Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6293/2019/1
Applicant	MicroZinc Pty Ltd
ACN	616 959 936
File Number	DER2019/000408
Premises	Manna Soil Solutions Lot 77 Wellard Road LEDA WA 6170 Legal description - Part of Lot 77 on Diagram 68183, As defined by the coordinates in Schedule 1 of the Works Approval
Date of Report	31 July 2020
Status of Report	Final

Table of Contents

1. Definitions of terms and acronyms

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

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
AEP	Annual Exceedance Probability: The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.
Applicant	MicroZinc Pty Ltd
ARI	Annual Recurrence Interval: The average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration.
AHD	Australian Height Datum
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CS Act	*Contaminated Sites Act 2003* (WA)
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
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.
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation
EC	electrical conductivity
ECR	Environmental Compliance Reports
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EPDM	ethylene propylene diene monomer
EP Regulations	*Environmental Protection Regulations 1987* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
GWL	Groundwater Licence
ha	hectares
HDPE	high density polyethylene
IBC	Intermediate Bulk Container
KIA	Kwinana Industrial Area
kL	kilolitre
Landowner	Manna Enterprises Pty Ltd
LPS	Local Planning Scheme
m^3	cubic metres
mbgl	metres below ground level
MRS	Metropolitan Region Scheme
Minister	the Minister responsible for the EP Act and associated regulations

Term	Definition
NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Primary Activities	as defined in Schedule 2 of the Works Approval
Risk Event	As described in *Guidance Statement: Risk Assessment*
RO	Reverse osmosis
Spent Pickle Liquor	Waste hydrochloric acid resulting from the galvanising process whereby iron scale and zinc metal are dissolved into the acid solution at saturated levels
TBP	Tributyl phosphate
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
UPVC	unplasticised polyvinyl chloride
WAPC	Western Australian Planning Commission

2. Purpose and scope of assessment

On 28 July 2019, the Applicant submitted a Works Approval application (the Application) for construction and operation of a chemical manufacturing facility and liquid waste treatment facility on Part of Lot 77 Wellard Road, Leda (the Premises).

The Applicant proposes to separate iron and zinc cations from up to 1,800 kL of galvanising SPL) per annum and treat up to 3,200 kL of low nutrient level industrial liquid waste per annum (nutrient recovery), following the establishment of a chemical processing and liquid waste treatment facility. The SPL and industrial liquid waste will be converted into soil conditioning nutrients, primarily to be sold into the agricultural market. A portion of treated industrial liquid waste will be irrigated onto an onsite vetiver grass bed; the vetiver will be harvested and used in the production of essential oils and as animal fodder.

The assessment of the application has been undertaken in accordance with DWER's published Regulatory Framework. The scope of the assessment includes:

- the proposed construction works to establish a nutrient recovery facility and animal fodder production area (refer to section 4);
- the design and location of the proposed works (refer to section 7); and
- a risk-based assessment of the emissions and discharges associated with the operation of the nutrient recovery facility and animal fodder production area (refer to section 8).

This assessment has resulted in the issue of Works Approval W6293/2019/1 which is contained in Attachment 3 of this report. In completing the assessment documented in this Decision Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://www.der.wa.gov.au.

2.1 Application details

The Applicant applied for a works approval. Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document/information description	Date received	DWER records reference
Works Approval application form with concurrent clearing application	28/07/2019	A1809758
Works Approval application supporting information		
Clearing permit application supporting information		
First response to request for further information under validation	09/09/2019	A1819654
Unsigned lease agreement from Manna Enterprises Pty Ltd	26/09/2019	A1826816
Signed lease agreement from Manna Enterprises Pty Ltd	16/10/2019	A1832341
Response to request for further information under assessment	10/02/2020	DWERDT252552
Western Australian Planning Commission (WAPC) granted development approval	24/06/2020	A1906489
Response to outstanding information in draft Works Approval and Decision Report	27/07/2020	A1917504

3. Background

The proposed nutrient recovery facility and animal fodder production area will be located on Part of Lot 77 on Diagram 68183 which is owned by Manna Enterprises Pty Ltd (Manna) (the Landowner) and will be occupied by the Applicant under a pending lease agreement. Lot 77 was previously owned by CSBP Limited (CSBP) that deposited waste gypsum from its fertiliser manufacturing processes on the site. On 1 December 2006, Manna entered into a formal lease agreement with CSBP to commence reusing the stockpiled gypsum as a soil improvement product for the agricultural and horticultural sectors. Manna subsequently purchased the site from CSBP in March 2016.

The Landowner agreed for the Applicant to apply for the Works Approval and Development Approval relating to their proposed nutrient recovery facility and animal fodder production area at Part of Lot 77. Subsequent to regulatory approval, the Landowner will enter into discussions with the Applicant about authorising a suitable land lease agreement for the occupancy and operation of the proposed facility. The lease is to be obtained by the Applicant from the Landowner prior to commencement of development of the site, as required by the Development Approval issued by WAPC. Similarly, a Memorandum of Understanding between the Landowner and Applicant outlining the arrangements for management of the proposed facility is to be completed prior to commencement of development.

The galvanising industry in Western Australia uses hydrochloric acid to remove iron scale from steel products prior to coating the steel with a thin layer of molten zinc metal. This process is called pickling. The pickling process also removes zinc metal. Consequently, iron (II) and zinc (II) dissolve into the hydrochloric acid solution (pickle liquor), resulting in the pickle liquor slowly losing the capacity to remove iron scale until it decreases in efficiency to a point where it is referred to as spent (SPL). Historically, SPL was treated by adjusting pH to precipitate the iron and zinc as insoluble hydroxides and the solidification of the generated sludge using absorbent material such as saw dust, which was then sent to landfill for disposal.

The Applicant has developed methods to treat SPL in order to recover the valuable zinc and iron salts, hence diverting treated industrial waste from landfill. The Applicant's process provides micronutrients in a form that cannot be offered in most markets, as the salts are already soluble and available for application with dilution. The recovered secondary resources from the SPL can be used by the agriculture and mining sector, as well as in the treatment of wastewater.

The Applicant also proposes to treat low nutrient level industrial liquid wastes that will be received onsite as saline solutions. The treatment of these solutions may include pH adjustment and separation of insoluble salts through an onsite RO unit, followed by irrigation of the solution into an onsite aboveground vetiver grass bed.

The location of the Premises is shown in Figure 5 (section 7).

Table 3: Prescribed Premises Categories that have been applied for.

Classification of Premises	Description	Approved Premises design capacity
Category 31	Chemical manufacturing: premises (other than premises within category 32) on which chemical products are manufactured by a chemical process.	Not more than 1500 tonnes per year
Category 61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewage waste) is stored, reprocessed, treated or irrigated.	Not more than 6000 tonnes per year

4. Overview of Premises

4.1 Operational aspects (from Application)

There will be effectively two processes occurring on the Premises.

'Process 1' is the phase separation of iron and zinc arising from galvanising SPL within dedicated above ground process tanks. The recovered liquid will be sold, as is, into the market.

'Process 2' involves the receival and treatment of industrial liquid wastes and includes pH adjustment and separation of insoluble salts through reverse osmosis, followed by discharge of saline solution into the proposed vetiver grass bed.

Operational aspects of the processes are detailed below and summarised in Figure 2.

Process 1

4.1.1 Transport, delivery and storage of Spent Pickle Liquor

SPL is a dangerous good (class 8 corrosive) when it is discharged from galvanising processes. It will be transported to the Premises either in 200 litre drums or Intermediate Bulk Containers (IBCs) loaded on flatbed trailers, or within dangerous goods tankers to be discharged into IBCs onsite. The SPL will be delivered to the truck receivals bay for unloading.

Up to 1,800 kL of SPL is anticipated to be received and processed onsite per year. In year one of operations, this will require four deliveries every week; subsequently, at full development, deliveries will increase to three per day.

4.1.2 Pre-treatment of Spent Pickle Liquor

All batches of SPL received on the Premises will be tested upon receipt into the plant for iron and zinc concentrations.

There may be organic contaminants (lacquers) that will need to be removed via filtration from the SPL when it is received on site. The organic contaminants are anticipated to amount to less than 0.04% of the received mass each year, or approximately 18 tonnes per year. The organic fraction will be collected in bulk bags, air dried on the dewatered solids pad and disposed to landfill each week.

Upon removal of the organic contaminants, the SPL will have calcium hydroxide (lime) or caustic added to it to increase the free acid concentration.

4.1.3 Solvent extraction and recovery of cations

The details and specifications of the solvent extraction and nutrient recovery process is proprietary information, which the Applicant considers to be commercially sensitive. However, DWER has considered the full detail of the proposed works and operations in its assessment of the potential impacts of emissions and discharges on the environment. A simplified description of the processes involved is below.

A high selectivity solvating ligand mixed with an organic phase will be used to transport zinc chloride into a water-immiscible solvent, similar to the schematic shown in Figure 1. The organic phase is not consumed in the process and the zinc chloride loaded extractant is stripped of zinc chloride in a following step.

This process allows the recovery of four product streams, by separating the zinc and iron content of the SPL:

- Zinc chloride ($ZnCl_2.2H_2O$)
- Iron chloride ($FeCl_2.4H_2O$)
- Hydrochloric acid (18% HCl)
- Calcium chloride ($CaCl_2.2H_2O$)

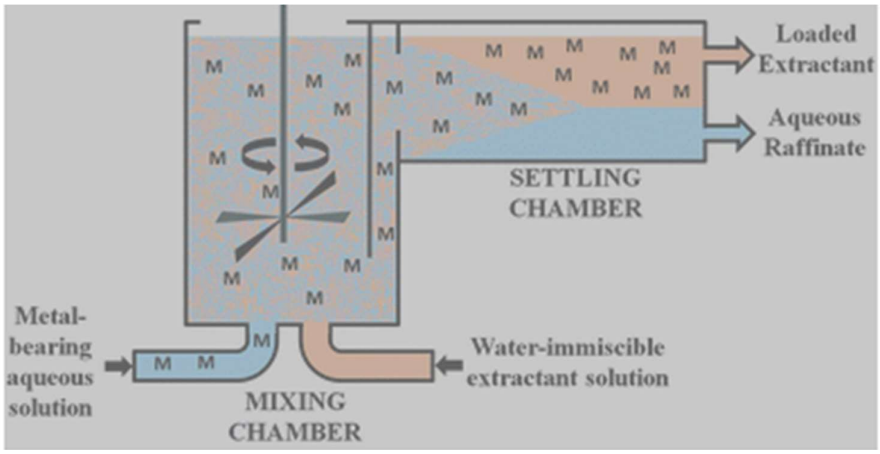


Figure 1: Solvent extraction schematic

Upon separating the iron and zinc cations, two identical volumes of each will be generated per year. The recovery of cations is anticipated to be 100% with all cations either being recovered in the iron solution or the zinc solution. The iron solution recovers 100% of the nickel (230 mg/L) and approximately 26% of the lead (520 mg/L). The zinc solution recovers 100% of the chrome (III) (360 mg/L) and 74% of the lead (1480 mg/L) (Table 4).

Table 4: Cation recovery concentrations

	Cations (% recovered)				
	Fe^{2+}	Zn^{2+}	Cr^{3+}	Ni^{2+}	Pb^{2+}
Zn Solution	7%	92%	100%	-	74%
Fe Solution	93%	8%	-	100%	26%

4.1.4 Bulk storage of chemicals

The Premises will be licensed as a dangerous goods site, for the storage and use of acid reagents.

