Environmental Assessment & Management Plan

North Bannister Resource Recovery Park – Landfill Cell 7 Development

Prepared for Veolia Environmental Services Pty Ltd

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Name	Position	File Reference
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1 Introduction

Veolia Environmental Services Pty Ltd (Veolia) owns and operates the North Bannister Resource Recovery Park at 6264 Albany Highway, North Bannister (the Site), which is licenced to accept up to 400,000 tonnes of Class III putrescible waste and 100,000 tonnes of organic waste per year. Currently, the Site comprises of six existing landfill cells, with a further seven more being proposed. Cell 6 is nearing the end of its lifespan, therefore Cell 7 is now required to allow for the continued disposal of putrescible waste at the Site.

Veolia recognises that security in landfill disposal is the foundation to an effective resource recovery strategy. Therefore, it is imperative that the design and approval of future engineered landfill cells continues to progress to ensure this vital waste service can continue to operate, providing long-term waste disposal for domestic and commercial communities.

A Works Approval from the Department of Water and Environmental Regulation (DWER) is required to construct Cell 7. This Environmental Assessment and Management Plan (EAMP) has been prepared to support the Works Approval application for the development of Cell 7 by outlining the existing environmental attributes, detailed designs, proposed construction works and environmental management measures to be implemented.

1.1 Objective

The objectives of this EAMP are to:

- Provide the design, construction and operational details of Cell 7;
- Outline the environmental aspects requiring management;
- Describe the proposed environmental management measures;
- Undertake a residual risk assessment in accordance with the DWER's *Guidance Statement: Risk Assessments* (2017); and
- Demonstrate that the proposed management measures adequately prevent or minimise potential environmental risks.

1.2 Scope of Report

The scope of this EAMP includes:

- Section 2: Site Information;
- Section 3: Environmental Attributes;
- Section 4: Social Attributes;
- Section 5: Infrastructure Layout and Design;
- Section 6: Infrastructure Operational Aspects;
- Section 7: Environmental Aspects and Management;
- Section 8: Post Closure Management;
- Section 9: Residual Risk Assessment; and
- Section 10: Conclusion.

2 Site Information

The following sections provide details on the Site's location, zoning and surrounding land use, separation distances, licencing, and existing infrastructure.

2.1 Site Location

The Site is located approximately 94km south south-east of Perth at 6364 Albany Highway, Bannister, WA 6390. The Prescribed Premises boundary, as shown in Licence L8871/2014/2 (Licence), covers an approximately 390-hectare (ha) area within Lot 2. Cell 7 is located on the western end of Lot 2. Access to the Site is from Albany Highway and allows vehicles to enter and exit from the eastern corner of Lot 11.

The Site locality is provided in

Figure 1.

2.2 Zoning and Surrounding Land Use

Located off the Swan Coastal Plain, the Site is bounded by bush to the north, south and west and by a Blue Gum plantation to the southeast and east. The Site is located in the Shire of Wandering (the Shire) and under the Shire's Local Planning Scheme No. 3 (LPS No. 3), the Site is classed as a special use zone within a rural area with State Forest bordering on the northeast.

Figure 2 highlights the land use tenure around the Site.

2.3 Sensitive Receptors

The Environmental Protection Authority (EPA's) *Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses (2005)* (Guidance Statement 3) contains the recommended separation distances between industrial activities, including waste management facilities, and sensitive land uses. Sensitive land uses are defined by the EPA as those that are sensitive to industrial emissions and include residential developments, schools, hospitals, shopping centres and other public areas and buildings. Table 2-1 provides the recommended minimum separation distances between sensitive land uses and the Prescribed Premises categories for which the Site is currently licenced.

Table 2-1: Recommended Separation Distances between Industrial and Sensitive Land Uses

Category No.	Industry	Impacts					Recommended Separation Distance
		Gaseous	Noise	Dust	Odour	Risk	
57	Used Tyre Storage		✓			✓	100-200m, depending on size
61	Liquid Waste Facility		✓		✓		Case by case
61A	Solid Waste Facility	✓	✓		✓	✓	Case by case
62	Solid Waste Depot		✓	✓	✓		200m

Category No.	Industry	Impacts					Recommended Separation Distance
		Gaseous	Noise	Dust	Odour	Risk	
64	Class II or III Putrescible Landfill Site	✓	✓	✓	✓		500m for subdivisions 150m for single residences 35m internal buffer from Site boundary
67A	Compost Manufacturing and Soil Blending		✓	✓	✓		150m for greenwaste

The Site meets all separation distance requirements as summarised in Guidance Statement 3. The closest single residence is more than 4km east from the nearest landfill operations. The closest industrial land use is the Richgro Compost Facility approximately 185m east from any Site operation. The closest recreational land use is Bibbulmun Track located approximately 18m north of the site boundary moving further from the boundary to the west, and 170m from any Site operation. These separation distances are illustrated in Figure 3.

2.4 Licencing

The Site is licenced for the acceptance, storage, treatment and/or burial of multiple waste types, including waste classified as Class II and III waste, as specified in the DWER Guideline *Landfill Waste Classification and Waste Definitions 1996* (as amended 2018). The Site is classified as a Prescribed Premises pursuant to Schedule 1 of *Environmental Protection Regulations 1987* as an 'industrial premise with the potential to cause emissions and discharges to air, land or water'. Therefore, it operates under an approved Licence (L8871/2014/2) granted by the DWER. The categories covered under the Licence are listed in Table 2-2.

Table 2-2: Prescribed Premises Categories

Category Number	Category Description	Category Production or Design Capacity	Approved Premises Production or Design Capacity
57	Used Tyre Storage	100 tyres or more	1,000 tyres
61	Liquid Waste Facility	100 tonnes or more per year	16,000 tonnes per annual period
61A	Solid Waste Facility	1,000 tonnes or more per year	90,000 tonnes per annual period
62	Solid Waste Depot	500 tonnes or more per year	14,000 tonnes per annual period
64	Class II or III Putrescible Landfill Site	20 tonnes or more per year	400,000 tonnes per annual period
67A	Compost Manufacturing and Soil Blending	1,000 tonnes or more per year	100,000 tonnes per annual period

2.5 Existing Site Infrastructure

The Site is owned and managed by Veolia and has been in operation since 2015. Veolia's existing Site infrastructure includes:

- Weighbridge;
- Administration office;
- Maintenance workshop;
- Greenwaste processing area;
- Three stormwater ponds;
- Six leachate ponds;
- Workshop; and
- Six Class III landfill cells.

Figure 4 provides a general layout of the Site.

3 Environmental Attributes

3.1 Climate

Climatic data were sourced from SILO for the period 1973-2023 for rainfall and evaporation. SILO is a database of Australian climate data from 1889 to the present that is hosted by the Queensland Department of Environment and Science (DES). It provides daily meteorological datasets for a range of climate variables in ready-to-use formats suitable for biophysical modelling, research, and climate applications. The datasets are constructed from observational data obtained from the Bureau of Meteorology (BOM), using mathematical interpolation techniques to infill gaps in time series and construct spatial grids. The spatial grid selected (Latitude: -32.55, Longitude: 116.40) encompasses the proposed development area at the Site in its entirety.

Table 3-1 summaries the rainfall data experienced at the Site from 1973-2023.

Table 3-1: Rainfall Summary in Millimetres (mm)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average	17	17	19	40	88	125	143	120	78	43	27	12	727
50th Percentile	0	0	57	13	60	154	57	158	109	37	44	35	725
90th Percentile	19	2	0	61	148	181	197	125	136	40	11	0	919
Maximum	8	50	107	61	81	84	312	118	91	102	3	6	1,022

The Site experiences a sub-tropical climate with hot dry summers and mild wet winters. Most rainfall in the area occurs during the months of May to September. The driest months are November to March. The mean annual pan evaporation rate is approximately 1,590mm, which exceeds average annual rainfall by about 863mm.

The prevailing wind data were sourced from BOM's Wandering Station (ID 010917), which is the closest weather station to the Site, and it is approximately 30km east from it. The wind direction generally ranges from north to southeasterly in the morning (9am), changing direction to westerly and south-westerly in the afternoon (3pm). Winds at the Site are typically gentle to moderate in the morning and the afternoon. The wind rose for morning and afternoon winds can be seen in Diagram 3-1.

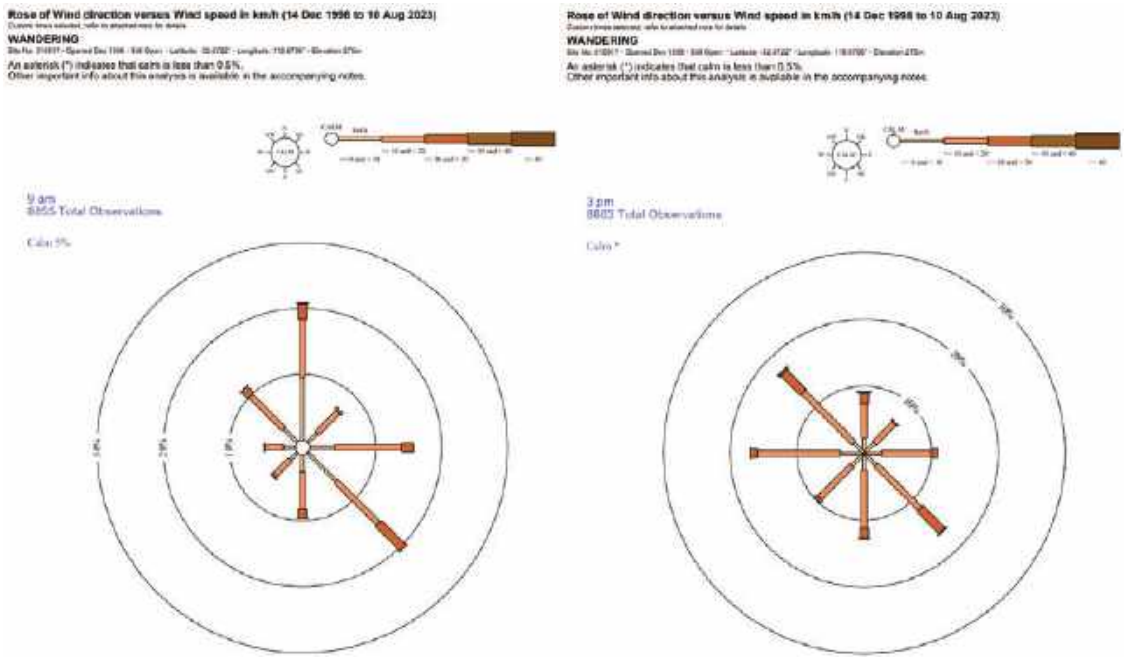

Diagram 3-1: 9am (left) and 3pm (right) Wind Rose for Wandering

3.2 Topography

The topography across the whole Site varies significantly from 310m Australian Height Datum (AHD) to 390mAHD. The highest point at the Site is at Cell 6, located on the western end of the premises. From here, the topography decreases to 315mAHD in the southeastern corner of the Site. The existing topography within Cell 7 development area ranges from 355mAHD to 370mAHD.

