



Application for Works Approval

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

Works Approval Number	W6639/2022/1
Applicant	Yara Pilbara Nitrates Pty Ltd
ACN	127 391 422
File number	DER2021/000662
Premises	Yara Pilbara Nitrates TAN Plant Village Road BURRUP WA 6714 Legal description Part of Lot 3017 on Deposited Plan 50979 Certificate of Title Volume 2784 Folio 568 As defined by the premises map and coordinates in the issued works approval
Date of report	10 August 2022
Decision	Works approval granted

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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 a groundwater extraction network, transfer pipework and evaporation ponds to support the remediation of a contaminated site on the Yara Pilbara Nitrates Pty Ltd Technical Ammonium Nitrate Plant premises. As a result of this assessment, works approval W6639/2022/1 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 18 November 2021, Yara Pilbara Nitrates Pty Ltd (Yara Pilbara, 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 the establishment of a groundwater extraction network, transfer pipework and evaporation ponds at their Technical Ammonium Nitrate Plant (TAN Plant) on Part of Lot 3017 on Plan 50979, Village Road, Burrup (the premises) to support the remediation of a contaminated site at this location.

The premises relates to the category and assessed production capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6639/2022/1. 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 W6639/2022/1.

2.3 Background

Yara Pilbara currently operates a 350,000 tonne per annum (tpa) TAN Plant on the premises under licence L9223/2019/1. The premises is located in the Burrup Strategic Industrial Area on the Burrup Peninsula approximately 11.5 km from the City of Karratha. It is adjacent to Yara Pilbara Fertilisers Pty Ltd Ammonia Plant.

The TAN Plant was commissioned in 2017. In 2017 and 2018, Yara Pilbara reported several unplanned and unauthorised releases of ammonium nitrate solution, cooling water containing corrosion inhibitor and process effluent containing ammonium and nitrate from the TAN Plant to the department under section 72 of the EP Act. Yara Pilbara has undertaken remedial works and upgrades to containment systems across the premises since the incidents occurred to prevent further or ongoing releases.

Subsequent to the releases occurring, elevated nitrate and ammonia concentrations were detected in groundwater beneath the premises which exceeded assessment levels for freshwater and/or marine aquatic ecosystems in the *Assessment and management of contaminated sites* (DWER 2021). In 2018 Yara Pilbara reported the premises as a Known or Suspected Contaminated site and the department subsequently classified the premises as 'potentially contaminated – investigation required' in accordance with the *Contaminated Sites Act 2003* (the CS Act).

A series of soil, sediment, groundwater and surface water investigations have been carried out

since contaminants were detected in groundwater on the premises. These have included ecological risk assessments, site investigations and monitoring and reporting in accordance with the department's contaminated sites guidelines and the *National Environment Protection (Assessment of Site Contamination) Measure 1999*. Independent review of these has been conducted by DWER accredited Contaminated Sites Auditor, and an initial Mandatory Auditor's Report (MAR) submitted under the provisions of the CS Act in 2020. Inspections and significant repairs to premises infrastructure have also occurred in the intervening time period.

In May 2021, atypical rainfall patterns resulted in the discharge of contaminated surface water from the supratidal flat, that surrounds the TAN plant premises, into King Bay. Investigations identified that contaminated groundwater beneath the TAN plant is migrating and discharging/daylighting into the upper supratidal flats providing a pathway for contamination to be transferred to receiving areas outside the premises. Evapo-concentration of nitrates is occurring resulting in highly concentrated nitrates in upper supratidal flat soils within the premises where the groundwater daylights. A source/pathway/receptor conceptual model for the premises is included in Figure 1 to illustrate contamination sources and movement.

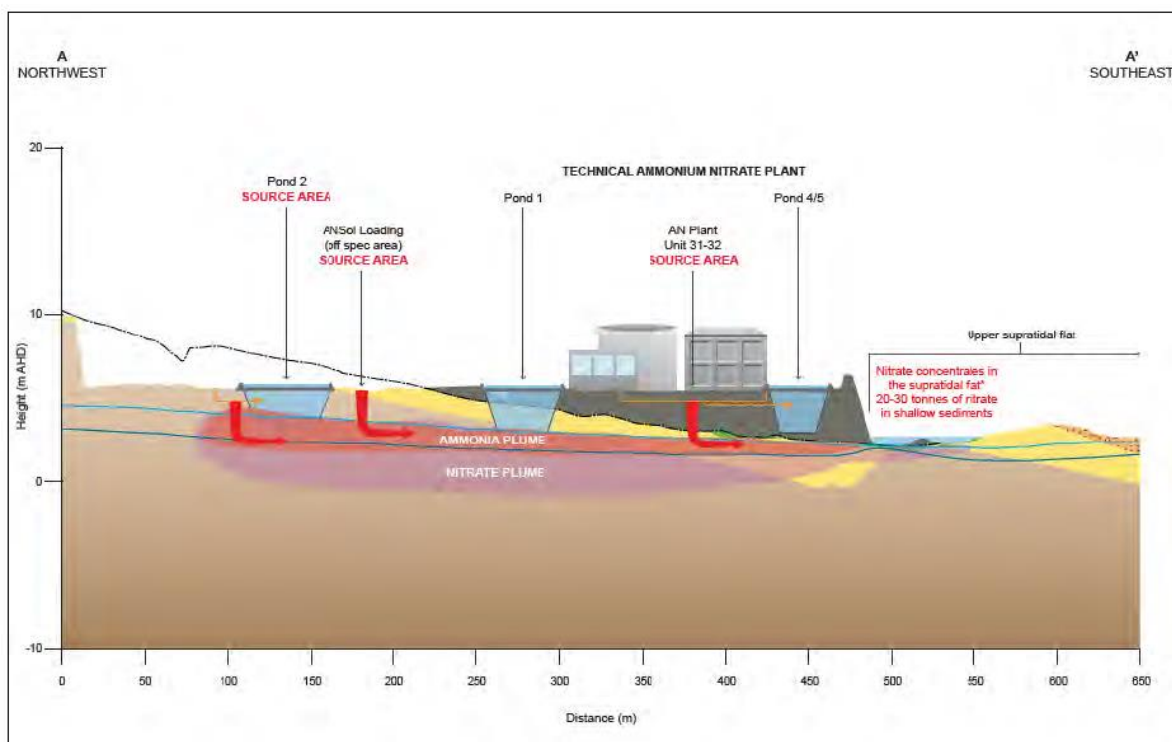


Figure 1 Yara TAN Plant Source/Pathway/Receptor Conceptual Site Model (Yara 2021)

The accredited Contaminated Sites Auditor recommended active remediation of the contaminated site to mitigate this risk. Yara Pilbara met with the department's Contaminated Sites and Marine Ecosystems branches in July and December 2021 to brief them on nutrient monitoring results and management and remediation options being considered for implementation. Investigation of remediation options had previously been completed and submitted with the 2020 MAR.

Yara Pilbara has developed a three phase Remedial Action Plan (RAP) (through consultant Golder and Associated Pty Ltd) which has been submitted to the accredited Contaminated Sites Auditor for technical review prior to formal referral to the department's Contaminated Sites Branch as a component of the next MAR. A copy of the RAP has also been provided to the Contaminated Sites branch for early reference. The remediation objectives of the RAP are to capture the ammonia and nitrate plume on site and prevent it from migrating from the site to the extent practicable, and to reduce the potential mass transfer of nitrate from sediments to surface water.

Yara Pilbara has completed Phase 1 of the three phase RAP under CS Act requirements. This included removal of approximately 4,000 tonnes of nitrate impacted soil from the supratidal flat within the premises boundary where groundwater daylighting and evapoconcentration occurs. The soil was disposed to a Class 3 landfill facility. The purpose of this work was to reduce nitrate load which may be mobilised into surface water during the wet season as a result of surface water flows. Sumps were installed at low points in the excavation areas to allow for capture and removal of contaminated surface water and a weir has also been installed to separate the impacted area from the upper tidal flats to prevent migration of nitrates into surface waters. Phase 1 works also included extension of an existing drainage swale at the northeastern boundary of the premises to direct clean stormwater from upstream catchments away from impacted areas of the premises to reduce potential for migration of nitrates from the premises.

Yara Pilbara is now seeking a works approval to enable Phase 2 of the RAP to be implemented. Phase 2 comprises Enhanced In-situ Bioremediation (EISB) of two source areas and hydraulic plume management through a groundwater extraction system downgradient of the two onsite source areas, and disposal via evaporation ponds. The application seeks approval to construct the groundwater extraction system, the transfer pipework and the evaporation ponds that are part of Phase 2 works.

2.4 Exclusions

This assessment relates to the groundwater extraction network, transfer pipework and evaporation ponds proposed as part of Phase 2 of the RAP only, therefore does not assess emissions, discharges or risks associated with the operation of the TAN Plant. Phase 1, the Phase 2 EISB and Phase 3 of the RAP do not involve emissions or discharges associated with operation of the TAN Plant and therefore are not within the scope of this assessment. These works will be subject to assessment and implementation under CS Act requirements.

2.5 Scope of works

The applicant proposes to establish a groundwater extraction and evaporation system to enable Phase 2 of the RAP to be implemented. It will comprise three core components; a groundwater extraction system, transfer pipework and evaporation ponds. The transfer pipework and ponds will also be used for premises wastewater management. Further details of each element are provided in the following sections.

2.5.1 Groundwater extraction system

The groundwater extraction system is proposed to comprise 36 extraction wells (PEW-01 to PEW-36) designed for a combined operational extraction rate of 150 m³/day. The applicant advised groundwater modelling and a hydraulic pilot trial completed in 2020/2021 was used to inform extraction rates and well spacing. An estimated 36 100 mm diameter extraction wells with submersible electric pumps and pressure transmitters will be installed to achieve an extraction rate of 75 m³/day. The applicant proposes to initially put 24 of the wells into service to achieve containment of the plumes while minimising production of wastewater. Evaluation of the performance of the first phase of extraction will be undertaken after a period of six months, to determine whether the remaining 12 extraction wells will be needed to be operated.

In addition to the wells and submersible pumps the groundwater extraction system will include; a main system control container (sea container) which will house the programmable logic controller (PLC) and an extraction manifold, two pump control containers, below ground well vaults/pits, above and below ground pipework/cabling and above ground piping supports. Extracted groundwater will be piped through 25 mm pipelines to an extraction manifold in the main system control container from where a 75 mm pipeline will transfer the extracted water to the evaporation ponds. The extraction manifold can measure instantaneous flow rate and volume extracted from each well and will have sample collection points. Extraction wells will have level transmitters monitored by the PLC allowing it to control the pumps and prevent them

running dry.

