iw Projects

MILLAR ROAD WASTE MANAGEMENT FACILITY

204 MILLAR ROAD WEST, BALDIVIS

WORKS APPROVAL APPLICATION SUPPORTING DOCUMENTATION

Image – Site Entrance

Prepared for

CITY OF ROCKINGHAM

[redacted]

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1. Introduction

The City of Rockingham (City) owns and operates the Millar Road Waste Management Facility. The facility was originally developed in the 1990's and with the growth in the residential population, there is a need to significantly upgrade and expand the current community waste management infrastructure.

In consideration of current and future residential population, the City proposes to develop completely new community small goods and bulk drop-off areas, a new waste transfer station and a new bulk green waste handling facility on site.

In addition, the City is proposing developing additional leachate ponds on site to improve current leachate management and in time, to also be used as replacement ponds for the old leachate ponds located on the Western Landfill.

This document provides the supporting documentation for the Works Approval application to enable the construction and operation of the proposed infrastructure.

2. The Proponent

The Proponent for this proposed development is the City of Rockingham:

Civic Boulevard
ROCKINGHAM
WA 6168

3. Premises Location and Details

Property Location:

204 Millar Road West
BALDIVIS
WA 6171

Property Descriptions:

Lot 2170
Plan 211650
Volume 1464
Folio 465

Prescribed Premises

The Prescribed Premises boundary incorporates the complete Lot and is unchanged by this application.

Appendix No. 1 – Premises Map indicates the extent of the Prescribed Premises boundary. The map has been sourced from the current facility licence.

4. Local Government Authority

The proposed development is within the City of Rockingham and the City is the Proponent.

The City has not identified any Planning related issues.

5. Ministerial Requirements

Environmental Protection Act Part IV - The original development was assessed by the Environmental Protection Authority (EPA), resulting in Ministerial Statement 271.

In the Ministerial Statement, Condition 9.1.3, states that "*The Proponent is committed to the maintenance and enhancement of waste recycling programmes within its municipal district and will ensure that ongoing practices at the landfill will facilitate the current programmes being implemented and the introduction of additional programs such as composting.*" The proposed development further enhances the City's ability to optimise the separation of recyclable and hazardous waste from the incoming waste stream.

This is the only condition related to the proposed works.

6. Current Operations

The site is currently used for a number of waste management activities operated under licence L7064/1997/11, including the following:

- Category 57: Used Tyre Storage (general) – up to 250 tyres at any one time;
- Category 61: Liquid Waste Facility – 1,000 tonnes per annum (tpa);
- Category 61A: Solid Waste Facility – 10,000 tpa;
- Category 62: Solid Waste Depot – 50,000 tpa; and,
- Category 64: Class II or III Putrescible Landfill Site – 450,000 tpa.

Under the above categories, the facility undertakes the following waste management activities:

- Community drop-off of recyclable items and hazardous household waste and general waste;
- Bulk drop-off of green waste; and,
- Landfilling of Class III waste and the associated landfill management activities, predominantly leachate, landfill gas, litter, odour and dust management.

In addition to the above waste management activities, there is also the City's waste administration and waste vehicle depot and vehicle workshop.

Of the above activities, only the community small goods and bulk drop-off, waste transfer, bulk green waste and leachate management activities will be impacted by the proposed infrastructure development.

7. Activities and Throughput

7.1. Proposal Activities

This proposal covers development of the following infrastructure:

- Community drop-off facilities for small and bulk materials;
- Community waste transfer station;
- Bulk green waste facility; and,
- Three new leachate ponds.

The proposed activities include the following:

- Community small goods drop-off:
  - Used motor oil;
  - Batteries;
  - Gas bottles and fire extinguishers;
  - E-waste;
  - Cardboard;
  - Mattresses;
  - Used vehicle tyres;
  - Steel and aluminum cans and aerosol cans;
  - Used paint;
  - Glass and plastic bottles; and,
  - Small residual waste bin.
- Community bulk drop-off:
  - Scrap metal and white goods, including de-gassing;
  - Green waste;
  - Inert waste; and,
  - Mulch free return to community.
- Community waste transfer station for residual waste destined for landfill;
- Bulk green waste for:
  - Receiving accumulated green waste from the community drop-off area;
  - Direct receival of bulk greenwaste;
  - Mulching green waste;
  - Storage of mulched green waste for subsequent utilisation by the City and community; and,
  - Removal of excess mulched green waste.
- Three additional synthetically lined leachate ponds.

7.2. Material Types and Quantity

The existing facility operating licence sets out the type and quantity of materials that can be accepted on site. This is a comprehensive list and covers all current and future requirements.

There is no proposed change to any material type or quantity from what is currently reflected in the facility licence. This proposal is simply developing improved facilities to replace the current, out-dated infrastructure. Consequently, the current licenced material type and quantity remains valid.

8. Infrastructure Design and Construction

8.1. Development Staging

The site is currently going through a significant redevelopment to improve the site utilisation and waste management facilities to cater for the City's and communities current and future waste management needs. There are numerous stages of developments; however, not all construction activities are waste related and hence, do not require a Works Approval prior to construction.

The City has recently completed the Stage 1 construction of a new site entrance road for commercial vehicles, which did not require a Works Approval. This road will now be slightly amended and used for the Stage 2 and Stage 3 main access road, with the commercial vehicles using an alternative route within the site to access the landfill.

This application relates to the Stage 2 development of the new bulk green waste area and community drop-off areas and the Stage 3 being the development of the new waste transfer station.

Subsequent stages of development include a new vehicle workshop, reconfigured administration office and new vehicle parking and storage area. The detailed design of these future facility is yet to be determined. None of these require environmental approval.

The leachate pond development is unrelated to the above activities and will be progressively developed as funding and operational needs determine. In is anticipated that at least the first pond and potentially the second pond will be constructed in 2026 or maybe 2027, with the third pond being constructed at a later time, again, dependent on budgets and operational requirements.

8.2. New Small Goods Drop-off Area

The new small goods drop-off facility will be redeveloped in the same area as has historically been used for these activities.

Some of the existing infrastructure (paving, asphalt, some concrete slabs) will be removed to form a large flat area that will be asphalted to provide significant flexibility in facility operation, including improved access to the existing recycling shed. There will be an ability to adjust the size and location of the various waste management activities to suit customer numbers, waste types and volumes and safe traffic movements. The vast majority of the native trees and some infrastructure (recycling shed, concrete slabs, water supply, cameras) will be retained and reused in the new facility layout.

The small goods drop-off area has not been designed with any specific activity related infrastructure (predetermined activity locations). Being a large flat asphalt area with a centrally located existing shed, there is total flexibility for the operational staff to move the various activities around to suit operational requirements, and being a predominantly open asphalt surface, trafficability and spillage management is improved.

The facility will operate with mobile storage containers to receive the drop-off materials. As appropriate to the size and type of materials being handled, some of the receptacles will be sealed and/or covered to prevent negative environmental impact. The number and size of receptacles for each material type will be dependent on the volume of material being received, ideally there will be adequate receptacles available to receive a full day's drop-off material quantities. This will eliminate the need for operations staff to remove and replace receptacles during the busy facility operating hours (receptacles removed and replaced during quiet days or after hours), which is a safety issue when customers are using the facility.

The space available enables the facility operator to set up multiple drop-off locations for the same material types, which increases facility efficiency during busy operating periods (weekends), and reduces traffic queuing times and reducing traffic congestion.

The existing recycling shed will be used to the receival and storage of weather impacted material.

Appendix No. 2 – Stage 2 and Stage 3 Development Drawings provide details of the proposed new small goods drop-off facility.

8.3. New Community Bulk Drop-Off Facility

The new community bulk drop-off facility will be constructed in the area of the current green waste (community and bulk) drop-off and inert waste drop-off areas. The new facility will provide improved space utilisation and safety for the community, including catering for the anticipated population growth over the next 15 to 20 years. The new facility will also include an area for the drop-off of scrap metal, white goods and mattresses and an area for the storage of mulch for the community to take at no charge.

Improved and more streamlined road access will be provided to the new facilities, with the road also providing access to the new waste transfer station. Ultimately, the community waste handling will involve the progressive drop-off of various waste and recyclable material types in a single drive through process that is easily followed by the customers and safely and environmentally sustainably managed by the City.

