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Prepared for

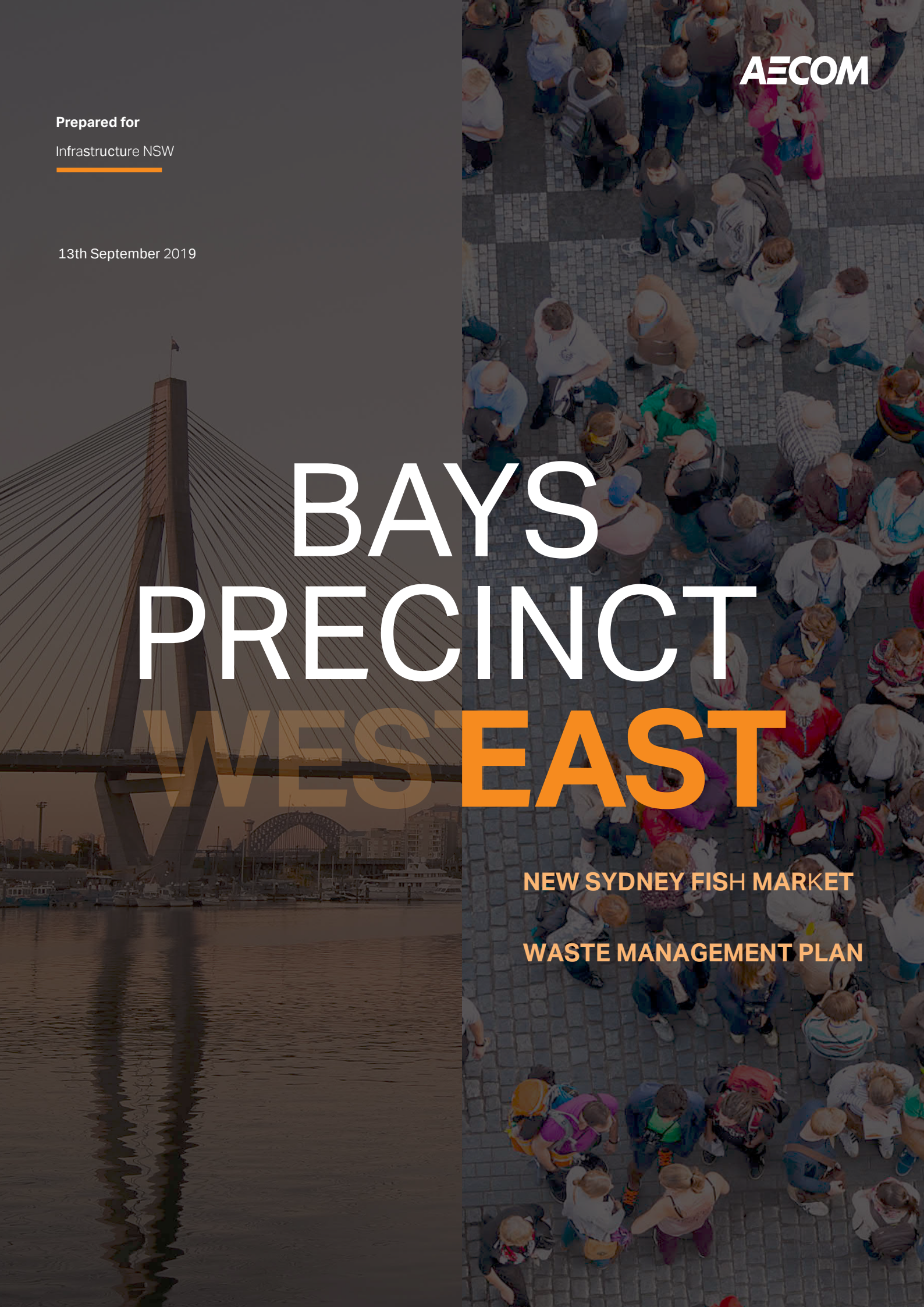
Infrastructure NSW

13th September 2019

BAYS PRECINCT WEST EAST

NEW SYDNEY FISH MARKET

WASTE MANAGEMENT PLAN



New Sydney Fish Market Waste Management Plan

Client: Infrastructure NSW

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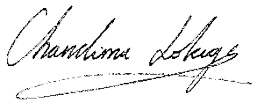
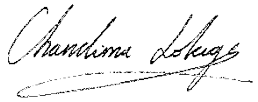
Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0.1	03-Apr-2018	Draft Report	Chani Lokuge Technical Director - Waste and Resource Recovery	
0.2	05-Nov-2018	Final Report	Katherine Dodd Senior Environmental Scientist	
0.3	02-Apr-2019	For SSDA	Chani Lokuge Technical Director - Waste and Resource Recovery	
0.4	05-Jul-2019	Tender Package	Chani Lokuge Technical Director – Waste and Resource Recovery	
0.5	13-Sept-2019	Tender Package	Chani Lokuge Technical Director - Waste and Resource Recovery	

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Abbreviations

CDS	Container Deposit Scheme
CoS DCP	City of Sydney Development Control Plan 2012
CEMP	Construction Environmental Management Plan
DCP	Development Control Plan
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
EIS	Environmental Impact Statement
EMS	Environmental Management System
ENM	Excavated Natural Material
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	NSW Environment Protection Authority
EPS	Expanded Polystyrene
ESA	Environmental Site Assessment
ESD	Ecologically Sustainable Development
IBC	Intermediate Bulk Container
INSW	Infrastructure NSW (formally UrbanGrowth NSW Development Corporation)
LEP	Local environmental plan
LGA	Local government area
MGB	Mobile Garbage Bin
MRF	Materials Recycling Facility
NSW	New South Wales
PoEO Act	Protection of the Environment Operations Act 1997
PoEO Waste Regulation	Protection of the Environment Operations (Waste) Regulation 2014
SEARs	Secretary's Environmental Assessment Requirements
SDS	Safety Data Sheet
SREP 26	Sydney Regional Environmental Plan No 26 – City West
SEPP	State Environmental Planning Policy
SSD	State Significant Development
RORO	Roll-On-Roll-Off
VENM	Virgin Excavated Natural Material
WARR Act	Waste Avoidance and Resource Recovery Act 2007
WARR Strategy	NSW Waste Avoidance and Resource Recovery Strategy 2014-2021
WMP	Waste Management Plan

Executive Summary

AECOM Australia Pty Ltd ('AECOM') was commissioned by Infrastructure New South Wales (INSW) (formally UrbanGrowth NSW Development Corporation) to prepare a Waste Management Plan (WMP) for the new Fish Market to be located at the head of Blackwattle Bay adjacent to Bridge Road (the Site).

This WMP has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) for Stage 2 of the development of the Site, which includes the demolition, construction and operation of the new Sydney Fish Market.

The WMP also considers relevant sections from the Blackwattle Bay State Significant Study Requirements, specifically Section 16 – Ecologically Sustainable Development, in particular condition 16.4:

> ***Condition 16.4:*** *Identify and implement waste management strategies to achieve NSW Government's Waste Avoidance and Resource Recovery Strategy 2007 (WARR) and compliments the NSW Government's Waste Less, Recycle More initiatives and EPA waste and recycling programs. Include measures to effective operational waste management, for example adequate space within buildings for waste infrastructure, off-street storage for collection and accessibility for waste collection vehicles. Identify both building and precinct solutions.*

Furthermore, the WMP addresses the following Secretary's Environmental Assessment Requirements (SEARs) issued by Department of Planning and Environment (DPE):

Demolition and Concept SEARs

18. Waste

- Provide an assessment of the demolition and early works impacts and their management, including waste classification in accordance with the EPA guidelines and off-site disposal of concrete waste and rinse water

Main Work SEARs

17. Waste

- Provide an assessment of the waste impacts and their management during construction and operation.
- Include measures to ensure effective operational waste management, for example adequate space within the development for waste infrastructure and collection.
- Identify solutions to deal with specific waste streams (food waste and polystyrene packaging) in a manner that maximises diversion from landfill, including investigation of closed loop polystyrene.

The following key tasks were undertaken in preparing this WMP:

Background Review and Identification of Key Issues

A desktop review of information related to the existing Fish Market and the proposed new Fish Market, including Concept layouts, waste audit data, current WMPs etc. In addition, a desktop review of relevant local government, NSW and Commonwealth waste legislation/regulations/guidelines was also undertaken.

Site Inspection

AECOM undertook two site inspections of the existing Fish Market to gain an understanding of the key waste streams generated and the current waste collection, storage, transport, on site processing and disposal strategies.

Waste Characterisation and Impacts

Based on the background review and site inspection, broad waste types and quantities anticipated from the new Fish Market were identified for the demolition/early works, construction and operation phases. Waste identified was categorised as construction and demolition (C&D) and commercial and

industrial (C&I) waste streams. The potential environmental (air, water, soil, etc.) impacts associated with generation of these waste streams were also identified.

Development of Preferred Waste Management Strategies

Potential management solutions for each waste stream were identified and analysed against site constraints. The focus of the options analysis was the operational phase; however potential measures for maximising resource recovery and management of residual waste during the demolition, early works and construction phases were identified to meet the respective SEARs. Recommendations for waste management strategies were based on implementation of the waste hierarchy, encompassing the whole waste lifecycle from generation and collection through to transport, processing and disposal. The proposed waste management strategies for each of the project phases are summarised below.

Demolition and Early Works – Waste Management Strategies

- Management of waste to align with this WMP and the Construction Environmental Management Plan (CEMP) for the demolition and early works.
- The demolition contractor should manage the storage, movement and disposal of demolition waste by nominating dedicated waste storage areas in close proximity to the demolition activity.
- Where possible, waste should be segregated at source to assist with reuse, recycling, or disposal.
- All demolition waste sent off-site would be sent to appropriately licensed material recovery and disposal facilities, and waste disposal receipts obtained and retained in the project files.

Construction – Waste Management Strategies

- Management of waste to align with this WMP and the CEMP for the main construction works.
- Generation of waste would be avoided through a number of measures such as selecting construction materials which have a long lifespan and/or high potential for reuse, returning packaging to suppliers where possible and practicable and apply practical building designs and construction techniques.
- Source segregation of key construction waste streams would be implemented to ensure efficient reuse and recycling of waste generated.
- Contaminated and/or hazardous waste and liquid waste /wastewater, where identified, would be removed by appropriately licenced contractors and transported to licenced facilities in accordance with NSW EPA regulations and guidelines in particular the *NSW EPA Waste Classification Guidelines (2014*).

Operation – Waste Management Strategies

- A centralised waste management strategy has been developed, whereby communal ‘green point’ storage rooms are provided on the retail level for temporary storage of retail waste and recycling. A dedicated caretaker or staff member would collect waste and recycling (except offal) from these green points and transfer to the relevant waste storage rooms on basement and loading dock level. The transfer of fish offal from the retail level to the lower ground and basement level storage rooms is the responsibility of each individual retail tenant.

The proposed architectural design has been developed to accommodate green points, and this strategy has been confirmed by UGDC via Aconex, mail number UGDC-RTRFI-000061 dated 22 March 2019.

- Source separation of waste streams at the proposed new Fish Market would be implemented to aid materials recovery and improve recycling; in particular, source separation of organics and recyclables would be introduced.
- Implementation of an electric bin tug system to transport and collect mobile garbage bins (MGBs) safely and efficient use of compaction equipment on site for cardboard, residual waste and expanded polystyrene (EPS) to reduce waste storage volume requirements and consequently collection frequencies.

- Transport of fish offal off-site for processing into an organic product, e.g. pet food.
- Transport of food organics off-site for further processing into renewable energy and/or compost product.
- Transport of dry recyclables to an off-site materials recycling facility (MRF).

1.0 Introduction

1.1 Background

Sydney Fish Market is the largest of its kind in the Southern Hemisphere and among the three largest seafood markets in terms of variety in the world. The market sources product both nationally and internationally and trades approximately 14,500 tonnes of seafood annually with up to 100 sustainable seafood species traded every day and approximately 500 species traded annually. The site attracts over three million visitors each year.

In November 2016 the NSW Premier announced a new Fish Market would be built at the head of Blackwattle Bay, adjacent to the existing Fish Market. In June 2017 the NSW Premier announced the appointment of Danish architects 3XN to lead the design team that includes Sydney firms BVN and Aspect Studios. They have been working with key stakeholders, including UrbanGrowth NSW and Sydney Fish Market Pty Ltd (SFM), to develop the design for the new Fish Market. As announced by the NSW Premier, works are planned to commence in 2019.

1.2 Site and Context

The site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2 km west of Sydney's CBD and is partially within the City of Sydney Local Government Area (LGA).

The land to which the development application relates comprises Lots 3 - 5 in DP 1064339, Part Lot 107 in DP 1076596 and Part Lot 1 in DP835794. Works to connect to the existing waterfront promenade to the west of the Site are located on Lot 3 in DP1018801. The development footprint is irregular in shape and has an area of approximately 36,800 m^2. The Site is partly on land above mean high water mark and partly on water below mean high water mark.

The Site has a frontage to Bridge Road to the south and Blackwattle Bay to the north. Pyrmont Bridge Road is an arterial road that links to the Anzac Bridge to the north west of the site. Sydney Secondary College Blackwattle Bay Campus is immediately south west of the site and the existing Fish Market immediately north east. Located directly opposite the site to the south is Wentworth Park, separated by Bridge Road.

Located approximately 400 m walking distance from the site are the existing Fish Market, Wentworth Park, and Glebe Light Rail stop. The Glebe Light Rail stop is on the Dulwich Hill Line which includes 23 stops along a 12.8-kilometre route running from Dulwich Hill to Central Station via Pyrmont.

The site contains a heritage listed stormwater culvert. The site is also located near a number of other heritage items.

The site's current uses include a concrete batching plant at the western end and concrete hardstand and wharf area at the eastern end, which is currently vacant. The site includes wharves and land-based structures. Part of the site is the water of Blackwattle Bay. Works would be undertaken on Bridge Road and its intersections with Wattle Street and Wentworth Park Road.

1.3 Approval Strategy

Pursuant to the provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (State and Regional Development) 2011* ("SEPP SRD") the new Fish Market development is State Significant Development and the Minister for Planning is the consent authority.

To deliver the new Fish Market, the following applications will be lodged:

1. A Concept development application seeking approval for Concept proposals for the new Fish Market. This is to meet the requirements for a master plan contained in clause 40 of *Sydney Regional Environmental Plan No 26—City West* (SREP26). This Concept development application will also set out details of the first stage of the development being the demolition of

land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall;

2. A development application for the construction of the new Fish Market;
3. An application to amend the planning controls applying to the site to enable the proposed development to be a permissible use on all of the site. This is to be achieved by an amendment to SREP26.

These applications are lodged concurrently.

1.4 Summary of the Development

The proposal is to build a new Fish Market with a contemporary urban design, provide unique experiences for visitors and world-class auction and wholesale facilities. The new facility will be set within an improved public domain including the creation of a waterfront promenade with improved access to Blackwattle Bay and linking to surrounding areas and to public transport.

The development would expand and improve the functions of the existing Fish Market in a new setting designed to achieve design excellence, functional performance and environmental sustainability.

The new Fish Market would include retail and food and beverage premises, wholesale facilities and auction rooms, offices and commercial space, Sydney Seafood School, back-of-house facilities and car, truck and coach parking spaces. The new Fish Market is to include a new foreshore promenade and wharves. The new Fish Market would be purpose built and would be supported by a state of the art back-of-house plant and recycling/waste management facilities.

1.4.1 Concept Development Application

The Concept development application seeks approval for:

1. the use of the site for the Fish Market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
2. a gross floor area of up to 30,000 m^2 contained within a defined building envelope;
3. waterfront structures such as wharves;
4. concepts for improvements to the public domain including promenades, access to Blackwattle Bay and landscaping;
5. pedestrian cycle and road access and circulation principles;
6. principles for infrastructure provision and waste management.

This Concept development application sets out the details of the first stage of the development being the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall, and related services relocations.

1.4.2 Main Works Development Application

The Main Works development application seeks approval for:

1. the construction of a new Fish Market including land and water-based structures.
2. the use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
3. a gross floor area of approximately 26,000 m^2 as calculated according to the definition of GFA under Sydney Regional Environment Plan 26 (SREP 26) (approximately 25,600 m^2 as calculated according to the definition of GFA under the Standard Instrument).
4. public domain works including promenades access to Blackwattle Bay and landscaping;
5. pedestrian, cycle and road access and circulation;
6. infrastructure provision and waste management;
7. associated works as required.

The proposed uses comprise:

Below Ground Level

- Parking for service and delivery, and private vehicles up to approximately 417 vehicles;
- Plant and storage;
- Waste management facilities; and
- End of journey facilities.

Ground Level – Outside of Building Envelope

- Up to three operational wharves for fishing fleet servicing and product unloading/loading, multi-purpose wharf space, private-operated ferry stop, recreational vehicles and the like;
- Vehicular access driveways; and
- Publicly accessible promenade.

Ground Level – Within Building Envelope

- Wholesale services space including product storage and processing;
- Auction floor and associated refrigeration and handling space;
- Loading dock including time-limited delivery and service vehicle parking area;
- Waste management facilities;
- Office space including buyers room; and
- Staff amenities, plant and storage.

Upper Ground Level (L1)

- Retail premises including fresh food retail, food and drink premises including harbourside dining;
- External/shared dining space;
- Ancillary back of house space and staff amenities; and
- Circulation areas.

Upper Level 2 (Mezzanine)

- Catering space;
- The Sydney Seafood School;
- Tenant and subtenant office space; and
- Plant and storage space.

1.5 Purpose of this Report

The purpose of this report is to outline the management of waste during the demolition, construction and operation of the new Fish Market and specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) for SSD 8924 (the Concept development application and Stage 1 works comprising demolition and early works) and SSD 8925 (the Stage 2 main works), issued on 22 December 2017 which state that the Environmental Impact Statement (EIS) is to address the requirements provided in Table 1.

Table 1 SEARs requirements

Application	Requirement	Addressed
SSD 8924 Item 18 - Waste	Provide an assessment of the demolition and early works waste impacts and their management, including waste classification in accordance with the EPA guidelines and off-site disposal of concrete waste and rinse water.	Table 2 Demolition and Early Works waste
	Provide a management plan for the identification, handling, transport and disposal of any acid sulfate soils containing waste that may be encountered during demolition and early works.	Refer to Acid Sulfate Soils Management Plan
	Provide a management plan for the identification, handling, transport and disposal of any asbestos waste and lead-based paint that may be encountered during demolition and early works.	Refer to Hazardous Materials Removal Management Plan
SSD 8925 Item 17 - Waste	Provide an assessment of the waste impacts and their management during construction and operation.	Section 5.2 Table 3 Section 6.2 Section 6.3 Section 8.0
	Provide a management plan for the identification, handling, transport and disposal of any acid-sulfate soils containing waste that may be encountered during demolition, site preparation and construction.	Refer to Acid Sulfate Soils Management Plan
	Include measures to ensure effective operational waste management, for example adequate space within the development for waste infrastructure and collection.	Section 8.4
	Identify solutions to deal with specific waste streams (food waste and polystyrene packaging) in a manner that maximises diversion from landfill, including investigation of closed loop polystyrene.	Section 8.0

1.6 Scope of Assessment

The following tasks were undertaken as part of this Report:

- Review of relevant legislation, policies and guidelines associated with waste management;
- Identification of waste streams that would be generated during the demolition, construction and operation of the Site;
- Estimation of indicative waste volumes generated during the demolition, construction and operation of the Site;
- Recommendations for management strategies and mitigation measures, including methods for source separation of different waste streams, storing, collecting and transporting waste streams; and
- Completion of preliminary details required for a Waste Management Plan (WMP) in accordance with the *City of Sydney Development Control Plan 2012* (CoS DCP).

1.7 References

The following documents have been referred to in producing the WMP:

- City of Sydney (2013) Development Control Plan 2012
- City of Sydney. Leave nothing to waste – Managing resources in the City of Sydney Area. Waste strategy and action plan 2017-2030
- Council of the City of Sydney Policy for New Developments, 2005
- Waste Policy: Local Approvals Policy for managing waste in public places. December 2017.
- Hyder Consulting (2016). Sydney Fish Market Functional Brief, Waste Management
- New Sydney Fish Market DTM Presentation, 2017
- New Sydney Fish Market Sustainability Package, 2017
- NSW Waste Avoidance and Resource Recovery Strategy 2014-2021
- Protection of the Environment Operations Act 1997 No 156
- Protection of the Environment Operations (Waste) Regulation 2014
- Secretary's Environmental Assessment Requirements, Application Number SSD 8924, Sydney Fish Markets – Concept development application and Stage 1 works comprising demolition and early works, dated 22 December 2017
- Secretary's Environmental Assessment Requirements, Application Number SSD 8925, Sydney Fish Markets – Stage 2 main works, dated 22 December 2017
- Sydney Fish Market Waste Management Plan, Environmental Solutions, 2012
- UrbanGrowth NSW. The Bays Precinct Transformation Plan 2015.

2.0 Legislation, Policy and Guidelines

2.1 NSW State Requirements

Protection of the Environment Operations Act 1997

The NSW waste regulatory framework is set by the *Protection of the Environment Operations Act 1997* (PoEO Act). An objective of the PoEO Act is to:

- Reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote the following:
  - Pollution prevention and cleaner production;
  - The reduction to harmless levels of the discharge of substances likely to cause harm to the environment;
  - The elimination of harmful wastes;
  - The reduction in the use of materials and the reuse, recovery or recycling of materials;
  - The making of progressive environmental improvements, including the reduction of pollution at source; and
  - The monitoring and reporting of environmental quality on a regular basis.

