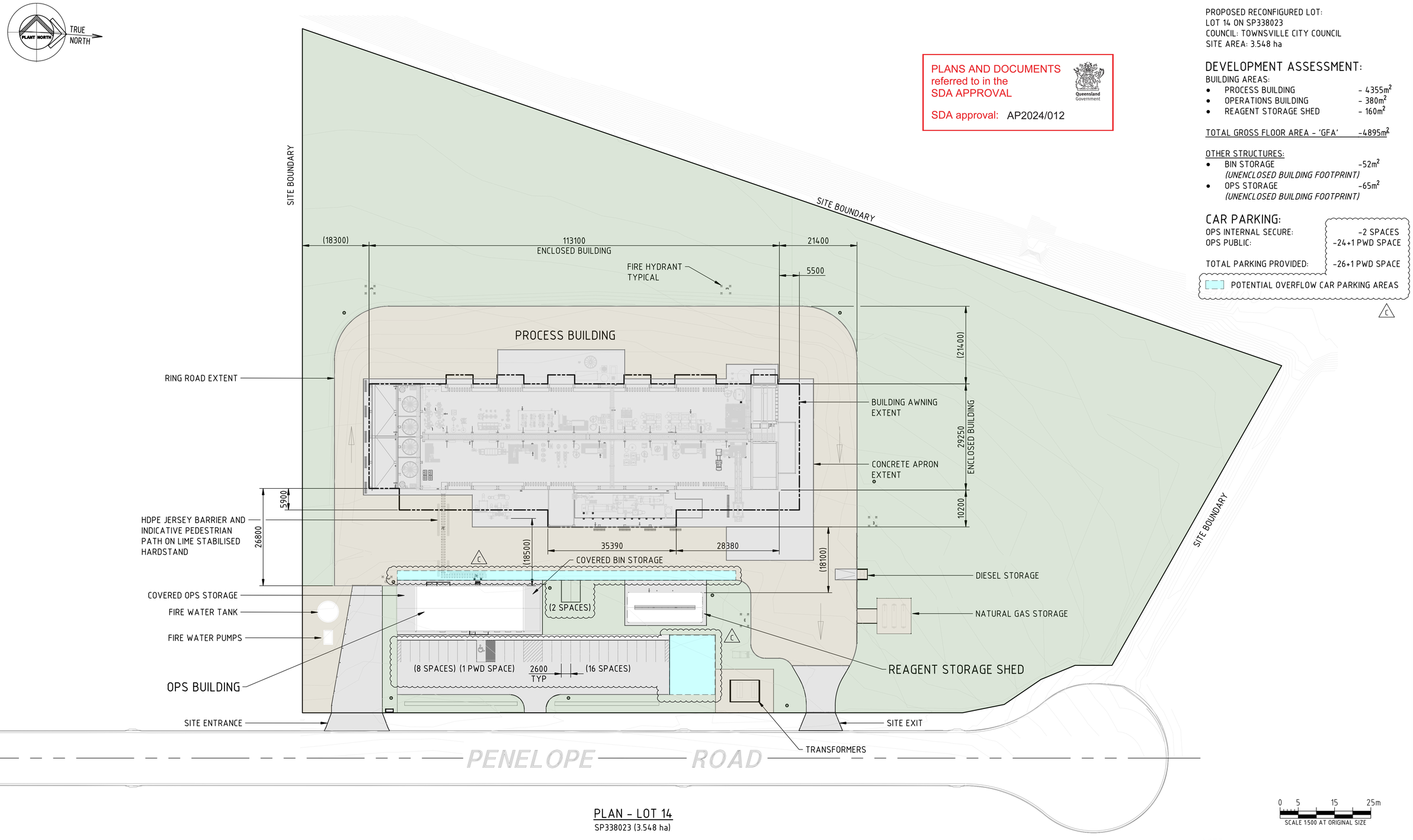

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2024/012

RPD:

PROPOSED RECONFIGURED LOT:
LOT 14 ON SP338023
COUNCIL: TOWNSVILLE CITY COUNCIL
SITE AREA: 3.548 ha

DEVELOPMENT ASSESSMENT:

BUILDING AREAS:

- PROCESS BUILDING – 4355m²
- OPERATIONS BUILDING – 380m²
- REAGENT STORAGE SHED – 160m²

TOTAL GROSS FLOOR AREA – 'GFA' –4895m²

OTHER STRUCTURES:

- BIN STORAGE –52m²
  (UNENCLOSED BUILDING FOOTPRINT)
- OPS STORAGE –65m²
  (UNENCLOSED BUILDING FOOTPRINT)

CAR PARKING:

OPS INTERNAL SECURE: –2 SPACES
OPS PUBLIC: –24+1 PWD SPACE

TOTAL PARKING PROVIDED: –26+1 PWD SPACE

POTENTIAL OVERFLOW CAR PARKING AREAS

C

PLAN – LOT 14

SP338023 (3.548 ha)

0 5 15 25m
SCALE 1:500 AT ORIGINAL SIZE

NOTE:
1. INTERNAL BUILDING EQUIPMENT LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE.

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CHECKED	TKE	15.11.24
DESIGNED	JGO	18.11.24
LEAD ENG	JGO	18.11.24
APPROVED		
SCALE	1:500	OR AS SHOWN
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SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY
TITLE: MINERALS PROCESSING FACILITY
AREA 01 – SITE
PROPOSED SITE PLAN

PROJECT NO	DRAWING NO	REVISION
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PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: AP2024/012

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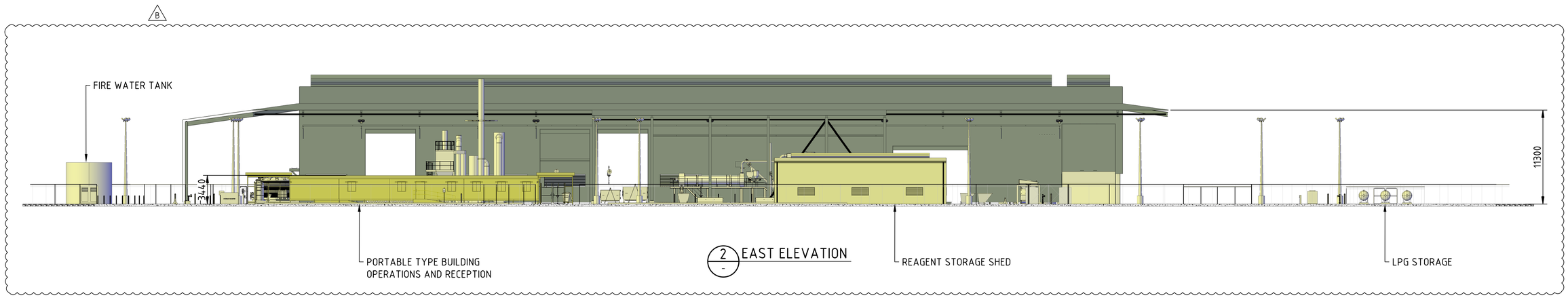

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2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

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CLIENT: QUEENSLAND TREASURY

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APPROVED		

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SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
EAST AND WEST ELEVATIONS

PROJECT NO: B071-P01
DRAWING NO: B071-D1-01-0002_02
REVISION: B

PLANS AND DOCUMENTS
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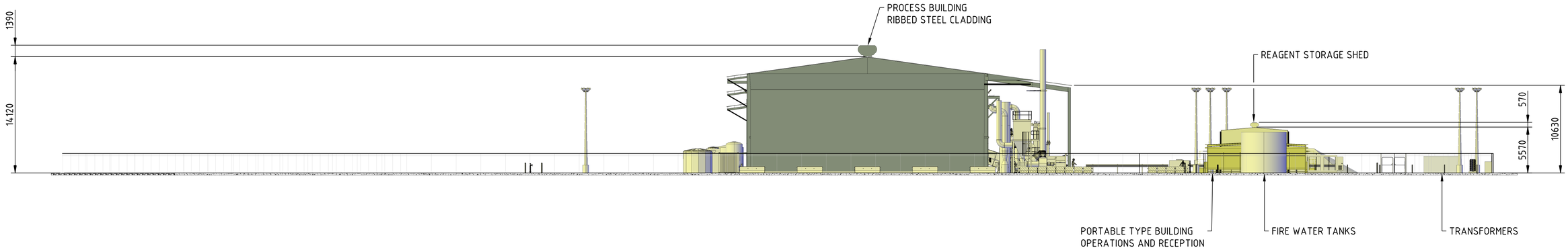
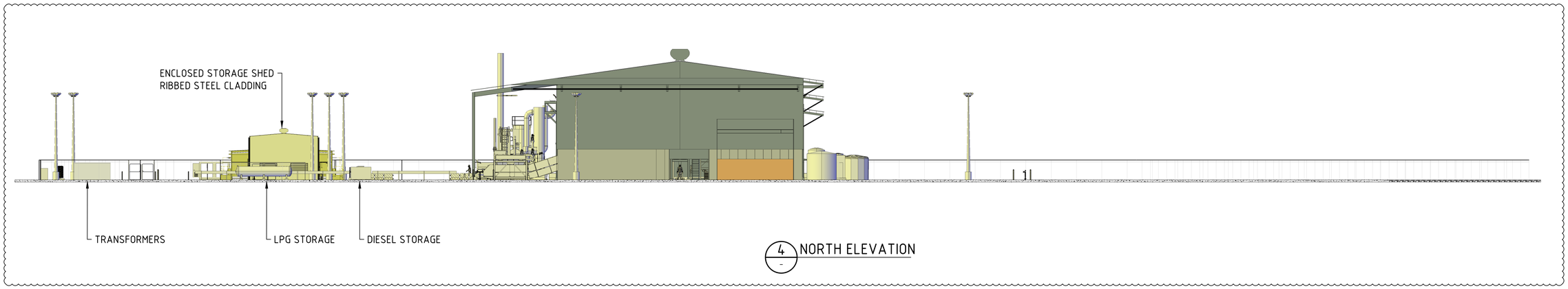
Queensland Government

SDA approval: AP2024/012



3 SOUTH ELEVATION



4 NORTH ELEVATION

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2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

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CLIENT: QUEENSLAND TREASURY

CLIENT DRAWING NO

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APPROVED		

SCALE: 1:250 OR AS SHOWN — DO NOT SCALE — A1

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DA ISSUE
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
NORTH AND SOUTH ELEVATIONS

PROJECT NO: B071-P01

DRAWING NO: B071-D1-01-0002_03

REVISION: B

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: AP2024/012

5 SOUTH EAST ISOMETRIC

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CLIENT: QUEENSLAND TREASURY

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DESIGNED	PJO	06.09.24
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SCALE: NTS OR AS SHOWN | DO NOT SCALE | A1

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DA ISSUE
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE:
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
SOUTH EAST ISOMETRIC

PROJECT NO	DRAWING NO	REVISION
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PLANS AND DOCUMENTS
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SDA APPROVAL

Queensland Government

SDA approval: AP2024/012

6 NORTH WEST ISOMETRIC

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CLIENT QUEENSLAND TREASURY

CLIENT DRAWING NO

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DESIGNED	---	06.09.24
LEAD ENG	---	06.09.24
APPROVED		

SCALE NTS OR AS SHOWN

DO NOT SCALE A1

SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT QLD RESOURCES COMMON USER FACILITY

TITLE
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
NORTH WEST ISOMETRIC

PROJECT NO	DRAWING NO	REVISION
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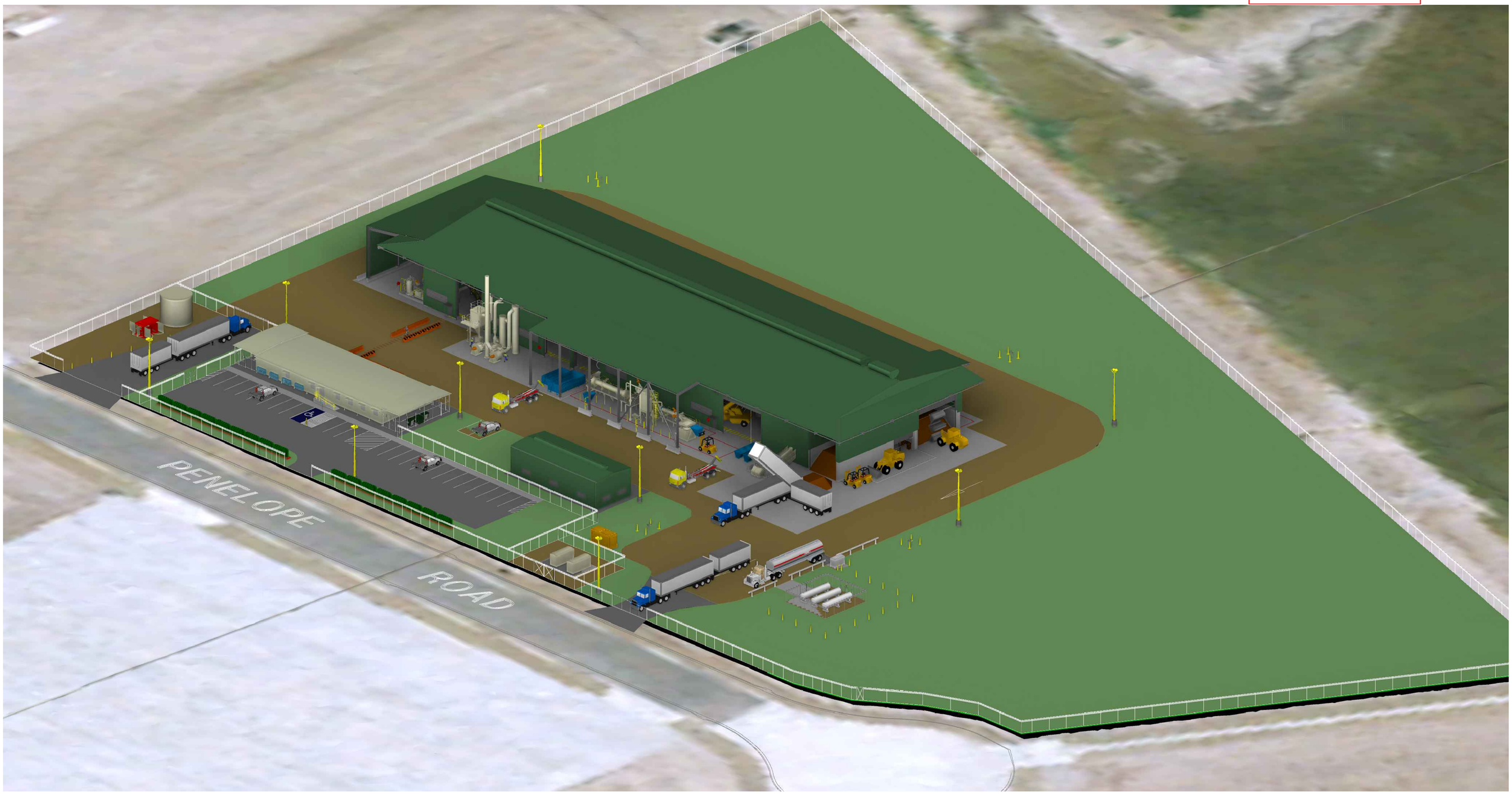
PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2024/012



7 – NORTH EAST ISOMETRIC

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2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

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PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
NORTH EAST ISOMETRIC

