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	W6892/2024/1
Applicant	Mid West Ports Authority
File number	DER2023/000803
Premises	Geraldton Port – Lease 11 298 Marine Terrace GERALDTON WA 6530 Legal description – Part of Lot 503 on Deposited Plan 57801 As defined by the coordinates in Schedule 2 of the works approval.
Date of report	11 June 2024
Decision	Works approval granted

Christine Pustkuchen

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MANAGER, RESOURCE 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, commissioning, and time limited operation of the premises. As a result of this assessment, works approval W893/2024/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

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

2.2 Application summary

On 15 December 2023, Mid West Ports Authority (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 the construction, commissioning, and time limited operation of a truck unloader facility at Lease 11 at the Geraldton Port (the premises). The premises is located at the western end of the Geraldton township, abutting the Indian Ocean.

The premises relates to categories 58 & 58A and assessed design capacity (i.e., 28,800 tonnes per day, or 10.5 million tonnes per annum) under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6893/2024/1. 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 2020b) are outlined in works approval W6893/2024/1.

2.3 Overview of premises and proposed activities

The premises is located within the larger Geraldton Port facility area, which is managed by the applicant and regulated under existing licence L4275/1982/15[1] (Figure 1). As part of the Port Maximisation Project to improve the port facility's material handling capacity, the applicant intends to construct a new multi-user truck unloader facility within Lease 11, as well as conveyors to connect the facility to the ship loader on berthing station (Berth) 4.

The replacement truck unloader will be designed to be capable of single, double, and triple loads and equipped with ten hoppers to facilitate efficient material unloading from incoming trucks. The facility will also be enclosed, with roller doors at either ends of the facility. This will provide adequate dust containment for both belly dumper and end tipper style trucks. The unloaded product will flow from trucks through a grizzly and into hoppers. The material will then be metered out via vibrating feeders onto an underground conveyor system via conveyor CV402, which will be constructed along with the truck unloader facility.

Conveyor CV402 will connect to existing conveyor CV401 through a transfer chute, which will

[1] The prescribed premises relevant to this Decision Report refers to the area within the Geraldton Port facility, where the replacement truck unloader facility is proposed to be constructed (Figure 1). The premises is located within and is a part of a larger prescribed premises for the Geraldton Port facility (regulated under existing licence L4275/1982/15). For the sake of clarity, the prescribed premises relevant to this application and assessment refer to the former, not the latter, unless stated otherwise.

transfer material to the port facility's ship loader on Berth 4. Existing infrastructure, such as conveyor CV401 and transfer tower TT500 will require extension and modifications to tie-in with the new conveyor CV402.

Once constructed, the proposed truck unloader is intended to replace the existing truck unloader, which has reached the end of its operational design life and is not expected to meet future port expansion requirements. The existing truck unloader will continue to operate until the replacement truck unloader is constructed, commissioned and fully operational. The decommissioning of the existing truck unloader has not been assessed under works approval W6893/2024/1.

Figure 1: Proposed truck unloader within existing Geraldton Port prescribed premises (red)

2.3.1 Construction activities

Construction of the truck unloader facility will require excavation of approximately 7,100 cubic meters (m^3) of soil. Excavated soils will be stockpiled at the premises before being reused at other parts of the port facility. Preliminary testing has classified the soil material as Class I waste, not acid-generating (i.e., no treatment for acid sulfate soil required) and do not exceed relevant Tier 1 human and ecological health guideline values for commercial/industrial uses (NEPC 2013).

To install underground infrastructure (e.g., conveyor CV402), sheet pile walls will be installed to excavate the footprint of the conveyors and allow for the installation of temporary wall struts and permanent ground anchors. During this time, the conveyor footprint will be dewatered within the sheet pile walls to facilitate the construction of a reinforced concrete ground slab, capping beam, and suspended slab. The CV402 and CV401 extension conveyors will then be installed within conveyor tunnels.

To manage noise emissions during construction, works will be undertaken in accordance with a Construction Noise Management Plan (AES 2023b).

Dewatering effluent management

Based on estimated dewatering rates of approximately 12-20 L/s, the applicant has expected up to 182 megalitres (ML) of dewatering effluent to be generated from construction dewatering. It is known that the local groundwater has been impacted by per- and polyfluoroalkyl substances (PFAS) (refer to Section 3.3.2 for anticipated dewatering effluent quality). Therefore, the management and disposal of the dewatering effluent requires careful consideration.

In this application, the applicant had considered several options for the disposal of dewatering effluent:

- Managed aquifer recharge – This was determined to be unfeasible due to the shallow water table.
- Natural infiltration – This was determined to be unfeasible due to the shallow water table.
- Temporary storage and offsite disposal to licensed facility – This was determined to be unfeasible due to the high dewatering rates required during certain stages of the dewatering program.
- Onsite PFAS treatment – This was determined to be unfeasible due to disproportionate cost of setting up a PFAS treatment system for the scale of the dewatering program.
- Discharge into marine harbour – This was determined to be feasible but may result in impacts to the receiving environment.

As the only viable option, the applicant has proposed to discharge the dewatering effluent into the inner harbour marine environment through the existing stormwater drainage network at the Geraldton Port facility. Due to the potential for impacts to the receiving environment, the department has undertaken a detailed risk assessment to ensure that the proposed discharge does not represent an unacceptable risk of impact to sensitive environmental receptors (refer to Section 3.3).

2.3.2 Environmental commissioning activities

The applicant intends to undertake environmental commissioning on the following infrastructure:

1. Truck unloader facility, including roller doors, microwave sensor laser system, hopper and vibrating feeder system and conveyors;
2. Baghouse dust extraction system, including dust extraction points and flanges, extraction fan, automated filter cleaning system, fabric filter bags and filter unit hopper (fittings and flanges); and
3. Washdown water filtration system, including washdown system (spray nozzle, spray system, water hoses), sump system, pipeline, and storage tanks (clean water and wastewater).

The applicant proposed to undertake no-load commissioning, followed by wet commissioning introducing limited product into the circuit. In addition to the truck unloader facility, environmental commissioning will also be undertaken on the associated baghouse dust extraction system and washdown water filtration system to ensure they are able to meet relevant environmental performance criteria (refer to Section 2.3.4 and 2.3.5, respectively). Where no further issues are identified, the applicant will undertake performance testing, where product is run through the truck unloading system at the intended design capacity. In total, environmental commissioning is expected to take around a month.

2.3.3 Time limited operation activities

Time limited operation will be undertaken for the new truck unloader facility for up to 180 calendar days. The activities undertaken during this period have been described in Section 2.3

at a design capacity of 1,200 tonnes per hour (i.e., 28,800 tonnes per day). The truck unloader facility will operate on a combination of weekdays and weekends, day and night, subject to shipping schedules at Berth 4. Relevant pollution abatement infrastructure will be operated during time limited operation of the truck unloader facility, including the baghouse dust extraction system and washdown water filtration system.

The (time limited) operation of the truck unloader facility will tie in with wider Category 58 activities at the Geraldton Port facility, which is regulated under licence L4275/1982/15.

Baghouse dust extraction system

Dust will be extracted from the truck unloader facility via a baghouse dust extraction system (Figure 2). The system will have multiple dust extraction points and utilise long cylindrical fabric bags to filter dust particulates from the airstream. As a result, clean air will be released to the environment through a ventilation fan. Dust particulates trapped in the baghouse will be collected in a filter unit hopper and discharged continuously into a removable bag located below the hopper and sealed to the discharge device. The baghouse system will have a dry-cleaning system that utilises a reverse-flow fan to continuously maintain airflow.

The baghouse is designed to filter dust particles at a rate of 26 m^3/s. The baghouse system has a 99% collection efficiency of reducing dust emissions down to a maximum of 25 mg/m^3. Dust particulates relevant to human health (e.g., PM_{10} and $PM_{2.5}$) will also be captured by the system.

Airtight inspection doors will be installed for ongoing maintenance. Test points will be installed for testing of air flow and air quality during installation and be sealed following environmental commissioning.

Washdown water filtration system

Washdown of the proposed truck unloader is required following unloading of different product types to mitigate build-up of residual material and cross-contamination between product streams. The applicant has proposed an automated recycle water washdown process to address this need (Figure 3).

To commence the washdown sequence, water will be sourced from main water supply to fill up 20 kL washdown water tanks. After use at the truck unloader facility, washdown water will be collected via a sump, which is pumped to 30 kL buffer tanks installed on hardstand and then passed through a water filtration system (WFS). The WFS consists of a proprietary filtration membrane, where water will be drawn through using suction pressure. Large particles and suspended solids will be captured and form a cake layer, while clean water passes through the membrane. Finally, the clean recycled water will be treated with UV and then circulated back to the washdown water tanks for reuse.

The WFS membranes will be cleaned via a backwash process, where the flow direction is reversed to push off the solids built up on the membrane surface. The backwash is then recycled back through the filtration system. The filtered suspended solids will be collected and stored in a 7.5 kL sludge tank for storage and disposal offsite.

While the truck unloader facility is inactive between unloading events, any residual treated washdown water will be discharged to a Water Corporation sewer system. Water quality testing will be undertaken prior to disposal to washdown water. At the time of the assessment, the department understands that the applicant has submitted an application to the Water Corporation and are awaiting approval.

The proposed design is expected to result in a significant reduction of up to 80% in water usage for washdown purposes. The current truck unloader relies fully on potable water for washdown activities (i.e., no water recycling) and is a manual process.

