ARUP

NEXTDC

S5 Data Centre

Back-up Generator Infrastructure Requirements Report

Reference: S5-EL-00-000-REP-E-DVA-APP

E | 15 May 2024

Job number 296866

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Document Verification

Project title	S5 Data Centre
Document title	Back-up Generator Infrastructure Requirements Report
Job number	296866
Document ref	S5-EL-00-000-REP-E-DVA-APP
File reference	

Revision	**Date**	**Filename**	S5-EL-00-000-REP-A-DVA-APP		
DRAFT Rev. A	22 Dec 2023	**Description**	Draft		
			Prepared by	**Checked by**	**Approved by**
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		Signature			
Rev. B	08 March 2024	**Filename**	S5-EL-00-000-REP-B-DVA-APP		
		Description	Draft		
			Prepared by	**Checked by**	**Approved by**
		Name	Javad Noori	Ian Lewis	Ian Lewis
		Signature			
Rev. C	27 March 2024	**Filename**	S5-EL-00-000-REP-C-DVA-APP		
		Description	For Approval		
			Prepared by	**Checked by**	**Approved by**
		Name	Javad Noori	Ian Lewis	Ian Lewis
		Signature			
Rev. D	18 April 2024	**Filename**	S5-EL-00-000-REP-D-DVA-APP		
		Description	For Approval		

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Rev. E	15 May 2024	**Filename**	S5-EL-00-000-REP-C-DVA-APP
		Description	For Approval

	Prepared by	Checked by	Approved by
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Issue Document Verification with Document ✓

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Executive Summary

This services infrastructure report has been prepared by Arup on behalf of NEXTDC Limited to accompany a detailed State Significant Development Application (SSDA) for the data centre development at 269 Lane Cove Road. The legal description of the site is Lot 3 in Deposited Plan (DP) 1129811.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-63168959). This report concludes that the proposed data centre development is suitable and warrants approval subject to the implementation of the following mitigation measures.

- The S5 facility is designed to operate from the 33kV utility power supply which has a high reliability performance. The Macquarie Park zone substation (132/33kV) is currently being upgraded by Ausgrid and is due for completion in December 2025. New 33kV feeders will be constructed and we assume they will be used to supply the S5 facility. The Macquarie Park Zone Substation is a highly reliable facility and the proposed design for the S5 facility will also include a fully redundant, 33kV utility power supply to further mitigate the likelihood for a need for the backup generators to run. This fully redundant 33kV supply, increases the reliability of the utility power supply and provides additional security, that would minimise downtime further and would limit disruption to only parts of the facility.
- Ausgrid analysed the outage scenarios of other zone substations in their network such as Homebush, Willoughby, Port Hacking and Alexandria and have stated in writing that there were no customer outages for customers, with similar, redundant supplies, in the last 10 years.

High noise levels when testing or operating back-up generators. Mitigation will be to provide acoustic treated measure and assess against NSW Noise Policy for Industry.

Fuel spills when filling generators. Mitigation measure will design the tanks to meet AS1940 requirement.

Fire and explosion risks associated with the generators. Mitigation measure will be Generators will be designed in accordance with AS 1940 and separation between fuel storage tanks.

Air pollution when generators are operational. Mitigation measure will be Two separate mains supply routes are proposed and the probability of mains failure has been investigated for the electrical supply. Failure rates for a supply in this arrangement are extremely low meaning the generators will rarely be used. Generators will include specific emissions control measures to Australian EPA requirements.

- Following the implementation of the above mitigation measures, the remaining impacts are appropriate.

1. Abbreviations and Glossary

Abbreviations	
Colo	A colocation facility, or colo, is a data centre facility in which a business can operate or rent space for servers and other computing hardware.
kL	Kilo-litre (1000l – equivalent to 1m3 volume)
MVA	Mega Volt Amp
MW	Megawatts
POEO	Protection of the Environment Operations Act
Proposal (the)	The purpose of the proposal is
SEARs	Secretary's Environmental Assessment Requirements
UGOH	Underground to Overhead
WSC	Water Services Co-ordinator
WWTP	Waste water Treatment Plant

2. Introduction

This report has been prepared to accompany a detailed SSDA for the proposed data centre development at 269 Lane Cove Road, Macquarie Park (SSD-63168959).