Figure **5** shows the general topography of the Site with 5m contour lines.

3.3 Geology

Geoscience Australia classifies surface geology profiles occurring across the Site:

- Ag: Undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, pegmatite. Locally metamorphosed, foliated, gneissic. Local abundant mafic and ultramafic inclusions; and
- Czl: Ferruginous duricrust, laterite; pisolitic, nodular, vuggy; may include massive to pisolitic ferruginous subsoil, mottled clays, magnesite, reworked products of ferruginous and siliceous duricrusts, calcrete, gossan; residual ferruginous saprolite.

The Site primarily consists of Czl, with some Ag present on the northern side and in the southeastern corner, as shown in Figure **6**.

A Geotechnical Investigation by Golder Associates Pty Ltd (Golder) was undertaken in 2017 to identify the subsurface soil, rock and groundwater conditions at the Site. Based on Golder's review of the Pinjarra 1:250,000 Geological Series Map, the Site is located on the Darling Plateau, to the east of the Darling Fault and over Archean granitic gneissic rocks that form part of the Yilgarn Block. The surface geology at the Site mostly comprises "*Colluvium, including valley-fill deposits, variably laterized and*

podsolised". The Site is bordered by a region of "*Laterite – chiefly massive, but includes overlying and pisolithic gravel and laterized sand*" (Golder, 2017).

The underlying lithology encountered during onsite well installation (GHD, 2022), is summarised as follows:

- Lateritic pale brown to red sand and gravel from ground level to depths ranging between 3.5m below ground level (bgl) and 21.5mbgl underlain by;
- Soft red and pink to grey and white (mottled) kaolin clays and silts encountered at depths between 5.0mbgl and 25.95mbgl and in some locations underlain by; and
- Firm red and brown to grey and white (kaolinite) clays.

3.4 Hydrogeology

It is understood that multiple aquifers may exist beneath the Site. This is supported by the background water quality data in groundwater (prior to construction of the landfill) which indicated disparate water quality chemistry (such as chloride ranges from 42mg/L to 696mg/L). The multi-layers of aquifers may be recharged from different sources such as rainfall infiltration or possibly deeper aquifer up-welling (GHD, 2022).

Previous monitoring (GHD, 2022) also indicated that acidic groundwater conditions was evident. This was observed in wells located up hydraulic gradient, areas away from the influence of the Site, and also in wells located down gradient of the Site, suggesting the acidity in groundwater may potentially reflect a background condition. Up-gradient wells appear to be slightly more acidic than downgradient wells in general.

A review of the monitoring well construction logs (GHD, 2022) suggest the wells are screened within the clayey geological profile ranging from clay to silty clay. Low permeability of the weathered basement rocks (clays and silty clays) may result in slow groundwater movement, which is likely to migrate from the prominent granitic topographical highs (which surround much of the landfill) towards the lower lying surface water drainage line in a southeasterly direction (GHD, 2022).

3.4.1 Historic Static Water Level

According to the 2022/2023 Annual Monitoring Report (Talis, 2023), a total of 13 groundwater monitoring bores are active across the Site, of which five bores are located near the Cell 7 development area and were used to generate groundwater contour lines. The contour plan has been developed utilising all available data for the Site up to 2023 and indicated a long-term maximum groundwater level between 344-323mAHD. The locations of the relevant operational monitoring bores, along with the groundwater contour lines are shown in Figure 7, with the data listed in Table 3-2. All other bores are either decommissioned or dry.

Based on historical groundwater levels data, the inferred groundwater flow beneath the Site is generally in a southeasterly direction following the topography toward Gringer Creek (6km southeast). On average, the post-winter water levels were approximately one meter higher than early spring.

Table 3-2: Groundwater Depth Summary

Bore ID	Historic Static Water Level (mAHD)	Historic Static Water Level (mbgl)
GMB3	344.0	18.0

GMB4	325.8	9.2
GMB6	337.2	8.8
MW02A	334.2	5.6
MW04B	333.8	1.1
MW06	323.9	1.8

Note: mAHD stands for metres Australian Height Datum, and mbgl represents metres below ground level.

In line with best practice landfill design standards, Veolia intends to maintain a minimum separation distance of at least 2m between the base of the deepest excavation and the highest recorded static groundwater level. It should be noted that the Cell 7 leachate drainage system ties into the downgradient Cell 5 system which maintains a minimum separation of approximately 5m from the maximum groundwater level (recorded in September 2023).

As shown in Table 3-2, the highest static water level recorded near the Cell 7 footprint, measured at 344mAHD at bore GMB3 in September 2023, or approximately 18mbgl. According to the groundwater contour lines in Figure 7, the groundwater elevation at the lowest point of Cell 7 is between 341 and 342mAHD. The lowest point of Cell 7 has been calculated to be at 346mAHD. Based on the maximum depth of Cell 7 and the groundwater contour lines, it is estimated that the distance from the lowest point of Cell 7 to the groundwater will be approximately 4.96m.

3.4.2 Groundwater Quality

Groundwater quality sampling is now undertaken across the Site on a biannual basis and in accordance with Veolia's Water Monitoring Procedure. Data gathered from monitoring bores located up-gradient of the landfill development area to date have maintained consistent background concentrations for all water quality parameters.

The results outlined in the 2022/2023 Annual Monitoring Report (Talis, 2023) indicated that groundwater was generally aerobic, acidic and fresh to slightly saline across the Site. Distal down-gradient wells appear to be more saline than up-gradient wells in general. Chemicals of potential concern (COPC) exceeded the adopted assessment criteria were reported in the following wells:

- Up-gradient wells: iron and zinc;
- Proximal down-gradient wells: chloride, total nitrogen (mainly as nitrate) and iron; and
- Distal down-gradient wells: chloride, total nitrogen (mainly as nitrate), iron, manganese, and nickel.

The majority of the COPC exceedances were recorded in down-gradient wells except for iron and zinc. The elevated concentrations of iron were reported in monitoring wells located across the Site including up-gradient wells, potentially reflecting a background condition. In general, the average concentrations of iron, manganese, nickel and zinc in groundwater were stable or decreased compared to the results in 2021/2022 period, while the average ammonia concentrations declined in the 2022/2023 period.

Overall, landfill leachate indicators such as chloride, total nitrogen (mainly as ammonia), potassium and potassium:chloride ratios derived from the Site is significantly higher than the groundwater in

downgradient by multiple orders of magnitude. It suggests that the groundwater beneath the Site and down-gradient of the Site is not being significantly impacted by the landfill operations.

3.5 Surface Water

The Site is located on the southern side of a ridgeline dividing two water catchment areas, the Hotham Catchment to the southeast and Upper Serpentine Catchment to the northwest. The Site is positioned primarily within the Hotham Catchment. There are non-perennial watercourses within and in close proximity to the site boundaries; one flowing in the southern part of the site and two to the north of the Site boundary.

Public Drinking Water Source Areas are located within and near the site boundaries. At the northern end of the site, a Protection Area P1 transitions into a Protection Area P2 within the site boundaries.

The locations of the catchments and surface water bodies within and surrounding the Site are provided in Figure **8**.

Surface water on-site is channelled from around the eastern edge of the landfill to Stormwater Dam 1. Overflow from Stormwater Dam 1 drains along a natural drainage channel toward Stormwater Dam 2, which in turn overflows into Stormwater Dam 3, approximately 300m downstream. Surface water from the western edge of the landfill is currently channelled through the Cell 7 area, along the southern edge of the landfill, through the plantation area, and ultimately into Stormwater Dam 3.

Previous investigations by GHD indicated that surface run-off emanating from the Site is fresh to slightly brackish (444mg/L to 772mg/L) with neutral pH and low metal concentrations in general (Talis, 2023).

3.6 Flora and Fauna

ENV Australia Pty Ltd (ENV) completed a Flora and Vegetation survey in 2011, which was supplemented by a desktop ecological survey in 2017, undertaken by Animal Plant Mineral (APM) (APM, 2017). Whilst the 2011 survey was conducted in an area outside of the proposed expansion zone (<100m to the north), the findings are considered applicable due to the degree of likeness between the vegetation complexes with both areas being dominated by Tasmanian Blue Gum (Eucalyptus globulus) plantation with isolated patches of disturbed remnant vegetation (Golder, 2017).

To ensure that the most up-to date information was used to identify the presence of any threatened or priority flora or fauna, Talis undertook a desktop review of the Department of Biodiversity, Conservation and Attraction's (DBCA's) online databases, which is discussed in the following sub-sections.

3.6.1 Flora and Vegetation

ENV found no records of groundwater-dependent ecosystems within the catchment area, within a 15 km radius of the landfill (GHD, 2017).

The proposed expansion area extends into a Tasmanian Blue Gum plantation. Two adjoining patches of remnant vegetation, potentially serving as foraging and/or breeding habitat, have been identified; however, the final landform design footprint avoids these areas (GHD, 2017).

The 2011 Flora and Vegetation survey identified 28 taxa, 24 genera, and 18 families within the survey area, including 26 native flora taxa and two introduced species. The most commonly recorded plant families were *Asteraceae* (four species) and *Fabaceae* (three species). The dominant vegetation complex in the proposed project area is Dwellingup 4 (D4) (Mattiske and Havel, 1998), consisting of open forest with *Eucalyptus marginata*, *Corymbia calophylla*, *Banksia grandis*, and *Allocasuarina fraseriana*. This D4 vegetation complex is well represented in the greater region (GHD, 2017).