The 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 also establishes the ability to set various waste management requirements via the *Protection of the Environment Operations (Waste) Regulation 2014* (PoEO Waste Regulation).

Protection of the Environment Operations (Waste) Regulation 2014

The PoEO Waste Regulation came into effect on 1 November 2014. The PoEO Waste Regulation sets out provisions that cover the way waste is managed in terms of classification and transportation as well as reporting and record keeping requirements for waste management facilities.

Waste Avoidance and Resource Recovery Act 2007

The *Waste Avoidance and Resource Recovery Act 2007* (WARR Act) includes the majority of NSW's over-arching objectives and guiding principles to encourage beneficial reuse and resource recovery.

The WARR Act promotes waste avoidance and resource recovery by providing a framework for the development of strategies and programs. It defines the waste hierarchy which is a set of priorities for the efficient use of resources which underpin the objectives of the WARR Act. The waste hierarchy ensures that resource management options are considered against the following priorities:

1. **Avoidance** including action taken to reduce the amount of waste generated, to maximise efficiency and avoid unnecessary consumption.
2. **Resource recovery** including reuse, recycling, reprocessing and energy recovery. Where avoiding and reducing waste is not possible, the next most preferred option is to reuse the materials without further processing, avoiding the costs of energy and other resources required for recycling.
3. **Disposal** including management of all disposal options in the most environmentally sensitive manner. Disposal is the least preferred option, and is appropriate for materials such as asbestos that cannot be safely reused or recycled.

Waste Avoidance and Resource Recovery Strategy 2014-2021

The *Waste Avoidance and Resource Recovery Strategy 2014-2021* (WARR Strategy) provides the strategic direction for future waste management and resource recovery activities in NSW. The priorities for waste reform were determined by the NSW Government in the *NSW 2021: A plan to make NSW number one*.

The WARR Strategy aims to drive the efficient use of resources, reduce the environmental impact of waste and improve the well-being of the NSW environment, community and economy. The WARR Strategy sets out long-term targets and provides a framework for the development of various implementation plans. The WARR Strategy sets the following targets for 2021–22 which are applicable to the Project

- Avoiding and reducing the amount of waste generated per person in NSW;
- Increasing recycling rates to 70% for commercial and industrial waste;
- Increasing recycling rates to 80% for construction and demolition waste; and
- Increasing waste diverted from landfill to 75%.

The WARR Strategy provides a clear framework for waste management to 2021-22 and provides an opportunity for NSW to continue to increase recycling across all waste streams. The Project would aim to meet the objectives of the WARR Strategy and implement measures to manage waste in a way which minimises the impact waste has on the environment.

NSW Waste Classification Guidelines

Waste classification helps those involved in the generation, treatment and disposal of waste, ensure the environmental and human health risks associated with their waste is appropriately managed in accordance with the PoEO Act and its associated regulations. Part 1 of the *Waste Classification Guidelines* (EPA, 2014) provides advice and direction on classifying waste so that appropriate management of all waste types is achieved.

Waste material from the construction and operational works at the Project would be classified in accordance with these guidelines.

NSW Draft Circular Economy Policy

The NSW Government has released a draft Circular Economy Policy which outlines the principles and ideas that can help to shape our approach to resource use and waste management in NSW.

A circular economy is all about valuing our resources by getting as much use out of products and materials as possible, and reducing the amount of waste we generate. For example, using recycled materials in manufacturing, repairing goods before buying new ones, or re-purposing materials that are no longer used.

The Project seeks to not only divert its recyclable materials from landfill, but recover these materials for secondary markets by adopting the principles of a circular economy.

2.2 Local Government Requirements

City of Sydney Development Control Plan 2012

The CoS DCP has been prepared by council in accordance with Section 74C of the EP&A Act and is intended to provide detailed provisions to:

- Encourage development to respond to its context and is compatible with the existing built environment and public domain;
- Recognise and reinforce the distinctive characteristics of Council's neighbourhoods and streets;
- Build upon objectives and controls under the *Sydney Local Environmental Plan 2012*;
- Protect and enhance public domain;
- Achieve objectives of *Council's Sustainable Sydney 2030 Strategy*;
- Encourage design that maintains and enhances the character and heritage significance of heritage items and heritage conservation areas; and
- Encourage ecologically sustainable development and reduce the impacts of development on the environment.

Section 3.14 of the DCP sets out waste management requirements to:

- Reduce the amount of construction and demolition waste going to landfill;
- Reduce the amount of waste generated in the operation of a development from going to landfill and maximise resource recovery; and
- Ensure waste from within developments can be collected and disposed in a manner that is healthy, efficient, minimises disruption to amenity and is conducive to the overall minimisation of waste generated.

Sydney Local Environment Plan 2012

The Sydney Local Environment Plan 2012 aims to make local environmental planning provisions for land in the City of Sydney in accordance with relevant standard environmental planning instruments under Section 33A of the EP&A Act. The Sydney Local Environment Plan 2012 is the overarching planning instrument under which the CoS DCP is implemented.

Leave nothing to waste – Managing resources in the City of Sydney area

The City of Sydney Leave nothing to waste: Waste strategy and action plan 2017-2030[1] (CoS Leave nothing to waste strategy) includes a number of targets for businesses which are applicable to the new Fish Market:

- To divert 70% of waste from operating businesses in the LGA away from landfill by 2021;
- To divert 80% of waste from construction and demolition activities in the LGA away from landfill by 2021;
- To divert 90% of waste from operating businesses in the LGA away from landfill by 2030; and
- To divert 90% of waste from construction and demolition activities in the LGA away from landfill by 2030.

In addition, the strategy includes a number of key priorities for waste management which have been considered when preparing this WMP:

- Promote innovation to avoid waste
- Improve recycling outcomes
- Sustainable design
- Better data management
- Future treatment solutions

2.3 Guidelines

Council of Australian Governments National Construction Code 2016

The *National Construction Code 2016* sets the minimum requirements for the design, construction, and performance of buildings throughout Australia.

Department of Environment & Climate Change NSW (2008) Better Practice Guide for Waste Management in Multi-unit Dwellings

This guide has been developed to assist council staff; architects, residential developers and building management incorporate better practice in the design, establishment, operation and ongoing management of waste services in residential multi-unit developments. It outlines various essential points to be considered when designing a waste management system for medium or high-density residential, mixed-use and integrated housing developments.

[1] City of Sydney, Leave nothing to waste: Waste strategy and action plan 2017-2030

NSW EPA (2012) Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities

This guide provides advice to help architects, developers, council staff and building managers to incorporate better waste management practice into the design, establishment, operation and ongoing management of waste services in commercial and industrial developments.

Council of the City of Sydney Policy for Waste Minimisation in New Developments, 2005

The purpose of this policy is to encourage efficient waste minimisation and resource recovery for demolition, construction and ongoing facility management. In addition, this policy seeks to facilitate the efficient and safe waste and recycling collection from all premises in the City of Sydney LGA.

3.0 Method of Assessment

Waste management has been assessed for the following stages of the Project:

1. Demolition and early works
2. Construction and operations

For both of these stages the waste management assessment involved an analysis of the waste characteristics for the Concept proposal, identifying types and approximate quantities of waste streams likely to be produced. An initial desktop waste classification has been undertaken in accordance with the Waste Classification Guidelines (EPA, 2014).

The management strategies for the site have been prepared in general accordance with the WARR Strategy and the City of Sydney requirements. As such, management strategies developed for each waste stream have been designed to be consistent with the waste management hierarchy, meet relevant legislation and policy, and achieve the environmental objectives of the works.

3.1 Consultation

AECOM waste consultants conducted site inspections of the existing Fish Market on 1 February 2018 and 13 July 2018. The purpose of these site inspections was to gain an understanding of the key waste streams generated at the Fish Market and current waste collection, storage, transport, on site processing and disposal strategies. In addition a number of key site constraints and potential areas for improvement were identified that have informed the preparation of the new Fish Market WMP. The AECOM team was accompanied by the existing Fish Market Operations and Waste Managers during the inspection. AECOM consultants viewed the major operations carried out on site. The site inspections were undertaken in the following areas:

- Waste management building
- Car park and loading dock
- Fish offal refrigerated storage room
- Existing Fish Market tenants (retail and catering)
- Wholesale & Auction Hall
- Offices
- Sydney Seafood School
- Wharf

Information gathered during the site inspection was used to assist in preparing this WMP for the new Fish Market.

3.2 Waste Management Strategy

The management of waste from the project would be undertaken through the adoption of the waste management hierarchy as a framework for prioritising waste management practices to achieve the best environmental outcome.

The preferred order of management is as follows:

- **Avoid** the potential of waste by identifying appropriate materials and procuring them;
- **Reduce** waste by optimising operation;
- **Reuse** waste by identifying sources that can utilise the waste;
- **Recycle** waste by identifying facilities that are able to recycle waste;
- **Recovery** of waste materials; and
- **Disposal** of waste when there is no reuse or recycling potential at an appropriate facility.

The underlying objective of effective waste management is to minimise the impacts to environmental and social values and to implement sustainability principles. To deliver effective waste management across the Project, a number of measures would be adopted as discussed in subsequent section of this WMP.

3.3 Receiving Environments

An understanding of the environmental and social context and sensitivity within which a proposed development or project activities are located is important to understanding the potential impacts. The site is generally surrounded by the following mixture of residential, recreational, and commercial land uses:

- West - Glebe which is characterised by dense residential dwellings comprised of predominately 19th century terrace style housing.
- South - Broadway/Ultimo which is a commercial area including a large shopping centre and Sydney University. Darling Harbour is located to the south east of the site.
- East - Pyrmont which is mixed use area comprising both commercial and residential land uses.
- North - Blackwattle Bay.

The site is located adjacent to Blackwattle Bay therefore potential impacts from pollution of surface waters by both solid and liquid waste generated from the Project would be managed.

4.0 Demolition and Early Works

The proposed scope for the demolition and early works comprise of:

- Site mobilisation and establishment (including installing environmental controls);
- Services verification, relocation and installation of temporary services;
- Any required localised remediation works; and
- Early civil works (cofferdam, piling, temporary works, drainage and other in ground services).

The site's current uses include charter boat mooring and operations and a concrete batching plant. The site includes wharves and land based structures.

A plan of the demolition works is provided in Figure 1 below. A whole site plan is provided in Figure 2 below.

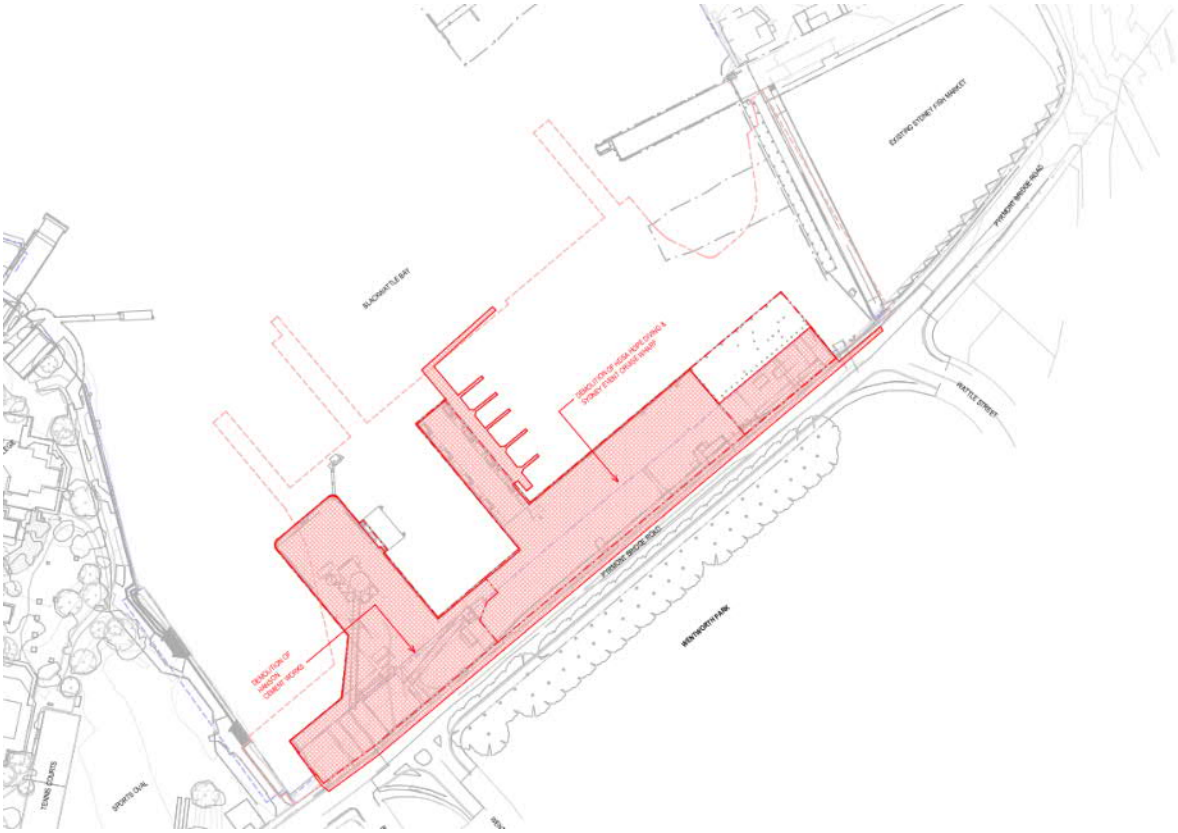


Figure 1 Fish Market demolition site plan (source: Thelem Consulting, Construction Environmental Management Plan, February 2018)

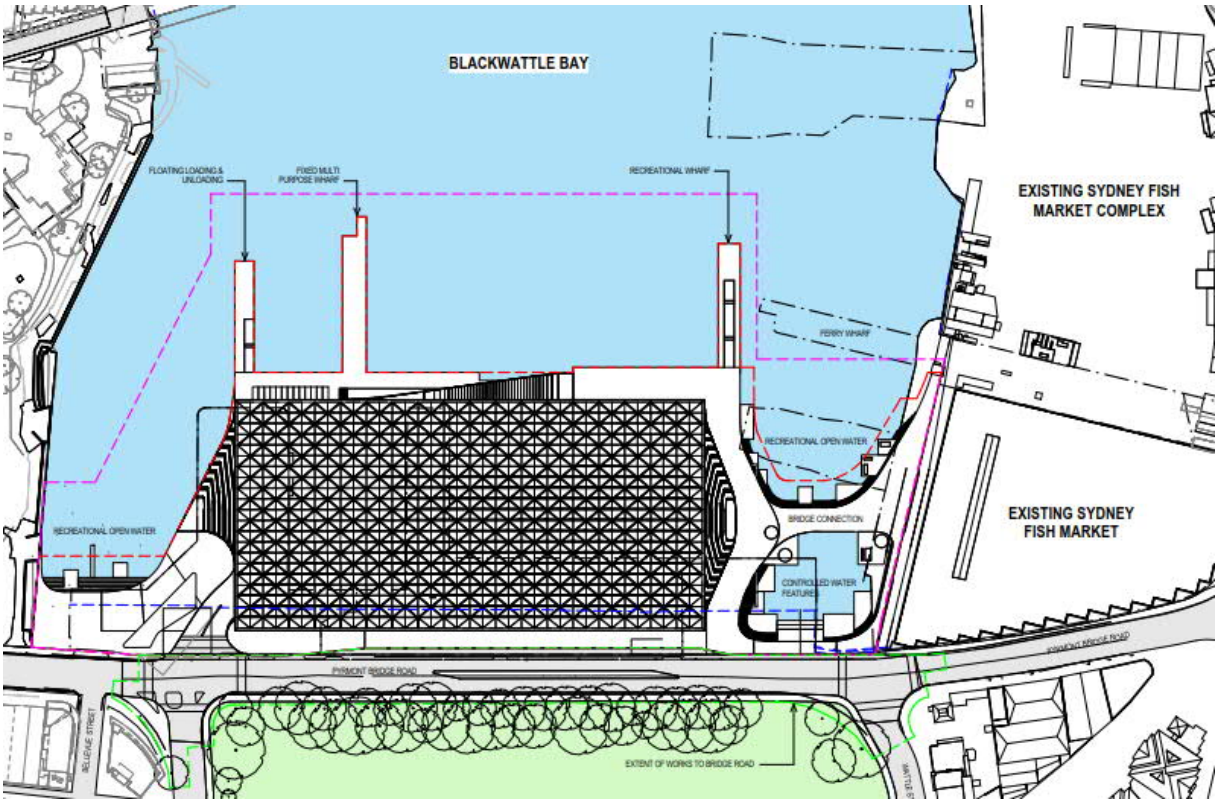


Figure 2 New Fish Market site plan (source: UrbanGrowth NSW via email 27 August 2018)

4.1 Waste Management Objectives

The key objectives for the management of waste generated by the demolition and early works are to:

- minimise waste generation on site and recycling generated;
- segregate waste on site to maximise reuse and recycling;
- segregate contaminated/hazardous waste for appropriate treatment and disposal, where applicable; and
- divert 80% of waste from demolition activities away from landfill[2].

These objectives are in line with the WARR Strategy[3] and the CoS Leave nothing to waste strategy[4].

4.2 Potential Environmental Impacts

If not managed responsibly, waste generated during the demolition and early works has the potential to cause the following impacts:

- Pollution of water, groundwater and soil;
- Emission of potentially offensive odours; and
- Resources not appropriately segregated and recovered and ultimately disposed of to landfill.

[2] UrbanGrowth NSW. The Bays Precinct Transformation Plan 2015
[3] NSW Waste Avoidance and Resource Recovery Strategy 2014-2021
[4] City of Sydney Leave nothing to waste: Waste strategy and action plan 2017-2030

4.3 Demolition and Early Works Waste Generation

The demolition and early works activities are anticipated to generate the following broad waste streams:

- Demolition wastes, including Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM), restricted/hazardous waste, uncontrolled fill material and spoil;
- Construction waste;
- Plant maintenance waste;
- Packaging waste;
- Work compound (on-site employees) waste; and
- Wastewater (from dewatering, plant maintenance and construction activities).

Estimates, where available, of the quantity, classification and primary source of major waste streams expected to be generated during the demolition and early works are summarised in Table 2. More accurate estimates of demolition waste, including fill, ENM and VENM would be provided during the design development phase of this Project.

Table 2 Demolition and Early Works waste estimates, classification and management

Waste Type	Estimated Quantity	Classification[5]	Management Strategy
Demolition and Early Works			
Reinforced concrete from wharf	Approx. 13,000 m^2	General Solid Waste (Non-Putrescible)	Sent to an off-site material recovery facility that pulverises the concrete and separates the reinforcement for scrap metal
Hardwood girders from wharf	To be confirmed prior to demolition works	General Solid Waste (Non-Putrescible)	To be confirmed if recyclable or treated for landfill
Timber headstocks from wharf	To be confirmed prior to demolition works	General Solid Waste (Non-Putrescible)	Recovered timber would be graded into three categories: • High architectural use (joinery exposed beams etc.) • Low architectural use (street furniture, landscaping etc.) • Landfill
Turpentine piles and fender piles wharf	To be confirmed prior to demolition works	General Solid Waste (Non-Putrescible)	To be confirmed if recyclable or treated for landfill
Asphalt surfacing from wharf	To be confirmed prior to demolition works	General Solid Waste (Non-Putrescible)	Sent to an appropriate facility for recycling
Galvanised structural steel access platforms and stairs at wharf	To be confirmed prior to demolition works	General Solid Waste (Non-Putrescible)	Sent to an appropriate facility for recycling

[5] Waste classification would be confirmed prior to disposal in accordance with the *Waste Classification Guidelines* (EPA, 2014)

Waste Type	Estimated Quantity	Classification[5]	Management Strategy
Unknown waste from pre-existing sea-bed debris	Unknown	Classified in accordance with the NSW EPA Waste Classification Guidelines and recycled or disposed at an appropriate facility	Classified in accordance with the NSW EPA Waste Classification Guidelines and recycled or disposed at an appropriate facility
Sediment fencing, geotextile materials	Minor	General solid (non-putrescible) waste	Reuse at other sites where possible or disposal to landfill
Fill material	To be confirmed during the design development phase of this project	Solid waste (non-putrescible) requiring classification	Off-site recycling or, if required, disposal to landfill
ENM	To be confirmed during the design development phase of this project	General solid waste (non-putrescible)	Off-site reuse
VENM	To be confirmed during the design development phase of this project	General solid waste (non-putrescible)	Off-site reuse
Conduits and pipes, bulk electrical cabling	Approx. 1 x 8 m^3 skip per week	General solid (non-putrescible) waste	Off-site recycling
Mixed construction material (non-ferrous metals, bricks, roof tiles, concrete, gyprock/ plasterboard Insulation material)	Approx. 4 x 8 m^3 skips per day	General solid waste (non-putrescible)	Off-site recycling Mixed construction waste would be collected on-site in dedicated skip bins and stored in designated locations. Skips would be closed during rainfall events to prevent land and water contamination. The skips would be collected when full and taken to an off-site C&D waste material recovery facility for sorting and recovery of recyclables. Any residual waste would be sent to landfill.