Chemicals used onsite will include TBP, calcium hydroxide, sulfuric acid, hydrochloric acid and anionic flocculent. The majority of this inventory will be stored in containers less than 1,500 litres when not in use. Storage and process tanks will be within a single concrete bunded area with a capacity of 101 m^3 and hydraulic conductivity of $<10^{-9}$ m/s.

Process 2

4.1.5 Treatment and irrigation of industrial liquid waste

Up to 3,200 kL of industrial liquid waste (other than SPL), in the form of saline solutions, is anticipated to be received and treated at the Premises per year to be used as an alternative to groundwater on site, including irrigation to the vetiver grass bed. The salinity of the solutions will be assessed, and those with high total dissolved solids (TDS) concentrations will be passed through RO water filtration to adjust their TDS (typically sodium, calcium chlorides and sulfates) to less than 600 mg/L prior to irrigation. This will ensure salinity in the vetiver grass bed is kept to a minimum acceptable level.

The saline solutions typically have minor contamination with cations such as cadmium (Cd), chrome (Cr), tin (Sn), zinc (Zn) and lead (Pb). There may also be some minor mineral oils associated with some loads. The concentration received will typically be less than 1000 mg/L and will be precipitated from the saline solution by addition of lime, allowing all cations to be precipitated, air dried on the solids drying pad and forwarded to Manna Enterprises Pty Ltd

(within Lot 77 Wellard Road, Leda) or disposed to landfill, along with any reject liquid waste. It is anticipated these solids will amount to approximately five per cent by weight of the total volume of industrial liquid waste received each year.

Treated RO water, as required, will flow under gravity through electrofusion welded pipe, from the treatment facility to the vetiver grass bed and discharged via direct flow into individual IBCs through individual float valves during site operational hours. No transfers will occur when operating staff are not on site.

Empty space within each container (ullage) of 110 mm will be maintained in all IBCs to allow for storm events. It is anticipated that approximately 50 kL per week of equivalent RO treated liquid waste will be received into the plant. On average, 45 - 49 kL per week will be required due to evapotranspiration losses in the vetiver beds. The residual water will be returned to the treatment facility and then transferred to Manna Enterprises Pty Ltd to offset current water consumption used for hydrating their lime product.

The volume of water anticipated to be irrigated in each twelve months is approximately 2,320 kL, or 46 kL per week. Consequently, there may be a small shortfall of irrigation water.

During periods of intense rainfall, the 110 mm ullage maintained at the top of each IBC will be utilised. The current 5% Annual Exceedance Probability (AEP) (20 year Annual Recurrence Interval (ARI)) for the site is stated to be 103 mm over 24 hours (BOM 2016). This volume, assuming 100% capture, will be retained within the ullage of each IBC and provide adequate response time to allow recovery of 13 mm from each IBC back into a 23 kL rainwater holding tank at the treatment facility.

It is anticipated that there will be no nutrient run-off as all nutrients will be dosed into each IBC based on needs. The IBCs will be inspected each day of normal operations and any defective units will be exchanged.

4.1.6 Vetiver grass bed installation and harvesting

Vetiver grass beds will be established aboveground, growing in approximately 2,500 IBCs placed in rows, with between 54 and 118 IBCs in each row. The IBCs will be placed on a compacted (10^{-6} m/s) lime/gypsum mortar hardstand finished at 7 metres Australian Height Datum (AHD), enclosed by compacted gypsum bund walls. The IBCs will be visually inspected each weekday for signs of leaks, and those with defects will be drained into standby IBCs and either repaired or replaced.

The IBCs will be individually volume controlled using float valves and will be fitted with an overflow outlet that flows back to a common sump. The common sump will be fitted with a float valve that allows volume control by pumping excess liquid back to the treatment facility holding tank through a pipe.

The Applicant proposes to install three groundwater monitoring wells along the western boundary of the vetiver bed site. The Applicant proposes to collect samples twice per year, in summer and in winter, yet has not specified detail on analyses of samples to be undertaken.

Only sterile cultivars of vetiver grass will be propagated vegetatively from known sources, and never propagated from seed, as fertile varieties may produce seed and be potentially invasive. The vetiver grass will grow on floating platforms within the IBCs and will be partially processed on site. Harvesting will be by hand and occur during January each year with half the crop being harvested at any one time. Leaves will be harvested by hand, strapped and sent for pasture supplement. Vetiver roots will be harvested when the plants are 24 months old and be air dried prior to being sent offsite for solvent extraction of essential oils. Biomass will be used for pasture supplement.

4.1.7 Stormwater management

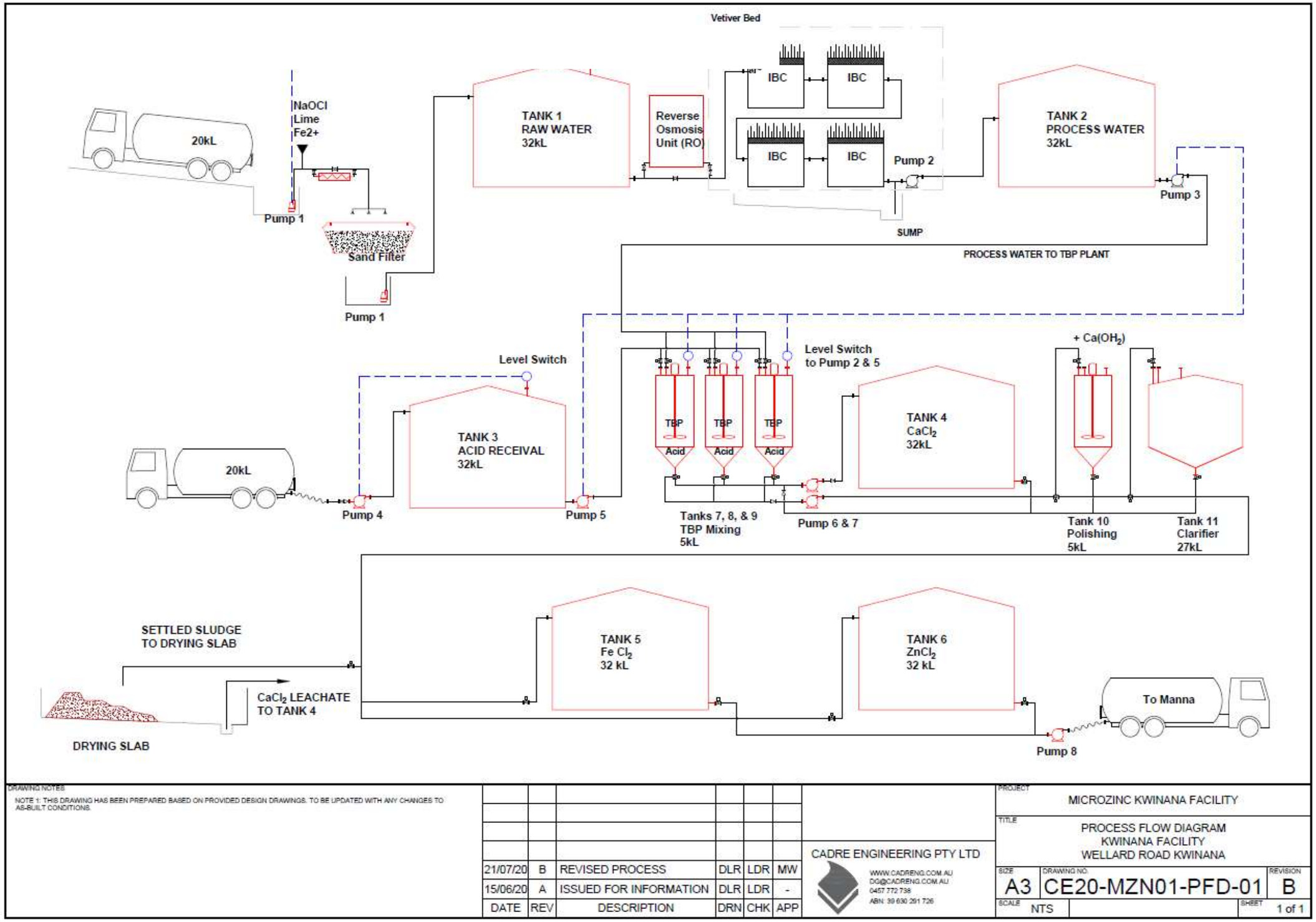
All dewatered solids will be removed from site prior to scheduled rainfall events. Dewatered

solids will be typically insoluble, however, RO rejects may be soluble. Consequently, after any unscheduled storm event, the stormwater will be tested and either passed through the RO unit and/or pumped to the vetiver grass beds.

The current 5% AEP (20 year ARI) for the site is stated to be 103 mm over 24 hours (BOM 2016). This volume, assuming 100% capture will be retained within the ullage of the treatment facility pad, at a depth of 100 mm. The bund wall will be 350 mm high at the highest point (175 mm high on average).

The treatment facility is capable of holding the City of Kwinana required ARI. Figure 3 shows drainage, including the solids drying pad, to the central “bog-out” bay and proposed constructed slopes. The surface area exposed to the 20 year ARI is 580 m^2, requiring bund capacity of 59.74 m^3. The bund will have capacity for 101 m^3 of stormwater.

Within 24 hours of a 20 year ARI occurring, the stormwater will be analysed for cations and, assuming no contamination, will be discharged into the adjacent drainage lines for disposal.



DRAWING NOTES:

NOTE 1: THIS DRAWING HAS BEEN PREPARED BASED ON PROVIDED DESIGN DRAWINGS. TO BE UPDATED WITH ANY CHANGES TO AS-BUILT CONDITIONS.

DATE	REV	DESCRIPTION	DRN	CHK	APP
21/07/20	B	REVISED PROCESS	DLR	LDR	MW
15/06/20	A	ISSUED FOR INFORMATION	DLR	LDR	-

CADRE ENGINEERING PTY LTD
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PROJECT: MICROZINC KWINANA FACILITY

TITLE: PROCESS FLOW DIAGRAM
KWINANA FACILITY
WELLARD ROAD KWINANA

SIZE: A3 | DRAWING NO.: CE20-MZN01-PFD-01 | REVISION: B

SCALE: NTS | SHEET: 1 of 1

Figure 2: Flow diagram of Premises processes

4.2 Infrastructure

The proposed facility infrastructure, as it relates to Category 31 and 61 activities, is detailed in Table 5 and with reference to the site plan (shown below in Figure 3 and Figure 4).

