Attachment 9 - Category Checklist (Solid Waste Landfill Sites) Supporting Information Report -

Lancelin Waste Management Facility

Shire of Gingin

PROUDLY CELEBRATING 15 YEARS OF ADVICE

February 2024

Acknowledgements

ASK Waste Management acknowledges the Traditional Owners of the land in which we work and live, and pays respects to Elders past, present, and emerging.

ASK also gratefully acknowledges the cooperation of the Shire of Gingin staff that provided information and assistance in the development of this report.

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1 PART 1: ENVIRONMENTAL SITING

1.1 SITING CONTEXT AND BACKGROUND

1.1.1 HISTORY OF THE SITE (PAST AND CURRENT ACTIVITIES)

The Lancelin Waste Management Facility (the Facility or LWMF) provides waste disposal and recycling services to the northern population centres of the Shire of Gingin including Lancelin, Ledge Point, Nilgen, and Karakin. The estimated catchment population of the landfill is approximately 1,576 people (2022, ABS ERP). The LWMF has been operational since the early 1980s and was licenced by DWER in 2013.

The Facility is located approximately 128km from Perth in the town of Lancelin and is accessed via an unsealed road off Lancelin Road. The Facility contains a landfill, stockpile areas, a reuse shed/area, and an inactive liquid waste pond. The liquid waste pond, lined with high-density polyethylene (HDPE), was established circa 2009/2010 and is located in the southeast corner of the Site. The Shire ceased the acceptance of liquid waste in approximately 2013. The pond is fenced and dry.

1.1.2 LAND OWNERSHIP

The LWMF is located on Lot 11089 on Plan 188900 Lancelin Road, Lancelin (the Site). The Lot is a crown reserve vested in the Shire under a management order for the designated purpose of a waste disposal site.

The Site is located within a registered Indigenous Land Use Agreement (ILUA) with the Yued Aboriginal Corporation. The Yued ILUA was registered in 2018.

There is also a memorial on the title under the Contaminated Sites Act 2003, registered 18/8/2017.

1.1.3 THE LOCAL AREA AND THE LANDFILL'S SITING WITHIN THIS AREA

Lancelin is a small coastal town 128km north of Perth. The LWMF is located 2.4km southeast of the Lancelin town centre. The Site is situated 650m inland of the Indian Ocean. The Site covers an area of approximately 25 ha, with the waste management operations of the Facility occupying approximately 4 ha.

The landfill siting can be found in **Figure 1.1**.

1.1.4 SURROUNDING LAND USES

The LWMF is surrounded by native vegetation with a large sand dune system situated to the north that extends for approximately 6.4km. Two wastewater ponds operated by the Water Corporation lie 200m east of the Facility.

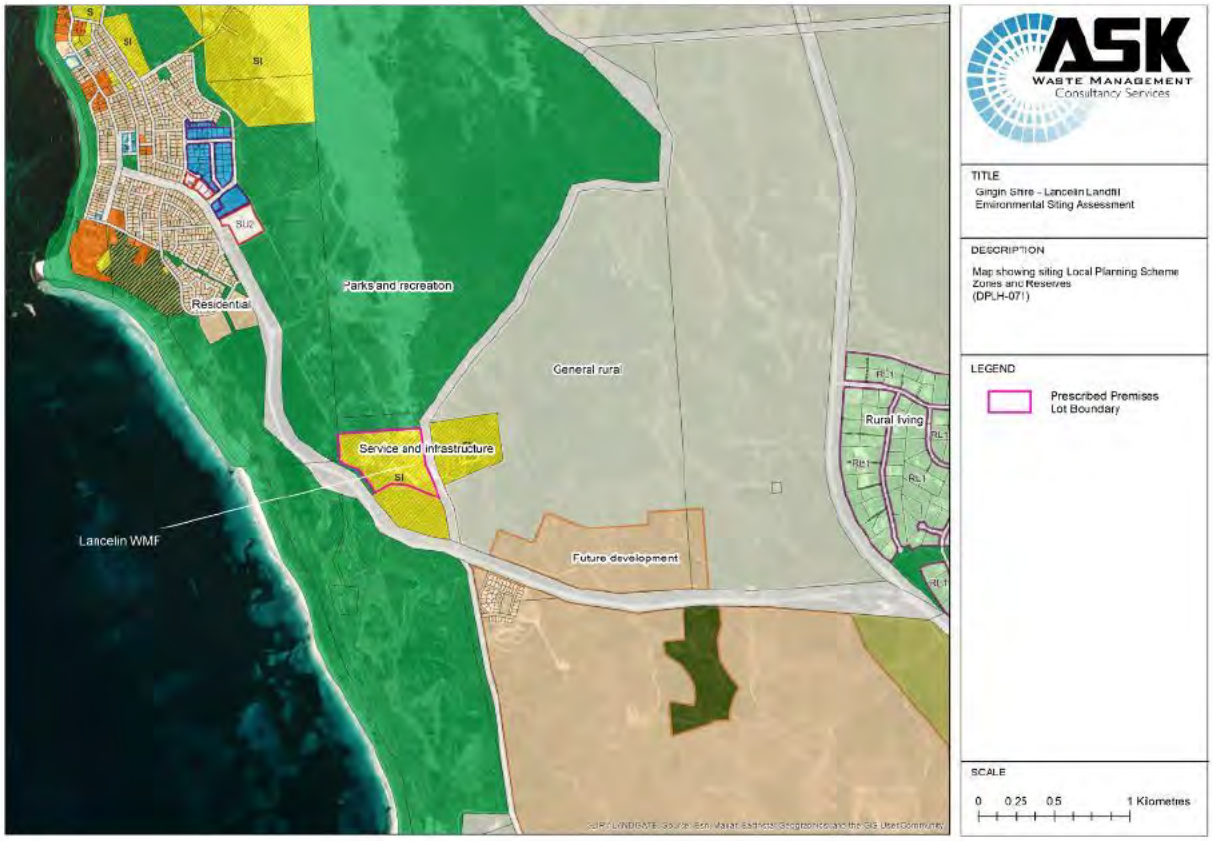
Under the Shire of Gingin Local Planning Scheme, land to the south, west, and north of the Facility is zoned Parks and Recreation. A sports and recreation area consisting of a bowling club, oval, tennis courts, and golf course is located approximately 520m southwest, with the closest point of the golf course approximately 400m from the Site boundary.

Residential properties are located 1.5km northwest of the Site, being the Lancelin townsite. A further subdivision lies 630m southeast with land around this area zoned for future development. The Karakin rural residential subdivision is located approximately 2.7km to the east. The Aglime Sand Minesite is 2.2km north of the Site.

The Shire's Local Planning Scheme Zones and Reserves surrounding the Facility are provided in **Figure 1.2**.

Figure 1.1 Siting of the Lancelin Waste Management Facility

Figure 1.2 Landuse zoning surrounding the LWMF (DPLH - 071)



1.1.5 COMMUNITY AND/OR STAKEHOLDER NEED FOR LANDFILL SITE

The Lancelin Waste Management Facility services the upper northern coastal region of the Shire of Gingin including the centres of Lancelin, Ledge Point, Nilgen, and Karakin.

Due to the large size of the Shire and the dispersed distribution of the local town centres, the Shire has three small unlined landfills each accepting less than 5,000 tonnes per annum (Lancelin, Gingin and Seabird) that have been operational for many years. Given the Shires' peri-urban location on the northern fringe of the Perth metropolitan area and the increasing number of third party landfills and recycling services located within or close to the region, in 2023, the Shire embarked on a waste reform and strategic planning project to inform future service delivery and infrastructure requirements. A preferred option has been identified to rationalise the number of Shire-owned landfills. This option incorporates the construction of 'Transfer Stations' at Lancelin WMF and the Gingin WMF to collect waste and recycling streams; and commencing the transport of waste for disposal from these Facilities to the Shire landfill in Seabird. This option will result in the closure and rehabilitation of the Gingin and Lancelin landfills.

This licence renewal application seeks to extend the licence for the LWMF for the short to medium term until the operational need for a landfill in Lancelin has been determined by Council. This decision is expected to occur in early 2024.

1.2 SENSITIVE RECEPTORS AND DESIGNATED AREAS

A high-level search of publicly available GIS datasets was undertaken to ascertain the LWMF's siting context in relation to the Department of Water and Environmental Regulation's Guidance Statement: Environmental Siting (2016) criteria. Results are shown in **Figure 1.3**.

The assessment indicates that most of the high-level environmental siting criteria have been met, except the following:

- the residential subdivision 630m southeast of the Site boundary is within the 1000m buffer as required under the DWER Odour Guideline 2019
- the Site coincides with an identified area of threatened communities
- species of threatened and priority flora have also been identified within 250 m of the site boundary.

Relevant environmental siting considerations as required within the Category Checklist (solid waste landfill sites) are discussed in the sections below.

Appendix A provides a summary of the data sets used in the assessment and lists the compliance level for each data set.

1.2.1 HUMAN RECEPTORS AND BUFFER DISTANCES

Residential properties commence 1.5km northwest of the Site within the Lancelin townsite, while another smaller subdivision is located 630m to the southeast. The rural residential subdivision of Karakin is located 2.7km to the east (see **Figure 1.1** and **Figure 1.2.**).

The Facility complies with the relevant buffer distances for sensitive land uses as specified within the WA EPA publication 'Guidance for the Assessment of Environmental Factors – Separation distances between industrial and sensitive land uses' (2005).

Table 2.2 Buffer distances (EPA, 2005)

Use	Impacts	Buffer distance
Putrescible landfill site (Class 2 & 3)	Gas, noise, dust, odour	500m (subdivisions), 150m single houses
Greenwaste processing (windrows)	Noise, dust, odour	150m

The residential subdivision 630m southeast of the Site boundary is within the 1000m separation distance as required under the DWER Odour Guideline 2019. Given the small volumes of waste accepted at the Facility and the prevailing winds directing emissions away from this subdivision (easterly winds in the morning and southwesterly winds in the afternoon), the Shire has had no complaints of odour from the Facility. Odour controls for the Facility are listed in Section **3.1.10.**

It is also noted the Facility is located within the odour buffer for the Water Corporation's Waste-Water Treatment Plant (WWTP) located to the east (Talis, 2020).

1.2.2 SURFACE WATERS

The following surface water bodies identified in proximity to the Site include:

- The Indian Ocean begins 600m west of the Site boundary
- There are two wastewater ponds owned by Water Corporation 200m to the east
- Approximately 13km east is the nationally important Karrakin wetlands
- The closest Surface Water Area as prescribed in the Rights in Water and Irrigation Act (RIWI) 1914, begins approximately 17.4km to the east of the Facility and is shown in **Figure 1.8.**

1.2.3 DEPTH TO GROUNDWATER AND POTENTIAL BENEFICIAL USES

The groundwater bores closest to the Site and the average static water levels (Water Information Reporting website) are shown in **Figure 1.4.** The bore southeast of the premises is reported as being

used for stock and domestic purposes and the bores east and southwest of the premises are used for monitoring purposes.

1.2.4 SENSITIVE FLORA AND FAUNA

As shown in **Figure 1.5** and **Figure 1.6**, the northwest corner of the Site is located within an area identified as a Critically endangered ecological community being 'Sedgelands in Holocene dune swales of the southern Swan Coastal Plain' (Threatened Ecological Communities and Priority Ecological Communities DBCA-038).

Threatened and Priority flora have also been recorded within 250m of the southeast corner of the prescribed premises boundary (**Figure 1.6**). These are listed as:

- Hibbertia leptotheca
- Constylis pauciflora subsp.euryhipis
- Stylidium maritimum

Figure 1.3 DWER Environmental Siting criteria locations in relation to the Lancelin Waste Management Facility

