Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval

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

Works Approval Number	W6833/2023/1
Applicant	Image Resources NL
ACN	063 977 579
File number	DER2023/000336
Premises	Nambung Station 2269 Wongonderrah Rd Nambung WA 6521 Legal description Lot 4113 on Deposited Plan 217467 Mining Tenement E 70/5034 As defined by the premises map in Schedule 1 of the issued works approval
Date of report	14 August 2024
Proposed Decision	Works approval granted

Grace Heydon
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Grace Heydon
A/Manager, Waste Industries
Regulatory Services
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the premises. As a result of this assessment, Works Approval W6833/2023/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

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

2.2 Application summary and overview of premises

On 16 May 2023, Image Resources NL (the applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake construction works relating to a wastewater treatment plant (WWTP) and irrigation sprayfield at the premises. The premises is approximately 17 km southeast of Cervantes.

The premises relates to a category 85: sewage facility, with an assessed design capacity of 25 cubic metres per day under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which is defined in Works Approval W6833/2023/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in Works Approval W6833/2023/1.

2.2.1 Previously proposed sprayfield location

The applicant originally proposed that the irrigation sprayfield be located to the east of Wongonderrah Road, where it was partially located on top of a Cervantes South Geomorphic Wetland (palusplain) on previously cleared farmland.

On-site sampling was conducted by WML Consulting Engineers (2023a; 2023b) in November 2022, which revealed that the depth to groundwater beneath the proposed sprayfield was less than 0.9 mbgl and that the soils were coarse (with fine fractions) with low nutrient holding capacity (low PRI/PBI). The applicant sized the sprayfield based on *Water Quality Protection Note 22* (WQPN22) (DoW 2008) (Table 1) as risk category C (fine-grained soils with significant eutrophication risk to surface water bodies within 500 m); however, due to the revised classification of sprayfield soils and nutrient loading calculation errors, the sprayfield was undersized and required revision. The applicant was advised that the location was not ideal for irrigation. The application remained on hold awaiting a response from the applicant.

The response was received in March 2024 and outlined a revised spray field area located approximately 250 m west of the original site on the western side of Wongonderrah Road. The size of the sprayfield was increased and revised sprayfield size calculations were provided. The applicant reassessed the risk category as category B with low eutrophication risk to surface waters within 500 m as per Table 1 of WQPN22 (DoW 2008).

2.2.2 Proposed works

The proposed works includes installation of a containerised and enclosed Tristar wastewater treatment plant (WWTP) Sequencing Batch Reactor (SBR) system capable of treating up to 25 cubic meters of sewage per day. The wastewater is to be mixed with reject water from the Reverse Osmosis Water Treatment Plant (WTP) and will be discharged to land onto the 3 ha irrigation sprayfield.

The SBR is to be constructed off-site and delivered on-site in modules. Installation will occur over 2-3 weeks, followed by environmental commissioning for up to 12 weeks, in order to achieve desired effluent quality. Commissioning is proposed to be carried out by a specialist engineer to ensure the plant is installed and operates to design requirements.

2.2.3 Premises operation

The Wastewater Treatment Plant (WWTP), Water Treatment Plant (WTP) and irrigation sprayfield is to be constructed on cleared farmland on Nambung Station, located in the mid-west region of Western Australia. The camp will accommodate construction workers and approximately 82 personnel from the proposed Atlas Project (mineral sands mining project).

The WWTP plant is expected to produce an estimated throughput of 20.5 m^3/day (calculated based on 250 L per person/day) for a duration of approximately 5 years; however the containerised wastewater treatment plant has a design capacity of 25 m^3/day. Influent will be generated from kitchen, laundry, toilet and bathroom facilities used by workers residing at the Atlas Project Accommodation Camp.

The expected influent (untreated wastewater) quality is outlined in Table 1.

Table 1: Expected WWTP influent quality

Parameter	Concentration
pH	6.5 - 8.5
Biochemical Oxygen Demand (BOD)	350 mg/L
Total suspended solids (TSS)	350 mg/L
Total nitrogen (TN)	60 mg/L
Total phosphorus (TP)	14 mg/L

Wastewater will be treated with polyaluminium chloride, sodium hypochlorite (hazardous) and sucrose to a low exposure risk level. Sewage sludge is to be collected in sludge tanks and periodically removed for disposal to an appropriately licensed facility, by a licensed carrier.

The expected effluent quality (treated wastewater) is outlined in Table 2.

Table 2: Expected WWTP effluent quality

Parameter	Concentration
pH	6.5 – 8.5
Biochemical Oxygen Demand (BOD)	<20 mg/L
Total suspended solids (TSS)	<30 mg/L
Total nitrogen (TN)	<30 mg/L
Total phosphorus (TP)	<8 mg/L
Thermotolerant coliforms *Escherichia coli (E. coli)*	<10 cfu/100 mL
Residual free chlorine (Cl_2)	0.2 – 2.0 mg/L

Reverse Osmosis Water Treatment Plant (WTP)

The water treatment plant is a containerised reverse osmosis (RO) system and is to be installed onsite to provide potable water for residents of the Atlas Project Accommodation Camp. Sodium hypochlorite, antiscalant, RO acid cleaner and RO alkaline cleaner is to be used to clean and preserve the RO membranes and to maintain the water quality of the treated water.

An estimated volume of 9 m^3/day of reject water (brine solution) will be mixed with 20.5 m^3/day of WWTP effluent resulting in a total discharge volume of 29.5 m^3/day of blended effluent per day. The blended effluent will be discharged to the non-human contact irrigation sprayfield via a high-density polyethylene pipeline, to be located above ground.

The expected water quality of the WTP effluent is outlined in Table 3.

Table 3: Expected WTP water quality output (based on current bore data)

Parameter	Concentration
pH	6.46
Total dissolved solids (TDS)	3168 mg/L

Note: A RIWI Act licence to construct and alter a well and a 5C groundwater licence permitting the applicant to extract 50,000 kL/year from the Eneabba aquifer has been granted by the department. The water extracted from the bore is to be used for mining camp purposes only and the licence is for a 3-year duration with no option for renewal.

2.3 Part IV of the EP Act

Image Resources Atlas Project is a significant proposal and has been assessed as an 'accredited assessment' by the Environmental Protection Authority under Part IV, Section 39A of the *Environmental Protection Act 1986*. The EPA Assessment number is 2311 and the assessment included a Public Environmental Review.

The accommodation camp, WWTP and irrigation sprayfield construction was approved under Section 41A(3) of the EP Act for Minor and Preliminary Works, allowing the Part V assessment (this application) to be processed alongside the Part IV assessment.

Additionally, the Atlas Project has been assessed and approved under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as the project is anticipated to significantly impact protected matters (flora, fauna, habitats and places) and is therefore considered a 'controlled action'.

3. Site characteristics

3.1.1 Site and soil characteristics

The land within the prescribed premises boundary is cleared rural farmland covered with free draining, sandy topsoil containing weeds and short grasses (WML Consulting Engineers, 2023a). The land is flat to gently sloping (0-6% gradient) and the ground elevation at Nambung Station is approximately 42 mAHD (Bureau of Meteorology 2024; WML Consulting Engineers 2023a).

The topsoil (to 0.2 m) is moderately permeable, moist, medium-dense sand with silt and trace root fibres. At 0.2 to 1.0 m below the surface, the sand becomes denser than the topsoil and from 1.0 to 1.5 m depth, the soil is either fine to medium grained sand with finer fractions or is wet and dense fine to medium grained clayey sand / silty sand with low to medium plasticity. At 1.5 to 2 m depth, sand is wet and medium dense to dense (WML Consulting Engineers 2023a). Based on soil sampling conducted within the prescribed premises, it is expected that the drainage potential is moderate with an estimated saturated hydraulic conductivity (Ksat) of between 0.1 – 1.5 m per day (WML Consulting Engineers 2023a).

The surface geology within the vicinity of the prescribed premises consists of Bassendean sands (highly leached quartz sand with seasonal swamps and clayey depressions between low lying dunes) with the Guildford Formation beneath (fluvial, shallow marine and estuarine deposits with silty and sandy clay) (MWES Consulting Engineers 2022a). Bassendean sands are generally transmissive (Bennelongia Environmental Consultants 2022).

Due to the aforementioned soil characteristics, the irrigation sprayfield soils are relatively free draining with an expected soil permeability of 0.1-1.0 m per day (WML Consulting Engineers 2023a). The Phosphorus Retention Index of soil sampled approximately 450 m east of the irrigation sprayfield is 4.4 to 14.8, indicating that soils within the prescribed premises are weakly absorbing and have a low capacity for nutrient retention (WML Consulting Engineers 2023a).

3.1.2 Climate

The annual average rainfall for 2023 at Nambung Station was 327.2 mm and the annual pan evaporation is estimated to be approximately 2200 mm within the region (Bureau of Meteorology 2024; WML Consulting Engineers 2023a). The area is not within a high flood or erosion risk area.

3.1.3 Depth to groundwater

The depth to groundwater beneath the proposed irrigation sprayfield is shallow. Five soil samples varying in distance from 130 m to 170 m east of the current sprayfield location were taken in November 2022 and groundwater was encountered at between 1.1 to 1.6 mbgl (WML Consulting Engineers 2023a; 2023b). The samples were located within the prescribed premises, immediately east of Wongonderrah Road. As sampling was conducted in November, these levels may not represent peak/winter groundwater levels and the distance to the water table may be less in wetter, winter months following groundwater recharge.

The Nambung white bore located south of the sprayfield location on Nambung Station was replaced in 2020 with bore ATPB04 in the same location, due to shallow depth. The bore installation revealed a groundwater depth of 2.19 metres (MWES Consulting 2022a).

The department requested additional information on the depth to groundwater beneath the proposed irrigation sprayfield from the applicant as a part of this assessment. The applicant used data from seven bores surrounding the irrigation sprayfield to create a groundwater contour map. Data was collected in November 2022. The estimated depth to groundwater based on the contour map varies from approximately 1.8 mbgl in the northwestern corner of the sprayfield to approximately 3.2 mbgl in the southeastern corner of the sprayfield, as displayed in Figure 1 below.