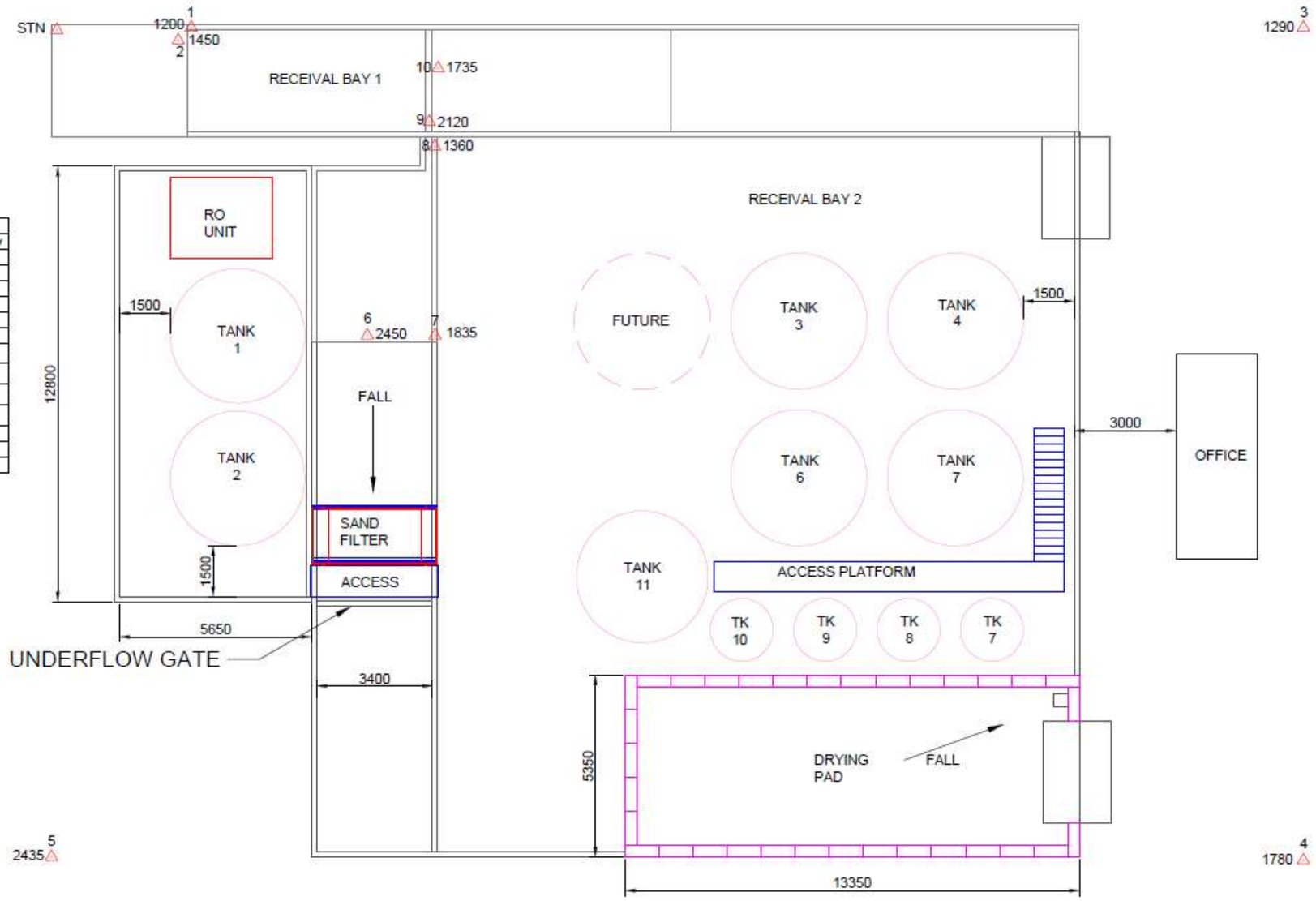
Table 5: MicroZinc facility Category 31 and 61 infrastructure

	Infrastructure	Site Plan Reference
	Prescribed activity category 61	
The Applicant will extract and recover cations from galvanising spent pickle liquor using multiple chemical reaction tanks that will be retained within a single bunded, concrete stabilised compound.		
1	580 m^2 concrete hardstand. Hardstand will have a concrete bund with capacity for 101 m^3 of stormwater and a hydraulic conductivity of 10^{-9} m/s. Hardstand will increase in depth from 0.15 m to 0.35 m at the southwestern corner and drain to a 55 kL receival bay.	Figure 3
2	65 m^2 dewatered solids holding pad with rolled form edges for insoluble zinc hydroxide. Approximately 5 m x 13 m concrete pad base with hydraulic conductivity of approximately 10^{-9} m/s that will drain into a sump in the southwest corner.	Figure 3 "Drying pad"
3	Tankfarm incorporating:	Figure 3
	• 3 x 5 kL polyethylene reaction tanks, each with a tank agitated gearbox constructed from Grade 316 (corrosion resistant) stainless steel, coated with fibre reinforced plastic;	Figure 3 "Mixing Tanks 7 – 9"
	• 4 x 32 kL polyethylene product holding tanks used to store hydrochloric acid, calcium chloride, zinc chloride and ferrous chloride;	Figure 3 "Tanks 3 – 6"
	• 1 x 12 kL polyethylene precipitation tank used in the precipitation of zinc hydroxide with base solution;	Figure 3 "Tank 10"
	• 1 x 27 kL polyethylene separation tank used in the continuous separation of solids;	Figure 3 "Tank 11"
	• Reverse Osmosis (RO) chiller/filter unit to produce reuse water for on-site, non-potable use (10.6 kL per day), such as irrigating vetiver grass;	Figure 3 "RO Unit"
	• Pipelines and pumps constructed from acrylonitrile butadiene styrene (ABS); and	Not specified
	• 1 x diesel fuelled generator	Not specified
	Prescribed activity category 31	
The Applicant will receive industrial inorganic liquid waste at the Premises, where it will be pre-treated, processed and stored when necessary. Reverse Osmosis treated liquid waste will be irrigated to a vetiver grass bed.		
4	45 m^2 truck receival bay constructed using 150 mm M32 reinforced concrete (hydraulic conductivity of the hardstand between 5.7 x 10^{-13} and 1.0 x 10^{-11} m/s). Truck receival bay will have a retaining (bund) wall height of 150 mm above the maximum operating liquid level in the bay, allowing storage of approximately 20 kL of received liquid.	Figure 3 "Receival Bay 1"
5	Tankfarm incorporating:	Figure 3
	• 1 x 32 kL polyethylene oil/water tank; and	Figure 3

	Infrastructure	Site Plan Reference
		"Tank 1"
	• 1 x 32 kL polyethylene return treated water tank	Figure 3 "Tank 2"
6	2,500 IBCs on a 0.8 ha hardstand of compacted gypsum/lime mortar (hydraulic conductivity of 10^{-6} m/s) for sterile vetiver grass (*Chrysopogon zizanioides*) propagation. The compacted hardstand will be capped with an impermeable seal coat.	Figure 4
7	Common sump constructed from ø1800 x 1800 deep sealed concrete liner and fitted with a float valve to allow volume control by pumping excess liquid from IBCs back to the treatment facility holding tank through a pipe. Sump will have capacity of at least 4.3 kL.	Figure 4 "1800ø well liner"; "Float switch"; "Solar powered pump"
	Other activities	
The Applicant proposes to construct the below infrastructure, which are not directly related to primary Category 31 or 61 activities and are not within the scope of this assessment		
8	Treatment facility will be enclosed by an 1800 mm high security chainwire fencing and lockable steel gates at site access points, in general compliance with Australian Standard (AS) 1725:2010.	Figure 3
9	A 3 m wide access roadway will be constructed using crushed gypsum or limestone	
10	Office building	

STN approximately 9.4m AHD
1. Top of Wall 1200 = 9.6m
2. Top of ramp 1450 = 9.4m
3. SE Corner 1290 = 9.7m
4. SW Corner 1780 = 9.2m
5. NW Corner 2435 = 8.5m
6. Bottom of slope 2450 = 8.5m
7. Top of wall 1835 = 9.2m
8. Top of Wall 1360 = 9.7
9. Bottom of Sump 2120 = 9.0m
10. Top of Grate 1735 = 8.8m

Equipment List			
ID	Type	Details	Capacity
1	Tank	Raw Water Tank	32kL
2	Tank	Process Water Tank	32kL
3	Tank	Acid Receival Tank	32kL
4	Tank	Calcium Chloride Tank	32kL
5	Tank	Ferric Chloride Tank	32kL
6	Tank	Zinc Chloride Tank	32kL
7	Mixing Tank	TPD Tank	5kL
8	Mixing Tank	TPD Tank	5kL
9	Mixing Tank	TPD Tank	5kL
10	Mixing Tank	Precipitation Tank	12kL
11	Clarrifier	Clarrification Tank	27kL
12	RO Unit	Reverse Osmosis Unit	TBA
13	Sand Filter	Custom Made Sand Filter	4m²



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15/06/20	A	ISSUED FOR INFORMATION	DLR	LDR	-

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PROJECT: MICROZINC KWINANA FACILITY

TITLE: SLAB GENERAL LAYOUT
KWINANA FACILITY
WELLARD ROAD KWINANA

SIZE	DRAWING NO.	REVISION
A3	CE20-MZN01-LAY-01	B

SCALE 1:400 SHEET 1 of 1

Figure 3: Treatment facility plan

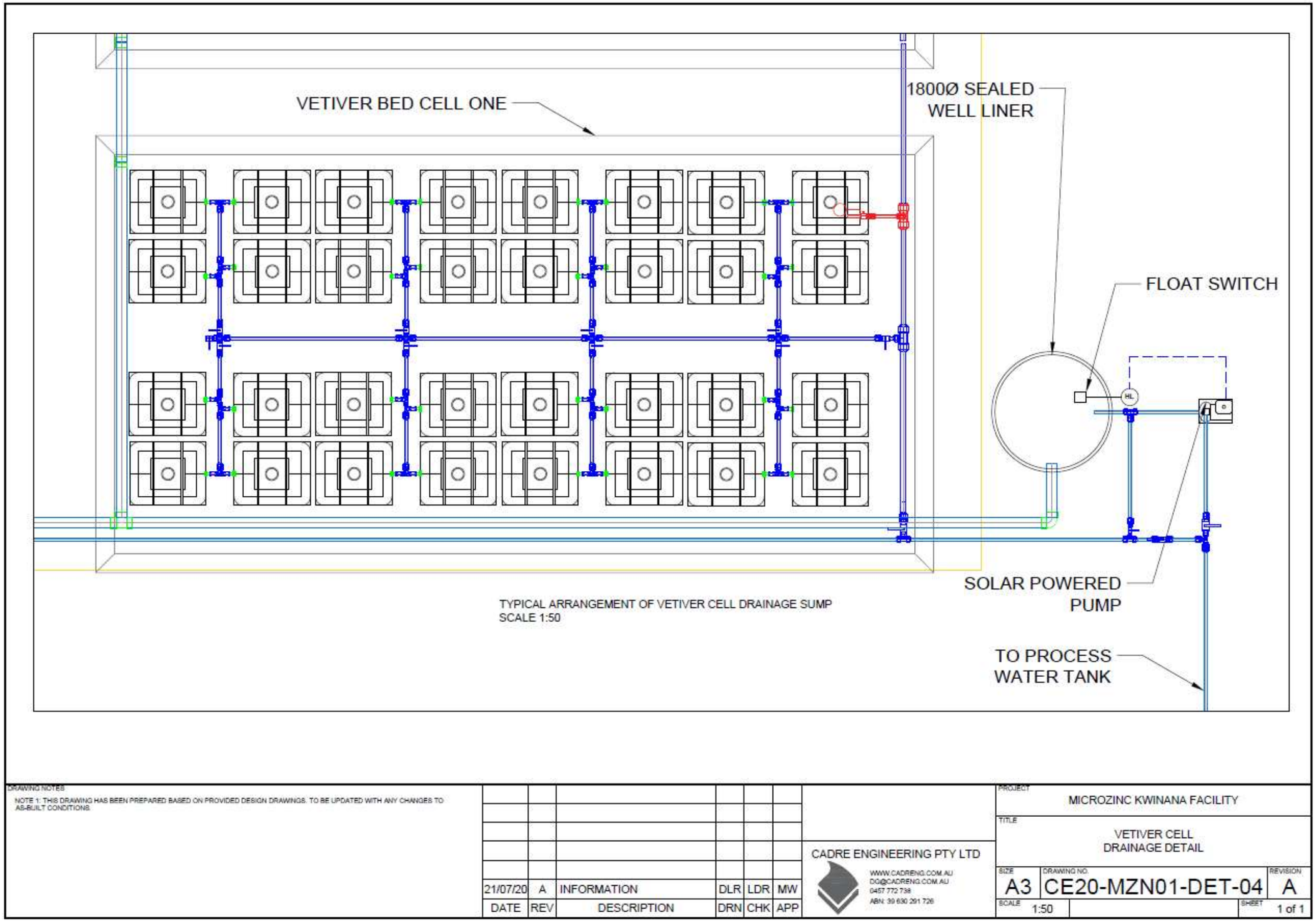

Figure 4: Vetiver grass bed area

5. Legislative context

Table 6 summarises approvals and notices relevant to the assessment.