The various waste handling areas have been designed with “Area A” and “Area B” configurations to enable the facility operators to receive the material in one area, while removing material from the other area, ensuring continuous operation in a safe manner, while minimising the quantity of material accumulating within the new facilities.

The drop-off areas have been designed as a single large area, that have been split into two portions (Area A and Area B), with movable concrete barriers to enable the facility shapes to be occasionally adjusted, based on material quantities and space availability. The main vehicle access roads are constructed of asphalt, with the material drop-off and storage areas consisting of 500 mm of compacted limestone.

All surfaces are sloped to ensure surface water runoff is directed to the surface water management system that includes a combination of localised stormwater sumps, soakwells and piped drainage systems to remove excess stormwater away from the waste management areas. The stormwater management system has been developed to, where possible divert surface water away from the waste handling areas and to ensure that the waste material is not stored in waterlogged areas and that there is free drainage of surface waters away from the waste handling areas.

Waste material will be dropped off by the community (customers), with City personnel in attendance to provide guidance and to ensure that only acceptable waste is dropped off. Occasionally, when the disposal floor is full, the area will be closed to the community and the material pushed up into stockpile, from where it will be relocated to either the bulk scrap metal area, new bulk green waste area or the inert material to landfill for use as road construction material. The white goods will be carefully stacked prior to degassing and thereafter relocated to the bulk scrap metal storage area located in the Valley Hollow.

Due to the limited space available within the new facility, there can be no long-term storage of accumulated waste. All waste material will be moved from the drop-off area within 48 hours to make space for subsequent waste drop-off. During the weekend peak periods, the accumulated waste material will be removed before the facility opens the following day.

There will also be a small area of 500 mm compacted limestone for the storage of mulched green waste being made available for the community to take at no cost.

Effectively, the facilities will operate in a similar fashion as currently occurs; however, in a far more structured manner, with the accumulated material being regularly removed.

The development also includes the construction of a staff and customer ablution and small storeroom.

During the construction of the new facilities, the existing scrap metal, white goods, green waste and inert waste drop-off activities will be temporarily relocated to an alternative area on site. The staging of the various construction activities has been developed to ensure that there will always be continuous operation of the community services on site.

Appendix No. 2 – Stage 2 and Stage 3 Development Drawings provides details of the proposed new community bulk drop-off facility.

8.4. Community Waste Transfer Station

The new waste transfer station will consist of asphalt areas for vehicle assess and concrete hardstand for the waste drop-off and waste push-up/load-out activities. The accumulated waste will be regularly pushed up and placed into large volume hooklift bins for subsequent removal to landfill.

The facility has been designed in two sections (Area A and Area B), so that one area can receive waste while the facility operators work in the other area to remove the accumulated waste material. Once the one area has been cleaned of waste, the areas will be swapped over and the process repeated. This ensures the safe and continuous operation of the facility, without the accumulation of significant quantities of waste material.

Stormwater landing in the asphalt area will be directed to interconnected soakwells, with any overflow directed, via a piped system, to stormwater sumps. Stormwater landing in the concrete hardstand area will flow across the concrete surface and enter inlet pits and from there be diverted via a piped system to stormwater sumps.

The lower load-out area consists of four concrete saw-tooth load-out bays for each of the two waste transfer station areas, making a total of eight load-out bays. Hooklift bins will be used to receive the accumulated waste and relocate it to the landfill. The bins are parked on concrete slabs, with the remainder of the lower area to the south being asphalt. The lower area also includes two stormwater sumps including a piped overflow culvert to the Valley Hollow to cater for excess surface water runoff.

The existing waste transfer station will continue to operate while the new facility is being constructed. Once the new facility has been opened, the existing waste transfer station will be demolished and removed (as part of subsequent stages of construction).

Appendix No. 2 – Stage 2 and Stage 3 Development Drawings provides details of the proposed new waste transfer station.

8.5. Bulk Green Waste Area

With the new community green waste drop-off area only receiving small loads of green waste and with there being a need to regularly remove the accumulated green waste from the new drop-off facility, a new bulk green waste area will be developed in the Valley Hollow. This new bulk green waste area will receive the green waste from the new community drop-off area and also directly delivered bulk loads of green waste. In addition to the green waste, there will also be an area for the processing and storage of mulched green waste that will be utilised by the City and community for landscaping purposes, with excess mulched green waste being removed from site.

The new infrastructure includes two compacted limestone areas of 70 m x 70 m each for the storage and mulching of green waste. The compacted limestone will be 500 mm thick and sloping at a gradient of 2% (1 in 50) towards two lined ponds, to ensure that there is adequate runoff from the limestone area to prevent ponding and hence stagnation within the stockpiled green waste material. The two ponds will be lined with 2 mm HDPE. The limestone pads are designed to be a minimum of 500 mm above the surrounding ground levels, which will prevent external surface water from flowing into the green waste area.

The two lined stormwater ponds have a storage capacity of approximately 1,490 m^3 each, excluding 500 mm of freeboard. With a catchment area of 6,100 m^2, each pond can cater for 244 mm of surface water runoff. Using a runoff coefficient of 50% (50% of the rainfall is absorbed into the green waste and surface of the limestone pad), each pond provides adequate storage to cater for approximately 488 mm of rainfall. A 1 in 20-year, 24-hour rainfall event (the typical rainfall event considered in design) has a maximum rainfall of 104 mm and a 1 in 100-year, 7-day event (the largest rainfall event measured by the BoM) has a maximum rainfall of 212 mm. Consequently, the stormwater ponds have been designed with significantly more capacity than is required to cater for a single rainfall event. The additional pond capacity has been provided to allow for some operational flexibility such that the facility operators do not have to empty the ponds immediately after a rainfall event in order to provide the minimum capacity for subsequent storm events. This operational flexibility enables the facility operators time to sample and test the accumulated surface water runoff to determine whether the water is not contaminated and hence, can be used for irrigation of the adjacent landfill capped surface or if contaminated, then it will be managed as leachate, as occurs with all landfill leachate on site.

The ponds are approximately 2.25 m deep, with 1.75 m of operating depth and a sump at RL 4.0 m AHD. Over the past few years of groundwater monitoring at the end of winter (period of highest groundwater level), the groundwater under the two ponds has been measured at approximately RL 1.8 m AHD to RL 2.0 m AHD. Hence, there is a minimum of 2.0 m separation distance between the underside of the pond liners and the local groundwater.

There will be a pump and associated extraction/delivery pipework to remove collected surface water runoff from the ponds to either reticulate the adjacent landfill capping area with uncontaminated surface water or pump the contaminated water into the overall site leachate management system.

In addition to the above, the two lined ponds will be fenced, there will be perimeter access roads and two external stormwater sumps to collect surface water from the surrounding areas and prevent it from entering the lined ponds.

As part of the pond construction works, the Superintendent will review the liner material manufacturer's Manufacturing Quality Assurance (MQA) documentation to confirm that the supplied liner material meets the required specification.

A specialist liner installation crew will be used that has a minimum of 100,000 m^2 relevant experience in the installation and CQA testing of similar geomembrane lining systems. In addition, during the liner installation, the Superintendent will undertake regular site visits and review the lining installer's CQA documentation and test results to confirm the works is carried out appropriately.

Appendix No. 2 – Stage 2 and Stage 3 Development Drawings provides detail on the proposed facility expansion.

Appendix No. 3 – Bulk Green Waste Area Pond Lining Specification provides the specification for the proposed 2 mm liner.

8.6. Leachate Ponds

The City undertook an assessment of the potential leachate generation on site (HELP Modelling and Water Balance). The outcome of the assessment was that the existing leachate ponds, including surface sprays on the ponds, are unable to manage the leachate generation from an average rainfall year, and that there was a need to utilise the site water cart to spray leachate over the active landfill area to increase leachate evaporation. The required utilisation is to run the water cart for an average 3.3 loads/weekday over the summer dry period from October to March.

If Pond A is constructed, then the water cart utilisation decreases to 2.2 loads and with Pond B, the water cart utilisation drops to 1.1 loads/weekday. The City has previously, successfully run up to 6 loads of the water cart per day over extended periods in order to manage above average weather patterns; hence, the above minimal water cart utilisation is easily achievable.

The third leachate pond has been included in the application to provide the City with an additional contingency to be able to construct an additional leachate pond if required.

The three new leachate ponds have been located on top of the capped Cell 12, 13, 14 & 15 landfill area. This is the only reasonable, long-term space available on site.

