

Assets | Engineering | Environment | Noise | Spatial | Waste

Recycling Centre Balcatta Redevelopment

Environmental Assessment and Management Plan



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Name	Position	File Reference
Ronan Cullen	Director and Waste Management Section Leader	TW20057 - Recycling Centre Balcatta EAMP.1b
Signature		

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1 Introduction

The City of Stirling (the City) propose to redevelop the existing Recycling Centre Balcatta (the Site) to establish a modern best practice Community Recycling Centre (CRC) and Waste Transfer Station (WTS) Facility (herein collectively referred to as the Project). The Project will improve the overall layout, operational efficiency, safety and usability of the Site along with providing increased capacity and services to manage waste for the City and Perth Metropolitan Area in the long term.

Establishment of the CRC will provide a variety of waste management services that align with the Waste Management Hierarchy. This will help encourage the community to reuse, recycle and recover waste materials thereby increasing the diversion of waste from landfill. The community will be able to drop off a range of waste materials with ease and safety. The CRC will be separated into free and paid (and pass) waste management services. The following facilities are included within each area:

Free Community Drop Off Area:

- Container Deposit Scheme (CDS) Facility;
- Recycle Shop and Forecourt;
- Hazardous Household Waste (HHW) Facility; and
- Material Recovery Drop Off.

Paid and Pass Community Drop Off Area:

- Fridge, Mattress and Tyre Laydown;
- Inert Waste Laydown;
- Green Waste Shed; and
- Mixed Waste Shed.

Establishment of the WTS Facility will provide a modern, best practice facility, increased capacity, and improved efficiency. The facility will allow for the consolidation of mixed/putrescible materials and other selected waste streams including the City's waste collection, commercial operators and materials collected at the Mixed Waste Shed. Waste materials will then be loaded into a semi-trailer or B-double truck and transported to a suitable facility for recycling, treatment, or disposal.

To redevelop the Site, the City requires a Works Approval to construct the Project. The details of the Project and the environmental aspects that require consideration and management are outlined within this Environmental Assessment and Management Plan (EAMP) so that the Department of Water and Environmental Regulation (DWER) can undertake an appropriate assessment.





1.1 Background

The City has completed two key stages to progress with the redevelopment of the Site. Stage One of the Project comprised the development of a Master Plan that encompassed the City's long-term waste management requirements and aligned with best practice design principles. The final Master Plan determined the general layout of all waste management activities that were proposed to take place and set the foundation for Stage Two, which was to develop the conceptual designs. Stage Two consisted of the preparation of a full suite of conceptual design drawings and cost estimates for the Project. A Preliminary Phasing Plan was also developed to outline how the current operations could continue through the Project works as well as an Implementation Plan, which outlined the works required to deliver the Project from approvals through to operation.

1.2 Objectives

The key objectives of the EAMP are to:

- Describe the current environmental and social values on and surrounding the Site;
- Describe the Project in detail, including design, operations and associated benefits;
- Identify any potential impacts to environmental and social aspects associated with the Project; and
- Develop environmental engineering and management measures to ensure that all potential impacts are managed to appropriate standards.



2 Site Information

2.1 Site Location and Access

The Site is located at 238 Balcatta Road, Balcatta, Western Australia (WA) 6021. It is approximately 12 kilometres (km) northwest of the Perth city centre and 7km from the Indian Ocean coastline (see the locality in Figure 1). The existing waste management operations take place in the northern section of Lot 45 on Plan 194142 and the City's Operations Centre is located in the southern section of the Lot. The Site currently includes a WTS Facility, Community Drop-off Area, green waste drop-off area and other bulk waste drop-off areas as well as the City's Engineering Works Area.

At present, there are a total of three access points. Two access points are from Natalie Way, which runs along the Site's western boundary. One of these access points is for City vehicles and visitors to the City of Stirling Operations Centre that is located directly south of the Site. The other access point is designated for Fire Department services only. The third and final access point is from Balcatta Road in the Site's northeast corner and is used by community and commercial users, City vehicles and City contractors. Figure 2 provides the current layout of the Site and highlights the access points.

2.2 Ownership and Licencing

The Site is owned and managed by the City and has been in operation since 1979. The Site is classified as a Prescribed Premises pursuant to Schedule 1 of *Environmental Protection Regulations 1987* as an 'industrial premises with the potential to cause emissions and discharges to air, land or water'. Therefore, it operates under an approved Licence (L7201/1997/10) granted by DWER. The category covered under the Licence is listed in Table 2-1.

Category No.	Name	Description	Expected Throughput (per annum)	Threshold (per annum)
62	Solid waste depot	Premises on which waste is stored or sorted pending final disposal or re-use.	500 tonnes or more	250,000 tonnes

Table 2-1: Category of Prescribed Premises

The Site is located within an industrial and business area of Balcatta. According to the City's Local Planning Scheme No. 3 (2010), the Site has been designated as a 'Special Control Area' (SCA) and zoned as 'Industry'.

In the current Licence, the Site boundary is defined as the cadastre boundary of Lot 45, which also encompasses the City's Operations Centre. However, the City will seek an amendment to the Licence boundary to include the Prescribed Premises activities only.





2.3 Current Operations

2.3.1 Site Activities and Infrastructure

The Site accommodates a wide range of waste management and ancillary activities and corresponding infrastructure, which can be split into five main areas:

- Community Drop-off Area;
- Inert Waste and Green Waste Drop-off Area;
- Waste Transfer Station;
- City Engineering Works Area; and
- Surface Water Sump.

Each of these areas are shown in Figure 2 and are described in the following sections.

2.3.2 Community Drop-off Area

As part of the City's services to the community, the Community Drop-off Area accepts a range of waste streams and recyclables free of charge. It consists of a Reuse Shop with, receptacles and designated areas for an array of recyclable materials as well as a household hazardous waste shed. These are all located around a loop road positioned adjacent to the eastern Site boundary. The key materials currently accepted in the Community Drop-off Area include:

- Reuse Shop:
 - Household and garden items including furniture;
 - Sporting equipment, including bicycles;
 - Building materials;
- Recycling Area:
 - Dry cardboard, magazines and paper;
 - o Polystyrene;
 - o Aluminium and steel cans;
 - Electronic waste;
 - o Scrap metal;
 - o Glass bottles;
 - White goods (excluding fridges and freezers);
 - Hazardous Waste Area:
 - o Oils;
 - o Solvents & Flares;
 - o Syringes; and
 - o Paints, etc.

The Reuse Shop is operated by a third-party contractor and is where the community can drop-off and purchase a variety of reusable materials.





For certain select waste streams, including green waste and bulk waste, community users pay a set fee. Therefore, community vehicles pass through the weighbridge to deposit these materials in other areas across the Site.

2.3.3 Green Waste Drop-off Area

The Green Waste Drop-off Area consists of a large, cleared area for community and commercial vehicles to lay down their green waste on the ground. Once sufficient volumes of green waste are accumulated, the material is loaded into a semi-trailer truck by a front-end loader using a ramp system. The green waste is then taken offsite for processing.

The area has been spilt into sections, to the east is where the community typically dispose of their green waste and in the western section is where the commercial users dispose of their green waste. However, on occasions when one section is closed for servicing/loading of green waste, both commercial and community users dispose of their green waste in the same section.

2.3.4 Waste Transfer Station

The WTS consists of a large steel frame shed with ribbed cladding that covers an approximate area of 3,500 square metres (m²). It is fully open on the northern side to accommodate a drop-off area for community and light commercial vehicles. The vehicles access this drop-off area by passing through the weighbridge in the Site's northeast corner and taking the second exit at the roundabout. There are also several other drop-off areas near the WTS building that the vehicles have access to after passing through the weighbridge. Along the road to the Site's roundabout from the weighbridge, there is the Tyre Drop-off Area. The White Goods Drop-off Area is located to the north of the WTS, while the lnert Waste Drop-off Area is to the southeast.

The following waste streams are accepted either in the WTS or in a designated drop-off area near the WTS (as depicted in Figure 2):

- WTS building:
 - Mixed waste (e.g. metals, plastics, glass, cardboard, household junk and construction waste);
 - Mattresses and bases (stockpiled along eastern wall of building);
- White Goods Drop-off Area:
 - Air conditioners;
 - Fridges and freezers;
 - Household bulk waste;
- Inert Waste Drop-off Area:
 - Clean sand, bricks and concrete; and
- Tyre Drop-off Area:
 - o Tyres.

Most of the area inside the WTS building is dedicated to the stockpiling of waste. In addition to community and commercial vehicles, waste collection vehicles and other contractor vehicles deposit their waste within the WTS. All waste that is designated for landfill is stockpiled by a front-end loader



and loaded into semi-trailer trucks, removing it from Site. The semi-trailer reverses down a ramp in the southern section of the building until it is underneath one of two holes in the floor where the waste material is stockpiled. The front-end loader gathers the material and drops it through the hole into the semi-trailer. The infrastructure used by this loading system was originally designed for a compaction system, which has since been decommissioned. The other drop-off areas are serviced, as required, once sufficient volumes of material have accumulated and the material is transported off-Site for further processing or disposal.

2.3.5 Engineering Works Depot

The City's Engineering Department stores various materials onsite, including sand, soils and aggregate, which are used in works across the City. These materials are currently stockpiled between the Green Waste Drop-off Area and the Community Drop-off Area along the Site's southern boundary. The department vehicles also use the Site's wash-down bay and fuel station.

2.3.6 Surface Water Sump

According to the 2004 survey conducted by the City, the surface water sump occupies an area of approximately 2,340m² in the eastern half of the Site and has a capacity of 8,562 cubic metres (m³). During major rainfall events, there have been instances in which the water in the surface water sump overtops into the Site's surrounding areas, including the Green Waste Drop-off Area.

2.4 Surrounding land use and zoning

Along the Site's western boundary across Natalie Way, there is the City of Stirling's Animal Care Facility and the neighbouring Richard Guelfi Reserve, which offers sport playing fields to the community and is home to the Balcatta Baseball Club and the Stirling Saints Amateur Football Club. Directly to the south is the City of Stirling's Operations Centre and across Delawney Street there is a residential subdivision. Lot 52 along the Site's eastern boundary is recorded as Crown land under Management Order in favour of Water Corporation to be used for drainage purposes, including pipeworks. A Water Corporation office complex is located further east of the Site boundary. Along the northern boundary of the Site, there are a series of businesses which front Balcatta Road.

As shown in Figure 3, the Site is zoned 'Industry'. To the west the zone is industry followed by 'Public Open Space and Local Authority'. To the north land is zoned 'Mixed Business', 'Local Centre' and 'Industry'. The land immediately east of the Site in which the Water Corporation is locate is zoned 'Public Use'. South of the Site are areas zoned 'Residential'.

2.5 Separation distances

The Environmental Protection Authority (EPA's) Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses (2005) (Guidance Statement 3) contains the recommended separation distances between industrial activities, including waste management facilities, and sensitive land uses. Sensitive land uses are defined by the EPA as those that are sensitive to industrial emissions and include residential developments, schools, hospitals, shopping centres and other public areas and buildings.





Table 2-2 provides the recommended minimum separation distances between sensitive land uses and the Prescribed Premises Category for which the Site is currently licenced.

Category	Inductor	Impacts					Recommended
No.	maustry	Gaseous	Noise	Dust	Odour	Risk	Separation Distance
62	Solid Waste Depot		\checkmark	\checkmark	\checkmark		200m

Table 2-2: Recommended Separation Distances between Industrial and Sensitive Land Uses

The closest sensitive receptor is the residential subdivision, which is directly south of the City's Operations Centre and across Delawney Street, approximately 199m, 214m and 250m from the corners of the proposed WTS, which is the closest activity within the Site to these receptors. Beyond the closest point of the WTS and the remainder of the Site exceeds this recommended separation distance. The location of the WTS and distances to this receptor are shown in Figure 4.





3 Environmental Attributes

The following sections outline the key environmental attributes on, and surrounding, the Site including topography, vegetation, geology, groundwater, surface water and acid sulfate soils.

3.1 Topography

The topography generally slopes from approximately 23 metres (m) Australian Height Datum (AHD) in the south western corner up to 29 mAHD in the northeast corner of the Site. The exception is the surface water sump with a base at 19 mAHD. The topography of the Site is shown in Figure 5.

3.2 Vegetation

Due to historical clearing of the Site, little vegetation remains. Most of the vegetation consists of trees located around the perimeter of the Site and isolated trees (both native and introduced species) scattered throughout the Site. As part of the redevelopment construction, some of these trees will require removal. Where possible, trees will be kept, and new vegetation established in 'green spaces' throughout the Site.

3.3 Geology

The Department of Mines, Industry Regulation and Safety (DMIRS), Geological Survey of Western Australia (GSWA) 1986 Geological Series 1:50,000 map classifies one surface geology profile occurring across the Site. This profile is described as Sand - pale and olive yellow, medium to coarse-grained, subangular to sub-rounded quartz, trace of feldspar, moderately sorted, of residual origin as shown in Figure 6.

3.4 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals that, if disturbed and exposed to air (i.e., by excavation, dewatering or drainage), can be oxidised resulting in release of acidity and potentially causing adverse environmental impacts.

ASS risk mapping considers existing geomorphological, geological and hydrogeological information to develop broad scale mapping for regions of the State for planning purposes. ASS risk mapping data generated by the DWER shows that the Site is located in an area with 'extremely low probability/confidence-unknown (see Figure 7). The closest ASS risk areas are approximately 530m south of the Site which are mapped as 'high probability/very low confidence' and 'Low Probability/Very Low Confidence'. The next closest mapped area is 560m to the west which is 'high probability/low confidence' (see Figure 7). Therefore, while it may be unlikely that ASS is present at the Site, any ASS encountered will be managed in accordance with the DWER's guidelines on 'Treatment and management of soil and water in acid sulfate landscapes' (June 2015).





3.5 Groundwater

Desktop investigations on groundwater levels were carried out using geospatial datasets from the DWER's Water Information Reporting (WIN, 2002) Site. The WIN site database is a State-wide record of surface and groundwater measurements, both quantitative and qualitative, taken at monitoring points across the State. The groundwater contour data provides a measurement of superficial aquifer groundwater levels.

It is estimated that the minimum groundwater contour levels range from 12mAHD to 14mAHD. The groundwater level reaches up to 12mAHD on the western Site boundary and consistently increases across the Site until it is approximately 14mAHD along the eastern Site boundary. The maximum groundwater contour levels display a similar gradient behaviour as the minimum contours, but the levels range from 16mAHD to 18mAHD. Therefore, the depth to groundwater is on average 9 to 11m below ground level, using the maximum groundwater contour levels. The groundwater contour data are shown in Figure 8.

Groundwater quality within the area is generally 'fresh' with a salinity of <250 milligrams per litre (mg/L) (Cardno, 2019). The WIN site database also provides limited water quality for some groundwater monitoring bores within its network as shown on Figure 8. Partial water quality information is available for two of these bores. According to WIN, Site 61603667 has a pH of 7 and a total dissolved solids (TDS) reading of approximately 380 mg/L. WIN Site 61604292 has a pH of 6.3 and a TDS reading of about 300mg/L.

3.6 Surface Water

A surface water sump is located in the eastern portion of the Site and serves as an overflow pond for the overall surface water management in the greater Balcatta area. A surface water ditch is located along the southern boundary of the Operational Area. Directly west of the Site, on the western side of Natalie Way, is Natalie Way Sump with a capacity of approximately 4,653m³. Surface water from the south west portion of the site is approved to discharge into this sump.

There are also several major surface water bodies in close proximity to the Site. Further west is Careniup Swamp Reserve and Lake Karrinyup, which are approximately 2km and 2.6km away, respectively. Lake Gwelup is approximately 2.5km southwest of the Site, and the Carine Swamps are approximately 3km northwest of the Site as shown in Figure 9.



4 **Project Design and Description**

The aim of the Project is to provide a modern best practice facility that will deliver critical waste management services for the community and wider Perth Metro in the long term. A description of the CRC and WTS Facility design and function is provided in the following sections. An aerial view with the proposed layout of each aspect of the project is shown in a more detailed conceptual layout drawing of the facility is shown in Drawing C-101 (Appendix A).

It should be noted the current Project design is at the conceptual stage only. Detailed designs and further engineering controls will be prepared by a suitable contractor engaged by the City through a Design and Construct contract.

4.1 Community Recycling Centre

The CRC has been separated into two distinct areas that provide free services and paid and pass services. The key aspects of each area are:

Free Community Drop Off Area:

- Container Deposit Scheme (CDS) Facility;
- Recycle Shop and Forecourt;
- HHW Facility; and
- Material Drop Off Facility.

Paid and Pass Community Drop Off Area:

- Fridge, Mattress and Tyre Laydown;
- Inert Waste Laydown;
- Green Waste Shed; and
- Mixed Waste Shed.

4.1.1 Best Practice Design Principles

The key elements of the Site were originally constructed in 1979 and are reflective of the standards for waste management facilities at that time. Since then, there have been significant alterations to the design standards applied to such facilities to minimise environmental, social, and health and safety risks. The following sections provide details on the best practice design principles that have been adopted in the development of the CRC.

4.1.1.1 Waste Hierarchy

The Waste Management Hierarchy (Diagram 4-1) is an internationally recognised concept and its principles underpin all modern sustainable waste management strategies. It provides a structure for prioritising waste management practices in relation to maximising the value of the various materials, with the most preferred or most sustainable (top of the hierarchy) to the least preferred or least sustainable (bottom of the hierarchy).





Diagram 4-1: Waste Management Hierarchy

The Waste Management Hierarchy has been adopted for the design of the redevelopment to determine the flow and priority order of waste management services that are provided to maximise the value of the materials accepted.