The application seeks consent for construction and operation of a data centre development and includes site preparation works, bulk earthworks and infrastructure, and construction of the buildings, ancillary facilities, and associated site works. The application also includes the delivery of two internal roads and an urban plaza adjacent to the Macquarie Park Metro Station entrance.

Specifically, the Project comprises the redevelopment of the site as summarised below:

- Site preparation works including demolition and removal of existing structures, tree removal and bulk earthworks.
- Staged construction and operation of two data centre buildings (Building A and Building B), each with a maximum height of 65 metres and a combined total gross floor area (GFA) of 46,935m^2 comprising 33,643m^2 of technical data hall floor space and 13,292m^2 of office, retail and innovation hub floor space.
- Building A will be delivered in Stage 1, comprising:
  - Basement parking for 105 cars including four accessible spaces and 10 EV spaces.
  - Two retail tenancies at ground level: 335m^2.
  - Lobby and innovation hub including auditorium and training rooms: 3,192m^2.
  - NEXTDC and mission critical (MCX) office floor space: 9,765m^2.
  - Seven storeys of technical data floor space accommodating seven data houses: 17,258m^2
  - Utilities including diesel generators (2MWe), above-ground water tanks for industrial water (460kL each), above-ground diesel storage tanks (110kL each) and an above-ground water tank for fire water (350kL each).
  - Business identification signage facing Waterloo Road and Lane Cove Road.
- Building B will be delivered in Stage 2, comprising:
  - Seven storeys of technical data floor space accommodating seven data halls: 16,385m^2.
  - Construction of a sky bridge which will connect with Building A, providing direct access between the data halls.
  - Utilities including diesel generators (2MWe), above-ground water tanks for industrial water (460kL each), above-ground diesel storage tanks (110kL each) and an above-ground water tank for fire water (350kL each).
  - Business identification signage on the western and southern building facades.
- Landscaping across the site in accordance with the project staging, delivering a mix of native and endemic plant species, shrubs and grasses, including 93 additional trees within a total area of 4,835m^2 deep soil and a resultant tree canopy cover of 6,211m^2.
- Staged delivery of public domain works, including:
  - Stage 1: construction of the northern extent of Road 13 from Waterloo Road and urban plaza between Building A and Waterloo Road.

- Stage 2: construction of the remaining southern extent of Road 13 and the full extent of Road 5.

- Delivery of 90 megawatts of power (via a separate application with Ausgrid) with a 33kV switching station to be accommodated on site, as well as other site services, including stormwater infrastructure.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 8 November 2023 issued for the SSDA (SSD-63168959). Specifically, this report has been prepared to respond to the SEARS requirement issued below.

Table 1 SEARs Compliance

Item	Description of Requirement	Section Reference (this Report)
Back-up generator Requirements	detailed justification for the chosen back-up power system, including: a comprehensive assessment of alternative commercially available technologies (e.g. solar power/large-scale batteries, hydrogen cells, etc) demonstration of a commitment to continual improvement with respect to the design of the back-up power system and its associated emissions a detailed overview of the proposed back-up generator system (if chosen), including: number and individual capacity of each generator (in terms of megawatts and megajoules per second) maximum operating time during a power outage event testing procedure (including whether testing will be carried out individually or in clusters), frequency and duration (including confirmation and, if necessary, justification of the need to test during the evening or night-time period).	Section 5

-

2.1 The Site

The site is located at 269 Lane Cove Road, Macquarie Park and is legally described at Lot 3 in Deposited Plan (DP) 1129811. It is located on the corner of Lane Cove Road and Waterloo Road and is made up of a single rectangular lot and is approximately 22,381m^2 in size. An aerial photograph of the site is provided at Figure 1

The site is located in the City of Ryde Local Government Area (LGA) within the Macquarie Park corridor, an established employment precinct with a particular focus on innovation. Macquarie Park is a nationally significant research and employment centre and includes the head offices for some of Australia's leading companies including Foxtel, Optus and Siemens. The site is approximately 2km southeast of Macquarie University, and 1.5km southeast of Macquarie Shopping Centre.