Table 6: Relevant approvals, notices and tenure

Legislation	Number	Subsidiary	Approval/Notice
Environmental Protection Act 1986	Vegetation Conservation Notice (VCN): CPS 6867/1	CSBP & Farmers Limited and Manna Enterprises Pty Ltd	VCN issued on 6 April 2016 issued to both parties to ensure that no unlawful clearing, or no further unlawful clearing takes place at Lot 77 Wellard Road, Leda by any owner or occupier.
	Assessment number: CPS 8635/1 Permitted under: W6293/2019/1	MicroZinc Pty Ltd	Clearing of 0.87 ha of native vegetation within Lot 77 for the construction of a nutrient recovery facility and animal fodder production area permitted under Works Approval W6293/2019/1, subject to conditions, issued 31 July 2020.
Transfer of Land Act 1893	N/A		A lease is to be obtained by the Applicant from the Landowner prior to commencement of development of the site, as required by Development Approval DA 25-50099-9 issued by the WAPC.
Dangerous Goods Safety Act 2004	-		A Dangerous Goods licence has been applied for by the Applicant and is being prepared by an accredited dangerous goods consultant at the time of issue of the Works Approval.
Rights in Water and Irrigation Act 1914	Groundwater licence (GWL): GWL 155853	Manna Enterprises Pty Ltd	GWL 155853 was issued on 23 June 2016 with an allocation limit of 20,075 kL per annum. Expires 22 June 2026.
Planning and Development Act 2005	Development Approval: DA 25-50099-9		Development Approval for a nutrient recovery facility and animal fodder production area on part of Lot 77 Wellard Road, Leda granted, subject to conditions, by the Western Australian Planning Commission (WAPC) on 11 June 2020.

5.1 Contaminated sites

Lot 77 on Diagram 68183 was classified as *contaminated – restricted use* under the *Contaminated Sites Act 2003* on 14 September 2007 and a memorial placed on the Certificate of Title.

The publicly available contaminated sites summary of records for Lot 77 (DER 2020) outlines that the site has been used to stockpile phospho-gypsum, limestone and peat since 1976. The

classification of Lot 77 was based on several soil and groundwater investigations that found sulfate is present in a groundwater plume from the southern portion of the site to the southwest at concentrations exceeding Australian drinking water guidelines. A screening risk assessment demonstrated that untreated groundwater at the site is unsuitable for potable and non-potable uses. The risk to surrounding receptors is low, however, if further monitoring indicates the concentration of sulfate moving off-site has continued to increase then, further investigations may be required.

The contaminated sites record states that the site appears suitable for commercial/industrial use, but may not be suitable for more sensitive land uses such as residential housing and child care facilities.

5.2 Other relevant approvals

5.2.1 Development approval

The local government authority for the proposal is the City of Kwinana. The Premises is located within an area not zoned under the *Town of Kwinana Local Planning Scheme No. 2.* Therefore, the application was referred to the Western Australian Planning Commission (WAPC) for approval. On 11 June 2020, WAPC granted development approval, subject to conditions, to the Landowner for the development of a nutrient recovery facility and animal fodder production area. DWER was provided with a copy of the development approval on 24 June 2020.

5.3 Part V of the EP Act

5.3.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance statements which inform this assessment are:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

EP Act subsidiary legislation relevant to this assessment includes the:

- *Environmental Protection (Unauthorised Discharges) Regulations 2004;*
- *Environmental Protection (Noise) Regulations 1997; and*
- *Environmental Protection (Kwinana)(Atmospheric Waste) Regulations 1992.*

5.3.2 Clearing

Clearing of native vegetation in Western Australia requires a clearing permit, unless exemptions apply. The Applicant applied for the assessment of clearing within the Works Approval application. The authorised extent of clearing has been limited to a maximum of 0.87 ha, within Plan 8635/1, attached in Schedule 3 of the issued Works Approval.

On 3 July 2020, the DWER Clearing Permit branch provided their clearing assessment; refer to Attachment 1 for the assessment. Clearing conditions are provided in the Works Approval.

6. Consultation

The Delegated Officer referred the Application to the City of Kwinana as a direct interest stakeholder. No other direct interest stakeholders were identified after taking into consideration the distance to the nearest dwelling or residential area (refer to Section 7).

The Application was publically advertised on DWER's website for a 21 day comment period on 25 September 2019, and one submission was received on 15 October 2019. The Delegated Officer's assessment has taken into consideration the submission. A summary of the public submission and stakeholder comments, and the Delegated Officer's response is included in Appendix 1.

7. Location and siting

7.1 Siting context

The Premises is located on the Swan Coastal Plain in the suburb of Leda, in the City of Kwinana, approximately 2.5 kilometres southwest from the city centre and approximately three kilometres to the east of the Kwinana Industrial Area (KIA). Lot 77 Wellard Road is not assigned to a zoning category by the *Town of Kwinana Local Planning Scheme No. 2.* Surrounding land uses are general industry and public purpose approximately 600 m to the west, special industry approximately 800 metres to the west, light industry approximately 1.6 kilometres to the northeast, and residential and park recreation and drainage approximately 1.2 kilometres to the east. The nearest residence is approximately 630 metres north of the vetiver grass bed within a non-zoned area. Lot 77 contains and is immediately surrounded by a large area of native vegetation. The location of the Premises is shown in Figure 5.

Table 7: Coordinates of the proposed treatment facility and vetiver bed

Easting	Northing
Treatment facility	
386061.360	6430579.376
386080.200	6430579.589
386080.575	6430546.331
386052.314	6430546.013
386052.064	6430568.184
386052.064	6430568.184
386051.939	6430579.270
385929.603	6430566.804
Vetiver grass bed	
386001.214	6430900.226
386048.317	6430900.757
386077.452	6430823.475
386078.077	6430768.047
386002.714	6430767.197

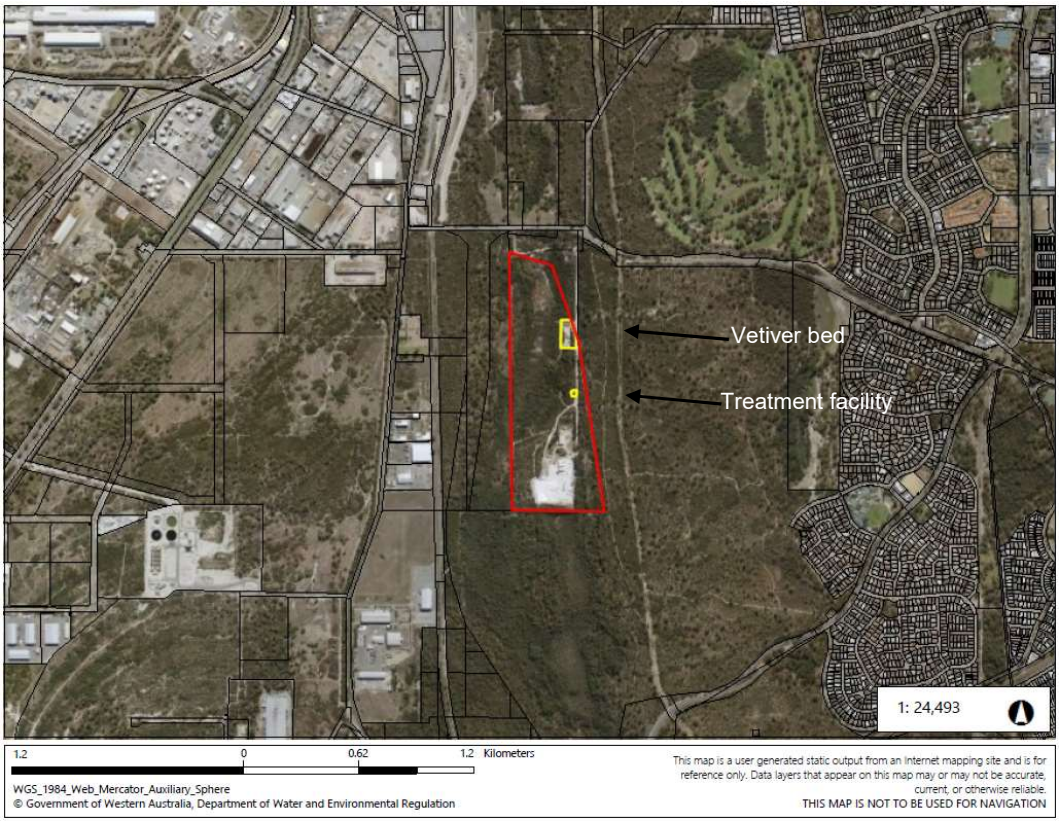

Figure 5: Location of the proposed treatment facility and vetiver bed (yellow line) within Lot 77 Wellard Road, Leda (red line)

7.2 Residential and sensitive receptors

The distances to residential and sensitive receptors are detailed in Table 8.

Table 8: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from the site
Residential Premises	Approximately 630 metres north of the vetiver bed and 950 metres north of the treatment facility.
Little Rascals (child care facility)	Approximately 1.7 kilometres east of the treatment facility.
Leda Primary School	Approximately 1.3 kilometres southeast of the treatment facility.
Peter Carnley Anglican Community School	Approximately 2.1 kilometres east of the treatment facility.
Banksia Park Retirement Village	Approximately 1.8 kilometres northeast of the treatment facility and vetiver bed.

7.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or emissions and discharges from the Premises. The distances to specified ecosystems are shown in Table 9. Table 9 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 9: Environmental values

Specified ecosystems	Distance from the site
Geomorphic Wetlands	• Unnamed Resource Enhancement Wetland – approximately 2 metres west of the vetiver bed and 100 metres west of the treatment facility (within Lot 77 Wellard Road, Leda). • Unnamed Conservation Wetland – approximately 480 metres south and 820 metres east of the vetiver bed, and 270 metres south of the treatment facility. • Conservation Wetland (Spectacles South) – approximately 5.3 kilometres northeast of the vetiver bed.
Parks and Wildlife Managed Lands and Waters	• Crown freehold – Department interest land approximately 230 metres west and 1.1 kilometres south of the treatment facility. • Leda Nature Reserve approximately 1.5 kilometres south of the treatment facility.
Bush Forever: Regional open space or proposed regional open space	• Approximately 100 metres east of the vetiver bed.
Regional Parks	• Rockingham Lakes - approximately 2.4 kilometres south of the treatment facility.
Threatened Ecological Communities and Priority Ecological Communities	• Critically endangered Threatened Ecological Communities (SCP19b) are within the treatment facility and vetiver bed sites. • Priority 3 Ecological Communities (SCP 25) are approximately 1.2 kilometres southeast of the treatment facility.
Biological component	
Threatened/Priority Fauna	• Critically endangered species (*Calyptorhynchus latirostris*) approximately 1.2 kilometres east of the treatment facility. • Vulnerable species (*Isoodon fusciventer*) approximately 1.6 kilometres west, 2.3 kilometres south and 1.4 kilometres east of the treatment facility.

