MACQUARIE PARK DATA CENTRE CAMPUS
IC3w DATA CENTRE

Waste Management Plan

Prepared for:

Macquarie Data Centres Pty Limited
Level 15, 2 Market Street
Sydney, NSW, 2000

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PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street
North Sydney NSW 2060 Australia

T: +61 2 9427 8100
E: sydney@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with GIDDIS Project Management (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.30465.100-R01-v1	August 2021	Chris Hambling	Andrew Quinn	Chani Lokuge
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1 Introduction

1.1 Overview

SLR Consulting Australia Pty Ltd (SLR) has been appointed by Macquarie Data Centres (MDC) to undertake the development of a Waste Minimisation and Management Plan (WMMP) for the proposed development of the Macquarie Park Data Centre Campus IC3 Super West site at 17-23 Talavera Road, Macquarie Park.

This WMMP serves to support the State Significant Development Application (SSDA) relating to the proposed development.

1.2 Project summary

This WMMP has been prepared by SLR on behalf of Macquarie Data Centres (MDC) C/- GIDDIS Project Management.

The following Waste Management Plan has been produced to support the Environmental Impact Statement (EIS) prepared by Willowtree Planning PTY Ltd (Willowtree Planning).

The EIS has been submitted to the New South Wales (NSW) Department of Planning, Industry and Environment (DPIE), in support of an application for State Significant Development (SSD), for the construction and operation of a data centre, involving earth works, provision of infrastructure and expansion of an existing data centre at 17 – 23 Talavera Road, Macquarie Park (Lot 527 DP 752035).

The proposal represents an extension to the approved data centre (LDA/2018/0322) to allow for additional data storage capacity at the subject site, improving the overall operational efficiencies and provision of technology services to customers and the wider locality.

The proposal involves the construction and operation of an expansion to an existing data centre located at 17-23 Talavera Road, Macquarie Park (Lot 527 in DP 752035), comprising:

- a five-storey building
- ancillary office space and staff amenities
- a back-up power system
- associated infrastructure, car parking, loading docks and landscaping

The subject site is located within the City of Ryde Local Government Area (LGA). The proposal seeks to operate 24 hours per day, seven (7) days per week.

The particulars of this proposal are summarised below:

- Minor earthworks involving cut and fill works
- Infrastructure comprising civil works and utilities servicing
- Construction of a five (5) storey building extension, comprising up to:
- 14 data halls
- 18 backup generators

- Fitout of the building for use as a data centre (on an as-needs basis)

1.3 Site Description

The site is described as Lot 527 DP 752035, commonly known as 17 – 23 Talavera Road, Macquarie Park. The site has a total area of approximately 20,000m^2, with access achieved via Talavera Road.

The site forms part of the Macquarie Park Corridor, which is the strategic centre of Macquarie Park, being a health and education precinct and an important economic and employment powerhouse in Sydney's North District.

The site is described through its current commercial setting as an existing Data Centre (LDA/2018/0322), adjoining surrounding commercial premises along Talavera Road, and forming part of the wider Macquarie Park Corridor.

The site is situated approximately 12.5 km northwest of the Sydney CBD and 11.3 km northeast of Parramatta. It is within close proximity to transport infrastructure routes (predominantly the bus and rail networks), as well as sharing direct links with the wider regional road network, including Talavera Road, Lane Cove Road, Epping Road, and the M2 Motorway.

These road networks provide enhanced connectivity to the subject site and wider locality. Additionally, the site is located within close proximity to active transport links, such as bicycle routes, providing an additional mode of accessible transport available to the subject site

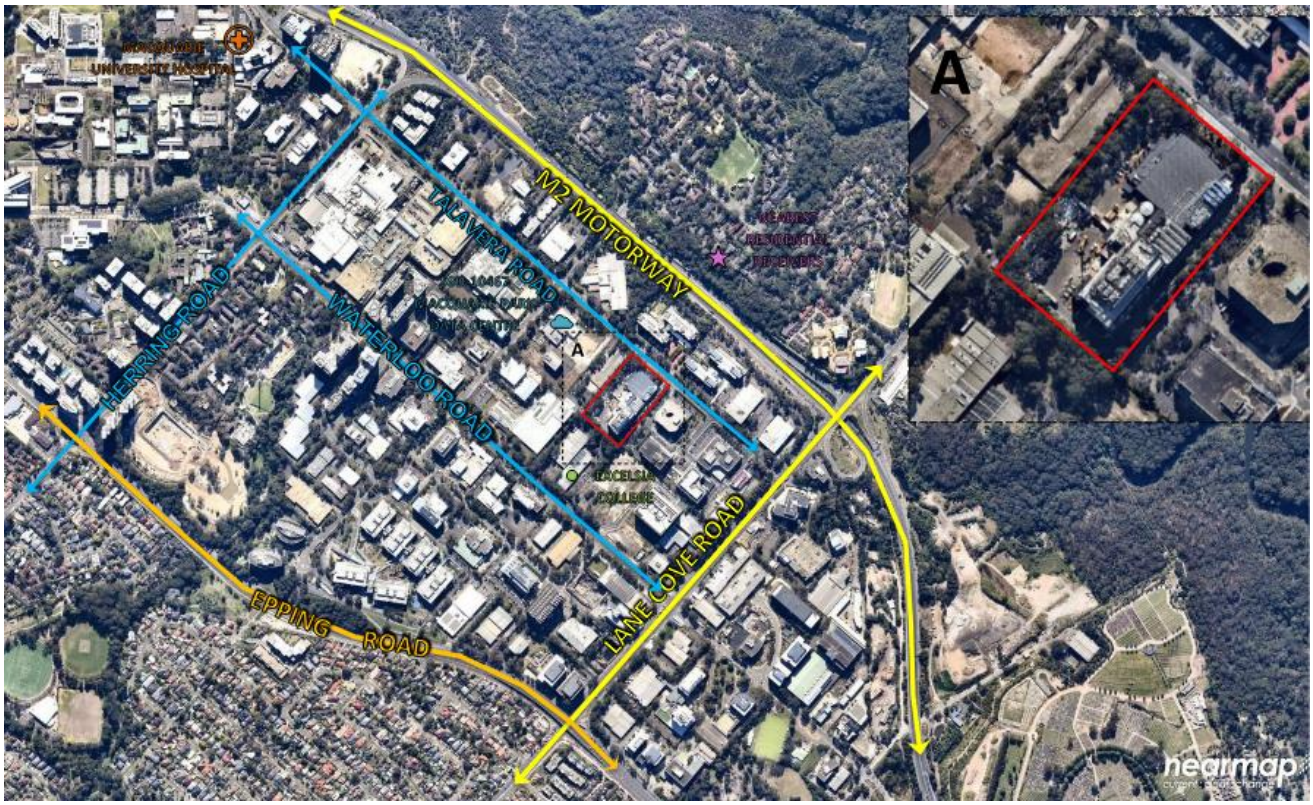


Figure 1 General location plan

Figure 2 Site Layout

The site 17 – 23 Talavera Road, Macquarie Park, being Lot 527 DP 752035.

1.4 Secretary's Environmental Assessment Requirements

This WMMP is prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs). The SEARs for the proposal outline Key Issues to be addressed as part of this EIS and includes:

SLR has been appointed by Macquarie Data Centres (MDC) to undertake the WMMP for the proposed development of the Macquarie Park Data Centre Campus IC3 Super West site.

The following Secretaries Environmental Assessment Requirements (SEARS) are addressed within Table 1 of this report.

Table 1 Secretary's Environmental Assessment Requirements

SEARs Items	Secretary's Environmental Assessment Requirements	Response
Waste	- Details of the quantities and classification of all waste streams to be generated on site during the construction and operation of the development - 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 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.	- See Section 5.2-5.6 for construction waste and Section 6.2-6.4 for classification and quantification of estimated waste arisings. - See Section 5.7 and Section 6.4-6.7 - See Section 5.5-5.6 and 5.8-5.11 and Section 6.8-6.12

Note: The NSW Waste Avoidance and Resource Recovery Strategy 2014-2021 was replaced in mid-2021 with the NSW Waste and Sustainable Materials Strategy – both documents are addressed in this WMMP

1.5 This Waste Minimisation and Management Plan

This WMMP applies to the waste generated from the site preparation, construction and operational stages of the Project and has been prepared using architectural drawings supplied by the Client and attached in **Appendix A**.

Part 7.2 – Waste Minimisation and Management of the City of Ryde Council Development Control Plan has specific requirements for applicants relating to waste minimisation and management. All applications for development must be accompanied by a Site Waste Minimisation and Management Plan. This report was prepared in accordance with these requirements

1.6 Objectives

The principal objective of this WMMP is to identify all potential wastes likely to be generated at the Project site during the site preparation, construction, and operational phases, including a description of how waste would be handled, processed, and disposed of, or re-used or recycled, in accordance with City of Ryde Council's (Council) requirements.

The specific objectives of this WMMP are as follows:

- To encourage the minimisation of waste production and maximisation of resource recovery.
- To ensure the appropriate management of contaminated and hazardous waste.
- To assist in ensuring that any environmental impacts during the operational life of the Project comply with Council's development consent conditions and other relevant regulatory authorities.

1.7 Review of WMMP

This WMMP is not a static document. It is a working document that requires review and updating to ensure ongoing suitability for the proposed on-going operations at the site.

This WMMP will be reviewed and updated:

- To remain consistent with waste and landfill regulations and guidelines
- If changes are made to site waste and recycling management, or
- To take advantage of new technologies, innovations and methodologies for waste or recycling management.