No species of conservation significance were recorded within the survey area; however, a search of the Flora Database identified nine species of potential conservation significance. Two species are listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and as Declared Rare Flora (DRF) under the *Wildlife Conservation Act 1950* (WC Act), while the remaining seven are listed as Priority Flora under the WC Act. All species identified as potentially occurring in the survey area are perennial and would have been detected if present during the survey (GHD, 2017).

The vegetation condition within the survey area varied from 'Degraded' to 'Completely Degraded', with known disturbances including historical logging, fire, and invasion by introduced species. Areas entirely altered from their natural state, such as the Tasmanian Blue Gum (*Eucalyptus globulus*) plantation, were described as 'Completely Degraded' (GHD, 2017).

Since no species of conservation significance were identified during the survey and the vegetation was recorded as 'Degraded', ENV concluded that it is unlikely the Site supports species of conservation significance (GHD, 2017).

3.6.1.1 *Threatened and Priority Ecological Communities*

In WA, 'Threatened Ecological Communities' (TECs) are defined by the WA Threatened Ecological Communities Scientific Advisory Committee 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 WC Act) 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*). 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 DBCA database search revealed no TECs within the Cell 7 development area. A small area of PECs is located in the southwestern corner of the Site, a significant distance to any operational area. The location of Threatened and Priority Ecological Communities near the Site is provided in Figure **11**.

3.6.1.2 *Threatened and Priority Flora*

The DBCA database search revealed no Threatened or Priority Flora within the Site boundary. Three Priority 3 species were found within a 2km radius around the Site to the west of the Site boundary. The location of Threatened and Priority Flora is provided in Figure **9**.

3.6.2 Fauna

The desktop ecological survey undertaken by APM identified that up to 27 fauna species have the potential to occur, comprising one reptile, two mammals, 20 birds and two invertebrates. Of potential concern are the fauna species of conservation significance, which are:

- Chuditch (*Dasyurus geoffroii*) is listed as Vulnerable under the EPBC Act and the WC Act;
- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is listed as Endangered under the EPBC Act and WC Act;
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) is listed as Endangered under the EPBC Act and WC Act;
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) is listed as Vulnerable under the EPBC Act and WC Act; and
- Western Brush Wallaby (*Macropus Irma*) is listed as a Priority 4 species under the WC Act (GHD, 2017).

All three Black Cockatoo species found in the State's southwest are considered likely to occur in the area. These species are protected under the EPBC Act and the WC Act. Additionally, the Chuditch and the Western Brush Wallaby, both protected under the WC Act, are known to occur in the greater area (GHD, 2017).

Potentially suitable feeding, refuge and maternal denning habitats for the Chuditch and Western Brush Wallaby, as well as nesting habitat for the Black Cockatoos, were identified in the remnant vegetation found adjacent to and outside of the proposed expansion footprint during the Flora and Vegetation survey. However, the small size and disturbed/absent understory limits the diversity of native fauna potentially occupying the area (APM, 2016) (GHD, 2017).

3.6.2.1 *Threatened and Priority Fauna*

No Threatened or Priority Fauna were identified within the Site boundary according to a search of the DBCA's database. Five threatened species and one specially protected species were found within a 2km radius around the Site to the east of the Site boundary. The location of Threatened and Priority Flora near the Site is provided in Figure **10**.

4 Social Attributes

The social attributes of the Site include Native Title, Aboriginal Heritage, European Heritage and Mining Tenements, which are discussed in the following sections.

4.1 Native Title

Under Australian Law, Native Title is a form of land title that recognises the unique connections Aboriginal groups have to the land. Native Title exists where Aboriginal people have maintained a traditional connection to their land and waters, since sovereignty, and where acts of government have not removed it. A search of National Map (nationalmap.gov.au) indicates that Native Title does not currently exist over the Site.

4.2 Aboriginal Heritage

Aboriginal Heritage sites (registered or not) are protected under the *Aboriginal Heritage Act 1972* (AH Act). An Aboriginal Heritage Site under Section 5 of the AH Act is defined as:

> *(a) any place of importance and significance where persons of Aboriginal descent have, or appear to have, left any object, natural or artificial, used for, or made or adapted for use for, any purpose connected with the traditional cultural life of the Aboriginal people, past or present;*
>
> *(b) any sacred, ritual or ceremonial site, which is of importance and special significance to persons of Aboriginal descent;*
>
> *(c) any place which, in the opinion of the Committee, is or was associated with the Aboriginal people and which is of historical, anthropological, archaeological or ethnographical interest and should be preserved because of its importance and significance to the cultural heritage of the State;*
>
> *(d) any place where objects to which this Act applies are traditionally stored, or to which, under the provisions of this Act, such objects have been taken or removed.*

A search for relevant Aboriginal Heritage sites was conducted using the Department of Aboriginal Affairs (DAA) online Aboriginal Cultural Heritage Inquiry System (ACHIS). Reported Aboriginal Heritage sites are categorised according to the assessment status of each place under the AH Act, as listed in Table 4-1.

Table 4-1: Aboriginal Heritage Site Assessment Categories

Category	Sub- Category	Assessment Status	Protected under the AH Act
Registered Aboriginal Site	N/A	Site has been assessed as meeting Section 5 of the AH Act	Yes
Other Registered Place	Lodged	Information has been received. Assessment has not been completed to determine if a site meets Section 5 of the AH Act	Yes (temporary)

Category	Sub- Category	Assessment Status	Protected under the AH Act
	Stored Data/Not a Site	Site has been assessed as not meeting Section 5 of the AH Act	No

The results of the search indicated that the Site is located within an area classified as no Aboriginal Heritage site. The Aboriginal Cultural Heritage (ACH) Registered Place 3582 'Serpentine River' is located 2.5km north of the Site.

4.3 European Heritage

To protect cultural heritage places in WA, the Heritage Council maintain a list of places that are either 'Statutory Listings' or 'Other Listings and Surveys'. Statutory Listings are heritage places that can affect or may affect the use and development of land and buildings, and Other Listings and Surveys include heritage places that do not have any effect on the use and development of land and buildings.

A search of the WA Government Heritage Council's inHerit online database and the Shire's Municipal Heritage Inventory indicated that there are no European Heritage sites located within or in close proximity to the Site.

4.4 Mining Tenements

A review of the Department of Mines, Industry Regulation and Safety (DMIRS) mining tenement data on NationalMap indicated that the Site is located within an exploration mining tenement area, held by AngloGold Ashanti Australia Limited. The area has not been surveyed and the tenement status is pending.

5 Infrastructure Layout and Design

Veolia intends to expand its Class III landfill activities with the construction of one landfill cell (Cell 7), which will provide approximately 714,446m^3, or 18-20 months, of additional landfill capacity for the Site. The Cell 7 development area is shown in Figure **4**.

The following sections provide further details on the design and construction of Cell 7.

5.1 Infrastructure and Activities

The existing Site infrastructure supports the operation of the landfill. The positioning of access roads directly into Cell 7 will be determined based on the location of the landfill tipping face. Initial lifts will be accessed from a southern road from the turning circle until the waste reaches the top of the western side slope at which point access will be switched to the western access road. Internal access roads will be strategically located and constructed to ensure easy access and egress from the landfill tipping area.

5.2 Class III Landfill Design

As part of its commitment to undertake best practice waste management, Veolia develops its cells in general accordance with the Victoria's Environmental Protection Authority (EPA) *Best Practice Environmental Management: Siting, Design, Operation and Rehabilitation of Landfills 2015* (BPEM Guidelines) and New South Wales' (NSW) EPA *Environmental Guidelines Solid Waste Landfills* (NSW EPA Guidelines), collectively referred to as the Landfill Guidelines.

Designing landfill cells using the criteria within the Landfill Guidelines ensures that construction and operational risks are mitigated, and the environment is protected throughout the lifespan of the Site. Therefore, Cell 7 will consist of the following elements:

- 500mm Engineered Fill Layer;
- Engineered Composite Lining System (in order of construction/installation):
  - Geosynthetic Clay Liner (GCL);
  - 2mm High Density Polyethylene (HDPE) Double Textured Geomembrane;
  - Cushion/Protection Geotextile;
  - Leachate Collection Layer – 300mm highly permeable low calcareous aggregate; and
  - Separation geotextile.
- Environmental Controls:
  - Leachate collection and management system incorporating:
    - DN 225mm HDPE perforated primary pipework; and
    - DN 160mm HDPE perforated secondary pipework.
  - Landfill gas management system incorporating gas wells and gas mains; and
  - Surface water management system consisting of open channel drains and ponds.
- Engineered Landfill Capping System (in accordance with the Landfill Guidelines).

To proactively manage potential construction delays, Veolia has elected to construct Cell 7 in two separate stages, the advance Bulk Earthworks and the Lining Works. This necessitated the production

of two sets of design documentation (i.e., drawings, Technical Specifications, CQA Plans), which are discussed further in the following sub-sections.

5.2.1 Design Drawings

The detailed design drawings for Cell 7 are provided in Appendix A. Note the Bulk Earthworks drawings have been issued for construction, but the Lining Works designs are currently preliminary only and not for construction. Construction drawings for the Lining Works will be prepared during the construction procurement process.

5.2.2 Construction Quality Assurance and Technical Specification

To ensure the materials and construction of the landfill cells meet the design criteria, a series of Construction Quality Assurance (CQA) plans and Technical Specifications have been prepared for Cell 7 development, which is anticipated to be constructed in the 2024/25 financial year. The CQA plans details the testing methods and quality assurance procedures to construct Cell 7. The Technical Specifications details the earthworks, supply and installation of the composite lining system and leachate collection and infrastructure. Copies of the Technical Specifications and CQA Plans for both the Cell 7 earthworks and lining works are provided in Appendix B and Appendix C, respectively.

5.3 Class III Landfill Construction

5.3.1 Earthworks

To prepare the area for construction, any rubbish, debris or deleterious material will first be removed. There is no native vegetation clearing required within the development footprint. Any existing topsoil/growth medium will be stripped from all areas within the earthworks to a minimum depth as specified in the construction drawings. After removal of topsoil, Cell 7 will be excavated to the design formation levels and geometry in two separate stages.

