some potential for shared receivers. Depending on the timing of this development, there may be a potential for cumulative impacts.
Australand Industrial, 36-40 Waterloo Road. **Local Development Application No:** MOD2020/0183 *Australand Industrial*	36-40 Waterloo Road, Macquarie Park, about 500 metres south of the Proposal	Unknown The Project was determined 29/07/2020	The project will involve the staged construction of four commercial buildings, each comprising four levels in addition to a basement carpark. The basement will accommodate 834 cars, loading dock and courier spaces. An internal park, public domain works and stratum subdivisions would also be delivered.	This development would be undertaken within 500 metres of the Proposal, one street block away. Depending on the timing of this development, there may be potential for cumulative impacts.
Proposed mixed use development 743-747 Victoria Road and 39 Church Street, **Local Development Application No: LDA2020/0288** *Ryde City of Ryde Council*	743-747 Victoria Road and 39 Church Street, Ryde, about 4.4 kilometres south of the Proposal	Unknown The application was lodged 27/08/2020. No determination has been made at this time	The project will involve the amalgamation of four allotments, the demolition of the existing structures on the site and the construction of a part five storey and part six storey mixed use development. A laneway is proposed to be delivered at the rear of the site.	This development is located 4.4 kilometres from the Proposal. Given this distance, this project is not expected to contribute to cumulative impacts with the Proposal.

Project and *Proponent*	Relative location	Proposed construction timeframe	Project details	Initial screening
45-47 Epping Road, Macquarie Park Local Development Application No: LDA2020/0307 *APlus Design Group*	45-47 Epping Road, Macquarie Park, about 1.2 kilometres south of the Proposal	Unknown The application was lodged 16/09/2020. No determination has been made at this time	The project will involve the demolition of existing structures and amalgamation of lots and would provide commercial towers not exceeding a building height of 45 metres and floor space ratio of 2.0:1 to accommodate a mix of land uses including: • Restaurants or cafes • Office Premises • Basement Car Parking.	This development would be undertaken 1.2 kilometres from the Proposal. Potential for shared sensitive receivers or shared impacts with the Proposal is minimal, particularly as this work would be separated from the Proposal by a major road (Lane Cove Road). In addition, the scope of works is not likely to result in any significant offsite impacts. As such, this project is not expected to result in cumulative impacts with the Proposal.
West Ryde Commuter Car Park *Transport for NSW*	W Parade, West Ryde NSW, about 4.1 kilometres south west of the Proposal	Early 2021 – late 2021	The project is part of the NSW Government's Commuter Car Park Program, and will deliver a new commuter car park at West Ryde Station with approximately 100 additional spaces at the existing car park site to the east of West Ryde Station	This development is located 4.1 kilometres from the Proposal. Given this distance, this project is not expected to contribute to cumulative impacts with the Proposal.
Macquarie Substation Project *Ausgrid*	17-21 Waterloo Road, Macquarie Park, about 890 metres south east of the Proposal	2019 to 2021	The project will involve the development of a new sub-transmission substation at Macquarie Park. The new substation would be built on Ausgrid's property on the vacant land in front of the existing Macquarie Park zone substation.	This development would be undertaken within 890 metres of the Proposal. As this work would be separated from the Proposal by Lane Cove Road, the potential for shared receivers would be limited, particularly given the likely site-based nature of the works. Regardless, as the timing of this development may overlap with the Proposal, there may be a limited potential for cumulative impacts.

21.2.2 M_Park development timing

The Proposal would form one of four buildings that would be delivered within the M_Park development site. The works that would be undertaken to deliver the M_Park development would be the subject of other, separate approvals and are not assessed within this EIS. It is understood that these other works are likely to be undertaken within the same time frame as the Proposal, and the overlap in the construction of these projects may have the potential to result in cumulative impacts.

The estimated construction timeframes across the proposed M_Park development are as follows:

- The construction of Building A would commence early 2021, and would be completed by around late 2022
- Demolition of the warehouse component currently located on the Site would be undertaken from around April to June, 2021
- Construction of the Proposal would be staged such that the southern portion of the Site would commence construction concurrently with these demolition works, from April to June 2021
- The remainder of the Proposal would commence construction following the completion of demolition works (from July 2021)
- The construction of the Proposal is anticipated to be completed by December 2022
- Demolition of existing buildings in the location of the Proposed buildings C and D is expected to commence around Q2 2022
- Construction of Building C is anticipated to be carried out from Q4 2022 to Q2 2024
- Construction of Building D is anticipated to be carried out from Q4 2022 to Q2 2024
- The entire M_Park Development is anticipated to be fully operational Q2 2024.

As noted above, the Proposal would mainly overlap with construction associated with Building A, but not Buildings C and D.

21.3 Review of residual impacts

A list of projects within the surrounding area and an initial screening is provided in **Table 21-3**. A rationale for why the project was included or excluded in the assessment, has also been provided

Table 21-3 Screening of environment aspects and potential for residual impacts

Environmental aspect	Initial screening
Landscape and visual	Given the distance of the Proposal to the projects identified in **Table 21-2**, and as no residual impacts are anticipated, potential for cumulative impacts have not been considered further for landscape and visual.
Geology, soils and contamination	As no residual impacts are anticipated, potential for cumulative impacts have not been considered further for geology, soils and contamination.
Transport and traffic	No residual transport or traffic impacts are anticipated during construction or operation. In addition, the Proposal would be located in close proximity to major roads including the M2 Motorway and Lane Cove Road and as a result, the extent to which the Proposal would utilise local roads would be minimal and its contribution towards cumulative construction traffic impacts is expected to be negligible. The Proposal would not add any significant quantity of traffic to the local road network, and no induced demand is anticipated as a result of the construction of Road 22. As such, this environmental aspect has not been considered further for cumulative impacts.