Waste Type	Estimated Quantity	Classification[5]	Management Strategy
Ferrous metal (sheet metal and steel)	Approx. 1 x 8 m^3 skip per week	General solid (non-putrescible) waste	Off-site recycling Metal and steel would be segregated and stored within designated areas on-site and transported by a licensed contractor to an off-site scrap metal recycling facility
Other recyclable timber	Approx. 2 x 8 m^3 skip per week	General solid (non-putrescible) waste	Reused on-site or off-site recycling Source separated timber would be either reuse d or sent off-site to a recycling facility
Paper and cardboard	Minor	General solid (non-putrescible) waste	Off-site recycling Source separated paper and cardboard would be sent off-site to a recycling facility
Sheet glass	Minor	General solid (non-putrescible) waste	Off-site recycling Source separated glass would be sent off-site to a suitable recycling facility or landfill
Dry recyclable general waste	Approx. 6 x 240 L MGB per day	General solid (non-putrescible) waste	Off-site recycling Source separated dry recyclable (e.g. plastic, aluminium and glass containers)and would be sent off-site to a material recovery facility
Non-recyclable general waste	Approx.6 x 240 L MGB per day	General solid (putrescible) waste	Off-site disposal General solid waste would be sent to an off-site landfill for disposal

Waste Type	Estimated Quantity	Classification[5]	Management Strategy
Packaging materials, including wood, plastic (including stretch wrap or LLPE), cardboard and metals	Minor	General solid (non-putrescible) waste	Off-site recycling or disposal Packaging materials would be returned to suppliers or recycled where possible, otherwise disposed to landfill
Wastewater, pump-out waste and septage (sewage)	Minor	Liquid (trade) waste	Off-site disposal at licensed facility or disposal direct to sewer where arranged with Council
Asbestos (including Asbestos Containing Material (ACM))	Refer to Water Quality, Soils and Contamination Plan	Special Waste	Off-site disposal to licensed facility
Lead paint	Minor	Hazardous waste	Off-site processing and disposal to a licensed facility
Plant Maintenance			
Empty oil and other drums / tins (e.g. fuel, chemicals, paints, spill clean ups)	Minor	Hazardous waste if the containers were previously used to store Dangerous Goods (Class 1, 3, 4, 5 or 8) and from which residues have not been removed by washing or vacuuming General solid (non-putrescible) waste if the containers have been cleaned by washing or vacuuming	Offsite recycling or disposal at licensed facility. (*Note: Discharge to sewer subject to Trade Waste Agreement with local water authority*)
Air filters and rags	Minor	General solid (non-putrescible) waste	Off-site disposal General solid waste would be sent to an off-site landfill for disposal
Oil filters	Minor	Hazardous waste	Off-site recycling at a licensed facility
Batteries	Minor	Hazardous waste	Off-site recycling at a licensed facility

4.4 Demolition and Early Works Waste Management Strategy

4.4.1 Waste avoidance

The demolition contractor would:

- Take advantage of opportunities for beneficial reuse for ENM and/or VENM generated from excavation works if possible;
- Sort and segregate site preparation and demolition wastes to ensure efficient recycling of wastes;
- Store wastes on site appropriately to prevent cross-contamination and/or mixing of different waste; and
- Ensure subcontractors are informed of and implement site waste management procedures.

4.4.2 Reuse, recycle and disposal

The demolition contractor would implement the following with respect to reuse, recycling and disposal of site preparation and demolition waste:

- Provide separate waste bins for recyclable and non-recyclable residual wastes;
- Access excavated spoil for contamination status and beneficial reuse in accordance with the Waste Classification Guidelines;
- Waste oil to be recycled or disposed of in an appropriate manner;
- Retain used crates for storage purposes unless damaged;
- Recycle cardboard, glass and metal wastes;
- Returning packaging to suppliers where possible and practicable;
- Recycle or dispose of solid waste timber, brick, concrete, tiles, asphalt, and rock (where such waste cannot be reused on site) to an appropriately licensed C&D waste recycling facility or an appropriately licensed landfill;
- Dispose of all asbestos, hazardous and/or intractable wastes in accordance with SafeWork NSW and NSW EPA requirements; and
- Batteries to be delivered to off-site recycling facilities/centres.

4.4.3 Waste segregation, storage and servicing

Waste materials produced from site preparation and demolition activities are to be segregated and stored separately on site.

It is anticipated that the site would provide allowances for separate storage (e.g. separate skip bins and/or appropriately managed stockpiles) of the following waste types:

- Bricks, roof tiles, concrete and scrap metal;
- Metal/steel (if any, in a condition suitable for recycling at metal recycling facilities);
- Timber;
- Glass;
- Hardstand rubble;
- Excavation spoil (uncontaminated);
- Contaminated excavation spoil (if present);
- Hazardous waste;
- Paper and cardboard;

- Recyclable general waste; and
- Non-recyclable general waste.

If there is insufficient space onsite for full segregation of waste types, the demolition contractor would consult with waste/recycling collection facilities to confirm which waste types may be co-mingled prior to removal from the site.

4.4.4 Waste storage areas

Areas designated for waste storage should:

- Allow unimpeded access by site personnel and waste disposal contractors;
- Have in place adequate environmental management controls to prevent off-site migration of waste materials and/or contamination from the waste; and
- Not present hazards to human health or the environment.

4.4.5 Waste servicing and transport off-site

The demolition contractor is to:

- Arrange for suitable waste collection contractors to remove site preparation and demolition 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/recycling collection contractor(s) and facilities receiving the waste/recyclables;
    - Records of waste/recycling collection vehicle movements (e.g. 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.

4.4.6 Contaminated and hazardous waste

Contaminated and/or hazardous materials, where identified, are to be removed by appropriately licensed contractors and transported to facilities licensed to accept such materials for treatment and/or disposal in accordance with NSW EPA regulations.

Where unexpected materials are encountered which are, or are suspected of being, contaminated or hazardous, the following shall be undertaken as a minimum:

- Work near the suspect material is to stop immediately and access to the area restricted;
- Site manager is to contact a qualified hazardous materials assessor and/or environmental consultant (as necessary) to arrange an assessment of the suspect material and advise on subsequent management procedures; and
- The demolition contractor's unexpected finds protocol, if available, shall be implemented.

4.4.7 Liquid waste management

Wastewater or liquid waste generated from demolition activities is not permitted to enter the storm water system of Blackwattle Bay or migrate off-site.

Areas, if any, designated on site for wash-down of equipment plant or machinery are to be appropriately bundled and isolated from the local storm water system and groundwater.

Liquid waste / wastewater would be removed by a suitably qualified liquid waste contractor and transported to an appropriately licensed facility for treatment and/or disposal in accordance with NSW EPA regulations.

4.4.8 Spills management

Spillages are to be immediately contained (if safe to do so) and the site manager notified as soon as possible.

Spill containment kits and spill control equipment are to be provided and maintained in sufficient numbers and at appropriate locations to allow ready and rapid access by site personnel. Safety Data Sheets (SDSs) should also be available to provide advice on spill clean-up and disposal.

4.4.9 Signage

Standard signage is to be posted in all storage/waste collection areas.

All waste containers are required to be labelled correctly and clearly to identify materials stored within. An example of signage is provided below.

4.4.10 Site inductions

Waste management measures and procedures are to be included in the site induction for all personnel working at the site.

With respect to waste management, the site induction is to include, at a minimum:

- An outline of the Construction Environmental Management Plan (CEMP) and WMP;
- Legal obligations;
- Emergency response procedures on site;
- Waste storage locations and separation of waste;
- Litter management in transit and on site;
- Implications of poor waste management practices;
- Correct use of spill kits; and
- Responsibility and reporting (including identification of personnel responsible for onsite waste management and individual responsibilities).

4.5 Management and Mitigation Measures

Recommended mitigation measures include:

- A CEMP would be prepared for the demolition and early works.
- The demolition contractor shall manage the storage, movement and disposal of demolition waste by nominating dedicated waste storage areas in close proximity to the demolition activity.
- Where possible, waste shall be segregated into component parts to assist with disposal, recycling or reuse.
- All demolition waste shall be disposed of at a licensed waste disposal facilities and waste disposal receipts obtained and retained in the project files.

4.6 Monitoring and Reporting

Records of volumes or tonnages of waste reused, recycled, or disposed to landfill should be maintained by the building contractor. Additionally, dockets/receipts verifying recycling and/or disposal in accordance with the WMP are to be retained.

Site personnel would undertake daily visual inspections of waste storage areas to identify and rectify any issues concerning waste management at the site, as well as identifying opportunities to improve waste management at the site. A written record of these inspections, which would include observations made and the results of any remedial actions taken, is to be undertaken and retained by the building contractor as part of the construction environmental management documentation.

5.0 Construction

The Main Works State Significant Development Application SSDA seeks approval for construction of:

- a new Fish Market including land and water-based structures;
- public domain works including promenades access to Blackwattle Bay and landscaping;
- pedestrian, cycle and road access and circulation; and
- associated works as required.

5.1 Waste Management Objectives

The objectives for the management of waste generated by the construction works are to:

- minimise waste and recycling generated on site;
- segregate waste on site to maximise reuse and recycling;
- segregate contaminated or hazardous waste for appropriate treatment and disposal, where applicable; and
- divert 95% of construction waste from landfill.

These objectives are in line with the *Bays Precinct Transformation Plan 2015* and exceed the requirements of the WARR Strategy and the CoS Leave nothing to waste strategy.

5.2 Potential Environmental Impacts

Improper management of waste during the construction works may result in the following impacts:

- Pollution of water, groundwater and soil;
- Emission of potentially offensive odours; and
- Resources not appropriately segregated and recovered and ultimately disposed of to landfill.

5.3 Construction Works Waste Generation

The construction activities are anticipated to generate the following broad waste streams:

- Mixed construction waste;
- Plant maintenance waste;
- Packaging waste;
- Work compound (on-site employees) waste; and
- Wastewater (from plant maintenance and construction activities).

Estimates, where available of the quantity, classification and primary source of major waste streams generated during the construction works are summarised in Table 3**.**

Table 3 Construction wastes – estimates, classification and management

Waste Type	Estimated Quantity	Classification[6]	Management Strategy
Main Construction Works			
Mixed construction material (non-ferrous metals, bricks, roof tiles, concrete)	Approx. 2 x 8 m^3 skips per day	General solid (non-putrescible) waste	Off-site recycling Mixed construction waste would be collected on-site in dedicated skip bins and stored in designated locations. Skips would be closed during rainfall events to prevent land and water contamination The skips would be collected when full and taken to an off-site C&D waste material recovery facility for sorting and recovery of recyclables. Any residual waste would be sent to landfill
Ferrous metal (sheet metal and steel)	Approx. 1 x 8 m^3 skip per week	General solid (non-putrescible) waste	Off-site recycling Metal and steel would be segregated and stored within designated areas on-site and transported by a licensed contractor to an off-site scrap metal recycling facility
Recyclable timber	Approx. 1 x 8 m^3 skip per week	General solid (non-putrescible) waste	Reused on-site or off-site recycling Source separated timber would be either reused or sent off-site to a recycling facility
Paper and cardboard	Minor	General solid (non-putrescible) waste	Off-site recycling Source separated paper and cardboard would be sent off-site to a recycling facility
Sheet glass	Minor	General solid (non-putrescible) waste	Off-site recycling Source separated glass would be sent off-site to a suitable recycling facility or landfill
Dry recyclable general waste	Approx. 8 x 240 L MGBs per day	General solid (non-putrescible) waste	Off-site recycling Source separated dry recyclable (e.g. plastic, aluminium and glass containers) and would be sent off-site to a material recovery facility

[6] Waste classification would be confirmed prior to disposal in accordance with the *Waste Classification Guidelines* (EPA, 2014)

Waste Type	Estimated Quantity	Classification[6]	Management Strategy
Residual waste (food waste, packing)	Approx. 8 x 240 L MGBs per day	General solid (putrescible) waste	Off-site disposal General solid waste would be sent to an off-site landfill for disposal
Packaging materials, including wood, plastic (including stretch wrap or LLPE), cardboard and metals	Minor	General solid (non-putrescible) waste	Off-site recycling or disposal Packaging materials would be returned to suppliers or recycled where possible, otherwise disposed to landfill
Hazardous or Restricted waste	Minor	Hazardous or Restricted Waste	Off-site processing and/or disposal Collected in suitable containers and sent off-site for further processing or disposal to licensed facility
Wastewater, pump-out waste and septage (sewage)	Minor	Liquid (trade) waste	Off-site disposal at licensed facility or disposal direct to sewer where arranged with local water authority
Plant maintenance during construction			
Empty oil and other drums / tins (e.g. fuel, chemicals, paints, spill clean ups)	Minor	Hazardous waste if the containers were previously used to store: • Dangerous Goods (Class 1, 3, 4, 5 or 8) and from which residues have not been removed by washing or vacuuming • General solid (non-putrescible) waste if the containers have been cleaned by washing or vacuuming	Transport to comply with the transport of Dangerous Goods Code applies in preparation for offsite recycling or disposal at licensed facility
Air filters and rags	Minor	General solid (non-putrescible) waste	Disposal to landfill
Oil filters	Minor	Hazardous waste	Off-site recycling
Batteries	Minor	Hazardous waste	Off-site recycling

5.4 Construction Waste Management Strategy

5.4.1 Waste avoidance

The following would be undertaken to avoid waste generation:

- Apply practical building designs and construction techniques;
- Sort and segregate construction wastes to ensure efficient recycling of waste streams;
- Store waste streams on site appropriately to prevent cross-contamination and/or mixing of different waste;
- Exercise a preference for long lifespan and/or high potential for reuse in selecting construction materials;
- reuse formwork where appropriate;
- Reduce packaging waste by:
  - Returning packaging to suppliers where possible and practicable;
  - 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.
- Ensure subcontractors are informed of and implement site waste management procedures.

5.4.2 Reuse, recycle and disposal

The following would be implemented with respect to reuse, recycling and disposal of construction waste:

- Provide separate waste bins for recyclable and non-recyclable waste streams;
- Access excavation spoil for contamination status and beneficial reuse;
- Waste oil to be recycled or disposed of in an appropriate manner;
- Retain roofing material cut-offs for reuse;
- Retain used crates for storage purposes unless damaged;
- Recycle cardboard, glass and metal;
- Returning packaging to suppliers where possible and practicable;
- Recycle or dispose of solid waste timber, brick, concrete, tiles, asphalt, and rock (where such waste cannot be reused on site) to an appropriately licensed C&D waste recycling facility or an appropriately licensed landfill;
- Dispose of all asbestos, hazardous and/or intractable waste in accordance with WorkCover NSW and NSW EPA requirements; and
- Batteries to be delivered to off-site recycling facilities/centres.

5.4.3 Waste segregation, storage and servicing

Waste materials produced from site construction activities are to be segregated and stored separately on site.

It is anticipated that the site would provide allowances for separate storage (e.g. separate skip bins and/or appropriately managed stockpiles) of the following waste types:

- Bricks, roof tiles, concrete and scrap metal;
- Metal/steel (if any, in a condition suitable for recycling at metal recycling facilities);
- Timber;
- Glass;
- Hardstand rubble;
- Hazardous waste;
- Paper and cardboard;
- Recyclable general waste; and
- Non-recyclable general waste.

If there is insufficient space onsite for full segregation of waste types, the building contractor should consult with waste/recycling collection facilities to confirm which waste types may be co-mingled prior to removal from the site.

5.4.4 Waste storage areas

Areas designated for waste storage should:

- Allow unimpeded access by site personnel and waste disposal contractors;
- Have in place adequate environmental management controls to prevent off-site migration of waste materials and/or contamination from the waste; and
- Not present hazards to human health or the environment.

5.4.5 Waste servicing and transport off-site

The building contractor is to:

- Arrange for suitable waste collection contractors to remove 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/recycling collection contractor(s) and facilities receiving the waste/recyclables;
    - Records of waste/recycling collection vehicle movements (e.g. 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.

5.4.6 Contaminated and hazardous waste

Contaminated and/or hazardous materials, where identified, are to be removed by appropriately licensed contractors and transported to facilities licensed to accept such materials for treatment and/or disposal in accordance with NSW EPA regulations and guidelines in particular the NSW EPA Waste Classification Guidelines.

Where unexpected materials are encountered which are, or are suspected of being, contaminated or hazardous, the following shall be undertaken as a minimum:

- Work near the suspect material is to stop immediately and access to the area restricted;
- Site manager is to contact a qualified hazardous materials assessor and/or environmental consultant (as necessary) to arrange an assessment of the suspect material and advise on subsequent management procedures; and
- The building contractor's unexpected finds protocol, if available, shall be implemented.

5.4.7 Liquid waste management

Wastewater or liquid waste generated from construction activities would not be permitted to enter the storm water system of Blackwattle Bay or migrate off-site.

Areas, if any, designated on site for wash-down of equipment plant or machinery would be appropriately bundled and isolated from the local storm water system and groundwater.

Liquid waste / wastewater would be removed by a suitably qualified liquid waste contractor and transported to an appropriately licensed facility for treatment and/or disposal in accordance with NSW EPA regulations.

5.4.8 Spills management

Spills are to be immediately contained (if safe to do so) and the site manager notified as soon as possible. Spill containment kits and spill control equipment would be provided and maintained in sufficient numbers and at appropriate locations to allow ready and rapid access by site personnel. Safety Data Sheets (SDSs) would also be available to provide advice on spill clean-up and disposal.

5.4.9 Signage

Standard signage would be posted in all storage/waste collection areas.

All waste containers would be labelled correctly and clearly to identify materials stored within. Some relevant examples are illustrated below.

5.4.10 Site inductions

Waste management measures and procedures would be included in the site induction for all personnel working at the site.

With respect to waste management, the site induction would include, at a minimum:

- An outline of this WMP;
- Legal obligations;
- Emergency response procedures on site;
- Waste storage locations and separation of waste;
- Litter management in transit and on site;
- Implications of poor waste management practices;
- Correct use of spill kits; and
- Responsibility and reporting (including identification of personnel responsible for onsite waste management and individual responsibilities).

5.5 Monitoring and reporting

Records of volumes or tonnages of waste reused, recycled, or disposed to landfill would be maintained by the building contractor. Additionally, dockets/receipts verifying recycling and/or disposal in accordance with the WMP would be retained.

Site personnel would undertake daily visual inspections of waste storage areas to identify and rectify issues concerning waste management at the site, as well as identifying opportunities to improve waste management at the site. A written record of these inspections, which would include observations made and the results of any remedial actions taken, would be undertaken and retained by the building contractor as part of the CEMP documentation.

6.0 Operational Waste Management

This WMP provides clear guidance on better waste management practices that reduce potential waste impacts during operation at the new Fish Market. This WMP has been developed in accordance to the provisions of the CoS DCP 2012 and has been based on the new Fish Market Concept Design Package issued on the 19 August 2019.

The WMP addresses the generation of waste from the various tenants and activities at the new Fish Market and includes:

- the type and expected volume of waste generated;
- plans and layout(s) of the proposed area/space allocated to the waste management facilities;
- nomination of the waste collection point(s) for the site; and
- details of the ongoing management of the storage and collection of waste, including transfer of bins between storage areas and collection points, maintenance of signage, and security of storage areas.

This WMP aims to meet legislative waste minimisation requirements and council objectives and is generally based on a number of overarching objectives, principles and strategies to deliver effective waste management across the site.

Section 6.0, 7.0 and 8.0 of this WMP should be read in conjunction with the following reports and drawings:

- Bird Management Strategy New Sydney Fish Market, March 2019
- Overall GA – Level B2 (AR-1-10B-B200) 3XN BVN Issue D dated 18/08/19
- Overall GA – Level L0 (AR-1-10B-L000) 3XN BVN Issue C dated 18/08/19
- Overall GA – Level L1 (AR-1-10B-L100) 3XN BVN Issue D dated 18/08/19

6.1 Waste Management Objectives

The objectives for the management of waste generated by the operations are to:

- minimise waste generation on site and recycling generated;
- segregate waste on site to maximise recycling;
- identify solutions to manage specific waste streams in a manner that maximises diversion from landfill (e.g. EPS); and
- divert operational waste and recycling from landfill to achieve a long-term target of 80% diversion from landfill.

These objectives are aligned with the Bays Precinct Transformation Plan 2015 and exceed the requirements of the WARR Strategy and the CoS Leave nothing to waste strategy.

6.2 Potential Environmental Impacts

If not managed responsibly, waste generated by the operations has the potential to cause the following impacts:

- land and surface water contamination as a result of spills or inappropriate storage, handling, transportation and disposal of solid and liquid wastes;
- noise impacts associated with waste collection, movement and transport;
- odours and vermin resulting from improper storage and treatment of solid and putrescible wastes;
- visual amenity impacts resulting from waste storage and movements at the Site (e.g. bins storage, collection and transport); and

- off-site land and water pollution due to windblown wastes following inappropriate storage, handling, and transportation of wastes.

6.3 Cumulative Impacts

No significant cumulative impacts associated with management of waste from the Site have been identified. Potential impacts which would be managed include a possible increase in the number of heavy rigid truck movements along Bridge Road. Traffic impacts are discussed in the Traffic Impact Assessment report.

6.4 Mitigation Measures

A number of mitigation measures have been incorporated in the design and form part of the WMP. The waste hierarchy has been used as a framework for on site management of waste. Table 4 includes a summary of the mitigation measures that have been developed.