4.1.1.2 Design Principles

To promote the overall advancement of the RCB towards a modern, fully-integrated recycling and waste management facility, the following best practice design principles were applied:

- 1. Maximise the source separation of materials to encourage diversion from landfill;
 - Maximise the separation of materials into clean streams for reuse, recycling or recovery;
- 2. Operational site management separated from areas intended for community use thereby avoiding interaction (separation between front and back of house);
- 3. Adopt best practice design and operational standards, including:
 - Promote sustainable waste management operations (CRC set out in relation to the waste management hierarchy);
 - One-way traffic flow through the facility to minimise traffic conflicts;
 - o Design of waste management infrastructure for efficient and safe disposal;
 - Design access roads to cater for queuing of traffic;
 - Appropriate signage to provide clear advice to users;
 - o Police all waste acceptance activities while minimising staff resources;
 - o Eliminate or minimise combining heavy and light traffic on Site;
 - o Promote occupational health and safety aspects for Site Users and Operational Staff;
 - o Incorporate environmental measures to minimise any potential impacts;
- 4. Incorporate environmentally sustainable design principles across the Project;
- 5. Support linkages/flows between various Site operations to improve operational efficiency and minimise the onsite material handling requirements:
 - One of the key operational requirements for the staff at the CRC will be the ongoing material handling. Minimise handling of materials on Site will minimise operational costs.
 Design logical linkages between operations to create operational efficiencies at the CRC;
- 6. Enable improved data collection;





- 7. Allow operational flexibility at the CRC:
 - Flexibility to accommodate change. The operations of a waste facility should be capable of changing quickly and efficiently. For example, in the case of an unscheduled influx of waste to the Site. This coincides with contingency planning for the Site when unexpected events or activities occur; and
- 8. Provision of visual amenity for customers:
 - For the City and the community to enjoy and be proud of the Site, it is imperative that the facility is designed to a high architectural standard and presented in a clean manner at all times.



4.1.2 Waste Sources, Streams and Volumes

The CRC has been designed to accept a range of materials for reuse, recycling and disposal from members of the community and commercial operators. To understand future waste volumes, the waste types and current volumes were projected over a 20 year period using the City's population data and a 1.5% growth rate. The estimated volumes for year 1 to 20 are shown Table 4-1.

Masta Tura	Estimated Tonnes per annum (tpa)							
waste rype	Year 1	Year 5	Year 10	Year 15	Year 20			
Reuse items	754	800	862	928	1,000			
HHW	754	800	862	928	1,000			
E waste	754	800	862	928	1,000			
Fridges	98	104	112	121	130			
Waste oil	5,000	5,307	5,717	6,159	5,000			
CDS	2,562	2,719	2,930	3,156	3,400			
Cardboard/paper	4,522	4,799	5,170	5,570	6,000			
Scrap metal	3,014	3,199	3,447	3,713	4,000			
C&D drop off (commercial)	3,000	5,816	13,306	30,442	10,000			
C&D drop off (residential)	2,000	3,261	6,008	11,070	10,000			
C&D (City's construction works)	2,000	3,261	6,008	11,070	23,000			
Green waste drop- off (commercial)	20,347	21,596	23,265	25,063	27,000			
Green waste drop- off (residential)	15,072	15,997	17,233	18,565	20,000			
Mixed waste drop- off	11,304	11,998	12,925	13,924	15,000			
Total	71,181	80,457	98,706	131,636	126,530			

Table 4-1.	Estimated	tonnes to	o he	received	at the	CRC	over	a 20 y	vear	neriod
	Lotinateu	tonnes to		received	attic	CILC	Over	a 20	year	periou

As shown above, it is estimated that by Year 20 the CRC will accept approximately 126,530 tpa.





4.1.3 Free Community Drop off Area

4.1.3.1 Container Deposit Scheme Facility

The Container Deposit Scheme (CDS) Facility consists of a 35m x 44m (1,540m²) steel framed shed with metal cladding. The facility contains a community acceptance area, sorting and processing area, office and ablutions. The CDS area will allow the community to drive through and drop off their recyclable containers that are eligible for a refund (i.e. glass, plastic, aluminium cans). An external servicing area is included for the containers to be collected and taken offsite for further processing.

4.1.3.2 Recycle Shop and Forecourt

A Recycle Shop and Forecourt is located near the entry to the Site to allow the community to drop off materials for reuse/resale. The Recycle Shop will consist of a drop off lane with 6 parking bays, drop off zone (13m x 15m), sorting area (8.6m x 15m), enclosed shed 38m by 13m (494m²) and large sealed forecourt area (18.5m x 28m) for the display and sale of the reused items. If required, items will be cleaned in the forecourt prior to sale. All electrical items suitable for sale will be tested and tagged to ensure the safety of consumers and to guarantee the item is in good working order. Any items received that are deemed not suitable for resale will be taken to the designated area for recycling. The total area of the facility is 58m x 28m (1,624m²). A large sealed public car parking area is located next to the Recycle Shop for customers. The carpark provides bays for 32 cars and 16 cars and trailers.

4.1.3.3 HHW Facility

HHW currently accepted onsite will continue to be accepted at the new facility. The HHW materials will be dropped off by the community at the HHW Facility and City waste management staff will correctly identify and place the hazardous materials in the secure storage area 25m x 12m (300m²). The building will be lockable and contain a suitable sealed and separate concrete hardstand storage areas with drainage to individual sumps to collect any liquids in the event of a spill. Adequate ventilation will be installed to ensure materials do not overheat. The hazardous materials will be removed periodically by a private contractor and taken to a suitably licenced facility. The HHW area will be continued to be managed and operated in accordance with the City's HHW Facility Safe Work Method Statement (SWMS) and Chemical Spills Management Procedure. A 5m x 5m hardstand, bunded and covered area is also located next to the HHW Facility for the collection of waste oil. Waste oil will be taken off site by a contractor for appropriate treatment.

4.1.3.4 Material Recovery Drop Off

Consistent with current operations, the community will dispose of scrap metal, e waste, cardboard and paper for free. The recycling area consists of a canopy covered multi-tiered facility with 30m³ hook-lift bins. The facility is elevated so that customers can reverse their vehicles up to the concrete safety wall (110cm) and then physically place the recyclables in the designated bins located below. The area has capacity for six hook lift bins for the collection of these recyclables and 12 trailer parking bays. A 20m x 6m scrap metal laydown area is located next to the facility for larger scrap metal items.





4.1.4 Paid and Pass Community Drop off Area

After passing through the Free Community Drop off Area vehicles can either go around the roundabout and exit the facility or continue on to the Paid and Pass Community Drop off Area. Vehicles continuing on though the Site will pass through a weighbridge prior to dropping off waste materials. The Paid Community Drop off Area consists of a Bulk Waste Acceptance Area, Green Waste Shed and Mixed Waste Shed.

4.1.4.1 Fridge, Mattress and Tyre Laydown

This area consists of a 20m x 16m canopy covered hardstand area for the collection of fridges, mattresses and tyres. Customers can pull up alongside this area to drop off materials in the designated and clearly signed areas. A degas area is included for the degassing of fridges prior to collection for recycling.

4.1.4.2 Inert Waste Laydown

The Inert Waste Area consists of an uncovered large hardstand area 20m x 22m 440m² and push walls that will accept inert waste materials i.e. C&D waste. There are four car and trailer parking bays allocated in front of the inert waste area for customers to drop off inert waste.

4.1.4.3 Green Waste Shed

The L-shaped Green Waste Shed is partially enclosed shed connected to the Mixed Waste Shed and separated by a concrete wall. The Green Waste Shed will provide a space for the safe and efficient material handling and storage of green waste. The long section of the shed is 70m x 25m. The community will access the Shed from the northern side and park in one of the 12 parking bays to drop off the green waste. The short section of the shed is a storage area (15m x 9m) on a flat floor that has the capacity to store green waste for a 48-hour period in the event that transport offsite is delayed. Two laydown areas 10m x 7m are provided for each shed to allow customers with bulky/heavy items to drop off directly onto a flat floor. A material handler will then move these into the storage area. Site operators will operate loaders within the building for moving and stockpiling waste. Green waste will then be shredded prior to loading into B doubles. B doubles will access the shed from the southern side of the building within a loading tunnel.

The Green Waste Shed has been sized to 47,000tpa to cater for current and future demands. As discussed in Section 2.3.3, the Site currently accepts approximately 17,000t of green waste per annum. The City also maintains a contract with a third-party waste collection provider for its green waste collection, which accounts for another 20,000t of green waste that could be accepted at the Site should the City bring this service in-house at the end of the current contract period. This volume was determined by also taking into consideration the City's future population growth, the enhanced popularity of the Site and allowing for a 25% increase in green waste tonnage in the coming years.



4.1.4.4 Mixed Waste Shed

The Mixed Waste Shed mirrors the design of the Green Waste Shed. The Mixed Waste Shed is the final drop off point of the CRC, which will allow the community to dispose of large volumes of mixed waste. A total of 12 parking bays are located outside for customer to drop off their mixed waste. Same as the Green Waste Shed, the long side of the shed is 70m x 25m and 15m x 9m in the short section. As before, two laydown areas 10m x 7m are located outside the facility. Loading of mixed waste into B Doubles will also occur within the loading tunnel.

4.2 Waste Transfer Station

4.2.1 Design Principles

The following best practice design principles were applied to the development of the WTS Facility:

- Fully enclosed, structurally sound building;
- Suitable access in and out of the building and use of high speed roller doors;
- Adequate ventilation for maintaining air quality;
- Extraction and exhaust system for 4 air changes per hour;
- Limit interaction of waste collection trucks and vehicles;
- Durable surfaces for the handling of waste;
- Sufficient space for machinery to handle waste;
- Maximise the separation of materials into clean waste streams for reuse, recycling or recovery by use of designated waste bunkers; and
- Leachate collection system.

4.2.2 Waste Sources, Streams and Volumes

The WTS Facility will allow for the consolidation of mixed/putrescible materials and other selected waste streams accepted at the Site including the City's waste collection, commercial operators and materials collected at the CRC. The key waste streams that will be accepted at the facility include Municipal Solid Waste (MSW), Food Organics and Garden Organics (FOGO), Commercial and Industrial (C&I) and hard waste. The future volumes of these materials were estimated based on current data volumes, the City's population data, 1.5% annual growth rate over a 20-year period. The estimated volumes for year 1 to 20 are shown in Table 4-2.

		Estimated Tonnes Per Annum (tpa)						
Waste Streams	Year 1	Year 5	Year 10	Year 15	Year 20			
General Refuse	90,433	95,982	103,400	111,391	120,000			
FOGO	37,680	39,993	43,083	46,413	50,000			
C&I	30,144	31,994	34,467	37,130	40,000			
Hard waste (bulk)	11,304	11,998	12,925	13,924	15,000			
Total	169,562	179,967	193,875	211,991	225,000			

Table 4-2: WTS Facilit	v Estimated	Tonnes Per	Annum	over a 2	0 vear	period
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As shown above, the total estimated volume to be received at the WTS Facility is 225,000 tpa in year 20. Therefore, the design of the facility was based on this estimated volume to ensure the facility can meet the future waste management needs of the City.

The MSW will be sent to landfill for disposal, the FOGO material will be transported offsite for composting, C&I and hard waste will be removed from the Site for recycling.

4.2.3 WTS Facility

The WTS Facility consists of a large steel frame shed that covers an area of 50m x 54m (2,700m²). The City's waste collection vehicles and trucks can access the WTS Facility from the northeast entrance off Balcatta Road. WTS Facility traffic will pass through the weighbridge then head south along the southern boundary of the Site and into one of the six roller doors accessed along the eastern side of the building to deposit waste materials. Waste materials will be unloaded onto the floor within, or in front of, the bunker system, and a front-end loader will gather the material and stockpile it in one of the four designated bunkers with a total area of 48m x 24m. The WTS Facility floor will consist of reinforced concrete 250mm in thickness with a 1° slope to direct any leachate towards drains and a sump.

Waste materials to be transported offsite will be loaded into either a semi-trailer or B-double truck, which will be stationed one metre below the receival floor via a sloped transfer lane along the outer wall of the WTS Facility.

The building will have fast acting Hormann insulated high speed doors to minimise odour impacts. Building ventilation will consist of extraction and exhaust stacks (>4m) that allow for four changes of air per hour to reduce odour impacts within the building.

4.3 Operational Area

The Operational Area contains a range of supporting infrastructure including:

- Material Storage Bunkers;
- Truck Ways Bays;
- Storage Shed, Crib and Ablutions;
- Washdown Bay; and
- Surface Water Sump.

Six (6) 15m x 8m and seven (7) 10m x 4.5m material storage bunkers are located west of the WTS Facility for the storage of inert waste materials prior to removal from site for recycling or reuse.

Three truck wash bays with a total area of 14m x 12m are located within the City's Operational Area located near the Material Storage Bunkers. Hydrocarbon contaminated water generated at the wash bay will be treated prior to discharge into the sewer.

The existing storage shed will be relocated to the west of the WTS Facility for the storage of equipment and supplies. A crib room and ablutions will be located next to the storage shed for WTS Facility staff



use. Wastewater generated at the ablutions will be treated onsite and then discharged directly into the sewer.

The City's sweeper truck will utilise the 27m x 9m washdown bay located north of the surface water sump to remove dust and sweeper tailings and maintain a clean vehicle. Wastewater from the washdown bay will be treated onsite then discharged into the sewer.

A large surface water sump is located in the south eastern corner of the Site. Clean surface water run off (i.e. water that does not come into contact with waste materials) will be directed to the sump for evaporation. (RCB drainage sump receives water via eight inlets from a surrounding drainage area covering approx. 40 hectares, which includes domestic, commercial and industrial premises.) Stormwater run off from new facilities will also discharge into this sump.

Water used in offices etc onsite will pass through baffles before a settlement tank, will then discharge the sewer.

4.4 Project Timeline

The current estimated Project Timeline is shown in Table 4-3. These timeframes will remain dynamic and may vary due to approval assessment periods and contractor timetables. Construction of the Project will be undertaken in phases and commissioned as each area is completed.

Stage	Start	End	Est Duration
Approval assessment phase	April 2021	September 2021	6 months
Procurement phase	March 2021	September 2021	7 months
Design and construction phase	September 2021	August 2023	24 months

Table 4-3: Project Timeline



5 Environmental Aspects and Management

There are a variety of environmental aspects that have been considered during the development of the Project. To minimise and/or avoid potential environmental impacts associated with the construction and operation of the redeveloped Site a variety of management measures have been developed. The environmental engineering measures and specifications will be further defined during the development of the detailed designs by the selected contractor during the Design and Construct contract.

5.1 Odour

Due to putrescible content and volume of waste types to be accepted within the WTS Facility, odours will be generated. The generation of odours can reduce amenity impacting personnel working within the WTS Facility as well as any external sensitive receptors when odours are released from the building. The generation of odours can cause nuisance and reduced amenity.

To understand the potential impacts and the management measures required, an Odour Impact Assessment (OIA) was undertaken by Environmental & Air Quality Consulting Pty Ltd (EAQ). EAQ Consulting determined that "Under normal operations the risk of an odour event affecting the nearest sensitive residential receiver is Low based on the proposed Site design, the waste acceptance procedures, protocols and responses and the low volume of FOGO wastes proposed" (EAQ, 2020). A copy of the OIA is attached in Appendix B.

The WTS Facility is expected to receive approximately 50,000tpa of FOGO which is <13% of the total waste to be received at the Site and represents 22% of the waste received within the WTS Facility. Although the OIA determined that no additional management measures were required, EAQ recommended options for odour treatment infrastructure in the event it was determined to be required in the future. The City has taken a conservative approach to avoid any potential impacts to amenity and has, therefore, adopted these management measures in conjunction with the existing odour controls undertaken at the Site.

Although odorous material or odour generating material will be accepted at the CRC, the volume of material is much less than the WTS Facility and therefore can be managed effectively by the daily removal of these waste types.

The management measures proposed to mitigate the potential for odour impacts across the Site include:

- WTS Facility:
 - An enclosed building to contain odour emissions;
 - o Automatic fast acting roller doors to minimise odour emissions escaping;
 - Extraction and exhaust stacks (>4m) that allow for four changes of air per hour to reduce odour impacts within the building;
 - o FOGO will be removed on a daily basis (within 24hrs);
 - Daily washdown of the tipping floor to remove any residue;
 - o Leachate collection system and regular removal of leachate from the Site;





- Green Waste Shed:
 - Only green waste will be accepted at the facility;
 - An enclosed building will reduce odour emissions;
 - Green waste will be removed on a daily basis and will be stored up to a maximum of 48 hours if transport offsite is delayed;
- Mixed Waste Shed:
 - Daily removal of general waste which will be removed from site within 24 hours;
 - General site odour management:
 - A complaints register will be maintained;
 - In the event an odour complaint is received, the source will be investigated, managed and monitored appropriately; and
 - Vehicles/trucks will be covered on entry and exit.

It is anticipated that these management measures will enable the City to appropriately manage potential odour impacts.

It should be noted that during the detailed design stage for the WTS Facility the exact requirements for the extraction and exhaust stacks required for the WTS Facility will be determined.

5.2 Noise

Noise emissions generated from the Project have the potential to result in reduced amenity. Noise emissions will be generated from construction of each facility, operational activities and from road and engine noise generated from vehicles entering and exiting the Site. An Environmental Noise Impact Assessment (ENIA) was undertaken by Talis Consultants (Talis) to determine if the Site will comply with the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The ENIA considered the proposed operations, separation distances, zoning, number and type of vehicles, vehicle movements, waste handling processes, equipment and plant. A copy of the ENIA is provided in Appendix C.

The ENIA determined that a variety of noise management controls were required for the project to be compliant with the Regulations. The management measures proposed to mitigate the potential for noise impacts include restricting operational times, installing noise barriers, vehicle noise controls, building noise controls and an environmental noise management plan (ENMP).





5.2.1 Operational Times

The following operations and equipment sources will only be used during daytime hours 7am to 7pm as defined in the noise Regulations:

- Hook Lift Trucks.
- Green Waste Shredding/Grinding.
- Green/Bulk Waste Wheel Loaders.
- B-doubles site movements (weekdays only).

5.2.2 Noise Barriers

To reduce noise received at the industry-to-industry boundary and at the receivers the following noise controls are proposed:

- An acoustic boundary wall with a height of 2.2m will be constructed on the north and east site of the boundary.
- An acoustic boundary wall with a height of 3.5m will be constructed at the south boundary.
- An acoustic boundary wall with a height of 2.2m will be constructed north of the Storage Area.

5.2.3 Vehicles Noise Controls

The following is proposed for vehicles:

- Speed limits should be limited to 20 km/h.
- B-double trucks should be certified to ADR 83/00 or European Regulation ECE R51.
- As the maximum speed on site will be set up 20km/h, the sound power for the B-Doubles is assumed to be 103 dB(A), a conservative 6 dB quieter.
- B-Doubles enter site, park up in the loading chutes or loading areas where they shut of their engine, they are not idling.
- Loaders to shut their engines in between loading operations.

5.2.4 Building Noise Controls

Noise control measures incorporated in the design of the WTS include:

- fast acting insulated high-speed roller doors.
- ventilation systems will be designed with a low noise mechanical system.
- any fans, cowlings and louvres associated with the active and passive ventilation of the WTS Facility are to be orientated in such a way not to affect the nearby receivers.
- Noise absorptive cladding on the inside wall and ceilings.

