Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6929/2024/1
Works approval holder	Karratha Recycling Pty Ltd
ACN	163 991 106
Registered business address	Level 15, Exchange Tower 2 The Esplanade, PERTH WA 6000
DWER file number	DER2024/000156
Duration	29/07/2024 to 29/07/2029
Date of issue	29/07/2024
Premises details	Karratha Recycling Liquid Waste Facility Lot 120 and 121 Pindan Road GAP RIDGE WA 6714

Prescribed premises category description (Schedule 1, ***Environmental Protection Regulations 1987***)	**Assessed production / design capacity**
Category 35: Asphalt manufacturing - premises on which hot or cold mix asphalt is produced using crushed or ground rock aggregates mixed with bituminous or asphaltic materials for use at a place or premises other than those premises.	40,000 tonnes per annual period
Category 36: Bitumen manufacturing: premises on which bitumen is mixed or prepared for use at places or premises other than those premises	20,000 tonnes per annual period
Category 61: Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	130,000 tonnes per annual period
Category 61A: Solid Waste Facility**:** premises (other than premises within category 67A) on which solid waste produced on other premises is stored, reprocessed, treated or discharged onto land	20,000 tonnes per annual period

This works approval is granted to the works approval holder, subject to the attached conditions, on 29 July 2024, by:

Grace Heydon

Digitally signed by Grace Heydon
Date: 2024.07.29 09:19:41 +08'00'

Grace Heydon – A/MANAGER WASTE INDUSTRIES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Works approval history

Date	Reference number	Summary of changes
20/02/2014	W5538/2013/1	New Works Approval for construction of a liquid waste facility.
06/03/2015	W5579/2014/1	New Works Approval for construction of an asphalt plant.
19/03/2015	W5806/2015/1	New Works Approval for expansion of the liquid waste facility.
8/03/2023	W6782/2023/1	Installation of a Oleology filtration unit.
29/07/2024	W6929/2024/1	Installation of a new Drying Bed

Interpretation

In this works approval:

(a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice in this works approval:

  (i) if dated, refers to that particular version; and

  (ii) if not dated, refers to the latest version and therefore may be subject to change over time;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This works approval requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this works approval.

Works approval conditions

The works approval holder must ensure that the following conditions are complied with:

Construction phase

Infrastructure and equipment

1. The works approval holder must:

(a) construct and/or install the critical containment infrastructure and/or equipment;

(b) in accordance with the corresponding design and construction / installation requirements; and

(c) at the corresponding infrastructure location;

as set out in Table 1.

Table 1: Design and construction / installation requirements

	Infrastructure	Design and construction / installation requirements	Infrastructure location
1.	Drying Bed	(a) Maximum dimensions of 70 m in length, 30 m in width and 1 m in depth; (b) Compacted base of in-situ soil; (c) Lined with GCL with a permeability great then 1 x 10-9 m/s; (d) The installation of a 150mm compacted road base layer on top of the GCL; (e) Comprise a spray seal and asphalt layer on top of the compacted road base layer; (f) Separation distance of at least 2 m must be maintained between the base of the liner and the highest wet season water table; (g) Perimeter of the Drying Bed must be bunded.	As shown in Figure 2 of Schedule 1
2.	GCL Liner	(a) The GCL must meet design and installation specifications as listed in Schedule 2: Minimum specification for excavation and GCL installation, Table 3; and (b) The liner must: (i) be installed as one consecutive piece, overlapped if necessary to manufacturer's specification; (ii) extend to the bunding around all sides; and (iii) be free from leaks and defects where it adjoins the bunding.	Within the drying beds shown in Figure 2 of Schedule 1

Compliance reporting

2. The works approval holder must within 30 calendar days of the infrastructure or equipment required by condition 1 being constructed and/or installed:

(a) undertake an audit of their compliance with the requirements of condition 1; and

(b) prepare and submit to the CEO a Critical Containment Infrastructure Report on that compliance.

3. The Critical Containment Infrastructure Report required by condition 2, must include as a minimum the following:

(a) certification by a suitably qualified civil engineer that each item of infrastructure or component thereof, as specified in condition 1, has been constructed and installed in accordance with the minimum requirements specified in condition 1 and Table 3 of Schedule 2;

(b) a Construction Quality Assurance Report from an independent third party that:

(i) is written and certified by a suitably qualified CQA engineer/consultant who has undertaken CQA on the completed works for the compacted subgrade and HDPE liner;
(ii) details the CQA procedures and testing undertaken for the compacted subgrade and GCL;
(iii) confirms the preparation of the subgrade and installation of the GCL have met the minimum requirements contained in Table 3 of Schedule 2 and the relevant requirements specified in condition 1;
(iv) confirms the quality control and assurance measures contained in Table 4 of Schedule 3 have been completed and that satisfactory results have been demonstrated;
(v) includes evidence of quality assurance and conformance testing works; and
(vi) certifies that the subgrade and liner are free of fault or defect, built to the design specification and fit for the intended purpose;