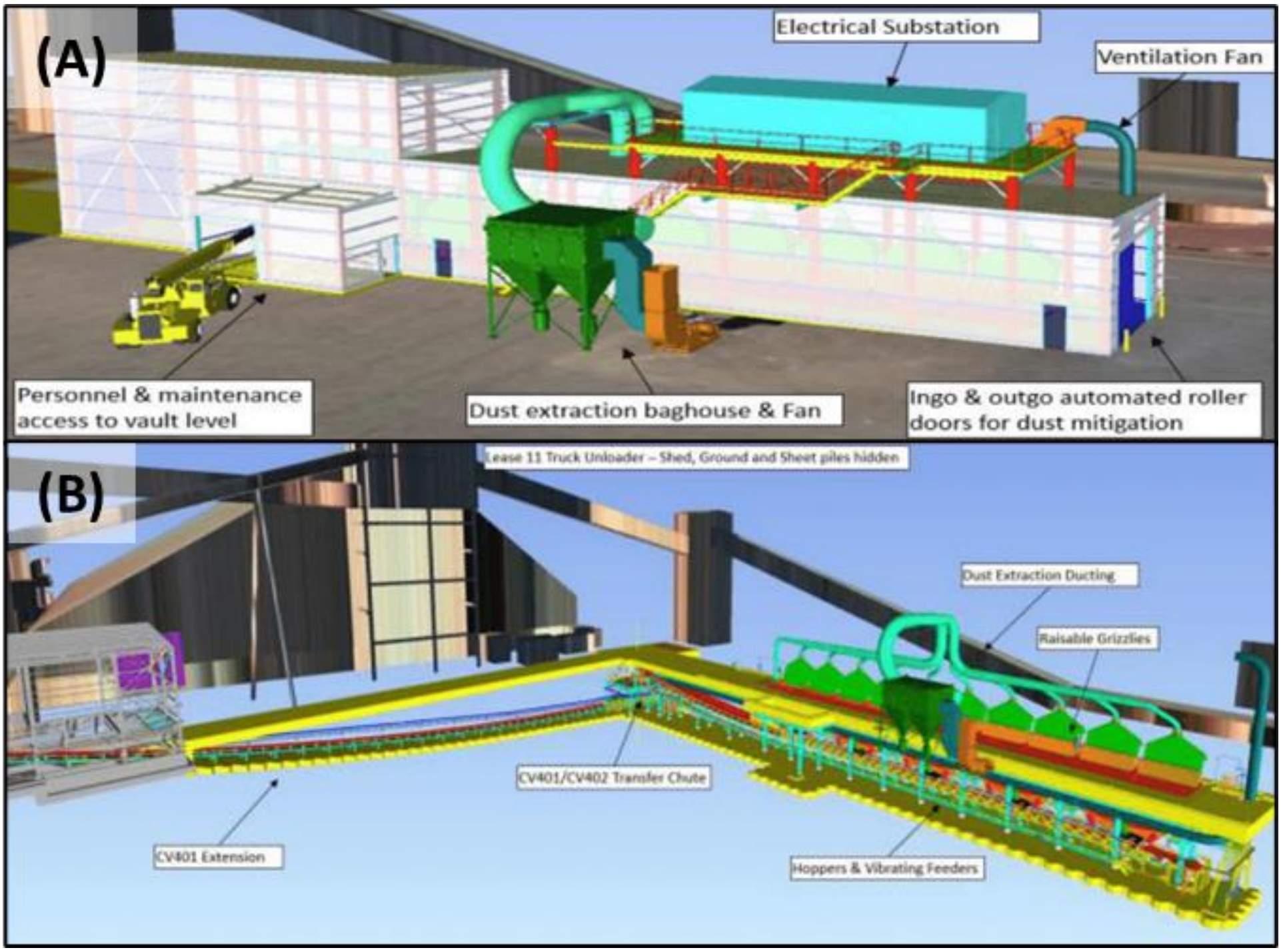

Figure 2: Model schematic of baghouse dust extraction system at (a) truck unload facility and (b) conveyor

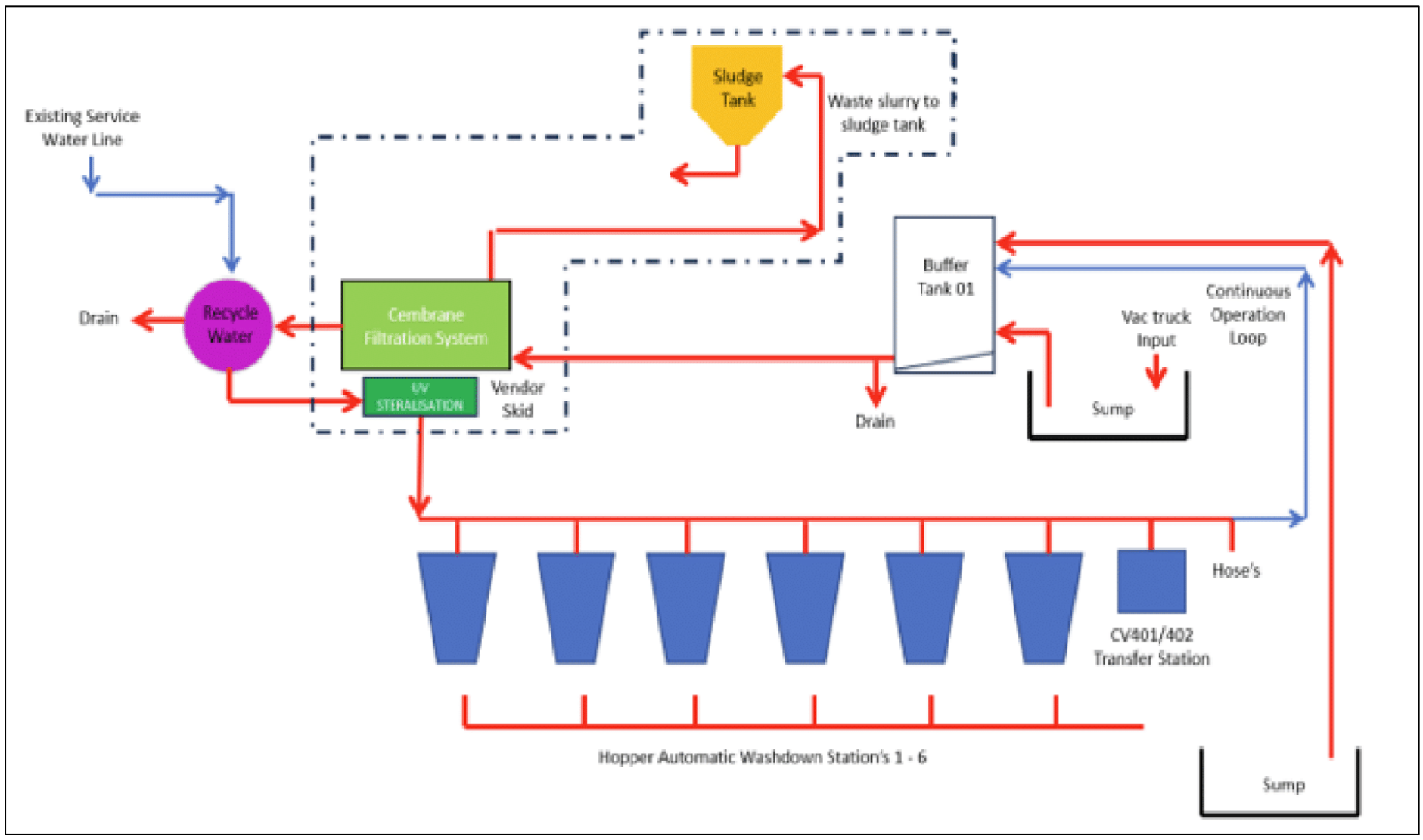

Figure 3: Washdown water filtration system process

3. Risk assessment

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

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

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction, commissioning, and operation, which have been considered in this decision report are Table 1. Table 1 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 1: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction of new truck unloader facility, underground conveyors, and transfer chute Modifications to existing conveyor and transfer tower Soil excavation Vehicle movements	Air / windborne pathway	• Soil will be wetted prior to and during excavation. • Soil stockpiles will be inspected daily and wetted down regularly using sprinklers covering the entire stockpile area. As the premises is located within the prescribed premises for licence L4275/1982/15, relevant conditions in the licence also apply for the management of dust emissions from construction activities and will be considered in the risk assessment, including: • **Condition 24** – Requirement to take practical measures to ensure dust generated on the premises does not cross the premises boundary. • **Condition 30** – Requirement to undertake ambient air quality monitoring, including particulate matter with a diameter of 10 micrometres or less (PM_{10}).
Noise			• Construction and earthworks will be undertaken in accordance with Construction Noise Management Plan (AES 2023b), including: ○ Carrying out construction work in accordance with environmental noise practices in section 4 of *AS 2436 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*; ○ Regularly inspecting operating equipment and implement an equipment maintenance program to ensure equipment and machines are operated according to manufacturer's specifications; ○ Where possible, utilising equipment with low noise emissions, including the use of low-tonal reversing alarms (croakers) on vehicles, and considering working arrangements that minimise noise emissions; and ○ Where deemed necessary, undertaking noise monitoring in accordance with procedures outlined in the *Environmental Protection (Noise) Regulations 1997* and *AS 1055 Acoustics – Description and Measurement of Environmental Noise – General Procedures*. • Construction and earthworks (with the exception of dewatering activities) will only be conducted during assigned daylight hours in accordance with the *Environmental Protection (Noise) Regulations 1997* (i.e., between 07:00am and 07:00pm). • Dewatering pumps will be equipped with noise-attenuating equipment and acoustic barriers.
Sediment		Overland runoff	• Stormwater within the premises will be captured via a series of sumps with silt traps and pumped to