Table 4 Operational waste – mitigation measures

Mitigation Measure	Responsibility	When to implement
Environmental Design Features Waste containment and storage facilities would be designed for satisfactory performance to minimise the impact of waste: • Design of waste storage facilities to Australian Standards • Spill kits and chemical storage areas • Technologies in place with respect to waste handling vehicles and machinery as well as waste management rooms for emissions control (e.g. allowing air changes through ventilation ducts or exhaust air fans) • Emergency procedures developed	Environmental Manager/ Officer	Planning
Energy Conversation All operations on site including waste related operations should implement energy efficient strategies to minimise the impact on the environment: • Procurement process to consider locally produced goods and services to reduce transport emissions • Mobile plant and/or machinery to use environmentally friendly and efficient fuel sources (e.g. using electric forklifts instead of gas-mobile plant in enclosed areas)	Engineers/ Project Managers/ Operators	Procurement, Planning and Operation (All times)
Site Induction Site inductions and ongoing toolbox talks would incorporate aspects of waste management including: • The waste hierarchy • Waste minimisation and reuse measures • Waste types and associated disposal requirements • Implications of poor waste management strategies • Energy consumption	All Site Personnel	Site Induction
Management Hierarchy The management of waste would be undertaken in general accordance with the hierarchy of control including: • Elimination and removal • Substitution • Isolation, enclosure or sealing • Engineering controls and • Safe work practices (administrative controls) • Personal protective equipment	All Site Personnel	At all times

Mitigation Measure	Responsibility	When to implement
Waste Classification Waste generated would be assessed and classified in accordance with *NSW EPA Waste Classification Guidelines* (2014) to determine the most appropriate management strategy	Environmental Manager/ Officer	Planning and Operation
Site maintenance and cleaning Regular site cleaning and bin maintenance: • Provision of bin wash down areas and sewer drainages in waste management rooms • Provision of wash down services for the goods hoist, particularly those transporting MGBs and other waste items • General site upkeep to reduce vermin	Engineers/ Project Managers/ Operators	Planning and Operation (All times)

7.0 Operational Waste Generation

The new Fish Market would have a number of different waste generating areas on site. These waste generating areas include the following:

- retail and catering
- wholesale trading area
- auction hall and loading dock
- wharfs/wharf operations
- offices
- Sydney Seafood School
- external shared public dining

To model the estimated waste generation rates for the new Fish Market the following steps were undertaken:

- Review of historical waste generation at the existing Fish Market;
- Comparison of floor areas for each commercial industry type in the existing Fish Market with the new Fish Market to determine potential increase in waste generation at the new Fish Market; and
- Modelling of waste generation using the above information for each waste stream and by each floor to understand where each waste stream is being generated and how to distribute bins accordingly.

7.1 Current Waste Generation

The waste generation rates used in this WMP were based on a review of waste audit and monitoring data for all tenants as well as previous waste management plans provided by the existing Fish Market. Waste generation rates for tenants who hold separate waste service contracts to SFM's waste service contract have been included in this WMP.

Table 5 provides a summary of the total annual waste monitoring data provided by SFM (3.5 year average).

Figure 3 indicates the average daily generation of mixed residual waste with organics, and recyclables at the existing Fish Market from 2014 – 2017[7]. This graph does not include fish offal. As shown in Figure 3, there were no significant variations in the average daily waste generated for mixed residual waste and recyclables at the existing Fish Market over the 3.5 year period. However; there is an observed increase in waste generation during peak periods for example, the Christmas period.

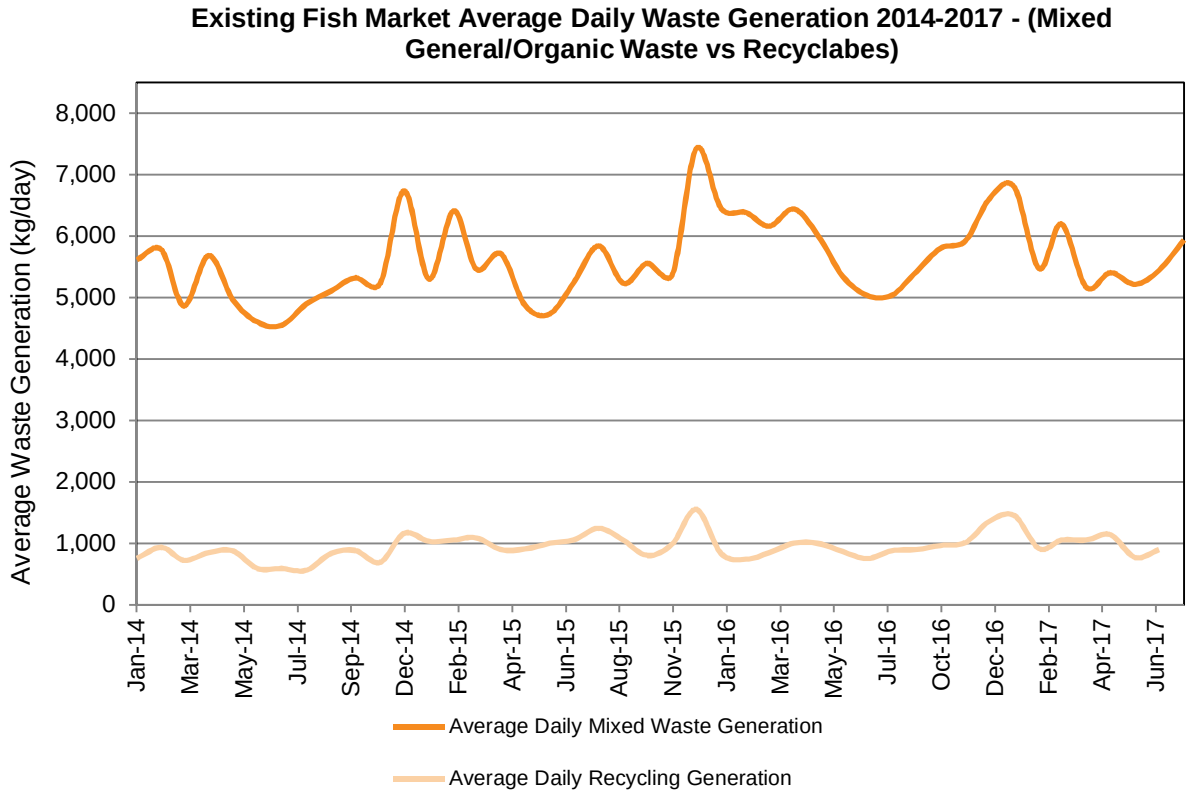
Figure 3 and Table 5 do not include data pertaining to fish offal generation. Fish offal is currently collected as a separate resource stream that is transported and used as input for pet food / chicken feed off-site.

Table 5 Summary of waste generation at the existing Fish Market

Waste Stream	Tonnes per week	Tonnes per year
Mixed Waste (General + Organic Waste)	42	2,188
Recycling	11	552
Total	**53**	**2,740**

[7] Waste Monitoring as at August 2017 (Waste generation data provided by SFM on the 07.02.18)

Figure 3 Existing Fish Market Average Daily Waste Generation 2014-2017 (source: SFM, provided 07.02.18)



7.2 Floor Areas

Waste generation data provided by the existing Fish Market has been used in preparation of this WMP to estimate the anticipated operational waste generation rates at the proposed new Fish Market, taking into account the increase in size of the various premises as indicated in the Concept layouts. Table 6 shows a comparison of the floor areas between premises at the existing Fish Market and the proposed new Fish Market.

Table 6 Operations floor area summary (NLA)[8]

Type of Premises	Existing Fish Market Area (m^2)	New Fish Market Area (m^2)	% Change
Retail and Catering (including new concepts)	6,582	13,660	+108%
Wholesale	4,656	4,777	+3%
Office/Commercial	2,025	1,929	-5%
Auction Hall*	4,675	4,239	-9%
External/Shared Public Dining (Common Seating)	796	666	-16%
Sydney Seafood Cooking School	578	706	+22%

**The drawings (AR-1-10U-NL00 issue B dated 19/08/2019) showing areas (NLAs) do not include an Auction Hall, however it has been assumed that this area is represented as 'SFM Operations'.*

The waste generation data provided by SFM is the total volume generated by the existing Fish Market. Waste generation data by individual generator e.g. wholesale, retail tenants etc. was not available. To

[8] 3XN BVN New Sydney Fish Market Area Summary

calculate the waste generation for the new Fish Market, it has been assumed that the increase in floor areas would result in an increase in potential waste generated.

According to information in Table 6, floor areas for retail and catering and Sydney Seafood School would increase significantly at the new Fish Market. As a result, potential waste generation at the new Fish Market is expected to be higher than current waste generation at the existing Fish Market.

7.3 Future Waste Generation

Table 7 outlines the estimated types and quantities of waste that may be generated at the new Fish Market. Figure 4 is a visual representation of the m^3/week data outlined in Table 7.

It should be noted that these rates do not factor in waste reduction targets but have been estimated using current waste generation data from the existing Fish Market to ensure the waste infrastructure is adequate for peak periods.

Table 7 Estimated waste generation rates at the new Fish Market

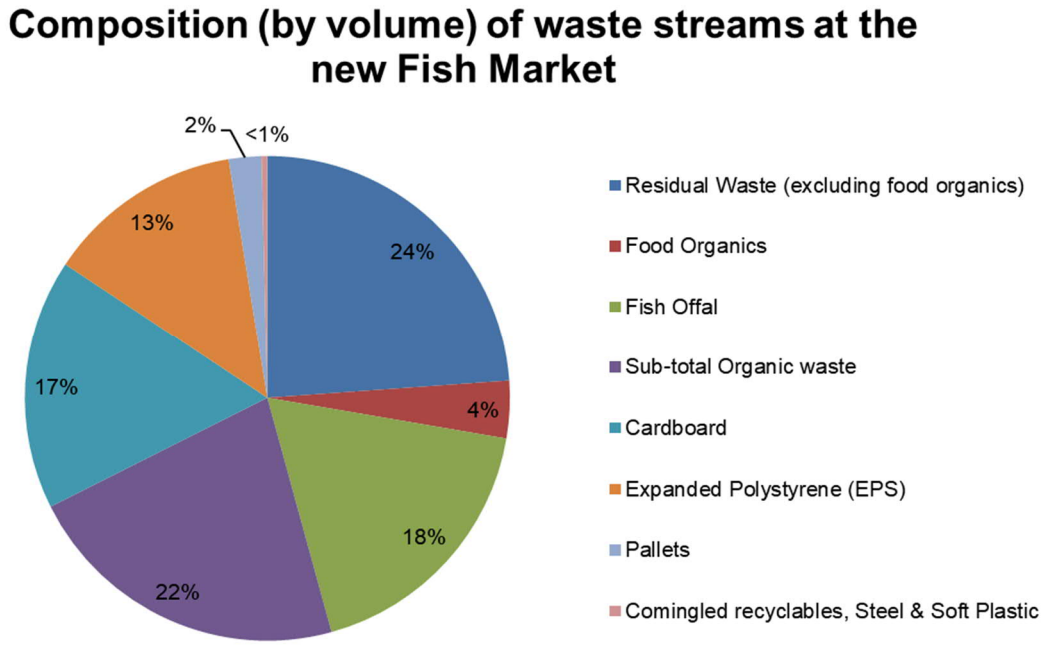
Waste Stream	m^3/week	tonnes / week	tonnes / year
Residual waste (excluding food organics)	158	27	1,390
Sub-total Residual Waste	**158**	**27**	**1,390**
Food organics	25	30	1,553
Fish offal*	40	48	2,500
Sub-total Organic Waste	**65**	**78**	**4,053**
Cardboard	110	8.8	458
EPS	86	2.4	126
Pallets	14	2.2	114
Co-mingled recyclables	2.5	0.8	42
Steel	0.02	0.02	1.01
Soft plastic	0.02	0.01	0.34
Motor oil (from boats)**	0.85	0.75	39
Sub-total Recyclables* **	**213**	**15**	**780**
Total	**436**	**120**	**6,223**

** source: Fish Offal forecasted generation provided by Sydney Fish Market, email dated 19.08.2019, 'SFM_Waste_All_data.xlsx'*

***peak generation of motor oils provided by INSW email dated 20.08.19*

****totals may not match due to rounding*

Figure 4 Waste composition at the new Fish Market in m³ per week



Co-mingled recyclables, steel and soft plastic have been grouped together due to their small volumes comparable other waste and recycling streams.

7.4 Fish Offal Generation

Fish offal is generated in the auction hall, wholesale trading, and retail & catering[9] areas. SFM estimate that the new Sydney Fish Markets will generate up to 2,500 tonnes of fish offal per year[10]. Contingency for future design has been allowed for in the floor area for storage of fish offal.

[9] Hyder Consulting (2016). Sydney Fish Market Functional Brief, Waste Management
[10] Sydney Fish Market, email dated 19.08.2019, '*SFM_Waste_All_data.xlsx'*

8.0 Operational Management Strategy

The operational waste management strategy in this WMP has been developed by adopting the waste hierarchy as a framework for waste management practices to achieve the best environmental outcomes. The preferred order of adoption is as follows:

- **Avoid** the potential of waste generation;
- **Reduce** waste during operations;
- **Reuse** waste where applicable;
- **Recycle** waste whenever possible;
- **Recovery** of waste materials; and
- **Disposal** of waste when there is no reuse or recycling potential.

8.1 Waste Minimisation

Waste minimisation measures have been for development and implementation during operation of the Site. Prevention and minimisation of residual waste would be addressed where feasible, through the use of efficient operation techniques.

Cleaner production techniques have been identified for reducing operational waste at the new Fish Market. Some of the techniques include but are not limited to:

- Implementation of ongoing improvement strategies in operational and maintenance practices, to optimise the use of resources and minimise the amount of waste generated. For example, Total Quality Management and Lean Principles;
- Application of highly efficient processes and/or “green technology” to ensure sustainable uses of energy, water and natural resources;
- Adopting a *cradle-to-cradle* (regenerative) approach in design and planning of operational works;
- Promotion of safe handling procedures of products in line with regulations and industry best practices; and
- Implementation of sustainable procurement practices, for example the use of biodegradable tableware instead of plastic-based products (especially in public dining areas). This may be achieved through the use of ‘green contracts’ with retailers which identify requirements for use of reusable and/or recyclable consumer products.

8.2 Source Separation

Source separation involves identification and separation of waste into common material streams or categories at the point of generation for separate collection. This aids material reuse and improves recycling, thereby capturing reusable or recyclable material that would otherwise end up in landfill. All waste materials generated during operation would be identified and classified in line with the *Waste Classification Guidelines* (EPA, 2014) prior to separation.

Appropriate receptacles would be provided on all levels across the Site during operation for residual waste and reusable/recyclable materials. These receptacles would be clearly marked and identifiable to Site staff and the public to encourage correct waste separation. All receptacles would be stored in the allocated waste storage areas on retail, loading dock and basement level. The location of public place bins is to be confirmed in collaboration with the project architects during Phase 4 of detailed design development.

The following waste streams would be source-separated at the new Fish Market:

- food organic waste (mostly from retail and catering premises);
- fish offal;
- co-mingled recyclables (bottles, lunch containers, cans etc.);

- residual waste;
- EPS;
- paper and cardboard;
- scrap metal;
- chemical waste;
- timber pallets; and
- cooking oils and motor oils.

8.3 Waste Monitoring and Auditing

To ensure cost-effectiveness and sustainable resource management, continuous monitoring and waste auditing throughout the operational works are required. Auditing and monitoring procedures would be developed for each waste stream to gather information on waste types generated, volumes produced, and waste management practices adopted.

The objectives of these procedures would be to:

- Establish baseline or benchmark data for planning purposes;
- Identify (new waste streams), characterise and quantify waste generated;
- Monitor the potential environmental impacts;
- Identify waste diversion or source reduction opportunities;
- Review the waste transportation records and disposal routes;
- Enable positive actions to be taken in the event of incidents or accidents occurring on-site;
- Monitor the implementation of the principles of waste management hierarchy; and
- Recommend future actions to improve waste management practices.

New waste streams would be addressed as they arise and assessed to determine the most suitable management measures to use when handling, storing, transporting and disposing of the waste. Waste streams unable to be readily classified would be sent for testing in an accredited laboratory to confirm their classification and assess the risks associated with handling and disposal of the waste.

8.4 Waste Collection and Storage

Given the multi-purpose use of the new Fish Market close consideration has been given for collection and storage, in addition to off-site recycling, processing and disposal. A number of waste storage rooms have been provided; one on Level B2 (the basement level) and three on Level L0 (the lower ground level (loading dock)).

8.4.1 Basement Level

The new Fish Market Concept Design includes a waste management room at the basement level which is approximately 117 m^2 in area[11]. This space would be required to accommodate storage of EPS and soft plastics.

Due to the location of this waste storage room and ventilation requirements, a cold press densifying machine for EPS has been selected to minimise the impacts of odourous emissions on employee health and safety. Figure 5 shows the proposed layout indicating the infrastructure and spatial requirements for waste processing and storage at the basement level. The internal layout of the room may be finalised as part of the detail design process in consultation with key stakeholders.

Details and specifications of the preferred cold press densifier for EPS can be found in Appendix A.

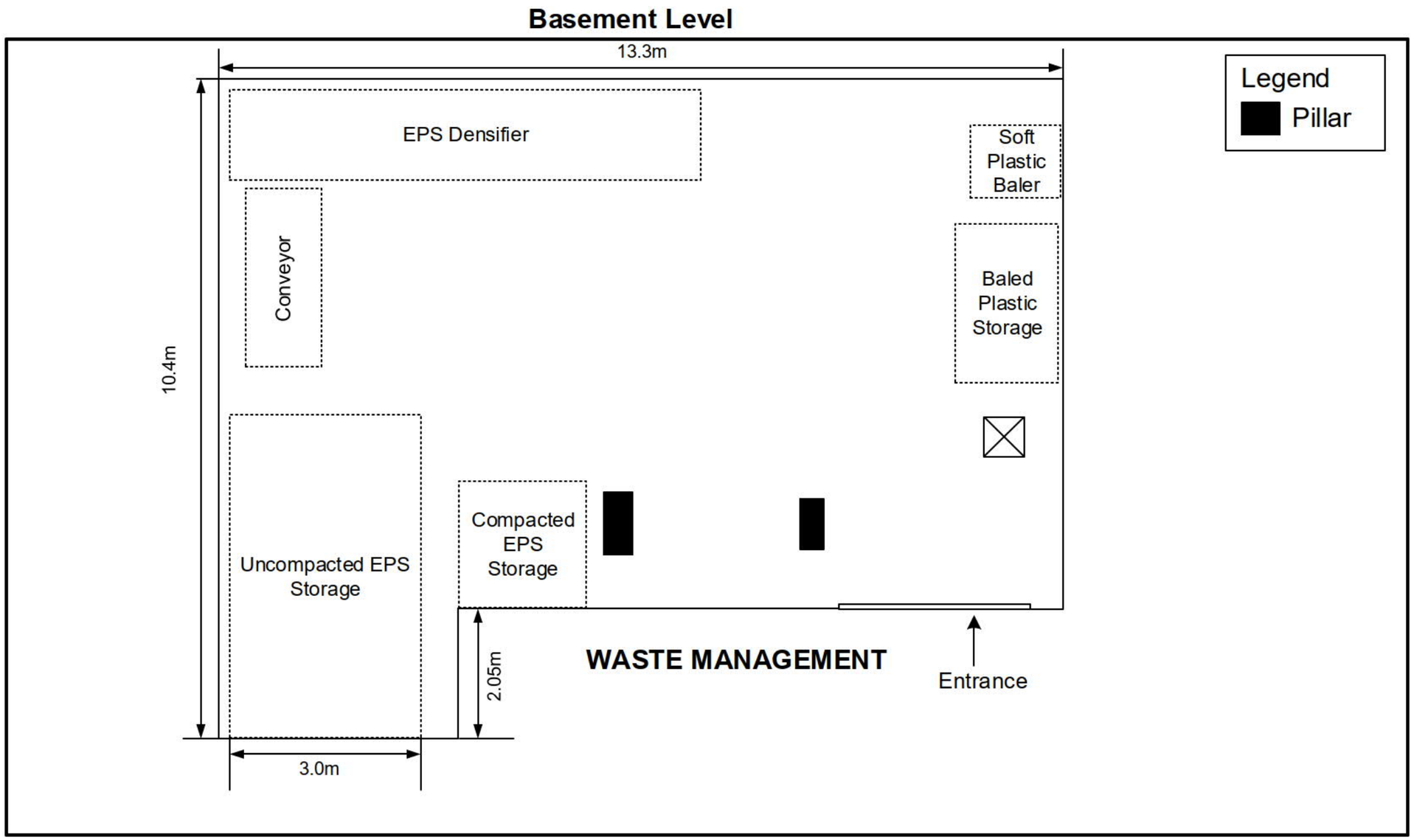
[11] Floor Plan Basement (AR-1-50X-AA00, Rev E) dated 19.08.193XN BVN

Table 8 identifies the infrastructure and equipment to be stored in the basement waste management room.

Table 8 Infrastructure requirements for the Basement waste storage room

Waste Type	Infrastructure Description	No. of Units	Proposed Collection Frequency	Minimum Area Required (m^2)
EPS	Storage area for uncompacted EPS, compacted EPS and the cold press densifying equipment	1	Collected three times a week	34
Soft plastic	Soft plastic baler and temporary storage area for soft plastic bales	1	As needed	7
Additional area for ancillary equipment, clearances and space for manoeuvring				50
			Total area required	**91**
			Total area provided	**117**

Figure 5 Proposed Waste Management Room Layout – Basement



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NB: Indicative Layout. Subject to design development

PROJECT

WASTE MANAGEMENT PLAN FOR THE NEW FISH MARKET

CLIENT

INFRASTRUCTURE NEW SOUTH WALES
Tel: +61 (0) 2 9216 5700

PROJECT MANAGEMENT DETAILS

NT	CL	CL
DESIGNER	CHECKED	APPROVED
DATE	10/09/2019	

PROJECT NUMBER

60595016

SHEET TITLE

PROPOSED PLAN FOR WASTE STORAGE AT THE BASEMENT LEVEL – NEW FISH MARKET

SHEET NUMBER

8.4.2 Lower Ground Level / Loading Dock

The new Fish Market Concept Design includes three waste management rooms at the lower ground/loading dock level which are (in total) approximately 278 m^2 [12]and one refrigerated waste storage room which is approximately 50 m^2 [12] Height restrictions in the basement waste storage room of 3.5 m result in specific waste infrastructure being located in the loading dock waste storage rooms.