Existing development includes a two-storey office furniture store (Work Arena) at the northern end of the site and offices and studios associated with Foxtel in the southern portion of the site. Scattered trees exist along the site boundaries, particularly within the western setback to Lane Cove Road, along the southern boundary and the eastern boundary.

Vehicle access to the site is currently provided from Waterloo Road with an internal driveway providing access to several at-grade parking areas. A further vehicle crossover has been constructed along the Lane Cove Road frontage; however, it is not currently in use and barriers have been installed prohibiting access.

The site is well serviced by public transport with several bus routes operating along Lane Cove Road and Waterloo Road. The entrance to Macquarie Park Metro Station is immediately to the north of the site. The site includes a lengthy frontage to Lane Cove Road which provides access to the M2 Hills Motorway and Epping Road.

Figure 1 Aerial Photograph of Site

Source: Urbis GIS 2023

2.1.1 Detailed Project Description

1. The key components of the Project are listed in the following table.

Table 2 Project Details

Descriptor	Project Details
Project Area	The site has a total area of approximately 22,381m^2. The entire site area will be disturbed as a result of the Project. The site does not contain any environmental contraints
Proposed Use	Data centre with ancillary office and innovation space. Two retail premises at ground level
Project Description	▪ Demolition of existing buildings and structures. ▪ Site preparation works including tree removal, bulk earthworks, excavation and construction of retaining walls. ▪ Staged construction of two data centre buildings including technical data hall floor space, ancillary office and innovation space and two ground floor retail premises. ▪ Vehicle access via Waterloo Road with on-site car parking and loading within basement. ▪ Associated landscaping including a trees, shrubs and grasses. ▪ Business identification signage. ▪ Staged delivery of public domain works via a Planning Agreement, including construction of Road 5 and Road 13 and an urban plaza between Building A and Waterloo Road. ▪ Provision of required utilities, including an on-site switching station.
Gross Floor Area	Total GFA of 46,935m^2, broken down as follows: ▪ Data halls/technical: 33,643m^2 ▪ Lobby and innovation hub: 3,192m^2 ▪ MCX office: 9,765m^2 ▪ Retail including BOH 335m^2 ▪ Total number of data houses: 14 data houses
Building Height	▪ Building A: office and innovation hub – 49 metres over 10-storeys

Descriptor	Project Details
	▪ Building A: data centre – 65 metres over nine-storeys ▪ Building B: data centre – 65 metres over nine-storeys:
Proposed Floor Space Ratio	2.1:1
Deep Soil Area	4,825m^2 of deep soil area (21.6% of site area or 27.7% of developable site area)
Car Parking	105 car spaces including 4 DDA spaces and 10 EV spaces
Motorbike Spaces	11 spaces
Bicycle Spaces	12 spaces
Utilities	Provision of required utilities including: ▪ 60 x diesel generators (2MWe). ▪ 12 x above-ground diesel storage tanks (110kL each). ▪ Eight above-ground water tanks for industrial water (460kL each). ▪ Two above-ground water tanks for fire water (350kL each). ▪ 33kV switching station.
Power Consumption	90 megawatts
Operations and Management	The facility will be constructed and operated by NEXTDC. The site will be operated on a 24-hour, 7 day a week basis.
Existing Services and Infrastructure	The site is fully serviced; however, existing services and infrastructure will be extended, adapted and augmented to meet the demands of the Project. A new 33kV switching station will be required to provide power to the site in the event of an emergency blackout to facilitate power to the generators.
Staging/Phasing	The Project will be constructed in two stages: ▪ Stage 1 will include the early works for the entire site, construction of Building A, the urban plaza and the northern section of Road 13. ▪ Stage 2 will include construction of Building B, including a skybridge connection to Building A, Road 5, and the remainder of Road 13.

