ARMADALE LANDFILL AND RECYCLING FACILITY & ENVIRONMENTAL MANAGEMENT PLAN

Table of Contents

1. Introduction

This Landfill Management Plan (LMP) has been assembled as a guide to the ongoing operation of the Armadale Landfill and Recycling Facility (ALARF) to ensure that the facility is operated in an environmentally sustainable and safe manner to ensure efficiency of the operation as well as reducing the environmental impact of the landfill and its environs.

1.1. Aim

The aim of this management plan is to provide clear instructions to the Armadale Landfill and Recycle Facility operators on how to best, operate the landfill to enhance the site performance, while minimising any potential environmental impacts.

1.2. Environmental Commitment

The City has been developing and operating Armadale Landfill and Recycling Facility with the relevant license conditions and works approvals, to minimise the environmental impact.

2. Facility & Operational Description

2.1. Facility Overview

City of Armadale has been operating the Armadale landfill and Recycling Facility.
The Facility consists of the following:

- Landfill Operations
- Transfer Station
- Recycling Operations

The facility operates within a License for Prescribed Premises under *the Environmental Protection Act 1986.* The facility is licensed for the following prescribed premises categories:

Category	Description	Capacity
57	Used tyre storage (general)	Up to 250 used tyres at one time
61	Liquid waste facility	99 tonnes per annual period
62	Solid waste depot	Combined total of 100,000 tonnes per annual period.
64	Class II or Class III putrescible landfill site	

City of Armadale is the owner and operator of Armadale Landfill and Recycling Facility located at Hopkinson Road, under license number L6964/1997/11. The site commenced deposition of waste in early 1975 in the eastern portion of the site. Prior to the City purchasing the land, the site had been used for the extraction of clay for brick and tile manufacturing. This natural clay rich geology is the primary source of groundwater protection from leachate.

The site is a class II landfill, receiving city of Armadale's household and contractor's waste. Commercial and industrial waste is not currently being accepted.. Sources of waste are domestic putrescible waste from the City of Armadale, and residential waste. The waste is delivered to the site in trucks and small vehicles with trailers. Any load above 3 tonnes is weighed as tonnes while load below 3 tonnes are weighed by Volume. Historically, the site has been used as a landfill facility; however, the focus has shifted to maximising resource recovery and promoting sustainability.

In July 2013, the City contracted Landfill Gas and Power (LGP) to install a flare at the Armadale Landfill. The flare installation works were completed and operational in June 2014. LGP was purchased by Energy Developments Limited (EDL) in 2016. In December 2018, responsibility for the operation of the flare at the Armadale Landfill was taken over by Run Energy.

2.2. Facility Operational Overview

Operational activities at ALARF include the following:

- Waste acceptance.
- Cover material application.
- Surface and groundwater management.
- Landfill gas management.
- Leachate management.
- Dust management.
- Litter management.
- Odour management.
- Noise management.
- Reporting.

2.3. Facility Operating Hours

The facility operating hours are as follows:

- Monday to Sunday – 8.00 to 16.45; and,
- New Year, Good Friday, and Christmas Day – Closed.

The City does not permit the facility to be left unattended whilst the main gate remains unlocked.

There is a sign installed at the gate that has contact information for any after-hours incidents.

A waste acceptance criteria sign has also been installed at the gate indicating the waste accepted on site and what is not accepted.

The landfill site is permanently staffed during all hours of operation.

3. Facility Operating License

The facility operates in accordance with the DWER License. The license contains specific conditions that must be adhered to during operation. The Facility operators and contractors are aware of the license conditions applicable to their specific responsibilities on site.

The City provides a copy of the license as a point of reference to guide the facility operations.

4. Occupational Health and Safety

The activities conducted at the landfill are always conducted in a safe and well-constructed manner to ensure that occupational health and safety is the sole primary consideration on site and the well-being of all landfill operators, contractors and customers is warranted.

The facility works under the Occupational Safety and Health Act 1984 and WorkSafe.

5. Site Infrastructure

5.1. Site Office, Crib Room, and Ablutions

The site office, crib room and ablutions are provided on site next to the new transfer station.

5.2. Storage building

The site has a storage building where generators, polystyrene compactor and other work tools are kept.

5.3. Vehicle Parking

Staff and private parking is provided next to the landfill office, other mobile plant is parked in an enclosed compound, fenced and installed with CCTV cameras.

The waste compactor (Tana) and waste dozer are parked at the landfill open face.

5.4. Transfer station.

Armadale Landfill and Recycling Facility has constructed a new modern transfer station which is split into two:

- Transfer station platform 1 for sorted waste.
- Transfer station platform 2 for unsorted waste

5.4.1. Transfer station platform 1-sorted waste

The transfer station sorting area is where customers can drop-off:

- Cardboard
- Scheme E-Waste (televisions, computers, computer peripherals
- Non-scheme E-Waste (small appliances)
- General waste and plastics (plastics will be source separated when recycling markets are available)
- Glass bottles
- Scrap metal
- Wood/timber

All bins are emptied as required, or at a minimum daily. The volumes of waste delivered on site determines the overall frequency of emptying the bins throughout the day.

General waste will be buried in the landfill daily whilst the landfill is still operating or transferred to the waste compactor (waste processing area), where it will be compacted and then loaded onto a truck for daily transfer to the Energy Recovered plant in Kwinana.

Cardboard is emptied from the bins frequently and processed through the cardboard compactor (waste processing area) and is collected by a contractor on regular basis.

All other bins are emptied at a minimum daily and stored in the respective stockpile area for collection from a contractor or for use onsite.

5.4.1.1. Household Hazardous Waste (HHW) acceptance area.

The household hazardous waste drop-off area is located between Transfer Station Platforms 1 and 2, and the area is provided with a shed that acts as a shield from various climatic conditions. Additionally, there are bins set aside for:

- Tyres
- Car Batteries and Household Batteries
- Polystyrene
- Electrical cables
- X-rays
- Ink cartridges.
- Motor oil
- Mobile phones

The household hazardous waste program is collected under the following categories:

- Aerosol cans
- Chemicals
- Fluorescent lamps and tubes
- Batteries (Household-dry cell)
- Gas bottles (up to 9kg); and,
- Fire extinguishers.

The Household Hazardous Waste Program accepts the following as guided by WALGA:

- Acids and alkalis
- Aerosols
- Batteries (Household-dry cell)
- Engine Coolants & Glycols
- Fire Extinguishers - non halon (red) only.
- Flammables
- Flares
- Fluorescent Lamps and Tubes (CFLs)
- Gas cylinders (small household)
- Household chemicals and cleaners
- Paint (collected through the Paintback Scheme)
- Pesticides/Herbicides
- Poisons/Toxics
- Pool Chemicals
- Smoke Detectors
- Unknown Chemicals (must be sealed in a chemical resistant container).

The HHW materials are moved from the drop-off point to the household hazardous waste storage area. These are sorted and stored appropriately until collected and taken offsite at least monthly by a fully licenced contractor.

The Paintback Scheme is also supported at the Armadale Landfill and Recycling Facility. Fully bunded paint stillages are used to collect:

- Water based paints.

- Oil based paints.

These are then stored near the chemical storage area (chemical shed) until collected, generally monthly.

The waste motor oil is stored in a ventilated shed, which can contain spillages and provides a controlled environment out of the elements. The HHW storage is in locked sea containers that are themselves fully bunded, enclosed and stored under a shade sail to shelter the containers from the rain and direct sunlight. Spills are contained in the bunded area. Due to the relatively small amounts of chemicals held onsite, the risk of a large spill is minimal, and it is unlikely to exceed the containment area.

5.4.1.2. Waste Motor Oil

The city accepts up to 20L of waste motor from residential customers. This must be declared upon entry to the Weighbridge Operator. The customer is directed that they leave the waste motor oil in the container (must be brought in the container that motor oil was purchased in) and take it to the hazardous waste disposal area, the attendant advises the customer where to drop off waste motor oil in the undercover area. Waste Disposal Officers transfer waste motor oil to the motor oil storage shed daily, they then decant the oil into the fully bunded oil storage tank

A contractor is scheduled to collect waste motor oil on a fortnightly basis.

5.4.1.3. Tyres

Tyres are dropped off into bins under the dome shelters by customers and moved to a storage pile by site staff daily. Tyres are collected from the site fortnightly or as required. Staff monitor tyre storage to keep numbers below 250 tyres and ensure that collections are scheduled should there be a spike in tyre disposal.

5.4.2. Platform 2 - Unsorted/Putrescible Waste – Transfer Station

Customers with unsorted waste (mixed waste) are directed to Transfer Station Platform 2. Waste is transferred by the customer into bins. These bins are emptied as required, or at a minimum daily. Waste will be buried in landfill whilst the landfill is still in operation and after landfill closure will be transferred to the unsorted waste compactor and then taken offsite to the waste to energy plant in Kwinana.

5.4.3. Mattresses

Spring mattresses must be declared by the customer at the weighbridge. They are dropped off in Drop Zone C and then transferred to a storage area north of the tyre pile. These are kept at least 18 metres from the tyres.

5.5. Fencing

5.5.1. Access Control

As per the license conditions, the site has an established fence that marks the boundary of the entire site for security and access purposes. When the site is not manned, the main gate is locked.

5.5.2. Litter Control

The facility has various strategies of litter management. A contractor has been assigned to collect litter every alternate day and a site register has been introduced for records purposes.

Adjacent to the landfill tipping area, there has been a portable fence installed which is 2 meters high to improve litter management. Fence inspections are done regularly by the contractor and the landfill operators for removal of any accumulated litter that has been blown onto the fence.