Emission	Sources	Potential pathways	Proposed controls
laden stormwater		into marine environment during rainfall events	existing stormwater drainage network. As the premises is located within the prescribed premises for licence L4275/1982/15, relevant conditions in the licence also apply for the management of sediment laden stormwater and will be considered in the risk assessment, including: • **Condition 2** – Requirement to take practical measures to prevent contaminated stormwater runoff and requirement to treat potentially contaminated stormwater prior to being discharged from the premises.
Dewatering effluent (PFAS-impacted)	Dewatering activities and discharge into existing drainage network	Loss of containment , due to either pipeline failure or overtopping	• Dewatering pipelines will be commissioned with clean water prior to operation to detect any potential leaks or defects, prior to commissioning with dewatering effluent. • Dewatering pipeline installed will be double skinned, or otherwise bunded, to contain dewatering effluent in the event of a leak or rupture. • Dewatering pipeline network will be confined to within the premises an be under constant observation during the work days. • Settling tank will be equipped with a high-water level indicator and be designed such that there is adequate storage capacity to accommodate the required dewatering rates and the settling rate. Where required, additional settling tanks may be installed or submersible pump will be used to increase outflow rate.
		Direct discharge to marine environment via stormwater outlet	• Fully enclosed sheet piling methodology will be utilised to minimise the required dewatering rates, reduce total volume of dewatering effluent generated and prevent mobilisation of nearby contaminant plume. • Groundwater investigations and modelling has demonstrated that dewatering drawdown impacts will be localised. • Dewatering effluent monitoring program will be implemented during discharge. Dewatering effluent samples will be analysed on a short turnaround time (i.e., three days turnaround time or less) and monitoring results assessed within 12 hours of receipt. • If PFOS concentration in dewatering effluent is detected above the 90% species protection level (SPL) default guideline value of 2.7 µg/L (ANZG 2023), discharge activities will be stopped immediately until suitable treatment or other management options can be implemented. An internal operational trigger level adopting the 95% SPL default guideline value of 0.48 µg/L will be used to prepare for implementing management actions in anticipation of the 90% SPL exceedance. • Where possible, the dewatering effluent quality will be assessed within 96 hours of sampling to ensure minimal impacts to receiving environment, where PFOS concentrations exceed the proposed limit. As the premises is located within the prescribed premises for licence L4275/1982/15, relevant conditions in the licence also apply for the management of dewatering effluent discharge into the inner harbour environment

Emission	Sources	Potential pathways	Proposed controls
			and will be considered in the risk assessment, including: • **Condition 2** – Requirement to treat contaminated or potentially contaminated stormwater prior to being discharged from the premises. • **Condition 31** – Requirement to undertake annual ambient sediment and pore water quality monitoring within the inner harbour area (excluding per- and polyfluoroalkyl substances). Additionally, it is understood that the applicant has been undertaking passive ambient water quality monitoring for metals and metalloids within the inner harbour area using diffusive gradients in thin films and will continue to implement the monitoring program.
Commissioning and time limited operation			
Dust	Commissioning and operation of truck unloader facility and conveyor system	Air / windborne pathway	• Truck unloader facility will be fully enclosed to ensure dust containment during truck unloading, with unloading only commencing once roller doors have been shut. • Truck unloader facility and conveyor will be equipped with a baghouse dust extraction system (refer to Section 2.3.3). • Baghouse dust extraction system will be maintained regularly to minimise risk of excessive noise generation due to wear and tear. • Conveyors will be installed within underground tunnel to reduce dust emissions. • During commissioning, truck unloader facility will undergo dry commissioning (i.e., without product) prior to proceeding with wet commissioning (i.e., with product) to minimise likelihood of accidental dust release. • During commissioning, air flow and quality of the baghouse dust extraction system will be tested, and visually inspected during commissioning. As the premises is located within the prescribed premises for licence L4275/1982/15, relevant conditions in the licence also apply for the management of dust emissions and will be considered in the risk assessment, including: • **Condition 1** – Requirement to operate and maintain all pollution control and monitoring equipment to manufacturer's specifications. • **Condition 3** – Requirement to ensure dust filtration system is in operation on any metal concentrate shed whenever dust generating activities are undertaken within the shed, including stockpile disturbance. • **Condition 24** – Requirement to take practical measures to ensure dust generated on the premises does not cross the premises boundary. • **Condition 30** – Requirement to undertake ambient air quality monitoring, including particulate matter with

Emission	Sources	Potential pathways	Proposed controls
			a diameter of 10 micrometres or less (PM_{10}).

Noise			• Acoustic assessment has been undertaken and found that noise generated from operation of the truck unloader facility will not exceed relevant assigned noise levels (AES 2023a).
			• Truck unloader facility will be fully enclosed to minimise noise emissions during truck unloading, with unloading only commencing once roller doors have been shut.
			• Baghouse dust extraction system will be maintained regularly to minimise risk of excessive noise generation due to wear and tear.
			• Conveyors will be installed within underground tunnel to reduce noise emissions.
			• Commissioning and operational activities will be undertaken in accordance with Construction Noise Management Plan (AES 2023b).
			• During commissioning, truck unloader facility will be monitored to ensure noise modelling predictions are validated, including:
			  ○ Monitoring of baghouse dust extraction system sound power levels at one metre from the fan when operating to ensure fan noise level does not exceed 85 dB;
			  ○ Where fan noise level exceeds 85 dB, a noise insulating shelter will be procured to encapsulate the fan and provide acoustic insulation to achieve 85 dB;
			  ○ Monitoring of audible alarms at one metre from the alarm to ensure alarm noise does not exceed 105 dB; and
			  ○ Monitoring of the conveyor rollers sound power level at one metre away from the conveyors to ensure noise does not exceed 85 dB.

Sediment laden and/or contaminated stormwater		Overland runoff into marine environment during rainfall events	• Stormwater within the premises will be captured via a series of sumps with silt traps and pumped to existing stormwater drainage network. • Truck unloader facility will be inspected regularly to clean up any product spillage on ground. As the premises is located within the prescribed premises for licence L4275/1982/15, relevant conditions in the licence also apply for the management of sediment laden/ contaminated stormwater and will be considered in the risk assessment, including: • **Condition 2** – Requirement to take practical measures to prevent contaminated of stormwater runoff and requirement to treat potentially contaminated stormwater prior to being discharged from the premises.
Washdown	Commissioning	Loss of	• Washdown water will be treated through the system prior to storage.

Emission	Sources	Potential pathways	Proposed controls
water	and operation of washdown water filtration system, including wastewater and sludge tanks	containment, resulting in discharge to marine environment	• Where washdown is no longer required between shipments, WFS-treated clean water will be disposed in Water Corporation sewer system and WFS will be flushed with potable water. • Buffer tank, sludge tank and recycle water tank will be equipped with high-level alarm and high level interlock to minimise the risk of an overtopping event. • During commissioning, sumps, pipelines, and storage tanks will be visually inspected, including the high-level alarm on storage tanks. • During commissioning, suspended solids and pH of treated washdown water will be monitored. • During commissioning, truck unloader facility will undergo dry commissioning (i.e., without product) prior to proceeding with wet commissioning (i.e., with product) to minimise likelihood of accidental washdown water release. As the premises is located within the prescribed premises for licence L4275/1982/15, relevant conditions in the licence also apply for the management of contaminated stormwater and will be considered in the risk assessment, including: **Condition 2** – Requirement to take practical measures to prevent contaminated of stormwater runoff and requirement to treat potentially contaminated stormwater prior to being discharged from the premises.

3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020b), 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 2 and Figure 4 below provides 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 2020a)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from prescribed activity**
Residential premises	The premises is located within the Geraldton township, where a number of residential premises are located in the vicinity of the premises boundary (Figure 4), including: • Dwelling (R3) – 600 m south-east; • Dwelling (R4) – 800 m south-east; • Dwelling (R1) – 1,100 south-west; and • Dwelling (R7) – 1,100 m south-east. Additionally, other types of dwelling are also present, including: • Retirement village (R5) – 700 m south-east; • Caravan park (R2) – 1,000 m west; and • Short-stay overnight caravan park (R10) – 1,000 m north-east.
Commercial/industrial premises	The premises is surrounded and abuts various industrial and commercial premises. Of note is the Fishing Boat Harbour, which is located approximately 230 m north-west of the premises boundary, directly adjacent to the wider Geraldton Port premises (Figure 4).
Recreational premises	The Geraldton Foreshore and Geraldton Beach are located approximately 1,000 m north-east of the premises boundary (Figure 4). The Fishing Boat Harbor (detailed above) is also used for recreational fishing.
Environmental receptors	**Distance from prescribed activity**
Marine environment	The northern premises boundary abuts the inner harbour, which connects to the Indian Ocean. Berthing stations are present and utilised as part of the wider Geraldton Port premises. Existing drainage system at the premises leads to stormwater outlet SW9, which is located north of the premises and discharges directly into the inner harbour.
Conservation significant fauna	Australian Sea Lion (*Neophoca cinerea*) is listed as an endangered marine species under the *Environmental Protection and Biodiversity Conservation Act 1999 (Cth)* and *Biodiversity Conservation Act 2016 (WA)*. Individuals were known to utilise rock walls beneath and adjacent to the berthing stations at the Geraldton Port facility as haul-out areas.

