Environmental Assessment and Management Plan

Inkpen Road Waste Management Facility

Prepared for Shire of Northam

November 2017

Project Number: TW17035
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**Signature**

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1 Introduction

Talis Consultants Pty Ltd (Talis) was engaged by the Shire of Northam (the Shire) to facilitate the application for a Works Approval for the expansion of the Shire’s landfill located at Inkpen Road Waste Management Facility (WMF) (the Site) and Licence for the operation of the WMF.

This Environmental Assessment and Management Plan (EAMP) has been developed to support the application by addressing planning, environmental and social aspects that require consideration and management for the proposed development.

As part of the EAMP, a desktop assessment was undertaken to understand and assess the existing environmental and social attributes of the Site and highlight any key constraints to the development of the Site. In addition to the desktop assessment, a detailed site Hydrogeological and Geotechnical Investigation (HGI) was conducted to understand the hydrogeological regime and the geotechnical properties of the underlying soils in support of the future development of the Site. The HGI included a hydrogeological risk assessment to understand the risk to nearby sensitive receptors.

A Risk Assessment of the Site’s activities was also undertaken to identify the potential risks to sensitive receptors and to determine a risk rating for each aspect following the implementation of proposed management measures. Based on outcomes of the Site investigations and Risk Assessment, a conceptual design was then developed for the proposed future landfill expansion.

1.1 Purpose and Scope

This EAMP has been prepared to support all the relevant environmental and planning approvals required for the future development of the Inkpen Road WMF. The objectives of this EAMP are to:

- Describe the current conditions on and surrounding the Site;
- Describe in detail the proposed development, including design, operations and its benefits;
- Identify any potential environmental constraints associated with the Proposal; and
- Develop environmental engineering and management measures to ensure that all potential impacts are managed to appropriate standards.

To achieve the objectives of the report, this EAMP consists of:

- Site Information;
- Site Environmental and Social Attributes;
- Conceptual Design and Proposed Site Activities;
- Benefits;
- Environmental Aspects;
- Environmental Management Measures; and
- Conclusion.
2 Site Information

This section provides the location and description of the Site including the waste types currently received and storage methods. In addition, details are provided on the Site’s current registration, access, surrounding land uses, separation distances, zoning and Certificate of Title.

2.1 Site Location

The Site is located at Lot 28734, Reserve R25796 Inkpen Road, Copley, Western Australia (WA) 6562. It is situated within the Kwolyinine Nature Reserve and covers an area of approximately 15 hectares (ha). The Site is located 3 kilometres (km) southeast of the town of Wundowie within the Shire (Figure 1).

2.2 Site Identification

Table 2-1 below provides information on the Site including the address, ownership, tenure and the centre point. The centre point coordinates were used for the desktop assessment to determine the environmental and social attributes of the Site.

<table>
<thead>
<tr>
<th>Address</th>
<th>Ownership</th>
<th>Tenure</th>
<th>Centre Point Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve 25796, Inkpen Road, Copley, WA 6562</td>
<td>Shire of Northam</td>
<td>Full Ownership</td>
<td>444,023</td>
</tr>
</tbody>
</table>

2.3 Certificate of Title

The details of the Certificate of Title for the Site are shown in Table 2-2. A copy of the Certificate of title is provided in Appendix A.

<table>
<thead>
<tr>
<th>Volume</th>
<th>Folio</th>
<th>Description</th>
<th>Primary Interest Holder</th>
<th>Status Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR3023</td>
<td>181</td>
<td>Lot 28734 on deposited plan 215405</td>
<td>Shire of Northam</td>
<td>Reserve under management order</td>
</tr>
</tbody>
</table>

2.4 Site Description

The Site is owned and managed by the Shire and has been in operation as a putrescible landfill since the 1970s. The Site consists of a Community Recycling Area (CRA), Greenwaste area, scrap metal stockpile area, and landfill including an asbestos pit, animal pit and soil stockpiles (Figure 2). Photos of the Solid Waste Depot have been provided in Appendix G.

The CRA is located near the Site entrance and consists of two sheds and a recyclable area. Historically, green waste was stockpiled and burned onsite. Currently, green waste is stockpiled to the west of the CRA and mulched. The finished product is provided to the community free of charge for reuse.

Scattered across the Site, there are stockpiles of clays and laterites which are used as cover materials for the landfill activities. The bulk storage area for scrap metal is south of the green waste stockpile area. Separate asbestos and animals pits are established near the centre of the Site.
2.4.1 Waste Streams

The waste streams, storage methods and annual volumes received at the WMF are shown in Table 2-3.

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>Current Storage Method</th>
<th>Current Annual Quantity Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Waste</td>
<td>Landfill</td>
<td>2,742 cubic metres (m$^3$)</td>
</tr>
<tr>
<td>Commercial Waste</td>
<td>Landfill</td>
<td>3,081 m$^3$</td>
</tr>
<tr>
<td>Mixed C&amp;D</td>
<td>Landfill</td>
<td>161.5 m$^3$</td>
</tr>
<tr>
<td>Asbestos</td>
<td>Landfill</td>
<td>120.5 m$^3$</td>
</tr>
<tr>
<td>Animal Remains</td>
<td>Landfill</td>
<td>21 No.</td>
</tr>
<tr>
<td>Tyres</td>
<td>Stockpile</td>
<td>411.0 m$^3$</td>
</tr>
<tr>
<td>Car batteries</td>
<td>2 No. Plastic Pallets</td>
<td>4.0 tonnes</td>
</tr>
<tr>
<td>Waste/Motor oils</td>
<td>5,000 Litre tank</td>
<td>4,950 Litres</td>
</tr>
<tr>
<td>Co-mingled general recycling</td>
<td>2 No. Hook lift Bins</td>
<td>9.4 tonnes</td>
</tr>
</tbody>
</table>

2.4.2 Waste Storage

Acceptance and bulk storage of green waste occurs to the west of the CRA. Users dispose of their green waste in one stockpile. The green waste is processed through mulching every second year and is made available to the community free of charge by self-loading directly from the processed pile.

Scrap metal is accepted and stored in a large stockpile to the south of the green waste stockpile area. Twice a year the scrap metal is compiled and taken offsite.

The quantities of green waste, scrap metal and clean fill accepted per annum are shown in Table 2-4.

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>Current Storage Method</th>
<th>Current Annual Quantity Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green waste</td>
<td>Designated open area</td>
<td>1,457.25 m$^3$</td>
</tr>
<tr>
<td>Scrap Metal</td>
<td>Designated open area</td>
<td>1,148.25 m$^3$</td>
</tr>
<tr>
<td>Clean Fill</td>
<td>Designated open area</td>
<td>1,750 m$^3$</td>
</tr>
</tbody>
</table>

2.5 Site Licensing

The Inkpen WMF was previously registered as a Category 89 Prescribed Premises subject to the Environmental Protection (Rural Landfill) Regulations 2002. The Site currently falls under Schedule 1 - Prescribed Premises of Part V of the Environmental Protection Regulations 1987 (as amended) as an ‘industrial premise with the potential to cause emissions and discharges to air, land or water’. At present, there is no approved licence for the existing Site activities. The Site, when licensed, would be represented under the following categories listed in Table 2-5.
Table 2-5: Categories of Prescribed Premises

<table>
<thead>
<tr>
<th>Category No.</th>
<th>Name</th>
<th>Description</th>
<th>Expected Throughput (per annum)</th>
<th>Threshold (per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>Used tyre storage (general)</td>
<td>Premises (other than premises within category 56) on which used tyres are stored.</td>
<td>100 tyres or more</td>
<td>200 tyres</td>
</tr>
<tr>
<td>62</td>
<td>Solid waste depot</td>
<td>Premises on which waste is stored, or sorted, pending final disposal or re-use.</td>
<td>500 tonnes or more</td>
<td>3,000 tonnes</td>
</tr>
<tr>
<td>64</td>
<td>Class II or III putrescible landfill site</td>
<td>Premises on which waste (as determined by reference to the waste type set out in the document entitled “Landfill Waste Classification and Waste Definitions 1996” published by the Chief Executive Officer and as amended from time to time) is accepted for burial.</td>
<td>20 tonnes or more</td>
<td>5,000 tonnes</td>
</tr>
</tbody>
</table>

2.6 Site Access

The Site is easily accessible by road. Users of the facility enter the Site via Inkpen Road and pass through a gatehouse before the users continue into the drop-off areas for recyclable/waste materials.

2.7 Surrounding Land Uses

As mentioned previously, the Site is located within the Kwolyinine Nature Reserve. South of the Nature Reserve, surrounding land is predominantly used for agriculture and pastoral purposes. North-west and west of the reserve are residential subdivisions for the town of Wundowie. Immediately north of the Reserve is Coates Reserve. Immediately to the east and north-east is agricultural and pastoral land followed by a large area of native vegetation and the town of Bakers Hill (Figure 1).