6. Landfill Plant and Equipment

6.1. List of Plant and Equipment

The following is a list of plant and equipment to be utilized on site:

- Supervisor 4 x 4 Ute.
- Assistant supervisor 4 x 2 Ute
- Landfill waste compactor (Tana).
- Waste dozer.
- Hook truck.
- Cardboard and polystyrene compactor
- Hino & Mitsubishi operation trucks 4 x 4 single Cab

- Alternative daily cover spray machine.
- Site generator.
- Volvo loader.
- Forklift.
- Multifunction Welder.
- Fuel trailer.
- Water tanker/fire truck.
- Leachate extraction and recirculation pumps; and,
- Other associated minor equipment.

6.2. Plant and Equipment Operational Requirements

The landfill waste compactor and waste dozer are required for the compaction and placement of waste on the active tipping area and the spreading of cover material at the end of each day.

The 4 x 4 single cab trucks are used for general access around site, and the water tanker/fire truck is used for dust suppression and firefighting.

Leachate extraction pumps will be used for circulating leachate from the landfill ponds to the landfill surface.

6.3. Plant and Equipment Maintenance

Records for plant maintenance are usually kept on site and all plant is maintained in accordance with the manufacturer's requirements. The city has a permanent maintenance crew that is responsible for plant and equipment maintenance.

7. Site Security

The facility has an internal fenced compound where mobile plant and equipment is stored at night. The compound is securely fenced, and the gates are locked after daily operations. Due to the semi- rural nature of the site, there is the possibility that the site can be broken into, and to protect the landfill assets, where possible, all assets of value are kept securely under lock and key.

A perimeter fence and lockable gates act as the primary site security and this restricts unauthorsed access to the site. The main access point is the main gate located at Hopkinson Road with a clear demarcation of the exit and entrance gates.

The site has camera surveillance 24/7, and in the event of a break-in the city is able to identify the offenders.

8. Waste Acceptance and Receival

8.1. Reference Documents

The facility operating License stipulates the class of Armadale landfill as a Class II; hence, this determines what type of waste is acceptable on site.

The license granted by DWER, allows the landfill to accept class II waste in accordance with the *Landfill Waste Classification and Waste Definitions 1996*.

The facility is expected to accept waste that conforms to the following:

8.2. Typical Conforming Waste Types

Typical conforming waste includes the following:

- Clean fill.
- Type 1 inert waste (C&D waste).
- Putrescible wastes (Class II waste).
- Contaminated solid waste meeting waste acceptance criteria specified for Class II landfills.
- Type 2 Inert Wastes (with specific License conditions); and,
- Type 1 and Type 2 Special Wastes (for registered sites as approved under the Controlled Waste Regulations).

8.3. Special Wastes Type 1 and 2

The only special waste accepted at the facility is below 5kgs of Wrapped Asbestos from City of Armadale residents. Large commercial volumes of ACM are not accepted.

All asbestos handled on site is managed in accordance with the Asbestos Management Plan.

8.4. Special Waste Type 2.

Special waste type 2 is not accepted on site due to the nature of the landfill.

8.5. Typical Non-Conforming Waste Types

Non-conforming waste could be the following:

- Liquid waste.
- Hazardous, intractable, and problematic waste.
- High hazard flammable; and,
- Class III and Class IV waste.

Waste entering the site that is identified as non-conforming waste is rejected and cannot be disposed of on site.

9. Weighbridge

On arrival at the site, all waste delivery vehicles are registered at the weighbridge.

The incoming load is weighed over the weighbridge and as a minimum, the following information recorded:

- Date and time of entry.
- Vehicle registration number.
- Type of waste delivered, including the identification of any asbestos.
- Customer name.
- Waste load weight (either by deducting the vehicle's stored tare weight from the gross weight or re-weighing of empty vehicle on exiting the facility).
- Origin of waste delivered; and
- Disposal location (asbestos up to 5kgs).

Once the vehicle has been weighed in, the vehicle progresses to the active landfill tipping area for commercial waste and transfer station for residential waste.

9.1. Waste Inspection

Upon arrival, the weighbridge operators conduct visual inspections on each waste load from both Commercial and Residential waste.

- At the weighbridge the waste delivery driver confirms the waste type.
- Each load is visually inspected before its accepted for disposal.
- Enquiries are undertaken in order to identify:
    - Material type.
    - Material quantity.
    - Material origin.
    - Non-conforming material types.
- Material deemed conforming is allowed to progress to the transfer station (residential) and landfill tipping area (commercial vehicles) and the material deemed non-conforming is removed from site immediately.

- Conforming loads accepted are further inspected at the transfer station and the landfill tip face area, during the offloading process by the Waste Disposal Officers
- At the transfer station, the waste is placed into the steel bins which are labelled to show acceptable material types, and once they are full, the waste is transferred to a hook lift bin then taken to the tipping area at the landfill. Commercial waste is taken straight to the landfill by the delivery vehicles.
- At the landfill tipping area, waste disposed is pushed then compacted accordingly.
- On completion of the tipping operation, the delivery vehicle departs the landfill.

9.2. Waste Rejection

If non-conforming waste is identified, and the customer has left the site, the waste is stockpiled separately or placed in a separate waste bin identified on site. If the customer is identified and hasn't left the site, the customer is requested to remove the waste from the site. If the customer cannot be identified, then the waste is removed from the site within 24-48 hours by a separate contractor authorised to handle the non- conforming waste.

Only waste that complies with the DWER *Landfill Waste Classification and Waste Definitions 1996* as applicable to Class II landfill site is accepted on site.

9.3. Record Keeping

A record of the weighbridge database is maintained on site. ALARF currently uses the Arch software, with the aim of moving to Mandalay software for effective record keeping.

9.4. Tare Weight Recording

The weighbridge software can store the tare weight of the waste delivery vehicles above 3 tonnes.

For vehicles that visit the site on a regular basis, the vehicle's tare weight is stored on the weighbridge software. Thereafter, it is only necessary for the vehicle to record its gross weight on entry into the landfill and a weighbridge docket produced.

To maintain an accurate tare weight, each vehicle is required to re-tare every 90-180 days.

It is important to ensure that the tare weight is representative of the weight of the empty vehicle. If the vehicle (eg. skip bin truck) is likely to have a different configuration of bin each time it arrives on site, then an accurate tare weight is not acceptable and the vehicle weighs in/out daily.

For vehicles that only visit the site occasionally, it is not necessary to store a tare weight.

9.5. Payment

Payment is either via credit card, cash, or account.

All account customers are pre-arranged and approved by the finance department or procurement department prior to the waste acceptance at the weighbridge. If not approved, the customer is required to pay via cash, account or credit card.

9.6. Waste Pre-treatment

There is no pre-treatment of waste on site as the facility is fundamentally a landfill site.

9.7. Communication

The weighbridge and all landfill mobile equipment have two-way radio and site mobile phone communication which is operated by the Leading Hand on shift.

Waste Disposal Officers have a two-way radio for effective communication.

The landfill advertises which working channel is to be utilized on site so that waste delivery vehicles, if they have the appropriate radios, can communicate with the landfill operations and vice versa.

10. Waste Disposal and Placement

10.1. Waste Delivery Vehicle Access

The main access to the Armadale Landfill and Recycling Facility site is at Hopkinson Road whereby there is an entrance at the far right heading towards Thomas Road. Upon

obtaining a docket at the weighbridge, the delivery vehicle is instructed on how to get to the transfer station (residential customers) and the tip face area (Commercial customers) and typically follow the appropriate site signage. On exiting the facility, the delivery vehicle follows a well indicated exit route with signs installed on site.

10.2. Tipping Face Area

The waste tipping location within the landfill cell is determined by the following:

- Progress of the landfill either horizontally or vertically.
- Final waste profile.
- Weather Seasons:
    - Wet weather
    - Dry weather
- Wind direction (to reduce litter generation).
- Transfer station.
    - Waste Drop off area.

When it comes to residential waste, residents normally dispose of their waste at the transfer station where the unsorted waste is placed in the bins which later get transferred to the landfill. Recyclable products are recycled separately based on the various programs. Commercial waste goes straight to the active landfill area although the facility has temporarily ceased accepting this type of waste in bulk.

The deposited waste from either commercial or residential waste is pushed into the designated tipping area place by a dozer or waste compactor in layers not exceeding 0.5 m in depth. Once the waste is finally disposed of, the waste is dismantled and compacted by the waste compactor. This is achieved by a minimum of three to five passed of the compaction vehicle. Subsequent loads of waste are placed on top of this waste and similarly shattered and compacted. The waste tipping area is kept as small as possible, to a maximum width of 30 m and a maximum height of 2 m.

This process is continued until the area of waste placement has reached its desired height or waste deliveries have ceased for the day. Thereafter, the compacted waste is

covered with a 150 mm layer of daily cover material, or an alternative daily cover solution is utilised to cover all waste.

A 300 mm layer of intermediate cover is placed over all waste that will not have subsequent waste placed over it within three months. This provides an improved cover to the waste mass over an extended period.

The formation of the waste mass within each landfill cell is in accordance with the individual landfill cell filling plans. The maximum slope of the internal waste batters is 1 V in 2.5 H.

10.3. Vehicle Tipping Location

For residential waste, waste is delivered at the transfer station sorted out and placed in the sealed bins. The bins once they are full, they are taken by a loader to the hook bins and later taken by a hook lift truck to the landfill. The waste is then compacted and covered at the end of the day.

For commercial waste, there is a designated area at the active tipping face of the landfill which is wide enough to facilitate the simultaneous tipping of at least three waste vehicles side by side, although currently the site is not accepting bulk commercial waste.

11. Cover Material Application

11.1. Requirement

License granted by DWER stipulates that the waste accepted should be covered on a daily basis.

The Cover is applied to the landfill surface to achieve the following:

- Surface stability.
- Surface trafficability.
- Fire control.
- Litter control.
- Odour control; and,
- Vermin control.