2.2 SEARs and DCP requirements relevant to this report

Table 3 identifies the SEARs requirements which are relevant to this technical assessment.

Table 3 SEARs requirements for Services and Infrastructure

Agency comments	
EPA – Electricity Generation The EPA requests further information be provided on the back-up generators, including: 1. *Number of back-up generators proposed* 2. *Individual capacity (in terms of megawatts and megajoules per second)* 3. *Maximum operating time in an emergency situation* 4. *Testing procedure, frequency and duration* 5. *Confirmation that testing will be carried out individually or in clusters; and* 6. *Justification of the need to test during the evening or at night*	Section 5
EPA – Electricity Generation *The Environmental Impact Statement (EIS) should definitely state whether schedules testing will exceed that 200-hour annual limit. If the testing time is definitely stated to be less than 200 hours per annum, then DPIE may want to consider adding a condition of consent reflecting this. Alternatively, if testing time could exceed 200 hours per year, then the proposed activity may meet the trigger for Clause 17, schedule 1 of the POEO Act. Please note that the EPA would consider 'operating' to include testing, if testing involved starting the generator. In addition, the definition of 'plant' in the schedule activity includes all generators on the premises, not each individual generator.*	Section 5
EPA – Chemical Storage *The EPA requests clarification on the total volume of diesel proposed to be stored at the premises and the capacity of the tanks in which diesel is to be stored. Under Clause 9 of the POEO Act, an activity requires a license is there is a capacity to store more than 2,000 tonnes of petroleum products (which includes diesel).* *Information on the location and design of chemical bunding and containments should also be included in the EIS. If diesel storage tanks are above ground, bunding requirements are set out in AS 1940:2017 The storage and handling of flammable and combustible liquids.*	Section 5

3. Policy and planning context

This Chapter presents relevant regulation, legislation and policy governing management of public utilities as it relates to the proposal.

3.1 Legislative context

3.1.1 Commonwealth Legislation

A number of Commonwealth legislative requirements to protect public utilities are noted below:

Telecommunications Act 1997

Security of Critical Infrastructure Act 2018

3.1.2 New South Wales Legislation

A number of NSW legislative requirements to protect public utilities are noted below:

Protection of the Environment Operations Act 1997

State Environmental Planning Policy (Infrastructure) 2007

Electricity Supply Act 1995

Gas Supply Act 1996

Water Management Act 2000

3.1.3 Guidelines

Fire safety guideline, Access for fire brigade vehicles and firefighters, ver 05.01, November 2020, Fire and Rescue NSW (FRNSW).

Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines, ver 3, February 2020, WaterNSW.

Building over and adjacent to pipe assets, 2015, Sydney Water

4. Methodology

This Chapter outlines the methodology used to define the baseline and undertake the environmental assessment of potential impacts of the proposal on public utilities including definition of the study area used as the basis of the assessment.

4.1 Study area

The assessment area will be limited to the subject site (the site boundary).

4.2 Method of Assessment

To address the project SEARs and address points raised by public utility authorities the following methodology was developed:

Collate and review available data on existing public utilities; including conducting a Dial-Before-You-Dig (DBYD) search.

Assess proposed site layout against any existing public utility infrastructure within the proposal boundary and identify any necessary protection or diversion works required.

Undertake demand assessment for each core utility serving the data centre.

Develop a site plan considering key, on-site utility infrastructure required to serve the data centre.

Consult with all relevant service providers to determine necessary off-site utility upgrades.

Consult with estate developer in developing integrated, estate utility networks.

Define preferred point of connection or servicing strategy for the development for each service.