Environmental aspect	Initial screening
Noise and vibration	Given the distance of the Proposal to the projects identified in **Table 21-2**, and to the nearest sensitive receivers, the potential for cumulative noise and vibration impacts is unlikely. As such, this environmental aspect has not been considered further for cumulative impacts
Air quality	Given the distance of the Proposal to the projects identified in **Table 21-2**, and to the nearest sensitive receivers, the potential for cumulative air quality impacts is unlikely. In addition, no residual impacts have been identified. As such, this environmental aspect has not been considered further for cumulative impacts
Non-Indigenous heritage	As no residual impacts are anticipated, this environmental aspect has not been considered further for cumulative impacts
Indigenous heritage	As no residual impacts are anticipated, this environmental aspect has not been considered further for cumulative impacts
Biodiversity	The Proposal would include the removal of vegetation during construction, including mature trees. The vegetation that would be removed as part of the Proposal is not known to be representative of any endangered ecological communities and no threatened species would be affected. While the Proposal is not anticipated to result in residual impacts with regards to biodiversity, it is recognised that where a number of projects within close proximity to each other would involve vegetation removal, this has the potential to result in impacts to biodiversity that may be more locally significant when combined.
Greenhouse gas and energy efficiency	The Proposal is not anticipated to result in any residual impacts to Greenhouse gas and energy efficiency. The Proposal would be constructed in consideration of Principles of Ecologically Sustainable Development. It is anticipated that this would also be the case for all other projects identified in **Table 21-2**, as per requirements set out under the *Environmental Planning and Assessment Act 1979*. As such, this environmental aspect has not been considered further for cumulative impacts
Hazard and risk	As no residual impacts are anticipated, this environmental aspect has not been considered further for cumulative impacts
Land use	The Proposal would not have any significant impacts to landuse, and no residual impacts are anticipated, this environmental aspect has not been considered further for cumulative impacts
Infrastructure	As no residual impacts are anticipated, this environmental aspect has not been considered further for cumulative impacts
Social and economic	While no residual impacts are anticipated with regards to potential social and economic impacts, it is recognised that concurrent construction activities have the potential lead to cumulative social impacts, as a result of cumulative impacts to amenity, and construction fatigue
Groundwater, surface water, flooding and water use	As no residual impacts are anticipated, this environmental aspect has not been considered further for cumulative impacts
Waste management	As no residual impacts are anticipated, this environmental aspect has not been considered further for cumulative impacts

21.4 Potential for cumulative impacts

In addition to the three other projects at the M_Park Development, projects identified in **Table 21-2** that are considered to have potential to result in cumulative impacts with the Proposal include:

- Ivanhoe Estate Masterplan and subsequent Ivanhoe Estate Redevelopment, Concept / Stage 1
- 159-161 Epping Road project
- Australand Industrial 36-40 Waterloo Road, Macquarie Park project.

These projects were considered to have the potential to contribute to cumulative impacts in conjunction with the Proposal given their approval status, distance to the Proposal Site, potential for shared sensitive receivers, their size (in terms of capital investment value or potential to generate offsite impacts, and/or construction timeframe.

Of the environmental aspects considered in **Table 21-3**, the following were considered to have the potential to contribute to cumulative impacts:

- Transport and traffic (construction and operation)
- Biodiversity (construction)
- Social and economic (construction).

21.5 Construction impact assessment

It is anticipated that the Proposal would be undertaken from April 2021 and is anticipated to be finalised in December 2022. Potential cumulative impacts during construction of the Proposal that may arise in conjunction with the other projects identified described in this section.

21.5.1 Transport and traffic

Cumulative impacts on the existing pedestrian, cycle, public transport and surrounding road networks could occur during construction of the Proposal.

Increased construction traffic could potentially increase congestion and delays on the local road network. However, as the Proposal would generate a relatively small number of construction vehicles. During construction, about 50 heavy vehicle and 150 light vehicle movements are anticipated. In addition, the Proposal would be located in close proximity to major roads including the M2 Motorway and Lane Cove Road, as such the extent to which the Proposal would utilise local roads would be minimal and its contribution towards cumulative construction traffic impacts is expected to be minimal.

The presence of work sites associated with other projects that may occur within or adjacent to roads could contribute to traffic, pedestrian, and cyclist delays. Detours may also be required as a result of road, footpath, or cycleway closures and as a result of the movements of construction vehicles. Risks to the safety of pedestrians, cyclists and other motorists may also increase as a result. Coordination with other project proponents would need to occur to manage potential impacts from construction activities on other projects within or adjacent to the Proposal.