2.8 Separation Distances

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

The recommended minimum separation distances between sensitive land uses and the Prescribed Premises categories required for the Site are shown in Table 2-6. The typical emissions associated with the corresponding categories including gas/particulate emissions, noise, dust and odour are also shown. The table also identifies the categories in which there is an increased risk of injury or death.

Table 2-6: Recommended Separation Distances between Industrial and Sensitive Land Uses

<table>
<thead>
<tr>
<th>Category No.</th>
<th>Industry</th>
<th>Impacts</th>
<th>Recommended Separation Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gaseous</td>
<td>Noise</td>
</tr>
<tr>
<td>57</td>
<td>Used tyre storage</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>62</td>
<td>Solid waste depot</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Category</td>
<td>Industry</td>
<td>Impacts</td>
<td>Recommended Separation Distance</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>---------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>64</td>
<td>Class II landfill</td>
<td>✓ ✓ ✓ ✓</td>
<td>500 (subdivisions) 150 (single residence) Internal buffer of 35m from Site boundary</td>
</tr>
</tbody>
</table>

The residential subdivision to the north of the Site is approximately 1.77km from the Site. The other subdivisions to the east and west are approximately 2.60km and 1.15km, respectively. The closest single residence is approximately 720m from the Site boundary to the southeast. The next closest single residence is approximately 885m from the Site boundary to the west of the Site. The separation distances between the Site and the nearest sensitive receptors are shown in Figure 7.

An internal buffer of 35m from the Site boundary is currently maintained under the current Category 89 registration, however, due to the remote location, significant separation distances, and the natural screening provided by the nature reserve, it is proposed that the internal buffer can be reduced to 20m for the works approval and licence application.

2.9 Zoning

Under the Shire’s 2013 Local Planning Scheme No. 6 (LPS6), the Site is marked as a Local Scheme Reserve, specifically “Public purposes: Rubbish disposal”.

3 Site Environmental and Social Attributes

The following sections outline the environmental and social attributes on and surrounding the Site.

3.1 Topography

In August 2016, Crossland & Hardy Pty Ltd was hired to undertake a survey of the Site. The highest elevation is located in the south-east corner of the Site, which reaches approximately 318m Australian Height Datum (AHD). The Site steadily slopes away from this point to the northwest corner of the Site. The north-west corner sits at approximately 295m AHD and is the lowest elevation across the whole site. From south to north, the Site gradually declines from 310m AHD to 295m AHD on the western side and from 318m AHD to 309m AHD on the eastern side. The topographical data are shown in Figure 3.

3.2 Flora and Fauna

The following sections describe the vegetation onsite, the potential for Threatened and Priority Flora and Fauna species to occur in the area and Environmentally Sensitive Areas (ESAs).

3.2.1 Vegetation

There is a moderate amount of vegetation within the Site, but it is anticipated to be of little ecological value given the history of the Site.

3.2.2 Threatened and Priority Fauna

A Threatened fauna search was conducted using the Department of Water and Environment Regulation (DWER) NatureMap tool. A 1km search radius was applied to the approximate ‘centre point’ of the Site which indicated that thirty (30) fauna species potentially found in the search area. No conservation significant species were identified within the Site. A copy of the NatureMap Species Report is provided in Appendix B.

Using the Federal Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (PMST), a one kilometre search radius was applied to the approximate ‘centre point’ of the Site. Nine (9) listed threatened species, consisting of birds and mammals, and eight (8) listed Migratory Species were identified as likely to or may occur at the Site. The Threatened fauna species are listed, their conservation status and type of presence is listed in Table 3-1. The EPBC Act Protected Matters Report is attached as Appendix C.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Common Name</th>
<th>Status</th>
<th>Presence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calidris ferruginea</td>
<td>Curlew Sandpiper</td>
<td>Critically Endangered</td>
<td>Species or species habitat may occur within area</td>
</tr>
<tr>
<td>Calyptorhynchus banksianaso</td>
<td>Forest Red-tailed Black Cockatoo</td>
<td>Vulnerable</td>
<td>Species or species habitat known to occur within area</td>
</tr>
<tr>
<td>Calyptorhynchus baudinii</td>
<td>Baudin’s Cockatoo, Long-billed Black-Cockatoo</td>
<td>Vulnerable</td>
<td>Roosting likely to occur within area</td>
</tr>
<tr>
<td>Calyptorhynchus latirostris</td>
<td>Carnaby’s Cockatoo, Short-billed Black-Cockatoo</td>
<td>Endangered</td>
<td>Species or species habitat known to occur within area</td>
</tr>
</tbody>
</table>
### 3.2.3 Threatened and Priority Flora

The EPBC Act PMST indicated that four (4) conservation significant flora may occur or is likely to occur within a 1km radius of the Site. A list of the Threatened flora species are provided in Table 3-2.

#### Table 3-2: EPBC Act Protected Matters Threatened Flora Species (1km radius)

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Common Name</th>
<th>Status</th>
<th>Presence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leipoa ocellata</td>
<td>Malleefowl</td>
<td>Vulnerable</td>
<td>Species or species habitat likely to occur within area</td>
</tr>
<tr>
<td>Numenius madagascariensis</td>
<td>Eastern Curlew, Far Eastern Curlew</td>
<td>Critically Endangered</td>
<td>Species or species habitat may occur within area</td>
</tr>
<tr>
<td>Rostratula australis</td>
<td>Australian Painted Snipe</td>
<td>Endangered</td>
<td>Species or species habitat may occur within area</td>
</tr>
<tr>
<td>Dasyurus geoffroii</td>
<td>Chuditch, Western Quoll</td>
<td>Vulnerable</td>
<td>Species or species habitat likely to occur within area</td>
</tr>
<tr>
<td>Phascogale calura</td>
<td>Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor</td>
<td>Vulnerable</td>
<td>Species or species habitat likely to occur within area</td>
</tr>
</tbody>
</table>

The Government data searches are suggestive and represent the potential for a species to exist in the area. Therefore, this does not confirm that these species are present within the search area or the Site. A copy of the EPBC Act Protected Matters Report is provided in Appendix C.

### 3.2.4 Threatened Ecological Communities

"Threatened Ecological Communities" (TECs) are defined by the WA Threatened Ecological Communities Scientific Advisory Committee (within DBCA) and are assigned to one of four categories (Presumed Totally Destroyed, Critically Endangered, Endangered, Vulnerable). While they are not afforded direct statutory protection at a State level (unlike Declared Rare Flora under the Wildlife Conservation Act 1950) their significance is acknowledged through other State environmental approval processes (i.e. Environmental Impact Assessment process pursuant to Part IV of the Environmental Protection Act 1986 (EP Act)).

Priority Ecological Communities (PECs) are ecological communities that are under consideration for listing as a TEC, but do not yet meet the criteria. The PEC is placed into a Priority Rating between 1-5 that ranks the PEC based on known occurrences, threats and management of the community.

The PMST indicated that no TECs or PECs occur within a 1km radius of the Site.
3.3 Environmentally Sensitive Areas

ESAs are declared in EPA Act under Section 51B as areas that cover any and/or all of the following areas of conservation significance:

- Declared World Heritage properties;
- Included on the Register of the National Estate;
- Defined wetlands and the area within 50m of these wetlands;
- Areas covered by vegetation within 50m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located;
- Threatened ecological communities;
- Bush Forever sites; and
- Areas identified within Environmental Protection Policy (EPP) areas.

According to Landgate, there are three ESAs almost equidistant from the Site. The Beechina Nature Reserve is 11.5km from the Site in the southwest direction. The Morangup Nature Reserve is 13.5km from the Site in the northwest direction. Finally, in the northeast direction, the Clackline Nature Reserve is 11km from the Site. The nearest Protected Area under EPP is the Kwolyinine Nature Reserve within which the Site resides.

The Site has no wetlands or Bush Forever sites in its vicinity.

3.4 Geology

The regional geology, site specific geology and acid sulphate soils (ASS) is discussed in the following sections.

3.4.1 Regional Geology

The Department of Mines and Petroleum's (DMP) Geological Survey of Western Australia (GSWA) State Regolith 500 map series for the Perth area classifies the underlying regolith soils as “residual or relict material, including ferruginous, siliceous and calcareous duricrust.” In addition, the underlying hard rock geology as “South West Terrane Greenstones”, forming part of the Yilgarn Craton and consisting of high grade metamorphic granulites and migmatites. The traditional 1:50,000 Geology map series is not available for the Site or the surrounding areas, which would have enabled some form of extrapolation. Instead, the 1:250,000 Geology map series was used and it classified the following three geologic profiles taking place onsite.

- Sand overlying laterite (Czs) – yellow, white or grey;
- Laterite (Czl) – chiefly massive, but includes overlying pisolithic gravel and laterized sand; and
- Migmatite (Am) – banded and nebuloitic.