The ponds will be constructed on top of the existing landfill cap (not excavated into the cap, other than the leachate sumps). The ponds will be lined with a GCL/HDPE synthetic liner, incorporating a sloping pond floor falling to a small sump. The ponds will be surrounded by a perimeter fence to prevent uncontrolled access and have an access ramp to gain access to the sump. Surface sprays will also be installed within the new leachate ponds.

Table 1 – Leachate Pond Design Capacities provides detail of the pond designs.

Table 1 – Leachate Pond Design Capacities

Description	Pond A	Pond B	Pond C
Pond Maximum Depth	3.0 m	3.0 m	3.0 m
Pond Overflow Volume	15,882 m^3	14,214 m^3	11,884 m^3
Pond Maximum Operating Volume (at -0.5 m below overflow)	12,155 m^3	10,904 m^3	9,156 m^3
Pond Area (top inside crest)	7,628 m^2	6,783 m^2	5,604 m^2
Pond Maximum Evaporation Area (at -0.5 m below overflow)	7,281 m^2	6,458 m^2	5,308 m^2

Appendix No. 4 – Leachate Generation Modelling Assessment provides details of the HELP modelling and water balance assessment.

Appendix No. 5 – Leachate Pond Drawings provides details of the proposed new leachate pond design.

Appendix No. 6 – Leachate Pond Specification provides details of the proposed new leachate pond specification.

Appendix No. 7 – Leachate Pond CQA Plan provides details of the proposed new leachate pond CQA requirements.

8.7. Construction Staging and Timing

8.7.1. Community Facilities

Due to the need to maintain continuous waste management services on site during the community facility construction works and the fact that some of the new infrastructure will be developed within existing waste management areas, it is necessary that the works be staged and not constructed as a single exercise. Consequently, it is proposed that the Stage 2 bulk green waste area (Stage 2a), community small goods drop-off area (Stage 2b) and community bulk drop-off area (Stage 2c) will be constructed as a single contract, albeit in three sub-stages.

Once the new bulk green waste area has been completed, and the bulk green waste receivals directed to the new facility in the Valley Hollow, the community green waste and drop-off activities will be relocated to the southern end of the current green waste area, which is in the area of the future new waste transfer station. This will then allow the new community bulk drop-off area to be constructed.

During the construction of the Stage 1 commercial vehicle access road, the small goods activities were relocated to a temporary location in the future bulk drop-off area. This will continue until the new small goods drop-off area has been completed.

Following the completion of all of the Stage 2 works, the community will be relocated to the new drop-off areas and then the Stage 3 new waste transfer station can be constructed. Once the new waste transfer station has been completed and commenced operation, the existing waste transfer station will be decommissioned and subsequently demolished as part of the development of the new vehicle parking and storage area.

8.7.2. Leachate Ponds

The leachate pond will provide additional leachate management capacity on site. The intention is to develop at least the first pond as soon as possible, and maybe the second pond. This will effectively double the existing four leachate ponds' capacity and significantly improve the City's ability to manage leachate being generated within the landfill.

At some time in the future, the City may construct the third new leachate pond.

9. Operating Methodology

9.1. Bulk Green Waste Area Operation

The new bulk green waste area located in the Valley Hollow will consist of two 70 m x 70 m x 0.5 m thick compacted limestone areas, each with separate surface water runoff ponds. This allows for operational flexibility, such that when there is low volume of material being handled, only one of the areas can be in operation, which reduces the potential for contaminated surface water runoff; however, when the volume of green waste increases, the second green waste area can be used. There is also the option to have one area dedicated for the receival and storage of unprocessed green waste and the other area for the processing and storage of mulched green waste.

The new bulk green waste area will be used for the accumulation of green waste that will be received at the Stage 2 community drop-off area and relocated to the bulk green waste area by the site operations personnel. No community deliveries will be directly received at the new bulk green waste area. Large bulk loads of green waste from City operations and commercial operators will be received directly at the new bulk green waste area.

The green waste will be received on the limestone pads and occasionally pushed up to optimise the storage capacity on the limestone pads. Once there is sufficient green waste accumulated, the green waste will be mulched and stockpiled. The majority of the mulched green waste will be subsequently removed by a downstream recycler, with some mulched material being left on site for use by the City's landscaping services and offered for free to the community at the new bulk drop-off facility.

The operation of the new bulk green waste facility will be similar to the current green waste operation, with the only difference being the separation of the community and bulk green waste activities and the capture of surface water runoff into lined stormwater ponds.

The two lined stormwater ponds will accumulate surface water runoff from the limestone pads. With the 2% fall on the pads, the surface water, including any rainwater that percolates through the piles of green waste and mulch, will flow into the two ponds and not pond on the limestone surface; hence, reducing potential water stagnation and subsequent contamination within the stored material.

The accumulated stormwater will be sampled and tested and then compared against the *Australian & New Zealand Guidelines for Fresh & Marine Water Quality* to determine the subsequent water manage methodology, with the most likely potential contamination indicator will be the biological oxygen demand (BOD). Uncontaminated water (BOD lower than guideline levels) will be used to irrigate the adjacent Cell 8 & 10 capped surface to sustain vegetation growth, and contaminated water (BOD higher than guideline levels) will be treated as leachate and pumped into one of the on-site leachate ponds.

9.2. Community Small Goods Drop-Off Area Operation

The community will enter the site via the gatehouse and be directed to the new small goods drop-off facility, where they will drive through and progressively drop-off a range of recyclable and hazardous waste materials. Once finished, they will either continue to the bulk drop-off area and/or waste transfer station or if they have no additional waste to dispose of, will exit the site.

Table 2 – Small Goods Waste Types and Handling provides a list of waste materials that will be receive at the new small goods drop-off area and provides detail on the proposed handling methodology.

Table 2 – Small Goods Waste Types and Handling

Waste	Handling Methodology
Gas bottles, fire extinguishers	Cages will be used for the storage of gas bottles 1 cage will be used for the storage of fire extinguishers
Batteries – dry-cell, lead/acid, lithium	Batteries will be sorted by facility staff into collection boxes provided by the downstream recycler. The boxes will be stored in the existing recycling shed.
Mobile phones	Small volume, sealed, covered bin will be used for the storage of mobile phones. The bins will be stored in the existing recycling shed.
E-waste	2 to 3 hook-lift bins will be used for the storage of e-waste
Cardboard	Cardboard will be accumulated in a large cage and then compacted into bales. Bales will be stored undercover and moved offsite when sufficient bales have been accumulated to fill a collection vehicle (same process as currently occurs)
Used motor oil	Oil will be stored in 5 kL a bunded steel tank. Empty container/drums will be stored in a small skip bin
Used vehicle tyres	A hook-lift bin will be used for the storage of used tyres

Waste	Handling Methodology
Aluminum cans	Large bin bags will be used for the storage of the various aluminum can
Aerosol cans	2 pallets and 8 small drums will be used for the storage of aerosol cans
Used paint	8 sealed, covered bins will be used to store used paint containers
Household Hazardous Waste (HHW)	HHW chemicals will be collected in a bunded, covered container and subsequently transferred to the HHW shed by facility staff
Glass and plastic bottles	Multiple skip bins will be used for the separate storage of the various bottle types
Mattresses	The existing recycling shed and/or multiple hook-lift bins will be used for the storage of mattresses
Residual waste	Small bin used to receive any residual waste that is sorted from the recyclable materials or may be left in the drop-off area. The bin will be emptied at least every 48 hours. If putrescible waste (most unlikely) then the bin will be emptied within 24 hours.

All storage containers are free-standing and will be removed from site once sufficient have been accumulated to fill a collection vehicle. The exception being the used engine oil. When the 5kL tank is full, a specialist contractor will come to site and pump out the oil from the tank. The existing recycling shed will be used to store some of the collected materials, primarily being those that will be impacted by weather,

In the event of a spill of a contaminating liquid onto the asphalt surface, spill kits will be readily available to absorb and cleanup the spill. Due to the low volume of liquid in each container, there will be no significant flow of the spilt liquid. Should the spillage occur close to a soakwell, a rubber mat will be placed of the soakwell inlet to prevent flow into the soakwell. Where possible, the handling of contaminating liquids will not occur in close proximity to soakwell inlets.

9.3. Community Bulk Drop-Off Area Operation

The new bulk community drop-off area will receive scrap metal, white goods, mattresses, green waste and inert bricks and rubble.