21.5.2 Biodiversity

While the Proposed vegetation removal associated with construction of the Proposal is not considered likely to result in any significant impacts to biodiversity (including no identified residual impacts), it is recognised that cumulative impacts to biodiversity may occur where cumulative vegetation removal across multiple developments may adversely affect biodiversity at a regional level. This is particularly relevant in term of potential impacts to biodiversity corridors and cumulative losses to endangered ecological communities and threatened species.

A review of the area surrounding the projects identified as potentially contributing to cumulative impacts with the Proposal are all located within urbanised and heavily modified locations around Macquarie Park. For this reason, no important habitat corridor linkages have been observed to occur between the Proposal and any of the other projects identified in **Section 21.4**.

The existing vegetation on the Site is mostly comprised of planted native or ornamental garden species, including groundcovers, shrubs, and mature trees. The total area of vegetation removal for

the Proposal is anticipated to be under 500 m^3. This would include landscaped gardens, street trees and some trees that may be naturally occurring. The extent of removal of mature trees for the project would comprise about 85 trees. Of these trees that would be removed, only 29 are considered to be of high retention value, based on the Institute of Australian Consulting Arborists (IACA) Tree, Assessment Rating System.

Landscaped native gardens would be provided as part of the Proposal, including the suspended landscape bridge. These landscaped gardens would replace some of the vegetation that would be removed to construct the Proposal. No significant biodiversity residual impacts are expected as a result of the Proposal.

The vegetation that would be removed as part of the Proposal is not known to be representative of any endangered ecological communities and no threatened species would be impacted. As such, no cumulative impacts with regards to endangered ecological communities or threatened species are anticipated as a result of the Proposal. Also, in consideration of the above, the potential for cumulative impacts to habitat corridor linkages, or cumulative impacts to ecologically significant vegetation is considered to be low.

21.5.3 Social and economic

As outlined in **Section 21.4**, there are a limited number of other projects whose construction would potentially result in cumulative impacts with the Proposal. However, there is the potential that these concurrent construction activities may have a small potential lead to cumulative social impacts on the local and regional community.

These cumulative social impacts may arise through direct amenity factors such as cumulative noise, air quality, traffic or visual impacts, or from cumulative changes to business. It is also recognised that these collective changes may affect less tangible social factors such as levels of stress and anxiety, the community's sense of place, cultural identity or community cohesiveness. Noting the relatively small scale and site-based nature of other projects proposed nearby, their geographical separation from this Proposal, and the lack of residential and community land uses surrounding the Proposal, the potential for cumulative social and economic impacts to arise, directly or indirectly is considered to be low. This is reinforced by the site-based nature, and relatively local scale of the Proposal and the implementation of mitigation measures (provided in **Chapter 18, Social and economic**) to manage impacts upon the social and economic environment.

Construction fatigue refers to the cumulative impact of direct impacts, such as noise, arising from concurrent or consecutive (i.e. 'back-to-back') construction activities from multiple projects over an extended period. It has been identified during the initial screening process that there is not a sufficient quantity of large scale concurrent or back to back projects within the vicinity of the Proposal to suggest that the community would experience any significant construction fatigue affects.

Regardless, to minimise the potential for cumulative amenity impacts, coordination with other nearby projects should be undertaken. This consultation should seek to understand their construction schedules and to avoid construction fatigue where possible, particularly in instances where the scheduled timeframe for construction is currently unknown.

21.6 Operation impact assessment

Potential cumulative impacts during operation of the Proposal that may arise in conjunction with the other projects identified are described in this section.

21.6.1 Transport and traffic

The Proposal is not anticipated to result in increased congestion during operation as the Proposal would generate a relatively small number of vehicle movements during operation. During operation, the anticipated extent of traffic that would be generated by the project is expected to consist of about 22 vehicles per hour during the AM peak and 18 vehicles per hour in the PM peak. In addition, the Proposal would be located in close proximity to major roads including the M2 Motorway and Lane Cove Road, as such the extent to which the Proposal would utilise local roads would be minimal and its contribution towards cumulative construction traffic impacts is expected to be minimal.

The provision of Road 22 is not anticipated to result in any induced demand, or traffic congestion impacts during operation, however in the future it may transpire that should any other projects in the vicinity also deliver local through-roads, positive cumulative impacts may be experienced through improved road connectivity and improved access. In addition, it is possible that the provision of additional local roads may lead to a cumulative increase in available on-street parking across Macquarie Park.

21.7 Safeguards and management measures

As the Proposal is not anticipated to result in any significant property or land use impacts during construction or operation, no land use safeguards or management measures are proposed.

22.0 Environmental management

This chapter outlines the environmental management approach for the Proposal during construction and operation.

22.1 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs) provided for the Proposal did not provide a specific requirement for environmental management measures. Instead, the requirement for mitigation measures are embedded within the requirements within matters for environmental assessment, for example, traffic.

22.2 Overview

Key legislation governing environmental management for the Proposal includes:

- *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act)
- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)

The Proposal would be required to be delivered in accordance with any conditions of approval issued under the EP&A Act, as well as any other permits or licenses required. Environmental management requirements for the Proposal would be confirmed through the State Significant Development (SSD) conditions of approval of the Proposal.