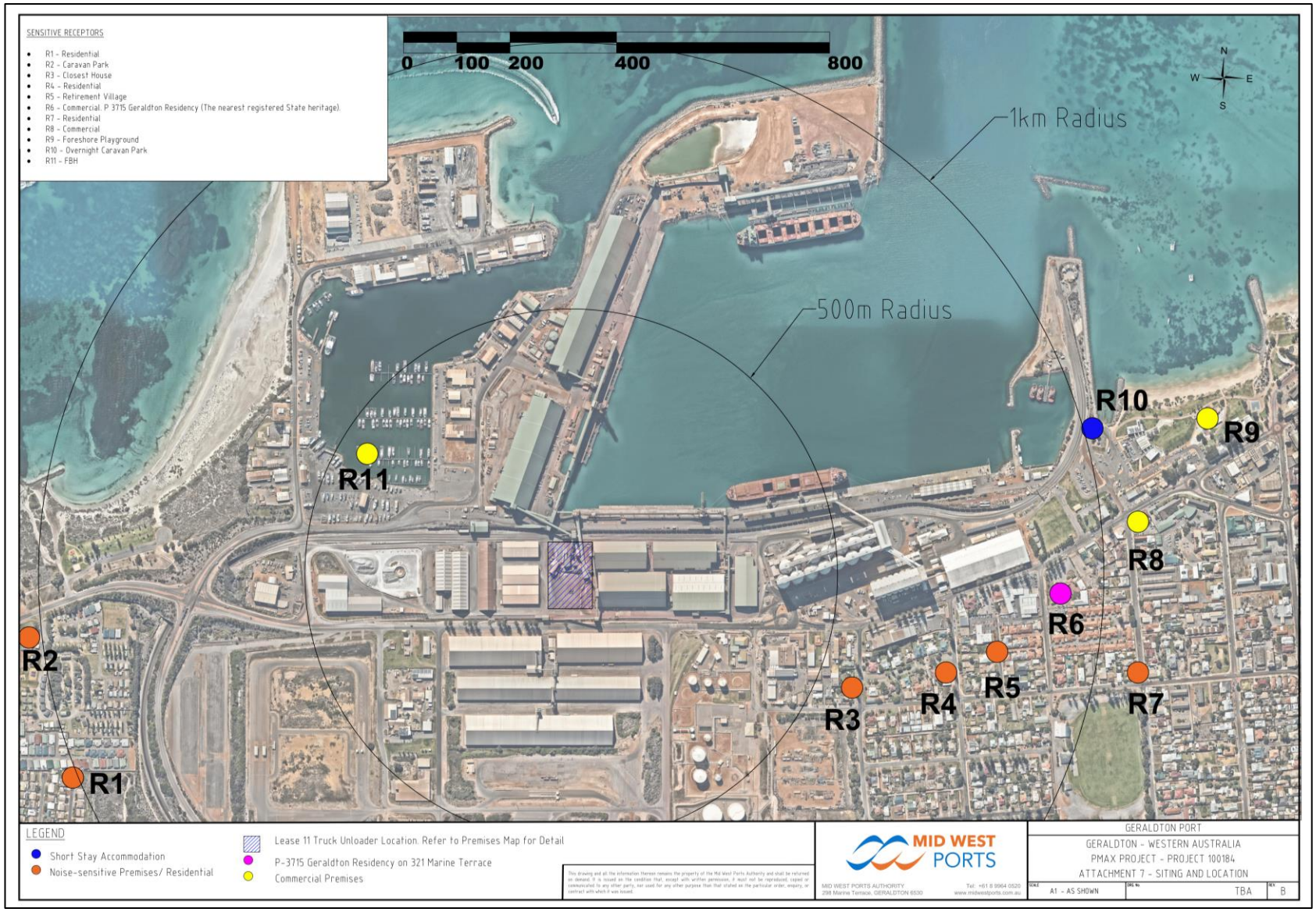

Figure 4: Distance to sensitive human receptors

3.2 Risk ratings

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

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

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

Works approval W6893/2024/1 that accompanies this decision report authorises construction, environmental commissioning, and time-limited operations. The conditions in the issued works approval, as outlined in Table 3 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment to existing licence L4275/1982/15 is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises i.e. truck unloading activities (Category 58). A risk assessment for the operational phase has been included in this decision report, however licence conditions will not be finalised until the department assesses the licence application.

Table 3: 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 licence	Comments and justification for additional regulatory requirements
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Construction of new truck unloader facility, underground conveyors and transfer chute Modifications to existing conveyor and transfer tower Soil excavation Vehicle movements	Dust	***Pathway:*** Air / windborne pathway ***Impact:*** Impact to human health and amenity	Human receptors, including residential, commercial, and recreational premises	Refer to Section 3.1	C = Slight L = Unlikely **Low risk**	Y	Condition 1 – Construction infrastructure requirements	The Delegated Officer has determined the proposed controls for managing dust, noise, and sediment laden stormwater emissions from the construction of the proposed infrastructure to be adequate. Existing licence L4275/1982/15 also contain relevant conditions for the management of these emissions. No additional regulatory controls are required.
	Noise			Refer to Section 3.1	C = Minor L = Possible **Medium risk**	Y	Condition 4 – Authorised construction hours	
	Sediment laden stormwater	***Pathway:*** Overland runoff into marine environment during rainfall events ***Impact:*** Impact to marine environment and ecological health	Marine environment Marine fauna	Refer to Section 3.1	C = Slight L = Rare **Low risk**	Y	None	
Dewatering activities and discharge into existing drainage	Dewatering effluent (PFAS-impacted)	***Pathway:*** Loss of containment , due to either pipeline failure		Refer to Section 3.1	C = Minor L = Unlikely **Medium risk**	Y	Condition 2 – Construction activity requirements	The Delegated Officer has determined the proposed controls for managing dewatering effluent emissions from pipeline failure during construction dewatering activities to be adequate.

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of licence	Comments and justification for additional regulatory requirements
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
network		or overtopping ***Impact:*** Impact to marine environment and ecological health						No additional regulatory controls are required.
		Pathway: Direct discharge to marine environment via stormwater outlet ***Impact:*** Impact to marine environment and ecological health		Refer to Section 3.1	C = Moderate L = Possible **Medium risk** Refer to Section 3.3	N	Condition 2 – Construction activity requirements **<u>Condition 3 – Dewatering effluent monitoring requirements</u>**	Refer to Section 3.3 for detailed risk assessment.
Commissioning and Operation (including time-limited-operations operations)								
Commissioning and operation of truck unloading facility and conveyor systems	Dust	***Pathway:*** Air / windborne pathway ***Impact:*** Impact to human health and amenity	Human receptors, including residential, commercial, and recreational premises	Refer to Section 3.1	C = Minor L = Rare **Low risk**	Y	Condition 1 – Construction infrastructure requirements Condition 8 – Environmental commissioning requirements Condition 13 – Time limited	In addition to dust management requirements under existing licence L4275/1982/15 (refer to Section 3.1.1), the applicant has considered the following dust management controls in designing the replacement truck unloader facility and associated conveyor system: • Enclosed structure for truck unloader; • Underground, enclosed conveyor line;

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of licence	Comments and justification for additional regulatory requirements
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
							operation requirements	and • Built-in baghouse dust extraction system. Refer to Section 2.3.3 for further detail on these controls. It has been determined that the proposed controls for dust emissions from the commissioning and time limited operation of the proposed infrastructure are adequate. Due to the enclosed nature of the infrastructure, the proposed activities are unlikely to contribute to dust emissions from the premises, with minor impacts occurring in exceptional circumstances (i.e., baghouse failure, improper operational practices). As such, requirements for the construction of the proposed infrastructure, commissioning of the baghouse extraction system and proper operational practices has been included as conditions in the works approval. No additional regulatory controls are required.
	Noise			Refer to Section 3.1	C = Minor L = Rare **Low risk**	Y	Condition 1 – Construction infrastructure requirements Condition 8 – Environmental commissioning	The applicant has undertaken an acoustic assessment to demonstrate that the operation of the proposed infrastructure would not exceed relevant assigned noise levels specified in the *Environmental Protection (Noise) Regulations 1997*. It has been determined that the proposed controls for noise emissions from the

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of licence	Comments and justification for additional regulatory requirements
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
							requirements Condition 13 – Time limited operation requirements	commissioning and time limited operation of the proposed infrastructure are adequate. Due to the enclosed nature of the infrastructure, worst-case scenario noise emissions from the proposed infrastructure were predicted to be at least 10 dB below the night-time assigned noise levels at each of the assessed receiver locations, indicating that noise emissions from the proposed infrastructure would not significantly contribute to overall noise emissions from the wider Geraldton Port facility. As such, requirements for the construction of the proposed infrastructure has been included as conditions in the works approval. No additional regulatory controls are required.
	Sediment laden and/or contaminated stormwater	***Pathway:*** Overland runoff into marine environment during rainfall events ***Impact:*** Impact to marine environment and ecological health	Marine environment Marine fauna	Refer to Section 3.1	C = Minor L = Unlikely **Medium risk**	Y	Condition 1 – Construction infrastructure requirements Condition 8 – Environmental commissioning requirements Condition 13 – Time limited operation requirements	It has been determined that the proposed controls for sediment laden stormwater and washdown water emissions from the commissioning and time limited operation of the proposed infrastructure are adequate. Existing licence L4275/1982/15 also contain relevant conditions for the management of these emissions. No additional regulatory controls are required.

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of licence	Comments and justification for additional regulatory requirements
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Commissioning and operation of washdown water filtration system, including wastewater and sludge tanks	Washdown water	***Pathway:*** Loss of containment, resulting in discharge to marine environment ***Impact:*** Impact to marine environment and ecological health		Refer to Section 3.1	C = Minor L = Unlikely **Medium risk**	Y	Condition 1 – Construction infrastructure requirements Condition 8 – Environmental commissioning requirements Condition 13 – Time limited operation requirements	

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

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

3.3 Detailed risk assessment for discharge of dewatering effluent into inner harbour marine environment

3.3.1 Overview of risk event

The construction of the proposed truck unloader facility requires dewatering of the local water table to facilitate subsurface works. Consequently, the applicant proposed to pump the effluent into a temporary settlement tank to remove fines and sediment, before discharging the dewatering effluent into the premises' existing drainage system. The effluent will eventually flow towards the inner harbour and be discharged through stormwater outlet SW9. Stormwater outlet SW9 receives stormwater from a number of sources within and adjacent to the port facility and is an authorised stormwater discharge point under licence L4275/1982/15.

The proposed dewatering activities represent a risk event of concern as it was previously determined that the local groundwater, and logically, the dewatering effluent generated from construction dewatering, has been impacted by PFAS. As such, a detailed risk assessment was undertaken to assess the risk of potential impacts to the marine environment as a result of the proposed discharge of PFAS-contaminated dewatering effluent.

3.3.2 Characterisation of discharge

Assessment of the potential impacts of the discharge of dewatering effluent into the inner harbour marine environment would require an understanding of the (i) volume and (ii) quality of the discharge.

Dewatering effluent volume

Dewatering is anticipated to be required for approximately 12 to 15 weeks to maintain dry working conditions. The applicant has proposed a fully enclosed sheet pile arrangement to surround the excavation and dewatering area (Figure 5). The purpose of the sheet piling would be to minimise the zone of dewatering influence, which in turn, will reduce the expected dewatering rates from approximately 30-100 L/s to approximately 12-20 L/s, subject to other factors such as groundwater levels and tidal influence. At these dewatering rates, the dewatering program is anticipated to generate up to 182 ML of dewatering effluent in total, which will be discharged into the inner harbour.