PROJECT NO: B071-P01

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REVISION: B

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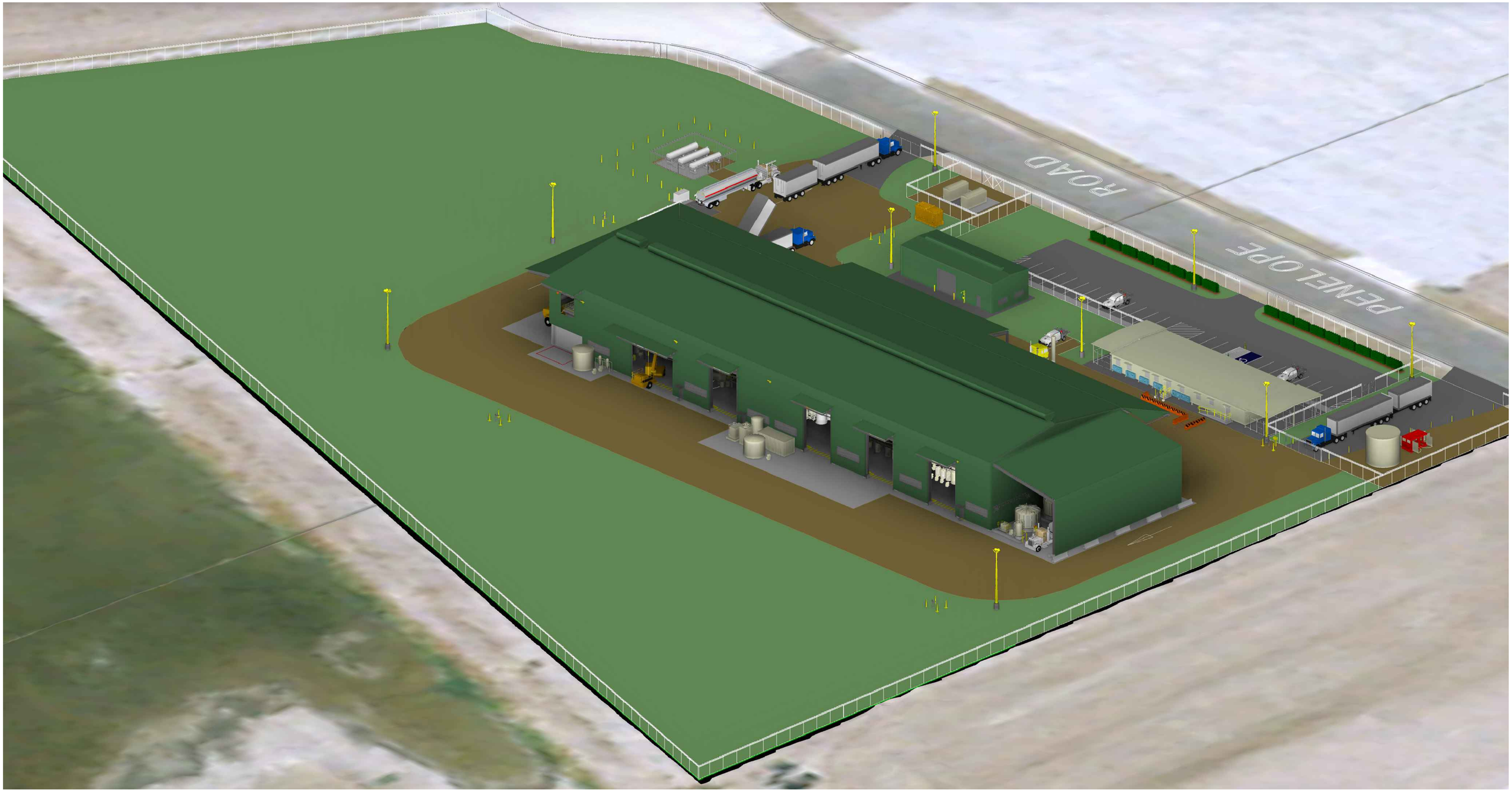
PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: AP2024/012



7 SOUTH WEST ISOMETRIC
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DESIGNED	PJO	06.09.24
LEAD ENG	PJO	06.09.24
APPROVED		

SCALE: NTS OR AS SHOWN | DO NOT SCALE | A1

SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE:
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
SOUTH WEST ISOMETRIC

PROJECT NO	DRAWING NO	REVISION
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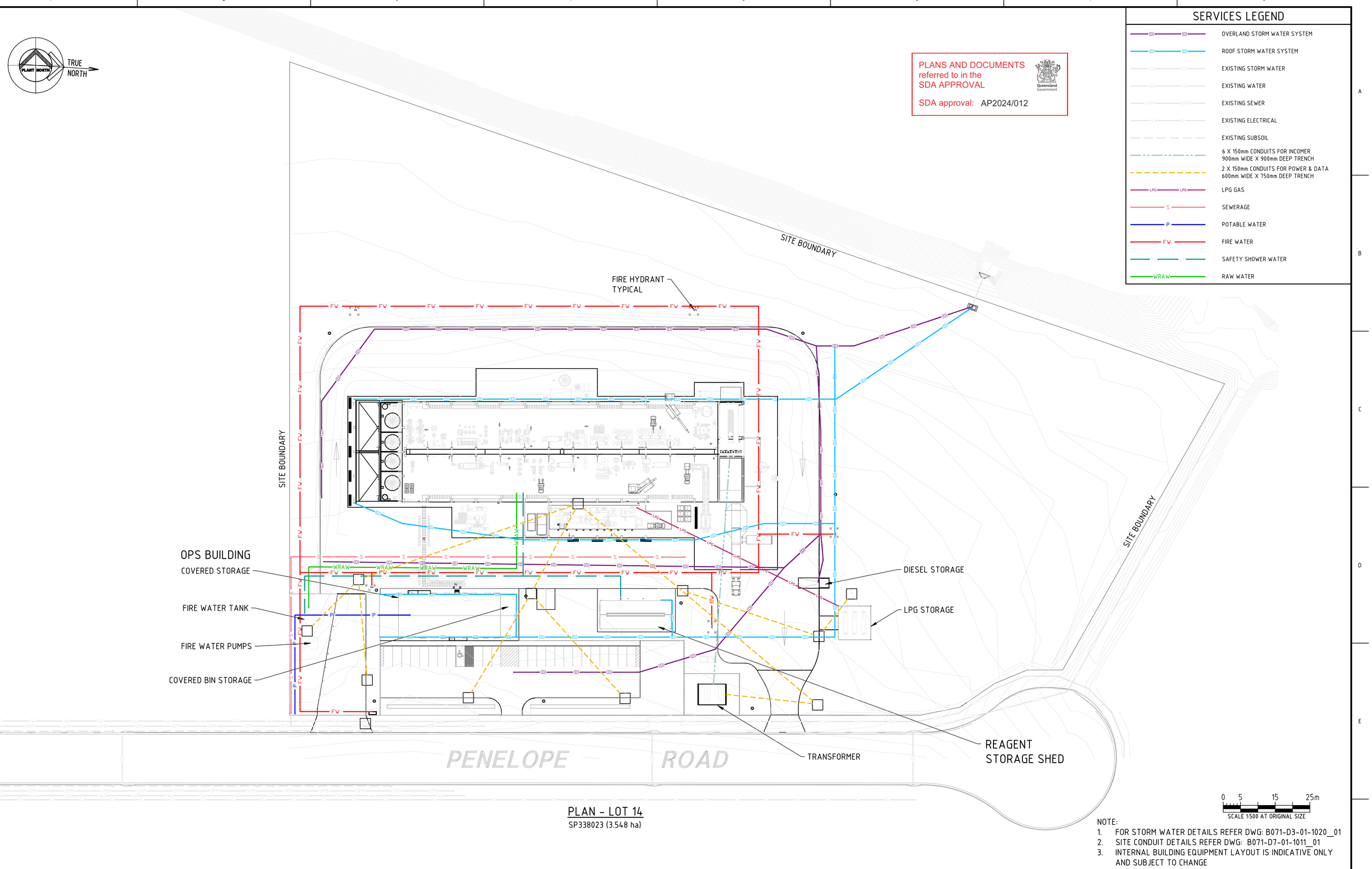

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2024/012

SERVICES LEGEND

(D)	OVERLAND STORM WATER SYSTEM
(D)	ROOF STORM WATER SYSTEM
(D)	EXISTING STORM WATER
W	EXISTING WATER
SPM	EXISTING SEWER
E	EXISTING ELECTRICAL
	EXISTING SUBSOIL
	6 X 150mm CONDUITS FOR INCOMER 900mm WIDE X 900mm DEEP TRENCH
	2 X 150mm CONDUITS FOR POWER & DATA 600mm WIDE X 750mm DEEP TRENCH
LPG	LPG GAS
S	SEWERAGE
P	POTABLE WATER
FW	FIRE WATER
	SAFETY SHOWER WATER
WRAW	RAW WATER

PLAN - LOT 14

SP338023 (3.548 ha)

0 5 15 25m

SCALE 1:500 AT ORIGINAL SIZE

NOTE:
1. FOR STORM WATER DETAILS REFER DWG: B071-D3-01-1020__01
2. SITE CONDUIT DETAILS REFER DWG: B071-D7-01-1011__01
3. INTERNAL BUILDING EQUIPMENT LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE

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REFERENCE DRAWINGS | DRAWING REVISIONS

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CLIENT DRAWING NO

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DESIGNED	PJO	06.09.24
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SEDGMAN

PRELIMINARY NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY AREA 01 - SITE UNDERGROUND PIPES AND SERVICES PLAN

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0005__01	B

NORTHERN CONSULTING engineers

CIVIL & STRUCTURAL ENGINEERS

ENGINEERING REPORT

QUEENSLAND RESOURCES COMMON USER FACILITY (QRCUF) AT 109 PENELOPE ROAD, STUART

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2024/012

FOR
RPS AAP Consulting Pty Ltd

JOB No: **MJ2506-A**

DOC REF: **MJ2506-A-ENG**

Phone: 07 4725 5550
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Email: mail@nceng.com.au
50 Punari Street Currajong Qld 4812
Milton Messer & Associates Pty Ltd
ACN 100 817 356 ABN 34 100 817 356

DOCUMENT CONTROL

Rev	Author	Reviewed	Approved		Date	Issued To:	Purpose
A	Irem Guney	John Single	John Single (RPEQ 24378)		01/02/2024	RPS AAP Consulting Pty Ltd	Draft for review & comment
B	Irem Guney	John Single	John Single (RPEQ 24378)		15/05/2024	RPS AAP Consulting Pty Ltd	Development Application (DA)
C	Irem Guney	John Single	John Single (RPEQ 24378)		28/08/2024	RPS AAP Consulting Pty Ltd	Final – Changes associated with layout amendments
D	Irem Guney	John Single	John Single (RPEQ 24378)		18/12/2024	RPS AAP Consulting Pty Ltd	Quality Options and Parking Rates Update

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APPENDIX A

B071-D1-01-0001_01 Rev J, prepared by SEDGMAN

APPENDIX B

Turning Path Assessment prepared by NCE

APPENDIX C

Stormwater Management Conceptual Sketch (Prelim Design) by NCE

APPENDIX D

ATLAN Vault, Filter and Spillceptor Technical Data

1.0 INTRODUCTION

1.1 Background

Northern Consulting Engineers (NCE), have been commissioned by RPS AAP Consulting Pty Ltd to prepare an engineering report for a Queensland Resources Common User Facility (QRCUF) at Cleveland Bay Industrial Estate at 109 Penelope Road, Stuart. The proposed works are on land described as Lot 14 on SP338024.

The following report has been produced to support a development application for Material Change of Use (MCU). The purpose of this report is to demonstrate how the proposed development can be achieved by addressing:

- Stormwater management, both quantity and quality;
- Water and Sewer services planning assessment;
- Low Impact Traffic Impact Assessment;
- Flooding.

The information provided in this report is based on the following layout plan and documents which are provided as appendices to this report;

- Proposed Site Layout Plans, reference B071-D1-01-0001_01 Rev J, prepared by SEDGMAN (**Appendix A**).
- Turning Path Assessment prepared by NCE (**Appendix B**).
- Stormwater Management Conceptual Sketch (Prelim Design) by NCE (**Appendix C**)
- ATLAN Vault, Filter and Spillceptor Technical Data (**Appendix D**)

1.2 Existing Development

The site is located at Cleveland Bay Industrial Estate between Bruce Highway and Ron Mclean Drive. Cleveland Bay Industrial Estate is a newly developed industrial subdivision and therefore the site is an unvegetated vacant block. **Figure 1-1** shows the location of the site in context to the surrounding properties, water courses, road reserves and easements, courtesy of Queensland Globe's online mapping tool.

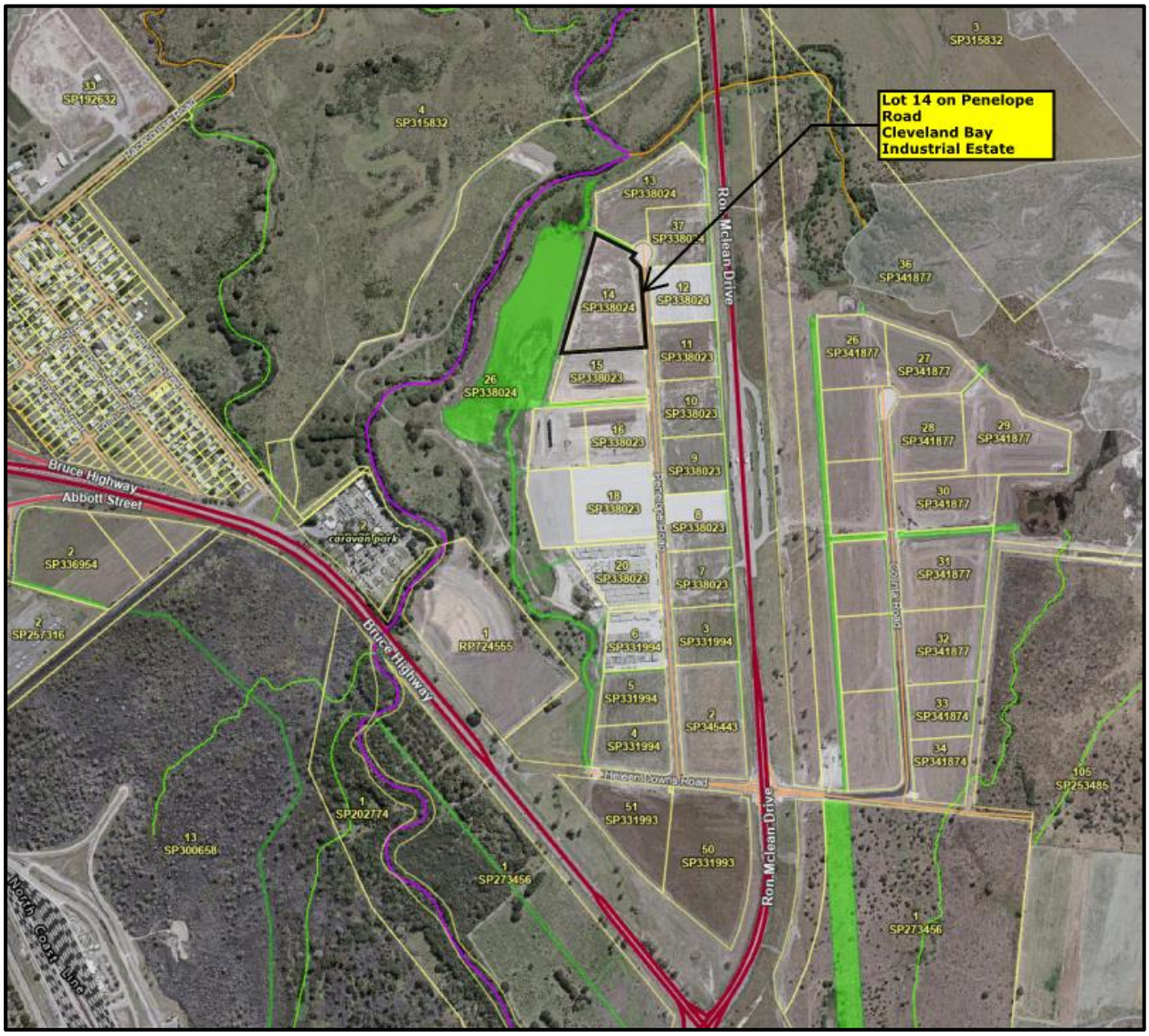


Figure 1-1 Location of the development in context to the surrounding properties

1.3 Proposed Development

The proposed development is a research and technology industry for QRCUF which involves the following;

- Operations Office/Process Buildings
- Reagent Storage Shed
- Fuel areas (bunded)
- Hardstand area
- Internal roads/car park
- Landscaping

The proposed development is illustrated in **Figure 1-2** with the original drawing provided in **Appendix A.**

