



Licence Number	L7021/1997/15
Licence Holder	City of Karratha
File Number:	DER2013/000622-1~4
Premises	Seven Mile Waste Disposal Facility Seven Mile Road Gap Ridge WA 6714 Legal description – Lot 85 on Plan 180017 and Lot 552 on Plan 71049 CROWN RESERVE 32987 and 33135
Date of Report	19 May 2020
Decision	Amendment Granted

1. Definitions and interpretation

1.1 Definitions

In this Amendment Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Amendment Report	refers to this document
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the <i>Environmental Protection Act 1986</i> Locked Bag 33 Cloisters Square PERTH WA 6850 info@dwer.wa.gov.au
CS Act	<i>Contaminated Sites Act 2003 (WA)</i>
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
Licence Holder	City of Karratha
Minister	the Minister responsible for the EP Act and associated regulations

Term	Definition
NEPM	National Environmental Protection Measure
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>
PFOA	Perfluorooctanoic acid
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PFAS NEMP	<i>PFAS National Environmental Management Plan (January 2018)</i>
PFOS	Perfluorooctane sulfonate
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Amendment Report applies, as specified at the front of this Amendment Report.
Revised Licence	the amended Licence issued under Part V, Division 3 of the EP Act, with changes that correspond to the assessment outlined in this Amendment Report.
Risk Event	as described in <i>Guidance Statement: Risk Assessment</i>
UDR	<i>Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)</i>
Usual working day	means 0800 – 1700 hours, Monday to Friday excluding public holidays in Western Australia.
Waste	has the same meaning given to that term under the EP Act.

2. Amendment Description

The following guidance statements have informed the assessment and decision outlined in this Amendment Report:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Licence Duration (August 2016)*
- *Guideline: Decision Making (June 2019)*
- *Guidance Statement: Risk Assessment (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

2.1. Purpose and scope of assessment

On 22 October 2019, the City of Karratha (the Licence Holder) submitted a Licence amendment application for the Seven Mile Waste Disposal Facility (L7021/1997/15) located at Seven Mile Road, Gap Ridge (the Premises). The amendment was sought by the Licence Holder for:

- An increase in annual waste accepted;
- Expansion of liquid and solid waste types accepted;
- Expansion of Special Waste Type 1 wastes accepted;
- Acceptance of Special Waste Type 3; and
- Clarifications to the existing licence containment infrastructure.

Table 2 below outlines the proposed changes to the Licence design or throughput capacities.

Table 2: Proposed design or throughput capacity changes

Category	Current design throughput capacity	Proposed design throughput capacity	Description of proposed amendment
64	100 000 tonnes per annual period	150 000 tonnes per annual period	Increase in current throughput capacity

2.2. Background

The Licence Holder commenced operations at the Premises in 1997 and is currently licenced for activities relating to Category 57 (Used tyre storage), Category 61 (Liquid waste facility), Category 61A (Solid waste facility), Category 62 (Solid waste depot) and Category 64 (Class II or Class III Putrescible landfill site).

The Premises is located approximately 9 km south-west of Karratha in the Gap Ridge industrial estate, and covers an area of approximately 100 hectares. A borrow area is located in the Premises south-west corner, with the separate disposal of contaminated hazardous waste and asbestos occurring in the south-east corner. A community recycling centre and liquid waste facility are located in the northern section of the Premises. Stockpiles of accumulated materials such as metals, construction and demolition waste and tyres are located on the western side of the Premises.

A detailed site plan reflecting the current site layout is included in Figure 1.



Figure 1: Aerial overview of Premises

3. Amendment Description

3.1 Increase in annual waste acceptance

The Licence Holder proposes to increase the current annual throughput for Category 64 (Class II or Class III Putrescible landfill site) from 100,000 tonnes per annual period to 150,000 tonnes per annual period. This increase in waste acceptance corresponds to a growing demand from local and regional waste generators from the industrial and resource sectors who have previously sent waste materials to Perth for disposal.

The Licence Holder currently has approval for the construction of 12 Class III landfill cells, issued under a licence amendment granted on 18 May 2017. Two cells have already been constructed and have been accepting waste since 29 October 2018. The Licence Holder anticipates that the increase in annual throughput for accepted waste for landfilling will be easily accommodated by the existing Class III cells, which are currently at 5% capacity.

Key Finding: The Delegated Officer considers that the facility has sufficient capacity for the proposed increase in annual throughput, due to the existing approval for future landfill cell development.

3.2 Expansion of liquid and solid waste types accepted

The Licence Holder is proposing to expand the types of solid and liquid wastes accepted at the Premises. A summary of proposed changes to current specifications for waste acceptance within existing licence conditions is outlined in Table 3 below.

Table 3: Expansion of liquid and solid waste types

Waste type	Waste code and description	Current specifications within existing licence	Proposed specification change
Liquid waste	J120 – waste oil and water mixtures or emulsions, and hydrocarbon and water mixtures or emulsions	Oily waste	Addition of all oily water emulsions or 'oily water'
	L100 – car and truck wash waters	None specified	Addition of car and truck wash waters from wash down bays
	L150 – industrial wash waters contaminated with a controlled waste	Industrial wash water and saline water	Addition of boiler blowdown sludge, cooling tower wash waters, industrial plant wash waters, stormwater collected from industrial facilities including ports and landfills, textile effluent and residues, wash water from industrial processes
	M130 – non-halogenated organic chemicals	Not currently accepted	Addition of brake fluid, coolant, ethylene glycol (antifreeze), propylene glycol and radiator fluid
	M250 – surfactants and	Not currently accepted	Addition of surfactants and

	detergents		detergents
	M270 – Per- and poly-fluoroalkyl substances (PFAS) contaminated materials, including waste PFAS containing products and contaminated containers	Not currently accepted	Please see 'Section 3.4: Acceptance of Special Waste Type 3' below
	N140 – fire debris or fire wash waters	Not currently accepted	Addition of fire wash water
	N205 – industrial waste treatment plant residues	None specified	Addition of scrubber sludge, industrial waste treatment sludges and residues
Solid Waste	J100 – waste mineral oils unfit for their intended purpose	Waste oil	Addition of saturated oily rags and hoses
	J170 – used oil filters	Not currently accepted	Undrained oil filters
	M270 – Per- and poly-fluoroalkyl substances (PFAS) contaminated materials, including waste PFAS containing products and contaminated containers.	Not currently accepted	Please see 'Section 3.4: Acceptance of Special Waste Type 3' below
	N220 - asbestos	Cement bonded asbestos only. No fibrous asbestos shall be accepted	Please see 'Section 3.3: Expansion of Special Waste Type 1 accepted' below
	None specified	Not currently accepted	Addition of drill mud - not to be confined by a controlled waste type

3.2.1 Liquid waste management

The addition of new liquid waste types is not expected to alter the current Category 61 throughput and will be encompassed under the current authorised annual throughput of 116,500 tonnes. The management of additional liquid wastes will be in accordance with existing management practices implemented at the facility. The Licence Holder considers the existing onsite liquid waste infrastructure sufficient for the additional waste types proposed.

Liquid waste accepted at the Premises is weighed at the weighbridge, with any non-conforming loads rejected and recorded. All liquid wastes require an escort to direct drivers to the special waste areas at the Premises, to ensure disposal into the correct area. All liquid wastes specified for inclusion in the licence through this amendment will be disposed of in evaporation ponds 5 and 6, which are HDPE lined to achieve a permeability of 10^{-9} m/s or less. An increase in liquid wastes deposited into ponds 5 and 6 is not anticipated to impact the ponds holding capacity due to the very high evaporation rate experienced at the Premises. The suitability of the evaporation ponds for liquid waste disposal is discussed in further detail in Section 4.4 below.

When the ponds are dry and a significant amount of solid residue has formed, the waste will be excavated for disposal into a Class III landfill cell. All residues will be tested to ensure that they

meet the acceptance criteria for the Class III cells as outlined in the Landfill Waste Classifications and Waste Definitions (LWCWD). Should the residue not meet the acceptance criteria, it will be collected and transferred to a sealed container for disposal at an appropriately authorised facility.

3.2.2 Solid waste management

The addition of new solid waste types for acceptance will increase throughput quantity, requiring the increase in Category 64 annual throughput capacity as requested through this amendment. The Licence Holder proposes that the management of the new solid wastes accepted will be consistent with existing practices already in effect at the Premises and all new waste types specified under this amendment will be disposed of into Class III landfill cells.

Prior to solid wastes being delivered to the landfill, customers are required to provide photographs of the waste, NATA approved laboratory analytical results and relevant safety data sheets to obtain a special disposal requirement permit from the Licence Holder. This will also confirm the suitability of the waste for disposal into the Class III cells following assessment against the LWCWD acceptance criteria for Class III landfills.

Drill muds will only be accepted on site in sealed vessels that are completely filled, and if it is demonstrated that the drill mud meets the requirements of a solid waste as defined by the LWCWD. Oily rags, oil filters and oily hoses will also be received in sealed containers and will be checked for any visible liquids prior to being accepted for disposal into Class III cells. No fixation of wastes will occur on site.

Once a special waste disposal permit is obtained, waste is delivered to the Premises and weighed at the weighbridge, with any non-conforming loads rejected and documented. When accepted, waste is escorted to the waste disposal area and vehicles are emptied into their nominated repository. Recently disposed waste is compacted at regular intervals throughout the day and at the end of the day, and is appropriately covered in accordance with existing licence conditions. Leachate generated from the Class III cells is pumped to evaporation pond 7, which is HDPE lined to achieve a permeability of 10^{-9} m/s or less.