5.3.1.1 *Bulk Earthworks Stage*

The earthworks to be carried out during the advance Bulk Earthworks include the following:

- General bulk cut earthworks to develop Cell 7, including:
  - Trimming and removal of the composite lining system over the eastern portion of the Cell 4 to Cell 5 intercell bund and Cell 6 to Cell 7 intercell bund to facilitate bulk earthworks;
  - Excavation, ripping and blasting of rock within Cell 7 to the formation level, 500mm below the Final subgrade level;
  - Filling within Cell 7 base to the interim stormwater drainage levels. Final subgrade surface level to be prepared by others during the Lining Works stage;
- Excavation to approximately 354mAHD for the turning circle area located to the south of Cell 7 and construction of wearing course/road base;
- Extension of the western cut-off swale drain to the southern boundary of Cell 9 including construction of box culvert;
- Extension of the 12m wide western access road to the southern boundary of Cell 7 and construction of wearing course/road base; and

- Extension of the 12m wide southern access road to the turning circle area located to the south of Cell 7 and construction of wearing course/road base.

Cell 7 will be ripped, blasted and excavated to the Formation Level (500mm below the final subgrade surface) and the basal area immediately regraded to create a diagonal spine drain with a 0.5% fall to allow surface water to passively drain out of Cell 7 during the 1 year hiatus between the Bulk Earthworks and Lining Works.

5.3.1.2 *Lining Works Stage*

The earthworks to be undertaken during the Lining Works stage require the regrading of the base of the cell to remove the temporary surface water drain, engineering the 500mm thick Engineered Fill Layer and construction of the southern side slope prior to installation of the lining system.

The earthworks to be carried out during the Lining Works include the following:

- Earthworks to form the required subgrade levels and geometry on the base and side slopes of the cell comprising;
  - Excavation to 250mm below finished surface level on the base of the cell and proof roll surface;
  - Ripping, moisture conditioning and recompacting, as necessary, the lower 250mm thick layer of in-situ soils on the base of the cell;
  - Placement and compaction of Engineered Fill on the base of the cell up to and including the lower 250mm layer of Engineered Fill; and
  - Placement and compaction of upper 250mm thick layer of Engineered Fill on the base of the cell;
  - Placement and compaction of 500mm thick Engineered Fill on the side slopes of the cell; and
  - Placement and compaction of Engineered Fill to construct the southern side slope of the cell.
- Preparation of the subgrade surface for installation of the geosynthetic lining system.

5.3.2 Composite Lining System

To protect the surrounding environment from contamination, a composite lining system will be constructed/installed. The key elements of the lining system are:

- 500mm thick Engineered Fill Layer;
- Geosynthetic Clay Liner (GCL);
- 2mm High Density Polyethylene (HDPE) Double Textured Geomembrane;
- Cushion/Protection Geotextile;
- Leachate Collection Layer – 300mm highly permeable low calcareous aggregate incorporating a network of leachate transmission pipes; and
- Separation geotextile.

The design of the composite system is shown in the detailed drawings in Appendix A.

The constructed 500mm thick Engineered Fill Layer will provide a firm base for the cell and soil hydraulic attenuation layer in the event the overlying geosynthetic lining system is compromised. The

selected soils will be subject to moisture conditioning, compaction and testing to ensure that it meets the design criteria. Field density tests will be performed to monitor the quality and uniformity of the material placement and compaction. Tests will be carried out by a NATA certified laboratory and all results will be checked by the CQA Consultant and Superintendent appointed by Veolia. These tests include, but are not limited to, moisture content, Atterberg limits, grading, dry density and permeability. Further details regarding the earthworks are detailed in the Technical Specification (available in Appendix B).

Independent conformance testing of the geosynthetic lining materials (GCL, HDPE, cushion geotextile and separation geotextile) will be undertaken prior to installation to ensure they meet the requirements outlined in the Technical Specification (available in Appendix B). Installation of the lining system will be undertaken by a qualified lining installer and supervised by a CQA consultant to ensure construction of the cell is in accordance with the CQA Plan and Technical Specification. Following completion of installation of the GCL, HDPE, cushion geotextile and leachate collection layer, a leak detection survey will be undertaken (see Section 5.3.4). Once the CQA consultant signs off on the survey, the final layer (separation geotextile) will be installed. Further details regarding the installation of the lining system for Cell 7 is provided in the Technical Specification (available in Appendix B).

During construction of Cell 7, the northern boundary will tie into the southern side of Cell 6 (active) at the toe of the existing intercell bund. The lining system on the eastern boundary of Cell 7 will tie into Cell 4 (filled) and 5 (filled). The tie-ins will be performed on the basal and side slope areas of each cell interface. The Cell 7 tie-in at the crest of the Cell 4 to Cell 5 intercell bund will require a triple welded seam on the horizontal crest as shown in Drawing LW-W-301 due to the area being significantly constrained by the cut slope below and the temporary waste slope above.

5.3.3 Leachate Collection and Extraction System

To protect the surrounding environment and groundwater from contamination, a leachate collection system will be constructed/installed. The key elements of the lining system are:

- 300mm thick highly permeable low calcareous aggregate leachate collection layer;
- DN 225mm HDPE perforated primary pipework;
- DN 160mm HDPE perforated secondary pipework; and
- Separation Geotextile.

The leachate collection system incorporates an aggregate drainage layer, a network of primary and secondary leachate collection pipes connected by gravity to the existing leachate collection sump in Cell 5. The 300mm thick aggregate drainage layer consists of low calcareous aggregate with a hydraulic conductivity of >1 x 10^{-3} m/s.

The pipe network consists of a DN 160mm HDPE perforated secondary pipes at maximum 25m spacings connected to two DN 225mm HDPE perforated primary pipes which connect into the existing DN 225mm HDPE perforated primary pipe in Cell 5. The base of the cell has been designed with 3% cross falls to two spine drains with 1% and 2% falls orientated diagonally across the cell base which will direct leachate towards the leachate collection sump located in Cell 5. Since Cell 7's leachate drainage system connects to the existing Cell 5 extraction system, an independent extraction system is not required to be developed for Cell 7.

The leachate collection system layout and the construction details of the leachate collection system for Cell 7 is shown in Appendix A and described in detail within the Technical Specification (Appendix B).

5.3.4 Leak Detection Survey

A leak detection survey will be undertaken on the geomembrane layer following installation of the leachate drainage layer and before the separation geotextile installation. A dipole survey will be conducted over the surface area of the completed leachate drainage layer and on the protection geotextile-covered side slopes in accordance with ASTM D7007 to identify any potential holes in the geomembrane. Any anomalies detected in the underlying geomembrane will be repaired by the Contractor as directed by the CQA consultant. Further details regarding the Leak Detection Survey are provided in the Technical Specification (Appendix B).

5.3.5 Surface Water Management System

Drainage channels in the form of open swales will be utilised to effectively transport surface water runoff to discharge or collection points for attenuation or diversion offsite. Each landfill cell will have a corresponding perimeter swale to mainly collect surface water that sheds from the landfill's restoration profile following permanent capping works. These swales will connect to existing swales that already direct surface water run-off to the series of surface water ponds around the Site. These drains will be clean earth channels.

The layout and construction details of the surface water management system for Cell 7 are available in Appendix A.

5.3.6 Landfill Gas Management System

There is an extensive network of landfill gas extraction wells and pipework across the Site. Through an active management system, the network removes landfill gas from the Class III landfill cells and transfers it to the Site's thermal methane destruction flare.

The landfill gas management system for Cell 7 will consist of a series of vertical landfill gas extraction wells spaced consistently across the surface of the cell (typically 50m spacing from a well's centre) which will be connected to the perimeter gas mains. The landfill gas is then directed to the flare under negative pressure induced by the rotary blower. The landfill gas management system for Cell 7 will be finalised at a later stage; however, a general concept design has been developed for the whole Site landfill and is provided in Appendix E.

Regular monitoring of the landfill gas management system will continue to be undertaken, to ensure that the system is working effectively.

5.3.7 Capping System and Restoration

To minimise the long term environmental and public health risks associated with the landfill, capping and restoration will be undertaken at the Site. In general accordance with the Landfill Guidelines, the key objectives of the capping and restoration to be satisfied through these works includes:

- Ensuring that all waste materials are covered to mitigate long term environmental and health risks;
- A restoration profile which will incorporate a low permeability capping layer to restrict the infiltration of rainwater into the waste mass and stop the production of leachate;
- Final fill profile and slopes that are greater than 1V:20H and less than 1V:6H to:
    - Ensure the long term stability and integrity of the capping material and containment layer;

  - Promote the shedding of surface water from the landfill;
  - Provide an aesthetically acceptable landform; and
  - Minimise long term maintenance requirements.
- A system of surface water management to positively deal with any accumulation of the rainwater;
- A gas management regime to control the generation of landfill gases and reduce any significant risk of adversely impacting the surrounding environment;
- Revegetating of the landmass to blend in with the surrounding environment;
- Deliver a suitable post closure land use; and
- Phased closure of the landfill cells as the operational life of the landfill progresses.

As required under Condition 23 of Veolia's Licence, a Capping Plan must be prepared three months prior to completion of waste disposal in Cell 7. The Capping Plan will include further information on the design and material specification for the capping system, noting that all works will be completed in accordance with the Landfill Guidelines.

5.3.8 As-Built Drawings

During cell construction, an approved qualified surveyor will survey each layer of the composite liner system. This data will be used to prepare 'as-built' drawings which will be endorsed by the surveyor. The as-built drawings will include but are not limited to:

- Formation excavation levels;
- Top of Engineered Fill Layer levels;
- Construction details including levels and slope angles for the basal liner system;
- Location of leachate collection pipework including connections of primary pipework to secondary pipework;
- Top of Leachate Drainage aggregate collection layer levels including mounding of material over pipework (top of bank and bottom of bank each side of mound);
- Locations and identification marks of each geosynthetic panel, including anchor trenches;
- Locations of damaged areas and penetrations; and
- Locations of patch repairs.

5.4 Project Timeline

The current estimated timeframe for each stage of the Cell 7 development, filling and closure is shown in Table 5-1.

Table 5-1: Project Timeline

Task	Duration	Start Date	End Date
DWER Assessment	90 days	January 2025	May 2025
Bulk Earthworks	60 days	January 2025	March 2025
Lining System Construction	45 days	January 2026	March 2026

Waste Acceptance	18-20 months	May 2026	December 2027
Capping and Closure	60 days	January 2028	March 2028

6 Infrastructure Operational Aspects

The following sections outline the key operational aspects of Cell 7 and the corresponding environmental control systems.