The ‘Czs’ profile is confined to just the northeast corner of the Site, while the ‘Am’ profile covers a relatively small section of the Site along the western boundary. The remainder of the Site has the ‘Czl’ profile. The geological data can be seen in Figure 4.
3.4.2 Hydrogeological and Geotechnical Investigation

A Hydrogeological and Geotechnical Investigation (HGI) was undertaken to determine the geology and engineering properties of the subsoils, the groundwater regime and the potential implications to the surrounding environment and groundwater users.

The investigations involved the installation three geotechnical bores/groundwater wells to a maximum of 42m below ground level (bgl) across the Site.

The HGI determined that the initial soil profile “generally consisted of coarse grained materials described as silty/sandy gravels from the surface to 4m bgl, further underlain by gravelly silty sand. Beneath these horizons, the soils were described as clayey silt material with sand inclusions, likely representing residual soils/extremely weathered bedrock. Bedrock was encountered within all bores at a depth of between 18m bgl (GW02) and 30m bgl (GW01), and was described as granite.”

No groundwater was intercepted during the installation of the three bores. Therefore, a groundwater assessment was not undertaken as part of the investigation. The investigation suggested that regional groundwater would exist at a greater depth within the granite bedrock. It was also anticipated that fractured rock aquifers “such as this generally have a low yield and are of limited beneficial use due to relatively high salinity”. A total of four registered groundwater wells were shown to be located within a 2 km radius of the Site. It is anticipated that these bores may be used in a non-potable, irrigation or agricultural setting.

Permeability at the site was recorded between $4.452 \times 10^{-7}$ m/s and $1.05 \times 10^{-8}$ m/s, with permeability generally decreasing with depth.

As part of the HGI, a risk assessment was undertaken to determine the potential risks to surrounding sensitive receptors. The risk to nearby groundwater users was considered low due to the >1 km separation distance, the deep groundwater table (>42 m bgl), low permeability of the soils and absence of surface water bodies located within the vicinity of the Site. A copy of the Hydrogeological and Geotechnical Investigation Report is provided in Appendix E.

3.4.3 Acid Sulphate Soils

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

ASS risk mapping geospatial data generated by DWER shows that no survey has been conducted for the area. The closest mapped area is over 30km west of the Site at 1204 Toodyay Road, Gidgegannup and is classified as a Class 1a risk area, which is described as “high to moderate ASS disturbance risk within 3m of ground surface”.

The risk area mapping takes into account existing geomorphological, geological and hydrogeological information to develop broad scale mapping for regions of the State for planning purposes. While the Site is located outside the boundaries of any ASS mapping that has been conducted so far, it is unlikely ASS are present, given the distance to the nearest occurrence.

The findings of the HGI as described in Section 3.4.2, indicated that the near surface soils in the Site were comprised of silty/sandy gravel with no characteristics of ASS.
3.5 Hydrology

This section details the hydrological aspects on and surrounding the Site which include groundwater, surface water, proclaimed areas, catchment areas and Public Drinking Water Sourced Areas (PDWSAs), wetlands and floodplains.

3.5.1 Groundwater

As part of the Hydrogeological and Geotechnical Investigation, three groundwater monitoring bores were installed at strategic points across the Site. The bores were drilled to a maximum depth of 42m bgl, no groundwater was intercepted at the bore locations. For further information, the Hydrogeological and Geotechnical Investigation is attached as Appendix E.

NationalMap indicates that groundwater is the area ranges between 3000 to 7000 total dissolved solids (tds).

3.5.2 Groundwater Proclaimed Areas

Under the Rights in Water and Irrigation Act 1914 (RIWI Act), proclaimed groundwater areas in WA are areas in which licences are required to construct or alter a well and to take groundwater. The Site is not located within the proclaimed Perth Groundwater Area. The closet licenced area is approximately 3km south of the Site along Chinganning Road.

3.5.3 Surface Water

Following a review of geospatial datasets, aerial photography and a site visit, no surface water bodies were identified on the Site. As shown in Figure 5, the closest surface water streams are Coates Gulley, which is 1km west from the Site boundary and Muranine Gully which is 2km south from the Site. These gullies eventually feed into Wooroloo Brook.

In the event that surface water is generated, this will be captured and managed through the proposed perimeter surface water system shown on the Conceptual Waste Profile (Drawing TW17035-C-020). Incident rainfall outside of the development area will continue to naturally infiltrate into the surrounding soils.

3.5.4 Catchment Areas

According to NationalMap, the Site is located within the Swan Coastal Basin, the Swan Avon-Lower Swan Catchment and Wooroloo Brook Sub-catchment.

3.5.5 Surface Water Proclaimed Areas

Under the RIWI Act, proclaimed surface water areas in WA are areas in which licences are required in order to take water from a surface watercourse. The Site is located within the Swan River Surface Water Proclaimed Area. However, the Shire does not plan to utilise any surface water at the Site and thus will not need to apply for a licence.

3.5.6 Public Drinking Water Sourced Areas

Under the Metropolitan Water Supply, Sewerage and Drainage Act 1909 or the Country Areas Water Supply Act 1947, the DWER has the necessary power to legally define the boundaries of PDWSAs. These are legally defined boundaries with varying Priority Levels (P1, P2 and P3) assigned to ensure that PDWSAs are managed and protected, allowing for the availability of reliable, safe, good quality drinking water from either groundwater or surface water sources.
Based on a review of available mapping, the Site does not have any PDWSAs within its boundaries, as shown in Figure 6.

3.5.7 Wetlands

Wetlands are vitally important ecosystems that support an array of unique species of plant, animal, alga, fungus and bacteria.

The DBCA manages the Swan Coastal Plain Geomorphic Wetlands geospatial dataset. The DBCA evaluated wetlands on the Swan Coastal Plain in order to assign one of the following management categories:

- **Conservation Category** – Wetlands which support a high level of attributes and functions. The objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms.
- **Resource Enhancement** – Wetlands which may have been partially modified but still support substantial ecological attributes and functions. The ultimate objective is to manage, restore and protect towards improving their conservation value.
- **Multiple Use** – Wetlands with few remaining important attributes and functions. The use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning.

According to DBCA’s geospatial dataset, there are no mapped geomorphic wetlands located on the Site. The nearest wetland identified is the Perth Airport Woodland Swamps, which is over 45km west from the Site.

3.5.8 Floodplains

The DWER prepares floodplain mapping to indicate the extent of flooding associated with Average Recurrence Interval (ARI) 100 year flood events. The ARI 100 year flood event is a statistical estimate of the average period in years between the occurrences of a flood of a given size and is roughly equal to a 1% probability of occurring in any given year.

A review of geospatial floodplain datasets from Landgate indicated that the nearest floodplain, a mapped floodplain with 100 year ARI, is over 25km to the northeast of the Site, associated with the Mortlock River that runs through the town of Northam. The distance of the 100 year ARI floodplain would indicate that the Site is at a low risk of flooding.

3.6 Cultural Heritage

3.6.1 Aboriginal Heritage

A search for relevant Aboriginal Heritage was conducted by using the Department of Aboriginal Affairs’ (DAA) online Aboriginal Heritage Inquiry System (AHIS), which incorporates both the Heritage Site Register and the Heritage Survey Database and lists the following heritage areas:

- Registered Aboriginal Sites;
- Other Heritage Places; and
- Heritage Survey Areas.

Other Heritage Places are described by the DAA as being either:
• Stored Data / Not a Site: The place has been assessed as not meeting Section 5 of the Aboriginal Heritage Act 1972; and
• Lodged: Information has been received in relation to the place, but an assessment has not been completed to determine if it meets Section 5 of the Aboriginal Heritage Act 1972.

No registered Aboriginal Heritage sites were recorded within the Site. The Site and its surrounds have been subject to four heritage surveys (21817, 21818, 102073 and 102074), and all were ethnographic. However, none of the surveys have been conclusive with boundaries recorded as unreliable or indeterminate. A copy of the search results is provided in Appendix D.

3.6.2 Native Title

According to the AHIS, the Site is located within a Registered Native Title Claim (WC2011/009) for ‘The Whadjuk People’. The claim area covers an area of approximately 5,600 km² that includes the Cities of Perth and Fremantle. Currently, there is a South West Native Title Settlement underway with the Department of the Premier and Cabinet (DPC) and six native groups. The Settlement is “recorded in six Indigenous Land Use Agreements (ILUAs)” with the six native groups, also known as the Noongar Native Title Agreement Groups, and is compliant with the Commonwealth Native Title Act 1993. While the Native Title has been registered, the process has yet to be completed. The latest updates on the Settlement are found on the DPC’s website under its Land, Approvals, and Native Title Unit.

3.6.3 Australian & European Heritage

To determine Australian and European heritage sites, the Heritage Council of WA’s (HCWA) database using the inHerit portal is used. The portal incorporates the following registers listed in Table 3-3.