Key Finding: Liquid and solid waste types currently accepted at the Premises are described as 'hazardous' under existing licence conditions.

As per the LWCWD, hazardous wastes are generally unsuitable for landfill disposal and should only be accepted within landfills after appropriate treatment.

The Delegated Officer considers that terminology specified on the existing licence needs improvement to provide clarity over those wastes that are considered 'hazardous' and those wastes that are suitable for disposal to the Class III landfill cells.

3.3 Expansion of Special Waste Type 1 acceptance

The Licence Holder proposes to accept a wider variety of asbestos and ACM than what is currently permitted under the existing licence. Proposed additional asbestos wastes will be non-friable only and include, but are not limited to, cement sheeting and moulded products, vinyl tiles, caulking, bituminous materials, gaskets and asbestos contaminated soil. To allow for the acceptance of these waste types, the Licence Holder is requesting restrictions around the types of asbestos or ACM products that can be accepted at the Premises be removed from existing licence conditions. Management of asbestos and ACM will be in accordance with existing management protocols already implemented at the facility, with asbestos and ACM disposed of in a designated asbestos area located in the south eastern corner of the Premises. All accepted asbestos and ACM will be wrapped and labelled, and covered with soil to a depth of 1,000mm by the end of the day. No asbestos or ACM will be disturbed once landfilled.

3.4 Acceptance of Special Waste Type 3

The Licence Holder proposes to accept per- and poly- fluoroalkyl substance (PFAS) contaminated materials, including solid and liquid wastes containing PFAS, waste PFAS containing products and contaminated containers.

3.4.1 Landfill acceptance criteria for PFAS impacted solid wastes

PFAS are a family of manufactured chemicals which do not occur naturally in the environment. Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are two of the most well-known PFAS and are contaminants of emerging concern in Australia and internationally (HEPA, 2018). PFOS and PFOA are known to be persistent, bio-accumulative and toxic and, due to their persistence in the environment and moderate solubility, can be transported long distances in water and air, and transfer between different media (for example soil, sediment, surface water and groundwater). They have been identified in the environment at a number of known and suspected contaminated sites in Western Australia.

Australia's Environment Ministers have endorsed the PFAS *National Environmental Management Plan* (NEMP) which was published in January 2018 (HEPA, 2018). The PFAS NEMP provides governments with a consistent, practical, risk-based framework for the environmental regulation of PFAS-contaminated materials and sites. The PFAS NEMP has been developed as an adaptive plan, able to respond to emerging research and knowledge.

The criteria reflected in the PFAS NEMP has been determined based on existing jurisdiction approaches to the derivation of landfill acceptance criteria for a number of standard landfill designs and consistent with the approach adopted in the LWCWD. The exception being that landfill acceptance criteria for total concentration have been capped at 50 mg/kg. This is based on the PFOS requirements of the Stockholm Convention on Persistent Organic Pollutants. As per the PFAS NEMP, waste concentrations must be less than both the relevant total and leachable concentration in the Australian Standard Leaching Procedure (ASLP) conducted at both pH 5 and un-buffered reagent water – approximating “worst case” for leaching conditions. Table 4 provides a summary of how landfill acceptance criteria in the PFAS NEMP correlates to landfill classes specified in Schedule 1 of the EP Regulations and the LWCWD.

Table 4: PFAS NEMP landfill acceptance criteria and equivalence to landfill class in Western Australia

PFAS NEMP Landfill Type	Equivalent Landfill Class as per Schedule 1 of the EP Regulations	Notes
Unlined	Class I/II landfill	Multiplication factors for ASLP leachable concentration ($\mu\text{g/L}$) and Total concentration (mg/kg) in the PFAS NEMP are consistent with the derivation of criteria for Class I and II landfills; equivalent to Leachable Concentration criteria for ASLP1 and ASLP2, and to Concentration Limit CL1 and CL2 (refer to Table 4 of the LWCWD). Note: Total concentration for PFOA is limited to 50 mg/ kg (based on the low content limit) as per Stockholm Convention.
Clay/single composite lined	Class III landfill	Multiplication factor for ASLP leachable concentration ($\mu\text{g/L}$) in the PFAS NEMP is consistent with the derivation of criteria for Class III landfills; equivalent to Leachable Concentration criteria for ASLP3 (refer to Table 4 of the LWCWD). Total concentration for PFOS

PFAS NEMP Landfill Type	Equivalent Landfill Class as per Schedule 1 of the EP Regulations	Notes
		+ PFHxS and PFOA limited to 50 mg/kg (low content limit) as per Stockholm Convention.
Double composite lined	Class IV landfill	Multiplication factor for ASLP leachable concentration (µg/L) in the PFAS NEMP is consistent with the derivation of criteria for Class IV landfills; equivalent to Leachable Concentration criteria for ASLP4. Total concentration for PFOS + PFHxS and PFOA limited to 50mg/kg (low content limit) as per Stockholm Convention.

3.4.2 Proposed acceptance, handling and disposal

The Licence Holder proposes to dispose of all PFAS containing solid waste into the Class III landfill cells at the Premises. Liquid waste containing PFAS will be treated within evaporation pond 7, which will also contain leachate generated from all Class III cells. When the pond is dry residue will be removed from the base of the pond and disposed of into the Class III cells. The following process has been proposed by the Licence Holder for the disposal of PFAS contaminated material to the Class III landfill cells, inclusive of residues recovered from the cleaning of evaporation pond 7:

- Material must contain a lower concentration of PFAS than the Class III landfill acceptance criteria for a single composite lined landfill cell, as specified in the PFAS NEMP and outlined in Table 5 below;
- Collected samples will be analysed by a NATA accredited laboratory, sampling and analysis of PFAS will be in accordance with the methodology prescribed in the PFAS NEMP;
- If waste meets this criteria, external waste generators must obtain a 'Special Waste Disposal Permit' by providing the Licence Holder with photos of the waste, analysis of the waste from a NATA accredited laboratory and any relevant safety data sheets. Permit applications are reviewed by a Waste Management Technical Officer on site. Random spot audits are also conducted to verify NATA analysis results;
- Should the PFAS concentrations exceed these acceptance criteria in materials generated off site, the Licence Holder will not accept the material at the Premises;
- Should PFAS concentrations exceed these acceptance criteria in residues recovered from evaporation pond 7, the material will be collected and transferred to a sealed vessel for offsite disposal at an appropriately licenced facility.

Evaporation pond 7 is constructed with compacted sub-base and a 2mm HDPE impermeable liner to achieve a permeability of 10^{-9} m/s or less. The Licence Holder expects the pond liner to sufficiently prevent the diffusion of PFAS through the liner and into surrounding soils and underlying groundwater.

Table 5: PFAS contaminated material - landfill acceptance criteria (HEPA, 2018)

Landfill Type		Interim Landfill acceptance criteria		Comments
		PFOS + PFHxS	PFOA	
Clay/single composite lined	ASLP leachable concentration (µg/L)	0.7 µg/L	5.6 µg/L	Drinking water x 10 (Australian Government Department of Health 2017).
	Total concentration (mg/kg)	50 mg/kg	50 mg/kg	Soil – Human health industrial/commercial x10 Total concentration for PFOS = PFHxS and PFOA of 50mg/kg (low content limit).

3.4.1 Suitability of Siting of Class III landfill cells

The PFAS NEMP outlines matters to be taken into consideration by the environmental regulator to determine whether the siting of an existing landfill is suitable for the acceptance of PFAS contaminated material. A summary of these considerations compared to the siting of the existing Class III cells at the Premises are detailed in Table 6 below.

Table 6: PFAS NEMP landfill suitability criteria and existing landfill siting

Landfill suitability criteria	Class III Landfill cell siting
The landfill is not located on a vulnerable aquifer.	The Licence Holder has conducted a review of the 1:100,000 Geological Survey of Western Australia map, which indicates that the landfill cells are in an area of 'sheetwash sand, silt and clay in distal outwash fans, with gilgai surface in areas of expansive clay', with areas of 'calcrete – massive, nodular and cavernous limestone, variably silicified; residual origin'. This is consistent with data the Licence Holder has obtained through the installation of monitoring wells at the Premises. This indicates that the landfill cells are located on a high vulnerability aquifer.
Whether the landfill is located within 1000 m of a surface water body that supports an aquatic environment (including groundwater dependant ecosystems), or within 1000 m of a surface water drain that is connected to groundwater and/or discharges directly into an aquatic environment (including groundwater dependent ecosystems) or a water body that supports fish or other fauna species that may be caught and consumed.	Seven Mile Creek and other associated minor non perennial watercourses are located 490 m east of the Premises boundary.

It is also outlined in the PFAS NEMP that when assessing landfill siting and design for the

suitability of acceptance of PFAS wastes the environmental regulator will have regard to the following for existing sites:

- Performance of the landfill liner system;
- Performance of leachate management system;
- Review of existing stormwater management controls; and
- Review of construction quality assurance for landfill liner and leachate system.

These matters are discussed in further detail in Section 4 below in the context of the acceptance of both PFAS contaminated material and other additional waste types.