6.1 Class III Landfill

6.1.1 Waste Acceptance and Disposal

Cell 7 is classified as Class III and will be licenced to accept the following waste types only, in accordance with the DWER's *Landfill Classification and Waste Definitions 1996 (as amended 2018)* and as per the Site Licence:

- Clean Fill;
- Uncontaminated fill;
- Type 1 and Type 2 Inert Wastes;
- Putrescible Waste;
- Contaminated Solid Waste (meeting criteria specified for Class II or Class III landfills);
- Type 1 and Type 2 Special Wastes; and
- Type 3 Special Wastes (meeting criteria specified for Class II or Class III landfills).

Upon entering and once weighed, accepted loads will be directed to the designated area for unloading or disposal in the active cell and tip face. The tip face will be clearly signed, and the site operator will ensure the load is in the correct location for the materials' appropriate management.

In the event that non-conforming waste materials are discovered within a vehicle, these will be denied access. Alternatively, if a vehicle is supposedly carrying a clean stream, such as green waste, but it is identified as being contaminated following inspection, this material will be directed to the landfill and charged the relevant disposal costs. If asbestos is identified, the asbestos would be removed from the material in accordance with the Site's asbestos management procedures. Only cement bonded asbestos and no fibrous asbestos can be accepted at the Site.

Covering the waste is part of the daily requirements set out by the Landfill Guidelines and is undertaken as per Site Licence requirements. The requirements of cover material will be obtained from the excavated surplus overburden soils. The placement of daily cover will be carried out by the Site staff and plant, as part of the environmental management processes, to discourage vermin and prevent litter, odour, dust emissions and potential impacts on amenity.

6.1.2 Operational Hours

The current operational hours for the Site will not change during the operation of Cell 7. Therefore, the hours for landfill operations are:

- Monday to Friday 5:00am to 5:00pm;
- Saturday: 5:00am to 1:00pm; and
- Sunday: Closed.

6.2 Leachate Management System

The Cell 7 leachate collection system will connect by gravity to the existing Cell 5 collection system for extraction from the Cell 5 sump. The Cell 5 risers are already connected to the Site's existing leachate pond system where leachate is treated via evaporation. Further discussion on the operation of the leachate management system for Cell 7 is provided in the following subsections.

6.2.1 Leachate Collection System

The leachate collection layer uses several collection pipes working together with the highly permeable 300mm aggregate layer to provide an effective long-term solution for the collection and transmission of leachate from the base of Cell 7. The leachate collection system for Cell 7 will connect to several existing collection pipes in Cell 5 using electrofusion couplings. The layout of the leachate collection system is provided in Appendix A.

6.2.2 Leachate Extraction System

Leachate from Cell 7 will be extracted from the existing risers installed within the Cell 5 sump. A submersible pump, installed inside the Cell 5 primary DN 450mm leachate extraction riser pipe, will extract leachate automatically when sufficient head is present over the pump's inlet. The pump is fitted with a level sensor which triggers the controller to tun the pump on.

The hydraulic head of leachate over the landfill liner surface will be managed during the landfill operation in general accordance with Landfill Guidelines requirements through extraction of leachate from the sump. Leachate levels on the landfill base will be maintained as low as reasonably practicable with a 0.3m maximum on liner surface and 1.3m within the leachate sump.

The leachate will then be transferred via a solid DN110 mm HDPE pipe rising main to the Site's centralised landfill leachate evaporation pond system located east and northeast of the landfill in the central portion of the Site.

6.2.3 Leachate Evaporation Pond System

The landfill leachate pond system at the Site currently comprises four leachate evaporation ponds with a combined operational capacity of 60ML. Since its construction, the pond system has effectively managed all existing leachate generated at the Site from landfill operations.

A water balance was completed by Golder in 2018 to ensure that the Site's leachate management system would have sufficient capacity to cater for leachate generated in the landfill Cells 1 to 6 at the Site.

Talis conducted a further assessment of the leachate generation potential of the whole site including Cell 7 to determine if the existing leachate storage capacity was sufficient to cater for the additional Cell 7. The assessment was undertaken using the Hydrologic Evaluation of Landfill Performance (HELP) software program. The assessment concluded that existing capacity was sufficient and that development of additional leachate ponds was not required. The pond system and findings of the assessment are discussed in the North Bannister Resource Recovery Park Landfill Leachate Balance Memorandum, Talis, 2 December 2024 enclosed in Appendix F.

To minimise risk to groundwater, the ponds were designed, constructed and are operated in general accordance with the Landfill Guidelines. The leachate ponds are lined with a composite geosynthetic lining system featuring a 2.0mm HDPE geomembrane overlaying a GCL.

6.2.4 Additional Monitoring and Management Measures

To minimise leachate generation within Cell 7, the active tip face and daily cover requirements will be maintained as per Veolia's Licence.

Leachate monitoring will be undertaken on a regular basis to ensure the leachate collection and extraction system is operating effectively, to determine the head and quality of leachate, and to ensure compliance with assessment criteria and compliance limits.

The current leachate monitoring and sampling regime outlined within Conditions 30, 31 and 32 of Veolia's Licence will be adopted for Cell 7, once operational.

6.3 Landfill Gas Management

The landfill gas management system operated by Run Energy is comprised of the following infrastructure elements:

- DN 160mm vertical landfill gas wells
- DN 90mm HDPE lateral connection pipes to main header;
- DN 160 mm lateral and DN 225mm HDPE main headers connected to the main perimeter header;
- DN 355mm HDPE perimeter header connecting to the junction with the future perimeter header serving future Cells 8 to 14;
- DN 450mm main header connecting the perimeter headers to the flare;
- Condensate dropout points (barometric traps), where condensate and leachate are returned to the landfill; and
- A flare.

The wellfield is monitored, maintained and expanded on a regular basis, resulting in an optimisation of landfill gas capture for environmental control. Drawings of the proposed landfill gas management system for the whole Site are enclosed in Appendix E.

6.4 Surface Water Management

The overall surface water management for the Site consists of a series of perimeter swale drains around the boundary of the landfill cells connected to surface water dams.

Regular site maintenance and repairs of drains and other associated surface water management infrastructure is undertaken. Site staff also inspect the system for evidence of contamination, excessive sedimentation and structural integrity of the system on a regular basis.

Water within the surface water pond system is also monitored to ensure compliance with the Site Licence and to identify any environmental issues that may impact the surrounding environment. Surface water monitoring is defined within the Site licence and will be continued once Cell 7 becomes operational.

7 Environmental Aspects and Management

The potential for the expansion of Class III landfill operations, through the development of Cell 7, to impact on a number of key environmental and social aspects is well recognised. The potential impacts associated with each key aspect are discussed in the following subsections, namely:

- Surface water;
- Leachate
- Groundwater;
- Air emissions, including:
  - Landfill Gas;
  - Odour;
  - Dust;
  - Noise; and
  - Asbestos.
- Geotechnical Stability;
- Litter;
- Vermin and Feral Animals;
- Weeds;
- Fire;
- Traffic;
- Security; and
- Rehabilitation.

The potential impacts to these aspects and the proposed controls and measures to manage the potential impacts are outlined in the following subsections.

7.1 Surface water

As stated within Section 3.5, stormwater must be diverted from the active landfill cells and leachate ponds into dedicated stormwater swales. Stormwater swales are to be kept clear of any waste to allow effective draining to the dedicated stormwater detention dams.

Surface water on-site is channelled from around the eastern edges of the landfill to Stormwater Dam 1. Overflow from Stormwater Dam 1 drains along a natural drainage channel toward Stormwater Dam 2, which in turn overflows into Stormwater Dam 3 (approximately 300m downstream from Stormwater Dam 2). Surface water from the western edge of the landfill is currently channelled through the Cell 7 area, along the southern edge of the landfill, through the plantation area, and ultimately into Stormwater Dam 3. Previous investigations indicated that surface run-off emanating from the Site is fresh to slightly brackish (444mg/L to 772mg/L) with neutral pH and low metal concentrations in general.

To manage surface water outside the footprint of Cell 7, a surface water swale to a depth of 850m will be installed along the western perimeter acting as a cut-off drain directing water to the plantation area in the footprint of future Cell 11.

To the south of Cell 7, the turning circle and southern embankment of Cell 7 is graded towards the existing drainage swale that runs along the southern boundary of Cell 5 through the plantation area and ultimately into Stormwater Dam 3.

Monitoring of surface water is undertaken in accordance with Conditions 30, 31 and 32 of the Site's Licence, which will continue following construction of Cell 7. All results collected during these monitoring events is submitted to the DWER annually in Veolia's Annual Environmental Report, required under Condition 38 of Veolia's Licence.

Any surface water that interacts with waste in the landfill cells will be classified as leachate and would be collected via the leachate collection system prior to evaporation in the Site's leachate pond system located east of the landfill cells. Leachate is discussed further in the following section.

7.2 Leachate

As outlined in Section 5.3.3, leachate will be collected in the leachate collection system designed for each landfill cell. Leachate will be pumped from the sumps by automatic pumps with the ability to manually override the system if required. Leachate extraction points are checked regularly to ensure pumps are operating effectively and the leachate head within the landfill cell is kept to a minimum. The leachate will be transferred from the sumps via pipework to the existing leachate ponds, which are shown in Figure **4**.

The Site has an interconnected leachate pond system to manage the leachate generated from all of the waste management activities taking place at the Site. The pond system specifically manages leachate generated from the landfill cells, some imported leachate, and will also be used to manage the leachate generated from Cell 7. The pond system and findings of an updated leachate water balance assessment that includes the development of Cell 7 are discussed in the North Bannister Resource Recovery Park Landfill Leachate Balance Memorandum, enclosed in Appendix F.

To summarise, the assessment concluded that the capacity of the existing four pond system was sufficient to cater for the leachate generated from Cell 7 and that development of additional leachate ponds was not required.

7.3 Groundwater

As outlined in Section 5.3.2, a composite lining system designed to comply with the criteria within the Landfill Guidelines will be installed for Cell 7. One of the key purposes of the lining system is to protect the surrounding environment and groundwater from impacts caused by leachate.