The use of cover material is enhanced so that excessive cover material is not used unnecessarily. The amount of cover material used is highly dependent on the condition

of the waste surface onto which it is being applied. The Waste Disposal Officers ensure that the compacted waste surface is relatively smooth and firm before applying cover material. An irregular waste surface with excessive void space results in significant quantities of cover material being consumed in order to achieve an adequate coverage. The use of excessive cover material results in the following:

- Wasted effort in sourcing, covering, and removing cover material.
- Waste of cover material; and,
- Waste of landfill airspace.

The benefits of immediately covering the final waste profile include:

- Earlier completion of portions of the landfill.
- Improved visual amenity.
- litter management.
- Odour management.
- Stormwater management.
- Leachate management; and,
- Fire management.

An adequate supply of cover material is essential for the continuous operation of the landfill. The landfill operators always maintain adequate stockpiles of available cover material next to the active tipping face.

11.2. Waste Cover Options

Daily cover to be used is a combination of the following:

- Soil that is received over the weighbridge (eg. from local earthworks projects and land subdivision).
- Soil material specifically imported onto site for use as cover material; and/or,
- Alternative daily cover.

11.3. Material Quantity

The waste is disposed of and compacted in layers of maximum 2 m high, with a 150 mm daily cover applied. This is a conservative position as in most circumstances, in a single day, there is at least two benches placed on top of each other and only the finalsurface of the waste covered at the end of the day: hence, only requiring half the cover material.

The daily or weekly cover material requirement is highly dependent on the waste

tonnage throughput.

11.4. Material Sources

The sources of daily cover material include:

- Soil received over the weighbridge from various customers.

11.5. Daily Cover

A soil daily cover material is applied at the end of each day's landfill operations. The cover material is placed to a depth of 150 mm over all exposed waste surfaces or alternative daily cover material is utilised as a substitute to the traditional soil cover material.

11.6. Intermediate Cover

A soil intermediate waste cover is placed on all landfill slopes that are not going to be landfilled within three months. The intermediate cover is a minimum of 300 mm deep and suitably spread and track rolled to cover all exposed waste and to enable surface water that lands on the intermediate cover surface to be shed away from the active landfill area.

Depending on the duration that the intermediate cover is left in place, over time, erosion may reduce the cover layer thickness and it may be necessary to occasionally reinstate the intermediate cover material.

12. Environmental Protection Activities

12.1. Concept

Armadale Landfill and Recycling Facility operations main aim is to minimise potential negative effects on the environment.

12.2. Contingency Planning

In case the day-to-day operations activities are not able to cope with the environmental impact, contingency measures to further improve the environmental management are to be implemented on site. These measures are implemented as stated below:

13. Stormwater Management

13.1. Overview

Currently, based on the stage of landfilling, there is an internal low point within the landfill footprint. This low point enables the city to collect and retain some surface water runoff within the site boundary, with other areas beyond the low point being shed directly off-site or into the internal perimeter drain, from where it eventually exits the site to join up with the external natural watercourse.

13.2. Stormwater Collection Areas

The following are distinct areas on-site that require different management of stormwater.

- **General site areas and access roads** – These are areas on-site that do not contain any waste materials and hence, all stormwater is deemed as being uncontaminated and hence can simply be discharged into the stormwater system and ultimately enter the external natural watercourse.
- **New Waste Transfer Station** –The New Transfer Station is handling all drop-off waste received on site. Stormwater accumulated within this area has the potential to come into contact with waste and hence has the potential to become contaminated, the degree of contamination being a function of the type of waste material. The type and degree of contamination would be a function of the waste type and determine the associated treatment required.

- **Landfill tip face area** – All stormwater is to be deemed as being contaminated and treated as leachate.

13.3. Existing Management System

13.3.1. Collection

The existing stormwater system collects surface water from across all areas of the site, including:

- Roads, hardstands, and paved areas.
- Vegetated areas.
- On and around buildings.
- Active landfill area.
- Temporarily closed landfill areas; and,
- Capped landfill areas.

The various areas have different stormwater collection systems ranging from formal concrete drains through to laminar flow over the ground surface. The collection system has been progressively developed to suit the site needs at each distinct area. There is no single collection system adopted on-site.

13.4. Containment

13.4.1. Uncontaminated Stormwater

Uncontaminated stormwater is stormwater that has not encountered any waste materials. Where the surface profile allows, all uncontaminated surface water is directed to the site perimeter where it flows either directly into the external natural watercourse running along the site northern boundary or into the internal perimeter drains to the east, south and west of the site and from there, eventually into the northern external natural watercourse.

Due to the low point within the landfill footprint and the current stage of landfilling there is a portion of the site that cannot be drained to the external watercourse and flows into the low point within the landfill footprint. Stormwater accumulated within this clay storage pond is naturally evaporated to reduce the accumulated volume.. The footprint of the clay pond is constrained by the surrounding waste, with no ability to expand horizontally; hence, the storage capacity of this clay stormwater pond is simply a function of the height of the dividing wall between the two clay ponds. If there is a need

to increase the storage capacity, the City increases the height of the dividing clay bund.

13.4.2. Contaminated Stormwater

Contaminated stormwater is generated by surface water runoff from the active landfill area. Landfill waste placement is to ensure that the smallest possible active area is maintained in order to minimise the generation of contaminated surface water.

All contaminated surface water is directed to the leachate ponds and treated accordingly.

13.5. Diversion

Stormwater diversion off-site is the primary mechanism for the management of stormwater. Where the surface profile allows, all uncontaminated surface water is directed to the site perimeter where it flows either directly into the external natural watercourse running along the site northern boundary or into the internal perimeter drains to the east, south and west of the site and from there, eventually into the northern external natural watercourse.

The diversion of surface water to the surrounding perimeter drains and natural watercourse reduces the quantity of accumulated stormwater on-site.

13.6. Disposal

Stormwater accumulated within the low point on the landfill is naturally evaporated. Historically, each year, the clay stormwater pond is able to be emptied before the onset of winter rains.

13.7. Monitoring

Monitoring of the surface water management system is to include the following activities:

- Monitoring the depth of the accumulated surface water within the clay stormwater pond to ensure that there is adequate capacity to receive the season's rainfall. This is via visual observation and ensuring that there is a minimum of 500 mm freeboard remaining in the pond.
- Monitoring all stormwater drains to ensure that they are free of sediment and litter to ensure full drain capacity; and,
- Monitoring the condition of the site internal perimeter drains to ensure that they retain full flow capacity and contain all flow generated from the site.

The frequency of monitoring will be a function of the stormwater management system performance. Typically, the drainage system should be comprehensively inspected prior to the onset of winter rainfall and occasionally after heavy rainfall events. The clay stormwater pond is to be monitored towards the end of winter as the volume of accumulated stormwater reaches a maximum.

13.8. Maintenance

The maintenance of the stormwater management system will typically be in response to regular monitoring, which would identify areas of the stormwater system that require maintenance.

Maintenance involves the cleaning out of the drains to ensure maximum flow capacity.

13.9. Future Management System

13.9.1. Collection

As the landfill development progresses, there will be less and less collection of surface water (and leachate) within the low point on the landfill. Eventually, there will come a time when waste has completely filled the low point of the landfill, and after the area is capped, all surface water can be diverted directly off-site.

There will, however, be a short period where there will be minimal stormwater storage available within the low point and there may be a requirement to pump accumulated stormwater out of the reduced size storage pond by circulating it into the landfill.

Once the landfill has been closed and finally capped, all surface water will be diverted off-site.

With the development of the new transfer station, there will be the potential of generated contaminated surface water; however, due to the proposed handling methodology, with all putrescible materials being disposed of in sealed bins, contamination will be minimal and primarily consist of silt as opposed to chemical contamination.

13.9.2. Containment

As with the current surface water containment, initially, there will be the containment of uncontaminated surface water within the stormwater pond and contaminated surface water in the leachate pond; however, in time, as the landfill development progresses,

there will be no more containment of uncontaminated surface water on-site. . When the landfill is closed and finally capped, there will be no more generation of contaminated surface water.

13.9.3. Diversion

Off-site diversion of stormwater from the capped sections of the Landfill and sealed roads is the primary mechanism for the management of stormwater. Where the surface profile allows, all uncontaminated surface water is directed to the site perimeter where it flows either directly into the external natural watercourse running along the site northern boundary or into the internal perimeter drains to the east, south and west of the site and from there, eventually into the northern external natural water course.

13.9.4. Disposal

The primary stormwater disposal mechanism will continue to be the discharge of stormwater into the external natural waste course to the north of the site, applicable to the capped sections of the landfill.

Stormwater accumulated within the low point on the landfill will gradually decrease as the landfill progresses.

13.9.5. Monitoring

Monitoring of the surface water management system is to include the following activities:

- Monitoring the depth of the accumulated surface water within the stormwater pond to ensure that there is adequate capacity to receive the season's rainfall. This is via visual observation and ensuring that there is a minimum of 500 mm freeboard remaining in the pond.
- Monitoring all stormwater drains to ensure that they are free of sediment and litter to ensure full drain capacity; and,
- Monitoring the condition of the site internal perimeter drains to ensure that they retain full flow capacity and contain all flow generated from the site.

The frequency of monitoring will be a function of the stormwater management system performance. Typically, the drainage system should be comprehensively inspected prior to the onset of winter rainfall and occasionally after heavy rainfall events. The stormwater pond is to be monitored towards the end of winter as the volume of accumulated stormwater reaches a maximum.

13.9.6. Maintenance

The maintenance of the stormwater management system will typically be in response to regular monitoring, which would identify areas of the stormwater system that require maintenance.

Maintenance involves the cleaning out of the drains to ensure maximum flow capacity.

13.9.7. Timeframe

Table 7.1 – Landfill Closure and Post Closure Timeframe provides an indicative timeframe for the anticipated closure and post closure activities, which may influence the installation, monitoring, and maintenance of the stormwater management system, in particular the transition from stormwater accumulation within the stormwater pond to direct off-site discharge.