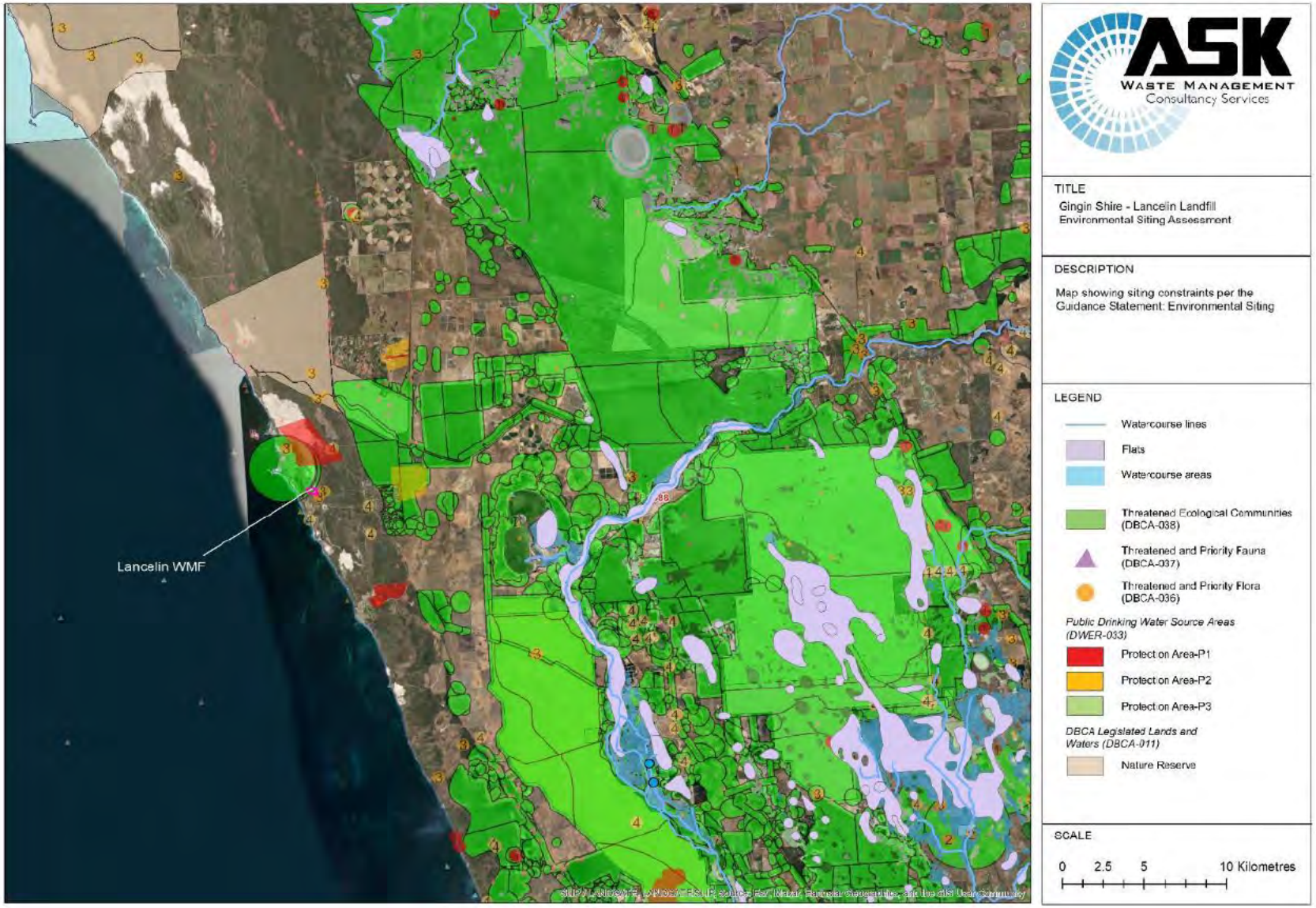


Figure 1.4 Water bore locations in relation to the LWMF (Water Information Reporting website)

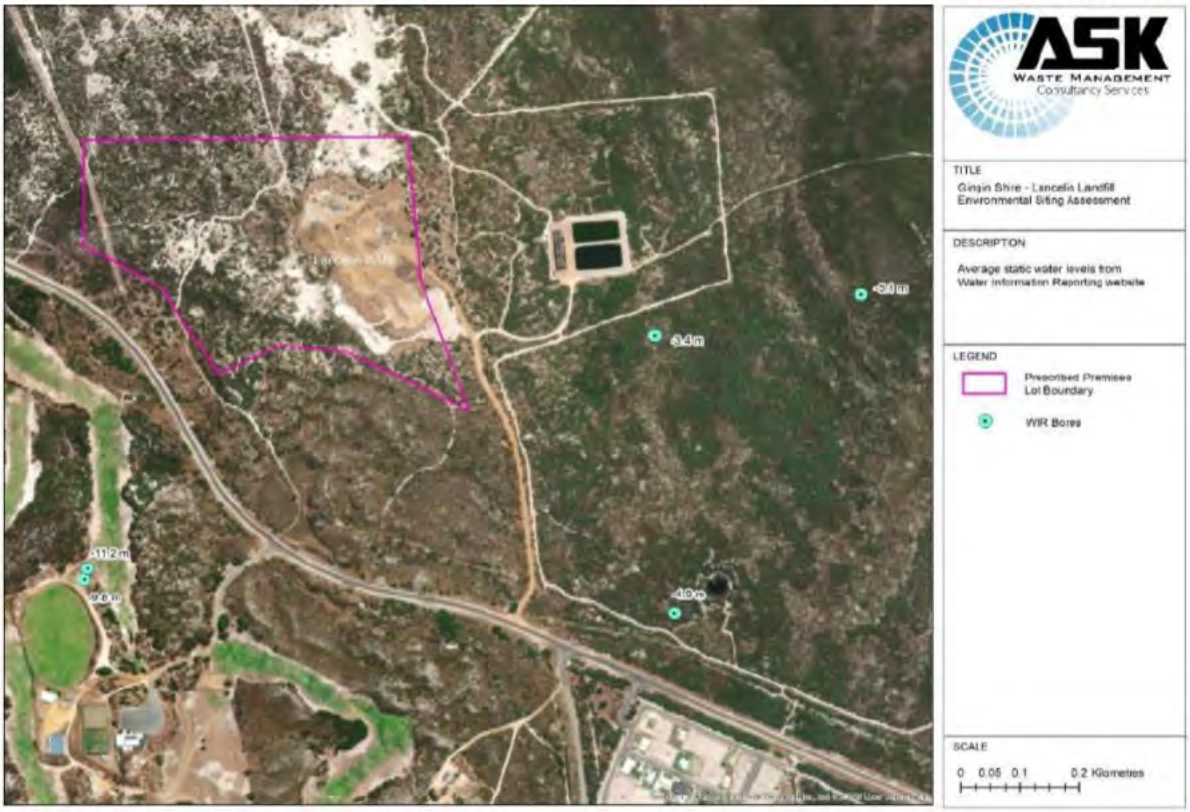


Figure 1.5 Proximity of the LWMF to threatened ecological communities, priority fauna, and priority flora (DBCA 036, 037 & 038)

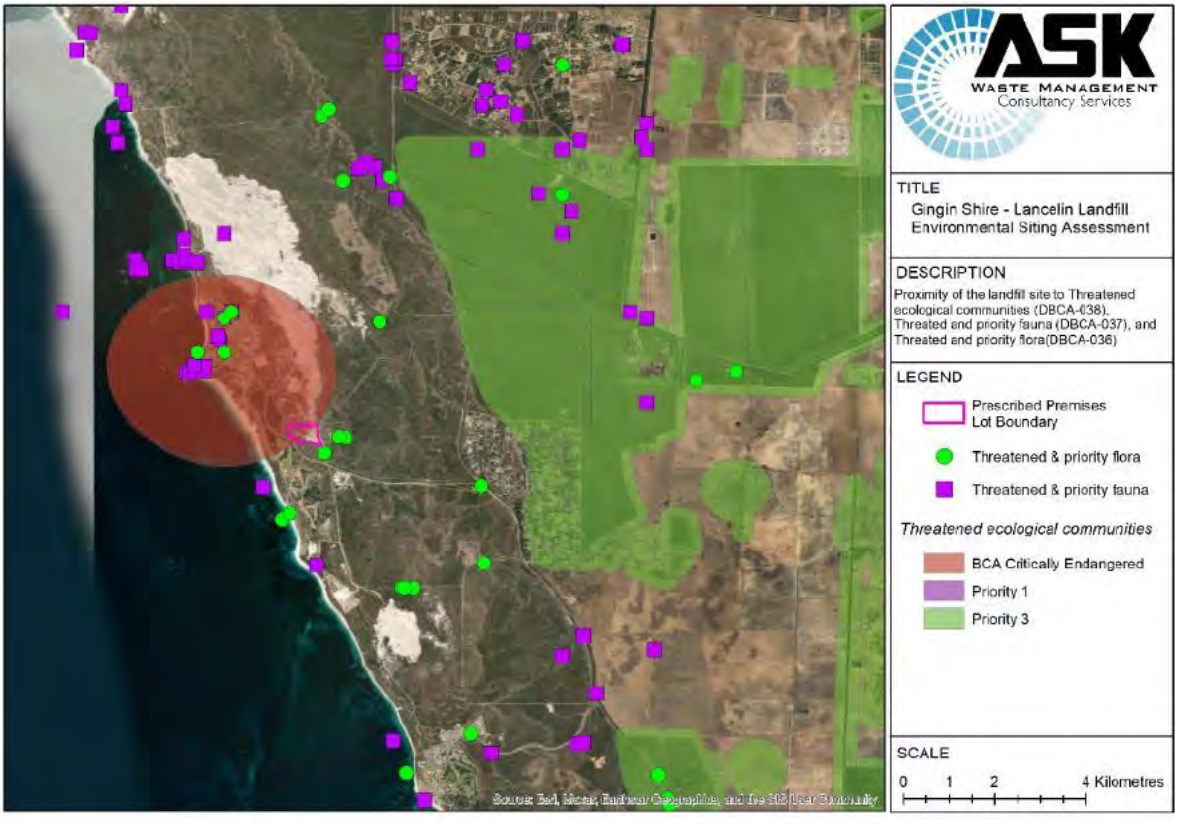
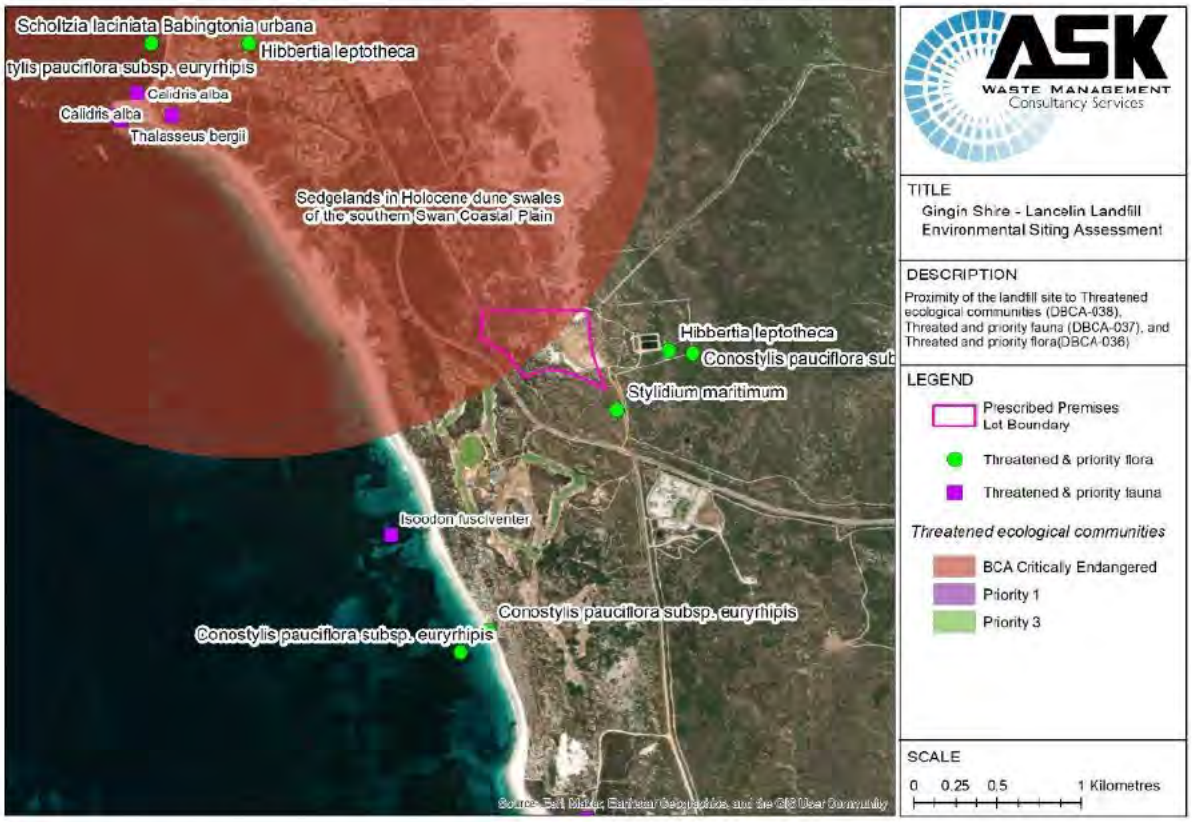


Figure 1.6 Proximity of the LWMF to threatened ecological communities, priority fauna, and priority flora (DBCA 036, 037 & 038)



1.2.5 DESIGNATED AREAS

Designated areas are defined by section 57 of the Environmental Protection Act 1986 and comprise water source areas proclaimed under the Rights in Water and Irrigation Act (RIWI) 1914, and Public Drinking Water Source Areas proclaimed under the Country Areas Water Supply Act 1947 and Metropolitan Water Supply, Sewerage, and Drainage Act 1909.

