Decision Report

Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6534/2021/1
Applicant	Shire of Coolgardie
File number	DER2021/000058
Premises	Coolgardie Waste Facility Coolgardie Tip Road COOLGARDIE WA 6492 Legal description - Crown Reserve 3497 Lot 501 on Deposited Plan 255090 As defined by the coordinates in Schedule 1 of the works approval
Date of report	02/09/2021
Decision	Works approval granted

Jarrod Abrahams

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MANAGER WASTE INDUSTRIES
REGULATORY SERVICES

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the premises. As a result of this assessment, works approval W6534/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary

On 5 February 2021, the Shire of Coolgardie (the applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake construction works relating to a Class III engineered landfill cell and associated leachate pond and stormwater basins at the Coolgardie Waste Facility (the premises). The premises is situated approximately 2.2 km west of the Coolgardie township, and is owned and operated by the Shire of Coolgardie.

The premises relates to the category and assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6534/2021/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) is also outlined in works approval W6531/2021/1.

Overview of existing facility

The premises is currently registered with the department (R1550) under the EP Regulations as a Category 89 putrescible landfill site with a production or design capacity of greater than 20 tonnes and less than 5, 000 tonnes per year. As part of operating under a registration, the Shire is required to operate the site in accordance with the *Environmental Protection (Rural Landfill) Regulations 2002*.

Currently the site accepts the following waste streams at the facility:

- Putrescible waste, asbestos and used tyres for landfilling in unlined trenches;
- Dead animals for burial in separate trenches/pits;
- Car bodies and scrap metals stockpiled for collection by metal recyclers;
- Waste mineral oils stored in two dedicated 1, 500 litre tanks for collection by an oil recycler;
- Building rubble which is stockpiled and reused onsite; and
- Green waste for stockpiling, drying, and burning in dedicated trenches.

The premises currently accepts waste from the Shire of Coolgardie and surrounds, including the Kambalda area following the planned closure of the local landfill and the opening of the waste transfer station at the Kambalda Waste Facility.

The premises occupies Reserve 3497, which is vested with the applicant for use as a waste disposal site. The reserve encompasses approximately 40.5 hectares of land abutting

unallocated crown land to the north, west and east and crown lease (GE M-446507) to the south-south-west. The site is accessed from the Great Eastern Highway via Coolgardie Tip Road and is secured by post and wire fences and lockable gates.

A diagram of the existing premises layout is provided in Figure 1.

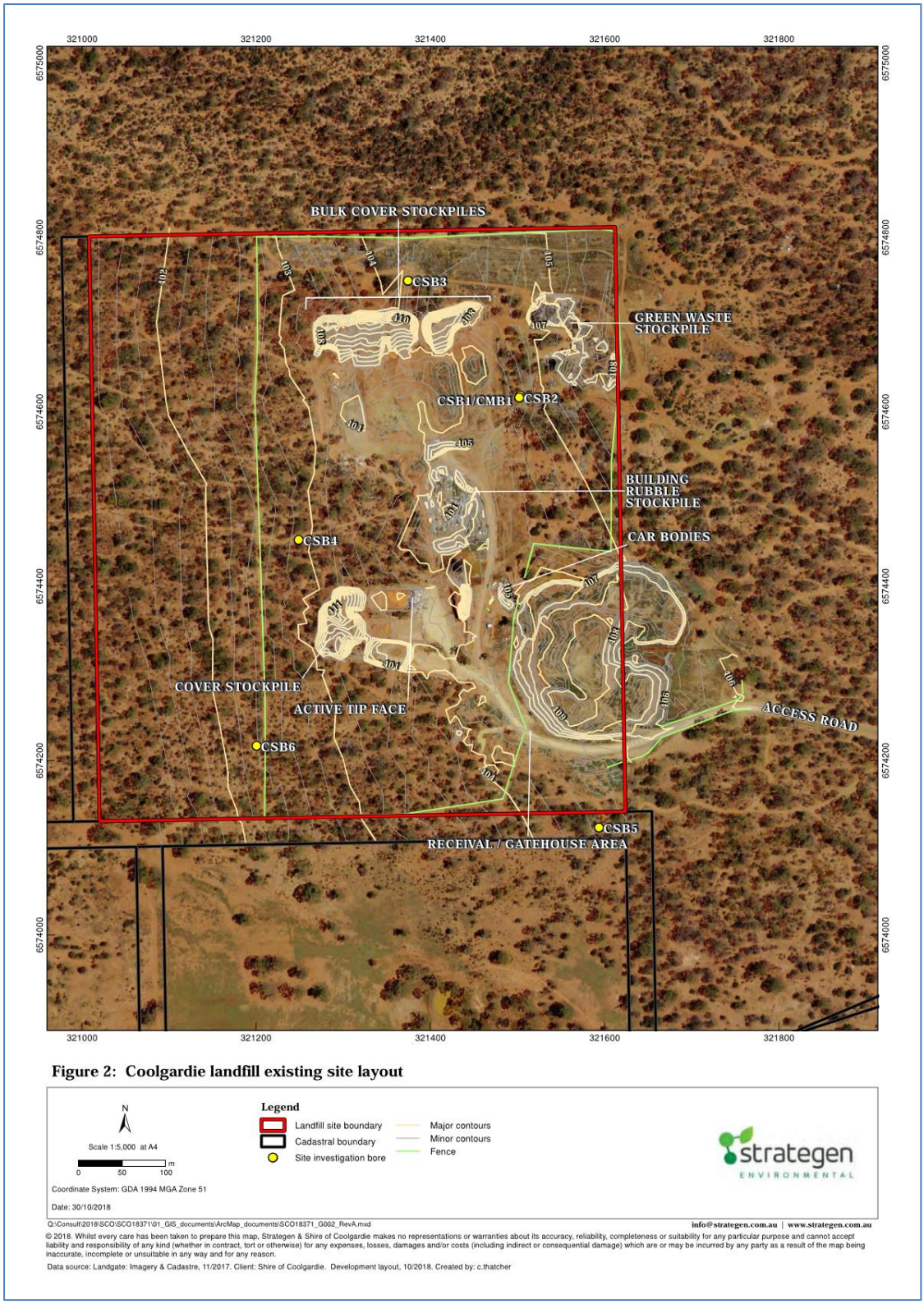

Figure 1: Coolgardie Waste Facility existing layout

2.3 Proposal overview

2.3.1 Description of proposed works

The applicant proposes to expand the capacity of the current waste facility by constructing a Class III landfill cell, which will facilitate the receipt of municipal waste and commercial and industrial wastes from waste generators throughout the Goldfields-Esperance region. The construction of the cell will be undertaken in seven stages across the projected 30-year life of the project.

The construction of the Class III landfill cell necessitates the installation of stormwater and landfill leachate management infrastructure in the form of bunding, collection infrastructure and dedicated leachate evaporation pond and stormwater retention basins. The construction of the new landfill cell and related infrastructure requires the clearing of up to 25.7 hectares of remnant native vegetation. A clearing permit is being assessed separately to this works approval therefore clearing under the works approval is not permitted.

As part of premises upgrades, the applicant intends to install a weighbridge and upgrade existing fences to cyclone fencing with CCTV, razor wire and electrification at strategic locations.

It is intended that in future the premises will also incorporate a small vehicle transfer area, additional landfill cells and other potential waste management activities, such as materials recycling and transfer facilities. However, these activities do not form part of the submitted application.

2.3.2 Construction works

Scope of construction works

The submitted works approval application relates to Stage 1 of the Class III landfill cell only, including construction and installation of the following infrastructure:

- Liner for the majority of the cell floor and the southern batter as well as partial areas of the eastern and western walls;
- Northern separation bund to contain leachate until future cells are constructed to the north;
- Stormwater management infrastructure (southern detention basin);
- Leachate management infrastructure (including lined leachate evaporation pond);
- Temporary and permanent access roads; and
- Perimeter screening berm.

Construction works will be carried out in accordance with a construction environmental management plan to be prepared and implemented on behalf of the applicant. Future stages of the landfill cell development will be authorised through separate approvals. The layout of the proposed upgrades to the premises are depicted in Figure 2.

The sequencing of construction activities to be undertaken on the premises are as follows:

- Clearing and grubbing of remnant native vegetation in accordance with clearing permit;
- Excavation, filling and compaction of landfill void;
- Subgrade installation;
- Compacted clay liner installation;

- Geocomposite liner installation;
- Geomembrane installation and anchoring;
- Geotextile cushion installation;
- Leachate collection system installation;
- Stormwater management system installation; and
- Installation of sidewall protection layer.

Class III landfill design and construction

The Class III landfill cell will be constructed on the western portion of the premises and has been designed around the following criteria:

- Expected landfill cell life of 30 years;
- Assumed annual waste quantity of 30,000 tonnes per year of Class III waste;
- Use of cover materials accounting for approximately 15% of the waste fill;
- Use of other miscellaneous engineering materials accounting for approximately 10% of the waste fill: and
- Combined post-settlement density for waste, cover and miscellaneous engineering materials of approximately 1 tonne/m^3.

The Class III landfill cell will be constructed progressively in seven stages, with a footprint of approximately nine hectares and rectangular geometry of 450 m in length and 200 m in width. The design includes 500 mm deep by 500 mm wide anchor trenches. The height of the associated batter is 8 m.

The staging plan which has been incorporated into the detailed design of the 30-year landfill cell is:

- 3-year annual throughput for Stage 1;
- 4-year annual throughput for Stages 2 – 4; and
- 5-year annual throughput for Stages 5 – 7.

The following design parameters have been considered for Stage 1 of the landfill cell:

- The footprint has been determined to cater for 125,000 m^3 of waste, assuming 1V:3H slopes for waste placement and top waste contours developed as part of the detailed design;
- The subgrade of Stage 1 cell will be over excavated to allow for construction and operation of the cell;
- The proposed elevation of the compacted clay liner is greater than 2 m above the groundwater level;
- The cell base comprises a 1% slope from east to west and 3% slope north to south;
- Sidewalls have been designed at 1V:3H; and
- Given that future stages of the landfill cell will be constructed by tying-in to the previous stage, an inter-cell bund will be incorporated into the design along the northern boundary of the cell floor.

The landfill cell will be constructed by excavation of in-situ soils. Excavated materials will be sorted and stockpiled based on the purpose and quality of the material for future use in:

- Daily cover;
- Construction of the screening berm;
- Landfill construction (i.e., subgrade fill, compacted clay liner, soil protection layer); or
- Landfill rehabilitation (i.e., compacted clay liner, subsoil, revegetation layer).

An access ramp shall be constructed across the perimeter bund to facilitate vehicular access to the landfill cell. The location of the ramp will be determined on the basis that the cell is accessible for the longest possible period. The ramp will accommodate traffic by fully laden articulated waste trucks and in a manner which minimises disturbance to the ramp surface.

