L6107 licence amendment application

Supporting Information –

Debottlenecking of CSPB Nitric Acid & Ammonium Nitrate Plants (MS689 & 875)

Date: 19 February 2024

Contents

EXECUTIVE SUMMARY

CSBP Kwinana, as part of Wesfarmers Chemicals, Energy and Fertilisers (WesCEF) business, is a major manufacturer and supplier of chemicals, fertilisers and related services to the mining, mineral processing industry and agriculture locally and around the world. The facility is in the Kwinana Industrial Area, Lot 20 on Diagram 78086, Port Road in Kwinana Beach.

The premises is subject to approvals under the *Environmental Protection Act 1986* (EP Act), including Ministerial Statements MS 689 and MS 875, and licence L6701/1967/17. The manufacture of ammonium nitrate products forms a significant part the operations.

As part of its business expansion, CSBP is seeking environmental approval to:

- Expand the nitric acid and ammonium nitrate production through debottlenecking the three nitric acid and ammonium nitrate (NAAN) plants. This will increase the chemical manufacturing (category 31) throughput from 3,712,000 to 4,070,800 tpa.
- Increasing the ammonium nitrate emulsion production by increasing operating hours to 24-hour operations. Chemical blending (category 75) throughput will increase from 100,000 to 262,800 tpa.
- Install additional nitric acid and ammonium nitrate storage capacity and vehicle loading points, to improve flexibility in product storage and facilitate greater decoupling between the nitric acid and ammonium nitrate plants.
- Connect the ammonia storage flare system to the ammonia plant flare, to improve safety when undertaking maintenance on the ammonia storage flare.

The NAAN tertiary abatement and debottlenecking works are currently scheduled as follows:

- NAAN3 – July 2024 to March 2025
- NAAN2 – July to December 2025
- NAAN1 – July to December 2027

The proposal has been referred to the EPA under s.45C of the EP Act. An application (this application) is now being submitted to the Department of Water and Environmental Regulation (DWER) under s.59 of the EP Act to amend the licence L6107.

The proposed works will significantly reduce nitrogen oxide (NO_X) emissions through the inclusion of tertiary abatement catalyst across the three NAAN plants prior to debottlenecking. The tertiary abatement will also significantly reduce greenhouse gas emissions.

The upgrading of NAAN plant debottlenecking components will, through focused selection of equipment and installed lagging to reduce sound power levels, result in a slight reduction in environmental noise at identified sensitive receptors.

The discharges to the marine environment will remain within existing approvals.

The proposed amendment will improve the air quality and greenhouse emission profile and retain the existing environmental risk profile.

1 APPLICATION SUMMARY & OVERVIEW OF PREMISES

1.1 Overview

Wesfarmers Chemicals, Energy & Fertilisers (WesCEF) operates chemical, energy and fertiliser businesses that service a range of sectors in both domestic and international markets. WesCEF businesses include CSBP Ammonia / Ammonium Nitrate & Industrial Chemicals (CSBP), which is a major manufacturer and supplier of chemicals, fertilisers and related services to the mining, minerals processing, industrial and agricultural companies locally and around the world.

CSBP's major chemical and fertiliser production facilities are in Kwinana, 40 km south of Perth (**Figure 3**). The entire CSBP Kwinana Industrial Complex (CSBP Kwinana) encompasses an area of 138 ha, with the BP Kwinana site located to the north, a railway and road corridor to the east, other industrial facilities to the south and Cockburn Sound to the west.

CSBP Kwinana operates multiple integrated chemical process facilities which includes an Ammonia Plant (AP2), Ammonium Nitrate Production Facility, which comprises three Nitric Acid and Ammonium Nitrate (NAAN) plants, a Prilling Plant (PP2) and an Ammonium Nitrate Emulsion (ANE) plant, and a fertiliser manufacturing facility (**Figure 4**). All are operated under a Part V licence, *Environmental protection Act 1986* (EP Act) L6107/1967/17.

The development and expansion of the facilities on the prescribed premises have also been subject to assessments under Part IV of the EP Act with implementation of NAAN development and expansions authorised through Ministerial Statement (MS) 689 and MS875. On 16 June 2023, CSBP applied to the EPA (consistent with this application), through a Section 45c (s45c) submission, to amend the proposal that allows an increase in throughput.

1.2 Purpose and scope

This document supports CSBP's application for a licence amendment to increase the facility production capacity associated with chemical manufacturing, blending and storage of nitric acid and ammonium nitrate products. The works primarily involve the re-engineering (debottlenecking) of existing infrastructure components. The existing licence authorises the categories of prescribed premises as listed in Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regs) (**Table 1**).

Consistent with the s45C application to the EPA to amend the approved proposal, CSBP is seeking the associated Part V approval to:

a) Increase the production of nitric acid from 720,000 tpa to 876,000 tpa, and ammonium nitrate solution from 936,000 tpa to 1,138,800 tpa through improvements to existing plant infrastructure. Prescribed premises Category 31 total for the premises will thereby be increased to 4,070,800 tpa (**Table 1**).

b) Increasing the production throughput of category 75 from 100,000 tpa to 262,800 tpa as the higher nitric acid production rates will allow an increase in ammonium nitrate emulsion production. The increase in production will be realised by increased Ammonia Nitrate Emulsion Plant shifts and will require an additional 435 tonnes of ammonium nitrate emulsion storage capacity.

c) Installation of additional product storage facilities to decouple individual processing units. This will allow for greater buffering / product accumulation while one part of the process is not operating.

d) Install additional truck load out facilities for nitric acid and ammonium nitrate solutions while installing a low strength ammonium nitrate solution receivals facilities.

Additionally,

e) CSBP is seeking approval to connect the ammonia storage flare system and ammonia plant flaring system to allow isolation of the ammonia storage for maintenance and inspection, thereby reducing the risk of fugitive ammonia emissions.

Amendments to the licence requires updating the prescribed premises category throughputs and associated site maps to reflect the additional infrastructure being installed **(Figure 5).** It is anticipated that the existing licence conditions will remain valid and do not need amending as the manufacturing processes remain the same with improved emission control (no increased risk). The proposed works will reduce air emissions (nitrogen oxide), while other emissions are expected to remain unchanged.

Table 1: Prescribed premises categories – proposed changes

Category no.	Description of category	Current Production / design capacity	Proposed Production / design capacity
31	Chemical manufacturing	3,712,000 tonnes per annual period (tpa)	4,070,800 tpa
61	Liquid waste facility	10,000 tpa	No change
61A	Solid waste facility	10,000 tpa	No change
75	Chemical blending or mixing not causing discharge	100,000 tpa	262,800 tpa

This document is structured to provide alignment of supporting information with the Department of Water and Environmental Regulation (DWER) application form. **Table 2** provides an overview of the application form supporting attachments and the relevant sections of this document that address each item.

Table 2: Application attachments

Application Form attachments	Reference in this document
Attachment 1A: Proof of occupier status	Figure 2
Attachment 1B: ASIC company extract	Figure 1
Attachment 1C: Authorisation to act as a representative of the occupier	N/A
Attachment 2: Premises map/s	Figure 3
Attachment 3A: Environmental commissioning plan	N/A
Attachment 3B: Proposed activities	Section 6
Attachment 3C: Map of area proposed to be cleared (only applicable if clearing is proposed)	N/A
Attachment 3D: Additional information for clearing assessment	N/A
Attachment 4: Marine surveys (only applicable if marine surveys included in application)	N/A
Attachment 5: Other approvals and consultation documentation	Section 4
Attachment 6A: Emissions and discharges	Section 7
Attachment 6B: Waste acceptance	N/A
Attachment 7: Siting and location	Section 5
Attachment 8: Other attachments	Appendices
Attachment 9: Category-specific checklist(s)	N/A
Attachment 10: Proposed fee calculation	Section 0
Attachment 11: Request for exemption from publication	N/A

2 APPLICANT DETAILS

CSBP owns the title of Lot 20 on Diagram 78086. A copy of the title is provided in **Figure 2**. The 3.75 ha area on which the wastewater treatment wetlands are located (Lot 18 on Plan 17311) is leased from BP. The current lease expires on 31 March 2026, with extension options until 2041.

ASIC
Australian Securities & Investments Commission

Current Company Extract

EXTRACT

Name: CSBP LIMITED
ACN: 008 668 371

Date/Time: 11 May 2023 AEST 05:49:01 PM

This extract contains information derived from the Australian Securities and Investments Commission's (ASIC) database under section 1274A of the Corporations Act 2001.

Please advise ASIC of any error or omission which you may identify.

Current Company Extract — CSBP LIMITED, ACN 008 668 371

Name:	MARK CHRISTIAN SCATENA	5EDX68686
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	11/06/2021	
Name:	ALEX ELIZABETH WILLCOCKS	5EGW10957
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	01/10/2022	
Name:	LEIGH JOSEPH MEYERS	5EGW10957
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	01/10/2022	
Secretary		
Name:	TAYLIA-SKYE ROCCI	2E3229029
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	01/03/2018	
Name:	DANIELLE FRANCOISE JULMY LUCAS	5EGY55762
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	17/10/2022	
Appointed Auditor		
Name:	ERNST & YOUNG	00866837E
Address:	Level 34 - 38 Central Park 152-158 Saint Georges Terrace PERTH WA 6000	
Start date:	23/01/1995	
Ultimate Holding Company		
Name:	WESFARMERS LIMITED	00866837L
ACN:	008 984 049	
ABN:	28008984049	

Share Information

Share Structure

Class	Description	Number issued	Total amount paid	Total amount unpaid	Document number
DEF	DEFERRED	1	2.00	0.00	000930168
ORD	ORDINARY SHARES	19180111	38300222.00	0.00	000930168

Documents

Note. Where no Date Processed is shown, the document in question has not been processed. In these instances care should be taken in using information that may be updated by the document when it is processed. Where the Date Processed is shown but there is a zero under No Pages, the document has been processed but a copy is not yet available.

11 May 2023 AEST 05:49:01 PM 2

Current Company Extract — CSBP LIMITED, ACN 008 668 371

Organisation Details		Document Number
Current Organisation Details		
Name:	CSBP LIMITED	019260266
ACN:	008 668 371	
ABN:	81008668371	
Registered in:	Western Australia	
Registration date:	01/02/1929	
Next review date:	30/06/2023	
Name start date:	31/07/2003	
Previous state number:	C0290017S	
Status:	Registered	
Company type:	Australian Public Company	
Class:	Limited By Shares	
Subclass:	Unlisted Public Company	

Address Details		Document Number
Current		
Registered address:	'Brookfield Place Tower 2' Level 14, 123 St Georges Terrace, PERTH WA 6000	5E4140364
Start date:	03/11/2016	
Principal Place Of Business address:	Kwinana Beach Road, KWINANA BEACH WA 6167	018004003
Start date:	14/01/2002	

Contact Address

Section 146A of the Corporations Act 2001 states 'A contact address is the address to which communications and notices are sent from ASIC to the company'.

Current		
Address:	GPO BOX M978, PERTH WA 6843	
Start date:	28/08/2003	

Officeholders and Other Roles		Document Number
Director		
Name:	IAN ROBERT HANSEN	2E4570366
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	19/12/2001	
Name:	BARNABY EDWARD JONES	5EAC12548
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	23/10/2018	
Name:	AARON JOHN HOOD	1ECU55320
Address:	[redacted]	
Born:	[redacted]	
Appointment date:	03/02/2020	

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Figure 1: ASIC Company extract

64V
Perth Batch
M964216

REGISTER NUMBER	
20/D78086	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
4	17/6/2015

WESTERN AUSTRALIA

DUPLICATE CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

VOLUME 1918 FOLIO 244

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 20 ON DIAGRAM 78086

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

CSBP LIMITED OF 11TH FLOOR, WESFARMERS HOUSE, 40 THE ESPLANADE, PERTH
(AN K807398) REGISTERED 19 DECEMBER 2008

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. THE RIGHT TO MINES OF COAL OR OTHER MINERALS BEING EXCLUDED FROM PORTION OF THE SAID LAND
2. E300912 EASEMENT BENEFIT SEE SKETCH ON VOL 1918 FOL 244. REGISTERED 21.2.1990.
3. D931868 EASEMENT TO THE STATE ENERGY COMMISSION OF WESTERN AUSTRALIA. SEE SKETCH ON VOL 1918 FOL 244. REGISTERED 11.11.1988.
   H626064 SUNDRY. THE GRANTEE OF TRANSFER D931868 IS NOW THE DBNGP LAND ACCESS MINISTER PURSUANT TO THE DAMPIER TO BUNBURY PIPELINE ACT 1997. REGISTERED 18.12.2000.
4. E319315 RESTRICTIVE COVENANT BURDEN. AS TO PORTION ONLY. REGISTERED 19.3.1990.
5. E380463 LEASE TO CSBP AMMONIA TERMINAL PTY LTD OF 9TH FLOOR, 40 THE ESPLANADE, PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 12.6.1990.
6. E752466 RESTRICTIVE COVENANT BURDEN. AS TO PORTION ONLY. REGISTERED 25.11.1991.
7. H626064 SUNDRY. PORTION OF THE LAND HEREIN IS WITHIN THE DBNGP CORRIDOR PURSUANT TO THE DAMPIER TO BUNBURY PIPELINE ACT 1997. SEE LAND ADMINISTRATION PLAN 1589. REGISTERED 18.12.2000.
8. K807399 EASEMENT TO WATER CORPORATION FOR PIPELINE PURPOSES. SEE DEPOSITED PLAN 41705. REGISTERED 19.12.2008.
9. M122669 EASEMENT BURDEN FOR ACCESS PURPOSES - SEE SKETCH ON DEPOSITED PLAN 67494 REGISTERED 4.12.2012.
10. M707534 LEASE TO AIR LIQUIDE WA PTY LTD OF 11TH FLOOR, 40 THE ESPLANADE, PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 17.7.2014.
11. M964216 LEASE TO COOGEE CHEMICALS PTY LTD OF LOT 4 PATTERSON ROAD, KWINANA EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 10.4.2015.

Warning: A current search of the certificate of title held in electronic form should be obtained before dealing on this land
Lot as described in the land description may be a lot or location

END OF PAGE 1 - CONTINUED OVER

DUPLICATE CERTIFICATE OF TITLE

REGISTER NUMBER: 20/D78086 VOLUME/FOLIO: 1918-244 PAGE 2

-----END OF DUPLICATE CERTIFICATE OF TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice

SKETCH OF LAND:	1918-244 (20/D78086).
PREVIOUS TITLE:	1884-803, 1869-813.
PROPERTY STREET ADDRESS:	LOT 20 PORT RD, KWINANA BEACH.
LOCAL GOVERNMENT AREA:	CITY OF KWINANA.

Figure 2: Certificate of title for Lot 20, Port Road, Kwinana Beach

3 PREMISES DETAILS

The extent of the prescribed premises is depicted in **Figure 3** below. The proposed works will be conducted within the existing prescribed premises boundary.

Point	x	y
A	384141	6431978
B	384679	6433260
C	384601	6433066
D	383785	6433041
E	383782	6432738
F	383231	6432731
G	383206	6432562
H	383181	6432531
I	383137	6432090

Legend
Prescribed premises boundary
Cadastral boundary
Corner points
Highways
Main road

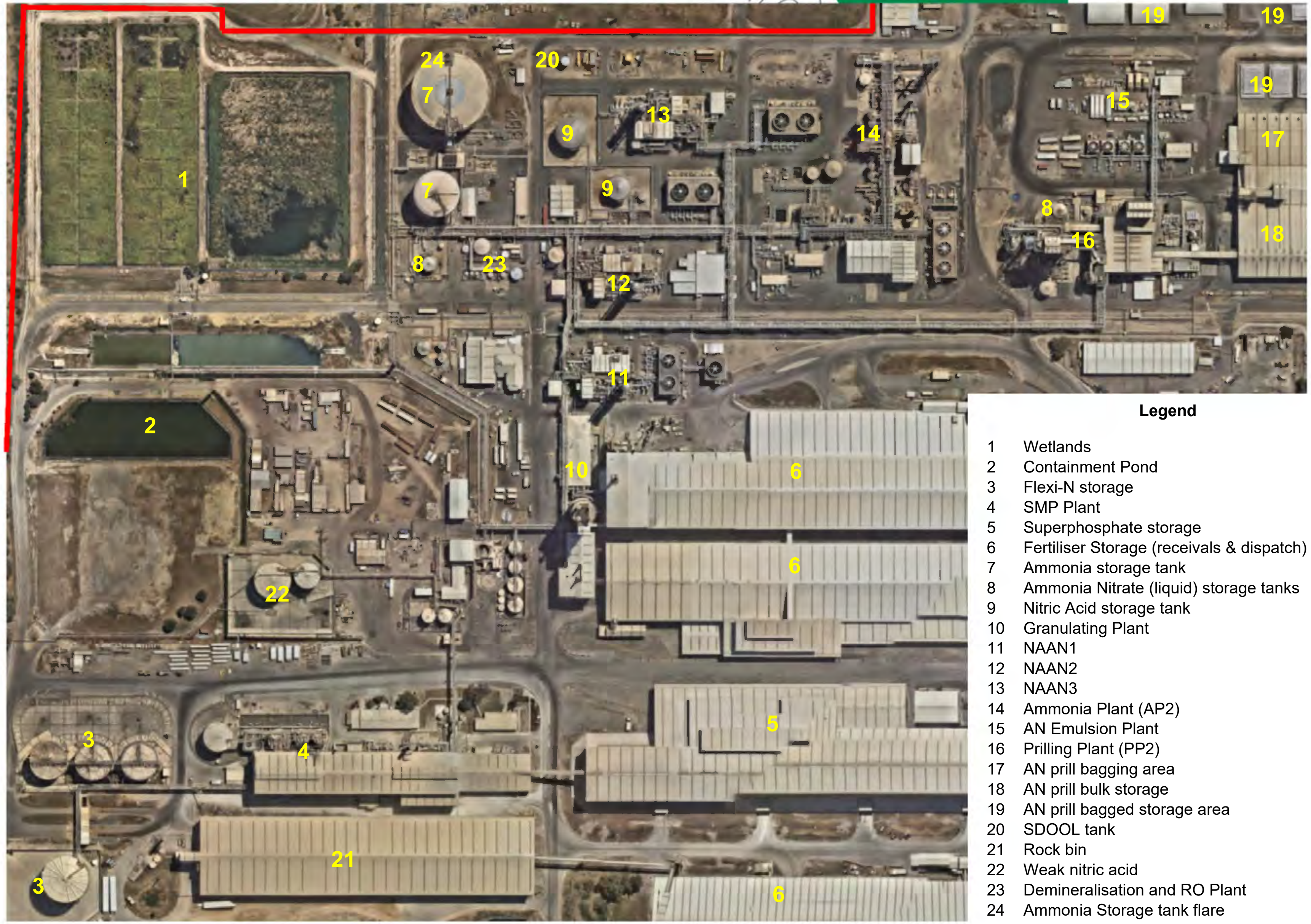
Scale 1:15,000 at A4
Coord. Sys. GDA2020 MGA Zone 50
Job No: 63297
Client: CSBP
Version: A | Date: 29-Nov-2022
Drawn By: ianandagoda | Checked By: CT

Lot 20 Kwinana Beach Road
Kwinana WA 6167

PREMISES MAP

strategen JBS&G

Figure 3: CSBP L6107 Prescribed premises map



Legend

1	Wetlands
2	Containment Pond
3	Flexi-N storage
4	SMP Plant
5	Superphosphate storage
6	Fertiliser Storage (receivals & dispatch)
7	Ammonia storage tank
8	Ammonia Nitrate (liquid) storage tanks
9	Nitric Acid storage tank
10	Granulating Plant
11	NAAN1
12	NAAN2
13	NAAN3
14	Ammonia Plant (AP2)
15	AN Emulsion Plant
16	Prilling Plant (PP2)
17	AN prill bagging area
18	AN prill bulk storage
19	AN prill bagged storage area
20	SDOOL tank
21	Rock bin
22	Weak nitric acid
23	Demineralisation and RO Plant
24	Ammonia Storage tank flare

Figure 4: Existing CSBP key infrastructure site plan

Figure 5: Indicative location of existing and proposed nitric acid and ammonium nitrate infrastructure at CSBP Kwinana associated with this application.

4 OTHER APPROVALS & CONSULTATION (Att.5 of AF)

4.1 DWER

Part IV EP Act

The first expansion of the Ammonium Nitrate Production Facility was assessed by the Environmental Protection Authority (EPA) under Part IV of the EP Act in June 2005 through a Public Environmental Review (PER) process. The proposal included the construction of NAAN Plant 2 (NAAN2) to increase the ammonium nitrate production capacity to approximately 580,000 tonnes per annum (tpa), the construction of a new ammonium nitrate storage tank and new prilling plant. The implementation of this proposal was authorised through MS 689.

In 2010, CSBP commenced a second phase of expansion of the ammonium nitrate production capacity, which included the construction of NAAN3, debottlenecking of the prilling plant, and installation of additional nitric acid and ammonium nitrate storage tanks. The Phase 2 expansion proposal increased the ammonium nitrate production capacity from 580,000 tpa to 936,000 tpa. The EPA also assessed the Phase 2 expansion proposal through a public environmental review process, and MS 875 was approved for its implementation. In June 2023, CSBP submitted a referral to the EPA to amend the proposal under s.45C for works now being applied for in this application. The EPA is currently assessing the referral.

Rights in Water and Irrigation Act 1914 (RIWI Act)

Water for the industrial operations of the facility is sourced from the Kwinana Water Reclamation Plant (KWRP), groundwater and supplemented by scheme water.

CSBP hold the following groundwater extraction licences granted under the *Rights in Water and Irrigation (RIWI) Act 1914:*

- Licence to take water GWL100798 (Superficial); 2,100,000 kL pa
- Licence to take water GWL100799 (Yarragadee); 2,500,000 kL pa

issued by the Department of Water and Environmental Regulation (DWER).

Increased operational water requirements will be sourced within existing groundwater allocations, additional KWRP and supplemented by scheme water, if required.

No dewatering of the soil profile will be needed for the proposed works, as no deep excavation are proposed, which would necessitate approval under the RIWI Act.

Contaminated Sites Act 2003 (CS Act)

Lot 20 was classified under the CS Act as *possibly contaminated – investigation required* in September 2008.

A Stage 3 detailed site investigation (DSI) was completed in 2020. DWER updated the classification on 5 May 2021 (maintaining the existing classification), listing the nature of contamination as nitrogen, arsenic and hydrocarbons present in soil and groundwater and noted the presence of co-mingled plumes related to both primary and secondary on and off-site sources.

The plumes are in a low flow zone of the lower Quaternary Sand (QS) aquifer with groundwater flow in a north-westerly direction. The superficial sandy aquifer extends 8 to 12 m below sea level. A human health and environmental risk assessment quoted in the DSI concluded that the arsenic in groundwater presents a negligible risk to human and environmental receptors. According to the DSI, there is evidence of arsenic migration to the Tamala Limestone (TL) aquifer, potentially extending to the north towards BP Refinery groundwater abstraction.

The NAAN1 and NAAN2 are located within the Arsenic Management area of the Contaminated Sites Management Plan (see Appendix A and **Figure 18**). The delineated management area encompasses the plume extent delineated in 2019-20 (see **Figure 6**, **Figure 7**, and **Figure 8**). In the DSI, background concentrations are used when interpreting plume indicator data to determine likely vertical and lateral extents of the plume relative to source zones. The maps show the upper background concentration limits (UBCL's) and lower plume concentrations limit (LPCLs) for arsenic as being 0.013 and 0.03 mg/L respectively.

The highest arsenic concentrations at the CSBP site were reported at the Ammonia / Ammonium nitrate (Amm/AN) plume, in the lower QS. Wells in the arsenic plume 'core' reported annual average arsenic concentrations ranging from 36-320 mg/L. Outside the Amm/AN area, arsenic concentrations were generally at least two orders of magnitude lower (<1 mg/L). Department of Health Non-potable Groundwater Use guidelines upper threshold is 0.1 mg/L while the WA EPA Cockburn Sound ecological quality criteria (EQC) Table 6 Primary Contact Recreation is 0.07 mg/L. Based on the guidelines, groundwater in the upper QS aquifer over the project area presents negligible risk.

Figure 6: Extent of Arsenic plume in upper Quaternary Sand aquifer (taken from GHD Detailed Site Investigation (DSI) Report 2021). Purple rectangle overlays the approximate extent of delineated Arsenic Management area.

Recent investigative soil testing (at a depth of approximately [±]1, 2.2 and 3m below ground level) conducted in an area north of the NAAN3 cooling towers did not identify arsenic levels of concern.

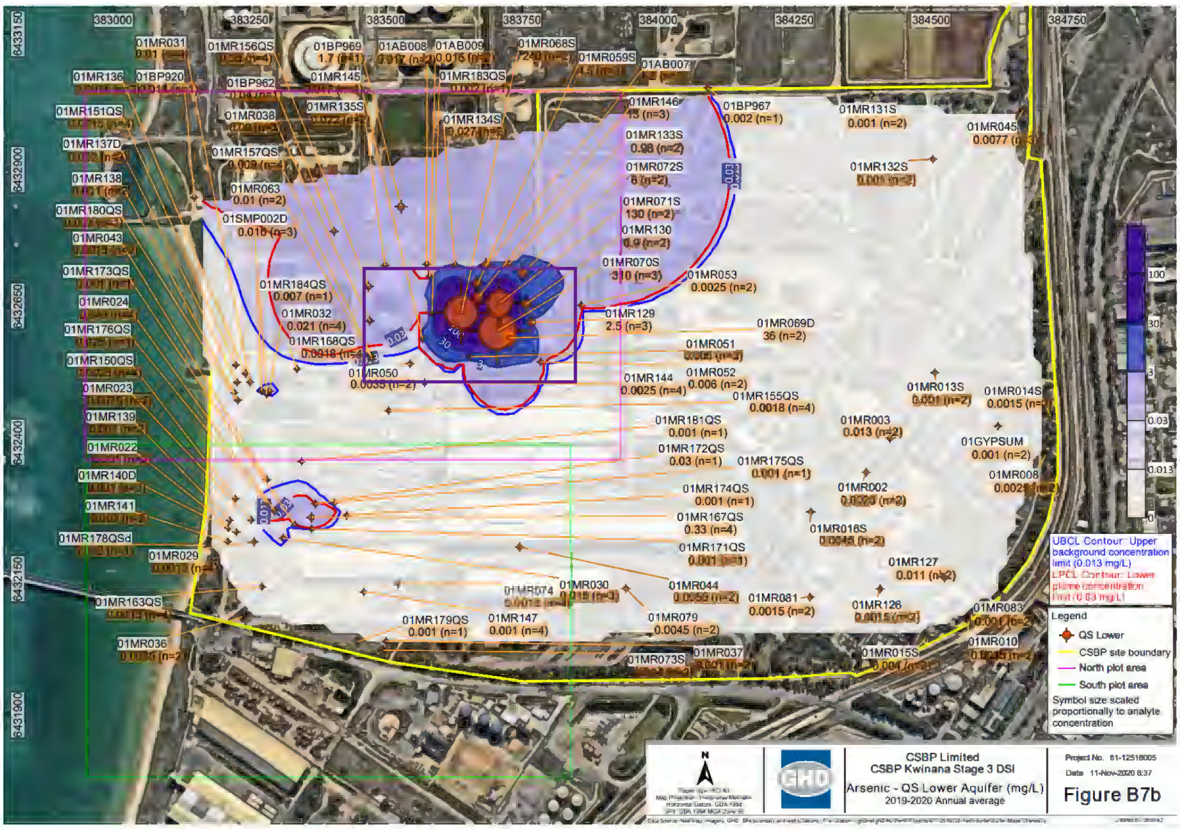


Figure 7: Extent of Arsenic plume in lower Quaternary Sand Aquifer (taken from GHD DSI Report 2021). The purple rectangle overlays the extent of delineated Arsenic Management Area.

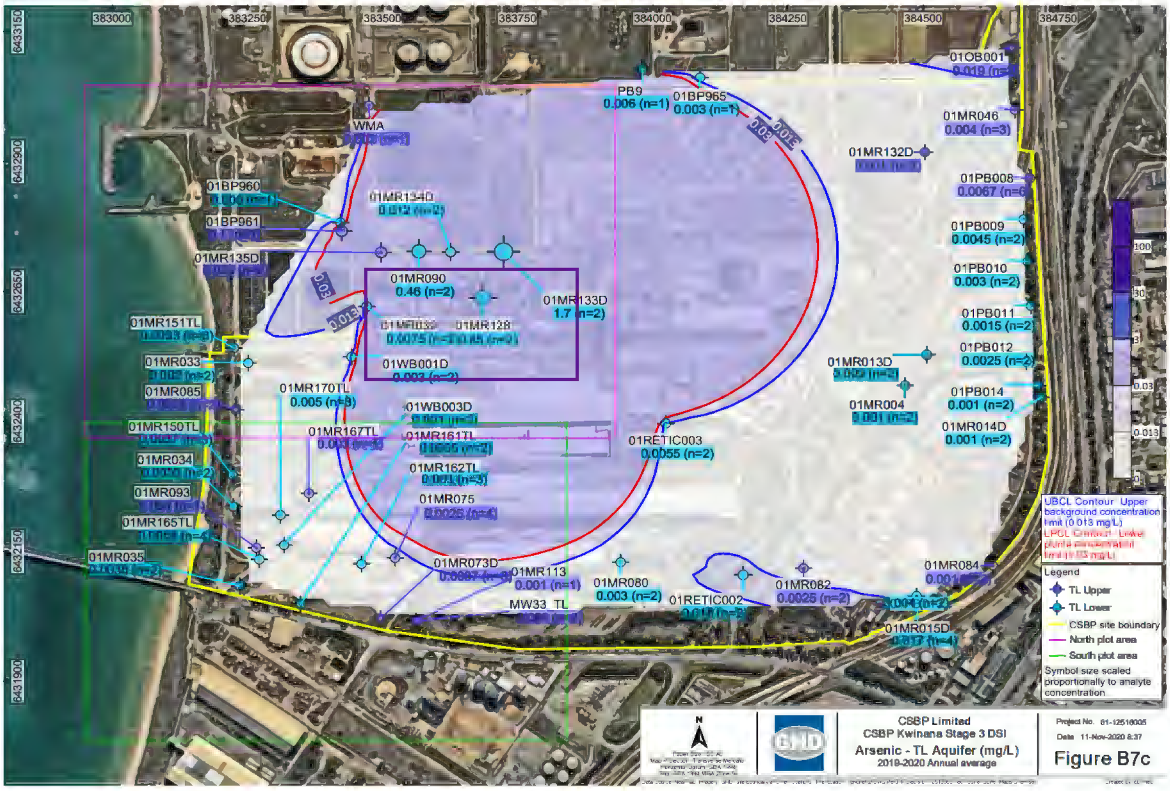


Figure 8: Extent of Arsenic plume in Tamala Limestone Aquifer. (taken from GHD DSI Report 2021). The purple rectangle overlays the extent of delineated Arsenic Management Area.

While contaminated soils are anticipated in the NAAN debottlenecking project area, interaction is unlikely given the depth and extent of excavation works for the Nitric Acid and

Ammonium Nitrate Plants. The Contaminated Site Management Plan endorsed by the external site auditor (Appendix B) specifies restrictions and action to be followed when undertaking intrusive works.

No interaction with contaminated soils is expected when installing additional infrastructure at the Ammonia Nitrate Emulsion Plant / near the Prilling Plant (storage tanks and loading infrastructure), being outside the extent of the delineated management area.

Proposed excavation works are detailed in Section 6.2.5.

Part V EP Act

L6107 regulates the CSBP prescribed premises activities on site.

W6887/2023/1 was granted in 2023 for the NAAN3 tertiary abatement works scheduled for installation in 2024.

4.2 Local government

The premises is located within the City of Kwinana, Kwinana Industrial Area and zoned as industrial. No change in land use is being proposed. As the works largely entail re-engineering of existing infrastructure and placement of new process and storage tanks, CSBP has not sought building approvals from the City of Kwinana. Section 74 of the *Building Act 2011*, states that a permit is not required for a building or an incidental structure that is, or is proposed to be, used in construction, operation or maintenance of a facility that is predominantly an industrial processing plant. A development application to the City of Kwinana for identified works will be submitted parallel to the licence amendment application.

4.3 Other

Dangerous Goods and Safety Act 2004 (DGS Act)

The DGS Act and subsidiary legislation is regulated by the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS). The dangerous goods legislation is limited to specific substances and regulates the storage, handling, and transport of these with a focus on minimising risk to people (human health), property and the environment.

CSBP holds several dangerous goods licences. Licence DGS01553 regulates volumes, tonnage and management of dangerous goods stored on site. The CSBP Kwinana facility is a Major Hazard Facility (MHF) and conforms to existing requirements. A MHF is designated by the Chief Dangerous Goods Officer when it stores, handles, transports, and processes quantities of specified dangerous goods that exceed specified threshold quantities, and a major incident could occur at that place. A MHF operator must comply with legislative obligations to provide the local community with information about their facility and the actions to take in the event of a major incident.

CSBP will obtain the necessary amended approvals for this expansion from DEMIRS once the environmental approvals have been obtained, which will also include the preparation of a safety report if required under the dangerous goods legislation.

4.4 Consultation

Consultation with the Water Corporation has been undertaken regarding provision of additional recycled water from the KWRP, and contractual changes to the Sepia Depression Ocean Outfall Landline (SDOOL) access. The discharge to SDOOL is consistent with Water Corporation approvals, which is subject to Ministerial Statement 665.

5 SITING AND LOCATION (Att. 7 of AF)

The CSBP Kwinana site encompasses an area of 138 ha and is situated at the intersection of Kwinana Beach Road and Rockingham Beach Road within the Kwinana Industrial Area (KIA), which is zoned 'Industrial' under the Town of Kwinana Town Planning Scheme No. 1 and the Metropolitan Regional Scheme.

CSBP Kwinana is directly adjacent to the Cockburn Sound beachfront to the west, with industry located adjacent to the site in all other directions. Further to the east is a one-kilometre-wide parks and recreation reserve, which preserves a landscape buffer between the KIA and 'Urban' zoned land at Medina. The nearest residential areas are located at Medina, approximately 2.1 km to the east, Calista 4.3 km to the southeast; Hillman 5 km to the south; and North Rockingham 3.3 km to the southwest.

Detailed information relating to receptors are provided in **Table 3**. The proposed works will be undertaken within the footprint of the existing plants. The proposed works is anticipated to reduce emissions and likely to have a positive effect on receptors.