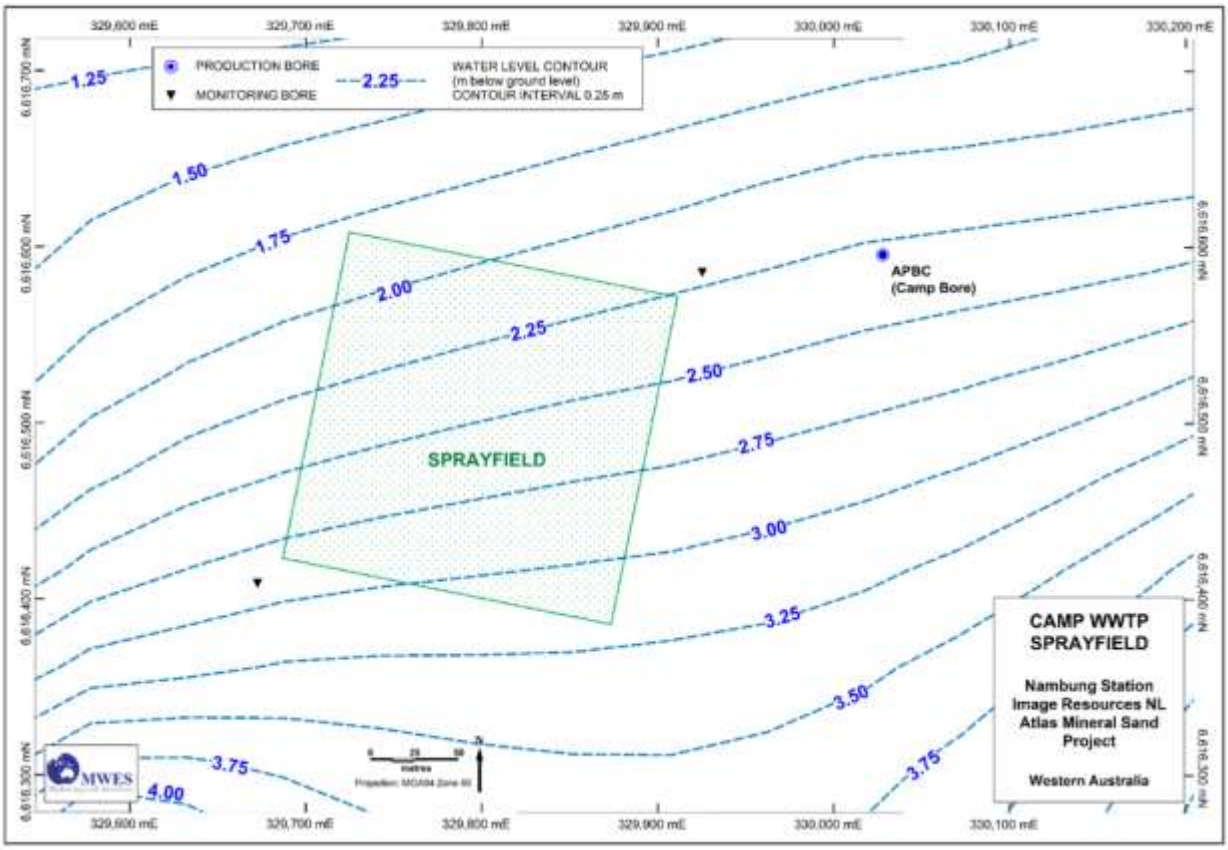

Figure 1: Irrigation sprayfield groundwater contour map

As the data did not correlate with the on-site sampled data, the department's regional hydrologist was consulted for advice regarding the depth to groundwater in the vicinity of the irrigation sprayfield. A review of the groundwater contour map and raw bore data used to create the contour map was undertaken due to the discrepancies in data between the field samples taken by WML Consulting Engineers (2023a; 2023b) in November 2022 and the contour map provided by the applicant (Figure 1). An alternative and equally valid contour map was extrapolated from the same bore data showing possible groundwater levels closer to 1.75 m which correlated closely with data obtained during on-site sampling (Figure 2). Note that the depth to groundwater may be less during winter months.

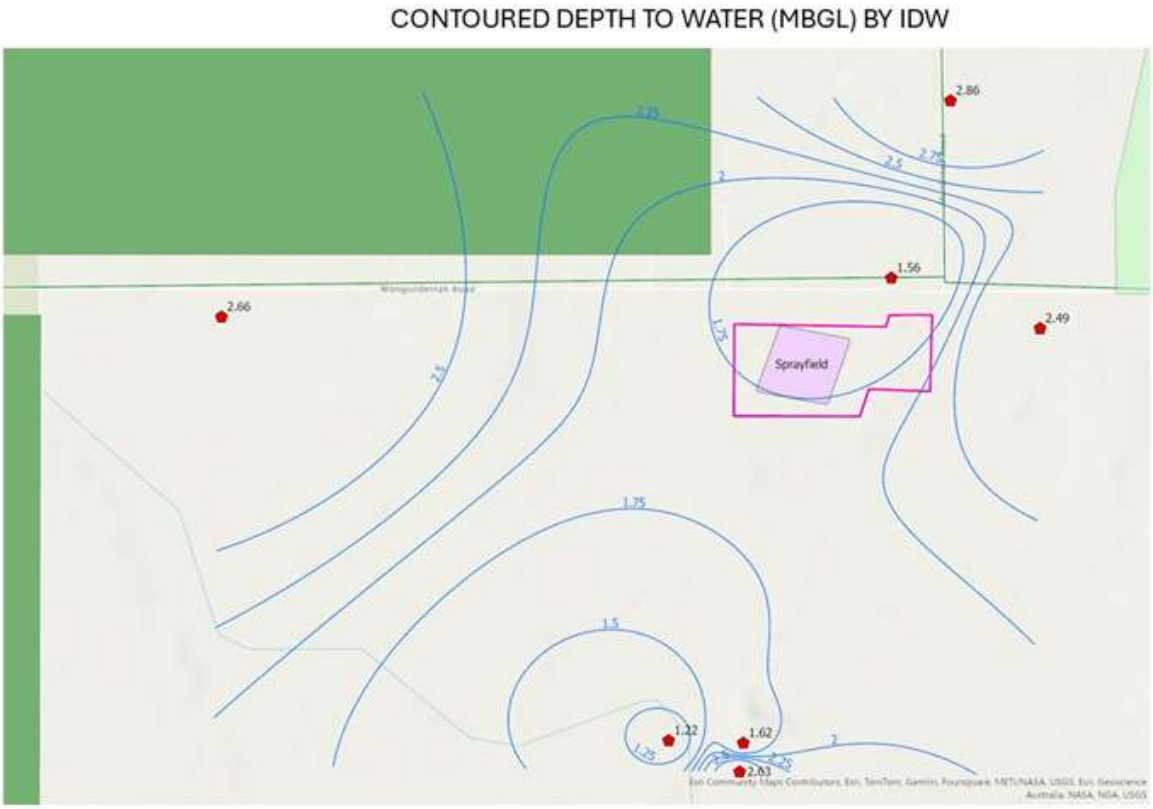

Figure 2: Interpretation of groundwater data created by the department using an alternative groundwater contouring method.

Based on the information available, depth to groundwater within the vicinity of the sprayfield is likely to be within the range of 1.1 to 3.2 metres and may be less during peak winter levels.

3.1.4 Groundwater salinity

DWER records indicate that the TDS of the superficial aquifer in the area of the irrigation sprayfield is 1500 to 3000 mg/L while the TDS of the deeper, confined Yarragadee aquifer in the area of the irrigation sprayfield is 3000 to 7000 mg/L.

ML8B bore is approximately 130 m north of the irrigation sprayfield and is the closest monitoring bore to the site. The bore is within the Eneabba aquifer which lies beneath the irrigation sprayfield. In April 2013, the electrical conductivity of groundwater sampled from ML8B bore was 7860 us/cm and the TDS was 4160 mg/L (MWES, 2022a). In November 2022, the electrical conductivity of groundwater sampled from ML8B bore was 7000 us/cm, indicating little variation in salinity over time in this area (Bennelongia Environmental Consultants, 2022).

The TDS of RO reject water is estimated to be approximately 3168 mg/L and this will be diluted with treated wastewater; therefore the blended effluent is likely to have a TDS within the range of bore data sampled at ML8B bore and similar to the upper TDS range of the superficial aquifer according to the department's records.

4. Internal technical advice

4.1.1 Mid-west region

The application was referred to the department's Mid West Gascoyne Region for advice regarding the suitability of irrigation in the proposed location, to obtain advice on the minimum separation distance required between the land surface and groundwater, to obtain additional regional groundwater data and to determine the risk of eutrophication to surrounding surface water bodies.

The following hydrogeological advice was received:

- Depth to groundwater at peak winter levels are required to inform the minimum depth to groundwater.
- A groundwater monitoring program is required to monitor depth of irrigation and depth to groundwater.
- Groundwater mounding may occur as a result of irrigation and is to be considered in the groundwater monitoring program.
- Potential for eutrophication of surrounding surface waters exists; however the vulnerability of surrounding surface water and levels of degradation of Cervantes South Geomorphic wetlands was unable to be determined with the available information.
- There are nearby surface water bodies within proximity of the irrigation sprayfield (potentially farm dams based on aerial imagery). If fed by groundwater, the dams may function as sumps and irrigation may cause gradual groundwater mounding which could lead to nutrient laden wastewater flow offsite into surrounding surface water bodies.

The shallow depth to groundwater and low soil nutrient absorption was raised as a concern.

The applicant submitted a groundwater management plan and the region was consulted on the suitability of the plan. The following advice was received:

- Uncertainty remains regarding actual depth to groundwater. Discrepancies and data gaps remain. Use the precautionary principle in the absence of further data and assume a high winter water level.
- Monitoring around the perimeter of the sprayfield using at least 4 bores (one on each side of the sprayfield) to monitor for groundwater mounding and changes in groundwater gradients over time is recommended.
- It is advisable to use data loggers for data collection to monitor temporary groundwater rises due to rainfall.
- A suitable separation distance between the land surface and groundwater is to be determined, maintained and monitored. Further technical expertise is required to determine this distance.
- Groundwater monitoring should include water quality testing parameters outlined in Table 3 of *Water Quality Protection Note 22* (WQPN22) (DoW, 2008).
- The groundwater management plan should be updated to include monitoring of irrigation rates, soil type, blended effluent water quality and the distance between the irrigation sprayfield land surface and groundwater.

4.1.2 Contaminated Sites Branch

The application was referred to the department' s Contaminated Sites Branch to obtain advice regarding the suitability of irrigating blended effluent in the proposed location, to determine the minimum separation distance required between the land surface and groundwater, to assess groundwater contamination risks and to obtain feedback on the groundwater management plan.

The following advice was received:

- RO reject water is likely to contain a high concentration of salts and is likely to contain radionuclides, heavy metals and metalloids with potential to contaminate groundwater and impact sensitive receptors.
- The best case scenario is to dispose of reverse osmosis reject water separately to treated wastewater, using an alternative method to irrigation, to avoid possible groundwater contamination with radionuclides, heavy metals, metalloids and high levels of salts.
- Sizing the sprayfield too small has potential to result in groundwater mounding to a one metre separation distance between land and groundwater and a minimum 1.3 metre separation distance is recommended.
- If irrigation of blended effluent is to occur, radionuclide, heavy metal and metalloid concentrations in blended effluent must be below trigger values outlined in *ANZECC & ARMCANZ (2000) Water Quality Guidelines Vol 3* and the sprayfield must be a minimum of 3 hectares in size to spread the contaminants over a larger area, reducing soil degradation and impacts on native vegetation.
- Due to the shallow depth to groundwater, it is recommended that the irrigation sprayfield is vegetated with a suitable salt tolerant crop to be harvested as biomass to assist removal of nutrients, reducing the likelihood of nutrient leaching to groundwater. A Biomass Management Plan outlining how this will be achieved and where the biomass will be removed to, is required.
- Groundwater monitoring bores are to be sampled annually in September or October when groundwater levels are at their peak.

4.1.3 Terrestrial Ecosystems Branch

A subterranean fauna assessment was conducted by Bennelongia Environmental Consultants (2022) to determine if dewatering from the larger Atlas Project would impact Subterranean fauna, if present. A desktop assessment and bore sampling found limited species and numbers of stygofauna (Bennelongia Environmental Consultants 2022).