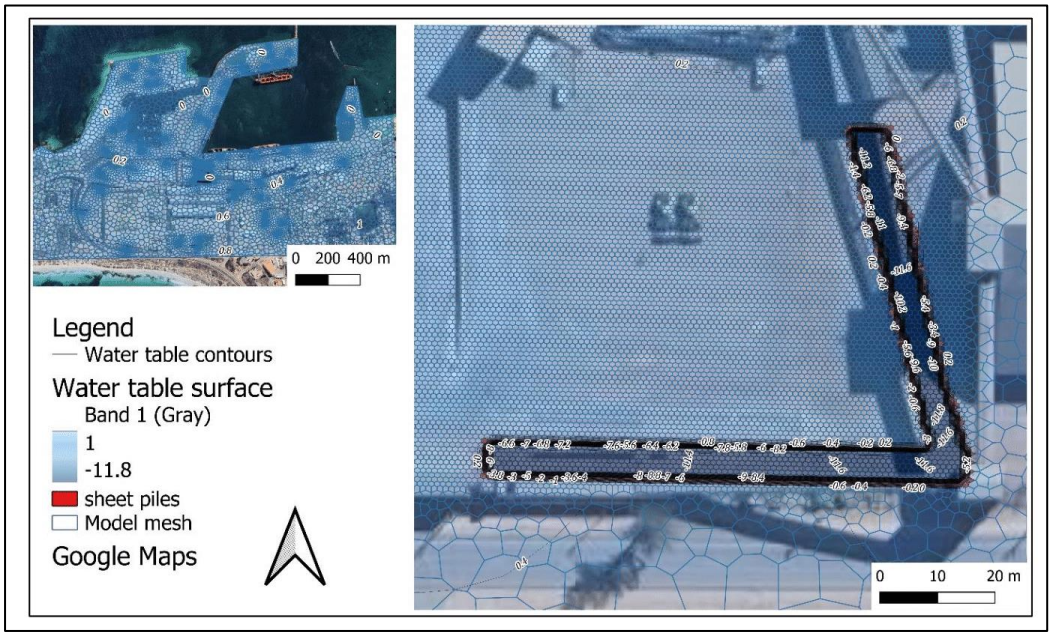

Figure 5: Extent of sheet piling and groundwater drawdown during dewatering

Dewatering effluent quality

The contaminant of concern within dewatering effluent is PFAS. PFAS are a group of synthetic industrial chemicals. While they have been produced and widely used in numerous consumer and industrial products since the 1950s, recent findings into the prevalence, persistence, and toxicity of PFAS has led to its status as an emerging contaminant (SA EPA 2017). In addition to their resistance to natural degradation, PFAS compounds have also been found to biomagnify and bioaccumulate through the food chain in marine environments (US EPA 2017). While only a number of PFAS compounds have been investigated thoroughly (Houde *et al.* 2011), there exists many other types of PFAS compounds that have not been investigated. Hence, the proposed discharge of PFAS-impacted dewatering effluent into the marine environment requires detailed assessment.

No PFAS-containing products are used at the port, however PFAS has been detected in groundwater surrounding the premises. The source of the PFAS is believed to be from a different area within the Geraldton Port facility, located to the south-east of the premises. The PFAS plume is thought to be migrating in the direction of regional groundwater flow, which is northwards towards the Indian Ocean via the inner harbour (SLR 2023). The plume migration may also be exacerbated by prevailing high-water table, which is influenced by tidal movements and the geotechnical profile of the surrounding areas (i.e., sand dune systems and reclaimed dredge fill) (SLR 2023).

Based on historical groundwater monitoring around the premises boundary, the PFAS plume appears to encompass the groundwater underlying the premises. Groundwater monitoring bores MW16, MW18 and MW56, located north-east, south-west and east of the premises boundary, respectively, have detected several PFAS compounds since at least 2021 (Figure 6). Most notably, the following observations can be made based on historical groundwater monitoring (Table 4):

1. PFAS compounds detected above their limit of reporting varied between monitoring locations. Most of the PFAS compounds detected across the three monitoring locations were perfluoroalkyl sulfonic acids (e.g., perfluorobutanesulfonic acid [PFBS], perfluoropentane sulfonic acid [PFPeS], perfluorohexanesulfonic acid [PFHxS], and perfluorooctanesulfonic acid [PFOS]).
2. Several perfluoroalkyl carboxylic acids were consistently detected at monitoring bore MW56, including perfluoroheptanoic acid (PFHpA), perfluorohexanoic acid (PFHxA), perfluorooctanoic acid (PFOA), and perfluorononanoic acid (PFNA). PFAS compounds from this group were detected at other monitoring locations, but less frequently and consistently.
3. 6:2 fluorotelomer sulfonic acid (6:2 FTS) was detected consistently at monitoring bore MW18. This PFAS compound was also detected at MW56 during the most recent monitoring event.
4. While not always the case, the PFAS compound detected at the highest concentrations at these monitoring locations was typically PFHxS.
5. Overall, where PFAS compounds were detected above their limit of reporting at both MW18 and MW56, higher concentrations were observed at the latter (i.e., east of the premises). Similarly, PFAS summations were also highest at monitoring bore MW56. This is consistent with the understanding that the source of the PFAS impacts was south-east of the premises, with the detection of PFAS at MW18 suggesting that the plume is also expanding westwards to some extent.

Currently, it is challenging to establish temporal trends due to limited and irregular monitoring frequency. Furthermore, there is a dearth of default guideline values for most PFAS compounds. Where draft and interim guidelines exist for PFOS and PFOA, the monitoring data available to date have not exceeded the default guideline value (DGV) for the 95% species protection level

(SPL) for these compounds (ANZG 2023; HEPA 2020). That being said, it is reasonable to assume that any groundwater dewatered from the premises will contain some level of PFAS.

While PFAS concentrations around the construction area have been established from groundwater monitoring, it is also important to consider the potential impact that dewatering will have on the quality of the dewatering effluent. Primarily, construction dewatering may temporarily produce a cone of depression around the construction area, potentially mobilising the nearby PFAS plume. By mobilising the plume closer to the construction area (where dewatering is taking place), the dewatering effluent produced may contain higher concentrations of PFAS over time.

To address this concern, the applicant proposed to use sheet piling (which was proposed earlier as a means of minimising dewatering effluent produced) to limit the drawdown influence and avoid mobilising the PFAS plume. Groundwater modelling undertaken by the applicant has shown that under a dewatering rate of 30 L/s over a three-month period, water table drawdown would remain localised within the sheet piled area (Figure 5).

In addition, particle tracking was used to simulate the movement and fate of groundwater surrounding the construction area. Over a seven-year simulation, the model showed that particles released around the source of PFAS contamination will migrate in accordance with regional groundwater flow direction (towards the inner harbour) without being influenced by the temporary dewatering activities (Figure 6). Therefore, without the risk of PFAS impacts in the localised water table being exacerbated by the mobilisation of the PFAS plume, the dewatering effluent quality (in terms of PFAS impacts) is likely to remain comparable to existing groundwater monitoring data.

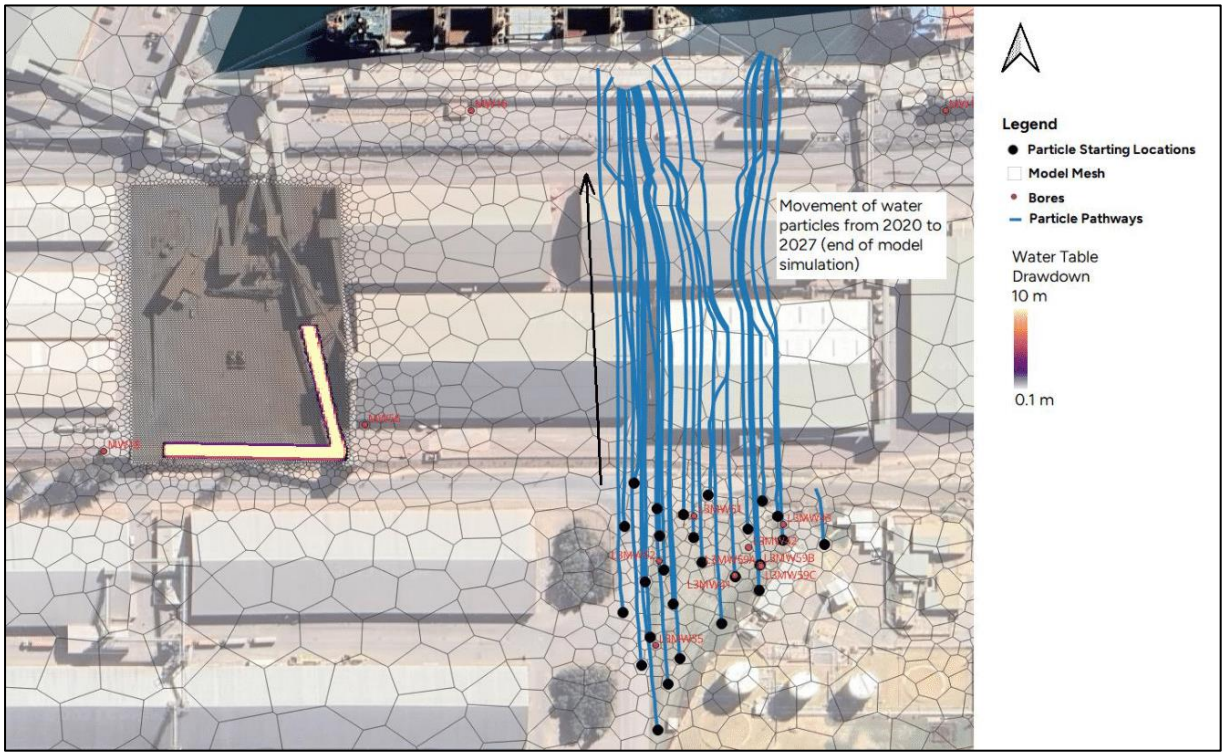

Figure 6: Particle tracking from PFAS source during sheet pile enclosed dewatering