Table 3: Proximity to sensitive receptors

Type / classification	Description	Distance + direction to premises boundary	Proposed controls to prevent or mitigate adverse impacts (if applicable)
Nearest human sensitive receptor (s)	Wells Park (recreation)	1.4 km SW	No impacts expected from proposed works, other than reduced emissions associated with implementing tertiary abatement technologies. Existing licence conditions contain regulatory controls.
	Kwinana Golf Course	2.0 km E	
	Nearest residence	2.1 km E	
	Oval by Motorplex	2.8 km NE	
	Wombat Wallow Childcare Centre	2.9 km E	
	North Rockingham	3.2 km SW	
	Calista Primary School	3.3 km E	
	Hope Valley	4.2 km NE	
Environmentally Sensitive Areas	Unidentified TEC intersecting southern part of premises.	0 km S	No ESA within zone of impact
Threatened Ecological Communities	Tuart trees / woodlands within boundary of premise	±380 m E of proposed activity	No TECs in the zone of impact
Threatened and/or priority fauna	*Isoodon fusciventer* (southern brown bandicoot / quenda) previously identified on site. *Zanda latirostris* (Carnaby's cockatoo habitat trees located in eastern boundary of site)	Within premises boundary	No threatened or priority fauna in zone of impact. Project area is already cleared and occupied by industrial activity.
Threatened and/or priority flora	No threatened or priority flora in zone of impact	N/A	Area is devoid of native vegetation.
Aboriginal and other heritage sites	No sites identified in AHIS for the premises. Nearest site registered for camping in the vicinity of Thomas Oval (#3710)	±2 km east	No archeological sites previously discovered in Kwinana Industrial Area. No disturbance of new areas.
Public drinking water source areas	No PDWSA within 5 km of facility.		No impact, no controls proposed

Type / classification	Description	Distance + direction to premises boundary	Proposed controls to prevent or mitigate adverse impacts (if applicable)
Groundwater	The water table below the premises is located ±1- 1.5 m AHD (± 2.5 – 3 m below ground level [bgl]). Groundwater is abstracted for use on site under RIWI Act licence, but not in the proximity of the proposed works.		The proposed works will be within existing infrastructure. New chemical containment infrastructure will include secondary bunding of hazardous materials in accordance with appropriate standards and Codes of Practice. No proposed dewatering of the soil profile.
Rivers, lakes, oceans, and other bodies of surface water, etc.	No natural lakes, wetlands, or river within the proximity of premises. Resource enhancement wetland in Bush forever site (ID 6375) Cockburn Sound (Indian Ocean)	>1 km E < 50 m W	No impact, no controls proposed. Marine discharge into the Sepia Depression (via SDOOL) is authorised in L6107 and Ministerial Statement MS665 with regulatory controls. No changes to risk expected and existing controls are considered appropriate.
Acid sulfate soils	No acid sulfate soils risk on site.		No impact.
Other	Bush forever site – ID 18621	>1 km E	No impact

The topography of the site is generally flat. Surface elevations typically range between 4 m Australian Height Datum (AHD) and 5 m AHD.

The site is located within the Swan Coastal Plain where superficial formations comprising of shallow calcareous sand of the Safety Bay Sand formation overlies Becher Sands (collectively referred to as the “Quaternary Sands” or QS aquifer unit) and the Tamala Limestone (TL aquifer unit). The SQ and TL is separated by a discontinuous Becher clay aquitard layer that restricts vertical water movements. The TL overlies the Pinjar member of the Leederville formation in the vicinity of the Site. Groundwater generally flows in s westerly, north-westerly direction where groundwater discharges into the marine environment.

6 PROPOSED ACTIVITIES (Att. 3 of AF)

CSBP conducts multiple chemical processing activities at the premises. This application specifically relates to debottlenecking infrastructure for the manufacture and storage of nitric acid and ammonium nitrate products (+ loading facilities) and increasing ammonium nitrate emulsion production.

6.1 Description of current processes

There are three NAAN plants at CSBP Kwinana (NAAN1, NAAN2 and NAAN3). The NAAN plants each comprise a nitric acid (NA) plant and an ammonium nitrate (AN) plant. The current combined nitric acid production capacity is 720,000 tonnes. Nitric acid is used in the manufacture of AN. The current maximum combined production capacity of ammonium nitrate solution (ANSol) by the three NAAN plants is 936,000 tpa.

Some of the ANSol is used in the Prilling Plant to create porous prill ammonium nitrate, which is the basis for most of the bulk blasting agents used by the mining industry. A portion of the ANSol is converted to an emulsion in the AN Emulsion Plant. Ammonium nitrate emulsion (ANE) is a water-resistant explosive used for blasting applications.

The remaining ANSol is diluted for use in the manufacture of liquid fertiliser or dispatched as a hot liquid for use in the mining industry (bulk sales).

A distributed control system in conjunction with an overarching advanced process control is used to monitor, adjust, and control each process. An independent dedicated programmable logic controller (PLC) and safety instrumented system (SIS) is used for emergency shutdown of the process.

The overall process is illustrated in **Figure 9**.

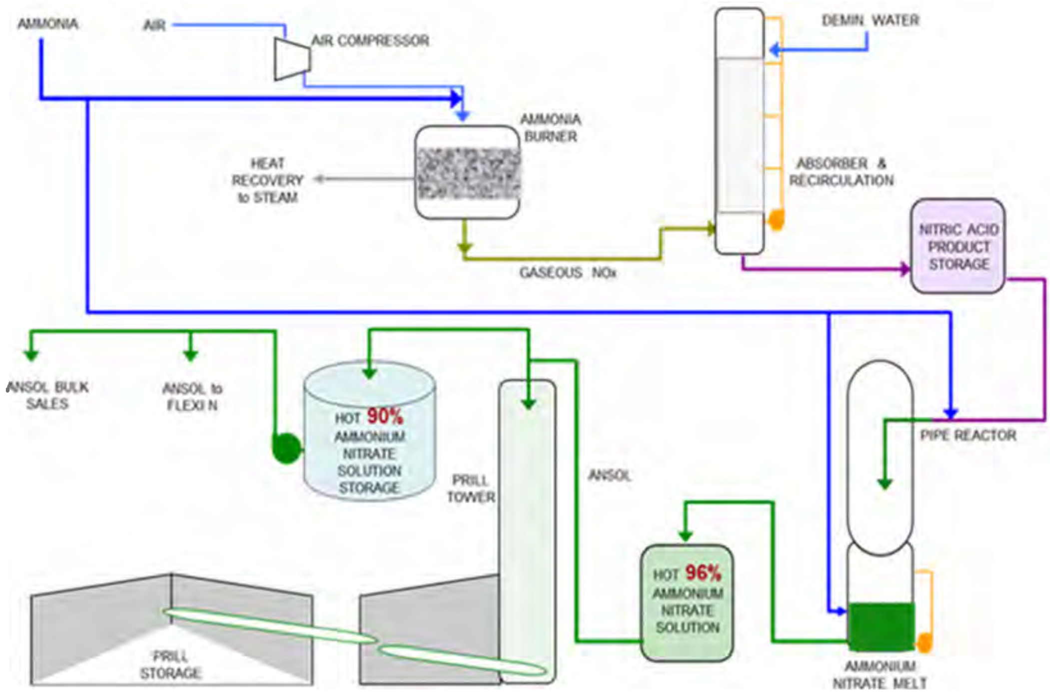


Figure 9 Nitric Acid and Ammonium Nitrate Process flow diagram (simplified).

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6.1.1 Nitric Acid production

The nitric acid manufacturing process involves the production of nitrogen oxide gases (NO_x) by mixing superheated and evaporated liquid ammonia (NH_3) feedstock and air (oxygen – O_2) over platinum - rhodium gauzes at approximately 920°C in an ammonia burner. The ammonia is sourced from the onsite ammonia storage tanks, or directly from the Ammonia Plant (AP2). It is represented by the following equilibrium reaction:

$$4\ NH_3 + 5O_2 \leftrightharpoons 4\ NO + 6\ H_20$$

The reaction is exothermic, generating heat, which is used to generate electricity with the reaction products cooled in the process. After leaving the burner, the reaction products are passed through a waste heat recovery boiler, tail gas heater, primary air heater, economiser and gas cooler condenser and separator. The mixture is cooled to approximately 60°C before entering an absorption column where it is absorbed counter-currently in de-ionised water, resulting in production of a nitric acid solution (63% weight for weight) via the reactions below.

$$2\ NO + O_2 \leftrightharpoons 2\ NO_2$$

$$3\ NO_2 + H_20 + \leftrightharpoons 2\ HNO_3 + NO$$

The nitrogen oxide (NO) formed in the last reaction then reacts with excess O_2 to drive the equilibrium to produce NO_2 and subsequently nitric acid (HNO_3).

The nitric acid product flows from the absorption column into storage tanks. There are currently two storage tanks (2,000 tonnes and 3,500 tonnes capacity expressed as 100% nitric acid) on site and they are fully bunded. Three minor nitric acid tanks within the plants are used in the manufacturing process for storage of weak acid for run down testing for the three plants.

Each nitric acid storage tank is fitted with pressure differential and ultrasonic/radar level indication and alarm systems.

During the NH_3 and air reaction over the gauzes, nitrous oxide (N_2O) is generated along with NO_X. Conversion of 85% of the waste N_2O to nitrogen (N_2) then occurs via the secondary abatement catalysts (vanadium pentoxide) located below the gauzes.

The residual waste process gas from the absorber, containing NO_x and some N_2O, is passed through a selective catalytic reactor (SCR) process that performs a NO_x reduction ($DeNO_x$) reaction over vanadium pentoxide catalysts, reducing NO_X to an acceptable level using a reaction with small quantities of NH_3. The remaining residual N_2O and NO_x are emitted into the atmosphere via the waste gas flared emission stack.

The as-built Nitric Acid (NA) 1 and NA2 flow path are similar (**Figure 10**) with slight variation to NA3 (**Figure 11**). The tertiary abatement works for NA3 was approved under works approval W6778.

The indicative key component layout for NAAN1 is shown in **Figure 12**. NAAN2 layout is essentially the same. NAAN3 is an inverted layout of NAAN1 & 2; this was done to minimise noise emission exposure at the premises boundary.

The catalysts used in the nitric acid production are tabled below (**Table 4**). Spent catalysts will be contained and tested for treatment / recycling / disposal options.

Table 4: Catalysts used in the nitric acid production

Catalyst	Function	End of life / Replacement
Platinum/rhodium gauzes	Used for oxidation of the ammonia / air mixture to NO, NO_2 and N_2O. During operation some of the precious metals are lost (burnt off) the gauzes	Up to 210 day service life. In order to recover some of this burnt off metal, palladium catchment gauzes designed for a 75% recovery, are located directly beneath the platinum/rhodium gauzes. Stainless steel separator screens are used between each catchment gauze to assist catchment. Spent catalyst (Pt/Rh and catchment gauzes) are sent for refining to recover precious metals after which a new set of catalyst and catchment gauzes are manufactured.
Vanadium pentoxide	Primary abatement - reduction of NO_X concentrations in tail gases in a Selective Catalytic Reactor / Abatement Vessel	According to the MSDS, the substance is not an oxidizer, is not self-combustible and not explosive. It is chemically stable and there is no hazardous decomposition of the substance. It is however acutely harmful to aquatic organisms, but will not be used in or near an aquatic environment. Used catlayst will likely have hazardous properties based on operational use. The catalyst is replaced approximately at five-year intervals.
Tri-cobalt tetraoxide / Cobalt aluminate blue spinal	Secondary N_2O abatement catalyst of tail gases.	The MSDS states that no ingredients present a hazard to health or the environment. Used catalyst will likely have hazardous properties based on operational use and will likely need to be removed by a controlled waste operator, with the intent of recycling. The catalyst is replaced approximately at 5 year intervals. During every alternative guaze change, the catalyst is screened and topped up to compensate for fines removed during the screening process.
Iron zeolite type catalyst e.g. EnviNOx Tertiary catalyst (or similar)	Tertiary abatement of tail gases	MSDS states it is virtually non-toxic. Used catalyst will likely have hazardous properties based on operational use and will likely need to be removed by a controlled waste operator, with the intent of recycling. The catalyst is replaced approximately at 15-20 year intervals. Storage in dry enclosed containers (e.g. HDPE).

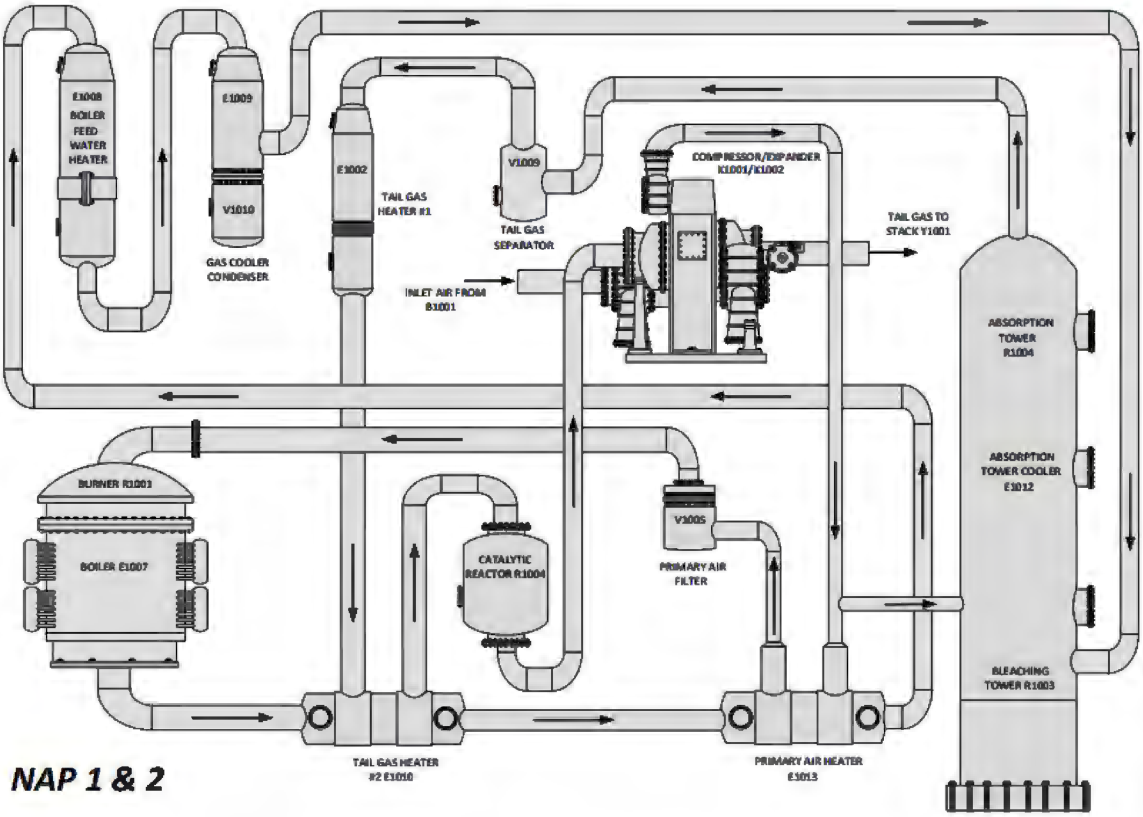

Figure 10: Nitric Acid Plant 1 and 2 process flow path

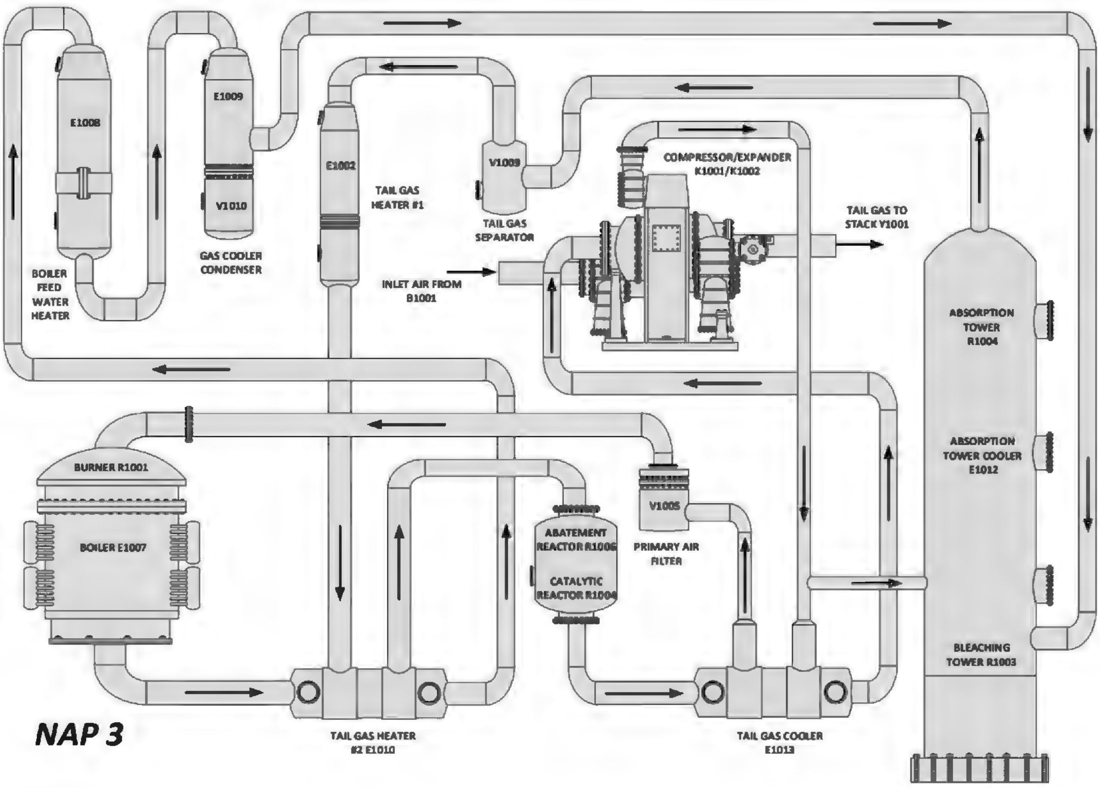

Figure 11: Nitric Acid Plant 3 process flow path

Nitric acid is pumped from the storage tanks to the ammonium nitrate plant or to the prill plant for internal use, or for despatch by road tanker if required.

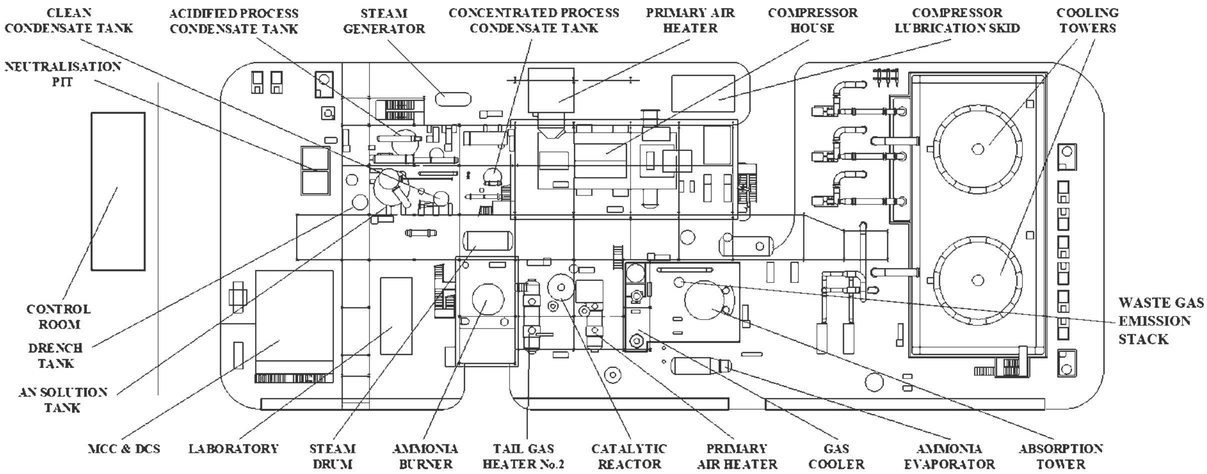

Figure 12: NAAN 1 Plant component layout

The potential environmental hazards in the nitric acid plant are:

- Release of gaseous ammonia to atmosphere.
- Release of NO_X to atmosphere.
- Emission of greenhouse gases.
- Nitric acid spill and loss of containment from plant or storage areas.

6.1.2 Ammonium nitrate solution production

Nitric acid is mixed with ammonia in a pipe reactor under pressure to create an ammonium nitrate (NH_4NO_3) solution:

$$HNO_3 + NH_3 \rightarrow NH_4NO_3$$

The heat from this exothermic reaction creates low-pressure steam for use in other parts of the plant. The formed product is ammonium nitrate (AN) solution, typically 96% ammonium nitrate (weight for weight – w/w). The AN solution (ANSol) is directed to the AN solution tank which forms part of a cooling loop. The ANSol is used to make liquid fertiliser, explosive-grade ammonium nitrate and ammonium nitrate prill.

The ANSol is transferred to one of two storage tanks; a 90 % solution tank with a capacity of 290 m^3 (300 t) and a 70-90 % solution tank with a capacity of 730 m^3 (900 t) or, supplied direct to the Prilling Plant. pH is monitored in the storage tanks; any acidity in the AN solution is neutralised by injection of gaseous ammonia. During transfer to the storage tanks, the solution strength is decreased from 96% to 90%. A 70% solution is used within the fertiliser business to manufacture liquid fertiliser (Flexi-N), a urea and ammonium nitrate solution mix.

Both product storage tanks are equipped with several systems to manage stability of the AN solution. These include but are not limited to:

- Atmospheric Vent: This vent on the vessels is designed to prevent confinement of NO_X fumes in the event of AN decomposition. During AN decomposition, two reaction mechanisms are possible, and under confinement conditions, the exothermic reaction can occur resulting in acceleration of decomposition. With no confinement conditions, the endothermic reaction occurs resulting is a slowing of the chemical decomposition;
- Drench systems: These systems involve manually operated water injection directly into the vessels. This serves two purposes, dilution of the AN solution and cooling.

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The use of this system in the event of AN decomposition will effectively terminate the decomposition reaction;
- Temperature monitoring: Incorporates both alarm and trip functions to prevent transfer of AN product to the storage vessels; and
- pH monitoring: This is undertaken on a continuous basis, as acidic pH can contribute to decomposition reactions. If acidic pH occurs, control systems add gaseous ammonia to acidic ANSol to raise the pH.

Waste AN solution will be captured within a contained system and directed to the neutralisation tank for treatment. All three NAAN plant neutralisation tanks are interconnected by piping and pumps, which is connected to the wastewater collection infrastructure.

The ANSol is also used to make the ammonium nitrate prill and emulsions.

6.1.3 Prilling

A description of the Prilling Plant (PP2) is provided for context information only (no proposed amendment to the Prilling Plant operation proposed as part of this application).

Prilling is the process of solidifying a material in a stream of air. AN porous prill is manufactured by prilling AN solution, then drying the formed prill by evaporating the remaining water. The prill is then cooled and coated before being stored in a purpose designed and constructed bulk AN prill storage area.

6.1.4 Ammonium nitrate emulsion production

The AN Emulsion (ANE) Plant uses ammonium nitrate solution, water, additives, diesel fuel oils and emulsifier, to produce an emulsified combination of fuel oil and ammonium nitrate solution. The emulsion product is used as an explosive, particularly in underground mines. ANEs are very insensitive to overheating and shock, and very difficult to initiate an explosion. The product is designed so that it requires further processing at the mine before becoming explosive.

The emulsion plant comprises three processing areas and storage / truck loading facilities (**Figure 13**). The processing stages / areas include: an ANSol preparation area, a fuel phase area, and an emulsion blending area. In the process, ANSol (90 %) is diluted with water and cooled before blending with additives to satisfy product formulation requirements. The resulting product is combined with an applicable fuel phase/emulsifier blend to create the desired emulsion product. All operational areas where chemicals are stored or blended to produce ANE are within sealed secondary containments.

The additives adjust the pH and provide one component of a gassing system. The emulsion does not become an explosive until it is combined with the other components of the gassing system, which is mixed with the emulsion at the mine site.

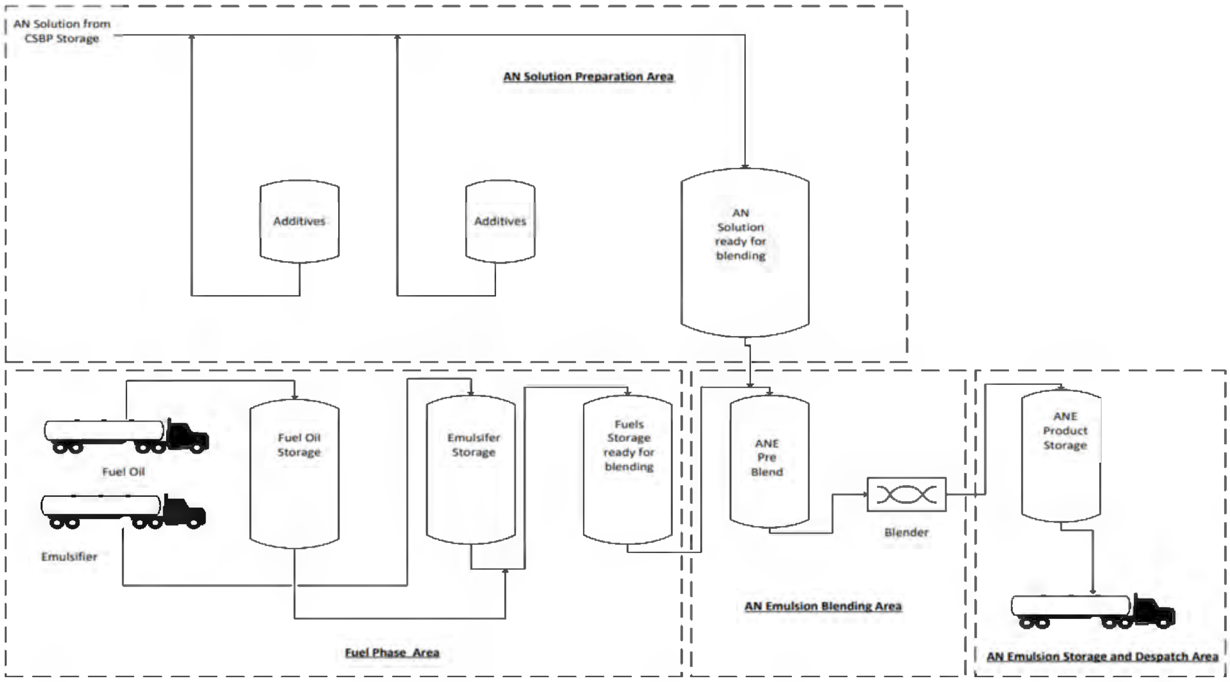

Figure 13: Ammonium nitrate emulsion process flow diagram (simplified)

The product is formed by the mixing and blending of chemicals listed in **Table 5** to produce the desired Emulsion product.

Table 5: Chemical ingredients to form AN emulsion

Chemical	Function
Ammonium Nitrate Solution	The main ingredient of the product which combined with a small percentage of water forms the oxidiser part of the Emulsion.
Acetic Acid	Used to reduce the pH of the ANSol in the oxidising area of the plant and forms one part of the gassing in the Emulsion.
Sodium Acetate	Acts as the pH buffer and stabiliser when added to the ANSol.
Sodium Thiocyanate	When added to the ANSol, it acts as a catalyst for the gassing reaction performed on the mine site.
Sodium Hexametaphosphate	When added acts as a crystal growth inhibitor reducing the forming on AN crystals in the Emulsion product.
Refined Oil	Forms the fuel phase of the emulsion which is mixed with emulsifier at a ratio of 4:1
Emulsifier	Is mixed with the refined oil to form the fuel phase makeup of the emulsion.
Urea	Added to the ANSol to act as a buffer when producing Reactive Ground (Inhibited) Emulsion.

ANSol Preparation Area

This area of the plant receives 90% ANSol from the Prill Plant ANSol tanker loading circulating loop.

The ANSol enters the ANSol Preparation Area and is diluted by adding demineralised water (from the on-site demineralisation plant) to a solution strength of 82 %. The diluted solution then passes through an ANSol cooler to cool the solution down to 83 ^{O}C and through a pH probe which controls the acetic acid addition. The other additives are then added for pH buffering and stabilisation and part preparation of the gassing system. The additives are received as pre-dissolved solutions for ease of handling and stored within bunded areas.

The solution is directed to either the ANSol surge tank or ANSol contingency tank where it is mixed. The ANSol surge tank normally acts as a buffer and to reduce the impact of variations in strength and pH, and to even out variations in AN solution flow. The ANSol contingency tank is used to collect off-specification AN Solution and to act as a batch tank for special batches such as Inhibited Emulsion (a product). This would require the addition of urea fed to the contingency tank via the urea hopper. The prepared ANSol is then pumped to the Emulsion Blending Area.

Fuel Phase area

In this area, refined oil (diesel) and emulsifier are mixed to produce the fuel phase for emulsion manufacture.

The refined oil is pumped from the storage tanks and mixed with concentrated emulsifier from the emulsifier concentrate tank at a 4:1 ratio by a static mixer. The mixed refined oil and emulsifier is classified as "Fuel Phase" and flows through to the fuel phase storage tank. Low pressure steam is used to raise the temperature of the fuel phase to set point of 50 ^{O}C with a trip at 55 ^{O}C. When emulsion is being produced, the fuel phase will mix with the oxidiser solution in a static mixer before entering the pre-blend tank flow at the blending unit. Prior to production and during interruptions in emulsion production, the fuel phase will recirculate through the pump back into the fuel phase tank.

Refined oil is brought to site in road tankers and pumped into the double-walled storage tanks. The storage tanks themselves are self-bunded for spill containment with a drain installed for bund storage removal. The emulsifier is received in isotainers which can be heated for transferring and is pumped to the emulsifier concentrate tank by the isotainer unloading pump. The concentrate tank is fitted with steam coils and an agitator to keep the emulsifier warm if required. The isotainers are placed in the bunded containment area.

In the Fuel Phase Area there is the provision to bypass the fuel phase storage tank which stores fuel phase to supply customers by drawing directly from IBC's placed on a portable bund, or from the customer supplied fuel phase storage isotainer.

AN Emulsion Blending Area

In this area the ANSol and Fuel Phase are brought together to make the AN emulsion (ANE). The emulsification process occurs in several stages. The ANSol and Fuel Phase mixture pass through a static mixer before entering the insulated pre blend tank, here mixing occurs to produce the "emulsion seed". The seeded mixture is then pumped through the emulsion blending pump.

If desired seeding does not occur in the pre blend tank, the mixture can be transferred to the three-tonne capacity waste emulsion tank. This tank is insulated, and steam jacketed, and its contents are recycled back into the pre blend tank once correct seeding is occurring. If the content of the pre blend tank is seeding, the product is mixed where viscosity is controlled by temperature (plate heat exchanger) and ingredient shearing. After the plate exchanger the Emulsion is transferred to a pre-selected storage tank in the ANE storage area.

Due to the design of the shearing system for emulsification, the blending rate is limited to the discharge pressure of the pre-blend pump and the arrangement of mixing elements in the static mixer. There are three lines from the AN blending area to storage; one is for the Base Emulsion product, the second is Inhibited Emulsion and Special Blends and the third is a line to take product directly from the emulsion blending unit to the tanker loading. The waste emulsion tank is not only included in the blending area to receive unseeded emulsion mix, but also to receive uncontaminated emulsion cleaned up around the blending skid area or from hose and line purging.

AN Emulsion storage and dispatch

ANE from the blending unit is sent to one of three storage tanks which have their own dedicated positive displacement loading pumps. A 55-tonne storage capacity tank is used for Inhibited Emulsion or Special Blend ANE while Base Emulsion is stored in either of the 100 tonne capacity tanks.

The ANE is stored in accordance with the *Code of Practice (CoP): Storage and handling of UN3375,* a document published by the Australian Explosives Industry and Safety Group (AEISG, 2018). This Code sets out the requirements and recommendations to control the risks arising from the storage, handling (including transfer operations), transport and security of Ammonium Nitrate Emulsions, Suspensions and Gels, which conform to UN3375. ANE has a high viscosity (does not flow easily). Raised pads are used as recommended to reduce or eliminate the risk of fuels pooling under ANE tanks.

The CoP design specifications require:

- Each tank to either have emergency venting according to AS1940 or a means of automatically releasing tank contents in a fire engulfment (tank to be manufactured with low melting point material (e.g. aluminium, plastic);
- The materials of construction of the tank and its supporting infrastructure shall have adequate strength for duty (consider densities of AN emulsion), and be resistant to corrosion from AN emulsion, or protected by appropriate coatings; and
- Storage of ANE is also to be such that large spills are drained away from the storage.
- Bunding is not recommended.

CSBP loads the product into tankers via adjustable gantry hoses for the customers.

Control Systems

The ANE Plant is controlled and monitored using a human machine interface system, which sends and receives signals from a PLC that controls the general running of the ANE Plant. A separate safety PLC controls all trips and safety functions of the plant processes.

The emulsion plant does not present any point source emissions. The process is essentially a blending process and there are limited scenarios that could lead to emissions. Most adverse plant conditions cause the blending to trip, thereby stopping the adverse conditions from mixing to occur.

Various upset conditions could theoretically lead to evolution of NO_X gases through overheating or over acidification, but these are not deemed likely and there is considerable process control to prevent this from happening as these could ultimately lead to a runaway thermal decomposition. These conditions have been assessed and safety instrument systems have been put in place to prevent these from occurring.

The existing blend tanks (ANSol surge and contingency tanks, both 30 m^3) can vent minor amounts of hydrogen sulphide gas (H_2S) from the thermal decomposition of the Sodium Thiocyanate added at 0.26 % when the tank is left static for a period; this was assessed as being insignificant when the ANE Plant was commissioned. The levels are very low, but the odour is potentially detectable next to the tanks. No H_2S odour complaints have ever been received because of the venting. There is also a possibility of insignificant levels of fugitive acetic acid vapour emissions from the Acetic Acid tank venting, which are also unlikely to impact workers on site, nor environmental receptors.

As part of the critical system controls implemented to manage environmental and WHS risk, the following measures are implemented (**Table 6**).