2.5.2 Transfer pipework

The transfer pipework will comprise two 75 mm HDPE pipelines (one for extracted groundwater and one for premises wastewater). The pipework will partially run above ground and partially be buried. Buried sections will be run through a PVC pipe conduit to protect the pipeline from damage. Water will primarily be delivered to the Concentration Pond East however a secondary flow path operated via a manual isolation valve, will be constructed to allow for flow to be directed to the Concentration Pond West as required. The system has been designed with sufficient capacity for transfer of the extracted groundwater (150 m³/day) as well as contaminated wastewater from the existing premises ponds. This is to allow for transfer of wastewater generated on the premises during normal operation or if existing wastewater ponds on the premises reach capacity to allow for evaporation of the wastewater.

2.5.3 Evaporation ponds

The applicant proposes to construct three evaporation ponds in the eastern portion of the premises, two concentration ponds (East and West) and a single precipitation pond. The ponds will be used to store and condense extracted groundwater and contaminated wastewater from the TAN Plant via solar evaporation. Precipitated solids/sludge from the precipitation pond will be collected and disposed to a licensed offsite disposal facility following a sufficient operational period.

The pond embankments and foundation will be constructed from in situ material from cut areas within the pond footprint and imported fill from local sources compacted to achieve specified density and moisture criteria. The foundations and embankments will be lined with double HDPE liners anchored to the embankment crest. The liners will be separated by a drainage layer. The applicant undertook a geotechnical investigation involving test pitting at the location of the evaporation ponds, and geotechnical laboratory testing of representative samples, to map the geological units present and their characteristics to inform the pond design. Laboratory testing of fill material from external sources was also undertaken to assess suitability for pond construction. The ponds have been designed by external consulting engineering firm Advisian.

Evaporation pond design

The applicant submitted a detailed design report for the evaporation ponds (Advisian 2022a). The report confirms the evaporation ponds have been designed in accordance with the *Department of Mines and Petroleum (DMP) - Code of Practice, Tailings Storage Facilities in Western Australia* (DMP 2013) and the *Australia and New Zealand Committee on Large Dams (ANCOLD) – Guidelines on Tailings Dams* (ANCOLD 2019 requirements for a dam assessed as a High C embankment failure consequence category, and a significant environmental spill consequence category. Design specifications for the pond as per the design report are summarised in Table 1. A stability analysis was undertaken for the proposed evaporation pond design which confirmed the minimum Factor of Safety (FOS) in accordance ANCOLD 2019 stability requirements are met for each pond.

Table 1: Evaporation pond design specifications

Design feature	Specifications		
	Concentration Pond West	Concentration Pond East	Precipitation Pond
Crest of Evaporation Pond	5 m wide		
Maximum	3.1 m / RL 5.5 mAHD	2.6 m/ RL 5.5 mAHD	2.5 m / RL 5.0

Design feature	Specifications		
	Concentration Pond West	Concentration Pond East	Precipitation Pond
Embankment Height			mAHD
Maximum operating level (MOL)	RL 4.40 mAHD	RL 4.40 mAHD	RL 3.90 mAHD
Spillway invert	RL 5.0 mAHD	RL 5.0 mAHD	RL 4.5 mAHD
Spillways	For each pond one 150mm concrete spillway up to 11 m wide and 0.5 m deep		
Slope of Internal and External Pond Batters	1V:2H		
Dimensions of Evaporation Pond	140 m x 146m Approximate surface area of 19,000 m ²	212 m x variable Approximate surface area of 16,000 m ²	76 m x variable Approximate surface area of 7,000 m ²
Water Storage Capacity (excludes freeboard)	19,420 m ³	16,870 m ³	7,620 m ³
Connector pipes	Two at RL 4.28 to 3.85 mAHD (to Precipitation Pond)	Three at RL 4.34 to 4.28 mAHD (to West Concentration Pond) Two at RL 4.28 to 3.85 mAHD (to Precipitation Pond)	NA
Freeboard	600 m between the maximum operating level and the spillway invert 1.1 m total freeboard to the embankment crest		

ANCOLD 2019 requirements for the design storage allowance above the pond maximum operating level (MOL) for a High C Consequence Category dam informed the pond embankment design. Bureau of Meteorology (BOM) Rainfall Intensity-Frequency-Density (IFD) curves for Karratha were used to determine key rainfall events. The resulting design storage allowances which were adopted for the evaporation pond design are detailed in Table 2 and illustrated in Figure 2 below. The design includes a 600 mm freeboard (to the spillway invert) to provide capacity for extreme storm storage in a 1 in 1,000 year AEP 72 hour rainfall event (619 mm). While the freeboard is slightly less than the design rainfall, it is considered adequate given the maximum recorded monthly rainfall is 348 mm for the area over a 50-year period (BOM 2022). Additionally, the design includes a 500 mm allowance above this to account for wave run up to prevent spillage during a storm surge event.

The embankment design includes an emergency spillway on each pond, set at the 600 mm freeboard level, to mitigate the risk of embankment damage during extreme weather events (i.e. a 1 in 1,000 year AEP 72 hour rainfall event). The spillways have been designed to convey 0.75 m³/s which is the flow associated with a 1-hour duration of Probable Maximum Precipitation (PMP) over the pond area less the 1-hour duration of 1: 1,000 event.

Table 2: Evaporation pond design storage allowances

Design case	Minimum requirement as per ANCOLD 2019	Allowance in pond design (mm)
Wet season water storage allowance	1: 10 notional AEP wet season runoff	210
Minimum extreme storm storage	1: 1,000 AEP, 72 hour rainfall event	600
Total Wave run up	1: 10 AEP wind event + 0.3 additional freeboard	500
Total freeboard above MOL	1: 100,000 + Wave run up for 1: 10 AEP wind event	1 100

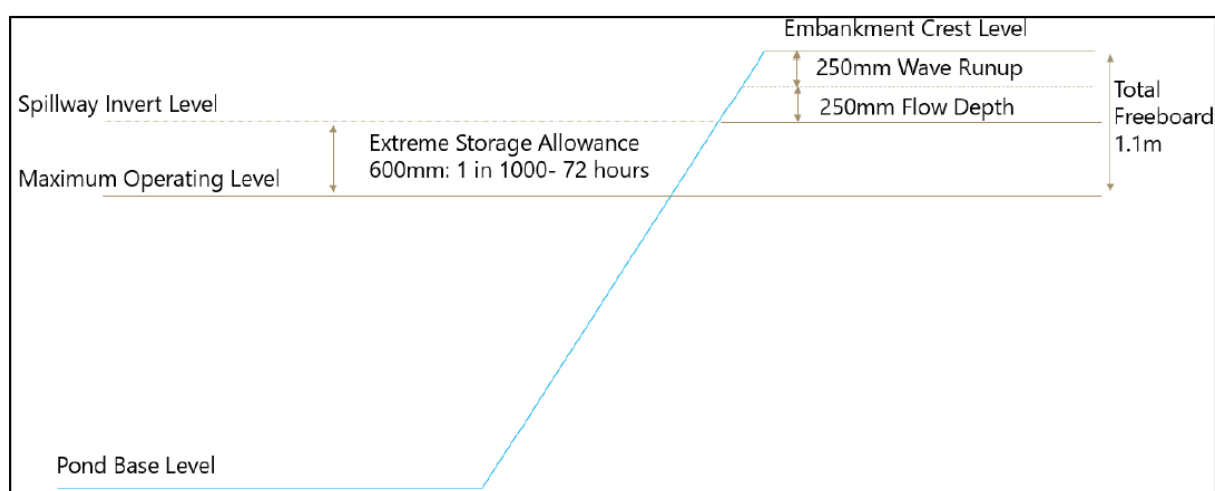


Figure 2: Evaporation pond freeboard and spillway

The ponds will have a capacity to contain 43,910 m³ at the MOL when constructed in accordance with the design. Yara Pilbara advised that 60% of the pond capacity is allocated for extracted groundwater and the remaining 40% for site wastewater management. Yara Pilbara has estimated that the ponds will provide for evaporation of approximately 91,000 m³ of wastewater per year based on surface area and evaporation records for the area.

Liner design

The evaporation ponds will be lined with a double liner system comprising:

- a 1.5 mm thick smooth white HDPE primary liner /top liner;
- a 1.5 mm thick smooth black HDPE secondary liner/base liner; and
- a geocomposite drainage layer between the primary and secondary liners for collection of any leakage. The drainage layer will comprise a biaxial, biplanar HDPE geosynthetic drain with geotextile bonded to both sides to protect the primary and secondary geomembranes.

The applicant provided specifications for the liners in a HDPE Liner Specifications Report (Advisian 2022b). The specification were selected taking into account the conditions the liner will be exposed to (elevated chloride and ambient temperatures/solar exposure). The liners will be anchored into a trench running along the internal crest of the embankments.

Each pond will have two recovery sumps. The floor of the ponds will be graded to slope toward the recovery sumps to allow for gravity flow of any leakage through the geocomposite drainage

layer to the sumps. The sumps will have water level loggers installed to allow real time monitoring for leaks and water level in each sump. A portable submersible pump system will be stored on the premises for transferring recovered water back to the evaporation ponds via leakage recovery pipes installed in the embankment and encased in stabilised sand.

Evaporation pond operation process

The evaporation ponds will be constructed with 110 mm diameter PVC connector pipes installed in the embankments to enable gravity water transfer between the ponds, which will facilitate the evaporation process. The connector pipes will be installed in the embankment between the East and West Concentration Ponds, and the embankment between the Concentration Ponds and the Precipitation Pond. The positioning of the pipes in the embankments will correspond with the maximum operational level for the relevant pond. The connector pipes will have valves to allow for operational control of flow between the ponds. The typical operational process for the ponds is outlined below:

- Extracted groundwater and wastewater will preferentially be transferred and discharged into the East Concentration Pond.
- A secondary inflow pipeline will be established to the West Concentration Pond to allow for extracted groundwater and wastewater to be directed into this pond if and when required. A manual isolation valve will be used to direct flow from the primary transfer pipeline to this pond.
- Once the East Concentration Pond is full gravity flow will transfer water to the West Concentration Pond and then on to the Precipitation Pond via the connector pipes.
- The connector pipe valves between the East and West Concentration ponds will remain open to allow water to gravity flow from the East to West Concentration Pond once the water level reaches the maximum operating level in the East Concentration Pond.
- The connector pipe valves between the West Concentration Pond and the Precipitation Pond will remain open to allow water to flow from the West Concentration Pond to the Precipitation Pond once the water level reaches the maximum operating level in the West Concentration Pond.
- The connector pipe valves between East Concentration Pond and Precipitation Pond will typically remain closed unless transfer is required to manage water levels or facilitate pond inspection or repair.
- Where ponds need to be emptied for inspection, repair or precipitate removal, the contained water will be pumped to an adjacent pond, and all connector pipe valves for that pond will be manually isolated. Gravity water flow will be maintained between the remaining two online ponds.
- Salts will primarily precipitate in the Precipitation Pond which will receive concentrated brine however a minor amount of precipitation is expected to occur in the Concentration Ponds although this is not anticipated to require removal.
- Based on water balance modelling the applicant anticipates clearing of precipitated solids and brine from the Precipitation Pond will be required approximately four years after commencing operation of the ponds.
- The applicant proposes to remove approximately half the brine in the fourth year of operating the pond with further removal of the brine and precipitated solids in the following year. The applicant proposes the leave a 15 cm layer of precipitated salts will be left in the pond to protect the liner.