5. Back-Up Generators

The data centre is a mission critical facility and therefore requires back up emergency power generation. The site is designed for a total of 60 no. low voltage 2MW generators rated to supply the data centre critical loads, admin load and life safety loads. All generators will be inside an acoustic treated indoor plantroom with local 1000 litre day tank fed from bulk fuel tanks located on lowest level of the building to comply with AS1940.

A typical floor layout for the electrical plantroom is depicted in Figure 2. The generators have spatial allowance for catalytic converters, however they are not required as noted in the Air Quality report S5-EN-01-000-REP-0000-B-DVA.

The Data Hall critical IT load is served by electrical plantrooms lineups. Each lineup consists of high voltage transformers, UPS with associated switchgear complemented by emergency standby generators, should utility not be available.

Table 4 - Generator Quantity

Location	Data Hall	Generator	Quantity
Data Centre Building A	Hyperscale and Enterprise Data Hall & Admin + Life Safety	2MWe Generators	Total of 30 Generators
Data Centre Building B	Hyperscale and Enterprise Data Hall & Admin + Life Safety	2MWe Generators	Total of 30 Generators

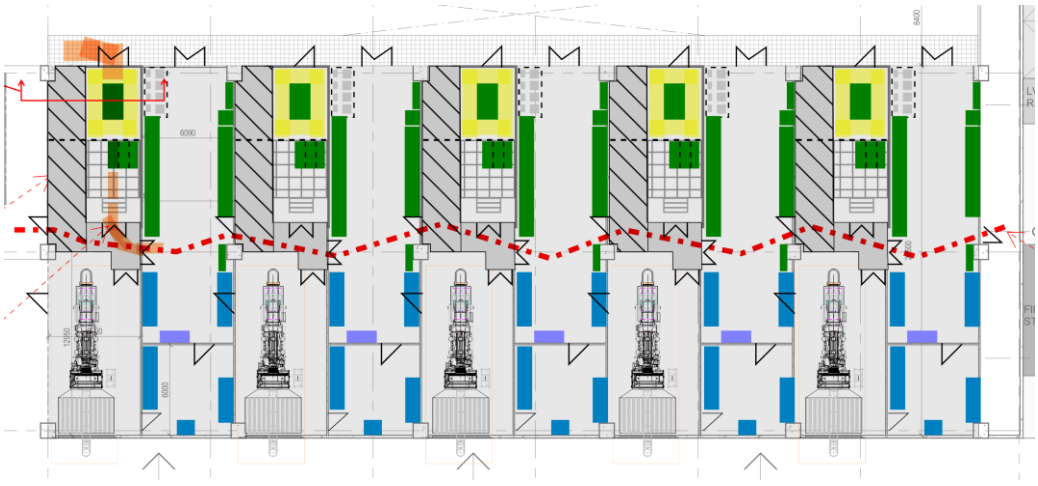

Figure 2 Typical Electrical Plantroom Arrangements

The following alternative commercially available technologies have been considered for standby generators:

Technology	Consideration	Technology Availability	Feasibility	Comment
Gas Turbine Diesel Generators	Reduce footprint compared to traditional diesel generator.	Yes	Gas turbine takes much longer to start and more suitable at medium voltage network.	Not feasible for this project due to slow start to pick-up the critical load.
Hydrogen Cell	Not considered due to lack of real estate space.	Yes	Very large real estate space required for Data Centre load requirement.	Not feasible for this project due to lack of real estate space in urban areas.
Solar Panels with large scale battery storage	Not considered due to lack of real estate space.	Yes	Very large real estate space required for Data Centre load requirement.	Not feasible for this project due to lack of real estate space in urban areas.
HVO (2nd gen biofuel)	Shelf-life comparable to diesel No additional space required. No special storage required	Yes	Lack of HVO availability in Australia.	HVO can offer reduced GHG, NOx, PM, CO and Greenhouse gases compared to diesel. NEXTDC can install generators with HVO capability at day one and utilise HVO as it becomes more readily available. For some suppliers performance and rating of generators are different to diesel when operated with HVO that will need to be considered during detail design stage. HVO currently not feasible for large scale applications due to lack of large scale production and storage.
Biodiesel	Not considered due to reduced shelf-life.	Not tested by suppliers	Not feasible due to reduced shelf-life and not tested by suppliers.	
Catalytic converters	Spatial allowance for Catalytic converters with supporting UREA day tank and bulk tank.	Yes	Spatial allowance for Catalytic converters with supporting UREA day tank and bulk tank.	Space provision allowed for all site diesel generators to reduce emission with UREA bulk tank to support.