Table 4: Ambient groundwater monitoring for PFAS compounds

Parameter[1]	Limit of reporting	Unit	MW18			MW56		MW16
			15/05/2020 [1]	26/08/2021	25/10/2023	4/10/2023	26/10/2023	26/08/2021
Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	0.0005	µg/L	<0.02	**0.0051**	**0.0029**	**0.0032**	**0.0033**	**0.0017**
Perfluoropentane sulfonic acid (PFPeS)	0.0005	µg/L	<0.02	**0.0014**	**0.0014**	**0.0019**	**0.0022**	**0.0006**
Perfluorohexane sulfonic acid (PFHxS)	0.0005	µg/L	<0.02	**0.0041**	**0.0034**	**0.007**	**0.0057**	**0.0055**
Perfluoroheptane sulfonic acid (PFHpS)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	0.0002	µg/L	<0.01	<0.0002	**0.0007**	**0.0051**	**0.0042**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	0.002	µg/L	<0.1	**0.008**	<0.0078	<0.0079	<0.0082	**0.005**
Perfluoropentanoic acid (PFPeA)	0.0005	µg/L	<0.02	<0.0005	<0.0016	<0.0005	<0.0016	**0.0013**
Perfluoroheptanoic acid (PFHpA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	**0.0008**	**0.0014**	<0.0005
Perfluorohexanoic acid (PFHxA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	**0.002**	**0.0024**	**0.0012**
Perfluorooctanoic acid (PFOA)	0.0005	µg/L	<0.01	<0.0005	<0.0005	**0.0011**	**0.0018**	<0.0005
Perfluorononanoic acid (PFNA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	**0.0008**	**0.0008**	<0.0005
Perfluorodecanoic acid (PFDA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	0.0005	µg/L	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.001	µg/L	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.001	µg/L	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.001	µg/L	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.001	µg/L	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001

Parameter[1]	Limit of reporting	Unit	MW18			MW56		MW16
			15/05/2020 [1]	26/08/2021	25/10/2023	4/10/2023	26/10/2023	26/08/2021
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0005	µg/L	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(N:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.001	µg/L	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.001	µg/L	<0.05	**0.001**	**0.002**	<0.001	**0.007**	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.001	µg/L	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.001	µg/L	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001
PFAS Summations								
Sum of PFHxS and PFOS	0.0002	µg/L	<0.01	**0.0041**	**0.0041**	**0.0121**	**0.0099**	**0.0055**
Sum of PFAS (WA DER List)	0.0002	µg/L	<0.01	**0.0182**	**0.009**	**0.0192**	**0.0258**	**0.0147**
Sum of PFAS	0.0002	µg/L	<0.01	**0.0196**	**0.0104**	**0.0219**	**0.0288**	**0.0153**

Note 1: Parameter concentrations above their respective limit of reporting are bolded. Parameter concentrations below their respective limit of reporting are coloured grey. Parameter concentrations exceeding relevant guideline values have been highlighted and coloured red.

Note 2: Limit of reporting during this monitoring event varied from the other monitoring events, making it difficult to assess for comparative purposes.

3.3.3 Applicant controls

The proposed controls for managing the risk of potential impacts to the marine environment was summarised in Table 1. As discussed in Section 3.3.2, the primary control being proposed is the use of sheet piling to fully enclose the dewatering area. The use of sheet piling will limit the drawdown influence on the water table, which will (i) minimise the required dewatering rate, and subsequently, the volume of dewatering effluent produced and discharged into the marine environment, as well as (ii) minimise the mobilisation of the existing PFAS plume at the port facility, ensuring groundwater PFAS concentrations within the premises do not increase significantly during and as a result of dewatering operations.

In addition, the applicant proposed to undertake a dewatering effluent monitoring program to assess the levels of PFAS being discharged into the inner harbour. The monitoring program is detailed in Table 5.

Table 5: Proposed dewatering effluent management plan

Monitoring parameter	Description
Monitoring location	Within settlement tank; or At the point of discharge into the port facility's stormwater drainage network (within the premises boundary).
Monitoring suite	pH, electrical conductivity (EC), perfluorooctanesulfonic acid (PFOS), copper (Cu), lead (Pb), zinc (Zn), nickel (Ni)
Monitoring frequency	Weekly
Trigger levels	90% species protection level for PFOS, adopted from ANZG (2023)[1]; and 80% species protection level for other parameters, adopted from ANZG (2018).
Trigger exceedance management actions	Dewatering effluent samples will be collected, transported, and analysed, with results aimed to be received within 96 hours of sampling to ensure timely implementation of management actions, if required. If dewatering effluent concentrations exceed 90% species protection level for PFOS, discharge to the premises' drainage system will cease immediately. Depending on the dewatering rate at the time of the exceedance, dewatering may continue, where dewatering effluent may be managed in the following manner: 1. where dewatering rate is sufficiently low, the dewatering effluent will be stored for offsite disposal at an appropriately licensed waste facility; 2. where dewatering rate is mid-range (i.e., approximately 10 L/s), onsite treatment of dewatering effluent to remove PFAS may be feasible and considered; and 3. where dewatering rate is high (i.e., >15 L/s), dewatering will cease through a controlled shutdown of the dewatering system.
Supplementary monitoring	Groundwater monitoring will be undertaken at monitoring bores MW16, MW18, and MW56 surrounding the premises for standing water level to monitor potential drawdown impacts. Groundwater monitoring will be undertaken daily during the first week of the dewatering program, then twice weekly for the remainder of the dewatering program.

Note 1: An operational trigger readiness trigger level according to the guideline value for 95% species protection level of PFOS will be adopted to prepare and/or initiate management actions in readiness for potential exceedance of the 90% species protection level.

No ambient monitoring of the receiving environment was proposed due to logistical issues, as well as the terminal discharge point (stormwater outfall SW9) receiving stormwater inputs from various onsite and offsite sources, which may not be representative of PFAS contributions from

the dewatering effluent.

3.3.4 Criteria for assessment

There are no current guidelines and default guideline value for PFAS at the time of the assessment, except for PFOS in freshwater environment (ANZG 2023). The PFAS National Environmental Management Plan 2.0 (NEMP; HEPA 2020) recommends adopting freshwater guideline values until marine-specific guideline values are established[2]. To assess the potential impact to the inner harbour marine environment, the applicant has proposed adopting the draft freshwater DGV (90% SPL) for PFOS of 0.48 µg/L (ANZG 2023) in the dewatering effluent monitoring program.

The adoption of freshwater guidelines for marine systems is likely to provide for a conservative measure of protection, as PFOS behaves differently due to relatively high salinity levels typically found in marine environments. High ionic strength conditions will impact the partitioning and mobility of PFOS in marine systems. For example, PFOS has been found to bind around eight to 10 times more strongly to marine sediments, compared to freshwater sediments (Chen *et al*. 2012; Oliver *et al.* 2020). It was thought that the higher salinity in marine environments drives PFOS to organic carbon present in sediment due to hydrophobic action and reduced electrostatic interactions. Due to this behaviour, the likely availability and toxicity of PFOS to marine species may be lower compared to their freshwater counterparts. In this respect, the application of freshwater DGV in a marine environment can be considered sufficiently conservative.

Working harbours are generally classed as 'highly disturbed systems' (i.e., 80% to 90% SPL). However, due to the bioaccumulative nature of PFOS, the next highest SPL was recommended for application in any system to increase conservatism (HEPA 2022), hence the adoption of the 90% SPL.

By applying the 90% SPL DGV for PFOS to the dewatering effluent monitoring program, it is reasonable to assume that the 90% SPL will be met in the receiving environment, with PFOS concentrations being lowered due to dilution with other stormwater inputs as well as seawater.

Therefore, the applicant proposed that the application of the 90% SPL DGV for PFOS is sufficient to ensure that the discharge of PFAS-impacted dewatering effluent will not pose an unacceptable risk to the inner harbour marine environment.

3.3.5 Potential impact to marine ecosystem and risk assessment

PFAS is an emerging contaminant and its behaviours and potential impacts on marine environments is still being investigated. While there are a large number of PFAS compounds, the most significant ones include PFOS, PFOA and PFHxS, due to their water solubility and resistance to degradation (EPA SA 2017). While PFOS is thought to bind strongly to marine sediments, the fate and transport of PFAS bound in sediments is not well understood, particularly at the inner harbour which experiences a high degree of sediment turnover due to tug wash.

PFOS and PFOA have been shown to be acutely toxic to fish and invertebrates in both short- and long-term tests, though the point where toxicity starts varies between marine organisms (EPA SA 2017). Some PFAS compounds, such as PFOS, PFOA and PFHxS, can bioaccumulate and biomagnify within marine food webs. Indeed, high concentrations of PFAS compounds have been observed in top predators, particularly marine mammals, such as seals and dolphins (Houde et al. 2011).

[2] The draft default guideline values for PFOS in freshwater systems (ANZG 2023) supersedes the interim guideline values specified in the NEMP (HEPA 2020). The NEMP also outlines interim default guideline values for PFOA, which is still applicable as no ANZG guidance has been published on this compound.

This may be of concern at the inner harbour, as the endangered *Neophoca cinerea* (Australian sea lion) are known to utilise rock walls beneath and adjacent to berths for hauling out. As one of the top predators likely present within the inner harbour, there is a risk of PFAS biomagnifying and bioaccumulating within the sea lion populations.

A study by Taylor *et al.* (2021) found detected PFOS, PFOA and PFNA in the liver of *N. cinerea*, with PFOA concentrations being highest in *N. cinerea*, compared to other Australian pinnipeds investigated. Interspecies variations in PFAS profiles were indicative of differences in PFAS bioaccumulation between species, which was likely attributed to the proximity to PFAS contamination, foraging range, and prey preference. While the impact of PFAS on the health of marine wildlife remains a key knowledge gap, Taylor *et al.* (2021) suggested there may be immunomodulatory effects with disease and mortality, such as endemic hookworm disease for *N. cinerea*, though this has not been investigated.