Table 3-3: Statutory Listings for Australian and European Heritage

<table>
<thead>
<tr>
<th>Type</th>
<th>Organisation</th>
<th>Legislation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Register</td>
<td>Heritage Council (assisted by the State Heritage Office)</td>
<td>Heritage of Western Australia Act 1990</td>
<td>Places of State significance included in the State Register of Heritage Places</td>
</tr>
<tr>
<td>Conservation Order</td>
<td>Heritage Council (assisted by the State Heritage Office)</td>
<td>Heritage of Western Australia Act 1990</td>
<td>Places of State significance or potential State significance (special cases)</td>
</tr>
<tr>
<td>Heritage Agreement</td>
<td>Heritage Council (assisted by the State Heritage Office)</td>
<td>Heritage of Western Australia Act 1990</td>
<td>Places protected by long-term agreement between the parties</td>
</tr>
<tr>
<td>Heritage List</td>
<td>Local Governments</td>
<td>Planning &amp; Development Act (2005); Local Planning Schemes</td>
<td>Places of local heritage significance</td>
</tr>
</tbody>
</table>

An online search using the portal found that no registered sites of Australian or European heritage occur on, or immediately adjacent to, the Site.
3.6.4 Local Government Heritage

A search on the inHerit portal identified no places of Local Government heritage significance within or immediately surrounding the Site. The closest Local Government heritage site is the Wundowie Foundry located 3km northwest of the Site boundary in the town of Wundowie.

3.7 Contaminated Site Information

The DWER provide information on contaminated sites within WA within a contaminated sites register in accordance with the Contaminated Sites Act 2003 (CSA Act). All sites of known or suspected contamination reported to DWER will be classified under the CSA Act as one of the following categories:

- Report not substantiated;
- Possibly contaminated – investigation required;
- Not contaminated – unrestricted use;
- Contaminated – restricted use;
- Contaminated – remediation required;
- Remediated for restricted use; or
- Decontaminated.

A search of the Contaminated Sites Database undertaken on 11 September 2017 confirmed that the Site is not listed as a contaminated site. The nearest contaminated site is located approximately 3km to the northwest along Werribee Road, and has been classified as ‘Contaminated – remediation required’.

3.8 Summary of Environmental and Social Attributes

A summary of the existing environmental and social attributes of the Site are shown in Table 3-4.

Table 3-4: Summary of Environmental and Social Attributes of the Site

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Topography         | • The elevation of the Site is about 318m AHD at its highest point in the south-eastern corner of the Site. The Site steadily slopes away to the northwest corner of the Site.  
|                    | • The northwest corner of the Site boundary sits at approximately 295m AHD and is the lowest elevation across the whole site. |
| Geology            | • The underlying regolith soils as “residual or relict material, including ferruginous, siliceous and calcareous duricrust.” The underlying hard rock geology as “South West Terrane Greenstones”, forming part of the Yilgarn Craton and consisting of high grade metamorphic granulites and migmatites.  
|                    | • The Geotechnical Investigation determined that the Site consisted of:  
|                    | o near surface soils generally comprised of silty/sandy gravel to a depth of 4m bgl;  
|                    | o underlying the gravel material, the profile included interbedded clayey, silty and sandy material to a depth of between 18m bgl and 30m bgl; and  
|                    | o The underlying bedrock was described as granite. |
| Acid Sulphate Soils| • No presence of ASS within the Site.  
|                    | • The closest mapped area is over 30km west of the Site at 1204 Toodyay Road, Gidgegannup and is classified as a Class 1a risk area. |
| Hydrogeology       | • Permeability is relatively low, varying between $4.452 \times 10^{-7}$ m/s and $1.05 \times 10^{-8}$ m/s, with permeability generally decreasing with depth. |
## Attribute | Comment
--- | ---
**Flora** | • DWER’s NatureMap Tool identifies thirty (30) species of flora or fauna potentially located within 1km of the Site. None of the species are identified as conservation significant.  
• EPBC Act’s Protected Matters Search Tool, identifies four (4) listed threatened species may occur or are likely to occur within a 1km radius of the Site.

**Fauna** | • EPBC Act's Protected Matters Search Tool identifies nine (9) listed threatened species, consisting of birds and mammals, may occur or is likely to occur within a 1km radius of the Site.  
• EPBC Act's Protected Matters Search Tool identifies eight (8) Listed migratory species as likely to or may occur at the within 1km radius of the Site.

**Threatened Ecological Communities** | • No TEC or PECs are located within the Site.

**Environmentally Sensitive Areas** | • The Site is located within Kwolyinine Nature Reserve. The next closest ESA is the Clackline Nature Reserve located 11km northeast of the Site.

**Groundwater** | • Groundwater was not intercepted during the Hydrogeological and Geotechnical Investigation.  
• The Site is not located within a Proclaimed Groundwater Area.

**Surface Water** | • The Site is located within a Proclaimed Surface Water Area.  
• There are no PDWSAs located within the Site.  
• No surface water bodies are located within the Site.  
• The Site is not located in close proximity to wetlands or floodplains. The closest wetland is the Perth Airport Woodland Swamps, approximately 45km west from the Site. The closest floodplain is approximately 25km to the northeast of the Site associated with the Mortlock River.

**Cultural Heritage** | • No registered Aboriginal Heritage sites or places are located within or immediately surrounding the Site.  
• There is one registered Native Title for the area in which the Site is located; WC2011/009 was registered by the Whadjuk people and the Settlement is currently being managed by the DPC.  
• No registered Australian or European heritage sites of significance within or immediately surrounding the Site.  
• No registered Local Government heritage sites of significance within or immediately surrounding the Site.

**Contaminated Site Information** | • The Site is not classified as a contaminated site on the DWER’s Contaminated Sites Database. The nearest contaminated site is located approximately 3km to the northwest along Werribee Road, and has been classified as ‘Contaminated – Remediation Required’.
4 Conceptual Design and Proposed Site Activities

The following section provides a description of the current layout, proposed Site layout and the activities that occur on the Site.

4.1 Current Site layout

The main access into and out of the Site is via an unpaved road off Inkpen Road within the Kwolyinine Nature Reserve in the northeast corner of the Site. For security measures, a fence runs along the entire Site boundary and the access point is gated.

The existing gatehouse is located near the Site entrance along the unpaved access road. A water tank is connected to the structure on its northern side. The access road continues further into the Site and leads to the CRA, which consists of two sheds and a recyclable area.

To the west of the CRA is the Green Waste Area, where green waste is stockpiled and processed through mulching. The resulting product is available free of charge to the community for reuse.

The Animal disposal pit can be found south of the Green Waste Area near the centre of the Site. According to the Site’s Waste Management Plan, there are two Asbestos disposal areas at the Site. The pit currently in use is directly south of the Animal disposal pit, while the other is a historic disposal area located near the southeast corner of the Site.

The existing landfill area spans across three large sections of the Site. The largest landfill area covers the majority of the northern section of the Site, while there are two smaller areas in the southern section of the Site. The active landfill area is the currently in the southwest section of the Site. Figure 2 The current Site layout is shown in Figure 2.

4.2 Proposed Site layout

The conceptual design provides an arrangement for the following activities:

- Landfill;
- CRA;
- Bulk Storage Area; and
- Surface Water Management System;

4.2.1 Landfill

4.2.1.1 Final Fill Closure Profile

The Shire proposes to close the landfill at the Site with best practice final fill profiles as outlined in Environmental Protection Authority (EPA) Victoria’s Best Practice Environmental Management Guidelines for the Siting, Design, Operation and Rehabilitation of Landfills 2015 (Best Practice Landfill Standards). During the preparation of conceptual final fill closure profiles, a number of factors were identified which influenced the design including:

- The presence of existing waste at the Site;
- Achieving final fill profile gradients within the range specified within the Best Practice Landfill Standards; and
- The amount of available material onsite for landfill and closure activities.
To address each of these factors, the final fill profile has been developed to ensure that:

- The quantity of waste unearthed during excavation works for new landfill cells is minimised to eliminate potential environmental and health and safety risks; and
- Best practice slopes of not less than 1:20 and not greater than 1:5 will be achieved.

The waste fill profile is shown in Drawing C-020. The gradients of slope range between 1:5 around the batters of the cell and 1:20 (post-settlement) on the upper slopes. These gradients are in accordance with the Best Practice Landfill Standards and will ensure the stability of the capping system and movement of surface water off the capping system. Typical cross-sections of the landfill and restoration profile are shown in Drawing C-021.

Due to the existing landfill profile, ensuring that each of the design factors is addressed requires the extension of the landfill footprint to achieve the final fill closure profile. The distance of the extension from the previous active landfill boundary varies around the perimeter of the current landfill footprint due to the existing topography. However, on average it has been calculated that the footprint will be extended to approximately 20m from the Site boundary. The extended landfill boundary is shown in Drawing C-020.

