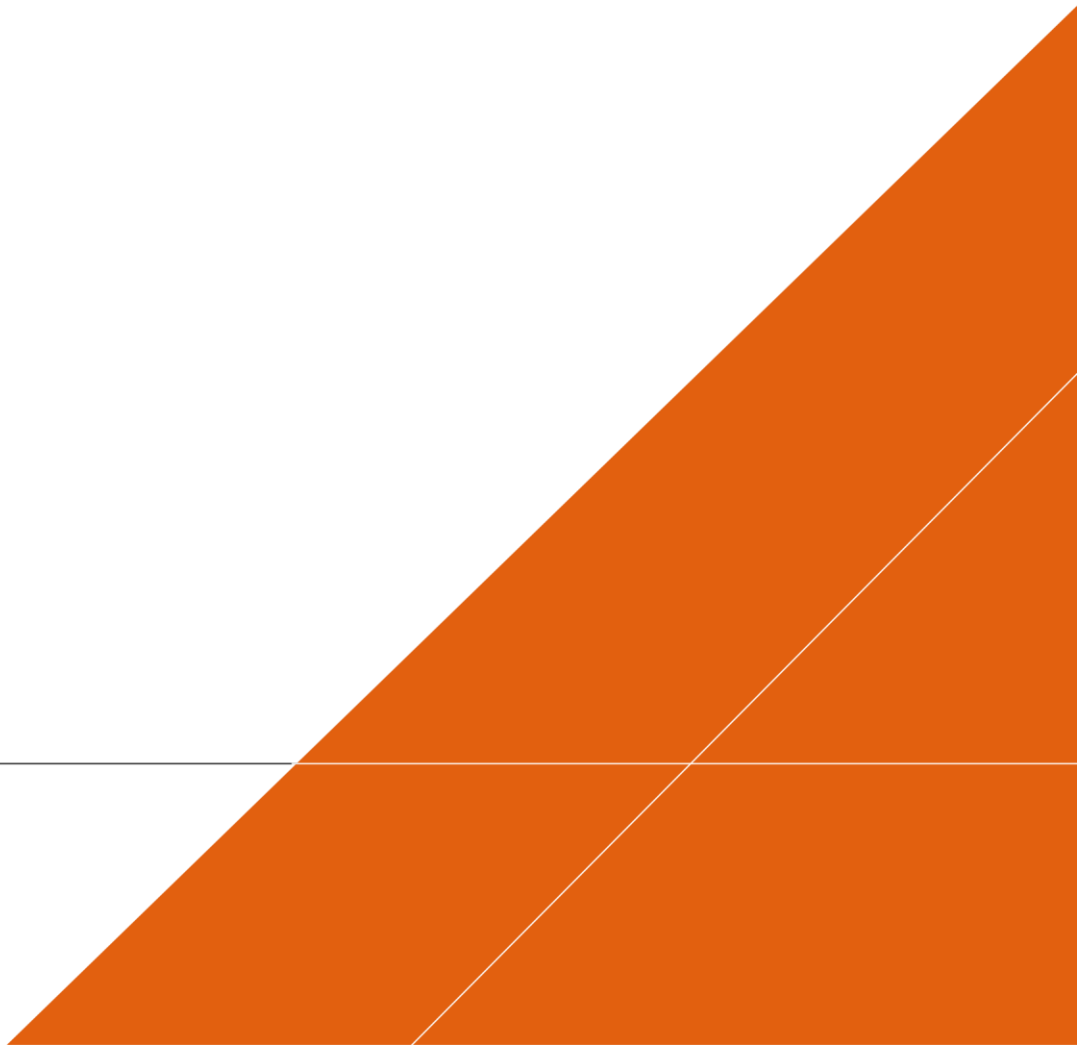
ARCADIS Design & Consultancy for natural and built assets

MINTO WAREHOUSE AND LOGISTICS HUB

Waste Management Assessment

01 APRIL 2016



Incorporating Hyder

MINTO WAREHOUSE AND LOGISTIC HUB

Waste Management Assessment

Author	Charlotte Wesley	
Checker	Sara-Rose Pogson	
Approver	Anna Zolotukhina	

Report No R-0001-AA009069-AAR-02

Date 1/04/2016

Revision Text Revision 01

REVISIONS

Revision	Date	Description	Prepared by	Approved by
01	01/04/2016	Revision 01	SP	AZ

CONTENTS

1 INTRODUCTION

Qube is preparing a State Significant Development Application (SSDA) in relation to the proposed development of 5 and 9 Culverston Road, Minto, being legally described as Lot 3 in DP 817793 and Lot 400 in DP 875711 (the Site), for the purpose of a Warehouse and Logistics Hub (the Proposal).