Appropriate traffic management measures, including internal speed limits, directional signage, turning areas and limits on vehicle numbers within the premises will be implemented as required to minimise environmental impacts and damage to premises infrastructure.

Liner configuration

The liner will comprise a composite system of prepared subgrade, compacted clay liner, geocomposite clay liner, HDPE geomembrane, leachate drainage aggregate and a soil protection layer.

The details of the proposed cell lining are set out in Table 1 below.

Table 1: Liner profiles of the composite lined Class III cell

Basal liner (top to bottom)	Sidewall liner (top to bottom)
Sacrificial geotextile (as required)	Soil protection layer (to be placed progressively with waste placement)
Separation geotextile	Cushion geotextile
300 mm drainage aggregate	2 mm HDPE geomembrane (single sided textured, textured side down)
Cushion geotextile	Geocomposite clay liner
2 mm HDPE geomembrane (smooth)	600mm compacted clay liner
Geocomposite clay liner	Prepared subgrade
600mm compacted clay liner	
Prepared subgrade	

Leachate management

The leachate collection system for the Stage 1 works will comprise:

- Leachate collection pipes;
- 300 mm thick leachate aggregate drainage layer;
- Leachate sump; and
- Vertical sump riser pipe.

The vertical sump riser pipe will be installed to provide overall structure and stability, and to facilitate the lifting and lowering of the leachate extraction pump and pipe into the sump. The riser will be constructed, and progressively extended vertically, with 2 m sections of DN1200 HDPE pipe. Within the sump, the riser will be mounted to the concrete foundation with a base plate and anchor bolts cast in the concrete. To prevent accidental damage to the lining system

during placement of the reinforced steel in the concrete foundation, a layer of no less than 150 mm of dry lean-mix concrete will be placed and compacted in the base of the sump foundation. The reinforcement steel will then be placed on top of the compacted dry lean-mix concrete, together with the anchor bolts and base plate for the riser, and the remainder of the foundation be poured with the specified concrete.

The preparation of the detailed specification for the leachate extraction pump and the associated vertical sump riser pipe will be undertaken as part of the final design for the leachate extraction and conveyance system. It is envisaged that the leachate extraction pumps for uncapped landfill stages will likely be pumps driven by an electrical motor, such as impeller pumps or helical rotor pumps. Given the likely significantly lower flow-rate requirements in capped landfill stages, due to the significantly reduced leachate generation, the extraction pumps used in capped stages are expected to be pneumatic pumps, such as diaphragm pumps or direct displacement pumps.

Leachate pond design and construction

The leachate pond will be constructed in the north-west corner of the premises and has been designed to service all seven stages of the landfill development. Based on leachate modelling and pond sizing assessment the pond will have the following dimensions:

- Leachate storage capacity of 4,249 m^3;
- Waterline dimensions of 50 m x 50 m;
- Internal slope of 1 in 3; and
- Leachate storage depth of 3 m (including 0.5 m freeboard).

The liner of the leachate pond will comprise (top to bottom):

- Ballast Gravel;
- HDPE geomembrane (smooth);
- Gas dissipation system;
- 600 mm thick compacted clay liner; and
- Subgrade: if the in-situ material does not constitute a ‘clayey subgrade’ or contains large particles / rocks, 200 mm of in-situ material shall be removed and reworked/replaced to provide a suitable base for geosynthetic installation.

A gas dissipation system has been included beneath the geomembrane liner to safely vent gas beneath the unballasted geomembrane to the atmosphere and furthermore avoid damage to the liner due to pressure build up.

The gas dissipation system comprises gas vents in the geomembrane. Half circle cuts within the geomembrane will be cut to vent landfill gas. Cuts will be located above the freeboard.

As the leachate pond will be constructed near the landfill footprint once the landfill has been fully developed to its proposed northern extent, a gas dissipation system has been included as a precautionary measure as part of the leachate pond design. The integrity of the landfill lining system could potentially be breached or impacted at some stage, during or after the active operational phase. Such breach of integrity could potentially cause migration of landfill gas, which could also impact the soil in which the leachate pond will be constructed.

The gas dissipation system comprises gas vents in the geomembrane. Full circle cuts will be cut into the geomembrane (above the freeboard) and covered with circular geomembrane flaps of a larger diameter than the cuts. The flaps will be extrusion welded to the main geomembrane in the upper 240° of the flaps to prevent rainwater ingress from above.

Construction quality assurance

The works will be constructed in accordance with the prepared technical specification and design drawings, and the construction will be subject to a construction quality assurance (CQA) plan that details:

- Landfill cell and leachate pond prepared subgrade, composite liners, and cell leachate collection system CQA requirements;
- The level of inspection to be provided during the construction of the different components of the cell and leachate pond;
- The quantity and type of CQA testing to be undertaken; and
- Processes and responsibilities of different parties involved during the construction of the cell and leachate pond.

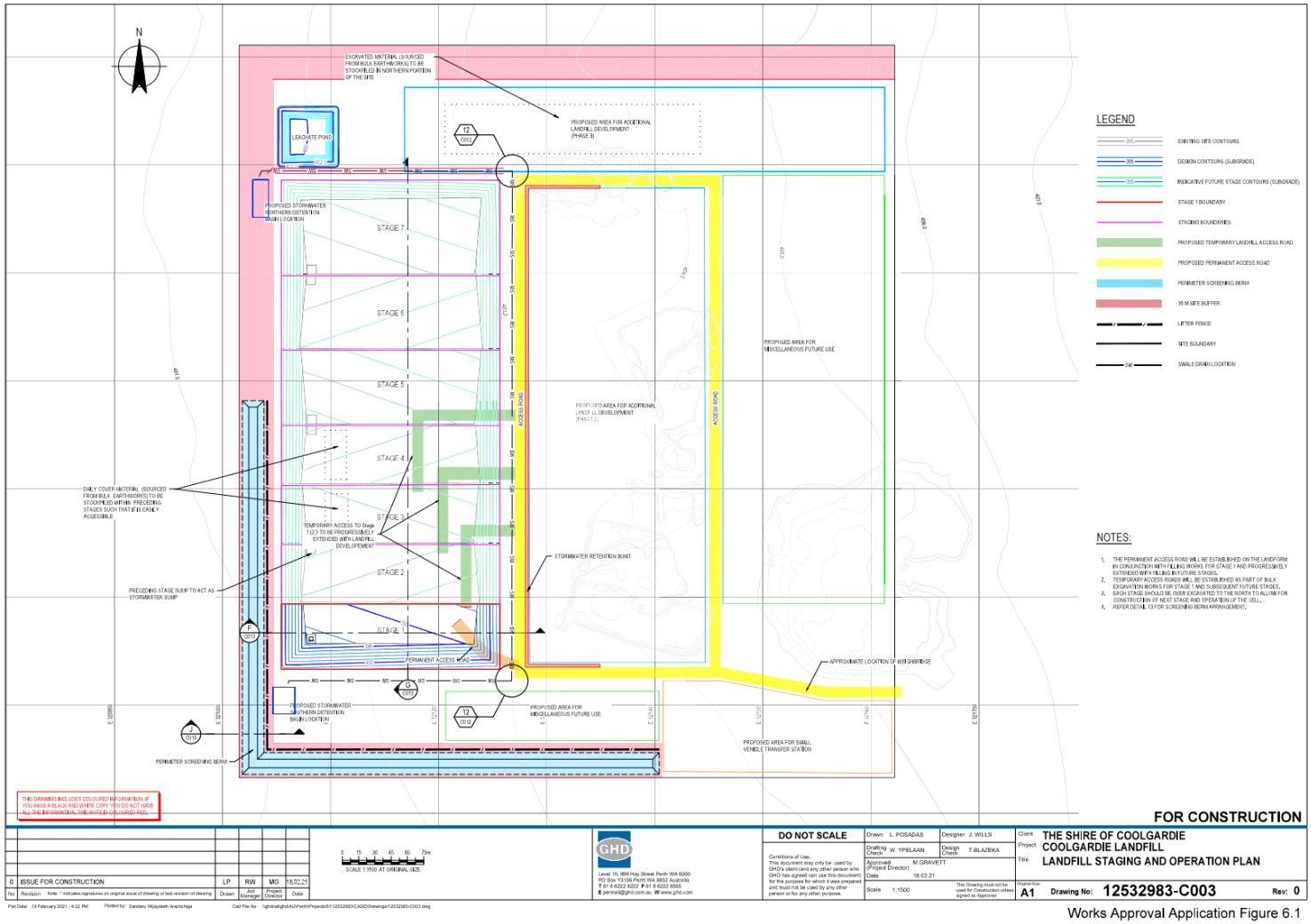

Figure 2: Proposed premises layout

Landfill gas management

The landfill is expected to accept up to Class III commercial and industrial waste as well as municipal putrescible waste. The current annual putrescible waste tonnage is less than 5,000 tonnes per year and the biodegradable proportion of the 30,000 tonnes per year waste stream is expected to be low.

Landfill gas modelling estimates that the cell will begin generating gas upon commissioning in 2021, and will continue to do so post-closure of the cell in 2052. The landfill gas generation on-site is estimated to peak soon after closure in 2052, with a landfill gas generation rate of up to 215 m^3/hour.

The primary mechanisms for landfill gas migration are through the surface or via subsurface migration. The landfill cell will be lined such that it reduces the lateral migration of landfill gas (i.e., below the surface). As such, the primary pathway for gas migration would be through the surface of the landfill. Any methane gas that may be emitted from the landfill waste during operation would be expected to readily disperse in the atmosphere. Migration through daily cover would partially oxidise methane emissions before dispersal to the atmosphere.

Given the gas generating potential for the Stage 1 works is expected to be minimal, no specific landfill gas management measures are proposed. The methane gas generation rates described above represent worst-case estimates for the expansion of the landfill based on the expected waste tonnage and waste types. The exact tonnages and types of wastes to be accepted at the landfill are presently unknown. Therefore, once greater certainty of the tonnages and type of wastes to be deposited in the landfill are known, the methane gas generation rate estimates may be updated, and the need for a gas collection system for the future stages of the landfill will be assessed based on the findings.

Stormwater management

As the premises is relatively flat, the surface water management system has been designed to direct stormwater to the north and south, away from the landfill. The design includes a series of bunds (or contour banks), and swale drains to direct stormwater to detention/sedimentation basins in the north and south of the premises.

The scope of works for Stage 1 will comprise the construction of the stormwater detention basin south of the Stage 1 cell. The detention basin has been sized to accommodate a 1-in 20-year storm event onsite. Given that annual evaporation is significantly higher than annual rainfall, it has been assumed that the detention basin will be predominantly dry prior to rainfall events.