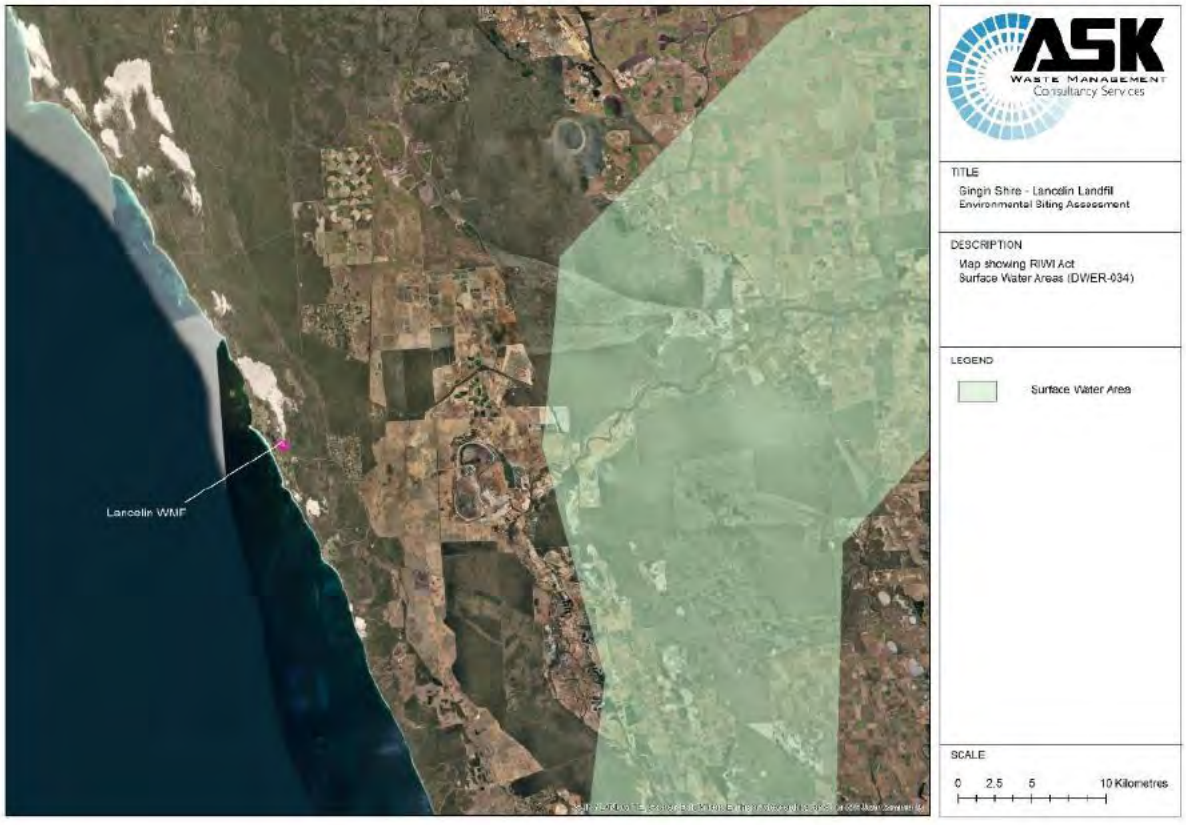
The Site is not located within a Public Drinking Water Source area. The Lancelin Water Reserve, a P1 Public Drinking Water Source area, begins 1.4km north of the Site, and another, the P2 Seaview Park Water Reserve, begins 4.5km to the east of the Site as shown in **Figure 1.3**.

The Site is located within a proclaimed groundwater area under the Rights in Water and Irrigation (RIWI) Act 1914 that is currently under review, as shown in **Figure 1.7.**

The closest Surface Water Area as prescribed in the RIWI Act, begins approximately 17.4km to the east of the Facility and is shown in **Figure 1.8**.

Figure 1.7 Map showing RIWI Act Groundwater areas in relation to the Facility (DWER -034)

Figure 1.8 Map showing RIWI Act Surface water areas in relation to the Facility (DWER-034)



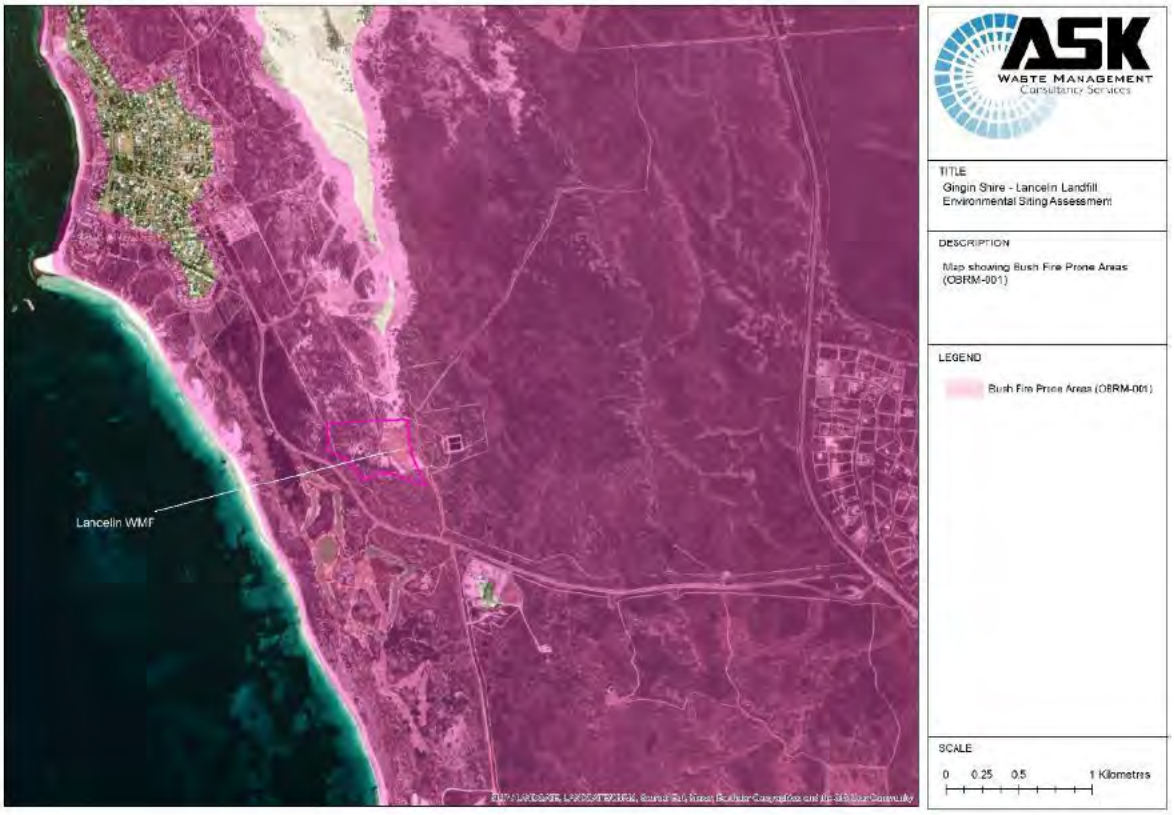
1.2.6 REGIONAL AND LOCAL CATCHMENT CHARACTERISTICS

See **Section 1.4.**

1.2.7 ADDITIONAL SITING INFORMATION

The Facility is located in a Bush Fire Prone area as shown in **Figure 1.9.**

Figure 1.9 Bushfire prone areas (OBRM – 001)



1.3 LOCAL CLIMATE AND METEOROLOGICAL DATA

1.3.1 CLIMATE

The climate in Lancelin is described by the Bureau of Meteorology (BoM) as Mediterranean with hot, dry summers and mild, wet conditions during winter. Climate data collected by the BoM, from the Gingin Aero weather station between 1996 and 2023 is shown in **Table 1.1.** This data shows that on average the monthly rainfall is 23.2mm, with most annual rainfall occurring in the winter months. The annual mean maximum temperature is 25.7 degrees with temperatures highest in January and February.

1.3.2 WIND CONDITIONS

The annual average Wind Rose charts for Gingin Aero from the BoM are shown in **Figure 1.10** Wind Rose data from Gingin Aero weather station (1996 - 2023) (BoM, 2023). These charts indicate that the Shire predominately receives an easterly wind in the morning and the afternoons typically see a southwesterly wind. Winds are strongest during the hotter months of December and January and weaker during the cooler months of June and July.

Figure 1.10 Wind Rose data from Gingin Aero weather station (1996 - 2023) (BoM, 2023)

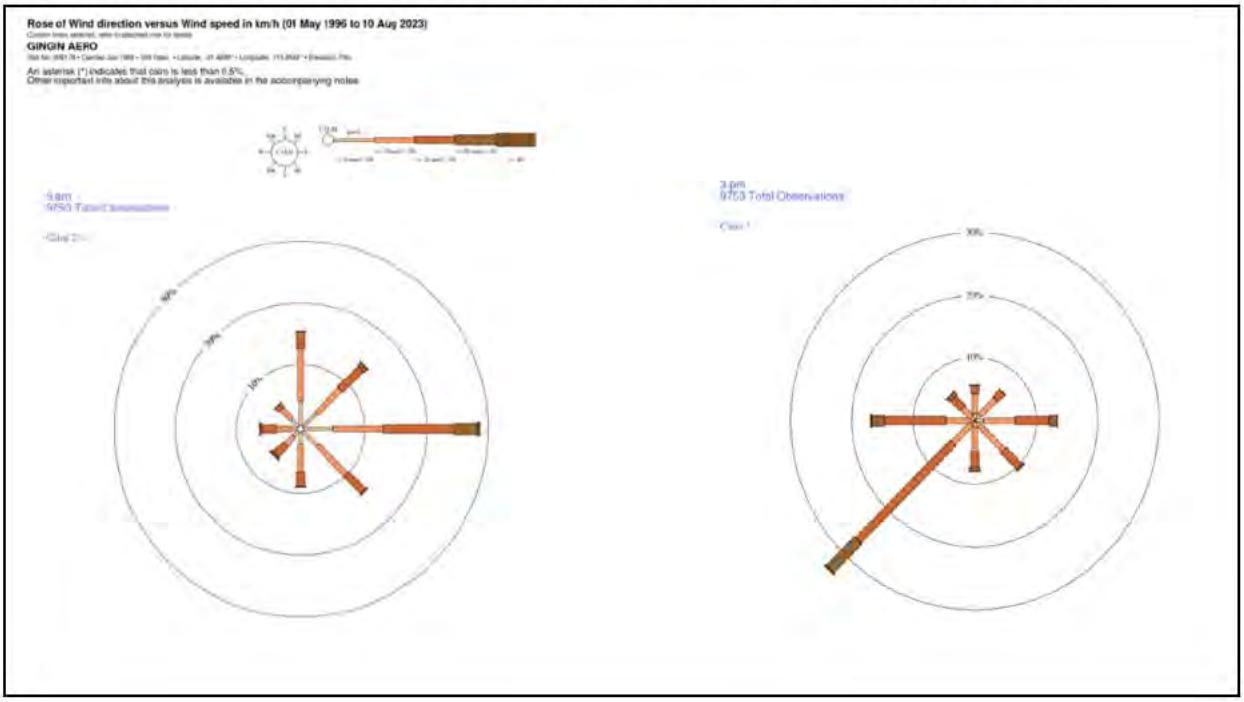


Table 1.1 Monthly climate statistics from the Gingin Aero weather station (Data from BoM, 2023)

Statistic Element	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Start Year	End Year
TEMPERATURE															
Mean maximum temperature (°C)	33.2	33.2	30.8	26.6	22.7	19.6	18.4	19.1	20.9	24.4	28.2	31.0	25.7	1996	2023
Mean minimum temperature (°C)	16.5	17.0	15.4	12.0	8.9	7.2	6.5	6.5	7.5	9.2	12.0	14.5	11.1	1996	2023
RAINFALL															
Mean rainfall (mm)	14.5	14.4	18.8	27.8	72.5	110.0	126.0	107.9	74.9	33.7	18.9	9.2	633.8	1996	2023
Decile 5 (median) monthly rainfall (mm)	1.2	2.5	12.0	25.3	70.0	113.0	117.6	116.0	78.4	29.2	14.2	3.5	605.5	1996	2023
Mean number of days of rain	2.1	2.0	4.0	6.2	10.4	13.5	16.7	14.6	13.8	8.3	4.9	3.1	99.4	1996	2023
Mean number of days of rain >= 1 mm	1.1	1.3	2.6	4.3	8.6	10.4	13.8	11.6	9.9	5.3	3.3	1.9	74.0	1996	2023
Mean number of days of rain >= 10 mm	0.4	0.3	0.5	0.9	2.6	4.1	4.7	4.0	2.5	1.1	0.6	0.2	21.9	1996	2023
Mean number of days of rain >= 25 mm	0.1	0.2	0.2	0.1	0.6	0.9	0.9	0.8	0.3	0.1	0.0	0.0	4.2	1996	2023
SOLAR EXPOSURE															
Mean daily solar exposure (MJ/m2)	28.9	25.7	21.0	15.3	11.5	9.6	10.1	13.1	17.0	22.7	26.7	29.5	19.3	1990	2017
Mean number of clear days	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean number of cloudy days	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9AM CONDITIONS															
Mean 9am temperature (°C)	24.2	24.0	22.1	19.3	16.2	13.1	12.0	12.8	15.1	17.9	21.1	22.9	18.4	1996	2010
Mean 9am relative humidity (%)	48	51	55	65	71	78	80	77	69	59	51	48	63	1996	2010
Mean 9am wind speed (km/h)	20.9	20.7	19.8	16.0	13.4	12.4	12.5	13.7	16.6	18.4	19.2	20.2	17.0	1996	2010
3PM CONDITIONS															
Mean 3pm temperature (°C)	30.8	31.0	29.0	25.0	21.9	18.5	17.1	17.6	18.9	22.1	25.6	28.2	23.8	1996	2010
Mean 3pm relative humidity (%)	33	33	35	43	49	56	58	55	53	46	39	35	45	1996	2010
Mean 3pm wind speed (km/h)	25.5	24.3	22.4	20.0	16.9	17.8	17.9	19.2	22.2	22.9	24.5	25.9	21.6	1996	2010

1.4 TOPOGRAPHY, GEOLOGY, AND HYDROGEOLOGY

1.4.1 SURFACE ELEVATION AND TOPOGRAPHY

The Site is situated on the Swan Coastal Plain in a low-lying, gently undulating area between the Indian Ocean and the Gingin Scarp. The Site is located within a coastal dune system, which runs north – south through the middle of the Site with a slightly increasing gradient to the south. The Facility sits at an approximate elevation of 11m, surrounded by coastal dunes to the north, south, and west of the Site each at an approximate elevation of 15m, 14m, and 16m respectively. The Site and surrounding elevation are shown in **Figure 1.11**.