The lower ground level/loading dock waste storage rooms designed for management of the following residual waste and recycling streams:

- residual waste
- food organics
- co-mingled recycling
- broken timber pallets
- clean pallets for re-use
- scrap metal
- cooking oils
- chemical waste
- cardboard
- fish offal

Equipment for processing these streams would also be stored in these rooms. It is estimated that one residual waste compactor would be required during operational periods at the new Fish Market. Cardboard collection and storage has been modelled based on use of a cardboard bailer. A potential option for the next design phase is to use a cardboard compactor which may be located adjacent to the residual waste compactor.

The fish offal storage room is refrigerated with an airlock.

Details of storage equipment in the lower ground level/loading dock waste storage rooms, including chemical waste storage containers and MGBs can be found in Appendix A. An example of the hook-lift compactor to be used at the new Fish Market and its specifications can be found in Appendix C.

[12] Floor Plan Lower Ground (AR-1-50X-AA00, issued 19.08.19) 3XN BVN

Table 9 Potential infrastructural requirements at the loading dock

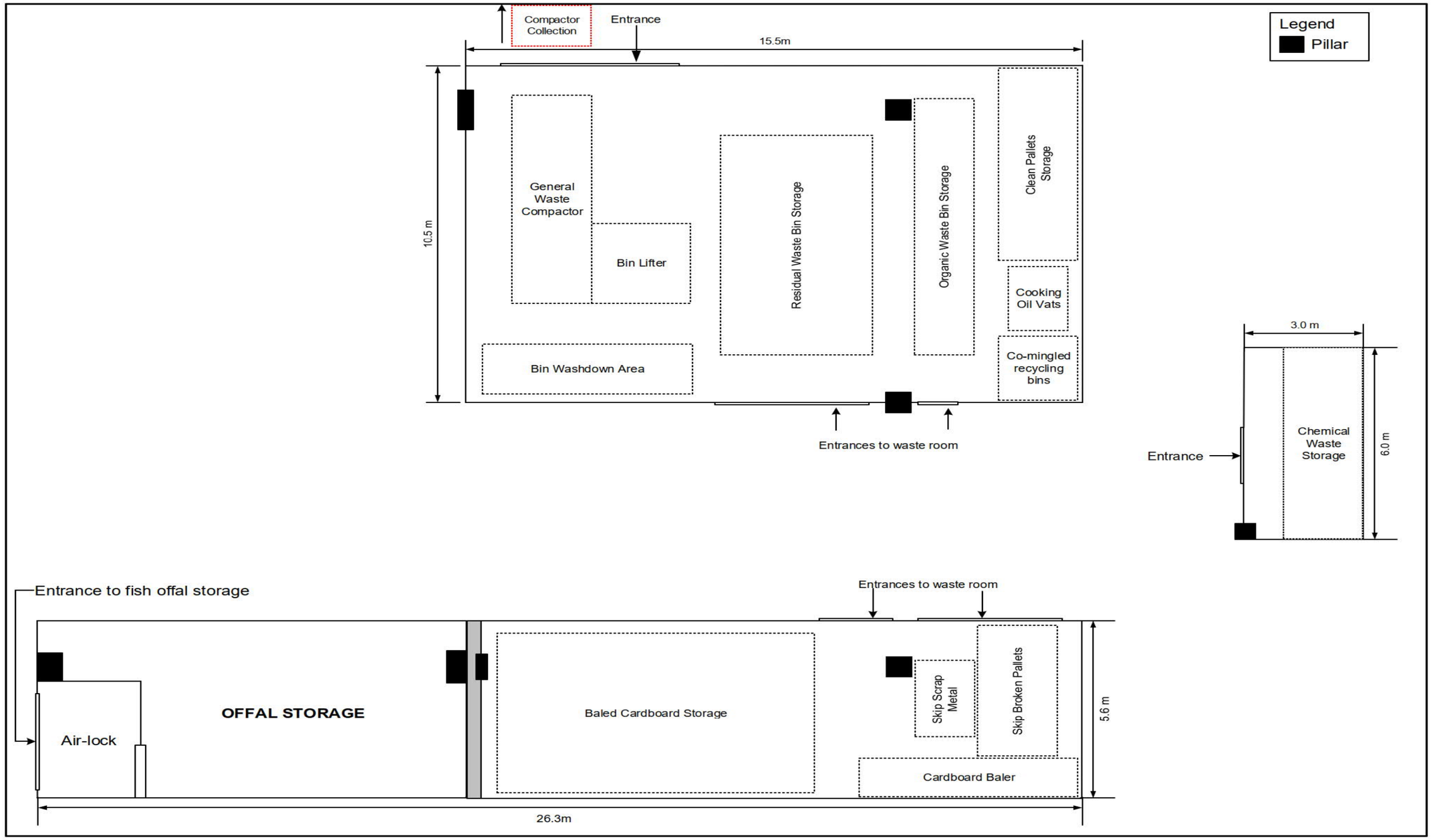
Infrastructure required	No. of units	Proposed Collection Frequency	Area (m^2)
Central Waste Storage Rooms			
Residual waste compactor (hook-lift)	1	4 times a week	16.25
Skip for broken pallets	1	Twice a week	8
Clean pallets	15	Reused	11
Skip for scrap metal	1	Scheduled Collection	4
Extra residual waste bins	18	-	27
Food organic waste bins	30	-	13
Co-mingled recycling bins	4	Collected every other day	4
Chemical waste	1 x oil drum crusher	N/A	12
	4 x containers for storage of crushed oil drums	Twice a month	
	1 x Intermediate Bulk Containers (IBCs) for waste oil	As required	
Cooking oil vat	1	Once every two days	4
Cardboard baler	1	-	6
Bailed cardboard	-	Twice a week	40
Clearance between equipment			100
Refrigerated Fish Offal Room			
Fish offal (separate refrigerated room and mega bins plastic storage containers)	-	Daily	44
*Area required for fish offal**		-	*44*
Area required for central waste storage		-	*199*
Total Area Provided for Fish Offal		**-**	***50***
Total Area Provided for Central Waste Storage		**-**	**278**

**Note: The area required for fish offal includes a contingency for potential future growth / variability in expected generation*

The total area allocated for waste management on the lower ground/loading dock waste storage room is adequate for storing forecast waste generation outlined Table 9.

Figure 6 shows the proposed layout of waste infrastructure and spatial requirements for waste processing and storage on the ground level. The internal layout of the rooms would be finalised as part of the detail design process in consultation with key stakeholders.

Figure 6 Proposed Waste Management Equipment Layout – Lower Ground Level (Loading Dock)



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NT	CL	CL
DESIGNER	CHECKED	APPROVED
DATE	10/09/2019	

PROJECT NUMBER

60595016

SHEET TITLE

PROPOSED PLAN FOR WASTE STORAGE AT THE LOWER GROUND LEVEL – NEW FISH MARKET

SHEET NUMBER

NB: Indicative Layout. Subject to design development. Layout does not indicate spatial location of waste management rooms at the lower ground level

8.4.3 Waste Movement

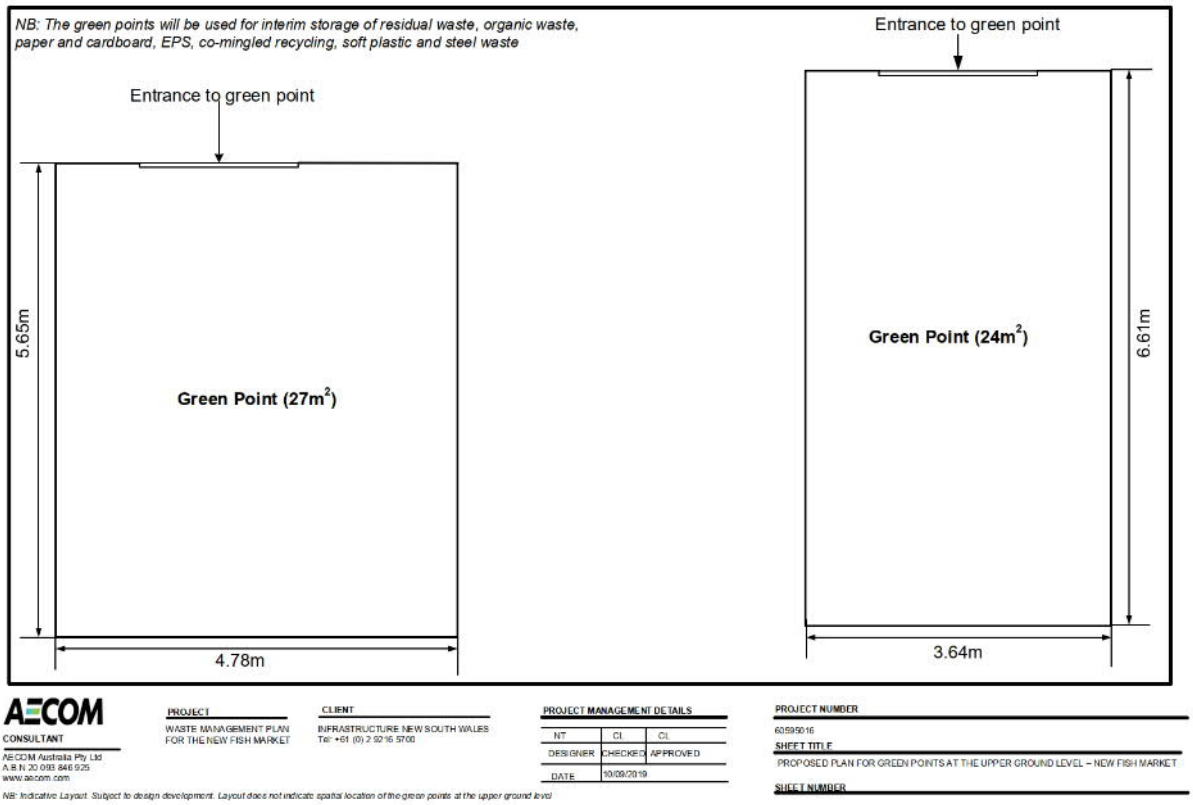
Transport within the new Fish Market

On the basement and loading dock levels, MGBs containing waste and recyclables will be transported between the point of generation and storage room by electric pallet jacks and goods hoist where applicable. The details of the electric pallet jacks proposed by SFM have been included in Appendix B. Forklift trucks would be used for transferring certain waste types such as pallets and fish offal bins.

On retail and mezzanine level, MGBs containing waste and recyclables will be transported between retail tenancies and public place bins to one of two green points on retail level, where waste and recyclables would temporarily be stored. Fish offal would not be stored in these green points due to possible amenity reduction. Once each green point has reached capacity, MGBs would be transferred down to the appropriate storage room on basement/loading dock level via goods hoist.

Provisions would be made to allow for the safe transfer of bins from the generating areas and temporary storage areas to the waste handling area for example via ramps with suitable gradients, signage, unobstructed passageway, etc. The maximum distance for manually pushing an MGB greater than 240 L around the new Fish Market is 30 m, excluding vertical travel via goods hoist.

Figure 7 Proposed layouts for green points (Upper ground level)



Transport of waste off-site

Transport of waste to off-site recycling/processing or disposal facilities would be handled by a private contractor(s). Due to the wide variability in waste types generated at the Site, different sized waste collection vehicles are anticipated.

The size of waste vehicles varies according to the collection service hence it is difficult to specify a waste collection truck at this stage. For example, Roll-On-Roll-Off (RORO) or hook lift systems are likely to be suitable for residual waste at the new Fish Market. A typical RORO system is shown below in Figure 8.

Figure 8 Roll-On-Roll-Off Collection System[13]

The movement involves a reversing vehicle to collect an uninhibited container, safely pulling it by the short end. The container is then lifted to a secure position on the vehicle. This movement requires an adequate height clearance depending on the hook-lift system and size of container.

Table 10 identifies dimensions for waste collection vehicles which may be used at the new Fish Market, provided by Veolia, the current waste service provider. A side loading vehicle has not been included in the table below as Veolia's commercial offering does not include side-loading collection vehicles.

Table 10 Typical dimensions for potential waste collection vehicles

Vehicle Type	Rear-loading[14]	Hook-lift truck[15]
Length overall (m)	8.0	9.25
Width overall (m)	2.5	2.6
Travel height (m)	3.4	4.3
Operational height when loading (m)	3.4	4.7*
Vehicle tare weight (tonnes)	13.0	13.5
Maximum payload (tonnes)	9.5	14.5
Turning circles (m)	25.0	20.6 (kerb to kerb)

*As confirmed by SFM and Veolia via email on 18 March 2019.

Based on the current design specifications of the waste management room in the basement, the maximum height clearance is approximately 3.5 m, indicating that collection vehicles with an operational height requirement no greater than 3.4 m would be required to collect waste stored in the basement waste management room.

[13] https://www.arequipment.com.au/hook-lift/
[14] Veolia Environmental Services: Sydney Commercial Services Equipment Matrix, Version 6, provided by Peter Lamb via email on 13 December 2018.
[15] Veolia Environmental Services: Sydney Commercial Services Equipment Matrix, Version 6, provided by Peter Lamb via email on 13 December 2018.

The current height clearance provided at the lower ground floor/loading dock is 5.2 m. The minimum requirement for operational height clearance at the lower ground floor/loading dock is 5 m. This is adequate for the operational clearance height of a standard hook lift vehicle (4.7 m) during collection.

Mobile garbage bins (MGBs)

MGBs would be placed at designated areas in waste generating areas around the Site. The most common capacities of MGBs in large commercial applications in Australia are 660L and 1,100L, however; 240L MGBs may be used for source-separated organics and co-mingled recycling waste.

Measurements differ between suppliers however typical MGB dimensions are provided in Table 11, as found in the CoS Waste Policy.

Table 11 Typical dimensions for bin types

	240L MGB	660 L MGB	1,100 L MGB
Height (mm)	1,080	1,250	1,470
Width (mm)	580	1,370	1,370
Depth (mm)	740	850	1,250
Weight (kg)	13.5	45	65

8.4.4 Amenity

Waste and recycling storage areas would be designed to minimise odour, pests and noise. In addition to frequent monitoring and collection of MGBs, the following design details would be adopted to maximise the amenity of waste storage at the new Fish Market. Table 12 outlines the design provisions for waste and recycling storage rooms, and Table 13 outlines the design provisions for refrigerated storage rooms. These design provisions have been stipulated by the City of Sydney in the most recent revision of the Guidelines for Waste Management in New Developments 2005, reference document D and amended where necessary to reflect the design of waste management in the new Fish Market.

Table 12 Design provisions for waste and recycling storage rooms

Ref No	Waste and recycling storage area construction
1.1	The floors, walls and ceilings of waste and recycling storage areas are to be finished with a rigid, smooth-faced impermeable material capable of being easily cleaned.
1.2	The floors of waste and recycling storage areas are to be graded and drained to Sydney Water approved drainage fitting. The floor is to be provided with a ramp to the doorway where necessary.
1.3	A close-fitting and self-closing door or gate operable from within the room is to be fitted to all waste and recycling storage areas.
1.4	Doors/gates to the waste and recycling storage rooms are to provide a minimum clearance width of 900 mm.
1.5	At least one door or gate to the waste and recycling storage area is to have sufficient dimensions to allow the entry and exit of waste containers of a capacity nominated for the development.
1.6	Lightweight roller shutter-type doors or grilles should be considered for access to waste and recycling storage areas, as these do not impact on the available storage space. If these types of doors or grilles are used, the requirement for a close-fitting and self-closing door remains, so that waste collectors can access the waste and recycling storage area other than through the roller door or grille.
1.7	The design shall restrict the entry of trespassers, vermin or other animals into the area.
1.8	The waste and recycling storage area is to be provided with an adequate supply of water for cleaning purposes with a hose cock.

Ref No	Waste and recycling storage area construction
1.9	The waste and recycling storage area is to be adequately ventilated by either: Natural ventilation openings to external air. The dimensions of the openings are not to be less than 5 per cent of the bin bay or bin room floor area. A mechanical exhaust ventilation system in accordance with relevant Australian standards.
1.10	Waste and recycling areas are to be provided with artificial light controlled by switches located both outside and inside the storage area.
1.11	Any compactors or mechanical devices, if permitted for the mechanical handling and storage of waste and recycling, are to be fitted with safety operating and cut-off systems.
1.12	Any facet of the waste and recycling management system that is visible from outside the building is to be in keeping with the dominant design of the remainder of the development.

Table 13 Design provisions for refrigerated waste storage rooms

Ref No	Refrigerated waste storage area construction
2.1	In some instances, Council may require that waste storage be refrigerated. This is likely if large quantities of food waste are generated on-site and waste removal from this site is difficult due to its location or long trading hours. Where a waste room is refrigerated, the temperature is to be maintained at or below 5°C with all refrigeration equipment installed with sufficient space for cleaning.
2.2	The floor, walls and ceiling of the refrigerated waste room are to be constructed of a rigid, smooth-faced impermeable material capable of being easily cleaned.
2.3	The floor of the refrigerated waste room is to be graded to the doorway.
2.4	An adequate supply of hot and cold water is to be provided through a centralised mixing valve with the hose cock located as close as practicable to the doorway.
2.5	The refrigerated waste room is to comply with Section G.1 of the Building Code of Australia as well as being provided with artificial light controllable from within the room.
2.6	Noise from the use of the refrigeration equipment associated with the waste room is not to give rise to “offensive noise”, as defined under the POEO Act

8.4.5 The Wharf Areas

To ensure appropriate management of waste generated by boats / vessels docked at the wharf a waste receptacle area would be provided at the land based end of the wharf. Table 14 provides the estimated area required, and associated waste collection infrastructure which would be required to store one days waste on the wharf. Waste disposed by boats / vessels would be collected by the new Fish Market daily and transported to the main waste storage room and/or loading dock for transport off-site.

Table 14 Waste collection requirements - wharfs

Waste Type	Infrastructure Required per Wharf	No of Units	Area (m^2)
Residual waste	660 L MGB	1	0.88
Co-mingled recycling	240 L MGB	1	0.61
Engine oil and lubricants	Self-bunded waste oil storage container	1	0.25
Used spill kits	140 L MGB	1	0.29
Total**			**2.33**

***Total area includes an additional15% contingency.*

8.4.6 Public Place Waste

A strategy for management of public waste may include use of solar compaction bins (Figure 9). A compaction bin can have a capacity of 600 L which would assist in reducing collection frequencies. When bins are near capacity (85% capacity) a communication is sent to an online waste management system to alert that collection is required. These bins are also used to reduce pest access and prevent windblown litter. Approximately 24 × 600 L smart compaction bins would be placed in public areas for collection of source-separated organic waste, residual waste and co-mingled recyclables.

It is preferred that all public place bins comply with the new Fish Market Bird Management Strategy by Ecosure, including bins that are self-closing and locking, and bins with lids composing of rubber flaps to prevent scavenging.