Arcadis has been engaged by Qube to investigate existing in ground utilities in the vicinity of the proposed development. The Proposal includes the following key components:

- Four (4) Warehouse facilities;
- Ancillary hardstand areas, car parking and external storage hardstand area.

The purpose of this report is to demonstrate how the Proposal will satisfy the SEARs.

1.1 Project Description

The Site is located in Minto and is bound by Airds Road, Rose Payten Drive and Main Southern Railway. Culverston Road crosses the development as outlined in Figure 1. The development is approximately 29.36 hectares in area and is planned to accommodate warehouses with the total building area of 112,000 m^2.

The existing site comprises an industrial area hardstand, shade structures and a warehouse building.

Figure 1 Site location

1.2 Proposed Development and Approval Conditions

This report has been prepared as part of a State Significant Development (SSD) Application and in accordance with the Secretary's Environmental Assessment Requirements (SEARs) (ref: SSD 7500, File: 16/03046 and dated 10/03/2016). The SEARs which are addressed in this report are presented in Table 1.

Table 1: Waste Management SEARs

SEARs Reference	Key Assessment Requirement	Where addressed
Waste	• Details of the quantities and classification of all waste streams to be generated on site	Section 3
Waste	• Details of waste storage, handling and disposal	Sections 3 and 5
Waste	• 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*	Section 5

2 LEGISLATION AND POLICY CONTEXT

The waste management for the construction and operational phases of the Proposal is influenced by a series of pieces of legislation, policies and plans. Documents relevant to the Proposal are outlined in Table 2.

Table 2 Legislation and policy context

Instrument	Relevant provisions
National Waste Policy: Less Waste, More Resources	The National Waste Policy, published in 2009 by the Federal Government, outlines the plans for waste management in Australia until 2020. The desired outcomes of the Policy are designed to steer the direction of waste management by all lower tiers of government. These outcomes are: ▪ Australia manages waste, including hazardous waste, in an environmentally safe, scientific and sound manner, and has reduced the amount per capita of waste disposed ▪ Waste streams are routinely managed as a resource to achieve better environmental, social and economic outcomes, including saving water, energy, greenhouse gas emissions and finite resources, and to increase productivity of the land ▪ Australia has increased the amount of products, goods and materials that can be readily and safely used for other purposes at end-of-life ▪ Opportunities to safely manage, reduce and recycle waste are available to all Australians, including approaches that have been tailored to meet the needs of remote and rural communities ▪ Risks associated with waste and hazardous waste substances are understood and managed to minimise current and intergenerational legacy issues ▪ Australia manages its products, materials and chemicals that contain potentially hazardous substances, in particular those that are persistent, bio-accumulative and toxic, consistent with its international obligations and using best available evidence, techniques and technologies ▪ Local stockpiling of hazardous waste has been significantly reduced particularly from rural and remote areas ▪ There are consistent and clear requirements for disposal of hazardous material, and for content labelling of manufactured goods, that also provide a level playing field for Australian manufacturers and importers and informs consumers ▪ Interaction of regulatory frameworks and operational processes across government agencies aligns with world's best practice and facilitates waste avoidance, resource recovery and appropriate end-of-life management arrangements within their own operations as well as by businesses and the community