Copies of the original WMMP and its future versions should be retained by the building manager. Changes made to the WMMP, as well as the reasons for the changes made, should be documented by the building manager as part of the review process.

2 Project description

2.1 Overview of proposed development

The proposed development comprises the construction of the IC3w Data Centre and activities to fit out the building for use as a Data Centre. The proposal includes ancillary office space, car and truck parking, landscaping, and signage.

The proposal does not require clearing or supporting infrastructure for the IC3e Data Centre which is already approved and is already under construction. The gross floor area of the overall data centre campus is summarised in Table 2 below.

Table 2 Gross Floor Area – Macquarie Park Data Centre Campus

Building	Type	Gross Floor Area (m^2)
IC2 (Existing)	Office	324
IC2 (Existing)	Data Room	4,454
IC3e (Existing)	Office	169
IC3e (Existing)	Data room	6,562
IC3w (Proposal)	Office	1,126
IC3w (Proposal)	Data room	7,971
TOTAL GFA		**20,606**

2.2 Overview of proposed construction activities

Project works for are expected to include site preparation and construction activities. The site currently is predominantly car parking, access road and a small area of landscaping. The proposed IC3w project will add an additional 9,097 m^2 of gross floor area across five levels.

A site plan for the Project is shown in **Figure 3** and **Appendix A**. The anticipated construction works for this development include the construction of the below:

- Earthworks, excavation and retaining walls
- Construction of the Development, comprising:

- A ground floor consisting of car parking, loading docks, electrical plant rooms, fire tank and misting control valves.
- Construction of the main building and façade, comprising five levels and 7,971 m^2 of data centre

- Fit out of all data halls in a staged manner based on need.

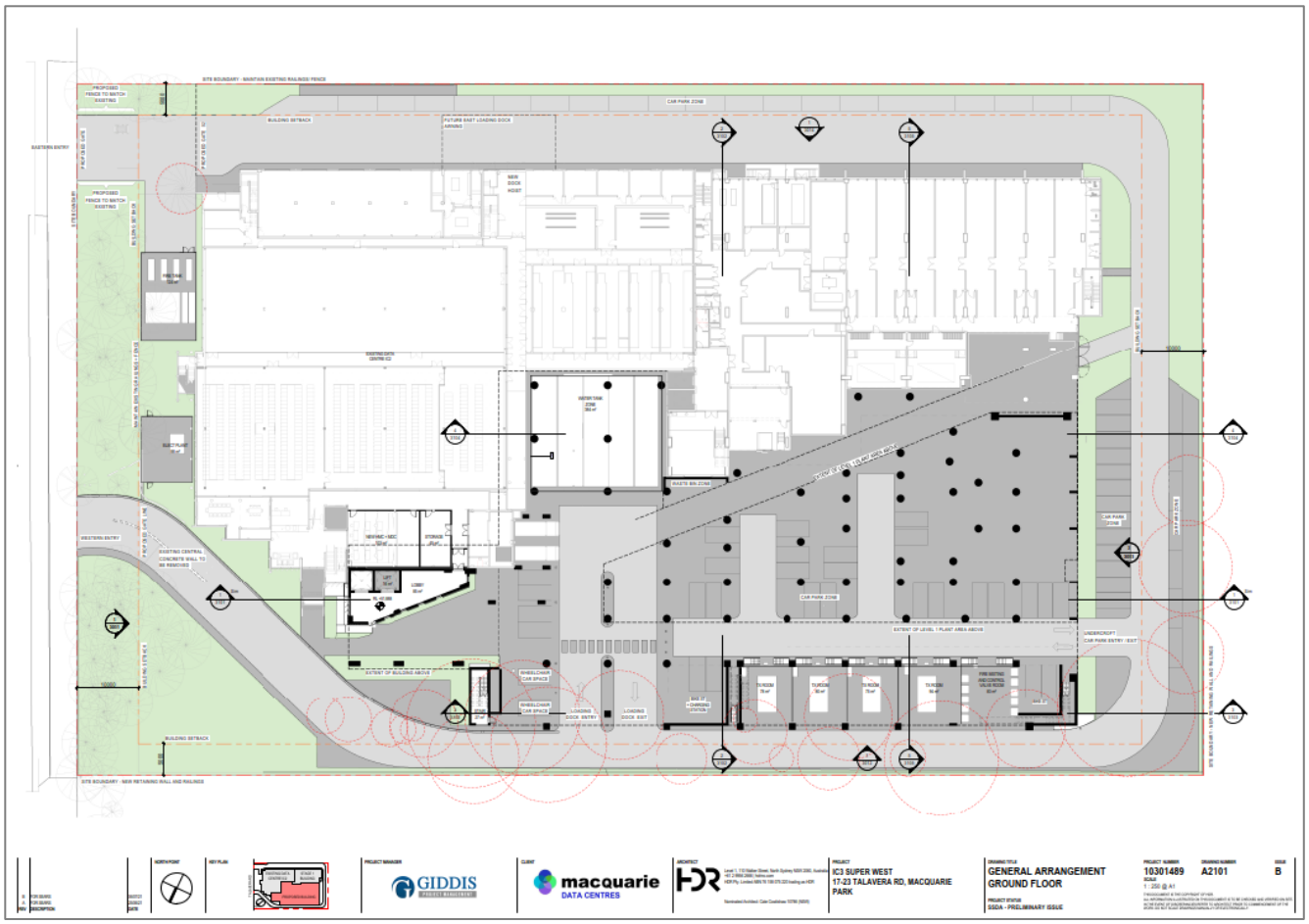


Figure 3 Site Plan

2.3 Overview of proposed operations

The IC3w Data Centre will provide additional data storage capacity in addition to the existing IC2 and under construction IC3e Data Centre. The site will operate on a 24-hour, 7 days per week basis. The site will 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.

The combined three data centres (IC2, IC3e and the proposed IC3w Data Centre) will accommodate up to 49 additional staff on site during busy period. Once IC3w is completed, it is proposed that there will be a total of 71 car parking spaces on site, in addition to 10 bicycle spaces. The proposal is expected to retain the provision for four loading vehicles suitable for vehicles up to and including an 8.8 m medium rigid vehicle. This is consistent with the already approved IC3e proposal.

3 Better practice waste management and recycling

3.1 Waste management hierarchy

This WMMP has been prepared in line with the waste management hierarchy shown in **Figure 4**, which summarises the objectives of the *Waste Avoidance and Resource Recovery Act 2001.* It is noted that the NSW Government recently released the NSW Waste and Sustainable Materials Strategy 2041 which sets a pathway to increase resource recovery performance, including a transition towards a more circular economy. The waste management hierarchy is still considered highly relevant.

The waste management hierarchy comprises the following principles, from most to least preferable:

- Waste **avoidance**, prevention, or reduction of waste generation. Achievable through better design and purchasing choices.
- Waste **reuse**, reuse without substantially changing the form of the waste.
- Waste **recycling**, treatment of waste that is no longer usable in its current form to produce new products.
- Energy **recovery**, processing of residual waste materials to recover energy.
- Waste **treatment**, reduce potential environmental, health and safety risks.
- Waste **disposal**, in a manner that causes the least harm to the natural environment.

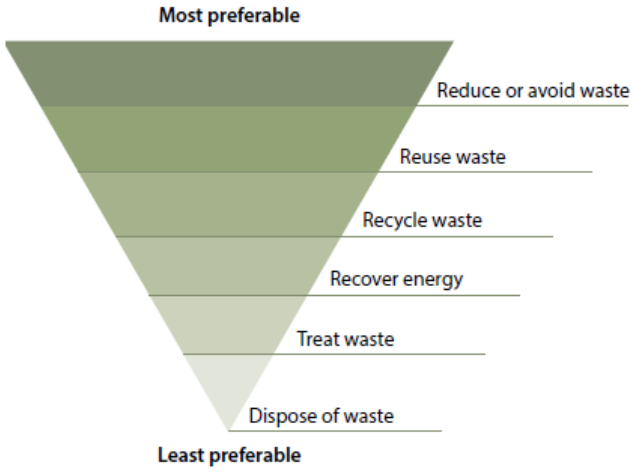


Image from NSW EPA (2014) NSW Waste Avoidance and Resource Recovery Strategy 2014-21.

Figure 4 Waste management hierarchy

3.2 Benefits of adopting better practice

Adopting better practice principles in waste minimisation offers significant benefits for organisations, stakeholders, and the wider community. Benefits from better practice waste minimisation include:

- Improved reputation of an organisation due to social and environmental responsibility.
- Lowered consumption of non-renewable resources.

- Reduced environmental impact, for example, pollution, from materials manufacturing and waste treatment.
- Reduced expenses from lower waste disposal.
- Providing opportunities for additional revenue streams through beneficial reuse.

4 Waste legislation and guidance

The legislation and guidance outlined in **Table 3** below should be referred to during the site preparation, construction, and operational phases of the Project.