Key Finding: The Delegated Officer notes the siting guidance outlined in the PFAS NEMP and considers that deviations from the siting criteria will need to be supported through a detailed risk assessment, as outlined in Section 8 and 9.

3.5 Clarifications to existing licence containment infrastructure

The Licence Holder has advised that administrative errors are present within the existing licence in relation to references to the liquid waste management ponds. The referencing to these ponds will be updated as a part of this amendment to better reflect operational use.

4. Emission and Discharge Controls

4.1 Applicant proposed controls

A summary of potential emissions resulting from proposed amendments to site operations, along with Licence Holder imposed controls for these emissions, is included in Table 7 below.

Table 7: Emissions and discharges from proposed changes to processing

Emission	Source	Proposed Controls
Leachate	Acceptance and burial of increased quantities of waste, new solid waste types and PFAS contaminated waste.	As outlined in Sections 4.2, 4.3, 4.4 and 4.5 below.
	Leaks resulting from conveyance infrastructure or liner failure, and poor liner construction.	
Liquid waste	Overtopping of pond containing new liquid waste types, PFAS contaminated waste and landfill leachate.	As outlined in Section 4.4 below.
Odour	Acceptance and burial of increased quantities of waste, acceptance of new solid and liquid waste types.	All solid wastes delivered to site for landfilling are covered. Waste deposited into the landfill is covered no later than the end of the usual working day, with wastes that are deemed as

		<p>odorous when deposited covered immediately.</p> <p>Cover materials (Inert Waste Type 1, soil or clay) are able to reasonably withstand weather conditions without significant damage and exposure to underlying waste.</p> <p>Liquid waste is discharged into the ponds so as to cause minimal disruption to the pond surface</p> <p>Oxidising compounds (hydrogen peroxide, potassium permanganate) or neutralising agents (sodium hypochlorite, sodium hydroxide) will be added will be added to evaporation ponds if emitting noxious odours, in line with current practice in place at the Premises.</p>
Dust	Increased waste handling and disposal, and increased movement of vehicles transporting waste.	<p>Wastes disposed of to landfill cells are regularly compacted.</p> <p>All working areas of the Premises are maintained in a damp state utilising an onsite water cart, with water sourced from the on-site extraction bore.</p> <p>Site speed limit of 30km/h applies.</p>
Noise	Increased movement of vehicles transporting waste.	<p>Site operations occur between 7:00am to 4:30pm.</p> <p>All mobile plant equipment used on site is regularly maintained.</p> <p>Site speed limit of 30km/h applies.</p>
Asbestos	Waste handling resulting in a release of asbestos fibres into the air	<p>All asbestos and ACM transported in a covered, leak proof or lined vehicle.</p> <p>All accepted asbestos and ACM double wrapped in heavy duty polyethylene (0.2mm thick) or otherwise contained to prevent airborne fibres.</p> <p>Deposited asbestos and ACM covered with soil to a depth of 1,000mm by the end of the day and not disturbed once landfilled.</p>

4.2 Landfill construction

The Licence Holder was given approval for the construction of 12 Class III cells in a staged approach over 20 years, under a Licence amendment issued on 18 May 2017. The construction of the Class III cells 1 and 2, which are currently in operation at the Premises, commenced in May 2018 and was completed in August 2018. Conditions within the existing licence include infrastructure specifications for the design and construction of the 12 approved cells and require a basal liner system, as indicated in Figure 2. This includes a composite basal containment layer composed of geosynthetic clay liner (GCL) overlain by a 2mm high density polyethylene (HDPE) geomembrane. This containment layer is utilised across the base and the embankments of the Class III landfill cells. The basal containment layer includes a protection geotextile to prevent any long-term damage from the overlying leachate collection layer and waste fill. The cell floors are graded to divert leachate to the external edges to form leachate extraction sumps.

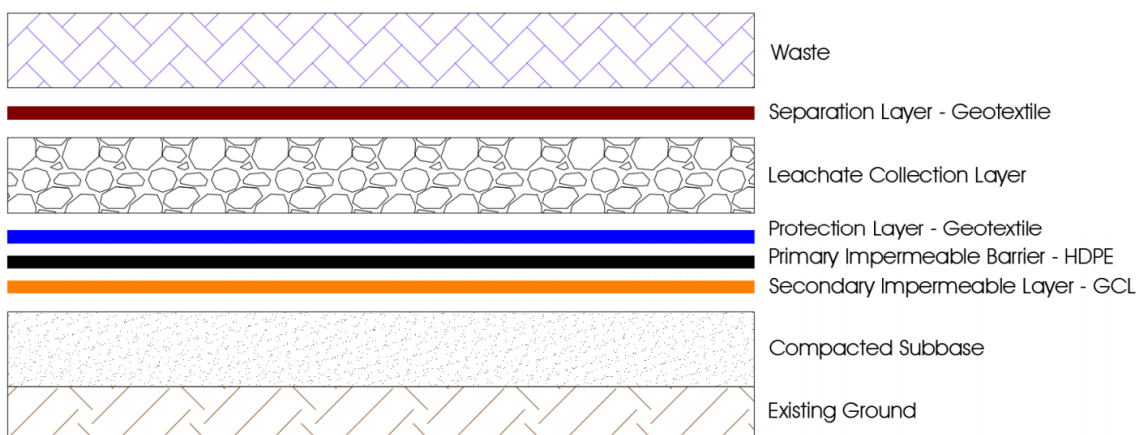


Figure 2: Typical basal liner system

In accordance with existing licence conditions, a construction quality assurance (CQA) report was submitted to DWER in September 2018 for Cell 1 and 2 confirming that the cells had been constructed as per the specifications in the licence and without any material fault. DWER carried-out a compliance inspection of the Premises in October 2018 to assess compliance with the specified construction requirements. The outcome of this inspection was that the Licence Holder was generally compliant with all construction specifications outlined in existing licence. Where departures from the requirements were found, they appeared minor in nature and not likely to materially change or affect the infrastructure.

In support of the 2017 Licence amendment the Licence Holder submitted a seepage assessment to evaluate the basal liner performance. Modelling was undertaken using the Hydrological Evaluation of Landfill Performance (HELP) computer program. The HELP program is a quasi-two-dimensional hydrologic model of water movement across, into, through and out of landfill cells. The Licence Holder considered the design of the lined cells in accordance with the Victorian EPA's Best Practice Environmental Management document '*Siting, design, operation and rehabilitation of landfills*'. This guideline indicates that seepage from landfills should not exceed 10L/ha/day. The results from the HELP modelling outline that seepage from each Class III landfill cell should range from 0.00219 to 0.06329 L/ha/day and the capped current landfill cell ranges from 0.00164 to 0.04329 L/ha/day.

Key Finding: The Delegated Officer considers that the existing Class III landfill cells have been constructed appropriately for the intended purpose of disposing Class III contaminated solid wastes, including Class III PFAS waste.

4.3 Leachate collection and management

As a part of the 2017 Licence amendment, the Licence Holder installed a leachate management system at the Premises which acts to divert leachate to a sump within landfill cells. From these sumps, leachate is pumped to evaporation pond 7. This system has been installed so as to allow for the connection of extraction points for future Class III cells when the cells are constructed.

The leachate collection and removal system for Class III cells 1 and 2 is comprised of a leachate drainage blanket, leachate collection pipework and a leachate extraction system. The drainage blanket is a 300mm thick layer of 20mm nominal size blue metal aggregate. A network of slotted polyethylene pipes is located within this drainage blanket along the floors of Cells 1 and 2 to facilitate the draining of leachate to designated sumps and extraction points located on the perimeters of the cells. A polyethylene side slope riser pipe is located on the protection geotextile from the low point of the cells, with the horizontal basal section perforated and placed within the sump. This is located on an additional layer of HDPE lining in order to minimise damage to the cell liner. The side riser pipes act to remove excess leachate from the sumps, with any leachate pumped to evaporation pond 7. A second polyethylene pipe runs next to the side slope riser and is used as a monitoring probe sleeve to facilitate monitoring of the leachate levels and extraction efficiency of the cell.

The Licence Holder submitted a CQA report in September 2018 confirming that the leachate collection system within Class III cells 1 and 2 has been built as per the specifications detailed within the existing licence. The leachate collection network across the Premises area designated for future Class III cells was commissioned in June 2019. The Licence Holder has provided a CQA report for the leachate collection network in January 2020 confirming that this has also been built with no material fault.

The seepage assessment submitted in support of the 2017 Licence amendment provided an estimation of the rate of production of leachate from the proposed new cells. In this regard, the HELP model requires weather, soil and design data and uses solution techniques that account for the effects of surface storage run-off, infiltration, evapotranspiration, vegetative growth, soil moisture storage, and leakage through soil, geomembrane or composite liners. The HELP simulation suggested that leachate production rate in a capped landfill cell would be less than 0.00015mm/m²/year and 0.0002mm/m²/year during operation due to the low annual rainfall and the high rate of evapotranspiration at the Landfill.

At the time of writing this decision report, the Licence Holder has advised that due to the limited volume of waste in active landfill cells 1 and 2 the quantity of leachate generated to date is minimal and not yet sufficient to analyse.

Key Finding: The Delegated Officer considers that the leachate collection system has been constructed appropriately and as per specifications outlined by the Licence Holder.