22.3 Proposed environmental management approach

The overarching approach to environmental management during the construction and operational stages of the Proposal is guided by the following:

- Safeguards and management measures
- Construction noise monitoring program
- Construction Environmental Management Plans (CEMPs) and sub-plans
- Operational environmental management – the approach to environmental management during operation would be defined in a project operational environmental management plan or system

22.3.1 Safeguards and management measures

Mitigation measures that would be implemented for the Proposal to address all potential environmental and social impacts are listed in **Table 22-1**.

Table 22-1 Summary of safeguards and management measures

ID	Mitigation measure	Timing
Landscape and visual		
VIA1	The retention of trees along Talavera Road assist in partially screening the proposed built form, helping to 'bed down' the data centre into the landscape.	During construction and operation
VIA2	The inclusion of screening shrubs within the frontage of the building on Talavera Road reduce the visual prominence of the security fencing and partially screen and soften the building from the public realm	During construction
VIA3	The provision of a landscaped 'lid' along the northern side of the site, which would visually soften and screen the built form when viewed from the north.	During operation,

ID	Mitigation measure	Timing
VIA4	Proposed landscaping along Road 22 and Talavera Road includes trees that, when mature, will reduce the visual scale of the building from the public realm as well as from private properties surrounding the Proposal site;	During design and construction
VIA5	The articulated façade design reduces the visual scale of the building; and	During design and construction
VIA6	The lighting of the site at the boundary with downward facing lights reduces the visual prominence of the building at night.	During construction and operation
Geology, soils and contamination		
SC1	A Soil and Water Management Plan will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The Plan will identify all reasonably foreseeable risks relating to soil erosion and water pollution associated with undertaking the Proposal, and describe how these risks will be managed and minimised during construction. This will include arrangements for managing pollution risks associated with: • management of fuels, chemicals used in the Proposal • management and handling of waste and litter generated during construction • identification and management of contaminated soils • identification and management and monitoring during and post-construction • response to spillage or contamination on the site and adjoining areas.	Prior to and during construction
SC2	A site-specific Erosion and Sediment Control Plan would be prepared and implemented in accordance with the (*Managing Urban Stormwater: Soils and Construction – Landcom, 2004*) (Blue Book). The Erosion and Sediment Control Plan would be established prior to the commencement of construction and be updated and managed according to the activities occurring during construction.	Prior to and during construction
SC3	Erosion and sediment control measures would be established prior to site establishment activities and would be maintained and regularly inspected during construction (particularly following rainfall events) to ensure their ongoing functionality. Erosion and sediment control measures would be maintained and left in place until construction is complete and areas are stabilised	Prior to and during construction

ID	Mitigation measure	Timing
SC4	The CEMP for the Proposal would include procedures for waste disposal and tracking including testing and disposal of fill, soil and bedrock in accordance with the NSW EPA (2014) Waste Classification Guidelines and applicable provisions under the POEO Act. Work, health and safety controls to prevent exposure of construction workers to contamination would be implemented in accordance with the requirements of the *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2017*	Prior to and during construction
SC5	The CEMP would also include an AMP and an unexpected finds procedure. Unexpected finds refers to contamination that is excavated during construction that was not anticipated based on the findings of the investigations	Prior to and during construction
SC6	Should groundwater be encountered during excavation works it would be managed in accordance with the requirements of the Waste Classification Guidelines (EPA, 2014) and Transport for NSW Water Discharge and Reuse Guidelines	During construction
SC7	Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area	During construction
SC8	Hydrocarbons and chemicals such as fuels, lubricants and oils would be stored on-site in dedicated facilities such as secure sheds, containers, storage tanks and proprietary hazardous substance cupboards, and in accordance with the applicable Safety Data Sheet (SDS)	During construction
SC9	Spill kits appropriate to products used on site must be readily available	During construction
SC10	Spills of fuel, oil, chemicals or the like would be cleaned up immediately, and the site environmental manager would be notified of the location of the incident, extent of the incident and type of material spilled	During construction
SC11	Diesel fuel storage tanks would be designed in accordance with the relevant safety standard for fuel storage tanks so as to prevent leaks. In addition, operational measures would be in place to control the refuelling of the tanks, lowering the risk of spills occurring	During design and operation
Traffic and transport		
TT1	A Construction Traffic Management Plan (CTMP) will be prepared and implemented as part of the CEMP. The CTMP will include: • Confirmation of haulage routes • Ongoing consultation/coordination with relevant stakeholders (Ryde City Council and Transport for NSW) as relevant to manage impacts • Measures to maintain access to local roads and properties	Prior to and during construction

ID	Mitigation measure	Timing
	• Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms • Plans for pedestrian and cyclist detours including communicating changes to pedestrian and cycling routes, provision of linemarking and signage	
TT2	A Framework Travel Plan (FTP) will be prepared and implemented as part of the Proposal. The FTP will include: • Strategies and procedures and an Action Plan to meet a 40 percent public transport/ 60 percent private transport target for the Proposal for journey-to-work trips • Information about infrastructure connections to the nearby footpath, bicycle and public transport networks	Prior to and during construction and operation
TT3	Communication would be provided to the community to inform them of changes to or traffic conditions including vehicle movements and anticipated effects on the surrounding road network	Prior to and during construction
TT4	Access for emergency vehicles would be maintained in accordance with relevant requirements. Emergency services would be advised of all planned changes to traffic arrangements prior to applying the changes	During construction
Noise and vibration		
NV1	A Construction Noise and Vibration Management Plan (CNVMP) is to be prepared for each stage of the Proposal's construction. The CNVMP should include: • Identification of nearby residences and other sensitive land uses • Description of approved hours of work • Description and identification of all construction activities, including work areas, equipment and duration • Description of what work practices (generic and specific) would be applied to minimise noise and vibration • A complaint handling process • Noise and vibration monitoring procedures, and • Overview of community consultation required for identified high impact works.	Prior to and during construction