2.6 Water Balance

The applicant undertook a water balance using a combination of PHREEQC (a computer program used for geochemical calculations/modelling) and Excel to determine the time required to evaporate the water based on the concentration of source water, and the required surface area/capacity for the evaporation ponds. PHREEQC was used to calculate the salt precipitation in the pond system and the activity of the remaining brine as the source water evaporates to 0.4% of the original volume. Results from the model were imported into Excel which then used these together with inflow, water depth and climate data to determine the pond composition over time. The modelling factored in reduced evaporation rates associated with pond storage and the salinity of the pond water.

The results of the water balance calculations undertaken indicate it will take around four years to reduce the water volume to 0.4%, and that solids precipitation in the Precipitation Pond will start around 18 months after the ponds commence operation and be complete after four years. A pond surface area of 40,000 m² is anticipated to be sufficient to achieve 90% water volume reduction in 14 months compared with the 42,000 m² area of the Concentration Ponds and Precipitation Pond.

Based on this modelling the applicant anticipates clearing of the Precipitation Pond will be required approximately four years after commencing operation of the ponds. In the fourth year of operation the applicant proposes to remove approximately half the remaining brine with further removal of the brine and precipitated solids in the following year. The applicant proposes the leave a 15 cm layer of precipitated salts will be left in the pond to protect the liner.

The delegated officer reviewed the water balance information provided and noted that monthly average rainfall and evaporation data from 1969-2000 had been used as an input, excluding more recent available climatic data. Noting that the Pilbara region has experienced climatic changes over time, including general trends of increased rainfall and reduced evaporation, particularly over the summer period (Sudmeyer 2016), and this trend was evident when comparing historic and more recent climatic averages relevant to the premises, the delegated officer conducted a simplified multi-year Excel water balance to compare results using climatic data for the periods 1969-2000 and 1991-2020. The pond surface area (all three ponds) and the projected inflow of 250 m³/day together with rainfall and evaporation data (adjusted by a pan factor of 0.7 to account for evaporation from ponds) were used to determine projected pond filling over a four-year period. When using historic climate data the water balance indicates evaporation exceeds inflows and precipitation each year where as more recent data indicates inflows and precipitation exceed evaporation and will reach capacity after approximately 3.5 years.

It is acknowledged that the department's water balance is a simplified approach and doesn't take into account the operational process of the ponds, fluctuating site inflows, and impacts of water quality, when compared to the applicant's water balance. Rainfall in the Pilbara region is also highly variable from year to year therefore water balances using climatic averages are indicative only. The delegated officer considers the ponds are appropriately sized and given the applicant intends to maintain a minimum operating freeboard in the ponds of 600 mm, has advised transfers into the pond will cease in the event the freeboard is exceeded, and inflows will be variable and able to be adapted as required, appropriate measures will be in place to prevent overflows occurring. Given the primary purpose for the ponds is for remediation of the contaminated site, the delegated officer considers that in the event of there being a risk of freeboard exceedance, or the ponds are filling faster than anticipated, premises wastewater inflow should preferentially be ceased to allow the ponds to continue receiving extracted groundwater, and the applicant should manage excess site wastewater as per the current practice of offsite disposal.

2.7 Rights in Water and Irrigation Act 1901 (RIWI Act)

Yara Pilbara applied for and has been granted a 26D licence under the RIWI Act to construct the new extraction wells required (CAW206911(1)). The existing 5C extraction licence has also

been varied to authorise Yara Pilbara to extract up to 150 m³/day (57,500 kL per year) of groundwater (GWL 205035(2)). The delegated officer noted that the installation of the extraction wells has already been authorised under the RIWI Act.

2.8 Part IV of the EP Act

The proposal to construct and operate the TAN Plant was referred to the Environmental Protection Authority (EPA) under Part IV of the EP Act on 11 November 2008 and was assessed through a Public Environmental Review (PER) assessment process. The EPA released its report and recommendation on the project (EPA Report 1379) in January 2011 and Ministerial approval for the proposal was granted through Ministerial Statement (MS) 870 on 11 July 2011. The proposed works are located within the TAN Plant development envelope and disturbance footprint authorised by MS 870. The statement has undergone a number of amendments since it was first issued with the most recent being via MS 1121 as a result of a section 46 review of condition 5 (requested by the Minister for Environment). The review resulted in replacement of the condition with a new condition which includes clear objectives to minimise air emissions to assist in maintenance of regional air quality to protect human health and amenity and minimise the risk of adverse impacts to rock art on Murujuga.

The application was referred to the department's EPA Services Branch to advise whether construction and establishment of the proposed infrastructure is consistent with the Part IV assessment and approval for the TAN Plant. EPA Services confirmed that the proposed activities are generally not inconsistent with previous Part IV approvals for the TAN Plant proposal as described in MS 870, and that based on the EPA's assessment report matters such as the regulation of wastewater appear to have been delegated to be regulated under Part V of the EP Act.

MS 870 was granted for the construction and operation of the TAN Plant and contains conditions that need to be considered in the assessment of emissions and discharges associated with the proposed works, operation of the works and the imposition of regulatory controls. A summary of conditions relevant to the works approval application is included in Table 3.

Table 3: Consideration of MS 870 conditions relevant to this application

Overview	Delegated officer considerations
<p>Condition 5-1 to 5-12 - amended in 2019 through MS 1121. Requires the proponent to meet the objectives of minimising air emissions from the proposal as far as practicable to protect human health, amenity and minimise the risk of adverse impact to rock art on Murujuga. The proponent is required to prepare and submit a revised Air Quality Management Plan and implement and make publicly available that plan once approved. The proponent is required to report to the CEO if monitoring of air emissions from the proposal indicates the objectives for air quality are not being met.</p>	<p>Yara Pilbara has undertaken a program of ambient air monitoring at three locations in proximity to the TAN Plant since 2017 in accordance with the requirements of condition 5 (including the previous version of that condition). The monitoring includes TSP and depositional dust monitoring and results of the monitoring program are reported on an annual basis. The delegated officer considers the requirements of condition 5 are applicable to the works approval application in that the proponent must minimise air emissions, notably dust, associated with the works and that ambient dust monitoring at the nearest sensitive receptor (Hearson Cove) is already in place.</p>

Overview	Delegated officer considerations
<p>Condition 7-1 – requires the proponent to employ necessary structures and apparatus as are necessary and agreed by the Department of Biodiversity, Conservation and Attractions (DBCA) to deter birds from entering the contaminated water pond, clean water pond and sewage wastewater treatment station pond.</p>	<p>Yara Pilbara has previously investigated bird deterrent systems and sought advice on the proposed systems from the then Department of Parks and Wildlife (now DBCA). The preferred deterrent option for implementation as agreed by DBCA requires parallel bird deterrent wires to be placed at an approximate 5 m spacing, 1 m above the water surface with weekly monitoring of the system.</p> <p>The delegated officer noted that the condition is not specific to the evaporation ponds and therefore determined to specify bird deterrent requirements in the works approval aligning with those agreed as preferred by DBCA.</p>
<p>Condition 7-2 requires that during construction of the TAN Plant the proponent place fauna refuges in trenches and other construction related voids and employ appropriately licensed personnel to undertake clearing of fauna from such installations.</p>	<p>The delegated officer noted that the MS requires specific actions to be taken during construction to prevent impacts to fauna as a result of excavations and voids and determined not to duplicate these requirements in the works approval.</p>
<p>Condition 9-1 and 9-2 – require the proponent to undertake an acid sulfate soils (ASS) investigation prior to the commencement of construction and to treat and manage any ASS encountered during construction in accordance with the department’s draft guideline on the treatment and management of acid sulphate soils and water in acid sulphate soil landscapes (DEC, 2009) and any subsequent revisions.</p>	<p>The delegated officer noted an ASS investigation was completed prior to construction of the TAN Plant. The investigation did not indicate the presence of actual or potential ASS within the plant site or adjacent area. To date no ASS have been disturbed on the premises. The delegated officer noted that if ASS are present within the area which will be disturbed to construct the evaporation ponds, the MS conditions require treatment and management to be undertaken and therefore will not duplicate these requirements in the works approval conditions.</p>

3. Risk assessment

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

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

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

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

Table 4: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction of evaporation ponds via cut and fill, and installation of groundwater extraction and transfer network	Air / windborne pathway	Watering of haul roads used for access, stockpiles, excavation and fill areas as necessary.
Noise			None
Operation			
Contaminated water (primarily elevated nitrates)	Extraction and transfer of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure) to the evaporation ponds	Loss of containment from the pipeline or extraction wells with direct discharge to ground, overland flow and/or infiltration to groundwater.	<ul style="list-style-type: none"> • HDPE transfer pipework will be procured and installed in accordance with the requirements of AS/NZS 4130-2009 – Polyethylene pipes for pressure applications • Sections of transfer pipeline which are buried will be run through a PVC pipe conduit to protect the pipeline from damage. • The transfer pipework will be inspected and pressure tested with fresh water to 1.5 times the normal operating pressure (1 bar) prior to commissioning. Leaks shall be rectified and lines re-tested. Records of pressure testing will be kept. • Pipework will be joined with electrofusion couplings. • Pressurised sections of the transfer pipework will have low pressure indicators monitored by a PLC programmed with an automatic shutdown fail safe. • The section of transfer pipework between the main system control container and evaporation ponds is open ended and will be visually inspected. • All construction materials and fittings will be new and installed in accordance with manufacturer’s instructions. • Permanent protection bollards will be installed around above ground infrastructure in trafficable areas to prevent damage to the extraction wells and transfer pipeline. • Below ground wells will be installed within suitably rated vaults. • Infrastructure integrity inspections will occur.