Due to the limited quantities of leachate reported to have been generated at the time of writing this amendment, the Delegated Officer considers there is a requirement for the ongoing monitoring of leachate to ensure that the leachate collection and management infrastructure is operating effectively. This monitoring will also allow an assessment of leachate generation as increased quantities of waste are deposited in the Class III landfill cells.

The justification for the addition of leachate monitoring conditions to the Licence will be outlined through a detailed risk assessment in Section 8 and 9.

4.4 Evaporation ponds and leachate storage pond

There are 3 evaporation ponds located in the northern area of the Premises which are designed

for the evaporation of wastewater. Each evaporation pond has an operating surface of 75m x 75m and receives an average of 350 tonnes of liquid waste per week. The Licence Holder is required to maintain a 0.5m freeboard to allow for a 1 in 20 year extreme rainfall event of 24hrs duration. The ponds are constructed to hold a maximum of 9,450 tonnes at any one time, which does not include the 0.5 m freeboard, and have an additional overflow capacity of 1,100 tonnes within the specified freeboard.

All 3 evaporation ponds are constructed with compacted sub-base and a 2mm HDPE impermeable liner to achieve a permeability of 10^{-9} m/s or less. The ponds also have stormwater drainage around their perimeter to prevent stormwater entering the ponds. Evaporation ponds 6 and 7 were constructed most recently under works approval W5182/2012/1, issued on 12 July 2012. Compliance documentation confirming that the ponds had been constructed to the required specifications was subsequently submitted to the Department on 12 April 2013.

As a part of the 2017 Licence amendment, evaporation pond 7 was repurposed as a leachate storage/evaporation pond for the new Class III cells. All leachate generated from the landfill will be evaporated and only landfill leachate and PFAS contaminated liquid waste will be deposited or disposed of to evaporation pond 7. Leachate is transferred to evaporation pond 7 by leachate side slope riser pumps, which are operated by compressed air and installed in sumps with a capacity of 10 kL which are located around the perimeter of the landfill area. The pumps use the direct air displacement method of pumping a fixed volume of liquid, and are automatically engaged when nominal leachate levels within the sump are reached. This occurs when leachate levels submerge a sensor on the pump positioned at 0.23 m above the sump base. Control units installed at the head works of cells 1 and 2 monitor the level of leachate/liquid within the landfill sumps.

Flow meters are installed at the extraction points of cells 1 and 2 and at the leachate outlet at evaporation pond 7, which continuously monitor flow rates. Due to the change in use of evaporation pond 7, and prior to receiving leachate, the Licence Holder undertook a liner integrity inspection that confirmed the liner to be intact. The Licence Holder also undertakes inspections of the visible sections of the pond liner every 6 months to ensure that the liners integrity is maintained, with the entire liner inspected approximately every 5 years after an operational clean of any sludge build up has occurred.

Evaporation pond 7 is fitted with an alarm which activates when the available freeboard reduces to 700 mm. Quantities of liquid within evaporation pond 7 are monitored using a level scout and a float switch. If the capacity of the pond reaches the freeboard, the float switch triggers the closure of a valve within the leachate collection system ensuring no further leachate is pumped into evaporation pond 7 from the sumps within the landfill cells. The sump has capacity to hold 10 kL of leachate within the landfill cells and the rising main which transfers leachate to evaporation pond 7 has a large diameter of 110 mm, providing additional buffer storage capacity. The Licence Holder can also utilise emergency standby pumps to enable the transfer of liquid wastes from pond 7 to ponds 5 and 6, which are constructed to the same specifications as evaporation pond 7. In the event that all 3 evaporation ponds are reaching their freeboard, liquid wastes can be removed via a submersible pump for temporary storage and/or disposal off site to an appropriately authorised facility.

The Licence Holder does not anticipate the ponds reaching capacity due to very high evaporation rates at the site, with average evaporation in Karratha estimated to be 3,200 mm per year, with a monthly average of 175 mm in July (winter) and 300 mm in January (summer). The Licence Holder has advised that the evaporation ponds have historically operated at less than 30% capacity. As there is no increase in liquid waste annual throughput and the landfill is expected to generate minimal leachate, a significant increase in pond levels, or liquids stored within the ponds, is not expected. Extreme rainfall events (storm or cyclone) are also not expected to result in the overtopping of the ponds as they have been constructed to contain a 1 in 20 year rainfall event of 24 hrs duration

When the ponds are dry and a sufficient amount of residue has accumulated, they are cleaned

out with all residue removed for disposal into the Class III landfill cells. Residues recovered from the ponds will be tested to ensure that they meet the acceptance criteria for Class III landfills. After cleaning, liner integrity will be assessed to ensure no damage to pond liner.

Key Finding: The Delegated Officer considers that the existing leachate management system for the Class III landfill cells is acceptable.

4.5 Groundwater monitoring

4.5.1 Addition of monitoring locations

The depth to groundwater at the Premises ranges between 7.8 to 11.4 meters below ground level (mbgl), with a groundwater separation distance of 3.3 mbgl maintained from the base of the Class III landfill cells as a minimum following the wet season. Groundwater is known to move generally in a north easterly direction across the Premises, and discharges approximately 7 km away into Nickol Bay.

Groundwater monitoring conditions within the existing licence require quarterly monitoring for a range of inorganic and organic parameters. Monitoring occurs across 8 bores at the Premises as located in Figure 3, with all monitoring bores being hydraulically up gradient of the Class III cells. The Delegated Officer has indicated to the Licence Holder during the assessment process that the lack of any down hydraulic gradient monitoring bores does not allow for the monitoring of potential impacts of landfilling activities to surrounding groundwater (e.g. any failure of landfill containment infrastructure).

Notwithstanding the above, the Licence Holder has indicated that monitoring bores are present hydraulically down gradient of the Class III cells, albeit not included within the existing licence. To monitor any potential impacts to groundwater from containment infrastructure failure, the Licence Holder has proposed to incorporate these additional bores into the existing groundwater monitoring program on site. The location of these proposed additional bores is indicated in Figure 4.