Table 6: Process safety control systems

Control	Function
Pressure Integrity Devices	• Ensure pressure equipment does not exceed design parameters.
Gas detection	• Detection of gases such as ammonia, hydrogen, and methane. • Gas detectors will either initiate emergency shutdown systems or activate alarms in control rooms. • Operator intervention is required for those gas detectors alarms that only have an alarm function.
Shut Down Devices	• Emergency shutdown system design to make the facility safe in the event of an operational parameter such as temperature, pressure or flow exceeding a define specification. • Shutdown functions can be DCS or Safety PLC controlled functions. • Some discrete systems such as compressor may have their own separate shutdown systems.
Instrumented Alarms/Operator Actions	• These are alarm functions that advise the control room panel operator that a defined operational parameter has exceeded a defined specification. • The response to the alarm is done by the panel operator.
Fire Protection Equipment	• Fire systems are designed to mitigate the impact of a loss of containment or fire event. • Systems can be automatic functions or manually operated. The CSBP Kwinana site has several firewater supply systems: o CSBP Fire water system - a dedicated fire water system on the Kwinana site is supplied scheme water from the Water Corporation. Scheme water is supplied from a 600mm offtake from the scheme water main at CSBP's property entrance on Kwinana Beach Road. The maximum flow rate and static pressure varies between 450 kPa and 600 kPa as it is determined by the Water Corporation's scheme water supply pressure. o BP Refinery Fire water system - this line is separate to the CSBP fire water system. The fire main size at the ammonia plant tie-in points is 300 mm and is wrapped carbon steel. Static supply pressure is nominally 1,000 - 1,200 kPag depending on what pumps and how many pumps are running. If the line pressure falls to 600 kPag, then additional electrically operated pumps operating on scheme water cut in to maintain pressure. If the pressure continues to fall to 250 kPag, then diesel pumps on scheme water cut in. An additional diesel pump on seawater can be used to supplement supply in emergencies. Minimum delivery pressure for firefighting equipment design is 1,000 kPag with a pipeline rating of 1,700 kPag. o Scheme water system - This system is used to supply potable water for offices, crib huts and safety showers. Scheme water fire hydrants exist in some remote areas. o Bore water system - Some hydrants in remote plant areas are supplied by the shallow bore water system. This system is maintained at approximately 580 kPa by a header tank. The maximum flow rate available with all seven production bores operating is approximately 7,500 L/min. o PP2 Fire water storage - This system consists of a 750 m^3 water storage tank and three diesel pumps. The system is manually operated to discharge the contents of the tank through the fixed sprinklers in the roof of the bulk AN storage shed. Although this system's purpose is to provide drench water for the AN stockpile, it can also be connected into the CSBP fire system. o Fire protection equipment – strategically installed fixed and portable monitors, fire hydrants, hose reels, fire extinguishers, gas quenching system and fire alarms and detectors. The fire system is inspected, tested, and maintained in accordance with AS1851.
Operational Procedures/Operator Actions	• Define procedures that provide specific guidance/instruction on activities to be undertaken. • Procedures require operations personnel to follow the required activities.
Interlock System	• These are engineering systems that ensure a defined series of steps are followed. • Interlocks can be mechanical or instrument.
Design Features	• These are inherent safety features that exist with facilities to prevent or mitigate events.

Control	Function
Control Systems	• These are like the emergency shutdown system. Differ in that controls systems are attempting to prevent a process condition from exceeding define parameters. • Control systems will automatically alter process activities such as flow, & pressure to maintain within acceptable levels.
Point source emission monitoring	• Monitoring discharges in accordance with regulatory requirements.

The amendment application proposes to increase the manufacturing capacity of ANE by increasing the operating hours of the plant and modifications to infrastructure described in Section 6.2 and 6.3.

6.1.5 Site Water Management

Water requirements for the CSBP Kwinana (CSBP and AGR) are met through a combination of groundwater (Yarragadee and Tamala aquifers) production bores, recycled water from the KWRP provided by the Water Corporation, recycling of onsite - process water, and scheme water. A portion of the sub-artesian (Yarragadee) water is passed onto Tronox. Scheme water is used to make up shortfalls if required. CSBP preferentially uses KWRP water (±4.4 ML/day). Based on the 5 yearly average, 63 % of the artesian groundwater allocation is used and 91 % of the superficial allocation is used. A breakdown of the water sourced is provided in **Figure 14**. The NAAN plants currently use approximately 1.7 GL/annum.

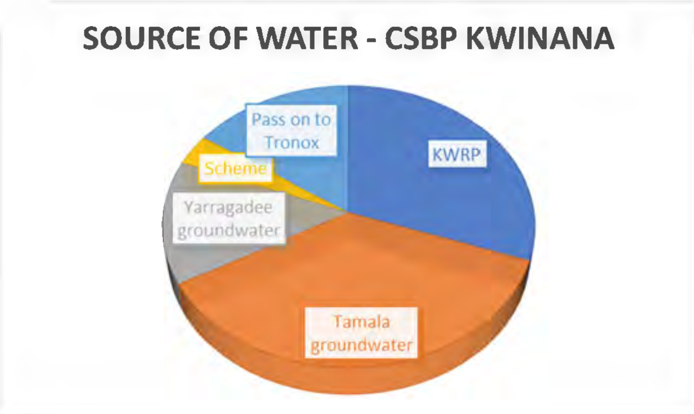

Figure 14: CSBP Water sources

Water is predominantly used in manufacturing processes (feedstock) and heat management: cooling purposes and steam for power generation.

High purity (demineralised) water required for chemical manufacturing is provided by the onsite Demineralisation Plant (Demin Plant) that polishes KWRP and sub-artesian water, or scheme water. The sub-artesian water is first treatment by the onsite reverse osmosis (RO) plant before it is used. The RO plant is designed to produce 2,000 m^3 per day of treated (permeate) water with a conductivity <40 µS/cm. The Demin Plant, via a filtration and ion exchange process, can produce 105 m^3 of demineralised water per hour (±2,500 m^3/day).

Large amounts of water (from a combination of available sources) are used for cooling, where water is lost to evaporation. The NAAN cooling towers on average evaporate 65.7 m^3/hr per NAAN cooling tower system with an average of 17 m^3/hr blowdown released to maintain the water quality needed. Plans to incorporate higher quality water for the cooling systems will reduce blowdown requirements and therefore reduce water use and wastewater generation.

The CSBP Groundwater Operating Strategy has been developed to monitor water quality for contamination and salt water intrusion at the production bores and manage volumes to support the licences to take water. Results are provided with annual environmental reporting. This monitoring is also supported by the groundwater contamination monitoring plan for site health, safety, and environmental risk management.

6.2 Proposed activities

CSBP is seeking approval for an increase in production capacity of nitric acid, ammonium nitrate and ammonium nitrate emulsion to meet market demand. The increased production of nitric acid and ammonium nitrate will be realised through infrastructure improvements (debottlenecking). No new discharge points are created as part of the amended processes.

Also, CSBP proposes to install a valved pipe connection to allow the ammonia storage flare system to be diverted to the ammonia plant ammonia flare system for short periods of time. This will make it easier to isolate the ammonia storage flare and the knockout pot for maintenance and inspection, and remove the risk associated with the current activity.

6.2.1 Increased Nitric Acid and Ammonium Nitrate production

To manage the emissions to air from the increased production, additional N_2O abatement technologies will be implemented in the form of a tertiary abatement. This will be implemented in stages with one NAAN Plant completed at a time. The staged implementation is to align with plant shutdown periods.

The NAAN tertiary abatement and debottlenecking works are currently scheduled as follows:

- NAAN3 – July 2024 to March 2025
- NAAN2 – July to December 2025
- NAAN1 – July to December 2027

No specific commissioning of tertiary catalyst reactors is required.

Tertiary abatement technology like that approved under works approval (W6778/2023/1) by DWER for implementing tertiary abatement in NAAN3 will be implemented.[1] The new tertiary catalyst reactors will increase the abatement of nitrous oxide from 85 % to approximately 95 %, reducing NO_X emissions to the environment. The new tertiary catalyst reactors require a feed of natural gas which acts as a reducing agent.

The proposed works will not create additional point-source emissions points and will reduce air emissions from existing emission points. To facilitate the proposed emission reduction, CSBP will implement the following changes to the existing NAAN1 and NAAN2 plants:

- Modifications (to create similar plant arrangement as NAAN3) to enable increase in the SCR inlet temperature from 270 °C to a minimum of 375 °C (**Figure 15**); and
- Installation of a tertiary catalyst reactor to replace the existing SCR, to enable N_2O reduction using a natural gas feed.

Following the implementation of air emission tertiary abatement works, debottlenecking of the relevant NAAN plant will be carried out to enable the production increase. Debottlenecking activities in each plant will include:

- Addition of an air precooler at the compressor inlet, using chilled water (created by vapour absorption system) and insulating the chilled water supply piping.
- Air compressor and expander modifications.
- New chilled water (created by vapour absorption machine [VAM]) system and cooling tower unit to supply chilled water to the top section of the absorber that provides cooling duties to increase nitric acid production and precool the inlet air to the air compressor for each of the NAAN plants.
- New weak acid cooler;

[1] Works to facilitate tertiary abatement at NAAN 3 were simpler due to the ability to upgrade the existing SCR to include the tertiary catalyst reactor without other plant modifications.

- New pipe reactor, reactor separator and cyclonic column in the ammonium nitrate plant.
- Other minor modifications including replacement of heat exchangers, pumps, and valves to optimise process throughput.

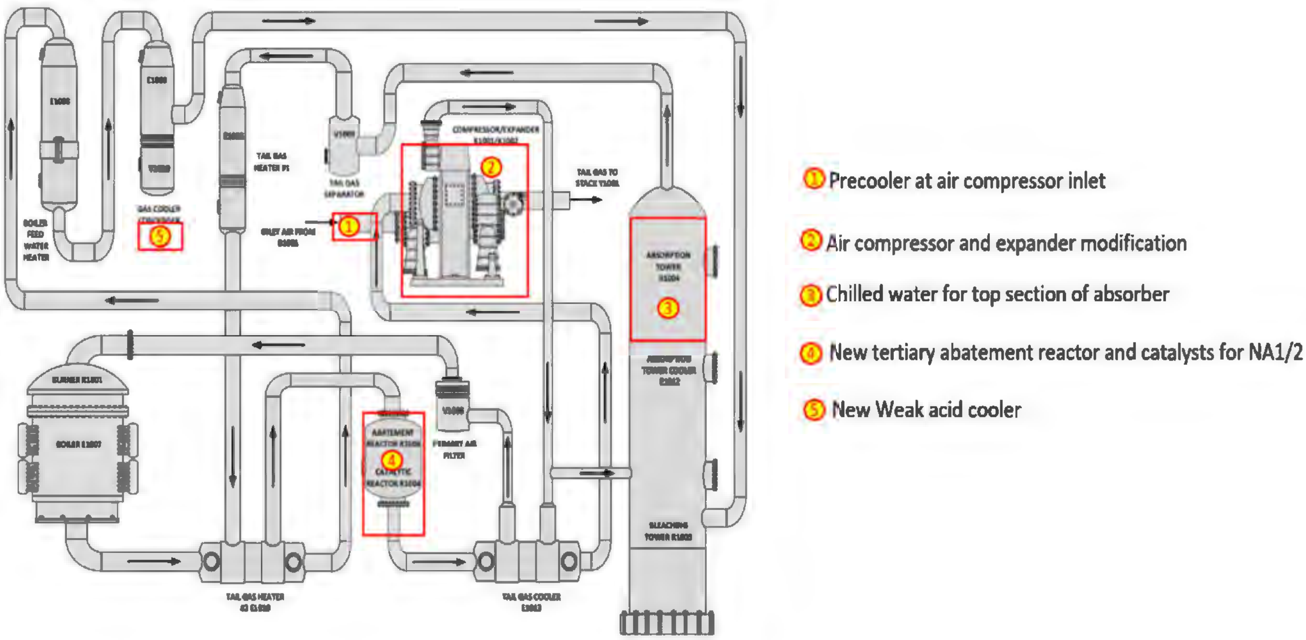

Figure 15: Proposed abatement and debottlenecking modifications to NA 1 and NA2 plants

The plot layout for the NAAN3 works is provided in **Figure 20**; upgrade works for NAAN1 and 2 will be similar.

Vapour Absorption Machine (VAM) Chiller

The plinth-mounted chiller units (for each NAAN Plant) will include a VAM unit and a twin water-cooling tower. For NAAN3, this unit will be located to the north of the plant, approximately 9.5 m from the boundary acoustic mitigation wall (**Figure 20**). Piping will be connected by an overhead pipe rack. The chiller units for NAAN1 and 2 will be positioned in vacant areas to the south of the pipe rack separating NAAN1 and NAAN2, while the supporting cooling towers will be positioned next to the NAAN1 auxiliary cooling tower.

The chiller unit will use vapor-absorption technology, whereby thermal energy is used to produce cooling instead of using mechanical energy. The heat source is usually leftover steam used to drive the cooling system.

A VAM uses water as the refrigerant and lithium bromide (LiBr) solution as the absorbent. The process of cooling goes through stages such as evaporation of refrigerant in the evaporator, absorption of refrigerant by concentrated LiBr solution in the absorber, boiling of dilute LiBr solution to generate refrigerant vapour in the generator and condensation of refrigerant vapour in the condenser. The heat exchange does not require direct contact between the refrigerant, the absorbent, and the steam. This process is schematically represented in **Figure 16**.

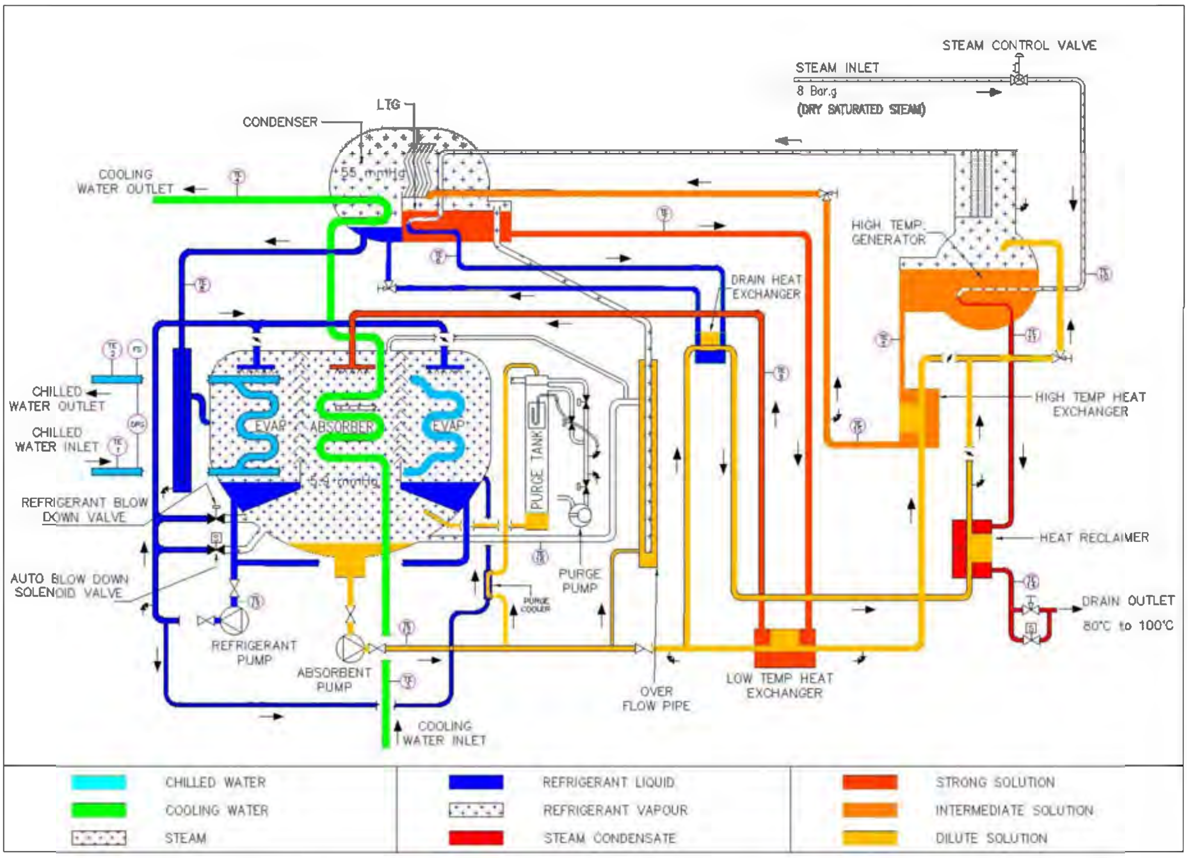

Figure 16: Schematic presentation of a Thermax Vapour Absorption Machine unit operation.

The advantages of using a vapour absorption system are:

- It is a simple heat exchanger working at different pressures. It is relatively cheap and reliable, requiring very little maintenance and operating cost.
- It works on environment-friendly refrigerant in the place of CFC (chlorofluorocarbons) which has an adverse effect on the ozone layer.
- As there are no moving parts which makes it free of noise and vibration.
- All the operations are fully automated hence it requires very little human intervention.

The associated cooling tower will have an estimated cooling water volume of 5.7 m^3 in its bowl at the recommended operating level. Water supply will likely be ±92 % from KWRP and 8 % groundwater. It is anticipated that the evaporation rate for each of the cooling towers (twin) will be 12.3 m^3/hr and the blowdown will be 1.7 m^3/hr.

The chemical dosing requirements stated below (**Table 7**). Chemicals will be kept in small quantities on portable bunded pallets to manage risk of any spills. The cooling water, chiller water and refrigerant are isolated with no direct contact with each other or the manufacturing chemicals, minimising risk of contamination.

The chiller unit water tower blowdown line for NAAN1 & 2 will connect to the existing NAAN1 cooling tower blow-down line that feeds directly to the wetland containment pond. NAAN3 chiller unit will connect via the NAAN3 stormwater sump (and pump that directs collected waters to the wetland containment pond) via four water tower connections:

1. Manual valve at bottom of basin
2. Overflow line at top of basin
3. Side stream filter connections
4. Analyser connection

Table 7: Chemicals used for cooling towers

Chemical	Function	Consumption	Storage
GenGard GN8020	Controls deposition build-up and scale formation	1,312 kg p.a.	1 x 200 L Tank & bund & 1 x 0.76L/hr dosing pump (Veolia)
FloGard MS6222	Corrosion protection	262 kg p.a.	1 x 100 L Tank & bund & 1 peristaltic dosing pump (Veolia)
Spectrus BD1500	Biocide enhancer	78 kg p.a.	1 x 100 L Tank & bund & 1 peristaltic dosing pump (Veolia)
Hypochlorite	Bleaching / oxidation agent	25,534 kg p.a.	1 x 2,000 L tank & bund & dosing pump
98% Sulphuric Acid	pH control	2,086 kg p.a.	1 x 1,000 L tank & bund & dosing pump

Additional water requirements

The proposed debottlenecking works will require an additional 0.65 GL/annum of water (1,780 kL/day). The additional water requirements for this expansion will be obtained from the existing groundwater allocations and additional KWRP water. Sourcing future high quality water will reduce water needs and ultimately wastewater volumes generated, enabling treatment through the capacity of existing wastewater management systems.

CSBP is investigating alternative additional water supply to increase the volume of high quality water for the site, to decrease the reliance on groundwater and increase its sustainable sources.

6.2.2 Expanded ammonium nitrate emulsion production

The plant design capacity is 30 tonnes per hour. Expanded emulsion production will be realised by an increase in operation hours, moving from day-shift operations only to a 24-hour two-shift operational model, to manufacture up to 262,800 tpa emulsion product. Furthermore, the emulsion product range will be expanded to include products with alternative formulations to meet market demand.

The proposed works do not introduce new environmental risk or change the manufacturing process; the risk profile remains unchanged.

To accommodate the additional production shifts and expanded product range, the following changes will be required at the emulsion plant:

- repurposing of two existing 110 kL fuel tanks to fuel-phase tanks (leaving two fuel tanks and two fuel-phase tanks), and the addition of a new 3 kL capacity run tank;
- addition of three 110 kL (140 tonnes each) capacity ANE storage tanks, and a new load-out station (replication of the existing load-out setup); and
- addition/modification of pumps, pipework, and process control system to integrate the new reagent and product storage tanks.
- Extension (by approximately 72 m^2) of the fuel phase area bunded concrete-reinforced hardstand for the placement of a new fuel phase run tank. A new fuel phase vertical run tank will be constructed with a capacity of 13 kL /10 t using mild steel tank with an agitator and heating unit and will be plumbed into the existing process piping.

The emulsion plant expansion does not present any additional point source emissions during normal or under upset conditions. Tanks may vent insignificant emissions to air.

6.2.3 Production flexibility and additional load-out facilities

In addition to the proposed production capacity, CSBP has identified an opportunity expand its nitric acid load out infrastructure while also enabling the acceptance of third-party ammonium nitrate solutions which CSBP will use in its chemical manufacturing processes.

The proposed works will not introduce new risks or changes to manufacturing processes, it does provide greater operational flexibility.

To facilitate an arrangement with a mineral processing customer that supplies them with nitric acid and ammonia, CSBP in return will receive their ammonium nitrate by-product. Suitable infrastructure will be installed on site within the existing operational footprint to annually:

- Deliver between 55-90 kt nitric acid at 62 % strength loaded into tankers/ISO containers;
- Deliver between 10-16 kt anhydrous ammonia into suitable vessels to be transported by road; and
- Receive between 50-70 kt of low strength ammonium nitrate solution (±70 %) that needs to be segregated for testing before being incorporated into the onsite manufacturing processes.

This change will involve establishing the following infrastructure:

- Nitric acid storage tank, stainless steel, 1,000 t capacity (789 m^3) within a new ± 412 m^2 concrete reinforced bunded secondary hardstand (2.4 m high and 300 mm thick walls), sump and sump pump to contain spills.
- ANSol tank (90 % w/w) with pumps, stainless steel, 700 t capacity (598 m^3 capacity);
- ANSol receival tank(s) for weak ANSol (70 % w/w), stainless steel, 1,000 t capacity (871 m^3);
- ANSol blending tank, 50 t (48 m^3).
- The ANSol tanks will be in a ±794 m^2 concrete reinforced bunded secondary containment 1.7 m high walls and 300 mm thick and include a sump and pump for collection of spills.
- Combined additional nitric acid and ANSol vehicle loading station; and associated pumps, heat exchanger and unloading station for quarantining of ANSol prior to being incorporated into manufacturing processes.

The containment infrastructure is designed to meet the AS3780 standard.

The associated works will enable multiple product loading points on site to provide redundancy and improved efficiency in the system while the additional tanks will provide storage buffering capacity, enabling greater decoupling of nitric acid and ammonia nitrate processes.

6.2.4 Ammonia storage flare connection

Fugitive ammonia emissions from the Ammonia Storage Tanks are vented through a flare on top of Ammonia Storage Tank 2. Maintenance of the Ammonia Storage Flare (ASF) is currently managed with operational controls and diverting small ammonia releases into a water tank during the isolation period. During this period there is an increased risk of venting to the atmosphere. Unburnt ammonia is a hazard to workers and presents a risk to environmental receptors.

The ammonia plant (AP2) flares fugitive process gas through an ammonia flare during upset conditions. The AP2 flare (APF) is not required during normal operations.

Both emission points (ASF and APF) maintain a natural gas fuelled pilot flare that always remains lit to manage upset conditions. Their locations are reflected in the current licence.

CSBP proposes to connect the ASF to the APF system via a connecting pipe and valve so that the ASF feed (**Figure 17**) can be diverted to the APF for short periods of time, allowing isolation of the ASF system and the ammonia storage knockout pot for maintenance and inspection, removing the risk associated with the current system for this activity. The APF will not discharge through the ASF.

The proposed work does not create new emission points, nor increase emissions. This contingency will enable required maintenance to be undertaken periodically safely with reduced incident risk.

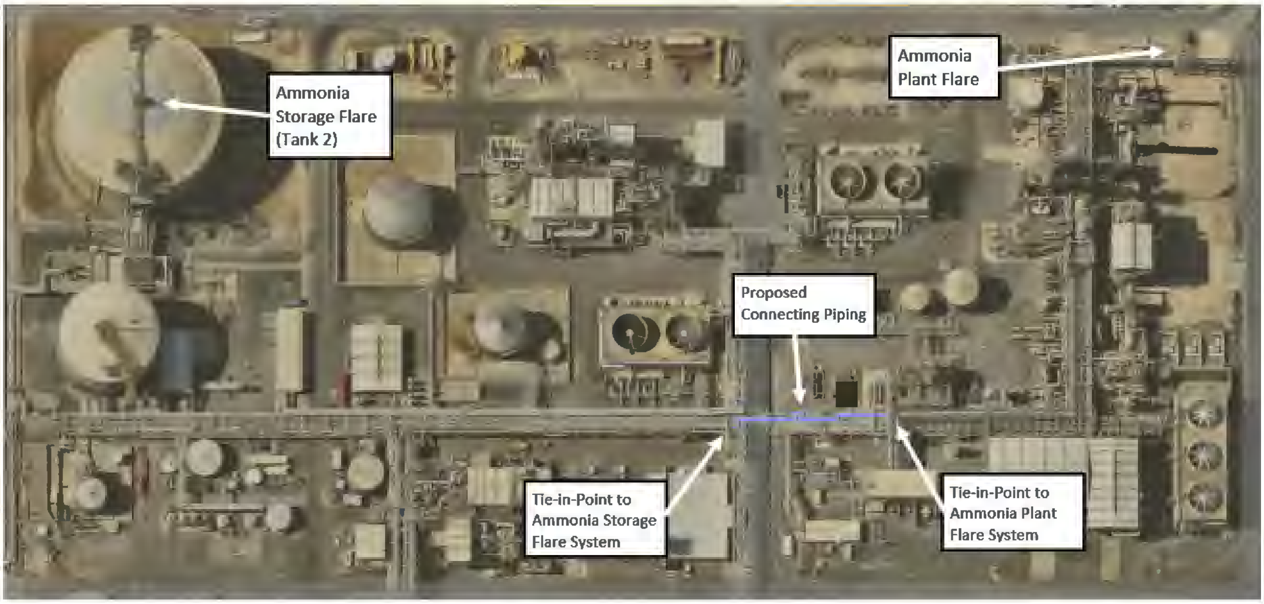

Figure 17: Proposed tie-in for Ammonia Storage and Ammonia Plant flare system

Investigations were conducted to identify volumes and the potential back pressure generated when the systems are separate and connected (operating). It considered potential purge volumes emitted through each flare separately and combined through the APF (**Table 8**).

PV5833B (in **Table 8**) is a purge gas vent valve in AP2 which represents the likely maximum flow case scenario from the ammonia plant during a start-up (3,950 kg/hr). The ammonia storage venting represents the maximum volumes likely to be vented (1,000 kg/hr). Combined purging of the APF and the ASF would result in 4,950 kg/hr, based off an estimate of venting that would occur under that scenario, but it does not represent the capacity of the AP2 flare which is much greater. The additional source from the ASF system will not impact on the capacity of the AP2 flare.

Table 8: Ammonia storage flare system and existing ammonia plant flare purge volumes.

Scenario	PV5833B	Ammonia storage	Total
Purge gas venting from PV5833B	10000 Nm3/hr (3950 kg/hr)	X	3950 kg/hr
Combined Purge gas venting from PV5822B & Ammonia storage venting	10000 Nm3/hr (3950 kg/hr)	1000 kg/hr	4950 kg/hr
Ammonia storage Venting	X	1000 kg/hr	1000 kg/hr

The combined purging scenario would be very rare (possibly likely to never occur) with the connected system. Maintenance outage on the ASF occurs approximately 1 week every 2 years, whereby alternative ammonia storage tank venting is needed. The pipe size at PV5833B and the ammonia storage venting tie-in is systematically increased from 250 mm to 600 mm diameter at the APF.

During a combined venting scenario, the back pressure at the ammonia storage connection would increase from <0.4 kPa gauge pressure (g) when ammonia storage venting solely to APF, to 7.1 kPa (g) for ammonia storage and AP2 venting through APF. This is well below the 300 kPa (g) design pressure of each flare and therefore poses no safety risk. The only issue with the 7 kPa (g) backpressure on the ASF system (during an ASF maintenance check) is the possible limitation on the venting from the Ammonia Storage Tanks vapour space hence additional controls will be included in the procedure for connecting the two systems. These controls include:

a) Administrative controls to manage the storage tank pressures, including ensuring all refrigeration units are available for service;
b) No ammonia importing to the ammonia storage tanks;
c) No additional activities required purging; and
d) There would also be consideration to delay the AP2 start-up until the ASF was available.

The isolation valve will be a gate valve manually opened via a handwheel. This valve will normally be closed and there will be procedural controls involved before opening it, to prevent accidental opening of the valve.

Once the piping is installed it will be purged with nitrogen gas, leak tested with nitrogen and then the tie-in point isolation valves will be opened to commission the new line. A new isolation valve in the middle of the new line which will serve as the isolation point between the two systems. There should be no potential for any emissions during the installation & commissioning.

6.2.5 Earthworks associated with proposed activities

ANE and additional NA & AN storage infrastructure

The ANE plant is located outside of the area delineated as being contaminated. Limited excavation works will be completed (up to 0.5 m depth) for the new 110 kL emulsion storage tank plinths at the ANE plant. Excavation works are expected to be shallow and largely remain within the compacted limestone base below the AN Emulsion plant. No contaminated soils will likely be intersected during the ANE expansion upgrades.

No deep excavation works are proposed either in the establishment of the new storage and loading infrastructure. This infrastructure will also be outside identified contaminated management areas. Any soils intersected will be treated as being contaminated, until laboratory analysis has proved otherwise, and managed in accordance with the Contaminated Sites Management Plan developed for the site.

Nitric Acid and Ammonium Nitrate Plants

The NAAN2 and NAAN3 infrastructure lies within the delineated arsenic plume management area identified in the Contaminated Sites Management Plan. NAAN3 chiller unit will also be inside the management area while the NAAN1 & 2 chiller unit infrastructure will be outside the boundary. The new chiller unit (chiller and cooling towers) for each plant will require excavation to a depth of approximately 1.5 m below ground level for the establishment of footings and plinths, and extension of pipe-racks to the units.

The extent of the arsenic management area is shown in **Figure 18**. Approximately 750 m^3 of soils will be handled during the NAAN expansion excavation works.

Excavation activities will not intersect the water table which is at ±1.2 m AHD. Ground level is ± 4 m AHD, and excavation would need to exceed 2.5 m to encounter groundwater.

The principal concern when interacting with contaminated soils is the exposure risk to workers and subsequent management of the soil. The excavated soils within the Arsenic management area will be assumed to be contaminated and be managed accordingly, with testing to be completed to verify risks and disposal of surplus soil.

Figure 18: Arsenic Management Area (from Contaminated Site Management Plan)

In accordance with the CSMP, the following controls will be applied as contaminated soil may be exposed during intrusive work:

- Avoid unnecessary contact with soil and groundwater where possible. Use machinery or hand tools to excavate material.
- Confirm appropriate PPE is worn by all personnel operating in any Management Area. In addition to standard Site PPE, nitrile gloves and safety glasses are mandatory when working with soil or groundwater plume Management Areas.
- Ensure that appropriate hygiene measures are adhered to once worker(s) have left the work area (i.e., personnel thoroughly wash their hands and face following field activities before eating, drinking, or smoking).
- Depth of excavation to be limited to less than 3 m bgl to avoid potential contact with groundwater.
- Confirm excavations are fit for purpose and do not unnecessarily extend laterally and vertically.
- Assume all excavated soil within the soil Management Area is contaminated and managed appropriately in accordance with the CSBP CSMP:
  - Place excavated material on temporary non-permeable liners (such as light density polyethylene (LDPE) sheeting) or the lined hardstand adjacent to the pond. Ensure the soils are placed on level, hard-standing surfaces and away from drainage structures (i.e., the site's perimeter drainage swale) to minimise the potential of contaminants leaching during dust suppression activities or rainfall.
  - Inclement weather dependant – LDPE sheeting shall be used to cover the stockpiled material.
  - Ensure excavated soils are not distributed across the site, nor relocated off-site.
  - Make sure excavated material from Management Areas is assessed before re-use or disposal.
  - Disposal will be to an authorised facility (based on analyses of soil samples).

6.3 Key infrastructure and equipment

The key infrastructure and equipment components associated with this application are detailed in the **Table 9**. New works are identified in italics. None of the proposed new works meets the definition of critical containment infrastructure (storage or containment of waste). The new infrastructure does not create new emission / discharge points, nor additional waste storage requirements.