Groundwater monitoring is undertaken to ensure that in the event the integrity of the lining system is comprised and leachate seeps from the landfill cell, contamination can be detected early. Groundwater is monitored on a biannual basis in accordance with Veolia's Water Monitoring Procedure and results are reported as required by Condition 40 of the Site Licence. Throughout the lifespan of the Site, groundwater will continue to be monitored at all bore locations in the network.

There are no monitoring bores within the Cell 7 development footprint. Three existing monitoring bores are located up-hydraulic gradient of Cell 7, while all other bores are located down-hydraulic gradient. All of these bores will continue to be monitored as per the Licence conditions to highlight any potential impacts to groundwater from these landfill cells.

In the event that an exceedance or declining groundwater quality trend is identified, further monitoring and investigation will be undertaken. Previous records of elevated analysis results have typically been indicative of a seasonal or short-term occurrence and have not generally continued over a long period of time. This is typical of a highly seasonal and variable groundwater system.

7.4 Air Emissions

7.4.1 Landfill Gas

The decomposition of the organic content within the waste stream will result in the generation of landfill gas which contains methane, carbon dioxide and other volatile organic compounds. These gases contribute to the effects of climate change, produce an odour, reduce amenity, impact human health and present explosive risks.

To ensure these impacts are mitigated, there is an extensive network of landfill gas extraction wells and transmission pipework across the Site. Through an active vacuum system, the network removes landfill gas from the Class III landfill cells and transfers it to the Site's flare for thermal destruction.

Horizontal landfill gas wells may also be installed progressively to collect and capture gas in Cell 7, as required. Condition 23 of the Site Licence requires a Capping Plan that includes landfill gas collection details for Cell 7 to be prepared three months prior to completion of waste disposal in the cell.

7.4.2 Odour

Odours are generated from a range of sources including the acceptance/transport of putrescible waste, greenwaste activities, landfill gas, leachate ponds and exposed waste prior to the application of cover material. To mitigate odours there are a range of management measures currently employed which include:

- Covering of waste during transport;
- Consideration of meteorological conditions during material handling;
- Daily cover and compaction of waste as per the Site Licence;
- Immediate burial of highly odorous wastes on acceptance at the weighbridge;
- Regular maintenance and monitoring of the leachate treatment system;
- Installation of a landfill gas management system; and
- Odour complaint system and follow-up investigations/actions.

These management measures will continue to be applied during the operations of Cell 7 and are anticipated to be sufficient to effectively manage odour emissions from the Site.

7.4.3 Dust

Dust will be generated during the construction and operation phase of each landfill cell as a result of clearing, earthworks and handling of materials. Excessive dust generation can impact local air quality causing respiratory impacts and reduced vision. To manage dust generation, Veolia currently implements a range of measures, including:

- Covering of waste during transport;
- Vehicles to maintain minimum speed limits;
- Use of a water cart to wet haul roads as necessary; and
- Appropriate handling and unloading of waste to minimise dust generation.

These measures which allow Veolia to effectively manage potential impacts relating to dust, will continue to be implemented during the construction and operation of Cell 7.

7.4.4 Noise

Noise will be generated during the construction and operational phases of each landfill cell as a result of vehicle and machinery activities. To reduce noise impacts, Veolia currently implements a range of management measures, including:

- All mobile machinery equipped with broadband reversing alarms;
- Site operations hours are restricted to 5:00am to 5:00pm Monday to Friday and 5:00am to 1:00pm on Saturday;
- Regular maintenance of mobile machinery and equipment;
- All staff provided with and trained in the use of appropriate Personal Protective Equipment (PPE).

These measures will continue to be implemented during the construction and operation of Cell 7 and are expected to allow Veolia to adequately potential noise impacts at the Site.

7.4.5 Asbestos

Asbestos is a hazardous fibrous substance which can occur within waste materials, particularly C&D wastes such as building rubble. Asbestos poses a potential risk if fibres become airborne and are breathed into the lungs. Serious health impacts may occur, often as a result of significant exposure to asbestos, including mesothelioma, lung cancer and asbestosis.

Veolia accepts asbestos and asbestos containing materials for burial into a designated asbestos disposal area, as per its Site Licence. Only cement bonded asbestos may be accepted at the Site, with no fibrous asbestos permitted to be accepted. Any asbestos contaminated waste loads will be managed and when relevant, will be buried within the asbestos disposal area as per Veolia's Licence.

In addition to Veolia' s Licence requirements, several management measures are implemented to ensure that risks associated with the acceptance of asbestos are minimised. These include:

- All asbestos and asbestos containing materials accepted at the Site are placed in the designated disposal area and covered with 300mm of soil as soon as practicable on the same working day, as per the Site Licence;
- Any asbestos contaminated waste loads will be managed and when relevant, will be buried within the designated asbestos disposal area;
- All staff are trained in the appropriate inspection, handling and disposal of asbestos materials;
- All staff provided with and trained in the use of appropriate PPE.

These management measures, along with the existing Licence conditions, are expected to be sufficient to minimise the risks associated with asbestos.

7.5 Geotechnical Stability

The geotechnical stability of the landfill is a key factor that may impact the integrity of the landfill environmental controls. Loss of integrity of the landfill liner can result in the contamination of groundwater and soils.

A Landfill Waste Slope Filling Options Assessment was completed in December 2016 by Golder to identify the most appropriate final landform and inform the design of the future landfill cells. A copy of the report is provided in Appendix D.

The following key conclusions and recommendations were made by Golder:

- The final landform should be designed to have 1:4 pre-settlement slopes and no benching to provide additional airspace and minimise the complexity of filling and capping operations:
- The final landform was identified as complying with the requirements outlined in the Landfill Guidelines; and
- The final landform is based on the assumption that settlement will be approximately 15-20%.

Existing Cells 1 to 6 have been developed in accordance with Golder's design which also included the design of all future cells. The Cell 7 design by Talis has maintained the same cell footprint but has altered the basal falls to incorporate two spine drains rather than one. This lowers the base very slightly in the northwest corner of the cell, but still maintains approximately 5m offset from maximum recorded groundwater elevation at its lowest point. All basal and side slopes comply with Landfill Guidelines. Site specific engineering controls for the subgrade were developed with consideration of the local groundwater and geology. The cell design features a 500mm Engineered Fill layer composite geosynthetic lining system and 300mm leachate collection layer extended to 357mAHD to manage the potential for leachate to perch against its side slope lining system.

To support the Cell 7 design, Talis undertook a basal Stability Risk Assessment (SRA). Since the design of Cell 7 features the longest and highest side slopes, of all the proposed future cells at the Site, the SRA assesses the highest risk internal waste slopes for the whole Site. To eliminate the requirement to undertake future analysis of temporary waste slopes for future cell developments, the Site's longest and highest temporary waste slope (future Cells 10 and 11) – was also assessed.

The temporary waste slope was found to meet the minimum Factors of Safety (FoS) under static and seismic scenarios. The internal western side slope was found to meet the minimum FoS under static conditions but just under the minimum FoS of 1.0 at 0.989 under seismic loading Safety Evaluation Earthquake (SEE) [Maximum Credible Earthquake - MCE] return periods of 1:1000 Annual Exceedance Probability (AEP) for drained circular and non-circular modes of failure.

The seismic event relates to a statistical occurrence that theoretically takes place once every 1000 years. As the leachate collection layer is exposed for comparatively little time, it will be buttressed by the first 3 layers of waste deposited into the cell within 4 months. The risk of a 1:1000 yr event occurring in a 4 month window is considered very low.

Furthermore, since the SRA was performed using "book values", conservative angle of friction values were applied in the modelling. It is anticipated that laboratory testing of the soils and geosynthetic interfaces can yield higher frictions angles which would lead to FoS above unity during rare seismic events.

The geotechnical stability of the internal and temporary waste slopes is acceptably stable.

An assessment of the soil characteristics is critical to understanding the stability risks and to confirm the appropriateness of the engineering requirements.

The SRA is enclosed in Appendix D.

7.6 Litter

Litter may be generated during the transport and handling of waste, causing impacts to amenity. To minimise the impacts from litter, the following management measure are currently implemented onsite:

- Maintenance of fencing 1.8m high;
- Use of litter screens at the tipping face;
- Daily compaction of waste; and
- Daily removal of windblown waste from fences and access roads.

These management measures will continue to be applied during the operations of Cell 7 and are anticipated to be sufficient to manage potential impacts associated with litter.

7.7 Vermin and Feral Animals

Due to the types of waste accepted, water sources and surrounding bushland, feral animals and vermin such as cats, foxes, rabbits, mice and rats have the potential to be attracted to the Site. Several management activities relating to vermin and feral animals will be undertaken, including:

- Application of adequate cover material;
- Regular monitoring for vermin and feral animals; and
- Vermin control such as baiting and trapping.

These management measures are expected to be sufficient to adequately manage risks associated with vermin and feral animals.

7.8 Weeds

Weed species have been recorded in cleared or disturbed areas within the Site. Veolia currently implements a range of management measures to ensure that weed populations do not spread, which include:

- Routine weed inspections; and
- Control measures (herbicides and physical removal) are undertaken several times per year as required and prior to flowering periods.

These management measures are expected to be sufficient to adequately manage risks associated with weeds.

7.9 Fire

There are a variety of fuel sources for fires at the Site, including waste in the active landfill areas, machinery, greenwaste stockpiles and vegetation. Therefore, Veolia uses a variety of management measures to ensure that the risk of fires at the Site is minimised. These include:

- Fire response infrastructure and equipment, including mobile water cart, fire extinguishers, stormwater dams, and fire breaks located around the Site;
- As stipulated by Condition 3 of the Licence, an adequate water supply and a means of distribution to be provided at all times for the purposes of firefighting;
- Pursuant to Condition 18 of the Licence, the DWER is informed of any fires by the end of the following working day after which the fire was discovered; and
- All staff trained in appropriate fire response techniques.

These management measures are expected to be sufficient to manage the risk of fires at the Site and will continue to be applied during the operations of Cell 7.

7.10 Traffic

The proposed operations will result in continued traffic movements to and from the Site and on the surrounding road network. Onsite traffic movements have the potential to generate noise, dust and create an occupational health and safety risk to staff. The following traffic movements are anticipated to occur onsite:

- External contractor vehicles arriving to Site to deposit waste materials;
- Internal plant and vehicle movements as required for operation of the Site; and
- A small number of traffic movements associated with staff personal vehicles, which will be limited to the front car parks; and to minimise car and truck interactions.