Instrument	Relevant provisions
	▪ There are efficient and effective Australian markets for waste and recovered resources, and local technology and innovation are sought after internationally ▪ Businesses, including those in manufacturing and the supply chain, embrace innovations that support the creation of value from potential waste streams and minimise their environmental footprint ▪ As part of a seamless national economy, there is a consistent and coherent regulatory environment that facilitates business activity in resource recovery and waste management ▪ Governments, industry and the community have embraced product stewardship and extended producer responsibility approaches ▪ Product stewardship and extended producer responsibility is adopted in business operations, leading to improvements in the design, longevity and disassembly of products, a reduction in hazardous content, less waste, and more thoughtful consumer choices
Product Stewardship Act 2011 (Commonwealth)	Product Stewardship refers to the 'whole of life' custodianship of products within the economy. This is achieved by encouraging or requiring manufacturers, importers, distributors and other persons to take responsibility for their products. Through Product Stewardship the amount of waste going to landfill is reduced, recycling rates are increased, valuable resource are reused for new products, and harmful substances in some products are prevented from entering the natural environment. The framework includes voluntary, co-regulatory and mandatory product stewardship. Voluntary accreditation schemes encourage product stewardship without the need for regulation. Organisations accredited under the legislation must meet specific requirements that ensure they carry out their activities in a transparent and accountable manner. Co-regulatory product stewardship schemes are delivered by industry and regulated by the Australian Government. The exact requirements are detailed separately in the regulations for the scheme. Mandatory product stewardship places legal obligations on parties to take certain actions in relation to a product. Requirements may include labelling of products, making arrangements for recycling products at end-of-life, or requiring a deposit and refund to be applied to a product. Items currently included in the 2015-2016 product list include: 1. Waste architectural and decorative paint 2. End-of-life batteries less than 5kg in weight. Until recently, end-of-life air conditioners and refrigerators with small gas charges were included in the product list. These items are now excluded as a cost benefit analysis of product stewardship of these products did not show a net benefit to society. Each year the Minister reviews the list for incorporation of suitable new product listings. The National Television and Computer Recycling Scheme came into effect in 2011 through the *Product Stewardship (Televisions and Computers) Regulations 2011*. The regulation supports a co-regulatory recycling scheme for televisions, computers, printers and computer products. In 2014 the federal government established a voluntary, industry-led tyre product stewardship scheme. The scheme is administered by Tyre Stewardship Australia (TSA). TSA aims to increase domestic tyre recycling, expand the market for tyre-derived products and

Instrument	Relevant provisions
	reduce the number of Australian end-of-life tyres that are sent to landfill, exported as baled tyres or illegally dumped.
NSW Waste Avoidance and Resource Recovery Act 2001 (WARR Act)	The NSW *Waste Avoidance and Resource Recovery Act* 2001 (WARR Act) promotes waste avoidance and resource recovery by developing appropriate strategies and programs. The WARR Act includes the following objectives: ▪ Encourage the most efficient use of resource and to reduce environmental harm in accordance with the principles of ecologically sustainable development ▪ Ensure that resource management options considered against the waste hierarchy ▪ Provide for the continual reduction in waste generation ▪ Minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste ▪ Ensure the industry shares with the community the responsibility for reducing and dealing with waste ▪ Ensure the efficient funding of waste and resource management planning, programs and service delivery ▪ Achieve integrated waste and resource management planning, programs and service delivery on a state-wide basis ▪ Assist in the achievement of the objectives of the *Protection of the Environment Operations Act* 1997
Waste Avoidance and Resource Recovery Strategy 2014 (WARR Strategy)	The WARR Strategy aims to reduce the environmental impact of waste and improve the well-being of the NSW environment, community and economy across the following key areas: **Principles** ▪ Avoid and reduce waste generation – reducing the amount of material entering the waste management or recycling systems by using products and materials more efficiently and avoiding unnecessary product use ▪ Increase recycling – increasing the amount of material that is recycled within the productive economy ▪ Divert more waste from landfill – increasing the amount of material in the waste stream that is diverted from landfill to alternative uses, such as recycling and energy recovery ▪ Manage problem wastes better – separating and managing materials in the waste stream that hinder effective recycling ▪ Reduce litter – reducing the presence of litter in the environment ▪ Reduce illegal dumping – reducing the incidence of illegal dumping in the community

Instrument	Relevant provisions

	Targets
	Key to delivering the WARR Strategy in the key results areas are the following targets:
	▪ By 2021-22, reduce the rate of waste generation per capita
	▪ By 2021-22, increase recycling rates for:
	  ▪ municipal solid waste from 52% (in 2010-11) to 70%
	  ▪ commercial and industrial waste from 57% (in 2010-11) to 70%
	  ▪ construction and demolition waste from 75% (in 2010-11) to 80%
	▪ By 2021-22, increase the waste diverted from landfill from 63% (in 2010-11) to 75%
	▪ By 2021-22, establish or upgrade 86 drop-off facilities or services for management of household problem wastes state-wide
	▪ By 2016-17, reduce the number of litter items by 40% compared with 2011-12 levels and then continue to reduce litter items to 2021-22
	▪ By 2016-17:
	  ▪ Reduce the incidence of illegal dumping of waste detected in Sydney and the Illawarra, Hunter and Central Coast regions by 30% compared with 2010-11
	  ▪ Establish baseline data to allow target-setting in other parts of the state