Figure 1.11 Topographic map of the Facility and surrounds (Topographic Map, 2023)

1.4.2 PHYSIOGRAPHY AND DRAINAGE

The landscape is influenced by the underlying geology of the Northern Perth Basin. At the regional scale, it mostly slopes westward and is drained by westerly-flowing watercourses. There are four dominant physiographic units: Swan Coastal Plain, Arrowsmith Region, Dandaragan Plateau, and Yarra Yarra Region as shown in **Figure 1.12**.

The Site lies on the Swan Coastal Plain in an area which is bounded to the east by the Gingin Scarp. The scarp was formed by marine erosion and separates the coastal plain from the Dandaragan Plateau in the southeast and the Arrowsmith Region in the northeast (HydroConcept, 2015).

A geological and hydrological assessment of the region by Kern in 1987 indicates the coastal plain is a low-lying, gently undulating area covered by Holocene and Pleistocene coastal dunes and shoreline deposits, with belts of alluvium and colluvium along the foot of the Gingin Scarp. The coastal plain may be subdivided into two main geomorphic units; the Coastal Belt and the Bassendean Dunes. The Coastal Belt consists of Quaternary shoreline deposits and the Quindalup and Spearwood Dunes. The Quindalup Dunes are composed of the Safety Bay Sand, which forms both stabilized and mobile dunes up to 150 m high. These overlap the Spearwood Dunes, which consist largely of lithified Pleistocene eolianite with leached quartz sand (Tamala Limestone) and form linear ridges rising to 164 m AHD and a low limestone plateau. The Bassendean Dunes occur in a zone about 15 km wide between the Coastal Belt and the Gingin Scarp. They consist of a belt

of low dunes of leached quartz sand (Bassendean Sand) with numerous interdunal lakes and seasonal swamps.

The area is drained by watercourses originating on the Dandaragan Plateau and Arrowsmith Region. All except the Moore River are seasonal streams terminating in large swamps or lakes in the Bassendean Dunes. Surface drainage is absent in the Coastal Belt (Kern, 1987).

Figure 1.12 Physiography of the Lancelin region (Rutherford et al 2005 as cited in HydroConcept 2015)

1.4.3 REGIONAL AND LOCAL GEOLOGY AND SOILS

The geology of the Lancelin area is shown in **Figure 1.13** and indicates that the Facility is classed as quaternary, siliciclastic/undifferentiated siltstone and sandstone with calcareous sediments. The bedrock geology of the area is classed as chalk, greensand, glauconitic sandstone, siltstone, and marl (DMIRS, 2023). The regolith geology of the Facility is categorised as carbonate-rich clay, silt, and sand in coastal deposits, while the dominant soil groups consist of calcareous sands (DMIRS, 2023).

Figure 1.13 Geological map of the Facility and surrounds (SH50-14 and part SH50-13)

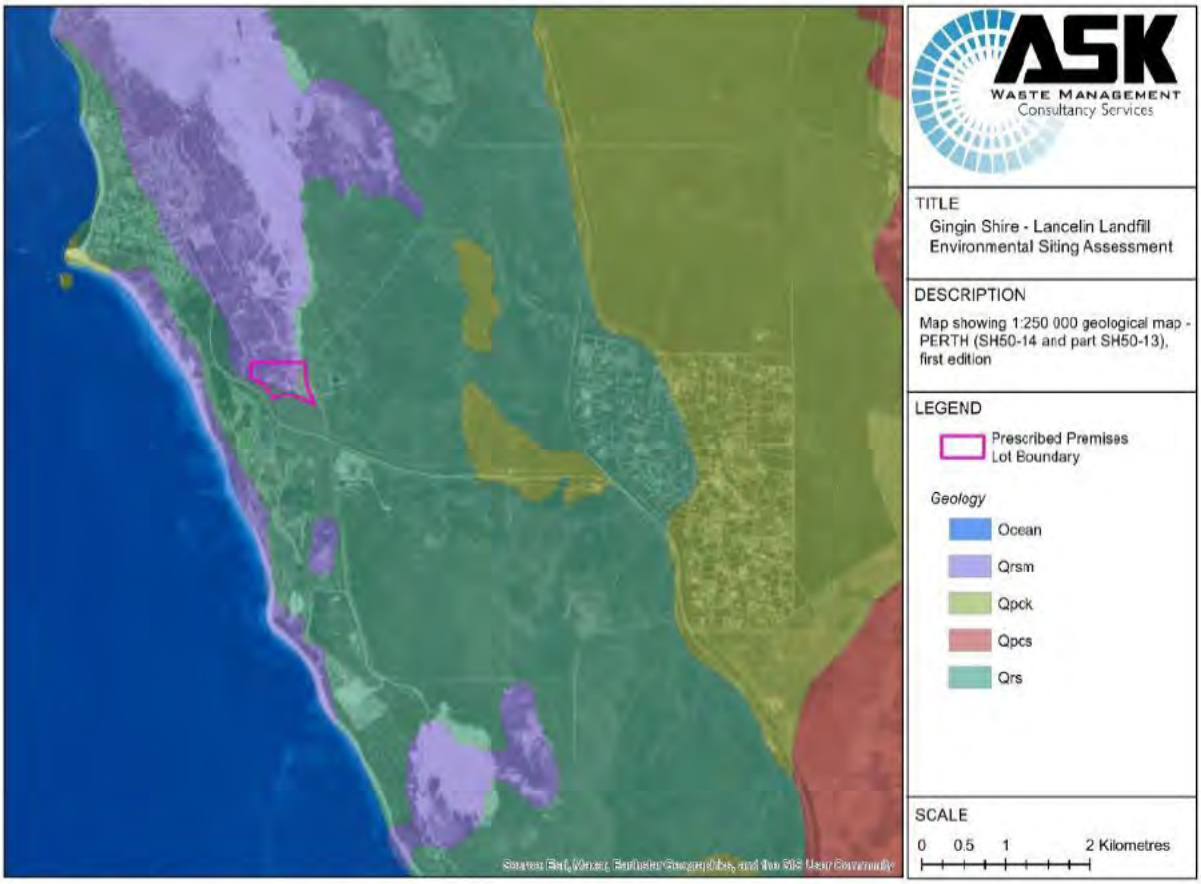
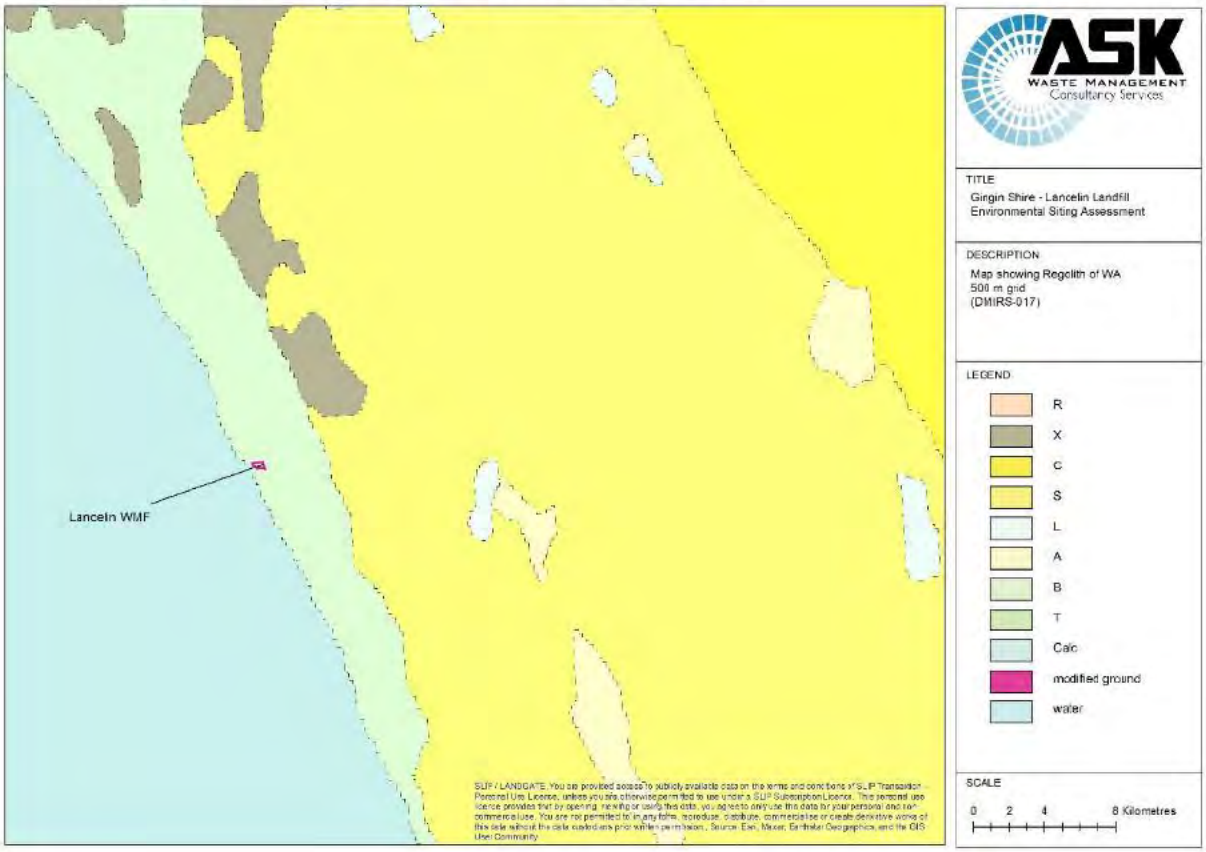


Figure 1.14 Regolith of Western Australia 500m grid (DMIRS-017)



LEGEND: Classification of Regolith Units (GSWA regolith classification scheme)	
	R - Residual or relict material; includes ferruginous, siliceous, and calcareous duricrust
	X - Exposed rock, saprolite, and saprock
	C - Slope deposits; including colluvium and sheetwash
	S - Sandplain, mainly eolian; includes some residual deposits
	L - Lacustrine deposits; include lakes, playas, and fringing dunes
	A - Alluvium in drainage channels, floodplains, and deltas
	B - Coastal deposits; including beaches and coastal dunes
	T - Coastal areas subject to significant tidal ranges; including tidal flats and tidal channels
	Calc - Calcrete; includes massive, nodular and sheet-like accumulations of carbonate
	Modified ground - includes opencut, mullock, slime dumps, tailings, crushed rock, stockpile, made ground, and evaporation ponds
	Water

1.4.4 REGIONAL AND LOCAL HYDROGEOLOGY

As shown in **Figure 1.15,** Lancelin is situated within the northern Perth basin of the Coastal Plain hydrological zone. The hydrogeology of the plain is dominated by unconsolidated sediments and limestone over sedimentary rocks. The Perth Basin sediments range from highly permeable to impermeable. Many of the surficial deposits in the hydrological zone are highly permeable sands (DoW, 2015).

Figure 1.15 Map showing the Hydrological zone of the LWMF (DPIRD – 069)

The hydrogeology of the site at increasing depths consists of the Superficial, Leederville, and Yarragadee Aquifers. Aquifer subareas are shown in **Figure 1.16** (DoW, 2015).

The thickness of the superficial aquifer in Lancelin is generally around 25m and is predominantly recharged by direct rainfall infiltration from the overlying soil of permeable sand and limestone

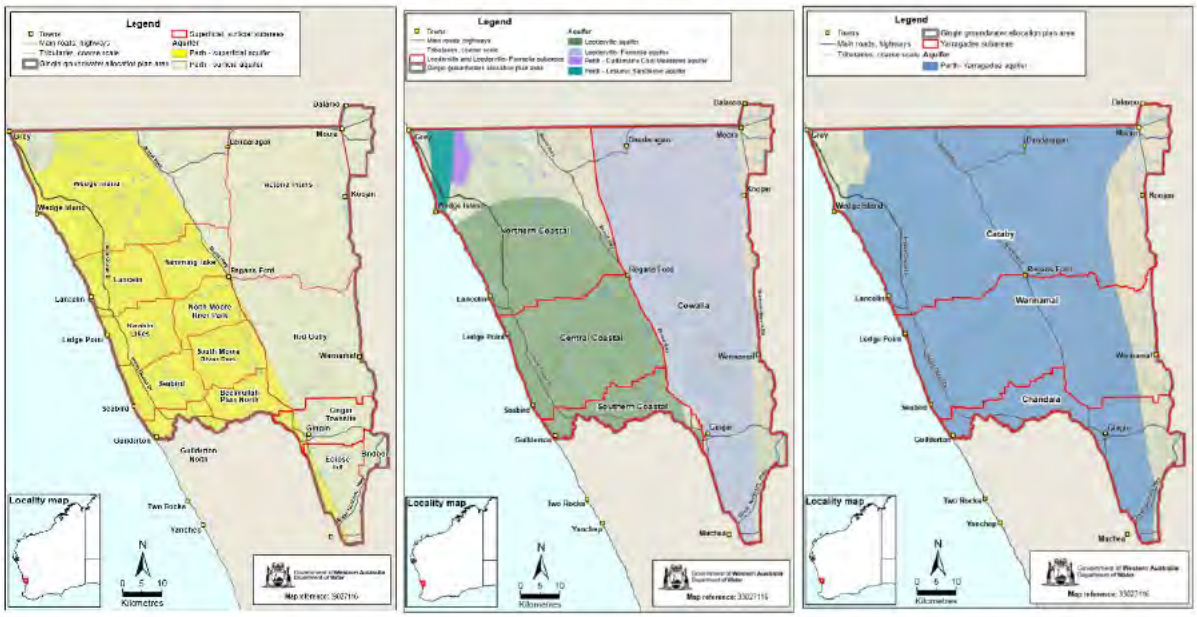
during winter and early spring. It is also recharged from upward groundwater flow from other underlying aquifers (Kern, 1987).