9.3.1. Scrap Metal and White Goods

The scrap metal and white goods will be received from the local residential community and stockpiled in the scrap metal area indicated in the drawings. The accumulated material will be regularly removed from the scrap metal area by the facility operators and relocated to the bulk scrap metal storage area located in the Valley Hollow. The white goods will be stored separately and degassed before being added to the bulk scrap metal storage area.

There will also be a small area for the accumulation of e-waste and mattresses that may inadvertently be delivered to this area, as opposed to being dropped off at the new small goods drop-off area before entering the new bulk drop-off area.

The e-waste will be stored in a small sealed, dedicated container or tarped, bunded pallets and regularly removed to the primary e-waste drop-off area located in the new small goods drop-off area.

The mattresses will be stored in a sealed, covered hooklift bin and when full, relocated to the Valley Hollow, in preparation for offsite removal.

9.3.2. Inert Bricks and Rubble

Bricks and rubble will be dropped off at the new bricks and rubble area. The area has been designed with two separate area that enables the community to safely drop off waste in one area, while the facility operators remove the accumulated material from the other area (Area A and Area B). The areas are rotated as and when required to ensure that there is a continuous drop-off service available to the community. The two areas are divided by concrete partitions and chain gates to ensure that the community use the appropriate disposal area, without the possibility that they can enter the other area that is being cleaned up of accumulated green waste.

There will be a staff member in attendance at the inert bricks and rubble area to assist the community and to ensure that only clean inert bricks and rubble is dropped off. Any non-compliant waste material dropped off will be loaded back into the customer's vehicle and they will then take the material to other recycling areas or the waste transfer station (for residual waste).

With brick and rubble being an inert waste stream, there is no environmental incentive to immediately remove the material from the drop-off area; hence, the removal of the accumulated bricks and rubble will be a function of the space availability within the facility and the need for road construction material on the landfill. It is envisaged that the accumulated material will be regularly removed; however, could remain within the facility for up to a week or more.

9.3.3. Green Waste

The green waste area has been designed and will be operated in the same manner as the inert bricks and rubble area, with two separate disposal/removal area. The exception being that the accumulated green waste will be removed and relocated to the bulk green waste area within 24 hours of being received. This is primarily to ensure that there is always space available for the community to drop off green waste and to prevent any stagnation of the green waste in the event of rainfall.

9.4. Waste Transfer Station Operation

The waste transfer station has also been designed with two separate operational areas, again, one for the receival of waste, while the other area is being cleared of accumulated waste.

The accumulated waste is pushed up using a front-end loader and the waste placed in large volume hook-lift bins, from where it is regularly moved to landfill. All waste within the waste transfer station will be removed to landfill within 24 hours of being received.

Again, there will be a staff member in attendance at the transfer station to assist the community and to ensure that only residual waste is dropped off and that the maximum rate of recycling is achieved. In addition. Any non-conforming waste material (liquids and hazardous waste) dropped off will be loaded back into the customer's vehicle and they will then take the material to other recycling areas.

9.5. Leachate Pond Operation

The new leachate ponds will be operated in the same manner that the existing leachate ponds are operated. Leachate will be pumped from out of the landfill leachate sumps and into the ponds. Leachate will be evaporated from the surface of the ponds, in addition, surface sprays will be utilised to increase the rate of leachate evaporation. As determined by the leachate modelling and water balance, there is a need to run the water cart to increase leachate evaporation; however, less often that if the new ponds were not constructed.

Under normal circumstances, the leachate ponds will be operated with a minimum 0.5 m freeboard, with the freeboard only being utilised in extreme rainfall events.

The leachate generation volumes and leachate pond depths will be monitored in order to confirm that the leachate management system is adequate to cater for the volume of leachate being generated each year.

The Leachate Generation Modelling Assessment confirms that there is adequate storage within the existing leachate ponds so that if not all leachate is removed from the system annually, there is an ability to store a significant amount of excess leachate within the ponds without the ponds overflowing. However, then in the following dry season, the facility operators will be required to put in extra effort (running additional water carts) to ensure that the legacy leachate volume is removed from the system such that there is not an ongoing year-on-year accumulation of excess leachate within the system.

Appendix No. 4 – Leachate Generation Modelling Assessment provides details of the HELP modelling and water balance assessment.

10. Commissioning

There are no commissioning requirements for the proposed infrastructure.

11. Time Limited Operations

Time Limited Operations are required to enable the new facilities to be immediately utilised, as the operation of some of the new infrastructure is required before subsequent construction can occur.

Time Limited Operations will also be required to enable the facilities to be operated while the Works Approval Compliance Documentation and subsequent Licence Amendment are being processed by the DWER.

With the proposed new facilities simply replacing the current facilities and there being no new waste management activities, the existing licence conditions cover most, if not all operational requirements to enable the facilities to commence operation immediately after the construction related Works Approval Compliance Documentation has been submitted to the DWER.

With regards to the leachate ponds, being additional pond capacity on site, these ponds are not immediately essential to the ongoing management of leachate but do assist greatly in the improved management of leachate; hence, it is preferable that this infrastructure be utilised as soon as it becomes available. Consequently, the utilisation of the leachate ponds has been included in the Time Limited Operations.

12. Rights to Water Irrigation Act 1914

There is no requirement for groundwater usage and hence no consequential impact of the *Rights to Water Irrigation Act 1914*.

13. Stakeholder and Community Consultation

There has been no formal stakeholder and community consultation associated with the project.

Due to the fact that the proposed new infrastructure simply replaces or in the case of the new leachate ponds, adds to the capacity of the existing, aged infrastructure, that there are no new activities being proposed, and there are no additional waste types or quantities involved, it has not been deemed necessary to undertake formal stakeholder and community consultation.

In addition, as part of the Works Approval process, the DWER advertises the proposed Works Approval, and the public is given the opportunity to provide comment.

14. Emissions

14.1. Emissions Sources

The primary emission source is the possible impact of contaminated surface water negatively affecting groundwater. Green waste management being the activity with the greatest potential for this to occur. To this end, the facility design includes sloping compacted limestone pads for green waste management, and in the bulk green waste area, where green waste will be stored, the design includes lined stormwater collection ponds. In addition, the facility operations will ensure that green waste is removed from the community green waste drop-off area with 24 hours of being received. General waste at the transfer station will also be removed to landfill within 24 hours of being received; hence, minimising the potential for contamination of surface water runoff.

Dust emissions - Due to the nature of the materials being received and handled, dust emissions from the inert bricks and rubble area will be minimal. This is a current activity, which has previously never cause dust emission concerns.

Odour Emissions - The general waste being delivered to the waste transfer station does not contain highly putrescible waste, as all customers have kerbside waste collection services that removed the vast majority of the putrescible waste. The current waste transfer station does not have an odour issue.

All other emission sources are deemed insignificant.

14.2. Air Emissions

There are no air emissions associated with the proposed infrastructure development or subsequent operation.

14.3. Dust Emissions

During construction, there may be some minor dust emissions associated with the earthworks.

There may be a small amount of dust emitted from the waste handling activities associated with the inert bricks and rubble; however, these would be extremely localised and limited to a few metres from the activities.

Composition and Quantity – During construction and facility operation, the dust will be composed predominantly of silica particles from the bricks and rubble. The quantity will be insignificant.

Variability of Emissions – Minimal dust emissions and hence, minimal variability in emissions.

Treatment Methodology – Dust suppressions during construction using water cart or hoses in the work areas. During operations, there will be no dust suppression required.

Monitoring – Visual observation by site operations staff. Monitoring community complaints.

Contingency Plans – If dust is a problem during construction, additional dust suppression will be applied by more regular use of the water cart or hoses. In the extreme event that dust is not able to be appropriately managed, the dust generating activity will be ceased until weather conditions improve. During operation of the inert bricks and rubble area, if dust is a concern, then the removal of material from the area will be suspended until weather conditions improve.

Environmental Receptors – Environmental receptors include the site operations staff, customers and neighbouring/surrounding properties.

Fugitive Emissions – All emissions are deemed fugitive.

Cumulative Impact – There is an adjacent landfill and sand/limestone quarry on site, which would add to potential dust emissions. Due to the scale of the proposed activities, any dust emissions would be insignificant in comparison to the other adjacent existing activities and hence can effectively be ignored as a cumulative impact on the greater site operations.