ID	Mitigation measure	Timing
NV2	Periodic notification (monthly letterbox drop or equivalent), website, Proposal Infoline, Construction Response Line, email distribution list and community and stakeholder meetings	Prior to construction
NV3	All employees, contractors and subcontractors are to receive an environmental induction	Prior to and during construction
NV4	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors	During construction
NV5	Attended vibration measurements are recommended at the commencement of vibration generating activities to determine site specific minimum working distances. Vibration intensive work should not proceed within the minimum working distances unless a permanent vibration monitoring system is installed approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS etc.) when vibration levels are approaching the peak particle velocity objective	During construction
NV6	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods. Consideration should be given to avoiding examination periods	During construction
NV7	High noise and vibration generating activities (e.g. rock breaking) may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block	During construction
NV8	Use quieter and less vibration emitting construction methods where feasible and reasonable. Equipment would be regularly inspected and maintained to ensure it is in good working order	During construction
NV9	The noise levels of plant and equipment must have operating sound power or sound pressure levels that would meet the predicted noise levels Noise emissions should be considered as part of the selection process	During construction
NV10	• Avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver. • The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. • Plant used intermittently to be throttled down or shut down. • Plant and vehicles to be turned off when not in use. • Noise-emitting plant to be directed away from sensitive receivers	During construction
NV11	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site	During construction

ID	Mitigation measure	Timing
NV12	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work	During construction
NV13	• Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. • Select site access points and roads as far as possible away from sensitive receivers. • Dedicated loading/unloading areas to be shielded if close to sensitive receivers. • Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible	During construction
NV14	• Schedule and route vehicle movements away from sensitive receivers and during less sensitive times. • Limit the speed of vehicles and avoid the use of engine compression brakes. • Maximise on-site storage capacity to reduce the need for truck movements during sensitive times	During construction
NV15	Where possible reduce noise from mobile plant through additional fittings including: • Residential grade mufflers • Damped hammers such as “City” Model Rammer Hammers • Air parking brake engagement is silenced	During construction
NV16	The use of less vibration-intensive methods of construction or equipment is preferred where practical to reduce the potential for cosmetic damage. All equipment should be maintained and operated in an efficient manner, in accordance with manufacturer’s specifications, to reduce the potential for adverse vibration impacts	During construction
NV17	Attended vibration measurements are undertaken when work commences, to determine site-specific minimum working distances. Vibration intensive work should not proceed within the minimum working distances unless a permanent vibration monitoring system is installed around one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.	During construction
NV18	Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.	During construction
NV19	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.	During construction

ID	Mitigation measure	Timing
Air quality		
AQ1	Daily construction activities should be planned to take into account the expected weather conditions for each workday. Regular dust observations to be undertaken of active excavation or stockpiling areas. Aim is to ensure visible dust is not moving offsite and that any areas needing additional measured be identified early. Records of observations should be compiled to enable the demonstration that dust is being managed in an ongoing manner. Records should include (as a minimum) the following: • Observation date and time • Area being inspected • Level of dust being generated • Meteorological conditions when observation occurred • Mitigation measures undertaken.	During construction
AQ2	Minimise exposed surfaces, such as stockpiles and cleared areas, including partial covering of stockpiles where practicable.	During construction
AQ3	Implement dust suppression measures on exposed surfaces, such as watering of exposed soil surfaces, dust mesh, water trucks and sprinklers to minimise dust generation.	During construction
AQ4	Establish defined site entry and exit points to minimise tracking of soil on surrounding roads. Use wheel washes or shaker grids where the risk of off-site track out of dirt is identified.	During construction
AQ5	Cover heavy vehicles entering and leaving the site to prevent material escaping during transport.	During construction and operation
AQ6	Keep vehicles and construction equipment operating on site well maintained and turned off when not operating (minimise idling on the site).	During construction and operation
AQ7	Minimise the handling of spoil when excavating and loading of vehicles.	During construction
Non-Aboriginal heritage		
NAH1	In the event that any unanticipated archaeological deposits are identified within the project site during construction, works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the Project Manager and the Environment and Planning Manager so they can assist in co-ordinating the next steps, which are likely to involve consultation with an archaeologist and Heritage NSW. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location	During construction
NAH2	The CEMP should include stop work procedures to manage activities in the unlikely event that intact archaeological relics or deposits are encountered.	During construction