Emission	Sources	Potential pathways	Proposed controls
Noise		Air / windborne pathway	<ul style="list-style-type: none"> • No specific controls are proposed for noise. • The TAN Plant licence L9223/2019/1 includes a requirement for quarterly monitoring of noise at the south east corner of the premises which is closest to sensitive receptors.
Contaminated groundwater and waste water (primarily elevated nitrates)	Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure) in Evaporation Ponds	Loss of containment from the ponds due to overtopping discharging to ground leading to overland flow and/or infiltration to groundwater.	<ul style="list-style-type: none"> • Evaporation ponds have been designed in accordance with the DMP Code of Practice, Tailings Storage Facilities in Western Australia and the ANCOLD 2019 Guidelines on Tailings Dams with minimum FOS for a High C embankment failure consequence category met by the pond design. • The evaporation ponds have been designed, and will be constructed and operated, with a total freeboard of 1.1 m to account for extreme storm storage (600 mm) and wave run up to prevent spillage during a storm surge event (500 mm). • Each evaporation pond will have an emergency spillway set 600 mm above the maximum operating water level to protect the integrity of the embankment walls in an extreme storm event (72 hour 1:1,000 year AEP). • Unsuitable construction materials such as vegetation, deleterious matter such as tree stumps, roots rubbish, building rubble and other debris within the pond area will be removed. • Evaporation pond foundation, embankments and anchor trenches will be constructed using imported and in-situ materials (predominantly clay sands / sandy clays) compacted to achieve the following as determined by AS 1289.5.1.1. Testing to confirm the criteria are met will be undertaken by a party NATA accredited to undertake the analysis. <ul style="list-style-type: none"> – Foundation: 95% SMDD at – 2% to optimal moisture content (OMC) – Embankments: 98% SMDD at OMC to +2%. – Anchor trench fill: 98% SMDD at ±2% to OMC to +2% • If the maximum operating level of the ponds is exceeded, transfers into the ponds will cease until capacity is reinstated.

Emission	Sources	Potential pathways	Proposed controls
Contaminated groundwater and waste water (primarily elevated nitrates)	Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure) in Evaporation Ponds	Spillway activation causing direct discharge to ground, overland flow and/or infiltration to groundwater.	<ul style="list-style-type: none"> • The evaporation ponds have been designed with emergency spillways set 600 mm above the maximum operating water level which is only anticipated to activate in an extreme storm event (72 hour 1:1,000 year AEP, 619 mm). • The spillways have been designed to convey a 1 hour probable maximum precipitation event (less the design storage of a 1 hour 1:1,000 year AEP) with a peak outflow through the spillway of 0.75 m³/s. • Spillways will be of concrete construction underlain by 1.5 mm HDPE secondary liner with rock armoring at the base. • Inflow to the ponds will be stopped in event of the pond water level exceeding the maximum operating level (freeboard) and not recommence until the water level is below this.
Contaminated groundwater and waste water (primarily elevated nitrates)	Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure) in Evaporation Ponds	Seepage/infiltration from ponds	<ul style="list-style-type: none"> • Final surfaces which will be lined will be inspected prior to lining. The surfaces will be graded smooth, free from sharp objects or other materials which may damage the liner and will be rolled smooth with a static smooth drum roller. • The evaporation ponds will be double lined with 1.5 mm HDPE liners with a permeability of less than 1x10⁻⁹ m/s. • HDPE liners will be separated by a geocomposite drainage layer comprising a biaxial, biplanar HDPE geosynthetic drain with geotextile bonded to both sides. • The primary liner or drainage layer will be conductive to allow for liner integrity testing to be undertaken. • Liners and the drainage layer will be anchored in 0.4 m wide by 0.7 m deep anchor trenches backfilled with fill/soil in 200 mm layers compacted to 98% SMDD at a ±2% OMC. • HDPE liner specifications have been selected with consideration of aggressive conditions such as elevated temperature and UV exposure, and water quality characteristics (high chloride). Liners will be certified as meeting the specifications. • Geomembrane welding materials will be as provided and supplied by the manufacturer. • Liner installation will be performed under the direction of a supervisor who has installed a minimum of 1,000,000 m² of HDPE flexible lining material.

Emission	Sources	Potential pathways	Proposed controls
			<ul style="list-style-type: none"> • Thermal weld seams will be used to join geomembrane panels and all seams and joints will be inspected and subject to a vacuum box test or air pressure test to identify leaks. • Damaged or defective welds will be repaired and re-tested. The location of repaired defects will be recorded. • Two 200mm x 300mm pieces of the primary HDPE liner will be installed just below the final water level of each pond. They will be cut off during annual inspections and tested for Standard Oxidative Induction Time (OIT), High Pressure OIT and Elongation to evaluate liner condition over time. • Each pond will have two recovery sumps with water level loggers installed and monitored by the PLC to detect seepage. • A portable extraction system capable of recovering at least 5 m³/day will be available on the premises and used to recover and return seepage to the ponds in the event it occurs.
Contaminated groundwater and waste water (primarily elevated nitrates)	Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure) in Evaporation Ponds	Ingestion of, or contact with, nitrate contaminated water. Drowning	<ul style="list-style-type: none"> • A 1.05 m high perimeter chain fence will be installed around the external crest of the evaporation pond embankments. • Bird deterrents will be installed at the evaporation ponds.
Concentrated brine and precipitated solids/salts		Direct discharge to land and leaching/infiltrating to groundwater	<ul style="list-style-type: none"> • Brine and precipitated solids will be retained in the Precipitation Pond for the first 4 years of operation. • Precipitated solids will be transferred into waste removal trucks for offsite disposal. • An approximate 15 cm layer of precipitated solids will be retained in the Precipitation Pond to prevent liner damage when clearing.

3.1.2 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 5 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* (DER 2020)).

Table 5: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Hearson Cove beach (recreational area) (zoned conservation recreation and natural/landscapes)	550 m southeast
Deep Gorge (recreational area) (zoned conservation recreation and natural/landscapes)	1.2 km south
Industrial receptors within the Burrup Peninsular	From 1.6 to 2 km to the northwest and west
Residential Premises – Dampier townsite	7.8 km southwest
Residential Premises – Karratha townsite	11.7 km southeast
Environmental receptors	Distance from prescribed activity
Murujuga National Park	Borders the premises to the east, 350 m from the northern premises boundary and 800 m from the south southern premises boundary
National Heritage Listed place – Dampier Archipelago (including the Burrup Peninsula) (ID 105727)	Listed due to the presence of rock engravings and other Aboriginal heritage sites such as stone arrangements. The nearest rock art is within 100 m south of the premises. The premises intersects a number of registered aboriginal heritage site boundaries and there is a registered site boundary (23263) within 50 m of the southern embankment of the West Concentration Pond.
Significant fauna	Migratory and marine bird species listed under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> were recorded during fauna surveys of the premises conducted prior to the construction of the TAN Plant and additional migratory bird species potentially occur. The birds are likely to forage on the supratidal flat directly south of the premises.
Hearson Cove – marine tidal ecosystem	A supratidal flat is located directly adjacent to the premises boundary to the south and east which runs between Hearson Cove and King Bay. Hearson Cove and an associated mangrove community lie approximately 600 m southeast of the premises (upgradient).
King Bay – mangroves and marine ecosystem	King Bay and an associated mangrove community lie approximately 1850 m southwest of the premises. Groundwater flows to the south east from the premises toward the supratidal flats which connect to King Bay.
Underlying groundwater (non-potable)	Depth to groundwater at the premises is generally shallow

purposes)	and follows surface topography ranging from 0.5 and 8 metres below ground level. Depth to groundwater decreases towards the tidal flat. Variation is driven by tidal variation and rainfall. Groundwater flow is in a southerly to east south easterly direction toward the supratidal flats. The TAN Plant is located within the Pilbara Groundwater Area and Pilbara Surface Water Area (proclaimed under the RIWI Act).
Acid sulfate soil (ASS) risk	Activities located within an area of high to moderate risk of ASS within 3 m of the surface however previous ASS investigations did not identify AASS or PASS within the plant area or adjacent area.

3.2 Risk ratings

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

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

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 6.

Works approval W6639/2022/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 6 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment of existing licence L9224/2019/1 is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the constructed groundwater extraction network, transfer pipework and evaporation ponds. 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 amendment application.

Table 6: Risk assessment of potential emissions and discharges from the premises during construction and operation

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Construction								
Construction of evaporation ponds via cut and fill and installation of groundwater extraction and transfer network	Dust	Air / windborne pathway causing impacts to health and amenity	Hearson Cove Recreation area 550m east	Refer to Table 4	C = Slight , minimal impact to amenity at a local scale L = Possible , could occur at some time Low Risk	Y	NA	The Delegated Officer considers that given the works will occur within the Burrup Industrial Area within an operating industrial site, and there is a separation distance of over 500 m to the nearest public recreational areas, there is a low risk of noise and dust emissions generated during construction impacting the amenity of the public. The general provisions of the EP Act apply to fugitive dust from the construction works and the applicant is required to comply with relevant provisions in the Noise Regulations with respect to construction noise. The applicant also undertakes quarterly noise monitoring at the southeast boundary of the premises in accordance with licence conditions to confirm continued compliance with the Noise Regulations.
	Noise			None		NA		
Operation								
Extraction and transfer of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure) to the evaporation ponds	Contaminated water (primarily elevated nitrates)	Loss of containment from the pipeline or extraction wells with direct discharge to ground, overland flow and/or infiltration to groundwater. Resulting groundwater contamination and/or degradation of ecosystem health of the supratidal flats, mangroves and King Bay.	<ul style="list-style-type: none"> Groundwater (0.5 to 8m bgl) Supratidal flats immediately south of the premises King Bay Marine ecosystem (~1850 m downgradient) 	Refer to Table 4	C = Minor , low level onsite impacts and minimal offsite impacts at a local scale L = Unlikely , will probably not occur in most circumstances Medium Risk	Y	Conditions 1, 11, 12 and 13	CAW206911(1) issued to the applicant under the RIWI Act authorises construction of the extraction wells by a driller with a class 1 water well drillers certificate. The delegated officer considers further regulatory controls relating to the installation of the extraction wells are not necessary to mitigate loss of containment from the wells. Contaminated extracted groundwater and site wastewater will be transferred to the evaporation ponds by pipeline. To mitigate the risk of loss of containment from the pipelines impacting the surrounding environment the applicant proposes to install the pipework in accordance with the relevant Australian Standard, inspect and pressure test it prior to commissioning and during operation will conduct inspections and have low pressure indicators (indicate a leak) monitored by a PCL which can automatically shut down the pipework that is leaking in the transfer network. To protect the pipeline from damage the applicant proposes to encase buried sections of pipeline in PVC and install bollards around above ground sections in trafficable areas. The delegated officer considers the applicant's proposed controls are adequate to protect the integrity of the pipeline and mitigate the risk contamination or ecosystem impacts occurring as a result of containment loss. They have therefore been imposed as regulatory controls in the works approval.
	Noise	Air / windborne pathway causing impacts to amenity	<ul style="list-style-type: none"> Hearson Cove Recreation area 550m east 	None		C= Slight , minimal impact to amenity at a local scale L= Unlikely , will probably not occur in most circumstances Low Risk		NA