At the WTS Facility, Green Waste Shed and Mixed Waste Shed, loading of B-doubles will be done via a loading bay tunnel to reduce the noise from the front-end loaders.

The shredder in the Green Waste Shed will be purchased based on a low noise source level with the necessary enclosures, which is estimated of a sound power of 105 dB(A).





5.2.5 Environmental Noise Management Plan

An Environmental Noise Management Plan (ENMP) will be developed to help manage environmental noise emissions from the facility. The plan should include the following:

- Procedures to ensure noise emissions are appropriately managed.
- Define maximum noise levels for trucks entering site.
- Actions to minimizes and manage noise complaints effectively and efficiently.
- Annual verification noise measurements be undertaken once the facility is operational.

It is anticipated that these management measures will enable the City to appropriately manage potential noise impacts.

5.3 Dust

Dust will be generated during the earthworks stage of construction and during operations. Excessive dust can reduce amenity, cause respiratory impacts, impact nearby vegetation and reduce visibility. The management measures proposed to mitigate the potential for dust impacts include:

- Use of onsite mobile water carts to supress dust emission during construction works;
- Sealed surfaces throughout the Site which will significantly reduce dust generation;
- Road sweeping will be undertaken across the site on a regular basis;
- Vehicles will be restricted to a maximum speed of 20km/hour, which will be signposted at appropriate locations including the entrance;
- All waste loads are to be covered during transport to and from the Site; and
- A complaints register will be maintained to record and respond to any complaints regarding dust generated at the Site.

It is anticipated that these management measures will enable the City to appropriately manage potential dust impacts.

5.4 Vermin and Feral Animals

Vermin such as rats, mice, birds and insects may be attracted to waste management facilities particularly those with poor housekeeping practices. If uncontrolled, vermin and feral animals can present a health risk and nuisance to staff and surrounding land users.

Although the WTS Facility will accept larger volumes of putrescible waste on a daily basis, the waste will be removed from the enclosed facility within 24 hours. Due to the frequent removal of putrescible waste the attraction of vermin and feral animals is likely to be low and can be managed effectively.

The management measures proposed to mitigate the potential for feral animals and vermin impacts include:

- All waste loads are to be covered during transport reducing potential for litter which may attract vermin and feral animals;
- Removal of putrescible waste from the WTS Facility within 24 hours;





- Daily removal of general waste within the Mixed Waste Shed;
- Regular litter collections will be undertaken which will reduce/avoid attraction of vermin and feral animals;
- A perimeter fence around the majority of the Site (excluding the front) which will be monitored and maintained on a regular basis;
- Any suspected and/or known shelters or breeding grounds for vermin will be managed appropriately;
- In the event a population of vermin or feral animals becomes problematic, the City will engage a qualified pest control contractor to implement appropriate management measures; and
- Anti-perch bird deterrent stripping will be installed along all steel trusses within structures as shown in Diagram 5-1.



Diagram 5-1: Example of Anti-perch Bird Deterrent Stripping

It is anticipated that these management measures will enable the City to appropriately manage potential vermin and feral animal impacts.

5.5 Stormwater

Stormwater will be generated as a result of precipitation falling onto the Site. This stormwater can generate leachate if it comes into contact with waste materials resulting in potential contamination to the surrounding environment. Stormwater can also cause flooding and damage to infrastructure. The management measures proposed to manage stormwater include:

- A Surface Water Management System (SWMS) which will consist of the following:
 - Delineated with kerbs and will utilise suitable slope gradients to guide the flow of surface water to drains and into a large extended sump collect for evaporation; and
 - o Emergency stormwater overflow culvert/soakaway.
- A permanent canopy will prevent rainfall entering hook lift bins and mixing with waste within the Fridge, Mattress and Tyre Collection Area;





- Fully enclosed buildings (WTS Facility, Recycle Shop and HHW Facility) to avoid interaction with stormwater;
- Covered, partially enclosed sheds (Green Waste Shed and Mixed Waste Shed) to avoid interaction with stormwater;
- Temporary bin covers will be applied to open air storage areas during periods of inclement weather; and
- All stormwater engineering features will be inspected regularly and maintenance works scheduled appropriately.

It is anticipated that these management measures will enable the City to appropriately manage stormwater generated on the Site.

5.6 Acid Sulfate Soils

Although it is unlikely that ASS exists within the Site, its presence will be confirmed during excavation activities required for the Project (i.e. for the extended sump). In the event ASS is encountered appropriate management of this material will be undertaken, which includes minimising disturbance and managing any ASS that is encountered in accordance with the DWER's guidelines 'Treatment and management of soil and water in acid sulfate landscapes' (June 2015). It is anticipated that these management measures will enable the City to appropriately manage potential ASS impacts.

5.7 Vegetation

As mentioned in Section 3.2, very little vegetation is present on the Site. Some native and non-native trees will require removal for the construction of the Project. The City will, however, retain as may trees as possible as well as establish green areas with planted vegetation to improve the visual amenity of the Site. The trees to be retained and require removal are shown in Drawing C -101 (Appendix A).

Under Part V of the Environmental Protection Regulations 1987, it is unlawful for a person to clear native vegetation unless the person has a permit, or the clearing is specifically exempt. As there is little native vegetation located within the Site that requires clearing to facilitate the purposes of constructing the new facility, it is anticipated that this vegetation is subject to a clearing exemption under Regulation 5 item 1 of the DWER's 'A guide to the exemptions and regulations for clearing native vegetation Under part V of the Environmental Protection Act 1986'.

5.8 Fire

Fires may occur at waste management facilities through faulty equipment, machinery, waste acceptance, landfill fires or arson. Fire may cause damage to infrastructure and pose a threat to staff and customers. Fire risk at the Site is currently managed via the City's 'Fire Implementation Plan' (FIP). The management measures to mitigate the risk and response to fires onsite include the use of:

- Fire alarms;
- Fire extinguishers;
- Fire hose reels;
- Site emergency response procedure; and





• Evacuation procedure.

The management measures within the FIP will be updated to reflect the new layout and will be implemented for the Project. In addition to external fire management equipment listed above, the following management measures will be implemented:

- Appropriate signage for waste types accepted at the facility;
- WTS Facility Building Management System (BMS) to include a fire alarm system to detect smoke, fire and carbon monoxide levels and be linked to building's sprinkler system;
- Fire extinguishers will be located within all mobile plant, RCVs and B-Doubles;
- All prevention/mitigation equipment will be kept in good working order, clearly signed and tested in accordance with the manufacturer's specifications; and
- Staff will also be adequately inducted and trained to respond to fire and smoke.

It is anticipated that these management measures will enable the City to appropriately manage potential fire risks at the Site.

5.9 Litter

The acceptance, transport and handling of waste can result in the generation of litter. As well as reducing visual amenity and causing health impacts to wildlife, litter can attract vermin to the Site, which may affect surrounding land uses if these vermin migrate offsite. The management measures proposed to minimise litter generation and appropriately manage litter that is generated include:

- The existing site boundary fence will continue to be inspected and maintained;
- All incoming and outgoing waste loads using the WTS Facility to be covered/contained;
- Unloaded waste and recyclable materials will be confined to the designated drop-off areas;
- Regular street sweeping will be undertaken around the facility;
- Monitoring of the meteorological conditions on site with operations ceasing during periods of unsuitable weather conditions;
- Any litter generated around the Site, and along the fence lines, will be collected on a regular basis as part of routine general housekeeping procedures;
- Staff training and inductions to include litter management; and
- Enclosed (Recycle Shop, HHW Facility and WTS Facility) and partially enclosed (Green Waste Shed and Mixed Waste Shed) buildings will ensure waste materials are contained.

It is anticipated that these management measures will enable the City to appropriately manage litter on the Site.



5.10 Security

A breach of security of the Site may result in injury to trespassers should interaction with plant and equipment occur. The management measures proposed to minimise security risks include:

- Appropriate warning signs will be installed at the site entrance;
- A perimeter fence around the majority of the site;
- All buildings will be locked outside operating hours; and
- All access gates will be locked securely outside of main operational hours.

It is anticipated that these management measures will enable the City to appropriately manage potential security risks.

5.11 Traffic

The flow and queuing of traffic within the Site has been considered during the conceptual design phase of the Project. The design has considered these aspects to minimise traffic impacts as far as practicable within the available space.

Vehicle movements were modelled based on the estimated quantity of waste materials accepted per year at the Site along with the types of vehicles expected to carry loads. Vehicle movements were modelled for the WTS Facility and the CRC for both operational vehicles and customer vehicles.

The incoming vehicles to the WTS Facility are predicted to be rear loaders, side loaders and flat bed trucks. Outcoming vehicles are predicted to be transfer trailers. For the Free Community Drop off Area at the CRC the incoming vehicles will be light vehicles and outcoming vehicles will be rear loaders curtainsider truck/trailer and hook lift bin trucks. At the Paid and Pass Community Drop Off Area incoming vehicles will be light vehicles and rear loaders and outcoming will be flatbed trucks, capitals, walking floor trucks and floor trailers.

The vehicle movements were based on 6 operational days per week over 10 hours for both community vehicles and site operational vehicles. The total traffic movements (inbound and outbound per vehicle) at the CRC and WTS Facility per day are shown in Table 5-1.





Table 5-1: Inbound traffic movements

Site operations	Throughput per annum (tonnes)	Volumes per day (average/ tonnes)	Vehicle type	Vehicle capacities (tonnes)	No. of vehicles movements per day	% of total inbound movements
WTS Facility	169,562	543	Rear loaders, side loaders and flat bed trucks, transfer trailers	Varies 6-30	282	15%
Free Community Drop Off Area	29,115	93	Light vehicles, Curtainsider truck/trailer, hook lift bin truck	Varies 0.3 - 40	950	51%
Paid Community Drop Off Area	53,984	173	Light vehicles, rear loaders, flatbed truck, capital, walking floor trucks and floor trailers	Varies 0.3 - 20	638	34%
				Total	1,870	100%

As shown above, the majority of the daily vehicle movements (51%) will be associated with the Free Community Drop Off Area.

The management measures proposed to mitigate potential traffic impacts across the Site include:

- A free flowing loop system to allow easy movement of customers through each area of the Site minimising traffic conflicts among users;
- Adequate parking has also been provided through the Site to reduce congestion;
- Customer traffic will be separated from service vehicle movements, providing a safe drop-off experience for the community and unhindered access for the Operator to service the bins;
- Signage providing directions, traffic control measures and safety instructions will be established and maintained at appropriate locations around the Site;
- Vehicles will be restricted to a maximum speed limit of 20km/hour, which will be signposted at appropriate locations, including the entrance to the Site;
- Adequate staff supervision to ensure staff safety around moving vehicles;
- Employees and contractors shall wear high visibility and reflective clothing when working in areas where vehicle movement occurs;
- All vehicles will be maintained in good working condition and drivers instructed to use conservative driving techniques; and
- All employees and contractors will be inducted with the Occupational Health and Safety (OHS) and traffic management procedures.



It is anticipated that these management measures will enable the City to appropriately manage potential traffic impacts.

5.12 Vehicle Emissions

The operation of diesel powered RCVs and B-Doubles within the WTS Facility will generate a range of emissions, predominantly, carbon monoxide (CO), carbon dioxide (CO₂), oxides of nitrogen (NOx) and sulphur dioxide (SO₂). Diesel emissions will also generate a mixture of other irritant gases, particulate matter (PM) and heat. These emissions can impact on the amenity and present health risks. The management measures proposed to mitigate vehicle emission impacts include:

- Passive and active ventilation will be incorporated in the WTS Facility as described in Section 5.1. This will ensure the constant circulation of air within the building. This will be controlled by the BMS, which will be triggered when CO and heat levels reach a certain limit;
- Mobile machinery will have emission standard engines, particulate filters, catalytic converters and/or wet scrubbers. Emissions will also be reduced through minimising idling times; and
- Regular maintenance of mobile plant and vehicles will be undertaken to ensure emission controls are maintained. Low emission fuels and sulphur lubricants will be used as much as practicable.

It is anticipated that these management measures will enable the City to appropriately manage potential air quality impacts.

5.13 Leachate

Leachate may be generated from the decomposition of the putrescible content of waste accepted at the Site. Due to the absorptive capacity of the waste within the WTS Facility, the dry and hot environment and holding time of 24 hours, the volume of leachate will be minimal. Leachate may be generated within mixed waste dropped off at the Free and Paid and Pass Community Drop Off Area however, based on the frequency of removal and protection from rainfall, little if any leachate will be generated.

The measures proposed to manage leachate generation and impacts include:

- The design of the WTS Facility floor should be graded so leachate will flow into a spoon drain (depression) at the back-bunker walls which goes to collection points and diverts the leachate to a containment tank below ground, external to the facility. Leachate will then be pumped out as required removed from the site for appropriate treatment.
- To maintain a clear separation between stormwater outside the building and the minimal leachate generated within the building, all vehicle access points will include a small bund that must be driven over to contain any water with the WTS Facility.
- Fully enclosed and partially enclosed covered buildings and canopies to stop rainfall infiltration;
- A Surface Water Management System to collect and manage clean surface water (see section 5.5).





It is anticipated that these management measures will enable the City to appropriately manage leachate generated at the Site.

5.14 Asbestos

There is a potential that C&D loads may contain asbestos contamination which can present a risk to personnel, plant and recycled building products. Of particular importance is the identification of asbestos, which can present risks to human health. Asbestos is a known carcinogen and requires the implementation of strict and specific management measures to protect the health of all staff and visitors. All C&D waste loads entering the site will be inspected at the weighbridge. In the event that a contaminated C&D waste load is identified at the point of entry, entrance to the facility will be denied. In the event a contaminated C&D load is not detected at the weighbridge, a site operator will be present during the unloading of C&D to inspect the material. If asbestos is detected it will be managed in accordance with the City's Asbestos Containing Material Management Plan (2019). The management plan will be updated for the Project.

5.15 Hazardous Household Waste

There is the potential for the incorrect acceptance, storage and handling of HHW which may present a risk to human health. However, given the City currently accept these materials and have established management measures, this potential risk is low.

The measures proposed to manage the risks associated with HHW include:

- The HHW Facility will be designed in accordance with the DWER Guidelines for the design and operation of facilities for the acceptance and storage of household hazardous waste;
- The HHW Facility will consist of an enclosed building with adequate ventilation, storage areas and sumps with sufficient capacity;
- HHW will continue to be managed in accordance with the City's HHW Safe Work Method Statement (SWMS) and Chemical Spills Management Procedure;
- All staff will be trained to appropriate handle HHW materials; and
- HHW will be removed form site by a qualified and experience contractor.


6 Residual Risk Assessment

The objective of the Residual Risk Assessment is to ensure the potential environmental and social risks associated with the proposed activities are understood and managed appropriately to ensure that there is no unacceptable residual risk. The risk assessment was undertaken in accordance with the DWER's Guidance Statement 'Risk Assessments', February 2017.

6.1 Sources of Hazards

For the purpose of this assessment, a source is defined as a primary risk with the potential to cause significant contamination or harm to the environment. With regards to the environment and public health, sources and its potential hazards which may arise from the various future activities have been identified and are shown in Table 6-1Table 6-1.

Source	Description of hazards
Odour	Odours generated from degradation of putrescible waste can cause impacts to amenity onsite
Noise	Noise emissions can reduce amenity onsite and for nearby sensitive receptors
Litter	Litter can result in impacts to amenity on and immediately surrounding the Site.
Dust	Dust generated during construction works can result in reduced visual amenity and cause respiratory issues.
Vermin and Feral Animals	Exposed waste can attract vermin and feral animals which may cause nuisance and present health risks.
Fire	Potential for fires from waste materials, faulty equipment and mobile machinery.
Security	Unauthorised personnel may access the Site resulting in a security risks to the Site facilities, plant and equipment.
Stormwater	Excessive stormwater that is not properly managed can lead to flooding onsite. Stormwater that comes into contact putrescible waste or area that hold putrescible waste generators leachate.
Traffic	Possibility for vehicles to collide with Site personnel, structures or other vehicles. Poor design of traffic flow and operations can lead to unpredictable traffic routes and create safety hazards for Site personnel.
Vehicle Emissions (WTS Facility)	Exhaust emissions generated within the WTS Facility can accumulate causing health impacts to staff.
Leachate (WTS Facility)	Leachate will be generated when the floors of the WTS Facility are washed down at the end of each day in order to mitigate odours and the water comes into contact with the waste.

Table 6-1: List of potential hazards





6.2 Pathways for Hazards

For the purpose of this assessment, a pathway for a hazard is defined as the route by which potential contamination or harm can migrate. The key migration pathways generally include the following:

- Air through which lightweight materials, such as dust, litter, odour, can travel;
- Surface along which the sources of contamination or harm can travel or be present at (e.g. surface water runoff, litter, persons walking or working over the surface); and
- Sub-surface whereby the underlying soils, bedrock, aquifers and infrastructure permit leachate migration towards the groundwater.

For the purpose of this assessment, a receptor is defined as the location where the impact of the contamination or harm is registered. The possible receptors of the contamination or harm cause by the identified hazards are summarised in Table 6-2.

Table 6-2: Receptors

Receptor	Description of the Receptor
Site Users	 Persons authorised to traverse across the Site, including: Operational staff Contractors carrying out maintenance or monitoring Visitors/Customers
Site Infrastructure	Buildings onsite and associated infrastructure
Surrounding Land Users	People who work or live beyond the boundary of the Site
Groundwater	• Shallow groundwater that exists beneath the Site which a water supply may be extracted for industrial or potable purposes

6.3 Risk Rating Matrix

To assess the various risks, the potential hazards identified in Table 6-1 were classified according to the DWER's Guidance Statement shown in Table 6-3.

Table 6-3: Risk Rating Matrix

				Consequence		
		Slight	Minor	Moderate	Major	Severe
	Almost Certain	Moderate	High	High	Extreme	Extreme
ity	Likely	Moderate	Moderate	High	High	Extreme
obabili	Possible	Low	Moderate	Moderate	High	Extreme
Pre	Unlikely Low		Moderate	Moderate	Moderate	High
	Rare	Low	Low	Moderate	Moderate	High





6.4 Risk Profile

Risk management measures refers to the key management strategies that will be adopted onsite to ensure that all hazards and potential risks identified are controlled to an appropriate level, and that strategies are in place to react to any potential incidents or accidents. In most cases these risk management measures decrease the probability and/or consequence of identified hazards and therefore lower the risk rating. The current risk rating and revised probability and consequence for each identified hazard following the implementation of management measures for the WTS Facility and CRC are shown in Table 6-4 and Table 6-5 respectively.