Protection of the Environment Operations Act 1997	The *Protection of the Environment Operations Act* 1997 (POEO Act) defines 'waste' for regulatory purposes and establishes management and licensing requirements along with offence provisions to deliver environmentally appropriate outcomes. The POEO Act includes protection of the environment policies (PEPs), which are used to establish environmental standards, goals, protocols. They provide both the framework for Government decisions that affect the environment and the means of adopting Australia-wide environment protection measures set by the National Environment Protection Council. The POEO Act contains a list of activities that require an environmental protection licence and provides a single licensing arrangement to replace the different licences and approvals under existing separate Acts relating to air pollution, water pollution, noise pollution and waste management. License holders are required to prepare and implement pollution incident response management plans and environmental audits. They also have a duty notify the regulating authority of pollution incidents. Scheduled and non-scheduled activities are regulated under the POEO Act, where the EPA is the appropriate regulatory authority. Under this legislation clean-up notices, prevention notices and fees can be issued. The Act has a three tier regime of offences relating to disposal of waste and corresponding penalties. Acts that render harm to the environment and acts of wilful negligence carry the most serious penalties.
Protection of the Environment Operations (Waste) Regulation 2014 (Proximity Principle)	The proximity principle restricts the distance waste can be transported by motor vehicle if generated in NSW. Waste cannot be transported more than 150km from the place of generation except where there are no lawful waste disposal facilities within 150km or if the disposal facility is located in another state and the border is within 150km of where the waste was generated.

Instrument	Relevant provisions
Protection of the Environment Operations (Waste) Regulation 2014 (The pasteurised organics order 2014)	Until recently it was permissible to shred and or screen garden organics prior to application to land under the raw mulch exemption. Raw mulch is defined as: a. horticultural barks, leaf mulch and wood chip mulch produced from forestry and sawmill residues, and urban wood residues; and b. branches, tree stumps and bark that are absent of leaves, flowers, fruit and plant propagules. Under the new raw mulch order 2014, it is noted that 'where there is a significant risk of the presence of plant propagules, pathogens and other contaminants, the raw mulch must be assessed against and comply with the conditions of the pasteurised garden organics order 2014'. Garden organics includes raw mulch and/or other plant material including leaves, plant trimmings, grass, flowers, fruit and plant propagules. According to the general conditions of the pasteurised garden organics order 2014, the processor must pasteurise the garden organics material supplied under this order as a minimum. Pasteurisation means a process to significantly reduce the numbers of plant and animal pathogens and plant propagules. Pasteurisation requires that the entire mass of organic material be subjected to either of the following: (a) Appropriate turning of outer material to the inside of the windrow so that the whole mass is subjected to a minimum of 3 turns with the internal temperature reaching a minimum of 55°C for 3 consecutive days before each turn. Where materials with a higher risk of containing pathogens are present, including but not limited to manure, the core temperature of the material mass should be maintained at 55°C or higher for 15 days or longer, and during this period the windrow should be turned a minimum of 5 times. (b) An alternative process that guarantees the same level of pathogen reduction, and the reduction of plant propagules as in (a). Any such alternative process must be clearly defined in writing and validated by a suitably qualified person prior to claiming compliance with this order. A written record of the validation report must be kept for a minimum period of three years.
The Macarthur WARR Strategy 2014-2017	The Macarthur WARR Strategy incorporates the plans of the Macarthur councils (Camden, Campbelltown and Wollondilly) through to 2017, and is based on the NSW WARR Strategy. Although the Strategy is mostly focused on domestic waste, the Strategy has the following main objective: ▪ To maximise recovery, diversion of waste from landfill and waste avoidance and appropriate disposal of waste through community education, increased engagement with stakeholders and working cooperatively across the region.
Campbelltown City Council's Community Strategic Plan 2013-2023	Campbelltown City Council's Community Strategic Plan outlines the community's objectives for the period 2013 to 2023. Key themes and objectives identified through consultation for the plan revealed that the community requires the following objectives: ▪ Manages healthy waterways leading to a healthy environment for our children ▪ Protects our natural resources, parks and reserves and supports our waterways ▪ Ensure sustainability through effective storm water management.