HydroConcept (2015) notes that the Superficial aquifer consists of predominantly alluvial, shallow marine, and aeolian sequences that parallel the coastline. The Superficial aquifer is unconfined and multilayered and stretches across most of the Swan Coastal Plain between the Gingin scarp and the Indian Ocean. The sediments range from predominantly clayey (Guildford Clay) in the east adjacent to the Gingin Scarp through a sandy succession (Bassendean Sand) in the central coastal plain area, to sand and limestone (Tamala Limestone) within the coastal belt.

According to DoW (2015), the Superficial aquifer is extensive and shallow (sand, gravel, clay); and is unconfined with a saturated thickness of up to 50m. The quality is reported as generally fresh (<100mg/L Total Dissolved Solids). This aquifer is used for the town's water supply.

The superficial Aquifer is underlain by the deeper and older Leederville and Yarragadee aquifers, both of which are semi-confined to confined aquifers according to DoW (2015).

Figure 1.16 Aquifer subareas around Lancelin (DoW, 2015)



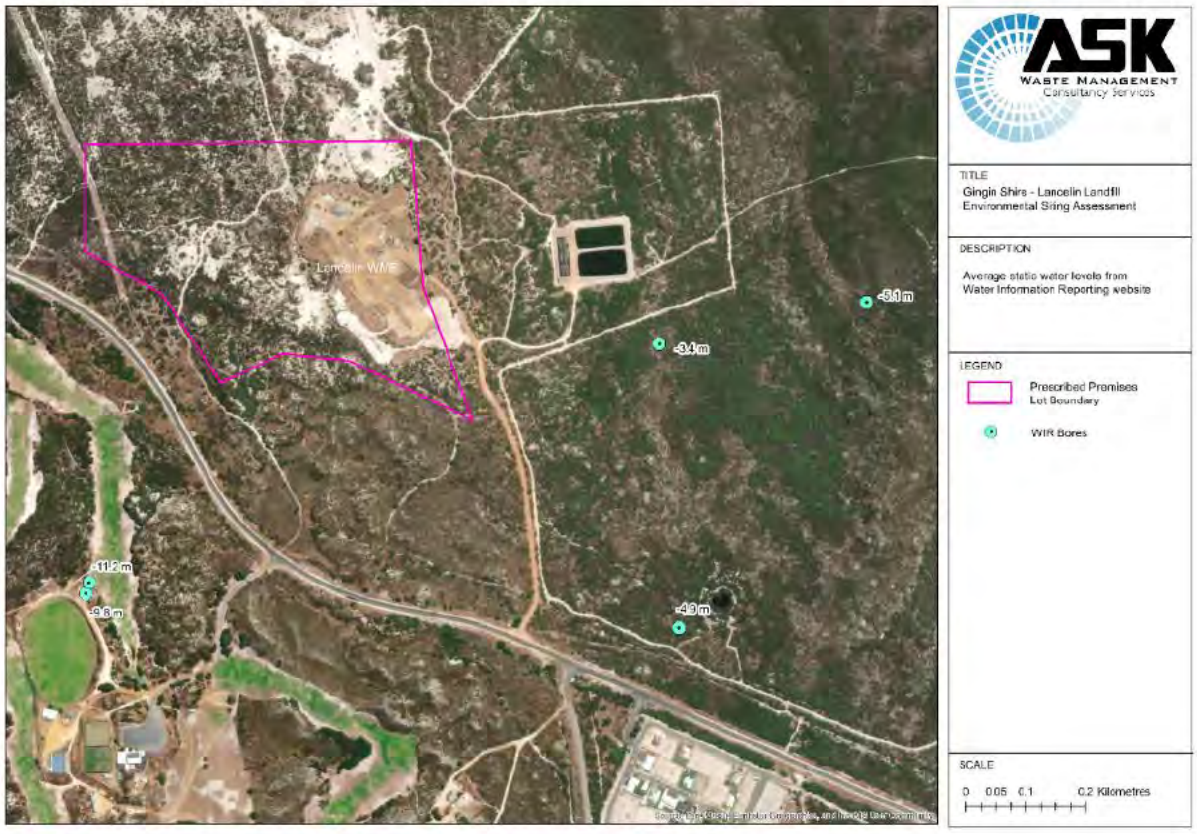
1.4.5 GROUNDWATER FLOW DIRECTION AND DEPTH

The watertable in the region slopes westwards from the Gingin Scarp toward the sea where groundwater discharge occurs. The watertable contours are sub-parallel to the coast and the predominant flow directions are to the west and southwest (Kern, 1987).

In the Lancelin area, the depth to the water table generally ranges from 2.5m to 6m below ground level, however, it can vary depending on topographic depressions in the landscape, around coastal lakes, and beneath large sand dunes and limestone ridges which can sometimes see a depth of greater than 50m (Water and Rivers Commission, 1997).

There are no groundwater monitoring bores on the Site. Depth to groundwater is assumed based on five groundwater bores close to the Site that are owned by Water Corporation and the Department of Water. These are shown in **Figure 1.17**, along with the bores' average static water levels. The bores east of the Site have average static water levels of 3.4m and 5.1m, while the bore southeast measures 4.9m and the two bores to the southwest have average levels of 9.8m and 11.2m.

Figure 1.17 Water bores and average static water levels (DOW Water Information Reporting website)



1.4.6 GROUNDWATER QUALITY AND CURRENT OR FUTURE USE

There are no groundwater monitoring bores on the Site, hence the groundwater quality is unknown.

1.4.7 GROUNDWATER AQUIFER CHARACTERISTICS

See **Section 1.4.4**.

1.4.8 DESCRIPTION OF GEOLOGICAL PROCESSES

See **Section 1.4.2** and **Section 1.4.3**.

2 PART 2: LANDFILL DESIGN OVERVIEW

2.1 PART 2A: 2.1 LANDFILL DESIGN CONCEPT

2.1.1 LANDFILL TYPE AND DESIGN CONCEPT

The LWMF accepts and processes wastes for disposal and/or recycling from municipal and commercial sources. It is an unlined Class II putrescible landfill accepting less than 5,000 tonnes per annum. The total area of the Site is approximately 25 ha, with the Facility operations occupying approximately 4 ha. The approximate area occupied by historic and current waste disposal is 3 hectares.

The Facility has been operational for many years. Landfill cells are developed on a cell-by-cell approach. Historical landfilling mostly occurred on an ad hoc basis, initially within depressions/valleys on the site, filling up to the surrounding ground level; and more recently above-ground waste cells. The Facility is constrained on the northern, southern, and eastern sides by the Site boundary, and on the western side by a steep sand ridge. The Shire does not intend to extend the landfill to the west and wishes to maintain the sand ridge as it provides effective screening and protection of the landfill operations from westerly winds. An LCMP and final landform has not been developed for the Facility, and as such the remaining airspace is unknown.

The anticipated lifespan for the landfill will be dependent on the Shire's desired future use for the Site. As discussed in **Section 1.1.5**, the Shire is undertaking a waste reform project and investigating the potential to streamline its landfill assets. The Shire's preferred option is to close the Lancelin landfill within five years. A Transfer Station is proposed to be constructed to collect waste and recycling streams. Waste for disposal will be transported to the Shire landfill in Seabird. The outcome of this decision is expected to occur in early - mid 2024. An LCMP will be subsequently developed to guide a suitable final landform and progressive rehabilitation and closure requirements in line with the Shire's long term requirements for the Site.

Given the small volumes of waste accepted at the Facility, and in line with previous licence requirements, the landfill cells are unlined. As a result, there is no leachate collection. Leachate generation is managed through effective operational site practices including:

- the construction of a bund around active cells to limit the ingress of surface water flows
- only operating one active landfill tipping area with a maximum linear length of 30 meters and vertical height of 2 meters
- Regularly covering waste

Surface water is managed to minimise the generation of leachate. Surface water is diverted away from the landfill cell and waste stockpile areas through the use of bunds constructed from insitu material to limit the ingress of surface water flows. However, given the permeability of the sandy soils on-site, surface water drainage ensures water does not tend to pool or flow on-site.

2.1.2 WASTE TYPES FOR DISPOSAL

The waste types proposed to be collected and/or disposed on-site are outlined in **Section 3.1.5** and include Putrescible waste, Special Waste Type 1, Greenwaste, Inert Waste Type 1, Contaminated solid waste, Inert Waste Type 2, Hazardous waste, and other recyclables.

2.1.3 SITE INFRASTRUCTURE AND EQUIPMENT

A list of all items of infrastructure and equipment within the Facility, relevant to this application, is provided in **Table 2.1**. The table lists the relevant prescribed premises category that the infrastructure relates to and provides a reference to the site plan layout which is provided in **Figure 2.2.**

Table 2.1 LWMF infrastructure and equipment

Infrastructure and equipment	Prescribed Premises	Site plan reference
Site office and Gatehouse	All	Gatehouse
Greenwaste stockpile area (domestic & commercial) 3 sided bunded stockpile area to store greenwaste	62	Green waste stockpile
Scrap metal stockpile area 3 sided bunded stockpile area to store scrap metal	62	Scrap metal stockpile Whitegoods
C&D stockpile area Stored on insitu hardstand	62/64	C&D stockpiles
Tyre storage area Stored on insitu hardstand	62	Tyre store
Cardboard and glass bins Caged containers on in situ hardstand	62	Cardboard Bins
Landfill cells Unlined landfill cells	64	Active landfill area
Asbestos burial cells Unlined landfill cell	64	Asbestos burial
Waste oil collection facility Enclosed oil collection facility	62	Waste oil collection
Drummuster compound Fenced compound for triple rinsed containers	62	Drummuster
Vehicle batteries storage Stored on pallets on insitu hardstand	62	E-waste and batteries
E-waste storage Stored in a caged container on insitu hardstand	62	E-waste and batteries
Fluorescent globes storage Stored in 240L MGB on insitu hardstand	62	Tip shop
Facility Access Road	All	Access Road

2.2 PART 2A: 2.3 PREMISE MAP AND SITE LAYOUT PLAN

A map providing an overview of the Facility including the Prescribed premise boundary and the Facility operational area is provided in **Figure 2.1**. A Facility layout plan is provided in **Figure 2.2**