5.1.1 Demand Estimate

The maximum demand is indicated in Table 5 below, the calculated demand for the proposed site is approximately between 90MVA to 97mVA.

The generators will support the entire building load.

Table 5 Site Electrical Maximum Demand

Site Electrical Load Summary Result		
	Total Load	Unit
IT Load Building A	30 to 32.5	MW
IT Load Building B	30 to 32.5	MW
Total IT Load	60 to 65	MW
PUE	1.4	
Total Load	84 to 91	MW
Admin Load	1.2	MW
Power Factor	0.95	
Total kVA	90 to 97	MVA

5.1.2 Operation

The data centre is a mission critical facility and therefore requires back up emergency power generation. The site is designed for a total of 60 no. low voltage 2MW generators rated to supply the data centre critical loads, admin load and life safety loads. All generators will be inside an acoustic treated indoor plantroom with local 1000 litre day tank fed from bulk fuel tanks located on lowest level of the building to comply with AS1940.

Generators will operate as a standby power supply in the event of mains failure. The connection enquiry with Ausgrid is for N-1 33kV feeders, fully rated supplies of the entire site load. Failure rates for a N-1 supply in this arrangement are extremely low, each feeder is fed from diverse bus section of the Zone Substation and each feeder can fully support the entire building load.

Although it is not possible to determine exactly the duration of power outage/damage over a year which would require the standby generators to be in operation, based on the electricity supplier Ausgrid Distribution and Transmission Annual Planning Report Summary (DTAPR, December 2023), it has been determined that the average unplanned actual system average interruption duration index (SAIDI) of power outage incident over the past 10 years is 74.5 minutes (total cumulative events) of unplanned outages per year per customer – based on year 2013/14 to 2022/23 of SAIDI data. This equates to less than 0.01% of likelihood of occurrence in a year. Ausgrid network and operations covers Sydney, the Central Coast and Hunter regions of New South Wales.

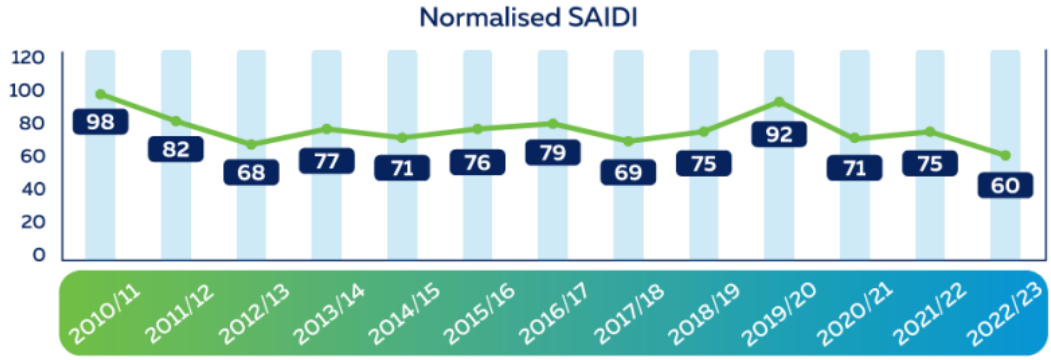

Figure 3 - Ausgrid graph of normalised SAIDI data in the past 13 years (Source: Ausgrid, 2023)

Each generator will be housed in a generator plantroom at each level with 1000 litre day tank and bulk fuel tank at lowest level of the building with 24hour + 24hour autonomy. Fuel tanks will be designed to comply with AS1940. Preliminary fuel calculations are shown in the table below.