Table 3 Legislation and guidance

Legislation and Guidance	Objectives
Council legislation and guidelines	
City of Ryde Local Environmental Plan (LEP) 2014[1]	The Ryde LEP came into force for the entire Ryde local government area on 12 September 2014 and provides the legal framework of the Ryde Development Control Plan, including land use and development permitted in a set zone. The LEP also contains provisions to conserve local heritage and protect sensitive land.
City of Ryde Development Control Plan (DCP) 2014[2]	The City of Ryde DCP came into effect on 12 September 2014 and supports provisions of the LEP planning controls by providing detailed waste and design guidelines under Part 7.2 – Waste Minimisation and Management. Part 7.2 has been prepared to meet the objectives of the Environment Planning and Assessment Act 1979, the Waste Avoidance and Resource Recovery Act 2001, and the Protection of the Environment Operations Act 1997. The overall aim of the DCP in relation to waste is for developers to consider how they may minimise, recover, and manage waste in accordance with regulatory requirements.
Waste Management Strategy 2014 City of Ryde	Council's waste strategy focuses on the steps the city is taking to better manage waste streams, focussing on the key areas of waste avoidance, resource recovery and Advanced Waste Treatment methods. The Strategy includes measures to implement a Waste Minimisation plan, as well as actions to engage, inform and educate the public and industry of the benefits of clever waste management and recycling to meet the City's current and future needs.
State and National legislation and guidelines	
Building Code of Australia (BCA) and relevant Australian Standards	The BCA has the aim of achieving nationally consistent, minimum necessary standards of relevant health and safety, amenity, and sustainability objectives efficiently.
Council of Australian Governments National Construction Code 2019	The National Construction Code 2019 sets the minimum requirements for the design, construction, and performance of buildings throughout Australia.
NSW EPA's Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities 2012	These better practice guidelines present information on waste minimisation and resource recovery as well as information on commonly used waste management provisions. The guidelines also provide benchmarks for assessing waste production rates in Australia.
NSW Waste and Sustainable Materials Strategy 2041	Replacing the *NSW Waste Avoidance and Resource Recovery Strategy (2014-21)* (see below) identifies a focus on the transition of NSW to a circular economy. The focus of the strategy is on minimising what is thrown away, and to use and reuse resources more efficiently, making them as productive as possible. The strategy identifies the need to identify infrastructure needs, the mandating of separation of some organic waste streams, and incentivising biogas generation from waste materials.

[1] City of Ryde, Local Environmental Plan, 2014. (https://legislation.nsw.gov.au/maintop/view/inforce/epi+608+2014+cd+0+N)

[2] City of Ryde, Development Control Plan (https://www.ryde.nsw.gov.au/Business-and-Development/Planning-Controls/Development-Control-Plan)

Legislation and Guidance	Objectives
NSW EPA (2014) NSW Waste Avoidance and Resource Recovery Strategy 2014-21	The *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* is aimed at ultimately "improving environment and community well-being by reducing the environmental impact of waste and using resources more efficiently" by presenting a framework intended to avoid and reduce waste generation, increase recycling, divert more waste from landfill, manage problem wastes better, reduce litter, and reduce illegal dumping. This Strategy remains relevant as council requirements have not yet been updated.
NSW EPA Resource Recovery Orders and Resource Recovery Exemptions	The NSW EPA has issued a number of resource recovery orders and resource recovery exemptions under the POEO (Waste) Regulation 2014 for a range of wastes that may be recovered for beneficial re-use. These wastes typically include those from demolition and construction works, as well as operational wastes such as food waste. • Resource recovery orders present conditions which generators and processors of waste must meet to supply the waste material for beneficial re-use. • Resource recovery exemptions contain the conditions which consumers must meet to use waste for beneficial re-use.
NSW EPA's Waste Classification Guidelines 2014	The NSW EPA *Waste Classification Guidelines* assists waste generators to effectively manage, treat and dispose of waste to ensure the environmental and human health risks associated with waste are managed appropriately and in accordance with the *POEO Act 1997* and is associated regulations.
Protection of the Environment Operations Act (POEO) 1997 and Amendment Act 2011	The *POEO Act 1997* and *POEO Amendment Act 2011* are administered by the NSW Environment Protection Authority (NSW EPA) to enable the NSW Government to establish instruments for setting environmental standards, goals, protocols, and guidelines. They outline the regulatory requirements for lawful disposal of wastes generated during the demolition, construction, and operational phases of a development, as well as the system for licencing waste transport and disposal.
The Work Health and Safety Regulation 2017	The Work Health and Safety Regulation 2017 provide detailed actions and guidance associated with the topics discussed in *The Work Health and Safety Act 2011*. The primary aim of the regulation is to protect the health and safety of workers and ensure that risks are minimised in work environments. Workplaces are to ensure that they are compliant with the requirements specified in the regulations. The regulations discuss items such as actions that are prohibited or obligated in work environments, the requirements for obtaining licences and registrations, and the roles and responsibilities of staff in workplaces.
Waste Avoidance and Resource Recovery Act 2001	The *Waste Avoidance and Resource Recovery Act 2001* aims to promote waste avoidance and resource recovery and repeals the *Waste Minimisation and Management Act 1995*. Specific objectives of the *Waste Avoidance and Resource Recovery Act 2001* include: • encouraging efficient use of resources • minimising the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste • ensuring industry and the community share responsibility in reducing/dealing with waste, and • efficiently funding of waste/resource management planning, programs, and service delivery. As of 2016, the addition to the Act of Part 5 defines the legislative framework for the "Return and Earn Container Deposit Scheme" whereby selected beverage containers can be returned to State Government authorities for a monetary refund.

5 Site preparation and construction waste and recycling management

5.1 Targets for resource recovery

Targets for new development are expected to contribute to state specific targets. The NSW Waste and Sustainable Materials Strategy 2041 (DPIE, 2021[3]) sets a target of:

- 80% average recovery rate from all waste streams by 2030.

Analysis by DPIE (2021) indicates that construction and demolition waste recovery rates in FY19 were 77%.

Council's Waste Management Strategy[4] refers to the EPA landfill diversion target for commercial and industrial waste of 76% in reference to targets for construction and demolition wastes, although does not explicitly set a target. The rates reported in the Waste Management Strategy were above 80% recovery.

It is anticipated that the waste minimisation measures in the following sections will assist the Project to meet these targets. Waste reporting and audits can be used to determine the actual percentage of wastes that have been recycled during the construction and site preparation stage of the Project.

5.2 Waste streams and classifications

The site preparation and construction of the Project is likely to generate the following broad waste streams:

- Site clearance wastes
- Construction wastes
- Plant maintenance waste
- Packaging wastes, and
- Work compound waste from on-site employees.

A summary of likely waste types generated from site preparation and construction activities, along with their waste classifications and proposed management methods, is provided in Table 4.

For further information on how to classify a waste type refer to the NSW EPA (2014) *Waste Classification Guidelines*[5]. Further information on managing site preparation and construction wastes is available from the NSW EPA website[6].

[3] NSW Government, Department of Planning, Industry and Environment (DPIE), 2021. NSW Waste and Sustainable Materials Strategy 2041. Stage 1: 2021-2027 (https://www.dpie.nsw.gov.au/__data/assets/pdf_file/0006/385683/NSW-Waste-and-Sustainable-Materials-Strategy-2041.pdf)

[4] City of Ryde, 2014. Waste Management Strategy, 2014.

[5] Available online from https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines

[6] http://www.epa.nsw.gov.au/your-environment/waste/industrial-waste/construction-demolition

Table 4 Potential waste types and their management methods

Waste Types	NSW EPA Waste Classification	Proposed Management Method
Site Clearance		
Green waste including timber, pine, and particle board	General solid waste (non-putrescible)	Separated, some chipped and stored on-site for landscaping, remainder to landscape supplies or off-site recycling. Stumps and large trees to landfill.
Clean fill	General solid waste (non-putrescible)	On-site re-use
Contaminated fill	To be classified subject to the results of testing	Off-site treatment or disposal to landfill
Excavated natural material (ENM) or virgin excavated natural material (VENM)	General solid waste (non-putrescible)	On-site re-use of topsoil for landscaping of the site, off-site beneficial re-use or send to landfill site.
Construction		
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 Remainder to landscape supplies.
Doors, Windows, Fittings	General solid waste (non-putrescible)	Off-site recycling at second hand building 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

Waste Types	NSW EPA Waste Classification	Proposed Management Method
Asbestos	Special waste	Off-site disposal at a licenced landfill facility.
Fluorescent light fittings and bulbs	Hazardous waste	Off-site recycling or disposal; contact *FluoroCycle* for more information[7]
Paint	Hazardous waste	Off-site recycling, Paintback collection[8] 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 including tiles	General solid waste (non-putrescible)	Off-site recycling at a crushing and recycling company
Carpet	General solid waste (non-putrescible)	Off-site recycling or disposal; reused for landscaping, insulation, or equestrian uses
Plant Maintenance		
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 licensed facility Note: Discharge to sewer subject to Trade Waste Agreement with local Council
Air filters and rags	General solid waste (non-putrescible)	Off-site disposal
Drained Oil filters	General solid waste (non-putrescible)	Off-site recycling
Commercial Lead acid or Nickel cadmium Batteries	Hazardous waste	Off-site recycling, Contact the Australian Battery Recycling Initiative[9] for more information
Packaging		
Packaging materials, including wood, plastic, including stretch wrap or LLPE, cardboard and metals	General solid waste (non-putrescible)	Off-site recycling
Wooden or plastic crates and pallets	General solid waste (non-putrescible)	Reused for similar projects, returned to suppliers, or off-site recycling. Contact *Business Recycling* for more information[10]
Work Compound and Associated Offices		
Food Waste	General solid (putrescible) waste	Dispose to landfill with general garbage

[7] Available online from http://www.fluorocycle.org.au/ or http://www.environment.gov.au/settlements/waste/lamp-mercury.html