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure)	Contaminated water (primarily elevated nitrates)	<p>Loss of containment from the ponds due to overtopping with direct discharge to ground, overland flow and/or infiltration to groundwater.</p> <p>Resulting groundwater contamination and/or degradation of ecosystem health of Murujuga National Park, the supratidal flats, mangroves and King Bay.</p> <p>Sedimentation and erosion could also occur in a loss of containment event.</p>	<ul style="list-style-type: none"> - Groundwater (0.5 to 8m bgl) - Supratidal flats immediately south of the premises - King Bay Marine ecosystem (~1850 m downgradient) - Murujuga National Park immediately east of the ponds - Registered Aboriginal heritage site 23263 less than 50 m from the Evaporation Ponds boundary 	Refer to Table 4	<p>C = Major, short-term impact to an area of high conservation value or special significance</p> <p>L = Rare, may only occur in exceptional circumstances</p> <p>Medium Risk</p>	N	<p>Conditions 1, 2, <u>11</u>, <u>12</u>, <u>13</u>, <u>15</u> and <u>16</u></p>	<p>The evaporation ponds will contain a large volume of saline, nitrate contaminated water, brine and precipitated salts (approximately 44,000 m³). There is a risk of embankment failure or overtopping resulting in the discharge of large volumes of contaminated water to the surrounding environment associated with this activity. The delegated officer reviewed the applicant's design report which reports the ponds have been designed in accordance with relevant guidelines, geotechnical assessment has been undertaken to identify suitable construction materials, and the embankments will meet FOS requirements if constructed in accordance with the design. The ponds have been designed with spillways to mitigate the risk of embankment failure during extreme storm events and based on the spillway positioning will operate with a 0.6 m freeboard and 1.1 m total freeboard to provide allowance for wave run up. Construction and operation of the pond as per the design is critical to mitigating the risk of loss of containment causing impact to the surrounding water and ecosystems, therefore the delegated officer has applied the design details as construction requirements in the works approval and maintenance of the freeboard as an operational requirement. Visual perimeter pond inspections were also specified to confirm integrity and freeboard are maintained. As the ponds are for storage and containment of a waste the delegated officer considers them to be critical containment infrastructure in accordance with the department's <i>Guideline: Industry Regulation Guide to Licensing</i> and included a requirement for a Critical Containment Infrastructure Compliance Report for the ponds, and associated hold period prior to commencing time limited operation of the ponds.</p> <p>The delegated officer noted the applicant conducted a water balance to determine pond sizing and the timeframe required for precipitation of salts. Although the water balance did not consider recent climatic conditions (refer section 2.6), the delegated officer considered the ponds to be appropriately sized given the applicant intends to maintain a suitable freeboard by ceasing inflows where necessary.</p> <p>As the primary purpose of the evaporation ponds is for the remediation of a contaminated site the delegated officer considers use of the ponds for disposal of contaminated groundwater should be prioritised over site wastewater. The delegated officer included the following controls in the works approval to ensure the primary purpose is achieved.</p> <ul style="list-style-type: none"> • a limit of 250 m³/day inflow based on the capacity the ponds are designed to treat to ensure the ponds retain adequate capacity for remediation; • associated monitoring and reporting of groundwater and premises wastewater inflows; • premises wastewater inflows preferentially ceased in the event the freeboard being at risk of being exceeded; and • reporting requirements in the event of freeboard exceedance.

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure)	Contaminated water (primarily elevated nitrates)	Seepage/infiltration from ponds leading to soil and groundwater contamination.	– Groundwater (0.5 to 8m bgl)	Refer to Table 4	C = Moderate mid level onsite impacts and low level offsite impacts at a local scale L = Unlikely , will probably not occur in most circumstances Medium Risk	N	Conditions 1, 2, 3, <u>12</u> , <u>13</u> and <u>16</u>	<p>There is a risk of seepage from the ponds causing contamination of groundwater due to the nature of the contained water (premises wastewater and contaminated groundwater containing elevated nitrates). To mitigate this risk the applicant has proposed to line the evaporation pond foundations and embankments with a dual HDPE liner system, separated by a geocomposite drainage layer which will also allow for detection and collection of leakage through the primary liner if it occurs. Liner specifications have been selected to account for the nature of the wastewater and high UV exposure of the Burrup. The ponds will be constructed to drain toward recovery sumps so any leakage which occurs drains to the sumps via the drainage layer where it can be pumped back into the pond.</p> <p>To ensure an acceptable level of risk with regards to seepage is maintained the delegated officer applied the design requirements for the liners, geocomposite drainage layer and recovery sumps with water level loggers as construction requirements in the works approval. Operational requirements relating to water level monitoring, detection and recovery of seepage from the recovery sumps were also included aligning with those proposed by the application. The delegated officer also included a requirement for daily perimeter inspections of the ponds which includes the geomembranes and management actions/reporting to be undertaken in the event water is detected in the recovery sumps (indicative of a potential leak).</p> <p>The applicant proposed use of sacrificial tags of pond lining, subject to annual testing to assess the integrity of the pond liners over time. As this testing is proposed to occur annually (exceeding the time limited operational period of the works approval), and the delegated officer considers this to be an appropriate frequency for detecting changes, the delegated officer has included a requirement to install the sacrificial liner tags in the works approval but annual testing and reporting/comparison of the results should be included as a regulatory control in any subsequent licence amendment.</p>

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure)	Contaminated water (primarily elevated nitrates)	Spillway activation causing direct discharge to ground, overland flow and/or infiltration to groundwater. Resulting groundwater contamination and/or degradation of ecosystem health of Murujuga National Park, the supratidal flats, mangroves and King Bay.	<ul style="list-style-type: none"> - Groundwater (0.5 to 8m bgl) - Supratidal flats immediately south of the premises - King Bay Marine ecosystem (~1850 m downgradient) - Murujuga National Park immediately east of the ponds 	Refer to Table 4	C = Major , short-term impact to an area of high conservation value or special significance L = Rare , may only occur in exceptional circumstances Medium Risk	Y	Conditions 1, 2, <u>14</u> and <u>15</u>	<p>The applicant has included spillways in the evaporation pond design to ensure the stability of the embankments is maintained during extreme rainfall events and prevent an uncontrolled discharge of concentrated contaminated water from the ponds. The use of spillways to manage water discharge as a result of extreme weather events is consistent in ANCOLD guidance. Spillways are not expected to be activated by rainfall events less than a 72 hour 1:1,000 year AEP (i.e activation of the spillway is considered rare), provided the applicant operates the ponds with a freeboard of at least 600 mm between the maximum operating level and spillway inverts.</p> <p>Activation of the spillway will allow for controlled release of water from the evaporation ponds. The delegated officer anticipates the water discharged is likely to be dilute rather than highly contaminated/saline considering more than 600 mm of rainfall is likely to have entered the ponds and may form a fresher lense on top of the more concentrated saline pond water.</p> <p>To maintain an acceptable level of risk associated with activation of the spillways, the delegated officer considers it necessary to include conditions requiring them to be constructed in accordance with the design provided and the evaporation ponds operated with a 600 mm freeboard. The delegated officer additionally included a condition which only authorises discharge via the spillways in the event rainfall in the preceding 72 hours exceeding 600 mm to ensure they are only activated when necessary, and not due to overfilling of the ponds. Management actions/reporting to be undertaken in the event of freeboard exceedance or spillway activation were also included.</p>

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure)	Contaminated water (primarily elevated nitrates)	Spillway activation causing direct discharge to ground and overland flow leading to erosion, sedimentation and/or flooding with resulting vegetation health decline, or impact to a registered aboriginal heritage site	<ul style="list-style-type: none"> Registered Aboriginal heritage site 23263 less than 50 m from the Evaporation Ponds boundary Murujuga National Park immediately east of the ponds 	None	<p>C = Major, short-term impact to an area of high conservation value or special significance</p> <p>L = Rare, may only occur in exceptional circumstances</p> <p>Medium Risk</p>	Y	<p>Conditions 1, 2 14 and 15</p>	<p>Inclusion of spillways in the evaporation pond construction is expected to prevent uncontrolled discharge of a large volume of water from the ponds, which is likely to result in significant erosion and sedimentation impacts. Discharge via the spillways is a controlled release and therefore presents less risk of such impacts occurring. The design includes riprap at the base to slow water flow and prevent erosion at the base of the pond. The delegated officer applied the design criteria of the spillways as controls in the works approval to ensure any discharge which occurs is controlled thereby minimizing any erosion of sedimentation which may occur. The delegated officer also included management actions to be undertaken in the event of spillway activation.</p> <p>The applicant has advised that spillways are required on each individual pond, even though they are connected, as the ponds would otherwise need to be larger to meet safety requirements.</p> <p>The delegated officer reviewed the spillway locations and noted that there is a registered Aboriginal Heritage Site boundary in close proximity to the West Concentration Pond spillway (<50 m but outside the premises boundary). The Aboriginal Heritage Management Plan for the TAN Plant states that in order to comply with conditions of the section 18 Consent granted under the <i>Aboriginal Heritage Act 1972</i> (AH Act) for the premises, the artefact scatter at this location was to be fenced prior to construction commencing, and no activity is allowed within the site boundary. The spillway location will discharge to the east of the site boundary however the applicant should confirm flow path will not impact the registered site in the event the spillway is activated to ensure they are not a risk of non-compliance with section 18 Consent requirements.</p> <p>The delegated officer also noted that the East Concentration Pond spillway will discharge toward the adjacent Murujuga National Park. The applicant has advised that relating to works which have been undertaken to prevent upstream catchment flows onto the premises, the area to the east of the evaporation ponds will be contoured from north to south to achieve unimpeded hydrological connection from upstream catchment surface water flows to the upper supra-tidal flats. In the event that the spillway is activated, the contouring will aid to direct the discharge to the supra-tidal flats, rather than into the National Park.</p>
Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure)	Contaminated water (primarily elevated nitrates)	<p>Ingestion of, or contact with, nitrate contaminated water leading to fauna injury, illness or death</p> <p>Drowning</p>	<ul style="list-style-type: none"> Fauna (particularly birds), including protected species within surrounding areas 	Refer to Table 4	<p>C = Moderate, low level offsite impacts at a local scale</p> <p>L = Unlikely, will probably not occur in most circumstances</p> <p>Medium Risk</p>	N	<p>Conditions 1, 11, 12 and 13</p>	<p>The delegated officer considered that given the infrastructure is being constructed on an existing fenced operating industrial premises (restricted access and noise as a deterrent), and the applicant has proposed to install additional fencing and bird deterrents to prevent fauna access to the ponds, fauna (including birds) are unlikely to access the pond area. The delegated officer noted that the applicant did not specify the type of bird deterrents that would be installed. Noting the requirements of condition 7-2 of MS 870 (refer to Table 3), and DBCA's agreement with parallel wires as an appropriate deterrent, the delegated officer considered it appropriate to specify installation and maintenance of bird deterrents which align with this. To monitor the effectiveness of the bird deterrents the delegated officer also included a requirement to record any fauna deaths during daily inspections of the ponds and include a summary of inspections in the time limited operations report.</p>