### 4.2.1.2 New Waste Pits

As part of the closure works, approximately 149,580m³ of fill is required to provide material for:

- Operational cover material, assuming 10% of the waste volume (50,580m³); and
- Construction of the capping system consisting of a 1.1m thick restoration layer over an approximate area of 90,000m².

Where possible, the fill material required will be obtained by excavating areas onsite. Five new waste pits have been designed in order to fulfil the following objectives:

- Recover additional materials for final waste and closure operations; and
- Attain an appropriate final fill closure profile.

Table 4-1 below outlines the characteristics of each designed waste pit.

<table>
<thead>
<tr>
<th>Pit No.</th>
<th>Excavated Soils Volume (m³)</th>
<th>Fill Volume (m³)</th>
<th>10% Allowance for Cover (m³)</th>
<th>Net Gain for Final Restoration (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit 1</td>
<td>21,900</td>
<td>20,550</td>
<td>2,055</td>
<td>19,845</td>
</tr>
<tr>
<td>Pit 2</td>
<td>10,800</td>
<td>10,250</td>
<td>1,025</td>
<td>9,775</td>
</tr>
<tr>
<td>Pit 3</td>
<td>25,400</td>
<td>27,000</td>
<td>2,700</td>
<td>22,700</td>
</tr>
<tr>
<td>Pit 4</td>
<td>7,300</td>
<td>9,700</td>
<td>970</td>
<td>6,330</td>
</tr>
<tr>
<td>Pit 5</td>
<td>11,750</td>
<td>13,300</td>
<td>1,330</td>
<td>10,420</td>
</tr>
<tr>
<td>Total</td>
<td>77,150</td>
<td>80,800</td>
<td>8,080</td>
<td>69,070</td>
</tr>
</tbody>
</table>

The net material gain of 69,070m³ for the expanded landfill footprint will be used for the final landfill and closure operations planned for the Site.
4.2.2 Community Recycling Area

The CRA will remain in place and will continue to cater for the acceptance of the following waste materials:

- Car Batteries;
- Co-mingled recyclables:
  - Aluminium & Steel Cans;
  - Glass;
  - Plastics;
  - Cardboard and paper;
- Tyres; and
- Waste/Motor Oil.

The current traffic management measures will continue to address any potential traffic conflicts with community vehicles and any third-party contractors that will be coming onto Site to collect and transport the materials offsite for processing or for resale to recycling markets.

4.2.3 Bulk Storage Areas

The area west of the CRA will continue to be utilised for stockpiling of clean streams that are recyclable or reusable. These materials will include the following:

- Green waste;
- Clean fill; and
- Scrap metal.

Vehicles with deliveries of green waste and scrap metal are directed to their respective processing and storage Areas. Traffic movements within these areas will be dependent on the size and orientation of the windrows/stockpiles and will need to be managed by the Site staff. The bulk storage areas will continue to be accessed by an unpaved road to the south of the storage areas.

Drawing C-010 shows the location and size of the proposed CRA and the Bulk Storage Areas. The total area is approximately 12,920m².

4.2.4 Surface Water Management

The proposed conceptual design includes a simple surface water management system design with two key objectives:

- To minimise leachate generation; and
- To proactively manage surface water.

As shown in Drawing C-020, a perimeter ditch will be constructed around the final fill footprint of the landfill that will channel surface water downgradient into an unlined, soak-away pond located in the northwest area of the Site, adjacent to the Site’s topographical low-point.

4.2.5 Vegetation Clearing

As part of the closure works, clearing of vegetation at the Site is required for two purposes:

- Extension of the landfill footprint to 20m from the Site boundary; and
- Providing access to additional ‘site-won’ restoration fill material.
The quality of vegetation at the Site has been severely degraded over the years with over 55% of the Site already cleared of vegetation. In accordance with the phased approach to the landfill activities, the clearing of vegetation will be undertaken progressively as required.

For the construction of the five waste pits, the approximate areas of vegetation proposed for clearing are as shown in Table 4-2. The total area of proposed vegetation clearing is approximately 1.9ha.

Table 4-2: Proposed Vegetation Clearing Areas

<table>
<thead>
<tr>
<th>Pit No.</th>
<th>Vegetation Clearing Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit 1</td>
<td>0.5035</td>
</tr>
<tr>
<td>Pit 2</td>
<td>0.2485</td>
</tr>
<tr>
<td>Pit 3</td>
<td>0.5350</td>
</tr>
<tr>
<td>Pit 4</td>
<td>0.2985</td>
</tr>
<tr>
<td>Pit 5</td>
<td>0.3175</td>
</tr>
<tr>
<td>Total</td>
<td>1.903</td>
</tr>
</tbody>
</table>

### 4.3 Material volumes

Table 4-3 sets out the estimated material volumes accepted onto Site per annum for each of the Site’s activities.

Table 4-3: Estimated Material Volumes by Site Activity

<table>
<thead>
<tr>
<th>Site activities</th>
<th>Estimated Throughput (tonnes per annum)</th>
<th>Approximate Design Capacity (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill</td>
<td>5,000</td>
<td>425,000</td>
</tr>
<tr>
<td>CRA</td>
<td>1,000</td>
<td>480</td>
</tr>
<tr>
<td>Bulk Storage Area</td>
<td>1,000</td>
<td>3,000</td>
</tr>
</tbody>
</table>

### 4.4 Waste Acceptance & Management

The Site will continue its policies in relation to waste acceptance, which allow for the following:

- Maximising recycling to ensure that only required items are disposed of to landfill;
- Diversion of hazardous materials from landfill such as:
  - Batteries;
  - Waste oil;
- Compaction of waste to maximise use of available void space.

The following sections outline the waste acceptance and management onsite in order to achieve the above objectives.

#### 4.4.1 Equipment and Machinery

The equipment that will continue to be utilised at the Site includes a front-end loader and excavator. The front-end loader will be utilised to undertake all materials handling operations for putrescible waste accepted onsite. The excavator will be used for stockpiling activities at the CRA.
External contractors will continue to access the Site to process the green waste and to collect the scrap metal to be taken offsite.

4.4.2 Materials Handling

In the event that non-conforming materials are discovered within a vehicle, these will be denied access. Vehicles carrying conforming loads will be guided to the designated drop-off location either within the CRA or the stockpile area, depending on the waste type. The details of the waste will be recorded, and then the relevant data is used for both internal and external invoicing and reporting requirements.

At the CRA, vehicles will reverse into the designated parking areas and will be directed to deposit their load within the relevant bin or area.

Vehicles that contain material which can be stockpiled such as scrap metal and greenwaste will be directed to areas designated for those materials. Materials that have been stockpiled will be periodically consolidated utilising the front-end loader/excavator to maintain the amenity and thoroughfares through the Site.

4.4.3 Materials Transport

Twice annually, scrap metal will be collected and taken offsite for processing by a third-party contractor. Every two years, green waste will be processed, mulched and provided to the community free of charge for reuse. Using personal trailers, the community collects the greenwaste directly from the processed pile and taken offsite.

4.5 Staffing

The Site is managed on behalf of the Shire by a hired contractor and is currently staffed by one person. The staff will need to be qualified and/or trained appropriately to undertake their relevant roles. The onsite training that they will undertake should include health and safety and environment management.

4.6 Operational Hours

The proposed hours of operation of the Site will be a continuation of the Site’s existing operating hours, which are listed below.

- Tuesday to Friday: 2.00pm to 5.00pm;
- Saturday, Sunday and Public Holidays: 9.00am to 5.00pm; and
- Closed on Mondays, Christmas Day, Good Friday & New Year’s Day.

4.7 Supporting Infrastructure

In addition to the infrastructure outlined previously, the following supporting infrastructure is required to be maintained or installed:

- Gatehouse – The gatehouse will remain at its current position along the unpaved access road from Inkpen Road;
- Fences and gates – A perimeter fence is already in place at the Site and will be maintained with the gate locked outside of main operating hours; and
- Additional Signage to be installed.
5 Benefits

The Shire has recognised that there are a number of benefits associated the proposed future development of the Site. The key benefits identified are:

- Waste diversion from landfill;
- Alignment with the Waste Hierarchy;
- Compliance with requirements of the Waste Avoidance and Resource Recovery (WARR) Act 2007;
- Material balance; and
- Improved environmental management.

5.1 Waste Diversion

Current consumption patterns, particularly within the developed world, are generating high volumes of materials, which have traditionally been regarded as waste and disposed of to landfill. Landfilling waste results in a loss of materials and energy from the supply chain and putrescible landfills can generate methane, a harmful greenhouse gas. In essence – traditional waste management practices are wasteful.

The Western Australian Waste Strategy (Waste Authority, 2012) provides targets for diversion of materials from landfill across the three key waste streams being municipal solid waste (MSW), commercial and industrial (C&I) and construction and demolition (C&D). The targets for municipal solid waste in the Perth Metropolitan Region are 50% by 2015 and 65% by 2020. State-wide targets for the commercial and industrial sector are 55% by 2015 (up from 46% in 2009/10) and 70% by 2020. Construction and demolition waste State-wide targets are 60% by 2015 (up from 29%) and 75% by 2020.