Table 9: Infrastructure and equipment (NAAN and AN emulsion plant)

Infrastructure & equipment	Detail	Category (if applic.)	Site Plan reference
Nitric Acid and Ammonium Nitrate Plants			
NAAN1, NAAN2, and NAAN3 plants (existing)	Each NAAN plant has the main elements: • Gas compressor • Ammonia evaporator & superheater • Ammonia burner over catalyst • Absorption tower • Selective catalytic reactor - SCR (waste gas pollution control) • Waste gas emission stack (64.5 m height) • Pipe reactor to form ANSol	31	**Figure 4** ID 11, 12 & 13 **Figure 12**
(new / modification)	• *Modifications to NAAN 1 & 2 with modification of SCR inlets* • *New tertiary catalyst reactor with natural gas feed - NAAN1 & 2.* Tertiary abatement in NAAN3 will be within the existing unit (previously approved – W6778/2023/1). • *Precooler and new air filtration unit at inlet of air compressor for each NAAN plant.* • *Air compressor and expander modifications for each NAAN Plant.* • *New chilled water unit (vapour absorption machine) and cooling tower to supply to absorber and air precooler for each NAAN Plant.* • *New weak acid cooler for each NAAN Plant.* • *New pipe reactor, reactor separator and cyclonic column (AN Plant) for each NAAN plant.* • *Other minor modifications including replacement of heat exchanges, pumps, and valves to optimise process throughput for each NAAN Plant.*		Figure 19 **Figure 20** **Figure 21**
NA product storage tanks (two, existing)	Combined 5,500 tonne (2,000 t & 3,500 t capacity) storage tanks surrounded in concrete bunds that has 110% capacity and spillage recovery sumps and pumps. Tanks fitted with level indicators and alarms.		**Figure 4**, ID: 9
Weak acid storage tanks (three, existing)	200 t from rundown check of AN1 production and 100 t (x2) weak acid from plant trips (for start-up or shut down). Tanks located within bunds to contain acid spillage and spillage recovery sumps and pumps. Tanks fitted with level indicators and alarms.		Within plant
AN solution tank (existing)	Fully enclosed stainless steel with operating volume of 40m^3, forming part of the AN cooling loop Tank fitted with level indicators and alarms.		Within plant
AN storage tank (two, existing)	1,100 m^3 fully enclosed storage (900 t and 300 t). Stainless steel tanks surrounded in concrete bunds that has 110% secondary containment capacity and spillage recovery sumps and pumps. Tanks fitted with level indicators and alarms		**Figure 4**, ID: 8
Ammonium Nitrate Emulsion (ANE) Plant			
Ammonium Nitrate Emulsion Plant (existing)	Main elements include the: **Oxidiser / ANSol Preparation area** • ANSol cooler. • Additive dosing tanks & pumps (x4, double-skinned HDPE, each with a working volume of 10 m^3 in secondary containment) – T0321 for acetic acid, T0322 for sodium acetate, T323 for sodium thiocyanate, & T0353 for sodium hexametaphosphate. • ANSol surge tank (40 t capacity) (T0324) and contingency tank (40 t capacity) (T0325) (carbon steel construction) within secondary containment area. • Urea feeder (T0326).	75	**Figure 4**, ID: 15 & **Figure 22**

Infrastructure & equipment	Detail	Category (if applic.)	Site Plan reference
	• Demin water tank (20 kL, HDPE) (T0339). **Fuel phase area** • Refined oil storage tanks (x 4, each with a working volume of 110 kL – double-walled steel with self-containing bunds and overfill protection) used for storing fuel oil transferred from tankers – T0328, T0349, T0350 & T0351. • Emulsion concentration tank (working volume of 30 m^3) (T0329) made of steel within secondary containment bund. The emulsifier is received in isotainers that is placed inside the bunded area (potentially up to three kept within bund), and content is transferred into the emulsion concentration tank (T0329). • Fuel phase (mixture of fuel oil & emulsifier) tank (working volume of 12 kL, steel, within secondary containment area) (T0330). **Emulsion blending area** • Blending unit, waste emulsion tank with 3 t operating volume (T0332) and Pre-blend tank with operating volume 0.5 t (T0333), blending system break tank with working volume of 1.5 t (T0347) and pumps. **AN emulsion storage and dispatch area** • Emulsion blend tank (55 t capacity, steel) (T0335). • Base emulsion tanks (2 x 100 t capacity, steel) (T0336 and T0337). • tanker loading pump and load out station. All chemical containment infrastructure is located on concrete hardstand and bunded (except for ANE storage tanks).	75	**Figure 4**, ID: 15 & **Figure 22**
Repurpose of fuel tanks	*110 kL Capacity, Fuel tanks (mineral oil) (T0351 and T0350) being repurposed to fuel-phased tanks which is a double skinned mild Steel tank located on a sealed surface, providing two fuel phased tanks and two fuel storage tanks, each of 110 kL capacity.*		
Run tank	*3 kL tank (for process control) – stainless steel within existing bunded area (T0363). (New)*		
Ammonium nitrate emulsion tanks	*3 x 110 kL (145 tonnes each) painted mild steel tanks to meet the Code of Practice requirements (AEISG, 2018) (T0365, T0366, T0367) for additional product storage due to increased production. (New)*		
ANE Tanker load out station	*Duplication of existing tanker load out station for ANE. (New)*		
Fuel phase run tank	*A 13 kL vertical mild steel tank with an agitator and heating unit in extended (±72 m^2) Fuel Phase area concrete secondary containment. (T0364). (New)*		
***Production flexibility and loading** (new infrastructure)*			
Nitric acid storage tank 1000 t capacity	*789 m^3 stainless steel storage tank surrounded in concrete bunds that has 110% capacity and spillage recovery sumps and pumps. Tanks fitted with pumps, level indicators and alarms.*		**Figure 23** and 25
ANSol tank 700 t capacity	*598 m^3* — *All tanks are stainless steel, and new. Tanks fitted with level indicators and alarms. Storage tanks surrounded in concrete bund that has min 110% capacity of largest tank, and spillage recovery sumps and pumps.*		**Figure 23** and 24
ANSol receival tank 1,000 t capacity	*871 m^3*		
ANSol blending tank, 50 t capacity	*48 m^3*		
NA and ANSol loading station	*Combined nitric acid and AN solution loading station.*		**Figure 23**
Ammonia storage flare connection			
Connection of ASF and APF tie-in piping & valve	*Install approx. 60 m of pipe (DN150 Schedule 40 ASTM A333 Gr 6, a low temperature carbon steel) to be installed within an existing overhead pipe rack with a new isolation valve. Allows venting of ammonia storage flare gas through the ammonia plant flare when the ammonia storage flare and knockout vessel is being inspected / maintained.*		**Figure 17**

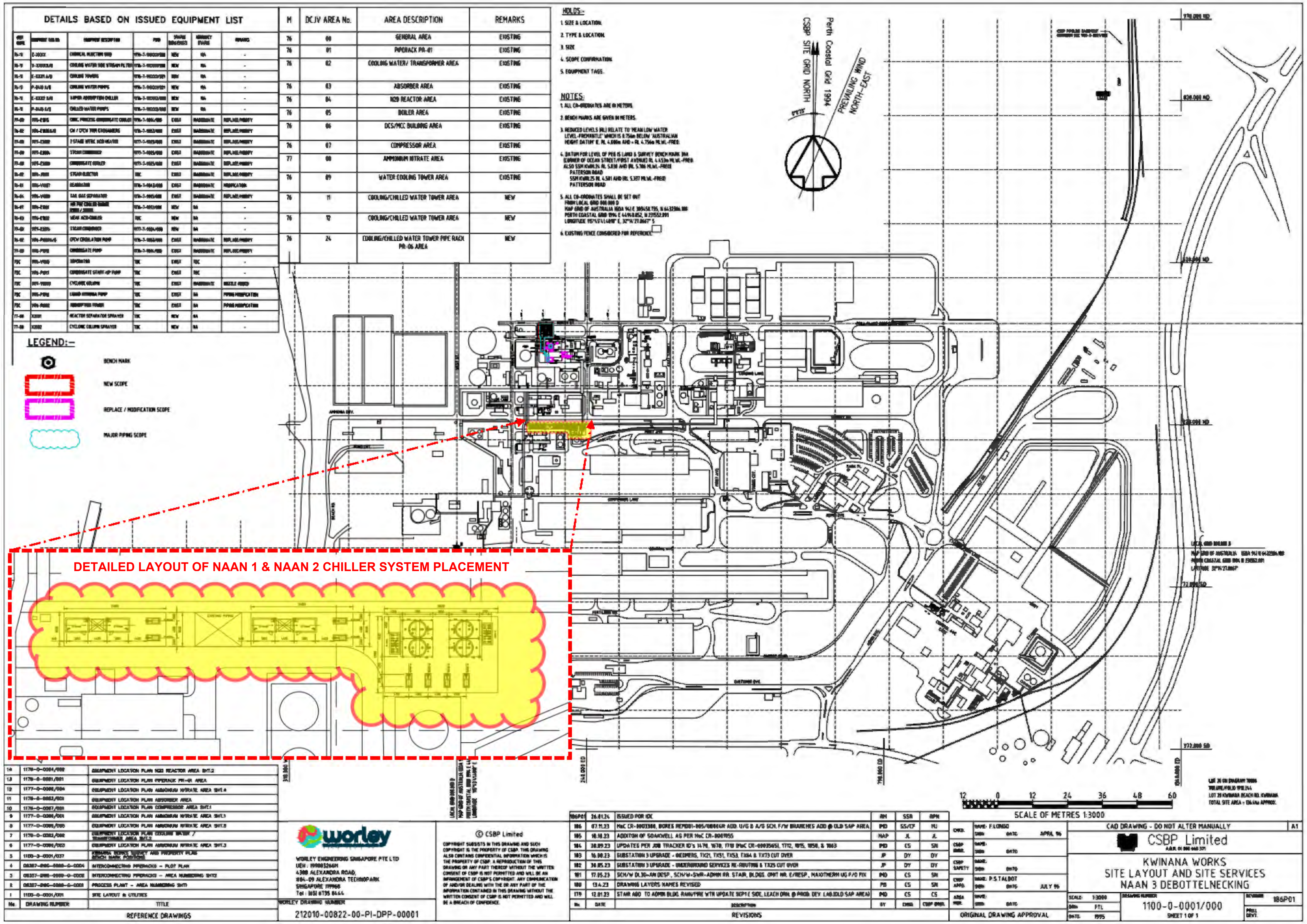

Figure 19: Plot Plan for NAAN debottlenecking works)

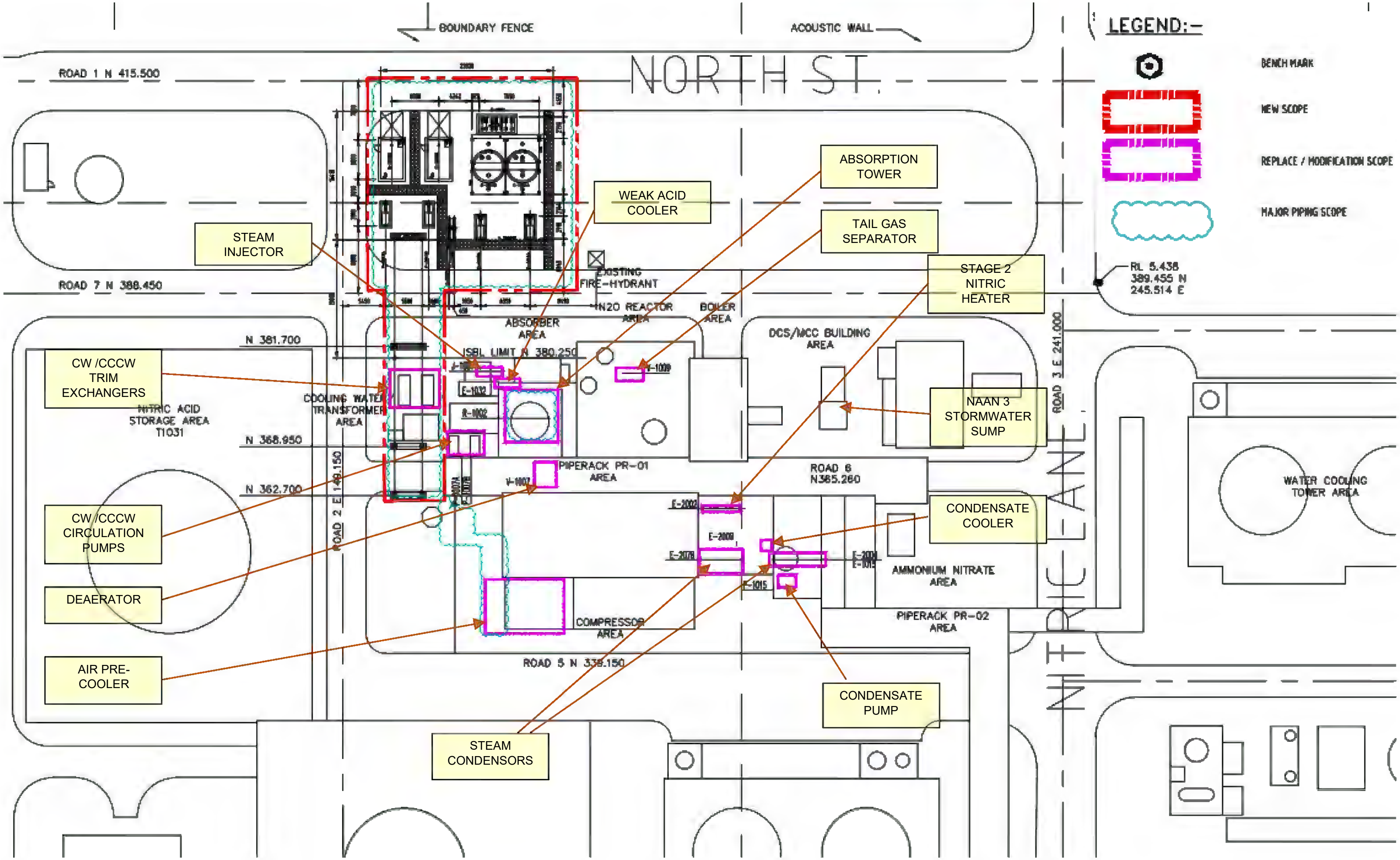

Figure 20: Proposed debottlenecking works site plan for NAAN 3 (excerpt from Figure 19)

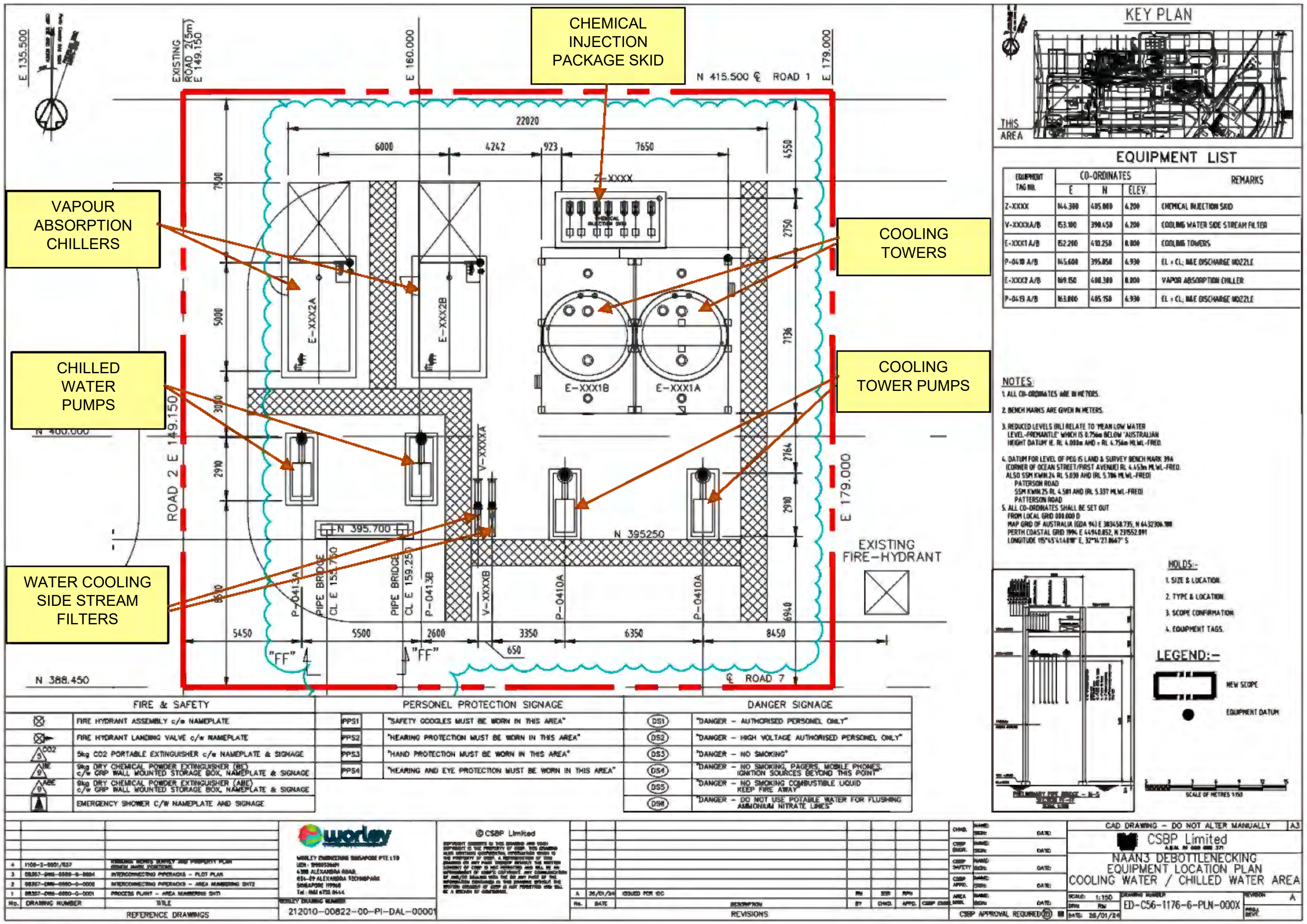

Figure 21: Key elements of Chiller system at NAAN 3 (each NAAN Plant will have its own chiller package).

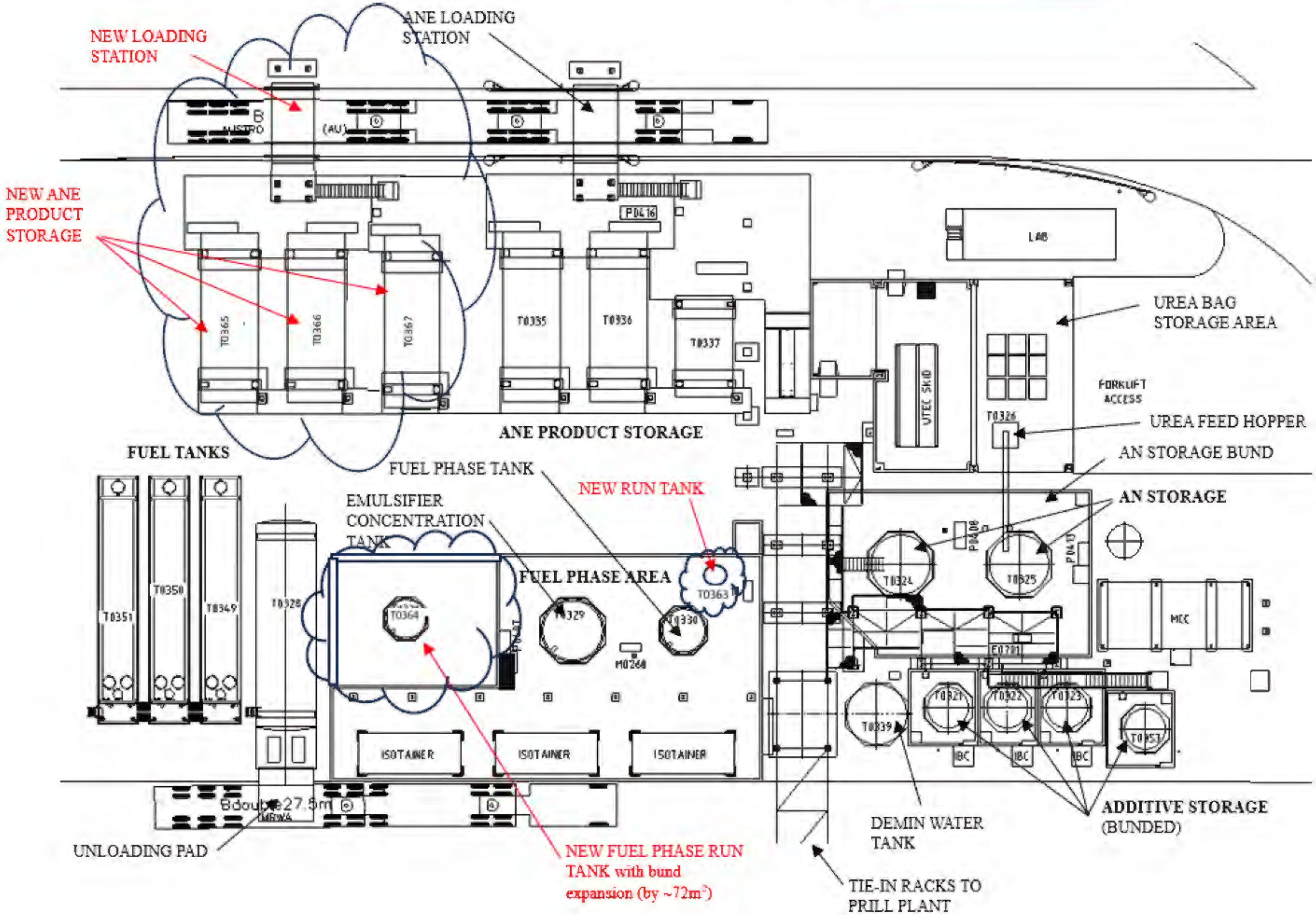

Figure 22: New infrastructure to support ANE expanded operations

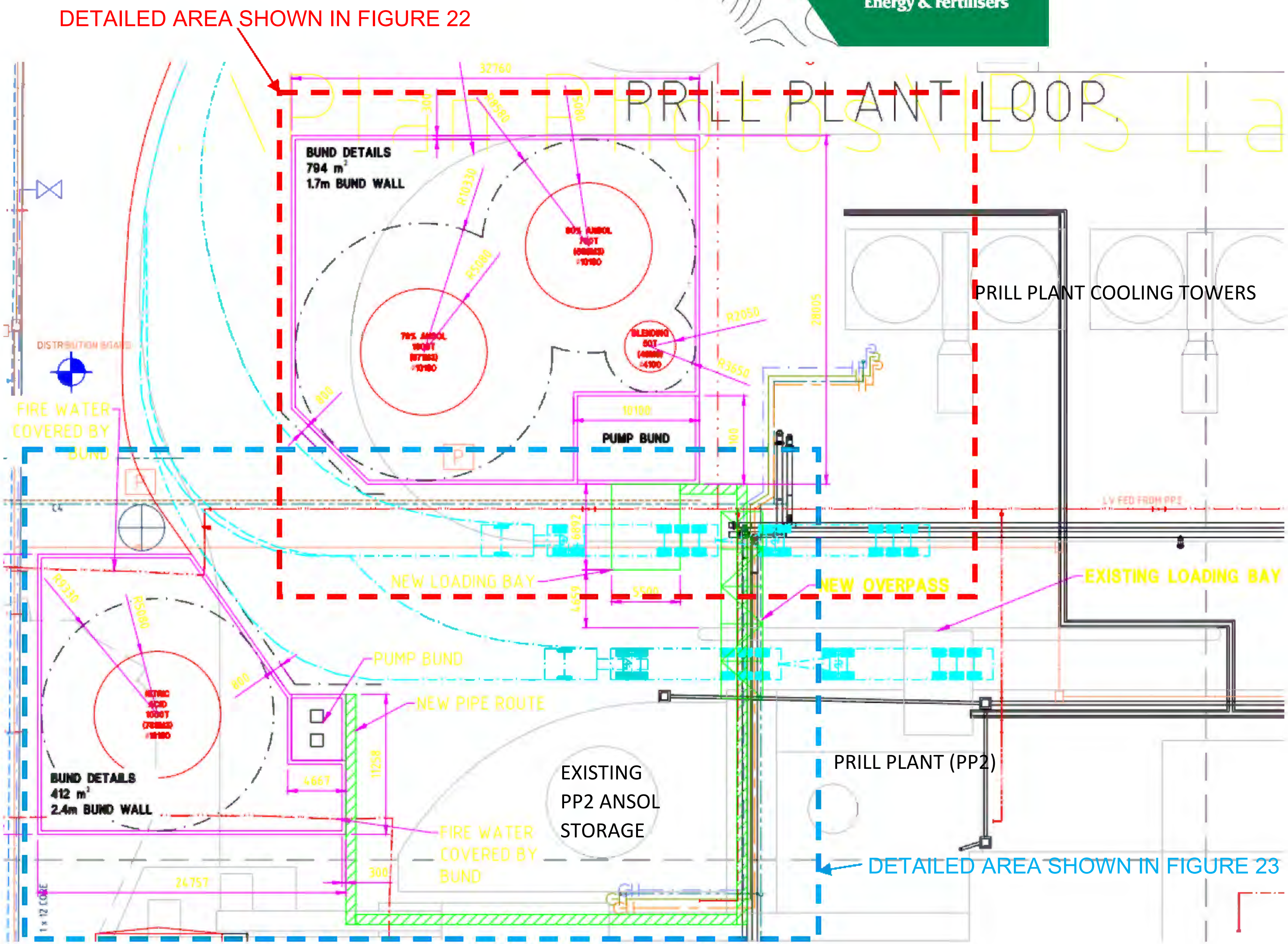

Figure 23: Schematic for new nitric acid and ammonium nitrate storage and truck loading infrastructure. Further detail provided in Figure 24 and 25.

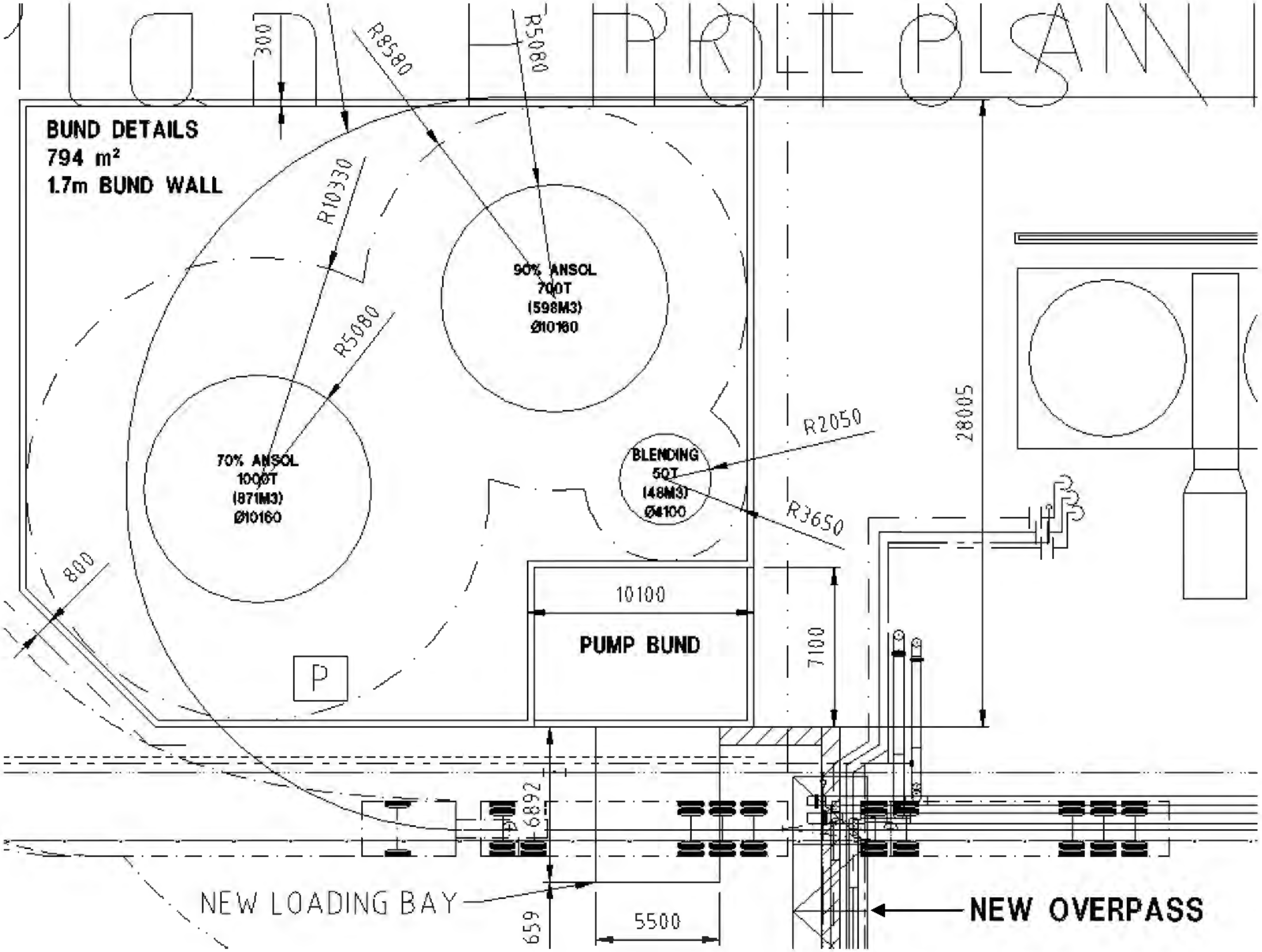

Figure 24: Detailed proposed ANSol storage tank layout and loading bay (being red rectangle excerpt from Figure 23)

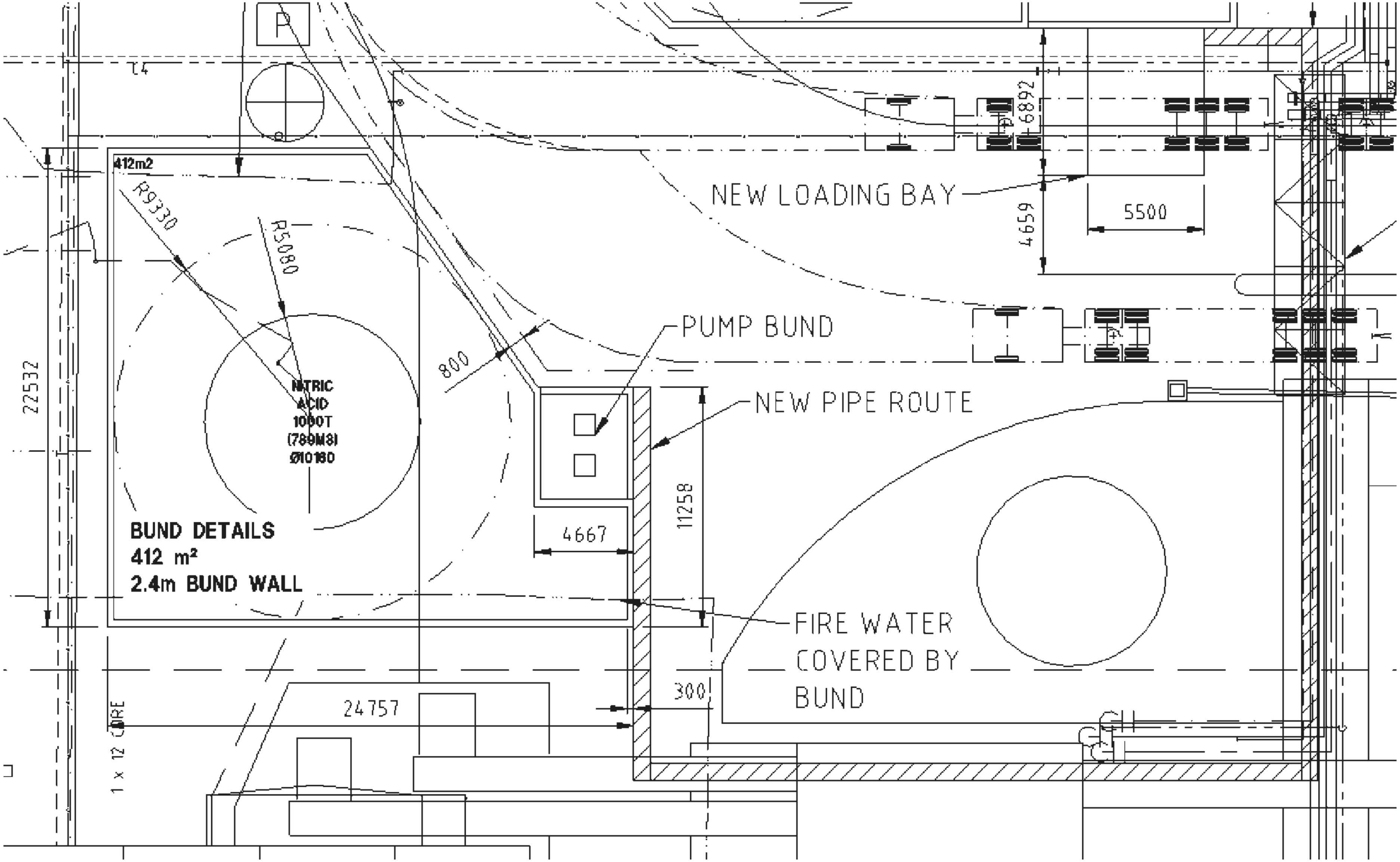

Figure 25: Detailed Nitric Acid Storage (being blue rectangle excerpt from Figure 23)

6.4 Environmental Commissioning (Att. 3a of AF)

Environmental Commissioning will not be required. Upgrades to each NAAN plant will need to occur during planned shutdowns to minimise disruptions to operations; current schedules are presented in Section 6.2.1.

6.5 Clearing (Att. 3A & 3D of AF)

All works will be completed within existing operational footprint. No clearing required.

7 EMISSIONS, DISCHARGES & WASTE (Att. 6 of AF)

Emissions and discharges were assessed under Part IV as part of the s45C referral to amend a proposal. The following environmental factors were presented for assessment as part of the referral process:

- Marine;
- Air quality (and human health);
- Greenhouse gas emissions;
- Noise;
- Human health; and
- Vegetation and flora (clearing)

The proposal has been consistent in meeting the respective EPA objectives, demonstrating acceptable levels of impact, including significant improvements in air quality and greenhouse gas emissions.

7.1 Emissions to air

Air pollution control conditions within the licence specific to the NAAN plants include continuous monitoring of NOx emissions during operations and start-up, hourly and half-hourly emission limits. Limits for particulate emissions from the prilling plant, collected through stack testing twice per annual period, are also specified.

7.1.1 Source of emissions

Emissions to air from the three NAAN plant stacks (**Figure 26**) are primarily NO_X and N_2O. Nitrogen dioxide (NO_2) is a reddish-brown gas, very acidic, corrosive and non-flammable. Nitrous oxide (N_2O) is a colourless and non-flammable gas that poses limited risk to safety but is a potent greenhouse gas.

Under normal operation and prior to debottlenecking, the average hourly NO_X concentration is typically around 0.1 g/m^3 (per NAAN Plant) well below the licence limit of 0.41 g/m^3 per plant. No exceedances of the start-up conditions have been reported in the last eight annual reporting periods.

While an increase in Nitric Acid production capacity to 819 tonnes per day per plant after debottlenecking is expected to increase emissions if no addition mitigation is applied, the proposed abatement works will realise a reduction of emissions at NAAN1 and NAAN2. The addition of a tertiary catalyst reactor containing an iron zeolite catalyst (or a catalyst of similar performance), which will be installed in place of the existing SCR. NAAN3 already has approval (MS875 and W6778) to implement tertiary abatement measures, which will be implemented with the next major plant shutdown period to also realise a reduction.

The waste gas will contact the tertiary catalyst in the presence of ammonia and natural gas, as a reducing, agent to reduce NO_X and N_2O emissions to atmosphere, improving the environmental outcome. The current and projected emissions associated with the expansion and debottlenecking are presented in **Table 10**. Given the anticipated significant reduction, the impact of NO_X emissions has not been reassessed.

There will however be a minor addition in carbon monoxide (CO) and methane (CH_4) emissions associated with the tertiary abatement due to the introduction of the natural gas. No change to ammonia emissions from the NAAN plants are expected.

Tertiary abatement will be installed prior to increasing production.