Advice from the department's Terrestrial Ecosystems Branch was sought regarding the presence of stygofaunal communities within the vicinity of the sprayfield that may be impacted by changes in groundwater chemistry. The branch advice confirmed that stygofauna was unlikely to be present within the area and the likelihood of detrimental impacts to stygofauna that may be present is low.

5. Risk assessment

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

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

5.1 Source-pathways and receptors

5.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and environmental commissioning which have been considered in this decision report are detailed in Table 4 and Table 5 below. Table 4 and Table 5 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 4: Proposed applicant controls - Construction

Emission	Sources	Potential pathways	Proposed controls
Construction			
Noise	Vehicle movements, generators and construction machinery	Air / windborne pathway	Noise to be managed in accordance with the *Environmental Protection (Noise) regulations 1997* – Regular servicing and maintenance of equipment – Installation of barriers or noise attenuation around motors, if required – Incident reporting and investigation of complaints with remedial action, if required – WWTP constructed off site and will be delivered to the site as modules, minimising on-site installation work
Dust	Vehicle movements, ground disturbance, installation of WWTP infrastructure	Air / windborne pathway	– None proposed
Hydrocarbons and chemicals	Leaks or spills from vehicles and chemical storage Installation of WWTP and associated infrastructure	Localised soil contamination and potential infiltration to groundwater Overland run-off and possible migration into surface water bodies, potentially causing ecosystem disturbance and impacting surface water quality	– Hydrocarbons and chemicals to be stored in an AS1940 compliant bunded storage facility or within AS1940 compliant self-bunded containers – Containment and cleanup of spills as soon as practicable – Facilities used for hydrocarbon or chemical storage to contain spill kits – Dedicated area for light vehicle refueling – Immobile/semi-mobile equipment to be refueled by a service vehicle containing a spill kit – Regular inspections of storage facilities – Regular inspection and replenishing of spill kits – Incident reporting

Table 5: Proposed applicant controls - Operation

Emission	Sources	Potential pathways	Proposed controls
Commissioning			
Treated wastewater	Excess discharge of treated wastewater to irrigation sprayfield	Localised soil contamination and potential infiltration to groundwater Overland run-off and possible migration into surface water bodies, potentially causing ecosystem disturbance and impacting surface water quality	– Even distribution of wastewater to appropriately sized irrigation sprayfield to prevent erosion and pooling – Fencing and signage – Irrigation sprayfield designed and operated to prevent run-off, spray drift and discharges occurring beyond the irrigation sprayfield boundary – Water quality monitoring during environmental commissioning to enable early detection and prompt adjustments to be made if water quality deviates from DWER and DoH requirements – Flow meter to record the volume of effluent discharged to the irrigation sprayfield – Contingency plan when irrigation is deemed unsuitable (due to wet weather, waterlogging/pooling etc.) is removal of blended effluent to a licensed facility
Hydrocarbons and chemicals	Leaks or spills from vehicles, storage and water treatment infrastructure	Localised soil contamination and potential infiltration to groundwater Overland run-off and possible migration into surface water bodies, potentially causing ecosystem disturbance and impacting surface water quality	– Hydrocarbons and chemicals to be stored in an AS1940 compliant bunded storage facility or within AS1940 compliant self-bunded containers. – Containment and cleanup of spills as soon as practicable – Facilities used for hydrocarbon or chemical storage to contain spill kits – Dedicated area for light vehicle refueling and immobile/semi-mobile equipment to be refueled by a service vehicle containing a spill kit – Diesel generators located in a dedicated service area – Regular inspections of storage facilities and regular inspection/restocking of spill kits – Incident reporting

Odour	Sludge and wastewater storage Spills / leaks of untreated / partially treated wastewater or sludge Incorrect chemical / biological treatment of wastewater	Air / windborne pathway	– Containerised system encloses WWTP infrastructure – Enclosed balance tank and irrigation tank – Sealed tanks to store sludge – Sludge tank periodically emptied by a licensed contractor and contents moved to a facility licensed to accept sewage sludge – Sealed shipping container houses the SBR
Noise	WWTP pumps and aeration units	Air / windborne pathway	– Noise to be managed in accordance with the *Environmental Protection (Noise) regulations 1997* – Regular servicing and maintenance of equipment – Installation of barriers or noise attenuation around motors, if required – Incident reporting and investigation of complaints with remedial action, if required
Partially treated or untreated wastewater	Spills and leaks of WWTP containment infrastructure Discharge of poorly treated effluent to irrigation sprayfield	Localised soil contamination and potential infiltration to groundwater Overland run-off and possible migration into surface water bodies, potentially causing ecosystem disturbance	– Containerised system encloses WWTP infrastructure. A sealed shipping container houses the SBR – Balance tank and irrigation tank enclosed – SBR is factory tested and tested with fresh water prior to filling with wastewater – Wastewater storage infrastructure made of impermeable materials – Spills to be contained and contaminated material removed by a licensed contractor – WWTP commissioning to be conducted by a specialist engineer to ensure it is correctly installed and functions as per design requirements – Water quality monitoring during environmental commissioning to enable early detection and prompt adjustments to be made if water quality deviates from DWER and DoH requirements – effluent retreated if unsuitable for discharge – Wastewater samples collected following AS/NZS 5667.10 and NATA accredited sample analysis for water quality parameters – Run-off from cleared areas diverted to sediment basins as required – Regular visual inspections of plant infrastructure – Incident reporting system – Automatic shutdown of system if operator does not respond to alarms

			– WWTP infrastructure to be located on a hardstand and to be bunded – Alarms to alert of high/low tank levels, faulty pump and faulty instruments

5.1.2 Receptors

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

Table 6, Table 7, Table 8, Figure 3 and Figure 4 below provide a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental Siting* (DWER 2020)).

Table 6: Sensitive human receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Rural residential properties	- Two farmhouses are located north of the prescribed premises within the same property. The distance to the property cadastral boundary to the northernmost prescribed premises boundary is 370 m. The closest farmhouse is approximately 837 m north and the other farmhouse is approximately 1.1 km north, measured from the industrial activity boundary (northern irrigation sprayfield boundary) to the southern sensitive land use activity boundary (method 2 in *Guideline: Odour Emissions* (DWER 2019) - relevant for odour emissions). - 2.61 km northeast from the northeastern corner of prescribed premises boundary to the cadastral boundary. Note: Nambung station homestead is 186 m south, measured from the southwestern corner of the prescribed premises boundary to the sensitive land use boundary. The property is located within Lot 4113 on Plan 217467 (the premises address) and is owned by Image Resources; therefore, it is not considered a sensitive receptor.
Cervantes townsite	17 km northwest of the premises. Measurement taken from north-western corner of the prescribed premises boundary.
Aboriginal heritage sites	Project within Yued Native Title (1997) determination area. No Aboriginal Heritage sites have been recorded within the vicinity of the prescribed premises.

Table 7: Sensitive environmental receptors (wetlands) and distance from prescribed activity

Environmental receptors - Wetlands	Distance from prescribed activity
Specified ecosystems: Lancelin Defence Training Area Wetland System (Directory of Important Wetlands in Australia WA119) – part of the regionally significant Bassendean Group (conservation value)	3.1 km east, measured from the eastern prescribed premises border, 3.3 km southeast, measured from the south easter corner of the prescribed premises border and 3.4 km south, measured from the southern prescribed premises boundary border. Note: WA and nationally threatened flora and fauna inhabit these wetlands (see Table 4 below).
Specified ecosystems: Geomorphic Wetlands Cervantes South (DBCA-013) – includes palusplain wetlands, sumplands, floodplains and creeks	Geomorphic wetlands are located within and surrounding the premises. The closest wetlands to the premises are listed below: **Palusplain wetlands**: - Closest is within the premises boundary and is located 174 m east of the eastern sprayfield boundary and adjacent to WWTP infrastructure - 340 m east of the western prescribed premises boundary and approximately 500 m west of the western sprayfield boundary - 138 m south, measured from the southern prescribed premises boundary and 194 180 m from the southernmost sprayfield boundary - 206 m north measured from the northern section of the prescribed premises boundary and 305 m from the sprayfield boundary to the southern border of the wetland **Damplands**: - Closest 353 m north, measured from the northernmost portion of the prescribed premises boundary to the southernmost border of the wetland **Sumplands**: - Closest is 213 m north, measured from the northern premises boundary and 258 m from the northern sprayfield boundary to the southern border of the wetland - 130 m west, measured from the western premises boundary and 274 m west of the western sprayfield boundary to the eastern wetland boundary **Floodplains**: - Closest is 490 m west-northwest, measured from the northwestern corner of the prescribed premises boundary **Creeks**: - Closest is 752 m south of the south-eastern corner of the prescribed premises boundary **Lake**: - Closest is 2.6 km northeast, measured from the north-eastern prescribed premises boundary Note: *EPA summary of reasons for decision – request to undertake minor or preliminary works under s.41A(3) of the Environmental Protection Act 1986* states 'The proponent has advised that the location of buildings, roads and general disturbance has been situated in the higher ground to the west of the wetland area'.

Table 8: Sensitive environmental receptors (other) and distance from prescribed activity

Environmental receptors	Distance from prescribed activity
Nambung River	2.9 km north-northwest, measured from the north-western corner of the prescribed premises boundary.
Frederick Smith Creek	973 m south-southwest, measured from the southwestern corner of the prescribed premises boundary. Connects to Lancelin Defence Training Area Wetland System to the south of the premises.
Underlying groundwater – groundwater users	Private bores (within 1km): • 123 m west (site ID: 61714559, site name: No11) – soak bore • 254 m south (site ID: 61710378, site name: White) – domestic supply bore • 446 m southeast (site ID: 61711117, site name: No1) – stock bore • 473 m north (site ID: 61714560, site name: No2) - stock bore • 861 m north (site ID: 61711118, site name: No. 1 Yewadabby) – stock bore • 1 km southwest (site ID: 61711120, site name: 27) – stock bore DWER bores (within 1km): • 130 m north (site ID: 61718078, site name: ML 8B) • 132 m north (site ID: 61718076, site name: ML 8A) • 132 m north (site ID: 61718077, site name: ML 8A Annulus) – Depth to groundwater is shallow (approximately 1.1 to 1.6 m) based on testing of the accommodation camp site soils detailed in the *Atlas Project Accommodation Site Geotechnical Investigation* (WML Consulting, 2023) and between 1.75 to approximately 3 m based on contour mapping. – Groundwater dependent ecosystems (wetlands) surround the premises. – Superficial aquifer (unconfined) is shallow and Yarragadee aquifer (unconfined beneath the site) is approximately 20 mbgl. – Water overflows from the surrounding wetlands into Tamala limestone karstic systems and groundwater is recharged directly via rainfall.
National Parks & Reserves: Nambung National Park (R24522) - DBCA Legislated Land & Waters	240 m north-northwest, measured from the north-western corner of the prescribed premises boundary to the south-eastern corner of the National Park boundary. Note: Reserve number 10525 is 5.4 km southeast of the south-eastern corner of the prescribed premises boundary
Threatened Fauna -*Calyptorhynchus latirostris* Carnaby's Black Cockatoo (endangered EPBC Act 1999, IUCN red list) and *Leipoa ocellata*	Vegetation surrounding the premises is high quality foraging habitat. *Calyptorhynchus latirostris* within 3 km of prescribed premises boundary and within Lancelin Defence Training Area Wetland System. *Leipoa ocellata* common name Malleefowl (vulnerable) - within 5 km of the prescribed premises.