The continuation of services for the stockpiling of scrap metal and greenwaste as well as the CRA allows for a significant portion of waste to be diverted from landfill. The proposed Site layout is in accordance with Waste Hierarchy, which is an internationally recognised concept and its principles underpin all modern sustainable waste management strategies. It provides a structure for prioritising waste management practices in relation to their environmental impacts, with the Most Preferred or Most Sustainable (top of the hierarchy) to the Least Preferred or Least Sustainable (bottom of the hierarchy). It allows to maximise the separation of materials into clean waste streams for reuse, recycling or recovery, and thus maximise the amount of waste diverted from a landfill.

5.2 WARR Act 2007

The WARR Act 2007 came into effect in July 2008 and it includes, but not limited to, the following provisions:

- Legislative frameworks for waste avoidance and resource recovery systems;
- Establishment the Waste Authority;
- Development the State Waste Strategy;
- Waste services by local governments; and
- Levies on waste.

The primary objective of the WARR Act 2007 is “to contribute to sustainability, and the protection of human health and the environment, in Western Australia and the move towards a waste free society by:

- Promoting the most efficient use of resources, including resource recovery and waste avoidance;
- Reducing environmental harm, including pollution through waste;
- The consideration of resource management options against the following hierarchy:
- Avoidance of unnecessary resource consumption;
- Resource recovery (including reuse, reprocessing, recycling and energy recovery); and
- Disposal.

Part 6 of the WARR Act 2007 outlines the requirement of local governments to provide waste services. Under Section 3 - Terms Used, ‘waste service’ is defined as:

(a) the collection, transport, storage, treatment, processing, sorting, recycling or disposal of waste; or
(b) the provision of receptacles for the temporary deposit of waste; or
(c) the provision and management of waste facilities, machinery for the disposal of waste and processes for dealing with waste.

Therefore, the Site and its activities closely align with the requirements of Part 6 of the WARR Act 2007. The future development of the Site ensures that a critical service for the community continues to be provided and that the Shire remains compliant with Part 6 of the WARR Act 2007.

5.3 Material Balance

Major works that may require material throughout the life of the landfill includes cell construction (internal and external bunds), daily cover material and capping material, which is further explained as follows:

- Daily cover material is assumed as 10% of the total landfill void;
- The capping material volume is calculated from the modelled two-dimensional area of the top of waste and an assumed 1.1m restoration soil layer; and
- All the material available from the excavation performed at the Site is assumed suitable for landfill construction and operating activities.

Material Balance is the calculation of the volume of materials required to carry out daily cover activities and the final restoration capping of the landfill and comparing these to the volume of available material retrieved from the Site. Consideration should be given to Material Balance across the life of the landfill during the conceptual design process to ensure there is little to no risk of having insufficient material over its lifespan. Otherwise, the material will need to be imported at a cost to the Shire.

The conceptual design described in Section 4 establishes Material Balance for the Site, in which restoration materials will be sourced from future cell excavations.

5.4 Improved Environmental Management

The development of the Site will help improve environmental management at the Site through the establishment of a surface water management system. As detailed in Section 6.4, the potential impacts of poor management of surface water/stormwater can result in impacts on the surrounding environment. The surface water management system will be engineered to manage surface water and minimise the generation of leachate generation. The surface water management system is described further in Section 7.5.
Potential Environmental Impacts

Waste management operations are generally considered as environmentally contentious. However, the strengthening of legislation and advancement in technology are continuously improving the day-to-day practices and environmental performances of waste management facilities. Based on similar experiences with waste facilities, it is anticipated that key environmental aspects will include:

- Odour;
- Noise;
- Dust;
- Stormwater;
- Leachate;
- Litter;
- Traffic;
- Vermin;
- Fire; and
- Landfill gas.

The source and potential impacts associated with these aspects are described in the following sections. In addition a Risk Assessment has been provided in Appendix F.

6.1 Odour

The Shire recognises that odour emissions is potentially the most sensitive environmental impact associated with the Site’s proposed activities. Odour emissions will be generated from the landfill activities and the green waste that will be mulched and stored onsite. The activities at the CRA are not anticipated to result in odour impacts. The overall risk rating from odour is determined to be ‘Low’ (Appendix F). The measures to manage odour that will be generated onsite are outlined in Section 7.2.

6.2 Noise

The Shire recognises that noise emissions associated with the proposed Site’s activities has the potential to result in noise impacts. Noise emissions would be generated from the operation of equipment onsite and from the vehicles entering and exiting the Site.

The Environmental Protection (Noise) Regulations 1997 (Noise Regulations) contain the allowable assigned noise levels at premises receiving such emissions, as shown in Table 6-1. Under the Noise Regulations, noise sensitive premises include residences, education facilities and hospitals.

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>$L_{A10}$</th>
<th>$L_{A1}$</th>
<th>$L_{Amax}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0700 to 1900 hours Monday to Saturday (Day)</td>
<td>45 + influencing factor</td>
<td>55 + influencing factor</td>
<td>65 + influencing factor</td>
</tr>
<tr>
<td>0900 to 1900 hours Sunday and public holidays (Sunday)</td>
<td>40 + influencing factor</td>
<td>50 + influencing factor</td>
<td>65 + influencing factor</td>
</tr>
<tr>
<td>1900 to 2200 hours all days (Evening)</td>
<td>40 + influencing factor</td>
<td>50 + influencing factor</td>
<td>65 + influencing factor</td>
</tr>
<tr>
<td>2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)</td>
<td>35 + influencing factor</td>
<td>45 + influencing factor</td>
<td>55 + influencing factor</td>
</tr>
</tbody>
</table>
Environmental Assessment and Management Plan
Inkpen Road Waste Management Facility
Shire of Northam

<table>
<thead>
<tr>
<th>Premises receiving</th>
<th>Time of Day</th>
<th>Assigned Level Decibels (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>All hours</td>
<td>60 75 80</td>
</tr>
<tr>
<td>Industrial</td>
<td>All hours</td>
<td>65 80 90</td>
</tr>
</tbody>
</table>

\( ^{1} \text{highly sensitive area means that area (if any) of noise sensitive premises comprising: (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and (b) any other part of the premises within 15 metres of that building that part of the building.} \)

As outlined previously, the closest residence is more than 720m southeast from the Site boundary, while the next closest residence is more than 885m west from the Site boundary. Given the existing operations and distance between the Site and the nearest sensitive receptors, no further environmental noise assessments are anticipated. The overall risk rating for noise is determined to be ‘Low’ (Appendix F). The management measures that can be utilised to control noise emissions at the Site are described in Section 7.3.

6.3 Dust

The Site has the potential to generate dust during construction and operation activities, including:

- Temporary impacts associated with the construction of new landfill cells;
- Impacts associated with the occasional mulching of green waste onsite;
- Vehicle movements onsite;
- Earthworks; and
- Material handling (loading and unloading, etc.).

The amount of dust generated onsite is currently minimal due to low number of traffic movements and sporadic Site activities. The overall risk rating of dust is determined to be ‘Low’ (Appendix F). The management measures that will be implemented to ensure that any potential dust impacts are adequately managed onsite are outlined in Section 7.4.

6.4 Surface Water

Surface water, or stormwater, will be generated as a result of precipitation falling onto the Site. There is the potential for stormwater to come into contact with the waste onsite. If this was to occur, this water would be classified as leachate and may contain elevated nutrients and contaminants. If released into the environment, it can have negative impacts to nearby receptors. The overall risk rating associated with stormwater is determined to be ‘Low’ (Appendix F). To manage surface water, site specific management measures have been developed and are outlined in Section 7.5.

6.5 Leachate

If stormwater comes into contact with the waste onsite it would be classified and treated as leachate. Leachate has the potential to contaminate soils, ground and surface water bodies if released into the environment. Therefore, all water that comes into contact with the waste or its designated area onsite will be managed appropriately to ensure that there are no contamination issues resulting from the Site activities. The overall risk rating associated with leachate is determined to be ‘Low’ (Appendix F). The management measures that will be adopted onsite to ensure that leachate is managed appropriately are set out in Section 7.6.
6.6 Litter

Litter may be generated at the Site as a result of the handling of waste, particularly during windy conditions. As well as reducing visual amenity, litter can attract vermin to the Site and may affect surrounding land uses if allowed to migrate offsite. The overall risk rating associated with litter is determined to be ‘Low’ (Appendix F). The management measures that will be utilised to control the generation of litter at the Site are described in Section 7.7.

6.7 Traffic

Onsite traffic movements have the potential to generate noise, dust and create an occupational health and safety risk to staff at the Site.