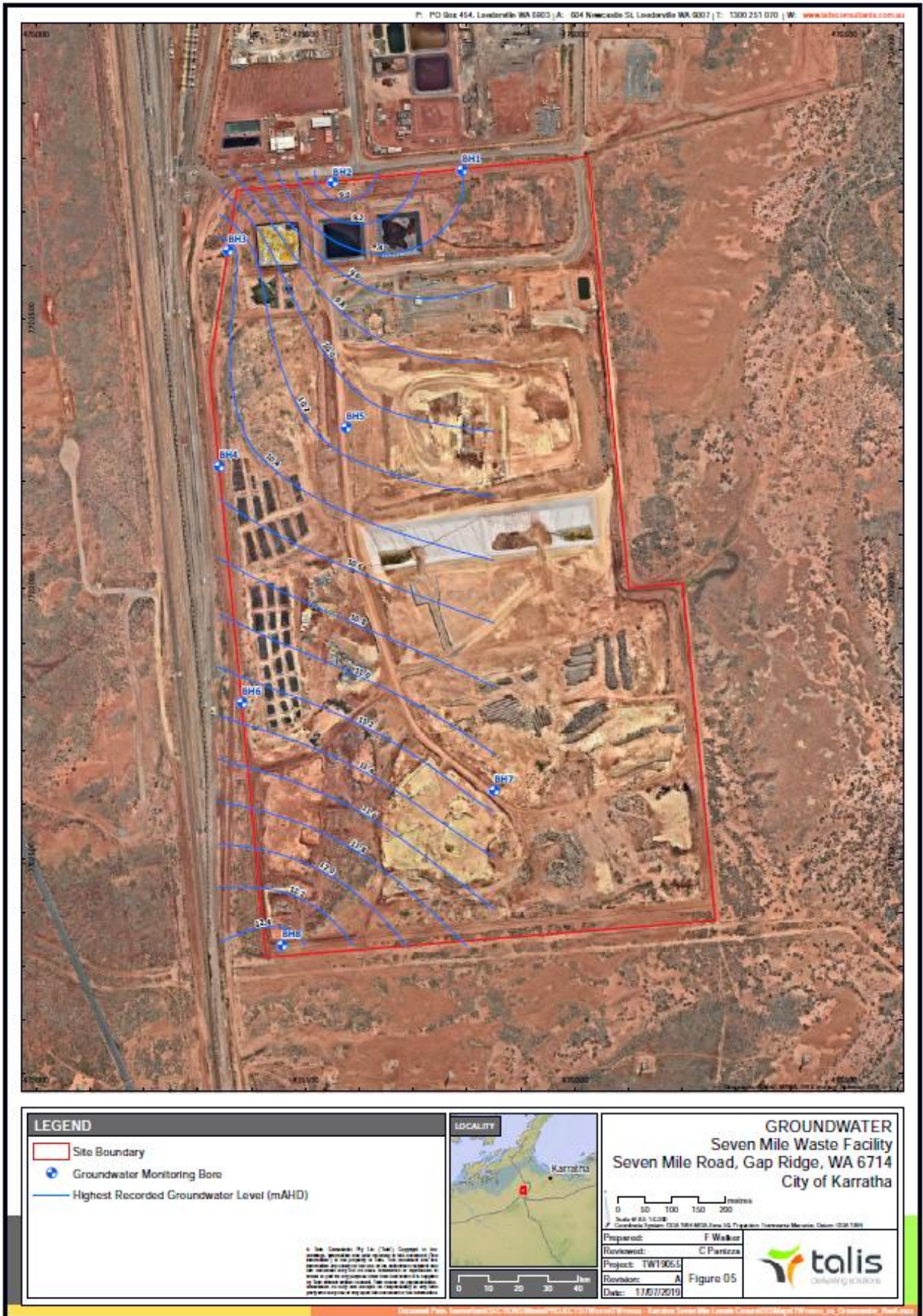


Figure 3: Current groundwater monitoring bore locations

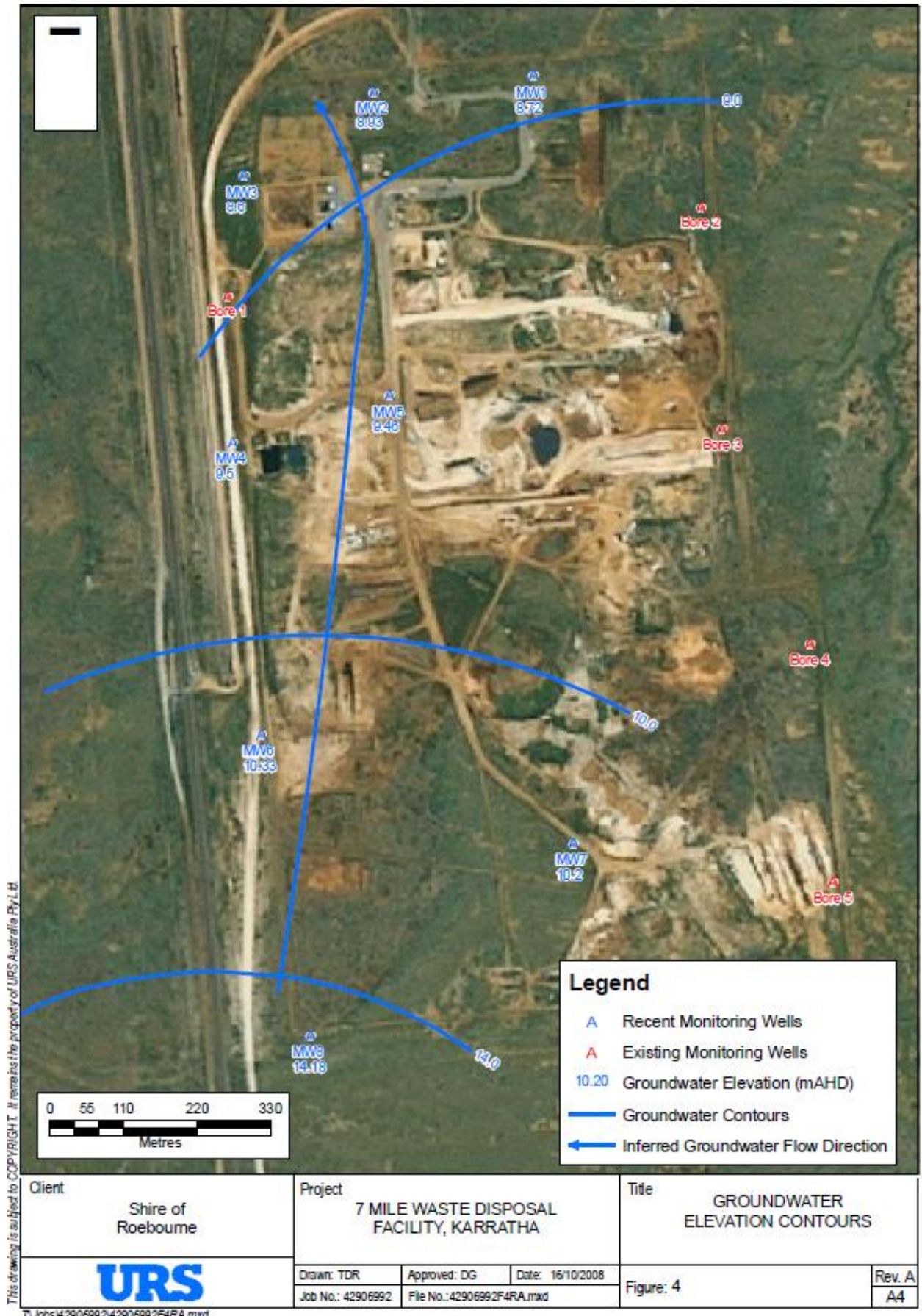


Figure 4: Locations of proposed additional groundwater monitoring bores

4.5.2 PFAS monitoring program

The Licence Holder has proposed to expand the existing groundwater monitoring program required by the existing licence to ensure samples are also tested for the presence of PFAS. The Licence Holder has proposed the following:

- Groundwater samples collected for analysis will be from the 8 existing monitoring bores, and the additional bores proposed for inclusion in the Licence;
- Prior to the first disposal of PFAS contaminated material at the Premises, all groundwater samples will be analysed for PFAS to provide a baseline assessment for existing water quality;
- Groundwater samples will be analysed for PFAS compounds on an annual basis, with samples being taken following the wet season (March to April);
- Monitoring will be undertaken in accordance with the requirements specified in Section 18 of the PFAS NEMP and will be analysed by a National Association of Testing Authorities (NATA) accredited laboratory using relevant methodology;
- Analytes to be included from groundwater monitoring will be at a minimum those outlined in Table 8 below;
- Analytical results will be compared to the freshwater and marine water ecological guideline values for aquatic ecosystems at 90% species protection level for highly disturbed systems, as specified in Table 5 of the PFAS NEMP; and
- Analytical results for PFAS will be reported to DWER within the Annual Environmental Report required by existing licence conditions.

Table 8: PFAS analytes included in groundwater monitoring

Analyte	Units
Perfluorooctane sulfonate (PFOS)	µg/L
Perfluorooctanoic acid (PFOA)	
6:2 Fluorotelomer sulfonate (6:2 FtS)	
8:2 Fluorotelomer sulfonate (8:2 FtS)	
Perfluoroheptanoic acid (PFHpA)	
Perfluorobutane sulfonate (PFBS)	
Perfluorobutanoic acid (PFBA)	
Perfluorohexanoic acid (PFHxA)	
Perfluorohexane sulfonate (PFHxs)	
Perfluoropentanoic acid (PFPeA)	

Key Finding: The Delegated Officer considers that the inclusion of groundwater monitoring bores down-gradient of the Class III cells is required to accurately detect any changes to groundwater as a result of premises activities.

The Delegated Officer also considers the inclusion of PFAS analytes within the

groundwater monitoring program necessary to monitor changes in groundwater condition resulting from the acceptance and disposal of PFAS materials at the premises.

5. Other approvals

The Premises is located in an area zoned as 'Public purposes: Waste disposal and treatment' as defined by the City of Karratha's Local Planning Scheme No. 8. The proposed activities specified under this amendment application fall under the public works exemption, acknowledging that the site is already licenced as a waste management facility. As a result, no planning approvals are required for ongoing Premises activities.

The Licence Holder has provided the following information relating to other approvals as outlined in Table 9.

Table 9: Relevant approvals

Legislation	Number	Approval
<i>Rights in Water and Irrigation Act 1911</i>	201359	Groundwater Licence for the extraction of 50,000 kL per annual period. Expiry 24 May 2028.

6. Amendment history

Table 10 provides the amendment history for L7021/1997/15 over the last decade.

Table 10: Licence amendments

Instrument	Issued	Amendment
L7021/1997/13	20 June 2009	Licence re-issue.
L7021/1997/14	20 June 2012	Licence re-issue.
L7021/1997/14	23 August 2013	Licence amendment for two evaporation ponds.
L7021/1997/14	30 October 2014	Licence amendment for addition of Category 62 and conversion to new format.
L7021/1997/15	11 June 2015	Licence re-issue.
L7021/1997/15	3 December 2015	Licence amendment for administrative changes.
L7021/1997/15	23 December 2016	Licence amendment to accept oily saline water for disposal via evaporation.
L7021/1997/15	18 May 2017	Licence amendment for construction of Class III cells and rehabilitation of existing landfill cell.
L7021/1997/15	29 October 2018	Minor amendment allowing the acceptance of Class III and the use of the constructed Class III cell.
L7021/1997/15	12 November 2019	Licence amendment for the addition of Category 61A, the increase of throughput capacity of Category 57, amalgamation of previous licence and amendment notices, and conversion to new format.

Instrument	Issued	Amendment
L7021/1997/15	20/5/20	Licence amendment for an increase in annual waste acceptance, expansion of liquid and solid waste acceptance, expansion of Special Waste Type 1 acceptance, Special Waste Type 3 acceptance, and clarifications to the existing licence containment infrastructure.