Targets and Limits – No dust emissions beyond the site boundary.

Environmental Risk – Nil.

14.4. Odour Emissions

Identified sources:

- Related to the proposed activity:
  - Possible odour from the bulk green waste storage area;
  - Possible waste odour from transfer station;
  - Leachate being pumped into the new ponds;
  - New leachate ponds surface.
- Related to other on-site activities:
  - Landfill activities;
  - Existing leachate ponds surface; and,
  - Existing green waste storage area.

Due to the proposed new infrastructure on site simply replacing the existing community facilities and the leachate ponds adding to the existing leachate management system (not a new activity), it is not anticipated that there will be any significant increase in odour emissions from the operation of the new infrastructure.

Composition and Quantity/Intensity – The composition and intensity of odour from the transfer station operation is a function of the waste type being received on site. Based on the operation of the existing facility, the odour emissions are minor such that there is no impact anticipated beyond approximately 50 m from the facility.

The potential odour from the new green waste area will be a function of the age of the greenwaste stored on site. With there being limited space available, the City cannot accumulate a significant volume of green waste and hence, has to regularly remove the green waste from site.

The composition and intensity of odour from the leachate ponds will be from the liquid surface area, and the method of operating the evaporation ponds (rate of discharge into ponds and surface spray utilisation). The odour composition will be a function of the waste types within the landfill. Based on the operation of the existing facility, the odour emissions are minor such that there is no impact beyond approximately 50 m from the facility.

Variability of Emissions – Odour emissions from the transfer station operation could vary slightly, depending on the waste type being received; however, these emissions will be so low as not to be noticeable beyond the fenced area.

Odour emissions from the green waste area will be relatively constant, varying slightly with the quantity of material being stored. There may be a spike in odour emissions when the bulk green waste is being handled.

Odour emissions from the evaporation ponds will be relatively constant. There may be some minor variability in the odour emissions during the leachate discharge process; however, this will cease once the discharge process is completed, as the pond storage volumes will mix the freshly pumped leachate to form a uniform blend of leachate.

Treatment Methodology – Immediate removal and landfilling of odourous general waste. Removal of all general waste from the facility (to on-site landfill) by the end of each day.

Removal of odourous green water from site.

There will be no odour treatment at the leachate ponds.

Monitoring – Odour emissions are monitored by site operations staff. Any elevation beyond normal odour levels will be detected by the operational staff.

Contingency Plans – Investigate the source of excessive odour emissions. Immediate removal of odourous general waste or green waste. Cease pumping into the leachate pond until the wind direction changes. Lime-dosing of the leachate ponds to adjust the liquid pH level.

Environmental Receptors – Site operational staff and customers visiting the Waste Management Facility and neighbouring receptors.

Fugitive Emissions – All emissions are deemed fugitive, as there are no specific odour emissions points.

Cumulative Impact – The landfill, including landfill gas related odours and the green waste stockpiling odours could combine, with the leachate pond or transfer station odours; however, with such low emissions anticipated from the leachate ponds and the waste transfer station, these new facilities will have a negligible combined impact.

Targets and Limits – No inconvenience to site personnel and no community complaints.

Environmental Risk – Environmental risk would relate to a possible amenity and health impact to receptors.

14.5. Noise Emissions

Noise management is to be considered during the construction and operation of the facility. The *Environmental Protection (Noise) Regulations* have restrictions on noise emissions during the period 7.00 pm to 7.00 am, Monday to Saturday. Beyond this time restriction, normal noise regulations apply.

The facility operates between 7.30 am and 4.00 pm, seven days per week; hence, all operations, other than Sunday, occur outside the noise restricted times. Sunday activities only involve community customers and hence, small, low noise activities. In addition, the nearest sensitive receptors are the Rockingham Regional Memorial Park 125 m to the east (725 m from the proposed infrastructure), a rural residence at 375 m to the southwest and a residential subdivision 430 m to the east (1,025 m from the proposed infrastructure), which are unlikely to be impacted by the proposed construction works or facility operations.

All activities on site are to be carried out in accordance with the *Environmental Protection (Noise) Regulations 1997*.

No noise sources have been identified:

Composition and Quantity – Nil.

Variability of Emissions – Nil.

Treatment Methodology – Nil.

Monitoring – Nil, but by third-party specialist if noise concerns are raised as being a potential problem by the local community.

Contingency Plans – In the event that noise is identified, cease noisy operations if excessive noise is generated. Determine an alternative means of handling the waste material.

Environmental Receptors – In the event that noise is identified, environmental receptors include the site operations staff, customers and neighbouring/surrounding properties.

Fugitive Emissions – All emissions are deemed fugitive.

Cumulative Impact – In the event that noise is identified, there is an adjacent landfill and sand/limestone quarry on site, which would add to potential noise emissions. Due to the scale of the proposed activities, any noise emissions would be insignificant in comparison to the other adjacent existing activities and hence can effectively be ignored as a cumulative impact on the greater site operations.

Targets and Limits – As defined by the *Environmental Protection (Noise) Regulations 1997* and nil complaints.

Environmental Risk – The environmental risk on site and to neighbouring properties is considered to be extremely low.

14.6. Light Emissions

There is no security lighting associated with the proposed development that will shine beyond the site boundary.

All light spills associated with security lighting will be contained within the property, in accordance with AS4282 - 1997 "*Control of the Obtrusive Effects of Outdoor Lighting*".

14.7. Discharge to Water

There will be no discharge to water.

Composition and Quantity – Nil.

Variability of Emissions – Nil.

Treatment Methodology – Nil.

Monitoring – Nil.

Contingency Plans – Nil.

Environmental Receptors – Nil.

Cumulative Impact – Nil

Targets and Limits – Not Applicable.

Environmental Risk – Nil.

14.8. Discharge to Land

There will be no discharge to land.

Composition and Quantity – Nil.

Variability of Emissions – Nil.

Treatment Methodology – Nil.

Monitoring – Nil.

Contingency Plans – Nil.

Environmental Receptors – Nil.

Cumulative Impact – Nil

Targets and Limits – Not Applicable.

Environmental Risk – Nil.

15. Complaints Management System

The Proponent maintains a Complaints Register on site and records all complaints received, including:

- Complainant name and contact number (if provided);
- Date and time of the complaint;
- Complete details of the complaint and any other concerns or other issues;
- Complete details and dates of any actions taken to investigate or respond to any complaints.

The site is located within a semi-rural area and the Proponent has been on site since early 1990. The facility has received occasional complaints associated with landfill operations, none of these have been attributed to the activities associated with this application.

Due to the scale and type of the proposed infrastructure development and the associated activities being existing activities on site, it is not anticipated that there will be any increased adverse impact on the surrounding community that would result in additional complaints being generated.

16. Vegetation Clearing

There is some minor clearing of native vegetation associated with the development of the community drop-off areas. This entails the removal of approximately 15 trees. The proponent has previously received a Clearing Permit No. CPS 10485/1 which authorises the removal of some of the affected trees.

Subsequent to the Clearing Permit being issued, there were some design amendments made that required some additional tree clearing as well as saving other trees. Consequently, there is a need to amend the Clearing Permit to accommodate the current facility design. The City is currently going through the process of amending the Clearing Permit.

The facility design has been developed to absolutely minimise the removal of native vegetation.

17. Flora and Fauna

The area of the proposed development is within existing cleared areas on site; however, there are a few trees growing in the area that will be removed. Where possible, the facility design has been developed to absolutely minimise the removal of native vegetation.

18. Fire Management

18.1. On Site Fire Management

The Potential Fire Sources include:

- Spontaneous combustion within green waste stockpiles (due to heat buildup); and,
- Unknown ignition sources within the general waste material at the transfer station - chemical reactions, batteries etc.

Management Measures include:

- During operating hours operations staff will immediately take action to extinguish any fires;
- The site has existing firefighting capacity, including water cart, fire hydrants, hose reels and fire extinguishers;
- The Rockingham Fire Station is located at 99 Dixon Road, Rockingham and is 6 km from the site and can respond to a fire within 8 minutes of being called out;
- The Baldivis Fire Station is located at Eighty Road, Baldivis and is 11 km from the site and can respond to a fire within 14 minutes of being called out;
- The green waste and general waste will be removed from the drop-off facilities and waste transfer station within 24 hours of being received; and,
- The bulk green waste area will be operated within the existing licence conditions, which include limited storage durations, windrow side restrictions and separation distances and temperature monitoring.