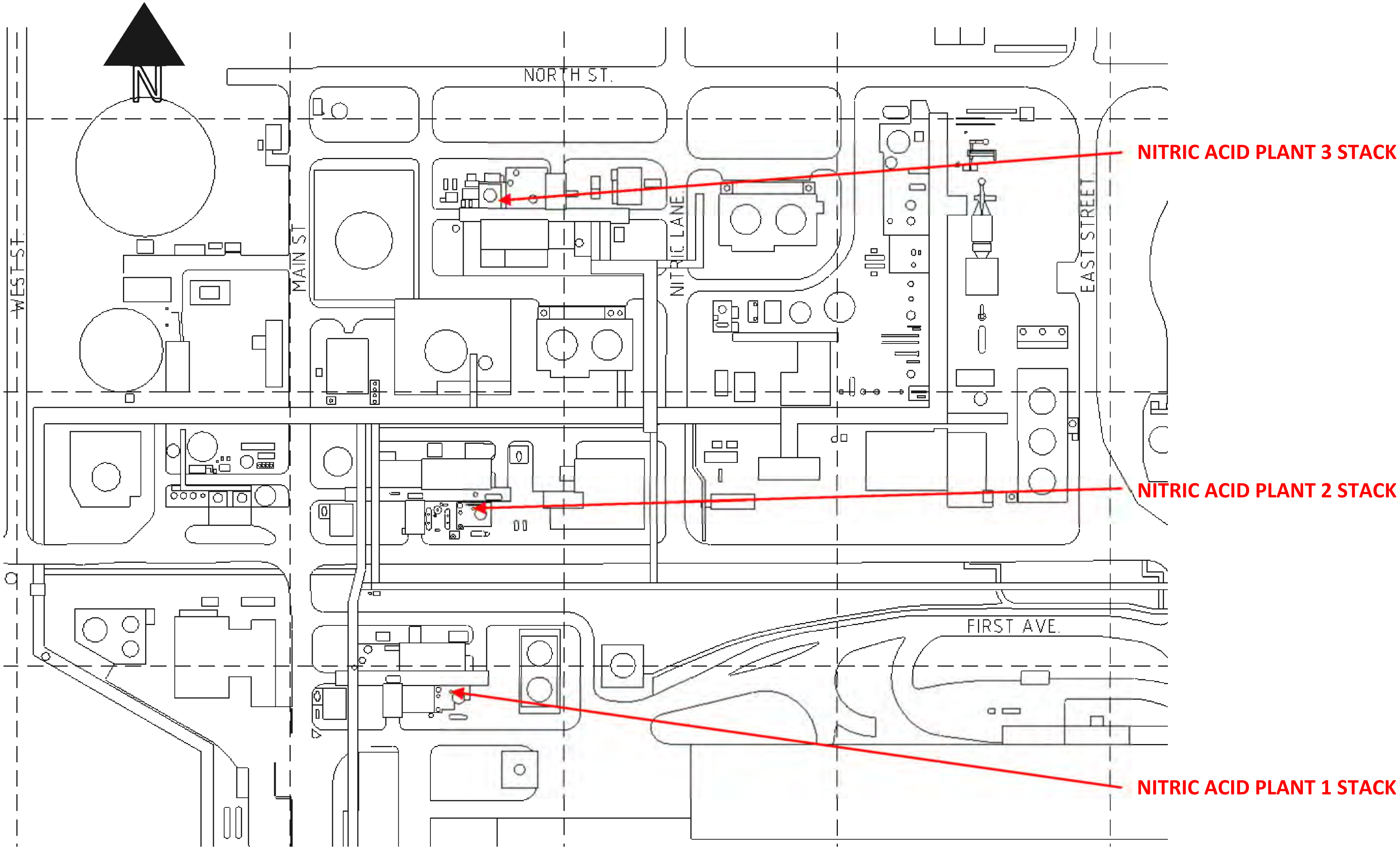

Figure 26: Location of Nitric Acid Plant stacks *(unchanged from L6107, Attachment 1, Map 3).*

Table 10: NAAN stack emissions (post debottlenecking for each Plant)

Species	Units	Existing production throughput	Expanded production	Expanded production with tertiary abatement	Comments
N_2O	ppm	142	190	25	Increase in N_2O with increased production but ultimately a decrease in emissions due to tertiary abatement
	g/m^3	0.267	0.342	0.045	
NOx	ppm	50	50	20	Stack emissions are expected to reduce to 20 ppm (manufacturer guarantee) but likely to be about 5 ppm during optimum tertiary abatement. Total emissions expected to decrease by approximately 140 tpa despite increased production.
	g/m^3	0.094	0.094	0.038	
NH_3	ppm	<5	<5	<5	No change
	g/m^3	0.0035	0.0035	0.0035	
CO	ppm	0	0	150	Increase due to natural gas addition as a reducing agent for tertiary abatement
	g/m^3	0	0	0.172	
CH_4	ppm	0	0	150	Increase due to natural gas addition as a reducing agent for tertiary abatement
	g/m^3	0	0	0.098	

The proposed amended proposal will not lead to any changes to NAAN plant emissions during start up events.

Emissions of particulates are attributable to the prilling plant, no change is proposed to the prilling plant production process or rate that would have regulatory control implications. The emulsion plant does not cause any point source air emissions, with the expansion not causing any changes to the process or emissions.

7.1.2 Assessment of air emissions

The screening analysis, detailed in the draft DWER Guideline Air Emissions (DWER 2019), provides a conservative assessment of air emissions, and involves simple calculations to predict a screening concentration (SC). The analysis compares the SC value with an air quality guideline value (AGV) screening tolerance, which represents likely insignificant impacts assuming worst case conditions.

Carbon monoxide (CO) emissions predicted from the NAAN plants, post installation of the tertiary catalytic abatement, underwent screening analysis to confirm that the introduction of this emission is insignificant.

The DWER (2019) draft guideline provides AGVs for CO based on 1-hour and 8-hour averaging periods. Note the screening assessment has only been carried out for the 1-hour averaging period as the methodology described in the draft guidance does not include averaging periods other than 1-hour, 24-hour and annual.

The NAAN emission points are relatively close together and could result in cumulative impacts. The predicted screening concentration is therefore tripled, to account for the potential contribution of the three plants, prior to comparison with the AGV.

The assessment of the CO emissions was carried out using the following stack parameters: stack height of 64.5m, an emission flow rate of 27.7 m^3/s. An effective emission height of 30-70 m was used with a CO concentration of 171.8 mg/m^3 (150 ppm) with a calculated CO emission rate of 4.76 g/s. The SC results for different scenarios, as presented to the EPA in the s45c, are demonstrated to be well below the 10 % screening criteria for CO and are considered a low risk (**Table 11**).

Table 11: Screening analysis

Emission	Heff (m)	Emission dispersion factor [CUE]	Plant emission rate [E] (g/s)	Averaging period	Screening concentration combined NAAN 1,2&3 [SC] (µg/m³)	AGV (25℃, µg/m³)	SC % of AGV	Screening criteria	Pass screening
CO	70	32	4.76	1-hour	456	30,000	1.5	<10%	Yes
	50	56			800	30.000	2.7	<10%	Yes
	30	112			1,599	30,000	5.3	<10%	Yes

Note, methane is not listed in the draft guideline as a pollutant and no AGV is provided; therefore, it has not been included in the screening analysis. Methane was assessed by the EPA (Ministerial Statement 875 and 689) as a greenhouse gas. It is projected that greenhouse gas emissions will be significantly reduced as part of this NAAN expansion despite an increased production with the introduction of the additional abatement technology (see Section 7.2), as presented in the EPA Request to amend the Approved Proposal.

Applicable criteria for ambient NOx (as NO_2) are provided in the National Environmental Protection (Ambient Air Quality) Measure (Air Quality NEPM) (DCCEEW 2021). Modelling of the existing operation determined that the direct and cumulative NO_X emissions comply with the Air Quality NEPM standards and have therefore not been further considered given the proposed reduced emissions.

Overall implementation of the proposed amendment proposal will not lead to elevated emission rates nor increased impacts to air quality. The existing targets and limits in the licence will be adhered to and are considered adequate to manage environmental and health risk.

The nearest receptors have been identified in **Table 3**; these are primarily located to the east of the site and at low risk from the proposal emissions.

7.1.3 Controls

Controls to manage air emissions include:

- The nitric acid and ammonium nitrate manufacturing is a closed process, and all emissions are directed through a dedicated stack (i.e., no fugitive emissions during normal operations).
- Installation of tertiary abatement (replacing the existing SCR) at NAAN1 (2027) and NAAN2 (2025).
- Installation of previously approved (W6778) NAAN3 tertiary abatement at next major planned shutdown (July – Nov 2024).
- Plant is automated with programmable control and monitoring systems, with an operator interface to effectively manage the manufacturing process to avoid upset conditions. Separate independent safety systems provide emergency shutdown in the case of trip instruments exceeding their trip set points.

CSBP covalent LITHIUM QNP AGR MODWOOD Kleenheat EVOL LNG

- Continuous monitoring of NO_X gases from each Nitric Acid Plant (licence condition A2(a)).
- Limiting concentration of NO_X gases from each Nitric Acid Plant during operation (excluding the half hour period following start-up), to an hourly average concentration of 0.41 g/m^3 (licence condition A2(c)).
- Not starting up more than one Nitric Acid Plant at the same time and maintaining a minimum of one hour between start-ups (licence condition A2(d)).
- Nitric Acid Plants will not be started unless a monitoring system is in place to analyse start-up NO_X (licence condition A3(a)).
- Maintaining records of time, wind speed and direction, and the maximum half-hourly average NO_X concentration during each start-up of each Nitric Acid Plant (licence condition A3(b)).
- Limiting the NO_X below a half-hourly concentration 2 mg/m^3 (expressed as nitrogen dioxide) during start-up (licence condition A3(c)).

The existing regulatory controls imposed in the licence remain appropriate to managing the risk of emissions to the atmosphere.

7.2 Greenhouse gas emissions

Greenhouse gas emissions (GHG) were assessed by the EPA in the s45C referral (Part IV of the EP Act). GHG emissions are regulated under MS 689 and MS 875.

Nitrous oxide (N_2O) is the predominant GHG emission from the manufacturing process, which is generated as a by-product of nitric acid production. Nitrous oxide has a global warming potential of 265 i.e., each tonne of N_2O gas has the equivalent greenhouse effect of 265 tonnes of carbon dioxide (CO_2) (DCCEW 2022a).

Nitrous oxide emissions from the approved MS 875 proposal have declined from 228,724 tCO_2-e in 2020 to 112,926 tCO_2-e in 2022. Consequently, the emissions intensity of the process has declined over the last three years from 0.28 tCO_2-e per tonne ammonium nitrate in 2020 to 0.14 tCO_2-e per tonne ammonium nitrate in 2022. These improvements have been realised by continual improvement of the existing SCR.

At current production rates (average 632 tpd for each NAAN plant), abatement by the existing SCR in the nitric acid process achieves an 85 % reduction in N_2O emitted to atmosphere. With the proposed increased throughput, without any tertiary abatement installed, a 33 % increase in N_2O emissions could be expected. This would lead to an overall increase in the intensity of production to 0.25 tCO_2-e per tonne ammonium nitrate.

To mitigate the increase in process intensity, the tertiary abatement catalyst to be installed prior to debottlenecking to increase the abatement of N_2O to approximately 95 %. The expected cumulative GHG emissions from the three NAAN plants, including minor increases in CH_4 emissions (±7,476 tCO_2-e/annum) due to the introduction of natural gas as a reducing agent, are summarised in **Table 12**.

Table 12: Cumulative NAAN plants GHG emissions

Aspect	Units	FY 2022	FY 2023	Expanded production (without tertiary abatement)	Expanded production with tertiary abatement
Production	t ammonium nitrate/annum	828,006	847,604	1,138,800	1,138,800
GHG emissions	tCO_2-e/annum	112,926	127,586	280,774	43,849
GHG emissions Intensity	tCO_2-e per tonne ammonium nitrate	0.14	0.151	0.25	0.04

The installation of tertiary abatement at the NAAN plants will reduce the intensity of ammonium nitrate production to realise a GHG emissions reduction of approximately 61 % compared to FY2022 emissions. Furthermore, the Scope 1 GHG emissions will decrease significantly below the 100,000 tCO_2-e per annum (EPA consideration trigger) and help contribute to CSBP's net zero GHG emissions by 2050 objective.

CSBP adheres to the Commonwealth Safeguard Mechanism requirements, which applies to facilities emitting more than 100,000 tCO_2-e per annum with legislated targets set as baselines. The reduced emissions will help contribute towards CSBP's overall reduction strategy.

7.3 Discharges to land

The proposed works will not result in discharges to land during normal operations. The manufacture of nitric acid and ammonium nitrate is within a contained system.

Management of effluent and wastewater is detailed in Section 7.4 as a discharge to the marine environment. All areas within the plant that store chemicals / hazardous materials are contained in impervious bunds to meet dangerous goods approval requirements.

Within the Nitric Acid Plants, the area around the absorber, product acid cooler and weak acid pumps are sealed to contain any product spillage. Additionally, acid spills from pumps or sampling lines are collected in the stainless steel acid purge tank. An acid purge pump is used to transfer the contents of the purge tank back to the gas cooler condenser separator. This avoids discharges to the environment.

The new NA and AN solution storage facilities will be within sealed secondary containment areas to meet dangerous goods requirements (and avoid environmental discharges).

ANE production is also undertaken within sealed and bunded areas. Only ANE product storage is excluded from secondary bunding in compliance with the *CoP: Storage and handling of UN3375* industry practice. Given the high viscosity the emulsion any spillage from containment failure will likely be recovered before presenting a risk to the environment. Storage within bunded areas would present a safety risk should an external fire within the bund cause the ANE to overheat and become an explosion risk.

Any discharges of liquid to land will infiltrate through the compacted limestone hardstand (nominally 400-500 mm thick) into the water table (about 2.5 – 3 m bgl). Spilled chemical products are soluble and will infiltrate into the ground when rained upon. Underlying soils are sandy and transmissive, while known contamination already exists in the underlying soils and groundwater; contamination located in low flow zone near base of Safey Bay Sand superficial aquifer.

All liquids resulting from spills or leaks of chemical and hydrocarbons are contained, recovered, or absorbed and disposed of, irrespective of whether this is inside or outside secondary containment in accordance with licence conditions. Hazardous wastes are removed by an authorised entity under the Controlled Waste Regulations and taken to an authorised site using the appropriate record-keeping system.

Waste management follow established protocols implement on site. Current practices include:

- Hazardous material spills are immediately cleaned up irrespective of whether this is in or outside a secondary containment, consistent with the licence.
- Suitable containers are provided for collection and storage of waste materials, enabling waste type and incompatibility separation.
- Waste materials are directed to recycling facilities where possible by the waste contractor.
- Records are maintained of waste types, quantity, disposal method and destination for tracking purposes.
- Hazardous materials, including spent catalyst (e.g., vanadium pentoxide) are kept contained until appropriate analyte testing (concentration, and leachability if needed) is completed and suitable disposal is arranged, with use of controlled waste tracking forms where necessary.

Replaced infrastructure materials and any wastes generated will be managed accordingly.

7.4 Discharges to water (marine)

Licence L6107/1967/17 conditions M2 to M5 authorises the following marine discharges:

- Diffuser at the end of the submarine pipeline to Cockburn Sound,
- SDOOL, or
- Emergency beach outfall.

7.4.1 Source and characterisation

The principal wastewater generated from the operation of the three NAAN plants is blowdown water from the cooling towers, and potentially contaminated stormwater collected within the plant hardstand areas.

Secondary containment infrastructure is established within the plant to capture spills. All nitric acid spills and effluent are collected in a nitric acid pump pit sump, which is then pumped to the AN plant neutralisation pit, tested for pH and conductivity, neutralised if needed before being pumped to the wetland system for further treatment. If the pH in the neutralisation pit is outside the setpoints an interlock will stop discharge. Each plant has its own neutralisation pit, but pumps can also transfer liquids between them.

The collected wastewater / contaminated stormwater is directed to the CSBP nutrient stripping wetland where the treated water is ultimately discharged to the marine environment through the Sepia Depression Ocean Outlet Landline (SDOOL)

The SDOOL discharge is operated by the Water Corporation and regulated by Ministerial Approval (MS 665), which forms the principal means of discharge by CSBP.

Only reverse osmosis reject water is sent directly to the SDOOL tank, by-passing the wetlands.

The quality (nutrient concentration) of the wastewater discharged from CSBP Kwinana will not change because of the proposed amended operations. The main source of contamination onsite comes from the handling of fertilisers in storage and dispatch areas. The nitrogen daily load limits set out in Condition M5(a) of Licence L6107/1967/17 will continue to be met.

When discharge of wastewater to SDOOL occurs, this effluent is pumped into the 100 m^3 SDOOL tank onsite prior to release (to the marine environment). During release, a side stream from the discharge pipeline is automatically delivered into a monitoring station where a series of online instruments continuously analysing pH, conductivity, and turbidity. A flow weighted composite sample is also collected for subsequent analysis to demonstrate compliance with relevant EP Act licence parameters.

Table 13 shows the licence parameters (limits/targets) applicable to wastewater discharges and the monthly average loads over the 2022/23 reporting period.

Discharge limits are prescribed for discharge to Cockburn Sound, should it occur, and concentration targets are applicable for discharge to SDOOL. CSBP exceeded the three-month rolling average of 200 kg/day of nitrogen in July and August 2022. Improvements to house-keeping practices and wetland management have been implemented to manage the risk. Licence compliance was maintained during the 2023 reporting period.

Table 13: Summary of 2022/23 discharges to marine environment

Parameter	Licence Limit	Measured monthly average daily loads												Licence concentration limit / target
	Monthly average daily load limit (kg/day)	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	mg/L (daily limit)
Total Inorganic Nitrogen daily average mg/L		82	31	29	33	24	23	13	22	22	36	40	62	-
TN average kg/day (3 month rolling average)	200[a]	212	209	164	96	78	67	50	50	50	75	89	136	
Orthophosphate mg/L		5.9	3.7	2.5	2	1.8	2.1	1.7	1.5	1.4	2.5	3.9	5.5	-
Orthophosphate	100[a]	16	17	14	9	6	5	5	4	4	6	8	12	
Arsenic (Inorganic) mg/L	-[b]	0.011	0.008	0.006	0.006	0.005	0.007	0.006	0.006	0.006	0.008	0.011	0.012	0.1
Cadmium mg/L	-[b]	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.036
Copper mg/L	-[b]	0.027	0.025	0.025	0.026	0.028	0.027	0.025	0.025	0.026	0.027	0.026	0.026	0.285
Free Cyanide mg/L	-[b]	0.002	0	0	0	0	0	0	0	0	0	0	0	0.1
Fluoride mg/L		1.6	1.6	1.6	1.5	1.4	1.7	1.7	1.8	1.8	1.7	1.5	1.5	-
Floride kg/day	54[a]	5.444	5.403	4.841	3.637	3.295	4.506	3.802	4.372	4.783	4.716	3.831	4.731	
Mercury mg/L		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0014
Mercury kg/day (average)	0.020	0.002	0.002	0.044	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	
Molybdenum mg/L	-[b]	0.025	0.025	0.025	0.028	0.025	0.033	0.025	0.025	0.03	0.026	0.025	0.025	0.25
MDEA mg/L	-[b]	0.016	1.005	1.049	0.042	1.000	1.016	1.000	1.005	1.000	1.000	1.000	1.000	16.0
Zinc mg/L	-[b]	0.036	0.033	0.025	0.041	0.043	0.036	0.039	0.039	0.05	0.051	0.038	0.038	2.25

a. These limits are three monthly rolling averages (kg/day)
b. No daily load limit stated in Licence

The debottlenecked NAAN plants proposal will result in a 125,000 kL/annum increase in wastewater effluent – 100,000 kL/annum (342 m^3/day) due to increased cooling water blowdown and 25,000 kL/annum from Demin Plant and RO reject water if groundwater of existing quality is used. As mentioned in an earlier section, sourcing additional good water quality supplies will reduce cooling blowdown volumes needing to be managed (across the site), which will address potential increases in wastewater volumes. Stormwater runoff will not increase as the approved proposal footprint will remain unchanged.

Nutrient-enriched waters are directed to the wetlands. The hydraulic capacity of the wetland system optimally treats 3,000 m^3 per day to enable effective nutrient management. Volumes are directly affected by collected precipitation from operating areas. Larger volumes and concentrations will reduce wetland treatment efficiency. The average daily discharge to SDOOL over the 2022/23 annual reporting period was 2,718 m^3, of which ±1700 m^3/day is derived from the wetland system (±64 % of the SDOOL discharge, varying between ±75 % and ±55 % of the discharge volume in winter and summer respectively). The other portion is principally reject (brine) water from the RO Plant.

The Water Corporation allows CSBP to discharge 3,700 m^3 of wastewater per day to SDOOL, after which alternative authorised disposal options are implemented as described below. The discharge capacity to SDOOL is more likely to be exceeded in winter and associated with high rainfall events. Discharge flows for the 2022/23 reporting period is illustrated below (**Figure 27**).

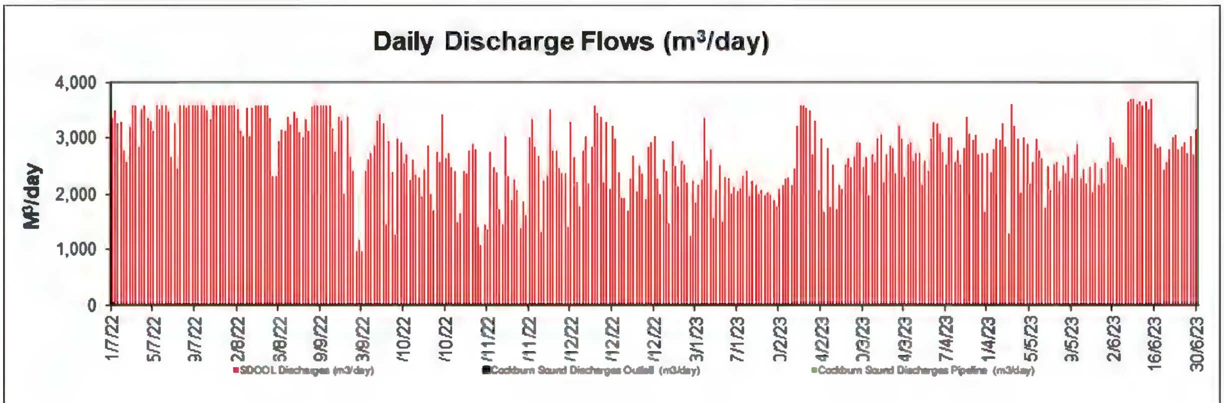

Figure 27: Daily discharge flows to SDOOL for period 1 July 2022 to 30 June 2023

Wetland system operation

The CSBP Kwinana nutrient-stripping wetland was constructed as a pilot project in 2004. The wetland system has been subject to multiple upgrades over the years to optimise wetland performance.

The wetland improves the sustainable management of wastewater by providing a permanent treatment option for suitable streams in a low-energy, natural approach. CSBP continues to investigate methods to optimise the efficiency of the wetland performance.

The wetland system is a suite of lined ponds, including a containment pond, two parallel vertical flow wetlands (wetland 2 and 3), a surface flow wetland (wetland 1), and a SDOOL tank (**Figure 28**).

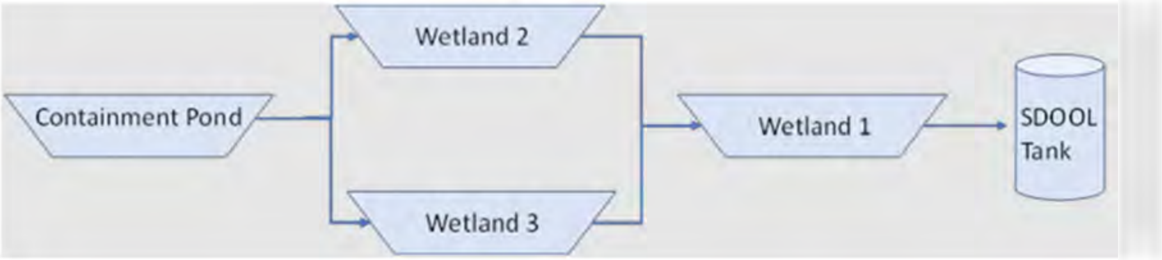

Figure 28: Wastewater treatment system

Discharge water is typically directed to the SDOOL tank which has online monitoring and automated trips to ensure only water meeting the discharge criteria is discharged to SDOOL. Effluent not meeting the discharge criteria undergoes further treatment / dosing or returned to the wetlands for recirculation.

The wastewater treatment system typically operates with collected wastewater directed to the 5,800 kL capacity containment pond. Water levels are monitored and controlled with pumps (except where there is a rare emergency overflow to Cockburn Sound via an open channel to the beach) to manage loads and anticipated volumes. The containment pond is usually operated at ±50 % of its capacity.

Influent is directed to vertical flow (VF) wetland cell 2 or 3 to enable intermittent dosing from the containment pond, flooding the total surface area of the VF wetland followed by a drawdown period, before passing through wetland 1 and the SDOOL tank.

Treatment wetland cells 2 and 3 have the inlet at the surface of wetland cell and the outlet at base of wetland cell. The water in cells 2 and 3 is naturally oxygenated with ambient air and the ammonia in the water is converted to nitrate by the nitrifying bacteria in the cell. Under normal operation either Wetland 2 or 3 is filled from the containment pond whilst the other is emptied, processing approximately 1,700 m^3 (averaged) of wastewater from the containment pond each day. Wetland 1 receives the water from either wetland 2 or 3 for denitrification and is pumped out to the SDOOL via the SDOOL tank.

The wetland system relies on microbial flora (bacteria and fungi) attached to wetland macrophytes (does not rely on plants for nutrient removal and the plants are not harvested) to remove biodegradable organics and nitrogen. As the wastewater flows through the treatment wetland, it is treated by the processes of sedimentation, filtration, oxidation, reduction, adsorption, and precipitation. Higher treatment performance has been shown with full vegetation where greater abundance and diversity of microbes colonise the more abundant surface area. Macrophytes typically used include genera such as *Baumea* (sedge), *Typha* (bulrush), *Schoenoplectus* (lake club-rush) and *Phragmites* (common reed).

The nutrient-stripping wetland system efficiently removes nitrogen (30 to 40 %) from the water when operating at or below about 2,000 m^3 per day. Higher wetland nutrient loading could require additional carbon loading (active management intervention) to wetland 1 to enhance denitrification and removal of total nitrogen prior to discharge.

Weeds are periodically controlled by an external contractor. Mosquito control, if required, is managed with a drying phase targeted to the area of mosquito infestation; mosquitoes have not presented an issue since the establishment of the wetland. Dense plant growth, predatory macro invertebrates in the water column and lack of stagnant water inhibit the success of mosquito larvae. Visual inspection lookout for potential mosquito infestations to trigger investigations.

Discharge Management

Under typical operations, the water is discharged to SDOOL. However, during periods of high rainfall when pond storage capacity, maximum pump rates and SDOOL capacity may be exceeded, wastewater is permitted to be discharged to Cockburn Sound via two alternative licensed discharge points – the emergency beach Outlet and/or the submarine pipeline diffuser. Current operations are such that overflows to the beach and discharges to Cockburn Sound via the diffuser are no longer part of normal operations (with the primary and preferred discharge being to SDOOL and, the beach discharge the last resort). Submarine discharge is undertaken proactively when it is assessed that the system will not cope with impending predicted significant rainfall events. The submarine discharge pipeline and diffuser extend 340m into the Cockburn Sound to a depth of 5 m to aid dispersion.

In the emergency situations, wastewater may by-pass elements of the wetland system prior to discharge (to prevent overwhelming the wetland system) or, may be discharged directly from the containment pond. The emergency discharges to Cockburn Sound since 2018 are provided in **Table 14**, and are associated with high rainfall events.

Table 14: Cockburn Sound discharges from CSBP wastewater system.

DWER reporting period	Submarine discharges		Beach discharges		Discharge periods
	Number of discharge events	Volume (kL)	Number of discharge events	Volume (kL)	
2018 FY	1	2,792	2	8,177	June 2018
2019	2	5,045	1	156	July 2018
2020	4	9,601	0	0	July 2019 (3), June 2020 (1)
2021	0	0	0	0	
2022	11	34,899	3	253	July 2021
2023	9	25,942	0	0	July, August, September, March, April, June

All wastewater discharges are managed in accordance with conditions contained in EP Act Licence L6107/1967/17. For discharges to the SDOOL, Water Corporation controls (licence instrumentation testing) also apply.

CSBP continues to liaise with Water Corporation to ensure monitoring is undertaken in accordance with the Water Corporation's Sepia Depression Ocean Outlet Monitoring and

Management Plan, and that CSBP wastewater quality does not adversely impact Water Corporation compliance with regulatory obligations.

Internal procedures are implemented to manage wastewater, with the controls outlined below.

Discharge criteria

The discharge criteria have been set by the licence L6107 conditions and the Water Services Agreement between the Water Corporation and CSBP Limited (updated 2021), with specified effluent criteria that is continuously monitored by the Water Corporation to manage discharge. The licence (M5(a) and (b)) identifies daily concentration limits for discharges to Cockburn Sound, which are also upper targets for discharge to SDOOL.

Monitoring requirements are also established in the licence when discharging to Cockburn Sound via the submarine pipeline or the beach outfall discharge, and via SDOOL.

The licence requires that discharges must be between pH 6.0 to 9.0; a pH between 4.0 and 10.0 on one day in a month is permitted. All concentrations of wastewater discharged via the SDOOL in 2022/23 were within licence limits/ targets and in accordance with the Water Corporation effluent criteria. Data related to wastewater discharge volume and quantity are recorded and reported to DWER in accordance with the EP Act licence.

The discharge of wastewater to the SDOOL is governed by the implementation conditions of the Ministerial approval for the KWRP Project (Ministerial Statement No. 665), which allows for up to 208 ML of wastewater to be discharged per day into the Sepia Depression off Point Peron. The Water Corporation can only accept and convey effluent to the Sepia Depression from industry partners where their toxicant loads conform to those permitted to be discharged to Cockburn Sound by their individual EP Act licences (Water Corporation, 2005). Wastewater discharged to the Sepia depression is from treated wastewater from Woodman Point, Kwinana, and Point Peron wastewater treatment plants, the KWRP, CSBP, BP Refinery and the Kwinana Cogeneration Plant.

7.4.2 Receiving environment

Post wetland treatment, wastewater is either returned for re-use processes, or discharged to SDOOL (Sepia Depression in Cockburn Sound).

Cockburn Sound is reported to have originally been home to more than 4,000 ha of seagrass meadows (Western Australian Auditor General, 2010). The Cockburn Sound Environmental Study in 1979 identified impacts from industrial discharges leading to a deterioration of water quality and widespread loss of seagrass (Department of Conservation and Environment, 1979). A reduction in direct discharges leading to water quality improvements was replaced by impacts from groundwater contamination in the 1980s.

Following widespread loss of seagrass into the 1990s, the 2001 State of Cockburn Sound report recognised the need for a coordinated approach to manage and conserve the environmental values (Cockburn Sound Management Council, 2018). Accordingly, the Environmental Protection (Cockburn Sound) Policy was developed in 2005 and updated in 2015 (EPA, 2015), and an Environmental Management Plan for Cockburn Sound and its catchment (Cockburn Sound Management Council, 2005) were prepared to ensure that the attributes of the sound are protected and enhanced in the future. Extensive monitoring is conducted by various organisations and collated by the Management Council (Cockburn Sound Management Council, 2018).

The environmental quality objectives for Cockburn Sound are to maintain ecosystem integrity, seafood safe for human consumption, aquaculture, primary and secondary contact recreation, aesthetic values, cultural and spiritual values, and water quality for industrial use. Environmental Quality Criteria (EQC) for Cockburn Sound have been established to provide benchmarks for evaluation of whether the environmental quality objectives have been met. The EQCs are available in the reference documentation (EPA, 2017a) developed to support the State Environmental (Cockburn Sound) Policy (EPA, 2015).

An assessment of marine water quality against the EQCs in 2018 (Cockburn Sound Management Council, 2018) reported that the water quality in Cockburn Sound has improved significantly since the 1980s. Values and uses dependent on adequate water quality are being maintained; specifically, seagrass coverage has increased between 1999 and 2017 indicating positive change. Concerns were reported regarding areas of localised poor water quality with reduction in sea grass density at some sites and decline in productivity of some commercial (including aquaculture) and recreational fisheries. The last publicly available assessment of Cockburn Sound marine water quality (2019-2020) determined that the environmental quality objectives were achieved (Cockburn Sound Management Council, 2021).

Environmental Quality Objectives (EQO) are defined in the Sepia Depression Ocean Outlet Monitoring and Management Plan developed by Water Corporation for maintenance of ecosystem Integrity, aquatic life for human consumption, primary and secondary contact recreation and aesthetic values. Environmental Quality Criteria (EQC) are included for receiving water physical, chemical, biological measures and for toxicants in sediments.

The Water Corporation reported that all the EQC for ‘Maintenance of Ecosystem Integrity’ over the 2021-2022 monitoring period indicate that there is minimal risk to the marine environment due to the discharge of the combined waste stream, including CSBP effluents, into the Sepia Depression (Water Corporation, 2022).

7.4.3 Controls

CSBP will continue to implement the following measures to ensure potential impacts to the marine environment are mitigated:

- Discharge wastewater in accordance with current regulatory requirements for quality as specified in the EP Act licence. Any spills in, or outside secondary containment is managed immediately upon discovery.
- Implement internal quality assurance programs, including frequent monitoring effluent characteristics (at CSBP onsite laboratory) generated from site to understand sources (quantity and quality) to manage abnormal wastewater flows or contaminants.
- Monitoring of wastewater quality and quantity at discharge points (licensed) to achieve discharge compliance, supported by sampling and NATA-accredited laboratory analysis. The SDOOL pipeline also has daily composite sampling taken and analysed to complement online monitoring systems measuring pH, turbidity, conductivity, and volumetric flow to water being discharged into the SDOOL pipeline to meet the Water Corporation specification. Automated systems (PLC) stop pumps when discharge criteria are not met with.
- Calibration of monitoring equipment in accordance with licence requirements. Implement groundwater monitoring in accordance with Groundwater Operating Strategy identified in the Licence L6107 and contaminated sites monitoring program.

- Contaminated stormwater / wastewater collection system is lined / contained to reduce risk of infiltration / fugitive emissions to land.
- Continue to investigate methods for optimising the efficiency of the nutrient-stripping wetland.
- Ongoing business investigations to reduce water use and wastewater discharges from onsite operations.
- Data review and reporting (record-keeping) activities.