[8] Available online from https://www.paintback.com.au/

[9] http://www.batteryrecycling.org.au/home

[10] Available online from http://businessrecycling.com.au/search/

Waste Types	NSW EPA Waste Classification	Proposed Management Method
Recyclable beverage containers including glass and plastic bottles, aluminium cans, and steel cans	General solid waste (non-putrescible)	Co-mingled recycling at off-site licensed facility or deliver to local NSW container deposit scheme 'Return and Earn' facility[11]
Clean paper and cardboard	General solid waste (non-putrescible)	Paper and cardboard recycling at off-site licensed facility
General domestic waste generated by workers such as soiled paper and cardboard and polystyrene	General solid waste (non-putrescible) mixed with putrescible waste	Disposal at landfill

5.3 Site preparation wastes

The Project will be constructed on previously disturbed land comprising commercial/industrial land associated with the Macquarie Industrial Park. Site preparation activities associated with the Project are anticipated to include:

- Removal of existing internal access roads circling the site
- Removal of existing car parking adjacent to current data centres

SLR has assumed car parking and roads are constructed of asphalt with a sub-layer of road base beneath. Council's guidelines to not provide waste generation rates for site preparation of demolition activities for carparks or roads. It is anticipated based on information provided by Giddis Project Management that the construction zone will encompass approximately 5,660 m2. This has been estimated by measuring the proposed ground floor footprint for the IC3wfrom the General Arrangement Plan (HDR-AR-2101) provided by Giddis Project Management. Estimates for depth of disturbance are based on SLRs experience on other projects.

Based on these assumptions, SLR estimates the volume of waste to be generated by the removal of asphalt and road base is estimated, as shown in **Table 5** below. Road base should be reused on site where possible. Asphalt should be removed from site for recycling at an appropriately licensed facility.

Table 5 Estimated quantities of site preparation wastes

Project component	Material	Surface Area (m^2)	Depth (m)	Volume (m^3)
Construction footprint	Asphalt	5,600	0.05	280
	Road base	5,600	0.1	565

Waste quantity estimates have been rounded up to the nearest 5 m^2

Council's DCP requires details of waste storage areas during demolition, construction, and ongoing operation to be submitted in support of the application. These should clearly show the location and provision for the storage and collection of waste and recycling. Stockpiles and site waste bins during construction should be sited to consider environmental factors and neighbouring properties.

It is possible that additional material will be generated during site preparation activities, such as preliminary groundworks or excavations for foundations. SLR recommends that excavated spoil is classified by a specialist contaminated land consultant and separated into contaminated materials, if any, uncontaminated fill or ENM.

[11] Available online from http://returnandearn.org.au/

Uncontaminated fill or ENM should be retained on site and managed appropriately for beneficial re-use for filling earthworks. As a last resort, remaining uncontaminated fill of ENM is to be sent off-site to a licenced facility in accordance with the Protection of the Environment Operations (Waste) Regulation 2014. The retention of waste tracking information on site is required by the NSW Government to demonstrate which facility received the material for recycling or disposal.

For contaminated material management, refer **Section 5.7.4** of this WMMP.

5.4 Construction Waste Types and Quantities

The Construction Site Manager will need to specify the types and quantities of wastes produced during construction and on this basis, the numbers and capacity of skip bins can be determined.

In the absence of readily available construction waste generation rates from Council, SLR has adopted the waste generation rates from Appendix A of The Hills Development Control Plan (DCP) 2012 for estimating the type and quantities of waste generated from construction of the Project. The waste generation rates listed in the Hills DCP include '2 Bedroom', '3 Bedroom', 'Block of Flats', 'Factory' and 'Office'. SLR has adopted the 'Factory' and 'Office' rates to measure waste expected from the Project, as the construction of a factory and office is the most relevant in representing the construction of the data centre. In the absence of readily available published information for 'Carpark' construction waste generation rates, SLR has developed 'Carpark' construction rates based on the 'Office' rates by:

- Removing timber, bricks and gyprock as these materials are unlikely to be present in significant quantities in a modern carpark structure, and
- Increasing the rates for concrete, sand or soil, metal and 'other', in proportion, to maintain the total assumed tonnage per 1,000 m^2 of construction.

The waste generation rates are shown in **Table 6**.

Table 6 Waste generation rates for the construction of the Project

Rate Type	Floor Area (m^2)	Waste types and quantities (m^3)						
		Timber	Concrete	Bricks	Gyprock	Sand or Soil	Metal	Other
Office Space (Office)	1,000	0.25	2.10	1.65	0.45	4.80	0.60	0.50
Data Centre (factory)	1,000	5.1	18.8	8.5	8.6	8.8	2.75	5
Ground floor (carpark)	1,000	--	30.6	--	--	14.3	4.5	8.1

The waste generation rates for 'Factory' are applied to calculate the waste quantities generated from the construction of each floor of the Data Centre. GFAs have been provided by Macquarie Data Centres as per the current design. Likewise, the GFA for office space is included within the IC3w design. For the ground floor, which comprises a mix of plant and car parking, the rates for car parking have been applied. This is estimated to comprise approximately 2,700 m^2 of floor area.

The 'Office' waste generation rates are applied to calculate the waste quantities from all office administration areas. The 'Carpark' waste generation rates are applied to calculate the waste quantities from the construction of all external hard surface areas including carparks and heavy and light duty surfaces. This is taken to be the ground floor which encompasses car parking, access roads, plus areas for firefighting equipment and water tank storage. The areas are based on the areas provided in the site plans attached in **Appendix A.**

Actual waste quantities and composition will vary; however, this estimate is provided so that the Construction Site Manager can make provision for on-site or off-site re-use and recycling opportunities. The construction wastes quantities anticipated from the construction of Building 3B are provided in **Table 7**.

Table 7 Estimated types and quantities of construction waste

Project component	Area (m^2)	Waste types and quantities (m^3)						
		Timber	Concrete	Bricks	Gyprock	Sand and Soil	Metal	Other
Office Space (within IC3w)	1,126	10	25	10	10	10	5	10
Data Rooms (Factory rates) (within IC3w)	7,971	5	20	15	5	40	5	5
IC3w Ground floor (Car Park rate)	2,700	-	85	-	-	40	15	25
Total Construction Waste	**11,728**	**15**	**135**	**30**	**20**	**95**	**25**	**40**

Waste estimates have been rounded up to the nearest 5 m^3.

The Site Manager is responsible for updating construction waste estimates once waste streams, estimated quantities, and final disposal locations and recycling services have been identified.

5.5 Waste Avoidance

In accordance with Council's DCP and better practice waste management, the Building Contractor, Building Designer and/or equivalent roles should:

- Provide space on site for the segregation and storage of wastes in containers suitable for collection.
- Provide a storage area for waste that is sufficient to handle and store the waste likely to be generated during construction activities.
- Develop a purchasing policy based on the approximate volumes of materials to be used so that the correct quantities are purchased.
- Arrange for delivery of materials on an 'as needed' basis to avoid material degradation through weathering and moisture damage.
- Communicate strategies to handle and store waste to minimise environmental, health and amenity impacts.
- Select materials with a low environmental impact over the lifecycle of the building.
- Choose timber from certified plantations and avoid unsustainable timber imports including western red cedar, oregon, meranti, Luan or merbau.
- Use leased equipment rather than purchase and disposal.
- Minimise site disturbance and unnecessary excavation.
- Design the Project to require standard material sizes or make arrangements with manufacturing groups for the supply of non-standard material sizes.
- Design works for de-construction.
- Reduce packaging waste by:
  - Returning packaging to suppliers where practicable to reduce waste further along the supply chain
  - Purchasing in bulk

  - Requesting cardboard or metal drums rather than plastics
  - Requesting metal straps rather than shrink wrap, and
  - Using returnable packaging such as pallets and reels.
- Use prefabricated materials.
- Select materials for Project works with low embodied energy properties or materials that have been salvaged or recycled for the construction of the Project including concrete that utilises slag and fly ash content, structural and reinforced steel that uses recycled steel content or bulk insulation products that contain recycled content, such as recycled glass in glass-wool.
- Preferentially use paints, floor coverings and adhesives with low VOC (volatile organic compound) content.
- Reduce the use of polyvinyl chloride products.
- Implement measures to prevent the occurrence of windblown litter, dust, and stormwater pollution.
- Ensure subcontractors are informed of and implement site waste minimisation and management procedures.

5.6 Reuse, Recycling and Disposal

Effective management of construction materials and construction and demolition waste, including options for reuse and recycling where applicable and practicable, will be conducted. Only wastes that cannot be cost effectively reused or recycled are to be sent to landfill or appropriate disposal facilities.

Refer to **Table 4** for an outline of the proposed reuse, recycling and disposal methods for potential site preparation and construction waste streams generated by the Project.

In accordance with Council's DCP and best practice waste management, the following specific procedures should be implemented:

- Ensure the site's project management of the site includes minimising waste generation, requiring the appropriate storage and timely collection of waste materials, and maximising re-use or recycling of materials.
- Store wastes on site appropriately to prevent cross-contamination and guarantee the highest possible re-use value.
- Consider the potential of any new materials to be re-used and recycled at the end of the Project's life.
- Determine opportunities for the use of prefabricated components and recycled materials.
- Strip topsoil from areas designated for excavation and store it on site for reuse.
- Reuse excavation material will be on-site where possible.
- Re-use formwork where appropriate.
- Retain roofing material cut-offs for re-use or recycling.
- Retain used crates for storage purposes unless damaged.
- Recycle cardboard, glass and metal wastes.