Table 6-4: Waste Transfer Station Residual Risk Profile

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Noise	Site Users & Surrounding Land Users	Air	Noise impacts from activities onsite impacting Site users and nearby receptors	Possible	Minor	High	 Speed limits should be limited to 20 km/h. B doubles operations shall be restricted to daytime hours (7am to 7pm). B-double trucks should be certified to ADR 83/00 or European Regulation ECE R51. As the maximum speed on site will be set up 20km/h, the sound power for the B-Doubles is assumed to be 103 dB(A), a conservative 6 dB quieter. B-Doubles enter site, park up in the loading chutes or loading areas where they shut of their engine, they are not idling. Loaders to shut their engines in between loading operations The ventilation systems are to be designed with a low noise mechanical system. Any fans, cowlings and louvres associated with the active and passive ventilation of the WTS Facility are to be orientated in such a way not to affect the nearby receivers. Noise absorptive cladding on the inside wall and ceilings. Regular maintenance of equipment and machinery Implement safe working practices and use appropriate PPE An acoustic boundary wall with a height of 3.5m will be constructed at the south boundary. An Environmental Noise Management Plan (ENMP) will be developed and implemented. 	Possible	Slight	Low
Vehicle Emissions	Site Users	Air	Vehicle emissions impacting the health of operators within the WTS Facility	Likely	Minor	Moderate	 Emission standard engines Particulate filters Minimising idling times Regular maintenance of mobile plant and vehicles 	Unlikely	Slight	Low
Odour	Site Users	Air	Waste streams that are accepted onsite can produce strong odours impacting amenity Leachate generation can result in unpleasant odours	Likely	Minor	Moderate	 FOGO is <13% of total waste and 22% of WTS Facility waste Fully enclosed facility Fast acting Hormann insulated high speed doors Frequent removal of material from the facility to minimise the time for the material to degrade and emit odours (<24hrs) During exceptional events highly odorous FOGO will be removed as soon as possible Roof extraction and exhaust stacks at heights >4m above ground Daily washdown of tipping floor Leachate management collection system and removal from Site 	Possible	Slight	Low
Stormwater	Site Infrastructure	Surface	Stormwater that is not properly managed can lead to flooding onsite resulting in damage to infrastructure	Possible	Minor	Moderate	 All vehicle access points will have a small bund that must be driven over to eliminate the ingress of stormwater into the facility Stormwater system will consist of adequate slopes, drains and extended sump All stormwater engineering features will be inspected regularly and maintenance works scheduled appropriately 	Unlikely	Slight	Low



Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Leachate	Surrounding Land Uses	Sub- surface	Leachate can ingress into the groundwater if not appropriately captured	Possible	Minor	Moderate	 Reinforced concrete floors within the WTS Facility and bitumen surrounds Leachate collection system - all leachate diverted to a containment tank and pumped out and treated through evaporation offsite Undertake routine integrity checks of the tank and conveyance system Ensure no clogging of conveyance system Regular removal of leachate and appropriate disposal 	Rare	Slight	Low
Vermin and Feral Animals	Site Users	Surface	Putrescible waste can attract vermin and feral animals presenting health risks, reduced amenity and annoyance	Possible	Slight	Low	 Perimeter fencing around Site boundary (excluding front) Frequent removal of material from the facility to minimise the attraction for vermin (within 24hrs) Fully enclosed facility Anti-perch bird deterrent stripping 	Unlikely	Slight	Low
Dust	Site Users	Air	Visibility may be impaired, and inhalation of dust may occur during construction activities	Possible	Minor	Moderate	 Mobile water carts to be used as necessary during construction No construction works or earthworks will take place during high winds Limit vehicle speed to 20km/h on unsealed surfaces 	Unlikely	Slight	Low
Security	Site Infrastructure	Surface	Unauthorised personnel may access the Site resulting in a security risk to facilities, plant and equipment.	Unlikely	Slight	Low	 Appropriate warning signs will be installed at the site entrance and WTS Facility Perimeter security fencing around majority of Site boundary The WTS Facility will be locked outside of operational hours 	Rare	Slight	Low
Traffic	Site Users	Surface	Poor design of traffic flow and operations can lead to unpredictable traffic routes and create safety hazards	Possible	Slight	Low	 Use of clear signage Green/red light permission system Limit vehicle speed and access to only designated areas 	Unlikely	Slight	Low
	Site Users	Surface	Risk of fires onsite from faulty	Rare Severe High During fire risk and emergencies, folloupdated Fire Management Plan Excess water supply from the surface necessary Installation of fire tank/hoses Fire ortingwichers on all mobile plant 		 During fire risk and emergencies, follow procedures in the City's updated Fire Management Plan Excess water supply from the surface water attenuation pond, if necessary Installation of fire tank/hoses Fire extinguishers on all mobile plant, RCVs and B-Doubles 	Rare	Minor	Low	
Fire	Site Infrastructure	Surface	equipment or waste creating risk to personnel and infrastructure	Rare	Major	High	 Fire alarm system which will detect smoke, fire and carbon monoxide level and be linked to building's sprinkler system All fire mitigation equipment will be kept in good working order, clearly signed and tested in accordance with the manufacturer's specifications Staff adequately inducted and trained to respond to fire and smoke 	Rare	Slight	Low
Litter	Surrounding Land Uses	Surface	Windblown waste escaping from the WTS Facility causing litter on Site and surrounding properties reducing amenity	Rare	Minor	Low	 Fast acting Hormann insulated high speed doors Daily removal of waste (within 24hrs) All vehicles to be covered entering and existing the WTS Facility Litter collections undertaken as required Street sweeping around the WTS Facility undertaken on a regular basis 	Rare	Slight	Low



Table 6-5: Community Recycling Centre Residual Risk Profile

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Noise	Site Users	Air	Noise impacts from activities onsite impacting amenity	Possible	Slight	Low	 Noisy operations and equipment restricted to daytime hours (7am to 7pm) i.e., hook lift truck, green waste shredder and wheel loaders White noise reverse beepers in vehicle and machinery Hooklift bins (no dragging of containments systems) Regular maintenance of equipment and machinery Implement safe working practices and use appropriate PPE An acoustic boundary wall will be constructed of 2.2m on the north and east site of the boundary An acoustic boundary wall with a height of 3.5m will be constructed at the south boundary A short acoustic wall be constructed of 2.2m north of the Storage Area An Environmental Noise Management Plan (ENMP) will be developed and implemented 	Unlikely	Slight	Low
Odour	Site Users	Air	Odours generated from the acceptance of general waste at multi-tier drop off facility impacting amenity	Possible	Slight	Low	 Waste will be removed daily and taken to the WTS Facility Only small volumes of mixed waste will be accepted 	Unlikely	Slight	Low
Stormwater	Site Infrastructure	Surface	Stormwater that is not properly managed can lead to flooding onsite resulting in damage	Possible	Minor	Moderate	 Stormwater system will consist of adequate slopes, drains and extended sump All stormwater engineering features at the Site will be inspected regularly and maintenance works scheduled appropriately 	Unlikely	Slight	Low
Vermin and Feral Animals	Site Users	Surface	Putrescible waste can attract vermin presenting health risks, reduced amenity and annoyance	Possible	Slight	Low	General waste removed daily and taken to WTS Facility	Unlikely	Slight	Low
Dust	Site Users	Air	Visibility may be impaired, and inhalation of dust may occur during construction activities	Possible	Minor	Moderate	 Mobile water carts to be used as necessary during construction No construction works or earthworks will take place during high winds Limit vehicle speed to 20km/h on unsealed surfaces 	Unlikely	Slight	Low
Security	Site Infrastructure	Surface	Unauthorised personnel may access the Site resulting in a security risk to facilities, plant and equipment.	Unlikely	Slight	Low	 Use of appropriate warning signs All buildings are locked outside of operational hours 	Rare	Slight	Low
Traffic	Site Users	Surface	Poor design of traffic flow and operations can lead to unpredictable traffic routes and create safety hazards	Possible	Slight	Low	 Use of traffic management signage Vehicle speed limits and access to designated areas only Flow through internal loop road Parking bays and roundabouts Service lanes for Site vehicles and machinery 	Unlikely	Slight	Low
	Site Users	Surface	Risk of fires onsite from equipment	Rare	Severe	High	 During fire risk and emergencies, follow procedures in the City's updated Fire Management Plan Excess water supply from the surface water attenuation pond, if necessary Installation of fire tank/hoses 	Rare	Minor	Low
FIRE	Site Infrastructure Surface		and infrastructure	Rare	Major	High	 All fire mitigation equipment will be kept in good working order, clearly signed and tested in accordance with the manufacturer's specifications Staff adequately inducted and trained to respond to fire and smoke 	Rare	Slight	Low



Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Asbestos Containing Material in C&D waste	Site Users	Air and surface	Risk to human health and recycled building product	Possible	Major	High	 Inspection of all C&D loads on entry at the weighbridge Supervision during offloading at the Inert Waste Laydown Management of asbestos in accordance with the City's updated Asbestos Containing Material Management Plan 	Rare	Minor	Low
Hazardous materials spills	Site users	Surface	Poor handling and storage of HHW causing risk to human health	Possible	Moderate	Moderate	 The HHW Facility will be designed in accordance with the DWER Guidelines for the design and operation of facilities for the acceptance and storage of household hazardous waste. The HHW Facility will consist of an enclosed building with adequate ventilation, storage areas and sumps with sufficient capacity. HHW will continue to be managed in accordance with the City's HHW Safe Work Method Statement (SWMS) and Chemical Spills Management Procedure. All staff will be trained to appropriate handle HHW materials. HHW will be removed from the site by a qualified and experience contractor. 	Unlikely	Minor	Low
Litter	Site Users and Surrounding Land Uses	Surface	Reduced amenity from windblown waste	Likely	Slight	Moderate	 Enclosed and partially enclosed buildings Cardboard and paper bins covered outside opening hours Daily removal of mixed waste and transfer to the WTS Facility Street sweeping around the CRC undertaken on a regular basis All buildings are locked outside of operational hours 	Unlikely	Slight	Low





7 Community and Stakeholder Consultation

The City understands that consultation with the community is a critical aspect of establishing new waste management facilities. Therefore, the City has developed a Community Consultation Plan (CCP) for the redevelopment of the RCB. The objective of the CCP is "*To provide stakeholders with balanced and objective information and to obtain feedback from stakeholders on need and customer experience.*" The CCP targets both primary and secondary stakeholders:

- Primary:
 - Local community;
 - Local Businesses;
 - o Commercial Customers;
 - o Internal stakeholders;
- Secondary:
 - o Wider community; and
 - Waste to Energy (WtE).

Consultation with the community has been undertaken since January 2020 via a variety of media, which include workshops, Frequently Asked Questions (FAQs), survey monkey, social media, newsletters and 'Have Your Say'. The City recently issued a survey on the RCB and its redevelopment from the 19 June to 17 July 2020 with 84 respondents. The survey sought to understand how often the facility is currently used, the materials dropped off, area from which the user is from, thoughts on the current design and suggestions for improvements.

The respondents expressed that they liked the following aspects of the current redevelopment concept plan. Answers received more than once are shown in bold:

- More efficient and safe;
- Better separation and less to landfill;
- User friendly;
- Improved traffic flow;
- Functional and organised;
- Better layout;
- Better access and less traffic congestion;
- More accessible;
- Modern;
- Safe for workers;
- Accommodates better community interaction with recycling;
- Better area for recycling shop; and
- Inclusion of Container Deposit Scheme.

As shown above, the overall response from the community regarding the Project conceptual design is positive. The City will continue to consult the community and Stakeholders until the Project is completed.





8 **Project Benefits**

There are significant benefits from establishing the CRC and WTS Facility. Each of these benefits is outlined in the following sections.

8.1 Community Recycling Centre Benefits

There are a range of benefits from the establishment of the CRC, including but not limited to:

- Alignment with the Waste Avoidance and Resource Recovery Strategy 2030;
- Alignment with the Waste Management Hierarchy;
- Resource recovery;
- Reducing environmental impacts;
- Additional service to the community;
- Usability, operational efficiency and safety; and
- Job opportunities.

Each of these is discussed in the following subsections.

8.1.1 Alignment with the WARR Strategy

The Waste Authority released the new Waste Avoidance and Resource Recovery Strategy 2030 (WARR Strategy) on the 10th of February 2019. The WARR Strategy sets the overarching objectives of *avoid*, *recover and protect*. The establishment of the CRC supports the WARR Strategy's objectives to *avoid* and *recover* materials through the resale of items and recycling of materials such as plastic, paper, glass, cardboard and metal. The Project also supports the objective to *protect* through best practice handling and storage of waste, acceptance and safe storage of HHW as well as minimising materials destined for disposal.

The WARR Strategy provides new targets for the recovery of waste which are shown in Table 8-1.

Objectives	Community	Government	Industry
AVOID	 2025 – Reduction in MSW generation per capita by 5% 2030 – Reduction in MSW generation per capita by 10% 	 Reduction in C&D waste generation per capita by 15% by 2025, 30% by 2030 Reduction in C&I waste generation per capita by 5% by 2025, 10% by 2030 	 2030 – All waste is managed and/or disposed using better practice approaches
RECOVER	 2020 – Increase MSW material recovery to 65% in the Perth and 	 C&I sector – Increase material recovery to 70% by 2020, 75% by 2025, 80% by 2030 	 2030 – All waste facilities adopt resource recovery better practice

Table 8-1: WARR Strategy Targets



Objectives	Community	Government	Industry
	 Peel regions, 50% in major regional centres 2025 – Increase MSW recovery to 67% in the Perth and Peel regions, 55% in major regional centres 2030 – Increase MSW material recovery to 70% in the Perth and Peel regions, 60% in major regional centres 	 C&D sector – Increase material recovery to 75% by 2020, 77% by 2025, 80% by 2030 	
PROTECT	 2030 – Move towards zero illegal dumping 2030 – Move towards zero littering 	 2030 – Move towards zero illegal dumping 	 2030 – No more than 15% of Perth and Peel regions' residual waste is disposed to landfill 2030 – All waste facilities adopt environmental protection better practice

Recognising these targets, there is a collective and positive national shift towards diverting more materials from landfill and aligning waste management practices with the Waste Hierarchy. The recovery of materials through the operation of the CRC will help the City to move towards achieving the set targets and go potentially beyond the expectations of the WARR Strategy.

The WARR Strategy outlines three guiding concepts namely 'Waste hierarchy', 'Circular economy' and 'Behaviour change – knowledge, enabling infrastructure, incentives'. The Project aligns with these guiding concepts through its proposed design and operation.

The options within the Waste Hierarchy that are addressed through the Project are *reuse*, *reprocessing*, *recycling and recovery*. These will be achieved through the acceptance of reusable materials and recyclable materials at the Recycle Shop. Reusable materials will be recovered and reused by the community. Recyclable materials will be recovered and either reprocessed or recycled through acceptance of material at the CDS Facility, Material Recovery Drop Off Area, Green Waste Shed, and Inert Waste Laydown.

The Project also supports the idea of a circular economy through the recovery of materials by implementing waste management options high up in the Waste Hierarchy. The management and recovery of materials will also occur within the area in which it is generated thereby reducing transport costs and providing local employment opportunities.



Behaviour change will be achieved through the construction of enabling infrastructure required for the CRC. The CRC will provide the community with a critical service and access to a facility that supports the recovery of reusable and recyclable materials. The CRC will encourage the community to separate waste, divert materials from landfill, and view these materials as a resource rather than waste. The CRC will also promote positive behavioural changes in the disposal of HHW by providing a safe storage facility prior to appropriate treatment and disposal. The HHW Facility will help to minimise illegal dumping of these problematic wastes, which can present potential health risks. In addition, the establishment of this facility will align with the Waste Authority's HHW program, which is a key headline strategy in the WARR Strategy.

The Project also supports two key principles within the WARR Strategy; 'Better practice' and 'Waste as a resource'. Better practice is defined in the WARR Strategy as "*practices and approaches that are considered by the Waste Authority to be outcomes-focussed, effective and high performing, which have been identified based on evidence and benchmarking against comparable jurisdictions.*" Reuse sheds and tips shops have been successfully implemented across a number of Local Governments Areas within WA and are recognised as a better practice waste management option that supports the Waste Hierarchy. In addition, the multi-tier drop-off design of the Cardboard, Paper and Metal Recycling Area is recognised as a best practice method for the acceptance of waste from the community, including both environmental and health and safety requirements.

8.1.2 Alignment with the Waste Hierarchy

The CRC layout has been designed with consideration of the Waste Hierarchy, which is an internationally recognised concept incorporating principles which underpin all modern sustainable waste management strategies. It provides a structure for prioritising waste management practices in relation to their environmental impacts, with the most preferred or most sustainable (top of the hierarchy) to the least preferred or least sustainable (bottom of the hierarchy). The CRC has been designed in alignment with the Waste Hierarchy with reuse and recycling services prior to waste disposal. This in turn will result in separated clean streams of materials while maximising their beneficial reuse and diversion from landfill.

8.1.3 Resource Recovery

As mentioned above, the CRC will help facilitate the recovery of valuable resources thereby increasing recycling rates and diversion of 'waste' from landfill. The majority of the materials to be accepted will be taken offsite for recycling to produce raw materials or manufacture new products. The key benefits of recycling are the diversion of waste from landfill, preventing or delaying the extraction of natural resources, protection of ecosystems from reducing the need to extract virgin resources, reduction in pollution from obtaining natural resources, reduction in energy usage and lower carbon emissions.

8.1.4 Reducing Environmental Impacts

Landfilling waste can result in environmental impacts through the clearing of vegetation, generation of leachate and landfill gas, attraction of vermin and feral animals as well as amenity issues including dust, odours and visual impacts. Diverting these materials from landfill for reuse, recycling and recovery through the CRC will help to reduce these impacts.





8.1.5 Additional Services to the Community

The CRC will provide the community with new waste management services for the reuse, recycling and disposal of waste materials. The Recycle Shop will be operated by a third party non for profit contractor for the sale of reusable materials. The CDS will provide the community with a container drop off facility to obtain refunds for approved containers. The HHW Facility will provide a facility to drop off hazardous waste for safe disposal or recycling. Members of the community will be able to drop off a range of bulk materials for recycling and refuse for disposal. These additional services will help encourage reuse and recycling through a well organised and easy to access best practice facility.