Overall implementation of the amended operation will not lead to elevated impacts to the marine environment. Specific wetland and liquid waste management measures include:

Wetland management

- Wetland system containment infrastructure is impervious (lined).
- Operation of the site wastewater system is controlled and monitored through the controller graphical interface. This allows responsible officers to actively manage the system, open and close valves, start and stop pumps, check live data such as flows and levels, and receive event notifications via an alarm system.
- Wetland ponds are maintained below 95 % capacity (min 300 mm freeboard).
- While the containment pond is authorised to overflow (discharge to Cockburn Sound beach in emergency situations), it is usually operated at a 50 % capacity whereby freeboard will exceed 1 m to enable volume fluctuations in the system (internal risk management).
- Implementing internal triggers and actions to manage escalating environmental compliance risk e.g., normal operations, elevated concentrations, internal target exceedance, or licence target / limit exceeded. For the latter, active intervention will be undertaken to restrict the discharge, conduct investigations, implement rectification measures, and provide regulatory notification and reporting.
- Maintain optimal wetland performance processes, including recommended hydroperiods, maintaining chemical balance in the system and management of weeds and mosquitoes.

Discharge to Cockburn Sound

For any direct discharge to Cockburn Sound, the following controls is implemented:

- Setting internal management approval requirements for specified actions.
- Checking rainfall forecasts and determine whether there is adequate capacity within the wetland system before considering discharge to Cockburn Sound.
- Sampling water quality before (to enable result determination prior to anticipated release) and during release, when practicable.
- Where one or more of the metal concentrations exceed the licence limits, determining an alternative strategy to manage the forecast stormwater volumes.
- Discharge is checked hourly against pond levels and weather conditions to assess period of discharge required.
- Periodic checking of pipeline integrity and that pump pit litter baskets are cleaned in preparation.

Liquid waste management

Implementation of the existing procedures, which include:

- All environmentally hazardous liquids are enclosed and kept in secondary containment areas (bunded or on spill pallets, in accordance with AS3870:2023, or a relevant Code of Practice).
- Solvents and chemicals are not to be poured into general drains.
- Internal administration processes to determine management options of liquids collected in sumps which are usually higher strength and not suitable for discharge to the containment pond with sample analysis provided on onsite laboratory.
- Liquid effluent which has a beneficial purpose (e.g. process water) is managed internally (incorporated into processing where feasible).
- All recyclable and non-recyclable liquid wastes requiring disposal is assessed by the WesCEF Environmental Department. Disposal will be undertaken by a controlled waste contractor in accordance with *Environmental Protection (Controlled Waste) Regulations 2004* and the appropriate records maintained. The environmental assessment will involve determining if the waste requires analysis, arranging sampling, or assessing alternative management options such as beneficial use.
- Liquid waste generated by spills or emergencies is immediately contained (controlled, contained, and recovered / cleaned up) using all relevant precautions. CSBP emergency response personnel to contact the Environment Department responsible officer to determine the appropriate recovery and storage method.

7.5 Noise

7.5.1 Context

The *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) stipulate allowable noise levels at off-site premises, including noise sensitive premises (as defined by Schedule 1 Part C) and commercial premises. Noise from traffic and other transport activity is not assessable under the Noise Regulations.

The night time 'assigned level' for sensitive noise receptors in the Kwinana/Medina residential areas is 35 $dB_{(A)}$. In the EPA s45C referral, it is identified that the background noise from the Kwinana Industrial Area has, in the past, has periodically exceeded 35 $dB_{(A)}$. Thus, to not be considered a significant contributor, each individual premises is required to emit no more than 30 $dB_{(A)}$ to these residential receptors at night. In the EPA referral, it is also stated that modelling conducted for the approved proposal (existing operations) determined that impacts at sensitive receptors were less than 30 $dB_{(A)}$.

Nearby sensitive receptors are situated in residential developments from the east to the southwest of CSBP Kwinana and can potentially be impacted by noise from the premises. The nearest sensitive receptors are ±2.1 km to the east in Medina and are exposed to general noise emissions from the Kwinana Industrial Area and local road and rail traffic.

7.5.2 Noise sources

The ammonium nitrate emulsion plant which involves blending and operation of smaller electrical pumps is not a major contributor of noise at the premises. 24- hour operation of this plant will likely be absorbed within the existing noise profile of CSBP Kwinana. The noise levels generated from activities associated with the increasing of a hardstand area, installation of tanks and piping / tie-in infrastructure will be of short duration with minimal noise emissions. These works will be undertaken during the day.

Construction noise associated with the NAAN plants will be of limited duration and completed one plant at a time. Some construction works will be undertaken pre-shutdown (e.g. chiller unit infrastructure) while upgrading / replacing components will require plant shutdown.

General noise levels will be lower during the shutdown period as the plants will have reduced operations. Pre-shutdown works for NAAN 3 are scheduled for July to November 2024 (chiller unit installation) and shutdown works are scheduled for February to April 2025. Upgrades and subsequent debottlenecking for NAAN 2 (July to December 2025) and NAAN1 (July to December 2027) will then follow.

The main source of noise emissions associated with the scope of the proposed amendment is associated with the operation of the three NAAN plants. NAAN1 was constructed circa 1995, at which time it was identified that the plant emitted high noise levels. A program of noise mitigation including vibration isolation of intercooler pipework and lagging was undertaken to reduce noise levels. The development of NAAN2 incorporated similar noise mitigation measures, with the new design providing slightly improved noise mitigation. In addition, the tail gas silencer for NAAN2 was of a higher acoustic attenuation performance than the original unit on NAAN1 (which was not upgraded). A low noise cooling tower was selected for NAAN2. NAAN3 is effectively a duplication of NAAN2.

The proposed debottlenecking project incorporates an upgrade of potential noise-generating components, including the existing compressor and expander units and associated piping, air intake cooling and other efficiency upgrade modifications for the three NAAN plants. It also involves the installation of additional noise sources, such as the chiller unit cooling towers. Equipment upgrades have focused on selecting lower noise options to mitigate noise generation.

7.5.3 Noise Predicted Assessment

CSBP engaged SLR Consulting to conduct an environmental noise assessment of the three NAAN Plants expansion. As the proposed debottlenecking project involves changes to existing equipment that affects noise emissions, a comparative sound power level assessment calculation was undertaken of existing and proposed modified/new equipment based on manufacturer information to help identify noise reduction opportunities (see Appendix 3).

The comparative assessment shows that, with the proposed controls (see below), a small reduction in environmental noise emissions is predicted for this project. The reduction in noise emissions is associated with upgraded acoustic attenuation of the older NAAN 1 tails gas stack and equivalent or improved control of air compressor / expander acoustic lagging systems. The noise mitigation measures offset the introduction of pre-cooling 'cooling tower' systems.

The proposed project noise emissions are predicted to reduce relative noise emissions from the CSBP Kwinana site, in line with regulatory expectations and will not increase site noise emissions. Currently CSBP noise is compliant with the requirements of the Noise Regulations.

The assessment showed that a while a slight increase in cumulative noise source sound power levels (± 0.6 dB(A)) was predicted for individual components, a small reduction in effective external environmental noise emissions is ultimately predicted for the proposed NAAN works (± 2.1 dB(A)). The compressor / expander is partially enclosed within a compressor house, reducing the acoustic sound power emitted externally. The calculation shows that the proposal is expected to result in a net 1.1dB(A) decrease at the most affected residential receptors (Medina residential area).

The existing CSBP Kwinana predicted noise levels are compliant with the night-time L_{A10} 'assigned level' at all residential receptors under 'worst case' climatic propagation conditions. The predicted small reduction in site noise emissions associated with the proposed NAAN debottlenecking project will therefore also result in compliant noise emissions.

7.5.4 Proposed NAAN debottlenecking noise mitigation

As part of the noise mitigation measures, several initiatives focusing on component selection and installation of lagging, are being implemented:

- Selecting lowest feasible noise equipment for components being replaced.
- Pipe sizes reviewed to match increased flowrates and manage noise vibration sources, e.g. increasing the discharge piping size of the air compressor from 18 to 24 inches. Such changes will lower the overall velocity of gas / air through the piping, which will reduce the overall noise emitted from piping.
- Acoustic Insulation will be reviewed and updated on the NAAN1, 2 and 3 compressor/expander units, with the acoustic insulation to be reinstalled / upgraded to the following units:
  - Intercooler Pipework to and from the compressor,
  - Acoustic insulation on the shell of the exchangers,
  - Inlet lines and outlet lines from the compressor, and

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    - Air filter inlet piping.

- Tail gas silencers are to be upgraded for each NAAN1, 2, 3 plants for the new process conditions and will provide an increase in acoustic performance in particular for NAAN1.
- To manage the steam system after debottlenecking, an air cooled dump condenser (ACDC) is required by condensing low pressure steam and sending it back to the deaerator. ACDC uses fans to blow air over steam coil banks and this can increase noise. For the noise management, CSBP has selected a Vapour Absorption Machine (VAM) option to provide chilling using steam. Due to steam consumption in VAM, there is no need to install ACDC, which will eliminate potential noise created from ACDC fans.
- Chiller unit and cooling towers present an additional noise source. Mitigation measures include:
    - Using vapour absorption (VAM) technology in the chillers needed for the NA absorber that uses low pressure steam instead of a nosier vapour compression refrigeration system.
    - Installing insulation (lagging) on the chilled water supply and return line will reduce noise generated due to fluid velocities.
- Steam injector in the Ammonia vaporiser chloride free cooling water circuit (CFCW) for startup: During the startup, the CFCW system needs to be preheated. This is done by injecting low pressure steam and due to existing poor design, steam is collapsing and creating vibration and noise. Consequently, the injector will be replaced to reduce vibration and noise level compared to the base case.
- Chiller unit cooling tower operations have been optimised by the installation for variable speed drives for the fans. This will allow turn down and reduced noise when full cooling capacity of the towers is not needed.

Furthermore, the existing acoustic barrier on the northern boundary ensures that the assigned noise level is not exceeded at the adjacent industrial property (BP Kwinana). These measures will continue to be employed for the proposed amended proposal.

The reduction in noise emissions is associated with acoustic attenuation of the older NAAN1 tails gas stack and improved control of air compressor / expander acoustic lagging systems, the noise mitigation measures offset the introduction of pre-cooling “cooling tower” systems.

The proposed NAAN debottlenecking project noise emissions are predicted to reduce relative noise emissions from the CSBP Kwinana site in line with regulatory expectations and will not increase site noise emissions, which are currently shown to be compliant with the requirements of the Noise Regulations.

7.6 Dust

The proposed works will be largely undertaken within existing plant areas and do not require extensive ground disturbing activities. Some minor excavation work will be conducted in the development of pipe rack foundations and plinths for the new VAM chiller unit, cooling tower and associated pumps. Excavations up to 1.5 m are planned with the preparation of the new product storage containment area and loading facility.

No significant dust generating activities will be undertaken as part of the NAAN expansion. Existing controls are considered adequate to manage the fugitive dust emissions, while particulates monitoring is already required for the ammonium nitrate prilling plant (which is not associated with the proposed works).

Conclusion

The aspects covered in this proposal does not increase the environmental risks. The upgrading of emission controls to include tertiary abatement within NAAN1 and NAAN2 will significantly reduce air quality and greenhouse gas emissions from the NAAN plants, with the proposed increase in operational throughput.

The proposed works does not add any new point source emissions with additional controls implemented to mitigate noise levels. Emissions and discharges can be adequately managed within existing regulatory controls.

Based on the current licence wording, the only changes proposed relate to the throughput capacity of the prescribed premises category descriptions.

8 PROPOSED FEE CALCULATION (Att. 10 of AF)

Proposed licence amendment fee has been calculated from the DWER guidance spreadsheet.

Amendment application fee calculator (effective as of 1 July 2022)	Instrument No.	
	Unit value ($)	13.60
Categories	**Units**	**Fee**
31 - Chemical manufacturing More than 100 000 tonnes per year	600	$8 160.00
61 - Liquid waste facility: More than 100 but not more than 10 000 tonnes per year	30	$408.00
61A - Solid waste facility: More than 100 but not more than 10 000 tonnes per year	30	$408.00
75 - Chemical blending or mixing not causing discharge: Not applicable	24	$326.40
	0	$0.00
	0	$0.00
	0	$0.00
	0	$0.00
	0	$0.00
	0	$0.00
Note: Amendment fee is determined by the category with the largest fee units	**Fee Payable**	**$8,160.00**

9 REFERENCES

AEISG (2018) Australian Explosives Industry and Safety Group. Code of Practice: Storage and handling of UN3375. Edition 5, July 2018. Available at: https://aeisg.org.au/wp-content/uploads/STORAGE-AND-HANDLING-OF-UN3375-COP-EDITION-5-JULY-2018.pdf

CSBP 2023. Kwinana Contaminated Site Management Plan (CSMP). Internal Plan developed to meet requirements of the Contaminated Sites Act, and approved by Contaminated Site Auditor (attached as Appendix 1)

DCCEEW (2021) National Environmental Protection (Ambient Air Quality) Measure Available at https://www.legislation.gov.au/Details/F2021C00475 [Accessed March 2023]

DCCEEW (2022a) Australian National Greenhouse Accounts Factors for individuals and organisations estimating greenhouse gas emissions November 2022. Available at https://www.dcceew.gov.au/climate-change/publications/national-greenhouse-accounts-factors-2022 [Accessed February 2023]

DCCEEW (2022b) Department of Climate Change, Energy, the environment, and Water. Safeguard Mechanism: Prescribed production variables and default emissions intensities. Available at https://www.dcceew.gov.au/sites/default/files/documents/safeguard-mechanism-document-production-variable-definitions-2022.pdf [Accessed February 2023]

EPA (2011) Report and recommendations of the Environmental Protection Authority Ammonium Nitrate Production Expansion Project: Phase 2, Kwinana. Report 1407. Available at: https://www.epa.wa.gov.au/proposals/ammonium-nitrate-production-expansion-project-phase-2-kwinana [Accessed March 2023]

EPA (2016) Environmental Factor Guideline Air Quality. Available at: https://environmentonline.dwer.wa.gov.au/article/?code=KA-01025 [Accessed March 2023]

EPA (2016b) Environmental Factor Guideline Social Surrounds. Available at: https://environmentonline.dwer.wa.gov.au/article/?code=KA-01007 [Accessed March 2023]

EPA (2020) Environmental Factor Guideline Greenhouse Gas Emissions. Available at: https://www.epa.wa.gov.au/policies-guidance/environmental-factor-guideline-%E2%80%93-greenhouse-gas-emissions-0 [Accessed February 2023]

EPA (2022) Request to amend a proposal or implementation conditions under section 45C of the *Environmental Protection Act 1986* Instructions

EPA (2023) Environmental Factor Guideline Greenhouse Gas Emissions. Available at https://www.epa.wa.gov.au/policies-guidance/environmental-factor-guideline-%E2%80%93-greenhouse-gas-emissions-0 [Accessed May 2023]

Herring Storer (2021) Environmental Noise Assessment CSBP proposed Low Carbon Ammonia Plant. Available at https://www.epa.wa.gov.au/proposals/ammonia-expansion-project [accessed March 2023]

Strategen and Parson Brinkerhoff (2010). CSBP Kwinana: Ammonium Nitrate Production Expansion Project: Phase 2 Public Environmental Review. Available at https://www.epa.wa.gov.au/proposals/ammonium-nitrate-production-facility-expansion-kwinana [Accessed: May 2023]

Water Corporation (2022). Performance Compliance Report 2021 – 2022 Ministerial Statement 665 Use of the Cape Peron Outlet Pipeline to Dispose of Industrial Wastewater to the Sepia Depression, Kwinana. [Online] Available at: https://pw-cdn.watercorporation.com.au/-/media/WaterCorp/Documents/Our-Water/Wastewater/Ocean-outfall/Point-Peron-monitoring-program/SDOOL-Compliance-Assessment-Report-2021-22.pdf?rev=ebb44b2f2f864cfe8e73f43e512b991f&hash=F9C73DAF55A2C73B57374C63DCF407C7&_gl=1*ko5ta3*_ga*MTQ0NTYzMzMxMy4xNjc4MjMyNDEy*_ga_2DXNDMGBGZ*MTY3ODIzMjQ0Ny4xLjAuMTY3ODIzMjQ1My41NC4wLjA. [Accessed September 2023].

APPENDICES

Appendix 1: Contaminated Sites Management Plan

Appendix 2: External auditor endorsement of CSMP

Appendix 3: CSBP Kwinana NAAN Debottlenecking environmental noise assessment

The Power of Commitment

Contaminated Site Management Plan

CSBP Kwinana Industrial Complex

CSBP Limited

03 July 2023

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Document status

Revision	Author	Reviewer		Approved for issue		
		Name	Signature	Name	Signature	Date
A	D Marsh	C.Gwynne	On file	C.Gwynne	On file	14.07.21
0	D Marsh	C.Gwynne	On file	C.Gwynne	On file	1.09.21
1	D Marsh	C.Gwynne	On file	C.Gwynne	On file	17.06.22
2	D Marsh	D.Marsh	On file	C.Gwynne	On file	28.02.23
3	D Marsh	D.Marsh		C.Gwynne		3.07.23

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1. Introduction

CSBP Limited's (CSBP) Kwinana Industrial Complex is located at Lot 20 Port Road, Kwinana Beach (herein referred to as the 'Site'). There are several areas of known contamination at the Site which require management to mitigate residual risks via a Contaminated Site Management Plan (CSMP). Specific areas of the Site requiring management are referred to as a 'Management Area' (or collectively as 'Management Areas'), with management controls detailed in this document. The names of Management Areas are used in **bold** throughout the document for ease of identification, refer Figures A1-A4 Appendix A. This CSMP covers the following:

Management Areas associated with groundwater contamination

Management measures for interaction with contaminated groundwater (referred to as 'plumes') which could cause environmental and/or human health impacts at the following Management Areas:

- **Arsenic Management Area** - Amm/AN arsenic plume
- (**Western Groundwater Management Area** - Western Area fertiliser groundwater plumes (including; Amm/AN plume, SMP[1]/GP Ponds plume, Liquid Ferts plume, Rock Pad/Southern Boundary plume)
- **Chlorophenol Management Area** - Chlorophenol plume at north-eastern area of the Site
- **Former SAP Management Area** - Inferred hydrocarbon impacted groundwater at the former Sulfuric Acid Plant (SAP) area

Management Areas associated with soil contamination

Management measures for interaction with contaminated soils which could cause environmental and/or human health impacts, including:

- **Arsenic Management Area** - Arsenic in soils in the Amm/AN area
- **Former SAP Management Area** - Hydrocarbons in soils in the Former SAP area

It is noted that:

- For works in suspected contaminated areas where no Management Area has been identified (e.g., a spill site, soils below a newly identified bund defect, solid waste stockpiles), the CSBP Environment Team must be engaged to assess the risks and inform management measures on a case-by-case basis.
- This CSMP incorporates and supersedes the previous "Arsenic Site Management Plan – CSBP Kwinana" (CSBP, 2020).
- Groundwater monitoring programs are not covered by this CSMP, but are detailed in the separate document, the CSBP Kwinana Groundwater monitoring Plan.

1.1 Purpose

This CSMP has been prepared to provide relevant stakeholders with sufficient information to enable management of potential health, safety and environmental risks associated with exposure to contaminants in groundwater and soil at the Site. Key stakeholders are CSBP management, CSBP Site workers and contractors.

The overarching objective of the CSMP is to ensure the risks from contamination at the Site are adequately managed during the ongoing operation of the Site and meet the requirements of the Contaminated Sites Act 2003 ('the Act').

It is noted that the overall risk to human health posed by the groundwater plumes was found to be low in the Stage 3 DSI (GHD, 2021), particularly given the low likelihood of coming to contact with plumes. This CSMP focuses on controls to mitigate residual on-Site risks in the event of exposure/contact with known contaminants.

[1] The contaminated site management plan (this plan) is referred to as CSMP. In this document, 'SMP' refers to the Superphosphate Manufacturing Plant ponds area of the Site.

The CSMP is an operational document, designed to be integrated with CSBP's existing broader health, safety and environmental management procedures in operation at the Site. The CSMP outlines 'Management Areas' which require controls to mitigate residual risks to human health.

This CSMP is a management plan for routine operational and maintenance works and may not address all the risks associated with major projects such as future development phases or remediation works within the Management Area or Site. This CSMP is to address contamination related risks only and does not intend to identify all HSE hazards associated with below-ground excavation/ intrusive maintenance work programmes (e.g., hot works proximal to operational fuel storage/ handling infrastructure). It works in conjunction with CSBP's HSE management systems, procedures and permit systems.

1.2 Limitations

This report has been prepared by GHD for CSBP Limited and may only be used and relied on by CSBP Limited for the purpose agreed between GHD and the CSBP Limited as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than CSBP Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by CSBP Limited and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the Site may be different from the conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular Site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant Site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or Site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the Site conditions. GHD is also not responsible for updating this report if the Site conditions change.

2. Responsibilities

2.1 CSMP ownership

This document shall be owned by the Wesfarmers Chemicals, Energy and Fertilisers (WesCEF) Environment Team (aka CSBP Environment Team). Regular update of the document shall occur upon changes to CSBP procedures, changes to the definition of Site, and/or any other change which applies to the contents of this Plan.

2.1.1 Contact details

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2.1.2 Stakeholder responsibilities

Table 1 identifies relevant stakeholders and associated roles/ responsibilities relevant to the CSMP.

Table 1 Stakeholder responsibilities

Stakeholder	Responsibilities
CSBP Ltd (Site occupant+owner)	Development of this CSMP. Provision of the CSMP to the Contaminated Sites Auditor (CSA) for review/ endorsement. Review and update of the CSMP, if required, due to identification of material/unexpected changes to the contamination status of the source and/ or affected sites. Commissioning monitoring programs to evaluate ongoing groundwater impact trends. Notify the Department of Environment Regulation (DWER) and the appointed CSA if site conditions change which have the potential to materially affect the relevance of this CSMP. Development of relevant reports under the Act for future submission to the CSA. Specific roles: **CSBP Environment Team**: overall ownership of the CSMP document and implementation **CSBP area operators**: responsible for the day-to-day implementation of the CSMP requirements, including delegation to other parties such as supervisors, safety representatives and occupational hygiene personnel who may need to implement/oversee aspects of the CSMP. Ensures all relevant persons are appropriately inducted and aware of the CSMP requirements, including keeping records demonstrating this. Liaise with CSBP Environment Team as required.
Contractor/Site workers (including CSBP staff)	Adhere to the contents of this CSMP, should intended works fall within a Management Area.
Suitably qualified environmental consultant	Engaged by CSBP (or others) to provide advice relating to future contamination assessment and any necessary updates to the CSMP on an as-required basis.
Appointed CSA	Review documents provided by the consultant/CSBP, including this CSMP, and provide advice to DWER in the form of a Mandatory Auditor’s Report (MAR) as required.

Stakeholder	Responsibilities
Department of Water and Environmental Regulation (DWER)	Ensure the DWER Reasons for Classification are updated and available in the public domain. Convey and communicate potential or actual health risks to the community.

2.2 Changes to definition of Site

It is the responsibility of the CSBP Environment Team to provide on-going monitoring of groundwater conditions at the CSBP Kwinana Works.

Should future monitoring confirm that the extent of groundwater contaminant plumes or soil contamination has expanded beyond that currently identified in this CSMP, the Environment Team will need to communicate the requirements of the CSMP to relevant personnel (including supervisors, managers and safety representatives) in the additional affected areas and update accordingly.

2.3 Communication to workers

Area-specific personnel including supervisors, managers, permitting officers, safety representatives and occupational hygiene personnel will be responsible for communicating the requirements of this CSMP to workers who may be exposed to contamination as a result of undertaking relevant work activities (as defined in the CSMP).

2.4 Workers

Area-specific personnel including operators, supervisors, managers, safety representatives and occupational hygiene personnel will be responsible for communicating the requirements of this CSMP to workers who may be exposed to contaminants as a result of undertaking relevant work activities.

All workers are responsible for conducting work in accordance with the requirements of the CSMP. Workers are also responsible for communicating any changes to the implementation of this document to supervisors or safety representatives.

3. Background

3.1 Previous assessments

Several assessments relating to contamination and groundwater contaminant plumes have taken place at the Site to date. The following assessments contain key information relating to the current understanding of the plumes to be managed.

Reference should be made to the Stage 3 DSI report for detailed plume information.

– Pre-2014
  - Various investigations & remediation associated with ammonia plant demolition, arsenic plume and fertiliser storage/leaks
– 2014 URS Preliminary Site Investigation (site wide)
  - Identified potential contamination sources from contemporary and historical site operations. Identified the following plumes; chlorophenol plume, sulfate at the Gypsum Ponds, Amm/AN plume, Rock Pad plume and hydrocarbons at the Former SAP. While some sources were listed in these areas, the following plumes were not formerly identified: SMP/GP Ponds plume and Liquid Ferts (although thought to be linked with former storage of AMSUL at the Rock Pad at the time).
– 2014 URS Human Health and Environmental Risk Assessment (HHERA) (arsenic impacted soil and groundwater)
  - Found negligible risks posed to both environmental and human health receptors off-Site. For on-Site workers, risks were acceptable given infrequent exposure. Potentially unacceptable exposures would not actually be realised via the nominated exposure pathways unless concentrations exceeded circa 20 mg/L.
– 2020 Arsenic Site Management Plan (CSBP v3.0)
  - Identified the controls to be implemented for potential contact with arsenic impacted groundwater in the Amm/AN area. The Management Area was delineated using an arsenic concentration of >5 mg/L, based on the findings of the HHERA (URS, 2014).
– 2018 Cardno Stage 2 DSI (site wide)
  - Further investigated plumes identified in the PSI. All plumes in this CSMP were identified, other than the Rock Pad/Southern boundary plume.
– 2018 GHD Gypsum Ponds DSI
  - The investigation found that sulfate and phosphorus concentrations in surface materials around the former Gypsum Ponds were elevated and potentially leaching. The resultant risk to human health and the environment was found to be low. Based on the risk determination, a Management Area has not been allocated to the Gypsum Ponds area. Residual risk is this area could be managed on a project-by-project basis in accordance with Section 5.3.
– 2020 GHD Stage 3 DSI (site wide)
  - Investigated and characterised the Western Area plumes to their current understanding. In addition, recognised that dissolved phase hydrocarbons in groundwater are likely present near areas of highly impacted soils in the former Sulphuric Acid Plant area.

3.2 Contamination status

The Department of Water and Environmental Regulation (DWER) first classified the Site (Lot 20 on Diagram 78086) as “possibly contaminated – investigation required” on 12 September 2008 under the *Contaminated Sites Act 2003*. Since that time CSBP has performed several Site investigations in a staged approach, the most recent being the Stage 3 Detailed Site Investigation. The Site classification was most recently updated on 5 May 2021, in which the classification remained “possibly contaminated – investigation required”. The DWER listed the nature of contamination as nitrogen, arsenic and hydrocarbons present in soil and groundwater and also notes the presence of co-mingled plumes related to both primary and secondary on and off-Site sources.

3.3 Groundwater setting

The plumes at the Site which this CSMP covers are located in the sand aquifer (referred to as the Quaternary Sands or QS), which includes the water table down to the subsequent limestone aquifer unit. A description of the units is outlined below.

The superficial formations at the Site comprise shallow calcareous sand of the Safety Bay Sand formation overlying Becher Sands and Becher Aquitard where present (collectively referred to as the "Quaternary Sands" or QS aquifer unit) and then limestone of the Tamala Limestone aquifer unit. The Quaternary Sands aquifer extends to a depth of approximately -12 mAHD (including any basal sediments/clays that may be present), with an estimated saturated thickness of 12 m. The underlying limestone aquifer is approximately 10 m thick (completely saturated at the Site), occurring between approximately -12 mAHD and -22 mAHD.

Regional groundwater flow is generally in a westerly direction towards, and ultimately discharging into, the Cockburn Sound. At the Site, the upper QS aquifer is observed to generally conform to the expected westerly flows (except for local short-term deviations due to stormwater mounding). The TL aquifer flow directions vary greatly depending on proximity to the coast (in the west) and the CSBP groundwater production borefield (in the east). Away from the borefield and coast, the central portion of the Site generally flows to the north-west, however close (within ~300 m) to the coast the direction appears to become more westerly.

For monitoring and risk management purposes, the Site has been divided into broad areas for ease of reference, as follows:

- Ammonia/Ammonium Nitrate plants (Amm/AN)
- Superphosphate manufacturing plant and granulating plant ponds (SMP/GP Ponds)
- Liquid Fertilisers (Liquid Ferts) (also referred to as Flexi-N, or Ferts)
- Rock Pad/Southern boundary
- Eastern portion of the Site, including sodium cyanide plant and borefield (East)
- Field Engineering/General (balance of the Site)

The Western Area of the Site has been defined as a focus area as it contains both the majority source zones and groundwater contaminant plumes and is the area of the Site that is directly upgradient from the Cockburn Sound. Western Area plumes include (key contaminant species in brackets):

- Amm/AN plume (arsenic + nitrogen)
- SMP/GP Ponds plume (nitrogen)
- Liquid Ferts plume (nitrogen)
- Rock Pad/Liquid Ferts plume (nitrogen)
- Former sulfuric Acid Plant (hydrocarbons - diesel)

This CSMP also addresses impacts from the Nufarm chlorophenol plume which is migrating towards the Site from the northeast in the QS and TL aquifers. The Nufarm plume is subject to its own Site Management Plan (Aurora, 2018).

4. Groundwater Management Areas and exposure scenarios

This section contains a basic description of the groundwater contaminant plumes at the Site requiring management, in addition to potential exposure scenarios to these plumes (as detailed in the Stage 3 DSI). Risks relate to worker exposure to contaminated groundwater and environmental damage caused by discharge of contaminated groundwater as part of Site works.

Areas where management controls are to be implemented are referred to as Management Areas in this CSMP, as they directly relate to locations where groundwater contaminant plumes are located. The Management Areas are illustrated in the below sections are:

- Western Groundwater Management Area
- Arsenic Management Area
- Former SAP Management Area
- Chlorophenol Management Area

The Stage 3 DSI noted that exposure to contaminated groundwater is limited at the site, however, likely to occur through the following transport mechanisms:

- Groundwater abstraction, or
- Deep excavation extending below the water table (>3 m below ground level)

These mechanisms are only considered relevant for **on-Site workers** such as future utility/ intrusive maintenance workers conducting subsurface excavations, trenching or entering underground manholes on and off-Site, including interaction with abstracted groundwater on-Site. It is noted that management measures in this CSMP do not apply to water abstracted from the CSBP borefield, but to other instances of groundwater interaction such as monitoring, dewatering or deep excavation. The contaminant exposure pathway is through incidental **dermal contact** and/or **ingestion** of impacted groundwater (note: this is consistent with the HHERA [URS, 2014a]).

4.1 Western Groundwater Management Area

The known plumes inside the **Western Groundwater Management Area** are:

- Amm/AN plume (nitrogen)
- SMP/GP Ponds plume (nitrogen)
- Liquid Ferts plume (nitrogen)
- Rock Pad/Southern Boundary plume (nitrogen)

Collectively these are referred to as “Western Area plumes”.

The Former Sulfuric Acid Plant (SAP) hydrocarbon plume is within the Western Groundwater Management Area however is covered separately in the Former SAP Management Area. Similarly, the Arsenic Management Area is within the Western Groundwater Management Area is also covered separately due to the specific risks and management required in those areas.

4.1.1 Exposure scenarios

The exposure pathway for on-Site workers to come into contact with groundwater from a Western Area plume is considered limited, given groundwater abstraction does not occur in these areas. Possible exposure scenarios include groundwater abstraction for monitoring purposes or contact with groundwater during deep excavation. As such, the Stage 3 DSI found the human health risk posed by contaminants in the groundwater plumes to be low. However, the controls in this CSMP are being implemented to manage residual risk.

Western Area plumes contain contaminants that are potentially harmful to human health. Based on the plume characteristics**, arsenic, ammonia, nitrate, molybdenum, and nickel** are the contaminants in Western Area plumes that may present a risk to human health for on-Site workers. In addition, **hydrocarbons** in groundwater are potentially present in a localised area of the Former SAP.

For management purposes, Western Area plumes have been grouped together in the 'Western Groundwater Management Area' (Figure 1), given the exposure scenarios and management/mitigation are the same. The arsenic plume in the Amm/AN area has a separate management area and additional controls (refer Section **Error! Reference source not found.**, 6.3).

Figure 1 Western Groundwater Management Area (refer Appendix A for full page figure and legend)

4.1.2 Amm/AN plume

The Amm/AN plume is considered a comingled arsenic, nitrogen, and seawater plume attributable to multiple historic and contemporary sources. The sources of the plume are identified primarily through proximity and source composition. Given the presence of arsenic in soil and groundwater, additional controls apply (refer Figure 2 for Arsenic Management Area)

The features of the Amm/AN plume are summarised as follows:

– Plume contaminants include elevated nitrogen (ammonia and nitrate), arsenic, sulfate, potassium and molybdenum.
– Seawater is also present at the base of the QS aquifer in the vicinity of the plume and in the Amm/AN area, introduced through historic seawater use. Seawater (salinity) could be considered as a potential contaminant if the water is used for purposes sensitive to salinity (e.g., cooling water) or discharged to a salt sensitive environment (e.g., onsite treatment wetlands).
– Plume 'core' is located at the base of the sand (lower QS) aquifer, with greatest concentrations occurring between depths 10-15 m below ground level. The shallow water table is generally free of or contains low levels of contaminants, however shallow groundwater contamination should not be ruled out in the area of the plume for the purposes of the CSMP.

– The plume has several local historical sources with variability in the individual source composition, age, location and potential for nitrification (biological conversion of ammonia to nitrate), making the plume chemistry relatively complex. Regardless, the sources all relate to denser-than-water process fluid leakage, consistent with the comingled plume settling at the base of the QS aquifer.

4.1.3 SMP/GP Ponds plume

The SMP/GP ponds plume is considered a comingled nitrogen plume, attributable to historical leaks from the respective ponds (refer Figure A1 for location). The SMP/GP Ponds plume is located within the Western Groundwater Management Area.

The features of the SMP/GP ponds plume are summarised as follows:

– Plume contaminants are elevated nitrogen (mostly ammonia), sulfate, dissolved metals including molybdenum, fluoride, nickel, aluminium and arsenic
– Seawater is also present at the base of the QS aquifer in the vicinity of the plume and the SMP/GP Ponds area, introduced through historic seawater use as cooling water. Seawater (as sodium chloride salinity) could be considered as a potential contaminant if the water is used for purposes sensitive to salinity or discharged to a salt sensitive environment (e.g., onsite treatment wetlands).
– Plume ‘core’ is located at the base of sand aquifer (lower QS), however also present in shallow groundwater near the water table (upper QS). As such, groundwater from all depths in this area should be considered impacted for the purposes of the CSMP.