7.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 10.

Table 10: Groundwater and water sources

Groundwater and water sources	Distance from Premises
Public drinking water source areas	Priority 2 area (managed to maintain or improve the quality of the drinking water source with the objective of risk minimisation) approximately 6.8 kilometres east.
Major watercourses/waterbodies	Unnamed waterbodies (lake/swamp) approximately 920 metres northeast and 2.1 kilometres southeast.
Groundwater	Depth to groundwater is encountered at approximately 1 - 5 metres below ground level (mbgl) at the proposed vetiver grass bed site and 5.5 - 7.5 mbgl at the proposed treatment facility site. Estimates based on recorded groundwater levels were measured in May of 2003 (end of summer) and may have changed over time. The estimate may fluctuate between 0.5 and 3 metres due to seasonal variation. Groundwater salinity in the area is 1000-1500 mg/L which is considered brackish. There is a bore located within the Premises (GWL 155853).

7.5 Soil type

Table 11 details soil types and characteristics relevant to the assessment.

Table 11: Soil and sub-soil characteristics

Soil and sub-soil characteristics	Description
Soil type classification	Tamala Limestone: predominantly calcarenite/Qpck
Acid sulfate soil risk	• Treatment facility site: no known acid sulfate soil risk. • Vetiver grass bed site: high to moderate acid sulfate soil risk within 2 m below the natural ground level.

7.6 Meteorology

The region experiences cool, wet winters and warm to hot, dry summers. The nearest Bureau of Meteorology site was the Medina Research Centre (site number 009194) which was closed in April 2018 and was located approximately 3.5 km north of the Premises.

7.6.1 Wind direction and strength

The Bureau of Meteorology provides the following wind roses, shown in Figure 6, for wind direction versus wind speed (9am and 3pm – 1983 to 2018) for the Medina Research Centre.

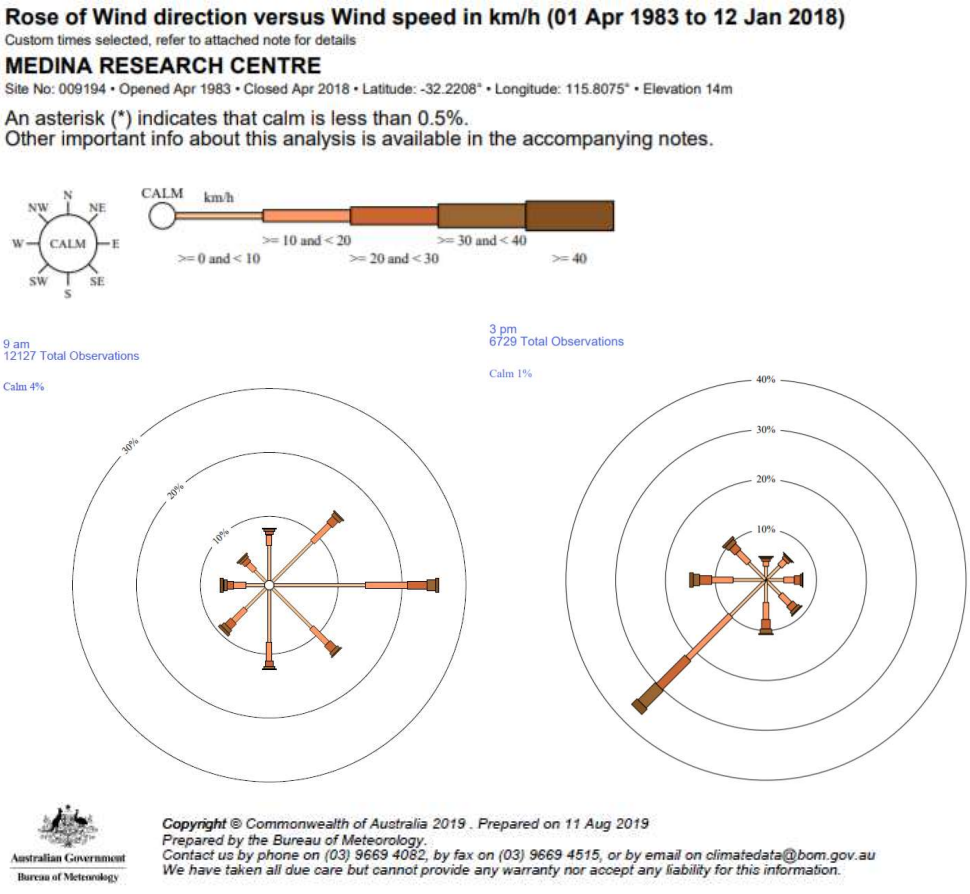

Figure 6: Wind direction and strength for 9am (left) and 3pm (right) at Medina Research Centre (site no. 009194).

It is important to note that these wind roses (shown in Figure 6) show historical wind speed and

wind direction data for Medina Research Centre and should not be used to predict future data.

7.6.2 Rainfall and temperature

The Bureau of Meteorology provides the mean rainfall and maximum temperature for the Medina Research Centre (1983-2018) (Figure 7).

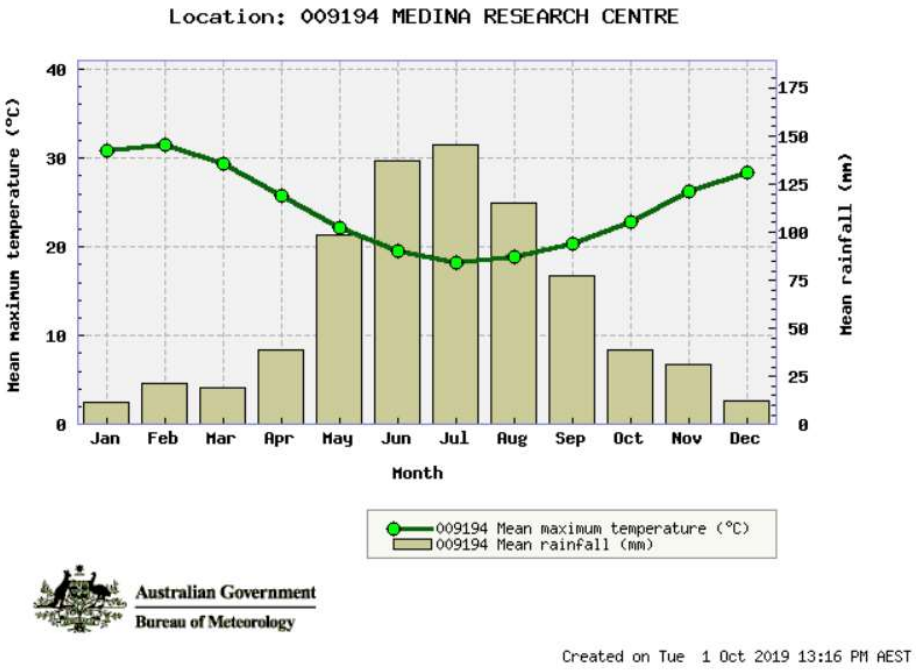

Figure 7: Mean temperature and rainfall at Medina Research Centre (site no. 009194).

8. 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 *Guidance Statement: Risk Assessments* (DER 2017).

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.

8.1 Source-pathways and receptors

8.1.1 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 12 below. Table 12 also details the proposed control measures the Applicant has proposed to assist in controlling these emissions, where necessary.

Table 12: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Fugitive dust	Vehicle movements on unsealed access	Air/ windborne	Nil

Emission	Sources	Potential pathways	Proposed controls
	roads	pathway	
	Clearing of native vegetation		Nil
	Construction of hardstands, new buildings, treatment facility and infrastructure		Nil
Noise	Vehicle movements on unsealed access roads		Nil
	Clearing of native vegetation		Nil
	Construction of hardstands, new buildings, treatment facility and infrastructure		Nil
Acidic water containing metals	Disturbance of acid sulfate soils in constructing hardstand at the vetiver grass bed site	Direct discharge	The proposed vetiver grass bed hardstand will be constructed using an existing lime/gypsum stockpile that will be compacted to at least 0.7 m above the natural ground level.
Operation			
Fugitive dust	Vehicle movements on unsealed access roads associated with delivery of industrial liquid waste and SPL	Air/ windborne pathway	Nil
Noise	Unloading and processing of industrial liquid waste and SPL		Deliveries to the Premises will typically occur during business hours. Operation of the treatment facility will only occur between the hours of 7:00 am and 6:00 pm Monday to Saturday.
Light	Normal operation of the treatment facility	Air pathway	Operation will typically not occur outside normal daylight hours. Any operations during night-time hours, requiring lighting, will only occur within the tankfarm and will not generate light spill greater than a typical rural property.
Processing chemicals (sulfuric acid, hydrochloric acid and anionic flocculent); *Industrial liquid waste*	Breach of containment (such as rupture of pipes/overtopping of holding tanks) associated with unloading, treatment and processing of industrial liquid waste and SPL	Direct discharge and infiltration	Due to the presence of hydrochloric acid, equipment for the process has been selected to prevent corrosion and failure. Tanks are constructed from high density polyethylene (HDPE), valves are constructed using unplasticised polyvinyl chloride (UPVC) and ethylene propylene diene monomer (EPDM) and pipelines and pumps from ABS. Agitator shafts are constructed from Grade 316 stainless steel,

Emission	Sources	Potential pathways	Proposed controls
(containing trace metals and mineral oils); and *SPL* (containing hydrochloric acid and trace metals)			coated with fibre reinforced plastic. 580 m^2 concrete hardstand with a concrete bund will have capacity for 101 m^3 of stormwater and a hydraulic conductivity of $1x10^{-9}$ m/s. Hardstand will increase in depth from approximately 0.15 m to approximately 0.35 m.
	Stormwater contaminated with leachate generated from acceptance and treatment of industrial liquid waste, containing insoluble precipitates (Cd, Cr, Sn, Zn and Pb) and TDS (sodium, calcium chlorides and sulphates)		There will be no liquid wastes disposed of offsite. All solid wastes will be collected in bulk bags, stored on the dewatered solids pad, and removed each week for landfill disposal. All solids will be removed offsite prior to scheduled rainfall events. 580 m^2 concrete hardstand with a concrete bund will have capacity for 101 m^3 of stormwater and a hydraulic conductivity of $1x10^{-9}$ m/s. Hardstand will increase in depth from approximately 0.15 m to approximately 0.35 m and have capacity to hold the local 20 year ARI.
Treated industrial liquid waste (containing sodium chlorides, calcium chlorides and sulfates, with a salinity of approximately 600 mg/L)	Breach of containment (such as rupture of pipes/overtopping of holding tanks) associated with irrigating treated industrial liquid waste to the vetiver grass bed	Direct discharge and infiltration	Vetiver grass beds to be contained in individual IBCs placed on a compacted lime/gypsum mortar hardstand enclosed by compacted gypsum bund walls. The hardstand will be cut to level, ensuring groundwater is at least 2 mbgl, and the remaining compacted soil will be tested to ensure a hydraulic conductivity of $1x10^{-6}$ m/s is achieved. The compacted soil will be capped with an impermeable seal coat. IBCs will be individually volume controlled using float valves and will be fitted with an overflow outlet that flows back to a common sump. The common sump will be fitted with a float valve that allows volume control by pumping excess liquid back to the treatment facility holding tank through a pipe. The IBCs will be visually inspected each weekday for signs of leaks. Any defective IBCs will be drained into standby IBCs and either repaired or replaced. The Applicant proposes to install three monitoring wells along the western boundary of the vetiver grass bed site. Samples will be collected twice per year, in summer and in winter to monitor groundwater contamination.