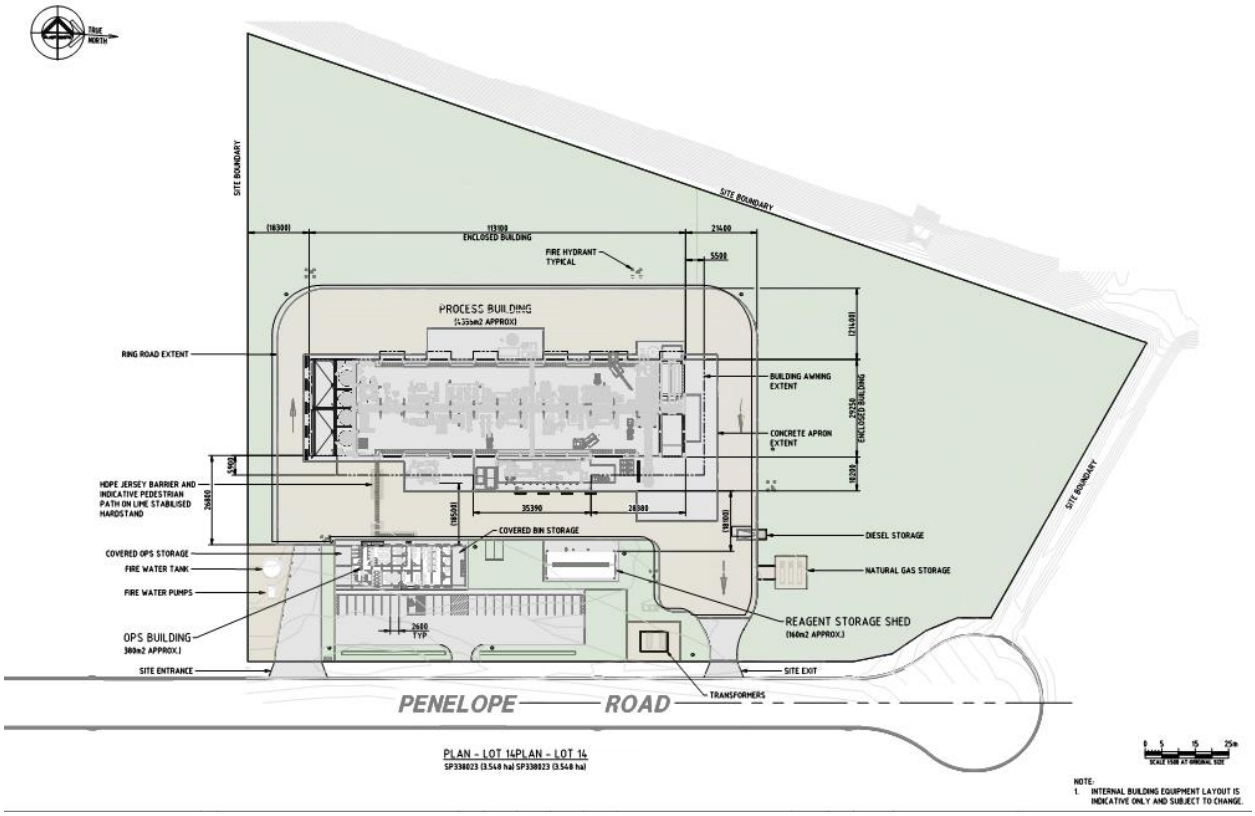


Figure 1-2 Proposed Development

2.0 STORMWATER MANAGEMENT

In accordance with the Queensland Urban Drainage Manual (QUDM) test in determining the lawful point of discharge (LPOD), the LPOD for the development has been defined as:

- The open drain at the rear (western) of site (Easement P in Lot 26 on SP338024)
- The open drain along the northern boundary (Easement R in Lot 26 on SP338024)

Currently, the site is free draining in a western direction towards the easement along the western boundary and discharging into the existing basin at the rear property (west). There is a 600mm dia (600Ø) reinforced concrete pipe (RCP) located on the western boundary to facilitate discharge to the easement for any future underground network.

The proposed development is expected to maintain the existing stormwater management strategy by draining towards the rear drainage easement being the existing basin. Run-off from the pavement areas will overland sheet flow and be captured via a pit and pipe system in which the first flush volume will be treated at an end of line device prior to discharging via the drainage easement. Roof water will be piped underground directly to the treatment system. Flows greater than the first flush volume within the underground system will by-pass the treatment system whilst the first flush flows will be treated via underground stormwater cartridge filter system that will adequately treat run-off prior to water reaching to LPOD's. Further details on water quality treatment are discussed in **Section 2.2**, while **Figure 2-1** illustrate the conceptual stormwater management describe above.

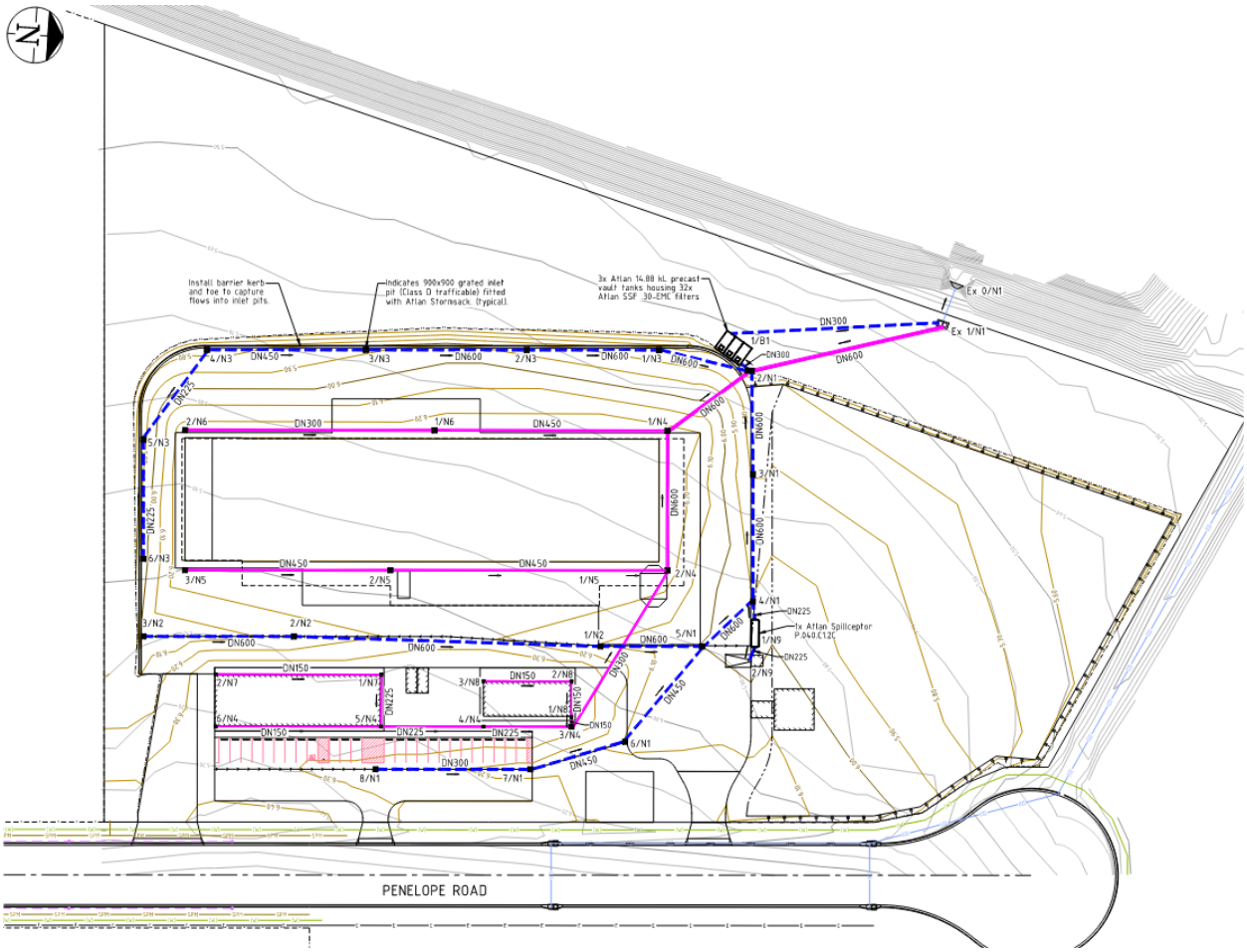


Figure 2-1 Stormwater management concept – cartridge system (refer **Appendix C** for original)

2.1 Quantity

The fraction impervious modelling for the site as part of the Cleveland Bay Industrial Precinct subdivision flood modelling was 90%. The increase in peak runoff due to the increased impervious area was addressed in the XP-RAFTS model developed by Venant Solutions during the subdivision design and thus any stormwater quantity issues have already been addressed as the development site will not exceed the 90% fraction impervious. Therefore, no additional quantity mitigation assessment has been completed as part of this report.

2.2 Quality

All stormwater treatment trains have been modelled with the aid of MUSIC 6.4.0. The catchments have been modelled in accordance with the following:

- "MUSIC Modelling Guidelines November 2018 – Consultation Draft", Water by Design (2018);
- Townsville Aero, 6 Minute Time Step From 3/03/1953 To 31/03/2010;
- Water by Design MUSIC Modelling Guidelines Source Nodes (Split) utilising modified percent impervious area & pollutant concentration;
- No drainage routing between nodes;
- Water by Design MUSIC Modelling Guidelines Recommended MUSIC Rainfall-Run-off Parameters SEQ for industrial land use.

2.2.1 Stormwater Quality Objectives

The design intent for the system is to meet the current TCC Planning Scheme water quality targets, namely:

- 80% Total Suspended Solids (TSS) Reduction
- 65% Total Phosphorus (TP) Reduction
- 40% Total Nitrogen (TN) Reduction
- 90% Gross Pollutants (GP) Reduction

In the event that the above targets are not achievable, the design intent is to ensure that the post development water quality discharging the site is equal to or better than the pre-development quality. Treatment targets shall be reached before water leaves the lot.

2.2.2 MUSIC Modelling

Pollutant loads for the development have been modelled primarily using "split" land use and references the MUSIC Modelling Guidelines November 2018 for the pollutant parameters for industrial surface types. The pollutant generation parameters adopted are shown in **Figure 2-2** with **Figure 2-3** depicting the rainfall-run-off parameters.

Below is the modelling concept adopted:

- The modelling has been assessed for post development.
- The developed assessment has been considered as only one (1) catchment area. The zone has been assessed as Industrial and based only on the area that shall be developed using a "split" catchment method.
- The MUSIC nodes include runoff from roof area, road/carparking area, ground area, hardstands, and the landscaping. **Table 2-1** depicts the source nodes and their imperviousness adopted in the assessment.

Table 2-1 MUSIC Source Nodes

Node Name	Zoning/Surface Type	Surface Area (ha)	Impervious (%)
Sheds/Office/Storage (roof)	Industrial	0.490	100
Roads (breakdown below)	Industrial	2.001	58
Landscaping	Industrial	1.057	0

- Generally, water will be treated via the combination of proprietary products, i.e., Atlan Stormsacks, Vault and Filter treatment train before leaving the lot and prior to entering the open drain to the west. The proposed cartridge filters can be fitted into a single module vault as shown on drawings provided in **Appendix D**. Proposed underground cartridge filter system parameters as input into MUSIC are given in **Table 2-2**. The modelling was carried out by Atlan which were based on:
    - Roof area = 4,895m²
    - Road Area = 20,015m² at 58% impervious as follows:
        - 60% impervious road (stab-gravel) area = 7,515m²
        - 100% impervious driveway/carparks area = 1,700m²
        - 50% impervious gravel hardstand = 10,800m²
    - 100% perv ground area = 10,570m²

- The fuel areas are to be bunded and treated separately via an oil separating system i.e., Atlan Spillceptor or similar, such that run-off (run-off with hydrocarbons) can be captured treated separately prior to discharging clean run-off into the stormwater network and trade waste.

- The MUSIC model setups described above and the proposed indicative treatment train layout is depicted in **Figure 2-4**.

TABLE 3.9 POLLUTANT EXPORT PARAMETERS FOR SPLIT CATCHMENT LAND USE (LOG^{10} VALUES)

FLOW TYPE	SURFACE TYPE	TSS LOG^{10} VALUES		TP LOG^{10} VALUES		TN LOG^{10} VALUES	
		MEAN	ST. DEV	MEAN	ST. DEV	MEAN	ST. DEV
URBAN RESIDENTIAL							
Baseflow parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	1.00	0.34	-0.97	0.31	0.20	0.20
	Ground level	1.00	0.34	-0.97	0.31	0.20	0.20
Stormflow parameters	Roof	1.30	0.39	-0.89	0.31	0.26	0.23
	Roads	2.43	0.39	-0.30	0.31	0.26	0.23
	Ground level	2.18	0.39	-0.47	0.31	0.26	0.23
INDUSTRIAL							
Baseflow parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	0.78	0.45	-1.11	0.48	0.14	0.20
	Ground level	0.78	0.45	-1.11	0.48	0.14	0.20
Stormflow parameters	Roof	1.30	0.44	-0.89	0.36	0.25	0.32
	Roads	2.43	0.44	-0.30	0.36	0.25	0.32
	Ground level	1.92	0.44	-0.59	0.36	0.25	0.32
COMMERCIAL							
Baseflow parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	0.78	0.39	-0.60	0.50	0.32	0.30
	Ground level	0.78	0.39	-0.60	0.50	0.32	0.30
Stormflow parameters	Roof	1.30	0.38	-0.89	0.34	0.37	0.34
	Roads	2.43	0.38	-0.30	0.34	0.37	0.34
	Ground level	2.16	0.38	-0.39	0.34	0.37	0.34

Figure 2-2 MUSIC "split" pollutant export parameters extracted from MUSIC Modelling Guidelines November 2018

TABLE A1.2 RECOMMENDED MUSIC RAINFALL-RUNOFF PARAMETERS SEQ

PARAMETER	LAND USE			
	URBAN RESIDENTIAL	COMMERCIAL AND INDUSTRIAL	RURAL RESIDENTIAL	FORESTED
RAINFALL THRESHOLD (MM)	1	1	1	1
SOIL STORAGE CAPACITY (MM)	500*	18	98	120
INITIAL STORAGE (% CAPACITY)	10	10	10	10
FIELD CAPACITY (MM)	200	80	80	80
INFILTRATION CAPACITY COEFFICIENT A	211	243	84	200
INFILTRATION CAPACITY COEFFICIENT B	5.0	0.6	3.3	1.0
INITIAL DEPTH (MM)	50	50	50	50
DAILY RECHARGE RATE (%)	28	0	100	25
DAILY BASEFLOW RATE (%)	27	31	22	3
DAILY DEEP SEEPAGE RATE (%)	0	0	0	0

Figure 2-3 MUSIC recommended rainfall run-off parameters for SEQ

2.2.2.1 Results

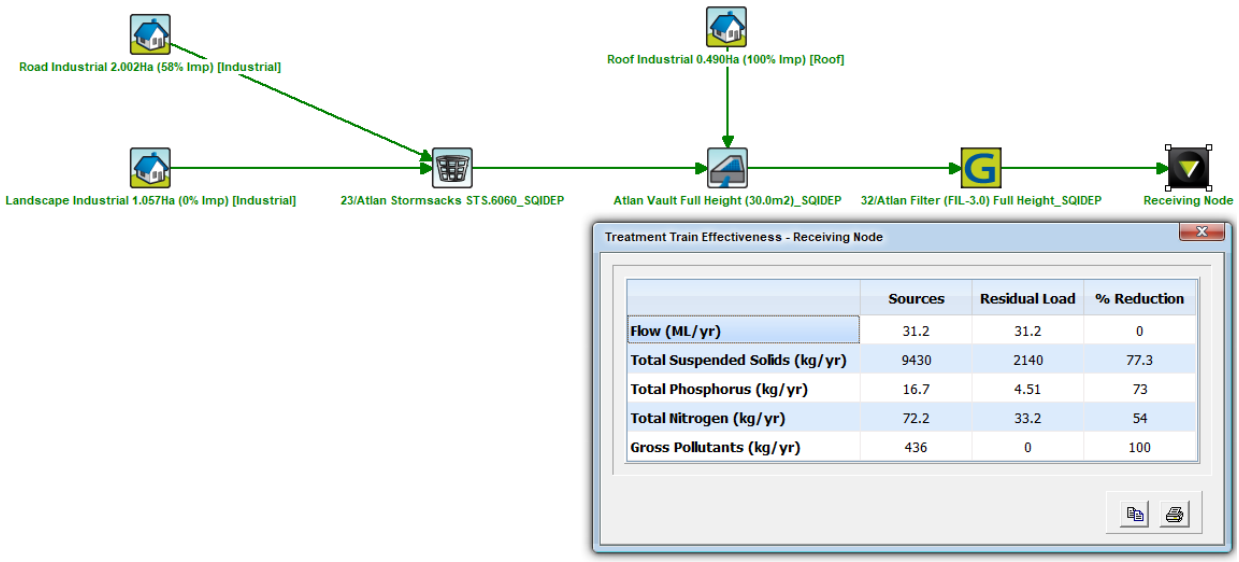


Figure 2-4 MUSIC treatment train layout

Table 2-2 MUSIC treatment input parameters

Treatment Item	Properties
Atlan Design Proposal	23x Atlan Stormsacks 32x Atlan Filters housed within 3x Atlan Vaults (Single module vault drawing attached) 1x Atlan Spillceptor P.040.C1.2C (drawing attached)

Refer to **Appendix D** for Atlan filter, vault and spillceptor drawings.