There is a low risk of fire associated with the management of the proposed facilities and the activities are currently occurring on site, albethey in difference areas, without fires being a significant issue.

19. Solid/Liquid Waste

This section deals with the quantities of solid and liquid waste being generated within the proposed new infrastructure, not the material that is being delivered to site.

19.1. Solid Waste

There is no solid waste generated as a result of the proposed activities.

Composition and Quantity – Not applicable.

Variability of Emissions – Not applicable.

Treatment Method – Not applicable.

Controlled Waste Tracking – Not applicable.

Contingency Plans – Not applicable.

Environmental Receptors – Not applicable.

Comparison Against Relevant Standards – Not applicable.

Cumulative Impact – Not applicable.

Waste Reuse – Not applicable.

Environmental Risk - Not applicable.

19.2. Liquid Waste

The liquid waste generated as a result of the proposed activities will be potential contaminated surface water runoff from the new bulk green waste area. This liquid will be directed to one of two lined stormwater ponds. The accumulated stormwater will be sampled and tested and compared against the *Australian & New Zealand Guidelines for Fresh & Marine Water Quality* to determine how best to manage the water. Uncontaminated water will be used to irrigate the adjacent Cell 8 & 10 capped surface to promote vegetation growth and contaminated water will be treated as leachate and pumped into one of the on-site leachate ponds.

Composition and Quantity – The contamination will be a function of the type (unprocessed or processed) and quantity of green waste being stored in the bulk green waste area. Being clean green waste, there will be only organic contaminants within the surface water runoff, the primary contaminant indicator being biological oxygen demand (BOD).

The volume of accumulated surface water runoff will be a function of rainfall intensity and the quantity and type of green waste being stored within the facility. Light rain will be absorbed within the green waste and the upper surface of the compacted limestone pads, resulting in no surface water runoff to the lined ponds. More intense rainfall will result in surface water runoff, with the volume being a function of the rainfall intensity.

The two lined stormwater ponds have a storage capacity of approximately 1,488 m^3 each, excluding 500 mm of freeboard. With a catchment area of 6,100 m^2, each pond can cater for 244 mm of surface water runoff. Using a runoff coefficient of 50% (50% of the rainfall is absorbed into the green waste and surface of the limestone pad), each pond provides adequate storage to cater for approximately 488 mm of rainfall. A 1 in 20-year, 24-hour rainfall event (the typical rainfall event considered) has a maximum rainfall of 104 mm and a 1 in 100-year, 7-day event (the largest rainfall event measured by the BoM) has a maximum rainfall of 212 mm. Consequently, the stormwater ponds have been designed with significantly more capacity that is required to cater for a single rainfall event. The additional pond capacity has been provided to allow for some operational flexibility such that the facility operators do not have to empty the ponds immediately after a rainfall event in order to provide the minimum capacity for subsequent storm events. This operational flexibility enables the facility operators time to sample and test the surface water runoff to determine whether the accumulated water is not contaminated and hence, can be used for irrigation of the adjacent landfill capped surface or if contaminated, then it will be managed as leachate.

Variability of Emissions – The emissions variability will be a function of rainfall intensity.

Treatment Method – Landfill capping irrigation for uncontaminated surface water runoff and treated as leachate for contaminated surface water runoff.

Controlled Waste Tracking – No applicable, as the liquid waste will be managed internally and not be removed from site.

Contingency Plans – The lined ponds have been designed with significantly larger capacity than is typically required for a 1 in 20-year, 24-hour rainfall event (composting guideline design requirement). In addition to this increased pond capacity, both ponds will be operated with a minimum 500 mm freeboard to prevent overflow.

Environmental Receptors – Local groundwater.

Comparison Against Relevant Standards – There is no green waste design guideline. As a comparison, the DWER composing guidelines provide design parameters for surface water collection. As described above, the facility design includes a greater storage capacity than required by this guideline.

Cumulative Impact – Nil.

Waste Reuse – Irrigation of uncontaminated surface water runoff onto the adjacent Cell 8 and Cell 10 capped surface to sustain vegetation growth.

Environmental Risk – Percolation of contaminated surface water runoff into the local groundwater. This is managed by the sloping, 500 mm thick compacted limestone pad and the lined ponds.

19.3. Spill Management

Large capacity lined ponds provide significant operational flexibility to manage accumulated surface water runoff, and the pond 500 mm freeboard prevents overflow.

20. Hydrocarbon/Chemical Storage

20.1. Hydrocarbon Storage

Quantity and Type – There will be no bulk hydrocarbon storage associated with the proposed activities.

20.2. Chemical Storage

Quantity and Type – There will be chemical storage associated with the proposed activities.

21. Contaminated Site Identification

The site was registered as "*Potentially Contaminated – Investigation Required*" (PCIR) in July 2017 due to the identification of PFAS, nutrients and heavy metals in groundwater beneath the site due to landfilling activities.

A Preliminary Site Investigation (PSI) is currently being undertaken.

22. Surface Water Management

The new small goods drop-off area has an asphalt surface incorporating interconnected soakwells with overflow discharges to a stormwater sump to the north.

In the new bulk drop-off areas, all surfaces are sloped to ensure surface water runoff is directed to the surface water management system that includes a combination of localised stormwater sumps, soakwells and piped drainage systems to remove excess stormwater away from the waste management areas. The stormwater management system has been developed to ensure that the waste material is not stored in waterlogged areas and that there is free drainage of surface waters away from the waste handling areas.

At the waste transfer station, the vehicle access roads are asphalt and incorporate interconnected soakwells with overflow discharges to stormwater sumps. The waste drop-off area is concrete lined, with all surface water flowing towards collection pits that transfers the surface water runoff to two surface water collection sumps, again with an overflow connection to the adjacent Valley Hollow. The waste transfer station lower area (bulk bin loadout area) is where the two stormwater sumps are located. All surface water from the lower area flows to the two surface water collection sumps.

The new bulk green waste area is raised a minimum of 500 mm above the surrounding surface levels to prevent external surface water from entering the facility. Surface water that accumulates around the new bulk green waste area will be directed to two stormwater collection sumps. In addition, the natural soils in this area (and across the site) consist of predominantly sand, with some limestone; hence, there is significant direct infiltration of rainfall and minimal surface water generation.

23. Groundwater Management

The new proposed facilities incorporate significant infrastructure and operational improvements in comparison to the current waste management facilities. This includes surface water diversion away from waste management areas, free draining waste management areas to prevent ponding and subsequent stockpile stagnation in the waste management areas and lined ponds in the new bulk green waste area. All of these infrastructure improvements reduce the possibility of contaminated surface water runoff and hence, improved groundwater protection.

The leachate ponds will be constructed on top of a capped portion of the Eastern Landfill; hence, any leakage from the new ponds will need to infiltrate through the landfill before it will impact on the groundwater.

The site has an existing groundwater monitoring system. The proposed infrastructure developments occur within the groundwater monitoring bore network and hence, there is no requirement to amend any of the existing site groundwater monitoring bores or monitoring methodology.

24. Risk Assessment

This risk assessment relies on relevant information that has been provided in the above documentation and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER February 2017).

For there to be a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

24.1. Source-Pathway and Receptors

24.1.1. Emissions and Controls

Possible emissions and associated likely pathways of transmission have been identified along with proposed controls.

Emissions and controls associated with existing site activities are managed in accordance with existing facility licence conditions and have not been included in this assessment, other than where there has been a change to a current waste management activity or there is considered to be a cumulative impact associated with the proposed construction works and subsequent operation of the new infrastructure.

Table 3 – Emissions and Controls provides a summary of the potential emissions from the proposed construction activities and subsequent operation of the associated infrastructure and the controls to manage the identified emissions.