Figure 9 Typical public waste receptacles

BigBelly recycling and garbage bin (source: Solar Bins Australia)

Orwaks Tom waste compaction system for public spaces (source: Orwark)

8.4.7 Summary of the Management Requirements

Table 15 Details of Waste Management – Operations

Waste Type	Classification[16]	Primary Source	Management Requirements	Destination
Operation – Wharf				
Residual waste (mixed garbage)	General Solid Waste (Non-Putrescible)	Fishing boats (mooring vessels), ferries (sometimes used for events/parties)	Residual waste (mixed garbage) would be collected in a designated receptacle (660 L MGB) located at a minimum practical distance from the head of the gangway[17]. Collected garbage would be conveyed to the loading dock at the ground level using an electric pallet jack system where it would be transferred to a residual waste compactor.	To an off-site waste disposal facility
Co-mingled recyclables	General Solid Waste (Non-Putrescible)	Fishing boats (mooring vessels), ferries (sometimes used for events/parties)	Co-mingled recyclables would be collected in a designated receptacle (240 L MGB) at each wharf. Recycling waste would be conveyed to the waste management area at the lower ground level (loading dock) using an electric pallet jack system.	Mixed recyclables to an off-site MRF
Engine oil and lubricants	Liquid Waste	Fishing boats (mooring vessels)	Facilities for disposal of liquid waste should be provided, e.g. self-bunded waste oil storage system. An emergency spill kit should be provided and securely housed at the wharf. A 140 L MGB would be used to collect used emergency spill kits.	• Waste oil to an off-site waste oil recycling facility • Spill kit waste to be disposed according to emergency guidelines and procedures
Operation – new Fish Market				
Residual waste	General Solid Waste (Non-Putrescible)	Retail & Catering, Wholesale, Loading dock, Offices, Seafood cooking school and Auction hall	Each waste generating area should have residual waste bins in their respective back of house areas. Retail residual waste would be manually transferred by each retailer to the nearest green point for temporary storage. SFM staff would be responsible for transferring residual waste from the two green points via electric pallet jacks and the goods hoist, to the storage room on lower ground level. Wholesale, loading dock, office and Auction Hall waste would be transferred in MGBs to the central storage room via electric pallet	To an off-site waste disposal facility

[16] Waste classification would be confirmed prior to disposal in accordance with the *Waste Classification Guidelines* (EPA, 2014)
[17] These waste receptacles should have self-closing lids to prevent land and water contamination and access for vermin (AS 3962 – 2001 – Australian Standard *Guidelines for design of marinas*)

Waste Type	Classification[16]	Primary Source	Management Requirements	Destination
			jack. A bin lifter would be used to transfer the waste into a residual compactor.	
Fish offal	General Solid Waste (Putrescible)	Retail & Catering, Wholesale and Auction Hall	Fish offal would be collected in dedicated MGBs and mega bins[18] (780 L). Retail fish offal would be transferred by individual retailers in smaller MGBs via good hoist to the waste management room on the lower ground level/loading dock. Wholesale, loading dock and Auction Hall fish offal will be transferred in megabins via forklifts to the goods hoist and to the refrigerated fish offal storage room.	Transported off-site for processing into chicken feed.
Source-separated organic waste (mostly food waste)	General Solid Waste (Putrescible)	Retail & Catering, Wholesale, Loading dock, Offices, Seafood cooking school and Auction hall	Each waste generating area should have organic waste bins (preferably 240 L MGBs). Retail food organic waste would be manually transferred by each retailer to the nearest green point for temporary storage. SFM staff would be responsible for transferring food organic waste from the two green points via electric pallet jacks to the goods hoist. Wholesale, loading dock and Auction Hall organic waste would be collected from the respective waste generating areas by electric pallet jack and transported to the goods hoist and finally the lower ground level/loading dock waste storage room. Organic waste would be stored for collection.	To an off-site organics processing facility
Co-mingled recyclables	General Solid Waste (Non-Putrescible)	Retail & Catering, Wholesale, Auction hall and Loading dock.	Each waste generating area should have co-mingled recycling waste bins. Retail co-mingled recyclables would be transferred by retailers to one of two green points for temporary storage. SFM would be responsible for collecting co-mingled recyclables from these green points via goods hoist and electric pallet jack. The bins would be collected from the wholesale, Auction Hall and loading dock via electric pallet jack and would be transported to the goods hoist to the lower ground level/loading dock waste storage room. Recyclables would be stored here for collection.	Co-mingled recyclables to an off-site MRF

Waste Type	Classification[16]	Primary Source	Management Requirements	Destination
Paper and cardboard	General Solid Waste (Non-Putrescible)	Retail & Catering, Wholesale, Auction hall and Loading dock.	Paper and cardboard would be collected in designated collection bins. Retail paper/cardboard would be transferred by retailers to one of two green points for temporary storage. SFM would be responsible for collecting paper/cardboard from these green points via goods hoist and electric pallet jack. The bins would be collected from the wholesale, Auction Hall and loading dock via electric pallet jack and would be transported to the goods hoist to the basement level waste storage room. Paper and cardboard would then be baled using a cardboard baler. Wet cardboard would be separated out and transferred to the residual waste compactor.	To an off-site MRF
EPS and soft plastics	General Solid Waste (Non-Putrescible)	Retail & Catering, Wholesale, Auction hall and Loading dock	Retail soft plastics and EPS would be transferred by retailers to one of two green points for temporary storage. SFM would be responsible for collecting soft plastics and EPS from these green points via goods hoist and electric pallet jack. The bins would be collected from the wholesale, Auction Hall and loading dock via electric pallet jack and would be transported to the goods hoist to the basement level waste storage room. The EPS would be processed using a cold pressing densifier to reduce the volume and prepare it for collection.	To an off-site recycling/reprocessing facility
Pallets	General Solid Waste (Non-Putrescible)	Retail & Catering, Wholesale, Auction hall and Loading dock	High quality pallets would be collected around the new Fish Market by an operator and transferred to the waste management room on the lower ground level/loading dock via a goods hoist using forklift trucks and electric pallet jacks. The pallets would be stacked and stored here for reuse. Broken pallets would be collected using a forklift and placed in a hook lift bin located at the loading dock.	• Clean pallets stored for reuse • Broken pallets to an off-site MRF
Cooking oils	Liquid waste	Retail & Catering	Transferred by individual retailers via the goods hoist to the waste management room on the lower ground / loading dock for decanting into a bulk IBC.	To an off-site liquid waste recycling facility

Waste Type	Classification[16]	Primary Source	Management Requirements	Destination
Operation – Public Areas				
Residual waste	General Solid Waste (Non-Putrescible)	Shared Public Dining	Stationary public waste bins for collection of residual waste would be placed in public dining areas. An operator would empty the contents of the bin and transfer the waste to the loading dock using an electric pallet jack system. Residual waste would then be placed into the residual waste compactor.	To an off-site waste disposal facility
Co-mingled recycling	General Solid Waste (Non-Putrescible)	Shared Public Dining	Stationary public waste bins for co-mingled recycling would be placed in public dining areas. An operator would empty the contents of the bin into MGBs (240 L) and transfer the waste to the waste management area at the loading dock via a goods hoist using an electric pallet jack. Co-mingled recyclables would be stored here prior to being transported offsite.	To an off-site MRF

Note: Goods hoist would be used to transfer waste from retail and mezzanine levels to the lower ground and basement levels.

9.0 Standard Limitations

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Appendix A

Waste Management Equipment

This section shows typical equipment that could be suitable for waste management at the proposed new Fish Market. Note that this information is provided as a guide.

Compactors (Hook Lift)

Compactors are suited to generators of large volumes of light to medium density waste, both recyclable and non-recyclable commercial and industrial waste. The compactor would be stored onsite (preferably at the loading dock) and eliminates the need for multiple bins and frequent collections. There a variety of compactor types available for both recyclable and residual waste including push blade, Auger and Pendulum systems. Compaction ratios vary according to waste type (up to 4:1)[18]. Depending on waste management requirements, some compactors can be custom designed and installed. Safety mechanisms are usually integrated into the units. Common systems would include in-built bin lifters. Programmable Logic Controller (PLC) configurations ensure safe monitoring and operation. Compactor systems would require adequate space for safe manoeuvring of pick-up trucks. Figure 10 shows a typical Auger Compactor system.

Figure 10 Typical Waste Compactor

EPS Cold Press Densifier

Due to its low density, EPS presents handling challenges as it occupies huge volumes in storage areas. As a result, it is important to reduce the size and storage space required; improving bulkiness and ensuring reusability and recycling of waste EPS. Cold compaction is suitable to users who prefer an alternative to melting technologies.

A pre-shredder for size reduction and preparation for the densification process is usually incorporated in most machines. The cold densification process relies on a screw mounted under the shredder, to direct the shredded material into a compaction zone. The output density ranges from 350-500 kg/m^3. Compaction ratios of 50:1 are achievable with these machines.

[18] https://www.cleanaway.com.au/our-services/general-waste/compactors/

Figure 11 Cold Press Densifier Cold Press Machine[19]

Drum Crusher

Drum crushers (Figure 12) ensure fast and easy crushing of steel drums (oil drums and containers) and are suitable for varying sizes of drums. Some systems are equipped with drum piercing spikes and an oil retention tank to capture residues. Some features include a high compaction force ratio, a totally enclosed chamber for safe operation, ease of loading and simple to operate.

Figure 12 Drum Crusher (Volume Reduction)[20]

Intermediate Bulk Containers (IBCs)

Intermediate bulk containers (pallet tanks) are reusable commercial/industrial containers designed primarily for storage and transport of bulk liquids. The systems consist of a metal frame surrounding a blow-mounded inner bottle and are mounted on a pallet (wood or metal pallet). At the new Fish Market, IBCs would be used for the temporary storage of waste oil and would be placed on a bunded area in the waste management room on the lower ground level / loading dock. Figure 13 shows a typical IBC.

[19]Compacting fish boxes (EPS): Technical data specification for SK370. RUNI Danish Engineering.
[20] https://wasteinitiatives.com.au

Figure 13 Intermediate Bulk Container

Bin Types for Waste Collection at the new Fish Market

The following section shows typical bin types that would be suitable for waste collection at the proposed new Fish Market.

Figure 14 Typical Mobile Garbage Bin (MGB) types

Figure 15 Typical Mega Bin (for fish offal storage)

Appendix B

Electric Pallet Jack Specifications

Platform lowlifter truck 2.0 - 2.5 ton

BT levio

P-series

LPE200

LPE220

LPE250

TOYOTA

MATERIAL HANDLING

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Platform lowlifter

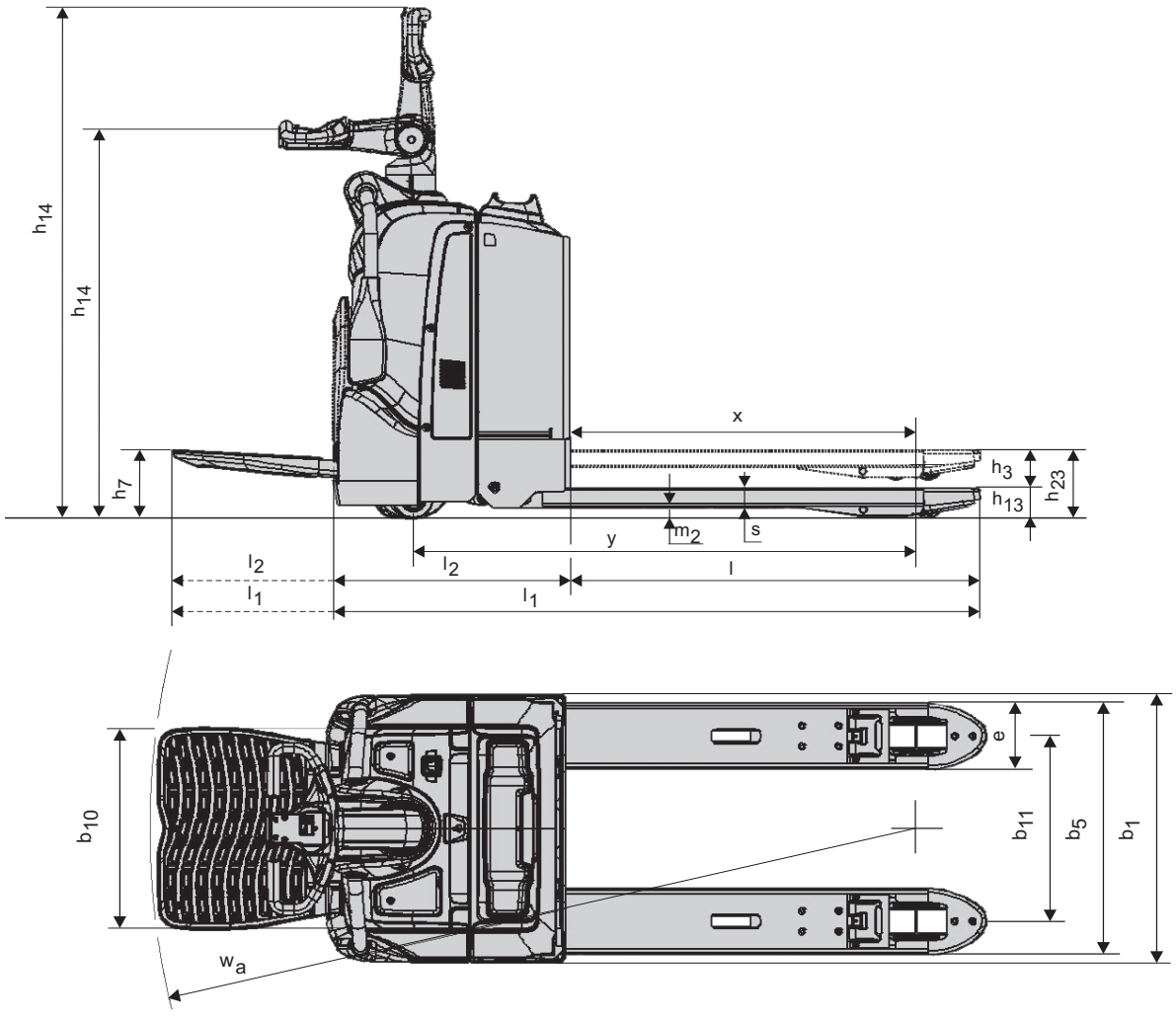
Specification for lowlifter trucks					LPE200			LPE220		LPE250
Identification	1.1	Manufacturer			Toyota	Toyota	Toyota	Toyota	Toyota	Toyota
	1.2	Model			LPE200	LPE200	LPE200	LPE220	LPE220	LPE250
	1.3	Drive			Electric	Electric	Electric	Electric	Electric	Electric
	1.4	Operator type			Stand on/pedestrian					
	1.5	Load capacity/rated load	Q	kg	2000	2000	2000	2200	2200	2500
	1.6	Load centre	c	mm	600	600	600	600	600	600
	1.8	Load distance, centre of support arm wheel to face of fork, fork raised/lowered	x	mm	913/957*	913/957*	913/957*	913/957*	913/957*	913/957*
	1.9	Wheelbase, fork raised/lowered	y	mm	1362/1406*	1362/1406*	1362/1406*	1410/1454*	1410/1454*	1410/1454*
Weight	2.1	Service weight with battery		kg	718	718	718	826	826	826
	2.2	Axle load, with load, drive/castor/fork wheel		kg	466/585/1667	466/585/1667	466/585/1667	679/834/1513	679/834/1513	641/911/1774
	2.3	Axle load, without load, drive/castor/fork wheel		kg	284/294/140	284/294/140	284/294/140	389/311/126	389/311/126	389/311/126
Wheels	3.1	Drive/castor/fork wheel			Vulkollan®*/Vulkollan®/Vulkollan®					
	3.2	Wheel size, front		mm	Ø 230x70	Ø 230x70	Ø 250x75	Ø 230x70	Ø 250x75	Ø 250x75*
	3.3	Wheel size, rear		mm	Ø 85x95	Ø 85x95	Ø 85x95	Ø 85x95	Ø 85x95	Ø 85x95
	3.4	Additional wheels (dimensions)		mm	Ø 125x50*	Ø 125x50*	Ø 125x50*	Ø 125x50*	Ø 125x50*	Ø 150x54*
	3.5	Wheels, number front/rear (x = driven wheels)			1x+ 2/2 or 4	1x+ 2/2 or 4	1x+ 2/2 or 4	1x+ 2/2 or 4	1x+ 2/2 or 4	1x+ 2/2 or 4
	3.6	Track width, front	b_{10}	mm	500	500	500	500	500	500
	3.7	Track width, rear	b_{11}	mm	370	370	370	370	370	370
Dimensions	4.4	Lift	h_3	mm	120 [1]	120 [1]	120 [1]	120 [1]	120 [1]	120 [1]
		Lift height	h_{23}	mm	205 [1]	205 [1]	205 [1]	205 [1]	205 [1]	205 [1]
	4.8	Stand height	h_7	mm	190	190	190	190	190	190
	4.9	Height of tiller in drive position, min./max.								
		Manual steering	h_{14}	mm	1100/1413	1100/1413	1100/1413	1100/1413	1100/1413	1100/1413
		Power steering, highest setting	h_{14}	mm	1201/1413	1201/1413	1201/1413	1201/1413	1201/1413	1201/1413
		Power steering, lowest setting	h_{14}	mm	1101/1313	1101/1313	1101/1313	1101/1313	1101/1313	1101/1313
	4.15	Height, fork lowered	h_{13}	mm	85	85	85	85	85	85
	4.19	Overall length	l_1	mm	1816*	1816*	1816*	1864*	1864*	1864*
	4.20	Length to face of forks	l_2	mm	666*	666*	666*	714*	714*	714*
	4.21	Overall width	b_1	mm	730	730	730	730	730	730
	4.22	Fork dimensions	s/e/l	mm	78/180/1150*	78/180/1150*	78/180/1150*	78/180/1150*	78/180/1150*	78/180/1150*
	4.25	Width over forks	b_5	mm	550*	550*	550*	550*	550*	550*
	4.32	Ground clearance, centre of wheelbase	m_1	mm	30	30	30	30	30	30
	4.33	Aisle width for pallets 1000x1200 crossways	A_{st}	mm	2430*	2430*	2430*	2477*	2477*	2477*
	4.34	Aisle width for pallets 800x1200 lengthways	A_{st}	mm	2277*	2277*	2277*	2324*	2324*	2324*
	4.35	Turning radius, fork raised	W_a	mm	1585*	1585*	1585*	1632*	1632*	1632*
Performance data	5.1	Travel speed, with/without load								
		Manual steering		km/h	6,0/6,0	8,0/8,0	8,0/10,0	7,5/8,0	7,5/10,0	7,0/12,5
		Power steering		km/h	6,0/6,0	8,0/8,0	9,0/10,0	8,0/8,0/8	9,0/10,0	11,0/12,5
	5.2	Lift speed, with/without load		m/s	0,05/0,08	0,05/0,08	0,05/0,08	0,05/0,07	0,05/0,07	0,05/0,07
	5.3	Lowering speed, with/without load		m/s	0,11/0,09	0,11/0,09	0,11/0,09	0,11/0,08	0,11/0,08	0,09/0,09
	5.8	Max. gradeability, with/without load [2]		%	8/18	8/18	8/18	8/18	8/18	8/18
	5.9	Acceleration time (over 10 m)		s	5,7	5,7	5,7	5,0	5,0	4,7
	5.10	Service brake			Electromagnetic					
Electric motor	6.1	Drive motor rating S2 60 min		kW	1,8	2,5	2,5	2,5	2,5	2,8
	6.2	Lift motor rating at S3 10%		kW	2,2	2,2	2,2	2,2	2,2	2,2
	6.4	Battery voltage/nominal capacity K_5		V/Ah	24/300*	24/300*	24/300*	24/400*	24/400*	24/400*
	6.5	Battery weight		kg	241	241	241	305	305	305
	6.6	Energy consumption acc. to VDI cycle		kWh/h		0,46			0,52	0,55
Others	8.1	Type of drive control			Variable AC	Variable AC	Variable AC	Variable AC	Variable AC	Variable AC

1) +20 mm for roll container handling.
2) Measured according to company standard.
*) Further alternatives are available and will produce other values.

All data are based on table configuration. Other configurations may give other values.
Truck performance and dimensions are nominal and subject to tolerances.
Toyota Material Handling Manufacturing Sweden AB products and specifications are subject to change without notice.

Battery dependent dimensions

Dimensions		Battery change		Lift out			Sideways			Li-ion	
		Compartment		Small	Medium	Large/DIN	Small	Medium	Large/DIN	Small	Medium
1.9	Wheelbase, fork raised/lowered	y	mm	1406/1362	1454/1410	1551/1507	1466/1422	1514/1470	1608/1564	1406/1362	1454/1410
4.19	Overall length										
	with platform up/down	l_1	mm	1816/2266	1864/2314	1961/2411	1876/2326	1924/2374	2021/2471	1816/2266	1864/2314
	with backrest	l_1	mm	2440	2488	2585	2500	2548	2645	2440	2488
	with fixed side protection	l_1	mm	2276	2324	2420	2336	2384	2480	2276	2324
4.20	Length to face of forks										
	with platform up/down	l_2	mm	666/1116	714/1164	811/1261	726/1176	774/1224	871/1321	666/1116	714/1164
	with backrest	l_2	mm	1290	1338	1435	1350	1398	1495	1290	1338
	with fixed side protection	l_2	mm	1126	1174	1270	1186	1234	1330	1126	1174
4.33	Aisle width for pallets 1000x1200 crossways										
	with platform up/down	A_{st}	mm	2430/2894	2477/2942	2572/3038	2489/2953	2536/3001	2631/3097	2430/2894	2477/2942
	with backrest	A_{st}	mm	3066	3114	3210	3126	3174	3270	3066	3114
	with fixed side protection	A_{st}	mm	2904	2951	3047	2963	3011	3106	2904	2951
4.34	Aisle width for pallets 800x1200 lengthways										
	with platform up/down	A_{st}	mm	2277/2741	2324/2789	2419/2885	2336/2801	2383/2848	2478/2944	2277/2741	2324/2789
	with backrest	A_{st}	mm	2914	2961	3058	2973	3021	3117	2914	2961
	with fixed side protection	A_{st}	mm	2751	2799	2894	2811	2858	2953	2751	2799
4.35	Turning radius, fork raised										
	with platform up/down	W_a	mm	1585/2049	1632/2096	1727/2193	1644/2108	1691/2156	1786/2252	1585/2049	1632/2096
	with backrest	W_a	mm	2221	2269	2365	2281	2329	2425	2221	2269
	with fixed side protection	W_a	mm	2059	2106	2202	2118	2166	2261	2059	2106
6.4	Battery voltage, nominal capacity K_5		V/Ah	24/225-300	24/400	24/375-600	24/225-300	24/400	24/375-600	24/100-150	24/200
6.5	Battery weight		kg	175-285	265-350	375-485	175-285	265-350	375-485	126/90	90/102



Truck features:

- BT Powertrak traction system
- Fingertip controls
- Information display
- Electronic braking system
- Electronic regenerative brakes
- Driver detection system
- Sideways battery change

TP-Technical Publications, Sweden — 746909-040, version 3, 2017-10-09

TOYOTA

MATERIAL HANDLING

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BT Levio W-series

PEDESTRIAN-OPERATED TRUCKS

Lightweight and compact design for easy use in congested areas or on-board vehicles

1.3 – 2.5 tonnes load capacities

Travel speed up to 6 km/h

Pages 4-5

BT Levio P-series

TRUCKS WITH DRIVER PLATFORM

Compact and manoeuvrable trucks with choice of platforms for high speed travel

2.0 – 2.5 tonnes load capacities

Travel speed up to 12.5 km/h

Pages 6-9

BT Levio S-series

STAND-IN TRUCKS

Fully enclosed cab and transverse driving position to work in congested areas

2.0 tonnes load capacities

Travel speed up to 10.5 km/h

Pages 10-11

BT Levio R-series

RIDER-SEATED TRUCKS

High speed trucks for transportation of multiple loads over long distances

2.0 – 3.0 tonnes load capacities

Travel speed up to 19.9 km/h

Pages 12-13

● standard ◦ option

	Safety	Durability	Productivity	Driveability	BT Levio LWE130
Truck features					
Automatic parking brake					●
Bogie fork wheels					◦
Climber wheels					●
BT Castorlink					●
Shock sensor					◦
Load support					◦
AC drive motors					●
Controls and instruments					
208˚ steering					●
Access Control (PIN codes)					●
Click-2-creep					●
Electronic braking system					●
Electronic speed control					●
Electronic fingertip controls					●
Hour meter					●
Tiller arm steering					●
Emergency collision button					●
Emergency cut-off					●
Parking brake					●
Temporary speed reduction (turtle button)					◦
Operator features					
Storage compartments					●
Driver-adapted programmable performance					●
Extra foot protection					◦
Maintenance features					
Easy access for maintenance					●
Fault diagnosis facility					●
Historic fault log					●
Battery management features					
Battery status indicator					●
Built-in charger					●
In-vehicle charging					◦

BT Levio W-series

LIGHTWEIGHT AND COMPACT PEDESTRIAN-OPERATED TRUCKS

The BT Levio LWE130 is a robust but extremely lightweight truck that can carry load so with ease over short to medium distances. Weighing just 255 kg, including battery, the LWE130 is exceptionally compact, allowing easy use in a wide variety of applications. This truck is also ideal in confined spaces such as retail sales area, shops or supermarkets but as well for on-board delivery vehicles. The LWE130's low-maintenance and revolutionary AC motor offers great energy efficiency, as well as durability and strength.