Prior to commissioning of Stage 1 and the acceptance of waste, stormwater may be pumped to the stormwater detention basin. Following commissioning, any stormwater accumulating within the cell will be considered contaminated and disposed of as leachate to the leachate pond.

During the operation of Stage 1(and subsequent stages, a temporary stormwater sump will be constructed behind the dividing bund to collect any rainwater which accumulates behind the bund wall in the over-excavated area. This may need to be periodically pumped to the existing stormwater management system.

A 0.5 m high perimeter bund will be constructed on the crest of the cell walls, so that stormwater will not run into the landfill cell. The perimeter bund wall will be located upstream of the access track to reduce the risk that the access track will flood and become unusable.

2.3.1 Operational management and monitoring

It is proposed that a groundwater and surface water sampling and analysis plan based on the existing knowledge of the site and departmental guidance will be implemented at the premises. It is proposed that the plan be reviewed annually in conjunction with monitoring results and future premises development. Such reviews will reassess the potential impacts

and adapt monitoring to be fit for purpose, evaluating the effectiveness of each monitoring location, assess where new monitoring locations and modifications to the monitoring program are required and ascertain what impacts may be occurring.

Groundwater monitoring

Groundwater monitoring bores installed during geotechnical investigations will be used to provide baseline hydrological conditions prior to the development of Stage 1 of the new landfill cell. The network will also be monitored in the long term (i.e., during and post-development of the cell) to provide ongoing measurement of quality and quantity, including temporal and seasonal changes. In addition to providing baseline information, results from initial groundwater monitoring will provide a benchmark against which any potential impacts may be assessed.

The groundwater monitoring network will initially comprise three existing groundwater bores, with one positioned hydraulically upgradient and two positioned down gradient of the proposed new cell location, which will identify groundwater impacts prior to potential off-site migration. Details and descriptions of the proposed monitoring bores are outlined in Table 2.

Table 2: Groundwater monitoring bore locations

Bore ID	Easting (m)	Northing (m)	Screen depth (mbgl)	Purpose
BH01	321023	6574147	23.0 – 34.5	Monitor groundwater quality hydraulically downgradient (west) of the Class III cell location
BH02	321017	6574495	29.0 – 35.0	Monitoring groundwater quality hydraulically downgradient (south-west) of the Class III cell location
BH03	321590	6574803	23.0 – 35.0	Monitor groundwater quality hydraulically upgradient(northeast) of the Class III cell location

The following monitoring program has been proposed:

- Groundwater level and quality will be initially monitored quarterly in the first year (2021) to assess seasonal, natural, groundwater fluctuations;
- Thereafter, groundwater level and quality will be monitored bi-annually in October/November (post-winter) and June/July (post-summer) to reflect seasonal changes;
- Groundwater monitoring will be undertaken from all groundwater monitoring bores for analysis of the parameters outlined in Table 3.

Table 3: Proposed groundwater monitoring locations and parameters

Monitoring location	Analytes
Groundwater Monitoring Bores BH01, BH02 & BH03	• pH (field), Electrical Conductivity (field), Standing Water Level (field), Dissolved Oxygen (field) • Ammonia-Nitrogen (NH3-N), COD (Chemical Oxygen demand), Nitrate Nitrogen (NO3-N), Total Phosphorus, Total Nitrogen, TDS (Total Dissolved Solids) and TOC (Total Organic Carbon). • Major cations and anions: Total Potassium, Chloride and Sulphate. • Dissolved metals: Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Nickel and Zinc • Monocyclic Aromatic Hydrocarbons: Benzene, Ethylbenzene, Toluene and Xylenes • Polycyclic Aromatic Hydrocarbons (PAHs): Acenaphthene, Anthracene, Benz(a)pyrene, Fluoranthene, Naphthalene and Pyrene • Organochlorine pesticides (OCPs): aldrin, chlordane (and metabolites), DDT (and metabolites), dieldrin, chlorpyrifos, HCB, heptachlor (and its epoxide), lindane • Organophosphates (OPPs): parathion, demeton-S-methyl, maldison, diazinon, demethoate,fenamiphos, fenthion • Atrazine, TCE, PCE and polychlorinated biphenyls (total) • PFAS compounds

Surface water monitoring

Surface water storage within the on-site stormwater retention basin and the leachate evaporation pond present a potential source of soil and groundwater contamination should vertical or lateral migration of contaminants occur.

Surface water will be tested for the contaminants outlined in Table 4 below.

Table 4: Proposed surface water monitoring locations and parameters

Monitoring location	Analytes
Leachate evaporation pond; Southern stormwater retention basin	• pH (field), Electrical Conductivity (field), Standing Water Level (field), Dissolved Oxygen (field) • Ammonia-Nitrogen (NH3-N), COD (Chemical Oxygen demand), Nitrate Nitrogen (NO3-N), Total Phosphorus, Total Nitrogen, TDS (Total Dissolved Solids) and TOC (Total Organic Carbon). • Major cations and anions: Total Potassium, Chloride and Sulphate. • Dissolved metals: Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Nickel and Zinc • Monocyclic Aromatic Hydrocarbons: (Benzene, Ethylbenzene, Toluene and Xylenes) • Polycyclic Aromatic Hydrocarbons (PAHs): Acenaphthene, Anthracene, Benz(a)pyrene, Fluoranthene, Naphthalene and Pyrene • Organochlorine pesticides (OCPs): aldrin, chlordane (and metabolites), DDT (and metabolites), dieldrin, chlorpyrifos, HCB, heptachlor (and its epoxide), lindane • Organophosphates (OPPs): parathion, demeton-S-methyl, maldison, diazinon, demethoate, fenamiphos, fenthion • Atrazine, TCE, PCE and polychlorinated biphenyls (total) • PFAS compounds

Landfill gas monitoring

No landfill gas monitoring has been proposed as part of the Stage 1 works and landfill cell operation as landfill gas generation is expected to be minimal and presents a low risk of

potential impacts. The prepared landfill gas model will be updated during the lifespan of Stage 1 as more information on waste volumes and composition is collected; and requirements for landfill gas monitoring will be considered as part of future works approvals and/or licence amendments.

Landfill management and operations

The existing waste facility operations, including Class II landfill activities, will continue to operate in accordance with Registration R1550, the Rural Landfill Regulations and the prepared Five Year Landfilling Operational Plan for the premises.

Upon completion of works, Critical Containment Infrastructure reporting, and the commencement of time limited operations, the applicant will implement a prepared Landfill Environmental Management Plan (LEMP) for the operation and management of the new Stage 1 landfill infrastructure.

The LEMP is not intended as a static document but requires regular review and updating to ensure ongoing suitability and effectiveness for environmental management at the landfill, as well as compliance with relevant legislation and approvals.

The premises currently operates 7 days a week (closing only for Good Friday and Christmas Day) and will continue to do so. The premises is open to the public, with gates and security measure proposed to restrict access outside of opening hours. The premises will be staffed by Shire of Coolgardie employees with the necessary training required to perform day-to-day activities related to landfill operations.

As a Class III landfill, the facility is expected to accept the following waste types, consistent with the *Landfill Waste Classification and Waste Definitions 1996 (as amended 2019):*

- Clean fill;
- Inert Waste Type 1;
- Uncontaminated fill;
- Neutralised acid sulfate soil;
- Putrescible waste;
- Contaminated solid waste meeting waste acceptance criteria specified for Class III landfills;
- Inert Waste Type 2; and
- Special Wastes Type 1, Type 2 and Type 3 as defined in the Landfill Definitions.

All incoming waste will be weighed over a new weighbridge where the waste type and quantity will be recorded by the weighbridge attendant. Each load will be inspected to identify the waste type and appropriate handling to reduce the quantity of waste going to landfill and ensure unacceptable loads of waste are not disposed at the premises. All loads of incoming waste will be inspected by premises staff to determine acceptability onsite. Inspection and screening of waste at active landfilling and stockpiling areas will also be undertaken.

Machinery and plant equipment necessary to the operation of the premises will be maintained onsite or engaged as part of specific activities or works campaigns, including:

- Spreading, compaction and covering of deposited waste;
- Compacting, trimming, shaping, grading, and levelling of cover layers;
- Construction of the final capping system; and
- Any other operations required for the operation of the waste facility, including activities within the existing recycling and re-processing areas.

A loader and traxcavator are currently maintained onsite to undertake the following daily site operations:

- CAT 966 loader: to cart cover material around the landfill and other materials around the site, and create shallow excavations; and
- CAT D5 Traxcavator: to cart cover material around the landfill and spread and compact waste for disposal.

A water truck and backhoe kept at the Shire of Coolgardie's depot are deployed for use at the premises.

Waste will be disposed in a manner that minimises any nuisance or environmental impact. Waste is to be compacted as much as practicable, preferably to a density between 700 kg/m^3 and 1,000 kg/m^3.

Each active waste disposal tipping face will be maintained, as far as practicable, in a dry condition during the life of that landfilling stage. The applicant may devise a designated alternative tipping face for use during wet weather periods where access to or operation of the working face could prove difficult or become unsafe.

Landfill cells will be filled as follows:

- For all newly constructed cells, a sand/soil protection layer, at least 1 m thick, shall first be placed across the entire floor and internal sidewalls of the cell to protect the cell leachate barrier from damage;
- Waste layers shall be placed in lifts, with each lift having a compacted thickness range of between 2 m and 4 m;
- Large, bulky wastes will be broken up and compacted prior to covering. Such wastes will not be disposed in the final lift layer of a waste cell, as settlement of the fill may result in these waste materials puncturing the overlying final landfill cap layer;
- Compaction of the disposed waste will initially be carried out primarily using earthmoving plant appropriately equipped and specified for use as equipment dedicated to landfill operations, and as volumes increase, landfilling equipment such as a landfill compactor may be introduced. Heavy vehicles may also be directed over completed areas to aid in compaction of the waste. Small vehicles are not permitted at the active landfilling area; and
- At the end of each working day, the active tipping face of the landfill will be covered with daily cover material (minimum of 0.15m of soil or alternative daily cover material (as applicable)) or intermediate cover material (minimum of 0.5m of soil) sufficient to contain odour, prevent wind-blown litter and deter vermin accessing the waste.

Cover and capping material will be generated by excavating in areas of future landfill stages. The extent and depth of excavation required will be adequate to source all soil required for both regular cover material and final capping material.

Landfill closure and rehabilitation

As landfilling will be progressed in 7 stages, it is anticipated that the landfill closure will follow a similar staging to spread capital costs associated with landfill final capping. The construction of a final cap is expected to occur following the completion of each finalised stage. Final capping involves the placement of an appropriately designed low-permeability cap profile, to minimise surface water infiltration, leachate generation and landfill gas migration.