8.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 8.1.1. 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 8.1.1), 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 13.

Works Approval W6293/2019/1 that accompanies this Decision Report authorises construction and time-limited operations. The conditions in the issued Works Approval, as outlined in Table 13 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. chemical manufacturing and liquid waste storage 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 13: Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions[2] of works approval	Risk assessment
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
• Vehicle movements on unsealed access roads • Clearing of native vegetation • Construction of hardstands, treatment facility and installation of infrastructure	Noise	Air/windborne pathway causing impacts to health and amenity	Residential premises located 630 m north of the vetiver bed and 950 m north of the treatment facility	Nil	C = Slight L = Unlikely **Low Risk**	N/A	N/A	General provisions of the EP Act and the provisions of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) will apply. Additionally, as conditioned in the Development Approval, the Applicant is required to submit a Dust Management Plan and a detailed overall management plan to the specification of the City of Kwinana prior to commencement of works. The management plan is to include noise mitigation measures and acoustic reporting. The Delegated Officer considers that these requirements, in combination with the separation distance from the proposed location of the treatment facility and vetiver grass bed to the closest human receptor, is sufficient for there to be no adverse impact from noise or dust emissions from the construction. Additionally, construction is expected to be of short duration (less than 6 months). Therefore, no additional regulatory controls are required for noise and dust emissions from mobilisation and establishment of infrastructure in the Works Approval.
	Fugitive dust				C = Slight L = Unlikely **Low Risk**			
		Air/wind pathway causing suppression of photosynthetic and respiratory functions	Vegetation including riparian vegetation adjacent to development areas		C = Minor L = Rare **Low Risk**			
	Acidic water containing metals	Disturbance of acid sulfate soils in constructing the hardstand at the vetiver grass bed site, where acid sulfate soil risk is high to moderate, could leach, causing soil and groundwater contamination, affecting ecosystem health	Soil and groundwater: • 1 – 5 mbgl	Refer to Section 8.1.1	C = Minor L = Rare **Low Risk**	Y	Conditions 1, 2 (infrastructure and equipment)	There is a high to moderate acid sulfate soil disturbance risk within 2 m of the surface of the natural ground level at the vetiver grass bed site. Disturbing acid sulfate soils and exposing them to air which may cause acidic water containing metals to leach into surrounding soil and groundwater, affecting ecosystem health. However, the Applicant has proposed to construct the base of the vetiver grass bed hardstand at approximately 0.7 m above the natural ground level on an existing lime/gypsum stockpile (7 mAHD). Given that acid sulfate disturbance risk is at approximately 2 mbgl at the site, this will equate to a 2.7 m separation distance from the works, therefore disturbance of acid sulfate soils is not anticipated. The Delegated Officer considers that this sufficiently minimises the risk of acid sulfate soil disturbance and has included a condition that requires the hardstand to be finished to at least 7 mAHD.
			Surface water and fauna that use the surface water: • Resource Enhancement Wetland approximately 2 m west of the treatment facility					
			Vegetation including riparian vegetation adjacent to Premises, and herbivorous fauna					
Operation (including time-limited-operations)								
Normal operation of the treatment facility • Transport, unloading and processing of SPL and industrial liquid waste	Noise	Air/windborne pathway causing impacts to health and amenity	Residential premises located 950 m north of the treatment facility	Refer to Section 8.1.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	General provisions of the EP Act and the provisions of the Noise Regulations will apply. As conditioned in the Development Approval, the Applicant is required to submit a detailed overall management plan to the specification of the City of Kwinana prior to commencement of works. The management plan is to include noise mitigation measures. The Delegated Officer considers that this, in combination with the separation distance from the proposed location of the treatment facility to the closest human receptor, is sufficient for there to be no adverse impact from noise emissions from the normal operation of the facility. Therefore, no additional regulatory controls on noise are required for the operation of the Premises.
	Fugitive dust	Air/windborne pathway causing impacts to health and amenity	Residential premises located 950 m north of the treatment facility	Nil	C = Slight L = Unlikely **Low Risk**	N/A	N/A	The Delegated Officer has considered frequency of vehicular movement on unsealed roads and the nature of proposed operations at the Premises (handling and processing of wastes in liquid form) in determining that dust emissions are likely to be minimal. The Delegated Officer therefore considers the Dust Management Plan required by the Development Approval is sufficient in addressing fugitive dust emissions from operational activities and therefore, regulatory controls on dust are not required to be duplicated in the Works Approval.
		Air/wind pathway causing suppression of photosynthetic and respiratory functions	Vegetation including riparian vegetation adjacent to Premises	Nil	C = Slight L = Unlikely **Low Risk**	N/A	N/A	
	Stormwater contaminated with leachate generated from acceptance and	Direct discharge and infiltration	Groundwater: • 5 - 7.5 mbgl	Refer to Section 8.1.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 1 (infrastructure and equipment); condition 20 (waste acceptance and	Due to the nature of the wastes and chemicals being used on site, and the treatment facility site being surrounded by native vegetation, there is an inherent risk of stormwater becoming contaminated and runoff impacting on nearby soil and vegetation. In order to minimise this risk, the Applicant has

Risk Event					Risk rating[1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions[2] of works approval	Risk assessment
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
	treatment of industrial liquid waste, containing insoluble precipitates (Cd, Cr, Sn, Zn and Pb) and TDS (sodium, calcium chlorides and sulphates)		Soil and vegetation, including riparian vegetation adjacent to Premises		C = Moderate L = Unlikely **Medium Risk**		management); and **conditions 21 – 24 (waste acceptance and management)**	included controls at the treatment facility, such as it being constructed on a single bunded and sloped hardstand draining to a sump, with a hydraulic conductivity of $1x10^{-9}$ m/s and capacity for 101 m^3 of stormwater (able to hold the local 20 year ARI). In accordance with DWER's *Guidance Statement: Risk Assessments* (DER, 2017a), as these controls lower the potential risk of on- and off-site impacts from surface water runoff, they are imposed on the Works Approval. To ensure an acceptable level of risk is achieved based on the type, rate and specification of waste accepted, and thus contaminated stormwater that may be present at the Premises, conditions have been included to regulate such specifications. The requirement to submit reports on waste acceptance and rejection is included in the Works Approval to ensure waste is not being stockpiled/accumulated on the Premises beyond what has been risk assessed and deemed acceptable in the Works Approval.
Upset conditions associated with operation of the treatment facility: • Movement of chemicals through conveyors, trucks and at stockyards • Pipes and holding tanks • Bulk storage of chemicals	• Industrial liquid waste, containing trace metals (Cd, Cr, Sn, Zn and Pb) and mineral oils • SPL • Sulfuric acid, hydrochloric acid and anionic flocculent	Breach of containment (such as rupture of pipes/ overtopping of holding tanks) of processing chemicals and industrial wastes resulting in direct discharge to land may cause soil contamination and ecosystem disturbance. Impacts may include increased alkalinity, electrical conductivity (EC) and trace metals. This may cause secondary impacts by infiltrating into the soil profile, potentially contaminating groundwater and surface water, inhibit vegetation growth and survival due to inundation of root zone, and cause tertiary health impacts to fauna.	Groundwater: • 5 - 7.5 mbgl	Refer to Section 8.1.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 1 (infrastructure and equipment); condition 19 (operational requirements); **conditions 15, 16 (compliance reporting under construction/ installation);** **conditions 17, 18 (time limited operations); and** **conditions 28, 29 (compliance reporting under time limited operations**	Due to the nature of the wastes and chemicals being used on site, and the treatment facility site being surrounded by native vegetation, there is an inherent risk of containment breach impacting on nearby sensitive receptors. In order to minimise this risk, the Delegated Officer has included regulatory controls, as derived from the Applicant, in the Works Approval. These include limits on chemicals to be stored and used on site, the requirement for infrastructure to have a specified minimum capacity, be constructed from corrosive resistant material, and be installed on a single bunded hardstand with a hydraulic conductivity of $1x10^{-9}$ m/s. In addition, the Applicant is required to complete and submit Environmental Compliance Report/s prior to commencing operations to ensure equipment and infrastructure are constructed or installed according to the requirements of the Works Approval to reduce risk of loss of containment. Before a Licence may be granted, the Applicant must submit a compliance report on the time limited operations and must demonstrate the environmental performance of the as-constructed infrastructure and activities.
			Soil and vegetation, including riparian vegetation adjacent to Premises, and herbivorous fauna		C = Moderate L = Unlikely **Medium Risk**			
			Surface water and fauna that use the surface water: • Resource Enhancement Wetland approximately 100 m west of the treatment facility		C = Moderate L = Rare **Medium Risk**			
Upset conditions associated with treatment and processing of industrial liquid waste in RO unit, and irrigation: • Irrigation of treated liquid waste	Treated industrial liquid waste, containing sodium chlorides, calcium chlorides and sulfates, with a salinity of approximately 600 mg/L	Breach of containment (such as rupture of pipes/ overtopping of IBCs), resulting in direct discharge of industrial liquid wastes to land, may cause soil contamination and ecosystem disturbance by increasing alkalinity and EC. This may cause secondary impacts by infiltrating into the soil profile, potentially contaminating groundwater and surface water, inhibit vegetation growth and survival due to inundation of root zone, and cause tertiary health impacts to fauna.	Groundwater: • 1 – 5 mbgl	Refer to Section 8.1.1	C = Moderate L = Unlikely **Medium Risk**	Y	Conditions 1, 2 (infrastructure and equipment including groundwater well installation); condition 19 (operational requirements); **conditions 15, 16 (compliance reporting under construction/ installation);** **conditions 17, 18 (time limited operations);** **conditions 25 – 27 (groundwater monitoring); and** **conditions 28, 29 (compliance reporting under time limited operations)**	Due to the nature of the liquid being irrigated and the vetiver grass bed being in close proximity to sensitive receptors, there is an inherent risk of treated industrial liquid waste impacting on surrounding sensitive receptors. In order to minimise this risk, the Applicant has included controls, such as the grass beds being contained within individual IBCs installed on a bunded hardstand capped with an impermeable seal coat, and having a hydraulic conductivity of $1x10^{-6}$ m/s. The hardstand, being constructed on an existing lime/gypsum stockpile above natural ground level, further minimises risk of infiltration to groundwater. Therefore, these controls are imposed on the Works Approval. The Delegated Officer also considers operational controls derived from the Applicant, such as individually volume controlling and maintaining 110 mm ullage in the IBCs, lower the potential risk of on- and off-site impacts and therefore are imposed on the Works Approval. The Applicant is also required to install at least three new groundwater monitoring wells west of the proposed vetiver grass bed hardstand, and must carry out monthly groundwater monitoring in order to detect any contamination relating to the Premises activities (Applicant had proposed bi-annual monitoring). Conditions that require the Applicant to complete and submit Environmental Compliance Report/s prior to commencing operations are included to ensure equipment and infrastructure are constructed or installed according to the requirements of the Works Approval. Before a Licence may be granted, the Applicant must submit a compliance report on the time limited operations and demonstrate the environmental performance of the infrastructure and activities. The Delegated Officer considers these controls as appropriate in mitigating risk of breach of containment of pipes/overtopping of IBCs and monitoring of potential discharges for management purposes.
			Soil and vegetation, including riparian vegetation adjacent to Premises		C = Moderate L = Unlikely **Medium Risk**			
			Surface water and fauna that use the surface water: • Resource Enhancement Wetland approximately 2 m west of the vetiver grass bed		C = Moderate L = Unlikely **Medium Risk**			

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

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

9. Determination of Works Approval conditions

The conditions in the issued Works Approval in Attachment 3 have been determined in accordance with DWER's *Guidance Statement: Setting Conditions*, having regard to the adequacy of the Applicant's controls.