Table 6 Fuel Calculations

General Design Assumptions				
Generator: MTU 16V4000 DS2500 (optimized 16V4000G84F)				
Fuel Consumption per Generator				
Rating: 1888 kWel / 2360 kVA / 3406 Amps				
Load:	100%	80%	75%	50%
L/hr:	513	411	385	263
Day Final Generator Quantity (per Building)				
Total LV Strings:	30			
Generator to LV String Ratio	1:1			
Total No. Generators	**30**			
Day 1 Generator Quantity (per Building)				
Total LV Strings:	5			
Generator to LV String Ratio	1:1			
Total No. Generators	**5**			
Day Final: Generator loading, fuel consumption & storage (per Building)				
Normal Operation	30 Gens @ 80%	12319 L/Hr		
String Failure / Generator Failure	24 Gens @ 100%	12319 L/Hr		
Fuel Storage Autonomy	48 hrs			
Total Fuel Capacity Required	591 kL			
Bulk Fuel Tank Capacity (Gross)	110 kL			
Bulk Fuel Tank Capacity (Useable)	99 kL			
Min. Bulk Fuel Tank Qty Req.	6			
Qty Tank per A & B System	3			
Day 1: Generator loading, fuel consumption & storage (per Building)				
Normal Operation	5 Gens @ 80%	2053 L/Hr		
String Failure / Generator Failure	4 Gens @ 100%	2053 L/Hr		
Fuel Storage Autonomy	48 hrs			
Total Fuel Capacity Required	99 kL			
Tank Qty per A & B System (based on Day Final size)	2			

Notes:

1. Tank quantities noted are for a single data hall building
2. 48 hours fuel autonomy shall be split across separated A & B systems equally
3. Useable volumes noted assume 90% tank efficiency
4. Maximum bulk fuel tank capacity based on AS1940:2017 requirements

5.1.3 Maintenance

For standby generators to be ready to operate should an unexpected interruption to mains power occur, a regular maintenance schedule is required. The proposed standby generator testing schedule is provided in Table 7. It is understood that the testing schedule in Table 7 excludes plant cooldown period considered to be exempted from the POEO (Clean Air) Regulation Standard of Concentrations, as part of the *start-up/shutdown* period exemption.

Maintenance testing of standby generators is anticipated to occur during the daytime period (the period from 7 am to 6 pm (Monday to Saturday) and 8 am to 6 pm (Sundays and public holidays[1]).

Table 7 – The proposed standby generator maintenance testing regime

Test	Run Time (Minutes)	Cooldown (excluded from Runtime)	No of Gens	Generator Per Test	Total Run Times (Minutes)	Description[a, b]
Quarter 1	20	10	60	1	1200	Operational Run – Tested under 55% minimum load
Quarter 2	40	10	60	1	2400	Maintenance Run – Tested under 50% load
Quarter 3	20	10	60	1	1200	Operational Run – Tested under 55% minimum load
Quarter 4	90	10	60	1	5400	Maintenance – Tested under 100% load
				Total	10200	**170 hours**

Note:

a. **Generator tested under low load is to be undertaken such that the emissions do not exceed the POEO (Clean Air)**. The generator loading should be re-confirmed once the final generator selection has been finalised.

b. Generator loads are +/- 5% load.

Based on the proposed maintenance testing schedule in Table 7, there would be up to one generator tested at any given time in either Building A or Building B. Generators will be tested under a load where emissions comply with the Standard of Concentrations requirements for non-scheduled premises under the POEO (Clean Air).

The preliminary generator testing schedule in Table 7 shows a proposed cumulative total hours of testing of 170 hours, not more than the 200-hour exemption limit in Schedule 1 Clause 17 of the NSW POEO Act 1997, as well as Part 5, Division 6, Clause 73 of the POEO (Clean Air) Regulation 2022, and therefore generator emissions are exempt from Schedule 2 Part 2 of the Standard of Concentrations in the POEO (Clean Air) Regulation 2022.