Instrument	Relevant provisions
Campbelltown (Sustainable City) Development Control Plan 2014	Waste management objectives in Campbelltown City Council's Development Control Plan (DCP) include: ▪ Ensure waste systems are easy to use and that, where necessary, collection vehicles are able to access buildings to remove waste ▪ Ensure healthy and safe practices for the storage, handling and collection of waste and recycling materials ▪ Prevent stormwater pollution that may occur as a result of poor waste storage and management arrangements ▪ Promote the principles of ESD through appropriate resource recovery and recycling, leading to a reduction in the consumption of finite natural resources ▪ Minimise the creation of noise during the collection of waste and recyclables In regards to waste management during construction and demolition, the DCP requires: ▪ All waste and recyclable streams shall be stored separately on site. ▪ All storage areas/ containers for each waste and recycling stream shall be kept on the site at all times and shall be indicated on the site plans/drawings as part of the Waste Management Plan (WMP). ▪ Where material cannot be reused or recycled, it shall be disposed of at an appropriately licensed waste management facility. Details of disposal arrangements shall be specified in the WMP. ▪ Convenient and safe vehicular access to waste and recycling material storage areas shall be provided. ▪ The removal, handling and disposal of asbestos or other hazardous materials shall be carried out in accordance with WorkCover NSW, Office of Environment and Heritage and other regularity authority guidelines and requirements.

3 WASTE GENERATION

3.1 Construction

Waste generating activities during the construction phase are listed in Table 3, with the types of waste these activities are likely to generate being listed in Table 4.

Table 3: Waste generating activities during construction

Phase 1 - Site preparation, bulk earthworks and utilities infrastructure	Phase 2 - Construction and fit-out of: Stage 1 Warehousing (approx. 40,000m2); Stage 2 Warehousing (approx. 44,000m2); Stage 3 warehousing (approx. 23,000m2)	Phase 3 - Miscellaneous structural construction and finishing works
Site Preparation • Vegetation clearance • Demolition of hail mesh structures • Demolition of existing infrastructure • Removal of pavements • Removal of redundant services • Bulk earth works Early works • Surplus materials and offcuts from construction compound fencing and hoardings • Bales and silt fences form installation of temporary sediment and erosion control measures • Surplus materials and offcuts from installation of temporary site offices and amenities • Excavation of fill when installing drainage and other utilities	Construction • Excavation associated with foundation work • Surplus material and offcuts from: ○ Foundation work and floor slab installation ○ Erection of framework and structural walls ○ Installation of roofing and wall coverings ○ Internal fit out of building ○ Connection to new utilities • Landscaping • Preparation of warehouse access road and car-parking areas • Forming of new kerbs, gutters, medians and other structures • Construction of asphalt and concrete pavements	Post Construction • Decommissioning/demobilisation of construction sites • Landscaping • Removal of construction ancillary facility

Table 4: Waste generated during construction

Waste Type	Classification	Estimated Quantity	Reuse/recycling	Disposal
Demolition				
Vegetation	General Solid Waste (non-putrescible)	Area of vegetation to be removed is yet to be determined, but could be up to 40,000 m^2	Transferred off-site for re-processing / recycling / reuse	Any element unable to be reused or recycled will require disposal at an

Waste Type	Classification	Estimated Quantity	Reuse/recycling	Disposal
				appropriately licensed facility
Concrete / asphalt pavement	General Solid Waste (non-putrescible)	Area of pavement to be removed is yet to be determined, but could be up to 260,000 m^2	Either re-processed on site or transferred off-site for re-processing	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Existing structures - Hail mesh structure	General Solid Waste (non-putrescible)	Hail mesh approx. 150,000 m^2 plus support structure	Assume sold and reused	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Existing structures - Existing building	General Solid Waste (non-putrescible)	Building footprint approx. 7,300 m^2	Transferred off-site for re-processing / recycling / reuse	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Existing structures - Wash bays	General Solid Waste (non-putrescible)	Building footprint approx. 850 m^2	Transferred off-site for re-processing / recycling / reuse	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Existing services - Stormwater	General Solid Waste (non-putrescible)	Infrastructure to be removed is yet to be determined, but could include culverts, pipes, fittings, geotextiles, pits and grates	Transferred off-site for re-processing / recycling / reuse	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Existing services - Water - Sewer - Gas - Electricity - Telecommunications	General Solid Waste (non-putrescible)	Removal of existing infrastructure will be dependent upon the likelihood of upgrade	Transferred off-site for re-processing / recycling / reuse	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility

Waste Type	Classification	Estimated Quantity	Reuse/recycling	Disposal
Construction				
VENM and ENM	General Solid Waste (non-putrescible)	Quantities yet to be determined	On-site re-use and / or taken off-site for recycling / reuse / re-processing, where relevant.	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Contaminated soil	To be determined	Quantities yet to be determined, if any	N/A	Treatment and disposal
Concrete	General Solid Waste (non-putrescible)	Volume of concrete required at site is yet to be determined, however a quantity of concrete wasted will be minimised through construction management processes	Either re-processed on site or transferred off-site for re-processing	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility disposal
Asphalt	General Solid Waste (non-putrescible)	Volume of concrete required at site is yet to be determined, however a quantity of asphalt wasted will be minimised through construction management processes	Either re-used / re-processed on site or transferred off-site for reuse / re-processing	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Timber and formwork (used and offcuts)	General Solid Waste (non-putrescible)	In-situ concrete yet to be determined, however a quantity of timber and formwork will be wasted. Waste generated will be minimised through construction management processes.	Either re-used on site or transferred off-site for reuse / re-processing	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Bricks / pavers / tiles	General Solid Waste (non-putrescible)	Quantities of bricks / pavers / tiles yet to be determines, however it is assumed that a proportion will be wasted, through breakage and off-cuts. Waste generated will be minimised through construction	Transferred off-site for re-processing	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility

Waste Type	Classification	Estimated Quantity	Reuse/recycling	Disposal
		management processes.		
Sedimentation controls	General Solid Waste (non-putrescible)	Controls are likely to include hay bales and silt fences	Transferred off-site for re-processing	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Packaging	General Solid Waste (non-putrescible)	Construction management processes will minimise the quantity of packaging waste produced	Packaging waste will be recycled wherever possible	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
General construction waste (non-putrescible)	General Solid Waste (non-putrescible)	Construction management processes will minimise the quantity of general construction waste produced	Transferred off-site for re-processing and recycling, wherever possible	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Putrescible office and lunchroom waste	General Solid Waste (putrescible)	The project is expected to create 300 construction jobs, however the amount of waste produced by on-site workers will be dependent on phase of construction, how many workers are on site and facilities provided for workers.	N/A	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility
Non-putrescible office and lunchroom waste	General Solid Waste (non-putrescible)	The project is expected to create 300 construction jobs, however the amount of waste produced by on-site workers will be dependent on phase of construction, how many workers are on site and facilities provided for workers.	All paper / cardboard and commingled recyclables will be transferred off-site for recycling	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility

3.2 Operations

Waste generating activities during the operations phase are listed in Table 5, with the types and estimated quantities of waste these activities are likely to generate being listed in

Table 6.

Table 5: Waste generating activities during operations

Office	Warehousing	External Paved Storage Area
• General solid waste (putrescible) – mixed residual waste • General solid waste (non-putrescible) – recyclable materials (paper, plastic containers, glass containers and aluminium cans), cardboard and plastic packaging	• De-stuffing from containers (likely to be cardboard, flexible plastics, pallets, metal and plastic ties) • Possible maintenance consumables and general waste, if maintenance undertaken on site • Spill kit consumables	• Spill kit consumables

Table 6: Waste generated during operations

Waste Type	Classification	Estimated Quantity	Reuse/recycling	Disposal
Residual Waste (office and lunchroom) [3]	General Solid Waste (putrescible)	10,500 L / week		Disposal at an appropriately licensed facility
Recyclables[4]	General Solid Waste (non-putrescible)	10,500 L / week	Off-site materials recovery and reprocessing	N/A
Maintenance / workshop consumables	Likely mostly General Solid Waste (non-putrescible)	Dependent upon site operational plans	Reuse and recycling of all materials, where feasible	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility

[3] The estimated volume of waste generated in offices / lunchrooms was based on the commercial waste generation rate for an Office, published in City of Melbourne's Guidelines for Preparing a Waste Management Plan – 2015 (10L of residual waste and 10L of recycling generated per 100m^2 of office floor area, for standard operating hours). These generation rates were applied to a floor area of 5,000 m^2 (for Offices 1A, 1B, 1C and 1D) and a 24 hour working day.

[4] See above footnote.