Table 7.1 – Landfill Closure and Post Closure Timeframe

Activity	Timeframe
Capping Western Portion	Summer 2021/2022 Financial Year
Capping Stage 1 East	Summer 2028/2029 Financial Year
Capping Stage 2 East	Summer 2030/2032 Financial Year
Capping Stage 3 East	Summer 2032/2040 Financial Year
Post Closure Monitoring and Maintenance	2040/2060 Financial Year
End of Landfill Post Closure Period	June 2060

It is pointed out that the above timeframe is based on the current assumption that the landfill will reach maximum capacity in 202039/2040 Financial Year. The ultimate timeframe will be highly dependent on when the landfill reaches maximum capacity.

13.9.8. Review

This Plan covers the stormwater management activities for the Armadale Landfill and Recycling Facility and is based on current best practice. Over time, there will be structural changes to the stormwater management system as the site expands; however, this Stormwater Management Plan is anticipated to remain relevant for the overall concepts of stormwater management.

Based on current planning, the new waste transfer station is now fully developed and the landfill lifespan is anticipated to be in the order of 15 to 20 years;, it is important to review this Plan approximately every five years',

to confirm the validity of the proposed stormwater management methodologies and activities and to reflect any site-based or industry change that may be relevant.

Once the landfill operations have been completed and the landfill finally closed and capped, this Plan is to be reviewed to remove all historical content relating to the management of stormwater within the low point and on the landfill operational areas.

14. Groundwater Management

14.1. Concept

Groundwater contamination is an essential consideration during the entire life of the landfill. Considerable attempts have been undertaken to identify the depth to groundwater. The landfill design has continued to be significantly developed with the consideration in protecting the groundwater from contamination.

Unlike stormwater, groundwater contamination is a progressive process of percolation of leachate into the ground, and once occurring, is impractical to rectify the cause within a short timeframe; consequently, the impact thereof will be potentially a long-term issue.

Depending on the source of contamination, remedial actions are available; however, are generally very slow and extremely expensive to undertake. Consequently, there has and will continue to be significant effort put in during design and construction to ensure that the best quality infrastructure is installed.

In addition, groundwater monitoring is undertaken by a contractor to monitor the condition of the groundwater to identify any possible contamination. All these reports are submitted to DWER while submitting the environmental annual report.

The groundwater is protected from potential landfill impact by the following site-specific attributes and actions:

- Natural environment (low permeability soils);
- The substantial landfill clay lining system;
- Selective waste receival (only Class II material);

- Ongoing leachate management.
- Progressive landfill closure.
- The capping system.
- Cap rehabilitation; and,
- Post closure repair and monitoring.

With all these protection mechanisms in place, it is still an industry-wide accepted fact that all clay lined landfills leak (generally through construction defects). However, based on the protection measures, the leakage would be minimal and of no environmental consequence.

14.2. Groundwater Contamination Limits

There are no defined contamination limits for groundwater, but typically the *DEC (2010) Fresh Water Guidelines* are used as a benchmark to determine if there is some impact on the groundwater occurring, but there are no defined contamination limits for groundwater.

14.3. Monitoring

Groundwater monitoring has been ongoing, whereby the contractor monitors the condition of the groundwater to identify possible contamination. The frequency of monitoring and the range of parameters to be analysed are indicated in the license granted by DWER.

15. Leachate Management

15.1. Concept

Leachate management revolves around the minimization of the amount of leachate generated at the landfill. This is primarily achieved by safeguarding that there is adequate surface water diversion away from the waste mass and open landfill cells, that the suitable final waste profile is attained, and the waste appropriately capped as soon as is practically possible to divert the surface water flow away from the waste and landfill cells.

Leachate generated is controlled efficiently using various options to minimize the volume of leachate generated within the landfill and avoid accumulation of leachate within the landfill cells.

15.2. Leachate Generation

The volume of leachate generated while the landfill is operating is depended on a range of site-specific factors including:

- Timing of when landfill cells were commissioned (summer or winter).
- Size of the landfill and area of exposure
- Quantity of landfill waste within the landfill.
- Shape of the waste mass (slope angle).
- Operation of the landfill.
- Type of waste; and,
- Type of cover material.

The above variables have a significant impact on the quantity of leachate being generated on-site.

Displaying the anticipated leachate volumes generated while the landfill was being developed and operational indicates that the ponds on site are adequate for leachate management till closure of the landfill. This calculation is based on the amount of the leachate generated recirculated within the landfill cells and waste mass.

15.3. Leachate Management Options

Leachate management is a crucial activity at Armadale Landfill and Recycling Facility. However, there are several options of managing leachate. Summer season, there is occasional or no rainfall and this is where the landfill operators reduce the volume of leachate significantly. This is where the ponds are ideally empty by the end of the summer period. Winter season, when there is heavy rainfall, there are minimal ways of eliminating leachate from the site, and hence leachate is stored within the leachate ponds. The majority of its rainfall, this is when most of the leachate generated on site is accumulated within the leachate ponds. Fortunately, with the site being in a relatively low rainfall zone, there is still part of winter period where there are simpler solutions of managing leachate other than storing in the leachate ponds are viable.

Leachate management options that have always been utilised on site, include the following:

- Accumulation of leachate in the ponds.
- Evaporation from the surface of the leachate.
- Leachate recirculation onto the waste surface using high- pressure sprays on the active landfill areas.
- If need be, leachate volumes are to be pumped onto the dry waste delivered on site as it gets placed and compacted in the landfill. Dry waste absorbs a significant amount of leachate volumes.
- In the case of an emergency spill from the leachate pond or pop-ups from the landfill cells, leachate is to be suctioned and trucked off site to a liquid waste treatment facility.

Recirculation and Evaporation are effective during summer season, but during winter, there is minimal evaporation.

15.4. Leachate Ponds

New leachate ponds have been constructed for effective leachate management. Each leachate pond has a maximum evaporation area of 3,625 m²and retains a volume of

7,250 m³ whilst still maintaining a 500 mm freeboard as per the DWER licensing conditions. The leachate ponds have been designed and constructed with an average operating depth of 2 m and an additional 500 mm freeboard, resulting in a total average depth of 2.5 m.

15.5. Leachate Evaporation

Based on the size of the leachate ponds, the effective annual evaporation from a single pond is calculated as follows:

- Median annual evaporation = 2,065 mm
- Median annual rainfall = 600mm
- Leachate pond maximum Evaporation surface area = 3,625 m²

Evaporation Volume = Area (0.8 * Evaporation – Rainfall) = 1052 m3/year/pond.

15.6. Leachate Extraction from Landfill

Due to the landfill having been developed within an existing clay pit and waste simply pushed out into the clay pit without any specific landfill base design, there is no ability to direct leachate to a specific low point for extraction purposes.

The base of the clay pit was excavated to a random shape, which resulted in a typically horizontal pit floor with random low points and small ridges (presumably to control and collect stormwater). This resulted in a waffle shape floor onto which the waste was placed. Consequently, there will be localised accumulation of leachate on the clay base, pooling within the individual waffle shaped depressions.

A piped leachate collection system was only developed once the complete base of the landfill had been covered and a significant portion of the western side of the landfill; hence, the existing leachate extraction network is perched above the clay base and is not able to drain the leachate that has accumulated within the bottom (historically old) layer of waste.

Anecdotally, the clay pit was excavated to approximately 3 m below ground level. The surrounding ground level is at approximately RL 26m AHD; hence, the base of the landfill is at approximately RL 23m AHD. As of 5 June 2020, the surface of the leachate on the pond was at RL 25m AHD. Based on the pond being approximately 1 m deep,

the base of the leachate pond is at approximately RL 24m AHD or approximately 1 m above the base of the landfill.

The piped leachate collection system has a low point at RL 25.27m AHD, which is just above the level of the leachate pond (as of 5 June 2020).

15.7. Containment

15.7.1. Base

Leachate is contained within the base of the landfill by the low permeability, naturally occurring clay soil on-site. Groundwater monitoring has not detected any leachate contamination around the landfill; hence, it can be presumed that leachate is well contained within the base of the landfill.

15.7.2. Side

The side of the landfill consists of approximately 3 m vertically of clay sidewall and above natural ground level, approximately 5 m of completed landfill. The 3 m of clay sidewall is equivalent to the landfill base and deemed a suitable containment structure for the leachate.

There is limited containment ability provided by the completed waste mass that is aboveground. In the event that this zone of waste became saturated with leachate, in time, leachate would emerge out of the external waste batters. The existing soil capping material will provide minimal resistance to the leachate flow and ultimately, leachate would flow down the outside of the landfill.

Based on the above side containment, so long as the level of the leachate saturation within the waste remains below the natural ground level, the leachate will be adequately contained. Above that level, leachate is likely to emerge out of the landfill.

The ideal is to keep the level of leachate saturation within the landfill to as low as possible so as to reduce the hydraulic pressure on the base and side of the landfill to reduce any leachate migration through the clay soil.

15.8. Overall

Based on the base and side containment and the fact that the piped leachate collection system is perched above the bottom of the landfill, there is a leachate saturated zone of

approximately 1 m of waste between the base of the landfill and the piped leachate collection system where there is no ability to extract any leachate. Above this saturation zone, there are differing zones of moist waste ranging from field saturation through to dry waste.

15.9. Diversion

Diversion of leachate is achieved by sloping the active landfill areas towards the existing leachate pond in the central low point of the landfill. Thereby shedding contaminated surface water directly into the leachate pond and hence limiting leachate generation within the waste mass.

In addition, diverting uncontaminated surface water from the capped and temporally capped surfaces significantly reduces leachate generation within the waste mass. The greater the capped surface, the greater the diversion of surface water and hence, the greater the reduction of leachate generation. Progressive capping of the landfill maximises the diversion of uncontaminated surface water.

15.10. Disposal

Leachate disposal refers to the reduction in the volume of accumulated leachate on-site. This currently occurs via direct evaporation from the leachate pond surface as well as recirculation of leachate onto the surface of the landfill to increase the wetted surface area and hence increase leachate evaporation. There will also be some infiltration of the recirculated leachate into the waste mass; however, this is not the intention of this leachate management method. Ideally, the recirculation spraying wet, but not saturates the waste surface.