The top of waste landform has been developed as part of the detailed design of Stage 1. The primary purpose of the landfill cap is to reduce the infiltration of surface water and hence reduce leachate generation. The landfill cap will also be designed to reduce the migration of

landfill gas from the surface. It is envisioned that the landfill cap will comprise of the following (top-down):

- 1.0 m revegetation layer comprising of topsoil and subsoils;
- Cushion geotextile/drainage geo-composite;
- Linear Low-Density Polyethylene geomembrane;
- 0.6 m Compacted Clay Liner/ Geocomposite Clay Liner; and
- 0.3 m seal bearing layer (completed as part of the operation of the landfill).

The landfill cap will be vegetated with grasses and shrubs native to the area. It is expected that the roots of the vegetation will hold the soil together, whilst tree and shrub canopy will buffer intense rainfall that may break soil apart.

During the establishment of vegetation, it is not expected that erosion will be an issue given the relatively flat surface (i.e., no grades greater than 20%). However, the topsoil layer may comprise of mulch material to aid in erosion protection whilst vegetation establishes.

Given the flat topography on-site, the cap design will consider surface drainage infrastructure (i.e., surface runoff berms) from the cap such that surface water is redirected in an appropriate manner off the landfill. The indicative design has included a series of contour banks to direct stormwater to the northern and southern edges of the landfill and into the southern and northern swale drains.

Native vegetation will comprise the primary erosion protection measure across the cap; however, the premises is located in an arid environment. Other contour banks may be required if erosion is noted during operation, to reduce overland flow velocity and reduce the risk of erosion.

2.4 PFAS waste acceptance and disposal

The PFAS National Environmental Management Plan (NEMP) Version 2.0 (January 2020) outlines guidance on the siting and design on landfills in relation to the proposed acceptance of the PFAS wastes. In determining whether a landfill will be suitable to accept solid PFAS-contaminated materials, the NEMP list the following considerations:

- ensuring the landfill is not located on a ‘vulnerable groundwater system’ (as defined in NEMP);
- depending on the landfill liner design, whether the landfill is located within 1000 m of a surface water body that supports an aquatic environment (including groundwater dependent 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;
- performance of landfill liner and leachate management system (giving consideration to historical groundwater and surface monitoring results for existing sites);
- leachate management practices at the landfill, in particular whether landfill leachate is recirculated through the landfill or sent to a wastewater treatment plant, whether treatment occurs prior to release, or if leachate is likely to be reused either on- or off-site;
- other factors as relevant to the specific landfill siting, design, operation and ongoing management; and
- whether there are significant additional PFAS compounds present in addition to PFOS, PFHxS and PFOA.

Key findings: the Delegated Officer notes that the siting and design of the landfill is acceptable for the proposed acceptance and disposal of PFAS impacted wastes. The following aspects have been considered in the assessment:

- **Groundwater depths measured in investigation boreholes installed as groundwater monitoring wells indicate groundwater levels between 25 and 30 m below ground level. At a maximum excavation depth of 8 m below natural ground level, there will be approximately 17 m of bedrock between the waste mass and the underlying aquifer. The groundwater underlying the premises is expected to be highly saline and therefore non-potable.**
- **The proposed cell will comprise a composite lining system to achieve a permeability of less than $1x10^{-9}$ metres per second or equivalent (refer to section 2.3.2 for details on the liner configuration). CQA testing and reporting will be required, including a leak detection survey following installation of the leachate drainage layer (prior to the separation geotextile installation).**
- **A leachate collection and management system (as detailed in section 3.3.2) will be constructed to collect leachate from the cell and convey it to a dedicated leachate collection pond in the north of the premises. Construction of the evaporation pond will comprise a composite lining system to achieve a permeability of less than $1x10^{-9}$ metres per second or equivalent and is of sufficient volume to contain both projected leachate volumes and stormwater produced as a result of a 1:20-year storm event. Leachate pond CQA testing and reporting will be required prior to the commencement of landfill operation.**
- **A stormwater management system separate to the leachate management system will be installed. External and internal cell bunds will be constructed of compacted clay to ensure that uncontaminated stormwater does not intermix with the collected leachate. All drains, pipes, culverts and other stormwater drainage infrastructure shall be designed to convey peak flow rate corresponding to a 1 in 20-year storm event, with available freeboard to convey discharge corresponding to a 1 in 20-year storm event.**
- **The closest watercourse to the premises is an unnamed, non-perennial (ephemeral) creek situated approximately 200 m south of premises boundary. The creek line drains west – northwest, ultimately discharging into a salt lake located approximately 14 km northwest of the premises boundary. The proposed bunding and capacity of the leachate evaporation pond and stormwater retention basins are considered adequate to contain any accumulated contaminated stormwater associated with a 1 in 20-year storm event. As such, the potential for PFAS impacted runoff to enter receiving environments is considered low.**

2.5 Stability assessment

Global stability assessment

A global stability assessment has been completed to document the embankment and foundation stability of the Stage 1 landfill cell. The assessment concluded that the factor of safety obtained in each analysis complied with the adopted factor of safety for each case.

The assessment was completed using the General Limit Equilibrium (GLE) software Slope/W which is contained within Geostudio 2019 R2 Suite. The method of Morgenstern-Price was used in the Factor of Safety (FoS) determination along with Mohr-Coulomb soil models and circular slip surfaces.

The Slope/W analysis was completed for six scenarios including a static case, two groundwater cases and three seismic cases. As part of the design process, a stability analysis was performed for pseudo-static conditions to address the effects of a seismic event for the following scenarios:

- Operation Basis Earthquake (OBE);
- Maximum Design Earthquake (MDE); and
- Maximum Credible Earthquake (MCE)

A summary of slope stability results are included in Table 5.

Table 5: Slope Stability Results Summary

Case	Static	Static (breached liner)	Static (drawdown)	Seismic (CDE)	Seismic (MDE)	Seismic (MCE)
Target Fos	1.5	1.2	1.2	1.1	1.1	1.1
Predicted FoS	2.16	1.95	2.16	1.99	1.91	1.42

Waste mass stability assessment

The waste mass stability calculations were calculated using the translational (or two-wedge) failure analysis presented in Qian, et al. (2002). This method is utilised to confirm that the base length is sufficient to provide friction resistance against the whole waste mass sliding. Given that the east and west edges will be bounded by batter, the critical dimension is the length of the cell floor in the north-south direction for the first stage. The calculations undertaken indicate that the base length of 161 m provided a factor of safety of 1.6 for waste placement at 1V:3H. Factors of safety above 1.5 are considered acceptable for long-term loadings and 1.2 for short-term loadings. A smaller base size would not be recommended even in the event that smaller than projected waste volumes are received.

Interface friction

The critical interface for batters is generally between HDPE geomembrane (smooth side) and cushion geotextile. The HDPE is specified as single sided textured, with the textured side facing downwards. A unit weight of 21 kN/m^3 has been assumed for the backfilling soil, and the critical interface is assumed to be between the smooth side of the single-sided textured HDPE geomembrane and the cushion geotextile. Interface friction calculations were based on maximum slope angle, length, and height length. The maximum slope would be the western batter at 8 m high with 1V:3H slopes. The anchor trenches along the top of the batter are designed to be 500 mm by 500 mm wide. The interface friction calculations for installation directly onto the subgrade indicate that the anchor trench design is adequate for 8 m vertically high slopes of 1V:3H.

Anchor trench design

The proposed anchor trenches are 500 mm deep by 500 mm wide, with a batter height of 8 m. The critical interface is between the smooth surface of the HDPE geomembrane and the cushion geotextile. As the HDPE geomembrane shall be installed prior to the cushion geotextile, the anchor trenches will temporarily be anchored with sandbags. A scenario has been calculated which indicated that when partially backfilled with 250 mm fill material, the anchor trench size of 250 mm deep by 500 mm wide was sufficient for the anchorage of cushion geotextile. As such, the anchor trench may be partially backfilled following placement

of the HDPE geomembrane, if required. It has been determined that the proposed anchor trench design provides adequate anchorage for static and dynamic loading.

Key findings:

- **The Delegated Officer notes that the nominated factors of safety are consistent with the minimum standard factors of safety for stability assessments (typical values used within Australia and internationally for municipal solid waste landfills).**

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this decision report are detailed in Table 6 below. Table 6 also details the proposed control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 6: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Clearing activities Construction of landfill cell, leachate pond, site access roads and associated waste storage/processing infrastructure	Air / windborne pathway	Separation distance from sensitive receptors. Deployment of water cart and use of sprinklers during construction. Wetting down of tracks, stockpiles, and exposed areas as necessary. Short-duration/temporary nature of construction activities.
Noise	Vehicle movements		Separation distance from sensitive receptors. All on-site machinery fitted with appropriate acoustic treatment (i.e., silencers). Construction activities only during day-time hours (7am to 7pm, Mon – Sat, excluding public holidays). Short-duration/temporary nature of construction activities.

Emission	Sources	Potential pathways	Proposed controls
Sediment laden stormwater		Overland flow and subsequent seepage to ground – causing impacts to native ecosystem and groundwater quality	Where a stockpile cannot be located such that drainage flows into the site, the stockpile shall have a drainage swale placed on the uphill side of the stockpile to divert surface water from the stockpile area and sediment traps at its base to capture sediment running off the stockpile. Stockpiles shall have maximum slopes not to exceeding 1(V):2(H) and rounded shoulders and base of batters to minimise wind and water erosion.
Spills of fuel/chemicals			Fuel or other bulk flammable liquids are not to be stored on site. Fuel for the generator and mobile plant and equipment is stored at the Shire's depot and transported to site as and when required for refueling. Any lubricants, additives or other similar liquids shall be stored on adequate and suitable self-bunded storage equipment.
Operation			
Dust (excluding asbestos)	Cover material stockpiles Vehicle movements Acceptance, storage, handling, burial, and decomposition of waste. Operational management of the premises.	Air/windborne pathway causing impacts to health and amenity	Avoiding groundworks during adverse weather conditions (high winds and dry conditions). Deployment of an onsite water cart. Vehicle speed restrictions. Ensuring all vehicles accessing the premises utilise designated access roadways wherever possible. Wetting-down of active tipping area during working hours. Wetting-down of waste materials with potential to generate dust prior to unloading at the tipping face. Application of inert waste cover material as soon as practicable after tipping and no later than the end of the working day. As far as practicable, the active landfill area will be positioned away from the edge of the active cell. As far as practicable, loads will not be tipped oblique to the wind, with dust being more likely to travel further where this is case. Material drop/tip heights will be minimised where possible. Exposed soil surfaces and stockpiles in