8.1.6 Usability, Operational Efficiency and Safety

The new layout will improve usability and operational efficiency through its organised design, logical configuration and flow through the various key components in line with the Waste Hierarchy. Users of the facility will move throughout the CRC through a one-way loop road, dropping off materials in the designated and clearly signed areas. The design ensures that the handling of materials by both customers and Site Staff will be minimised, as far as reasonably practicable. The one-way system will encourage customers to flow freely through the component areas smoothly, separated from service vehicle movements by design. Conversely, the operator can service the drop off areas, from the back of house, unhindered by customer movements. This also creates a clear separation of the community from the Site operations, thereby improving safety by avoiding interaction with commercial vehicles and Site operations.

8.1.7 Job Opportunities

Jobs will be created both directly and indirectly through the construction and operation of the CRC. Skills and services required will include civil contracting, material handling, administration, accounting, equipment and earthworks suppliers and operators. New and existing suppliers in the area will have the opportunity to tender for contracts to assist with the construction as well the operation and maintenance aspects of the facility.

8.2 Waste Transfer Station Facility Benefits

The key benefits from establishing a new WTS Facility includes but are not limited to:

- A modern best practice facility;
- Increased capacity;
- Improved operational efficiency; and
- Local employment.

Each of these are discussed in the following subsections.





8.2.1 A Modern Best Practice Facility

As mentioned previously in Section 4.2.1, the WTS Facility has been designed to the best practice standards. By adopting the best practice standards for the WTS Facility, the City will be able to provide an essential service for the community that effectively manages environmental emissions and risks in the long term. As discussed previously in Section 5.1, the City have chosen to take a conservative approach to managing odour emissions by ensuring four air changes per hour to mitigate any potential impacts on nearby sensitive receptors.

8.2.2 Increased Capacity

The WTS Facility has been designed to a capacity of 225,000tpa based on a one and half day storage capacity. This design capacity will allow for the future growth and acceptance of refuse, FOGO, hard waste and C&I for the next 20 years. The increased capacity will also allow the City to accept additional materials from other waste generation sources, including other LGAs, to provide more commercial opportunities for the City.

8.2.3 Improved Efficiency

WTS's are utilised to aggregate waste materials within close proximity to their sources of generation to allow for greater efficiencies in the transportation of these materials to treatment and disposal facilities. The proposed design also helps to improve efficiency through easy vehicle access, adequate space for movement of vehicles within the building, flow through access for B-doubles to collect waste materials for transfer offsite.

8.2.4 Local Employment

Due to the proposed construction works required there is anticipated to be a number of local employment opportunities on the Site. Furthermore, the Site is expected to employ 3-4 full-time staff at a minimum once operational. In addition, a number of speciality haulage vehicle drivers (approximately eight in the initial operational years and up to twelve by the end of thirty operational years) are expected to be contracted by the City for transport of the waste materials from the WTS Facility to the Waste to Energy (WtE) facility or Red Hill.

8.2.5 Regional Resource Recovery Facility

Due its location, the Site is the key regional waste management facility within the northern suburbs of Perth which is currently heavily utilised by residents of the surrounding local government agencies. Through its redevelopment to a best practice modern integrated facility and increased capacity the City may choose to accept waste from surrounding LGAs. A range logistical, economical and environmental benefits will result from adopting a regional approach to waste management. The site will be a strategic hub for waste management especially given the future closure of Tamala Park. The Site will play important role in northern suburbs potentially feeding organic or WtE facilities therefore the city has been committed to build best practical facility ensuring this potential can be achieved.



9 Conclusion

The City is seeking approval to redevelop the existing Recycling Centre Balcatta which includes establishment of a modern CRC and WTS Facility. The Project will provide best practice waste management services for the community that align with the Waste Hierarchy and help increase diversion of waste from landfill.

Collectively, the key potential environmental aspects and risks associated with the construction and operation of the CRC and WTS Facility include odour, noise, dust, vermin/feral animals, stormwater, acid sulfate soils, fire, litter, vehicle emissions, leachate, asbestos containing material and HHW. Other associated risks considered for the Project include security and traffic. The current conceptual design of each of the facilities and the operational management measures have been developed to ensure all these risks and potential impacts are managed appropriately. The overall residual risk of these potential impacts once the proposed management measures are adopted is low.

As mentioned previously, the environmental engineering controls within this document will be further refined when detailed designs are prepared by a contractor engaged by the City through a Design and Construct contract.

Although the Site already meets the 200m recommended screening/separation distances for solid waste depots, the EPA's Guidance Statement 3 has been considered for the Project. The nearest sensitive receptor is ~199m from the closest point of the proposed location of the WTS Facility, the remainder of the WTS Facility and Site activities exceeds the recommended separation distance. Management measures outlined in this EAMP, specifically regarding noise and odour have been developed to ensure compliance with relevant regulations and to ensure there are no impacts on these sensitive receptors.

A range of benefits are associated with the Project including alignment with the WARR Strategy and Waste Hierarchy, increasing resource recovery, reducing environmental impacts, local employment opportunities and providing a key regional resource recovery facility. From an operational perspective, the redevelopment will improve layout, operational efficiency and safety.

Based on the City's current successful operation of the site, the Project's compliance with separation distances, design, proposed engineering and environmental management measures and low residual risk, Talis and the City believes that the construction and operation of the Project can be achieved in a manner that ensures that any potential impacts can be managed to appropriate standards.





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Figures

Figure 1: Site location

Figure 2: Current layout

Figure 3: Zoning

- **Figure 4: Separation Distances**
- Figure 5: Topography
- Figure 6: Geology

Figure 7: Acid Sulfate Soils

Figure 8: Groundwater

Figure 9: Surface water

Figure 10: Proposed layout







P: PO Box 454, Leederville WA 6903 | A: 604 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W:

















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Figure 08







P: PO Box 454, Leederville WA 6903 | A: 604 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.t







Appendix A: Conceptual Drawing









Appendix B: Odour Impact Assessment



RECYCLING CENTRE BALCATTA REDEVELOPMENT - ODOUR IMPACT ASSESSMENT

CITY OF STIRLING: ODOUR IMPACT ASSESSMENT



City of Stirling: Odour Impact Assessment

Prepared for: City of Stirling



Project Ref: EAQ-20016 March 2021



Environment | Air Quality



Environmental & Air Quality Consulting Pty Ltd

PO Box 897 JOONDALUP DC WA 6919 +61 (8) 6108 3760 +61 (0) 449 915 043 www.eaqconsulting.com.au

jhurley@eaqconsulting.com.au

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1 Background

Environmental & Air Quality Consulting Pty Ltd (EAQ) was engaged by Talis Consultants (Talis) on behalf of the City of Stirling (the City) to undertake an Odour Impact Assessment (OIA) of the City's proposed Balcatta Recycling Centre Redevelopment (the Site), specifically the existing Waste Transfer Station (WTS) located at 238 Balcatta Road, Perth Western Australia.

The OIA will support the City's application for Environmental Approvals including referral to the Environmental Protection Authority (EPA) and Works Approval to the Western Australia (WA) Department of Water and Environmental Regulation (DWER) to upgrade the existing WTS to include handling and transfer of Food Organics Garden Organics (FOGO) waste streams.

The Works Approval application process is regulated by the DWER under Part V of the *Environmental Protection Act 1986* (EP Act). The Site, under the EP Act is currently classified as a Category 62 Prescribed Premise (Solid waste depot) with a Category design capacity of 500 tonnes or more per year and $\leq 250,000$ tonnes per year (EPA Licence: L7201/1997/10).

The City has completed a Master Plan and preliminary concepts for the redevelopment where the Business Case for the redevelopment has now been approved by Council. Subsequently the attainment of Environmental Approvals including referral to the Environmental Protection Authority (EPA) and Works Approval to the WA DWER is now required to proceed to the detailed design and construction phases of the redevelopment project.

The Sites' intent is to become a state of the art Waste Recycling Centre and WTS within the Greater Perth Metropolitan Area that will facilitate an increase in residential, commercial and local government waste streams.

The Sites' proposed wastes acceptance are listed in Table 1-1.

Waste Type	Tonnages (per annum)	
Community Recycling Centre (CRC)		
Reuse items	1,000	
HHW	1,000	
E waste	1,000	
Whitegoods	130	
Waste oil	5,000	
CDS	3,400	
Cardboard/paper	6,000	
Scrap metal	4,000	
C&D drop off (commercial)	10,000	
C&D drop off (residential)	10,000	

Table 1-1: Proposed Waste Receivals Schedule



C&D (City's construction works)	23,000
Green waste drop-off (commercial)	27,000
Green waste drop-off (residential)	20,000
Mixed waste drop-off	15,000
Total CRC Waste Acceptance	126,530
Waste Transfer Station (WTS)	
Refuse	120,000
FOGO	50,000
Commercial & Industrial (C&I)	40,000
Hard Waste (bulk)	15,000
Total WTS Waste Acceptance	225,000

For the purposes of this OIA, the increased receivals within the WTS of Refuse and FOGO wastes are the primary waste receivals of consideration that pose a potential risk for increased odour emissions from the Site.

The garden organics (GO) component of the FOGO waste stream will be delivered to the greenwaste shed initially. This will increase the volume of greenwastes to the Site, however; given the current receivals of greenwastes to the Site that takes place in the open air (i.e. not within a shed) where those greenwastes are only handled and transferred (i.e. no shredding, grinding or composting) the risk of an increase in the greenwaste odour footprint from the proposed greenwaste shed is unlikely.

1.1 Regulatory Guidance for OIA

The OIA follows the most recent Government of WA DWER Guideline "Odour Emissions" June 2019 document ^[1] where the Guideline provides assessment methods for delivering adequate odour data and information to the DWER for the assessment of applications under Part V of the EP Act; where, "Part V Division 3 of the EP Act provides the Department with mechanisms for regulating odour, by way of conditions on works approvals and licences applied to prescribed premises".

The DWER employs a risk-based approach to its assessment of applications for instruments under Part V of the EP Act.

In determining the risk posed by odour, DWER considers:

- the location, proximity and sensitivity of receptors;
- the management of odour sources and activities;
- the intensity and offensiveness of the odour;
- potential odour impacts from other nearby sources;

^[1] <u>https://www.der.wa.gov.au/images/documents/our-work/licences-and-works-approvals/licensing%20guidelines/Guideline%20-%20Odour%20emissions%20v1.0%20FINAL%20(June%202019).pdf</u>



- the topography and complexity of terrain;
- the size and / or complexity of the facility when compared with other Australian operations;
- any unusual configuration of odour sources or technology compared with other Australian operations;
- whether the proposal is located in a Strategic Industrial Area (SIA);
- the presence of multiple industry categories which may emit odours on the same site;
- current and cumulative impacts from odour; and
- pathways and impacts on sensitive receptors.

Given the size of the Sites' proposed redevelopment, the increase in waste acceptance and the inclusion of FOGO waste receivals, the OIA requires a detailed analysis that describes (among others) the processes, odour emission sources, controls and responses in ameliorating any existing or potential odour impacts and the pathway(s) for emissions to impact receivers by an analysis of local meteorological trends and problematic conditions.

The DWER's odour analysis procedure (step-wise) is as follows:




Figure 1-1: DWER Odour Guideline – Odour Analysis Procedure



2 Balcatta WTS Locality

The Balcatta WTS is located at 238 Balcatta Road, Balcatta, Perth Western Australia. The WTS is located within the Balcatta Industrial/Commercial Precinct which occupies approximately 260 hectares of land. The Balcatta locality adjacent to the WTS is urban residential within the Town Planning Scheme.

Balcatta is located approximately 17 kilometres (km) north, north-west of the Perth Metropolitan Central Business District, is approximately 6 kms due east of the coastline and approximately 23 kms due west of the Darling Escarpment (Scarp).

Terrain within the locality is flat and varies by approximately +/-20 metres (m) within a radius of 5 kms from the WTS.

The WTS is sufficiently inland from the coastline to avoid coastal wind effects that can cause pollutant emissions to persist at ground level (i.e. persistent nuisance), such as pollutant recirculation.

Additionally, the WTS locality is a sufficient distance away from the Scarp to avoid influences on local wind characteristics due to terrain complexity such as katabatic winds (drainage flows) down the Scarp and along the coastal plain, and anabatic winds (upslope flows) that can affect a plumes momentum and trajectory as it interfaces with terrain structures. These terrain interactions influence the way in which local winds flow during seasonal variations in temperature and as such can have notable effects on odour impacts downwind of an odour source that resides nearer to the Scarp.

Given the WTS's location away from the coastline and Scarp, steady-state conditions are likely to prevail, that is; based on local terrain (flat, relatively uniform) and non-complex meteorology within the locale (i.e. no coastal or Scarp influences) the meteorological conditions are assumed to remain constant during the dispersion pathway from emissions' source to receptor and therefore any odour plume is expected to incrementally disperse as it travels further downwind.

The land use within 5 kms of the WTS is almost entirely urban. The nearest urban residential land use is at a distance of approximately 250m to the south of the existing WTS.

Structure planning within the locality does not intend to deviate from the existing land use zonings. Residential zoning within 5 kms of the WTS are already at R20 with small designations of R30 and R40 zoning. There is no planning to re-zone the Balcatta Industrial Precinct to urban.

The local sensitive receiver environment downwind of the Site is therefore urban residential.

The Locality of the Site is illustrated in **Figure 2-1** to follow.

The Sites' existing layout and proposed upgrade layout are presented in **Figures 2-2** and **2-3** respectively.



Figure 2-1: Locality of Recycling Centre Balcatta



	Recycling Centre Balcatta
	WTS Building
_	State_Road_Network
	Local Road Network
Prepar . Hurl	red By: ey



Figure 2-2: Recycling Centre Balcatta (Site) Existing Layout



LEGEND	
Site Boundary Cadastre	
SITE LAYOUT PLAN	
Recycling Centre Balcatta 238 Balcatta Road Balcatta, WA 6021	
Projector: Transvers Mercator: Datu: 31/01/2019 Coordinate System: GDA 1994 MGA Zone 50 Projector: Transverse Mercator: Datu:: GDA 1994 Scale @ast:11,400 Prepared: F Walker Date: 31/01/2019 Checked: R Cullen Project No: TW18005 Reviewed: C Panizza Revision: A	
Eignee 05	



Figure 2-3: Recycling Centre Balcatta (Site) Proposed Layout





3 Detailed Analysis

Existing odours from the WTS originate from kerbside collections of household putrescibles, often comingled with greenwastes and inert wastes, collectively known as municipal solid wastes (MSW).

The organic fraction recovered from the MSW is typically around 50% demonstrating the magnitude of "contaminants" within the traditional MSW waste streams. Other waste streams within the WTS come from commercial bin collections such as retail/restaurant wastes.

Recyclables are collected separate of these waste streams and processed typically within a Materials Recovery Facility (MRF), as are incoming greenwastes which are handled and transferred separate of the WTS.

Recently there has been a concerted movement to FOGO waste collections based on the 3-bin system for household waste kerbside collections. The 3-bin system serves to provide households with a means to separate food organics (FO) and garden organics (GO) into two separate collection bins. Recyclables are collected in the third bin.

The FOGO waste streams have a low contaminant ratio and as such the recovered organic fractions (diverted from landfill) are much higher than traditional MSW waste handling and processing.

FOGO odours within the proposed upgraded WTS are expected to be higher in concentration (tonne for tonne of waste) based on the higher fraction of recoverable organics. However, given the activity is a WTS and not composting, the magnitude of the increased odour strength is not expected to be prohibitive to the normal operations of the proposed WTS.

The proposed WTS will consist of four (4) laydown areas for Refuse, Hard Wastes, FOGO and C&I Wastes. These segregated areas will receive daily waste streams with the WTS capacity of 225,000 tonnes per annum (tpa) allowing for a 1¹/₂ day storage of these wastes as required.

Existing WTS Odour Emissions

The odour characters within a WTS reflect those odours typically observed from residential bins. The odour of rubbish/garbage is the prominent odour descriptor which represents General Refuse.

During seasonal variations the hotter months can cause higher odour strength emissions due to the advanced decomposition of the wastes within residential bins and the council collection trucks. Contamination of green wastes within the residential bin collection can further exacerbate odour strength emissions.

Other odours from within a WTS are typically benign given those other co-mingles wastes are largely inert.

Incoming wastes can be considered as 'fresh' and are held on the WTS floor for periodical timeframes between council collection drop-off and the closure of the WTS Site. The existing management of the



WTS ensures that no putrescible wastes are retained on the WTS floor overnight given the existing WTS is opened of three sides. To achieve this wastes are loaded into waiting transport trucks for removal from the WTS daily.

The existing WTS odour sources are:

- Waste Receivals and Daily Storage
 - Tipping Floor receiving putrescible wastes;
 - Tipping Floor receiving inert household and commercial wastes
 - \circ Small Vehicle unloading onto Tipping Floor from designated area; and
 - Commercial Vehicles unloading directly onto Tipping Floor.
- Truck Loading Bays (2)
 - One truck for inert household and commercial wastes; and
 - One truck for putrescible wastes.
- Sludge and Wash Leachate
 - Washdown of Tipping Floor as required resulting in Sludge/leachate; and
 - Truck loading bays leachate and liquid wastes from loading.

All wastes received on the existing WTS floor (Tipping Floor) are mobilized to the awaiting waste removal transport trucks by front end loader. The Tipping Floor itself is open to atmosphere on three (3) sides representing a wholly naturally ventilated building with no odour controls for capture and treatment.

Sludge and leachate wastes are handled whenever there is liquid generated from wash down and retained within the Truck loading bays/sweeping pits. The liquid waste is pumped into a settling pit/tank and onto separation further downstream to remove solids before discharge to sewer.

Previously, an odour complaint followed a Christmas period where notable seafood putrescible wastes were on the Tipping Floor. As a result of the complaint the City resolved to ensure these Christmas wastes and other putrescibles are loaded out daily to ensure no overnight retention of odour emitting wastes within the WTS.

The existing management of the WTS and Tipping Floor has ensured that odour complaints are nonexistent.

Proposed WTS Odour Emissions

The proposed upgrade of the Site to include relocation and upgrades to the WTS will result in a more controlled waste receivals and transfer.

The proposed upgrade to the Site will relocate the existing WTS approximately 100 m to the south-east of its current position.

Within the proposed WTS there will be four (4) areas for waste receivals, comprising of:



- General Refuse;
- Hard wastes;
- FOGO; and
- C&I wastes.