Table 2-3 summarises the results of the assessment. The data clearly indicate that the water quality leaving the site post-development generally complies with the quality objectives set by TCC, other than being 2.7%

shy of the TSS target. That said, this is a minor reduction to the overall target with the intent of water quality being achieved as each other parameter exceed the reduction targets. Overall, the proposed development can comply with TCC's healthy water policy, ensuring that water quality remains within acceptable limits across all evaluated scenarios.

Table 2-3 MUSIC treatment train effectiveness

Description	Sources	Residual Load	% Reduction	TCC Treatment %
Flow (ML/yr)	31.2	31.2	0	
Total Suspended Solids (kg/yr)	9190	1840	77.3	80
Total Phosphorus (kg/yr)	16.9	4.21	73	65
Total Nitrogen (kg/yr)	72.4	31.9	54	40
Gross Pollutants (kg/yr)	436	0	100	90

3.0 WATER AND SEWER SERVICES

3.1 Water Network

Considering the location of this development parcel within a newly established industrial zone, it is expected that a comprehensive evaluation of the water network capacity has been conducted to ascertain its sufficiency for accommodating the envisioned development.

In accordance with the Cleveland Bay Industrial Estate Subdivision plans for Lot 14, shown in below **Figure 3-1**, the site is currently serviced via Ø200 UPVC Class 16 water main along the frontage, Penelope Road. It is proposed that connection to Council's system will be via a new water meter tapping into the Ø200 main located at the front of site.

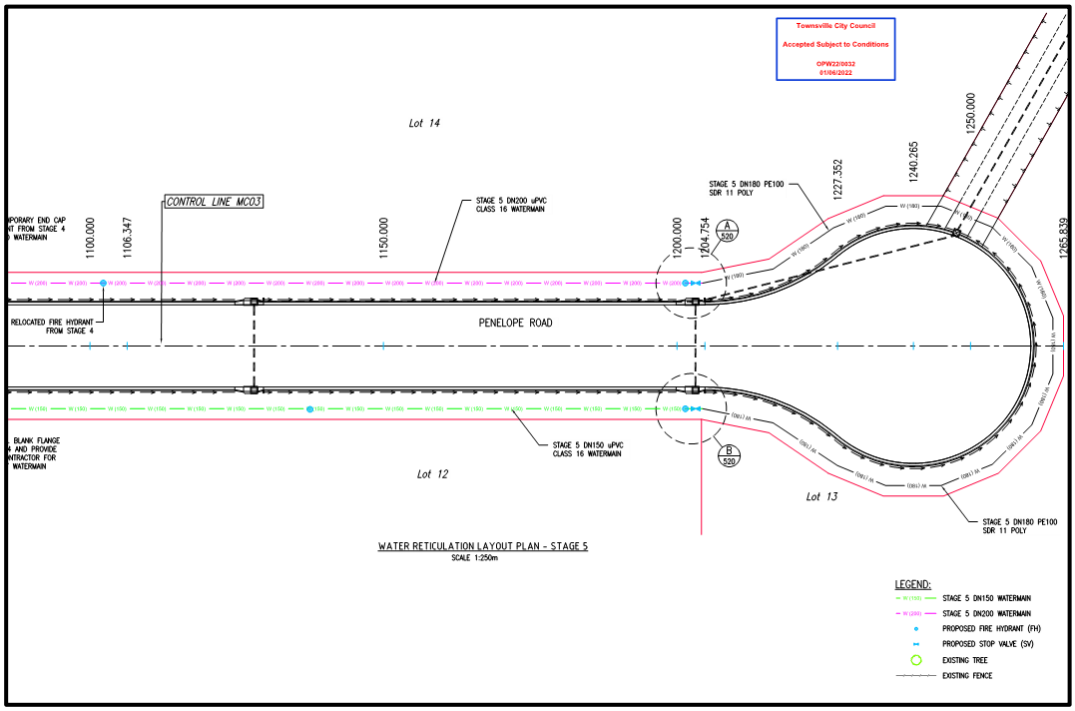


Figure 3-1 Cleveland Bay Industrial Estate Stage 5 - Water Reticulation Plans by Langtree Consulting (Extract)

3.2 Sewer Network

Similar to the adequate capacity of the water network servicing the proposed development lot, it is anticipated that a comprehensive evaluation of the sewer network capacity has been undertaken to ensure its adequacy for accommodating the proposed development.

It is understood that the sewer strategy for the estate is each lot will be serviced by its own private pump station that will discharge to a connection point and sewer pressure main located in the road reserve which will convey waste water to a Council owned centralised pump station. In accordance with the Cleveland Bay Industrial Estate Subdivision plans for Stage 4, there is OD63 PE100 P16 SDR11 pressure main along the frontage of adjacent Lot 15 on SP338023 which terminates 1.5m north of the Lot 14/15 common boundary as shown in below **Figure 3-2**. This will be the connection/discharge point for the developments private pump station.

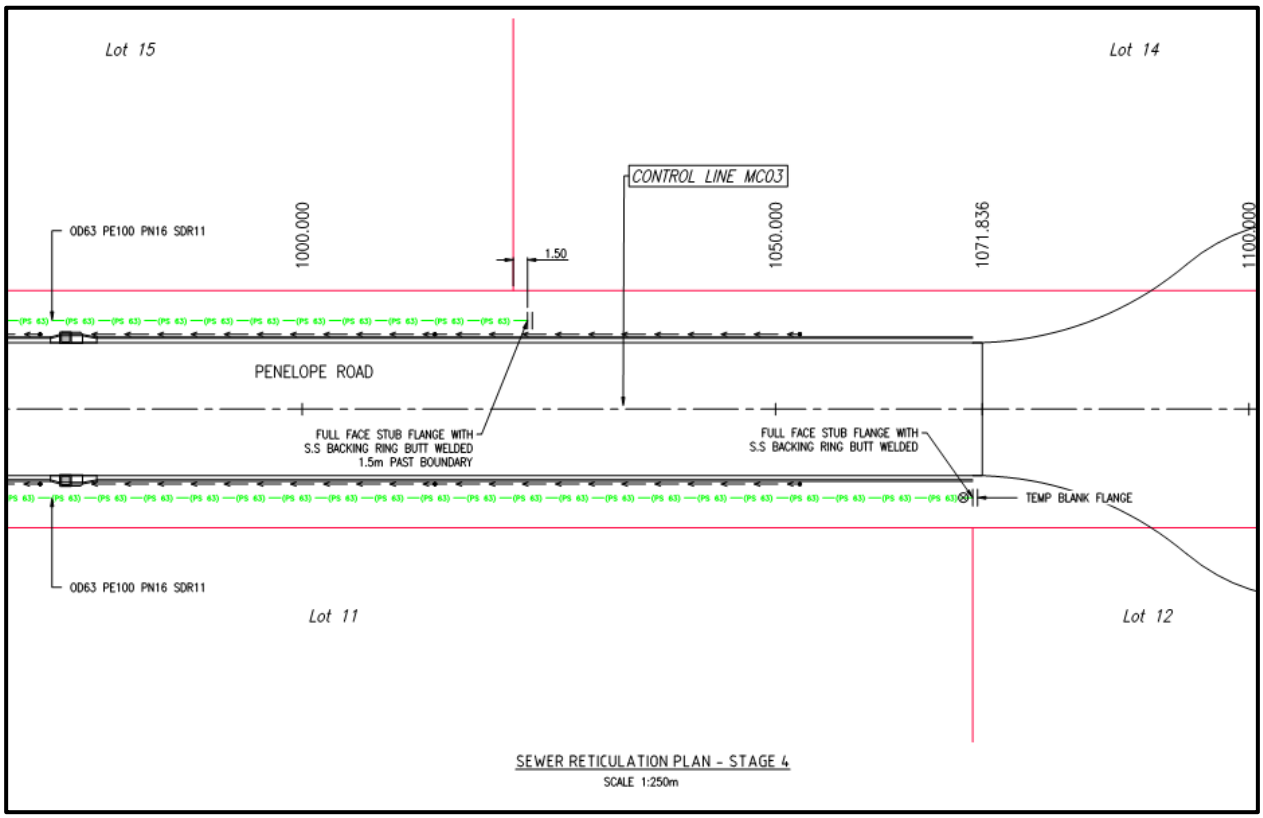


Figure 3-2 Cleveland Bay Industrial Estate Stage 4 - Sewer Reticulation Plans by Langtree Consulting (Extract)

4.0 TRAFFIC ASSESSMENT

4.1 Development Parking Facilities

The parking arrangement delineated in **Appendix A** by Sedgman was evaluated for adherence to both AS2890.1 and the TCC Planning Scheme.

TCC planning scheme, Schedule 6.10 prescribes a parking rate of one (1) space per 80m^2 GFA (gross floor area). As the proposed use involves a total GFA of 4,895m², this would prescribe 62 car parking spaces. The proposal provides 24 car parking spaces plus 1 PWD space; accessed directly from Penelope Road; while a further two (2) spaces provided within the processing building compound; giving a total of 26 spaces plus 1

PWD space. While this is less than prescribed within Schedule 6.10; as a specialist facility, those travelling to the QRCUF will either be staff or others having a specific reason to be there, for example, representatives of the proponents for campaigns. Access by members of the general public will not occur, meaning that vehicle demand for parking will be known and can be regulated during site operation.

The GFA of the QRCUF reflects the dimensions of the main processing building which is designed to house large and highly specialised equipment, machinery and associated controls. Operation of this machinery is largely automated, with staff being on site to monitor the equipment and assist in moving material in and out of the facility through the various stages of processing. In practical application, operation assumes an average of 25 persons will be on the site during testing campaigns, allowing for overlapping shifts. As such, the 26 car parking spaces (plus 1 PWD space) proposed are sufficient for the operations of the site and supporting administrative activities, including provision for visitor parking. Notwithstanding this, the site provides sufficient area for overflow parking adjacent to the car parking area and south of the processing building should greater car parking be required for a particular proponent. The proposed car parking rate will thus be sufficient to cater to the demand generated by the development and avoid overflow of car parking on Penelope Road.

In general, the proposed parking bay arrangement ensures adequate width (2.6m) and length (6.0m) in compliance with AS2890.1 Clause 2.4.1 (b) (ii).

4.2 Traffic Management

Figure 4-1 indicates anticipated traffic movement over the site. NCE have conducted a swept path analysis for the internal roads and access to the site utilising a 25.0m B-double. Furthermore, car park vehicle movements have been assessed to demonstrate vehicles can enter and exit the car parks safely. This analysis shows that the access and internal roads can cater for the largest design vehicle. Refer to the **Appendix B** which shows the vehicle swept paths completed by NCE.

An assessment of the current development footprint was completed against the Department of Transport and Main Roads Guideline “Treatment options to improve safety of pedestrians, bicycle riders and other path users at driveways February 2021”.

The “Access Sight Line Layout” provided in **Appendix B** evidences sufficient sight distance is provided to pedestrian/bicycle users of a typical pathway constructed in accordance with TCC Standard drawings. A control gate is proposed to be installed at the exit location of the internal road that will limit vehicle speeds prior to entering the verge/road corridor, therefore; speed humps are not required at this location. No control gate is currently proposed for the car park entry/exit, however as there is no pedestrian facilities proposed or currently in place; the site being located within a cul-de-sac and the provision for on-site parking; the likelihood of pedestrian and cyclist traffic within the verge/road corridor is very low. Subsequently, no speed controls are proposed for the car park entry exit location.

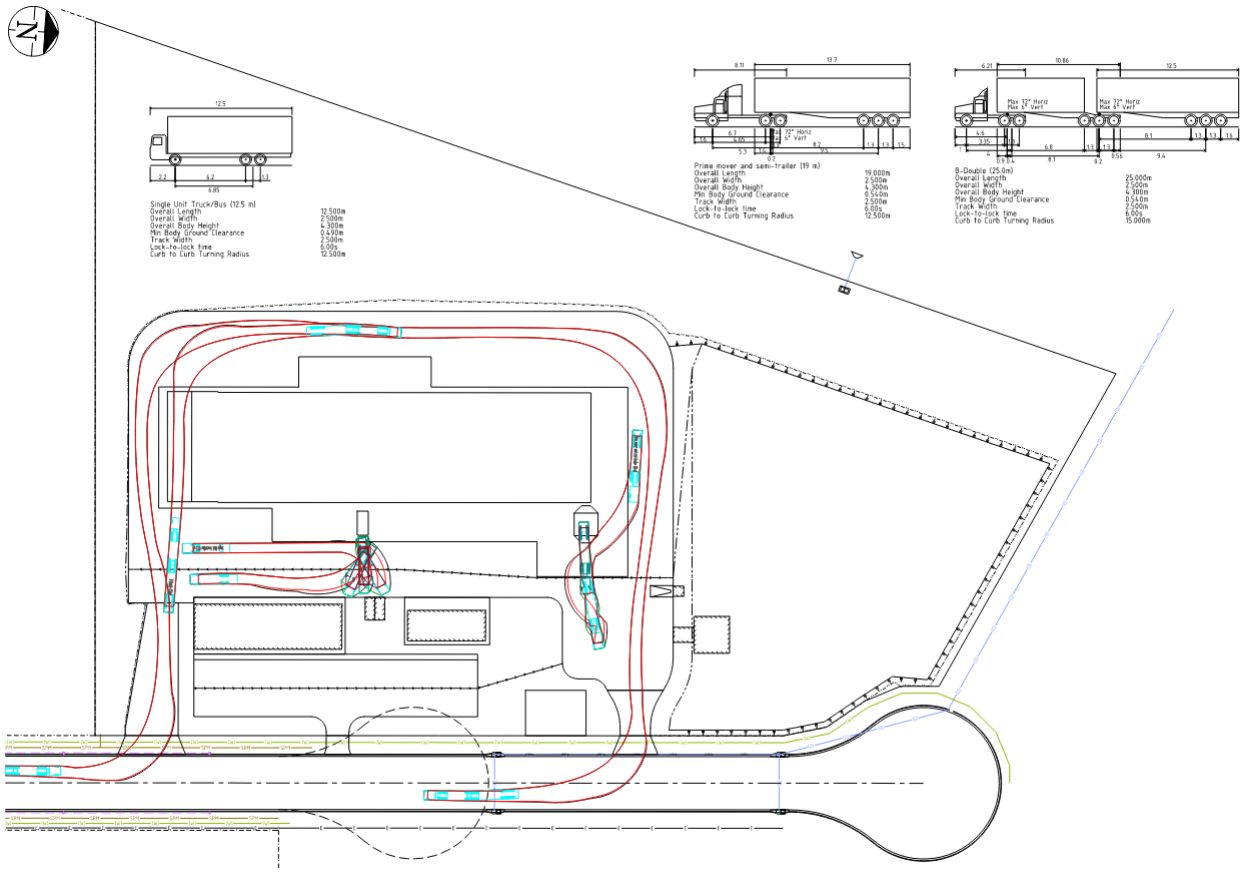


Figure 4-1 Site Traffic Movements

5.0 FLOODING

Flooding has been addressed by the flood report completed by Venant Solutions (Ref. MJ: L.M00260.02.07.docx) which addresses the flood impacts for the Cleveland Bay Industrial Precinct development stages. In accordance with this assessment the 1% AEP (defined flood event) for the site varies along the western boundary from 5.36m AHD at the common boundary of Lot14/15 to 5.30m AHD at the north-western corner. Based on the above, the site is predominately immune from the 1% AEP flood event.