To date, the above two leachate management methods have been adequate to dispose of all leachate generated on-site.

15.11. Monitoring and Maintenance

With the existing leachate collection system being a subsurface gravity drainage system, there is nothing that requires monitoring or maintenance.

The leachate pond depth is monitored on a regular basis and in the event that there is more leachate storage capacity required, the leachate pond area is expanded, with a reciprocal reduction in area of adjacent stormwater pond.

16. Dust Management

16.1. Concept

Dust management is vital at the Armadale Landfill and Recycling Facility to enhance and minimise the environmental impact caused by dust emission.

16.2. Sources

Sources of dust emissions at the landfill include:

- Landfill tip face.
- Plant movement along access roads.
- Spreading of cover material

The above-named sources are easily manageable within the boundary premises.

16.3. Mitigation strategies

Various mitigation strategies are implemented to ensure that dust emissions can be minimised at the Armadale Landfill and Recycling Facility. The mitigation strategy is a function of the source of dust generation.

Vehicle movements along access roads - Materials used for the construction and maintenance of the internal roads have an impact on the dust generated. Material used on site is grinded or crushed construction waste (Bricks and Rubble) and the characteristic of this material generates dust, because of vehicle and mobile plant movement. As a result, dust mitigation strategies are required for implementation. The following mitigation strategies have been implemented:

Dust „suppression is done by City of Armadale's water truck which has a capacity of 11,000L. License granted by DWER stipulates that dust should always be controlled within the boundary premises. The amount of water used in dust suppression is dependent on the weather conditions, number of vehicles on site and all these factors determine how often dust will be suppressed. Dust suppression is applicable based on the quantity of dust emitted.

Speed - Site speed contributes a lot to the quantity of dust emitted. The less the speed the less the dust generated on the internal roads. The site permits all vehicles to move at 20km/hr. Speed bumps, signs and speed radars have been installed indicating the

speed limit enforced on site. In case the speed limit doesn't work, then dust suppression strategies are to be implemented.

Tip face area activities - when loads are being tipped and when compaction occurs on waste materials, there is dust emitted in the process. When dusty loads are tipped, there is always a water truck standby for dust suppression at the tip face. After dust suppression is completed, the load is pushed and compacted.

Loading and unloading of cover material - Due to the nature of this activity it is difficult to adequately control dust emissions during adverse weather conditions; however, this activity is not a potential major contributor towards dust loading on site. The primary method for controlling dust emissions is, where possible, to delay these activities until weather conditions improve. Where this is not possible, due care is taken to place the material in vehicles and not drop it from a height. There is little option for change of methodology with regards to unloading vehicles during adverse weather conditions. There are, however, opportunities to load and unload vehicles further away from the site boundary to reduce the risk of dust emissions blowing beyond the boundary.

16.4. Water Source

ALARF main source of water supply for dust suppression is a groundwater bore. A standpipe has been installed to facilitate refill of water into the water truck. There are also two tanks on site with a capacity of approximately 250,000L that acts as a back-up..

16.5. Emissions Limits

ALARF has maintained a target of no dust emission beyond the landfill boundary and there have not been any complaints raised from external sources.

16.6. Monitoring

Dust emission is visually monitored on a continuous basis by site operations staff. The facility also maintains comprehensive complaints register, which is used as a gauge of success with regards to dust emission management. If there is a dust emission issue identified, formal dust monitoring is to be undertaken by an independent third party to

determine the extent of the problem and propose appropriate improved dust management solutions.

17. Litter Management

17.1. Concept

The main aim of litter management is to reduce the impact of litter on the environment and to ensure that the amount of litter blown from the tip face area is collected.

17.2. Sources

Possible sources of litter emissions are:

- Waste delivery vehicles.
- Tip face area during tipping of waste loads.
- Tip face area during pushing and compaction of the waste; and,
- Waste delivery vehicles departing the site.

17.3. Treatment Options

There are several litter mitigation strategies that are to be employed to reduce litter emissions on-site. The mitigation strategy is a function of the source of litter generation.

Waste delivery vehicles – Waste delivery trucks operators are advised to cover their loads while driving on public roads or provide a tarp. Consequently, waste delivery trucks upon the delivery of waste on site, they are required to cover their bins or provide a tarp to prevent litter from blowing off. This enhances litter control to an extent to where there are no litter emissions from these vehicles delivering waste to the landfill.

Waste Disposal Officers and weighbridge operators normally conducts visual inspections on the waste delivery trucks is in the case where the loads are not properly covered, the driver is advised on the importance of covering their waste. It's noted on the register that the driver has been given a warning and the company is also advised. In the case they commit the same offence repeatedly, the following happens to the driver:

- Bar the driver from site.
- Bar the vehicle from site.

- The waste delivery company makes the appropriate changes to the vehicle to improve covering; or
- Other solutions that may be negotiated between the Service Lead and the waste delivery company.

Blown from active tipping area during tipping of waste loads - This is the activity that results in significant litter generation in certain circumstances, as the waste is typically tipped from a height onto the landfill surface. The degree of litter generation is a function of the following factors:

- Tipping height.
- Waste type.
- Waste vehicle type (compactor trucks cause less litter than loosely packed vehicles).
- Wind speed and direction.
- Season of the year (summer is worse than winter); and,
- Location of the active tipping face.

Treatment options include:

- Selecting waste tipping areas to best suit the ambient weather conditions.
- Utilisation of litter screens next to the tipping vehicles.
- Litter fencing around the active landfill area.
- Removing litter from the litter screens and fences as soon as possible, but as a minimum at least every two days.
- Collecting litter blown beyond the tipping area of the landfill as soon as possible, but as a minimum on a weekly basis; and,
- Collecting litter blown beyond the landfill boundary as a minimum on a weekly basis.

Blown from active tipping area during pushing and compaction of the waste -This activity also results in significant litter in certain circumstances, as the waste is pushed around the landfill surface. The degree of litter generation is a function of the following factors:

- The distance that the waste needs to be pushed.
- Waste type.
- The time it takes to compact the waste.
- Wind speed and direction.
- Season of the year (summer is worse than winter); and,
- Location of the active tipping face.

Treatment options include:

- Selecting waste tipping areas to best suit the ambient weather conditions.
- Minimising the distance from where the waste vehicle tipped to the position of final waste placement.
- Litter fencing around the landfill tip face area.
- Removing litter from the litter screens and fences as soon as possible, but as a minimum at least every two days.
- Collecting litter blown beyond the landfill tip face as soon as possible, but as a minimum on a weekly basis; and,
- Collecting litter blown beyond the landfill boundary as a minimum on a weekly basis.

Blown from waste delivery vehicles departing the site - Once the vehicles have tipped the waste at the landfill, some of the vehicles do not completely empty all the waste from the back of the vehicle and in some circumstances, there is litter blown around the inside of the vehicle as it departs the site. If the vehicle covering system is not well fitted, this loose waste material can blow out of the vehicle. The degree of litter generation is a function of the following factors:

- The type of vehicle.
- The efficiency of the vehicle tipping operation.
- Waste type.
- The functionality/efficiency of the vehicle cover system; and,
- The speed of the vehicle.

Treatment options include:

- Being aware of the vehicles that have the potential to cause litter from this source (walking floors, not tippers).
- Where possible, the inspection of the vehicles prior to departing from the tipping area to ensure that the vehicle is empty.
- Advising customers which vehicles are causing the problem and working with the customers to try and reduce/eliminate the problem.
- Collecting litter blown within the site boundary; and,
- Collecting litter blown beyond the landfill boundary as a minimum on a weekly basis.

Litter generation and the appropriate management thereof is an on-going aspect of landfill operations. There is no reasonable way to completely prevent the generation of litter; hence, an active litter management system is always required on site. The more effort that would be undertaken to reduce litter generation, the less effort that is required to collect litter that has been blown around the site.

Ultimately, litter collection around the landfill and beyond the site boundary is the only effective way to clean up the site and maintain it in a reasonable state.

17.4. Emissions Limits

Minimising litter blown beyond the active landfill and beyond the landfill property boundary.

Not having litter beyond the landfill property boundary for more than a week (litter collection as a minimum on a weekly basis).

17.5. Monitoring

Daily inspection of the active landfill tipping area.

Weekly inspection of the landfill area site (within the Prescribed Boundary), and beyond the site boundaries.

18. Odour Management

18.1. Concept

The objective of odour management is to minimise the generation of odour from the landfill and leachate management system.

18.2. Sources

The sources of potential odour emissions from the landfill activities include the following:

- Putrescible waste being delivered and unloaded at the tip face area.
- landfill gas emissions.
- Leachate ponds; and,
- Leachate recirculation onto the surface of the landfill.

18.3. Treatment Options

There are several odour mitigation strategies that are employed to reduce odour emissions on-site. The mitigation strategy is a function of the source and intensity of odour generation.

Putrescible waste being delivered and unloaded at the active tipping area -Most putrescible waste arriving on site is not overly odorous as in most circumstances; the waste has not yet putrefied, as it is relatively fresh waste.

The degree of odour generation and the impact on receptors because of putrescible waste being delivered to site is a function of the following factors:

- Waste type.
- Waste age.
- Wind speed and direction.
- Buffer distance to receptors.
- The distance the waste would be pushed prior to being compacted and covered.
- Duration the waste is left uncovered; and,

- Efficiency of the waste covering operation.

Treatment options to manage and reduce the potential impact of odour on site include:

- Efficient active tipping area to reduce the time between the waste being tipped and it being compacted in place.
- Minimising the distance that the waste is pushed around the active tipping area; and,
- Application of adequate cover material.