Importantly, the odour profile within the proposed WTS will vary only based on contributions from FOGO waste receivals, however; the proposal initially seeks to receive only 50,000 tpa of FOGO.

This volume of FOGO into the proposed WTS constitutes approximately 5,260 x 9.5 tonne Refuse Collection Vehicles (RCV), or on average up to 17 x 9.5 tonne RCV's daily. The total wastes volumes per RCV will vary and therefore the number of 9.5 tonne FOGO trucks delivering to the proposed WTS may be 20-25 daily. The arrival of these FOGO trucks will be concerted around typical peak timeframes following kerbside collections' schedules. Currently the existing WTS receives the putrescible kerbside collection wastes during the afternoon periods daily.

The odour profile of the FOGO wastes will resemble that of General Refuse, albeit at potentially higher concentrations on a volume by volume basis given the higher organic fraction expected within the FOGO waste stream.

Other wastes received in the proposed WTS; General (refuse), Hard Wastes (bulk) and C&I will exhibit a lower odour profile given the organic fraction will be removed due to the dedicated FOGO collections, however; for the purposes of conservatism these wastes' odour profiles are assumed to remain as they currently are.

Sludge and Wash Leachate will be managed and collected as it currently is, however; the proposed design will include upgrades to the sludge and waste water collection infrastructure that will improve upon its existing design.

3.1 Operational Odour Analysis (OOA)

3.1.1 Existing and Proposed WTS Activities

Currently the Site manages its emissions based on the following:

- Wastes received must comply with the waste categories set out in the City's current Licence Conditions;
- Waste type and volumes are monitored by onsite weighbridge operational staff and site operations personnel using waste classification guidelines;
- Discharge of wastes to the Environment are regulated and reported in accordance with the current DWER "Notification of waste discharges" under the EP Act 1986;
- WTS Sludge and Wash Leachate is managed in accordance with the City's "Sludge Pump Procedure";
- Incoming waste delivery trucks are covered as per contract arrangements;



- Wastes deposited on the WTS Tipping Floor are stockpiled into General Refuse (residential), Household & Commercial Wastes (typically inert) and Putrescible Wastes;
- Transport Trucks are positioned within one of two loading bays where the Loader Operator deposits the respective wastes into the truck(s);
- Odorous wastes are stockpiled on the Tipping Floor according to the classification of the wastes received;
- Odorous wastes are loaded into the waiting transport truck and the Tipping Floor cleared of putrescible (odorous) wastes daily;
 - No sorting, separation or composting of putrescible wastes.
- Green wastes are deposited elsewhere on the Site and not within the existing WTS;
 - No processing of green wastes i.e. no grinding, shredding or composting.
- Daily and weekly wash downs of the Tipping Floor as required and subsequent immediate pumping (removal) of sludge and leachates into the settling pit/tank;
- Litter patrols conducted in accordance with the City's management procedures of the Site;
- Unsecured loads resulting in lost wastes from incoming/outgoing transport trucks is investigated immediately with cleanup crews deployed as required, contractor is advised of the contractual breach and put on notice;
 - Leachate/waste water trucks cannot leave Site with liquid leaks.
- All outgoing waste transport trucks are covered and secured to control emissions; and
- > All putrescible (odorous) wastes are removed from the WTS Tipping Floor within 24 hours.

The proposed upgrades to the Site to include the receivals of FOGO wastes will follow the same management and procedural steps as outlined above. However, there will be improvements in individual management and response procedures in accordance with the upgraded infrastructure proposed.

The relocation of the WTS will marginally decrease the separation distance to the nearest residential receptor from 250 m to 200 m. However, this decrease in separation distance is negligible given that the existing and proposed waste streams into the WTS do not vary other than a slight increase in putrescible wastes through FOGO. Moreover, the proposed WTS will be enclosed to minimise continuous naturally ventilated fugitive odour emissions.

The following Operational Odour Analysis **Table 3-1** summarises the current WTS processes, sources of odour emissions, process controls, triggers and corrective actions and overall risk rating for odour impacts.

Table 3-2 lists the proposed OOA for the inclusion of FOGO wastes within the newly proposed WTS.

Importantly, the proposed FOGO waste volumes represent <13% of the Sites' total proposed waste acceptance and approximately 22% of the wastes proposed to be handled and transferred within the WTS.

Odour								F	tesidual Odou	r Impact Potentia	I	
Odour Source	Dispersion Pathway to Nearest Receptor	Process Description	Emission Source	Process Control	Triggers & Corrective Actions	Corrective Action Evaluation	Contingency Actions	Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (nearest receiver)	
Waste Transfer Station (WTS)	Pathway to the nearest receptor is a ground level emission, negligible terrain influences nor complex meteorology. Nearest receptor is approximately 250 m to the south of the WTS		During transit the trucks are closed/covered and the Emission Source is Negligible given it is contained	All Waste Trucks are covered	Weighbridge staff and operational personnel accept wastes according to Licence Conditions and Waste Classifications	Wastes non- conforming are refused Site entry	Not Required	Minor	Rare	Low	Low	
		Incoming RCVs	RCVs unload putrescible wastes on Tipping Floor within the WTS. Initial displacement of an odour plume during deposition of the wastes. Wastes are stockpiled on the Tipping Floor to ensure separation from other non- putrescible wastes. The stockpile is an area/volume source whereby odour emissions are driven off due to cross- wind flows	Presently Nil given the WTS is open on 3-sides	Those wastes deemed highly odorous by operational personnel, such as Christmas food wastes, are cleared from the Tipping Floor ASAP into load-out truck. Tipping Floor washed down to remove leachates	Removal of these odorous wastes directly into the load-out truck ensures the risk of odorous emissions from the Tipping Floor are minimised within the Site	Covered load out truck, during standby, if the putrescible waste loads are highly odorous	Moderate	Rare	Medium	Low	
		lı C		1	Incoming Commercial Wastes	During transit the Trucks are closed/covered and the Emission Source is Negligible given it is contained	All Waste Trucks are covered	Weighbridge Staff and Operations Personnel accept wastes according to Licence Conditions and Waste Classifications	Wastes that are non-conforming are refused Site entry	Not Required	Moderate	Rare

Table 3-1: Summary of Current WTS Operations & Odour Impact Potential



							Contingency Actions	F	Residual Odour	Impact Potentia	
Odour Source	Dispersion Pathway to Nearest Receptor	Process Description	Emission Source	Process Control	Triggers & Corrective Actions	Corrective Action Evaluation		Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (nearest receiver)
Waste	Pathway to the nearest receptor is a ground level emission, negligible terrain influences nor complex meteorology. Nearest receptor is approximately 250 m to the south of the WTS	Incoming Commercial Wastes	Commercial trucks deposit wastes directly onto the Tipping Floor. Initial displacement of an odour plume during deposition of the wastes. Wastes are stockpiled on the Tipping Floor to ensure separation from other non- putrescible wastes. The stockpile is an area/volume source whereby odour emissions are driven off due to cross- wind flows	Presently Nil given the WTS is open on 3-sides	Those wastes deemed highly odorous by operational personnel, such as Christmas food wastes, are cleared from the Tipping Floor ASAP into load-out truck. Tipping Floor washed down to remove leachates	Removal of these odorous wastes directly into the load-out truck ensures the risk of odorous emissions from the Tipping Floor are minimised within the Site	Covered load out truck, during standby, if the putrescible waste loads are highly odorous	Moderate	Rare	Medium	Low
Transfer Station (WTS)		Incoming Residential Wastes	Community Residents delivering General Refuse wastes to the WTS. Wastes passed over bund wall onto Tipping Floor. Inert C&I wastes pose no odour emissions risk	Nil – not required other than appropriate acceptance of wastes as per waste classifications	Nil	Nil	Nil	Slight	Rare	Low	Low
		Deposited Sludge & Wash Down Leachate	Ground level liquid wastes that undergo vapourisation, in particular within the hotter seasonal periods	Liquid waste residues within the WTS are managed in accordance with the City's "Transfer Station Sludge Pump Procedure" which details the processes required to remove and contain liquid wastes deposited on the Tipping Floor	Visually noticed sludge and leachates	Response protocols adhering to the City's "Transfer Station Sludge Pump Procedure"	Not required given the settling pit/tank volume and low volumes of liquid wastes required to be pumped from the Tipping Floor during a response	Minor	Rare	Low	Low



								F	Residual Odour	Impact Potentia	I
Odour Source	Dispersion Pathway to Nearest Receptor	Process Description	Emission Source	Process Control	Triggers & Corrective Actions	Corrective Action Evaluation	Contingency Actions	Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (nearest receiver)
	Pathway to the nearest receptor is a ground level emission, negligible terrain influences nor complex meteorology. Nearest receptor is approximately 250 m to the south of the WTS	Load-out Transport Trucks – During Loading	Putrescible Wastes Truck & Inert/C&I Wastes Truck	Trucks are parked in a bund; Tipping Floor Loader dumps the wastes (from above) directly into the trailers. Trucks are not covered during loading; the Tipping Floor remains open on 3-sides. No process control other than the waste types being loaded.	Overloaded Trucks of Putrescible Wastes are removed from the loading bund and relocated to the Tipping Floor where excess wastes are removed. This transit occurs within the confines of the WTS.	Loader Operator to revise loading operations to ensure no future overloading.	Not required.	Moderate	Rare	Medium	Low
Waste Transfer Station (WTS)		ay to the nearest or is a ground mission, ble terrain ices nor complex rology. st receptor is simately 250 m to uth of the WTS Load-out Transport Trucks – Leaving the Site Inert/C&I Wastes Truck Inert/C&I Wastes Truck Load-out Transport Truck prior to leaving the Site. Inert/C&I Wastes Truck Load-out Transport Truck prior to leaving the Site. Load-out Transport Truck prior to leaving the Site.	Putrescible Wastes Truck	Loaded Transport Trucks are covered and free of falling wastes/debris and free of any residual leachate leaks prior to leaving the WTS and transporting the wastes offsite. Weighbridge and Operational Personnel inspect the Transport Truck prior to leaving the Site.	"Flying" wastes from outgoing transport trucks are investigated immediately with cleanup crews deployed as required. Contractor is advised of the contractual breach and put on notice. Leachate/waste water trucks cannot leave Site with liquid leaks.	Cleanup Crews, as required, report to the City of cleanup event and containment	Not Required unless Transport Truck(s) are broken down where the trailer(s) are parked-up and a new Truck deployed to hitch onto the	Minor	Rare	Low	Low
			"Flying" wastes from outgoing transport trucks are investigated immediately with cleanup crews deployed as required. Contractor is advised of the contractual breach and put on notice.	of lost wastes during transit.	laid-up trailer(s) and continue the transport of the wastes to their final destination.						



Table 3-2: Summary	of Proposed	WTS Operat	ions & Odour I	mpact Potential

Odeur								F	Residual Odou	Impact Potentia	I
Odour Source	Dispersion Pathway to Nearest Receptor	Process Description	Emission Source	Process Control	Triggers & Corrective Actions	Corrective Action Evaluation	Contingency Actions	Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (nearest receiver)
			During transit the trucks are closed/covered and the Emission Source is Negligible given it is contained	All Waste Trucks are covered.	Weighbridge staff and operational personnel accept wastes according to Licence Conditions and Waste Classifications.	Wastes non- conforming are refused Site entry	Not Required	Minor	Rare	Low	Low
Waste Transfer Station (WTS)	Pathway to the nearest receptor is a ground level emission, negligible terrain influences nor complex meteorology. Nearest receptor is approximately 200 m to the south of the WTS	Incoming RCVs	Covered Trucks enter the WTS via one of the six doorways.	WTS Receivals Doors are automated, fast- acting and are initiated via a floor pressure pad allowing Truck Ingress/Egress. Trucks cannot enter or leave the WTS until such time as the access doorway has fully retracted.	Waste Receivals doorway(s) fail/damaged and cannot close. Manual override of damaged doorway allowing closure where possible. Spare parts (e.g. actuator motors, controls) held in supply for Maintenance to enact the repairs. In the event that a door is sufficiently damaged the turnaround time to repair/replace is up to 72 hours, where; the doorway is cordoned off and the designated bunker(s) nearest to the damaged doorway also cordoned off (Hard Waste and C&I Waste bunkers excluded)	Reinstatement of working doorway confirms repair.	Not required other than cordoning off the disabled doorway and corresponding waste bunker(s). In the event that a total doorway failure arises, all WTS wastes can be diverted from the Site direct to landfill or other disposal facilities.	Moderate	Rare	Medium	Low



25 March 2021

			Emission Source P	Process Control		Corrective Action Evaluation		Residual Odour Impact Potential			
Odour Source	Dispersion Pathway to Nearest Receptor	Process Description			Triggers & Corrective Actions		Contingency Actions	Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (nearest receiver)
Waste Transfer Station (WTS)	Pathway to the nearest receptor is a ground level emission, negligible terrain influences nor complex meteorology. Nearest receptor is approximately 200 m to the south of the WTS	Incoming RCVs	Trucks unloading odorous wastes onto WTS Tipping Floor	Trucks deposit their wastes onto the Tipping Floor within the designated bunker area for; Refuse, Hard Wastes, FOGO and C&I Wastes	Refuse or FOGO Wastes that are highly odorous based on origin of the wastes (e.g. commercial restaurant wastes, seafood wastes) are pushed up into the designated bunker to minimise surface area exposure and those wastes loaded into the B-Double outbound trucks as immediately as possible. WTS doorways are ensured closed during elevated odour events based on the wastes on the Tipping Floor at that time	Preferential attention to loading out those odorous wastes is expedited to ensure the wastes are loaded and covered with less odorous wastes in the shortest timeframe possible	Rejection of highly odorous waste streams as required, although historically the Site has been shown to have no odour complaints from offsite receptors except under a single exceptional circumstance where Christmas seafood wastes were held on the Tipping Floor for extended timeframes	Major	Unlikely	Medium	Medium – only during the exceptional event and during the time for response (this event is not expected to occur) Low – prior to and following the exceptional event and subsequent response
		Imm of Si proc wast Once onsite, accidental loss of wastes/spillages at entrance, or in transit, to the WTS building RCV/ mair spill traff	Immediate notification of Site Manager and proceed to contain the wastes and move wastes immediately into the WTS. Subsequent incoming RCV's to pull-up and maintain stand-by if the spill has blocked other traffic routes to the WTS	Determination of the "why" for the spill event and a review of the operations to ensure future events do not occur	High level Management to convene weighbridge and operational staff to update management, procedural and response protocols.	Nil in most circumstances. Wastes can be diverted from the Site as required to limit the subsequent incoming waste volumes if/as required	Moderate	Rare	Medium	Low	



25 March 2021

				Process Control			Contingency Actions	F	Residual Odour Impact Potential			
Odour Source	Dispersion Pathway to Nearest Receptor	Process Description	Emission Source		Triggers & Corrective Actions	Corrective Action Evaluation		Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (nearest receiver)	
Waste Transfer Station (WTS)	Pathway to the nearest receptor is a ground level emission, negligible terrain influences nor complex meteorology. Nearest receptor is approximately 200 m to the south of the WTS	earest ind mplex	Excess wastes received at the WTS where short-term handling and storage cannot be managed effectively	Wastes immediately diverted from the Site. WTS doors to be closed and remain closed. B-Double outbound trucks to be positioned (if not already) within the side-load bays inside the WTS. Additional B-Doubles called to Site on standby	Weighbridge Staff and Operations Personnel to inform all contractual incoming waste contractors to divert from Site as per diversion management response	and nel Ensured cessation of incoming WTS wastes	ed ion of ing WTS s	Major	Rare	Medium	Medium – only during the exceptional event and during the time for response (this event is not expected to occur)	
											Low – prior to and following the exceptional event and subsequent response	
		Tipping Floor Loader	Emissions within the WTS where the Loader is moving wastes into the designated bunkers and/or loading out the wastes into awaiting B-Doubles	Loader preferentially loads out the Refuse and FOGO wastes when these wastes are evident in the designated bunkers.	In the event that the WTS contains excess Refuse and FOGO wastes the Loader operator prioritizes efforts to load out these wastes	Review volumes of Refuse and FOGO waste streams coming into the WTS to inform the need for increased Loader operations	Incoming Refuse and FOGO wastes can be directed to pull- up and standby onsite, or be diverted from Site if required	Moderate	Unlikely	Medium	Low	
		B-Double outbound trucks	Wastes inside the B-Double trailers	All trailers are covered prior to exiting the WTS	Not Required in most instances except where liquid wastes may be leaking from a trailer	Trailer to remain inside the WTS and the problem rectified before moving outbound. Subsequent trailers inspected prior to loading	Contractor assessed and their maintenance and management plans reviewed to rectify	Minor	Rare	Low	Low	



								í	Residual Odour	Impact Potentia	I
Odour Source	Dispersion Pathway to Nearest Receptor	Process Description	Emission Source	Process Control	Triggers & Corrective Actions	Corrective Action Evaluation	Contingency Actions	Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (nearest receiver)
Waste Transfer Station (WTS)	Pathway to the nearest receptor is a ground level emission, negligible terrain influences nor complex meteorology. Nearest receptor is approximately 200 m to the south of the WTS	Deposited Sludge & Wash Down Leachate within the WTS	Ground level liquid wastes that undergo vapourisation, in particular within the hotter seasonal periods	Liquid waste residues within the WTS are managed in accordance with the City's "Transfer Station Sludge Pump Procedure" which details the processes required to remove and contain liquid wastes deposited on the Tipping Floor. Liquid waste residues will "fall" according to the WTS slab design and be collected in a designated area and managed accordingly	Visually noticed sludge and leachates	Response protocols adhering to the City's "Transfer Station Sludge Pump Procedure"	Not required given the settling pit/tank volume and low volumes of liquid wastes required to be pumped from the WTS floor during a response	Minor	Rare	Low	Low





FIDOL factors are also important in considering the risk of odour impacts on sensitive receptors. These factors are dimensions of odour nuisance, and are:

- <u>Frequency of odour impacts;</u>
- <u>Intensity</u> (or strength) of the odour;
- <u>D</u>uration of the exposure events;
- <u>Offensiveness of the odour; and</u>
- <u>L</u>ocation of the impacts (the sensitivity of the receiving environment).

When considering the FIDOL factors within this OIA, it is largely unforeseeable under normal operating conditions that the proposed upgrades to the Site, the increased waste acceptance and importantly the inclusion of FOGO wastes, which represent approximately 22% of the wastes handled and transferred within the WTS, would result in a notable increase in the odour footprint from the WTS.