ID	Mitigation measure	Timing
Aboriginal heritage		
AH1	All construction staff should undergo a heritage induction, including information such as the importance of Aboriginal cultural heritage material and places to the Aboriginal community, as well as the legal implications of removal, disturbance and damage to any Aboriginal site	Prior to and during construction
AH2	In the event that Aboriginal items, including possible human skeletal material (remains), are unexpectedly identified during works, all works in the area must cease immediately and a heritage specialist be consulted to assess the significance of the unexpected find and determine appropriate measures to follow. A stop work procedure relating to Aboriginal heritage should be included within the Proposal's construction management plan and presented during the heritage induction	During construction
Biodiversity		
BIO1	A Flora and Fauna Management Plan (FFMP) will be prepared and implemented as part of the CEMP to identify potential impacts and to define management and mitigation measures. All workers should be inducted as to the requirements detailed in the FFMP.	Pre-construction and during construction
BIO2	All vegetation removal will be limited to the minimum extent necessary to construct the Proposal. Measures to further minimise the need for vegetation removal will be investigated during detailed design and implemented where practicable and feasible.	Pre-construction and during construction
BIO3	Areas of vegetation to be retained will be demarcated prior to the commencement of works to protect from damage. This may include fencing or flagging trees or vegetation to be protected, establishment of root protection zones and establishment of no-go zones, where relevant and practical.	Pre-construction and during construction
BIO4	If unexpected threatened species are discovered, an expected find protocol will be implemented, which at a minimum should include: • Stop works immediately • Notification of the find to the environment manager • Determination of appropriate mitigation measures in consultation with the environment manager (including relevant re-location measures) • Any handling of fauna would be carried out by appropriately licenced or experienced person and undertaken in accordance with relevant guidelines • Implementation of frog hygiene protocols (if required) • Updating of biodiversity offset requirements (if required).	Pre-construction and during construction

ID	Mitigation measure	Timing
BIO5	Pre-clearing surveys will be undertaken by a suitably qualified ecologist to identify the presence of: • Vegetation that may exhibit important habitat features • Threatened flora and fauna.	Pre-construction and during construction
BIO6	Where practical, vegetation clearing will be staged to allow for fauna that may have the potential to be disturbed as a result of clearing activities to self-relocate.	During construction
BIO7	Weeds within the Proposal Site will be actively managed prior to vegetation clearing. Cleared weed material will be disposed of to a facility licenced to receive green waste. Machinery and vehicles will be checked and/or cleaned to ensure that they come and go from Proposal Site in a weed free state.	During construction
BIO8	The identification of pathogens would be undertaken as part of pre-clearing inspections. In the event that pathogens are identified within the Proposal Site, appropriate mitigation measures would be identified and implemented.	Prior to construction and during construction
Greenhouse gas and energy efficiency		
GHG1	Passive systems including high performance insulation to facility walls, ceilings and roofs, and high-performance glazing to occupied spaces	During construction and operation
GHG2	High efficiency chilled water-cooling system	During operation
GHG3	Variable speed drives on all chilled water and condenser water pumps	During operation
GHG4	Energy efficient LED lighting throughout the facility	During construction and operation
GHG5	Sub-metering throughout the facility to help monitor and interpret energy consumption in operation and enable optimisation year-on-year	During construction and operation
GHG6	Where practical, selection of materials with low embodied materials such as concrete with high proportion of substitute cementitious materials (SCM)	During construction
GHG7	Procurement of renewable energy supply agreements to provide a portion of total facility energy demands	During construction and operation
GHG8	Based on the estimated design PUE ratio, it is projected that the facility would be capable of achieving at least a 5 Star National Australian Built Environment Rating System (NABERS) Energy rating for Data Centres.	During operation
GHG9	High efficiency fixtures and fittings matching the highest Water Efficiency Labelling and Standards (WELS) water efficiency labelling	During construction and operation
GHG10	Sub-metering of major water uses and sources	During construction and operation
GHG11	Collection of rainwater and treated stormwater with potential for reuse in cooling tower systems and/or toilet flushing and irrigation	During operation

ID	Mitigation measure	Timing
GHG12	Collection of condensate from air handling systems	During operation
GHG13	For the main building green roofs were considered but not adopted due to risks related to water incursion which would compromise the security of IT and power equipment within the data halls. A green roof was however adopted for the elevated landscape structure over the driveway running along the northeastern face of the building. This structure would span the distance between the building itself and the retaining wall, but would not be attached to the building (to prevent water ingress).	During operation
GHG14	Building commissioning and tuning undertaken against internationally recognised standards such as ASHRAE Standard 150 and CIBSE Code M	During construction
GHG15	Contractor requirements to implement a best practice environmental management plan and undertake all construction under an ISO14001 certified environmental management system	During construction and operation
GHG16	Consider the inclusion of electric vehicle charging infrastructure with the inclusion of renewable supply to enable carbon neutral private transportation.	During operation
Hazard and risk		
HR1	All hazardous substances that may be required for construction and operation would be stored and managed in accordance with the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005), the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning, 2011) the *Work Health and Safety Act 2011* (Commonwealth and NSW) and the requirements of the *Environmentally Hazardous Chemicals Act 1985* (NSW)	During construction and operation
HR2	Hazardous materials and special waste (such as asbestos – if detected) would be removed and disposed of in accordance with the relevant legislation, codes of practice and Australian Standards (including the *Work Health and Safety and Regulation 2011* (NSW))	During construction
HR3	Construction site planning would ensure hazardous materials are stored appropriately and at an appropriate distance from receivers, in accordance with the thresholds established under *Applying SEPP 33*. Should the minimum buffers be unable to be maintained, either due to space constraints, the close proximity of sensitive receivers, or requirements to store volumes of hazardous materials in excess of storage thresholds, a risk management strategy would be developed on a case-by-case basis	Prior to and during construction