- Recycle or dispose of solid waste timber, brick, concrete, asphalt, and rock, where such waste cannot be re-used on site, to an appropriately licenced construction and demolition waste recycling facility or an appropriately licenced landfill.
- Dispose of all asbestos and/or hazardous wastes in accordance with SafeWork NSW and NSW EPA requirements.
- Deliver batteries and florescent lights to drop off-site recycling facility.
- Return excess materials and packaging to the supplier or manufacturer.

5.7 Waste Storage and Servicing

5.7.1 Waste Segregation and Storage

As outlined in the City of Ryde DCP, waste materials produced from site preparation and construction activities are to be separated at the source and stored separately on-site. It is anticipated that the Project will provide enough space on-site for separate storage, for example, separate skip bins or appropriately managed stockpiles, of the following waste types:

- Bricks, concrete, and scrap metal
- Metal and steel, in a condition suitable for recycling at metal recycling facilities
- Timber
- Glass
- Hardstand rubble
- Uncontaminated excavation spoil if present
- Contaminated excavation spoil if present
- Hazardous waste if present
- Paper and cardboard
- General co-mingled recycling waste, and
- Non-recyclable general waste.

If there is insufficient space on-site for full segregation of waste types, the Site Manager, or equivalent role, should consult with the waste and recycling collection contractor to confirm which waste types may be co-mingled prior to removal from the site.

5.7.2 Waste Storage Areas

Under the DCP, waste storage areas will be accessible and allow enough space for storage and servicing requirements. The storage areas will also be flexible in order to cater for change of use throughout the project. Where space is restricted, dedicated stockpile areas are to be delineated on the site, with regular transfers to dedicated skip bins for sorting.

All waste placed in skips or bins for disposal or recycling will be adequately contained to ensure that the waste does not fall, blow, wash or otherwise escape from the site. Waste containers and storage areas are to be kept clean and in a good state of repair.

As per Council's DCP, areas designated for waste storage should:

- Allow unimpeded access by site personnel and waste disposal contractors
- Consider environmental factors which could potentially cause an impact to the waste storage, such as slope, drainage and the location of watercourses and native vegetation
- Allow enough space for the storage of garden waste and other waste materials on-site
- Employ adequate environmental management controls to prevent off-site migration of waste materials and contamination from the waste. For example, consideration of slope, drainage, proximity relative to waterways, stormwater outlets and vegetation
- Consider visual amenity, safety, accessibility, and convenience in their selection, and
- Not present hazards to human health or the environment.

5.7.3 Waste Servicing and Record Keeping

The Site Manager or equivalent role is to:

- Arrange for suitable waste collection contractors to remove any construction waste from site
- Ensure waste bins are not filled beyond recommended filling levels
- Ensure that all bins and loads of waste materials leaving site are covered
- Maintain waste disposal documentation detailing, at a minimum:
- Descriptions and estimated amounts of all waste materials removed from site
- Details of the waste and recycling collection contractors and facilities receiving the waste and recyclables
- Records of waste and recycling collection vehicle movements, for example, date and time of loads removed, licence plate of collection vehicles, tip dockets from receiving facility, and
- Waste classification documentation for materials disposed to off-site recycling or landfill facilities.
- Ensure lawful waste disposal records are readily accessible for inspection by regulatory authorities such as Council, SafeWork NSW or NSW EPA, and
- Remove waste during hours approved by Council.

If skips and bins are reaching capacity, removal and replacement should be organised as soon as possible. All site generated building waste collected in the skips and bins will leave the site and be deposited in the approved site lawfully able to accept them.

5.7.4 Contaminated or Hazardous Waste Management

During the site preparation and construction phases, SLR recommends that a qualified and certified contractor is engaged to remove any contaminated or hazardous materials encountered or produced, for example, asbestos, and dispose of all contaminated or hazardous waste at an appropriately licenced facility.

All asbestos and other hazardous waste must be handled according to appropriate legislation and regulation including the Work Health and Safety Regulation 2017.

In accordance with Council's DCP, hazardous waste management at the site may require a licence from the EPA and approval from Council. If hazardous waste is identified for removal, Council and NSW EPA are to be consulted prior to undertaking any hazardous waste removal.

5.8 Site Inductions

All staff, including sub-contractors and labourers, employed during the site preparation and construction phases of the Project must undergo induction training regarding waste management for the Site.

Induction training is to cover, as a minimum, an outline of the WMMP including:

- Legal obligations and targets
- Emergency response procedures on-site
- Waste priorities and opportunities for reduction, reuse, and recycling
- Waste storage locations and separation of waste
- Procedures for suspected contaminated and hazardous wastes
- Waste related signage
- The implications of poor waste management practices, and
- Responsibilities and reporting, including identification of personnel responsible for waste management and individual responsibilities.

It is the responsibility of the Site Manager or Building Contractor to notify Council of the appointment of waste removal, transport, or disposal contractors.

5.9 Signage

Standard signage is to be posted in all waste storage and collection areas. All waste containers should be labelled correctly and clearly to identify stored materials.

Signs approved by the NSW EPA for labelling of waste materials are available online[12] and should be used where applicable. A selection of signs prepared by NSW EPA is provided in **Figure 5.**

[12] NSW EPA approved waste materials signage https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/business-government-recycling/standard-recycling-signs

Figure 5 Examples of NSW EPA labels for waste skips and bins

5.10 Monitoring and Reporting

The following monitoring practices are to be undertaken to improve site preparation and construction waste management and to obtain accurate waste generation figures:

- Conduct waste audits of current projects where feasible.
- Note waste generated and disposal methods.
- Look at past waste disposal receipts.
- Record this information to track waste avoidance, reuse, and recycling performance and to help in waste estimations for future waste management plans.

As per Council's DCP, records of waste volumes recycled, reused or contractor removed are to be maintained. This can include dockets or receipts verifying recycling and disposal in accordance with this WMMP. This evidence should also be presented to regulatory bodies when required.

Daily visual inspections of waste storage areas will be undertaken by site personnel and inspection checklists and logs recorded for reporting to the Site Manager on a weekly basis or as required. These inspections will be used to identify and rectify any resource and waste management issues.

Waste audits are to be carried out by the Building Contractor to gauge the effectiveness and efficiency of waste segregation procedures and recycling and reuse initiatives. Where audits show that the above procedures are not carried out effectively, additional staff training will be undertaken and signage re-examined.

5.11 Roles and Responsibilities

All personnel have a responsibility for their own environmental performance and compliance with all legislation. It will be the responsibility of the Building Contractor to implement the WMMP, and an employee and subcontractor responsibility to ensure that they always comply with the WMMP.

Where possible, an Environmental Management Representative should be appointed for the Project. Suggested roles and responsibilities are provided in **Table 7**.

Table 8 Suggested roles and responsibilities for site preparation and construction waste management

Responsible Person	General Tasks
Construction Site Manager	Ensuring plant and equipment are well maintained.
	Ordering only the required number of materials.
	Keeping materials segregated to maximise reuse and recycling.
	Ultimately responsible for routinely checking waste sorting and storage areas for cleanliness, hygiene and safety issues, contaminated waste materials, and also ensuring that all monitoring and audit results are well documented and carried out as specified in the WMMP.
Construction Environmental Manager or equivalent	Approaching and establishing the local commercial reuse of materials where reuse on-site is not practical.
	Establishing separate skips and recycling bins for effective waste segregation and recycling purposes.
	Ensuring staff and contractors are aware of site requirements.
	Provision of training of the requirements of the WMMP and specific waste management strategies adopted for the Project.
	Contaminated waste management and approval of off-site waste transport, disposal locations and checking licensing requirements.
	Approval of off-site waste disposal locations and checking licensing requirements.
	Assessment of suspicious potentially contaminated materials, hazardous materials, and liquid wastes.
	Monitoring, inspection, and reporting requirements.

Daily visual inspections of waste storage areas may be delegated to other on-site staff. All subcontractors will be responsible for ensuring that their work complies with the WMMP through the project induction and contract engagement process.

6 Operational waste management

6.1 Targets for resource recovery

Targets for new development are expected to contribute to state specific targets. The NSW Waste and Sustainable Materials Strategy 2041 (DPIE, 2021) sets a target of:

- 80% average recovery rate from all waste streams by 2030.

Analysis by DPIE (2021) indicates that commercial and industrial waste recovery rates in FY19 were 53%.

Council's Waste Management Strategy was released in 2014 and predates the updated State Strategy, aligning closely with the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021. There are no specific targets in the current Waste Management Strategy relating to Commercial and Industrial Wastes, other than aligning with the State targets.

It is anticipated that the waste minimisation measures in the following sections will assist the Project to meet the state's targets. Waste reporting and audits can be used to determine the actual percentage of waste that are being, or have been, recycled during operation.

6.2 Waste streams and classifications

The operation of the Project is anticipated to generate the following broad waste streams:

- Domestic wastes generated by employees, including food wastes
- Bulk packaging wastes, including polystyrene, plastic wrapping, and cardboard boxes
- General office waste
- Electronic wastes
- Garden organic waste from landscaped areas
- Bulky waste items such as furniture
- Stores, plant, and general maintenance wastes, and

Potential ongoing waste types, their associated waste classifications, and management methods are provided in **Table 9**. For further information on how to determine a waste's classification, refer to the NSW EPA (2014) Waste Classification Guidelines. Suggestions for recycling drop off locations and contacts can be found on https://businessrecycling.com.au/ for each waste type.