7. Location and receptors

7.1 Sensitive and Environmental receptors

Table 11 below lists the relevant sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 11: Receptors and distance from activity boundary

Residential and sensitive premises	Distance from Prescribed Premises Boundary
Commercial Premises	Adjacent to Premises
Stayover Kingfisher Village	1.4 km south-east of Premises
Civeo Karratha Village	2.2 km north-east of Premises
Residential properties	3 km north-east of Premises

Table 12 below lists the relevant environmental receptors in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 12: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises Boundary
Pilbara Groundwater Area (<i>RIWI Act 1914</i>) <ul style="list-style-type: none"> Groundwater typically 6-10 m below existing ground level Hyper saline brackish 	Premises mapped within this designated area
Pilbara Surface Water Area (<i>RIWI Act 1914</i>)	Premises mapped within this designated area
Threatened ecological communities <ul style="list-style-type: none"> Roebourne Plains gilgai grasslands 	Premises mapped within this area
Surface water lines <ul style="list-style-type: none"> Seven Mile Creek Minor non perennial water course 	490 m east of Premises

8. Risk assessment

Table 13 below describes the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. Both tables identify whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 13: Risk assessment for proposed amendments during operation

Risk Event					Consequence rating	Likelihood rating	Risk	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	Potential emissions	Potential receptors	Potential pathway and receptor (impact)	Licence Holder controls					
Increase in throughput of Category 64 from 100,000 tonnes per annual period to 150,000 tonnes per annual period	Liquid waste: Overtopping of evaporation pond 7 due to an increased quantity of landfill leachate generate from increased waste disposal	Commercial Premises adjacent to the Premises Seven Mile Creek and minor non perennial water sources – 490 m east of Premises Pilbara Surface Water Area – Premises within designated area Pilbara Groundwater Area – Premises within designated area Threatened ecological communities (Roebourne Plains gilgai grasslands) – mapped within Premises area	Surface runoff: Overland flow of liquid wastes	As outlined in Section 4.4.	Major	Unlikely	Medium	As outlined in Section 9.2	Conditions 25 – 28: Liquid Waste Management
	Dust: Increased waste handling and disposal, and increased movement of vehicles	Commercial Premises adjacent to the Premises Stayover Kingfisher Village 1.4 km south-east of Premises Threatened ecological communities (Roebourne Plains gilgai grasslands) – mapped within Premises area	Air: Health and amenity impacts	As outlined in Section 4.1.	Moderate	Unlikely	Medium	The Delegated Officer considers that an increase in Premises throughput will not significant increase the emission of fugitive dust. Current dust management practices in place at the Premises will be sufficient to continue to manage potential dust emissions. With current controls in place by the Licence Holder, it is considered unlikely that dust generated during operation of the landfill will travel 1.4 km to the nearest residential receptors.	Dust emissions can be adequately regulated under the general provisions of the EP Act.
	Odour: Generated from increased quantities of accepted wastes	Commercial Premises adjacent to the Premises Stayover Kingfisher Village 1.4 km south-east of Premises		As outlined in Section 4.1.	Slight	Possible	Low	The Delegated Officer considers that an increase in Premises throughput may increase localised odour emissions, however an increase in odour emission can be adequately mitigated through the use of current management practices already in place at the site.	Condition 11: Landfill cover requirements. Odour emissions from other operational aspects can adequately regulated under the general provisions of the EP Act, if required.
	Noise: Increased movement of vehicles transporting waste	Civeo Karratha Village 2.2 km north-east of Premises Residential properties 3 km north-east of Premises		As outlined in Section 4.1.	Minor	Unlikely	Medium	The Delegated Officer considers that an increase in Premises throughput will not significant increase noise emissions arising from the Premises. Current noise management practices appear sufficient to continue mitigation of noise emissions.	Noise emissions are regulated under the EP (Noise) Regulations.
Acceptance of new solid and liquid waste types	Leachate: Leaks resulting from conveyance infrastructure or liner failure, and poor liner construction	Commercial Premises adjacent to the Premises Seven Mile Creek and minor non perennial water sources – 490 m east of Premises Pilbara Surface Water Area – Premises within designated area Pilbara Groundwater Area –		Seepage: Lateral and vertical sub-surface migration of leachate to groundwater	As outlined in Section 4.	Major	Unlikely	Medium	As outlined in Section 9.1

Risk Event					Consequence rating	Likelihood rating	Risk	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	Potential emissions	Potential receptors	Potential pathway and receptor (impact)	Licence Holder controls					
	Liquid waste: Overtopping of ponds containing liquid waste types and landfill leachate	Premises within designated area Threatened ecological communities (Roebourne Plains gilgai grasslands) – mapped within Premises area	Surface runoff: Overland flow of liquid wastes	As outlined in Section 4.4.	Major	Unlikely	Medium	As outlined in Section 9.2	Conditions 25 – 28: Liquid Waste Management
	Asbestos: Waste handling resulting in a release of asbestos fibres into the air	Commercial Premises adjacent to the Premises Stayover Kingfisher Village 1.4 km south-east of Premises Civeo Karratha Village 2.2 km north-east of Premises	Air: Health and amenity impacts	As outlined in Section 4.1.	Major	Unlikely	Medium	The Delegated Officer considers that the current asbestos management procedures in place at the Premises are sufficient to manage the acceptance, transportation and disposal of a wider range of asbestos containing products than currently permitted for acceptance on the existing licence. The Delegated Officer considers that additional asbestos containing products and ACM that are proposed to be accepted at the Premises will be adequately managed and disposed of as per the Premises existing asbestos management plan.	Condition 6: Waste acceptance Condition 9: Waste processing Condition 38: Register of asbestos waste
	Odour: generated from acceptance of new waste types wastes	Residential properties 3 km north-east of Premises	Air: Health and amenity impacts	As outlined in Section 4.1.	Slight	Unlikely	Low	The Delegated Officer has reviewed the list of additional waste types to be accepted at the Premises and considers it unlikely that significant odour emissions will occur. Any localised odour emissions will be mitigated through odour management practices currently in effect at the Premises.	Odour emissions will be regulated under the general provisions of the EP Act.
Acceptance of PFAS contaminated solid and liquid wastes	Leachate: Leaks resulting from conveyance infrastructure or liner failure, and poor liner construction	Commercial Premises adjacent to the Premises Seven Mile Creek and minor non perennial water sources – 490 m east of Premises Pilbara Surface Water Area – Premises within designated area Pilbara Groundwater Area – Premises within designated area	Seepage: Lateral and vertical sub-surface migration of leachate to groundwater	As outlined in Section 4.1	Major	Unlikely	Medium	As outlined in Section 9.2	Condition 8: Baseline groundwater monitoring assessment Condition 26: Management of evaporation ponds Conditions 29 – 31: Monitoring of ambient groundwater
	Liquid waste: Overtopping of ponds containing liquid waste types, PFAS contaminated waste and landfill leachate	Threatened ecological communities (Roebourne Plains gilgai grasslands) – mapped within Premises area	Surface runoff: Overland flow of liquid wastes	As outlined in Section 4.4.	Major	Unlikely	Medium	As outlined in Section 9.2	Conditions 25 – 28: Liquid Waste Management

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Department's Guidance Statement: Risk Assessments (February 2017)

9. Detailed Risk Assessment

9.1 Leachate

Leachate generated from the landfilling of wastes may cause contamination of the groundwater from nutrients, metals and toxicants. This may result in a reduction of the quality of extracted groundwater for human uses. There is also potential for leachate to contaminate surrounding land impacting flora associated with Seven Mile Creek and associated minor non-perennial water courses located 490 m east of the Premises.

The existing Class III landfill cells 1 and 2 are constructed with a basal liner system and are consistent with the typical requirements for a Class III landfill containment system. The leachate collection and removal system incorporated into the cells is comprised of:

- A 300mm thick layer of 20mm nominal sized blue metal aggregate;
- A network of slotted polyethylene pipes draining to designated sumps and extraction points located on the perimeter of the cells;
- Polyethylene side slope risers located on an additional layer of HDPE lining in order to minimise damage to the cell liner; and
- A second polyethylene pipe running next to the side slope riser for use as a monitoring probe sleeve.

Leachate generated from the Class III landfill cells at the Premises is likely to contain PFAS due to the acceptance of PFAS contaminated solid wastes into the landfill. All leachate will be directed into evaporation pond 7, with leachate generation continuously logged by a monitoring and control system installed into the leachate collection network. Liquid PFAS contaminated waste will also be disposed of into evaporation pond 7.

Evaporation pond 7 is constructed with a compacted sub-base and a 2mm HDPE impermeable liner to achieve a permeability of 10^{-9} m/s or less. The Licence Holder undertakes inspections of visible sections of the pond liner every 6 months to ensure that the liners integrity is maintained.

Stormwater is diverted from the evaporation pond using a perimeter drainage network. The pond has been demonstrated to have a holding capacity which is sufficient to contain leachate generated from the landfill, additional PFAS contaminated wastes and accommodate for a 1 in 20 year rainfall event of 24hrs duration. The ponds are also not expected to reach capacity due to the extremely high evaporation rates demonstrated at the Premises.

Seepage assessments conducted on the Class III landfill cells indicate that the leachate production rate in a capped landfill cell would be less than 0.00015mm/m²/year and 0.0002 mm/m²/year during operation due to the low annual rainfall and the high rate of evapotranspiration at the premises. Modelling conducted suggests seepage from the Class III cells range from 0.00219 to 0.06329 L/ha/day and leachate seepage within the capped landfill ranges from 0.00164 to 0.04329 L/ha/day.

To assist with the detection of any failure of landfill containment infrastructure, the Licence Holder is proposing to undertake ambient groundwater monitoring from an additional 5 bores. The inclusion of these bores will encompass groundwater hydraulically down-gradient of the landfill cells and evaporation ponds, and is expected to provide an indication of impacts to groundwater from Premises operations. Sampling for a range of common PFAS parameters is also included within the groundwater monitoring schedule on an annual basis.

The Delegated Officer notes that due to the minor quantities of leachate generated to date from within the active landfill cells (landfill cells 1 and 2), an assessment of the functionality of the leachate collection and removal system is unable to be made. The Delegated Officer notes however that as the remaining Class III cells are constructed and connected into the leachate

management system, larger quantities of leachate are expected to be generated.