4.1.4 Liquid Ferts plume

The Liquid Ferts plume is considered a comingled nitrogen plume (refer Figure A1 for location). The sources of the plume are considered to be generally known, primarily through location and source composition. However, there is still some uncertainty regarding the precise source location of historical leaks and spills in the area given the number and size of the bunds, sumps and soaks. The Liquid Ferts plume is located within the Western Groundwater Management Area.

A summary of key factors linking the Liquid Ferts plume and its source zones is included below.

– The features of the Liquid Ferts plume are summarised as follows:
– Plume contaminants include elevated nitrogen (ammonia, and some nitrate near source zone), molybdenum, sulfate.
– Seawater is also present at the base of the QS aquifer in the vicinity of the plume and in the Liquid Ferts area, introduced through historic seawater use as cooling water. Seawater (as sodium chloride salinity) could be considered as a potential contaminant if the water is used for purposes sensitive to salinity or discharged to a salt sensitive environment (e.g., onsite treatment wetlands).

Plume ‘core’ is located at the base of the sand (lower QS) aquifer, with greatest concentrations occurring between depths 10-15 m below ground level. The shallow water table is generally free of or contains low levels of contaminants, however shallow groundwater contamination should not be ruled out in the area of the plume for the purposes of the CSMP.

4.1.5 Rock Pad/Southern boundary plume

The Rock Pad/Southern boundary plume is considered a comingled nitrogen plume, attributable to multiple sources in the area (refer Figure A1 for location). There are differing characteristics of the shallow (upper QS) and deeper (lower QS) aquifer in this area. The sources of the plume are considered to be identified, primarily through location and source composition. However, it is noted some ambiguity of sources remains in this area. The Rock Pad/Southern Boundary plume is located within the Western Groundwater Management Area.

The features of the Rock Pad/Southern boundary plume are summarised as follows:

– Plume contaminants include elevated nitrogen (ammonia in lower QS and nitrate in upper QS), molybdenum, sulfate and calcium.

– The plume in the upper and lower QS have different characteristics. For the purposes of the CSMP, groundwater from all depths in this area are assumed to be impacted.

4.2 Arsenic Management Area

Consistent with the HHERA (URS, 2010), relevant exposure pathways include incidental dermal contact and ingestion of arsenic-impacted groundwater by maintenance workers, such as incidental contact with groundwater during abstraction and monitoring, or during excavations extending below the water table (> 3 m below ground level).

The Arsenic Management area is defined in Figure 2**Error! Reference source not found.**. The majority of the Amm/AN operational area has been adopted as the Arsenic Management area, given elevated arsenic concentrations in groundwater on-Site are contained within this area. The former arsenic management plan concentration threshold for the area requiring management was 5 mg/L arsenic or greater, which is considered conservative. The adoption of the entire Amm/AN area as a Management Area is slightly larger and considered more appropriate than the former the 5 mg/L threshold as it accounts for potential heterogeneity/variability in concentrations within the plume.

Figure 2 Arsenic Management Area (refer Appendix A for full page figure)

4.3 Former SAP Management Area (hydrocarbons)

The DSI identified soils throughout the Former SAP area contain elevated TRH at or near the water table. While monitoring wells were not installed at/near locations that correlated with the most impacted soils, it is considered that localised groundwater impacts (dissolved-phase TRH) would be present at locations with elevated soil concentrations. Given the presence of hydrocarbons in soils and groundwater, management measures (this CSMP) are implemented should workers come into contact with soil or water in this area. The hydrocarbon plume is located within the Western Groundwater Management Area, however a specific Management Area has been defined where impacts are expected to be greatest (refer Figure 3 below), which require additional controls for activities such as deep excavations (refer Section 6.2). The Former SAP Management Area is the same for soils and groundwater.

The exposure scenarios are as per the Western Area fertiliser plumes. The Stage 3 DSI found the human health risk posed by hydrocarbons in the groundwater in the Former SAP area to be low and not suitable for non-potable use scenarios. However, controls in this CSMP are being implemented to manage residual risk.

Refer to Figure 3 for the hydrocarbon Management Area. The Management Area was based on the area where soil contamination was found to be the greatest.

Figure 3 *Former SAP Management Area (refer Appendix A for full page figure)*

4.4 Chlorophenol Management Area

A chlorophenol plume originating from off-Site sources has been identified to be encroaching in the north-east of the Site, originating from Nufarm Chemicals (formerly Chemicals Industry Kwinana [CIK]), located immediately to the north-east of the Site boundary.

The features of the Nufarm plume are summarised as follows:

– Plume contaminants include elevated chlorinated phenols, chloride, sulfate, petroleum hydrocarbons, EC and pH.
– The plume is present in both the sand (QS) and TL aquifers

The portion of the plume encroaching onto the Site is believed to be confined to the north-eastern portion of the Site, however, is not fully delineated. The highest chlorophenol concentrations (on-Site) are consistently reported at 01OB001, which is screened in the TL aquifer.

Current known distribution of the plume indicators does not indicate migration to the production borefield. However, previous modelling indicates high EC water associated with the Nufarm plume could migrate to the production borefield (MWES, 2013). The Nufarm plume is subject to its own Site Management Plan (Aurora, 2018).

A plume Management Area for the chlorophenol plume is illustrated in Figure 4. No concentration threshold has been applied; the Management Area is based on the occurrence (presence) of the plume based on current information.

The Stage 3 DSI found the human health risk posed by the chlorophenol plume to be low. However, the controls in this CSMP are being implemented to manage residual risk.

The chlorophenol plume is considered to contain contaminants that are potentially harmful to human health, including 2-Chlorophenol, 2,4-Dichlorophenol and phenol.

The **potential** exposure pathway for on-Site workers to come into contact with the chlorophenol plume is through groundwater abstraction, specifically, from the CSBP production borefield. The production bore closest to identified chlorophenol impacts is 01PB008, which is screened in the TL aquifer. 01PB008 is located approximately 130 m to the south of monitoring well pair 01MR045+01MR046, which are impacted by the chlorophenol plume. The impacts are not delineated. At 01PB008, phenols were reported below the Limit of Reporting over the monitoring period. Continued monitoring is undertaken as part of CSBPs Operation Strategy.

Given groundwater abstraction occurs in the vicinity of the chlorophenol plume, and the plume is not delineated and could migrate in the future, the SPR linkage is considered to be potentially complete at this time. On-Site workers are considered to potentially interact with abstracted groundwater, given its use for the following purposes:

- Use in cooling towers in the Amm/AN, PP2 and Sodium Cyanide areas
- Input to product and wet scrubber make-up in the Superphosphate Manufacturing Plant and Granulating Plant.
- Washdown water at Liquid Ferts and chemicals dispatch points
- Fire hydrants connected to the bore water ring main
- Hydrotesting
- Dust suppression and other ancillary Site services

Chlorophenol monitoring is in place in CSBPs groundwater contamination monitoring plan to manage future risks.

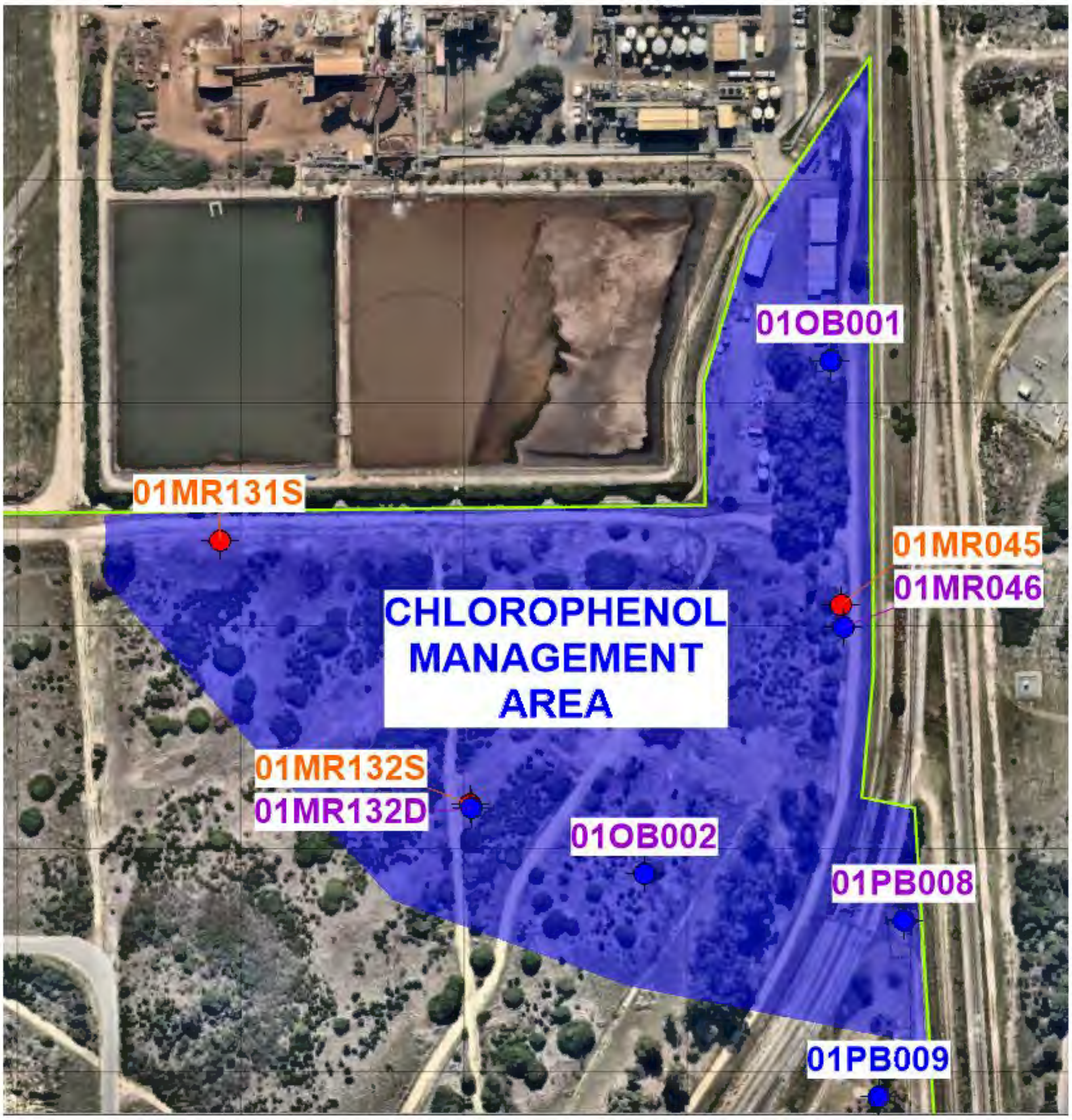


Figure 4 Chlorophenol Management Area (refer Appendix A for full page figure)

5. Soil contamination management areas

This section contains a basic description of the soil contamination at the Site requiring management. Risks relate to exposure to contaminated soils and environmental damage caused by migration of soil-borne contaminants.

Exposure to contaminated soils is limited at the Site, and likely to occur only through intrusive excavation works. As such, exposure is only considered relevant for **on-Site workers** such as utility/ intrusive maintenance workers conducting subsurface excavations, trenching or entering underground manholes on and off-Site. The contaminant exposure pathway is through incidental **dermal contact** and/or **ingestion** of impacted soils.

The Management Areas which include soil contamination are:

– Arsenic Management Area (arsenic in soils)
– Former Sulphuric Acid Plant Management Area (hydrocarbons in soils)
– Known contaminant source areas (management as required)

5.1 Arsenic Management Area

The Arsenic Management Area footprint is the same for soil and groundwater.

The HHERA (URS, 2014) found the risk from exposure to arsenic in soils (above groundwater) as low and acceptable. As such, the former arsenic management plan did not include consideration of arsenic impacted soils. However, it is considered that given the spatial extent of historical activities involving arsenic in the Amm/An area, that residual impacts could remain.

This CSMP includes soils in the Amm/AN area as a contingency, as future excavations in the area could result in exposure to residual arsenic impacted soils.

5.2 Former SAP Management Area

The Stage 3 DSI found the human health risk posed by hydrocarbons in soil in the Former SAP area to be low. Controls in this CSMP are being implemented to manage residual risk.

The Former SAP Management Area footprint is the same for soil and groundwater (refer to Figure 3). The area was based on the area where soil contamination was found to be the greatest. Based on Stage 3 DSI results, excavations >1m in depth are likely to encounter hydrocarbon impacted soils in this area.

5.3 Known contaminant source areas

The Stage 3 DSI found the human health risk of soil borne contaminants in known source areas (i.e., locations of contaminant release to ground) to be low.

Potential risks to human health associated with sources zone soils (which were not specifically investigated) and future spills or leaks (which are possible on an operational site), are considered to be adequately managed by CSBP's current operational management practices. For works in suspected contaminated areas where no Management Area has been identified (e.g., a spill site, soils below a newly identified bund defect, solid waste stockpiles), the CSBP Environment Team must be engaged to assess the risks and inform management measures on an case by case basis

No specific Management Area is allocated for this category. As a guide, soil management should be considered for intrusive excavations or soil disturbance near infrastructure at the:

– Amm/AN plant area
– SMP/GP Ponds area
– Liquid Ferts area
– Rock Pad/Southern Boundary area
– Former Gypsum Ponds

6. CSMP Requirements

The following management measures are required to mitigate residual contamination risks.

6.1 General requirements (all Management Areas)

The pertinent institutional controls for mitigating health risks to workers involved in relevant Site activities (as defined) are wholly embodied in existing CSBP guidelines and procedures. These include provision of medical surveillance (where required), hazard and risk management, work permitting and standard operating procedures. A synopsis of the relevant elements of these institutional controls is provided below.

Quick reference guide

The following controls can be applied to all management areas:

- Avoid unnecessary contact with soil and groundwater where possible
- Confirm appropriate PPE is worn by all personnel operating in any Management Area. In addition to standard Site PPE, nitrile gloves and safety glasses are mandatory when working with soil or groundwater plume Management Areas.
- Make sure that appropriate hygiene measures are adhered to once worker(s) have left the work area (i.e., personnel thoroughly wash their hands and face following field activities before eating, drinking or smoking).

6.1.1 Restriction on land use

Site use is restricted to commercial/industrial purposes only (i.e., current/ongoing use) and in its current configuration/layout. Other land use types at the Site are not considered likely and therefore this CSMP considers management under an industrial setting only.

6.1.2 Restriction on groundwater abstraction

The following restrictions on groundwater abstraction apply in the Management Areas*:

- Applies to the superficial aquifer only (i.e., Safety Bay Sands/Quaternary Sands and Tamala Limestone), not underlying aquifers (i.e., Yarragadee).
- No abstraction of groundwater from wells, spears, sumps or similar for any purpose other than environmental investigation or remediation, unless assessed as acceptable by the CSBP Environment Team
- Depth of excavation to be limited to less than 3 m bgl where possible to avoid potential contact with groundwater or requirement for dewatering.

The CSBP Environmental Team should be contacted in the event groundwater abstraction (such as dewatering) is proposed to be undertaken, or groundwater is encountered during excavation. Additional controls may be required where contact with groundwater is unavoidable, such as storage in a suitable container made of impervious material (IBC or drums) or developing a specific dewatering management plan.

* Note: The restrictions apply to new groundwater abstraction. It is noted that 01RETIC001, 01RETIC002 and 01RETIC003 currently abstract water from the superficial aquifer and are routinely sampled as part of licence monitoring. The existing CSBP production borefield is in the east of the Site and is not located within a Management Area and are also routinely monitored as part of licence monitoring.

6.1.3 Excavations

In soil Management Areas:

- Excavations must adhere to this CSMP, as contaminated soil may be exposed during intrusive work

- Confirm appropriate PPE is worn by all personnel operating in the Management Area and adheres with CSBP Site requirements, as follows:
  - Safety footwear, steel-toed work boots and/or gumboots (must comply with Australian Standard/ New Zealand Standard [AS/NZS] 2210).
  - Safety glasses (must comply with AS/NZS 1337:1992).
  - Long sleeved shirt and long pants (neck to toe to wrist).
  - Nitrile gloves (can be worn in combination with cur-resistant gloves).
- Avoid unnecessary contact with impacted media (soil, groundwater). Use machinery or hand tools to excavate material.
- Make sure that appropriate hygiene measures are adhered to once worker(s) have left the excavation site (i.e., personnel thoroughly wash their hands and face following field activities before eating, drinking or smoking).
- Depth of excavation to be limited to less than 3 m bgl where possible to avoid potential contact with groundwater or requirement for dewatering.
- Confirm excavations are fit for purpose and do not unnecessarily extend laterally and vertically.
- Assume all excavated soil within the soil Management Area is contaminated and managed appropriately (see below).
  - Place excavated material on temporary non-permeable liners (such as light density polyethylene (LDPE) sheeting) or the lined hardstand adjacent to the pond. Ensure the soils are placed on level, hard-standing surfaces and away from drainage structures (i.e., the site's perimeter drainage swale) to minimise the potential of contaminants leaching during dust suppression activities or rainfall.
  - Inclement weather dependant – LDPE sheeting shall be used to cover the stockpiled material.
  - Ensure excavated soils are not distributed across the site, nor relocated off-site.
  - Make sure excavated material from Management Areas is assessed before re-use or disposal.
- Refer to CSBP guidance on excavations [WCEF-PD-OHS-040-05] (refer Section 7.2).

6.1.4 WESCEF Occupational Hygiene Management Plan [WCEF-PD-OHS-090-04]

The following sections of WESCEF Occupational Hygiene Management Plan [WCEF-PD-OHS-090-04] outline occupational hygiene requirements:

- *Section 6.4.3 –Communication*. A hazard communication system is implemented by each business unit to ensure hazards are communicated to workers involved in relevant site activities.
- *Section 6.8 – Site Based Policies*. Policies associated with Personal Protective Equipment (PPE) and the Health Surveillance and Biological Monitoring Program have been developed.

6.1.5 WESCEF Hazard and Risk Management [WCEF-GM-OHS-040-01]

The following sections of the WESCEF Hazard and Risk Management [WCEF-GM-OHS-040-01] procedure outline risk management requirements:

- *Section 4 – Hazard/Risk Management Process*. Potential exposure to impacted groundwater should be considered throughout the hazard management process.
- *Section 10 – Hierarchy of Control*. This CSMP constitutes the administrative control to mitigate potentially unacceptable risk. PPE should be implemented as indicated in this CSMP or any referenced Job Safety Analysis (JSA) or Team Based Risk Assessment (TBRA).

6.1.6 Work Permit System [CSBP-11-031-51]

The following sections of the CSBP Work Permit System procedure [CSBP-11-031-51] outline work permitting requirements:

– *Section 1 – Purpose.* The CSBP Kwinana Work Permit system controls high risk and/or non-routine work activities through assignment of responsibilities, required communication, and identification of hazards and application of appropriate risk controls prior to the commencement of work. Potential exposure to arsenic-impacted groundwater should be addressed in the JSA or TBRA and risk mitigation requirements (including PPE) communicated to the working party.
– *Section 5.2 – Work Permit Preparation*. The Permit Authoriser will prepare the Work Permit documents agreeing with the Permit Holder on the final set of hazard controls based on the Work Area Hazard Identification/Precautions section of the Work Permit form and pre-task risk assessment.
– *Section 14.5 – Excavation / Penetration Certificate*. Excavation / Penetration Certificates are administered by Engineering Services and are to be kept with the associated Work Permit at all times. A JSA or TBRA (as required) and Site services drawings should be attached to the excavation certificate showing the job location.
  - Excavation >3 m deep in or near groundwater Management Areas should be avoided. If unavoidable, contact the CSBP Environment Team for testing.

6.1.7 Excavation Certificate (CSBP-PF2470)

CSBP Excavation Certificates are issued under a CSBP Work Permit and are to be kept with the associated Work Permit at all times. Excavation Certificate is completed by a Nominated Excavation Authoriser, who authorises the Excavation Certificate for the Permit Holder.

The Excavation Certificate stipulates that prior to excavation the Nominated Excavation Authoriser must complete the following, with respect to contamination risk:

– Review of the site contamination management plan to identify any additional controls

6.1.8 Groundwater monitoring

Monitoring of groundwater is an additional indirect control, as residual risks posed by groundwater impacts can be effectively managed via the abovementioned controls.

Ongoing monitoring of the Site plumes is outlined in CSBP documents:

– Groundwater Operating Strategy
– Kwinana groundwater contamination monitoring plan

Refer to the above for monitoring locations, frequency, and analysis suites.

The objective of the contamination monitoring is to ensure adequate identification and monitoring of risks associated with potential and known contamination sources including assessing changes over time. Recognising the findings of the Stage 3 DSI (GHD, 2021), the plumes are largely delineated and further assessment of the magnitude and extent of groundwater impacts beneath the Site is not specifically required.

It is noted that ongoing routine monitoring of hydrocarbons at the former Sulfuric Acid Plant area is not included in the groundwater contamination monitoring plan, given its low risk, nor is it a requirement of this CSMP. However, should ground disturbance works occur in the area, such as large-scale excavation, then ad-hoc monitoring of existing monitoring wells in the area may be warranted, subject to CSBP Environment Team requirements.

Data evaluation

Monitoring results are reviewed on an annual basis (in the *Groundwater monitoring and management report*) to continually inform the level of risk, plume migration and understanding..

6.2 Former SAP Management Area (hydrocarbons)

In addition to control measures and PPE required for all areas, in the event excavations exceed 1 m depth or signs of contamination are evident (hydrocarbon odours, visual stains), the following should be implemented:

- Have a Lower Exposure Limit ('LEL') device present within the trench to warn of potential unacceptable ground gas conditions
- Monitor wind direction and stand upwind if possible.
- Make sure appropriate respirators are available for all workers if necessary
- Take appropriate measures to make sure no unauthorised ignition sources are used within the defined work area (mobile phones, cigarettes etc.)
- Make sure that fire extinguishers are available in the work area.

Refer to Figure 3 for the Former SAP Management Area.

6.3 Arsenic Management Area (Amm/AN area)

The overall procedural framework for management of risks from arsenic impacted groundwater is summarised in Figure ***5***.

The following existing CSBP guidelines and procedures are applicable for workers in the Amm/AN area that may come into contact with arsenic contaminated groundwater (refer Figure 2**Error! Reference source not found.** for arsenic Management Area).

6.3.1 JSA – Ammonia-AN Groundwater Sampling [CSBP-EM-ENV-071-03]

Refer to the following sections:

- *Hazard Identification Section* has Hazardous Substances selected as potentially applicable to groundwater sampling in this location.
- *Task Step 2* refers to biological monitoring (see further Section 6.3.3) as a potential control, and minimum PPE of nitrile gloves and safety glasses.

6.3.2 WESCEF Occupational Hygiene Survey (WCEF-GM-HSE-0006)

The following sections of the above procedure outline requirements:

- *Section 4.15 Arsenic*. Description of location and historical usage of arsenic, and controls to be employed in this area

6.3.3 Health Surveillance and Biological Monitoring Program [WESCEF-PD-090-02]

The following sections of the above procedure outline requirements:

- *Section 3.4 – Health and Hygiene Team*. The WesCEF Health and Hygiene Team, comprising the Occupational Health Nurse, Occupational Hygienist and Occupational Physician (as the "Appointed Medical Practitioner"), is responsible for the implementation, delivery and review of the Health Surveillance Program. They establish through a risk assessment process if health surveillance is required and the frequency with which it should be delivered.

As per WA *Work Health and Safety Regulations* (2022) inorganic arsenic is listed as a Hazardous Chemical for which health surveillance is required as per Schedule 5.3; Regulation 5.23(1) (as at 02.07.2019), if the person is at risk as a result of the person's exposure to the hazardous substance. Workers identified in Figure 1 should be enrolled in the health surveillance program, which includes worker exposure to heavy metals (including arsenic).

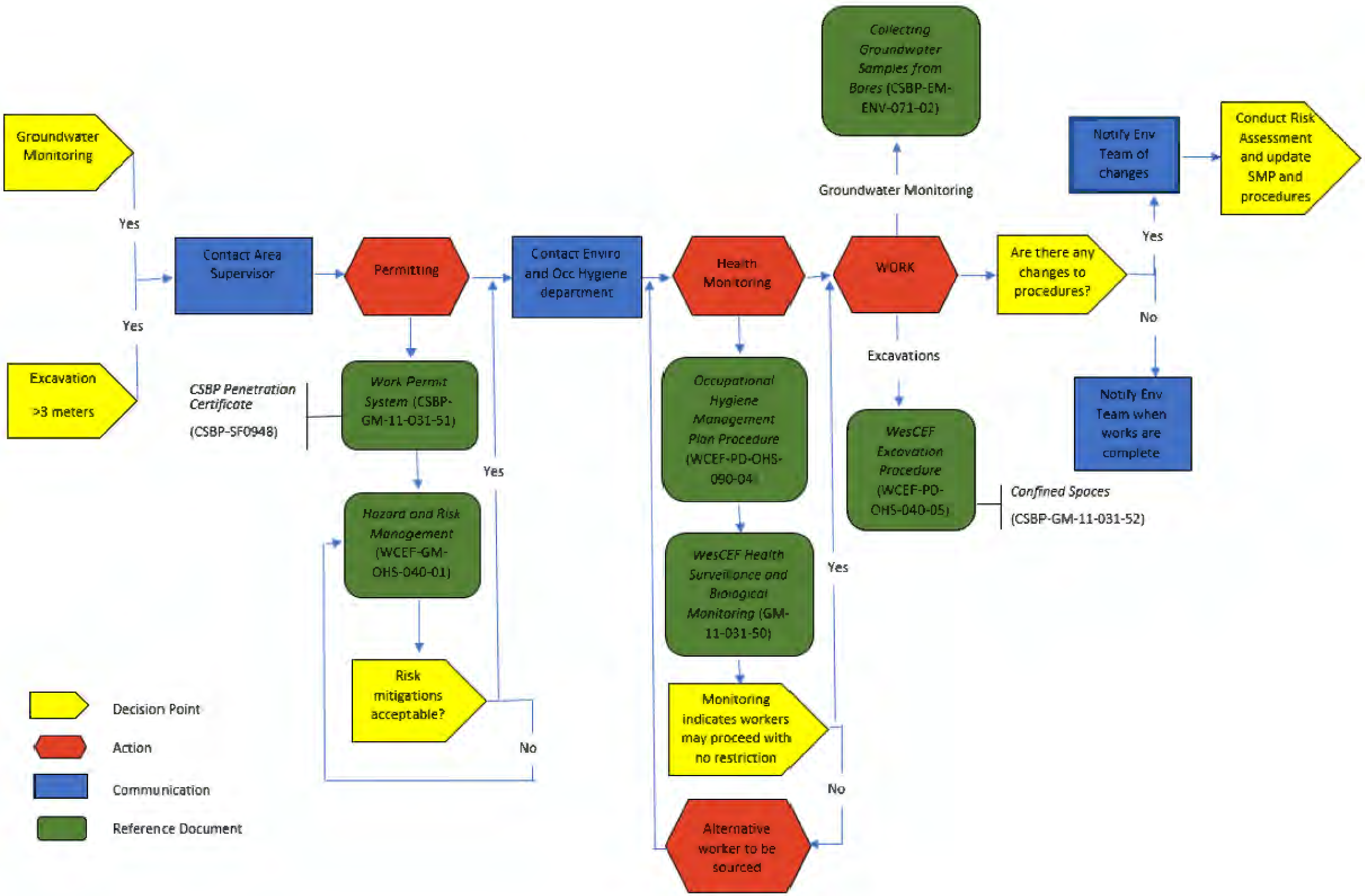


Figure 5 ***Arsenic impacted groundwater risk control (Source: CSBP 2020 arsenic site management plan)***

6.4 Chlorophenol Management Area

When contact with chlorophenols is anticipated, such as during monitoring, the following controls should occur in addition to the general requirements for all areas:

- Wear full length PPE, including gloves and safety glasses
- Avoid contact with contaminated equipment
- Equipment coming into contact with chlorophenols should be washed thoroughly and immediately after exposure
- Wash hands thoroughly before eating, drinking, smoking, etc
- Standing upwind while handling equipment or groundwater contaminated with chlorophenols
- Avoiding entering enclosed spaces with equipment contaminated with chlorophenols
- Effluent disposal is to be undertaken in accordance with direction from the CSBP Environment Team advice. Offsite disposal will require sampling and analysis of the effluent and transport by a suitably licensed operator to a licensed facility approved to accept the effluent.

Refer to Figure 4 for the chlorophenol plume Management Area.

7. Relevant Operating Procedures

7.1 Collecting Groundwater Samples from Monitoring Bores [CSBP-EM-ENV-071-02]

Refer to the following sections of the procedure:

- *Section 1.4 – Job Hazards*. Specific hazards that may be encountered include hazardous contaminants.
- *Section 1.5 – Personal Protection Equipment*. In addition to standard site PPE requirements and area specific personal protection equipment, nitrile gloves must be worn to prevent exposure to arsenic-impacted groundwater.
- *Section 1.7 – Licenses and Certificates*. A permit should be obtained to carry out groundwater sampling in identified arsenic-impacted areas.
- *Section 2 – Procedure*. Purged wastewater from contaminated bores should be collected for appropriate disposal.

7.2 Excavations [WCEF-PD-OHS-040-05]

Refer to the following sections of the procedure:

- *Section 4 – General Requirements*. Excavations that may result in contact or interface with contaminated soil or groundwater require prior input from the Occupational Hygienist and Environment Team.
- *Section 5.2 – Managing Unexpected Asbestos, Buried Waste or Contamination*. If contaminated water is encountered or suspected during and excavation, work shall stop immediately, and workers are to exit the excavation area. The Occupational Hygienist and Environment Team are to be contacted for advice.
- *Section 6.12 – Water Entering an Excavation*. In addition to standard site PPE requirements, additional PPE must be worn to prevent exposure to arsenic-impacted water in deep excavations.
- *Section 6.12 – Water Entering an Excavation*. Work should be stopped, and the Occupational Hygienist and Environment Team should be contacted to undertake water sampling and re-issue excavation permit to address potential risk to workers from arsenic-impacted water.

It is noted that an excavation will be considered a confined space if it meets the definition of a confined space, regardless of depth, and may also require management of risks associated with entry into confined spaces. The discussion of requirements for confined spaces is not included within the scope of this CSMP and is covered by CSBP procedure GM-11-031-52.

8. Forms and procedures

Links to relevant forms and procedures are included on the cover page.

9. Contingency responses

Incidents may arise during the course of works where subsurface conditions vary from prior understanding in relation to the Site, or potential non-conformances has occurred where works are undertaken not in accordance with this CSMP. Table 2 below provides a series of potential contingency measures in relation to incidents (although unlikely) which may arise.

Table 2 Potential Incident(s) and Contingency Measures

Incident / breach	Contingency Measure
Work not undertaken in accordance with minimum requirements stipulated in this CSMP	Cessation of works immediately Notification of incident to CSBP Environment Team who will raise an incident notification, if required. Consult with relevant stakeholders and/ or suitably qualified personnel to assist in rectifying issue Re-commence works in accordance with CSMP Review CSMP and establish if non-conformance requires addition to CSMP by means of addendum or revision. Review incident report and communicate incident review to stakeholders
Community/worker/internal site complaint	Record the complaint in incident reporting system Identify the source of the complaint and review Site practices are being carried out in accordance with the CSMP If complaint is valid, ensure ongoing works action the complaint issue Evaluate if the CSMP requires updating in terms of additional management measures Communicate to complainant that their complaint has been actioned
Unregistered activity	Cessation of works immediately Identify components in CSMP which are relevant to works, and seek approvals if required Undertake works in accordance with the CSMP Report in incident reporting system Review incident report and communicate incident review to stakeholders
Monitoring indicates increase in concentration or, unexpected elevated concentrations detected	If groundwater monitoring data obtained from monitoring indicates an increasing concentration trend, potential actions include: – Review of spatio-temporal data from recent and historical monitoring to inform a decision as to the acceptability of the magnitude of the increase. – If the review of results is acceptable, then monitoring will continue in accordance with the schedule/frequency detailed in the monitoring plan. – If results indicate a new source or migrating plume, further assessment will be required to determine the associated risk and potential mitigation measures – Relevant correspondence would be initiated with the appointed CSA (and DWER if necessary) informing them of the detection and proposed follow-up actions (including consideration of further reporting obligations under the Act) – The adequacy of the CSMP and monitoring plan would be reviewed in the context of the monitoring well network suitability and the frequency of monitoring events. Elevated results do not necessarily mean that the overall plume configuration has become unstable, merely that localised mobilisation may have been stimulated. In cases where the identified contamination is determined to be attributable to a new release, this would necessitate early intervention to investigate and resolve the source.

9.1 Reporting and performance monitoring

Recording of activities including intrusive work should be accurately recorded whereby at a minimum, the following should be captured:

- All disturbance activities in plume Management Areas, including work program duration and nature of works undertaken
- Details of personnel or contractors undertaking the work
- All environmental incidents which have occurred
- Community complaints, details of incident and actions/ response to the incidents
- The works to undertake appropriate certification or sign-off, including validation of reinstatement of material, imported clean fill material, in accordance with any engineering plans and/ or specification(s), prior to reinstatement of surfaces, in accordance with all design specifications
- Any environmental reports including sampling and analysis of soil, surface water or groundwater, proof of acceptance to landfills should any material be disposed
- Copies of any environmental regulatory approved management plans including, but not limited to, dust management plans relating to specific activities within the Management Areas

Reporting of these activities would be by exception only, with relevant details (such as those relevant to Site contamination understanding) included in CSBPs annual monitoring report.

10. CSMP Review and Update

There is no expiry for the requirements of this CSMP unless appropriately justified to relevant stakeholders on the basis of suitable investigations/reasoning. Documents of this nature are classified as “living documents” and are subject to revision based on changes including, but not limited to, the following:

– Changes to Site conditions
– Changes to legislation and/ or codes of practice
– Changes to the land use

Any questions or concerns that may arise in regard to this CSMP should be directed to CSBPs Environment Team in the first instance. CSBP can provide additional information in relation to the CSMP and the Management Area, as well as updated contact details for the environmental consultant if required. Similarly, if information relating to the CSMP and ongoing monitoring is required, such queries should also be directed to the Environment Team.

11. References

Aurora environmental, 2018. Sub-surface management plan lot 51 Mason Road, Kwinana Beach. Report prepared for Nufarm Australia Ltd, Report Number: AP2015-181 Rev 5, dated 24 August 2018.

CSBP Limited, 2020. Arsenic Site Management Plan – CSBP Kwinana. Version 3.0.0 (superseded)

CSBP Limited. Collecting Groundwater Samples From Monitoring Bores. 12 April 2013. EM-ENV-071-02.