Table 9 Potential waste types, classifications, and management methods for operational waste

Waste Types	NSW EPA Classification	Proposed Management Method
General Operations		
Clean office paper	General solid (non-putrescible) waste	Paper recycling at off-site licensed facility
Cardboard including bulky cardboard boxes	General solid (non-putrescible) waste	Cardboard recycling at off-site licensed facility
Recyclable beverage containers, glass and plastic bottles, aluminium cans, steel cans	General solid (non-putrescible) waste	NSW container deposit scheme 'Return and Earn', container recycling at off-site licensed facility
Food waste	General solid (putrescible) waste	Compost on or off-site or dispose to landfill with general garbage
Batteries	Hazardous waste	Off-site recycling, alternatively contact the Australian Battery Recycling Initiative for more information
Mobile Phones	Hazardous waste	Off-site recycling; can be taken to the Mobile Muster program. Contact Mobile Muster for more information
Bulky polystyrene	General solid (non-putrescible) waste	Off-site recycling or disposal at landfill
Furniture	General solid (non-putrescible) waste	Off-site reuse or disposal to landfill
E-waste	Hazardous waste	Off-site recycling
Printer toners and ink cartridges	Hazardous waste	Off-site recycling, free disposal box or bags and pickup service exists for printer toners and ink cartridges

Waste Types	NSW EPA Classification	Proposed Management Method
General garbage, including non-recyclable plastics	General solid (putrescible and non-putrescible) waste	Disposal at landfill
Maintenance		
Spent smoke detectors[13]	General solid (non-putrescible) waste, or Hazardous waste (some commercial varieties)	Disposal to landfill, or off-site disposal at licensed facility
Glass, other than containers	General solid (non-putrescible) waste	Off-site recycling
Light bulbs and fluorescent tubes	Hazardous waste	Off-site recycling or disposal, contact FluoroCycle[14] or Lamp Recyclers[15] for more information
Cleaning chemicals, solvents, area wash downs, empty oil or paint drums, chemical containers	Hazardous waste if containers used to store Dangerous Goods (Class 1, 3, 4, 5 or 8) and residues have not been removed by washing or vacuuming. General solid (non-putrescible) waste if containers 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 licensed facility.
Garden organics - lawn mowing, tree branches, hedge cuttings, leaves	General solid (non-putrescible) waste	Reuse on-site or contractor removal for recycling at licenced facility
Hazardous		
E-Wastes	Hazardous Waste	Off-site recycling at a licenced facility.

6.3 Estimated quantities of operational waste

6.3.1 General operational wastes

Schedule C of Section 7.2 *Waste Minimisation and Management* of Council's DCP provides commercial waste and recycling generation rates. These do not specifically apply to the nature of a data centre operation. Macquarie Data Centre's has provided existing waste arisings for the existing IC2 Data Centre. SLR has used these actual rates of generation to estimate operational rates for the development. In discussion with Macquarie Data Centres, SLR has calculated the overall waste needs for the 3 data centres to allow the development of a waste storage area that allows for waste management of entire campus wastes.

Existing waste collections are:

- General waste: 1 x 4,500 L bin collected weekly (approximately 75% full on collection)
- Cardboard: 2 x 660 L bin collected weekly (approximately 75% full on collection)

[13] The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) require that when more than 10 smoke alarms (particularly americium-241 sources) are collected for bulk disposal they must be treated as radioactive waste and the requirements of the National Health and Medical Research Council's Code of practice for the near-surface disposal of radioactive waste in Australia (1992) must be met.

[14] https://www.fluorocycle.org.au/

[15] https://www.lamprecyclers.com.au/

- Approximately 10 x pallets a month

SLR has calculated the waste generation rate from the overall data centre campus by extrapolating from the IC2 waste generation rate by GFA for IC3e and IC3w, as per below.

Table 10 Estimated operational waste

	IC2	IC3e	IC3w	Total
GFA Office Space	324	169	1,126	1,619
GFA Data Hall	4,454	6,562	7,971	18,987
Totals	4,778	6,731	9,097	20,606
Estimated waste generation				
General Waste (L per week)	**3,375**	**4,842**	**6,457**	**14,674**
Cardboard (L per week)	**1,650**	**2,367**	**3,157**	**7,200**

Rates calculated based on existing IC2 waste generation.

At present separation of other non-cardboard recyclable waste is not undertaken. SLR recommends that recyclable waste generated in the office space within each IC is separated.

The Ryde DCP provides an estimated rate of 10 L/100 m^2/day to calculate office recyclable waste generation. With the total office space of 1,619 m^2 across the campus, this gives an estimate of 200 L of recyclable waste per day. This estimate includes cardboard, which accounts for approximately 60% of the office recyclable waste stream. When recalculated, the remaining recyclable waste generation rate is approximately 80 L per day or 560L per week.

Using the waste generation rates in **Table 10** above, the approximate weekly waste quantities for the Project have been calculated.

Table 11 Estimated quantities of operational general waste and recycling for the data centre campus

Location	General Waste (L/week)	Recycling (General) (L/week)	Recycling (Cardboard) (L/week)
Wast data centre campus (total)	14,675	560	7,200
IC3w (this proposal)	6,450	420	3,160

Waste quantity estimates have been rounded up to the nearest 5 L.

6.3.2 Additional operational wastes

In addition to the estimated quantities of waste and recycling listed in **Table 11**, the Project is anticipated to produce:

- Electronic waste, generated from fit out/decommissioning of individual data centres and associated infrastructure
- Minimal quantities of green landscaping waste
- Other wastes derived from maintenance activities.

E-waste generation will vary depending on the nature of data-centre client activities. Macquarie Data Centres. The Site Manager should ensure there is sufficient storage capacity within the Data Centre to temporarily store e-waste as it is generated. E-waste should be sent for recycling at a suitably licensed facility. The site manager should establish a contract for collection and recycling with an e-waste recycling contractor.

To minimise packaging waste generated in the recyclables stream, it is recommended that packing waste is returned to the suppliers where possible. As larger quantities of packaging waste may be campaign sourced (e.g., new fit outs, new client fit out), the site manager should ensure there is sufficient storage for packaging waste prior to it being sent for recycling.

If additional collection services are required, such as secured document destruction, these can be organised with a private waste contractor who can provide additional bins and take collected waste to an off-site licenced facility.

The Project is anticipated to produce minimal quantities of garden organics. Less than 100 L of garden organics are estimated to be generated per week. This waste will be taken by a landscaping contractor who will dispose of it at an off-site licenced facility.

6.4 Waste Storage Area Size

Council's DCP requires all commercial premises to:

- Have a dedicated waste and recycling storage room or area which has adequate storage space to meet the needs of the land use activity.
- All waste and recycling storage rooms and areas must be designed and constructed in accordance with the requirements of Schedule 4 (refer to S4.2 Waste and Recycling Storage Rooms and S4.5 External Waste and Recycling Storage Areas (see Section 6.6).
- The waste and recycling storage room or area must provide separate containers for the separation of recyclable materials from general waste. Standard and consistent signage on how to use the waste management facilities should be clearly displayed.
- Space must be provided in each occupancy for the temporary storage of garbage and recyclables generated in that area.
- Hazardous and special waste is to be stored in accordance with relevant occupational, health and safety and environmental protection legislation.
- Sufficient space in the development must be allocated to store bulky items such as used pallets and crates to prevent illegal dumping in the public domain.

For the IC3w Data Centre, the waste storage area must be large enough to adequately store all quantities of operational waste and recycling between collections. Given there are two other data centres at the same address, the size calculation allows for the storage and management of wastes generated from the entire campus.

All waste storage room calculations have considered the bin dimensions listed in Council's DCP, as outlined in **Table 12**.

Table 12 Dimensions and approximate footprint of bins

Dimension	Height (mm)	Depth (mm)	Width (mm)	Gross Floor Area (GFA) (m^2)
4.5 m^3 Front lift General Waste	1,850	1,860	2,050	3.81
4.5 m^3 Front lift Cardboard	1,850	1,860	2,050	3.81
660 L Rear lift general recycling	1,080	770	1,360	1.05
1100 L Rear lift e-Waste bin	1,460	1,230	1,370	1.69

Bin dimension for 1,100 L rear lift bin sourced from Council's DCP, 4.5m^3 dimension from Penrith City Council DCP

To allow for ready movement of bins into and out of the bin storage area, the bin storage area is to provide a floor area of at least twice the total minimum bin GFA. This can also act as a contingency in the event of spikes in waste generation. Additionally, an additional 0.2 m should be allowed between the bins to allow for manoeuvrability. This has been considered in the calculation of the waste storage area for each of the buildings in the Project.

The recommended storage areas do not include consideration for the storage of bulky and hazardous waste. For the additional storage space for bulky and hazardous waste, refer 6.4.1.

6.4.1 Operational waste

The estimated number of bins required for weekly storage of operational waste and recycling generated by the Project are shown in **Table 13** and are based on:

- The estimated quantities of operational waste and recycling as shown in **Table 11**
- Bin dimensions from the Council's DCP as shown in **Table 12**

The estimated number of bins required for weekly storage of operational waste and recycling generated by the project is shown in **Table 13.**

Table 13 Minimum number of bins and waste storage area for operational waste of the Project

Waste type	Bin required	Collection frequency	Storage area estimate (m^2)
General waste	1 x 4.5 m^3 Front lift general	4 x weekly	8
General recycling	1 x 660L Rear lift	1 x Weekly	2
Cardboard	1 x 4.5 m^3 Front lift general	2 x weekly	7
Electronic Waste	1 x 1100L	As required	4
Bulky Waste	-	As required	8
		TOTAL	**29 m^2**

As outlined in the Ryde DCP, additional storage space for the bulky waste stream must be provided. This stream includes broken pallets, broken storage units, bulky e-waste and other materials that cannot be disposed of in the general or recyclable waste stream. SLR recommends that the site has a specific bin for e-waste to be collected and has allowed for a 1,100-litre bin to be stored within the waste storage area.