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

- A one-way system will facilitate free flowing movement of community visitors through the Site;

- Signage providing directions, traffic control measures and safety instructions will be established and maintained at appropriate locations around the Site;
- Vehicles will be restricted to minimum speed limits;
- Employees and contractors shall wear high visibility and reflective clothing when working in areas where vehicle movement occurs;
- All vehicles will be maintained in good working condition and drivers instructed to use conservative driving techniques; and
- All employees and contractors will be inducted with the site Occupational Health and Safety (OHS) and traffic management procedures.

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.

7.11 Security

A breach of security may result in injury to persons or damage to infrastructure. To minimise potential security the following management measures are implemented:

- Appropriate signage is installed at the Site entrance;
- Lighting and CCTV is installed in relevant areas of the Site, including at the main Site access road and key buildings;
- A perimeter fence is installed around the Site and is monitored and maintained on a regular basis; and
- All access gates and buildings are locked securely outside of operational hours.

These are anticipated to allow Veolia to effectively manage any risk associated with security at the Site.

7.12 Rehabilitation

Following completion of the capping system, the landfill cells will be rehabilitated using native species. The key stages of the rehabilitation works are:

- Drainage works, contour banks, topsoiling and scarifying;
- Direct seeding and tubestock planting;
- Staking and tree guarding;
- Weed control and general maintenance; and
- Revegetation monitoring using permanent transects and quadrants.

Rehabilitation at the Site will be undertaken in accordance with the Landfill Guidelines and will occur progressively. As required by Condition 12 of Veolia's Licence, rehabilitation of Cell 7 will take place within 6 months after disposal into the cell has been completed.

7.13 Environmental Management Summary

A summary of the environmental management measures is provided in Table 7-1.

Table 7-1: Summary of Environmental Management Measures

Aspects	Management Measures
Surface Water	• Implementation and maintenance of a surface water management system, consisting of a series perimeter drains to a network of stormwater dams; and • Ongoing surface water monitoring and reporting
Leachate	• Leachate collection system within each landfill cell, designed using the criteria within the Landfill Guidelines, including: o 300mm aggregate drainage layer o Primary and secondary pipe network (225mm and 160mm OD HDPE) o 1-3% base slope o Collection sump • Leachate extraction system, including: o Primary and secondary side risers o Submersible pumps o Solid HDPE pipe rising main to the Site's centralised leachate pond system • Landfill leachate evaporation pond system, consisting of three ponds with a combined operational capacity of approximately 60ML and a combination of both mechanical and floating evaporators. These ponds are lined with a composite, geosynthetic lining system. • Ongoing monitoring in accordance with the Leachate Management Procedure
Groundwater	• Class III composite lining system designed using the criteria within the Landfill Guidelines • Minimum separation distance of 5m from known groundwater table levels • Ongoing biannual monitoring in accordance with the Veolia's Water Monitoring Procedure • Reporting in accordance with Condition 30 of the Site Licence
Landfill Gas	• Progressive installation of both horizontal landfill gas wells as part of an active landfill gas extraction system; and • Preparation of a Capping Plan that includes landfill gas collection details, as required under Condition 23 of Veolia's Licence.
Odour	• Installation of a landfill gas management system; • Consideration of meteorological conditions during material handling; • Regular maintenance and monitoring of the leachate treatment system; • Covering of waste during transport; • Daily cover and compaction of waste as per the Site Licence; • Immediate burial of highly odorous wastes on acceptance at weighbridge; and • Odour complaint system and follow-up investigations/actions.
Dust	• Vehicles to maintain minimum speed limits; • Use of a water cart as necessary; • Covering of waste during transport; and • Appropriate handling and unloading of waste to minimise dust generation.
Noise	• All mobile machinery equipped with broadband reversing alarms; • Site operations hours are restricted to 5:00am to 5:00pm Monday to Friday and 5:00am to 1:00pm on Saturday;

	• Regular maintenance of mobile machinery and equipment; • All staff provided with and trained in the use of appropriate Personal Protective Equipment (PPE).
Asbestos	• All asbestos and asbestos containing materials accepted at the Site are placed in the designated disposal area and covered with 300mm of soil as soon as practicable on the same working day, as per the Site Licence; • Any asbestos contaminated waste loads will be managed and when relevant, will be buried within the designated asbestos disposal area; • All staff are trained in the appropriate inspection, handling and disposal of asbestos materials; • All staff provided with and trained in the use of appropriate PPE.
Geotechnical Stability	• All basal and side slopes comply with Landfill Guidelines • The proposed landfill closure profile consists of a 1V:20H profile on the crown and 1V:6H on the side slopes, which is within the standards specified within the Landfill Guidelines • Site specific engineering controls for the subgrade were developed with consideration of the local groundwater and geology • Assessment of the landfill design through a Stability Risk Assessment which determined that all required factors of safety were met, and the design is deemed acceptable
Litter	• Maintenance of fencing 1.8m high; • Use of litter screens at the tipping face; • Daily compaction of waste; and • Daily removal of windblown waste from fences and access roads.
Vermin and Feral Animals	• Application of adequate cover material; • Regular monitoring for vermin and feral animals; and • Vermin control such as baiting and trapping.
Weeds	• Routine weed inspections; and • Control measures (herbicides and physical removal) are undertaken several times per year as required and prior to flowering periods.
Fire	• Fire response infrastructure and equipment, including mobile water cart, fire extinguishers, stormwater dams, and fire breaks located around the Site; • As stipulated by Condition 3 of the Licence, an adequate water supply and a means of distribution to be provided at all times for the purposes of firefighting; • Pursuant to Condition 18 of the Licence, the DWER is informed of any fires by the end of the following working day after which the fire was discovered; and • All staff trained in appropriate fire response techniques.
Security	• Appropriate signage is installed at the Site entrance; • Lighting and CCTV is installed in relevant areas of the Site, including at the main Site access road and key buildings; • A perimeter fence is installed around the Site and is monitored and maintained on a regular basis; and • All access gates and buildings are locked securely outside of operational hours.

8 Post Closure Management

Post-closure management will occur following landfill closure, when all waste management activities have ceased, and the Site has been converted to its designated end use. Post-closure management will involve monitoring, maintenance and reporting activities. It is anticipated that most of the intensive post-closure management will be conducted in the first 10 years after closure, when subsidence, landfill gas, leachate management and revegetation issues will be most prominent. Surface and groundwater monitoring will continue, with a sampling program developed in consultation with the DWER. Monitoring and inspection data will continue to be recorded and assessed.

Areas that will require ongoing maintenance include the revegetation areas, groundwater monitoring bores, surface water control structures and the landfill cap. Maintenance requirements will include any infrastructure that remains including roads, signage and fences, as well as groundwater, surface water, leachate and landfill gas collection systems. Fire breaks will also be required to be maintained on an annual basis. Revegetation areas will require monitoring and areas of poor performance may require re-seeding or supplementary planting.

Landfill gas and leachate will continue to be produced in landfill cells at the Site for many years after closure and will require ongoing management. Landfill gas monitoring is required to monitor the state of gas generation and to ensure it is being collected and flared where necessary. It is likely that the power generation equipment will be removed when gas recovery becomes economically unviable (possibly 10 – 15 years after landfill cell closure). At such time, Veolia may need to install a gas flare or other methane oxidation system to manage residual landfill gas.

Weed management will be an ongoing requirement, with inspections and control activities continuing until such time as vegetation on Site is of sufficient quality and density. Given the Site is being used for passive recreation (walking trails picnic grounds, etc) there is a high risk of ongoing infestation of weeds at the Site. Weed management would be an ongoing management issue in this instance. Post-closure management will remain the responsibility of the Veolia.

9 Residual Risk Assessment

Each of the potential risks was assessed as per the *DWER Guidance Statement: Risk Assessments - Part V, Division 3, Environmental Protection Act 1986* (February 2017) (Guidance Statement). The objective of the Residual Risk Assessment is to ensure the potential risks associated with the proposed activities are understood and managed appropriately to ensure that there is no unacceptable residual risk. The sources of hazards, pathways and receptors of hazards identified are outlined in the following subsections.

9.1 Sources of Hazards

For the purpose of this assessment, a source is defined as a primary risk with the potential to cause significant contamination or harm to the environment. With regards to the environment and public health, sources and its potential hazards which may arise from the various future activities have been identified and are shown in Table 9-1.

Table 9-1: List of Potential Hazards

Source	Description of Hazards
Surface Water	Excessive surface water that is not properly managed can lead to flooding onsite Surface water that comes into contact with general mixed or putrescible waste can generate leachate
Leachate	Risk to surface and groundwater from the seepage of leachate from the landfill
Groundwater	Risk to groundwater from the seepage of leachate from the landfill in the event the integrity of the lining system is compromised
Landfill Gas	Generation of landfill gas and uncontrolled release to the atmosphere contributing to greenhouse gas emissions Vertical or horizontal movement of gases through soil to buildings onsite or nearby houses presenting an explosion risk
Odour	Odours generated from putrescible waste can cause impacts to amenity
Dust	Dust generated during construction works can result in reduced visual amenity and cause respiratory issues
Noise	Noise emissions can cause impacts to amenity
Asbestos	Asbestos is a known carcinogen that can cause mesothelioma, lung cancer and asbestosis. Asbestos fibres inhaled deep into the lungs can result in the development of mesothelial cells which may result in cancer
Geotechnical Stability	Partial collapse of batter can lead to damage to the landfill lining system and its environmental engineering controls Instability of landfill waste profile can lead to health & safety concerns
Litter	Litter can result in impacts to amenity on and immediately surrounding the Site

Vermin and Feral Animals	Exposed waste can attract vermin which may cause nuisance and present health risks
Weeds	Introduction and spread of weeds can comprise revegetation
Fire	Potential for fires from waste materials and equipment
Security	Unauthorised personnel may access the Site resulting in a security breach of the Site facilities, plant and equipment
Waste Exposure	Potential exposure of waste at the tie-in areas between Cell 7 and surrounding landfill cells leading to health and safety risks

9.2 Pathways for Hazards

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

- Air through which lightweight materials, such as dust, litter, odour and landfill gas, can travel;
- Surface along which the sources of contamination or harm can travel or be present at (e.g., surface water runoff, litter, persons walking or working over the surface); and
- Sub-surface whereby the underlying soils, bedrock, aquifers and infrastructure permit gas and leachate migration towards the receptors as follows:
  - Lateral and vertical migration of leachate within or towards the groundwater; and
  - Lateral and vertical migration of landfill gas either in the gas phase or dissolved in groundwater via subsoil, bedrock, aquifers and manmade underground services such as pipelines, drainage systems and manholes.