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Storage of contaminated groundwater (from groundwater plume) and wastewater (from existing premises infrastructure)	Concentrated brine and precipitated salts	Leaching or direct discharge to land causing contamination of soil and surface and/or groundwater.	<ul style="list-style-type: none"> - Groundwater (0.5 to 8m bgl) - Supratidal flats immediately south of the premises - King Bay Marine ecosystem (~1850 m downgradient) 	Refer to Table 4	C = Moderate , mid level onsite impacts and low level offsite impacts at a local scale L = Unlikely , will probably not occur in most circumstances Medium Risk	N	Conditions 1, 2 and 3	<p>The precipitation pond will primarily store/accumulate brine and precipitated salts. There is a risk the contained materials will leach into soils and groundwater causing contamination. As discussed earlier in this table the applicant has proposed appropriate construction and lining of the ponds to ensure brine and precipitated solids are retained within the Precipitation Pond. The delegated officer has applied pond construction and lining requirements as controls in the works approval to maintain the assessed level of risk.</p> <p>The applicant anticipates removal of the solids and brine will not be undertaken until the fourth year of operation. Based on this removal will not be required during the 180 day time limited operational period authorised in the works approval. The delegated officer therefore determined not to include regulatory controls relating to removal of the precipitated salts and brine. Given the potential for these materials to cause contamination in the environment, undertaking removal and disposal of these materials at an appropriate time during operation of the evaporation ponds will present an elevated risk of contamination if they are allowed to be stored outside of the ponds for any period of time. The delegated officer therefore considers that when L9223/2019/1 is amended to include the operation of the ponds it should include controls preventing storage of the brine and salts outside the ponds prior to disposal, or if storage is required, it must be within contained vessels, of suitable construction for the contained materials, for a minimal time period. The delegated officer does not consider it necessary to include requirements specifying where the brine and salts should be disposed as it is the responsibility of the waste generator to determine appropriate means of waste disposal to avoid committing an offence under the provisions of the EP Act.</p>

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: Conditions **4, 5, 6, 7, 8, 9, 10, 17, 18, 19, 20** and **21** are all department imposed conditions required for compliance reporting, authorising time limited operation, and general complaint and record keeping requirements

4. Consultation

Table 7 provides a summary of the consultation undertaken by the department.

Table 7: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 2 February 2022 for a period of 21 days, and in the West Australian Newspaper on the same date (check).	No comments were received in response to the advertisement of the application	N/A
Local Government Authority advised of proposal on 3 February 2022	No comments were received from the LGA.	NA
Other Stakeholders advised of the application 3 February 2022 and invited to provide comment including: <ul style="list-style-type: none"> • Murujuga Aboriginal Corporation • Dr John Black • Friends of Australian Rock Art (FARA) • Dr Marie Ferland • Department of Biodiversity, Conservation and Attractions • Conservation Council of Western Australia 	<p>DBCA responded and confirmed that installation of 5 m spaced wires as a bird deterrent was an appropriate management control for birdlife.</p> <p>FARA and Dr J Black submitted responses to the correspondence on 24 February 2022. A summary of their comments and the department's response is provided in Appendix 2</p>	<p>The Delegated Officer noted the DBCA's response.</p> <p>The department's response to the matters raised by these stakeholders is provided in Appendix 2.</p>
Applicant was provided with draft documents on 4 July 2022	The applicant submitted a response to drafts on 25 July 2022. A summary of their comments and the department's response is provided in Appendix 1	The department's response to the matters raised is provided in Appendix 1.

5. Decision

Based on the assessment in this decision report, the Delegated Officer has determined that the proposal to construct and operate a groundwater extraction network, transfer pipework and evaporation ponds to enable the remediation of a contaminated site on the Yara Pilbara TAN Plant premises in accordance with Phase 2 of their RAP, will not pose an unacceptable risk of to public health or the environment. This determination is based on the following.

- The primary purpose of the evaporation ponds is for remediation of a contaminated site. The ponds will receive up to 250 m³ per day of nitrate contaminated water groundwater (60%) (extracted from the contaminated site) and site wastewater (40%).
- The evaporation pond surface area and capacity have been informed by modelling and a water balance which indicate approximately four years is required to precipitate salts from the water based on the predicted inflow of 250 m³ per day.

- The evaporation ponds have been designed to meet appropriate ANCOLD Factor of Safety requirements and will have spillways to minimise the risk of embankment failure.
- The evaporation ponds have been designed and will be operated with adequate freeboard to minimise the risk of overtopping or discharge through the spillways.
- The evaporation ponds will have a dual HDPE liner system to minimise the risk of seepage. A drainage layer will be installed between the liners which will reduce the risk of damage to the liners and will allow for identification and collection of seepage if it occurs.

In order to minimise the potential for environmental impacts to occur the applicant has proposed the following key controls which have been imposed in the works approval as they are considered critical to maintaining an acceptable level of risk:

- Construction of the evaporation ponds in accordance with the specifications set out in the Evaporation Pond Design Report which have been based on ANCOLD 2019 requirements.
- Installation of a dual HDPE liner system separated by a geocomposite drainage layer that meet the specifications in HDPE Liner Specification document to minimise the likelihood of seepage occurring.
- Installation of recovery sumps which will allow for identification of any seepage through the primary HDPE liner via water level loggers and enable recovery of seepage.
- Installation of a spillway on each pond to minimise the risk of overtopping during extreme rainfall events.
- The ponds will be operated to a maximum water level which provides at least 0.6 m freeboard to the spillway inverts to provide extreme storm storage based on a 1:1,000 year AEP 72 hour rainfall event and the ponds will have a total freeboard of 1.1 m to prevent overtopping due to wave run-up during an extreme storm event.
- The extraction network and pressurised sections of the transfer pipeline will be controlled and monitored by a PLC that is capable of shut-down in the event of a pressure loss (indicative of a leak) and will record the volumes of extracted groundwater and wastewater discharged. This will be supported by visual inspection of sections unable to be remotely monitored.
- Permanent bollards will be installed around above ground extraction and transfer infrastructure in trafficable areas to prevent damage.
- Bird deterrents and perimeter fencing will be installed at the ponds to prevent fauna access.

The delegated officer determined to apply some additional operational controls in the works approval to ensure the ponds operate as per design and any integrity issues are identified in a timely manner. These include:

- Daily perimeter inspections of the evaporation ponds for integrity issues, freeboard and fauna impacts to ensure issues are identified and responded to in a timely manner.
- Management actions to be taken in the event freeboard is exceeded or water is recorded by water loggers in the recovery sumps.
- Monitoring of any seepage recovered from the recovery sumps to ensure identification of potential issues with liner integrity in a timely manner.
- Continuous monitoring of the volume of extracted groundwater and wastewater discharged into the ponds, monitoring of other wastewater transfers into the ponds (i.e. via truck or tanker) and a limitation on inflows into the pond based on the design basis

of 250 m³ per day to minimise the likelihood of the ponds filling too rapidly or not being able to dispose of contaminated wastewater to the ponds.

- Limitations on spillways activation such that they are only authorised to activate (discharge to the environment) in the event more than 600 mm of rainfall has occurred in the preceding 72 hours to ensure activation only occurs as a result of an extreme rain event (1:1,000 year AEP). Requirements for reporting and monitoring of any spillway activation were also included.

The delegated officer is satisfied the above controls lower the overall risk profile of the proposed infrastructure, and adequately address the potential for unacceptable impacts to the environment to occur. As the works are proposed to be conducted in a staged manner, the works approval has been constructed to enable staged compliance reporting and time limited operation to occur.

A licence amendment will be required to authorise ongoing operation of the constructed infrastructure. Licence conditions will not be finalised until the department assesses the amendment application. The department will consider information reported in the Compliance Reports, the Time Limited Operations report, and any CEO notifications made during the works approval period, in assessing the application. Conditions will be imposed to ensure day-to-day operations do not pose an unacceptable risk of impacts to on and off-site receptors.

Works Approval W6639/2022/1 that accompanies this report authorises construction and time limited operations only. The conditions in the issued works approval, as outlined in the above risk table have been determined in accordance with the *Guidance Statement: Setting Conditions* (DER 2015).

6. 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.