ID	Mitigation measure	Timing
HR4	Risks associated with the rupture of underground utilities would be minimised by carrying out utility checks (such as Dial Before You Dig searches and non-destructive digging), consulting with relevant utility providers and, if required, relocating and/or protecting utilities in and around the Proposal prior to construction. Consultation with utility providers would commence during detailed design and continue during construction to mitigate the risk of unplanned and unexpected disturbance of utilities	Prior to and during construction
HR5	A Battery Management System is to be deployed to prevent overheating or overcharging of the lithium-ion batteries	Operation
HR6	The Battery Management System is to be connected to the essential power system for the building	Operation
Infrastructure		
IN1	The ongoing detailed design of the Proposal will incorporate ESD principals to the greatest extent practicable, to reduce the extent to which the Proposal would be required to draw upon electricity and water resources.	Detailed design
IN2	A detailed construction delivery and staging plan would be developed by the construction contractor prior to the commencement of construction. The construction delivery and staging plan would describe the commencement and duration anticipated for the construction for each key project element, in detail. The construction and delivery staging plan will also provide details regarding commissioning of the Proposal. During the commissioning phase, utilities and infrastructure will be tested to confirm adequacy and operational quality.	Prior to construction
IN3	Construction best practices would be implemented to reduce the water consumption of the Proposal during operation. This may include such actions as sweeping instead of hosing where possible, and use of high pressure low flow nozzles, auto stop-flow triggers on hoses and so on.	During construction
IN4	The construction and commissioning of Road 22 will be delivered prior to the operational phase of the Proposal to provide access to the Site and to improve the existing local road network.	During construction
Social and economic		
SE1	All businesses, residential properties and other key stakeholders (e.g. local councils, shopping centre management) affected by the Proposal will be notified at least five working days prior to commencement of construction. The notification will include: • Details of the Proposal • Construction period and construction hours • Contact information for Proposal management staff • Complaint and incident reporting and how to obtain further information	Prior to construction

ID	Mitigation measure	Timing
SE2	Complaints received from the community will be accepted, monitored and acted upon	Prior to and during construction
SE3	Local people, services and materials will be prioritised for the Proposal as far as practical	Prior to and during construction
SE4	Further consideration of the Crime Prevention Through Environmental Design (CPTED) principles will be given for the construction and operational phases of the Proposal	Prior to and during construction and operation
Groundwater, surface water and flooding		
GW1	A groundwater monitoring program will be prepared and implemented to confirm the existing conditions and to monitor groundwater levels and groundwater quality during construction. The groundwater monitoring program will be included as a subplan to the CEMP and will identify groundwater monitoring locations, performance criteria in relation to groundwater levels and groundwater quality, and potential remedial actions that would manage or mitigate any non-compliances with performance criteria. The frequency of this ground water monitoring should be implemented commensurate to the extent to which the Proposal would intercept groundwater. A minimum bi-annual frequency is recommended.	Prior to and during construction
GW2	Any diversion of groundwater to the existing stormwater network would take place in consultation with City of Ryde Council, and any tests required by council such as establishment of baseline pollutants would be implemented.	Prior to and during construction
SW1	A Construction Soil and Water Management Plan (CSWMP) would be developed to manage the soil and water issues relevant to the construction of the Proposal. This sub-plan would be part of the CEMP. The CSWMP would identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks would be addressed during construction. The CSWMP would include detailed erosion and sediment control measures to be implemented for the Proposal. These control measures would align with the management approaches outlined in *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004), *Managing Urban Stormwater: Soils and Construction Volume 2A* (DECC, 2008) (referred to as the Blue Book), the *Water Discharge and Reuse Guideline* (TfNSW, 2015c), *Concrete Washout Guideline* (TfNSW, 2015b), *Water Sensitive Urban Design Guideline* (TfNSW, 2017b) and *Chemical Storage and Spill Response Guideline* (TfNSW, 2015a).	Prior to and during construction

ID	Mitigation measure	Timing
SW2	On-site retention or detention strategies would be implemented to manage permissible site discharge and reduce flood risk. Assessment of the permissible site discharge and minimum on-site detention volume as dictated by City of Ryde Council requirements would be confirmed during the detailed design.	Prior to and during construction
SW3	Undertake consultation with City of Ryde Council prior to connecting to existing stormwater drainage system.	Prior to and during construction
SW4	Stormwater treatment device/s / water sensitive urban design features would be provided as part of the Proposal	Prior to and during construction and operation
SW5	Stormwater quality management measures would be implemented to further support the City of Ryde Council stormwater pollution reduction targets These measures would include: • Prohibition of release of dirty water into drainage lines and/or waterways • As part of the regular site walk-overs that are conducted by construction supervisors, visual checks for potential water quality issues (i.e. turbidity, hydrocarbon spills/slicks), should be undertaken ,to identify any potential spills or erosion and sediment control issues • Water quality control measures would be implemented to prevent any construction materials (e.g. concrete, grout, sediment etc) entering drain inlets or waterways.	Construction and operation
SW6	Measures to manage accidental spills and leaks would be detailed in the site-specific emergency spill plan, included in the CEMP and implemented on Site.	Prior to and during construction
FL1	Stockpiles and storage areas would be located outside of mapped flood extents.	During construction
FL2	Works would cease in mapped or likely flood prone areas (such as un-stabilised excavated areas) when a severe weather warning is issued for the immediate area, and work sites would be secured accordingly.	During construction
FL3	Temporary drainage or drainage diversions would be installed so that stormwater function is not impeded during construction.	During construction
Waste management		
W1	A Waste Management Plan (WMP) would be prepared as part of the CEMP. The WMP would: • Identify requirements consistent with the waste and resource management hierarchy and cleaner production initiatives • Include relevant measures from the National Waste Policy: Less Waste, More Resources (Department of Agriculture, Water and the Environment, 2018) • Provide a framework so that resource efficiency is delivered through the design and construction practices	During construction