Factors listed in the *Guidance Statement: Licence Duration* have been considered and the issued Works Approval expires three years from date of issue.

10. Applicant's comments

The Applicant was provided with draft copies of the Works Approval and Decision Report on 8 July 2020. The Applicant responded to DWER on 27 July 2020, providing outstanding information on the proposed infrastructure and processes as requested by DWER. The updated information has been incorporated within this Decision Report and the Issued Works Approval.

11. Conclusion

This assessment of the risks of construction and time limited operation activities on the Premises has been undertaken with due consideration of a number of factors, including the key documents and policies specified in this report.

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.

12. References

1. Department of Environment Regulation (DER) 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.
2. DER 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.
3. DER 2015. *Guidance Statement: Risk Assessments.* Department of Environment Regulation, Perth.
4. DER 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.
5. DER 2016. *Vegetation Conservation Notice CPS 6867/1*. Department of Environment Regulation, Perth.
6. DER 2020. *Basic Summary of Records Search Response, Lot 77 Wellard Rd Leda, Report Generated on 25/06/2020*. Department of Environment Regulation, Perth.
7. DoW 2006. *WQPN 30 Groundwater Monitoring Bores*. Department of Water. Perth.

Appendix 1: Summary of comments on the application for Works Approval from stakeholder

Summary of comments received	Department response
Direct interest stakeholder – *City of Kwinana*	
The City of Kwinana responded on 20 November 2019 confirming it had received a Development Application from the Applicant on 19 August 2019. The City's recommendation was for approval subject to a number of conditions. As the site is zoned Public Purposes – Special Uses under the Metropolitan Region Scheme (MRS), the City of Kwinana does not have delegation to approve/refuse an application under the MRS where the land is not zoned under a Local Planning Scheme (LPS). Therefore, the City assessed the proposal and forwarded its recommendation to the WAPC for their determination under the (MRS).	The Delegated Officer has noted the City of Kwinana's recommendations and referral of Development Approval to WAPC. See section 5.2.1 for the WAPC determination.
Public submission	
Concern was raised that the proposed site is part of the Kwinana Industrial Area (KIA) buffer zone and therefore no new industry should be allowed in the KIA buffer zone. The submission also stated that the existing blending of rock phosphate occurring on the site should be stopped and the site rehabilitated.	The suitability of the location with regard to planning and development is not within the scope of DWER risk assessment. The proposed development of the site as a nutrient recovery facility and animal fodder production area has been assessed by the WAPC. The Delegated Officer has considered the WAPC's recommendations and Development Approval conditions in the environmental risk assessment and application of regulatory controls in order to mitigate adverse impacts to the environment.
The submission raised concern regarding the lack of a detailed breakdown of traffic movement submitted with the Application; stating that details on how congestion will be stopped at the adjacent level rail crossing is required, and questioning what will stop trucks travelling through the heavy populated areas of Bertram, Wellard and Leda.	

Summary of comments received	Department response
The submission raised concern about existing stockpiles on the site already causing water contamination in the shallow water table as well as the close proximity to surface water/ swamps. The proposed plastic membrane liner of the vetiver grass bed would rupture with the mechanical movement over this site, causing further water contamination.	The Delegated Officer has given due regard to the potential impacts of the proposed works and operations on nearby sensitive receptors, including wetlands and groundwater in the assessment (refer to Section 8). Conditions in the Works Approval include the installation of groundwater monitoring wells and associated monitoring commitments. The Applicant's original vetiver grass bed design, consisting of a HDPE lined hardstand on which vetiver would be directly propagated, has been replaced by above ground beds placed in individual IBCs installed on a hardstand, constructed using compacted gypsum already on the site. The Delegated Officer has considered the risk of groundwater contamination in the risk assessment and application of regulatory controls (refer to Section 8).
The submission raised concerns about there being homes directly opposite the site and other homes and sensitive receptors close by.	The Delegated Officer has considered all sensitive receptors likely to be impacted by the construction and operation of the proposed Premises activities, and determines that there will be no adverse impacts of emissions or discharges on public health or amenity (refer to Section 8).
Concern was raised on water use on site, stating that groundwater use, which is already contaminated, will create water movement problems.	A groundwater bore exists on the site with an allocation limit of 20,075 kL per annum (GWL 155853), and the Applicant proposes using treated RO water for all non-potable onsite uses. The Delegated Officer considers this approach appropriate in managing groundwater use on site.
The submission raised concern that the Application does not include provision for toilets, washing facilitates or firefighting requirements.	WAPC Development Approval contains a condition requiring the Applicant to submit and implement a Bushfire Management Plan to the specification of the City of Kwinana. The Delegated Officer determines that planning for amenities and firefighting requirements are not within the scope of DWER's risk assessment of emissions and discharges to the environment. Therefore, as regulatory controls relating to these are addressed in the Development Approval, they are not required to be duplicated in the Works Approval.
The submission stated that a dangerous goods site such as this should not be trusted to a company that appears to have no experience in running such a site.	The Applicant is required to obtain a Dangerous Goods Site licence prior to operating the Premises, as regulated by Department of Mines, Industry Regulation and Safety (DMIRS). The Delegated Officer considers the Applicant's suitability for such a licence is therefore not within DWER's scope of assessment.

Attachment 1: Clearing permit assessment report

Government of Western Australia
Department of Water and Environmental Regulation

Assessment Report

1. Application details

1.1. Permit application details

Permit application No.:	8635/1
Permit type:	Works Approval / Licence Assessment

1.2. Applicant details

Applicant's name:	Microzinc Pty Ltd

1.3. Property details

Property:	Lot 77 on Diagram 68183, Leda
Local Government Authority:	City of Kwinana
Localities:	Leda

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	Purpose category:
0.87		Mechanical Removal	Miscellaneous

1.5. Site Information

Clearing Description

The application is to clear 0.87 hectare of native vegetation within Lot 77 on Diagram 68183 (the application area) (Figure 1), Leda, for the purpose of constructing a nutrient recovery facility and an animal fodder production area.

The application area consists of southern (herein referred to as Site 1) and northern site (herein referred to as Site 2). The Applicant (2019a) advised that approximately 0.06 hectares of native vegetation largely consisting of weedy grass species and dead/diseased jarrah tree trunks are required to be cleared within Site 1, and approximately 0.06 hectares of *Acacia rostellifera* monoculture within Site 2. A larger footprint was applied for to provide more flexibility.

Vegetation Description

The application area occurs within the Swan Coastal Plain (SCP) Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and is mapped as the Quindalup vegetation complex which is described as a coastal dune complex - low closed forest and closed scrub. The coastal dune complex consists mainly of two alliances - the strand and fore-dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *Melaleuca lanceolata* (Rottnest Teatree) - *Callitris preissii* (Rottnest Island Pine), the closed scrub of *Acacia rostellifera* (Summer-scented Wattle) and the low closed *Agonis flexuosa* (Peppermint) forest of Geographe Bay (Heddle et al., 1980).

A site inspection of the application area was conducted by the Department of Water and Environmental Regulation (DWER) on 17 December 2019.

The site inspection identified that vegetation within Site 1 comprises of three tuart trees over an understorey in degraded (Keighery, 1994) condition and Site 2 predominantly consists of a monoculture of *Acacia cyclops* regrowth in completely degraded (Keighery, 1994) condition (DWER, 2019).

Vegetation Condition

The condition of the vegetation within the application area is considered to be in degraded to completely degraded condition, described as:

- Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).
- Completely Degraded; No longer intact, completely/almost completely without native species (Keighery, 1994).

The condition of the vegetation was determined by the DWER site inspection (DWER, 2019).

Soil type

The application area is mapped as vasse wet, swamp phase land subsystems, which is described as swamp (Schoknecht et al., 2004).

Comments

The local area is considered a 10 kilometre radius from the perimeter of the application area.

Figure 1 Application area cross-hatched blue.

Figure 2a *Eucalyptus gomphocephala* in Site 1

Figure 2b Vegetation in Site 1

Figure 2c *Acacia cyclops* in Site 2

Figure 2d Vegetation in Site 2

Figure 2a-d Representative photos of the vegetation within the application area (DWER, 2019).

2. Minimisation and mitigation measures

No avoidance and minimisation measures have been proposed.

3. Assessment of application against clearing principles, planning instruments and other relevant matters

As detailed below, the proposed clearing may be at variance with Principle (b) and is not likely to be at variance with any other clearing principle.

According to available databases, three threatened and 16 priority flora species have been recorded in the local area. Based on the similarities shared between the soil and vegetation types in habitats for these flora taxa and within the application area, it was determined that no conservation significant flora species are likely to occur within the application area. The DWER (2019) site inspection identified that the application area comprises of vegetation in degraded (Keighery, 1994) to completely degraded (Keighery, 1994) condition, with invasive weeds dominating the area and suffocating the native vegetation. Noting this, the application area is not likely to provide habitat for any threatened or priority flora taxa.

According to available databases, no threatened or priority ecological communities (TEC or PEC) have been mapped within the application area. The closest TEC is Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the SCP (Tuart woodland), listed as critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Priority 3 PEC by the Department of Biodiversity, Conservation and Attractions (DBCA), located approximately 70 metres northeast of the application area. Although three Tuart trees have been observed in the application area (DWER, 2019), noting the degraded (Keighery, 1994) to completely degraded (Keighery, 1994) condition of the vegetation and the key diagnostic characteristics of this TEC, which includes minimum patch size and condition thresholds, the vegetation observed in the application area is not considered to meet the criteria to be classified as Tuart woodland TEC (DWER, 2019).

According to available databases, 45 fauna species listed as conservation significant under the *Biodiversity Conservation Act 2016* (BC Act) or by DBCA have been recorded within the local area. Of these species, the application area is likely to provide habitat for three threatened black cockatoo species; forest red-tailed black cockatoo (*Calyptorhynchus banksia* subsp. *naso*), Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) (collectively referred to as black cockatoos herein this report), Quenda (*Isoodon obesulus*) and Rainbow Bee-eater (*Merops ornatus*).

According to available databases, the application area is located outside of the mapped confirmed breeding area for Carnaby's cockatoo. Suitable breeding habitat for black cockatoos includes trees which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow. For most tree species, including marri and tuart trees, a suitable DBH is 500 millimetres (Commonwealth of Australia, 2012). The DWER (2019) observed three Tuart trees with DBH greater than 500 millimetres. Neither of the trees contained hollows. Considering this, the application area is not likely to provide suitable breeding habitat for black cockatoos.