Excessively odorous loads are an extremely rare occurrence on site and typically relate to a dedicated waste collection emanating from a single source (eg. crayfish factory). These loads are received directly from the waste generator and are not received in bulk transfer trailers from transfer stations (as they cause odour issues at the transfer stations, which are typically closer to sensitive receptors than the active landfilling area).

The waste collection company is required to make enquiries to the Resource Recovery Service Lead as to whether the waste can be accepted at the landfill. In this case, the Resource Recovery Service Lead investigates the waste source and type to assess if it is acceptable. If deemed acceptable, then special landfilling conditions are imposed upon the delivery of the odorous material such as:

- Minimum notification period prior to waste delivery.
- Delivery only in certain wind conditions (speed and direction); and,
- Maximum quantities of waste to be delivered in a single load or day.

These conditions are set to ensure that the landfill is able to adequately manage the waste material. On the day of delivery, a void is prepared in the landfill where the odorous waste is tipped and immediately covered over.

If waste acceptance is agreed to, then a trial is carried out to assess the effectiveness of the proposed landfill methodology and the odorous nature of the waste. If the trial is successful, then the waste is accepted. As a result of the trial, or ongoing receival of the waste, from time to time, it is necessary to amend the acceptance conditions or landfill methodology to improve odour management.

In the event of an excessively odorous waste load arriving at the landfill without prior arrangement, the method of detection of the odorous load is that the weighbridge

operator notices the excessive odour, or the Waste Disposal Officer detects the odour on the landfill tipping face.

In the event that the load is still in the vehicle when the odour is detected, the landfill Waste Disposal Officer the Service Lead, and the Service Lead instructs the vehicle driver not to tip the load and park up the vehicle while investigations are quickly carried out. The driver is asked about the waste type in the vehicle and its origin. There may be a need to obtain additional information from the waste collection company and/or the waste generator. Once all available information has been collected, the Service Lead determines if the load is accepted or rejected. Rejected loads are immediately removed from site and the appropriate rejection information recorded on the vehicle transaction docket via the weighbridge software.

When considering the acceptability of the odorous load, the Service Lead considers the following influencing factors:

- The customer's past performance with odorous loads.
- The size of the load.
- The degree of odour emanating from the load (assessed by a walk around the vehicle and sensing the degree of excessive odour).
- The information provided by the vehicle driver, collection company and waste generator (if obtained).
- The wind speed and direction to likely receptors.
- The track record of odour complaints on site; and,
- The ability to quickly form a void in the landfill to receive the load and cover it immediately.

If the load is acceptable, it is received and immediately covered over.

The customer is advised of the prearrangement requirements for any future odorous loads.

Landfill gas emissions - Landfill gas emissions from the landfill have the potential to be the greatest cause of odour on site. Consequently, the management of landfill gas is a critical aspect of overall facility management.

The odorous component of the landfill gas is the hydrogen sulphide content, which is typically less than 1% of the gas volume. This has a density slightly greater than air; hence, tends to stay at ground level and not dissipate vertically, as does methane and most of the other components of the landfill gas.

The degree of odour generation on site and the impact on receptors is a function of the following factors:

- The type of landfill liner material used.
- The permeability of the natural soils.
- Waste type.
- Waste moisture content.
- Wind speed and direction.
- Buffer distance to receptors.
- Age of the waste.
- Volume of waste in the landfill.
- Density of the waste.
- Timing of when the gas extraction infrastructure will be installed.
- The efficiency of the landfill gas infrastructure.
- The type of cover material used.
- The quality of the cover material placement.
- The type of final capping utilised.
- The quality of the workmanship when sealing around penetrations through the landfill cap; and,
- The degree of settlement around penetrations through the landfill cap.

As can be seen, there are many influencing factors that need to be adequately managed to ensure the appropriate control of landfill gas on site. There are also many landfill activities that are carried out by different parties on site that need to be well coordinated to ensure that the best possible control of landfill gas is achieved.

The related parties include:

- Landfill designer (capping construction).
- Landfill construction contractors (capping construction).
- Construction Quality Assurance consultants (capping construction).
- Landfill operators; and,
- Landfill gas specialist contractor.

Control and treatment options include:

- Compliance with the DWER landfill development guidelines ensures the appropriate design and construction of the landfill infrastructure to best contain and extract landfill gas;
- Appropriate training and monitoring of landfill operator performance; and,
- Regular monitoring of the performance of the gas extraction network and making adjustments and/or repairs as required.

Leachate ponds - Odour emissions from the leachate ponds are extremely low and hence do not cause odour concerns. Odour from the leachate ponds emanate from the following sources:

- When the fresh leachate is pumped from the landfill into the pond (this only occurs during pumping);
- Directly from the leachate pond surface; and,
- During forced evaporation via spray irrigation.

The degree of odour generation and the impact on receptors is a function of the following factors:

- The concentration/quality of the leachate.
- The quantity of leachate pumped into the ponds at any one time.
- The rate of pumping into the ponds.
- How the leachate flows into the pond.
- The quantity of leachate irrigation during forced evaporation.

- Depth of the leachate in the pond (to prevent it going anaerobic).
- Wind speed and direction; and,
- Buffer distance to receptors.

On site control and treatment options include:

- Regular pumping of small quantities of leachate into the ponds as opposed to pumping significant quantities in a short period.
- Allowing the fresh leachate to flow down the side of the pond liner as opposed to projecting it into the air.
- The leachate pond's maximum depth does not allow the leachate to become anaerobic.
- Large pond surface area to encourage aerobic digestion within the ponds to reduce the odorous component within the liquid; and,
- Lime (or other chemicals) dosing of the leachate pond to change the pH and hence the odour emissions.

Leachate recirculation onto the surface of the landfill - This operation includes the distribution of leachate onto the landfill surface via sprinklers and/or water tanker.

Due to the relatively low volumes of leachate being recirculated at any one time, this is a minor source of odour emissions.

The degree of odour generation on site and the impact on receptors is a function of the following factors:

- The concentration/quality of the leachate.
- The quantity of leachate sprayed onto the landfill surface at any one time (leachate recirculated into the landfill does not generate odour emissions).
- The rate of spraying onto the landfill.
- Wind speed and direction; and,
- Buffer distance to receptors.

On site control and treatment options include:

- Only recirculating leachate when conditions are appropriate:

    - The waste surface is dry.
    - The daily recirculation quantity is able to be evaporated from the surface and not accumulate on the surface.
    - There is adequate space on the waste surface to enable recirculation without negatively impacting on the landfill operations.
- Regular spraying of small quantities of leachate onto the landfill as opposed to significant quantities in a short period; and,
- Low volume spray irrigation in preference to large volume sprinklers.

18.4. Emissions Limits

Odour limits are subjective to individual tolerances and sensitivities, and it is difficult to set a definitive odour value that can be readily measured on site. Hence, the emissions limits adopted for on-site monitoring by Waste Disposal Officers is founded around "nil" odour, "noticeable" odour and "unreasonable" odour.

Noticeable odour is a level of odour when it is first identified by the person undertaking the odour monitoring.

Unreasonable odour is a level of odour that is deemed by the person undertaking the monitoring as being unreasonable. The level of what is deemed unreasonable is agreed by the site monitoring personnel based on the location of monitoring, location of the nearest receptor and the likely impact on the receptor.

DWER sets a target of 500 odour units emitted from a single source and this is used as the benchmark for third-party olfactory monitoring should it be undertaken.

The acceptability of the site emissions limits is based on the number of complaints received from site operations staff, neighbours, and customers. A target of zero complaints is adopted.

If, based on the adopted "noticeable" and "unreasonable" odour limits, there are still complaints received, then the limits are to be reassessed and lowered to ensure no complaints are received.

18.5. Monitoring

As part of normal operations, site staff are aware of typical odour levels associated with day-to-day activities around the landfill site. Should any unusual odour levels be

experienced, the site staff immediately reports the incident to the Service Lead, who investigates the cause and takes the appropriate action to manage the odour. It is acknowledged that site staff do become desensitised to odour after being exposed to the same odour for an extended period. The facility also maintains comprehensive complaints register, which is used as a gauge of success with regards to odour emissions management.

Formal, on-site odour monitoring by consultants consists of regular monitoring of the odour levels (nil, noticeable or unreasonable) at predetermined locations around the site and recording the monitoring event data, which as a minimum includes the following:

- Location.
- Date.
- Time.
- Odour level (nil, noticeable or unreasonable).
- Odour type (unrelated to landfill activity, landfill gas, fresh waste, leachate).
- Weather conditions:
    - Wind direction.
    - Wind speed (nil, low, mild, strong).
    - Temperature (cold, cool, warm, hot); and,
- Name of person undertaking the monitoring.

As a minimum, odour monitoring locations include:

- Nearest accessible point to the neighbouring residential properties.
- 500 m from the landfill and leachate ponds.
- At the Prescribed Boundary to the landfill site; and,
- Immediately adjacent to all sources of odour:
    - Leachate ponds.
    - Leachate extraction points.
    - Landfill gas flare infrastructure.

    Penetrations through the landfill cap.

- Active landfill tipping area.
- Areas of leachate recirculation; and,
- Daily and temporary covered areas.

The precise location of each monitoring point is determined by the following:

- Predominant wind directions.
- Site topography (including valley lines).
- Neighbouring residential properties; and,
- Accessibility.

The timing of when the monitoring occurs on a particular day or at a particular location is to be determined to ensure that the worst-case odour scenario is monitored. This includes:

- ALARF site boundaries early morning, especially when there is a temperature inversion in winter.
- Leachate ponds when leachate is being pumped into the ponds.
- Areas of leachate recirculation when leachate is being recirculated; and,
- When the winds speed is low.

To reduce the possibility that the person undertaking the monitoring gets desensitised, monitoring occurs from the furthest/least odorous locations first and then progress towards the nearer/more odorous locations.

All records of odour monitoring are retained as a database of odour performance on site.