Waste Type	Classification	Estimated Quantity	Reuse/recycling	Disposal
Spill kit consumables	Likely mostly General Solid Waste (non-putrescible), however classification of spill kit consumables will be dependent upon spill type	Generated as necessary	Sent off-site for treatment at an appropriately licensed facility, if necessary	Disposal at an appropriately licensed facility
De-stuffing from containers: - Flexible plastics - Cardboard - Pallets - Ties (plastic and metal)	General Solid Waste (non-putrescible)	Dependent upon expected throughput	Reuse and recycling of all materials, where feasible	Any element unable to be reused or recycled will require disposal at an appropriately licensed facility

4 POTENTIAL IMPACTS

The impacts of the Proposal include construction and operational impacts. Construction impacts relate to the waste streams which could be generated by the demolition and construction processes and operational impacts relate to the management of waste streams that could be produced at the Proposal site when the facility is operational. This Section outlines potential impacts associated with treating, storing, using and disposing of any waste and waste products. These have been separated into impacts associated with treating, storing and using materials on-site, and recycling and disposal, which occurs off-site.

4.1 Construction

Table 6 provides a list of impacts associated with potential waste management activities. These are indicative only and subject to requirements set out in the Construction Environmental Management Plan (CEMP) to be issued prior to commencement of construction.

Table 7: Potential impacts associated with on-site and off-site waste management during construction

On-site Waste Management	Off-site Waste Management
Treatment and/or Reprocessing • Vegetation will be either re-processed on-site or transferred off-site for reprocessing. Should this occur on-site, it will have an impact on noise sensitive receivers. • Concrete and asphalt will be reprocessed on-site or transferred off-site for reprocessing. Should this occur, it would potentially generate dust and have an impact on noise sensitive receivers.	Recycling • Noise associated with recycling activities (particularly with construction and demolition (C&D) waste) • Dust caused by recycling activities (particularly with C&D waste) • Odour associated with putrescible waste processing • Greenhouse gas emitted from recycling activities
Storage • VENM / ENM will be stored on-site for re-use or prior to removal from site. • Should concrete and asphalt be re-processed and re-used for on-site applications, it will be stockpiled on-site. Potential impacts associated with concrete stockpiling include health and safety hazards, dust and impact on visual amenity. • Timber, plasterboard, bricks / pavers / tiles, sediment controls, surplus building materials and other C&D wastes will be temporarily stockpiled on site prior to re-use, re-processing and / or off-site disposal. This could result in health and safety issues, dust and could impact visual amenity. • If waste is stored incorrectly, it may result in airborne litter and stormwater pollution.	Disposal • Greenhouse gas associated with disposal of putrescible waste • Dust • Consumption of landfill airspace • Disposal of potentially valuable natural resources • Health and safety risks associated with hazardous waste disposal
Re-use • The Contractor may re-use some waste materials on-site. This is not expected to have an impact as it will essentially replace virgin materials.	

4.2 Operations

Table 8 provides a list of impacts associated with potential waste management activities during operations. These are indicative only and subject to the Operational Environmental Management Plan (OEMP).

Table 8: Potential impacts associated with on-site and off-site waste management during operations

On-site Waste Management	Off-site Waste Management
Treatment and / or Re-processing • N/A	Recycling • Noise and odour associated with recycling activities • Greenhouse gas emitted from recycling activities
Storage • Odour associated with storage of putrescible waste generated at the office • Vermin attracted by outside storage of putrescible waste • If waste is stored incorrectly, it may result in airborne litter and stormwater pollution	Disposal • Greenhouse gas associated with disposal of putrescible waste • Dust • Consumption of landfill airspace • Odour at putrescible waste landfill • Disposal of potentially valuable natural resources • Health and safety risks associated with hazardous waste disposal

5 MITIGATION MEASURES

This Section outlines mitigation measures to address the impacts of waste management during the construction and operational phases as described in Section 4. It also outlines the principles which will ensure the Proposal's consistency with the aims, objectives and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021 (see Section 2), such as decreasing waste generation and increasing recycling.

5.1 Construction

Measures to mitigate the effect of the construction waste streams would be incorporated into the CEMP (to be issued prior to commencement of construction), including the following:

- Characterisation of construction waste streams
- Management of any identified hazardous waste streams
- Procedures to manage construction waste streams, including handling, storage, classification, quantification, identification and tracking
- Mitigation measures for avoidance and minimisation of waste materials
- Procedures and targets for reuse and recycling of waste materials.