The following traffic movements are anticipated to occur onsite:

- a front-end loader managed onsite for landfilling purposes;
- community vehicle traffic coming onto Site to utilise the offered services;
- external contractor vehicles arriving onto Site for green waste processing; and
- a small number of traffic movements will be associated with staff using the Site ute.

The overall risk rating associated with traffic is determined to be ‘Low’ (Appendix F). The management measures that will be adopted to ensure that any impacts results from traffic movements at the Site are appropriately managed are described in Section 7.8.

6.8 Vermin

Vermin such as rats, mice, birds and insects may be attracted to waste management facilities particularly those with poor housekeeping practices. If uncontrolled, vermin can present a health risk to Site staff and surrounding land users and potentially impact any surrounding ecological values. The overall risk rating associated with vermin is determined to be ‘Low’ (Appendix F). The management measures that will be implemented to control vermin are outlined in Section 7.9.

6.9 Fire

The Department of Fire and Emergency Services’ (DFES) Map of Bush Fire Prone Areas indicates that the Site has been classified as a Bush Fire Prone Area. Potential fire risks include, but not limited to, fire in gatehouse/sheds and fire related to Site plant and equipment. The overall risk rating associated with fire is determined to be ‘Low’ (Appendix F). The management measures that will be implemented to control fire are outlined in Section 7.10.

6.10 Landfill Gas

The key risks associated with the generation of landfill gas are:

- Odours from the decomposition of waste;
- Generation of gases contributing the climate change;
- Impacts to human health; and
- Potential for explosions.

The decomposition of the organic content within the waste stream results in the generation of methane, carbon dioxide and volatile organic compounds. These gases contribute to the effects of climate change,
produce unpleasant odours and potentially impact human health. Landfill gas can also present an explosive risk to nearby residents. The overall risk rating associated with landfill gas is determined to be ‘Low’ (Appendix F). Section 7.11 provides the landfill gas management measures that will be implemented onsite.
7 Environmental Management

To ensure the potential environmental impacts identified in this EAMP will be appropriately managed and minimised, the Shire will implement a variety of engineering and management measures, which are described in the following sections.

7.1 Legislative Context

The environmental management measures that are summarised within this section have been prepared in accordance with the following relevant legislative and guidance documents:

Legislative:

- Environmental Protection Regulations 1987;
- Environmental Protection (Noise) Regulations 1997;
- Environmental Protection (Controlled Waste) Regulations 2004; and

Guidance Documents:

- Sustainability Victoria (2009) Guide to Best Practice at Resource Recovery Centres; Melbourne, Victoria;
- Environmental Protection Authority Victoria’s Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills; and

7.2 Odour Management

The Shire recognises that there is potential for odour emissions to be generated at the Site as part of the proposed Site activities. To ensure that the generation of odour at the Site is appropriately minimised and managed, the following odour management measurements will be implemented:

- The Site’s operating hours will be limited to those specified within this EAMP;
- The residual waste will be covered partially every day or second day and covered entirely every week with clean fill or soils to an appropriate thickness as specified in Best Practice Landfill Standards;
- All vehicles carrying putrescible waste onsite is required to be enclosed or covered;
- An online complaints register, called ‘Customer Service Request or Complaints’, will continue to be maintained by the Shire to ensure that the community has the opportunity to express their comments or concerns regarding the operations of the Site; and
- Odour levels at the Site will be continuously monitored by staff and action taken, if required.

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

7.3 Noise Emission Management

Noise emissions will be produced from the operations taking place onsite. As mentioned previously, there are several sources of noise associated with the proposed Site activities including equipment and vehicle
movements. To ensure that noise emissions are minimised, the following noise emission management measures will be implemented onsite:

- Waste acceptance and the operation of equipment and machinery onsite will be restricted to operational hours only;
- Vehicles will be restricted to a maximum speed of 15km/hour at the Site;
- Noise reducing workplace procedures will be adopted such as slow unloading of materials from the lowest height possible;
- All materials handling will be confined to the designated areas;
- All equipment and machinery will be maintained in good working condition; and
- Workers employed at the Site will be provided with personal protective clothing (PPE) including ear muffs to mitigate any noise impacts associated with the Site activities.

The above noise mitigation measures are anticipated to be sufficient to appropriately manage noise emissions at the Site and ensure compliance with the Environmental Protection (Noise) Regulation 1997.

7.4 Dust Management

The generation of dust is anticipated due to construction efforts and the general operation of the Site activities. To manage the generation of dust onsite, the Shire will implement the following management measures:

- Vehicles will be restricted to a maximum speed of 15km/hour on the Site, which will be signposted at appropriate locations including the entrance to the Site;
- Operations will cease during periods of excessive high winds if likely to cause offsite impacts; and
- For contingency, the Site can utilise the services of the Shire water trucks if required.

It is anticipated that the implementation of the engineering and management measures listed above will be sufficient to manage dust at the Site.

7.5 Surface Water Management

The Shire will ensure that surface water/stormwater will be managed through a variety of means to ensure appropriate treatment and discharge. Therefore, the following management measures will be adopted:

- Surface water will be diverted away from waste areas, into perimeter channels to a soak-away pond in the Site’s northwest corner; and
- All surface water engineering features at the Site will be inspected regularly and maintenance works scheduled appropriately.

7.6 Leachate Management

To contain leachate all waste handling operations will be confined within their designated areas. Most activities onsite are undertaken on clayey soils, mitigating any potential ground contamination issues for the Site arising from the generation of leachate. Currently, the Site does not have a leachate drainage system installed and the landfill cells are excavated into in-situ clay soils. The low permeability of the soil horizon inhibits the migration of generated leachate.

The following management measures will be adopted to ensure that there are minimal environmental impacts regarding leachate associated with the proposed Site activities:
• All waste handling operations to be confined to their designated areas; and
• The Site will continue to practice appropriate waste covering practices to minimise the generation of leachate.

Through the adoption of the above management measures, it is anticipated that any potential impacts associated with the generation of leachate will be managed appropriately.

It is important to note that the Site is considered to be in a low-risk environment with regards to leachate as no groundwater was been detected during site investigations, there are no close sensitive receptors, and the annual waste inputs are relatively low.

7.7 Litter Management

To ensure that the generation of litter is minimised and appropriately managed at the Site, the following management measures will be implemented:

• All unloaded waste and recyclable materials will be confined to the designated drop-off areas;
• All source separated commodities will be stored in a designated area;
• All vehicles entering the Site will be covered to prevent uncontrolled release of litter on to the Site;
• The boundary fence will be inspected regularly and any maintenance works scheduled accordingly;
• Any litter generated around the Site and along the fence lines will be collected on a regular basis as part of routine procedures; and
• Wind-blown litter outside the Site will be collected.

These litter management measures outlined above will enable the Shire to appropriately manage litter at the Site.

7.8 Traffic Management

To minimise any potential impacts of traffic movements at the Site, the following management measures will be implemented:

• Signage providing Site directions, traffic control measures and safety instructions will be established and maintained at appropriate locations around the Site;
• Vehicles will be restricted to a maximum speed limit of 15km/hour at the Site, which will be signposted at appropriate locations, including the entrance to the Site;
• There will be adequate staff supervision onsite;
• Staff and contractors shall wear high visibility and reflective clothing when working onsite; and
• All vehicles will be maintained in good working condition.

Through the adoption of these management measures all potential impacts associated with traffic movements on and surrounding the Site will be controlled to appropriate standards.

7.9 Vermin Control

Accepting of wastes at the Site may attract vermin which has the potential to impact local health of workers and nearby land users. To control potential vermin issues at the Site, the Shire proposes the following proactive management measures to be implemented:

• The generation of odour and litter will be minimised through the implementation of appropriate management measures (see Section 7.2 and Section 7.7);
• All vehicles carrying waste are to be covered;
• A perimeter fence is present on the Site and will be monitored and maintained on a regular basis;
• The Shire will have any suspected and/or known shelters or breeding grounds for vermin on the Site eliminated; and
• Should any vermin issues be experienced, the Shire will utilise professional services to eradicate vermin at the Site.

Through the adoption of the vermin management measures set out above, any potential impacts associated with the proposed Site operations are anticipated to be adequately managed.

7.10 Fire Management

The following management measures have been put in place to mitigate potential fire risks:

• Fire extinguishers are located in various locations onsite and are clearly marked with signs;
• A 3m wide fire break is maintained along the entirety of the Site boundary;
• Staff will be trained in the use of fire extinguishers and emergency procedures;
• Evacuation plans and designated muster areas are established onsite; and
• A Fire Management Plan has been developed.

As outlined in the Fire Management Plan, in the event there is a fire onsite, personnel are to call 000. The Inkpen Road Bush fire brigade is located in close proximity (6kms) and Bakers Hill approximately 9kms away. If the fire is able to be smothered or extinguished, then the Site staff are trained to do so until the fire services arrive in order to minimise the scale of the fire and to prevent it from spreading. With the implementation of the above fire management measures, the potential risks of fire at the Site will be appropriately mitigated.