Key Finding: The Delegated Officer notes the siting guidance outlined in the PFAS NEMP and that the Premises is located on a high vulnerability aquifer, and that Seven Mile Creek and other associated minor non perennial watercourses are located 490 m east of the Premises boundary.

The Delegated Officer has considered the toxicity and persistence of PFAS and has determined that based on the siting of the landfill, pathways to groundwater and the potential consequences of leachate emissions containing PFAS impacting on-site and local/regional groundwater quality, the consequence rating is **Major**.

The Delegated Officer has considered the siting of the landfill and the construction and design of existing Class III landfill cells and the leachate extraction systems and considers that the likelihood of this consequence occurring is **Unlikely**.

The overall rating for the risk of leachate emissions from the Class III landfill cells during operation is therefore **Medium** and acceptable subject to regulatory controls.

The Delegated officer considers that deviations from the PFAS NEMP siting criteria can be supported based on the suitability and control measures of the Licence Holders infrastructure to receive and store PFAS contaminated wastes.

The requirement for the ongoing monitoring of landfill leachate generated has been incorporated into licence conditions to ensure that the performance of the leachate collection and removal system is monitored as further Class II landfill cells are constructed and utilised.

9.2 Liquid Waste

The acceptance of liquid waste onto the premises may cause contamination of the groundwater from nutrients, metals and toxicants. This may result in a reduction of the quality of extracted groundwater for human uses. There is also potential for liquid waste to contaminate the surrounding land impacting flora associated with Seven Mile Creek and associated minor non-perennial water courses located 490 m east of the Premises.

Evaporation ponds 5 and 6 will contain liquid wastes and evaporation pond 7 will contain leachate generated from the Class III landfill and PFAS contaminated liquids. All three ponds are constructed with compacted sub-base and a 2mm HDPE impermeable liner to achieve a permeability of 10^{-9} m/s or less. The ponds are constructed to hold a maximum of 9,450 tonnes of liquid waste and have an overflow capacity of 1,100 tonnes within a 0.5 m freeboard with drainage infrastructure constructed around the perimeter to prevent the infiltration of stormwater into the ponds. The Licence Holder is also required to maintain a freeboard of 0.5 m to allow for a 1 in 20 year rainfall event of 24hrs duration under current licence conditions.

Evaporation pond 7 is fitted with additional control measures to prevent overtopping due to the increased risk of PFAS contaminated waste entering the environment. These measures include an alarm system which activated when the available freeboard reduces to 700 mm, the ability to retain leachate within the landfill cells to prevent further transfer to pond 7, and the emergency standby pumps which can be utilised to pump liquid wastes into ponds 5 and 6. Ponds 5 and 6 are constructed to the same specification as pond 7 and hence share the same suitability for the storage of landfill leachate and PFAS contaminated material.

The very high evaporation rate experienced at the Premises will assist in effectively maintaining a relatively low pond capacity. The Delegated Officer notes the evaporation rate at the Premises will also assist in ensuring overtopping of the ponds does not occur, however overflow capacity and storm water management have been taken into account to ensure that the infrastructure has the capacity to manage an influx of storm water resulting from a significant rainfall event

(storm or cyclone) which is considered to be a likely event at the Premises.

To assist with the detection of any failure of evaporation pond liner or leachate collection infrastructure, the Licence Holder is proposing to undertake ambient groundwater monitoring from an additional 5 bores. The inclusion of these bores will encompass groundwater hydraulically down-gradient of the landfill cells and evaporation ponds, and is expected to provide an indication of impacts to groundwater from Premises operations. Sampling for a range of common PFAS parameters is also included within the groundwater monitoring schedule on an annual basis.

Key Finding: The Delegated Officer notes the siting guidance outlined in the PFAS NEMP and that the Premises is located on a high vulnerability aquifer, and that Seven Mile Creek and other associated minor non perennial watercourses are located 490 m east of the Premises boundary.

The Delegated Officer has considered the toxicity of liquid wastes and has determined that based on the siting of the landfill, pathways to groundwater receptors and the potential consequences of liquid waste emissions impacting on-site and local/regional groundwater quality, the consequence rating is **Major**.

The Delegated Officer has considered the siting of the landfill, the design of the leachate extraction systems and the construction and design of the evaporation ponds and considers that the likelihood of this consequence occurring is **Unlikely**.

The overall rating for the risk of liquid waste emissions from the evaporation ponds during operation is therefore **Medium** and acceptable subject to regulatory controls.

The Delegated officer considers that deviations from the PFAS NEMP siting criteria can be supported based on the suitability and control measures of the Licence Holders infrastructure to receive and store PFAS contaminated wastes.

Conditions on the existing licence specifying management practices for liquid waste appear adequate to mitigate the risk posed by an increase in landfill leachate generation and expansion of liquid waste acceptance at the Premises.

The inclusion of additional groundwater monitoring bores hydraulically down gradient of the evaporation ponds will assist in monitoring the integrity of the pond liner and leachate collection infrastructure.

10. Consultation

A summary of Licence Holder comments and any subsequent actions taken by DWER is included in Table 14 below.

Table 14: Summary of consultation

Method	Comments received	DWER response
<p>Applicant referred draft documents (27 February 2020)</p>	<p>It is confirmed that a throughput of 150 000 tonnes per annum will encompass the receipt of all waste types received under the defined waste types of Condition 6, Table 3.</p>	<p>Throughput reflected in Licence.</p>
	<p>Please include F100 and F120 on the amended licence for waste acceptance (reflecting the acceptance of paint and similar waste types). Please also include F130 and F110. Paint will be accepted for storage and removed offsite, as waste category F100, F110, F120 and F130.</p>	<p>Waste codes and relevant waste types included in waste acceptance conditions (Condition 6, Table 3) and waste processing conditions (Condition 9, Table 4).</p>
	<p>To clarify waste disposal and storage, no other wastes will be disposed of onsite other than those already nominated. All other waste will be stored for offsite removal.</p>	<p>Noted. Conditions retained in the licence.</p>
	<p>Septage waste, sewerage waste and waste from grease traps are disposed of to Evaporation Ponds 5 and 6.</p>	<p>Disposal method for these waste types reflected in waste processing conditions (Condition 9, Table 4).</p>
	<p>Liquid waste (with the exception of Special Waste Type 3) is proposed to be discharged into Evaporation ponds 5 and 6</p>	<p>Noted – reflected in licence conditions.</p>
	<p>Leachate and Special Waste type 3 will be disposed of to Evaporation Pond 7.</p>	<p>Noted – reflected in licence conditions.</p>
	<p>Please remove Bores 1 – 5 from the required monitoring point locations. The City of Karratha proposes to install a new groundwater well onsite, immediately down hydraulic gradient of the proposed organics processing hardstand, but up-gradient from Class III landfill Cell 2. The proposed location of this well will enable the City to assess if there is any contamination of groundwater relating to proposed composting activities, and confirm whether the inferred groundwater flow direction is in fact in a north-north westerly direction and not north-north easterly, supporting the request for removing Bores 1-5 from monitoring requirements stipulated in the draft licence. Bore 1 is also damaged and cannot be sampled.</p>	<p>In response to the Licence Holders comments, the application was referred internally to DWER's Hydrogeology branch for comment. Feedback received indicates that the direction of groundwater flow at the Premises is in a north-easterly direction, assuming all bores have a screened interval at approximately the same level in the same aquifer. Whilst the Licence Holders comments have been considered, based on the Hydrogeology advice and the outcome of the risk assessment, the requirement for the inclusion of the additional monitoring bores within the monitoring schedule for the site will remain on the Revised Licence. The placement of the bores along the eastern boundary will provide information on the Premises boundary to give an indication of water quality as it leaves the site. The bore which is located near the dog-leg on the eastern boundary is particularly important, as there is the potential for groundwater flow</p>

		<p>near this site to affect vegetation along the creek, or organisms that live in the hyporheic zone beneath the creek bed.</p> <p>The proposed installation of the groundwater bore adjacent to the composting facility will be considered as a part of the Works Approval application.</p> <p>The Delegated Officer considers that the existing 4 bores along the western boundary of the site will accurately encompass groundwater movement at this location and will remove the requirement for the monitoring of the damaged bore (Bore 1).</p> <p>A condition will be added to the Licence requiring the submission of an estimate of screening depth for the 4 eastern boundary bores within 3 months of the Revised Licence being issued.</p>
	<p>Blending of dry/spadable residue from the evaporation ponds will occur on a layer of sacrificial sand located within the Class III landfill cell. Due to being inside the Class III landfill cell, any stormwater received will be retained within the hardstand area.</p>	<p>The blending of wastes which exceed the Class III landfill acceptance criteria on a layer of sacrificial sand within the Class III cell is not an acceptable treatment for these wastes, as to perform the blending the landfill must first receive wastes that exceed the landfill acceptance criteria.</p> <p>Reference to blending will be removed from the Decision report. All waste exceeding the Class III acceptance criteria is required to be removed from site for disposal at an appropriately licenced facility.</p>
	<p>The process proposed for the acceptance of Special Waste Type 3 is as follows:</p> <ul style="list-style-type: none"> • All waste generators must obtain a Special Waste Disposal Permit prior to arriving onsite for disposal of waste. • The permit application submitted is accompanied with NATA analyses relevant to Landfill suite. • The Waste Management Technical Officer assesses all permit applications submitted and NATA analyses and issue permits for disposal. • Random Spot Audits are also conducted onsite to verify NATA analysis results • All waste transporters seeking to dispose of waste to the 7 Mile WDF must demonstrate that it complies with the Class III landfill requirements, or it will not be accepted. 	<p>Acceptance specification for Special Waste Type 3 reflected in the Decision Report.</p> <p>The Delegated Officer notes that PFAS concentrations within any residues recovered from the Evaporation Ponds will also need to meet the Class III acceptance criteria. If criteria is exceeded, waste is required to be removed from site for disposal at an appropriately licenced facility.</p>