Table 3 – Emissions and Controls

Emission	Source	Potential Pathway	Proposed Control
Dust	Dust generated during construction – Minimal emissions associated with the earthworks activities	Air/windborne pathway	Water cart and hoses wetting down affected areas
	Dust generated during operation of the new infrastructure: Handling of inert waste within the new drop-off area	Air/windborne pathway	Minimal emissions identified Same operation for the new activity as currently occurs for the existing activity, which does not generate noticeable dust Water cart and/or hoses wetting down affected areas and material stockpiles
Noise	Noise generated during construction – Minimal emissions associated vehicle movements	Air/windborne pathway	Low vehicle speed Low frequency reversing beacons (croaker type)
	Noise generated during operation of the new infrastructure	Air/windborne pathway	No emission identified No controls required during operation

Emission	Source	Potential Pathway	Proposed Control
Odour	Odour generated during construction	Air/windborne pathway	No emission identified No controls required during construction
	Odour generated during operation of the new infrastructure	Air/windborne pathway	No emission identified No controls required during operation
Seepage and Spillage	Seepage and spillage during construction	Seepage and spillage to soils and groundwater	No emission identified No controls required during construction
	Seepage and spillage during operation of the new infrastructure	Seepage and spillage to soils and groundwater	Asphalt areas Sloping waste management areas to prevent ponding and stagnation within waste stockpiles Surface water diversion away from waste management areas Regular removal of accumulated waste material Lined ponds in new bulk green waste area Lined leachate ponds and also constructed on top of an existing, capped landfill area
Wind-blown Waste - Litter	Associated with proposed construction activities	Air/windborne pathway	No emission identified No controls required during construction
	Associated with proposed operational activities	Air/windborne pathway	No emission identified No controls required during operation
Fire/Smoke	Fire in green waste and general waste areas	Air/windborne pathway	Regular removal of waste materials Small and separate green waste stockpiles Existing site firefighting infrastructure and capability Fire brigade in close proximity
Fire debris and washwaters	Firefighting activities during construction - None identified	Seepage to soils and groundwater	No emission identified No controls required during construction
	Firefighting activities during operation - Fire in the transfer station or green waste areas and subsequent firefighting water runoff	Seepage to soils and groundwater	Green waste and general waste areas have small stockpile capacity; hence, only potential for small fires, which will be easily extinguished. Potential for larger fires in the new bulk green waste area. All firefighting debris and washwater will end up in the two lined sumps where it will be captured. The extent of retention will be a function of whether

Emission	Source	Potential Pathway	Proposed Control
			and the extent to which the pond liners are impacted by the fire.

24.1.2. Receptors

With the site being an existing waste management facility and hence having been through previous Licence Amendments/Works Approvals and the associated assessments, the site receptors are well established.

Employees, visitors and contractors on site have not been included in the list of receptors, as these parties are considered as being associated with the proposed development and hence, protected by site operating procedures, management strategies and relevant State legislation.

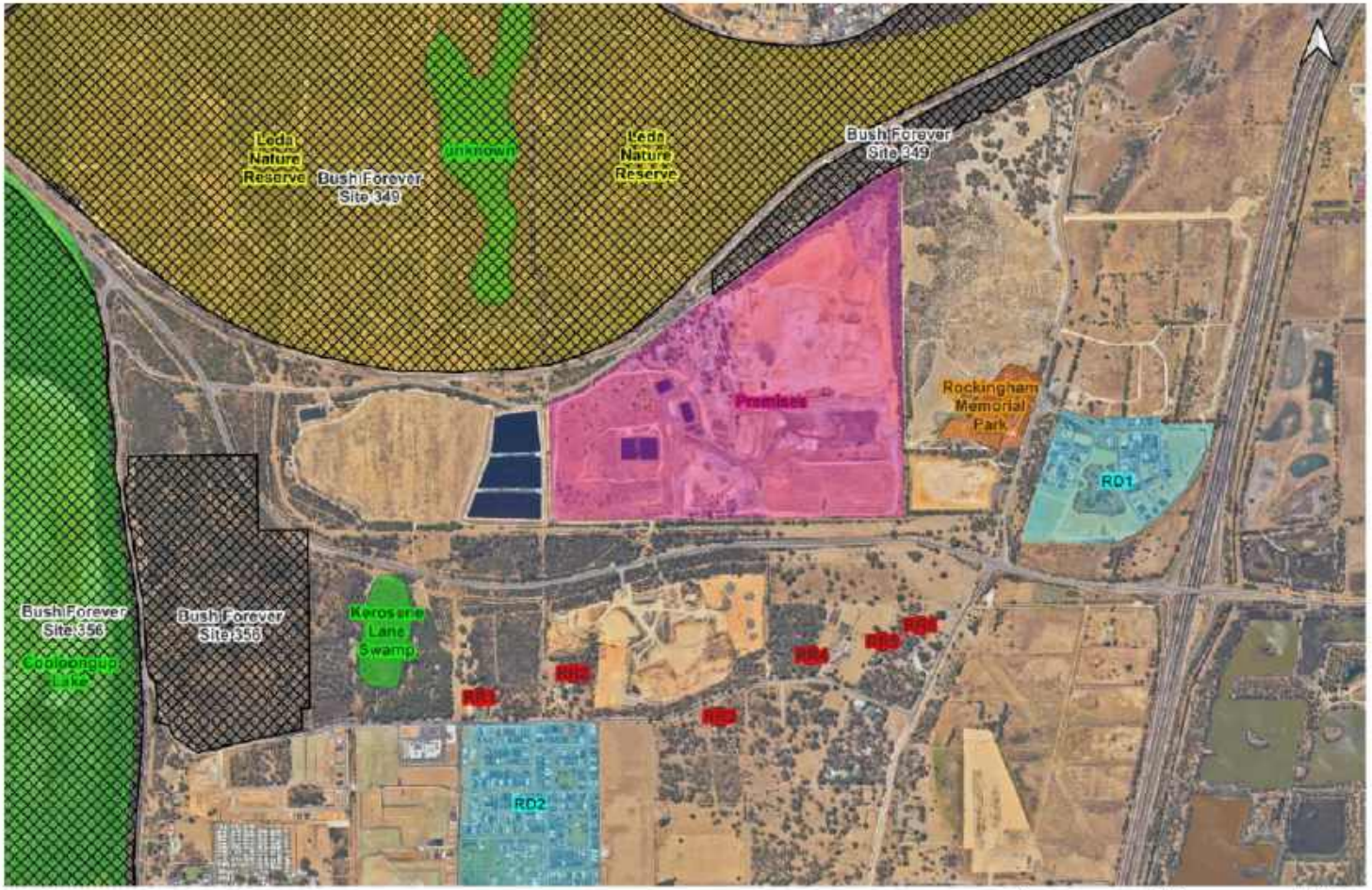
Table 4 – Receptors provides a comprehensive summary of the human and environmental receptors surrounding the site (*source DWER Amendment Report for Licence L7064/1997/11, dated 02 March 2023*).

Table 4 – Receptors

Human Receptor	Distance from Premises Boundary
Sensitive receptor – Rural residential homestead (RR1)	Approximately 660 m southwest of the Premises boundary
Sensitive receptor – Rural residential homestead (RR2)	Approximately 525 m south of the Premises boundary
Sensitive receptor – Rural residential homestead (RR3)	Approximately 680 m south of the Premises boundary
Sensitive receptor – Rural residential homestead (RR4)	Approximately 475 m south of the Premises boundary
Sensitive receptor – Rural residential homestead (RR5)	Approximately 425 m south of the Premises boundary
Sensitive receptor – Rural residential homestead (RR6)	Approximately 375 m south-southeast of the Premises boundary
Sensitive receptor – Residential development (RD1)	Approximately 430 m east of the Premises boundary
Sensitive receptor – Residential development (RD2)	Approximately 700 m south of the Premises boundary
Sensitive receptor – Rockingham Regional Memorial Park	Approximately 125 m east of the Premises boundary
Environmental Receptor	**Distance from Prescribed Activity**
Geomorphic wetland – Kerosene Lane Swamp (conservation management category)	Approximately 560 m southwest of the Premises boundary

Geomorphic wetland – Cooloongup Lake (conservation management category)	Approximately 1.5 km west of the Premises boundary
Geomorphic wetland – Unnamed basin sumpland (conservation management category)	Approximately 380 m northwest of the Premises Boundary
Underlying groundwater – Perth - Superficial Swan	Regional information indicates that groundwater ranges from approximately 3 mAHD at the eastern boundary of the Premises to 2 mAHD at the western boundary. Depth to groundwater ranges between 25 mBGL to 3 mBGL depending on the extent of cut and fill activities across the Premises. Regional groundwater flows in a westerly direction towards Lake Coloongup. Monitoring during October 2021 encountered groundwater ranging between 5.056 mAHD to 1.9141 mAHD across the Premises. Local groundwater flow is inferred to be west-northwesterly. The closest downgradient abstraction bore is located approximately 250 m west of the Premises boundary in the BHP Billiton Nickel West Baldivis Tailings Storage Facility. The facility is a known contaminated site and groundwater abstraction is for treatment purposes.
Nature Reserve/Bush Forever Site – Leda Nature Reserve / Bush Forever Site 349	Approximately 70 m north of the Premises boundary
Bush Forever Site – Bush Forever Site 356	Approximately 850 m east of the Premises boundary
Threatened Ecological Community (TEC) / **Priority Ecological Community (PEC) –** Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain (Critically Endangered [C'wth], Priority 3 [WA])	Approximately 70 m south of the new bulk green waste area

Figure 1 – Receptors Surrounding the Premises



Source: *DWER Amendment Report for Licence L7064/1997/11, dated 02 March 2023*)

[redacted]

24.1.3. Risk Ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER February 2017) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages. Where linkages are in-complete they have not been considered further in the risk assessment.