(c) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 1;

(d) photographic evidence of the installation of the infrastructure;

(e) evidence that pipework, fittings and pumps have been tested and inspected to ensure the infrastructure is fit for purpose prior to use;

(f) a description of, and explanation for, any departure from the requirements in condition 1; and

(g) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

Records and reporting (general)

4. The works approval holder must record the following information in relation to complaints received by the works approval holder (whether received directly from a complainant or forwarded to them by the Department or another party) about any alleged emissions from the premises:

(a) the name and contact details of the complainant, (if provided);

(b) the time and date of the complaint;

(c) the complete details of the complaint and any other concerns or other issues raised; and

(d) the complete details and dates of any action taken by the works approval holder to investigate or respond to any complaint.

5. The works approval holder must maintain accurate and auditable books including the following records, information, reports, and data required by this works approval:

(a) the works conducted in accordance with condition 1;

(b) any maintenance of infrastructure that is performed in the course of complying with condition 1; and

(c) complaints received under condition 4.

6. The books specified under condition 5 must:

(a) be legible;

(b) if amended, be amended in such a way that the original version(s) and any subsequent amendments remain legible and are capable of retrieval;

(c) be retained by the works approval holder for the duration of the works approval; and

(d) be available to be produced to an inspector or the CEO as required.

Definitions

In this works approval, the terms in Table 2 have the meanings defined.

Table 2: Definitions

Term	Definition
AS 3706.1	Means AS 3706.1-2012 *Geotextiles – Methods of test, Method 1: General requirements, sampling, conditioning, basic physical properties and statistical analysis*
AS3706.4	means AS 3706.4-2001 *Geotextiles - Methods of test Determination of burst strength - California bearing ratio (CBR) - Plunger method*
ASTM D5887	means ASTM D5887-22 *Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter*
ASTM D5890	means ASTM D5890-19 *Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners*
ASTM D5891	means ASTM D5891-19 *Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners*
ASTM D5993	means ASTM D5993-16 *Standard Test Method for Measuring Mass per Unit Area of Geosynthetic Clay Liners*
ASTM D6768	means ASTM D6768-20 *Standard Test Method for Tensile Strength of Geosynthetic Clay Liners*
ASTM D6243	means ASTM D6243-20 *Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liners by the Direct Shear Method*
ASTM STP 1308	means ASTM STP 1308-EB *Testing and Acceptance Criteria for Geosynthetic Clay Liners*
books	has the same meaning given to that term under the EP Act.

Term	Definition
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 info@dwer.wa.gov.au
critical containment infrastructure	means the items of infrastructure listed in condition 1.
Critical Containment Infrastructure Report	means a report to satisfy the CEO that works of critical containment infrastructure have been constructed in accordance with the works approval.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V Division 3 of the EP Act.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
EP Act	*Environmental Protection Act 1986* (WA).
EP Regulations	*Environmental Protection Regulations 1987* (WA).
GCL	Elcoseal Geosynthetic Clay Liner
premises	the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map in Schedule 1 to this works approval.
prescribed premises	has the same meaning given to that term under the EP Act.
suitably qualified civil engineer	means a person who: (a) holds a Bachelor of Engineering recognised by Engineers Australia; and (b) has a minimum of five years of experience working in a supervisory area of civil or structural engineering; or is otherwise approved in writing by the CEO to act in this capacity
waste	has the same meaning given to that term under the EP Act.
works approval	refers to this document, which evidences the grant of the works approval by the CEO under section 54 of the EP Act, subject to the conditions.

Term	Definition
works approval holder	refers to the occupier of the premises being the person to whom this works approval has been granted, as specified at the front of this works approval.

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in the map below in red.

Figure 1: Premises map

Drying Bed Map

The location of the Drying Bed is shown in the map below.

Figure 2: Drying bed location

Schedule 2: Minimum specification for excavation and GCL installation

The construction works and requirements described in the following tables are required to be completed in accordance with Condition 1, Table 1, row 2.