	<ul style="list-style-type: none"> • No blending of Special Waste Type 3 containing material will occur on site. 	
	<p>There is no pond crust present on the evaporation ponds due to the nature of the liquid waste disposed.</p> <p>Disturbance of the pond surface is minimised to reduce the likelihood of odour emissions.</p> <p>Weeds may be removed from the perimeter of the evaporation pond from time to time, however this activity is not expected to produce significant odour emissions.</p> <p>Oxidising compounds are regularly applied to neutralise noxious odours.</p>	<p>As no pond crust is present on the evaporation ponds, the requirement for the Licence Holder to maintain the pond surface free of encroaching vegetation or debris has been retained within the Licence.</p>
	<p>The correct units for the evaporation pond holding capacity is tonnes, as per the Works Approval granted (W5182/2012/1) for construction of Pond 6 & 7 (referred to as pond 2 & 3), submitted to DWER 12 July 2012.</p> <p>The overflow area of the pond is included within the minimum 500 mm freeboard that is maintained within the ponds. The pond overflow forms part of the Evaporation Pond construction.</p> <p>Overtopping of ponds is very unlikely to occur as the ponds are engineered to have a minimum of 500 mm freeboard. Leachate from the landfill cells will cease to be pumped to Evaporation Pond 7 when the float reaches 500 mm from the top of the pond. For overtopping to occur, at least 450 mm of rain would need to be received, which is not expected to occur on a regular basis. For example, in the recent event of Tropical Cyclone Damien, total rainfall received was approximately 235 mm. No overtopping of the ponds occurred in this instance.</p>	<p>Holding capacity units for the evaporation pond has been corrected to 'tonnes' within the decision report. Evaporation pond specifications have been updated in the Decision Report.</p> <p>Leachate and overtopping controls within the landfill cells have been updated within the Decision Report.</p>
	<p>The Sump Capacity at the base of the Class III landfill cell is 10 kL (5000 x 4000 x 500 mm).</p> <p>Air well pump is approximately 0.2 m in height and 0.9 m in length. The sump fills with leachate from the bottom. When leachate levels submerge a sensor on the pump positioned at 0.23 m above the sump base, this triggers the controller to feed air into the submerged pump chamber and pump leachate from the sump to Evaporation Pond 7.</p>	<p>Sump capacity has been reflected within the Decision Report.</p> <p>Leachate and overtopping controls within the landfill cells have been updated within the Decision Report.</p>
	<p>The City is able to complete an inspection of the visible section of liner on a six monthly basis.</p> <p>A report relating to the integrity and inspection of Pond 7 has already been submitted to DWER (before acceptance of leachate to Pond 7).</p>	<p>Decision Report updated to reflect inspection of visible section of the liner only.</p>
	<p>Please note that the reference to the perimeter bunding in the original licence amendment application and previous correspondence is incorrect.</p>	<p>Reference to perimeter bunding removed from Decision Report.</p>

	<p>There is currently no perimeter bunding present around the site that contains surface water runoff from the entire site within the site boundary.</p>	<p>The Delegated Officer considers that the lack of entire Premises perimeter bunding will not have a significant impact on the risk assessment outcome due to pond overtopping controls in place at the Premises.</p>
	<p>The ponds have been constructed to contain a 1 in 20 year storm event of 24 hrs duration, not a 1 in 100 year rainfall event of 24 hrs duration.</p>	<p>Pond construction specifications updated in the Decision Report. The Delegated Officer considers that the pond capacity will be adequate to accommodate stormwater from low frequency high intensity rainfall events.</p>
	<p>Groundwater bores MW1 to MW8 were monitored for groundwater level in March 2020. It is likely that the March groundwater level represents the shallowest groundwater separation distance experienced throughout a year, as it is after the wet season. Monitoring results from March 2020 indicate the separation distance to groundwater ranges from 7.8 to 11.4 m below ground level (bgl). As the base of the Class III landfill cells is 4.5 m bgl, this provides a separation distance of 3.3 m as a minimum following the wet season. However the separation distance varied significantly, with a groundwater separation distance of 6.9 m at other locations. These values are seasonal.</p>	<p>Groundwater separation distances updated within the Decision Report to reflect most recent monitoring results.</p>

11. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a licence amendment will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

11.1 Summary of amendments

Table 15 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 15: Licence amendments

Condition No.	Proposed amendments
N/A Table 1	Removal of definition for 'AQIS'
N/A Table 1	Removal of definition for 'Contaminated Solid Waste'
N/A Table 1	Insertion of definition for 'Special Waste Type 3'
N/A Table 1	Insertion of definition for 'Wastewater'
6 Table 3	Insertion of new waste codes (where relevant) Increase in annual throughput of solid waste (Category 64) Removal of 'Contaminated Solid Waste' Removal of reference to 'Hazardous Waste' Addition of Special Waste Type 3 (solid and liquid waste) Change in Special Waste Type 2 specification to limit acceptance of friable asbestos only Clarification added to solid and liquid waste acceptance specifications
8	Insertion of new condition requiring the submission of a baseline groundwater monitoring system prior to the acceptance of Special Waste Type 3
9 Table 4	Correction of administrative errors and restructuring of table Removal of 'Contaminated Solid Waste' Clarification added to process limits of solid and liquid wastes Inclusion of 'Special Waste Type 3' process limits
11 Table 5	Inclusion of daily landfill cover requirements for Special Waste Type 3 and removal of reference to 'solid waste'
25	Correction of administrative errors

Table 7	Change of material to be treated in Ponds 5 and 6 Change of material to be treated in Pond 7
29	Condition removed as action has been completed
32	Insertion of new condition requiring the submission of evidence of the depth, condition and screening intervals of the additional groundwater monitoring bores by 15 August 2020
33 Table 8	Removal of 'Contaminated Solid Waste' Removal of 'Hazardous' Insertion of 'Special Waste Type 3'
35 Table 10	Insertion of new condition specifying the monitoring of leachate generated from the Class III landfill cells
39	Incorporation of 'Quarantine Waste' to encompass wording removed from condition 6 (waste processing)
40 Table 10	Correction of administrative errors Insertion of monitoring requirement for landfill leachate generation
N/A Table 13	Increase in Category 64 annual throughput to 150,000 tonnes
N/A Table 14	Inclusion of additional groundwater monitoring bores Inclusion of PFAS groundwater monitoring parameters, averaging period, monitoring frequency and method
N/A Schedule 4 and Table 15	Insertion of new Schedule and Table outlining concentration limits for PFAS contaminated material

Melissa Chamberlain
A/MANAGER WASTE INDUSTRIES
INDUSTRY REGULATION

An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

Document title	Availability
Licence L7021/1997/15 – Seven Mile Waste Disposal Facility	accessed at www.dwer.wa.gov.au
Talis Consultants, September 2018. <i>CQA Validation Report – Cell 1 & 2 Construction – Seven Mile Waste Disposal Facility</i>	DWER records (A1729841)
DWER, October 2018. <i>CQA Compliance assessment report Cells 1 & 2 – Seven Mile Waste Disposal Facility</i>	DWER records (A1729843)
Bowman & Associates Pty Ltd, April 2013. <i>Evaporation Pond 2 & 3 Construction Compliance Report – Seven Mile Waste Disposal Facility</i>	DWER records (A619494)
DWER, August 2013. <i>Licence Amendment – L7021/1997/15 – Seven Mile Waste Disposal Facility</i>	DWER records (A666294)
DWER, May 2017. <i>Licence Amendment – L7021/1997/15 – Seven Mile Waste Disposal Facility</i>	DWER records (A1427335)
DWER, December 2016. <i>Seepage report - Seven Mile Waste Disposal Facility</i>	DWER records (A1333803)
Talis Consultants, October 2019. <i>CQA Validation Report – Leachate Extraction System Installation - Seven Mile Waste Disposal Facility</i>	DWER records (A1862270)
Works Approval W5182/2012/1 – Seven Mile Waste Disposal Facility	DWER records (A523919)
HEPA, January 2018. PFAS National Environmental Management Plan. Heads of EPAs Australia and New Zealand (HEPA).	accessed at https://www.epa.vic.gov.au/for-community/environmental-information/land-groundwater-pollution/pfas-national-environmental-management-plan
DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	accessed at www.dwer.wa.gov.au
DER, October 2015. <i>Guidance Statement: Setting conditions</i> . Department of Environment Regulation, Perth.	
DER, August 2016. <i>Guidance Statement: Licence duration</i> . Department of Environment Regulation, Perth.	
DER, November 2016. <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.	
DER, June 2019. <i>Guideline: Decision Making</i> . Department of Water and Environment Regulation, Perth.	