19. Noise Management

19.1. Concept

The main aim of a noise management is to minimise the impact of noise associated with waste operations at the Armadale landfill during the operational hours to the set standards in the *Environmental Protection (Noise) Regulations 1997*.

19.2. Sources of noise

Noise emissions sources include:

- Site mobile plants and waste delivery vehicles
- Reversing beacons on plants and vehicles

19.3. Treatment Options

There are varied noise mitigation strategies that are implemented to enhance the reduction of noise emissions on-site. The strategies to be implemented on site include:

Site mobile plants and waste delivery vehicles – mobile plants and the City of Armadale garbage trucks are the major contributors to noise emission at the landfill. Noise emission is managed by managing the speed limit being a maximum of 20 km/hr, which is sufficient in managing noise emission. There are speed limits signs, speed bumps and speed radars installed on site, and this has helped in regulating speed and noise emission.

City of Armadale has taken into consideration noise production levels while the site is operational. New mobile plant purchased by the City is evaluated to produce low noise levels. At the transfer station, which is the area of the landfill considered closer to the receptors, the loader is the only machine that operates within the platform area. City of Armadale has purchased a Volvo L70 loader which has an ingenious rubber mounting system, that helps in reducing the vibrations and noise levels significantly. The loader is also installed with a heavy-duty insulation. Volvo L70has an engine output of 72dB which is within the acceptable noise range.

The high-powered machinery on site is the waste compactor (Tana) and a dozer that operates at the active landfill tipping face which is far from the landfill receptors. Regular servicing of the machines is done to ensure that they are in good working condition and the waste disposal officers are well trained in using the equipment.

Noise generated on site and the impact on the receptors is dependent on the following factors:

- Number of plants operating at the same time on site
- The speed limit of waste delivery vehicles.
- The noise power levels of each plant and vehicle.
- Speed and Direction of the wind; and,
- Proximity to the receptors.

Remedies to noise emissions include:

- Speed regulation on internal roads which have already been implemented on site:
    - Installation of speed bumps.
    - Installation of speed signs on site; and,
    - Installation of speed radars on site.

Reversing beacons on plants and vehicles – The reversing beacons on plants and vehicles so far have not been identified as a problematic source of noise emission. This is because City of Armadale has installed low frequency beepers that are compliant and emit low noise levels.

Treatment options include:

- Speed regulation on internal site roads.
- Regular maintenance of the low frequency beepers.

19.4. Emissions Limits

It's a requirement that premises within sensitive receptors are not exposed to noise levels that are more than 45 dBA for more than 10% of the time, 55 dBA for more than 1% of the time and not exceeding 65 dBA during normal business hours, as stipulated in the *Environmental Protection (Noise) Regulations 1997.* There are associated penalties for tonality of 5 dB, modulation 5 dB and 10 dB for recklessness.

19.5. Monitoring

The Landfill is monitored daily by the site operators and Service Lead. In the case of noise emission identification, an external contractor is to be hired to determine the depth of the issue and propose the mitigation strategies appropriate to improve noise

management.

20. Fire Management

20.1. Concept

The objective of a Fire Management Plan is to identify and outline mitigation strategies in case a fire occurs at the Armadale Landfill and Recycling Facility. Fire Management Plan outlines the fire mitigation and management methods and the response procedure. The main aim of a Fire Management Plan is to minimise the risk to the landfill staff, landfill receptors and fire fighters.

20.2. Sources

The potential fire sources are:

Bushfire from neighbouring properties.

▪ Landfill fires:

- Heat generated through anaerobic decomposition of compacted waste.
- Heat generated through composting of stockpiled mulch.
- Landfill operations, such as operation of mobile plant.
- Incoming loads containing burning or smouldering material or chemicals that may ignite.

20.3. Treatment options

The aim of the Fire Management Plan is to reduce the threat to the landfill staff, landfill receptors and fire fighters in the event of a fire within or near the site.

The landfill site design and management take into account the following fire protection measures: -

- Road Systems.

The main entrance road is sealed up to a point where unsealed roads are reached heading towards the waste drop off areas. The unsealed roads will be maintained along the top of perimeter slopes that are easily accessible to firefighting appliances.

The firebreak along the northern perimeter fence can be used as an access way however

is only accessible by four-wheel drive, is not suitable for firefighting appliances and should not be used in extreme conditions as escape is hindered by a deep drain to the north.

- Firebreak Systems.

In addition to the previously stated site roads, the site must comply with the City of Armadale Firebreak Notice.

- Measures to Reduce Risk of Fire on Site.
    - Reduction in fire fire fuel by controlling weeds and maintaining the fire breaks.
    - Capping certain areas of the landfill to reduce the risk of a surface fire.
    - Applying alternative daily cover or soil on areas that are actively being landfilled.
    - Limited mulch stockpile onsite.
    - Maintenance of at least 20 metres separation distance between stockpiles of used vehicle tyres, mattresses, green waste and mulch.
- The site has an existing bore connected to a standpipe next to the laydown area and a tank with a capacity of 195,000 L. They are the main source of water supplies at the landfill.
- The landfill is equipped with an early Fire Warning System.
- The landfill site leadership is the main point of contact in the event there is fire at the landfill.
    - Head Environment & Sustainability - Gary Taylor 0488 123 756
    - Resource Recovery Service Lead – Judith Scott 0429 470 168

20.4. Actions in the event of fire on site

Staff who discover a fire must ensure the Service Lead and Leading Hand are advised immediately of the fire using 2-way radio. In the event of a large fire, the emergency

warning siren must be activated. The alarm can be activated by pushing buttons the alarm buttons located on wall panels at weighbridge, Drop 'N' Shop and the landfill office has two remotes available from the Service Lead and Admin Officer.

If the fire is deemed unmanageable, as determined by the Service Lead or Leading Hand, seek immediate response from FESA by phoning '000' and provide details of where the fire is, type of material burning e.g. Bushland/vegetation, landfill surface fire etc., size of fire and the personnel onsite.

  - Notify the Weighbridge Attendant to prevent any customers from entering site over the weighbridge.

  - Staff member (fire warden) to attend weighbridge to assist in the evacuation of customers onsite and prevent anyone from entering site (exception being FESA/Emergency vehicles).

  - Weighbridge Attendant to note number of vehicles leaving the site, if possible.

  - Weighbridge Attendant to greet Fire Emergency Services on arrival (entry through the exit gate) and provide relevant information about the fire and registers held at the weighbridge.

  - Weighbridge Attendant to direct Fire Emergency Services to the Chief Fire Warden and fire front.

- Area Wardens to evacuate all members of the public from the site, evacuation route will be dependent on the direction, source and severity of the fire.

- Service Lead to be informed immediately of fire by mobile phone if they are not onsite. Service Lead Judith Scott 0429 470 168 ▪ Waste Disposal Officer or Drop'n'Shop staff to place 'landfill closed' sign at entry gate and close gate to prevent members of the public from entering site. "Landfill closed" signs may be placed at the intersections of Hopkinson Road & Rowley Road and Hopkinson Road & Thomas Road.

- All City of Armadale Personnel on site must carry a 2-way radio.

- Staff on site must gather at the closest muster point (Appendix 2) if it is safe to do so and await instruction from the Chief Fire Warden or proceed to the next muster point if safe to do so.

- If required, staff are to evacuate the site through the most suitable exit.

- As the site is an active landfill, there is a possibility of having the burning waste explode and exposure to toxic substances or chemicals may occur.

- In attempts to extinguish the fire, there may be an exposure to chemicals and Asbestos which pose a health hazard to the fire fighters, receptors and landfill staff.

- Staff are trained to extinguish small fires by use of fire extinguishers, water carts, plants and equipment, within their level of competency and only if deemed safe to do so.

Areas exempted from extinguishing fires include the chemical/HHW shed, and the oil shed. Staff should evacuate immediately if there is a fire in these two locations.

21. Fuel Management

The facility has a 4,500L fuel tank that is used to store fuel in accordance with the *Code of Practise for the Storage and Handling of Dangerous Goods* for the mobile plant and equipment. The fuel tank comes with a bowser, spill kit and a fuel pump. Hydrocarbons stored on site are primarily used for plant maintenance and are stored in small quantities in the storage shed.

22. Fuel, oil and chemical spill procedure.

When a fuel or oil spills occur, the Landfill staff follows the following steps to manage it:

1. **ASSESS:**

Quickly assess the spill:

- Can the situation be handled with on-site resources, or do you require outside help?
- Advise Service Lead or Leading Hand or other personnel of the incident and request assistance.
- What area of the landfill has the spill occurred in?
- Can you safely stop the source of the spill? Use the available chemical identification SDS if unsure of the type of chemical and safe handling procedure.

Fuel storage tank: This will likely be a Hydrocarbon spill of Diesel stored on site.

Transfer station or platform: this area will likely encounter a spill for motor used oil, Paint, and the paint may be oil or water based and tinted to any colour, a chemical spill or a spill of Battery Acid, liquid will likely be clear.

Oil Shed: This will likely be a Hydrocarbon spill of used motor oil accepted on site.

HHW Storage shed: This spill will likely be from chemicals stored in the shed/storage area where dangerous goods are stored, the spill could be - flammable, corrosive or toxic.

Workshop/Storage shed: this spill will likely be a hydrocarbon spill from oil or diesel while the site machines are being maintained.

Check and ensure that the spilled liquid is present as suggested above before proceeding to the next step and refer to the table below for the appropriate spill kit requirements based on the spill type.

Zones	Bin colour/Lid Colour	Kit type
Blue zone (Drop n shop)	Blue/Blue	General purpose spill kit located at the entrance of the Dropping shop supervisor's office.
Yellow Zone Fuel storage Tank	Yellow/Yellow& Red/Red	Oil and Fuel (Yellow) and a Hazchem spill kit (Red) located next to the fuel storage tank.
Yellow Zone Oil Shed	Yellow/Yellow	Oil and Fuel spill kit Located at the entrance of the oil shed.
Yellow Zone HHW Storage Area	Red/Red	Hazchem spill kit is located at the HHW storage shed next to the Flammable Liquid 3 storage shed.
Yellow Zone (Workshop/ Storage shed)	Blue	General Purpose Spill Kit Located at the entrance of the mechanic workshop next to the air compressor.
Yellow Zone. (Platform Area/ Transfer Station)	Blue/Blue	General Purpose Spill Kit Located at platform area adjacent to the HHW acceptance area.