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14. EPA 2019, Ministerial Statement 1121, Technical Ammonium Nitrate Production Facility, Burrup Peninsula, City of Karratha, Perth, Western Australia.
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Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Condition 1 Table 1 Groundwater extraction system	Requested the number of extraction wells specified to be installed be removed as there may be a need to install more wells in the future (subject to approval under the RIWI Act). Also requested the requirement for permanent bollards to be installed at each extraction well be amended to only those wells which are above ground and located in trafficable areas. Advised that below ground wells would be installed within suitably rated vaults.	<p>The delegated officer noted that CAW206911(1) authorises the construction of up to 55 non-artesian wells and therefore determined it appropriate to revise the number of wells which can be constructed from up to 36 to up to 55 for consistency with the RIWI Act licence to construct or alter wells.</p> <p>The delegated officer also considered it appropriate to revise the requirement for permanent protection bollards to only be required for above ground extraction wells in trafficable areas, as only those wells are at risk of damage from vehicles. The requested change was made and an additional requirement included for below ground wells to be installed in vaults.</p>
Condition 1 Table 1 Transfer pipework	<p>Clarified some of the proposed controls for the extraction network and transfer pipework and requested changes to the works approval requirements and descriptions in the decision report to reflect these including:</p> <ul style="list-style-type: none"> • HDPE pipework will be connected with electrofusion couplings rather than compression fittings • The sections of the transfer pipework between the Main Control Container/PLC and evaporation ponds are open ended and therefore pressure sensors are unable to be used to detect leakage on these sections. Pressure sensors will therefore only be installed on pressurised sections of the pipeline and the open ended sections will be subject to inspection. • Protection bollards are only proposed to be installed around the transfer pipework in trafficable areas. Remaining above ground pipework will be located in metal conduit. 	<p>The delegated officer considered the changes would not increase the risk of operation of transfer pipework causing detrimental impact to receptors and amended the works approval requirements to reflect the requested changes.</p>
Condition 1 Table 1 Bird deterrent system	Requested the requirements be amended in line with the bird deterrents installed on existing ponds at the TAN Plant, such that the wires be attached to the perimeter fence posts (will therefore be located approximately 1 m above the embankment crest). The perimeter chain link	<p>Requirements for bird deterrents were based on the deterrents in place on existing ponds. As the requested change aligns with deterrents currently in use, and is not considered to increase the risk of birds being impacted by the infrastructure, the delegated officer amended</p>

Condition	Summary of applicant's comment	Department's response
	fence prevents birds entering the facility under the wires	the works approval requirements and decision report content to reflect the requested change.
Condition 2 Table 2 Evaporation pond recovery sumps	Requested changes to the sump requirements as the applicant intends to install water level loggers to enable real time monitoring/detection of leaks/water level. Rather than installing a submersible pump in each recovery sump the applicant proposes use of a portable submersible pump system, capable of pumping at least 5 m ³ /day, and with a flow meter on the extraction line, which would be stored on the premises and is able to be connected to the leakage recovery pipe in the sumps in the event leakage is detected, to allow for leakage recovery. Volumes of recovered leakage transferred to the ponds would be monitored.	The delegated officer considered the revised infrastructure requirements provide for equivalent detection and recovery of leakage therefore do not increase the risk seepage impacting on surrounding receptors. The works approval construction and operational requirements and decision report content relating to the recovery sumps were therefore revised accordingly.
Conditions Compliance reporting (conditions 4-7) and time limited operation (conditions 8-10)	<p>Advised it is intended to construct the infrastructure in two stages to enable the applicant to meet its commitment to the department's Contaminated Sites Branch to commence operation of the extraction network by the end of 2022. Requested changes to the works approval requirements such that construction and time limited operation can be conducted in stages. Stage 1 will include the extraction network, transfer pipelines and the East Evaporation pond. Stage 2 will include the West and Precipitation Evaporation Ponds. Staged construction will enable Stage 1 to be completed during the dry season and commence operation while Stage 2 is then constructed as there is insufficient time to complete both stages before the end of 2022.</p> <p>Noted that a certifier for the Environmental Compliance Report was not stated and included an alternate definition of a suitably qualified and experienced engineer, to certify the report.</p>	<p>The delegated officer considers the proposal for staged construction and time limited operation will not increase the assessed risk profile of the premises and therefore agreed to alter the works approval requirements and decision report to reflect construction and time limited operation occurring in two stages.</p> <p>The department does not specify engineer certification of all infrastructure in Environmental Compliance Reports. The requirement is specified based on the risk failed infrastructure poses. The delegated officer does not consider engineer certification of the non CCI infrastructure (fences, bird deterrents, extraction bores and transfer pipes) to be warranted.</p>
Condition 10	Noted there is a discrepancy in the time limited operational period referred to in the works approval (120 calendar days) and the decision report (6 months) and requested they are aligned to six months. Queried whether time limited operation is able to continue until a licence amendment is granted if it extends beyond the six month timeframe specified.	<p>The delegated officer considers it appropriate to amend the works approval time limited operations period to align with the decision report (180 calendar days) as the timeframe does not change the assessed risk and allows sufficient time for assessment of a licence amendment application post construction.</p> <p>The conditions of the works approval restrict time limited operation to the sooner of 180 days or when a licence is granted. Time limited operation is therefore not authorised to occur beyond the 180 day timeframe. The requirement is as such to ensure applicants submit a licence/amendment application in a timely manner following completion of construction, rather than delaying submission.</p>

Condition	Summary of applicant's comment	Department's response
Condition 13 Table 5	<p>The applicant considers the PLC monitoring of pressure sensors on the transfer pipework is sufficient control for detection of leaks and an increase from daily to fortnightly pipeline inspections has been requested. Additionally, it is considered the evaporation pond inspections should also be increased from daily to fortnightly as there is already a high level of control applied to the infrastructure. The applicant stated that findings from regular perimeter inspections will report damage to pong infrastructure, freeboard capacity breach and fauna death/entrapment.</p>	<p>The delegated officer considers regular inspections are necessary during the time limited operational period to confirm operation of the infrastructure is as anticipated.</p> <p>Given that the pipeline contains contaminated water, pressure sensors will not operate on open ended sections of the pipeline, the applicant advised sections without pressure sensors would be inspected, and the ability to detect minor leaks is dependant on the sensitivity of pressure sensors, the delegated officer considers daily pipeline inspections to be appropriate when the pipeline is operating, and retained this requirement.</p> <p>The delegated officer considers in appropriate to tailor inspection requirements to the key risks. Inspection requirements for the recovery sumps were removed as the water level loggers connected to the PLC are considered an appropriate means to detect seepage. An additional requirement for reporting and investigation in response to water being detected in the recovery sumps was added to the works approval as it is considered appropriate that the department be made aware of potential integrity issues in a timely manner.</p> <p>Other inspection requirements relating to the evaporation ponds were retained at a daily frequency as they are considered key to early detection of potential integrity or capacity issues or fauna impact. The wording of the inspection requirements was revised to clarify a daily perimeter inspection is required.</p>
Condition 16 Table 8	<p>Provided confirmation that the PLC in the main system control container will record groundwater flows into the ponds and that if wastewater needs to be manually transferred into the evaporation ponds from existing ponds 1 and 2 it would be transferred by the site waste service provided and the volume would be recorded.</p>	<p>Updated the table to reflect the information provided. Added monitoring requirements relating to seepage recovery sump water level based on the advice that water level loggers would be installed.</p>
Table 9 Definitions	<p>Requested the definition for premises wastewater be expanded to include wastewater from TAN Plant ponds 1 and 2 in addition to ponds 4 and 5 specified as water may be transferred into the evaporation ponds from ponds 1 and 2 via a truck in the event of high rainfall requiring contingency wastewater storage.</p>	<p>The definition was updated to include the additional ponds as they are located on the premises and the works approval has sufficient controls to mitigate the risk of overfilling the evaporation ponds.</p>
Decision Report	<p>Advised that only 24 extraction wells are proposed to be put into service initially in 2022 and the remaining 12 will be ready for use after initial 6-</p>	<p>Noted.</p>

Condition	Summary of applicant's comment	Department's response
	month performance review.	
	Applicant provided a response to several queries regarding criteria in the pond design report. Advised that some incorrect numbers were included in the report that have since been amended.	The decision report was updated to reflect the revised details for the pond surface area, the design rainfall events,
	Advised that fauna clearing licences are no longer required from DBCA for removal of fauna from construction voids and that suitably trained personnel would undertake this activity and contact DBCA if advice is required during this.	Noted.

Appendix 2: Summary of comments on the application from stakeholders

Comments received	Department response
<p>Concerned that a works approval is only now being sought for remediation of a site classified as potentially contaminated in 2018, that DWER did not meet with Yara Pilbara to discuss remediation of the contaminated site prior to July 2021 when contamination had reached King Bay, and that DWER has not sought to stop the cause of the contamination earlier.</p> <p>Estimated based on information in the application relating to the amount of nitrate in contaminated soil removed from the premises that the level of soil contamination was 38,000 ppm nitrate-N which is very high and likely to kill/prevent plant growth and soil organisms.</p> <p>Requested the TAN Plant cease production until the contamination problem is resolved.</p>	<p>Identification, recording, management and remediation of contaminated sites is regulated under the CS Act and Regulations. The department's <i>Guideline: Assessment and management of contaminated sites</i>, provides guidance on the investigation/assessment and management of contaminated sites in WA within the legislative framework provided by the CS Act and Regulations. The <i>National Environmental Protection (Assessment of Site Contamination) Measure 1999</i> (ASM NEPM) also guides the assessment of contamination. This framework establishes the order and scope of investigative studies which must be undertaken dependant on the classification of a site.</p> <p>Yara Pilbara has undertaken a suite of investigations and submissions to the department since first reporting the discharge of process effluent on the premises in accordance with this framework. This has included preliminary and detailed site investigations, development of a conceptual site model, ecological risk assessment, groundwater, surface water and sediment sampling events, and assessment of remediation options.</p> <p>The initial MAR submitted to the department in 2020 for the site outlines various works which have been undertaken to stop the source of contamination including soil remediation works for areas impacted by spills and leaks and replacement/repair of much of the infrastructure. In the report the auditor recommended that active groundwater remedial measures were not required based on the low level of environmental risk indicated to sensitive ecological receptors at that time further however the auditor recommended further detailed site-specific ecological investigation were undertaken to inform the ecological risk assessment. The May 2021 rainfall event highlighted that there was a potentially unacceptable risk of offsite impacts occurring and that active remediation would be required.</p> <p>Records relating to sites which have been reported under the CS Act are able to be requested from the department via submission of a Form 2 and payment of a fee.</p>
<p>Queried why DWER did not seek comments on the application until three months after it was submitted.</p>	<p>In accordance with the department's <i>Guideline: Industry Regulation Guide to Licensing</i>, stakeholder and public consultation is not undertaken until applications have been accepted for assessment and the required fees have been paid. The applicant was advised on 28 January 2022 that their payment had been received and application accepted with advertising of the application and sending of consultation letters occurring the following week.</p>