Figure 2.1 Overview of the LWMF operational layout

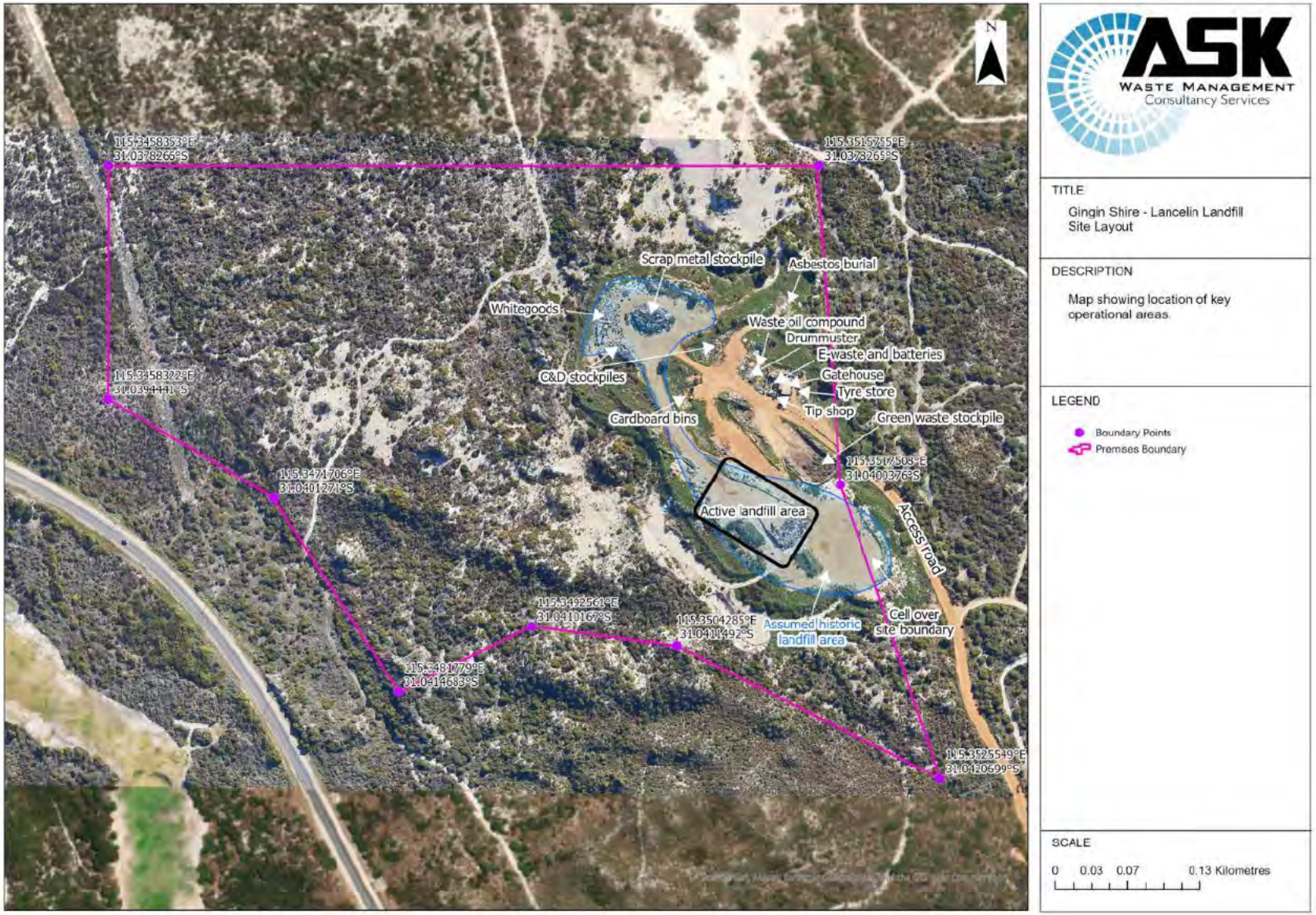
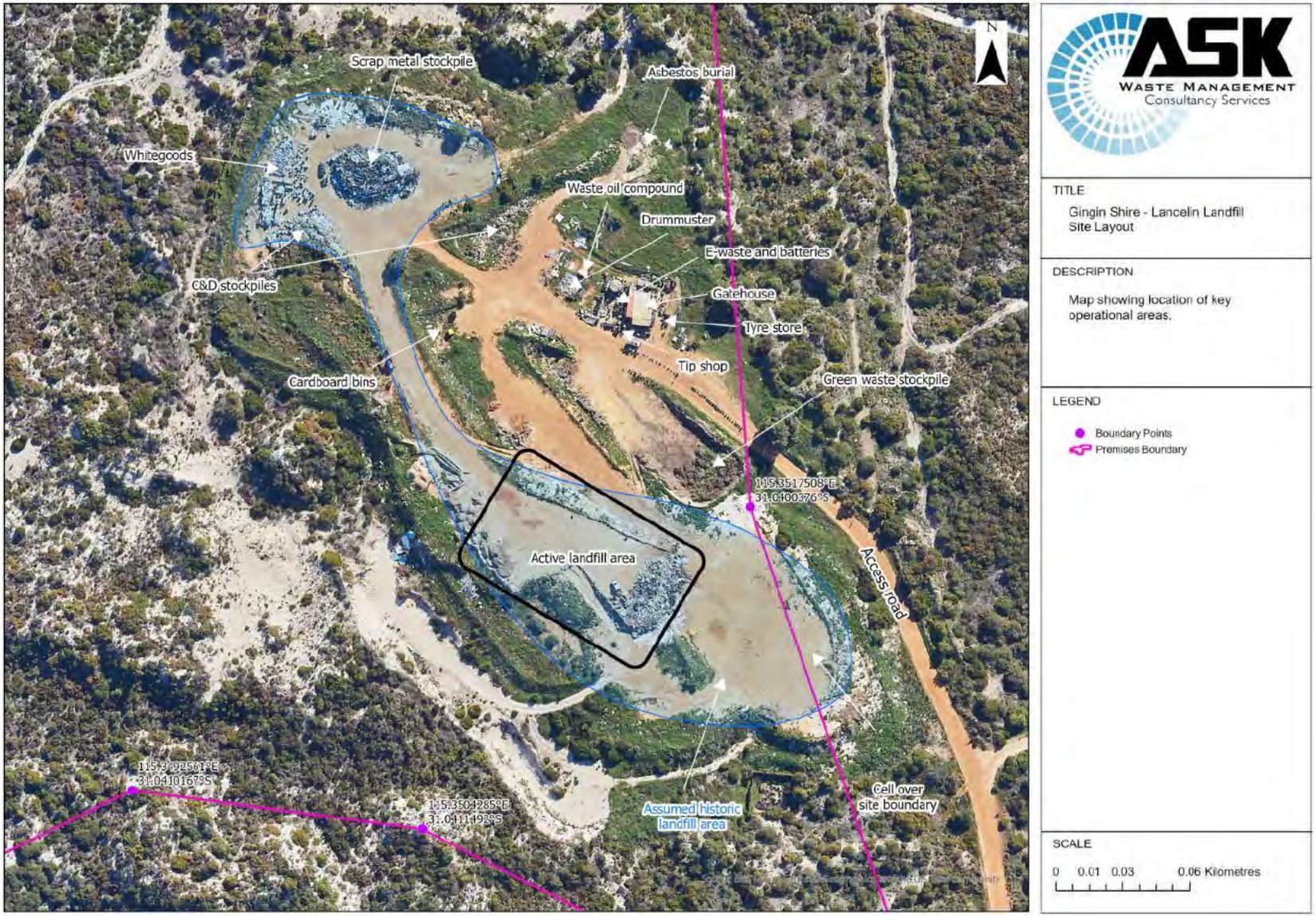


Figure 2.2 Facility Layout Plan (detail)



2.3 PART 2E: 2.16 GAS MANAGEMENT SYSTEM

The Facility currently has no gas management infrastructure. Given active landfilling is currently occurring, the formation of landfill gas (LFG) is likely to continue for some years. However, considering the low annual volumes of putrescible waste landfilled and the sandy site soils, LFG emissions are expected to be small in volume, diffuse, and relatively uniform. These factors should ensure emissions are rapidly dispersed and oxidised reducing risks to site users and workers.

LFG emissions from landfill operations will however pose climate risks. Progressive capping will assist in minimising emissions, however, given the time delay between finishing an area and capping, emissions are still expected to occur.

The following operational measures will be implemented to reduce the risk associated with LFG generation and minimise emissions:

- Facility staff will be trained on the health and safety risks posed by LFG emission and migration
- Where possible, organic matter should be included with soil used for daily cover to facilitate oxidising conditions for the breakdown of methane
- Greenwaste will be mulched and/or burned on-site to eliminate any additional LFG production from biodegradation of this waste stream in the landfill
- Surface water will be managed to reduce the generation of leachate within the waste mass, which in turn will limit LFG generation
- A risk evaluation for LFG accumulation will be undertaken for all existing and new structures located at the Facility
- Buffers will be maintained from buildings and structures to minimise the risk of off-site migration of LFG.

As part of the development of the LCMP for the Facility, LFG generation modelling will be undertaken and a landfill gas management system proposed. Given the low annual volumes landfilled on-site, it is expected that a passive system will be appropriate for the Facility.

2.4 PART 2F: 2.18 SURFACE WATER MANAGEMENT

Surface waste will be managed to reduce the environmental risks associated with the infiltration of surface water into the waste mass and to minimise the production of leachate.

Operationally, surface water is diverted away from the landfill cell and waste stockpile areas through the use of bunds constructed from insitu material to limit the ingress of surface water flows. Undisturbed and rehabilitated / revegetated areas will be maintained as filters for sediment from disturbed sub-catchments. Given the permeability of the sandy soils on-site, however, surface water drainage ensures water does not tend to pool or flow on-site.

As part of the development of the LCMP for the Facility, a surface water management system will be developed. The key features will include:

- Implementation of a best practice capping system over the landfill
- Development of a perimeter drainage system along the toe of the landfill to collect stormwater
- Incorporation of measures into the capping system to direct surface water from the landfill cap to the stormwater drains such as contour drains and drainage chutes
- The final slopes of the landfill will be developed to minimise rainfall from infiltrating through the body of waste.

2.5 PART 2G: 2.22 GROUNDWATER AND SURFACE WATER MONITORING

The Shire has not previously been required to install any groundwater monitoring bores on the Site. As such no groundwater monitoring has been undertaken and the groundwater conditions beneath the landfill are unknown.

As part of the development of the LCMP for the Facility, the proposed post-closure groundwater monitoring requirements will be provided.

3 PART 3: PREMISES OPERATION

3.1 LANDFILL MANAGEMENT OPERATIONS

This section outlines the operational management aspects undertaken at the Facility to minimise amenity and environmental impacts upon surrounding receptors.

3.1.1 OPERATIONAL HOURS OF THE FACILITY

The operational hours of the Facility are Thursday to Monday from 8.30 – 5:30pm.

The Facility is staffed at all times while open to the public.

3.1.2 SECURITY FENCING AND SITE ACCESS

3.1.2.1 Site Access

The Facility is accessed from the eastern boundary of the Site via an unsealed limestone road off Lancelin Road. Vehicles pass through an entrance gate at the Facility and immediately come to the gatehouse.

3.1.2.2 Facility Entrance and Gatehouse

The entrance is located towards the eastern boundary of the Facility (see **Figure 2.2**). It is comprised of lockable entrance gates, a gatehouse building, a tip shop, signage, and staff amenities. Customers are required to stop at the gatehouse so that the gatehouse attendant can inspect loads.

3.1.2.3 Entrance Sign

A sign is provided at the Facility entrance which displays the following:

- Hours of operation
- Contact telephone number for information and complaints or notification of fires
- A list of materials accepted on the premises
- A warning, indicating penalties for people lighting fires

Figure 3.1 Facility entrance signage

3.1.2.4 Fencing

The Facility is currently unfenced. The Shire is currently assessing its options to rectify this. Parts of the Facility were previously fenced, however due to the shifting nature of the sand dune system surrounding the Facility, much of the fencing has been buried under sand.

3.1.3 INTERNAL TRAFFIC CONTROL

To facilitate the safe and efficient movement of vehicles, appropriate traffic control signage is installed, maintained, and updated as necessary. This includes the following:

- Facility speed limits
- Give way and stop signs
- Traffic directions
- Public access prohibited signs

3.1.4 WEIGHBRIDGE AND WASTE ACCEPTANCE

There is no weighbridge at the Facility. Waste loads are volumetrically assessed by Gatehouse staff. On arrival of a vehicle carrying a load of waste at the Facility gatehouse, waste acceptance procedures undertaken are as follows:

1. The vehicle is stopped and gatehouse staff verbally and visually inspect the load of waste to determine the waste types present.
2. The waste types identified are cross-checked against those acceptable under the Facility's EPL.
3. If a load of waste contains materials that cannot be accepted at the Facility, the load is refused and redirected to an appropriate Facility (Tamala Park or Red Hill).
4. If the waste load is deemed acceptable for disposal at the Facility, the Gatehouse Attendant records the following information with the gatehouse waste software system:
    - Vehicle registration number
    - Company Name (if commercial)
    - Waste type/s
    - Sector source (MSW, C&D, C&I)
    - Quantity of waste, or units of waste depending on waste type
5. If a fee or charge is applicable the Gatehouse Attendant issues a receipt.
6. The gatehouse attendant directs the vehicle to the appropriate disposal or recycling area/s within the Facility and provides instructions relevant to the material types to be disposed of.

3.1.5 WASTE ACCEPTANCE

Table 3.1 provides the waste types as defined by the Landfill Waste Classification and Waste Definitions (1996, as amended 2019) proposed to be accepted at the Facility; quantity limits and processing requirements.

Table 3.1 Waste acceptance detail

Waste type	Waste detail	Quantity	Processes
Putrescible waste	Kerbside collected waste, drop off waste from municipal and commercial sources	Combined total of not more than 5,000 tonnes per annual period	Disposal by Landfill
Special Waste Type 1	Asbestos waste		Disposal by Landfill
Greenwaste	Generated from commercial, and municipal sources		Receipt, handling, storage prior to mulching, disposal by burning and/or disposal to landfill
Inert Waste Type 1	Building and demolition waste, scrap metal, car bodies, whitegoods		C& D material receipt, handling, storage for future reuse and/or disposal to landfill

			Scrap metal receipt, handling and storage prior to off-site recycling
Contaminated solid waste			Disposal by Landfill
Inert Waste Type 2	Tyres		Receipt, handling and storage prior to off-site recycling
Hazardous waste	Used oil		
	Vehicle batteries		
	E-waste		
	Fluorescent globes		
Other recyclables	Comingled recycling, cardboard		

3.1.5.1 Record keeping

The Shire recently introduced a waste facility data software management and reporting system (Cooee) at the Facility to ensure accurate and complete records are kept of waste received to meet Licence and DWER annual return reporting requirements.

The data management system incorporates DWER approved default bulk densities for various reportable waste material categories to ensure the consistent and accurate reporting of weights of waste streams received at the Facility.

3.1.6 LANDFILLING METHOD

Once the waste has been accepted at the gatehouse, Facility users (both domestic and commercial) are directed to the active tipping face to deposit the waste. Waste is pushed up, compacted, and covered in line with **Section 3.1.7**.

Landfilling activities at the Facility are managed as follows:

- Waste is not landfilled within 35m of the Premises prescribed boundary
- Waste is placed within a defined trench or an area enclosed by earthen or other bunds
- The tipping area is restricted to a maximum linear length of 30m and an exposed face not exceeding 2m in vertical height
- The separation distance between the base of the landfill and the highest groundwater level shall not be less than 3m
- A minimum horizontal distance of at least 100m between the tipping area and any surface water body is maintained.

3.1.6.1 Asbestos disposal methods

Asbestos waste that is received at the Facility is managed as follows:

- Before entry to the Facility, asbestos material shall be wrapped in heavy-duty plastic
- Subject to acceptance controls as listed in the Facility Asbestos Management Plan
- Only disposed of in a designated asbestos disposal area
- Not deposited within 2m of the final tipping surface of the landfill
- No works shall be carried out on the landfill that could lead to a release of asbestos fibres
- Asbestos waste is covered with 1m of clean fill (cover material) or putrescible waste as soon as practicable after deposit and prior to any compaction of the waste
- Staff witness the burial of asbestos in accordance with these procedures
- A register of Special Waste Type 1 (asbestos waste) disposed of at the Facility is maintained and includes:
    - a plan showing the position of burial of the asbestos waste
    - the date of the deposit

- the signature of the staff member responsible for the burial of the waste attesting that it was buried in accordance with these procedures.