5.1 Finished Floor Levels

There is some uncertainty on the triggers that constitute a structure being used for the manufacture or storage of hazardous materials and as such it's unclear as to whether the proposed warehouse needs to be designed to prevent the intrusion of flood waters up to at least 0.2% AEP flood event, refer Council's flood hazard overlay code, PO9. To gain an appreciation of the potential impact that the difference in design flood events has on the finished floor level (FFL) of the structures, advice relating to the 0.2% AEP and probable maximum flood (PMF) level were sought from Council. Based on the advice received, the following is noted:

- The increase in PMF level from the 1% AEP flood ranges from 0.19m to 0.28m, therefore is recommended to adopt 0.3m for design purposes (note this increase is based on baseline, i.e. no estate development).

- The increase from the 1% AEP flood level to the 0.2% AEP flood level is ~0.15m (note this increase is based on baseline, i.e. no estate development).

From the above, it is recommended to adopt a minimum FFL for buildings of 5.76m AHD, which will provide ~100mm freeboard to the expected PMF level, however subject to the end users desires, this FFL could be reduced to 5.50m AHD which is estimated to equal the 0.2% AEP event. The natural surface levels (NSL) over the warehouse footprint range from 6.0m to 5.60m, therefore the adoption of 5.76m is anticipated to achieve a suitable balance between compliance with flood criteria and NSL's.

6.0 CONCLUSION

NCE have undertaken an engineering investigation associated with the Queensland Resources Common User Facility (QRCUF) development at 109 Penelope Road, Stuart (Lot 14 on SP338024). The findings of this assessment are summarised below:

- The development site does not exceed the fraction impervious previously addressed as part of the Cleveland Bay Industrial Precinct subdivision design and thus no additional mitigation is required for the stormwater quantity.

- The stormwater quality assessment was undertaken via MUSIC and shows that the quality objectives have been met via a treatment train of cartridge system and oil separator.

- The existing water and sewer infrastructure is anticipated to have sufficient capacity to service the proposed development and is located appropriately to service the proposed lots from the frontage.

- The development proposes to provide 27 parking spaces, less that the provision 62 spaces in accordance with Council planning scheme parking rate, however due to the assumption that the facility will have an average of 25 staff (allowing for overlapping shifts); strict compliance with the planning scheme parking rates would significantly exceed the parking demand generated by proposed staffing and is considered excessive and unnecessary. Therefore, the current proposal of 27 spaces is considered to adequate service the development.

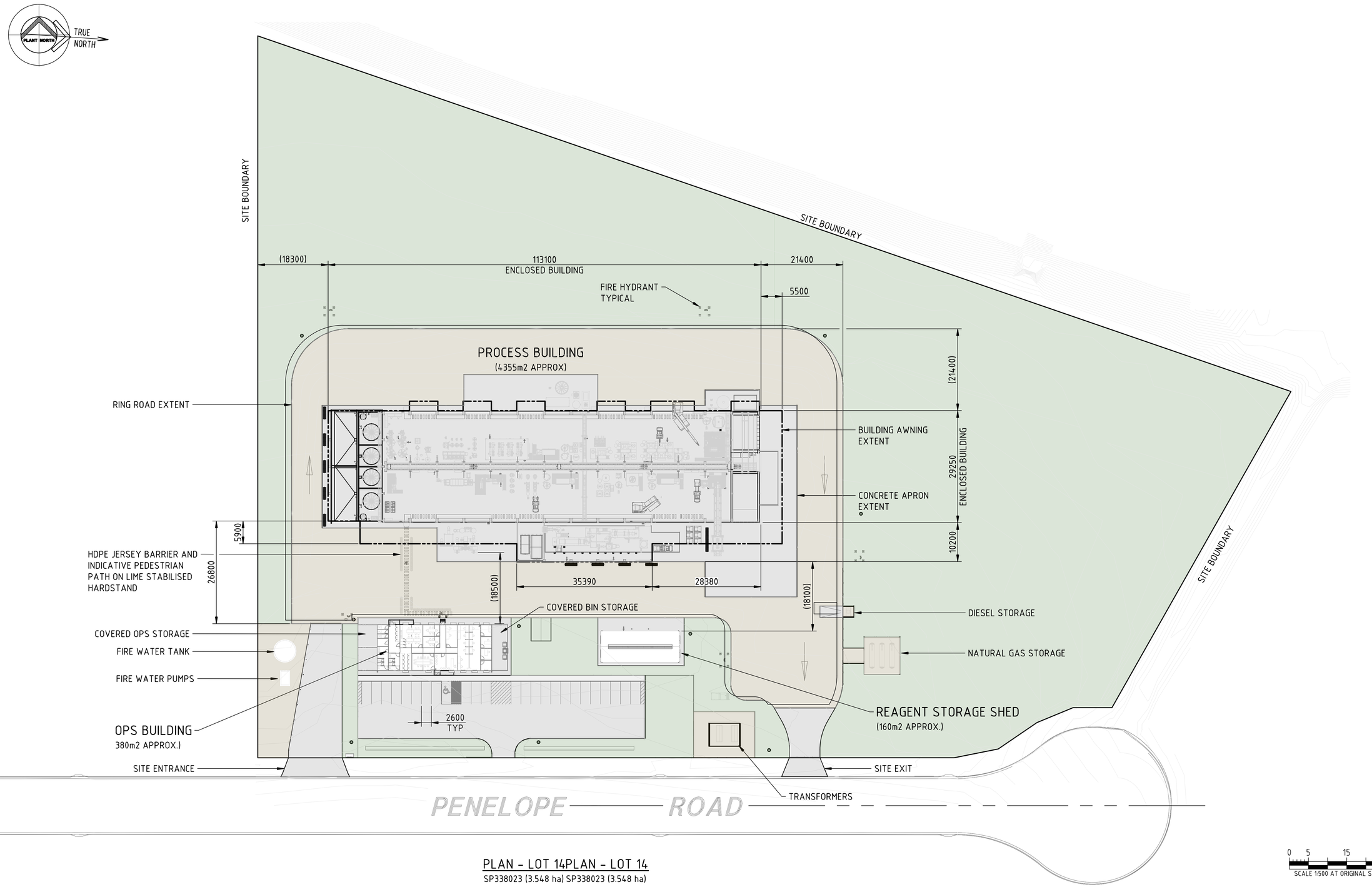
- In general, the proposed parking bay arrangement ensures adequate width and length in compliance with AS2890.1 Clause 2.4.1 (b) (ii).

- NCE have completed swept path modelling of a 25.0m B-double indicates the access and internal roads adequately cater for the largest design vehicle.

- The site is predominately immune from the 1% AEP flood event, however there is some uncertainty surrounding the minimum finished floor level (FFL) of structures. Subsequently a recommendation of a minimum FFL of 5.76m AHD has been provided in order to provide immunity to the probable maximum flood (PMF).

APPENDIX A

B071-D1-01-0001_01 Rev J, prepared by SEDGMAN



PLAN - LOT 14PLAN - LOT 14

SP338023 (3.548 ha) SP338023 (3.548 ha)

NOTE:
1. INTERNAL BUILDING EQUIPMENT LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE.

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		H	TRANSFORMER YARD AND REAGENT SHED RELOCATED	TKE	TKE	PJO	02.08.24	
		G	SITE RECONFIGURED	RWE	RWE	PJO	03.07.24	
		F	PRELIMINARY ISSUE - LAYOUT UPDATED	RWE	RWE	PJO	07.06.24	
		E	PRELIMINARY ISSUE - STORAGE AREAS ADDED AND BUILDING SIZES UPDATED	TKE	TKE	TKE	15.03.24	
		D	PRELIMINARY ISSUE - EQUIPMENT ADDED AND ADMIN BUILDING SIZE UPDATED	TKE	TKE	---	07.02.24	
		J	PRELIMINARY ISSUE	TKE	TKE	TKE		

REFERENCE DRAWINGS

DRAWING REVISIONS

CLIENT: QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	TKE	05.09.24
CHECKED	TKE	05.09.24
DESIGNED	TKE	02.09.24
LEAD ENG	TKE	02.09.24
APPROVED		

SCALE 1:500 OR AS SHOWN

DO NOT SCALE A1

SEDGMAN

PRELIMINARY
NOT FOR CONSTRUCTION

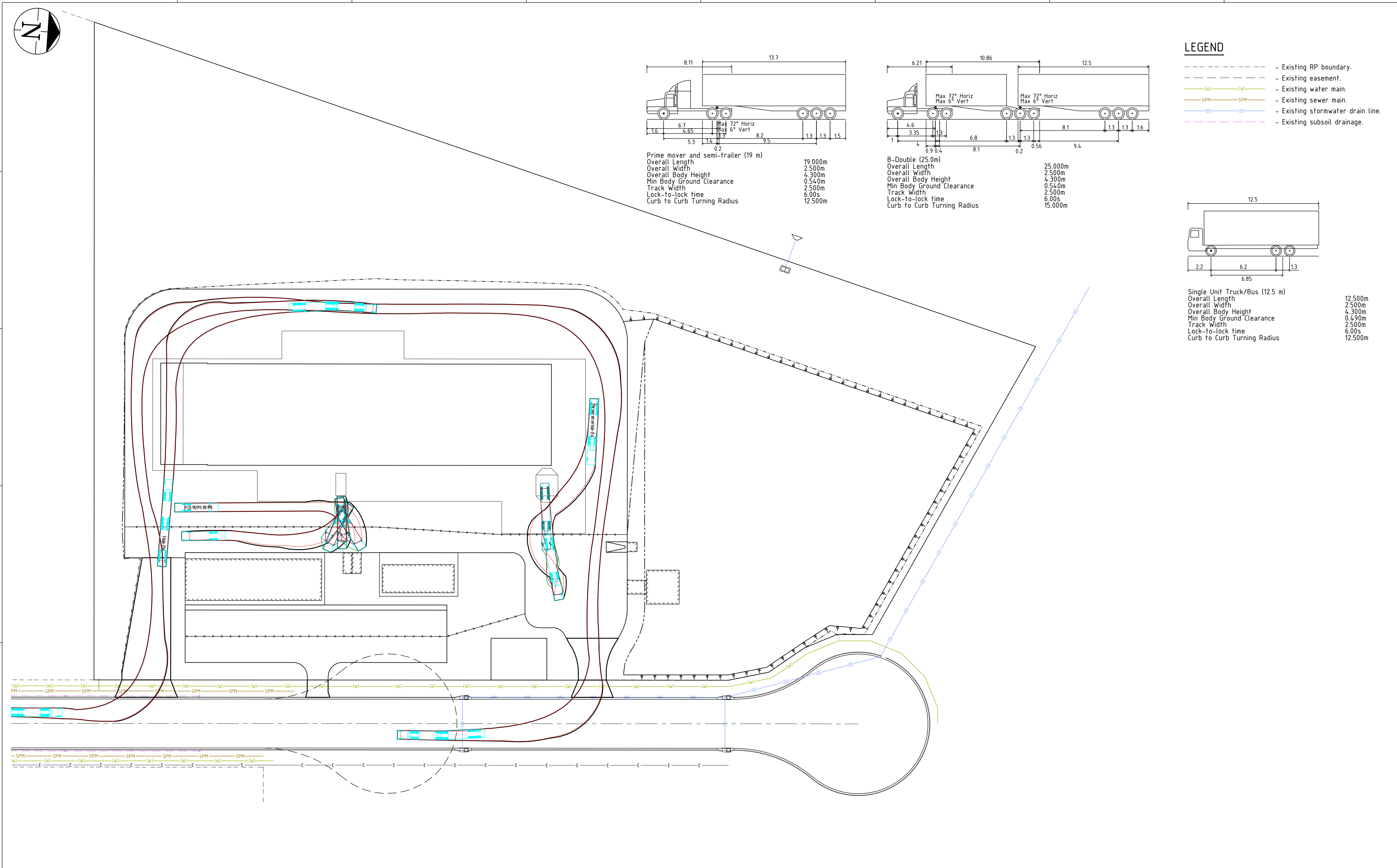
PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
SITE PLAN

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0001__01	J

APPENDIX B

Turning Path Assessment prepared by NCE



DRAWING NO	TITLE
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B071-XR-01-3000_04_A	TOPOGRAPHIC SURVEY SHEET 4 OF 4
B071-XR-01-3000_03_A	TOPOGRAPHIC SURVEY SHEET 3 OF 4
B071-XR-01-3000_02_A	TOPOGRAPHIC SURVEY SHEET 2 OF 4
B071-XR-01-3000_01_A	TOPOGRAPHIC SURVEY SHEET 1 OF 4

REFERENCE DRAWINGS

REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
A	PRELIMINARY ISSUE	KJM	JS	JS	2/08/24	

DRAWING REVISIONS

CLIENT: QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	KJM	2/08/24
CHECKED	JS	2/08/24
DESIGNED		
LEAD ENG	JS	2/08/24
APPROVED		
SCALE	1:500	OR AS SHOWN
	DO NOT SCALE	A1

SEDGMAN

NORTHERN CONSULTING engineers

PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
VEHICLE MOVEMENT
LAYOUT PLAN