With the inclusion of FOGO wastes, which have been introduced to promote waste separation within the household, the fraction of organic wastes in a FOGO waste stream are expected to be higher than previous kerbside collections of putrescible co-mingled wastes.

Given this, the percentage of the organic fraction in General Refuse bins from kerbside collections is expected to be low as these wastes are now typically part of the FOGO bin.

Importantly, the proposed redevelopment of the Site will also provide an enclosed WTS as opposed to the existing WTS that is opened on 3-sides, and will also have improved capture and controls for leachate management.

Presently there is no proposition to include odour extraction and treatment infrastructure for the WTS given its current operations have proven successful in ensuring odour emissions do not impact at the nearest receiver. The proposed WTS will however have adequate ventilation for worker comfort. Moreover, the inclusion of the FOGO as a minor percentage of total waste acceptances does not require dedicated odour treatment infrastructure at this time.

Notwithstanding, <u>Section 3.4.1</u> summarises those odour treatment technologies suitably available for servicing the WTS should the need arise.

In considering the detail provided in **Tables 3-1** and **3-2** above, the current operations at the Site have not caused odour nuisance at the nearest residential receiver.

The City acknowledges however that an industrial receptor immediately adjacent to the Site recorded an odour nuisance within the Christmas period where those typical Christmas food wastes, often high volumes of seafood, were held on the existing WTS Tipping Floor longer than 24 hours. This was mitigated for subsequent future time periods by the City updating its WTS handling and transfer procedures to ensure all food wastes are removed from the WTS at the end of each day.



3.2 Local Meteorological Analysis

The nearest Bureau of Meteorology (BoM) Automatic Weather Station (AWS) is located at Perth Metro (AWS # 009225) which is approximately 7.8 kms south-east of the Site.

The terrain elevation at the AWS is approximately 25 m Australian Height Datum (AHD) which is the same elevation as the Site.

Whilst the AWS is a further 5 kms inland compared to the Site, the terrain elevations, local structures and distance from the Scarp are comparable suggesting that similar meteorological trends would prevail, in particular steady-state dispersive conditions free of complex meteorology due to terrain or coastal effects.

EAQ analysed the last five (5) calendar years of 2015-2019 inclusive to determine average meteorological conditions within the locality.

A Wind Rose analysis of the meteorological output is presented in Figure 3-1.

It can be seen that the prominent frequency of winds in the locale are from the south (5-Year Annual Resultant Vector).

This is also the case in summer and proportionally in spring further supporting the historic complaint from the adjacent industrial receptor that is immediately north of the existing WTS.

Winter is the seasonal period most likely to bring about an odour complaint from the southern residential receivers given the resultant vector in the winter months is from the north.

Autumn prevailing winds would primarily affect those residential receivers north-west of the Site, whilst the seasonal months of spring sees winds flowing from the south and south-west origins toward those immediately adjacent industrial receptors. Spring conditions are unlikely to affect residential receivers further downwind of those adjacent industrial receptors.

The 5-year wind analysis shows that prominent easterly wind conditions characteristic of katabatic wind flows influenced by the Scarp are largely non-existent within the locality. The prominence of the sea breeze given the marginal coastal proximity is the dominant wind pattern across the locality.

Importantly there are a high percentage of calm winds <0.5 metres per second (m/s), representing 13.77% of the 5-year dataset. During calm conditions an odour plume can stagnate and the plumes' concentration tends to increase. When a wind follows calm periods, the stagnant plume is pushed as a "parcel" and where calms persist thereafter the stagnant plume can persist as nuisance odour.

Figure 3-2 illustrates the 5-year wind trends between the daily hours of 0700hrs – 1800hrs (inclusive) and shows that calm wind percentages have decreased from the 24-hour total of 13.77% to 4.14%.



This 4.14% represents the percentage of calm winds that will occur across 7-days during Site operational hours and allowing for the lead-up and shut-down periods of each day. It should be noted however that the Site will not operate every day. The Site daily operations occur Monday – Saturday.

Within the operational hours of 0700hrs – 1800hrs, there is a prominence of winds ≤ 4 m/s of approximately 67% of the operational hour's dataset. These wind speeds would pose the greatest risk for causing odour nuisance offsite, in particular during the cooler months where there is less convective (vertical) mixing and odour plumes are retained closer to the ground.

Approximately 72% of these ≤ 4 m/s winds (excluding calms) blow from the north-west (270[°]) through north and easterly quadrants, to due south (i.e. north and east quadrants). The remaining winds (28%) blow from due south (180[°]) to north-west (270[°]) i.e. from the south-west quadrant.

Given this, those winds <4 m/s that may cause the largest odour impacts at the nearest sensitive receiver would originate from the north and east quadrants and occur for only 24% of the entire 5-year dataset. In other words, the most problematic wind conditions with respect to the nearest sensitive receiver (residential) and under the most problematic wind conditions will occur for approximately 24% annually.

As wind strength increase to >4 m/s (14.4 km/hr) the surrounding surface friction/roughness due to building structures, houses and bushland will increase mechanical dispersion of the odour plumes as the plumes come into contact with physical obstacles that break-up the plume.



Figure 3-1: Wind Characteristics of Direction and Velocity Frequencies (5-Year Annual and Seasonal)







Figure 3-2: Wind Characteristics of Direction and Velocity Frequencies (5-Year 7AM-6PM)



In consideration of the (then) Department of Environmental Regulation (DER)'s Guidance Statement: Risk Assessments (February 2017), the proposed redevelopment of the Site, assuming uncontrolled release of odours under exceptional circumstances, *Consequence* of odour impacts at the nearest residential sensitive receiver is Moderate; where:

- Onsite impacts: mid-level;
- Offsite impacts local scale: low-level; and
- Offsite impacts wider scale: minimal.

And, the *Likelihood* of the risk occurring is Unlikely, where:

• The risk event will probably not occur in most circumstances.

Based on this assessment of the risk criteria under an exceptional event where uncontrolled odours are released to the environment, the future risk is considered to be Medium.

When considering the OOA (refer Section 3-1) and those proposed process and management protocols, triggers and responses, the future risk under normal operations is considered to be <u>Low</u>, and is based on a **Minor** *Consequence* with a **Rare** *Likelihood*. The justification for this Low risk considers that:

- The existing controls in place for the Site, based on an older technology with respect to the existing naturally ventilated WTS, and handling of all Site accepted wastes, have continued to demonstrate that offsite odour impacts and nuisance do not occur;
 - There has been an exception to this due to Christmas food wastes causing an odour impact at an adjacent industrial receptor, where;
 - That event was met with a management response by the City to ensure no food wastes are held on the WTS at the end of each operational day.
- > There have been no complaints by the nearest residential sensitive receivers.

With this in mind the City has continually demonstrated a strong process and management undertaking at the existing Site, and the proposed redevelopment; to include modernized infrastructure and controls, poses no more of a risk for offsite odour impacts than currently experienced based on the proposed waste acceptance where the inclusion of FOGO represents <13% of the Sites' waste acceptance under the redevelopment proposal.

The City is also committed (as required) to installing dedicated air extraction inside the WTS and subsequent dispersion of the extracted air through roof top fans. This will improve the dispersion of the odours from the WTS.



3.4 Additional Detailed Analysis Methods

Other tools in the Odour Guidance for a Detailed Analysis are not necessary for this OIA at this time. It is evident that any increase in the Sites' odour footprint will be met with upgraded process infrastructure and subsequent management procedures, protocols and responses.

In the event however that odour release results in an odour nuisance at the nearest sensitive residential receiver, odour capture and improved dispersion and/or treatment can be employed.

It is not expected that this will be required based on the redevelopment and proposed waste acceptances, but is included herein for the purposes of forward consideration with respect to facility design and the footprint required to site infrastructure.

3.4.1 Odour Treatment Infrastructure

In in simplest form a WTS can achieve a higher level of odour dispersion through the use of a ducted extraction network and subsequent exhaust of the captured odorous air through roof top stacks.

By convention the minimum volume of air extracted from a building odour source is typically four (4) air changes per hour. This allows for a minimum standard of worker comfort inside the building. Given the WTS is likely to have no exposed personnel working inside the proposed WTS, the need for worker comfort is less important.

Nonetheless, where considering 4 x air changes per hour, the City would need to extract approximately 110,000 m³/air per hour based on a proposed WTS estimated design of 50 m x 54 m (2,700 m²) x 10 m (average height of WTS).

This volume of air would then be exhausted through roof top stacks that should be at a height of no less than 4 m above the terminal roof height of the WTS. The exhaust velocity of these stacks should be \geq 15 m/s.

Dispersion modelling of the extraction and exhaust stacks would confirm the efficacy of these stack heights and exit velocities. Where required, the stacks would either increase in height and/or exit velocity to ensure any building wake effects can be overcome that would otherwise prematurely pull the odour plume back to ground. Ensuring that the exhausted plume overcomes building wake effects ensures the odour plume is ejected into the free-stream above the WTS.

In the event that the extracted odour volume required odour treatment, the simplest and likely most cost effective solution would be biofiltration, although it is difficult to make a case for the need for such treatment of WTS odours.

Notwithstanding, EAQ would recommend a biofilter surface area of approximately 700 m^2 and 1.8m deep to treat the 110,000 m^3 /air per hour of odorous air. Again, it is difficult to substantiate the need for such odour treatment given the expectation that the combined/mixed odour strength from the



proposed WTS would be of a low concentration. On the expectation that it is a low concentration, the size of the biofilter could be scaled back.

Typically a biofilter is sized based on air volume alone and in general at those peak airflows the biofilter is only limited by peak fluctuations in odour strength. Where odour strength is low, the biofilter can receive larger volumes of low concentration air and subsequently the overall surface area of the biofilter treatment infrastructure can be reduced.

Note: The extraction and biofilter approximations herein would need to be substantiated by way of detailed design before finalization of this design advice.



4 Summary Findings of Odour Impact Assessment

- The City of Stirling proposes to redevelop its existing Recycling Centre Balcatta;
- The Site redevelopment includes redevelopment of the existing WTS (among others) to a fully enclosed modernized WTS;
- The proposed WTS will have:
 - Automatic fast-acting doorways;
 - Four designated waste bunkers for waste separation;
 - Laneways for loading of wastes into outbound B-Double trucks; and
 - All wastes are received, handled and transferred inside the WTS.
- The WTS proposes to receive, handle and transfer FOGO wastes which account for <13% of the total waste acceptance to the Site;
- The odour profile inside the proposed WTS is not expected to change from the existing WTS, although the concentration of odours during FOGO handling may increase marginally;
 - The organic fraction within the FOGO waste streams will be higher than traditional General Refuse putrescibles on a volume by volume basis, however; the General Refuse organic fraction will decrease accordingly due to household sorting of wastes prior to depositing into bins.
- The redevelopment will see a relocation of the existing WTS where the separation distance from the nearest sensitive residential receiver decreases marginally from 250 m to 200 m;
 - At a separation distance of 200 m the WTS location satisfies the EPA's separation distance of 200 m, and that of the lead document for odour assessments, the DWER Odour Guidance 2019.
- The City has not caused an odour nuisance on the nearest sensitive residential receivers;
- The City acknowledges an odour complaint during a previous Christmas period due to food wastes held on the WTS beyond end of day operations, where the City resolved the issue by changing management practices to ensure that food wastes are not held on the WTS Tipping Floor past end of day operations;
 - The odour complaint came from an immediately adjacent industrial receptor north of the WTS.
- Local meteorology shows that the average wind direction originates from the south;
- Winds ≤4 m/s affecting the nearest sensitive residential receivers, and blowing from the north and east quadrants occur for only 24% annually;
- The management protocols of the redeveloped Site ensures that where an exceptional event may occur, waste acceptance can be halted and incoming wastes diverted from the Site;
 - The WTS also has adequate capacity to hold wastes for 1½ days as required.
- The risk of an odour impact from the redeveloped WTS during an exceptional event is rated as Medium with a risk criteria of Moderate *Consequence* and Unlikely *Likelihood*; and



• Under normal operations the risk of an odour event affecting the nearest sensitive residential receiver is Low based on the proposed Site design, the waste acceptance procedures and protocols and responses within the City's management procedures.



5 Summary Table for Detailed Analysis

Detailed analysis tools	Tick if used	Comments
	Emission sou	rce
Operational odour analysis (OOA) (priority tool)	\boxtimes	Section 3.1
Odour source assessment (OSA)		Not required
Pathway and receptor		
Location review ("highly recommended")	\boxtimes	Section 2
Meteorological Review	\boxtimes	Section 3.2
Odour field assessment (OFA)	\boxtimes	n/a other than standard site visit for familiarization
Complaints data analysis	\boxtimes	Part of <u>Section 3.3</u>
Community surveys		Not required - as above for complaints
Comparative dispersion modelling		As required, but not within this OIA
Comparison with similar operations		Not required



Appendix C: Environmental Noise Impact Assessment



Recycling Centre Balcatta (RCB)

Environmental Noise Impact Assessment



Prepared for City of Stirling

25 March 2021

Project Number: TN20013-1



DOCUMENT CONTROL									
Version	Description	Date	Author	Reviewer	Approver				
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Executive Summary

This report summarises an environmental noise impact assessment undertaken for the City of Stirling's Recycling Centre Balcatta (RCB) redevelopment in Balcatta, Western Australia (WA).

Aim

The aim of the assessment was to determine if the proposed RCB redevelopment and upgraded operations will comply with the Environmental Protection (Noise) Regulations 1997.

Method

A desktop noise model was developed for the proposed RCB, incorporating the new equipment, operations and facility layout changes required for the re-development.

Outcomes – no noise control

Noise modelling and analysis of the proposed RCB operations predicts that the operations do not comply with the assigned noise levels at some of the sensitive receivers and the industrial boundary during night-time hours. As a result, noise control and noise management measures are required.

Noise Control

Table E 1 summarises the noise control and noise management measures which will be implemented by the RCB operations. Detailed information on each noise control is presented in section 5.3.

Noise control	Description	See Report Section
Operating times	Operation of some vehicles and activities will be limited to day-time hours.	5.3.1
Shielding	Noise walls be constructed on-site.	5.3.2
Vehicle speed limits	Vehicle speed limits will be restricted	5.3.3
Building design	High speed insulated doors and absorptive wall cladding will be included in the building design.	5.3.4
Equipment specifications	Noise specifications will be developed for certain noise generating equipment items.	5.3.5

Table E 1 Noise Control Summary

Outcomes – post noise control

Noise modelling of the RCB operations with the proposed noise control measures implemented has been undertaken (see section 5.4). It has been concluded from this modelling that the RCB operations will comply with the assigned noise levels with the noise controls implemented.



Recommendations

The following is recommended for the RCB;

- The noise controls listed in Table E 1 and described in detail in section 5.3 be implemented.
- Confirm the outcomes of the noise study via validation noise measurements and on-site verification activities.
- Develop an operations Noise Management Plan (NMP) for the Facility (see section 5.3.5).



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1 Introduction

1.1 Background

The City of Stirling (the City) is proposing to redevelop its existing Balcatta Recycling Centre (RCB) to improve the current layout and establish a new Community Recycling Centre (CRC) and Waste Transfer Station (WTS) Facility (the Project). The RCB is located at 238 Balcatta Rd, Balcatta, Western Australia.

1.2 Aim

The aim of the noise assessment was to determine if the proposal will comply with the Environmental Protection (Noise) Regulations 1997 (the Regulations), and where applicable, define noise mitigation measures to achieve compliance.

1.3 Scope

The scope of this report includes a noise assessment for the Project, including existing equipment, proposed upgrades and new equipment.

1.4 Applicable Documents

[1] Environmental Protection Act 1986.

- [2] Environmental Protection (Noise) Regulations 1997.
- [3] Draft Guidance Note 8 Guideline on Environmental Noise for Prescribed Premises.



2 Facility Overview

The RCB, as shown in Figure 2-1 and Figure 2-2, is operated by the City. Redevelopment of the site, as shown in Figure 2-3, will improve the layout, operational efficiency and provide a wider variety of waste management services to the City and Perth Metropolitan Area.

The proposed redevelopment will include the following services:

- Free Community Drop-off Area:
 - Container Deposit Scheme Facility.
 - Recycle Shop and Forecourt.
 - Hazardous Household Waste (HHW) Facility.
 - Material Recovery Drop off.
- Paid and Pass Community Drop-off Area:
 - Whitegoods, Mattresses and Tyre Laydown.
 - Green Waste Shed.
 - Mixed Waste Shed.
- Waste Transfer Station (WTS) Facility.
- Operations Area:
 - Material Storage Bunkers.
 - \circ $\;$ Truck Wash Bays.
 - \circ Offices.
 - Weighbridges.
 - Workshop.
 - Surface Water Management System.

The site is currently open to the public Monday to Sunday from 8am to 4pm, with general contractor vehicle movements, associated with waste pickups, occurring between 4am to 7pm.




Figure 2-1 : Recycle Centre Balcatta – Site Locality (source: Nearmaps)





Figure 2-2 : Recycle Centre Balcatta Site Overview – Current Site Layout (source: Nearmaps)





Figure 2-3 : Proposed RCB layout



3 Assessment Criteria

Received noise has been assessed against the Regulations [2]. The following sections summarise the noise limits (i.e. assigned noise levels) defined in the Regulations.

3.1 Environmental Protection (Noise) Regulations

The Regulations define maximum allowable noise levels which apply to noise received at sensitive premises, such as residential areas. These are determined by a combination of a base noise level plus an Influencing Factor (IF). The result is termed the assigned level.

The assigned noise levels include L_{A1} , L_{A10} and L_{AMAX} noise parameters, defined as:

- L_{ASMAX} means an assigned level which is not to be exceeded at any time;
- L_{AS1} means an assigned level which is not to be exceeded for more than 1% of time; and
- L_{AS10} means an assigned level which is not to be exceeded for more than 10% of time.

For noise sensitive premises, the time of day also affects the assigned levels.

Table 3-1 presents the assigned noise levels for noise sensitive residential premises. As the facility is operational from Monday to Sunday from 7am, the L_{A10} assigned noise level is 35 + IF.

Type of premises	Time of day	Assigned Levels (dB)		
		L _{A10}	L _{A1}	L _{Amax}
	0700 to 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
Noise sensitive premises: highly sensitive area	0900 to 1900 hours Sunday and public holidays	40 + IF	50 + IF	65 + IF
	1900 to 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + IF	45 + IF	55 + IF
Industrial	All hours	65	80	90

Table 3-1 : Assigned Noise Levels as defined in the Environmental Protection (Noise) Regulations

3.2 Influencing Factor

The Influencing Factor (IF) is based on the proximity of noise sensitive premises to surrounding industrial and commercial land uses and the proximity of major and secondary roads.