Western Australian Threatened Flora (within Lancelin Defence Training Area Wetland System)	Western Australian threatened flora: *Grevillea thelemanniana* (P1), *Isopogon panduratus* subsp. *palustris* (P2), *S. badius* (P2), numerous P3 and P4 flora. Nationally threatened flora: *Andersonia gracilis* – common name Slender Andersonia (endangered) *Anigozanthos viridis* subsp. *terraspectans* – common name Green Kangaroo paw (vulnerable), endangered *Manarthuria keigheryi* - common name Keighery's Macarthuria (endangered).
Threatened Ecological Communities (TEC's)	Endangered Priority 3 TEC's (Banksia Dominated Woodlands of the Swan Coastal Plain) exist less than 50 m from the premises and sprayfield boundary.

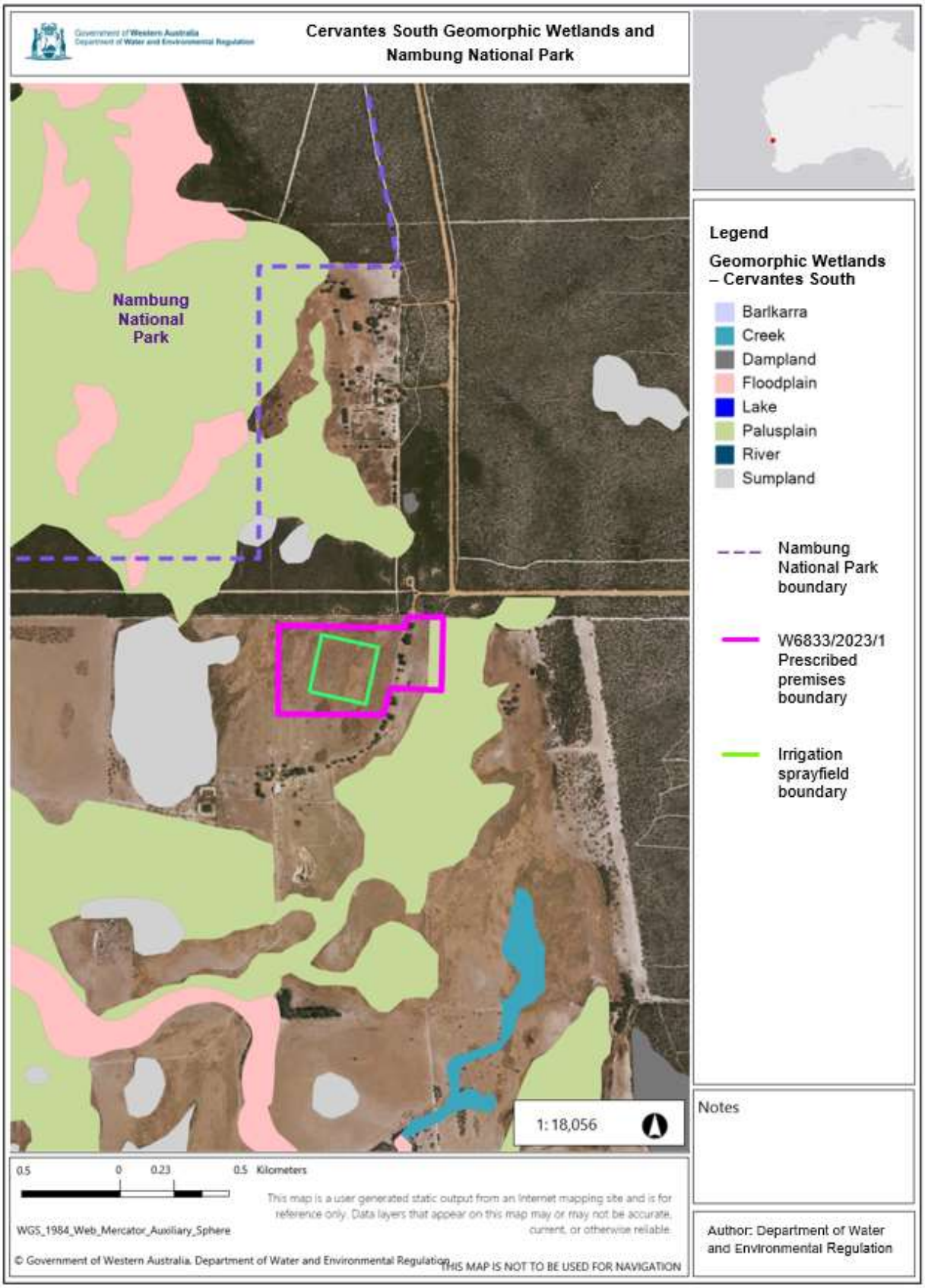

Figure 3: Distance to sensitive receptors - Geomorphic Wetlands (Cervantes South) and Nambung National Park

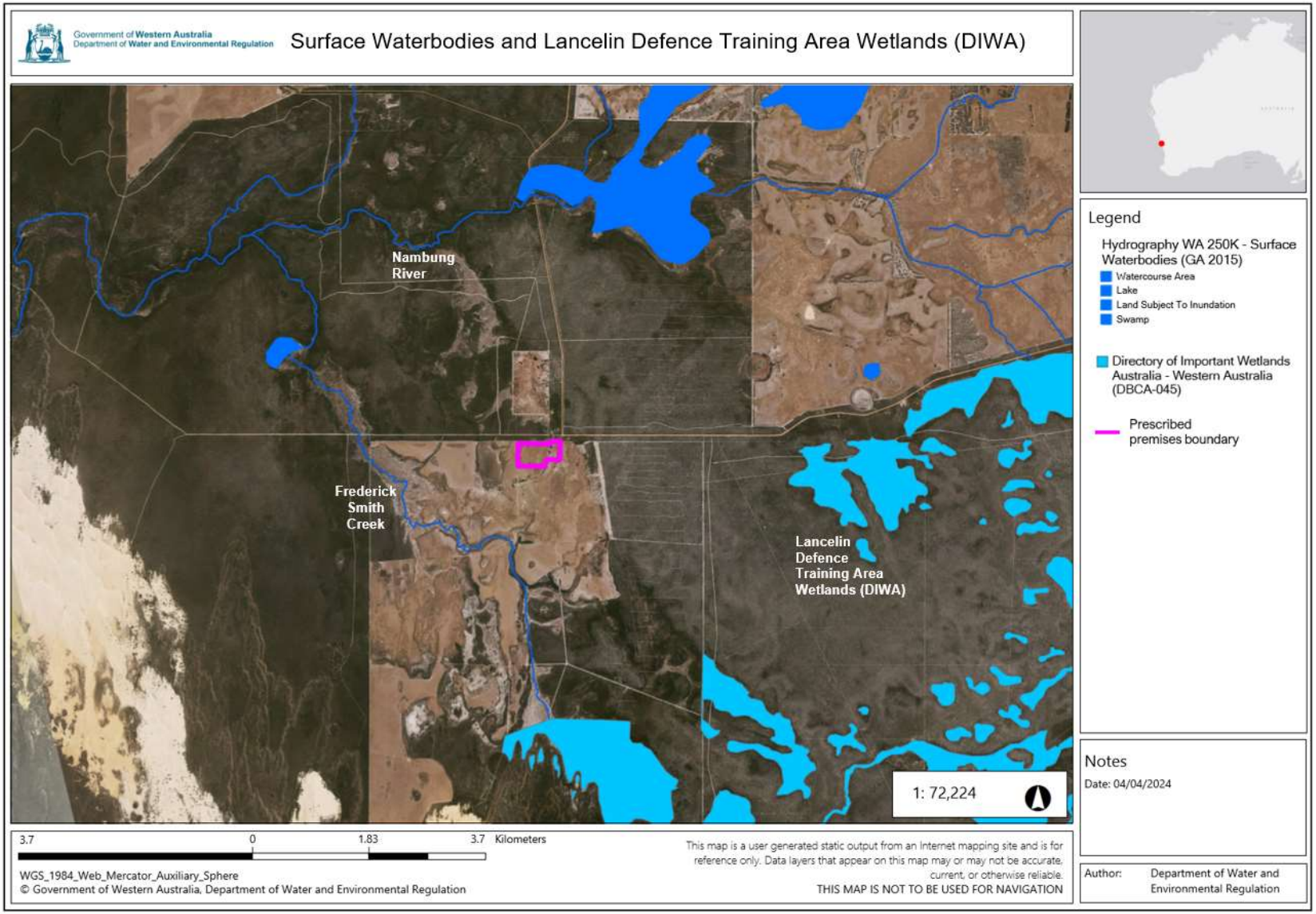

Figure 4: Distance to sensitive receptors - Surface water bodies and Lancelin Defence Training Area wetlands (DIWA wetlands).

5.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 5.1. 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 5.1), 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 9.

Works approval W6833/2023/1 that accompanies this decision report authorises construction, environmental commissioning, and time-limited operations. The conditions in the issued works approval, as outlined in Table 9 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A registration is required following the commissioning phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises i.e. Category 85 activities. A risk assessment for the operational phase has been included in this decision report.

Table 9: Risk assessment of potential emissions and discharges from the premises during construction, commissioning and operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Construction of WWTP infrastructure and installation of equipment	Dust	Air / windborne pathway causing impacts to health and amenity	Residences - closest 370 m north Nambung National Park 239 m north-northwest	Refer to Section 5.1	C = Slight L = Rare **Low Risk**	Y	N/A	The Delegated Officer considers dust emissions associated with equipment installation and WWTP construction to be minimal, contained within the immediate vicinity of works and adequately regulated by the general provisions of the EP Act.
	Noise			Refer to Section 5.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	Due to the limited duration of works and the low risk of emissions impacting sensitive receptors, the *Environmental Protection (Noise) Regulations 1997* are deemed sufficient to manage noise emissions.
	Sediment laden stormwater	Erosion causing run-off from cleared and disturbed land into surface water bodies		Refer to Section 5.1	C = Minor L = Rare **Low Risk**	Y	N/A	Minimal construction is required as the WWTP is delivered as modules and is containerised.

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Vehicle movements Machinery operation Diesel generator operation (camp power supply)	Noise – reversing beepers and engine noise	Air / windborne pathway causing impacts to health and amenity	Residences - closest 370 m north Nambung National Park 239 m north-northwest	Refer to Section 5.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	Due to the limited duration of works and the low risk of emissions impacting sensitive receptors, the *Environmental Protection (Noise) Regulations 1997* are deemed sufficient to manage noise emissions.
	Hydrocarbon and chemical spills	Discharge to land via overland run-off or seepage to groundwater potentially disturbing nearby wetland ecosystems and surrounding native vegetation	Geomorphic wetlands – closest within premises boundary TEC P3 - closest adjacent to premises Frederick Smith Creek (minor) 937 m southwest Nambung National Park 239 m north-northwest Groundwater bores – closest private bore is 123 m east	Refer to Section 5.1	C = Minor L = Unlikely **Medium Risk**	Y	**Condition 9**	N/A Condition contains requirements for the cleaning of spills of environmentally hazardous materials.