For the purpose of this assessment, a receptor is defined as the location where the impact of the contamination or harm is registered. The possible receptors of the contamination or harm cause by the identified hazards are summarised in Table 9-2.

Table 9-2: Receptors

Receptor	Description of the Receptor
Atmosphere	• Ozone layer surrounding the Earth
Air Quality	• Local air quality
Site Users	• Persons authorised to traverse across the Site including: ◇ Operational staff ◇ Contractors carrying out maintenance or monitoring ◇ Visitors/Customers
Site Infrastructure	• Buildings onsite and associated infrastructure
Surrounding Land Users	• People who work or live beyond the boundary of the facility

Surface Water	• Surrounding natural surface water bodies
Groundwater	• Groundwater that exists beneath the landfill either as a local perched system or as a regional aquifer from which a water supply may be extracted for industrial or potable purposes
Vegetation and Flora	• Vegetation and flora in surrounding areas
Fauna	• Fauna species whose habitat is within or surrounding the facility

9.3 Risk Rating Matrix

To assess the various risks, the potential hazards identified in Table 9-1 were classified according to the DWER's Guidance Statement shown in Table 9-3.

Table 9-3: Risk Rating Matrix

		Consequence				
		Slight	Minor	Moderate	Major	Severe
Probability	Almost Certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	High	Extreme
	Possible	Low	Medium	Medium	High	Extreme
	Unlikely	Low	Medium	Medium	Medium	High
	Rare	Low	Low	Medium	Medium	High

9.4 Risk Profile

Risk management measures refers to the key management strategies that will be adopted onsite to ensure that all hazards and potential risks identified are controlled to an appropriate level, and that strategies are in place to react to any potential incidents or accidents. In most cases these risk management measures decrease the probability and/or consequence of identified hazards and therefore lower the risk rating. The current risk rating and revised probability and consequence for each identified hazard following the implementation of management measures for landfill cells are shown in Table 9-4.

9.5 Assessment Conclusion

The Residual Risk Assessment identified the current sources of hazards as well as possible sources of hazards arising from the proposed works. The risk rating prior to the implementation of management measures ranged from 'Low' to 'Extreme'. The revised risk ratings were all downgraded to 'Low' to 'Medium' once management measures were applied. Given the proposed management measures Veolia will ensure any potential health, environment, and amenity impacts are avoided or minimised.

Table 9-4: Residual Risk Profile for Cell 7

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Surface Water	Vegetation and flora	Surface	Sedimentation from uncontrolled stormwater impacting flora and vegetation	Possible	Minor	Medium	• Implementation and maintenance of surface water management system consisting of a series perimeter drains to a network of stormwater dams • Diversion of water that does not come into contact with waste to surrounding areas • Landfill design using the criteria within the Landfill Guidelines for Class III landfills • Progressive capping of cells to minimise infiltration of water • Seasonal surface water monitoring	Unlikely	Slight	Low
	Groundwater	Surface	Water that encounters waste generating leachate that can cause contamination to groundwater	Almost certain	Major	Extreme		Almost certain	Slight	Medium
	Surface water	Surface	Uncontrolled stormwater that encounters waste generating leachate and contaminating surrounding surface water	Possible	Major	High		Unlikely	Slight	Low
Leachate	Groundwater	Subsurface	Contamination of groundwater resulting from seepage from the landfill	Possible	Major	High	• Landfill design using the criteria within the Landfill Guidelines • Construction of landfill cell, including a leachate collection & extraction system, as per Technical Specification and CQA Plan • Utilisation of the Site's landfill leachate evaporation pond system • Ongoing monitoring in accordance with the Leachate Management Procedure	Unlikely	Minor	Medium
Landfill Gas	Site Infrastructure	Subsurface	Vertical or horizontal movement of gases through soil to buildings onsite or nearby houses presenting an explosion risk	Possible	Severe	Extreme	• Progressive capping of cells • Installation of active landfill gas collection and extraction system • Implementation of a landfill gas monitoring program	Rare	Major	Medium
	Surrounding Land Users	Subsurface		Possible	Severe	Extreme		Rare	Major	Medium
	Atmosphere	Air	Release of landfill gas into the atmosphere contributing the greenhouse gas emissions	Almost certain	Moderate	High		Unlikely	Slight	Low
Odour	Site Users	Air	Odours generated from the acceptance and degradation of waste in the landfill impacting amenity onsite	Almost certain	Minor	High	• Installation of a landfill gas management system • Consideration of meteorological conditions during material handling • Regular maintenance and monitoring of the leachate treatment system • Covering of waste during transport • Daily cover and compaction of waste • Immediate burial of highly odorous wastes on acceptance at the weighbridge • Odour complaint system and following up investigations/actions	Possible	Slight	Low
	Surrounding Land Users	Air	Odours generated from the acceptance and degradation of waste in the landfill impacting nearby receptors	Possible	Minor	Medium		Unlikely	Slight	Low
Dust	Site Users	Air	Visibility may be impaired, and inhalation of dust may occur during construction activities and handling of waste	Possible	Minor	Medium	• Water cart to be used as necessary • No construction works or earthworks will take place during high winds • Vehicles to maintain minimum speed limits • Covering of waste during transport	Possible	Slight	Low
Noise	Site Users	Air	Noise impacts from activities onsite impacting Site users	Likely	Slight	Medium	• Broadband reversing alarms on mobile machinery • Regular maintenance of equipment and machinery • Implement safe working practices and use appropriate PPE • Sufficient separation distances from sensitive receptors	Unlikely	Slight	Low
	Surrounding Land Users	Air	Noise impacts from activities onsite impacting nearby receptors	Possible	Slight	Low		Unlikely	Slight	Low

Asbestos	Site Users	Air	Inhalation of asbestos fibres from asbestos	Possible	Major	High	• All asbestos and asbestos containing materials accepted at the Site are immediately buried in a dedicated asbestos disposal area as the Site Licence • All personnel are trained in the appropriate inspection, handling and disposal of asbestos materials • Use of appropriate PPE	Unlikely	Moderate	Medium
Geotechnical Stability	Site Infrastructure	Surface	Partial collapse of batter can lead to damage to the landfill lining system and its environmental engineering controls	Possible	Major	High	• All basal and side slopes comply with Landfill Guidelines • The proposed landfill closure profile consists of a 1V:20H profile on the crown and 1V:6H on the side slopes, which is within the standards specified within the Landfill Guidelines	Rare	Minor	Low
	Site Users	Surface	Instability of landfill waste profile can lead to health & safety concerns	Possible	Major	High	• Site specific engineering controls for the subgrade were developed with consideration of the local groundwater and geology • Assessment of the landfill design through a Stability Risk Assessment which determined that all required factors of safety were met, and the design is deemed acceptable	Rare	Minor	Low
Litter	Site Users	Air and surface	Litter impacting on amenity onsite	Possible	Slight	Low	• Maintenance of fencing 1.8m high • Use of litter screens at the tipping face • Daily cover and compaction of waste • Daily removal of windblown waste from fences & access roads	Rare	Slight	Low
	Surrounding Land Users	Air and surface	Litter impacting amenity of nearby receptors	Unlikely	Slight	Low		Rare	Slight	Low
Vermin & Feral Animals	Site Users	Surface	Putrescible waste can attract vermin and feral animals presenting health risks, reduced amenity and nuisance	Possible	Minor	Medium	• Daily covering and compaction of waste as stated within the Site Licence and as per the Landfill Guidelines • Feral animal management procedure	Possible	Slight	Low
Weeds	Vegetation and flora	Air and Surface	Introduction of weeds impacting surrounding native vegetation or revegetation onsite	Possible	Minor	Medium	• Routine inspections • Chemical or physical removal of weed species	Unlikely	Slight	Low
Fire	Site Users	Surface	Risk of fires onsite from equipment or landfill creating risk to personnel and infrastructure	Unlikely	Severe	High	• Fire response infrastructure and equipment, including mobile water cart, fire extinguishers, stormwater dams, and fire breaks located around the Site • An adequate water supply and a means of distribution to be provided at all times for the purposes of firefighting • All staff trained in appropriate fire response techniques	Rare	Minor	Low
	Site Infrastructure	Surface		Unlikely	Major	Medium		Rare	Minor	Low
Security	Site Infrastructure	Surface	Unauthorised personnel may access the site resulting in a security breach of the site facilities, plant and equipment	Unlikely	Minor	Medium	• Appropriate signage will be installed at the site entrance • Lighting and CCTV will be installed in relevant areas of the Site including at the access road and key buildings • The perimeter fence will be installed around the Site and will be monitored and maintained on a regular basis • All access gates and buildings will be locked securely outside of operational hours	Unlikely	Slight	Low
Waste Exposure	Site Users	Surface	Potential exposure of waste at the tie-in area between Cell 7 and the surrounding cells leading to health and safety risks	Possible	Moderate	Medium	• Waste operations near the tie-in area were minimised where possible • Majority of tie-in area to be cleared of material using machinery to minimise hand excavations • Use of appropriate PPE	Unlikely	Minor	Low

10 Conclusion

The construction of Cell 7 is required to continue to provide security for disposal of Class III waste at the Site. The landfill cells have been designed using the criteria within the Landfill Guidelines and will be constructed to these guidelines to minimise environmental impacts. To further reduce potential environmental impacts associated with the operation of Cell 7, Veolia will continue to implement its environmental management procedures. As determined through the Residual Risk Assessment in Section 9, the residual risk rating was determined to be 'low' to 'medium' following the implementation of management measures. Therefore, Veolia believes that the construction and operation of Cell 7 can be adequately managed in accordance with the existing Site Licence.

11 References

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Figures

APPENDIX A
Drawings

APPENDIX B

Technical Specifications

APPENDIX C
CQA Plans

APPENDIX D

Stability Risk Assessment

APPENDIX E

Landfill Gas Collection System Conceptual Layout

APPENDIX F

Leachate Water Balance Assessment

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