Emission	Sources	Potential pathways	Proposed controls
			non-active area will be stabilised (e.g., with chemical surfactants) or temporarily covered (e.g., with mulch) prior to permanent re-vegetation or restoration.
Noise	Acceptance, storage, handling, burial, and decomposition of waste – up to Class III including asbestos and biomedical waste Vehicle movements	Air/windborne pathway causing impacts to health and amenity	Separation distance from sensitive receptors. Maintenance of all landfill plant and machinery in proper working order. Ensuring all vehicles accessing the premises utilise designated access roadways. Limiting operation of plant and equipment to specified working hours. If required, plant and equipment shall be fitted with appropriate acoustic treatment (i.e., silencers). Construction of screening berm in the southwest corner of the premises.
Odour	Acceptance, storage, handling, burial, and decomposition of waste Recovered leachate	Air/windborne pathway causing impacts to health and amenity	Immediate burial or placement of cover material over odorous wastes. Not depositing waste in standing water (in the wake of rainfall events). Depositing waste in thin layers to optimize compaction. Minimising disturbance of previously filled areas.
Landfill leachate	Acceptance, storage, handling, burial, and decomposition of waste Collection, storage, and management of leachate Operational management of the premises	Seepage to ground – causing impact to native ecosystem and groundwater quality Pond overtopping or pipework failure resulting in overland flow with subsequent seepage to ground – causing impact to native ecosystem and groundwater quality	The base of the proposed cell is significantly higher than the level of groundwater underlying the premises (the groundwater level is between 25 m to 30 m below natural ground level based on findings of the factual geotechnical report, and the landfill cells will be excavated to a maximum depth of 8 m below ground level. Therefore, there will be in the vicinity of 17 - 22 m of bedrock (cemented duricrust material) between the waste mass and the underlying aquifer. Installation of 600 mm thick compacted clay liner and a 2.0 mm single sided textured HDPE geomembrane as part of cell construction. Installation of a leachate collection system and evaporation pond. Leachate head of the landfill liner will be maintained at a maximum 300 mm. Accumulated leachate in the cell sump will

Emission	Sources	Potential pathways	Proposed controls
			be pumped into the dedicated leachate evaporation pond. Leachate containment infrastructure engineered to accommodate sufficient storage capacity for leachate over a worst-case climatic period (i.e., 2 consecutive 90% AEP rainfall years). Placement of intermediate cover material over each cell stage is completed. Placement of capping layer at the end of the cell's life will reduce ongoing leachate generation.
Potentially contaminated stormwater	Acceptance, storage, handling, burial, and decomposition of waste (i.e., accumulation of rainwater within trenches, tipping areas and depressions) Operational management of the premises (i.e., runoff from exposed waste and cover stockpiles)	Basin overtopping and overland flow with subsequent seepage to ground – causing impact to native ecosystem and groundwater quality	A 0.5 m high perimeter bund will be constructed on the crest of the walls, so that stormwater will not run into the landfill cell. The perimeter bund wall is located upstream of the access track, to reduce the risk that the access track will flood, and the track become unusable. Precast reinforced concrete pipes have been included to convey stormwater from upstream of the bund to the southern and northern swale drains. A surface water management system for the premises has been designed to direct stormwater to the north and south, around the landfill footprint. The design includes a series of bunds (or contour banks) and swale drains to direct stormwater to clay-lined stormwater detention/sedimentation basins in the north and south of the site. Typically, minimum drainage grades of 1% are required for grassed channels, however, this is not feasible for the site, with natural drainage grade of 0.6% from east to wet and almost flat in the north-south direction. Stormwater retention/sedimentation basin, and stormwater drainage infrastructure have been designed for "worst case climatic scenarios" to contain surface water on-site. Following the closure of a cell stage, an engineered landfill cap will be constructed on top of the cell; any surface water runoff from the landfill cap will runoff into stormwater drains and to a stormwater holding dam. The cap will be revegetated with native plant species to stabilise the site and reduce erosion from overland stormwater flows.

Emission	Sources	Potential pathways	Proposed controls
			Should the applicant believe weather conditions will hinder effective environmental management of the premises, no further waste will be accepted onsite until weather conditions become more favourable (with respect to environmental management) or alternative environmental management measures are identified and implemented.
Fugitive landfill gas	Acceptance, storage, handling, burial, and decomposition of waste Leachate methanogenesis under anerobic conditions within evaporation pond Post-closure vertical migration though capping layer	Passive venting to air Lateral migration through soil	The landfill cell will be lined such that it reduces the lateral migration of landfill gas. Use of daily cover material would oxidise some of the methane gas before dispersing in the atmosphere. Regional clay geology surrounds the lining system, and some oxidation of methane is expected to occur in the clay lithology.
Vector emissions – vermin, pests, pathogens	Acceptance, storage, handling, burial, and decomposition of waste – up to Class III including asbestos and biomedical waste	Movement via air, or transmission via fauna	Regular compaction and covering of deposited waste. Fencing of premises boundary with cyclone mesh. Use of traps and/or baits to deter and/or control vermin, as well as engaging professional pest and weed control subcontractors. Grading of premises to prevent surface ponding (and mosquito breeding) following rainfall events.
Windblown waste/litter	Acceptance, storage, handling, burial, and decomposition of waste – up to Class III including asbestos and biomedical waste	Air/windborne pathway causing impacts to amenity Dispersal by scavenging fauna	Construction of screening berm in southwest corner of premises. Covering all loads entering and transported within the premises. Regular compaction and covering of deposited waste. Establishing and maintaining vegetative litter screens around strategic locations within the premises.

Emission	Sources	Potential pathways	Proposed controls
			Size of tipping face limited to reduce potential for windblown waste. Fencing of premises boundary with cyclone mesh.
Smoke and ash from uncontrolled fire	Acceptance, storage, handling, burial, and decomposition of waste Accidental ignition, spontaneous combustion, or arson	Air/windborne pathway causing impacts to health and amenity Habitat destruction (fire)	Fencing of premises boundary with cyclone mesh topped with razor wire and electrification at strategic locations. Installation of CCTV. Establishing and maintaining fire breaks between the site boundary and surrounding areas. Inspection of incoming waste to identify any likely ignition sources (e.g., batteries, flammable chemicals). Parking of plant and machinery away from active landfilling areas. Control of wind-blown litter accumulations along internal premises perimeter. Ensure adequate cover material is used to isolate freshly placed waste from any potential fire. Timely covering of deposited inflammable wastes. Compaction and covering of deposited combustible wastes to eliminate voids. Deployment of a mobile water tanker equipped with firefighting pump and apparatus on site during active landfilling operations.
Dust – asbestos fibres	Acceptance, handling, and burial of asbestos waste	Air/windborne pathway causing impacts to health and amenity	Inspection of incoming waste to identify any potential asbestos containing material. Adoption of dedicated asbestos acceptance and burial procedures.

Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 7 below provide a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental Siting* (DWER 2020)). The proximity of sensitive receptors to the premises boundary are depicted in Figure 3.

Table 7: Sensitive human and environmental receptors and distance from prescribed activity

Receptor ID	Human receptors	Distance from prescribed activity
H1	Residential property	Approximately 420 m south-south-west of premises boundary
H2	Rural residential properties	Approximately 800 m to the south of the premises (South of Great Eastern Highway) and the Goldfields Water Supply Scheme pipeline corridor
H3	Coolgardie Cemetery	Approximately 1 km east of premises boundary
H4	Coolgardie Golf Club	Approximately 1.1 km southeast of premises boundary
H5	Coolgardie Township (Lindsay Street)	Approximately 2.4 km west of premises boundary
H6	General public	Public will continue to have access to the Coolgardie Waste Facility during construction. However, the general public will be excluded from the new cell area during construction
Receptor ID	**Environmental receptors**	**Distance from prescribed activity**
E1	Remnant native vegetation	Immediately adjacent to premises boundary
E2	Un-named creek - non-perennial, minor feature.	Approximately 200 m south of premises boundary Creek drains west – northwest, discharging into a Salt Lake approximately 14 km northwest of the premises
E3	Recorded threatened and priority flora	No specimens recorded within a 2 km buffer of the premises boundary

E4	Underlying groundwater (non-potable purposes) Designated groundwater area – Goldfields.	Approximate depth to groundwater 25 – 30 m below natural ground level based on findings of the factual geotechnical report, and the landfill cells will be excavated to a maximum depth of 8 m below ground level. Therefore, there will be in the vicinity of 17 - 22 m of bedrock (cemented duricrust material) between the waste mass and the underlying aquifer.
E5	**Specified Ecosystems – DBCA legislated tenure** Kangaroo Hills timber reserve	Approximately 6.7 km southwest of premises boundary

Remnant native vegetation

Based on available information, the native vegetation immediately surrounding the premises is unlikely to provide habitat for conservation significant flora or fauna species however, native vegetation is considered a potential receptor for emissions associated with fire events. No specimens of threatened flora have been recorded within a 2 km buffer of the premises boundary.

Water resources

Receptor relevance for surface water is likely to be groundwater given overland flow is likely to be highly seasonal and unlikely to impact the discharge site, a non-perennial salt lake situated 14 km to the north west of the premises. Little information has been provided on underlying groundwater characteristics, flow direction or quality. However available information indicates that the total dissolved solids concentration in the range of 14,000 -35,000 milligrams per lire.

The underlying aquifer is likely to be unconfined alluvial (weathered rock) and fractured rock. Groundwater is likely to be available for industrial use, stock watering and irrigation use, with most extraction licences associated with minerals and mining tenure. The closest groundwater user is situated approximately 4.5 km east of premises boundary.

Increased seepage from surface water storage and discharges is considered in relation to potential changes in vegetation species and weed proliferation over time.

Figure 3: Distance to sensitive receptors

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 8.

Works approval W6534/2021/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 8 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises i.e. landfilling activities. A risk assessment for the operational phase has been included in this decision report, however licence conditions will not be finalised until the department assesses the licence application.