Council's guidelines do not provide storage area dimensions for bulky waste. In the absence of dimensions provided by Council, SLR has adopted storage area dimensions for bulky waste presented in The City of Sydney's Guidelines for Waste Management in New Developments. These are applied as they are the most recent recommendations for bulky waste storage that have been provided in guidelines for new developments in NSW and are applicable to non-residential developments. The recommended space for storing bulky wastes should be at least:

- 4 m^2 for developments between 100 m^2 and 2,000 m^2, and
- An additional 4 m^2 for developments over 2,000 m^2 and for every 20,000 m^2 of office space.

SLR recommends 8 m^2 to be allocated for bulky waste storage. The total recommended waste storage area is 29 m^2.

Management may consider organising a skip on a monthly basis or as required to remove bulky waste items or engage a contractor to collect and transport these items for reuse, recycling, or disposal at an EPA licensed facility. The site manager should consider the need for a separate e-waste bin should depending on need.

The waste storage areas for the project are shown on the architectural drawing attached in **Appendix A** in line with Council's requirements. A schematic of the proposed waste storage room, including bulky waste is show on **Figure 6**.

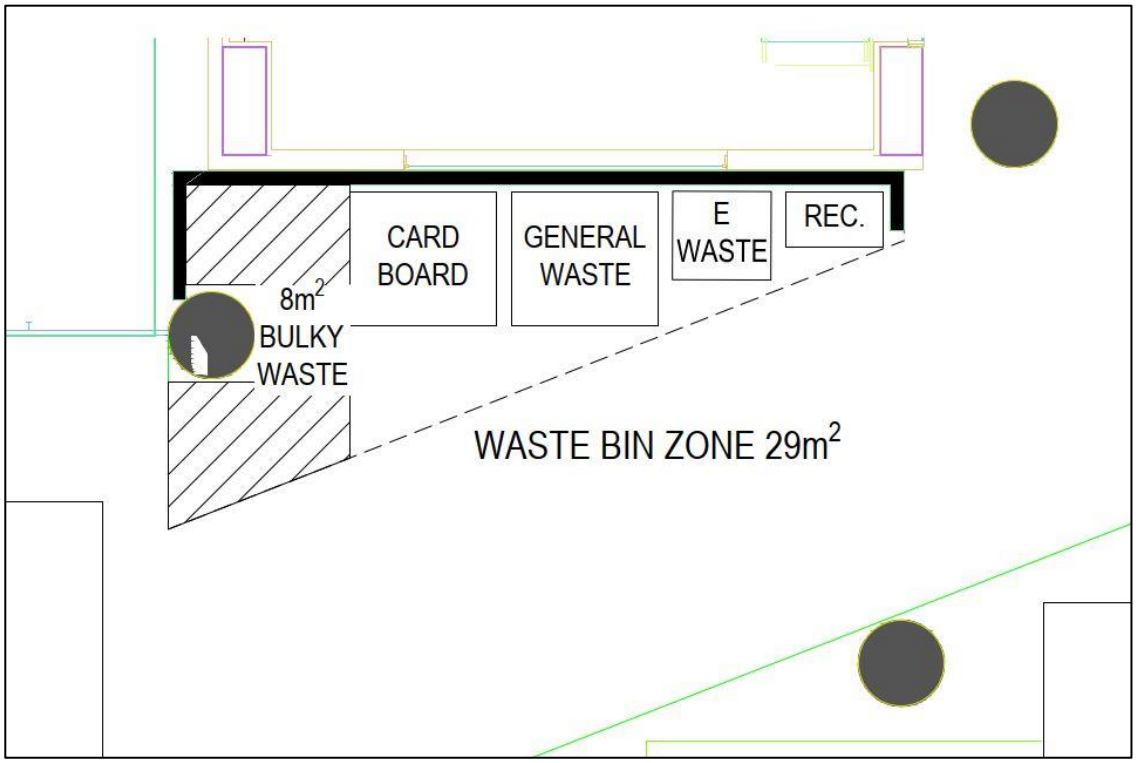


Figure 6 Schematic showing indicative waste storage room layout

SLR recommends that waste audits be undertaken approximately one month into the operational phase of the Project to quantify actual waste generation rates. The assessment of generated waste quantities will be influenced by management, employee, and tenant attitudes to recycling and disposal, and the adequacy of signage and education provided for occupants.

6.5 Waste Storage Room Location

In accordance with Council's DCP, the design for the waste storage areas of the Project is to take into consideration better practice waste management and recommendations from Council's DCP. The Client may consider a single waste storage room or area location that can service waste needs across the IC2, IC3e and proposed IC3w buildings to increase efficiency of collection. In this instance the waste storage area will be located within the IC3w Data Centre servicing the entire campus.

In accordance with better practice waste management and Council's DCP, the waste storage area should be located so that:

- They provide easy, direct, and convenient access for users of the Data Centre;
- Permit easy transfer of bins to the collection point if relocation of bins is required;
- Permit easy, direct, and convenient access for collection service providers;
- They do not intrude on car parking, landscaping, access and turning areas required for the type and scale of the development;
- They do not reduce amenity (i.e., minimises the potential for noise, odour and other amenity and environmental impacts on residents or other occupants);
- Maximises protection of trees and significant vegetation.

As per Council's DCP, the collection areas for the data centre are to be clearly nominated on site plans accompanying development applications. The waste storage areas are shown on the site plan as presented in **Appendix A**, and as shown on **Figure 6**, in accordance with Council requirements.

6.6 Waste Storage Area Features

In accordance with better practice waste management and Council's DCP, the waste storage area should incorporate the following features.

Access driveways and service areas for waste collection vehicles must be designed in accordance with Australian Standard AS 2890.2-2002 Parking Facilities – Part 2: Off-street commercial vehicle facilities.

As required by Council's DCP, the collection areas for the data centre are to be clearly nominated on site plans accompanying development applications. SLR will include drawings showing where the waste storage areas are located on the site plan, in accordance with Council requirements.

The collection vehicles required for 4.5 m^3 front lift bins require 6.2 m height clearance to empty the bins. Therefore, front-lift bins are commonly used in outdoor areas with no restrictions on overhead clearance. The waste storage area should have a roof as required in the DCP, but bins can be withdrawn from the storage area for emptying by the collection vehicle. For this reason, SLR recommends that the waste storage areas be in, or adjacent, to an outdoor area where there are no restrictions on overhead clearance.

External waste and recycling storage areas must be designed and constructed in accordance with Schedule 4: S4.5. External Waste and Recycling Storage Areas.

The relevant parts of Schedule 4 S4.5 are:

- The waste and recycling storage area must be roofed to prevent the entry of rainwater. The ceiling must be of a minimum height to enable access for cleaning and the lids of bins to be fully opened.
- The floor of the waste and recycling storage area must be constructed of concrete finished to a smooth even surface.
- All uncontaminated stormwater from the roof and uncovered paved areas of the site must be directed away from the waste and recycling storage area and be drained to Council's stormwater drainage system.
- Where garbage or putrescible waste is to be stored, the floor must be graded to a floor waste connected to the sewerage system. The floor waste must be fitted with an in-floor dry basket arrestor approved by Sydney Water Corporation.
- Where garbage or putrescible waste is to be stored, a tap with a hose connection must be provided in or adjacent to the waste and recycling storage area to facilitate cleaning.
- The waste and recycling storage area must be adequately screened from the street to prevent the creation of unsightly conditions

6.7 Waste Servicing

Based on communication with the Client, SLR understands that waste collections will be undertaken through a private contractor. The following general waste servicing access requirements should be implemented:

- Waste will be removed regularly.
- Arrangements should be in place so that the waste and recycling storage rooms are not accessible to the general public.

Where possible, access must be provided for waste collection vehicles to stand on the premises when collecting wastes and leave the site in a forward direction.

Adequate access must be provided for the users, waste collection staff and collection vehicles. Where collection vehicles are required to drive into a property to collect waste and recycling:

- The site must be designed to allow collection vehicles to enter and exit the property in a forward direction with minimal need for reversing and to be operated with adequate clearances; and
- The driveway and any basement space needed are to be suitable for collection vehicles in terms of pavement strength, spatial design, access width and height clearances. Appendix C Collection Vehicles and Appendix D Vehicle access/Turning Circles under the Better Practice Guide for Waste Management in Multi-Unit Dwellings, DECC 2008 are to be used as a guide.

In accordance with Council's DCP, the following is required for the access provisions for of waste collection vehicles:

- Drawings must show the site's entry point, vehicle's route of travel and manoeuvring
- The site must be designed to allow collection vehicles to enter and exit the property in a forward direction with minimal need of reversing and to be operated with adequate clearances; and

- The driveway and any basement space needed are to be suitable for collection vehicles in terms of pavement strength, spatial design, access width, and height clearances. The DCP recommends using Appendix C Collection Vehicles and Appendix D Vehicle access/Turning Circles under the Better Practice Guide for Waste Management in Multi-Unit Dwellings (DECC 2008) to be used as a guide.
- Swept path models must illustrate how a standard waste collection vehicle will enter, service and exit the site
- A 0.5 m unobstructed clearance is required from all obstructions for the vehicle's ingress and egress manoeuvres
- For rear loaded vehicles, an additional 2 m unobstructed loading zone is required behind the vehicle for the loading of 1,100 L bins. Additionally, a 0.5 m side clearance is required on either side of the vehicle for driver movements and accessibility
- Unobstructed access, adequate driveways, and ramps of sufficient strength to support waste collection
- A structural engineer's report is to accompany the DA and confirm that all infrastructure used for vehicle ingress and egress movements can support the waste collection vehicle's weight. Council's DCP consists of dimensions for waste collection vehicles.