Best-practice waste management principles would be incorporated into the CEMP, such as:

- All waste and recyclable streams shall be stored separately on site
- All storage areas / containers for each waste and recycling stream shall be kept on the site at all times and shall be indicated on the site plans/drawings as part of the CEMP
- Convenient and safe vehicular access to waste and recycling material storage areas shall be provided
- The removal, handling and disposal of asbestos or other hazardous materials shall be carried out in accordance with WorkCover NSW, Office of Environment and Heritage and other regularity authority guidelines and requirements
- Appropriate signage will be used in the waste storage area to ensure correct separation of recyclables
- Stockpiles will be maintained in accordance with the erosion and sedimentation control plan
- Waste to be stored so as to avoid airborne litter, vermin and stormwater pollution
- Re-processing, recycling and/or removal of waste materials for disposal should be scheduled to limit stockpiling and associated impacts.
- Putrescible materials need to be removed from site as soon as possible to avoid odour impacts. Non-putrescible materials should be reprocessed or removed from site on an 'as-needs' basis to limit logistical, health and safety and dust impacts. Hazardous waste materials, should they arise, must be immediately removed to limit environmental and health and safety risks.
- Waste materials should only be transported to their next destination using a licensed contractor
- Waste materials should only be transported to an appropriately licensed facility for recycling or disposal
- Records to be maintained on all waste exiting the construction site.

Waste avoidance principles that could be incorporated into the CEMP include:

- Avoidance and reuse of material would have priority over recycling
- Recycling would have priority over disposal
- If possible concrete components would be crushed and re-used on-site, with the remainder sent to a recycling facility

- Waste generation would be minimised by ordering the correct quantity of materials
- Selection of materials which maximise recycled content, while having low embodied water and energy use
- Selection of materials which maximise durability and lifespan.
- Selection of reputable waste removal contractors who will guarantee that recyclable material will be recycled and will provide any relevant certificates
- Vegetation removed shall be either preserved for use in the new development, or mulched for inclusion in landscaping activities. The remainder will be sent to a composting facility.
- Excavated earth will be used for infill and landscaping where feasible, the remainder will be sent to a recycling facility
- Asphalt will be re-used by transferring it to a batching plant or using it as a base layer for access roads
- Coordinate and sequence trades people to minimise waste
- Pre-fabricate materials where possible
- Use modular construction to reduce the need for excess waste, where possible or feasible
- Reuse formwork
- Separate off-cuts to facilitate reuse, re-sale or efficient recycling
- Select landscaping which reduces green waste
- Engage with the supply chain to supply products and materials that use minimal packaging
- Set up schemes with suppliers to take back packaging materials.

5.2 Operations

Measures to mitigate the effect of waste arising during operation of the facility would be incorporated into the Proposal's environmental policy for operations, within the OEMP. This policy would include measures to encourage recycling behaviour and increase the diversion of waste into recycling streams. These would include requirements such as:

- Addressing waste management requirements and goals in staff inductions
- Providing staff access to documentation outlining the facility's waste management requirements
- Locating recycling bins in kitchen areas beside general waste bins to prevent contamination of recycling
- Positioning paper recycling bins close to printer/photocopying equipment
- Minimising general waste bins at desks but providing adequate container and paper recycling to encourage sorting of recyclables
- Providing adequate bin storage for the expected quantity of waste.

Waste arising from maintenance would be dealt in part by the asset management strategy and the overarching environmental policy which adheres to the waste hierarchy. Where feasible from a safety and cost perspective, assets would be refurbished; if a replacement is required the maintenance contractor would be responsible for ensuring any waste is recycled; if this is not possible arrangements for disposal at an appropriately licenced facility would be made.

Disposal of containers would be provided in the area around the diesel re-fuelling station to dispose of used spills kits. These containers will be taken for disposal at an appropriately licenced facility.

The following mitigation and quality control measures would be incorporated into the OEMP:

- Appropriate areas shall be provided for the storage of waste and recyclable material

- Standard signage on how to use the waste management system and what materials are acceptable in the recycling will be posted in all waste collection and storage areas
- All waste shall be collected regularly and disposed of at licensed facilities
- An education programme and on-going monitoring will to be implemented for training personnel to properly sort and transport waste into the right components and destinations

ARCADIS Design & Consultancy for natural and built assets