Table 8: Risk assessment of potential emissions and discharges from the premises during construction, commissioning, and operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Clearing activities Construction of landfill cell, leachate pond, site access roads and associated waste storage/processing infrastructure Vehicle movements	Dust (excluding asbestos)	Air / windborne pathway resulting in impacts to human health and amenity	Residential and Rural residential properties	Refer to Section 3.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 9	N/A
	Noise				C = Minor L = Possible **Medium Risk**	Y	N/A	N/A - the applicant must adhere to the *Environmental Protection (Noise) Regulations 1997*.
	Sediment laden stormwater	Overland flow and subsequent seepage to ground – causing impact to native ecosystem and groundwater quality	Remnant native vegetation		C = Slight L = Rare **Low Risk**	Y	N/A	N/A
			Un-named creek - non-perennial, minor feature.					
	Spills of fuel/chemicals		Underlying groundwater (non-potable purposes)		C = Minor L = Rare **Low Risk**	Y	N/A	N/A

Operation **(including time-limited-operations operations)**								
Cover material stockpiles	Dust (excluding asbestos)	Air/windborne pathway causing impacts to health and amenity	Residential and Rural residential properties	Refer to Section 3.1	C = Minor L = Possible **Medium Risk**	Y	Condition 9	N/A
	Sediment laden stormwater	Overland flow and subsequent seepage to ground – causing impact to native ecosystem and groundwater quality	Remnant native vegetation	Refer to Section 3.1	C = Slight L = Rare **Low Risk**	Y	Conditions 2, 13 and 20	N/A
			Un-named creek - non-perennial, minor feature	Refer to Section 3.1	C = Slight L = Rare **Low Risk**			N/A
Vehicle movements	Dust (excluding asbestos)	Air/windborne pathway causing impacts to health and amenity	Residential and Rural residential properties	Refer to Section 3.1	C = Minor L = Possible **Medium Risk**	Y	Condition 9	N/A
			Coolgardie cemetery and golf club		C = Minor L = Rare **Low Risk**			
	Noise		Residential and Rural residential properties	Refer to Section 3.1	C = Minor L = Possible **Medium Risk**	Y	Condition 1	The applicant must adhere to the *Environmental Protection (Noise) Regulations 1997*.

			Coolgardie cemetery and golf club		C = Slight L = Unlikely **Low Risk**			
Acceptance, storage, handling, burial, and decomposition of waste – up to Class III including asbestos and biomedical waste	Dust (excluding asbestos)	Air/windborne pathway causing impacts to health and amenity	Residential and Rural residential properties	Refer to Section 3.1	C = Minor L = Possible **Medium Risk**	Y	Condition 9	N/A
			Coolgardie cemetery and golf club		C = Slight L = Unlikely **Low Risk**			
	Dust - asbestos fibres	Air/windborne pathway causing chronic health impacts	Residential and Rural residential properties	Refer to Section 3.1	C = Major L = Unlikely **Medium Risk**	Y	Conditions 16 and 17	N/A
			Coolgardie cemetery and golf club		C = Major L = Unlikely **Medium Risk**			
			Coolgardie township		C = Major L = Unlikely **Medium Risk**			
	Noise	Air/windborne pathway causing impacts to health and amenity	Residential and Rural residential properties	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Condition 1	The applicant must adhere to the *Environmental Protection (Noise) Regulations 1997*.
	Odour	Air/windborne pathway causing impacts to health and amenity	Residential and Rural residential properties	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Condition 17	N/A
			Coolgardie cemetery and golf club		C = Minor L = Possible **Medium Risk**			

			Coolgardie township		C = Minor L = Possible **Medium Risk**			
	Sediment laden stormwater	Overland flow and subsequent seepage to ground – causing impact to native ecosystem and groundwater quality	Remnant native vegetation	Refer to Section 3.1	C = Slight L = Rare **Low Risk**	Y	Conditions 2, 8, 16, 19 and 20	N/A
			Un-named creek - non-perennial, minor feature		C = Slight L = Rare **Low Risk**			
	Landfill leachate	Overtopping or leakage and overland flow with subsequent seepage to ground – causing impact to native ecosystem and groundwater quality	Un-named creek - non-perennial, minor feature	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Conditions 2, 8, 16, 18, 19	N/A
			Remnant native vegetation		C = Moderate L = Unlikely **Medium Risk** **(See Section 3.3 also for the detailed risk assessment for leachate management)**			
		Seepage to ground – causing impact to native ecosystem and groundwater quality	Underlying groundwater (non-potable purposes)		C = Minor L = Unlikely **Medium Risk** **(See Section 3.3 also for the detailed risk assessment for leachate management)**			

	Potentially contaminated stormwater	Overtopping and overland flow with subsequent seepage to ground – causing impact to native ecosystem and groundwater quality	Un-named creek - Non-perennial, minor feature	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Conditions 2, 8, 16, 19 and 20	N/A
			Remnant native vegetation		C = Moderate L = Unlikely **Medium Risk**			
			Underlying groundwater (non-potable purposes)		C = Minor L = Unlikely **Medium Risk**			
	Fugitive landfill gas	Passive venting to air Lateral migration through soil	Remnant native vegetation	Refer to Section 3.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 17	N/A
	Vector emissions – vermin, pests, pathogens	Movement via air, or transmission via fauna	Residential and Rural residential properties Coolgardie cemetery and golf club Coolgardie township	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Condition 17	N/A

	Windblown waste/litter	Air/windborne pathway causing impacts to amenity Dispersal by scavenging fauna	Residential and Rural residential properties Remnant native vegetation	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	Y	Conditions 10 and 17	N/A
	Smoke and ash from uncontrolled fire	Air/windborne pathway causing impacts to health and amenity	Residential and Rural residential properties Coolgardie cemetery and golf club Coolgardie township	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Condition 17	N/A
	Embers (bushfire ignition)	Potential property and habitat destruction	Residential and Rural residential properties	Refer to Section 3.1	C = Major L = Unlikely **Medium Risk**	Y	Condition 17	N/A
			Remnant native vegetation Recorded threatened and priority flora Kangaroo Hills timber reserve	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 17	N/A

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 Detailed risk assessment – Leachate management

3.3.1 Water balance and pond sizing

It has been determined that evaporation significantly exceeds annual rainfall in the Coolgardie region, and therefore evaporation has been identified as a viable strategy for the management of leachate at the premises. The applicant's consultant undertook an infiltration assessment to estimate rainfall infiltration into the waste mass during filing and post completion final capping. This along with a prepared water balance based on local climate data were used to determine the required storage capacity of the proposed leachate evaporation pond.

The containment capacity of the premises has been assessed against the expected volumes of leachate generated in a worst-case climatic scenario of two 90th percentile rainfall years (i.e. year 2011 repeated twice). The water balance considered:

- The leachate collected from the landfilled waste;
- Rainfall into the leachate pond; and
- Incidental evaporation from the leachate pond

Based on the results of the water balance, the required pond parameters are a leachate storage capacity (not including freeboard) of 4,249 m^3 and waterline dimensions of 50 m x 50 m. The proposed leachate evaporation pond described in section 2.3.2 has been designed to a sufficient capacity to receive and manage leachate from the first seven stages of the landfill.

A 0.5 m freeboard will guard against leachate overtopping as a result of wave action, and a 1 m high bund will be installed around the periphery of the leachate pond in order to prevent the entry of any stormwater runoff, which will be managed via the proposed stormwater retention basin.

3.3.2 Leachate collection system

The proposed drainage aggregate layer will be 300 mm thick with a hydraulic conductivity not less than 1 x 10^{-3}. It is considered that this will be of sufficient permeability to facilitate the drainage and collection of leachate from the landfill cell.

The proposed sub-rounded aggregate will be derived from high-strength, non-calcareous rock, which is resistant to crushing and degradation from waste placement and operational activities.

The leachate collection pipes shall comprise of nominal 160 mm diameter PE100 PN16 HDPE pipes for high demand piping applications in accordance with ISO 4427 (*Plastics piping systems for water supply and for drainage and sewerage under pressure - Polyethylene (PE)*). HDPE is typically resistant to most leachates, excluding those high in aromatic hydrocarbons, halogenated hydrocarbons and aromatic ketones. Given that the landfill is not expected to take wastes containing high concentrations of the above, it is considered unlikely that chemicals will damage or degrade the HDPE pipes.

To maintain the liquid head below 300 mm, the leachate pipes shall be spaced at a maximum 25 m. The use of 160 mm diameter pipework will facilitate the passage of remote inspection and cleaning equipment.

The leachate generated in Stage 1 will be pumped to the dedicated leachate evaporation pond to the north of the cell. A pump with suitable capacity and chemical durability will be installed within the leachate sump by the applicant. No permanent conveyance pipe will be installed, instead the applicant will utilise flexible pipes for leachate conveyance.

Key findings

- **The proposed leachate evaporation pond has sufficient capacity to contain and manage leachate for the entire life of the cell (all seven stages).**
- **The applicant proposes to implement a series of quality assurance and quality control measures associated with general earthworks and liner installation, for both the landfill liner and the leachate pond liner. These measures are considered by the Delegated Officer to be consistent with industry practice and standards.**
- **The Delegated Officer considers that any loss of containment from the leachate conveyance system (pipework), pond liner failure or overtopping would not result in significant impacts to surface or groundwater systems, should such an event occur (LOW RISK). There is however the potential for remnant native vegetating to be adversely impacted in the event of overland flow of leachate beyond the premises boundary (MEDIUM RISK).**
- **In view of the local geology (estimated 17 - 22 m of m of bedrock (cemented duricrust material) between groundwater and floor of landfill cell) and groundwater quality (expected to be highly saline and therefore non-potable), the Delegated Officer considers that the likelihood that native ecosystem and groundwater users will be adversely impacted by leachate emissions is rare (LOW RISK).**
- **Regulatory controls are included as conditions of the works approval, to ensure construction of the landfill cells adheres to the proposed lining specification and quality assurance and quality control (QA/QC) protocols. These measures will ensure that containment infrastructure will be constructed appropriately and thus mitigate against a contaminant pathway being present; thus, reducing the potential risk (level of impact).**
- **The Delegated Officer has determined that groundwater monitoring conditions shall be imposed as a condition of approval to identify any potential impacts on groundwater quality arising as a result of loss of containment and leachate infiltration. Quarterly monitoring has been proposed for the first 12 months of operation. The Delegated Officer will likely require quarterly monitoring to be maintained for entirety of the operational lifespan of the facility.**
- **On the basis of the proposed applicant and regulatory controls, the Delegated Officer considers that the controls for the mitigation of impacts associated with potential leachate emissions from the premises are adequate.**

4. Consultation

Table 9 provides a summary of the consultation undertaken by the department.