Table 3: Liner Subgrade Construction Specifications

Infrastructure or Equipment	Requirements (design and construction)
Drying Bed Site Preparation and Subgrade construction	The following site preparation works must be undertaken: (a) Excavate all unsuitable materials to a minimum depth of -300 mm from the final surface level (FSL) of the pond and drying bed and replace with engineered fill material to FSL to form a suitable subgrade; (b) Excavation of all unsuitable materials to a minimum depth of -300mm from final surface level (FSL) to form a suitable subgrade, and replace with engineered fill material; (c) Moisture condition and compact to Standard Maximum Dry Density (SMDD) of 95% and Optimum Moisture Content (OMC) of -2% to +2% in layers to FSL not exceeding 300mm and not less than 100mm. (d) If suitable material (meeting requirements for engineered fill material) exists in the Pond and Drying Bed footprint, the material shall be excavated to -250mm of FSL, ripped and treated as per engineered fill material for moisture conditions and compaction requirements; (e) Internal batters cut to 1:3 (V:H); (f) Proof roll entire footprint including pond and drying bed floor and embankments. (g) Following rolling, ensure the prepared subgrade is protected from desiccation and flooding, and the surface is maintained in a smooth condition prior to GCL installation.
GCL installation	(a) The entire surface area of each roll must be inspected by the suitably qualified CQA civil engineer/consultant prior to works commencing or during unrolling/installation, to ensure that there are no tears, punctures, abrasions, indentations, cracks, thin spots or other faults in the material; (b) Each roll or panel shall carry a label which identifies, as a minimum: (i) Product name, grade, and name of manufacturer. (ii) Date of manufacture, batch number. (iii) Material thickness. (iv) Roll number. (v) Roll length. (vi) Roll weight. (vii) Roll width. (viii) Handling guidelines. (ix) Reference numbers to raw material batch and laboratory certified reports. (x) Manufacturers approved quality assurance stamp and the technician's

	signature. (c) Rolls should be stored flat in their original, unopened packaging in a location away from construction traffic but sufficiently close to the active work area to minimise handling; (d) Rolls should not exposed to moisture prior to installation. Damaged wrappers should immediately be repaired with weather resistant tape. Wrapping should only be removed from Elcoseal rolls immediately prior to installation; (e) A Spreader Bar with a steel tube insert must be used to lay GCL Rolls. (f) Installation and seaming must be undertaken by installers with extensive experience in seaming the same type of GCL being installed and using the same seaming procedures to be used on site. They must hold a current independent certification for seaming and installation to a recognised industry standard (national or international); (g) The method used to unroll and deploy the panels must not score, scratch or crimp the geomembrane; (h) Must not be installed during rainfall, high winds or in the presence of standing water on the subgrade; (i) Must be installed to overlay the subgrade so that the GCL remains in direct contact with the subgrade, with sufficient slack given to ensure low areas in the subgrade are not bridged by the GCL; (j) Panel overlap zones must be no less than 300 mm and orientated so the overlap is in the down sloping direction and across the pond base; (k) The edge of deployed or previously placed panels needs to coincide or match with the visible blue line on the roll being deployed; (l) The transverse or end overlaps need to be sealed using bentonite paste; (m) Panels installed on pond embankments must be fixed in anchor trenches; (n) Panels must be free of holes, blisters, blemishes, striations, bubble, roughness, contaminants and permanently attached raw materials; and (o) The installation must be undertaken in accordance with any additional minimum requirements specified by the manufacturer.
Anchor trenches	(a) Must be set back at least 1.0 m from the top edge of the pond and drying bed embankment; (b) An anchor trench should be used at the top of slopes steeper than 7H: 1V; and (c) Must be backfilled with engineered fill while liner materials are in the relaxed state, in full contact with subgrade and without sharp edges, wrinkles or folds.
Inspection and repair	Following installation of the GCL, the works approval holder must; (a) identify any damage to the GCL by inspecting the surface of the liner for rips, tears and displaced panels; (b) conduct appropriate repairs to any damage identified through the inspection; (c) Where the GCL has been damaged during installation, covering with an overlapping piece of GCL can repair such areas. The overlap should be at least 500 mm; and (d) document the results of the inspection, and if required, any repairs done to the liner.

Schedule 3: Construction Quality Assurance Testing

Geosynthetic Clay Liner

The Construction Quality Assurance Requirements for the installation of the GCL are outlined in Table 4 below.

Table 4: GCL CQA Testing.