Safe and user-friendly operation

For optimal driver comfort, the entire range is now user-friendly and intuitive thanks to their quieter operation and programmable driver parameters. To ensure safe and efficient material handling, the LWE130 is designed to be compatible with the fleet management tool I_Site that monitors for example driver authorisation (PIN code), machine utilization and detects possible impacts of your truck in real time.

Unique Castorlink system

Stability is assured with a five-wheel chassis design with linked side castors, protecting the wheels and load an ensuring stability on uneven surfaces.

Easy battery charging

The BT Levio LWE130 features a built-in charger for fast and easy charging- just plug it into a power socket. There is also the option of an in-vehicle charging system for opportunity charging when travelling on delivery vehicles. In-vehicle charging features intelligent control to only operate when the main vehicle engine is running.

TPS-based reliability

Like all Toyota trucks, BT Levio trucks are built according to the Toyota Production System, assuring the highest levels of quality, durability and reliability.

- The unique Castorlink system protects castor wheels on uneven surfaces
- The control panel includes a pull-out power lead for the built-in battery charger
- Easy access for efficient servicing

Load capacity: 1.3 t @ 600 mm load centre
Maximum travel speed: 5.5 km/h
Maximum battery capacity: 63 Ah

● standard ◦ option

	Safety	Durability	Productivity	Driveability	BT Levio LWE140	BT Levio LWE160	BT Levio LWE180	BT Levio LWE200	BT Levio LWE250
Truck features									
Automatic parking brake	●				●	●	●	●	●
Bogie fork wheels			●	●	◦	◦	◦	◦	●
BT Powerdrive		●	●	●	●	●	●	●	●
BT Castorlink	●	●	●	●	●	●	●	●	●
Climber wheels			●	●	◦	◦	◦	◦	◦
High-capacity battery models			●				◦	◦	◦
Electronic braking system	●	●	●	●	●	●	●	●	●
Electronic regenerative brakes (motor)	●		●	●	●	●	●	●	●
Electronic speed control	●		●	●	●	●	●	●	●
Load support	●		●		◦	◦	◦	◦	◦
Controls and instruments									
180˚+ steering	●		●	●	●	●	●	●	●
Access Control (PIN codes)	●				●	●	●	●	●
Automatic deceleration	●		●	●	●	●	●	●	●
Click-2-Creep	●		●	●	●	●	●	●	●
Drive motor temperature warning	●	●			●	●	●	●	●
E-bar			●	●	◦	◦	◦	◦	◦
Electronic controller temperature warning	●	●			●	●	●	●	●
Electronic fingertip controls	●		●	●	●	●	●	●	●
Emergency collision button	●				●	●	●	●	●
Emergency cut-off	●				●	●	●	●	●
Hour meter					●	●	●	●	●
On-board data terminal mount			●	●	◦	◦	◦	◦	◦
Parking brake	●				●	●	●	●	●
Smart Access (electronic card/fob)	●				◦	◦	◦	◦	◦
Temporary speed reduction (‘turtle’ button)	●		●	●	◦	◦	◦	◦	◦
Tiller arm steering	●			●	●	●	●	●	●
Operator features									
Driver-adapted programmable performance	●			●	●	●	●	●	●
Flip-down driver platform			●	●				◦	
Shrinkwrap holder			●			◦	◦	◦	◦
Storage compartments			●	●	●	●	●	●	●
Writing table			●	●		◦	◦	◦	◦
Weighing scale	●		●	●	◦	◦	◦	◦	◦
Maintenance features									
Easy access for maintenance		●	●		●	●	●	●	●
Fault diagnosis facility		●	●		●	●	●	●	●
Historic fault log		●			●	●	●	●	●
Battery management features									
Battery status indicator		●	●		●	●	●	●	●
Battery discharge prevention system		●			●	●	●	●	●
Built-in charger			●	●	◦	◦	◦	◦	◦
Lithium-ion batteries			●					◦	
Sideways battery change			●					◦	◦
Special applications									
Coldstore version		●			◦	◦	◦	◦	◦
EEx version (ATEX)	●				◦	◦	◦	◦	◦
Reel/drum handling					◦	◦	◦	◦	◦
Silent version			●					◦	

LWE200SI

BT Levio W-series

PEDESTRIAN-OPERATED TRUCKS

BT Levio W-series are compact trucks with a full range of capacities. All models, from 1400 kg to 2500 kg, share the same compact design - easy to use, with impressive handling capacity, which means they are suited to all types of application.

Handling with care – just Click-2-Creep!

Finite positioning is easy with these BT Levio W-series trucks. The unique click-2-creep feature means that by simply double-clicking the control lever the truck is set to creep speed, allowing safe control in tight situations.

Totalview concept

The optimised length of the control arm combined with the low overall height of the truck means you always get a clear and safe view of the forks.

Li-ion battery technology

TThe latest maintenance-free Li-ion battery technology is available on the LWE200, with 30% less energy consumption, giving exceptional battery life and the option for fast-charge at any time revolutionising battery management and eliminating the need for battery change in multi-shift applications.

TPS-based reliability

Like all Toyota trucks, BT Levio trucks are built according to the Toyota Production System, assuring the highest levels of quality, durability and reliability.

- A clear and safe view of the forks
- Easy access for efficient servicing
- Fingertip control for drive, lift and lower with unique click-2-creep feature
- Easy access for efficient servicing

Load capacity: 1.4, 1.6, 1.8, 2.0, 2.5 t @ 600 mm load centre
Maximum travel speed: 6 km/h
Maximum battery capacity: 300 Ah

Standard model with flip-down platform and foldable sideguards

Optional fixed platform and backrest

Optional fixed platform and sideguards

● standard ○ option ◌ available as part of plus package

	Safety	Durability	Productivity	Driveability	BT Levio LPE200	BT Levio LPE220	BT Levio LPE250
Truck features							
Automatic parking brake					●	●	●
Bogie fork wheels					○	○	○
Climber skids					○	○	○
Electronic regenerative brakes (motor)					●	●	●
Fixed AC motor					●	●	●
Fork length dependent steering (OTP)					●	●	●
Load support	◌				○	○	○
Powertrak traction system					●	●	●
Reduced speed when cornering (OTP)					●	●	●
Shock sensor	◌				○	○	○
Spring-loaded drive wheel					●	●	●
Twin castor wheels					○	○	○
Xenoy exterior covers					●	●	●
Controls and instruments							
180°+ steering					●	●	●
Access Control (PIN codes)					●	●	●
Click-2-Creep					●	●	●
Driver direction dependent steering (OTP)					●	●	●
E-bar					○	○	○
Emergency collision button					●	●	●
Hour meter					●	●	●
On-board data terminal mount					○	○	○
Power/Electronic steering	◌		◌		○	○	○
Temporary speed reduction (‘turtle’ button)	◌				○	○	○
Tiller arm steering					●	●	●
Smart Access (electronic card/fob)					●	●	●
Soft pedestrian drive characteristics (OTP)					●	●	●
Operator features							
Adjustable tiller arm height					○	○	○
Configuration dependent tiller arm length					●	●	●
Driver-adapted programmable performance					●	●	●
Driver detection system					●	●	●
Fixed sideguards	◌				○	○	○
Flip-down driver platform					●	●	●
Folding sideguards					●	●	●
Foot safety photocell					○	○	○
One-touch safety gates					●	●	●
Rear backrest/guard	◌				○	○	○
Shrinkwrap holder					●	●	●
Storage compartments					●	●	●
Writing table					○	○	○
Maintenance features							
Easy access for maintenance					●	●	●
Fault diagnosis facility					●	●	●
Historic fault log					●	●	●
Battery management features							
Battery status indicator					●	●	●
Built-in charger					○		
Lithium-ion batterires					○	○	○
Quick battery locking			◌		○	○	○
Sideways battery change					○	○	○
Special applications							
Coldstore platform/driver unit					○	○	○
Corrosive environment version					○		
EEx version (ATEX)					○	○	○

BT Levio P-series

TRUCKS WITH DRIVER PLATFORM

The BT Levio P-series range has a compact design but offers capacities up to 2500 kg. The result is an extremely manoeuvrable range of machines with the smallest turning radius in their class combined with the highest maximum speed, at up to 12.5 km/h, for outstanding productivity.

Unique, adapted driver experience

The standard truck has a folding driver platform with ‘one-touch’ foldable gates. Fixed platform and fixed rear or side guards are options. The height of the steering arm is fully adjustable at the touch of a button, and its length is adapted to suit the application. Optimised Truck Performance adjusts speed when cornering and according to load length, direction of travel, and if pedestrian-operated. Effortless electronic steering is an option.

Totalview concept

The BT Levio P-series range fully complies with ISO 13564-1:2012 to ensure a clear view of the forks from the driving position.

Li-ion battery technology

The latest maintenance-free Li-ion battery technology is available on BT Levio P-series models, with 30% less energy consumption, giving exceptional battery life and the option for fast-charge at any time revolutionising battery management and eliminating the need for battery change in multi-shift applications.

Quiet operation

The BT Levio P-series has a very low noise level, and is the quietest truck in its class.

TPS-based reliability

Like all Toyota trucks, BT Levio P-series trucks are built according to the Toyota Production System, assuring the highest levels of quality, durability and reliability.

- The height of the steering arm can be adjusted at the touch of a button
- A clear view of the forks from the driving position
- One-touch action to fold away the sideguards
- Easy access for efficient servicing

Load capacity: 2.0, 2.2, 2.5 t
@ 600 mm load centre
Maximum travel speed: 12.5 km/h
Maximum battery capacity: 600 Ah

● standard ○ option

	Safety	Durability	Productivity	Driveability	BT Levio LSE200
Truck features					
Automatic parking brake					●
Bogie fork wheels					●
Electronic braking system					●
Electronic regenerative brakes (motor)					●
Electronic speed control					●
Controls and instruments					
Automatic deceleration					●
Electronic fingertip controls					●
Emergency cut-off					●
Hour meter					●
Power/Electronic steering					●
Operator features					
Adjustable backrest					●
Driver detection system					●
Low step-in					●
Storage compartments					●
Writing table					○
Maintenance features					
Easy access for maintenance					●
Battery management features					
Battery status indicator					●
Sideways battery change					○
Special applications					
EEx version (ATEX)					○

BT Levio S-series

STAND-IN TRUCKS

BT Levio S-series models are small and manoeuvrable. A fully enclosed stand-in cab gives maximum driver protection, whilst retaining a compact overall size to allow maximum manoeuvrability in congested and busy areas.

Transverse driving position for longer distance travel

The driver stands transversely in the cab, which allows easy driving in either travel direction, making this truck ideal for operations where the truck is continuously travelling backwards and forwards. An optional 45˚ driving position is also available as an option.

TPS-based reliability

Like all Toyota trucks, BT Levio S-series trucks are built according to the Toyota Production System, assuring the highest levels of quality, durability and reliability.

- Easy driving with small electronic steering wheel
- The driver is fully protected within the cab

Load capacity: 2.0 t @ 600 mm load centre
Maximum travel speed: 10.5 km/h
Maximum battery capacity: 620 Ah

● standard ◦ option

	Safety	Durability	Productivity	Driveability	BT Levio LRE200	BT Levio LRE300	BT Levio LRE300T
Truck features							
Automatic parking brake	●			●	●	●	●
Bogie fork wheels			●	●	●	●	●
Clear-view overhead guard	●		●	●	◦		
Electronic braking system	●	●	●	●	●	●	●
High performance models			●			●	●
Load support	●		●	●	◦		
Twin drive tyres		●	●				●
Controls and instruments							
360˚ progressive steering	●		●	●		●	●
Automatic deceleration	●		●	●	●	●	●
E-bar			●	●	◦	◦	◦
Emergency cut-off	●				●	●	●
Hour meter					●	●	●
Pedals as in a car	●			●	●	●	●
Power/Electronic steering	●		●	●	●	●	●
On-board data terminal mount			●	●	◦	◦	◦
Steering direction indicator	●		●	●		●	●
Operator features							
Adjustable seat	●		●	●	●	●	●
Adjustable steering wheel	●		●	●	●	●	●
Driver detection system	●				●	●	●
Writing table			●	●	◦	◦	◦
Maintenance features							
Easy access for maintenance		●	●		●	●	●
Historic fault log		●			●	●	●
Battery management features							
Battery status indicator		●	●		●	●	●
Sideways battery change			●		●	●	●
Special applications							
Coldstore version		●			◦		
EEx version (ATEX)	●				◦	◦	◦

BT Levio R-series

RIDER-SEATED TRUCKS

Designed and built for high-speed transportation of multiple loads, and with load capacities of up to 3000 kg and travel speeds up to 19.9 km/h the BT Levio R-series provides effective longer distance transportation. Long fork options mean that multiple loads can be carried, creating a highly efficient and productive solution.

High-level cushioned driving position

High-speed travel demands a safe driving position and a clear view. The cab on BT Levio R-series trucks is elevated to ensure full all-round visibility, and any floor vibrations caused by high-speed travel are eliminated due to the spring-loaded cab.

Fully adjustable cab and controls

Operations of this type usually involve long periods of driving, so the seat and controls within the cab are fully adjustable to suit the driver.

TPS-based reliability

Like all Toyota trucks, BT Levio P-series trucks are built according to the Toyota Production System, assuring the highest levels of quality, durability and reliability.

- The cab and controls are fully adjustable to suit the driver
- Optional E-bar for ancillary equipment

Load capacity: 2.0, 3.0 t @ 600 mm load centre
Maximum travel speed: 19.9 km/h
Maximum battery capacity: 840 Ah

How we plan your operation:

Advice
Your local sales contact functions as a business advisor for all handling and logistics operations. He or she will analyse your requirements and find efficient solutions, as well as support your activities during the planning and operational phases.

Complete range
We offer you a complete range of Toyota trucks: warehouse trucks, tow tractors, counterbalanced trucks and automated solutions.

Solutions
We offer you financial options, including finance lease and long term rental programmes. Our quality approved used trucks are available at a competitive cost level. You can also plan forward with short-term rental options to handle peak periods of activity.

How we build quality trucks:

TPS
The world-renowned Toyota Production System is the strong foundation for quality in manufacturing.

Kaizen
A process of continuous improvement, achieved by following a clear set of values.

ISO 14001
All trucks are produced to these quality standards with minimum environmental impact.

European
Over 90% of our trucks sold in Europe are built in our factories in Sweden, France or Italy.

How we take care of you and your trucks:

TSC
The Toyota Service Concept is based on the TPS principle and is unique in the industry.

Total lifetime support
Maintenance, repairs, back-up with extra trucks, driver training and management information.

Real-time information
Instant online access to updated information such as technical support, truck history, parts, truck availability and effective time and route planning

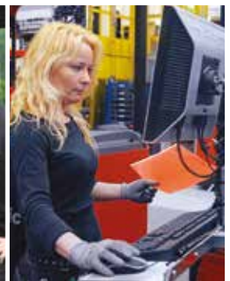
Exact-fit
In terms of parts and people, with structured training and accreditation processes.

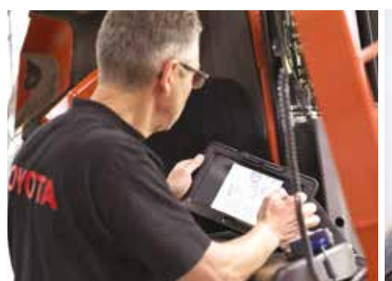
GPRS/3G
Smart truck telemetry allows better safety standards (including driver management) and complete fleet control for improved safety, efficiency and cost reduction (with Toyota I_Site).

We think customer first

Reliability
Confidence
Availability
Productivity
Quality
Safety
Cost-efficiency
Sustainability
Environment

These are the expectations of our customers, with fleets of all different sizes.
We get to know them through surveys, sales discussions and service visits.
We are always there for them, all over Europe.



For more information about:
- Toyota Production System (TPS)
- Toyota Service Concept (TSC)
- Finance and rental plans
- Service and parts programmes
- Smart truck technology
- Toyota I_Site fleet management
- Environment & sustainability policies

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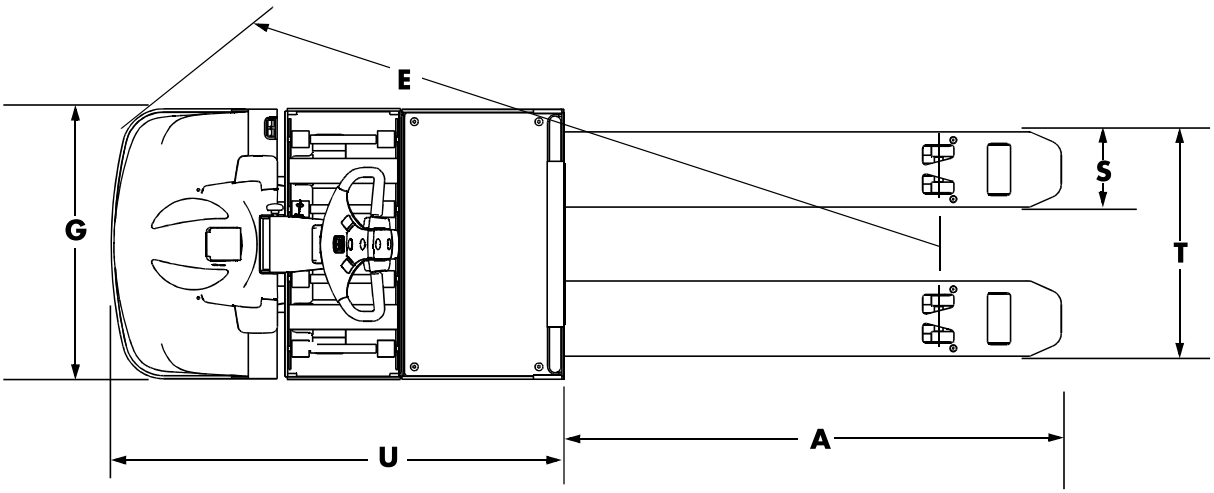
Model 8510 Center Rider

Specifications

This section lists the specifications of the Model 8510 Pallet Truck.

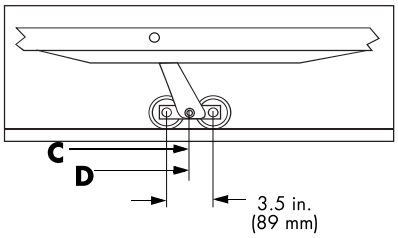
Model 8510 Layout



AA = 5.8 in. (147 mm) from floor to bottom of battery rollers with forks lowered [11.8 in. (300 mm) with forks raised]

AB = 8.1 in. (206 mm) from floor to top of battery rollers with forks lowered [14.1 in. (358 mm) with forks raised]

Tandem Load Wheels – Standard on all 8,000 lb. capacity trucks with fork length of 144 inches



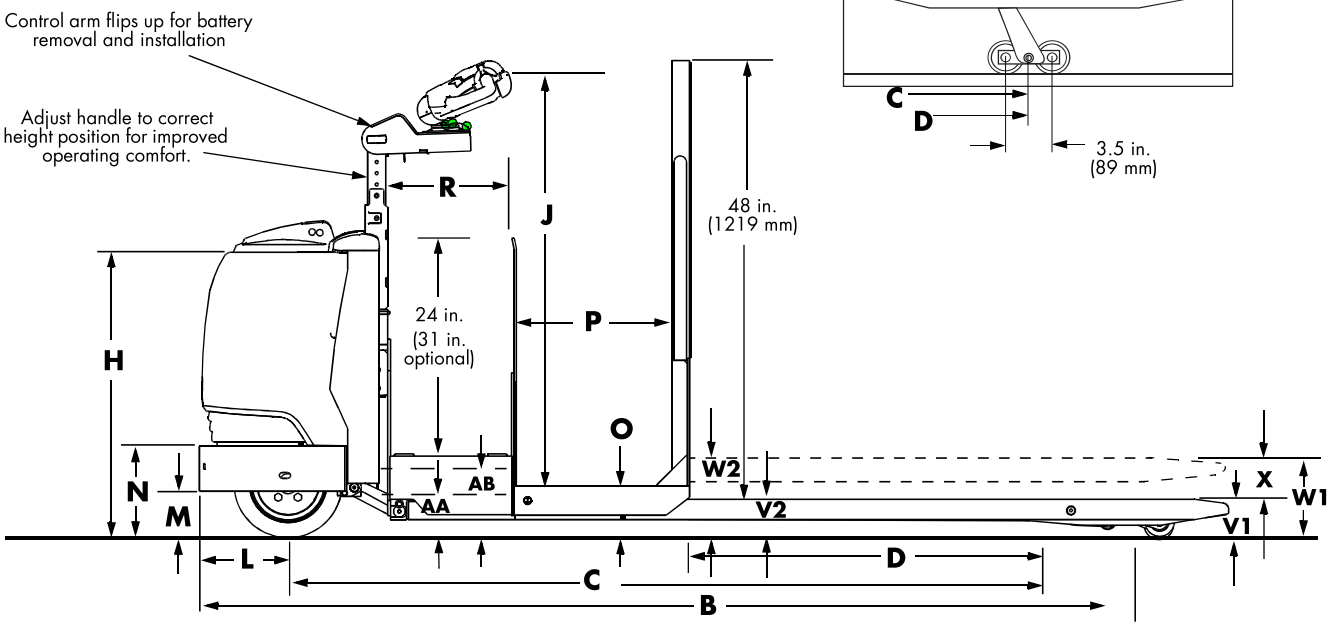


Figure 5. Pallet Truck Model 8510 Layout

Model 8510 Dimensional Data

Model 8510 Dimensional Data, Fork Lengths up to 60 in.