Foraging habitat for black cockatoos within seven kilometres of a breeding site is important to adequately support breeding pairs, and individual night roosting sites need food and water within six kilometres (EPA, 2019). Overlapping foraging ranges within 12 kilometres also support roosting sites and maintain habitat connectivity and movement across the landscape (EPA, 2019). The foraging habitat within the application area has been rated as low because it is comprised of three Tuart trees and predominantly *Acacia* sp. and the other key food species such as *Banksia* sp. were lacking (DWER, 2019).

The application area is not located within the mapped confirmed breeding area for Carnaby's cockatoo and according to available databases, there are no confirmed breeding points within the local area. The nearest confirmed breeding point is approximately 32 kilometres from the application area. Given this, the application area is not likely to provide significant foraging habitat for black cockatoos breeding.

According to available databases, there are numerous confirmed roosting sites for black cockatoos that occur within the local area. Within a six kilometre radius of the application area, there are four confirmed roosting sites. None of these confirmed roosting sites occur within a conservation area. The foraging habitat within the application area may provide some food to support roosting

black cockatoos. However, based on the extent of the foraging habitat scattered in Site 1 and Site 2, its quality, the proposed clearing is not considered to significantly impact on the availability of food sources in the local area.

Quenda, listed as Priority 4 by DBCA, is known to inhabit scrubby, swampy vegetation with low, dense understorey, located nearby water courses, pasture, or forest/woodland that is regularly burnt and is in areas of pasture and cropland lying close to dense cover. Populations inhabiting jarrah and wandoo forests are usually associated with watercourses (Department of Environment and Conservation, 2012). A site inspection of the vegetation adjacent to the application area observed evidence of quenda diggings (DWER, 2019). Noting this, Quenda may utilise the application area. However, noting the extent of the proposed clearing and a large remnant of wetland and dryland vegetation which is likely to contain similar or better habitat adjacent to the application area, the application area is not likely to provide significant habitat for Quenda. It is considered that any potential impacts to this fauna species can be addressed through a fauna management condition that aims to enable fauna to move on to utilise adjacent areas of suitable habitat.

The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. The nest is located in an enlarged chamber at the end of long burrow or tunnel that is excavated, by both sexes, in flat or sloping ground, in the banks of rivers, creeks or dams, in roadside cuttings, in the walls of gravel pits or quarries, in mounds of gravel, or in cliff-faces (Department of the Environment, 2020). The site inspection of the application area (DWER, 2019) observed that the fill appears to be suitable habitat for the Rainbow Bee-eater. However, no burrows of this species were identified, and the face of the fill appeared to be active, and therefore, it may discourage or disturb this species to occupy the application area. Considering also the minimal extent of the proposed clearing scattered in two sites and a large remnant of vegetation adjacent to the application area which is likely to contain similar or better habitat, the application area is not likely to provide significant habitat for the Rainbow Bee-eater.

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001). The Environmental Protection Authority (EPA) recognises the Perth Metropolitan Region to be a constrained area, within which a minimum 10 per cent representation threshold for ecological communities is recommended (EPA, 2008). The application area is located within the mapped extent of the Perth Metropolitan Region Scheme (MRS) and 10 per cent threshold therefore applies. The application area is also situated within the SCP IBRA bioregion and within the mapped SCP vegetation complex Quindalup Complex which retain approximately 39 and 60 per cent of their pre-European vegetation extents respectively. The local area (10 kilometres radius) retains approximately 29.6 per cent native vegetation cover. Noting this, the application area is not likely to contain vegetation significant as a remnant of native vegetation in an area that has been extensively cleared.

According to available databases, no watercourse or wetlands are mapped within the application area. Site 2 of the application area is adjacent to a resource enhancement sumpland. The classification of the wetland may have been partially modified but still support substantial ecological attributes and functions (EPA, 2008). The EPA (2008) recommends that potential impacts should be minimised by ensuring appropriate buffers. The vegetation within Site 2 was observed to be a monoculture of *Acacia cyclops* which is mainly associated with consolidated sand dunes (DWER, 2019). Taking this into account, the vegetation in the application area is not associated with the wetland. Furthermore, the site inspection (DWER, 2019) observed that the wetland is within 10 metres of Site 2 and the part of the wetland nearest to the application area is weed infested. Noting this, the extent of the proposed clearing and the vegetation in the application area in a degraded (Keighery, 1994) to a completely degraded (Keighery, 1994) condition with invasive weeds dominated the area, the proposed clearing is not likely to have a significant impact upon riparian vegetation.

Noting the extent of the proposed clearing and the condition of the vegetation within the application area, the proposed clearing is not likely to exacerbate or contribute to further land degradation, deteriorate the quality of ground water, cause or exacerbate flooding than that which is currently present.

According to available databases, the closest conservation area is Leda Nature Reserve (Class A) (PIN 11932557) located approximately 1.5 kilometres southeast of the application area. Noting the extent of the proposed clearing and the distance to this conservation area, the proposed clearing is not likely to have an impact on the environmental values of any adjacent or nearby conservation area.

The disturbance caused by the proposed clearing may increase the risk of weeds and dieback being introduced into areas of adjacent remnant vegetation. Weed and dieback management practices will assist in mitigating this risk.

Planning instruments and other relevant matters

The application area was historically used as farming land from approximately 1953 (Applicant, 2019a). Partial regrowth occurred between 1974 and 1979, and subsequently, the site was cleared again. Site 1 and 2 remained cleared until 2001 and 1995 respectively, when regrowth was noticeable (Applicant, 2019a). The Applicant (2019a) also advised that Site 2 is a former dump area, storing approximately 4,000m^3 of limestone.

The vegetation within the application area is under the protection of Vegetation Conservation Notice (VCN) (CPS 6867/1). The requirement of this notice is that the person to whom this vegetation conservation notice is given and each owner and occupier of the Land who is bound by this vegetation conservation notice is required to ensure that no unlawful clearing, or no further unlawful clearing, takes place at the property.

The site is classified by the DWER as a contaminated site – restricted use and has sulphate present in a groundwater plume that extends from the southern portion of the site to the south-west. The land use of the site is restricted to commercial/industrial use. The site has been used to stockpile phosphor-gypsum, limestone and peat since 1976.

A development approval under the provisions of the *Planning and Development Act 2005* was granted to Manna Enterprise Pty Ltd (Manna), the owner of the Land on 11 June 2020 (Department of Planning, Lands and Heritage, 2020). It is noted that in the letter of 6 September 2019 Manna authorised Microzinc Pty Ltd to submit a Works Approval as well as planning application under the MRS for the proposed activities (Applicant, 2019b).

No Aboriginal sites of significance have been mapped within the application area.

4. Recommendation

An assessment of the environmental impacts of the proposed clearing has been undertaken in accordance with DWER's Regulatory Principles, taking into consideration the clearing principles contained in Schedule 5 of the *Environmental Protection Act 1986* (EP Act). Noting the assessment against the clearing principles above, the proposed clearing may be at variance with principle (b) and is not likely to be at variance with the remaining principles. Section 62(1) of the EP Act provides for conditions to be placed on a works approval to prevent, control, abate or mitigate pollution or environmental harm. Recommended conditions are as follows:

1. Clearing authorised
The Works Approval Holder shall not clear more than 0.87 hectares of native vegetation within the area cross-hatched yellow on attached Plan 8635/1.

2. Avoid, minimise and reduce the impacts and extent of clearing
In determining the amount of native vegetation to be cleared authorised under the Works Approval, the Works Approval Holder must have regard to the following principles, set out in order of preference:
(a) avoid the clearing of native vegetation;
(b) minimise the amount of native vegetation to be cleared; and
(c) reduce the impact of clearing on any environmental value.

3. Dieback and weed control
When undertaking any clearing or other activity authorised under the Works Approval, the Works Approval Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:
(a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
(b) ensure that no known *dieback* or *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
(c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

4. Fauna management – direction of clearing
The Works Approval Holder shall conduct clearing in a slow progressive manner from one direction to the other (e.g. east to west) to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

5. Records must be kept
The Works Approval Holder must maintain the following records for activities done in pursuant to this Permit:
(a) In relation to the clearing of native vegetation authorised under the works approval:
  (i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
  (ii) the date that the area was cleared;
  (iii) the direction in which clearing was undertaken;
  (iv) the size of the area cleared (in hectares);
  (v) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with Condition 2; and
  (vi) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with Condition 3; and
  (vii) actions taken in accordance with Condition 4.

6. Reporting
The Works Approval Holder must provide to the *CEO* the records required under condition 5 of this Permit, when requested by the *CEO*.

Definitions
The following meanings are given to terms used in this Permit:

CEO means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*;

dieback means the effect of Phytophthora species on native vegetation;

fill means material used to increase the ground level, or fill a hollow;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

weed/s means any plant –
(a) that is a declared pest under section 22 of the Biosecurity and Agriculture Management Act 2007;
(b) published in a Department of Biodiversity, Conservation and Attractions Regional Weed Rankings Summary, regardless of ranking; or not indigenous to the area concerned.
(c) not indigenous to the area concerned.

Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20 of the
Environmental Protection Act 1986

1 July 2020

5. References

Applicant. (2019a). MicroZinc Pty Ltd. Clearing Permit Application – Supporting information. Supporting documents in relation to application CPS 8635/1. DWER Ref: A1832478.

Applicant. (2019b). Supporting documentation in relation to application CPS 8635/1. Letter of authority. DWER Ref: A1832341.

Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.

Commonwealth of Australia (2012) EPBC act referral guidelines for three threatened back cockatoos species. Department of Sustainability, Environment, Water, Populations and Communities, Canberra.

Department of Biodiversity, Conservation and Attractions (DBCA) (2007-) NatureMap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife. URL: http://naturemap.dpaw.wa.gov.au/. Accessed March 2020

Department of Environment and Conservation. (2012). Fauna profiles. Quenda. *Isoodon obesulus* (Shaw, 1797).

Department of the Environment (2020). *Merops ornatus* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Mon, 30 Mar 2020 17:41:12 +1100.

Department of Planning, Lands and Heritage (2020) Grant of a development approval under the provisions of the *Planning and Development Act 2005*. DWER Ref: A1906847.

Department of Water and Environmental Regulation (DWER). (2019). Site inspection report in relation to clearing permit application CPS 8635/1. DWER Ref: A1873449.

Environmental Protection Authority (2008) Environmental Guidance for Planning and Development - Guidance Statement No. 33 available from: https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/GS33-270508.pdf

Environmental Protection Authority (EPA). (2019). EPA Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region. Advice of the Environmental Protection Authority under Section 16(j) of the *Environmental Protection Act 1986*.

Government of Western Australia. (2019) 2018 South West Vegetation Complex Statistics. Current as of October 2018. WA Department of Biodiversity, Conservation and Attractions, Perth.

Heddle, E. M., Loneragan, O. W., and Havel, J. J. (1980) Vegetation Complexes of the Darling System, Western Australia. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.

Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.

GIS Datasets

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- Aboriginal Heritage Places (DPLH-001)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- IBRA Vegetation Statistics
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Regional Parks (DBCA-026)
- Soil and Landscape Mapping – Best Available

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System)– Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

Attachment 2: Clearing permit plan

Attachment 3: Issued Works Approval W6293/2019/1