Due to the uncertainty with PFAS behaviour at the inner harbour marine environment, it is understood that a higher level of species protection was proposed by the applicant in ensuring that the potential risk of impact from the dewatering effluent discharge is minimised. As discussed in Section 3.3.4, the adoption of the freshwater DGV for 90% SPL (PFOS) for dewatering effluent monitoring was considered adequately conservative. The applicant has committed to ceasing discharge of dewatering effluent to the marine environment if the DGV was exceeded.

The Delegated Officer considers the consequence of this risk event to be **moderate**, due to the persistent and bioaccumulative nature of PFAS compounds. In considering the controls and monitoring program proposed by the applicant, the Delegated Officer considers the likelihood of this risk event to be **possible**. The resultant risk rating is **medium risk**.

A major factor underpinning the risk rating determined was a lack of understanding in PFAS behaviour and existing PFAS impacts within the abiotic (i.e., seawater, sediment) and biotic (i.e., invertebrates, algae, sea lion etc.) components of the inner harbour marine ecosystem. Therefore, the Delegated Officer has taken a conservative approach to determining the risk rating.

As a result of the risk rating, the Delegated Officer also considers the proposed controls insufficient for managing the potential impacts from this risk event. As such, the following have been conditioned in works approval W6893/2024/1 as additional regulatory requirements:

1. **Condition 3** – The proposed dewatering effluent monitoring program has been expanded to include not only PFOS, but up to 28 PFAS compounds, including PFOA and PFHxS. This is due to: (i) the detection of other PFAS compounds, in addition to PFOS, during historical groundwater monitoring events, (ii) the relatively higher concentrations of these PFAS compounds (i.e., PFHxS) compared to PFOS, (iii) the potential concerns associated with other PFAS compounds (i.e., PFHxS, PFOA), as well as (iv) the lack of any existing robust PFAS monitoring/assessment from the premises or the ambient inner harbour marine environment. The Delegated Officer does not consider the lack of formal guideline values for other PFAS compounds as reasonable justification for their exclusion from a PFAS monitoring program.
2. **Condition 3** – In addition to the inclusion of up to 28 PFAS compounds, the Delegated Officer has also specified the interim guideline value (at 90% SPL) as a limit for PFOA. Should the specified limit be exceeded, the Delegated Officer requires the same level of management actions be taken, as if the PFOS limit was exceeded.

4. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website from 29 February 2024 until 21 March 2024. Application advertised in The West Australian on 11 March 2024.	A total of 13 submissions were received during the public comment period. Refer to Appendix 1.	Refer to Appendix 1.
City of Greater Geraldton advised of proposal on 29 February 2024.	None received.	N/A
Applicant was provided with draft documents on 7 May 2024.	Refer to Appendix 2.	Refer to Appendix 2.

5. Conclusion

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

References

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2. AES 2023b, *Noise Management Plan for the Construction of New Truck Unloader*, Ref: AES-890347-R02-0-30112023, Riverton, Western Australia.
3. ANZG 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Governments and Australian state and territory governments, Canberra, Australian Capital Territory.
4. ANZG 2023, *Draft toxicant default guideline values for aquatic ecosystem protection: Perfluorooctane sulfonate (PFOS) in freshwater,* Australian and New Zealand Guidelines for Fresh and Marine Water Quality, CC BY 4.0, Australian and New Zealand Governments and Australian state and territory governments, Canberra, Australian Capital Territory.
5. Chen H, Zhang C, Yu Y & Han J 2012, *Sorption of perfluorooctane sulfonate (PFOS) on marine sediments*, Marine Pollution Bulletin, 64(5), pp. 902-906.
6. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
7. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Environmental Siting*, Perth, Western Australia.
8. DWER 2020b, *Guideline: Risk Assessments*, Perth, Western Australia.
9. Environment Protection Authority South Australia (EPA SA) 2017, *Per and polyfluorinated alkyl substances (PFAS) in the marine environment – Preliminary ecological findings*, Adelaide, South Australia.
10. Heads of EPAs Australia and New Zealand (HEPA) 2020, *PFAS National Environmental Management Plan Version 2.0 – January 2020*, Department of Climate Change, Energy, the Environment and Water.
11. Houde M, De Silva AO, Muir DCG & Letcher RJ 2011, *Monitoring of Perfluorinated Compounds in Aquatic Biota: An Updated Review*, Environmental Science & Technology, 45(19), pp. 7962-7973.
12. National Environment Protection Council (NEPC) 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999, amended 2013*.
13. Oliver DP, Navarro DA, Baldock J, Simpson SL, & Kookana RS 2020, *Sorption behaviour of per- and polyfuoloroalkyl substances (PFASs) as affected by the properties of coastal estuarine sediments*, Science of the Total Environment, 720(2020), 137263.
14. SLR Consulting Australia (SLR) 2023, *Geraldton Port Discharge PFOS in the Marine Environment*, Ref: V6.5255.L1.PFAS Marine Ecology TechMemo.v3_231128.docx, Subiaco, Western Australia.
15. Taylor S, Terkildsen M, Stevenson G, de Araujo J, Yu C, Yates, A, McIntosh RR & Gray R 2021, *Per and polyfluoroalkyl substances (PFAS) at high concentrations in neonatal Australian pinnipeds*, Science of the Total Environment, 786, 147446.

Appendix 1: Summary of comments submitted during public comment period

Item	Concern	Number of submissions	Description of concern	Department's response
Note: During the period where this application was advertised for public comment, the department had also received and advertised an application submitted by the applicant to amend existing licence L4275/1982/15 by increasing the authorised Category 58 throughput at the Geraldton Port premises from 16,000,000 tonnes per annual period to 23,000,000 tonnes per annual period (i.e., an increase of 7,000,000 tonnes per annual period). In receiving public comments, the department noted that some comments did not specify which application they had intended to comment on or that the comments were relevant for both applications. As such, the department has decided to consider and address these comments in both applications.				
1	Increase in port facility throughput	4/13	• The Geraldton Port facility is proposing to increase ports output by seven million tonnes per annum, which is approximately a 44% increase on the current exports from the facility. • Over the last decade, there has been a significant increase in the tonnages of material handled at the premises. • Continuing to increase the throughput of bulk material handling at the premises will exacerbate ongoing issues with emissions and discharges from the premises, which are currently impacting the broader Geraldton area (e.g., dust; see below). • There is a lack of confidence that the increased emissions and discharges from the premises can be adequately managed, given previous and current performance.	This application for a works approval to construct a new truck unloader facility will not result in an increase to the design capacity of the Geraldton Port premises. The proposed truck unloader facility will have a design capacity of 10,512,000 tonnes per annual period, which is still within the current authorised throughput for Category 58 activities under existing licence L4275/1982/15 (i.e., 16,000,000 tonnes per annual period). Furthermore, the proposed truck unloader facility is intended to replace the existing truck unloader facility in servicing Berth 4. As such, the design capacity of the existing truck unloader does not need to be considered. The comments received are relevant to the ongoing application to increase the Category 58 throughput to 23,000,000 tonnes per annual period under licence L4275/1982/15 and will also be considered in that assessment.
2	Dust emissions	13/13	The following concerns were raised: • That fugitive dust emissions from the premises have	The department understands that there are significant concerns for dust emissions from the continued operation of the Geraldton Port

Item	Concern	Number of submissions	Description of concern	Department's response
			been worsening in the recent years. This observation was provided by long-term residents of Geraldton and represented six of the 13 submissions (46%). • The high level of damages to vessels at Fishing Boat Harbour, resulting in frequent and costly maintenance and repairs. Vessel users of the Fishing Boat Harbour represented 9 of the 13 submissions (69%). • Ineffectiveness of the dust tamer fences in managing dust emissions from the port facility. • Potential for dust emissions to impact respiratory health, especially for children and elderly population. Furthermore, the presence of silica and asbestos fibres within talc and iron ore dust raises further concerns for the risk of silicosis and asbestosis, respectively. • Monitoring undertaken by the applicant have identified particulate matter (PM) limit exceedances but have often been discounted as not being from the premises. • Current dust management at the premises does not include the broader port system, including rail and truck transport, which are also potential dust sources. The following impacts have been observed as a result of dust emissions from the Geraldton Port premises: • Impacts within the Fishing Boat Harbour are extensive, and despite engagement with the applicant over many years, have not been resolved and have worsened as buildings and vessels suffer corrosion, including oxidation of aluminium vessels, staining of fibreglass vessels. Some have also commented that similar issues are not present at other anchorages, noting the dust issues was associated with the port facility; • Black dust from trains along the rail corridor;	premises. As part of the future port operations, the construction and operation of the proposed truck unloader facility has the potential to contribute to cumulative dust emissions and exacerbate dust-related impacts on human health and amenity. In undertaking its risk assessment for dust emissions, the department has determined that the potential risk of dust emissions from the operation of the proposed truck unloader facility is low, due to the following reasons: 1. The proposed truck unloader facility is a fully enclosed structure (when material handling is taking place); and 2. The proposed truck unloader facility is equipped with a baghouse dust extraction system for the capture of dust particles prior to being released to the environment. These proposed controls are likely to reduce dust emissions from material handling activities, compared to current operations at the existing truck unloader facility. Once constructed, the infrastructure will be assessed and regulated under licence L4275/1982/15 through a licence amendment. The comments received are relevant to the ongoing application to increase the Category 58 throughput to 23,000,000 tonnes per annual period under licence L4275/1982/15 and will also be considered in that assessment. The ongoing licence amendment application is better placed to address concerns surrounding

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			• Black sticky dust blowing northwards from the premises across the inner-city area of Geraldton and Beresford area; • Dust deposition on vegetation around the Point Moore area, as well as in residential areas (e.g., roofs, rainwater tanks, cars) near the rail corridor; • Dust emissions and deposition affecting property value in Beachlands and surrounding areas; and • Pink dust from fine iron ore, which has covered buildings, road markings along Marine Terrace and coloured avifauna a subtle pink. The following actions were proposed: • Storage and handling of talc product within enclosed shed. • Implementing sprinkler system in tunnel to water carriages as they approach the port facility. • Monitoring for cumulative and broader spatial dust emissions across the city, including the port facility, transport networks and broader residential areas. • Monitoring for PM, in addition to PM_{10} and $PM_{2.5}$, as concerns are not limited to human health, but also amenity as well as damages to infrastructure and property. • Monitoring and data analysis should be undertaken by an independent third-party. • Publication of real-time dust monitoring data for PM_{10} and $PM_{2.5}$ by the department, as opposed to the current practice of publishing 24-hour averages.	dust emissions and impacts from the wider Geraldton Port premises, as well as the proposed actions to address this issue.