Table 9: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 6 May 2021	None received	N/A

Department of Planning, Lands and Heritage advised of proposal on 06/05/2021	*"Please be advised that the Land Use Management division of the Department of Planning, Lands and Heritage raises no objections to the above-mentioned proposal."*	N/A
Applicant was provided with draft documents on 06/08/2021. A formal response was received 30/08/2021.	Refer to Appendix 1	Refer to Appendix 1

5. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. *DWER 2020, Guideline: Risk Assessments, Perth, Western Australia.*
4. Department of Water and Environmental Regulation (DWER) 1996, Landfill Waste Classification and Waste Definitions 1996 (as amended 2019).
5. *ISO (International Organization for Standardization) 4427-1:2019 Plastics piping systems for water supply and for drainage and sewerage under pressure — Polyethylene (PE) — Part 1: General*
6. *Qian, X, Koerner, R & Gray, D 2002. Geotechnical Aspects of Landfill Design and Construction, Prentice Hall, Sydney*

Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition/Section	Summary of applicant's comment	Department's response
Draft works approval		
20	*There is an error in Condition 19 which has created an additional Condition 20. This means that all subsequent conditions are numbered wrongly. For the purposes of providing these comments, the condition numbers as presented in the draft works approval have been used. On correction of the error, the following conditions will need cross-references updating – Condition 23 (complaints); Condition 25 (maintenance of books) and Condition 26 (specification of books).*	Noted and corrected.
Table 1: Infrastructure and equipment design, construction, and installation requirements Weighbridge	*Additional details of the proposed weighbridge are provided as follows:* • *14 loadcell above ground multideck electronic weighbridge (42 m x 3.5 m).* • *Able to be calibrated as required in accordance with legislative requirements.* *Capable of determining the mass of a vehicle, including prime movers, rubbish trucks and connected trailers.*	Detail inserted.
Table 2: Critical Containment Infrastructure design, construction, and installation requirements Stage 1 Class III landfill cell – Sidewall liner	*The design and construction requirements for this component of the critical containment infrastructure does not include a requirement for leak detection testing, like that specified for the cell floor areas with basal liner in Row 1 of the table.* *While the test method is different due to the presence of the leachate drainage aggregate (ASTM D 7007), a leak location survey can be undertaken on the installed sidewall liner after placement of the protection geotextile.* *As identified in the Technical Specification, Section 10.4 (Execution) on page 74, the test method could be arc testing (ASTM D 7953) or the water lance method (ASTM D 7703).* *We recommend that this additional leak location testing be included in the design and construction requirements for the sidewall liner areas.*	Noted and testing requirement inserted.
Table 3: Groundwater monitoring requirements	*We request that the monitoring location specified in Column 1 of the table is referenced to Schedule 1, Figure 3.*	Noted and inserted.

Condition/Section	Summary of applicant's comment	Department's response
	The parameters for pH and standing water level (SWL) have table note references; however, there are no table notes. We assume that the notes should be the same as Table 9 referring to in-field analysis of pH and determination of SWL prior to collection of water sample.	Noted and inserted.
Table 4: Infrastructure and equipment requirements during time limited operations - Stormwater retention basin and Table 15: Leachate and stormwater management system construction and installation requirements - Leachate evaporation pond - Stormwater management system	*The operational requirement references "Contains surface water runoff produced as a result of a 1:100-year storm event." This should read 1:20-year storm event, instead of 1:100-year.* *The stormwater management infrastructure sizing and design for the landfill is based on a 1:20-year storm event, which is acknowledged on page 8 of the Draft Decision Report, Section 2.3.2 (Construction works), Stormwater management.* *It is assumed that this reference to a 1:100-year storm event was quoted in error, and we request that it is changed to 1:20-year storm event.* *This also applies to two further similar references to 1:100-year storm events, both in Table 15. We request that these references to a 1:100-year event are also changed to 1:20-year storm events.*	Noted and amended.
Table 6: Waste processing Special waste type 1	*We request that bullet points four and five relating to the covering of the waste are deleted as they duplicate the requirements in Condition 17, Table 7. Following, we request that the last bullet point is reworded to '…attest that it has been buried in accordance with the specification in this table and the cover requirements in Table 7.'*	Noted and amended.
Table 7: Cover requirements – Special Waste Type 1 – ACM and or asbestos contaminated soil that is not wrapped in	*The cover requirements associated with Special Waste Type 1 (ACM and or asbestos contaminated soil that is not wrapped in heavy duty plastic) and Special Waste Type 2 are not practical regarding the requirement to cover the waste with 1,000 mm of suitable material. The timescales specified for Special Waste Type 2 for 300 mm and 1,000 mm depth cover are also not clear. To allow greater flexibility in site operation whilst providing the same level of protection, we request that the following specification is used:*	Issue noted. The requirements were incorrect and have been amended to clarify requirements. An additional requirement has been included in relation to the use of Inert waste type 1 materials used for the cover of unwrapped/uncontained

<table>
<tr><th>Condition/Section</th><th>Summary of applicant's comment</th><th>Department's response</th></tr>
<tr><td>heavy duty plastic
– Special Waste Type 2</td><td>
<table>
<tr><th>Waste type</th><th>Material</th><th>Depth</th><th>Timescales</th></tr>
<tr><td>Special Waste Type 1 – ACM and or asbestos contaminated soil that is not wrapped in heady duty plastic</td><td>Inert Waste Type 1 or Clean Fill, soil, or clay</td><td>300 mm</td><td>Immediately after deposit and prior to compaction</td></tr>
<tr><td>Special Waste Type 2</td><td>Inert Waste type 1 or Clean Fill, soil, or clay</td><td>300 mm</td><td>As soon as practicable after deposit</td></tr>
</table>
</td><td>asbestos contaminated soils. Where these materials are used for cover of these wastes, they must be equal to or less than 10 mm fraction size and uniform in profile to eliminate void spaces in the cover layer.</td></tr>
<tr><td>Condition 18</td><td>Licence holder is stated instead of works approval holder.</td><td>Noted and corrected.</td></tr>
<tr><td>Condition 19</td><td>Correct error to correctly reference Table 9 and delete extra Condition 20.</td><td>Noted and amended.</td></tr>
<tr><td>Table 9: Monitoring of groundwater quality</td><td>We request that the monitoring location specified in Column 1 of the table is referenced to Schedule 1, Figure 3.</td><td>Noted and reference inserted.</td></tr>
<tr><td>Table 10: Monitoring of surface water and leachate quality.</td><td>We request that the monitoring location specified in Column 1 of the table is referenced to Schedule 1, Figure 3.</td><td>Noted and reference inserted.</td></tr>
<tr><td>Table 11: Definitions
Qualified CQA Engineer/Consultant</td><td>As described in the definition, the role of CQA Engineer/Consultant would be limited to holders of a Bachelor of Engineering degree recognised by the Institute of Engineers.
We request that this qualification requirement be extended to non-degree holders, such as qualified and experienced technicians or scientists with suitable certification such as Geotechnical Inspection and Testing Authority (GITA), Third Party Construction Quality Assurance Consultant (TPCC) or Geosynthetic Certification Institute – Inspectors Certification Program (GCI-ICP).
This will allow for greater flexibility in selecting a suitable CQA Engineer/Consultant for both the earthworks (subgrade, compacted clay liner) and geosynthetics components (GCL, geomembrane, geotextile) of the lining systems whilst maintaining, and potentially exceeding, the level of qualification and experience required by the current definition.</td><td>DWER has retained the requirement for a suitably Qualified Engineer to certify works specified in Condition 2 and Table 2. The following definition has been specified:
means a person who:
a) holds a Bachelor of Engineering recognised by the Institute of Engineers; and
b) has a minimum of five years</td></tr>
</table>

Condition/Section	Summary of applicant's comment	Department's response
		of experience working in a supervisory area of geotechnical engineering; and c) is employed by an independent third party external to the Works Approval Holder's business. Reference to the option to use a Geotechnical Engineer has been removed as it is redundant given the scope of qualifications as defined above. It is open to the Works Approval Holder to use other suitably qualified personal to certify individual components of the overall works however, final certification of all works must be provided by a suitably Qualified Engineer as outlined above.
Table 14: Cell construction and installation requirements; – Stage 1 – HDPE Geomembrane	*The bullet point list for "**Weld locations**" is out of alignment and several full sentences have been split into separate bullet point items. As per the Technical Specification, Section 7.10.5, Page 50, the correct bullet point list is:* ***Weld locations*** *The geomembrane panel placement shall take into consideration the site geometry including:* • *Field seams shall be orientated parallel to the line of maximum slope.* • *No cross-seams (transverse seams) shall be permitted on batters or within 1.5 m of the toe of the batter.* • *In corners and odd shaped geometric locations, the number and total length of field seams shall be minimised.*	Noted and amended.

Condition/Section	Summary of applicant's comment	Department's response
	• *All primary welds used to connect panel ends to sheets shall form T-joins (tees). These T- connections shall have a distance of at least 0.5 m and shall be patched in accordance with Section 7.15. The welding seams of the geomembrane cannot cross (no cruciform connections).*	
Table 15: Leachate and stormwater management system construction and installation requirements Stage 1 – Leachate collection sump and vertical sump riser pipe	*The draft works approval requests that the specifications are to be provided by the applicant.* *The leachate riser will be installed to provide overall structure and stability, and to facilitate the lifting and lowering of the leachate extraction pump and pipe into the sump. The riser will be constructed, and progressively extended vertically, with 2 m sections of DN1200 HDPE pipe.* *In the sump, the riser will be mounted to the concrete foundation with a base plate and anchor bolts that will be cast in the concrete. To prevent accidental damage to the lining system during placement of the reinforcement steel in the concrete foundation, a layer of no less than 150 mm of dry lean-mix concrete will be placed and compacted in the base of the sump foundation. The reinforcement steel will then be placed on top of the compacted dry lean-mix concrete, together with the anchor bolts and base plate for the riser, and the remainder of the foundation be poured with the specified concrete.* *The above specification is supported by re-issued GHD Drawing 12532983-C011 attached (draft works approval Figure 6), which provides additional dimensions and construction notes relating to the foundation.* *The preparation of the detailed specification for the leachate extraction pump and the associated riser pipe will be undertaken as part of the final design for the leachate extraction and conveyance system, either by the lead contractor or a suitably experienced and qualified hydraulics sub-contractor.* *At this stage it is envisaged that the leachate extraction pumps for uncapped landfill areas, i.e., any areas of constructed cell footprint where no final cap has been constructed yet, will likely be pumps driven by an electrical motor, such as impeller pumps or helical rotor pumps.* *Given the likely significantly lower flow-rate requirements in capped landfill areas/cells, due to the significantly reduced leachate generation, the extraction pumps are expected to be pneumatic pumps, such as diaphragm pumps or direct displacement pumps.*	Noted and inserted. Reference figure updated.