PROPERTY		TEST METHOD	MQC[1] REQUENCY	UNITS	ELCOSEAL® GRADE			
					X800	X1000	X2000	X3000
GCL Hydraulic Properties								
Hydraulic Conductivity, k	MaxArv[2]	ASTM D5887	40,000 m²	m/s	3.5×10^{-11}	2.8×10^{-11}	3×10^{-11}	2.4×10^{-11}
	Typical[3]				2.5×10^{-11}	1.9×10^{-11}	2.4×10^{-11}	1.7×10^{-11}
Bentonite Characteristics								
Swell Index	Typical	ASTM D5890	40,000 m²	mL/2g	≥ 24	≥ 24	≥ 24	≥ 24
Fluid Loss	Typical	ASTM D5891	40,000 m²	mL	≤ 15	≤ 15	≤ 15	≤ 15
GCL Components - Mass								
Cover Nonwoven Geotextile Mass per Unit Area	MARV[4]	AS 3706.1	10,000 m²	g/m²	220	220	220	260
	Typical				250	250	250	300
Bentonite Mass per Unit Area @ 0% Moisture Content	MARV	ASTM D5993	2,500 m²	g/m²	3,700	4,000	3,700	4,250
	Typical				4,100	4,500	4,250	4,700
Carrier / Composite Geotextile Mass per Unit Area	MARV	AS 3706.1	70,000 m²	g/m²	110	110	320	350
	Typical				110	110	360	380
Geotextile Configuration (Carrier / Cover)					W / NW[5]	W / NW	W+NW / NW	W+NW / NW
GCL - Mass								
GCL Total Mass per Unit Area @ 0% Moisture Content	MARV	ASTM D5993	2,500 m²	g/m²	4,030	4,330	4,240	4,860
	Typical				4,460	4,860	4,860	5,380
GCL - Strength Properties								
Strip Tensile Strength (MD)[6]	MARV	ASTM D6768	10,000 m²	kN/m	7	8	12	12
	Typical				10	11	15	16
CBR Strength	MARV	AS 3706.4	25,000 m²	N	1,400	1,600	3,500	4,100
	Typical				2,000	2,100	4,100	5,300
CBR Elongation	MARV	AS 3706.4	25,000 m²	%	10	15	30	30
	Typical				30	40	80	80
GCL - Shear Strength Properties								
Hydrated Peak Internal Shear Strength @ 10kPa Normal Stress	Typical[7]	ASTM D6243	Periodic	kPa	30	30	35	40
Hydrated Peak Internal Shear Strength @ 30kPa Normal Stress	Typical	ASTM D6243	Periodic	kPa	50	50	60	70
GCL Longitudinal Edge Treatment								
Bentonite Impregnation - Width ≥ 300 mm - Typical				-	√	√	√	√
Edge Sealing Performance	Typical[7]	ASTM STP 1308 (Mod.)10,11	Periodic	m/s	2.5×10^{-11}	1.9×10^{-11}	2.4×10^{-11}	1.7×10^{-11}
GCL Roll Dimensions								
Standard Roll Dimensions (Width x Length)				m	4.7 x 45	4.7 x 35	4.7 x 30	4.7 x 30
Typical Roll Mass (standard roll length). Note: Longer custom roll lengths are available to suit project requirements.			(Weighed every roll)	kg	1,395	1,050	960	950
GCL Spreader Bar Requirement				-	Heavy-Duty[8]	Heavy-Duty[8]	Standard[9]	Standard[9]

1. **MQC** = Manufacturing Quality Control – an ongoing system that monitors and tests materials during manufacture to ensure compliance with certification documents and contract specifications.
2. **MaxARV** = Maximum Average Roll Value – a MaxARV is defined as the Mean or Typical values plus 2 standard deviations. Mathematically, it is implied that 97.5% of the results of the tested specimens will be less than the MaxARV. A MaxARV provides a confidence level of 97.5%. **NOTE** – in reference to GCL Permeability, **LOWER IS BETTER.**
3. **Typical** = A typical value is the arithmetic mean of a set of results. This implies that 50% of the tested specimens will typically exceed this value and 50% will typically not meet this value.
4. **MARV** = Minimum Average Roll Value – a MARV is defined as the Mean or Typical values less 2 standard deviations. Mathematically, it is implied that 97.5% of the results of the tested specimens will exceed the MARV. A MARV provides a confidence level of 97.5%.
5. **W**= Woven, **NW**= Nonwoven.
6. **MD** = Roll Machine Direction.
7. **Peak Value** reported at 10kPa or 30kPa normal stress. [The reported values are not intended to replace site specific internal shear or interface friction testing required for design].
8. **Heavy-Duty WLL** (Working Load Limit) = 1,400kg.
9. **Standard WLL** (Working Load Limit) = 1,000kg.
10. **Reference** - Daniel, D.E. Trautwein, S.J. and Goswami, P.K. 1997. Measurement of Hydraulic Properties of Geosynthetic Clay Liners Using a Flow Box, Testing and Acceptance Criteria for Geosynthetic Clay Liners, ASTM STP 1308, p. 196-207.
11. **Modification Reference** - Kendall, P.M., Austin, R. A. 2014. Investigation of GCL Overlap Techniques Using a Large Scale Flow Box, 7th International Congress on Environmental Geotechnics, 3B-3, p. 746-753.