7.11 Landfill Gas Management

Currently, there is no evidence of the presence of landfill gas in large quantities at the Site. The landfilling activities onsite are small-scale and sporadic throughout the year. However, the situation will be monitored as landfill activities continue and a Landfill Gas Management Plan will be drafted and implemented, if required.

7.12 Other Management Measurements

7.12.1 Security

The Site is fully surrounded by a chain-link fence and the one access point at the Site has a gate. To ensure the security of the Site is not compromised, the following practices will be adhered to:

• The perimeter fence will be monitored and maintained on a regular basis; and
• The Site access gate will be locked securely outside of main operational hours to prevent unauthorised vehicles and persons from accessing the Site, which may be a security and/or fire risk.

By utilising the above management measures the risk of security issues associated with the Site will be minimised.

7.12.2 Complaints Management

In the event that a complaint is received, the Shire will investigate the source of the complaint and determine whether it is due to routine activities or is an unusual event. If investigations indicate that the disturbance is
part of routine activities and is likely to continue, additional management control measures will be implemented, where practicable.

In the event that complaints are made, the procedures will follow the Shire’s Customer Service Charter.

### 7.13 Summary of Proposed Management Measures

A summary of the proposed management measures to be implemented at the Site is shown in Table 7-1.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Management Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour</td>
<td>The Site’s operating hours will be limited to those specified within this EAMP.</td>
</tr>
<tr>
<td></td>
<td>The residual waste will be covered partially every day or second day and covered entirely every week with clean fill or soils to an appropriate thickness as specified in Best Practice Landfill Standards.</td>
</tr>
<tr>
<td></td>
<td>All vehicles carrying putrescible waste onsite is required to be enclosed or covered.</td>
</tr>
<tr>
<td></td>
<td>An online complaints register, called ‘Customer Service Request or Complaints’, will continue to be maintained by the Shire to ensure that the community has the opportunity to express their comments or concerns regarding the operations of the Site.</td>
</tr>
<tr>
<td></td>
<td>Odour levels at the Site will be continuously monitored by staff and action taken, if required.</td>
</tr>
<tr>
<td>Noise</td>
<td>Waste acceptance and the operation of equipment and machinery onsite will be restricted to operational hours only.</td>
</tr>
<tr>
<td></td>
<td>Vehicles will be restricted to a maximum speed of 15km/hour at the Site.</td>
</tr>
<tr>
<td></td>
<td>Noise reducing workplace procedures will be adopted such as slow unloading of materials from the lowest height possible.</td>
</tr>
<tr>
<td></td>
<td>All materials handling will be confined to the designated areas.</td>
</tr>
<tr>
<td></td>
<td>All equipment and machinery will be maintained in good working condition.</td>
</tr>
<tr>
<td></td>
<td>Workers employed at the Site will be provided with appropriate PPE including ear muffs (where required) to mitigate any noise impacts associated with the Site activities.</td>
</tr>
<tr>
<td>Dust</td>
<td>Vehicles will be restricted to a maximum speed of 15km/hour on the Site, which will be signposted at appropriate locations including the entrance to the Site.</td>
</tr>
<tr>
<td></td>
<td>Operations will cease during periods of high winds.</td>
</tr>
<tr>
<td></td>
<td>For contingency, the Site can utilise the services of the Shire water trucks if required.</td>
</tr>
<tr>
<td>Stormwater Management</td>
<td>Stormwater will be diverted away from waste areas.</td>
</tr>
<tr>
<td></td>
<td>All stormwater engineering features at the Site will be inspected regularly and maintenance works scheduled appropriately.</td>
</tr>
<tr>
<td>Leachate Management</td>
<td>All waste handling operations to be confined to the Site’s designated areas.</td>
</tr>
<tr>
<td></td>
<td>The Site will continue to practice appropriate waste covering practices to minimise the generation of leachate.</td>
</tr>
<tr>
<td>Litter</td>
<td>All unloaded waste and recyclable materials will be confined to the designated drop-off areas.</td>
</tr>
<tr>
<td></td>
<td>All source separated commodities will be stored in a designated area.</td>
</tr>
<tr>
<td></td>
<td>All vehicles entering the Site will be covered to prevent uncontrolled release of litter on to the Site.</td>
</tr>
<tr>
<td></td>
<td>The boundary fence will assist in preventing any litter escaping from the Site.</td>
</tr>
<tr>
<td>Aspect</td>
<td>Management Measures</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Traffic</td>
<td>The boundary fence will be inspected regularly and any maintenance works scheduled accordingly. Any litter generated around the Site and along the fence lines will be collected on a regular basis as part of routine procedures. Wind-blown litter immediately outside the Site will be collected daily.</td>
</tr>
<tr>
<td></td>
<td>Signage providing Site directions, traffic control measures and safety instructions will be established and maintained at appropriate locations around the Site. Vehicles will be restricted to a maximum speed limit of 15km/hour at the Site, which will be signposted at appropriate locations, including the entrance to the Site. There will be adequate staff supervision onsite. Staff and contractors shall wear high visibility and reflective clothing when working onsite. All vehicles will be maintained in good working condition and drivers instructed to use conservative driving techniques.</td>
</tr>
<tr>
<td>Vermin</td>
<td>The generation of odour and litter will be minimised through the implementation of appropriate management measures. All vehicles carrying waste are to be covered. A perimeter fence is present on the Site and will be monitored and maintained on a regular basis. The Shire will have any suspected and/or known shelters or breeding grounds for vermin on the Site eliminated. Should any vermin issues be experienced, the Shire will utilise professional services to eradicate vermin at the Site.</td>
</tr>
<tr>
<td>Fire</td>
<td>Fire extinguishers are located in various locations onsite and are clearly marked with signs. A water tank with pump and hose is located next to the gatehouse. Staff will be trained in the use of fire extinguishers and emergency procedures. Evacuation plans and designated muster areas are established onsite. A 3m wide fire break is maintained along the entirety of the Site boundary. A Fire Management Plan has been developed.</td>
</tr>
<tr>
<td>Landfill</td>
<td>The situation will be monitored as landfill activities continue and a Landfill Gas Management Plan can be drafted and implemented, if required.</td>
</tr>
<tr>
<td>Gas</td>
<td>The perimeter fence will be monitored and maintained on a regular basis. The Site access gate will be locked securely outside of main operational hours to prevent unauthorised vehicles and persons from accessing the Site, which may be a security and/or fire risk.</td>
</tr>
<tr>
<td>Security</td>
<td>Complaints procedures will follow the Shire’s Customer Service Charter.</td>
</tr>
</tbody>
</table>
8 Conclusion

The Shire is seeking to expand and improve its operations at the Inkpen Road WMF. The redevelopment includes the expansion of the existing landfill and continuation of current operations including the CRA and bulk storage areas. To ensure that all proposed expansion activities and operation of the facility complies with legislative requirements, the Shire is applying for a Works Approval and Licence.

The Site will be classified as a Prescribed Premises pursuant to the Environmental Protection Act 1987 with the Shire seeking a licence for the following categories:

- Category 57 – Used tyre storage (general), meaning Premises on which used tyres are stored;
- Category 62 – Solid waste depot, meaning Premises on which waste is stored, or sorted, pending final disposal or re-use; and
- Category 64 – Class II putrescible landfill, meaning Premises on which waste is accepted for burial.

The existing environmental and social aspects associated with the Site were investigated as part of this EAMP to highlight any potential constraints to the proposed redevelopment. No issues of concern were identified during the assessment that would present a hindrance to the development of the Site.

In addition to the desktop assessment, a Hydrogeological and Geotechnical Investigation was undertaken to further understand the hydrogeological and geology attributes of the Site and determine the potential risks to surrounding sensitive receptors. The outcome of the assessment determined that the risk of the activities occurring onsite is ‘Low’.

The total area for the proposed CRA and Bulk Storage Areas is approximately 12,920m². The layout and services for the CRA remain unchanged.

There are a number of benefits associated with the Shire’s proposal for the future development of the Site, including improved environmental management, diversion of waste from landfill, alignment with the WARR Act 2007 and Waste Hierarchy and achieving Material Balance for the landfill.

The key potential environmental and social impacts associated with the development and operations of the Site include:

- Odour;
- Noise;
- Dust;
- Stormwater;
- Leachate;
- Litter;
- Traffic;
- Vermin;
- Fire; and
- Landfill Gas.

Following an evaluation of the potential environmental impacts, a suite of engineering and management measures will be adopted as part of the construction and operation of the activities onsite. A Risk Assessment was undertaken as part of developing this EAMP which assessed all potential impacts from the activities occurring onsite. The risk ratings following the implementation of proposed management were determined to range from ‘Low’.

Given the above, the Shire's proposed future development of the Inkpen Road Waste Management Facility can be achieved in a manner that ensures that any potential associated environmental impacts can be managed appropriately.