The collection vehicles required for 4.5 m^3 front lift bins require 6.2 m height clearance to empty the bins. Therefore, front-lift bins are commonly used in outdoor areas with no restrictions on overhead clearance. For this reason, SLR recommends that the waste storage areas be in an outdoor area with no restrictions on overhead clearance.

SLR recommends that the design of the Project is reviewed by a traffic specialist and that the drawings are updated to be in accordance with Council's servicing requirements listed above. This WMMP should be updated to reflect those updates.

Hazardous waste produced at the site will be collected by appropriately licensed specialised services.

Once a private waste contractor is engaged, a valid waste and recycling collection contract is recommended to demonstrate disposal at a waste facility lawfully able to accept it. Written evidence of the valid contract should be kept on-site.

6.8 Waste Avoidance, Reuse and Recycling Measures

6.8.1 Waste Avoidance

Waste avoidance measures include:

- Participating in take-back services to suppliers to reduce waste further along the supply chain
- Avoiding printing where possible
- Review of packaging design to reduce waste but maintain 'fit for purpose'
- Providing ceramic cups, mugs, crockery, and cutlery rather than disposable items
- Purchasing consumables in bulk to avoid unnecessary packaging
- Presenting all waste reduction initiatives to staff as part of their induction program, and
- Investigating leased office equipment and machinery rather than purchase and disposal.

6.8.2 Re-use

Possible re-use opportunities include establishing systems with in-house and supply chain stakeholders to transport products in re-useable packaging where possible.

6.8.3 Recycling

Recycling opportunities include:

- Collecting and recycling e-wastes
- Flatten or bale cardboard to reduce number of bins required
- Paper recycling trays provided in office areas for scrap paper collection and recycling
- Collecting printer toners and ink cartridges in allocated bins for appropriate contractor recycling, and
- Development of 'buy recycled' purchasing policy.

6.9 Communication Strategies

Waste management initiatives and management measures should be clearly communicated to building managers, owners, employees, customers, and cleaners. Benefits of providing this communication include:

- improved satisfaction with services
- increased ability and willingness to participate in recycling
- improved amenity and safety
- improved knowledge and awareness through standardisation of services
- increased awareness or achievement of environmental goals and targets
- reduced contamination of recyclables stream
- increased recovery of recyclables and organics material, if implemented, and
- greater contribution to targets for waste reduction and resource recovery, the environment and heritage conservation.

To realise the above benefits, the following communication strategies should be considered:

- Use consistent signage and colour coding throughout the Project
- Ensure all staff are trained in correct waste separation and management procedures
- Provide directional signage to show location of and routes to waste storage area
- General waste and co-mingled recycling bins should be clearly labelled and colour-coded to ensure no cross contamination, where applicable
- Employees and cleaners should adhere to the WMMP for compliance, in consultation with management, and
- Repair signs and labels promptly to avoid breakdown of communications.

6.10 Signage

The waste storage and collection areas should be provided with appropriate signage. These signs should clearly identify waste management procedures and provisions to contractors, tenants and visitors should be distributed around the Project.

Signs which clearly identify waste management procedures and provisions to staff and visitors should be distributed around the Project. Key signage considerations are:

- Clear and correct labelling on all waste and recycling bins, indicating the correct type or types of waste that can be placed into a given bin, as shown in **Figure 7**
- Signposts and directions to location of waste storage areas
- Clear signage in all waste storage areas to instruct users how to correctly separate waste and recycling
- Maintaining a consistent style colour scheme and system for signs throughout the Project, and
- Emergency contact information for reporting issues associated with waste or recycling management.

Colour-coded and labelled bin lids are necessary for identifying bins. All signage should conform to the relevant Australian Standard and use labels approved by the NSW EPA[16]. The design and use of safety signs for waste rooms and enclosures should comply with Australian Standard AS 1319 Safety Signs for the Occupational Environment and clearly describes the types of materials designated for each bin.

Figure 7 Example of bin labels for operational waste

6.11 Monitoring and Reporting

Monitoring is recommended to ensure waste and recycling management arrangements and provisions for the Project are functional, practical and are maintained to the standard outlined in this plan, at a minimum.

Visual assessments of bins and bin storage areas should be conducted by the building manager, at minimum:

- Weekly, in the first two months of operation to ensure the waste management system is sufficient for the operation, and
- Every six months, to ensure waste is being managed to the standards outlined in this document.

In addition, audits are to be conducted on a half-yearly basis to ensure WMMP provisions are maintained.

[16] NSW EPA waste signage and label designs http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm

Quantities of waste and recycling associated with disposal of waste and recycling, including dockets, receipts and other physical records should be recorded by the Building Manager. This is to allow reviews of the waste management arrangements and provisions at the site over time. Records of waste disposal should also be available to regulatory authorities such as the NSW Environmental Protection Authority and SafeWork NSW, upon request.

Any deficiencies identified in the waste management system, including, but not limited to, unexpected waste quantities, is to be rectified by the Building Manager as soon as it is practical. Where audits show that recycling is not carried out effectively, management should carry out additional staff training, signage re-examination and reviews of the waste management system where the audit or other reviewing body has deemed necessary. If this waste management plan no longer sufficiently meets the needs of the Project, review, and updates to maintain suitability must be undertaken.

6.12 Roles and Responsibilities

It is the responsibility of the Building Manager, or equivalent role, to implement this WMMP and a responsibility of all warehouse tenants and staff to follow the waste management procedures set out by the WMMP. SLR recommends that all subcontractors enlisted by the Client are to have roles and responsibilities identified and the Project's waste management system clearly explained. A summary of recommended roles and responsibilities are provided in **Table 14**.

Table 14 Operational waste management responsibility allocation

Responsible Person	General Tasks
Management	Ensure the WMMP is implemented throughout the life of the operation.
	Update the WMMP on a regular basis (e.g., annually) to ensure the Plan remains applicable.
	Undertake liaison and management of contracted waste collections.
	Organise internal waste audits on a regular basis.
	Manage any complaints and non-compliances reported through waste audits etc.
	Perform inspections of all waste storage areas and waste management equipment on a regular basis.
	Organise cleaning and maintenance requirements for waste management equipment.
	Monitor bins to ensure no overfilling occurs.
	Ensure effective signage, communication and education is provided to alert visitors, employees, and cleaners about the provisions of this WMMP and waste management equipment use requirements.
	Monitor and maintain signage to ensure it remains clean, clear, and applicable.
	Ensure waste and recycling storage rooms are kept tidy.
	Ensure that regular cleaning and daily transfer of bins is being undertaken by the cleaners
	Ultimately responsible for the management of all waste management equipment, cleaning requirements, waste transfer and collection arrangements.
Cleaners and Staff	Removal of general waste, recyclables, cardboard waste, and hazardous waste from floor areas for transfer to centralised waste and recycling collection rooms daily or as required.
	Cleaning of all bins and waste and recycling rooms on a weekly basis or as required.
	Compliance with the provisions of this WMMP.
Gardening Contractor, as applicable	Removal of all garden organics waste generated during gardening maintenance activities for recycling at an off-site location or reuse as organic mulch on landscaped areas.

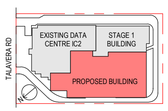
APPENDIX A

Site design drawings

REV	DESCRIPTION	DATE
B	FOR SEARS	06/07/21
A	FOR SEARS	25/06/21

NORTH POINT

KEY PLAN



PROJECT MANAGER
GIDDIS PROJECT MANAGEMENT

CLIENT
macquarie DATA CENTRES

ARCHITECT
HDR
Level 1, 110 Walker Street, North Sydney NSW 2060, Australia
+61 2 9956 2666 | hdrinc.com
HDR Pty. Limited ABN 76 158 075 220 trading as HDR
Nominated Architect: Cate Cowlishaw 10786 (NSW)

PROJECT
IC3 SUPER WEST
17-23 TALAVERA RD, MACQUARIE PARK

DRAWING TITLE
GENERAL ARRANGEMENT GROUND FLOOR

PROJECT STATUS
SSDA - PRELIMINARY ISSUE

PROJECT NUMBER
10301489

DRAWING NUMBER
A2101

ISSUE
B

SCALE
1 : 250 @ A1

ASIA PACIFIC OFFICES

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST
Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Level 11, 176 Wellington Parade
East Melbourne VIC 3002
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

NEWCASTLE CBD
Suite 2B, 125 Bull Street
Newcastle West NSW 2302
Australia
T: +61 2 4940 0442

PERTH
Ground Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY
Tenancy 202 Submarine School
Sub Base Platypus
120 High Street
North Sydney NSW 2060
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
12 Cannan Street
South Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 2 4249 1000

AUCKLAND
Level 4, 12 O'Connell Street
Auckland 1010
New Zealand
T: 0800 757 695

NELSON
6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628

WELLINGTON
12A&B Waterloo Quay
Wellington 6011
New Zealand
T: +64 274 898 628