CSBP Limited. Collection and Preservation of Surface Water Samples. 19 July 2012. EM-ENV-071-01.

CSBP Limited. Confined Space Procedure. GM-11-031-52.

CSBP Limited. Excavation / Penetration Certificate. Version 2.0. PF2470-0108.

CSBP Limited. Excavations. 16 January 2014. GM-11-036-04.

CSBP Limited. Hazard and Risk Management. 29 January 2014. WCEF-PD-OHS-040-01.

CSBP Limited. Health Surveillance and Biological Monitoring Program (HSP). 13 January 2014. GM-11-031-59.

CSBP Limited. Work Permit System. 29 January 2014. GM-11-031-51.

DWER (2021) Assessment and management of contaminated sites.

DWER (2019) Landfill Waste Classification and Waste Definitions 1996 (as amended 2019)

GHD 2021. Kwinana works depot Stage 3 DSI. Volume 1: Hydrogeological Conceptual Site Model

GHD 2021. Kwinana works depot Stage 3 Investigations. Volume 2: Hydrogeological numerical modelling report

GHD 2021. Kwinana works depot Stage 3 DSI. Volume 3: Detailed Site Investigation.

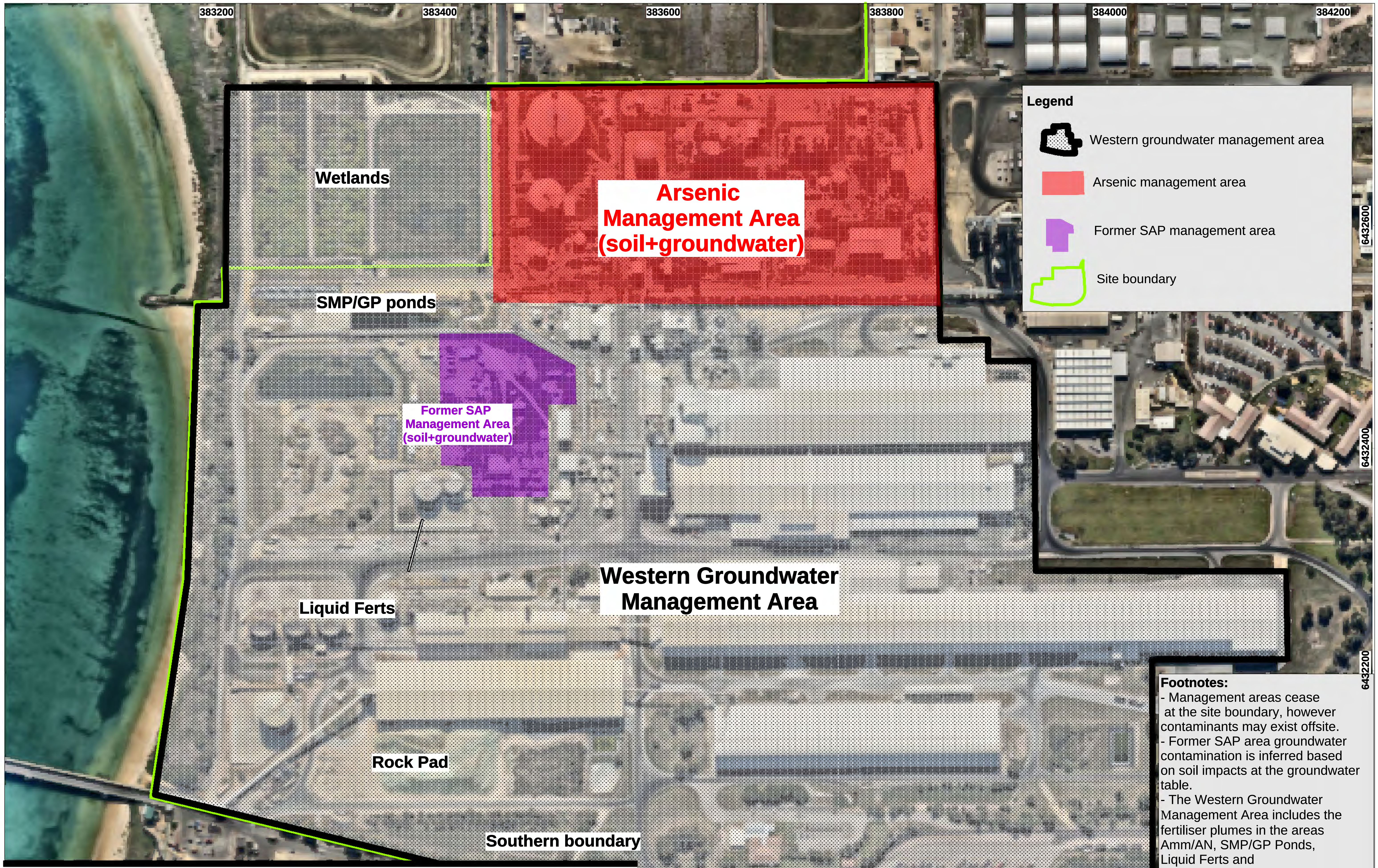
Government of Western Australia 2022. Work health and Safety Regulations. 24 December 2022.

URS Australia Pty Ltd. Tier 3 Human Health and Environmental Risk Assessment – Arsenic Plume. 15 September 2010. [DRAFT]

URS Australia Pty Ltd. Preliminary Site Investigation. 12 December 2012. [DRAFT]

Appendix A

Figures



CSBP Limited
Site Management Plan
WESTERN MANAGEMENT AREA

Project No. **12544016**
Revision No. **1**
Date **1/06/2022**

Figure A1

Data Source: Nearmap: Imagery, GHD: Site boundary and well locations | File location: \\ghdnet\ghd\AU\Perth\Projects\61\12544016\Tech\Surfer\Surfer Maps\SMP management areas

Legend:

- Arsenic management area
- Site boundary

Footnotes:

- Management areas cease at the site boundary, however contaminants may exist offsite.

Paper Size: ISO A3
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

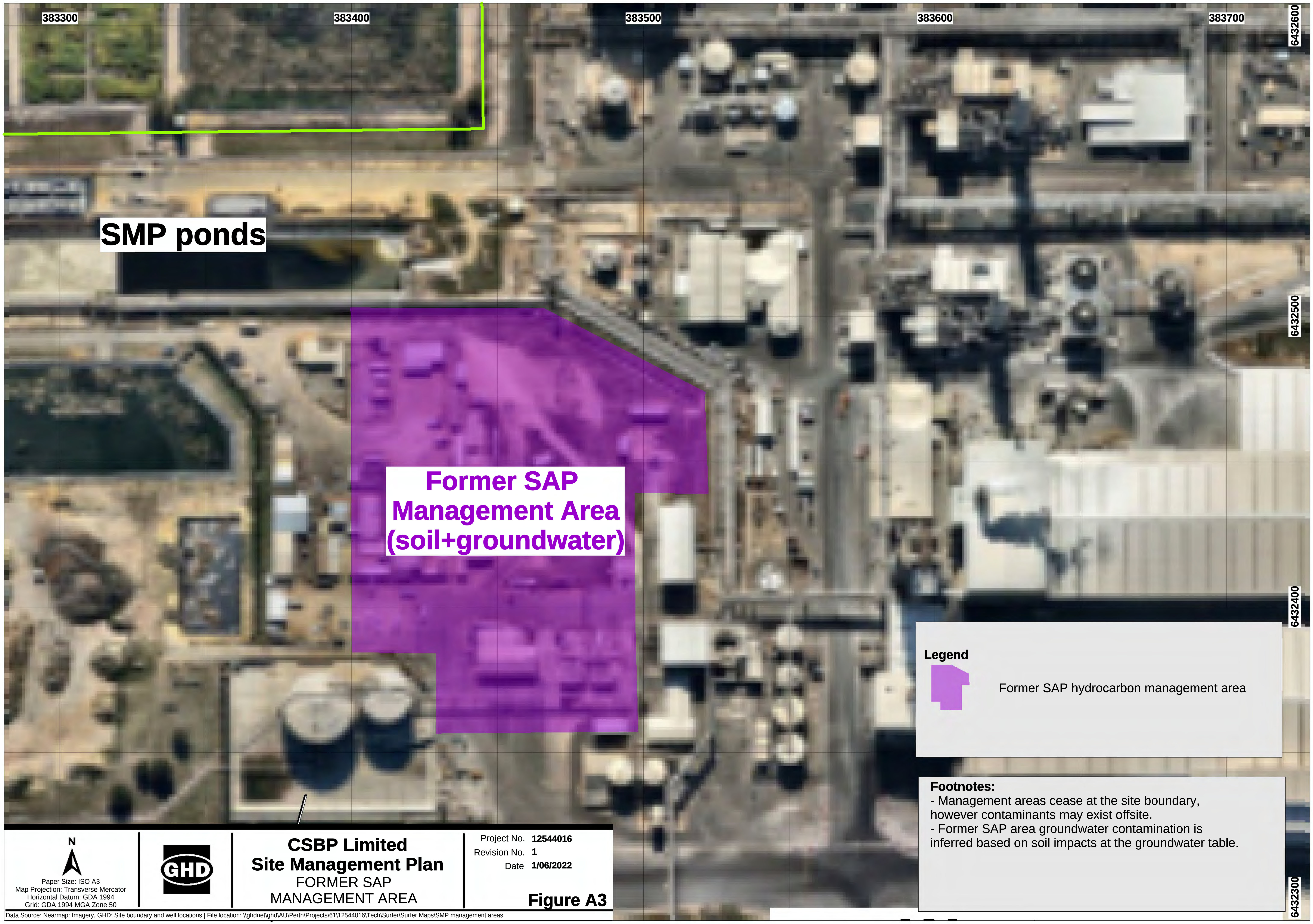
GHD

CSBP Limited
Site Management Plan
ARSENIC MANAGEMENT AREA

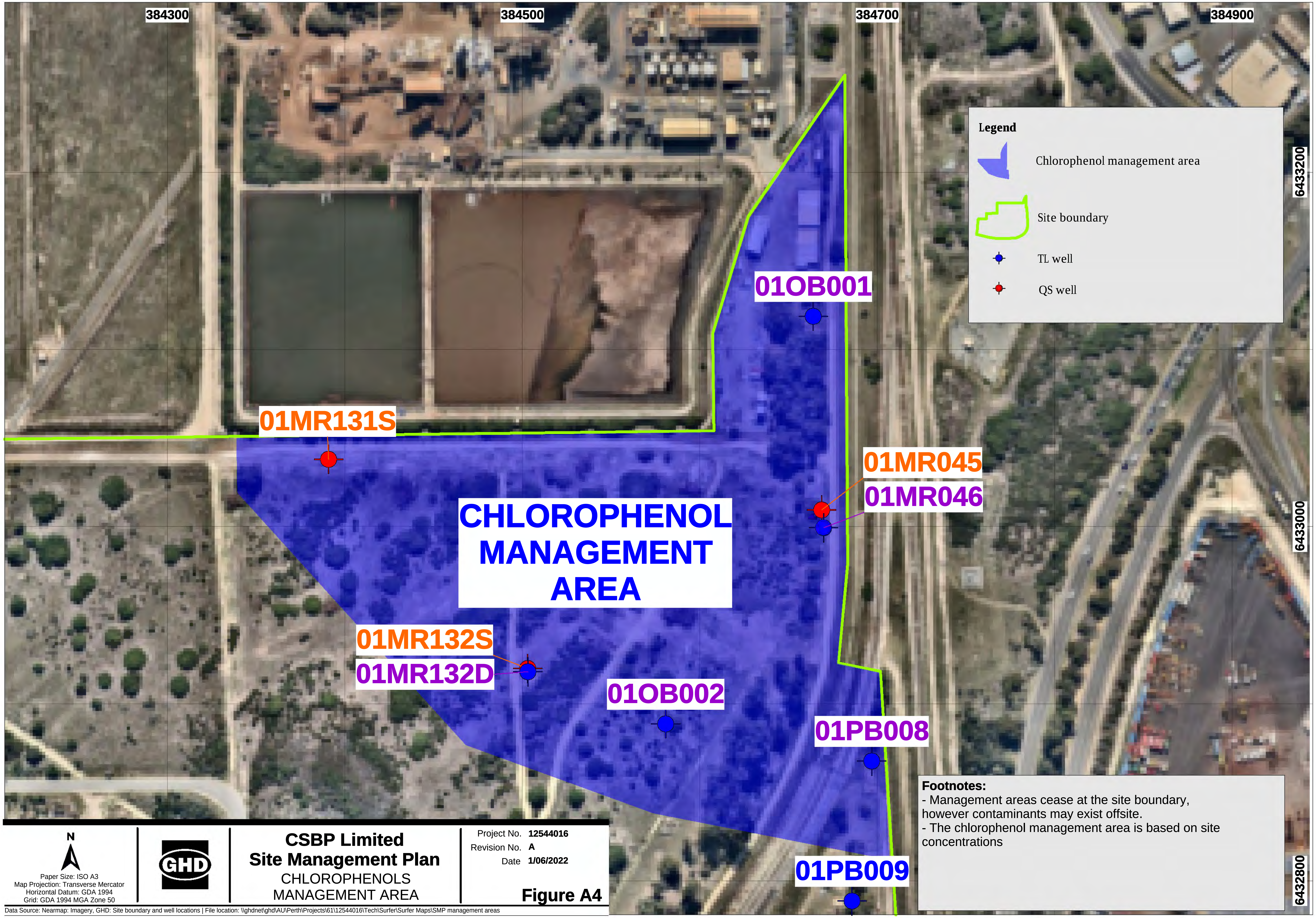
Project No. **12544016**
Revision No. 1
Date **1/06/2022**

Figure A2

Data Source: Nearmap: Imagery, GHD: Site boundary and well locations | File location: \\ghdnet\ghd\AU\Perth\Projects\61\12544016\Tech\Surfer\Surfer Maps\SMP management areas



383300
383400
383500
383600
383700
6432600
6432500
6432400
6432300
SMP ponds
Former SAP Management Area (soil+groundwater)
Legend
Former SAP hydrocarbon management area
Footnotes:
- Management areas cease at the site boundary, however contaminants may exist offsite.
- Former SAP area groundwater contamination is inferred based on soil impacts at the groundwater table.
N
Paper Size: ISO A3
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50
GHD
CSBP Limited
Site Management Plan
FORMER SAP
MANAGEMENT AREA
Project No. 12544016
Revision No. 1
Date 1/06/2022
Figure A3
Data Source: Nearmap: Imagery, GHD: Site boundary and well locations | File location: \\ghdnet\ghd\AU\Perth\Projects\61\12544016\Tech\Surfer\Surfer Maps\SMP management areas



CSBP Limited
Site Management Plan
CHLOROPHENOLS MANAGEMENT AREA

Project No. 12544016
Revision No. A
Date 1/06/2022

Figure A4

Data Source: Nearmap: Imagery, GHD: Site boundary and well locations | File location: \\ghdnet\ghd\AU\Perth\Projects\61\12544016\Tech\Surfer\Surfer Maps\SMP management areas

ghd.com

The Power of Commitment

Senversa Pty Ltd
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20 February 2024

Catherine Finch
Senior Environmental Advisor
CSBP Ltd
PO Box 345
KWINANA WA 6966

Dear Catherine,

Re: Contaminated Sites Management Plan
Interim Auditor Advice

Senversa Pty Ltd is pleased to provide CSBP Ltd (CSBP) with this Interim auditor Advice (IAA) documenting review of a Contaminated Site Management Plan (CSMP) prepared by GHD in relation to ongoing management of contamination issues at CSBP's Kwinana facility (the site).

1.0 Project Appreciation

There are several known areas of contamination within the Kwinana facility that require management to mitigate risk to human health and the environment. CSBP have previously developed an Arsenic Management Plan (v3.0, CSBP, 2020) that served this function but following updates to the characterisation of issues at the site and to reflect current site activities, it was determined that the existing plan required an update. Consequently, CSBP commissioned GHD to prepare an updated version of an appropriate management plan for the site and are seeking auditor endorsement of it. Review of the updated plan is the subject of this advice.

GHD have described the purpose of the plan as follows (GHD, February 2023):

"This CSMP has been prepared to provide relevant stakeholders with sufficient information to enable management of potential health, safety and environmental risks associated with exposure to contaminants in groundwater and soil at the Site. Key stakeholders are CSBP management, CSBP Site workers and contractors.

The overarching objective of the CSMP is to ensure the risks from contamination at the Site are adequately managed during the ongoing operation of the Site and meet the requirements of the Contaminated Sites Act 2003 ('the Act').

It is noted that the overall risk to human health posed by the groundwater plumes was found to be low in the Stage 3 DSI (GHD, 2021), particularly given the low likelihood of coming to contact with plumes. This CSMP focuses on controls to mitigate residual on-Site risks in the event of exposure/contact with known contaminants.

The CSMP is an operational document, designed to be integrated with CSBP's existing broader health, safety, and environmental management procedures in operation at the Site. The CSMP outlines 'Management Areas' which require controls to mitigate residual risks to human health.

This CSMP is a management plan for routine operational and maintenance works and may not address all the risks associated with major projects such as future development phases or remediation works within the Management Area or Site. This CSMP is to address contamination related risks only and does not intend to identify all HSE hazards associated with below-ground excavation/ intrusive maintenance work programmes (e.g., hot works proximal to operational fuel storage/ handling infrastructure). It works in conjunction with CSBP's HSE management systems, procedures, and permit systems."

The auditor reviewed a draft version of the CSMP and provided IAA (Senversa, 21 April 2023). The document was subsequently amended, and a final version provided to the auditor for endorsement.

This letter represents endorsement of the finalised version of the CSMP and is Interim Auditor Advice (IAA) only and is not an audit report.

2.0 Objective

The objective of the review was to assess the quality of the CSMP (including consistency with relevant guidelines) and to assess the plan in terms of its ability to address the management of contamination related risks at the site.

3.0 Scope of Work and Methodology

The following document was reviewed:

Contaminated Sites Management Plan – CSBP Kwinana Industrial Complex (GHD, 3 July 2023)

The review was undertaken by Jeremy Hogben in his capacity as an accredited Contaminated Sites Auditor (WA) and consistent with relevant auditor guidelines, namely:

Requirements for Mandatory Auditor's Reports – Contaminated Sites Guidelines (DWER, November 2016)

Jeremy was supported by Nathan Henderson in his capacity as auditor's assistant and there was no requirement for advice from Jeremy's Supporting Expert Team (SET) in this case.

4.0 Review Findings

IAA provided by the auditor following review of the draft CSMP identified only three minor issues with the document otherwise being of sound quality and fit for purpose.

Review of the final document (GHD 3 July 2023) confirmed that the minor comments had been appropriately addressed.

On this basis the auditor is pleased to endorse the plan.

5.0 Closing

If you have any comments or questions, please do not hesitate to contact the undersigned at jeremy.hogben@senversa.com.au on 0419 122 534.

Yours sincerely,

Jeremy Hogben
Contaminated Sites auditor (WA)

Limitations

Senversa has prepared this document for use only by its client for the specific purpose described in its proposal, which is subject to limitations. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and Senversa's use of professional judgement for the purposes of the work means that matters may have existed that would have been assessed differently on behalf of third parties.

CSBP KWINANA NAAN Debottlenecking

Environmental Noise Assessment

CSBP Limited

Kwinana Beach Road
Kwinana WA 6166

Prepared by:

SLR Consulting Australia

Level 1, 500 Hay Street, Subiaco WA 6008,
Australia

Report 675.072268.00003-R01

9 February 2024

Revision: 0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0	10 January 2024	Paul Drew	Luke Zoontjens	Draft
1	9 February 2024	Paul Drew	Luke Zoontjens	Paul Drew

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with CSBP Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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List of Tables

1.0 Introduction

SLR Consulting Australia has been engaged by CSBP Limited to undertake an environmental noise compliance assessment for the proposed debottlenecking of three Nitric Acid and Ammonium Nitrate (NAAN) plants at their Kwinana site.

The proposed debottlenecking project incorporates an upgrade of the existing air compressor and expander units with associated piping, air intake cooling and other efficiency upgrade modifications.

The report details the predicted change in noise levels at the Medina and other residential areas surrounding the Kwinana Industrial Area (KIA) and an assessment of noise impact against applicable noise limits from the Regulations.

2.0 Criteria

The noise emissions from transformer substations are regulated in Western Australia under the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) ('the Regulations'). Generally, to achieve compliance with the Regulations, the noise levels at nearby residential areas from the Substation operations are not to exceed defined limits (assigned levels).

A summary of the applicable noise limits is provided in **Table 1.** These limits are determined from consideration of prevailing background noise levels and 'influencing factors' that considers the level of commercial and industrial zoning in the locality. The influencing factor (IF) considers zoning and road traffic within 450 metres of each noise sensitive premises.

Table 1 Assigned noise level summary

Part of premises receiving noise	Time of day	Assigned level, dB		
		L_{A10}	L_{A1}	L_{Amax}
Noise Sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	0700 to 1900 hours Monday to Saturday *('Day')*	45 + IF	55 + IF	65 + IF
	0900 to 1900 hours Sunday and public holidays *('Sundays')*	40 + IF	50 + IF	65 + IF
	1900 to 2200 hours all days *('Evening')*	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 Monday to Saturday and 0900 hours Sunday and public holidays *('Night')*	35 + IF	45 + IF	55 + IF
Noise Sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use.	All hours	60	75	80
Commercial premises	All hours	65	75	80
Industrial and utility premises	All hours	65	80	90

The specific assigned level for each receiver is detailed in **Section 3.3**.

Under the Regulations, if noise emitted from any premises when received at any other premises cannot reasonably be free of intrusive characteristics of tonality, modulation and impulsiveness, a series of adjustments are added to the emitted levels (measured or calculated) and the adjusted level must comply with the assigned level. The adjustments are detailed in **Table 2** and are further defined in Regulation 9(1) of the Regulations.

Table 2 Definition of noise characteristics

Noise characteristic	Definition	Adjustment if present (Note[1])
Tones	Where the difference between the A weighted sound pressure level in any one third octave ban and the arithmetic average of the A weighted sound pressure levels in the two adjacent one third octave bands is greater than 3 dB in terms of $L_{Aeq,T}$ where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.	+5 dB
Modulation	A variation in the emission of noise that – Is more than 3 dB LAFast or is more than 3 dB LAFast in any one third octave band; Is present for at least 10% of the representative assessment period; and, Is regular, cyclic and audible.	+5 dB
Impulsiveness	Present where the difference between the L_{APeak} and L_{Amax} is more than 15 dB when determined for single representative event.	+10 dB
Note 1 where noise emission is not music, these adjustments are cumulative to a maximum of 15 dB		

3.0 Methodology

3.1 Overview

The existing CSBP Kwinana noise prediction model is based on measurement of the individual NAAN units 1, 2 and 3. The existing acoustic model does not have an identified sound power representation of the individual air compressor/expander units, which are the main noise sources proposed to be upgraded.

The site acoustic model is in the process of being upgraded to a more detailed model with identifiable individual noise sources. The intent of the model upgrade is to provide more information and assist CSBP Kwinana to identify opportunities for mitigation of environmental noise. The new model is complex and will not be completed in time to be used for this assessment. As the proposed NAAN debottlenecking project involves change to existing plants, a comparative assessment identifying the extent of change of noise emissions will be undertaken, referencing the previous site acoustic model predicted noise emissions. Potential additional site noise emissions associated with a proposed new Ammonia Plant 3 have not been included in this assessment.

Comparative sound power information is provided by the compressor/expander supplier, which facilitates a comparative assessment of the impact of the proposed changes.

Acoustic data for the proposed new air compressor pre-cooling system (cooling towers) can also be accounted for.

The relative change in the site noise emission can be estimated from comparison with the site overall predicted noise emissions, providing the means to assess the acoustic impact of the proposal.

Changes in predicted emissions at the noise sensitive receivers can be assessed against the 'assigned levels' to determine the level of compliance with the Regulations. Key aspects of the noise prediction modelling and the noise assessment are detailed below.

3.2 Noise prediction model

3.2.1 Sensitive receivers

The modelling considered two of the nearest residential receivers surrounding the Kwinana Industrial Area. **Figure 1** shows the locations of the noise sensitive receivers and the site, and **Table 3** summarises their location and description.

Figure 1 Site location and identified sensitive receivers

Table 3 Sensitive receivers

ID	Address (notes)
R1	Cee & See Caravan Park (adjacent CBH)
R2	Residential near CBH (Rockingham)
R3	Residential further from CBH (Rockingham)
R4	Hillman residential
R5	Hillman residential (south)

ID	Address (notes)
R6	Rockingham Holiday Village (147 Dixon Rd, East Rockingham)
R7	Leda residential area (south)
R8	Leda residential area
R9	Calista residential area
R10	Medina residential area
R11	Rural residence west of golf course
R12	Rural residence west of golf course
R13	Residence (35 Hubbard Way)

3.2.2 Noise sources

Source noise emission sound power levels for the existing and proposed compressor/expander have been provided by the equipment manufacturer (**Section 4.1**).

NAAN 1 was commissioned sometime around 1995, at which time it was identified that the unit emitted high noise levels. A program of noise mitigation including vibration isolation of intercooler pipework and lagging was undertaken to reduce noise levels. The development of NAAN 2 incorporated similar noise mitigation measures, with the new design providing for slightly improved noise mitigation. In addition, the tail gas silencer for NAAN 2 was of a higher acoustic attenuation performance than the original unit on NAAN1 (which was not upgraded). A low noise cooling tower was selected for NAAN 2. NAAN 3 is effectively a duplication of NAAN 2.

The proposed upgrade of NAAN 1, 2 and 3 will require replacement of the tail gas silencers, providing an expected reduction in noise of the NAAN 1 tail gas stack compared to the existing as the new silencer is to match or exceed the performance of the NAAN 2/3 silencers. The compressor / expander pipework will be mostly replaced, providing the opportunity to better isolate the pipework for NAAN 1, and new acoustic cladding will rectify some deteriorated cladding on NAAN 1.

An improvement in process efficiency can be achieved by pre-cooling the air compressor intake air, requiring the addition of three sets of two relatively small low noise cooling towers (two for each unit).

3.2.3 Environmental propagation

The CONCAWE prediction methodology was utilised within SoundPLAN. The CONCAWE prediction method is specially designed for large facilities and incorporates the influence of wind effects and the stability of the atmosphere.

3.2.4 Meteorological effects

The 'default meteorological conditions' for noise modelling in the DWER guidelines have been adopted to determine the effects of meteorology on noise emissions from the site. The weather conditions summarised in **Table 4** is used to approximate the typical worst-case weather conditions for enhancement of sound propagation.

Table 4 Default 'worst-case' meteorological conditions for noise modelling

Parameter	'Day time' 0700-1900	'Night' 1900-0700
Wind Speed	4 m/s Worst case scenario as source to receiver	3 m/s Worst case scenario as source to receiver
Temperature inversion lapse rate	0°C per 100m	2°C per 100m
Pasqual stability class	E	F
Temperature	20°C	15°C
Relative Humidity	50%	50%

3.2.5 Uncertainty of prediction

The statistical accuracy of environmental noise predictions using CONCAWE was investigated by Marsh (Applied Acoustics 15 - 1982). Marsh concluded that CONCAWE was accurate to ±2 dBA in any one octave band between 63 Hz and 4 kHz and ± 1 dBA overall.

3.3 Assigned levels and adjustments

The assigned noise levels for the identified sensitive receivers are detailed in **Table 5.** The assigned levels include the IF derived based on the proximity of the receivers to industrial and commercial zoned areas, (including the development site) and major and secondary roads.

Table 5 Assigned noise levels at sensitive receivers

ID	Receptor Type	Influencing Factor, dB	Assigned Levels, L_{A10} dB		
			Day	Evening	Night
R1	Cee & See Caravan Park (adjacent CBH)	7	52	47	42
R2	Residential near CBH (Rockingham)	3	48	43	38
R3	Residential further from CBH (Rockingham)	1	46	41	36
R4	Hillman residential	3	48	43	38
R5	Hillman residential (south)	0	45	40	35
R6	Rockingham Holiday Village (147 Dixon Rd, East Rockingham)	11	56	51	46
R7	Leda residential area (south)	0	45	40	35
R8	Leda residential area	0	45	40	35
R9	Calista residential area	0	45	40	35
R10	Medina residential area	4	49	44	39
R11	Rural residence west of golf course	11	56	51	46
R12	Rural residence west of golf course	11	56	51	46
R13	Residence (35 Hubbard Way)	1	46	41	36

The plant operates at all times. Therefore, the predicted noise emissions are compared against the more critical night-time L_{A10} assigned levels.

4.0 Results and discussion

4.1 Equipment sound power level changes

Table 6 presents the noise source sound power levels of the existing and proposed units associated with the proposed NAAN debottlenecking project. Considering the prediction uncertainty and that output results are typically rounded to whole numbers, overall A-weighted differences of less than a dB are considered negligible (especially if the content is similar).

Table 6 Individual Item Noise Source Modelled Sound Power Levels, L_{Aeq} dB

Equipment Item	Existing Sound Power, dB	Proposed Sound Power, dB	Net increase in Sound Power, dB
Kwinko-1 Compressor/Expander	122.4	123.2	0.8
Kwinko-2 Compressor/Expander	122.4	123.2	0.8
Kwinko-3 Compressor/Expander	122.4	123.2	0.8
Kwinko-1 Tail Gas Stack	115.0	109.5	-5.5
Kwinko-2 Tail Gas Stack	109.5	109.5	0.0
Kwinko-3 Tail Gas Stack	109.5	109.5	0.0
Kwinko-1 Pre-cooling Cooling Towers	-	101.4	-
Kwinko-2 Pre-cooling Cooling Towers	-	101.4	-
Kwinko-3 Pre-cooling Cooling Towers	-	101.4	-
Combined Sound Power	**127.6**	**128.2**	**0.6**

The Compressor/Expander is partially enclosed within a compressor house, reducing the acoustic sound power emitted externally. The adjusted outdoor sound power levels based on measurements undertaken on site for the existing NAAN plants are shown in **Table 7**.

Table 7 Effective External Noise Source Sound Power Levels, L_{Aeq} dB

Equipment Item	Existing Sound Power, dB	Proposed Sound Power, dB	Net increase in Sound Power, dB
Kwinko-1 Compressor/Expander	113.0	113.3	0.3
Kwinko-2 Compressor/Expander	113.1	113.3	0.2
Kwinko-3 Compressor/Expander	118.1	113.3	-4.8
Kwinko-1 Tail Gas Stack	115.0	109.5	-5.5
Kwinko-2 Tail Gas Stack	109.5	109.5	0.0
Kwinko-3 Tail Gas Stack	109.5	109.5	0.0
Kwinko-1 Pre-cooling Cooling Towers	-	101.4	101.4
Kwinko-2 Pre-cooling Cooling Towers	-	101.4	101.4
Kwinko-3 Pre-cooling Cooling Towers	-	101.4	101.4
Combined Sound Power	**121.9**	**119.8**	**-2.1**

4.2 Predicted noise emissions

The acoustic spectrum of the emitted sound is an important aspect of sound propagation and resultant noise emission to far-field locations such as Median residential area. A comparative calculation of 'worst case' propagated sound from the NAAN location to Medina for the existing and proposed cumulative sound power of the three CSBP Kwinana NAAN plants was undertaken.

The calculation shows that the proposal is expected to result in a net 1.1 dB decrease in combined NAAN plant noise emissions at the most affected residential receptors at Medina residential area. This reduction in noise emission is associated with the proposed upgrade of the Kwinko-1 tails gas attenuator and improved lagging of compressor pipework, the latter affecting mainly higher frequency noise emissions.

The typical received noise level at Medina is therefore estimated to reduce from L_{A10} 27 to 26 dB for the combined CSBP Kwinana NAAN plants following the proposed debottlenecking project.

The potential reduction in noise emissions under 'worst case' night conditions at Medina residential area is around 0.5 dB, which is considered insignificant.

The existing CSBP Kwinana site noise emissions to key receptor locations are shown in **Table 8.**

Table 8 CSBP Kwinana Predicted noise levels

Sensitive Receiver ID	Night-time Criteria, L_{A10}, dB	Night-time Level for Compliance with allowance for 'Significantly Contributing', L_{A10}, dB	Existing Plant Predicted Emission L_{A10}, dB	Predicted compliance?
R1	42	37	27	Yes
R2	38	33	26	Yes
R3	36	31	26	Yes
R4	38	33	22	Yes
R5	35	30	21	Yes
R6	46	41	23	Yes
R7	35	30	27	Yes
R8	35	30	28	Yes
R9	35	30	29	Yes
R10	39	34	28	Yes
R11	46	41	39	Yes
R12	46	41	38	Yes
R13	36	31	30	Yes

The existing CSBP Kwinana predicted noise levels are compliant with the night-time L_{A10} 'assigned level' at all residential receptors under 'worst case' climatic propagation conditions. The predicted small reduction in site noise emissions associated with the proposed NAAN debottlenecking project will therefore also result in compliant noise emissions.

4.3 NAAN Debottlenecking Assumptions

This assessment is based on the acoustic data provided by the equipment suppliers.

Details on the equipment sound power levels is shown in **Table 6** and **Table 7**.

The air compressor and expander generate high levels of noise internally, and this can be emitted by sound radiation from the unit and via upstream and downstream ductwork. All systems need to be attenuated to control noise emissions. Equivalent to the existing unit on NAAN 2, comprehensive structure-borne isolation and acoustic lagging is to be installed.

The fresh air intake system silencer is designed to achieve no greater than L_{Aeq} 88 dB at 1 metre from the inlet.

5.0 Conclusion

The proposed debottlenecking project incorporates an upgrade of the existing air compressor and expander units with associated piping, air intake cooling and other efficiency upgrade modifications for the three Nitric Acid and Ammonium Nitrate (NAAN) plants at CSBP Kwinana.

A comparative assessment of the proposed project noise emissions compared to the existing plant noise emissions show that a small reduction in environmental noise emissions is predicted for this project. The reduction in noise emissions is associated with upgraded acoustic attenuation of the older NAAN 1 tails gas stack and equivalent or improved control of air compressor / expander acoustic lagging systems. The noise mitigation measures offset the introduction of pre-cooling ‘cooling tower’ systems.

The basis of the noise mitigation measures are outlined in this report.

The proposed NAAN Debottlenecking project noise emissions are predicted to reduce relative noise emissions from the CSBP Kwinana site in line with regulatory expectations and will not increase site noise emissions, which are currently shown to be compliant with the requirements of the *Environmental Protection (Noise) Regulations 1997*.

Making Sustainability Happen