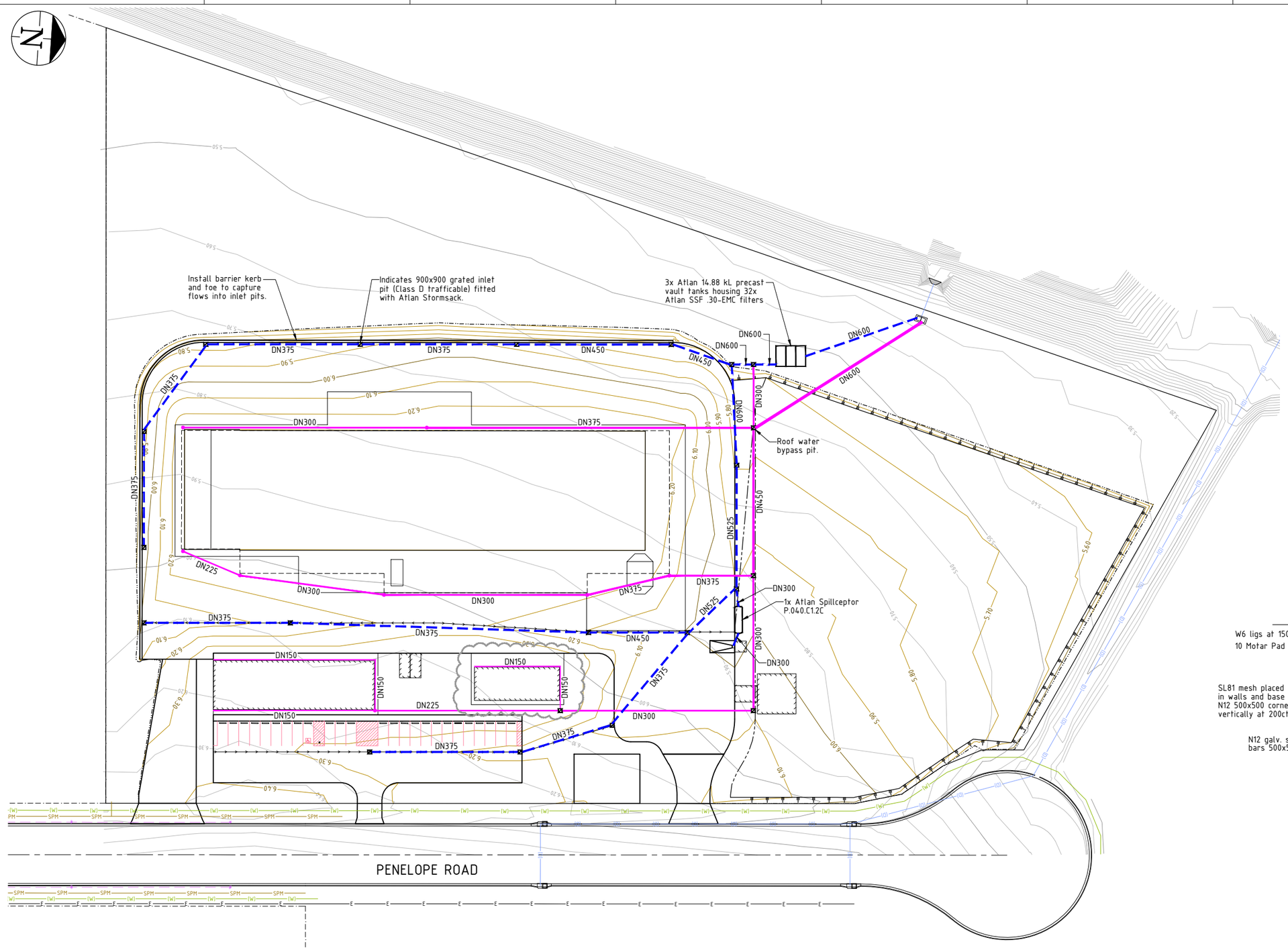
PROJECT NO: B071-P01

DRAWING NO: B071-D3-01-1050__01

REVISION: A

APPENDIX C

Stormwater Management Conceptual Sketch
(Prelim Design) by NCE

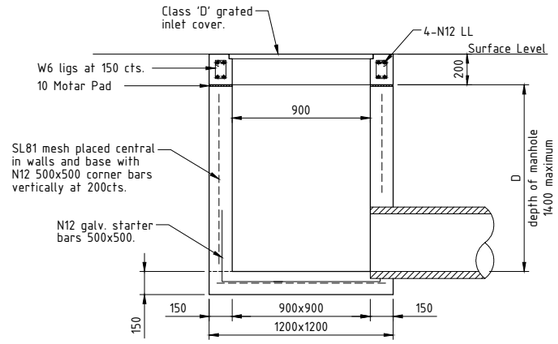


LEGEND

- Overland stormwater system.
- Roof stormwater system.
- RP boundary.
- Existing minor contour.
- Existing major contour.
- Design minor contour.
- Design major contour.
- Change of grade.
- Top of batter.

STORMWATER NOTES:

1. All stormwater drainage to be in accordance with AS/NZS 3500.3 U.N.O.
2. All pipes to be BlackMAX U.N.O. Approved alternative rubber ring jointed PVC.
3. Laying of pipe to be in accordance with AS/NZS 3500.3.
4. All junction pits are to be 900x900 concrete manholes. Proprietary product approved alternate subject to compliance with design vehicle loads.
5. All pit lids are to be minimum class D.



900x900 CONCRETE STORMWATER PIT
NTS

LAYOUT PLAN

0 5 15 25m
SCALE 1:500 AT ORIGINAL SIZE

REFERENCE DRAWINGS		DRAWING REVISIONS						
DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
B071-D1-01-0001_01_C	SITE PLAN	F	BUILDING LOCATION AMENDED	KJM	JS	JS	22/08/24	
B071-XR-01-3000_04_A	TOPOGRAPHIC SURVEY SHEET 4 OF 4	E	LAYOUT AMENDED.	KJM	JS	JS	15/08/24	
B071-XR-01-3000_03_A	TOPOGRAPHIC SURVEY SHEET 3 OF 4	D	ISSUED FOR OPERATIONAL WORKS APPROVAL.	KJM	JS	JS	20/06/24	
B071-XR-01-3000_02_A	TOPOGRAPHIC SURVEY SHEET 2 OF 4	C	LAYOUT AMENDED	KJM	JS	JS	17/05/24	
B071-XR-01-3000_01_A	TOPOGRAPHIC SURVEY SHEET 1 OF 4	B	PRELIMINARY ISSUE 100% - TITLE BLOCK CHANGES	JS	JS	JS	5/03/24	
		A	PRELIMINARY ISSUE	KJM	JS	JS	8/02/24	

CLIENT: QUEENSLAND TREASURY
CLIENT DRAWING NO

DRAWN	KJM	8/02/24
CHECKED	JS	8/02/24
DESIGNED	DS	8/02/24
LEAD ENG	JS	8/02/24
APPROVED		
SCALE	1:500	OR AS SHOWN
	DO NOT SCALE	A1

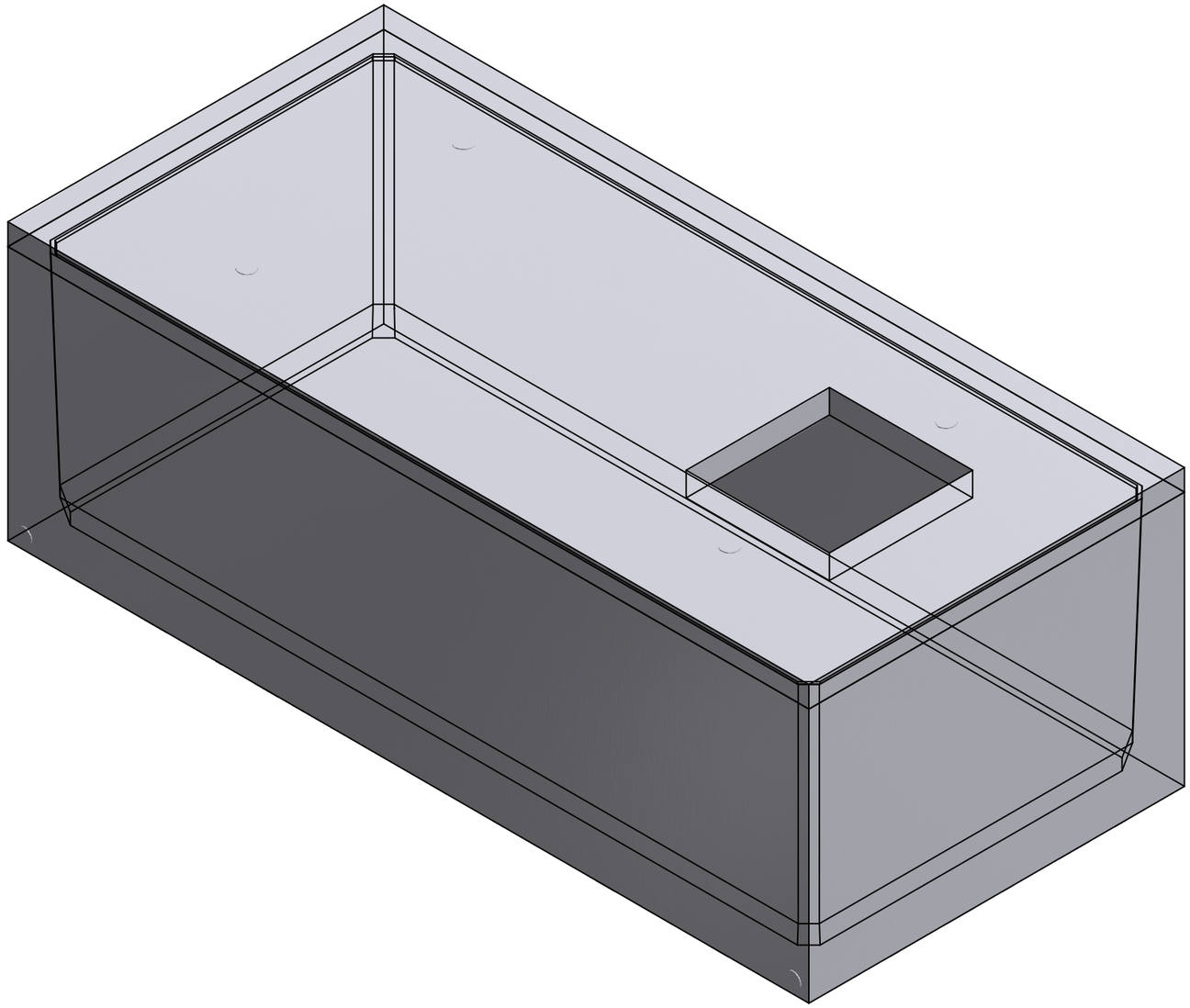
SEDGMAN
NORTHERN CONSULTING engineers
Civil | Structural | Forensic
Traffic | Flood Modelling
PRELIMINARY NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY
TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
STORMWATER CONCEPT
LAYOUT PLAN OPTION 1

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D3-01-1020_01	F

APPENDIX D

ATLAN Vault, Filter and Spillceptor Technical Data



SV.5023-1464 - 3D VIEW

DRAWING INDEX	
DRAWING No.	DRAWING TITLE
SP21-CT19370-C	COVER SHEET AND DRAWING INDEX
SP21-CT19380-C	GENERAL NOTES
SP21-CT19390-C	GENERAL ARRANGEMENT
SP21-CT19400-C	PERMISSIBLE PENETRATIONS. SHEETS 1,2 & 3
SP21-CT24070-C	TANK LID PENETRATION OPTIONS
SP21-CT48180-C	GENERAL LIFTING ARRANGEMENT

SV.5023-1464 COVER PAGE.dwg

REV	DATE	BY	DESCRIPTION	CHK
1	04/21	G.T	INITIAL RELEASE	
2	10/21	G.T	GENERAL AMENDMENTS	

CLIENT:

Drawn	G.T	Date 9/04/2021
Check		Date
Verified		Date
Approved		Date
Request No.		

spelstormwater
joy in water
spel.com.au

PROJECT :

TITLE
COVER SHEET AND DRAWING INDEX
14.88 kL SPEL PRECAST CONCRETE TANK
SV.5023-1464

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N.T.S	A3	1	2

CUSTOMER CODE :

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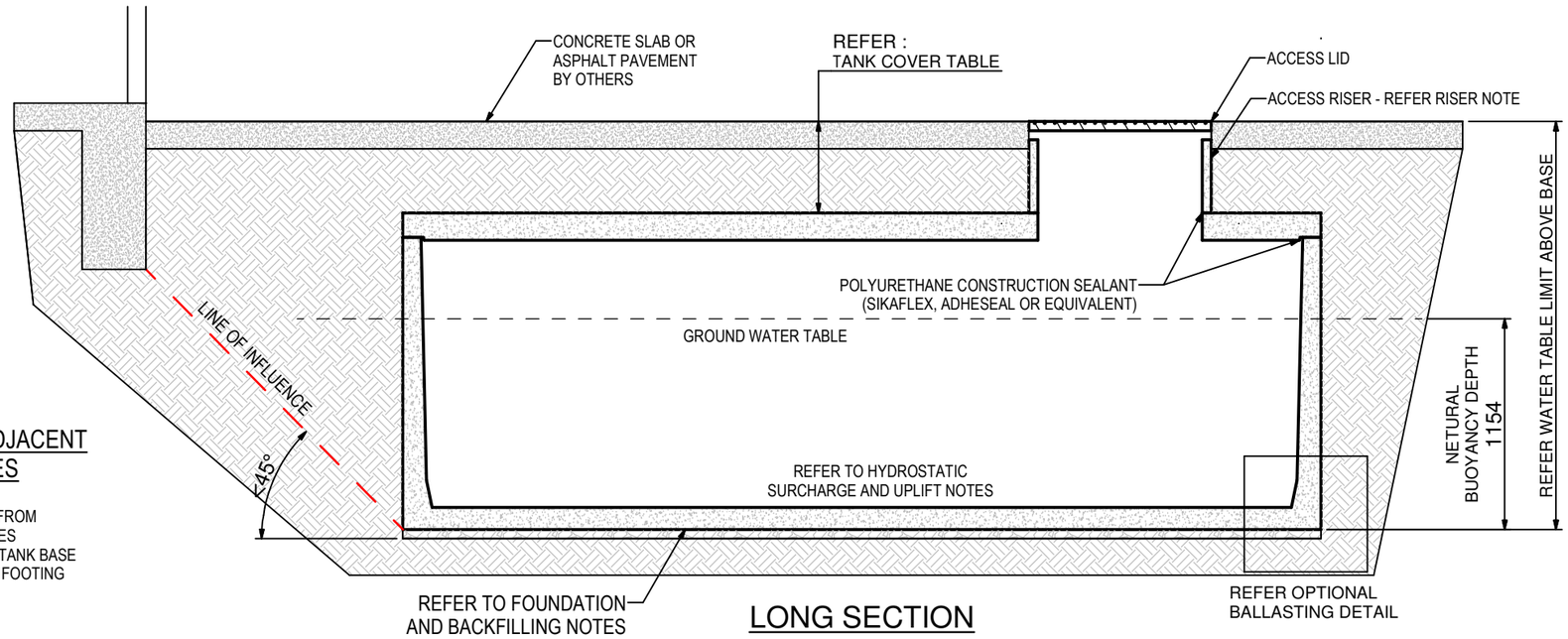
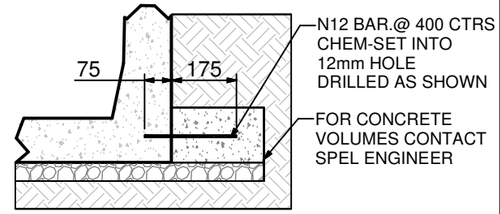


LONG SECTION

TANK POSITIONING ADJACENT TO STRUCTURES

THE LINE OF INFLUENCE FROM
ADJACENT STRUCTURES
IS TO BE LESS THAN 45° FROM TANK BASE
EXCAVATION TO STRUCTURE FOOTING



OPTIONAL BALLASTING DETAIL

BOUYANCY CONTROL JOINT

ANTI-BOUYANCY CONTROL ONLY REQUIRED FOR
TANKS IN HIGH WATER TABLE REFER TO
HYDROSTATIC SURCHARGE AND UPLIFT NOTES

DESIGN CRITERIA

DESIGN IN ACCORDANCE WITH:
AS/NZS 1170.0 - DESIGN LOAD GENERAL REQUIREMENTS
AS/NZS 1170.1 - PERMANENT AND SUPERIMPOSED LOADS
EXPOSURE CLASSIFICATION IN ACCORDANCE WITH AS/NZS 3600 - 'B2'
THE TANK DESIGN LIFE EXPECTANCY IS UP TO 50 YRS.

HEAVY VEHICLES ARE ASSUMED TO BE WITHIN THE GROSS VEHICLE MASS (GVM) AND AXLE LIMITS PRESCRIBED BY THE QUEENSLAND DEPARTMENT OF TRANSPORT AND MAIN ROADS. THE HEAVY VEHICLES THAT THE TANK AND LID ARE DESIGNED FOR INCLUDES:

- SINGLE RIGID TRUCK
- RIGID TRUCK WITH TRAILER
- SEMI TRAILER
- B-DOUBLE
- TWIN STEER TRUCKS

WHICH REPRESENTS AXLE GROUPS OF:

- SINGLE AXLE = 9.0 TONNES
- TANDEM AXLE = 16.0 TONNES
- TRI-AXLE = 20.0 TONNES

WHEEL LOADS ARE BASED ON TANKS INSTALLED IN CONTROLLED TRAFFIC AREA (CARPARK) WITH VEHICLES OPERATING AT REDUCED SPEED.
NOTE: TANKS ARE NOT DESIGNED TO BE INSTALLED UNDER OPEN ROADS. IF W80 AND SM1600 RATING IS REQUIRED, CONSULT SPEL ENGINEERS

CONCRETE

1. TO COMPLY WITH THE REQUIREMENTS OF AS 3600-2018-CONCRETE STRUCTRES.
2. 50 MPa

TANK COVER

TANK TYPE	COVER	BASE THICKNESS	LID THICKNESS	EXTRA REINFORCEMENT	EXCAVATION kPa	WATER TABLE LIMIT ABOVE BASE
STOCK	0-2000	120	150	-	100 kPa	5000
CUSTOM	2001-2500	150	200	Y	125 kPa	7000
CUSTOM	2501-3000	150	200	Y	150 kPa	7000
CUSTOM	3001-3500	150	200	Y	175 kPa	7000

HYDROSTATIC SURCHARGE AND UPLIFT

IMPORTANT NOTE:

NEUTRAL BUOYANCY DEPTH PROVIDED IS A GUIDE ONLY. IT IS CONSERVATIVELY CALCULATED WITH ZERO SOIL COVER AND ZERO SLAB COVER. SEEK SPEL ADVISE FOR SITE SPECIFIC BALLASTING CALCULATIONS, THAT CAN TAKE INTO CONSIDERATION SOIL / SLAB COVER OVER TANK, ANY ADDITIONAL CLEAR OPENINGS IN THE TANK LID,AND ANY PENETRATIONS IN THE TANK WALLS OR BASE.