Table 30. Model 8510 Dimensional Data, Fork Lengths up to 60 in. (Sheet 1 of 2)

			8510-FRC60L			
	Nominal Fork Length	**in. (mm)**	**36 (914)**	**42 (1067)**	**48 (1219)**	**60 (1524)**
A	Actual Fork Length	in. (mm)	36 (914)	42 (1067)	48 (1219)	60 (1524)
B	Overall Length [4]	in. (mm)	96.3 (2446)	102.3 (2598)	108.3 (2750)	120.3 (3055)
C	Wheelbase, Lowered	in. (mm)	78.75 (2000)	84.75 (2153)	90.75 (2305)	102.75 (2610)
C	Wheelbase, Raised	in. (mm)	74.1 (1882)	80.1 (2035)	86.1 (2187)	98.1 (2492)
D	Load Wheel Location, Lowered	in. (mm)	28.3 (719)	34.3 (871)	40.3 (1024)	52.3 (1328)
D	Load Wheel Location, Raised	in. (mm)	23.3 (592)	29.3 (744)	35.3 (897)	47.3 (1201)
E	Turning Radius, Raised [4]	in. (mm)	86.4 (2194)	92.4 (2348)	98.5 (2501)	110.6 (2809)
G	Truck OAW [4]	in. (mm)	32.5 (826)			
H	Power Unit Height	in. (mm)	31.4 (798)			
J	Control Handle Height	in. (mm)	41.5 to 49.0 (1054 to 1245)			
L	Bumper to Drive Tire Center [4]	in. (mm)	9.9 (251)			
M	Bumper Underclearance [4]	in. (mm)	5.2 (133)			
N	Bumper Height [4]	in. (mm)	10.2 (258)			
O	Operator's Platform Height	in. (mm)	5.2 [1] (133)			
P	Operator's Platform Depth	in. (mm)	23.25 [3] (590)			
R	Battery Compartment Width (Nominal)	in. (mm)	13.4 (340)			
S	Fork Width (each)	in. (mm)	9.0 (6K) / 10.0 (8K) (229 (6K) / 254 (8K))			

Notes:

[1] With forks lowered.

[2] See Table 36 on page 2E2-49 for available overall fork widths.

[3] Subtract 6.0 in. (152 mm) for 17.25 in. (438 mm) Operator Compartment (Option Code 999).

[4] Does not include bumper.

Table 30. Model 8510 Dimensional Data, Fork Lengths up to 60 in. (Sheet 2 of 2)

	Nominal Fork Length	in. (mm)	8510-FRC60L 36 (914)	42 (1067)	48 (1219)	60 (1524)
T	Fork OAW	in. (mm)	27.0 [2] (686)			
U	Head Length [4]	in. (mm)	60.6 (1539)			
V1	Fork Lowered Height at Tip	in. (mm)	3.25 (83)			
V2	Fork Lowered Height at Heel	in. (mm)	3.75 (83)			
W1	Elevated Height at Tip	in. (mm)	9.25 (235)			
W2	Elevated Height at Heel	in. (mm)	9.5 to 9.75 (235)			
X	Lift	in. (mm)	6.0 (152)			

Notes:

[1] With forks lowered.

[2] See Table 36 on page 2E2-49 for available overall fork widths.

[3] Subtract 6.0 in. (152 mm) for 17.25 in. (438 mm) Operator Compartment (Option Code 999).

[4] Does not include bumper.

Model 8510 Dimensional Data, Fork Lengths over 60 in.

Table 31. Model 8510 Dimensional Data, Fork Lengths over 60 in. (Sheet 1 of 2)

Nominal Fork Length		in. (mm)	8510-FRC60L and 8510-FRC80L					
			84 (2134)	93 (2362)	96 (2438)	103 (2616)	144 [1] (3658)	144 [9] (3658)
A	Actual Fork Length	in. (mm)	84 [2] (2134)	93 [2] (2362)	96 [2] (2438)	103 [2][3] (2616)	144 [5] (3658)	144 (3658)
B	Overall Length [6]	in. (mm)	144.3 (3665)	153.3 (3894)	156.3 (3970)	163.3 (4148)	204.3 (5189)	204.3 (5189)
C	Wheelbase, Lowered	in. (mm)	111.2 (2824)	111.2 (2824)	111.2 (2824)	118.2 (3002)	159.2 (4044)	138.6 (3520)
C	Wheelbase, Raised	in. (mm)	106.5 (2705)	106.5 (2705)	106.5 (2705)	113.5 (2883)	154.5 (3924)	133.9 (3401)
D	Load Wheel Location, Lowered	in. (mm)	60.4 (1534)	60.25 (1530)	60.4 (1534)	67.4 (1712)	108.1 (2745)	87.5 (2223)
D	Load Wheel Location, Raised	in. (mm)	55.4 (1407)	55.75 (1416)	55.4 (1407)	62.4 (1585)	103.4 (2625)	82.8 (2103)
E	Turning Radius, Raised [6]	in. (mm)	119.1 (3025)	119.1 (3025)	119.1 (3025)	126.2 (3205)	167.7 (4259)	146.8 (3729)
G	Truck OAW [6]	in. (mm)	32.5 (826)					
H	Power Unit Height	in. (mm)	31.4 (798)					
J	Control Handle Height	in. (mm)	41.5 to 49.0 (1054 to 1245)					
L	Bumper to Drive Tire Center [6]	in. (mm)	9.9 (251)					
M	Bumper Underclearance [6]	in. (mm)	5.2 (133)					
N	Bumper Height [6]	in. (mm)	10.2 [6] (258)					
O	Operator's Platform Height	in. (mm)	5.2 [7] (133)					
P	Operator's Platform Depth	in. (mm)	23.25 [10] (590)					
R	Battery Compartment Width (Nominal)	in. (mm)	13.4 (340)					

Notes:

[1] Only available on 8K trucks. Load wheel drops into first slot of third pallet.
[2] (2) 48 x 40 in. (1219 x 1016 mm) pallets.
[3] These forks have 7 in. (178 mm) longer wheelbase to allow for load overhang.
[4] (3) 40 x 48 in. (1016 x 1219 mm) pallets
[5] (3) 48 x 40 in. (1219 x 1016 mm) pallets.
[6] Not including extended bumper.
[7] With forks lowered.
[8] See Table 36 on page 2E2-49 for available for overall widths.
[9] Load wheel drops into second slot of second pallet.
[10] Subtract 6.0 in. (152 mm) for 17.25 in. (438 mm) Operator Compartment (Option Code 999).

Table 31. Model 8510 Dimensional Data, Fork Lengths over 60 in. (Sheet 2 of 2)

Nominal Fork Length		in. (mm)	8510-FRC60L and 8510-FRC80L					
			84 (2134)	93 (2362)	96 (2438)	103 (2616)	144 [1] (3658)	144 [9] (3658)
S	Fork Width (each)	in. (mm)	10 (254)					
T	Fork OAW	in. (mm)	27.5 [8] (699)					
U	Head Length [6]	in. (mm)	60.6 (1539)					
V1	Fork Lowered Height at Tip	in. (mm)	3.25 (83)					
V2	Fork Lowered Height at Heel	in. (mm)	3.75 (95)					
W1	Elevated Height at Tip	in. (mm)	9.25 (235)					
W2	Elevated Height at Heel	in. (mm)	9.5 to 9.75 (235)					
X	Lift	in. (mm)	6.0 (152)					

Notes:

[1] Only available on 8K trucks. Load wheel drops into first slot of third pallet.
[2] (2) 48 x 40 in. (1219 x 1016 mm) pallets.
[3] These forks have 7 in. (178 mm) longer wheelbase to allow for load overhang.
[4] (3) 40 x 48 in. (1016 x 1219 mm) pallets
[5] (3) 48 x 40 in. (1219 x 1016 mm) pallets.
[6] Not including extended bumper.
[7] With forks lowered.
[8] See Table 36 on page 2E2-49 for available for overall widths.
[9] Load wheel drops into second slot of second pallet.
[10] Subtract 6.0 in. (152 mm) for 17.25 in. (438 mm) Operator Compartment (Option Code 999).

Model 8510 General Information

Table 32. Model 8510 General Information

		8510-FRC60L	8510-FRC80L
Power Unit		24 Volt Single Drive, AC Drive Motor	24 Volt Single Drive, AC Drive Motor
Max. Capacity	lb. (kg)	6,000 (2722)	8,000 (3629)
Operator's Compartment		Stand-up (Center)	Stand-Up (Center)
Drive Tire, Rubber, Dia. x W	in. (mm)	12 x 4.75 (305 x 121)	12 x 4.75 (305 x 121)
Load Tire, Poly (2), Dia. x W	in. (mm)	3.25 x 5.91 (83 x 150)	3.25 x 5.91 (83 x 150)
Caster Tire, Poly (2), Dia. x W	in. (mm)	3 x 3.5 (76 x 89)	3 x 3.5 (76 x 89)
Gradability, Unloaded	%	10	10
Gradability, Loaded	%	10	8

Model 8510 Performance Specifications

Table 33. Model 8510 Performance Specifications

		8510-FRC60L		8510-FRC80L		
		Unloaded	**Loaded**	**Unloaded**	**Loaded**	
Travel Speed [1][2]	mph (km/h)	9.0 (14.5)	6.5 (10.5)	9.0 (14.5)	6.2 (10.0)	
Lift Time	sec.	4	5	4	5.4	

Notes:

[1] Maximum speed attainable, after break-in period, varies with truck weight, rolling resistance, options, and battery condition.

[2] Maximum speed when using turtle speed is 3.5 mph (5.6 km/h).

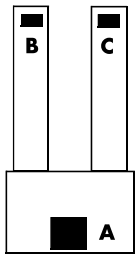
Model 8510 Battery Specifications

Table 34. Model 8510 Battery Specifications

		8510-FRC60L	8510-FRC80L
Amperes, Max		750	750
Battery Connector Type		SB-175	SB-175
Battery Connector Color		Gray	Gray
Lead Location		B	B
Lead Length	in. (mm)	18 (457)	18 (457)
Maximum Usable Compartment Size (L x W x H)	in. (mm)	31 x 13.25 x 31 (787 x 337 x 787)	31 x 13.25 x 31 (787 x 337 x 787)
Battery Weight, Maximum	lb. (kg)	1,500 (680)	1,500 (680)
Battery Weight, Minimum	lb. (kg)	980 (444)	980 (444)

Model 8510 Wheel Loading Specifications

Table 35. Model 8510 Wheel Loading Specifications



	8510-FRC60L		8510-FRC80L	
Wheel	**Unloaded**	**Loaded**	**Unloaded**	**Loaded**
A	66%	34%	68%	30%
B	17%	33%	16%	35%
C	17%	33%	16%	35%

Note: Values given are for 48 x 27" forks.

Model 8510 Fork Specifications

Table 36. Model 8510 Fork Specifications (Sheet 1 of 3)

Model	Order Code	Fork Length in. (mm)	Fork Overall Width in. (mm)	Truck Weight w/o Battery lb. (kg)
Universal Pallet Forks				
8510-FRC60L	100430	84 (2134)	27 (686)	1,750 (794)
	100431	93 (2362)	27 (686)	1,790 (812)
	100433	96 (2438)	27 (686)	1,800 (816)
Blunt Nosed Forks				
8510-FRC60L	100437	36 (914)	27 (686)	1,300 (590)
	100438	42 (1067)	27 (686)	1,320 (599)
	100440	48 (1219)	27 (686)	1,340 (608)
	100441	60 (1524)	27 (686)	1,390 (630)
	100442	84 [1][5] (2134)	27 (686)	1,750 (794)
	100444	93 [1][5] (2362)	27 (686)	1,790 (812)
	100445	96 [1][5] (2438)	27 (686)	1,800 (816)
	100446	103 [1][2][3][5] (2616)	27 (686)	1,825 (828)

Notes:

[1] Forks are designed to handle two tandem 48 in. (1219 mm) long pallets.
[2] 48 in. (1219 mm) High Load Backrest is standard.
[3] These forks have 7 in. (178 mm) longer wheelbase to allow for load overhang.
[4] For fork lengths over 60 in. (1524 mm), add 0.62 in. (16 mm) to fork OAW.
[5] For fork lengths over 60 in. (1524 mm), add 0.5 in. (13 mm) to fork OAW.
[6] Forks are designed to handle three 40 in. (1016 mm) long pallets.
[7] Forks are designed to handle three 48 in. (1219 mm) long pallets.
[8] Dual tandem load wheels are standard.
[9] Load wheels drop into first slot of third pallet.
[10] Load wheels drop into second slot of second pallet.

Table 36. Model 8510 Fork Specifications (Sheet 2 of 3)

Model	Order Code	Fork Length in. (mm)	Fork Overall Width in. (mm)	Truck Weight w/o Battery lb. (kg)
8510-FRC60L	100447	36 (914)	24 (610)	1,300 (590)
	100448	42 (1067)	24 (610)	1,320 (599)
	100449	48 (1219)	24 (610)	1,340 (608)
	100450	60 (1524)	24 (610)	1,390 (630)
	100451	84 [1][5] (2134)	24 (610)	1,750 (794)
	100452	93 [1][5] (2362)	24 (610)	1,790 (812)
	100453	96 [1][5] (2438)	24 (610)	1,800 (816)
	100454	103 [1][5] (2616)	24 (610)	1,825 (828)
8510-FRC60L	100455	36 (914)	22 (559)	1,300 (590)
	100456	42 (1067)	22 (559)	1,320 (599)
	100457	48 (1219)	22 (559)	1,340 (608)
	100458	60 (1524)	22 (559)	1,390 (630)
	100459	84 [1][4] (2134)	22 (559)	1,750 (794)
	100460	93 [1][4] (2362)	22 (559)	1,790 (812)
	100461	96 [1][4] (2438)	22 (559)	1,800 (816)
	100462	103 [1][4] (2616)	22 (559)	1,825 (828)

Notes:

[1] Forks are designed to handle two tandem 48 in. (1219 mm) long pallets.
[2] 48 in. (1219 mm) High Load Backrest is standard.
[3] These forks have 7 in. (178 mm) longer wheelbase to allow for load overhang.
[4] For fork lengths over 60 in. (1524 mm), add 0.62 in. (16 mm) to fork OAW.
[5] For fork lengths over 60 in. (1524 mm), add 0.5 in. (13 mm) to fork OAW.
[6] Forks are designed to handle three 40 in. (1016 mm) long pallets.
[7] Forks are designed to handle three 48 in. (1219 mm) long pallets.
[8] Dual tandem load wheels are standard.
[9] Load wheels drop into first slot of third pallet.
[10] Load wheels drop into second slot of second pallet.

Table 36. Model 8510 Fork Specifications (Sheet 3 of 3)

Model	Order Code	Fork Length in. (mm)	Fork Overall Width in. (mm)	Truck Weight w/o Battery lb. (kg)
Universal Pallet Forks				
8510-FRC80L	100429	84 (2134)	27 (686)	1,960 (889)
	100432	93 (2362)	27 (686)	2,000 (907)
	100434	96 (2438)	27 (686)	2,010 (912)
	100435	144 [9] (3658)	27 (686)	2,260 (1025)
	100436	144 [10] (3658)	27 (686)	2,260 (1025)
Blunt Nosed Forks				
8510-FRC80L	100463	84 [1][2][5] (2134)	27 (686)	1,960 (889)
	100464	93 [1][2][5] (2362)	27 (686)	2,000 (907)
	100465	96 [1][2][5] (2438)	27 (686)	2,010 (912)
	100466	103 [1][2][3][5] (2616)	27 (686)	2,035 (923)
	100467	144 [2][5][7][8][9] (3658)	27 (686)	2,260 (1025)
	100468	144 [2][5][7][8][10] (3658)	27 (686)	2,260 (1025)

Notes:

[1] Forks are designed to handle two tandem 48 in. (1219 mm) long pallets.
[2] 48 in. (1219 mm) High Load Backrest is standard.
[3] These forks have 7 in. (178 mm) longer wheelbase to allow for load overhang.
[4] For fork lengths over 60 in. (1524 mm), add 0.62 in. (16 mm) to fork OAW.
[5] For fork lengths over 60 in. (1524 mm), add 0.5 in. (13 mm) to fork OAW.
[6] Forks are designed to handle three 40 in. (1016 mm) long pallets.
[7] Forks are designed to handle three 48 in. (1219 mm) long pallets.
[8] Dual tandem load wheels are standard.
[9] Load wheels drop into first slot of third pallet.
[10] Load wheels drop into second slot of second pallet.

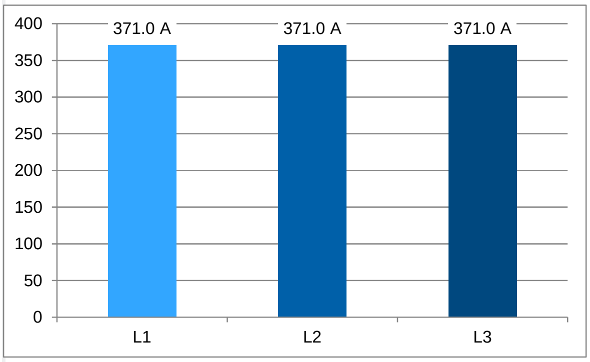
RAYMOND

Phase Currents and kVA of Chargers

Customer:	Toyota	**Contact:**	Peter Poulos
Project:	VRLA Tensor X Gel 690Ah		
		Date:	11/12/2018

Enter Fields (Please enter without Units) — **Calculated Values**

Position	Quantity	Charger - AC PlugType	Mains			Phase Allocation to			Mains Current per Phase			kVA per unit	kVA Total
			Phases	Voltage	I_max per Phase	L1	L2	L3	L1	L2	L3		
		8FBN25 Counter Balance											
1	35	HP48T100X - 20amp	3-ph	400 A	10.6 A	x	x	x	371.0 A	371.0 A	371.0 A	7.3 kVA	257.0 kVA
			Total Input Current / Total kVA:						371.0 A	371.0 A	371.0 A		257.0 kVA



Fuse per String:	125.0 A
Min. Number of Strings:	3

REMARKS:

The chargers should be divided equally between the individual phases, in order to ensure a uniform use of the mains.

The mains currents given are the max. occurring input currents that occur under full load.

For the specified GNB HP 2100 type chargers elevated starting currents will not occur.

In charging stations circuit breaker of K-type or screw type fuses with sluggish tripping characteristic should be used.

Note that the three phase HPK Chargers can definitely NOT work on generators as the generators source impedance is far to high and is also very inductive. The high impedance means the voltage can collapse easily and the high inductance causes ringing with the input capacitance leading to excessive voltage. In the main the three phase HPK chargers are not designed for generators. Single phase HPK Chargers are also not designed to work with generators, but if the VA is at least 1.5 times that of the charger and the tracking is moderate single phase operation may be possible but not recommended.

Appendix C

Example Hook-Lift Compactor Specifications

*Waste***Pac** SC25
BLADE COMPACTOR

WASTE INITIATIVES

SPECIFICATIONS	
Motor Drive	5.5 kW
Power Supply	415V, 3-Ph, 16A
Compaction Force	26T
Feed Opening	1.25m x 1.50m
Cycle Time	72 secs
Compaction Rate	Max 300kg/m3
Throughput	Max 150m3/hr
Ram Penetration	250mm

SC25 COMPACTOR FEATURES

- Suitable for a very broad range of materials and applications
- High compaction minimises transfer frequencies reducing transport costs and carbon footprint
- Robust design – engineered for long life and optimum performance.
- Built in power pack for security and safety of personnel
- Hour meter, full signal & 80% full signal included
- Guide rails & container coupling included

OPTIONAL EXTRAS

- Material Force-Feeder
- Material Pre-Shredder
- Bin Tipper for infeed
- Wall Chutes
- Custom hopper design
- Auto start/stop functions
- Odour control systems

Schematics

STANDARD SIZES (Bin only)	
15 m3	(L) 4600 x (H) 2000
18 m3	(L) 4600 x (H) 2300
21 m3	(L) 4600 x (H) 2600
23 m3*	(L) 6500 x (H) 2100
25 m3*	(L) 6500 x (H) 2250
30 m3*	(L) 6500 x (H) 2600
32 m3*	(L) 6500 x (H) 2750
35 m3*	(L) 6800 x (H) 2750
38 m3*	(L) 7100 x (H) 2750

* *Stationery compactor sizes only.*