Red Zone Landfill Area	No Kit present	Any spill that occurs will likely start a fire and fires in this zone are put out by the Fire department or a site fire warden.

2. **SECURE:**

Utilise another staff member to ensure there is no unauthorised or unexpected access to the spill area, if the spill is within the HHW storage Area, evacuate the area as quickly as possible and barricade the area with a caution tape and cones or barricades to prevent unauthorised access. If the spill is elsewhere onsite, evacuate the affected area as quickly as possible and cordon off the site using bollards to prevent accidental unauthorised access to the spill.

Ensure that persons not directly involved in the clean-up of the spill do not come into contact with the spilled liquid or any resulting fumes.

3. **CONTAIN:**

A spill must be contained quickly by surrounding the spill with the absorbent booms at a safe distance and if the ground is uneven the booms should be pressed onto the surrounding ground by foot. Absorbent booms and absorbent pillow should be overlapped by 300mm to ensure no leakage.
Quick Identification of the type of spill is aided by determining the area of the landfill that the spill has occurred in.
There is an immediate need to contain the spill as quickly as possible. This can be done effectively using absorbent booms and absorbent pillows to surround the spill.
Note that in a major spill it is recommended that booms are also placed around storm water drains to prevent any environmental damage to off-site areas.

Due to the nature of chemical liquids stored and handled in every area of the landfill, proceed to step 4 and put on correct PPE before coming near the spilled liquid or powder.

4. **PPE**

WARNING: Do not come into contact with the liquid if you are not wearing the correct personal protection equipment (PPE). You must be able to identify the liquid and check with the Safety Data Sheet to specify the correct PPE to wear. If the liquid cannot be identified, seek advice and assistance from the Service Lead before proceeding to Step 5.

Zone	Eye Protection	Lung protection	Body covering	Hand protection	Feet protection
Blue Zone (Drop n g shop)	Safety Glasses		Tyvek	Nitrile Gloves	Safety rated footwear.
Yellow Zone (Oil shed & the workshop area)- Nonchemical Spills	Safety Glasses		Tyvek Overalls	Nitrile Gloves	Safety rated footwear.
Yellow Zone (HHW Storage shed). (Chemical spills)	Chemical Safety Goggles - Safety Goggles these must be properly fitted.	Full Face Face shield to cover the entire face.	Tyvek Overalls to suit chemical per SDS requirements .	Laminated Chemical Gloves or Nitrile Gloves	Safety Rated footwear
Yellow Zone (Transfer station/ Platform)	Safety Goggles	Respirator P2	Tyvek and overalls	Nitrile Gloves Or Laminated Gloves.	Safety Rated footwear.

PPE will be located in designated PPE Cabinets as well as within some spill kits. The nature of the spill must be known and SDS in Chemwatch consulted before selecting your PPE and coming into contact with the spill.

5. ABSORB:

Convert liquid to a solid by method of adsorption and use pads or loose granular absorbent as appropriate
If the Spill is already a solid such as a powdered substance proceed directly to step 6

An effective response centres on turning a liquid problem into a solid solution. Therefore, use the loose HAZCHEM absorbent material, or the appropriate absorbent pads. The loose fibrous material should be sprinkled over the liquid spill. Using a yard broom or similar the loose material should be swept over the liquid spill to expose the absorbent to the liquid. The sweeping action should be continued until the liquid is completely absorbed and the surface dry. More absorbent material can be added as required to complete the conversion of the

liquid spill into a solid material.

The HAZCHEM synthetic absorbent pads and booms (usually yellow, green, pink, for hydrocarbon spills and yellow or green for chemicals) are used for absorbing both hydrocarbon and water-based liquids. It is particularly useful for chemical spills, where the organic absorbent is unsuitable or where dust is not desirable.

The White Hydrocarbon specific pads and booms are used for absorbing all oils and fuels, particularly in outside situations where there may be water present from rain. Use the White booms to protect drains when dealing/handling spills from the (Blue/1) zone where hydrocarbons are stored.

A final cleaning of the floor using an alternately detergent, water, mop and bucket is required if the floor surface is still slippery or contaminated.

Oil shed and Workshop:

Use the white pads if the spill is hydrocarbon (Oil or fuel) based, and the granular absorbent found within the spill kit to soak up the liquid and the yellow pads if anything else. The pads can be placed on top of the liquid and only, if possible, turned over to further absorb the spill.

The Granular absorbent should be swept over and into the spilled liquid and affected area with a stiff broom and then scooped up with a plastic + Spark resistant shovel.

On a rough bitumen surface the granular absorbent found within the spill kit and the fibre materials will be the most effective to soak up the liquid. The pads can be placed on top of the liquid and only, if possible, turned over to further absorb the spill.

Transfer station and HHW storage shed:

Use the yellow/white/pink pads and the granular absorbent found within the spill kit to soak up the liquid. The pads can be placed on top of the liquid and only, if possible, turned over to further absorb the spill. It is not recommended to do this if the spill is of an acid nature

The Granular absorbent should be swept over and into the spilled liquid and affected area with a stiff broom and then scooped up with a plastic + Spark resistant shovel.

6. **DISPOSE**:

After usage, using a dustpan, shovel, and broom, place the spent absorbent in the heavy-duty Hazardous Waste disposal bags that are included in the kits. The absorbent pads and booms are simply picked up by hand and placed in the disposal bags. Ties are

provided to seal the bags. Finally dispose of spent absorbents under the HHW program.

FOR HAZARDOUS CHEMICALS:

Each disposal bag must be double-bagged and clearly labelled with the name of the chemical in the bag.
Disposal must be conducted by a licensed waste contractor per current arrangements.
After discussion with your Service Lead the absorbed waste should be reinserted into the original 'stream' of disposal that it was originally intended for. In the case of Hydrocarbons these need to be sent to Licensed Class III landfill or disposed under the HHW program.

An example of this is that oil-soaked poly absorbents should be able to be disposed of with other oil- soaked waste such as rags when the amount of absorbed liquid is only minor.

Hazardous chemicals once converted to a solid will most times be able to be collected by the same waste contractor who was designated to collect the liquid prior to it being spilled.

7. **REPORT:**

Report the spill by filling in an incident report no more than 24 hours post incident. If spills are more than 20 litres Serve Lead and Resource Recovery Advisor to complete a DWER N1 notification form and lodge with DWER Pollution Watch within 24 hours of incident.
This ensures recurrent causes can be identified, and more permanent solutions initiated where possible.

8. RESTOCK:

To maintain effectiveness of response to spills and manage legal responsibilities it is essential that the kits are replaced by the Service Lead after every use. In this way, the kits will always be at maximum capacity for each incident.

When spills occur, of less than 5 litres, the spill is cleaned up, and the spilling kit materials used are bagged and disposed of through the HHW program , any spills greater than 5 litres are reported to DWER within 24 hours and the methodology used in cleaning the spill is dependent on the magnitude of the spill and in accordance with the DWER regulations.

23. Bird Management

Landfills act as a source of attraction for birds in search of food and water. Landfills attract a variety of birds species such as crows, ibises, and other birds of prey. Birds number control is the best way of controlling the impact that birds can cause. A cluster of birds once they are established on site, it becomes extremely difficult to control the numbers and eliminate them. Complete elimination of birds from the landfill is close to impossible, and hence controlling them would be the only suitable thing.

Freshly delivered municipal waste in large quantities is the major source of attraction for birds. Despite the site accepting municipal waste, waste accepted is compacted and covered immediately with the active tipping area being not more than 30m and 2 m length.

Upon noticing the birds on site, mechanisms to control birds are immediately implemented:

The main objective is to maintain the *natural bird ecological dynamic of the area.*

Mitigation strategies to control the number of birds on site include the following:

- Immediate compaction and covering of waste received:
- Water bodies elimination.
- Minimizing the active tipping face area.
- Scarecrows/ decoys to scare birds away.
- Traps: and selected culling (with the appropriate authority obtained pursuant of the (*Biodiversity Conservation Act 2016)*

24. Contingency Planning

Landfill staff and contractors are trained in landfill operation in accordance with the license granted by DWER, management plans, procedures, and industry best practise.

To minimize environmental impacts and operational impacts, measures are put in place to ensure the landfill operates smoothly. Service Lead is responsible in ensuring that all the landfill activities are operated as per the landfill standard operating procedures. Contingency planning forms part of the operational and environmental management of the landfill. Ongoing monitoring of the following:

- Groundwater and surface water
- Landfill gas management.
- Leachate management
- Fire management.
- Unauthorised waste disposal
- Odour and dust management.
- Litter management.

It's the responsibility of the landfill Service Lead to ensure that the contingency plan is implemented to enhance the performance and outcome of the landfill and in the case of non-conformance, the proper actions are taken to identify, implement and record landfill improvements.

25. Reporting

25.1. Quarterly Landfill Levy Returns

Waste Avoidance and Resource Recovery Levy Regulations 2008, requires all the landfills accepting waste from the Perth Metropolitan area pay the landfill levy. DWER requires every landfill to submit levy returns and payments on a quarterly basis. The weighbridge officer ensures the weighbridge data is sent to the Resource Recovery Service Lead/ Resource Recovery Advisor for computation of the landfill levy return.

25.2. Annual Reporting

Every calendar year, in September, there are reports that are required to be submitted to DWER. This is also indicated on the license granted by DWER.

The following reports are required to be submitted:

- Annual Environmental Report.
- Annual Audit Compliance Report.