1. TANK WITH WATER LEVEL UP TO 1154 FROM THE TANK BASE HAS NIL HYDROSTATIC UPLIFT (NEUTRAL BUOYANCY MARK). FOR WATER LEVELS GREATER THAN THIS CONTACT SPEL ENGINEERS FOR SITE SEPTIC BALLASTING ADVICE..

RISER NOTES:

IF PROCURING NON-"SPEL" MANUFACTURED RISERS.
THE SUPPLIER IS TO CONFIRM THE RISER IS SUITABLE FOR:
1. THE DEPTHS REQUIRED FOR THE PROJECT.
2. THE TRAFFIC RATING REQUIRED
3. 35mm MINIMUM RISER WALL THICKNESS BEARING ON TANK LID.

FOUNDATION REQUIREMENTS AND BACKFILLING

1. THE TANK MUST BE FOUNDED ON COMPACTED 50mm MINIMUM LEVELLING SUB-BASE COMPRISED OF SAND OR ROAD BASE THAT ACHIEVES CBR40 WHEN THE TANK IS SUBJECTED TO VEHICLE LOADING. CBR15 OR OTHERWISE. 5-10mm DRAINAGE GRAVEL IS AN ACCEPTABLE SUB-BASE MATERIAL WHEN TANK IS SUBJECTED TO VEHICLE LOADING, 10mm MAXIMUM TO BE STRICTLY ADHERED TO.
2. BACKFILL AROUND THE TANK WITH A WELL DRAINING GRANULAR MATERIAL IN LAYERS NO THICKER THAN 500mm. MAXIMUM VARIATION OF 500mm IN BACKFILL PLACEMENT HEIGHT FROM ONE SIDE OF TANK TO THE OTHER
3. COMPACT PAVEMENT SUBGRADES ABOVE THE TANK LID WITH LIGHT DUTY HAND OPERATED COMPACTION EQUIPMENT. DO NOT USE HEAVY MECHANICAL COMPACTION TECHNIQUES (SUCH AS VIBRATORY OR STATIC ROLLERS) ABOVE TANK LID OR ADJACENT TO THE TANK WALLS WITHIN 1500mm OF TANKS WITHOUT ENGINEER'S APPROVAL
4. BACKFILL SUPPORTING BUILDINGS OR PAVEMENTS TO HAVE LEVEL 1 SUPERVISION & TESTING (PROJECT ENGINEER TO ADVISE)
5. BACKFILL SUPPORTING TRAFFICABLE PAVEMENT MUST BE LEVEL 1 SUPERVISION & TESTING. A PAVEMENT THAT IS DESIGNED TO BE SUSPENDED OVER BACKFILL SHOULD EXTEND A NOMINAL DISTANCE BEYOND THE EDGE OF THE EXCAVATION ONTO NATURAL GROUND. THE SPECIFIC DESIGN IS THE RESPONSIBILITY OF THE PROJECT ENGINEER.

LIFTING NOTES:

1. TOTAL APPROVED 15.0 t (WLL) LIMIT AS SPECIFIED ON DRAWING. CONSULT AN RPEQ ENGINEER FOR LIFTING DESIGN OF SPECIFICALLY DESIGNED TANKS WITH ADDITIONAL FIXTURES INSTALLED AND TOTAL WEIGHT EXCEEDING APPROVED 15.0 t
2. THE ERECTOR SHALL COORDINATE WITH THE SITE PROJECT ENGINEER FOR SITE ACCESS, GROUND CONDITIONS AND PLANNED LIFTING EQUIPMENT PRIOR TO TANK DELIVERY ON SITE.
3. RIGGING ARRANGEMENT SHALL ENSURE THE LOAD IS EVENLY DISTURBED BETWEEN ALL LIFTING ANCHORS.
4. ONLY USE LIFTING PINS PROVIDED WHEN LIFTING, DAMAGED LIFTING PINS SHALL NOT BE USED UNLESS CAPACITY IS VERIFIED AND APPROVED BY A RPEQ ENGINEER.

SV.5023-1464 NOTES PAGE.idw

REV	DATE	BY	DESCRIPTION	CHK
1	04/21	G.T.	INITIAL RELEASE	
2	10/21	GT	GENERAL AMENDMENTS	
3	01/22	GT	FOUNDTION NOTE 3 AMENDED	
4	01/22	GT	BUOYANCY NOTE AMENDED	

Drawn GT	Date 7/04/2021
Check	Date
Verified	Date
Approved	Date
Request No. KEYWORDS	

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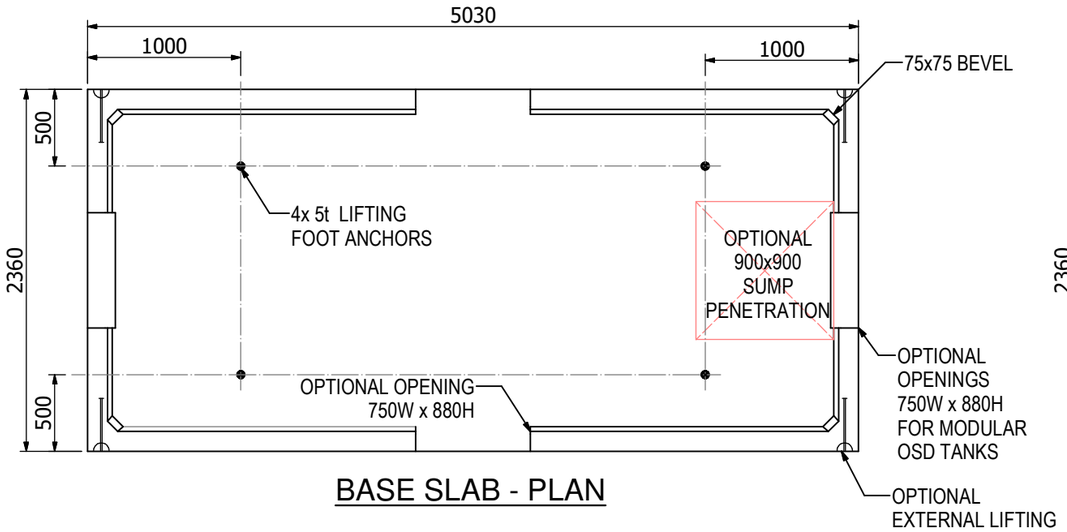
PROJECT :

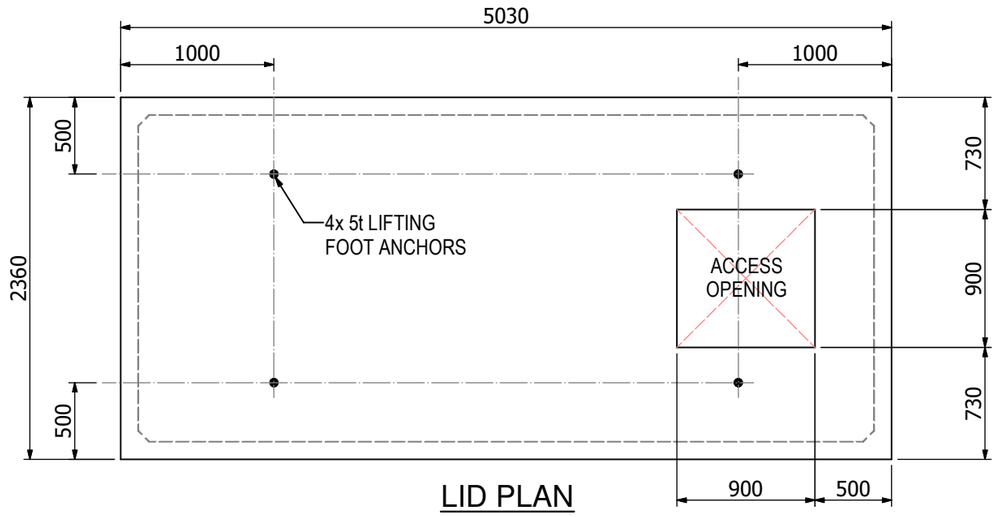
TITLE
GENERAL NOTES
14.88 kL SPEL PRECAST CONCRETE TANK
SV.5023-1464

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	4

CUSTOMER CODE :
DWG No. SV.5023-1464 NOTES PAGE



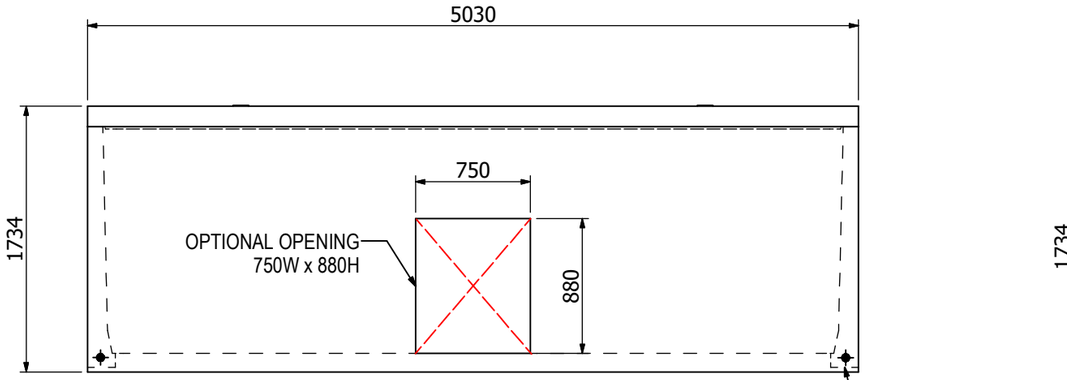
BASE SLAB - PLAN



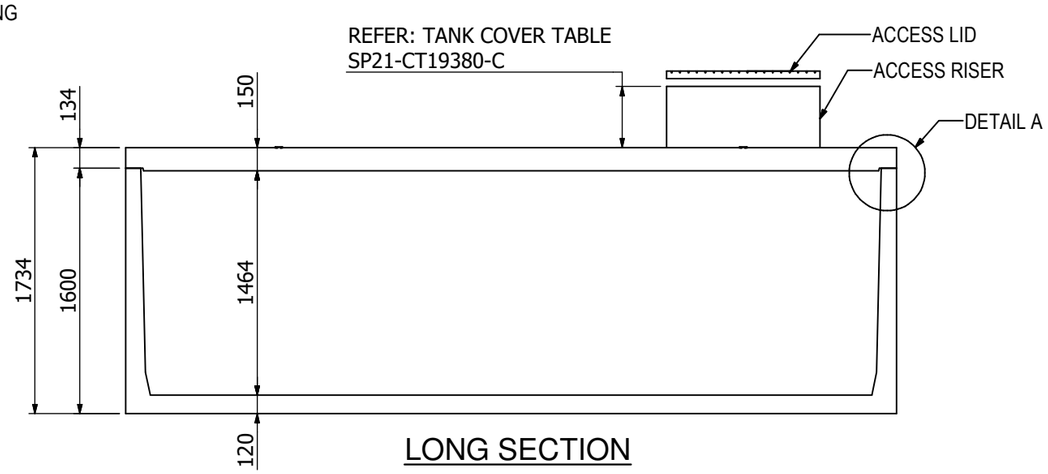
LID PLAN

NOTE:

OTHER ACCESS OPENING SIZES AND POSITIONING OPTIONS AVAILABLE SEE "TANK LID PENETRATION OPTION" DRAWING No. SP21-CT204070-C



LONG ELEVATION



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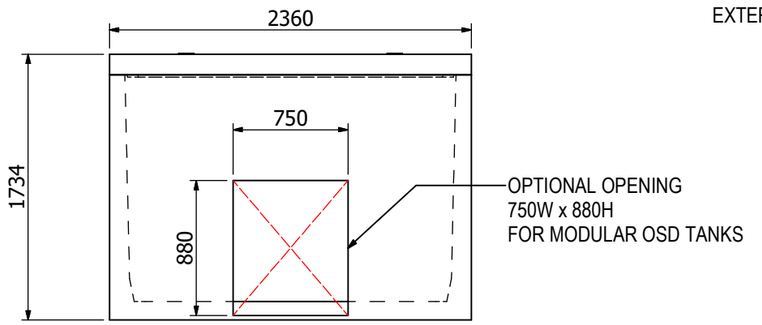
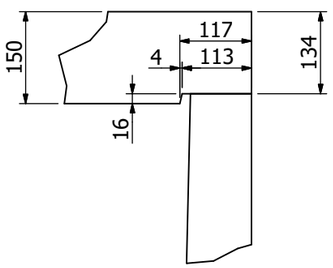


SHORT WALL ELEVATION



DETAIL A

STOCK TANKS

TANK WEIGHT = 9.8t
LID WEIGHT = 4.4t
(WEIGHTS CALCULATED WITH NO PENETRATIONS IN TANK OR LID)

SV.5023-1464 GENERAL ARRANGEMENT.dwg

REV	DATE	BY	DESCRIPTION	CHK
1	05/21	G.T	INITIAL RELEASE	
2	10/21	GT	GENERAL AMENDMENTS	

CLIENT:

Drawn	GT	Date 8/04/2021
Check		Date
Verified		Date
Approved		Date
Request No.		