Comments received	Department response
<p>Concerned the conceptual model in the application suggests large amounts of groundwater have become highly contaminated with ammonia and ammonium nitrate. Rainfall events will dissolve nitrate containing salt crusts and enter King Bay and groundwater will also move through the soil to King Bay polluting the environment.</p> <p>Queried what studies DWER has required Yara Pilbara undertake for damage done to mangroves, bird and marine life at King Bay after the rainfall event in May 2021 washed contaminated water into the Bay.</p>	<p>Management of the contaminated site and associated reporting and investigation/studies are being undertaken under the requirements of the CS Act. A three Phase RAP has been developed to remediate the contaminated site on the premises. The works approval has been sought only for part of the Phase 2 scope (extraction, transfer and evaporation of contaminated water) as these works relate to construction of infrastructure for the storage and treatment of a waste (contaminated groundwater). As detailed in sections 2.3 and 2.4 phase 1 works have already been undertaken to remove the contaminated soil, install sumps for capture and removal of contaminated surface water and a weir to separate the impacted area from the upper tidal flats to prevent migration of nitrates into surface waters and transfer off the premises.</p> <p>A preliminary ecological risk assessment was undertaken in 2018 and submitted with the initial MAR. A detailed ecological risk assessment, assessing the off-site ecological risk posed by nutrients, since the May 2021 rainfall event, is currently being finalised by Golder, and will be provided to the department as an addendum to the preliminary ecological risk with the 2022 MAR. This has included sampling and analysis of the supra-tidal flats sediments and water down gradient of the premises.</p>
<p>Raised concern that a premises adjacent to a National Heritage Listed area which contains the oldest continuous record of human activity in rock engravings becoming so contaminated is an indictment on the WA Government and the decision makers at the department. Concerned that mismanagement of the premises by the department/WA Government puts the unique heritage environment of the Burrup at risk.</p> <p>Consider that the department must improve its oversight of operation of the Yara Plant and emissions released into the environment.</p>	<p>Matters regarding mismanagement of the premises and compliance and regulation of the TAN Plant under the Part V licence are outside the scope of the assessment of the works approval application.</p>
<p>Queried if the nearby Perdaman site has been inspected for groundwater and soil contamination and recommend the Perdaman proposal be put on hold until the contamination issue is resolved.</p>	<p>Condition 6 of MS 1180 for the Perdaman Urea Project requires the proponent (Perdaman Chemicals and Fertilisers Pty Ltd) to undertake detailed hydrogeological studies to quantify baseline groundwater quality at least six months prior to ground disturbing activities. These studies will indicate if groundwater contamination is present. Separate to this Yara Pilbara have undertaken studies of down gradient areas under CS Act requirements to determine the level of risk to ecological receptors. These will be referred to the department's Contaminated</p>

Comments received	Department response
	Sites branch with the 2022 MAR for consideration in classification of the premises and off premises areas under the CS Act.
<p>The stakeholder has contested the establishment of the TAN Plant since 2011 due to the sacred and pristine environment of Murujuga. They are concerned the licence conditions of both the TAN and Ammonia plants are inadequate, and the lack of effective compliance regulation is resulting in demonstratable damage to Aboriginal rock art and contamination of the water system.</p> <p>DWER must improve the Licence conditions, compliance monitoring and increase penalties for contamination of the pristine and sacred Murujuga environment.</p>	<p>Matters regarding compliance and regulation of the TAN Plant under the Part V licence are outside the scope of the assessment of the works approval application. The TAN Plant licence is currently subject to an appeal and matters raised in that appeal will be considered through this process.</p> <p>The EP Act, rather than individual instruments issued under the Act, includes provisions for offences and penalties under the Act and the department does not have jurisdiction to amend these.</p>
<p>Concern regarding Yara International's history of contamination at industrial sites around the world, having been awarded Prix Pinocchio du Climate 'Greenwashing' Award in Paris in 2015 and 2020.</p> <p>Raised concerns relating to complaints of pollution from the Yara's plants on the Burrup including leaking ponds, the integrity of the TAN plant infrastructure, the contaminated atmosphere, releases occurring at night and faulty air monitoring stations, and the department's investigation of such occurrences. Real time monitoring of ammonia and nitrogen dioxide emissions must be put in place by DWER and made publicly available.</p> <p>Raised concern that workers at Yara report there have been leaks of nitric acid into the environment because of corrosion of the nitric acid tanks.</p>	<p>These matters have been raised in separate correspondence to the department and a response has been provided to the stakeholder regarding these. They are under investigation by the department's Compliance and Enforcement directorate, and are not within the scope of the works approval application therefore are not addressed further. The department has not received any recent reports regarding leaks from the nitric acid tanks. The department has a Pollution Watch hotline for reporting of concerns regarding emission events.</p> <p>The premises is also a Major Hazard Facility therefore the storage of Dangerous Goods such as nitric acid is regulated by the Department of Mines, Industry Regulation and Safety and issues with integrity of infrastructure storing dangerous goods should also be reported to them.</p>
<p>Raised concern that contaminated soil was disposed at the Seven Mile Creek Waste Facility close to residents and requested the soil be returned to the Yara site for treatment.</p> <p>Consider that the removal of nitrate contaminated soil from the premises should have been undertaken under a works approval and that the disposal of this soil at the Seven Mile Waste Disposal</p>	<p>The Seven Mile Waste Facility is a lined Class III landfill facility which is authorised to accept contaminated solid waste meeting waste acceptance criteria for Class III landfills. There are no specified acceptance criteria for nitrate therefore the premises is not excluded from accepting nitrate contaminated wastes. The licence holder for the landfill has discretion as to what wastes are accepted provided they comply with any limitations of the operating licence. The department does not typically regulate where wastes from a premises must be disposed,</p>

Comments received	Department response
<p>facility, which is close to residents of Nickol and Bayton areas of Karratha places another area under threat of contamination whenever it rains, and is unacceptable. The Department should require the soil to be removed back to the Yara site and remediated, with extracted nitrated and ammonia collected and sold as fertiliser or their Licence should be revoked.</p>	<p>it is the responsibility of the waste generator to determine appropriate means of waste disposal to avoid committing an offence under the provisions of the EP Act. It is also a matter between a waste generator and disposal facility operator to determine whether a waste is suitable for disposal in accordance with licence requirements. The department cannot prevent the applicant from sending wastes to a disposal facility provided they meet the requirements of that facility.</p>
<p>Due to issues with the build of the TAN Plant the department must require Yara Pilbara to employ a registered/qualified geotechnical engineer with the design and certification of the ponds provided to the department from the engineer before the Works Approval is granted.</p>	<p>The department requested further information for the assessment of the application and was provided with the detailed design report for the ponds. The design report was undertaken by external consultant Advisian. As per section 2.5.3 the ponds have been designed in accordance with relevant design guidelines and the delegated officer has included conditions requiring construction of the ponds in accordance with this design and submission of a Critical Containment Infrastructure Compliance Report certified by a qualified geotechnical or civil engineer confirming the construction requirements have been met.</p>
<p>The HDPE liners will inevitably fail over time. While the ponds will have leak inspection pipes no information is provided on how or when liners will be replaced and the works approval must include a timing and method for replacement of the liners. There should be strict monitoring of the pond liners for timely replacement to prevent leaks and that substantial penalties should be imposed in the event of a leak.</p>	<p>Works approvals are short duration instruments (3-5 years) granted for construction, commissioning and initial time limited operation of infrastructure only. Ongoing operational requirements will be subject to a licence amendment application. The department typically does not specify timeframes for liner replacement, rather require monitoring of infrastructure integrity so that issues can be identified and remedial action taken if the integrity is compromised. The ponds will have a dual lining system, with a compacted base meaning that a leak in the primary liner is able to be detected without it corresponding with seepage into the environment.</p> <p>The works approval requires monitoring and reporting of any seepage recovered between the liners which will be indicative of a leak in the primary liner. If seepage is reported, replacement of the lining could be investigated. Additional to this, pieces of liner will be installed below the operating water line that are exposed to the water and UV over time (sacrificial tags). These will be tested on an annual basis and compared with previous results to detect if liner deterioration is likely to be occurring and at what rate. The delegated officer has recommended this requirement is included in the subsequent licence amendment as the pond is only authorised to operate for 4 months under the works approval.</p>
<p>Consider Yara has knowingly and deliberately spread contamination through the practice of 'daylighting and evapoconcentration' and that the practice of groundwater and waste daylighting and evapoconcentration should not have been</p>	<p>Daylighting refers to groundwater coming to the surface and evapoconcentration refers to the natural process of water evaporating leaving concentrated precipitated salts behind. This is not a practice which Yara Pilbara has engaged in or undertaken rather it is a description of a pathway for transfer of contaminated groundwater to the surface that has been identified as occurring on the premises. As detailed in sections 2.3 and 2.4 the area in which</p>

Comments received	Department response
permitted by government, with penalties being imposed once they became aware of the practice.	evapoconcentration is occurring was subject to Phase 1 remedial works under CS Act requirements to remove the contaminated soil, install sumps for capture and removal of contaminated surface water and a weir to separate the impacted area from the upper tidal flats to prevent migration of nitrates into surface waters as a result of the daylighting and evapoconcentration process which is occurring.
Details are required for the disposal of precipitated solids and sludge from the evaporation ponds as these concentrated materials will be toxic. A record of the concentration of elements in the sludges must be provided to the department and the material should not be transferred offsite and this will transfer the problem to the community. The works approval must specify methods for reducing the concentration of elements in the sludge below recommended safe levels for humans and the environment and the material not be permitted to be moved offsite until it reaches these levels.	The brine and precipitated solids produced as a result of the evaporation process are waste products. It is the responsibility of the waste generator to determine appropriate means of waste disposal to avoid committing an offence under the provisions of the EP Act. The department typically does not specify regulatory controls for the disposal of waste unless it is being disposed on a premises. There are suitable licensed waste receival facilities located in Western Australia which are capable of managing this type of waste product.
Bioremediation of nitrate and ammonia in ground water is an excellent idea. However, insufficient quantitative information is given in the documentation to determine the impact it will have on the contaminated ground water.	As per section 2.4, the EISB is outside the scope of the works approval application as it does not involve emissions or discharges associated with operation of the TAN Plant. These works will be subject to assessment and implementation under CS Act requirements. Further information can be sought from the department's CS branch if required. Full details of the scope of this activity will be contained within the RAP which will be submitted to the department with the next MAR anticipated to be submitted before the end of 2022.
The application does not specify what sort of bird deterrents will be installed on the ponds and Yara should specify what methods will be used. The Works Approval needs to include reporting of all adverse incidents for birds.	As per the requirements of MS 870 (Table 3), the DBCA has previously been consulted with regard to suitable bird deterrents for the TAN Plant and has advised that parallel wires above the water surface is an appropriate deterrent. The delegated officer has included this as a requirement in the works approval together with recording and reporting of fauna deaths/injuries at the ponds.