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Commissioning								
Commissioning of Wastewater Treatment Plant	Odour	Air / windborne pathway causing impacts to health and amenity	Residences – closest approximately 837 m north[3]	Refer to Section 5.1	C = Slight L = Rare **Low Risk**	Y	N/A	N/A
Commissioning of Wastewater Treatment Plant	Untreated or partially treated nutrient laden, saline wastewater	Unintended release of nutrient laden/brackish wastewater or chemical contaminants to land via leaks, spillage or tank overtopping: - Impacts on soil quality and health of surrounding vegetation; - Migration of contaminated wastewater though soil into groundwater causing ecological disturbance to wetlands (groundwater dependent ecosystems), vegetation and surface water bodies; - Overland runoff causing ecosystem disturbance or impacting surface water quality.	Geomorphic wetlands – closest within premises boundary Priority 3 Threatened Ecological Community - closest adjacent to premises *Calyptorhynchus sp*. Carnaby's Black Cockatoo - habitat surrounds premises Frederick Smith Creek 937 m southwest Nambung National Park 239 m north-northwest Lancelin Defence Training Area Wetland System - closest wetland is 3.1 km east Nambung River 2.9 km north-northwest Groundwater bore users – closest private bore is 123 m east	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	N	**Conditions 3, 6, 7, 8, 9, 10, 11 & 12**	Condition 3 provides assurance that the integrity of WWTP pipework, tanks, fittings and joins is maintained to prevent unintended release of treated wastewater to the environment via infrastructure defects. Placement of the WWTP on an earthen hardstand and earthen bunding provides a physical barrier to reduce the likelihood of spills or leaks of emissions reaching environmental receptors. Alarm systems alert operators to high tank levels and pump faults or failure to enable immediate remedial action to prevent discharge to the environment. Conditions 6 and 7 ensure infrastructure is installed and constructed to required specifications prior to commencement of environmental commissioning, mitigating the risk of spills, leaks and overtopping due to installation or construction faults.

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
	Chemical spills and leaks (chemicals used in wastewater and water treatment)			Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	N	**Conditions 3, 6, 7 & 9**	Chemical reagents are to be located within the containerised WWTP and are to be stored according to Australian standards to prevent contamination of groundwater and surface water resulting from unintentional spills and leaks. Integrity of pipework, tanks, fittings and joins is to be maintained to prevent unintended release of treated wastewater to the environment.
Commissioning of Wastewater Treatment Plant	Discharge of treated wastewater to land (irrigation sprayfield)	Pooling or waterlogging of soils within irrigation area resulting in runoff to surrounding areas (overland flow)	Geomorphic wetlands – closest 130 m west of sprayfield and east within premises boundary	Refer to Section 5.1	C = Minor L = Likely **Medium Risk**	N	**Conditions 6, 7,8 and 9**	Sprinkler systems capable of rotation and isolation manage waterlogging and pooling by avoiding irrigation on affected areas and even distribution of wastewater over the sprayfield area is achieved using the appropriate number and placement of sprinklers; therefore avoiding waterlogging or pooling due to uneven application. Monitoring the flow and volume of blended effluent discharged to the sprayfield ensures that the land is not irrigated beyond capacity. When blended effluent is produced at the predicted volume of 29m^3/day, irrigation tank 2 (a 14m^3 tank) will not hold a full day of effluent production; therefore, irrigation will be continuous, regardless of whether sprayfield soils have the capacity to receive the effluent. The works approval holder proposes to dispose of blended effluent to a licensed facility where irrigation must be ceased due to waterlogging or pooling.

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
		Accumulation of salt, excess nutrients, water treatment chemicals and toxicants in irrigation sprayfield soils followed by migration to groundwater causing ecological disturbance to wetlands, groundwater dependent vegetation, surface water bodies and groundwater quality for bore users (groundwater less than 3.2 mbgl)	Frederick Smith Creek 937 m southwest Nambung National Park 239 m north-northwest Groundwater bore users – closest private bore 123 m east Geomorphic wetlands – closest 130 m west of sprayfield and east within premises boundary Priority 3 TEC - closest adjacent to premises Lancelin Defence Training Area Wetland System - closest wetland 3.1 km east	Refer to Section 5.1	C = Moderate L = Likely **High Risk**	N	**Conditions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 & 14.**	Refer to Section 5.4
		Wind dispersal of saline water (spraydrift) impacting health of surrounding vegetation and causing ecological disturbance	Priority 3 TEC - closest adjacent to premises *Calyptorhynchus sp*. Carnaby's Black Cockatoo - habitat surrounds premises Nambung National Park 239 m north-northwest	Refer to Section 5.1	C = Moderate L = Unlikely **Medium Risk**	N	**Conditions 3, 6, 7, 8 and 9**	Spray drift due to blended effluent irrigation has the potential to impact nearby Threatened Ecological Communities (TEC's) and vegetation within Nambung National Park due to high TDS; therefore, the low drift sprinkler nozzles are required to limit spray drift generated, spray drift is not permitted beyond the premises boundary and the volume of blended effluent permitted to be discharged to the sprayfield is limited.

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
		Groundwater Mounding - Rising groundwater levels increase the risk of groundwater contamination due to the reduced distance between the land surface and groundwater, increasing the risk of impacts on surrounding sensitive receptors as groundwater is a pathway to receptors.	Groundwater bore users – closest private bore 123 m east Geomorphic wetlands – closest 130 m east Priority 3 TEC - closest adjacent to premises	Refer to Section 5.1	C = Moderate L = Likely **Medium Risk**	N	**Conditions 4, 5, 10, 11, 12, 13 & 14.**	Monitoring of standing water level is required to identify increases in groundwater levels over time to mitigate adverse impacts on sensitive receptors.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).
Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.
Note 3: Distances less than 1 km measured from odour activity boundary to sensitive land use activity or property boundary.

5.3 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 10 below.

Table 10: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 11 below.

Table 11: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
			Environment	Public health* and amenity (such as air and water quality, noise, and odour)
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guideline: Environmental Siting.*

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

"onsite" means within the Prescribed Premises boundary.

5.4 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 12 below:

Table 12: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

5.5 Detailed risk assessment – discharge to land

5.5.1 Description of risk event

Untreated wastewater generated by residents of the Atlas Project Accommodation Camp will be processed and treated by a containerised Tristar Sequence Batch Reactor (SBR) system to produce WWTP effluent. The WWTP effluent will be mixed with saline reject water produced from the Reverse Osmosis water treatment plant. The blended effluent will be piped to the irrigation sprayfield located to the west of the accommodation camp and sprinkler systems will discharge the blended effluent to land.

Reverse osmosis reject water has high total dissolved solids (TDS) and is also likely to contain elevated levels of heavy metals, metalloids, water treatment chemicals and high concentrations of radioactive materials (radionuclides).

Properly treated wastewater contains elevated concentrations of nitrogen and phosphorus, chemicals used in wastewater treatment, heavy metals, metalloids and low levels of pathogens at concentrations that are suitable for irrigation. However, if wastewater is partially or improperly treated, it has the potential to contain higher levels of these contaminants, posing a greater risk to human health and the receiving environment.

The daily continual discharge of blended effluent onto the irrigation sprayfield has the potential to cause seepage of aforementioned contaminants to groundwater. Groundwater contamination has the potential to adversely impact the health of / cause ecological disturbance to:

- Native vegetation within and surrounding the sprayfield due to maladaptation to increased nutrients, salinity, radionuclides and changes in soil structure;
- Groundwater dependent Banksia Dominated Woodlands of the Swan Coastal Plain (Priority 3 TEC) surrounding the irrigation sprayfield. Impacts on these woodlands has the potential

to impact *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo) habitat and affect their health and survival;

- Groundwater dependant wetland communities; and
- Groundwater users via contamination of domestic and stock bores.

5.5.2 Criteria for assessment

- Department of Environment and Conservation (NSW), 2004, *Environmental Guidelines: Use of Effluent by Irrigation*, Sydney, New South Wales.
- EPA Victoria (2022), *Victorian Guideline for Irrigation with Recycled water. EPA Victoria Publication 168.3,* Melbourne, Victoria.
- New South Wales Government (1998). *Environment & Health Protection Guidelines*: *On-site Sewage Management for Single Households,* New South Wales.
- *ANZECC & ARMCANZ (2000) Water Quality Guidelines*

5.5.3 Applicant controls

Operational controls

Refer to Table 4 and Table 5 in section 5.1

Groundwater Management Plan

A groundwater management plan was submitted on 28/06/2024 by the applicant upon request from DWER following hydrogeological advice stating that groundwater monitoring was necessary to address the risk of groundwater contamination and rising groundwater as a result of irrigation of blended effluent over time.

Applicant controls to monitor and manage groundwater levels proposed in the Groundwater Management Plan are outlined below:

1. Installation of two monitoring bores in locations specified in Figure 4 of Works Approval W6883/2023/1.
2. Monthly monitoring of depth to groundwater for a 6-month period followed by a review of monitoring frequency after the initial 6-month period.
3. Response and contingency plans to be implemented when the depth between the water table and the ground surface is less than 1 metre consistently over a 3-month time period.
4. Proposed response and contingency plan measures include establishing if the groundwater level increase is due to climatic conditions or anomalies, ensuring correct functioning of the bore, cleaning the bore, pumping groundwater from bores to increase depth to the water table, increasing sprayfield size and alternate methods of disposal (irrigating elsewhere, combining blended effluent with process water or dust suppression, removal to evaporation/holding ponds).

The applicant's proposed controls to prevent groundwater contamination proposed in the Groundwater Management Plan are outlined below:

1. Installation of two monitoring bores (as mentioned above) in locations specified in Figure 1.
2. Quarterly monitoring of groundwater for pH, electrical conductivity (EC), dissolved oxygen (DO), total organic carbon (TOC), nitrates, phosphates and trace elements for a 12-month period followed by a review of monitoring frequency after the initial 12-month period.

3. Response and contingency plans to be implemented when there is a consistent change in aforementioned water quality parameters over a 12-month time period and when a change in concentration of 20 percent or more occurs. N, P, TOC and trace elements will be compared to natural background concentrations.
4. Proposed response and contingency plan measures include checking for equipment and sampling errors, modelling to determine the fate of contaminants and the risk to groundwater, checking the condition of the bore, cleaning the bore, pumping groundwater from bores to reduce contaminants in groundwater, increasing sprayfield size and alternate methods of disposal (irrigating elsewhere and removal to evaporation/holding ponds).