Table 5 - Risk Rating Matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

Table 6 – Risk Ratings

Risk Event				Risk Rating
Source/Activity	**Potential Emission**	**Potential Pathway and Impact**	**Receptor**	**C = Consequence L = Likelihood**
Construction activities				
Construction	Dust	Air/windborne pathway causing impacts to health and amenity	Immediately adjacent to the Premises – 125 m east of Premises boundary, 725 m east of proposed activities	C = Slight L = Rare **Low Risk** Lowest possible risk – likely zero
			Single residential premises 375 m south southeast and residential subdivision 700 m south of the Premises boundary	C = Slight L = Rare **Low Risk** Lowest possible risk – likely zero
	Noise	Air/windborne pathway causing impacts to health and amenity	Immediately adjacent to the Premises – 125 m east of Premises boundary, 725 m	C = Slight L = Rare **Low Risk** Lowest possible risk – likely zero

Risk Event				Risk Rating
Source/Activity	**Potential Emission**	**Potential Pathway and Impact**	**Receptor**	**C = Consequence L = Likelihood**
			east of proposed activities	
			Single residential premises 375 m south southeast and residential subdivision 700 m south of the Premises boundary	C = Slight L = Rare **Low Risk** Lowest possible risk – likely zero
Operations				
Waste Handling	Dust	Air/windborne pathway causing impacts to health and amenity	Immediately adjacent to the Premises – 125 m east of Premises boundary, 725 m east of proposed activities	C = Slight L = Rare **Low Risk** Lowest possible risk – likely zero
			Single residential premises 375 m south southeast and residential subdivision 700 m south of the Premises boundary	C = Slight L = Rare **Low Risk** Lowest possible risk – likely zero
	Noise	No emission identified		
	Odour	No emission identified		
	Wind-blown waste	No emission identified		
	Seepage and Spillage	Seepage to soils causing impacts to groundwater	Local groundwater users, groundwater dependent wetlands	C = Slight L = Unlikely **Low Risk**
	Fire/Smoke	Air/windborne pathway causing impacts to health and amenity	Immediately adjacent to the Premises – 125 m east of Premises boundary, 725 m east of proposed activities	C = Possible L = Minor **Medium Risk**
			Single residential premises 375 m south southeast and residential	C = Possible L = Minor **Medium Risk**

Risk Event				Risk Rating
Source/Activity	**Potential Emission**	**Potential Pathway and Impact**	**Receptor**	**C = Consequence** **L = Likelihood**
			subdivision 700 m south of the Premises boundary	
	Fire debris and washwater	Seepage to soils causing impacts to groundwater	Local groundwater users, groundwater dependent wetlands	C = Slight L = Unlikely **Low Risk**

Appendices

Appendix No. 1 – Premises Map

Appendix No. 2 – Stage 2 and Stage 3 Development Drawings

Appendix No. 3 – Bulk Green Waste Area Pond Lining Specification

Appendix No. 4 – Leachate Generation Modelling Assessment

Appendix No. 5 – Leachate Pond Drawings

Appendix No. 6 – Leachate Pond Specification

Appendix No. 7 – Leachate Pond CQA Plan

Appendix No. 1 – Premises Map

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Appendix No. 2 – Stage 2 and Stage 3 Development Drawings

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Appendix No. 3 – Bulk Green Waste Pond Lining Specification

The geomembrane used in the two stormwater collection ponds shall have the minimum material Specifications as set out in Table A:

Table A - HDPE Geomembrane Material Specifications

Property	Test Method	HDPE Test Value – 2.00mm Smooth Textured	Testing Frequency (minimum)
Thickness (min. ave.) • Lowest individual for 8 out of 10 values • Lowest individual for any of the 10 values	D 5994	nom. (-5%) - 10% - 15%	Per roll
Asperity Height (min. ave.) (*1*)	D 7466	0.40 mm	Every 2nd roll (*2*)
Density (min. ave.);	D 1505/D 792	0.940 g/cc	90,000 kg
Tensile Properties (min. ave.) (*3*) • Yield strength • Break strength • Yield elongation • Break elongation	D 6693 Type IV	 29 kN/m 21 kN/m 12% 100%	9,000 kg
Tear Resistance (min. ave.)	D 1004	249 N	20,000 kg
Puncture Resistance (min. ave.)	D 4833	534 N	20,000 kg
Carbon Black Content - Particle size ~20 nm (range)	D 4218 (*5*)	2.0-3.0%	9.000 kg
Carbon Black Dispersion	D 5596	note (*6*)	20,000 kg
Stress Crack Resistance (*4*)	D 5397 (App.)	500 hr.	Per GRI GM10
Geomembrane Oxidative Induction Time (OIT) (min. ave.) (7) (a) Standard OIT, **and** (b) High Pressure OIT	 D 8117 D 5885	 100 min. 400 min.	90,000 kg
Geomembrane Oven Aging at 85ºC (*7*) (11) (a) Standard OIT (min. ave.) - % retained after 90 days, **and** (b) High Pressure OIT (min. ave.) - % retained after 90 days	D 5721 D 8117 D 5885	 55% 80%	Per each formulation
Geomembrane UV Resistance (*8*) (11) (a) Standard OIT (min. ave.) or (b) High Pressure OIT (min. ave.) - % retained after 1,600 hrs (*10*)	D 7238 D 8117 D 5885	 N.R. (*9*) 50%	Per each formulation
Longitudinal Edge		Smooth on both sides	

(1) Of 10 readings, 8 out of 10 must be ≥ 0(1) Of 10 readings, 8 out of 10 must be ≥ 0.35 mm, and lowest individual reading must be ≥ 0.30 mm; also see Note 6.
(2) Alternate the measurement side for double sided texture sheet.
(3) Machine direction (MD) and cross machine direction (XMD) average values shall be on the basis of 5 test specimens each direction.

Yield elongate is calculated using a gauge length of 33 mm.

Break elongation is calculated using a gauge length of 50 mm.

(4) The SP-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test shall be constructed on smooth edges of textured rolls or on smooth sheets made from the same formulation is being used for the textured sheet materials.
The yield stress used to calculate the applied load for the SP-NCTL test shall be the manufacturer's mean value via MQC testing.
(5) Other methods such as D 1603 (tube furnace) or D 6370 (TGA) are acceptable if an appropriate correlation to D 4218 (muffle furnace) can be established.
(6) Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.
(7) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
(8) The condition of the test shall be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60° C.
(9) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
(10) UV resistance is based on percentage retained value regardless of the original HP-OIT value.
(11) Test results are to be less than 12 months old relative to the date of manufacture of the delivered geomembrane and the manufacturer is to provide certification that the resin is of the same formulation as the rolls supplied for the works.
For Notes, refer to GRI Test Method GM13 - http://www.geosynthetic-institute.org/grispecs/gm13.pdf

Minimum Average Roll Value (min. ave.) is defined as the Mean value less 2 standard deviations. Mathematically, this implies that 97.5% of the results of the tested specimens will exceed the min. ave.

The Regulatory Authority landfill design guidelines require that the manufacturer carry out both the standard AND high pressure tests for the Oxidative Induction Time and the Oven Aging properties of the geomembrane, as opposed to the GRI GM13 giving the manufacturer the option to choose which of the two tests to perform.

Appendix No. 4 – Leachate Generation Modelling Assessment

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Appendix No. 5 – Leachate Pond Drawings

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Appendix No. 6 – Leachate Pond Specification

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Appendix No. 7 – Leachate Pond CQA Plan

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