3.1.6.2 *Waste within 35m of boundary and over boundary*

Historical practices at the Facility have resulted in landfilling occurring within 35m of the eastern boundary and also outside the boundary of the prescribed premises. As shown in **Figure 2.2**, the over boundary waste is a small area of approximately 2,500m² located between the access road and the prescribed boundary.

The Shire is investigating its options to address these issues, including the potential reduction of the internal buffer, relocation of over boundary waste or acquiring the adjoining land parcel. The Shire will advise DWER of the outcome of this process, with a licence amendment application being submitted to amend the prescribed premises boundary, should it be required.

3.1.7 WASTE COVER

Soil extracted from on-site reserves is used as cover material, as well as clean fill accepted on-site.

Waste received for landfilling is levelled, compacted, and covered every second day. Municipal waste is covered within 24 hours of delivery.

Landfill cover activities at the Facility are managed to ensure:

- Putrescible waste is covered with at least 150 millimetres of cover material at the end of the day's operation or with at least 230 millimetres of cover material at the end of each week.
- A stockpile of sufficient cover material is maintained to ensure waste can be covered for two weeks and to cover waste in the event of a fire.
- A final soil cover of at least one metre is applied to landfill cells at final height.

3.1.8 LITTER MANAGEMENT

The Facility is surrounded by a buffer of native vegetation in all directions. The nearest sensitive receptor is approximately 650m to the southeast. There have been no complaints on Shire records regarding litter emissions from Facility operations.

A hierarchy of litter control measures are implemented at the Facility as discussed in the sections below.

3.1.8.1 *Load Control*

The following load control procedures are to be implemented to help prevent the generation of litter from incoming loads of waste:

- Facility users are subject to load and waste acceptance controls that require all normal loads to be secured with nets and tarpaulins to prevent the accumulation of litter along principal site access routes.
- Regular inspections of incoming vehicles to ensure loads are covered, secure, and not contributing to litter.
- Regular inspections of primary access routes with active litter clean up as required.

3.1.8.2 *Waste Handling*

Most of the litter arising from landfill operations results from wind acting on the waste at the point of tipping and during the initial compaction practices. Litter loss at the point of tipping will be minimised where practicable by:

- Only operating a single open tip face
- Keeping the working area as tight as practicable
- Levelling and compacting waste regularly

- Regularly applying cover material to the required depths

3.1.8.3 *Perimeter Fencing*

- A perimeter fence surrounding the Facility shall be maintained (see **section 3.1.2.4**)
- Litter screens will used on three sides around and within two meters of the tipping area

3.1.8.4 *Litter collection*

- As it is practically impossible to prevent litter from escaping from the Premises, litter collections are to be regularly undertaken along access roads and buffer zones surrounding the Facility.
- Any waste that has been washed or blown away from the tipping area will be collected and returned to the tipping area on a weekly basis.

3.1.9 DUST MANAGEMENT

The Facility is located surrounded by sand dunes and coastal vegetation, with typically windy local climatic conditions. This makes it practically impossible to manage dust so that no visible dust crosses the boundary of the premises. The nearest sensitive receptor is approximately 650m southeast of the Facility. The prevailing winds direct any emissions away from this subdivision (easterly winds in the morning and southwesterly winds in the afternoon) and as such, the Shire has had no complaints on Shire records regarding dust emissions from the site.

The Shire takes all reasonable and practical measures to prevent and where that is not practicable minimise dust emissions from the Facility. These measures include:

- Operations are undertaken to ensure that minimal visible dust is generated
- Enforcing speed limits on-site to minimise wheel generated dust
- Mobile water tank is kept on-site for wetting down surfaces if required
- A Complaints Register is maintained on-site to record any complaints received; this register includes the date, nature, and resolution action of any complaints received.

3.1.10 ODOUR MANAGEMENT

The residential subdivision 630m southeast of the Site boundary is within the 1000m separation distance as required under the DWER Odour Guideline 2019. Given the small volumes of waste accepted at the Facility and the prevailing winds directing emissions away from this subdivision (easterly winds in the morning and south westerly winds in the afternoon), the Shire has had no complaints of odour from the Facility.

The following management practices and mitigation measures are implemented to minimise odour emissions from the Facility:

- All odour generating wastes delivered to the Facility must be contained in a covered vehicle to minimise potential odour emissions
- The waste types accepted at the Facility are controlled in accordance with the waste acceptance procedure
- The size of the working face is to be kept as small as possible
- Waste is not deposited in standing water where practicable
- Waste is regularly covered in accordance with **Section 3.1.7**
- Minimising disturbance of previously filled areas
- Municipal kerbside waste will be covered as soon as practicable and not later than the end of the working day
- A Complaints Register is maintained on-site to record any complaints received; this register should include the date, nature, and resolution action of any complaints received.

3.1.11 NOISE MANAGEMENT

The Shire takes all reasonable and practical measures to prevent or minimise noise emissions from all operations at the Facility including:

- Machinery operation and transport movements are scheduled to occur during standard business hours
- Operations emissions and operating times will comply with the Environmental Protection (Noise) Regulations 1997 (predicted noise emissions are not expected to exceed the regulations)
- All mobile plant used on-site is regularly maintained
- Speed limits enforced on all site access roads
- A Complaints Register is maintained on-site to record any complaints received; this register should include the date, nature, and resolution action of any complaints received.

There have been no complaints on Shire records regarding noise emissions from the site.

3.1.12 LANDFILL GAS MANAGEMENT

Considering the low annual volumes of waste received at the Facility, the LFG generated is expected to be in small volumes and present a low risk. However, the following operational measures will be implemented to reduce the risk associated with LFG generation; and minimise emissions:

- Facility staff will be trained on the health and safety risks posed by LFG emission and migration
- Where possible, organic matter should be included with soil used for daily cover to facilitate oxidising conditions for the breakdown of methane
- Greenwaste will be mulched and/or burned on-site to eliminate any additional LFG production from biodegradation of this waste stream in landfill
- Surface water will be managed to reduce the generation of leachate within the waste mass, which in turn will limit LFG generation
- A risk evaluation for LFG accumulation will be undertaken for all existing and new structures located at the Facility
- Buffers will be maintained from buildings and structures to minimise the risk of off-site migration of LFG.

3.1.13 FIRE PREVENTION AND MANAGEMENT

There is no burning of any waste at the Facility except greenwaste.

The Shire implements numerous measures to prevent, prepare for, and manage fires at the Facility. These measures are described in the sections to follow.

3.1.13.1 Fire prevention practices

Preventative measures reduce the likelihood of a fire event occurring and/or the severity of an event should it eventuate. **Table 3.2** outlines the range of control measures used at the Facility to prevent the risk of fires.

Table 3.2 Fire prevention practices at the LWMF

Prevention measures	Detail
Premise Layout	Separated and clearly designated areas for materials drop-off and disposal
	Fire break surrounding the Facility
	Separation provided between the location of waste collection/storage areas for various combustible waste streams to ensure low risk of fire spread to other areas of the Facility

	Insitu hardstands provided for all operational areas
Site Security	To restrict unauthorised access and deter arson the Shire has a 1.8m fence and is maintained around the active operational areas
Vehicle and equipment management	Vehicles and other machinery (e.g., loaders) have appropriate heat shrouds and spark arrestors fitted and are kept, maintained and refuelled in designated areas away from combustible material.
	Regular servicing and maintenance is undertaken of on-site equipment and machinery
	All electrical equipment on-site is regularly tagged and tested to ensure its continued operational safety
Site control and management procedures	The gatehouse for the Facility is staffed at all opening times to oversee operations
	A no smoking policy is implemented at the site to control potential ignition sources. This warning sign is contained on the site entry sign
	Appropriate signage is provided at the main site entry identifying materials accepted on-site to eliminate the risk of high risk hazardous waste being presented for disposal at the Facility
	Firebreaks are maintained around the site to ensure that a fire can be contained off-site or within the site without affecting the external properties where possible
	Site vegetation and fuel loads are managed to Shire requirements to minimise the risk of fire.
Waste acceptance	All waste received at the Facility is checked to ensure it complies with the site licence waste acceptance criteria and ensure that hazardous materials (tyres, batteries, chemicals, etc) are separated for correct storage and disposal from mixed waste and green waste streams
Outdoor stockpile management	Outdoor stockpiles of combustible materials are managed to achieve the following requirements: • The maximum length of an external stockpile will be no greater than 50 m. • The maximum height of an external stockpile (loose piled or baled) will not exceed 4 m. • Stored combustible materials will be inspected regularly to identify any smouldering areas or smoke, especially during extreme weather conditions and total fire bans (i.e., extreme temperature days). • Combustible solid materials will be stored away from: Powerlines and other ignition sources, Fuels and flammable solvents used for operational purposes, and Hazardous and/or controlled waste storage areas.
Tyre management procedures	The tyre stockpile will be managed to achieve the following requirements: • Tyres are stored on an insitu hardstand. • No more than 99 tyres stored on-site at any one time • The tyre storage area is regularly maintained to ensure a low fuel load
Hazardous waste management (batteries, e-waste, waste oil, fluorescent tubes)	• Car batteries are stored on a bunded pallet on a insitu hardstand • Waste oil is stored in a purpose built waste oil storage unit • Fluorescent tubes are stored in individual steel drums on a limestone hardstand. The storage area is located close to the gatehouse to enable oversight of operators. • Lead acid batteries are stored on bunded pallets
Greenwaste stockpiles	• All greenwaste is stored in windrows. • The greenwaste storage area is on a base of compacted limestone. • A 5m firebreak is maintained around the greenwaste storage area. • Greenwaste stockpiles are monitored during hot weather and any generated heat to minimise the risk of auto ignition.

3.1.13.2 Fire preparation practices

Table 3.3 outlines the range of activities undertaken at the Facility to ensure the Shire is prepared in event of a fire at the Facility and to ensure an effective response.

Table 3.3 Fire preparation practices at the LWMF

Preparation measures	Detail
Access gates	Local emergency response agency to have key access to front gates for after hours access if required.
Premise layout	• The premises layout allows safe, efficient, and effective access for firefighting trucks to enter and access all areas of the premises • Sufficient cleared area is provided on-site to enable stockpiles to be relocated and broken apart during a fire.
Fire breaks	Fire breaks are to be maintained around the site to ensure that a fire can be contained within the site without affecting the external properties.
Portable water tanks	Portable fire fighting unit maintained on-site.
PPE	Staff are provided with steel capped boots, uniforms, and safety vests.
Sand stockpile	A stockpile of sand is located on-site and will be utilised if a stockpile internally combusts and creates a fire hazard.
On-site machinery	Machinery is present on-site during operations capable of breaking apart, separating, and dividing stockpiles to arrest the spread of fire if required.
Emergency Evacuation Plan	The Shire will develop, maintain, and regularly review an Emergency Evacuation Plan (EVP) for the Facility. The EVP identifies the location of the Emergency Operations Centre, Emergency Assembly Area, frequency of evacuation drills, details of emergency control personnel, and an Emergency and Evacuation Plan for the site.
Emergency Contacts	The EVP will contain a list of Emergency contacts in the event of a Fire
Staff training	• Any staff or contractors on-site (operation of Facility provided under contract) will be required to understand and comply with the specifications of the Facility Fire Management Plan, Emergency Evacuation Plan, and Operational Management Plan. • Fire and evacuation drills will be undertaken biannually.

3.1.13.3 Fire management practices

Table 3.4 outlines the management measures undertaken to manage and respond in the event of a fire within, or impacting on, the Facility.

Table 3.4 Fire management measures at the LWMF

Management measures	Detail
Greenwaste burning procedures	Greenwaste is only burnt providing the following conditions are met: • ensure the greenwaste is dry and seasoned for at least two months before burning • ensure the greenwaste is burnt in a dedicated area at least 25 metres from any premises boundary or active fill area • greenwaste is burnt in a manner to minimise the generation of smoke • greenwaste burnt in windrows or trenches • the volume of greenwaste burnt is restricted such that it can be completely burnt during daylight hours • Staff are in attendance until the fire is extinguished • Adherence with DFES Prohibited and Restricted Burning periods
Emergency Response team	A Chief and Deputy Warden for the Facility has been nominated

Emergency responsibilities	Roles for the Chief warden and Deputy warden, and procedures for fire management until the fire brigade arrives will be developed.

3.1.14 VECTOR MANAGEMENT

The Shire implements control measures to prevent infestations of pests, flies, and vermin at the Facility. Vermin control at the Facility is achieved via the following mechanisms:

- Maintenance of a pest management program and treatments where required
- Regular pushing up and compaction of the waste in accordance with **Section 3.1.7**
- Application of adequate cover material in accordance with **Section 3.1.7**
- Adequate perimeter fencing and gates
- Elimination of ponding water on the property where practicable
- Frequent removal of litter and contaminants and regular cleaning and maintenance of tipping areas will be undertaken
- Application of adequate cover material with putrescible waste covered daily

Facility staff are expected to monitor the levels of key vectors as part of daily management. The presence of vectors is to be formally reported as part of a regular site inspection program.

3.1.15 CHEMICAL AND FUEL STORES

As all Facility machinery is kept at the Shire depot in Lancelin, no fuel is stored on-site, apart from diesel for the site generator.