Condition/Section	Summary of applicant's comment	Department's response
	It is noted that any power supply requirements for any potential pump type(s) can be met with the current power supply established at the site, or with additional localised solar power supply at the pump locations. *Based on the above assumptions, the minimum performance specification for both the pump and the pipe are provided as follows:* *• Pump minimum flow rate of 2 m3/hr at a minimum dynamic head of 40m.* *Note: this pump performance is expected to allow for at least 50% excess capacity above the likely requirements established as part of the design.* *• Pump motor to meet IP68 ingress protection requirements.* *Note: explosion protection ratings will be determined as part of the detailed design.* *• Pump fitted with an extraction pipe system and suitable reflux valves.* *• Pump affixed to a stainless-steel chain of suitable strength and sufficient in length to exceed the maximum height of the sump riser cover at the maximum vertical extension of the final landform in the sump location by no less than 1m.* *• Vertical extraction system comprises a lay-flat hose of suitable strength connected to a suitably sized HDPE pipe at surface level.* *• Surface level HDPE pipe connected into the main transfer pipe via suitable reflux valves and joints.* *• Pump controlled by suitably specified and selected pressure transducers, or alternative, with settings for pump start, pump stop and high-level alarms.*	
Table 15: Leachate and stormwater management system construction and installation requirements – Stormwater management system	*Bullet point 3 for this infrastructure item reads as follows:* *"All drains, pipes, culverts and other stormwater drainage infrastructure shall be designed to covey peak flow rate corresponding to a 1 in 20-year storm event, with available freeboard to convey discharge corresponding to a 1 in 100-year storm event."* *Typographic errors as underlined – we understand that the first underlined word "covey" should read "convey" and the second highlighted word "convey" should read "contain".* *Note: the reference to a 1 in 100-year storm event is requested to be changed to a 1 in 20-year storm event as per the comments against Table 4.*	Noted and amended.
Table 18: Geocomposite clay liner CQA requirements	The four entries in column 4 (Frequency) and 5 (Minimum Value MARV) have been mixed up for this item. The entries in column 4 should be in column 5, and vice-versa. The revised table section for this item should be as follows:	Noted and amended.

<table>
<tr><th>Condition/Section</th><th>Summary of applicant’s comment</th><th>Department’s response</th></tr>
<tr><td>Conformance testing upon transport to site – Geotextile</td><td>
<table>
<tr><th>Item</th><th>Property</th><th>Standards</th><th>Frequency</th><th>Minimum Value MARV</th></tr>
<tr><td rowspan="4">Conformance testing upon transport to site - Geotextile</td><td>Cover geotextile - mass (MARV)
Non- woven</td><td>AS 3706.1</td><td>Every 20,000 m^2</td><td>200 g/m^2</td></tr>
<tr><td>Carrier geotextile - mass (MARV)
Non- woven</td><td>AS 3706.1</td><td>Every 20,000 m^2</td><td>200/100 g/m^2</td></tr>
<tr><td>Durability of geotextile and reinforcing yarns (min.)</td><td>Section 5.6.2 of GRI-GCL3</td><td>Yearly</td><td>65%</td></tr>
<tr><td>California bearing ratio (CBR) burst strength (MARV)</td><td>AS 3706.4</td><td>Every 25,000 m^2</td><td>1,500 N</td></tr>
</table>
We note that this error only applies to this item, as identified above. The entries in the table for the remaining items are correctly quoted and entered.
</td><td></td></tr>
<tr><td>Table 21: Separation geotextile CQA requirements
Conformance testing upon transport to site</td><td>The Minimum Value MARV entered in column 5 for the Mass per unit area item is specified as ≥ 160 g/m^2. This value is incorrect – as per the Technical Specification, Section 8.5.2, Table 17, on page 63, the value for this property should be ≥ 270 g/m^2.</td><td>Noted and amended.</td></tr>
<tr><td colspan="3">Draft Decision Report</td></tr>
<tr><td>Page 6, Section 2.3.2 Construction works</td><td>The highlighted text requires the applicant to provide additional information relating to the potential for gas build up beneath the liner.</td><td>Noted and additional text inserted.</td></tr>
</table>

Condition/Section	Summary of applicant's comment	Department's response
Leachate pond design and construction	*We acknowledge that the leachate pond will be constructed in virgin soil, which has not been used previously for landfilling activities. However, we note that the provision of the vents the design is a precautionary measure based on several aspects.* • *The leachate pond will be constructed near the landfill footprint once the landfill has been fully developed to its proposed northern extent. The integrity of any landfill lining system could potentially be breached or impacted at some stage, during or after the active operational phase. Such breach of integrity could potentially cause migration of landfill gas, which could also impact the soil in which the leachate pond will be constructed;* • *The integrity of the leachate pond itself could potentially be breached, which could lead to the migration of leachate into the underlying and surrounding soils, which in turn could trigger degradation processes within the underlying and surrounding soils that could give rise to decomposition gases; and* • *Without any breaches of the pond liner integrity, the continuous and repeated exposure of geomembrane areas on the sidewalls to significant temperature changes between daytime and night time, and summer and winter could cause the formation of condensate and pockets of excess air under the liner.* *The scenarios described above could all have the potential to lead to the formation of excess air under the liner (also known as "whales" as when they become visible on the liquid surfaces they appear similar to "whale backs"). Any such formation would have the potential to cause further damage to the geomembrane, ultimately causing tears and leachate seepage.* *The proposed vents are only minor in nature and extent but could still provide a means of escape for excess air or ground gases that would otherwise get locked under the liner beside the anchor trench.* *Regarding the actual observations quoted in the draft decision report, we request the following changes:* • *The relevant bullet point bullet point (#3) that this aspect refers to (also highlighted in yellow) references a "Gas dissipation system" comprising "Viking vents and strip drains".* • *In addition, the following paragraph describes "A gas dissipation system has been included beneath the geomembrane liner to safely vent gas beneath the unballasted geomembrane to the atmosphere and furthermore avoid damage to the liner due to pressure build up."*	

Condition/Section	Summary of applicant's comment	Department's response
	The above references are incorrect as the design only allows for the installation of simple flap valves on the pond sidewalls above the lower freeboard level. A gas dissipation system with Viking vents and strip drains is not included in the provided design. Therefore, we request that the above references are removed as they do not reflect the correct nature of the proposed venting arrangements. *The correct description is provided as follows:* *The gas dissipation system comprises gas vents in the geomembrane. Full circle cuts, as shown in Figure 10 of the draft Works Approval (Leachate pond details and sections), will be cut into the geomembrane. These cuts will then be covered with circular geomembrane flaps of a larger diameter than the cuts. The flaps will be extrusion welded to the main geomembrane in the upper 240° of the flap to prevent rainwater ingress from above. The cuts will be located above the freeboard.*	
Page 14, Section 2.4 PFAS waste acceptance and disposal, Key findings Bullet points 3, 4 and 5	*All three key findings (bullet points 3, 4 and 5) include references to either containment or conveyance of leachate volumes or stormwater produced as a result of 1 in 100-year storm events. We assume that the references to a 1:100-year storm event are quoted in error and request that they are changed to 1:20-year storm events (refer to comments against Table 4 and Table 15 of the draft works approval).*	Noted and amended.
Minor typographic errors	*Page 22, Table 7, Receptor ID E3 – 'recorded' instead of 'recoded'.* *Page 32, Section 3.3.1, para 3 – cross reference error 'Section 0' instead of 'Section 2.3.2'.*	Noted and amended.

Appendix 2: Application validation summary

<table>
<tr><th colspan="6">SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)</th></tr>
<tr><td colspan="6">Application type</td></tr>
<tr><td>Works approval</td><td>☒</td><td colspan="4"></td></tr>
<tr><td rowspan="5">Licence</td><td rowspan="5">☐</td><td>Relevant works approval number:</td><td></td><td>None</td><td>☐</td></tr>
<tr><td colspan="3">Has the works approval been complied with?</td><td colspan="2">Yes ☐ No ☐</td></tr>
<tr><td colspan="3">Has time limited operations under the works approval demonstrated acceptable operations?</td><td colspan="2">Yes ☐ No ☐ N/A ☐</td></tr>
<tr><td colspan="3">Environmental Compliance Report / Critical Containment Infrastructure Report submitted?</td><td colspan="2">Yes ☐ No ☐</td></tr>
<tr><td>Date report received:</td><td colspan="3"></td></tr>
<tr><td>Renewal</td><td>☐</td><td>Current licence number:</td><td colspan="3"></td></tr>
<tr><td>Amendment to works approval</td><td>☐</td><td>Current works approval number:</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Amendment to licence</td><td rowspan="2">☐</td><td>Current licence number:</td><td colspan="3"></td></tr>
<tr><td>Relevant works approval number:</td><td></td><td>N/A</td><td>☐</td></tr>
<tr><td>Registration</td><td>☐</td><td>Current works approval number:</td><td></td><td>None</td><td>☐</td></tr>
<tr><td colspan="2">Date application received</td><td colspan="4">5 February 2021</td></tr>
<tr><td colspan="6">Applicant and premises details</td></tr>
<tr><td colspan="2">Applicant name/s (full legal name/s)</td><td colspan="4">Shire of Coolgardie</td></tr>
<tr><td colspan="2">Premises name</td><td colspan="4">Coolgardie Waste Facility</td></tr>
<tr><td colspan="2">Premises location</td><td colspan="4">Coolgardie Tip Road, Great Eastern Highway
Crown Reserve 3497, Lot 501 on Deposited Plan 255090</td></tr>
<tr><td colspan="2">Local Government Authority</td><td colspan="4">Shire of Coolgardie</td></tr>
<tr><td colspan="6">Application documents</td></tr>
<tr><td colspan="2">HPCM file reference number:</td><td colspan="4">DWERDT409920; DWERDT409922</td></tr>
<tr><td colspan="2">Key application documents (additional to application form):</td><td colspan="4">Application Form
Supporting Document:
- Environmental Siting and Conceptual site model
- Landfill design and construction
- Monitoring
- Odour analysis
- Information used to calculate fees</td></tr>
</table>

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)	
Scope of application/assessment	
Summary of proposed activities or changes to existing operations.	Works approval Construction of Stage 1 of: - Class III landfill cell – majority of call floor, southern batter and partial eastern and western wall - Separation bund to the north for first cell - Leachate pond and leachate management infrastructure - Stormwater pond – southern detention basin - Perimeter screening berm Access roads

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Proposed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 64: Class II or III putrescible landfill site	Proposed – 30,000 tpa	N/A

Legislative context and other approvals		
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes ☐ No ☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☐ No ☒	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Certificate of title ☒ Lot 501 on deposited plan 255090 with primary interest holder as Shire of Coolgardie. General lease ☐ Expiry: Mining lease / tenement ☐ Expiry: Other evidence ☐ Expiry:
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☒ N/A ☐	Approval: Expiry date: Development Approval not yet submitted to Council – proposed to

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)		
		be submitted post-validation. RFI response advises that the Development Approval application will be submitted to the Shire by the end of May 2021. Subject to LPS 5 – SCA 1 – which is subject to advice from EPA (?)
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☒ No ☐	CPS No: CPS 9080/1 Currently under assessment – 25.7 ha Maps and clearing description provided for reference
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☒	Application reference No: N/A Licence/permit No: N/A
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☐ No ☒	Application reference No: Licence/permit No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	Name: Goldfields Groundwater Area Type: Designated Groundwater Area Has Regulatory Services (Water) been consulted? Yes ☐ No ☒ N/A ☐ Regional office: Goldfields
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☒ No ☐	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes ☐ No ☐ N/A ☒
Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☐ No ☐	Yes – Rural landfill regulations under Registration R1550

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)		
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☒ No ☐	Incomplete Report Classification: Incomplete Date of classification: N/A