ID	Mitigation measure	Timing
	• Provide consistent clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures • Outline procedures for stockpiling of wastes • Set out processes for disposal, including on-site transfer, management and the necessary associated approvals/permits. All waste generated would be regularly removed from site as required by licensed contractors, in order to avoid potential issues associated with odour, visual amenity and attracting animals/pest species • Outline that waste generated within the Proposal area would be segregated at source and suitably stored in designated waste management areas within the Proposal area • Include material tracking measures to track waste and recyclables generated from the Proposal and removed from the Proposal area. Material tracking records would include types, volumes and management measures for waste and resources arising from/used for the Proposal • Outline an unexpected finds protocol to manage the potential for unexpected finds during construction of the Proposal (i.e. asbestos or other hazardous materials) • Include a process for auditing, monitoring and reporting.	
W2	Stockpiled wastes would be: • Appropriately segregated to avoid mixing and contamination Appropriately labelled • Appropriately stored to minimise risk of erosion • Less than three metres in height with an appropriate height to length batter ratio (e.g. 1:3) • Isolated from surface water and stormwater drains.	During construction
W3	The following resource management hierarchy principles would be followed: • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery where possible) • Disposal is undertaken as a last resort.	During construction and operation
W4	Where a NSW EPA Resource Recovery Order exists for a specific waste material the opportunity to re-use the waste under that order should be considered prior to disposal. Current orders (and exemptions) are found on the NSW EPA website: https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/resource-recovery-framework/current-orders-and-exemption The current orders should be periodically reviewed during construction for applicability.	During construction and operation

ID	Mitigation measure	Timing
W5	All waste would be assessed, classified, managed and disposed of (where they cannot be re-used) in accordance with the Waste Classification Guidelines (NSW EPA, 2014a).	During construction and operation
W6	Waste segregation bins would be located at various locations within the Proposal Site, if space permits, to facilitate segregation and prevent cross contamination.	During construction and operation

22.3.2 Construction Noise monitoring program

In addition to the safeguards and management measures, a monitoring program should be developed which includes attended measurements at the commencement of construction stages, as well as in response to any complaints.

The measurements should be conducted in accordance with the procedures outlined in Australian Standard AS 1055 *Acoustics – Description and measurement of environmental noise* and in accordance with methods outlined in the *Noise Policy for Industry*.

The following monitoring schedule has been recommended in the Noise and Vibration Impact Assessment (NVIA) and reproduced in **Table 22-2**.

Table 22-2 Construction noise monitoring schedule

Schedule Day	Action
During first month of construction	Complete one round of operator-attended 15-minute noise monitoring at site boundaries and closest residences
	Carry out equipment noise level checks on all critical items of plant and issue Equipment Noise Certificates
During subsequent months of construction period	Carry out equipment noise level checks on any new (untested) items of critical plant and issue Equipment Noise Certificates

As part of the monitoring program the following information should be included in the quarterly reports:

- Field calibration results (before and after measurements)
- Measurement times and dates
- Qualitative description of the noise environment during the measurements
- L_{A1}, L_{Aeq} and L_{A90} levels
- Meteorological conditions during the measurements, and
- Estimation of or recorded noise contribution from other major noise sources.

A system of records which provides full documentation of all noise monitoring results, complaint handling and responses to non-compliances should be established and maintained.

22.3.3 Construction Environmental Management Plans

A CEMP would be prepared by the construction contractor for the Proposal. The CEMP would address the relevant requirements of the planning approval document (including mitigation measures and any conditions of approval). The CEMP would include relevant sub-plans for the management of specific potential environmental impacts in relation to specific environmental issues such as traffic and transport.

22.3.4 Operational environmental management

Environmental performance during operation of the Proposal would be managed by the implementation of an operational environmental management plan or system. The plan or system would be prepared to be consistent with the conditions of approval.

The plan would detail how the mitigation measures would be implemented and achieved during operation, and would specify the environmental management practices and procedures to be followed. The plan would include the following:

- A description of activities to be undertaken during operation
- Statutory and other obligations, including approvals, consultations and agreements required from authorities and other stakeholders
- Overall environmental policies, guidelines and principles to be applied to operation
- A description of the roles and responsibilities, including relevant training and induction to ensure that employees are aware of their environmental and compliance obligations
- An environmental risk analysis to identify the key environmental performance issues associated with the operation phase
- Details of how environmental performance would be managed and monitored.

23.0 References

This chapter lists references to documents used throughout the body of this Environmental Impact Statement

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