Appendix 2: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Works approval		
Condition 1	The applicant proposed modifications to design and construction requirements in Table 1: 1. Modification such that the works approval holder must construct the relevant infrastructure an equipment in *general* accordance with the construction drawings in Schedule 2 of the works approval as the drawings were not issued for construction and may be subject to minor design variations. The applicant has noted that the variations are unlikely to materially alter the outcome of the risk assessment. 2. Modification to equipment specifications (e.g., from 'reverse-flow fan' to 'automated filter cleaning system' for the baghouse dust extraction system, and from 'backwash capabilities' to 'automated cleaning capability' for the washdown water filtration system). The proposed modification will provide some level of flexibility in designing the equipment, noting that the outcome of the intended function/outcome of the equipment has not been changed.	The department has no issues with the proposed changes. Design and construction requirements in Table 1 have been modified accordingly. The department does not consider the changes to have materially altered the outcome of the risk assessment.
Condition 2	The applicant proposed modifications to the activity requirements in Table 2: 1. Modification to the dewatering pipeline requirements, such that spill management is not limited to only the use of temporary trenches. Alternative controls included installing double-skinned or bunded dewatering pipelines. This proposed modification will provide some level of flexibility in managing pipeline failure, depending on where the pipework is located within the pipeline route. The applicant stated that the pipeline route will be within the premises and be under constant observation for most of the time during work hours. Specific monitoring of the pipeline will also be completed. 2. Removal of the requirement to monitor pressure within dewatering pipelines, as the bunding and inspection requirements are considered adequate for managing the potential impact of pipeline failures. The	The department has no issues with the proposed changes. Activity requirements in Table 2 have been modified accordingly. The department does not consider the changes to have materially altered the outcome of the risk assessment.

Condition	Summary of applicant's comment	Department's response
	design of the pipeline will cause water flow to reduce significantly, should there be a leak on the inlet side of the dewatering system. The applicant stated that the pipeline route will be within the premises and be under constant observation for most of the time during work hours. Furthermore, the dewatering pumps will operate at a low pressure, where the use of a pressure gauge will be less effective than visual observation.	
N/A	Under draft condition 4, the applicant was required to determine whether discharge of dewatering effluent had to cease (i.e., due to exceedance of relevant limits specified in condition 3) within 96 hours of sampling. The applicant proposed alternative wording for condition 4, such that the works approval holder must schedule the required laboratory analysis for a 72-hour turnaround to ensure timely receipt of results and that the data received must be assessed within 12 hours of receipt. The rationale for the alternative wording was to reduce the likelihood of non-compliance due to delays and technical complications caused by third-party service suppliers (e.g., transport, laboratory services etc.). The alternative wording was proposed as it still meets the same intent.	The department acknowledges the potential risk of non-compliance with this draft condition cause by third-party service provider delays. Further noting the relatively low PFAS concentrations in the dewatering effluent (based on baseline groundwater monitoring) as well as the low likelihood of exceeding the relevant limits specified in condition 3, the department has accepted the alternative condition proposed by the applicant and has modified Table 2 to include it. Draft condition 4 was removed from the works approval.
Condition 4	The applicant proposed alternative wording for condition 5 (now condition 4), such that the works approval holder must ensure that construction activities at the premises are undertaken in accordance with the relevant Construction Noise Management Plan (CNMP). The existing draft condition limiting construction hours between 07:00 to 19:00 from Monday to Saturday cannot be achieved as construction dewatering will be undertaken continuously (i.e., 24-hours every day).	The department has retained the condition, with modification to allow for construction dewatering activities outside of the specified period. Where possible, the department will prescribe specific requirements in a works approval, instead of referencing other documents. Nevertheless, the department acknowledges that a Construction Noise Management Plan has been submitted to manage noise emissions from construction activities, including continuous dewatering during nighttime hours.
Condition 8	The applicant provided clarification on the commissioning requirements for the truck unloader facility and conveyor system in Table 4: 1. The door seals in Table 4 refer to compressible seals that are used to accommodate floor level tolerances.	The department has acknowledged this and modified the commissioning requirements accordingly.

Condition	Summary of applicant's comment	Department's response
	The applicant proposed modifications to the commissioning requirements for the baghouse dust extraction system in Table 4, such that the proposed changes to infrastructure components (in condition 1) are accurately reflected in this condition (e.g., from 'reverse-flow fan' to 'automated filter cleaning system').	The department has acknowledged this and modified the commissioning requirements accordingly.
	The applicant requested the authorised commissioning duration be modified from 30 calendar days to 120 calendar days (i.e., four months) as contingency for any potential delays and/or interdependency between infrastructure/equipment.	The department has modified the authorised commissioning duration to 120 calendar days. The department does not consider the changes to have materially altered the outcome of the risk assessment.
Condition 9	The applicant requested the timeframe for the submission of the Environmental Commissioning Report be modified from 30 calendar days to 60 calendar days (i.e., two months), as contingency for any potential delays and/or interdependency between infrastructure/equipment, as well as to align with the timeframe for the submission of the Environmental Compliance Report.	The department has modified the timeframe for the submission of the Environmental Commissioning Report to 60 calendar days. The department does not consider the changes to have materially altered the outcome of the risk assessment. In accordance with condition 12, the applicant cannot commence time limited operation prior to the submission of the Environmental Commissioning Report.
Condition 13	The applicant proposed modifications to the operational requirements during time limited operation in Table 5: 1. Removal of the requirement to ensure the washdown water filtration system is operational during and after material handling. This is because the truck unloader facility and washdown water filtration system are not interdependent. The washdown water filtration system may be offline for scheduled maintenance of unscheduled disruptions. These will not impact operations as the in-loading phase can progress without requiring any washdown and manual washdown can be undertaken, where washdown water will still be collected and stored in the same storage system. 2. Modification to the requirement to store slurry waste at the sludge tank until offsite disposal, such that slurry waste storage is not limited to just the sludge tank. The applicant proposed to authorise storage of slurry waste in the sludge tank, self-contained sump or other fully contained unit,	The department has no issues with the proposed changes. Operational requirements during time limited operation in Table 5 have been modified accordingly. The department does not consider the changes to have materially altered the outcome of the risk assessment. It is expected that the applicant takes reasonable measures in ensuring fugitive dust emissions and cross-contamination of product is minimised, where the washdown water filtration system is not operational. Similarly, it is expected that the applicant takes reasonable measures in ensuring waste material are handled and stored appropriately, ensuring no release of waste or waste leachate to the environment

Condition	Summary of applicant's comment	Department's response
	which will provide flexibility in waste management.	
Decision Report		
N/A	The applicant proposed the following modifications to the Decision Report text: 1. Section 2.3 – Removal of 'dust mitigation baffles' from the text, as that component of the truck unloader was removed from the design. The proposed dust control system has been designed to mitigate dust emissions with the facility door closed. 2. Section 2.3.2 – Replace 'reverse flow fan' with 'automated filter cleaning', to align with modification to the works approval conditions. This aligns with proposed changes to the works approval conditions (see above). 3. Section 3.1.1 – In Table 1, replace the proposed control for managing construction noise from 'restricting construction and earthworks to assigned daylight hours' to 'ensuring that the construction activities are undertaken in accordance with the CNMP'. This aligns with proposed changes to the works approval conditions (see above). 4. Section 3.1.1 – In Table 1, specifying that stormwater captured in sumps will be discharged into existing stormwater discharge location (i.e., the same as the proposed dewatering effluent discharge location), instead of a stormwater basin. This was an error in naming convention. 5. Section 3.1.1 – In Table 1, replace the proposed control for managing loss of containment of dewatering effluent during construction, from 'installing dewatering pipelines in temporary trenches' to 'ensuring that dewatering pipelines are either double-skinned or bunded'. This aligns with proposed changes to the works approval conditions (see above). 6. Section 3.1.1 – In Table 1, remove the proposed control for monitoring pressure within dewatering pipelines. This aligns with proposed changes to the works approval conditions (see above). 7. Section 3.1.1 – In Table 1, replace the proposed control for managing discharge of dewatering effluent during construction, from 'analysing dewatering effluent samples within 96 hours of sampling to determine whether discharge must be ceased' to 'scheduling laboratory analysis on	The department has no issues with the proposed changes, as they are primarily administrative or relate to the proposed changes to the works approval conditions (see above). As such, the Decision Report text has been modified accordingly, with the following exception: For Item 3, the department has retained the proposed control for restricting construction and earthworks to assigned daylight hours, noting the requirement for continuous dewatering as an exception. Implementation of the CNMP has already been listed as a proposed control in the draft Decision Report. For Item 7, the department retained the initial proposed control, noting that this was a commitment proposed by the applicant and an important consideration in the detailed risk assessment. The department acknowledges the potential risk of non-compliance caused by third-party service supplier delays. Overall, the department does not consider the changes to have materially altered the outcome of the risk assessment.

Condition	Summary of applicant's comment	Department's response
	expedited (three-day) turnaround to ensure timely receipt of results and assess the data within 12 hours of receipt to determine whether dewatering effluent discharge must cease'. This aligns with proposed changes to the works approval conditions (see above). 8. Section 3.1.1 – In Table 1, replace the proposed control for managing commissioning phase noise emissions from 'restricting commissioning activities to assigned daylight hours' to 'ensuring that the construction activities are undertaken in accordance with the CNMP'. 9. Section 3.1.1 – In Table 1, replacing the proposed control for managing contaminated water discharge during environmental commissioning, from 'managing stormwater via series of sumps with silt traps or via infiltration' to 'discharging stormwater captured in sumps into existing stormwater discharge location (i.e., the same as the proposed dewatering effluent discharge location.	