Seven noise sensitive receivers, listed in Table 3-2, are in close proximity to the site and have been used to assess the impacts of the RCB on the community. An influencing factor has been calculated for each premises which is also shown in Table 3-2. The location of each receiver is given in section 4.2.1.

R7



Table 3-2 : Noise Sensitive Receiver Influencing

3.3 Adjustments for intrusive or dominant characteristics

-

Received noise levels are subject to adjustments if the noise exhibits intrusive or dominant characteristics (i.e. if the noise is impulsive, tonal or modulating). These adjustments, shown in Table 3-3, are cumulative up to a maximum of 15 decibels (dB).

-

19.2

Yes

3

Section 9 of the Regulations sets out objective tests to assess whether the noise is free of these characteristics. A definition of tonality, impulsiveness and modulation as defined by Regulation 9 is presented in Appendix A1 and a summary of its application is discussed below.

Tonality	Modulation	Impulsiveness
+ 5dB	+5 dB	+10 dB

Based on the proposed vehicle movements, activities and equipment to be utilised on-site, it is highly likely that the received noise will exhibit tonal characteristics at the nearest receivers. As a result, a 5 dB tonal penalty has been added to the received noise levels at each receiver.



3.4 Applicable Assigned Levels

The facility will operate during night-time and daytime hours, the applicable assigned noise levels for the nearby noise sensitive premises are as shown in Table 3-4.

Noise Sensitive		Night-time (LA10)	e [*] Assigne	ed Levels	Daytime ^{**} Assigned Levels (LA10)		
Premises	Factor, ub	L _{A10}	L _{A1}	L _{Amax}	L _{A10}	L _{A1}	L _{Amax}
R1	3	38	48	58	48	58	68
R2	3	38	48	58	48	58	68
R3	4	39	49	59	49	59	69
R4	1	36	46	56	46	56	66
R5	2	37	47	57	47	57	67
R6	1	36	46	56	46	56	66
R7	3	38	48	58	48	58	68

Table 3-4 : Assigned Night-time Noise Levels

* Night-time hours are 2200-0700 on days which are not a Sunday or Public Holiday (where night-time hours are 2200-0900)

** Daytime hours are 0700-1900 on days which are not a Sunday or Public Holiday (where daytime hours are 0900-1900 and the levels are 5 dB less than the daytime levels in the table)



4 Noise Modelling Overview

4.1 Noise Model Software

A desktop environmental noise model was created to simulate the proposed operations using the SoundPlan v8.2 software program. This software package calculates sound pressure levels at nominated receiver locations and produces noise contours over a defined area of interest. SoundPlan can be used to model different types of assessments, such as industrial noise, traffic noise and aircraft noise.

The inputs required by the SoundPlan modelling software are noise sources, ground topographical data, meteorological data and sensitive receiver point locations. SoundPlan utilises CONCAWE¹,² for calculating the attenuation of sound during outside propagation.

4.2 Noise Model Inputs

4.2.1 Noise Sensitive Receivers

Table 4-1 and Figure 4-1 present the locations of noise sensitive receivers (R1 to R7) used in this assessment to predict noise levels within the community.

Reference	Description	GPS Location (MGA zone 50)		
		x	у	
R1		388099.8	6473705.2	
R2	Noise Sensitive Premises	388266.3	6473699.3	
R3		388478.8	6473736.5	
R4		388657.9	6473605.7	
R5		388255.9	6473599.0	
R6		387917.8	6473606.4	
R7		388958.8	6473777.3	
Boundary	Industry to Industry Boundary	N/A		

Table 4-1 : Noise Sensitive Receivers

¹ CONCAWE (Conservation of Clean Air and Water in Europe) was established in 1963 by a group of oil companies to carry out research on environmental issues relevant to the oil industry.

² The propagation of noise from petroleum and petrochemical complexes to neighbouring communities, CONCAWE Report 4/81, 1981





Figure 4-1 : Surrounding Noise Sensitive Premises.

4.2.2 Topography

A City approved ground topographical layer of the study area, with contour heights in 2 metre (m) intervals, has been added to the model. The topography has been used to create a Digital Ground Map (DGM) in the noise model.

4.2.3 Ground Absorption

The acoustic properties of the ground surface has an effect on the propagation of noise. Flat nonporous surfaces such as concrete, asphalt and calm water are highly reflective whereas soft, porous surfaces such as foliage and grass are highly absorptive.

For CONCAWE, the ground factor (G) varies from 1 (totally absorptive) to 0 (totally reflective).

To represent the study area, the ground factor applied to the model was 0.4 for industrial and residential areas and 0.8 for parks and recreational areas.

4.2.4 Meteorological Conditions

SoundPlan (using the CONCAWE algorithm) calculates noise levels for defined meteorological conditions. Table 4-2 presents the worst-case meteorological conditions for daytime only as applied to the model, which are defined in the Department of Water and Environmental Regulation's (DWER's) "Draft Guideline on Environmental Noise for Prescribed Premises".



Table 4-2 :	Worst-Case	Meteorological	Conditions f	or Noise	Propagation
	Troise Gase	increation of objection	conditions	01 110150	opagation

Time of Day	Temperature	Relative	Wind	Wind	Pasquil Stability
	(Degrees)	Humidity	Speed	Direction	Category (PSC)
Night (19:00 - 07:00)	15° Celsius	50%	3 m/s	Worst Case	E

4.2.5 Noise Sources

4.2.5.1 Mobile Equipment

The following mobile equipment were included in the noise model:

B-double trucks

The B-double trucks sound powers were derived from information obtained from Mack trucks, which states that all Volvo and Mack products are certified to ADR 83/00 or European Regulation ECE R51. Based on this information, the calculated sound power is 109 dB(A), at 75% of the maximum engine speed was used.

Hook-Lift Bin Trucks

Hook-Lift trucks are used to transfer the containers filled by members of the public (e.g. glass or electronic waste) to the respective waste stream. The noise source level applied to these trucks is 98dBA.

Wheel Loaders

Wheel loaders will be utilised for bulk waste, feeding the green waste shredder and loading the B-doubles. The noise source level applied to these wheel loaders is 99 dB(A).

4.2.5.2 Green Waste Shredding and Grinding

Green waste shredding and grinding will be undertaken inside the Green Waste Shed. The noise source level applied to the Shredder and Grinder is 115 dBA.

Detailed noise source data including octave bands for each item measured are shown in Appendix B and Table 4-3 provides a summary of the equipment Sound Power Levels (SWL) used in the model.

Equipment Details	Operation	Total	Sound Power Level (SWL) per item in dB(A)
Customer/ Residential Cars Idling	Dropping off waste	-	73
B-Double Trucks	Pickup Waste	2	109
Hook-lift Bin Trucks	Pickup / Move Waste	1	98
Wheel Loader	Green Waste Shed	4	99

Table	4-3	: Fo	uipm	ent N	oise	Sources
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Equipment Details	Operation	Total	Sound Power Level (SWL) per item in dB(A)
	Mixed Waste Shed		
	WTS Facility		
	Material Storage Bunkers		
Timber Grinder/Shredder	Green Waste Shed	1	115
Cardboard Compacter	Materials Recovery Area (outside)	1	85

4.2.6 Buildings

All the facilities buildings will be built on a concrete slab with a structural steel frame clad with corrugated steel sheeting. The acoustic properties of these materials have been used for the buildings in the model.

4.2.7 Noise Model Scenario

The modelled scenario includes all the proposed buildings and infrastructure associated with the future operations. The following activities have been included in the scenario:

- Customer Recycling Collection.
- Light vehicles idling.
- WTS Facility.
 - Wheel Loader.
- Green Waste and Mixed Waste Shed.
 - Shredder.
 - \circ Wheel Loader.
- B-Double Trucks (2).
- Bin Lift Trucks (1).
- Material Storage Bunkers.
 - Wheel Loader.
- Operational Cardboard Compactor.

Notes:

- Truck numbers (hook lift trucks, customer vehicles and Waste Transfer Vehicles) have been based on the estimated daily traffic movements of 10 trucks and 120 light vehicles per hour.
- It should be noted that short term vehicle movements of trucks exiting the site to commence daily operations (e.g. road sweepers and curb side collection trucks) were not included in the assessment.



5 Noise Model Results

The following sections present the modelling results and contour maps for the operational scenario as discussed in Section 4.2.7.

5.1 Model Results

Table 5-1 presents the predicted received noise levels for the modelled scenario under worst case weather conditions, and a comparison against the assigned noise level (as the modelled activities commence before 7am the night-time assigned levels are given). As can be seen from the table the predicted noise levels exceed the assigned level. As a result, noise controls need to be considered to reduce the impact of the facilities noise on the surrounding residents.

Sensitive Premises	Assigned Level (L _{A10})	Model Prediction (LA10) [5dB penalty applied for tonality]
R1	38	48
R2	38	53
R3	39	52
R4	36	48
R5	37	49
R6	36	42
R7	38	39
Boundary	65	<65

Table 5-1 : Noise Modelling Results

5.2 Noise Contour Map

Figure 5-1 presents the noise contour map for the modelled scenario.





Figure 5-1 : Noise Contour Map



5.3 Noise Controls

This section details the noise controls that will be implemented to reduce the facilities noise impacts.

5.3.1 Operational Times

The following operations and equipment sources will only be used during daytime hours as defined in the noise Regulations:

- Hook Lift Trucks.
- Green Waste Shredding/Grinding.
- Green/Bulk Waste Wheel Loaders.
- B-doubles site movements (weekdays only).

5.3.2 Noise Barriers

To reduce noise received at the industry-to-industry boundary and at the receivers to a compliant level, the following noise barriers are required:

- An acoustic wall with a height of 2.2m to be constructed on the north and east site boundary.
- An acoustic wall with a height of 3.5m to be constructed on the south boundary.
- An acoustic wall with a height of 2.2m will be constructed north of the Storage Area.

5.3.3 Vehicles

The following noise control measures is proposed for vehicles at the site:

- Speed limits should be limited to 20 km/h.
- B-double trucks should be certified to ADR 83/00 or European Regulation ECE R51.
- As the maximum speed on site will be set up 20km/h, the sound power for the B-Doubles is assumed to be 103 dB(A), a conservative 6 dB quieter.
- B-Doubles enter site, park up in the loading chutes or loading areas where they shut of their engine, they are not idling.³
- Loaders to shut their engines in between loading operations.

³ The B-double numbers are based on waste projections. It should be noted that loading times of the B-doubles can exceed the model assessment period, which could result in more B-doubles located on site at any time.



5.3.4 Buildings

The following noise reduction packages are required to be included in the design of the CDS, WTS, Mixed Waste and Green Waste Buildings:

- The ventilation systems are to be designed with a low noise mechanical system.
- Any fans, cowlings and louvres associated with the active and passive ventilation of the Facility are to be orientated North (i.e. away from the nearest sensitive receivers).
- Noise absorptive cladding on the inside wall and ceilings to a minimum specification of a 50mm Rockwool.

At the WTS Facility, Green Waste and Mixed Waste Sheds, loading of B-doubles will be done via a loading bay tunnel to reduce the noise from the wheel loaders.

- These building include fast acting insulated high-speed doors.
- For the Green Waste shed, the timber shredder will achieve a sound power level of ≤105 dB(A).

5.3.5 Environmental Noise Management Plan

An Environmental Noise Management Plan (ENMP) should be considered to help manage environmental noise emissions. The plan should include the following:

- Procedures to ensure noise emissions are appropriately managed.
- Define maximum noise levels for trucks entering site.
- Actions to minimize and manage noise complaints effectively and efficiently.
- Annual verification noise measurements be undertaken once the facility is operational.

5.4 Noise controls Scenarios

5.4.1 Model Scenarios

Table 5-2 details the noise model scenarios inclusive of noise controls, it should also be noted that these scenarios were run under the meteorological conditions for the stipulated time of day.

Scenario A – Night-Time (2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays)	Scenario B – Daytime (0700 to 1900 hours Monday to Saturday)	Scenario C –Daytime (Sunday) (0900 to 1900 hours Sunday and public holidays)
Green Waste Shed (wheel loader only)	Green Waste Shed (shredder + wheel loader)	Green Waste Shed (shredder + wheel loader)
Mixed Waste Shed (wheel loader only)	Mixed Waste Shed (wheel loader only)	Mixed Waste Shed (wheel loader only)
WTS Facility (wheel loader only)	WTS Facility (wheel loader only)	WTS Facility (wheel loader only)

Table 5-2 : Noise Control Scenarios



Scenario A – Night-Time (2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays)	Scenario B – Daytime (0700 to 1900 hours Monday to Saturday)	Scenario C –Daytime (Sunday) (0900 to 1900 hours Sunday and public holidays)			
Customer cars on site	Customer cars on site	Customer cars on site			
	Hook lift materials recovery and Material Storage Bunkers (2)	Hook lift materials recovery (1)			
	Cardboard Compactor	Cardboard Compactor			
	Loader at Material Storage Bunkers (not operating during B-Double operations)				
	B-double (2) under normal operations (not operational during Loader operations)				

5.4.2 Model Results

Table 5-3 presents the predicted received noise levels for the modelled scenarios under worst case weather conditions, and a comparison against the assigned noise. The results show that with the noise controls implemented the facility is predicted to be compliant.

Consitivo	Model Prediction (LA10) - [5dB penalty applied for tonality]							
Premises	Assigned Noise Level	Scenario A	Assigned Noise Level	Scenario B	Assigned Noise Level	Scenario C		
R1	38	34	48	47	43	40		
R2	38	35	48	48	43	42		
R3	39	33	49	48	44	40		
R4	36	29	46	40	41	36		
R5	37	31	47	45	42	38		
R6	36	29	46	41	41	35		
R7	38	27	48	39	43	34		
Boundary	65	<65	65	<65	65	<65		

 Table 5-3 : Noise Modelling Results



5.4.3 Noise Contour Maps

Figure 5-2 to Figure 5-4 present the noise contour maps for the modelled noise control scenarios inclusive of all noise controls.





Figure 5-2 : Noise Contour Map Noise Control Scenario A (Night)





Figure 5-3 : Noise Contour Map Noise Control Scenario B (Day)





Figure 5-4 : Noise Contour Map Noise Control Scenario C (Sunday Daytime)



6 **Conclusions and Recommendations**

Based on the outcomes of the modelling and analysis it can be concluded that if the proposed noise controls are implemented correctly, the noise levels from the Project are predicted to comply with the assigned noise levels as defined in the Regulations.

The following is recommended:

- That the proposed noise controls be implemented (see Section 5.3).
- That an ENMP be developed for the Facility (see Section 5.3.5).



APPENDIX A Noise Regulations Summary

Noise management in Western Australia is implemented through the Environmental Protection (Noise) Regulations 1997 (the Regulations), which operate under the Environmental Protection Act 1986. The Regulations specify maximum noise levels (assigned noise levels) which are the highest noise levels that can be received at noise-sensitive (residential), commercial and industrial premises.

Assigned noise levels are defined differently for noise sensitive premises, commercial premises, and industrial premises. For noise sensitive premises, an Influencing Factor (IF) is included in the assigned noise levels. The IF depends on the presence of major/minor roads and commercial/industrial land use zonings within circles of 100 metres and 450 metres radius from the noise sensitive premises.

For noise sensitive residences, the time of day also affects the assigned levels. The regulations define three types of assigned noise level:

- i) L_{ASMAX} means an assigned level that is not to be exceeded at any time;
- ii) LAS1 means an assigned level that is not to be exceeded for more than 1% of time;
- iii) L_{AS10} means an assigned level that is not to be exceeded for more than 10% of time.

Type of premises receiving noise	Time of day	Assigned Levels (dB)					
		L _{A10}	L _{A1}	L _{Amax}			
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor			
	0900 to 1900 hours Sunday and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor			
	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + influencing factor			
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor			

Table A1 : Assigned Noise Levels for Noise Sensitive Premises



Type of premises receiving noise	Time of day	Assigned Lev			
		L _{A10}	L _{A1}	L _{Amax}	
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80	
Commercial premises	All hours	60	75	80	
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90	
Industrial and utility premises in the Kwinana Industrial Area	All hours	75	85	90	

Environmental Protection (Noise) Regulations 1997

Intrusive or Dominant Noise Characteristics (Regulation 9)

Received noise levels are subject to penalty corrections if the noise exhibits intrusive or dominant characteristics, i.e. if the noise is impulsive, tonal or modulated. That is, the measured or predicted noise levels are increased by the applicable penalties, and the adjusted noise levels must comply with the assigned noise levels. Regulation 9 sets out objective tests to assess whether the noise is taken to be free of these characteristics. Table A2 lists these penalties.

Table A2 : Assigned penalties for intrusive or dominant noise characteristics

Adjustment where noise emission is not music. These adjustments are cumulative to a maximum of 15 dB

Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB	+5 dB	+10 dB

Regulation 9 amended in Gazette 5 Dec 2013 p. 5656 7.



APPENDIX B Noise Source Levels

	Frequency Hz, dB(A)								
Source	63	125	250	500	1k	2k	4k	8k	Overall dB(A)
Rhino 500 bin lift truck	80	85	89	92	92	92	86	75	98
Wheel Loader (L120F)	75	88	87	94	96	93	91	82	99
Customer/ Residential Cars Idling	52	58	64	66	70	69	61	54	74
B-Double Truck – Speed under 20km/h	84	93	99	102	102	98	103	93	109
HAAS Timber Grinder	92	99	104	107	111	109	104	96	115
Cardboard Compactor	68	71	73	75	74	72	70	60	81

Table B 1 - Modelled Mobile Equipment, Sound Power Levels (SWLs)



Assets | Engineering | Environment | Noise | Spatial | Waste

Talis Consultants

Head Office Level 1, 604 Newcastle Street, Leederville Western Australia 6007

> PO Box 454, Leederville Western Australia 6903

NSW Office 5/62 North Street, Nowra New South Wales, 2541

PO Box 1189, Nowra New South Wales, 2541

P: 1300 251 070 E: info@talisconsultants.com.au

Talis Consultants

Level 1, 604 Newcastle Street, Leederville, Western Australia 6007

PO Box 454, Leederville, Western Australia 6903

Phone: 1300 251 070 Email: info@talisconsultants.com.au