5.5.4 Key findings

The Delegated Officer has reviewed the information regarding discharges of blended effluent to land via irrigation and has found:

1. Direct information on the depth to groundwater beneath the irrigation sprayfield at peak levels (end of winter) have not been provided and the assessment therefore relies on groundwater contour maps generated from bore data and results from soil sampling (at sites ranging from 150 to 450 m east of the sprayfield). As there are several ways to infer groundwater contours from bore data, there is uncertainty as to the actual depth to groundwater as there is a variation of approximately one metre when the bore data is contoured using two different standard techniques (IDW and Kriging). A shallower depth to groundwater increases the risk of blended effluent leaching to groundwater and, in turn, increases the likelihood of groundwater contamination; therefore frequent standing water level monitoring within monitoring bores near the irrigation sprayfield is required.
2. Where effluent is discharged to land, a degree of separation between the land surface and groundwater is to be maintained. A one metre or less separation distance for a 3 month period as a trigger value to initiate a management response is deemed insufficient to manage the risk of groundwater contamination given the highly transmissive soils and due to the possibility of groundwater movement off-site. Based on hydrogeological site-specific advice, a 1.3 metre separation distance between the ground surface and groundwater is a suitable distance to maintain and is therefore a more appropriate value to use as a trigger value, requiring immediate action if reached.
3. In the absence of substantial background or baseline groundwater water quality monitoring data within the vicinity of the sprayfield, the applicant is unable to compare groundwater monitoring results to pre-irrigation background levels.
4. Monthly groundwater monitoring for the entire environmental commissioning period is required as a minimum to provide sufficient data to create a current baseline of groundwater quality and groundwater levels to measure ongoing data against. This allows changes to be detected and actioned.
5. Based on monthly sampling frequency, the environmental commissioning period is to be 365 days in duration to allow for a sufficient volume of data collection that accounts for seasonal variation as well as anomalies.
6. The Delegated Officer considers the installation of four monitoring bores around the perimeter of the sprayfield necessary to provide an accurate representation of groundwater levels beneath the irrigation sprayfield. Bores up and cross hydraulic sprayfield will also be required to ensure comprehensive monitoring of groundwater parameters can occur.

7. Regular ongoing monthly monitoring of groundwater levels and contaminants is necessary to identify potential degradation of groundwater quality and rises in groundwater levels resulting from discharge of irrigation to land. Analysis of major ions, radionuclides, heavy metals and metalloids is required in addition to water quality monitoring parameters proposed in the groundwater management plan.
8. Contingency measures provided in the Groundwater Management Plan (e.g. increasing sprayfield size and alternative disposal) require time and pre-planning to implement. Additionally, the feasibility of utilising such measures is unclear.

5.5.5 Consequence

If groundwater contamination due to irrigation of blended effluent occurs, the Delegated Officer has determined that specific consequence criteria for the environment are at risk of not being met and include mid-level onsite impacts, low level offsite impacts and minimal offsite impacts at a wider scale. Therefore, the Delegated Officer considers the consequence of discharging blended effluent to land to be **moderate.**

5.5.6 Likelihood of Risk Event

An adequate vertical separation distance between the irrigation sprayfield surface and groundwater is required to prevent groundwater contamination due to prolonged irrigation of nutrient laden and saline blended effluent.

The application of blended effluent to land requires adequate planning and management to avoid environmental degradation and the likelihood of groundwater contamination resulting from irrigation is high in this instance due to the following site-specific characteristics:

- Moderate permeability of sprayfield soils;
- Shallow depth to groundwater beneath the irrigation sprayfield;
- An unconfined aquifer exists within the region of the sprayfield, adding to the risk of groundwater reaching the water table and transportation of nutrients and saline water off-site;
- Close proximity of groundwater dependent vegetation, TEC's and groundwater bores.
- The Eneabba aquifer lays beneath the sprayfield location and is recharged directly by rainfall. The Eneabba formation is used for groundwater abstraction. The saturated thickness of the superficial aquifer is 2-8 metres in this location (MWES Consulting 2022a); and
- Uncertainty surrounding the risk of eutrophication to surrounding surface waters and uncertainty as to the level of degradation of nearby geomorphic wetlands.

The Delegated Officer has determined that groundwater contamination will probably occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of groundwater contamination resulting from irrigation of blended effluent to be **likely.**

5.5.7 Overall rating of irrigation of blended effluent

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 10) and determined that the overall rating for the risk of irrigation of blended effluent to land is **high.**

5.6 Summary of acceptability and treatment of Risk Events

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above, with the appropriate treatment and control, are set out in Table 13 below. Controls

are described further in section 6.

Table 13: Risk assessment summary

Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
Emission	**Source**	**Pathway/ Receptor (Impact)**			
Nutrient laden and saline blended effluent (containing heavy metals, metalloids and radionuclides)	Discharge of blended effluent to irrigation sprayfield	Leaching of contaminants through soil to groundwater leading to ecological disturbance to wetlands, groundwater dependent vegetation, surrounding surface water bodies and groundwater quality for bore users.	Refer to sections 5.1.1 and 5.5.3	Moderate consequence Likely likelihood **High Risk**	Acceptable subject to regulatory controls
		Accumulation of salt, excess nutrients, water treatment chemicals and toxicants in irrigation sprayfield soils leading to degradation of native vegetation including TEC's.	Refer to sections 5.1.1 and 5.5.3	Moderate consequence Likely likelihood **High Risk**	Acceptable subject to regulatory controls
		Rise in groundwater levels further increasing the risk of groundwater contamination and increasing the risk of impacts on sensitive receptors.	Refer to sections 5.1.1 and 5.5.3	Moderate consequence Likely likelihood **High Risk**	Acceptable subject to regulatory controls

6. Regulatory controls

The Delegated Officer will incorporate the following controls into the works approval:

6.1 Biomass Management Plan Submission

Due to the shallow depth to groundwater, the presence of a shallow, unconfined aquifer beneath the irrigation sprayfield, high hydraulic conductivity of sprayfield soils, lack of existing sprayfield vegetation and proximity of sensitive receptors, it is crucial that the nutrient and water balance within the irrigation sprayfield area is well managed to prevent groundwater contamination resulting from excess nutrient loading.

Additionally, the risk of discharging treated wastewater to land has a high risk of impacts to native vegetation where the native vegetation is ecologically important, threatened and is located within 100m of the irrigated area (EPA Victoria 2022).

Sprayfield vegetation consists of short grasses and weeds; therefore, the uptake of nutrients as biomass will be minimal and the establishment of weed species on the irrigation sprayfield is of concern.

Conditions 1 and 2 require the development, submission and implementation of a Biomass Management Plan within 60 days of the works approval being granted. The Delegated Officer considers that the establishment of salt tolerant crops within the irrigation sprayfield area will

reduce the environmental impacts of blended effluent irrigation by ensuring nutrients are transferred into biomass and are periodically harvested and removed, thereby reducing the likelihood and quantity of nutrients reaching groundwater. With the establishment of crops, nutrients and water are utilised within the root zone, resulting in minimal contaminants reaching groundwater. The uptake of water by crops via evapotranspiration will also reduce the amount of blended effluent reaching groundwater which has the potential to cause a reduction in depth to groundwater over time, further increasing the risk of groundwater contamination.

6.2 Sprayfield sizing

6.2.1 Hydraulic loading assessment

The appropriate sprayfield size required to maximise the uptake of water by established sprayfield crops was calculated by DWER's hydrogeologist using the 'nominated area water-balance method' utilising the following documents:

- Department of Environment and Conservation (NSW), 2004, *Environmental Guidelines: Use of Effluent by Irrigation*, Sydney, New South Wales.
- EPA Victoria (2022), *Victorian Guideline for Irrigation with Recycled water. EPA Victoria Publication 168.3,* Melbourne, Victoria.
- New South Wales Government (1998). *Environment & Health Protection Guidelines*: *On-site Sewage Management for Single Households,* New South Wales.

Local rainfall and evapotranspiration data, wastewater flow and irrigation rate were considered in the calculations. Calculations were based on monthly inputs and outputs.

Based on hydraulic loading calculations, a minimum sprayfield size of 2.9 hectares is required to prevent excessive migration of blended effluent to groundwater. A smaller sized sprayfield poses a significant risk of groundwater mounding to a depth of one metre below the sprayfield surface during wetter months and it is not advisable to irrigate treated wastewater where the vertical separation distance between the land surface and the groundwater table is less than 1.3 metres (US EPA, 2006).

6.2.2 Nutrient loading calculations

The proposed nutrient loading that will be discharged to the sprayfield per year and the estimated nutrient uptake by sprayfield crops is calculated to determine the sprayfield size that will minimise the risk of contaminants leaching to groundwater. The sprayfield size is determined by the limiting factor which may be nitrogen, phosphorus or hydraulic loading.

Based on nutrient loading calculations, providing the irrigation sprayfield is vegetated with an established crop as specified in conditions 1 and 2 of the works approval, an estimated minimum sprayfield size of 3 hectares is deemed sufficient to balance the applied nutrient loading rate with nutrient removal via biomass harvesting.

The sprayfield size estimated based on nutrient loading rates was determined utilising the following documents:

- Department of Environment and Conservation (NSW), 2004, *Environmental Guidelines: Use of Effluent by Irrigation*, Sydney, New South Wales.
- New South Wales Government (1998). *Environment & Health Protection Guidelines*: *On-site Sewage Management for Single Households,* New South Wales.

Based on site-specific hydrogeological advice from DWER's contaminated sites branch, the Delegated Officer has sized the sprayfield to 3 hectares to ensure the established crop is able to fully utilise the nitrogen and phosphorus loading applied to the sprayfield annually and to ensure that the saline blended effluent will not cause adverse effects on native vegetation. The

sprayfield is suitably sized to prevent soil degradation due to contaminant induced changes to soil quality and structure.

Additionally, due to the presence of radionuclides, heavy metals, metalloids and brine naturally present in the concentrated reverse osmosis water, the sprayfield sizing is maximised to reduce the risk of impacts of aforementioned contaminants on sprayfield soils, native vegetation and groundwater.

6.3 Monitoring requirements

6.3.1 Treated WWTP effluent monitoring

The Delegated Officer has included the requirement to monitor treated effluent water quality prior to blending with reverse osmosis reject water. Condition 9 provides assurance that water quality parameters meet the manufacturer's specifications in practice, as per condition 3 (row 7) of the works approval. The tested effluent will provide evidence that the wastewater treatment process is working to effectively treat the wastewater to the manufacturer's specifications, ensuring the effluent is at a standard suitable for discharge to the irrigation sprayfield. The sprayfield size was determined based on effluent water quality parameters as per condition 3 (row 7) of the works approval; therefore effluent that exceeds these limits, exceeds the specified nutrient loading and increases the risk of adverse impacts on sensitive receptors.

6.3.2 Blended effluent monitoring

Reverse osmosis reject water contains high levels of total dissolved solids and is likely to contain elevated concentrations of select heavy metals and metalloids. Additionally, reverse osmosis reject water commonly contains high levels of naturally occurring radioactive material in the form of radionuclides, particularly Radium 226 and 228, Uranium 238, Gross alpha and Gross beta. Radioactive material has been identified within the vicinity of the Atlas Project.

To prevent groundwater contamination with heavy metals, metalloids and radionuclides which have the potential to cause adverse environmental impacts, the Delegated Officer has included the requirement to monitor blended effluent monthly to ensure that concentrations of heavy metals, metalloids and radionuclides in blended effluent meet *ANZECC & ARMCANZ (2000) Water Quality Guidelines Vol 3* criteria.

The sprayfield size selection and risk assessment is based on the expectation that water quality parameters stipulated in condition 3 (row 7) are adhered to. Exceedance of these parameters increases the risk of contaminant leaching to groundwater with adverse environmental impacts on nearby sensitive receptors resulting from groundwater contamination; therefore the Delegated Officer has included the requirement to monitor thermotolerant coliforms, BOD_5, total suspended solids, total dissolved solids, total nitrogen, total phosphorus, pH and residual chlorine under condition 12.