[1] NSW EPA, 2017. Noise Policy for Industry.

Table 8 Fuel required for Testing Produces

	Data Hall Generator	
Generator Fuel Consumption - No Load	No Data	L/hr
Generator Fuel Consumption – 50% Load	263	L/hr
Generator Fuel Consumption – 75% Load	411	
Generator Fuel Consumption – Full Load	513	L/hr
Annual Fuel Consumption for Generator Test	78,390	L

The fuel consumption includes generators running during cooldown period.

6. Assessment of potential operational impacts

Section 6 presents potential operational impacts that the development could have on the surrounding environment and public utility networks.

6.1 Standby Generators

Potential operational impacts of the electrical infrastructure within the subject site include:

High noise levels when testing or operating back-up generators.

Fuel spills when filling generators.

Fire and explosion risks associated with the generators.

Air pollution when generators are operational.

Refer to below section 7 for mitigation measure.

7. Environmental management measures

Table 9 details the proposed management and mitigation measures proposed as part of the design for utility impacts.

Table 9 Environmental Management Measures for Utility Impacts

ID	Impacts	Mitigation	Responsibility	Timing
IR2	High noise levels when testing or operating back-up generators.	Generators are indoor acoustically treated. The noise level of generator testing will be assessed against NSW Noise Policy for Industry.	Proponent/Contractor	Design and Operation
IR3	Fuel spills when filling generators.	Fuel tanks will be designed to comply with AS1940. Each fill point will have all ancillaries to meet requirements of AS1940.	Proponent/Contractor	Design and Operation
IR4	Fire and explosion risks associated with the generators.	Generators fuel system will be designed in accordance with AS 1940 which defines location in the building and separation between the tanks. Generators and bulk fuel tanks located inside a secure plantrooms only approved personnel can access this area.	Proponent/Contractor	Design and Operation
IR6	Air pollution when generators are operational	Two separate mains supply routes are proposed in N-1 arrangement, and the probability of mains failure has been investigated for the electrical supply. Failure rates for a supply in this arrangement are extremely low meaning the generators will only be used in an emergency. Generators will include specific emissions control measures to Australian EPA requirements.	Proponent	Design and Operation

8. Summary of residual impacts

This section provides a summary of the construction and operational risks both pre-mitigation and any residual impacts remaining after the implementation of the management measures describe in Section 7. Pre-mitigation and residual impacts are summarised in Table 10.

Table 10 Summary of pre-mitigation and residual impacts

Potential pre-mitigation adverse impact	Relevant management measures	Potential residual impact after implementation of management measures	Comment on how any residual impacts would be managed
Operation			
High noise levels when testing or operating back-up generators.	Generators are standby acoustically treated units which include noise attenuation features. Generators will only operate in the unlikely event that both electrical supplies are off-line.	Potential that noise levels are high.	The noise level of generator testing will be assessed against NSW Noise Policy for Industry. Testing of generators to be undertaken during daytime periods unless otherwise required.
Fuel spills when filling generators.	Each fill point will have all ancillaries to meet requirements of AS1940. The fuel parking truck area will be bunded to contain any spillage. The generator room will have 1000 litre day tank with the whole room bunded.	Risk of accidental spills when fuelling.	Operator to prepare a management plan detailing safe method of work for filling bulk fuel tanks. Supplier to have spill kits available at the time of filling.
Fire and explosion risks associated with the generators.	Generators are located indoor fire rated plantrooms. Suitable separation provided between fuel storage tanks (“belly tanks”) and generators. Access to generators or bulk fuel tanks limited to approved personnel.	Low risk of fire and explosion.	Operator to implement monitoring and maintenance plan. Generator area to be kept clean and free from flammable materials. Generators to be frequently inspected for faults/defects.

9. References

NSW Government, 1997. Protection of the Environment Operations Act.

NSW Government, 2007. State Environmental Planning Policy (Infrastructure).