3.1.16 ENVIRONMENTAL MONITORING

There are no groundwater monitoring bores on-site. See **Section 2.5.** for further information.

3.1.17 CONTINGENCY PLANNING

Contingency planning including mapping out all likely incidents and corrective measures to be taken, will be addressed as part of the Facility Operational Management Plan to be developed in 2024, and detailed in **Section 3.1.18** below.

3.1.18 LANDFILL OPERATIONAL MANAGEMENT PLAN

There has been no Operational Management Plan (OMP) developed for the Facility. The Shire will produce an OMP for the Facility by **30 June 2024.**

The OMP will facilitate the safe and efficient operation of the Facility and ensure that the environment and the surrounding community are safeguarded from off-site impacts and emissions. It will describe the level of performance expected and practices required for managing, operating, monitoring, and rehabilitating the Facility.

The OMP will address the following:

- Requirements for compliance with the Facility EPL
- Facility description
- Waste types and quantities
- Facility design
- Facility operation and infrastructure management
- Recycling and resource recovery
- Environmental management measures
- Environmental monitoring program
- Emergency management and contingency planning
- Facility closure and rehabilitation
- Facility reporting.

4 PART 4: LANDFILL CLOSURE AND REHABILITATION

There has been no Landfill Closure Management Plan developed for the Facility. To minimise environmental impacts during and after the progressive closure of the Facility, the Shire will produce a Landfill Closure Management Plan (LCMP) by **30 June 2024**.

The LCMP will include, but is not limited to:

- Details of future intended land use
- Final landform and surface contours (pre- and post-settlement)
- Landfill cap design detail and drawings (specifications and materials to be used in the final cap)
- Stormwater and landfill gas management measures for the final landform
- Details on post-closure monitoring and aftercare management
- Revegetation requirements.

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APPENDIX A – GIS ASSESSMENT CRITERIA

Table 4.1 Summary of citing criteria from the Department of Water and Environmental Regulation's Guidance Statement: Environmental Siting (2016)

Ref.	GIS Dataset Title	Relevant Department	Description	Criteria	Lancelin Waste Management Facility
1.	Ramsar sites in Western Australia	Department of Biodiversity, Conservation and Attractions (DBCA)	Wetlands are recognised through the Ramsar Convention as internationally important.	Not within 500 m (NT Guidelines)	Complies
2.	Important wetlands – Western Australia (DBCA-045)	Department of Agriculture, Water and the Environment (DAWE) (Cth)	Nationally significant wetlands identified in *A directory of important wetlands in Australia.*	Not within 500 m (NT Guidelines)	Complies
3.	South Coast Significant Wetlands (DBCA-018)	DBCA	Regionally and internationally significant wetlands in the south-coast region.	Not applicable	
4.	Geomorphic Wetlands Swan Coastal Plain (management) (DBCA-019)	DBCA	This dataset has the location, boundary, geomorphic classification (wetland type) and management category (Conservation, Resource Enhancement or Multiple Use) of wetlands on the Swan coastal plain.	Not applicable	
5.	Geomorphic Wetlands Augusta to Walpole (DBCA-017)	DBCA	This dataset has the location, boundary and geomorphic classification (wetland type) of wetlands from Augusta to Walpole.	Not applicable	
6.	Geomorphic Wetlands Cervantes Eneabba (DBCA-015)	DBCA	This dataset has the location, boundary and geomorphic classification (wetland type) of wetlands.	Not applicable	
7.	Geomorphic Wetlands Cervantes South (DBCA-013)	DBCA	This dataset has the location, boundary and geomorphic classification (wetland type) of wetlands.	Not applicable	

Ref.	GIS Dataset Title	Relevant Department	Description	Criteria	Lancelin Waste Management Facility
8.	Geomorphic Wetlands Cervantes (Coastal) (DBCA-014)	DBCA	This dataset has the location, boundary and geomorphic classification (wetland type) of wetlands.	Not applicable	
9.	Parks and Wildlife Managed Lands and Waters (DBCA-011)	DBCA	Parks and Wildlife (DBCA) managed lands and waters in Western Australia including national parks, nature reserves, conservation parks, ex- pastoral leases, freehold land the department manages or has an interest in, miscellaneous reserves, marine parks, marine nature reserves, marine management areas, section 5(1)(g) reserves, state forest and timber reserves.	Not within 250 m (NT Guidelines)	Complies
10.	Bush Forever: Regional open space or proposed regional open space (DPLH-019)	Department of Planning, Lands and Heritage	Bush Forever provides a policy framework to ensure bushland protection and management in the Perth metropolitan area is addressed and integrated with broader land use planning and decision-making.	Not applicable	
11.	Western Swamp Tortoise Habitat (DWER-071)	Environmental Protection Authority	The western swamp tortoise is the most endangered tortoise or turtle species on earth. It is listed as a critically endangered species under the *Western Australian Wildlife Conservation Act 1950*, the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and the United Nations Convention on International Trade of Endangered Species (CITES). The habitat of the tortoise is protected under the *Environmental, Protection (Western Swamp Tortoise Habitat) Policy 2011*.	Not within 250 m (NT Guidelines)	Complies
12.	Rottnest Island Reserves Nature Reserve	Rottnest Island Authority	'A' Class Nature Reserve as described in *Rottnest Island Authority Act 1987*.	Not applicable	
13.	Regional Parks (DBCA-026)	DBCA	This refers to eight regional parks that make up most of the land reserved for parks and recreation in the metropolitan area. The current land tenure arrangements within the regional parks are complex, with several different landholders of both crown and private land.	Not within 250 m (NT Guidelines)	Complies
14.	Fish Habitat Protection Zones (DPIRD-049)	Department of Primary Industries and Regional Development	Polygon coverage of the Fish Habitat Protection Areas in Western Australia is declared under section 115 of the *Fish Resource Management Act 1994*.	Not within 500 m (NT Guidelines)	Complies

Ref.	GIS Dataset Title	Relevant Department	Description	Criteria	Lancelin Waste Management Facility
15.	Waterways Conservation Areas (DWER-072)	Department of Water and Environmental Regulation (DWER)	Management areas as declared under the *Waterways Conservation Act 1976.*	Not within 250 m (NT Guidelines)	Complies
16.	Peel Harvey Environmental Protection Policy (EPP) (DWER-066)	Environmental Protection Authority	The Peel Harvey EPP: sets out the estuary's environmental quality objectives, which (if achieved) will rehabilitate the estuary and protect it from further degradation outlines the means to achieve and maintain the environmental quality objectives for the estuary.	Not applicable	
17.	Green Growth	Department of Premier and Cabinet	Mapping of the spatially related conservation commitments from Action Plans F and G and of the proposed new conservation reserves (phases 1 and 2) referred to in Action Plan H.	Not applicable	
18.	State Environment Policy (SEP) Cockburn Sound Policy Boundary 2005 (DWER-058)	Environmental Protection Authority	This dataset shows the spatial boundaries of the SEP Cockburn Policy Boundary 2005. It was updated in 2010 to accurately represent the coastline and the recent approval of James Point Stage 1. When this dataset was created, schedules 1–3 of the policy were updated. There are three levels of ecological protection (high, moderate and low). The policy states that the percentage of moderate protection (MEPA) which is low ecological protection (LEPA) should not exceed 5%. This spatial data represents the EPA's most recent recalculations of this statistic. Currently, the percentage of MEPA which is LEPA is 4.39%.	Not applicable	
19.	Ecological Communities (Threatened Ecological Communities and Priority Ecological Communities) (DBCA-038)	DBCA	Ecological communities throughout Western Australia that are 'presumed totally destroyed', 'critically endangered', 'endangered', 'vulnerable', 'priority 1–5', 'lower risk' and 'not evaluated'. Communities are based on various life-forms including plants, invertebrates and microorganisms.	Not within 250 m (NT Guidelines)	Does not comply. Area identified as a threatened ecological community includes the north-west corner of the prescribed premises Lot.
	Biological Component				

Ref.	GIS Dataset Title	Relevant Department	Description	Criteria	Lancelin Waste Management Facility
20.	Threatened / Priority Flora (DBCA-036)	DBCA	This database describes threatened (declared rare) and priority flora populations for all land tenures within Western Australia.	Not within 250 m (NT Guidelines)	Does not comply. Threatened / priority flora has been recorded within 250 m of the southeast corner of the prescribed premises boundary.
21.	Threatened / Priority Fauna (DBCA-037)	DBCA	The database has records of observations of any fauna listed as threatened or priority.	Not within 250 m (NT Guidelines)	Complies
	Physical Component				
22.	Public Drinking Water Source Areas (DWER-033)	DWER	Public water source areas were proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* and the *Country Areas Water Supply Act 1947*.	Not within any PDWS areas	Complies
23.	Hydrography WA 250K – Surface Water Polygons (GA 2015) (DWER-031)	DWER	Western Australia's major streamlines, are coded with a hierarchy and named. The dataset includes many streams in addition to the detailed hydrography in areas where its data is limited (e.g. Eastern Wheatbelt and Western Plateau). Dataset is designed to evolve as more information becomes available.	Not within 500 m (NT Guidelines)	Complies
24.	Groundwater Contours (DWER-095 & DWER-096)	DWER	Groundwater Contours – May 2003 (mAHD) Only available for Gnagara Jandakot region.	Not applicable	
25.	GEODATA Waterbodies	Geoscience Australia	Watercourses identified within Western Australia	Not within 500 m (NT Guidelines)	Complies
26.	Acid Sulfate Soils Risk Map, Swan Coastal Plain (DWER-055)	DWER	Map of the risk of land development activities disturbing acid sulfate soil (ASS) materials, based on the likelihood of ASS materials occurring within soil profiles.	Not applicable	

Ref.	GIS Dataset Title	Relevant Department	Description	Criteria	Lancelin Waste Management Facility
27.	Acid Sulfate Soils Risk Map, Albany–Torbay (DWER-054)	DWER	Map of the risk of land development activities disturbing ASS materials, based on the likelihood of ASS materials occurring within soil profiles.	Not applicable	
28.	Acid Sulfate Soils Risk Map, Estuaries (DWER-050)	DWER	Predicted risk of ASS materials occurring within shallow soil layers in Western Australian estuaries (not covered by other DAWE ASS risk datasets) that could be disturbed by normal land development activities (e.g. drainage, excavations, dewatering).	Not within 500 m (NT Guidelines)	Complies
29.	Acid Sulfate Soils Risk Map, Geraldton (DWER-051)	DWER	Data of the risk of land development activities disturbing potential acid sulfate soil (PASS) materials, based on the likelihood of PASS materials occurring within 3 m of the ground surface for Geraldton.	Not applicable	
30.	Acid Sulfate Soils Risk Map, Lower Southwest (DWER-052)	DWER	Data on the risk of land development activities disturbing PASS materials, based on the likelihood of PASS materials occurring within 3 m of the ground surface for the Lower Southwest region.	Not applicable	
31.	Acid Sulfate Soils Risk Map, Pilbara Coastline (DWER-053)	DWER	Data on the risk of land development activities disturbing PASS materials, based on the likelihood of PASS materials occurring within 3 m of the ground surface for the Pilbara Coastline.	Not applicable	
32.	Contaminated Sites – Reported Sites (DWER-059)	DWER	This database holds information on confirmed contaminated sites (those classified as 'contaminated – remediation required', 'contaminated – restricted use' and 'remediated for restricted use'). The Reported Sites Register has information on all other reported sites.	Note any restrictions on on-site use	No identified contaminated sites in the area. There is a memorial on the title of the Lot under the Contaminated Sites Act 2003, registered 18/8/2017

Table 4.2 - Other datasets

Ref.	GIS Dataset Title	Relevant Department	Description	Criteria	Lancelin Waste Management Facility
1.	Local Planning Scheme (DPLH-071)	Department of Planning, Lands and Heritage	Land use zones in the Local Planning Scheme.	Not within 1000 m of a residential zone (DWER Odour Guidelines)	Not Comply The Southern lot boundary is approximately 630m to the nearest residential zone with the active landfilling area approximately 850m to the nearest residential zone.
2.	Aboriginal Settlements (DPLH-002) (DPLH-003)		Identified Aboriginal settlements and townships, as well as Aboriginal Lands Trust (ALT) estate areas.	Not within 1000 m of a residential zone (DWER Odour Guidelines)	Complies
3.	Heritage (DPLH-001) (DPLH-004) (DPLH-005) (DPLH-006)		Heritage areas, including Aboriginal heritage sites and State Heritage Register sites.	Not within a heritage area. No heritage sites / items on-site.	Complies
4.	Linear structures (DMIRS-053)			Not within 1 km of a fault line (NT Guidelines)	Complies
5.	Soil type		Dominant soil groups - Highest probability (DPIRD-077)	Preferred clay soils	Calcareous sands (421, 442)
6.	Flood area		Identified flood prone land and historical flood levels	Not within the flood area	Complies
7.	Clearing Regulations – Environmentally Sensitive Areas (DWER – 046)			Not within area	Complies

Ref.	GIS Dataset Title	Relevant Department	Description	Criteria	Lancelin Waste Management Facility
8.	Road access			Preferred access via existing major road	No name
9.	Pastoral lease			Preferred not on a pastoral lease	Not on a pastoral lease
10.	Mining tenement			Preferred not on a mining tenement	Not on a mining tenement
11.	Distance to airport			More than 3 km from an airport runway	Complies
12.	Other comments				There is an area less than 1 km to the south of the waste management facility that has been zoned "future development" in the Local Planning Scheme.