The volume of blended effluent discharged to the sprayfield is not to exceed 29.5 m^3 per day as exceeding this limit alters the nutrient and hydraulic loading, increasing the risk of groundwater contamination. Therefore, the Delegated Officer considers monitoring the cumulative volume discharged to the sprayfield an appropriate control to ensure the limit is not exceeded.

6.3.3 Groundwater monitoring

Internal advice from DWER`s hydrogeological experts has determined that the risk of groundwater contamination requires management with a groundwater monitoring plan to be implemented over the life of the proposed irrigation due to the shallow depth to groundwater at the site.

Based on hydrogeological advice, the Delegated Officer has determined that due to the shallow depth to groundwater, monitoring the standing water level from bores at the perimeter of the sprayfield is necessary to minimise the risk of groundwater mounding over time.

There is currently no data available on peak groundwater levels during the wettest months when groundwater will be at the highest level. Data collected in November 2022 by WML Consulting Engineers (2023a; 2023b) is the only data available on groundwater levels within the vicinity of the irrigation sprayfield; therefore, the Delegated Officer considers monthly monitoring of standing water level as per condition 13 necessary to provide baseline data and to detect changes in standing water levels.

An adequate vertical separation distance between the irrigation sprayfield surface and groundwater is required to prevent groundwater contamination due to prolonged irrigation of nutrient laden and saline blended effluent.

Measurement of standing water level as per condition 13 of the works approval is required to demonstrate that the vertical separation distance between irrigated soil and the water table is maintained and that the depth to groundwater does not reduce over time. Identification of rising groundwater levels, beyond seasonal variation, allows for irrigation modification / discontinuation to prevent groundwater contamination and to therefore reduce the risk of impacts on sensitive receptors.

The Delegated Officer considers radionuclide, heavy metal, major ions and metalloid monitoring of groundwater under condition 13, necessary to identify whether groundwater contamination is occurring.

6.3.4 Monitoring reports

Monitoring results are to be submitted in the form of an Environmental Commissioning Report under conditions 15 and 16 of the works approval, prior to issue of a registration to confirm that the risk of impacts of continual irrigation are acceptable and well managed.

The Environmental Commissioning Report enables the Delegated Officer to review and assess any alterations in groundwater chemistry and to assess changes in groundwater levels with consideration of actual WWTP and WTP volume outputs, water quality parameters, equipment / infrastructure performance and operational compliance.

6.4 Consultation

Table 14 provides a summary of the consultation undertaken by the department.

Table 14: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 12 April 2024	None received	N/A
Local Government Authority advised of proposal on 12 April 2024	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal 12 April 2024	DMIRS replied on 22 April 2024 stating that the works for the WWTP is approved under the *Land Administration act 1997*, not under the *Mining Act 1978*; therefore, there are no comments	Noted.

Department of Biodiversity, Conservation and Attractions (DBCA) advised of proposal 12 April 2024	DBCA replied on 2 May 2024 stating they have no comments on the application	N/A
Department of Health (DoH) advised of proposal 12 April 2024	None received	N/A
Department of Energy, Mines, Industry Regulation and Safety (DMIRS) advised of proposal 12 April 2024	None received	N/A
Department of Climate Change, Energy, the Environment and Water (DCCEEW) advised of proposal 12 April 2024	None received	N/A
Yued Aboriginal Corporation advised of proposal 12 April 2024	None received	N/A
South West Aboriginal Land and Sea Council advised of proposal 12 April 2024	None received	N/A
Applicant was provided with draft documents on 31 July 2024	Refer to Appendix 1	Refer to Appendix 1

7. Conclusion

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

References

1. Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3, Primary Industries – Rationale and Background Information.* Australia; New Zealand.
2. Bennelongia Environmental Consultants, 2022, *Baseline Stygofuana Survey at the Image Resources Atlas Project Borefield*, Jolimont, Western Australia.
3. Bureau of Meteorology (2024) *Daily rainfall Nambung Station*, BoM, accessed 29 July 2024.
4. Department of Environment and Conservation (NSW), 2004, *Environmental Guidelines: Use of Effluent by Irrigation*, Sydney, New South Wales.
5. Department of Environment and Science (Qld), 2020, *Disposal of effluent using irrigation: Technical guideline*, Brisbane, Queensland.
6. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
7. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
8. Department of Water, 2008. *Water Quality Protection Note 22: Irrigation with nutrient-rich wastewater*, Perth, Western Australia.
9. Department of Water and Environmental Regulation, 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
10. EPA Victoria (2022), *Victorian Guideline for Irrigation with Recycled water. EPA Victoria Publication 168.3,* Melbourne, Victoria.
11. MWES Consulting (2022a), *Atlas Mineral Sands Project Groundwater Hydrology & Water Balance Report,* Perth, Western Australia.
12. MWES Consulting (2022b), *Atlas Mineral Sands Project Infiltration Pond Testing Report & Managed Aquifer Recharge Application,* Perth, Western Australia.
13. New South Wales Government (1998). *Environment & Health Protection Guidelines*: *On-site Sewage Management for Single Households,* New South Wales.
14. WML Consulting Engineers (2023a), *Atlas Project Accommodation Site - Site and Soil Evaluation (SSE),* Perth, Western Australia.
15. WML Consulting Engineers (2023b), *Atlas Project Accommodation Site - Geotechnical Investigation,* Perth, Western Australia.

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

Condition	Summary of applicant's comment	Department's response
Condition 1	Environmental commissioning will start soon after the Sequencing Batch Reactor (SBR) WWTP is connected. The risk of biomass growth is unlikely to occur immediately, therefore a 60-day timeframe is appropriate given the risks to develop and implement a biomass management plan without delaying the start of the commissioning phase.	Irrigation for a period of up to 60 days is deemed acceptable given that impacts to groundwater and soil structure are likely to be cumulative over time. The requirement for the biomass management plan to be developed prior to commissioning commencing has been removed as requested. Condition 8 of the works approval requires submission of an Environmental Compliance Report before environmental commissioning commences; therefore, the Delegated Officer notes that the expected timeframe for commencing environmental commissioning may be delayed.
Condition 3, item 1, points 5 and 7.	The storage tanks are balanced and have adequate capacity based on manufacturer advice and site conditions. Level alarms are fitted to both tanks to indicate overflow and result in system shut down to prevent overflow and equipment damage.	Noted. It is the works approval holder's responsibility to ensure the *Environmental Protection (Unauthorised Discharges) Regulations 2004* are complied with.
Condition 3, item 1, row 3	Amend to 'on a graded earth pad'. AS1940 is the standard for storage and handling of flammable and combustible liquids and is not intended for wastewater treatment plants.	The requirement to adhere to AS 1940 standard has been removed as requested. The Delegated Officer considers a graded earthen pad acceptable given that the WWTP is containerised.
Condition 3 Item 1, row 6	Remove point (a). Monitoring WWTP effluent volumes is more effective for determining environmental impacts than influent volumes. Influent volumes won't provide information relating to environmental management.	Volumes of raw wastewater received at the WWTP inlet informs the department of the amount of treated wastewater being processed through the WWTP. This in turn ensures DWER can confirm compliance with the permitted throughput at the premises. The volume of treated wastewater in blended effluent determines the extent of RO reject water dilution. Blended effluent that is not sufficiently diluted with treated wastewater poses a higher risk to sensitive receptors due to a higher level of salinity than proposed. The monitoring requirement will remain on the works approval.

Condition	Summary of applicant's comment	Department's response
Condition 3 Item 1, row 7	Total nitrogen discharge limit is <20 mg/L. The concentration proposed in the application and used in sprayfield sizing calculations was <30 mg/L.	Noted. Condition amended to <30 mg/L.
Condition 3 Item 1, row 8	Remove requirement to install fencing around the WWTP compound as it is located within a mine camp, is not accessible to the public and fencing requirements for the irrigation sprayfield is covered in condition 1, item 5. Remove requirement to adhere to AS 1725 standards for fencing requirements.	The Delegated Officer considers the removal of the requirement to fence the WWTP compound acceptable.
Condition 3 Item 3	RO reject water (brine) pipelines is provided in Figure 2 (revised).	Noted.
Condition 3 Item 4	Remove condition 3, item 4. Corrosive reagents not stored within WWTP. Only minor volumes of reagents are stored within the SBR container.	Condition removed. The works approval application states that "chlorine will be stored and fully contained in a designated storage area within the WWTP" as a proposed control to manage possible spills. Condition 91(j) is deemed appropriate to manage the risk resulting from chemical spills and it is the works approval holders responsibility to adhere to the *Dangerous Goods Safety Act 2005* and *Environmental Protection (Unauthorised Discharges) Regulations 2004*; therefore, the Delegated Officer has removed the condition. Note that Sodium hypochlorite used in the wastewater treatment process is a Class 8 corrosive chemical and is toxic to aquatic life.
Condition 3 Item 5	Removal of 'radius' from condition wording as sprinkler number and size is based on a 30 m diameter. Remove requirement to use sprinklers with 2.4 mm nozzles. The sprinkler design is too specific and an equivalent sprinkler is adequate. 36 sprinklers will irrigate the sprayfield area.	Condition amended as requested. The Delegated Officer considers equivalent sprinklers that reduce clogging and spray drift acceptable to manage the risks.
Condition 4	Bores will be installed by 31 October in indicative locations stated in the works approval.	Noted.

Condition	Summary of applicant's comment	Department's response
Condition 8(b)	Remove condition. Reasoning as per condition 1.	Condition removed as requested. As per condition 1, the Biomass Management Plan must be submitted within 60 days of the works approval issue date. Irrigation for a period of up to 60 days prior to implementation of the Biomass Management Plan is deemed acceptable given that impacts to groundwater and soil structure are likely to be cumulative over time.
Condition 9(1a)	Total nitrogen discharge limit is <20 mg/L. The concentration proposed in the application was <30 mg/L. Commissioning will be conducted to bring the system up to a level that will achieve these limits; therefore the applicant has requested to remove the requirement to achieve these limits during environmental commissioning.	The discharge limits in condition 9, table 3 are the limits proposed in the application. Wastewater not treated to this level of water quality poses a greater risk of environmental impacts than those assessed in this document. The SBR is designed to treat to these limits; therefore, meeting the commissioning requirements is realistic and achievable. However, the Delegated Officer notes that the intent of commissioning WWTP infrastructure is to ensure these limits can be met during ongoing operations. Therefore, the discharge limits have been removed from commissioning operational requirements. Category 85 activities operate under a registration; therefore, environmental commissioning under the works approval must demonstrate that water quality parameters can be met in order to authorise progression to a registration. As such, Condition 16(c) and 16(d) have been added to the works approval, which requires confirmation that the WWTP is achieving the specified discharge limits by the end of the commissioning period, and a summary of exceedances and rectification actions to be provided should exceedances be occurring.
Condition 9(1b)	Remove condition. It is likely there will be instances where meeting the treatment limits is not possible (e.g. full irrigation tank or where recirculating chlorinated water would impact WWTP operation). Irrigation of treated wastewater exceeding water quality limits when throughput is lower will result in a similar nutrient loading than peak throughput. Short-term, the risk is low.	The Delegated Officer considers removal of this condition acceptable as it will not alter the risk profile. Conditions specifying discharge limits for blended effluent irritation will adequately manage the risk.
Condition 9(1c)	Amend condition wording to add 'if able to do so'. It is likely there will be instances where meeting the treatment	In line with the removal of discharge limits from condition 9(a) and the removal of condition 9(b), this condition will also be removed.

Condition	Summary of applicant's comment	Department's response
	limits is not possible (e.g. full irrigation tank or where recirculating chlorinated water would impact WWTP operation). Irrigation of treated wastewater exceeding water quality limits when throughput is lower will result in a similar nutrient loading than peak throughput. Short-term, the risk is low.	Conditions specifying discharge limits for blended effluent irritation will adequately manage the risk.
Condition 9(1d)	Remove condition. It is likely there will be instances where meeting the treatment limits is not possible (e.g. full irrigation tank or where recirculating chlorinated water would impact WWTP operation). Irrigation of treated wastewater exceeding water quality limits when throughput is lower will result in a similar nutrient loading than peak throughput. Short-term, the risk is low.	In line with the removal of discharge limits from condition 9(a) and the removal of condition 9(b) and 9(c), this condition will also be removed. Conditions specifying discharge limits for blended effluent irritation will adequately manage the risk.
Condition 9(1h)	The WWTP site is integrated into the site drainage system. An entire tank spill is likely to stay within the drainage system to be cleaned up. Earthen bunding will lead to pooling and ponding compromising pad integrity and tank structures.	In the works approval application, a proposed control for controlling run-off from cleared areas is perimeter bunding. The drainage system mentioned in the comments has not been submitted to the department for assessment and the assessment is now complete; therefore, the Delegated Officer deems condition 9(1h) necessary to manage the risk of surface water run-off into surrounding areas.
Condition 9(2c)	Amend condition to be monthly average as opposed to daily volume. Conditions within the works approval (e.g. condition 9(f)) require irrigation to cease for several days in certain conditions, resulting in additional effluent volume to be discharged afterwards. Loading limits are based on annual loading; therefore daily limits are not applicable.	The daily volume is not to be exceeded as it will exceed the capacity of the sprayfield soils to hold water and will exceed the ability of the biomass to utilise applied nutrients, resulting in a higher risk of blended effluent reaching groundwater. In the works approval application, limiting irrigation during significant rainfall events was listed as a proposed control to manage discharge via surface water run-off and it is stated that there will be significant storage to allow for periods of restricted irrigation. DWER queried the contingency plan for wet weather conditions as it was noted that irrigation tank 1 and irrigation tank 2 storage was too limited to allow for wet weather contingency plans. The solution given by the applicant was to remove the effluent to a licensed carrier in this situation. Note that there is not enough volume in irrigation tank 1 or irrigation tank 2 to store the effluent for more than half a day at full throughput; therefore, there will be no storage for an additional volume of effluent to be discharged at a later time.

Condition	Summary of applicant's comment	Department's response
Condition 9(2f)	Remove condition. Works approval contains other conditions that address effluent ponding and pooling. The condition is too onerous (e.g. irrigation should not cease with 1mm of rainfall).	Condition removed. The Delegated Officer considers condition 9 item 2(a) to (f) sufficient to manage the risk of ponding and pooling.
Condition 9(3a)	There are conditions (such as condition 9(2f)) within the works approval that require irrigation to cease for several days (such as during rainfall events). This means that additional irrigation volumes will need to be discharged after those periods to return the tanks to normal levels. Amend condition to be monthly average as opposed to daily volume. Loading limits are based on annual loading; therefore daily limits are not applicable.	Condition 9(2f) has been removed from the works approval as requested. There are no other conditions within the works approval that would require irrigation to cease, meaning that there will be no need to additional irrigation volumes. Annual loading limits can be used to calculate sprayfield sizing; however, the throughput of a WWTP (and other discharge components) is recorded as a daily average, in line with Category 85 specifications outlined in the *Environmental Protection Regulations 1987*. 9 m^3 is the volume of RO reject water proposed to be produced per day in the application; therefore the Delegated Officer considers this condition reasonable.
Condition 11	Amend condition to apply at the completion of environmental commissioning. Commissioning is to bring the system up to a level that will achieve these limits.	The discharge limits specified for BOD, TSS, TN, TP, Thermotolerant coliforms and residual free chlorine align with the treatment specifications of the WWTP for TWW only. With consideration given to the dilution of TWW with the RO brine stream, the Delegated Officer considers that these limits will be achievable. The discharge limit specified for TSS has been aligned with the expected salinity of underlying groundwater. With consideration give not the dilution of RO brine with TWW, the Delegated Officer considers that this limit will be achievable. Discharge limits for the remaining parameters have been assigned based on the trigger values outlined in the *ANZECC & ARMCANZ (2000) Water Quality Guidelines Vol 3* and are not related to any treatment or commissioning process occurring through the WWTP. Therefore, the Delegated Officer considers that these limits are appropriate. Condition will remain unchanged. Category 85 activities operate under a registration; therefore, environmental commissioning under the works approval must demonstrate that water quality parameters can be met in order to authorise progression to a registration.

Condition	Summary of applicant's comment	Department's response
Condition 13	Bore locations are sufficient.	Noted. Works approval updated.
Schedule 1: Premises map	Spatial coordinates provided.	Noted. Works approval updated.
Accommodation village and WWTP site plan map	Updated site plan provided.	Noted. Works approval updated. In Figure 2, trees close to accommodation camp infrastructure are marked with a yellow circle. The works approval holder stated in the application that no clearing would be required under the works approval; however if clearing is now intended, it is the responsibility of the works approval holder to obtain the necessary approvals to do so.
WWTP process flow map	Reagent store not required. Updated map not provided.	Noted.
Groundwater monitoring bores map	Figure 4 in Schedule 1 of the Works Approval draft is sufficient.	Noted. Works approval updated.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY					
Application type					
Works approval	☒				
Licence	☐	Relevant works approval number:		None	☐
		Has the works approval been complied with?		Yes ☐ No ☐	
		Has time limited operations under the works approval demonstrated acceptable operations?		Yes ☐ No ☐ N/A ☐	
		Environmental Compliance Report submitted?		Yes ☐ No ☐	
		Date Report received:			
Renewal	☐	Current licence number:			
Amendment to works approval	☐	Current works approval number:			
Amendment to licence	☐	Current licence number:			
		Relevant works approval number:		N/A	☐
Registration	☐	Current works approval number:		None	☐
Date application received		16/5/2023			
Applicant and Premises details					
Applicant name/s (full legal name/s)		Image Resources NL			
Premises name		Nambung Station			
Premises location		2269 Wongonderrah Rd, Nambung WA 6521 Legal Description - Lot 4113 on Plan 217467			
Local Government Authority		Shire of Dandaragan			
Application documents					
HPCM file reference number:		DWERDT779784			
Key application documents (additional to application form):		- Works Approval Application Supporting Document, Atlas Project, Preston Consulting Pty Ltd 16 May 2023 - Prescribed Premises Boundary Shapefile			

Scope of application/assessment	
Summary of proposed activities	New Works Approval Construction and commissioning of a Wastewater Treatment Plant (WWTP), Water Treatment Plant (WTP) and irrigation sprayfield on cleared farmland on Nambung Station (Mid-west region) to accommodate construction workers residing at the accommodation camp. The accommodation camp will accommodate 82 personnel from the proposed Atlas Project (mineral sands mine currently under Part IV assessment) and will produce an estimated raw wastewater effluent volume of 20.5 m^3/day (calculated based on 250 L per person/day). The accommodation camp, WWTP and irrigation field construction is approved under Section 41A(3) of the EP Act for Minor and Preliminary Works; therefore, Part V assessment is able to be processed alongside Part IV assessment. WWTP (Sequencing Batch Reactor System) to be constructed off-site and delivered on-site in modules. Installation duration estimate is 2-3 weeks, followed by environmental commissioning duration for up to 12 weeks, in order to achieve desired effluent quality. Commissioning is to be carried out by a specialist engineer to ensure the plant is installed and operates to design requirements. Time limited operations is requested for 90 days. Treated wastewater (from the WWTP) will be combined with reverse osmosis reject water (from the WTP) before it is discharged to the fenced irrigation sprayfield (non-human contact field) via a HDPE pipeline (predominately above ground). The WTP is a containerised reverse osmosis system for brackish water and is expected to process 30 kL/day of bore water (from a licensed bore) which will be used as potable water for the accommodation camp. The licence to construct and use the groundwater bore has not been granted. Environmental commissioning estimated to occur in quarter 3, 2023 followed by time limited operations estimated to commence in quarter 4, 2023. The lifespan of the proposed mine is estimated to be 3 years and the lifespan of the accommodation camp is expected to be 5 years.

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

Table 1: Prescribed premises categories

Prescribed premises category and description	Proposed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 85: Sewage Facility: premises – (a) on which sewage is treated (excluding septic tanks) (A) (b) from which treated sewage is discharged onto land or into waters.	Maximum capacity 25 m^3/day or 9125 m^3/year Estimated throughput is 21 m^3/day or 7665 m^3/year	N/A

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes ☒ No ☐	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐ Atlas Project No. 2311 is still under Part IV assessment. Notice of Decision to Consent to Minor or Preliminary Works under Section 41A(3) of the EP Act granted 19 June 2023 - Approves construction, commissioning, maintenance and time limited operations of 5.89 ha accommodation camp including WWTP, associated pipework and irrigation area. The Atlas Project is assessed as an accredited assessment under Part IV (Section 87 EPBC Act).
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☐ No ☒	Ministerial statement No: Part IV under assessment EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☒ No ☐	Reference No: 2021/9056 under assessment by EPA. Proposal is under accredited assessment. Atlas Project is considered a controlled action under the EPBC Act.

Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Certificate of title ☒ General lease ☐ Expiry: Mining lease / tenement ☐ Expiry: Other evidence ☐ Expiry:
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☒ N/A ☐	Approval: Expiry date: Development approval for the accommodation camp was granted by the Shire of Dandaragan on 17/12/2021. 'Application to Construct or Install an Apparatus for the Treatment of Sewage' and 'Building Permit' from the Shire of Dandaragan are still required. Note: Department of Health (DoH) approval for WWTP & Irrigation field has not been granted and is being processed in parallel with this application.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☐ No ☒	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☒	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☒ No ☐	Application reference No: 056937 Licence/permit No: TBA The applicant is in the process of applying for DWER approval for a 26D (s26D 055102) groundwater licence to construct/install a water supply bore and a 5C (s5C 055102) groundwater licence to extract 50,000 kL/year of water to treat and use as a source of potable water for the accommodation camp. Application received by DWER on 29/6/23. Image Resources has another 26D licence (licence number 207729).

Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	Name: N/A Type: N/A Has Regulatory Services (Water) been consulted? Yes ☐ No ☐ N/A ☒ Regional office: Mid-West
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes ☐ No ☐ N/A ☒
Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☒ No ☐	*Mining Act 1978* *Environmental Protection (Noise) Regulations 1997* *Dangerous Goods Safety Act 2004* *Environmental Protection (Controlled Waste) Regulations 2004*
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☐ No ☒	Classification: N/A Date of classification: N/A