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PROJECT :

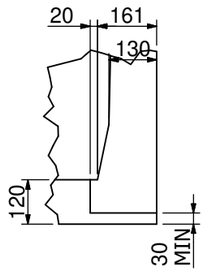
TITLE
GENERAL ARRANGEMENT
14.88 kL SPEL PRECAST CONCRETE TANK
SV.5023-1464

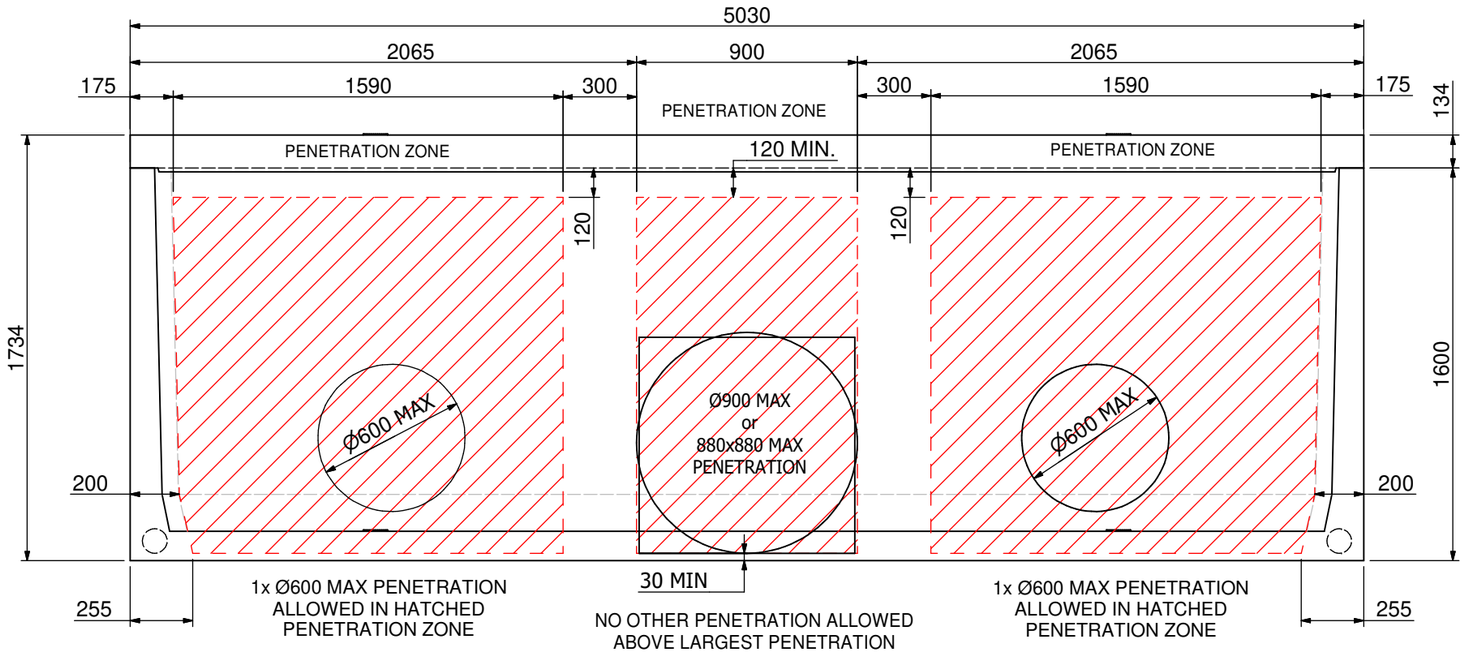
SCALE	SIZE	SHEET	REV
N.T.S	A3	1	2

CUSTOMER CODE :

DWG No. SP21-CT19390-C

STOCK TANKS





PLEASE NOTE:

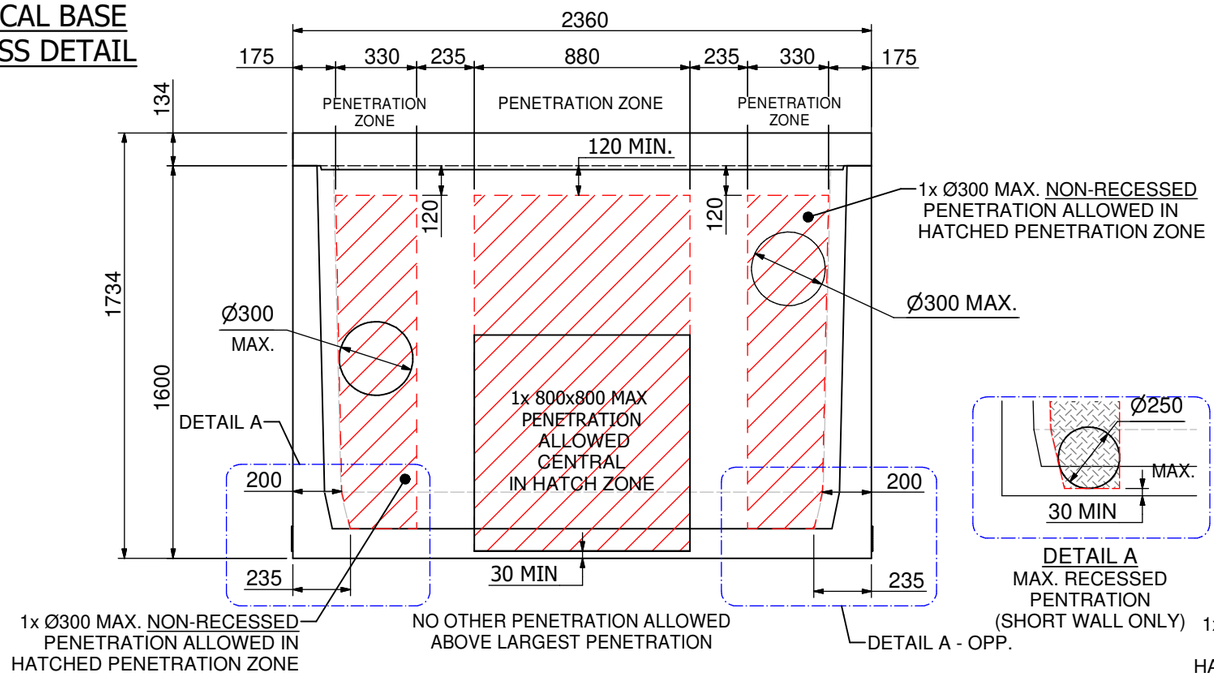
THESE GUIDELINES ARE FOR A STOCK TANK
WITH STANDARD REINFORCEMENT.

IF REQUIRED PENETRATIONS ARE OUTSIDE OF THE GUIDELINES SHOWN, CONTACT SPEL WHO WILL SEEK FURTHER ENGINEERING ADVICE.

CUSTOM TANKS CAN PROVIDE PENETRATIONS OUTSIDE THESE GUIDELINES REFER.
"PERMISSIBLE PENETRATIONS - CUSTOM TANKS"
ON DRAWINGS SP21-CT19400 - C SHEET 2 & 3
FOR A GUIDE PRIOR TO TANK PRODUCTION.

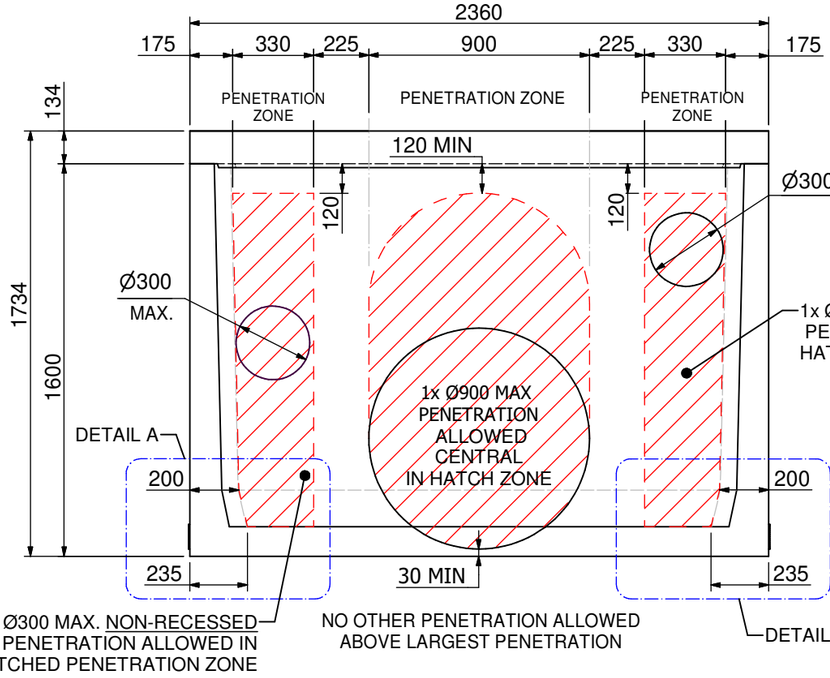
LONG WALL - SINGLE LARGEST PERMISSIBLE PENETRATION

TYPICAL BASE RECESS DETAIL



DETAIL A
MAX. RECESSED
PENTRATION
(SHORT WALL ONLY)

SHORT WALL - 880x880 MAX. PENETRATION



SHORT WALL - Ø 900 MAX PENETRATION

REV	DATE	BY	DESCRIPTION	CHK
1	07/21	G.T	INITIAL RELEASE	
2	10/21	GT	DRAWING SET EXPANDED	

Drawn	GT	Date 7/04/2021
Check		Date
Verified		Date
Approved		Date
Request No.		

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PROJECT :

TITLE
PERMISSIBLE PENETRATIONS
14.88 kL SPEL PRECAST CONCRETE TANK
SV.5023-1464 STOCK TANKS

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	2

CUSTOMER CODE :
DWG No. SP21-CT19400-C

SV.5023-1464 PENETRATIONS - STOCK TANKS.dwg

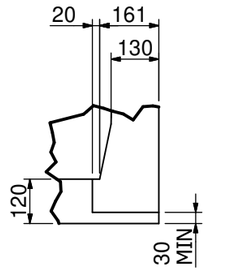
CUSTOM TANKS

IMPORTANT NOTE:

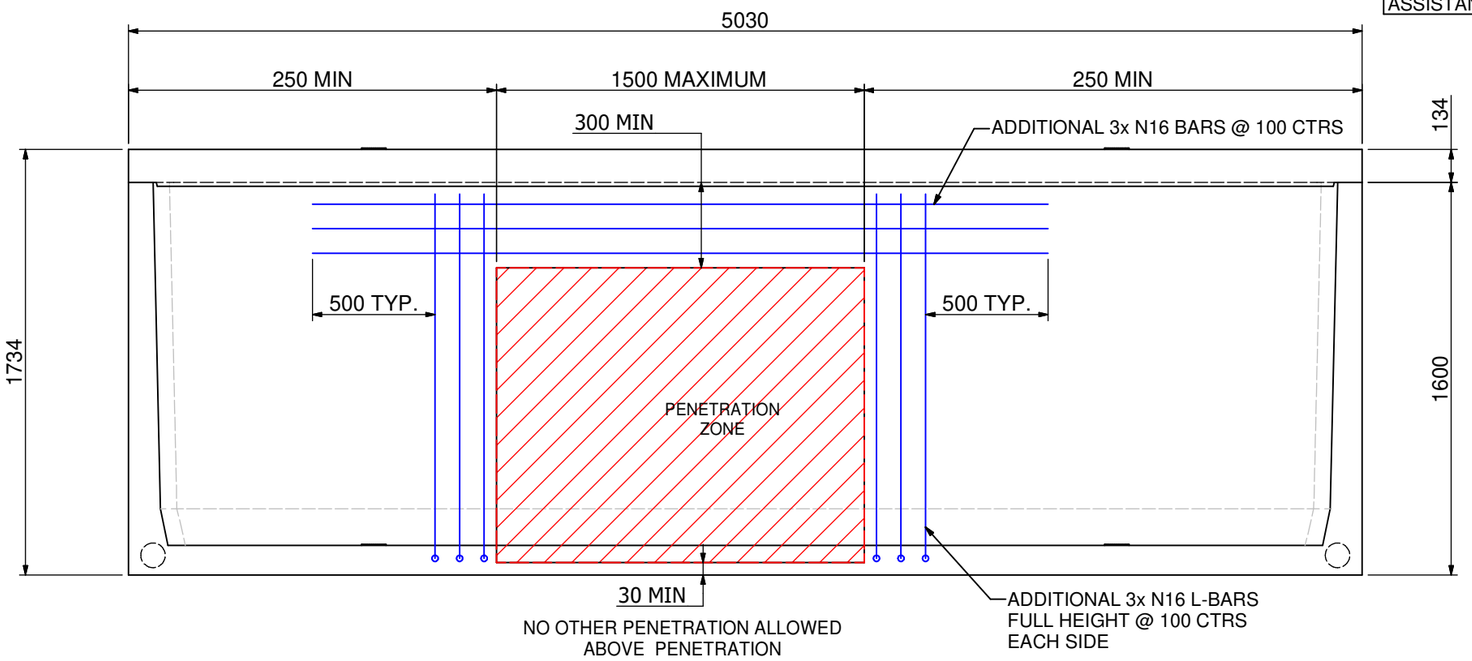
THESE PENETRATIONS CANNOT BE PERFORMED TO A STANDARD TANK.

THEY ARE REQUIRED TO BE ARRANGED WITH SPEL, PRIOR TO POURING THE TANK SO ADDITIONAL REINFORCEMENT CAN BE INCLUDED.

FOR STANDARD PERMISSIBLE PENETRATION REFER DRAWING SP21-CT19400-C SHEET 1
FOR ADDITIONAL PENETRATION COMBINATIONS CONTACT SPEL FOR DESIGN / ENGINEERING ASSISTANCE.



TYPICAL BASE RECESS DETAIL



LONG WALL - MAXIMUM SINGLE PENETRATION

SV.5023-1464 PENETRATIONS - CUSTOM TANKS PAGE 2.dwg

REV	DATE	BY	DESCRIPTION	CHK
1	10/11/2020	G.T	INITIAL RELEASE	

Drawn	GT	Date 7/04/2021
Check		Date
Verified		Date
Approved		Date
Request No.		

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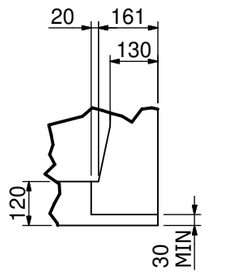
PROJECT :

TITLE PERMISSIBLE PENETRATIONS
14.88 kL SPEL PRECAST CONCRETE TANK
SV.5023-1464- CUSTOM TANK

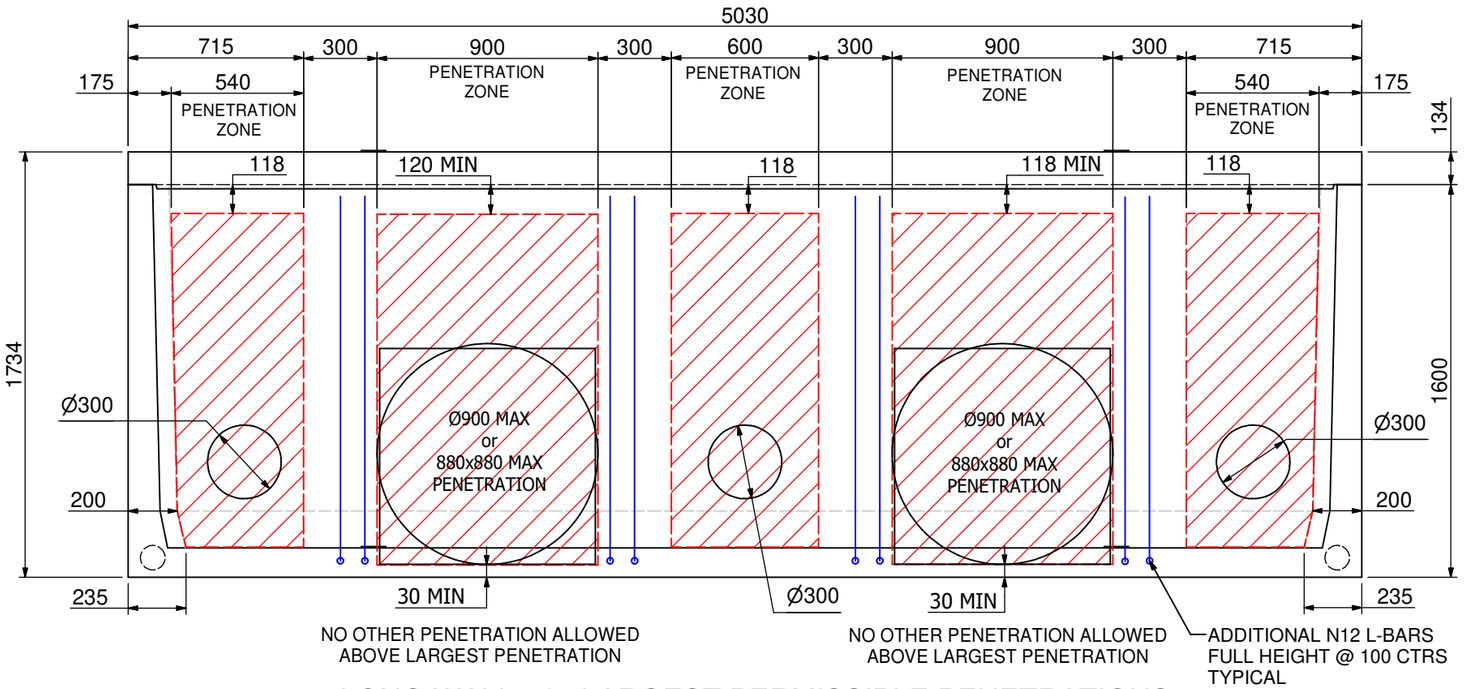
SCALE	SIZE	SHEET	REV
N.T.S	A3	3	1

CUSTOMER CODE : | DWG No. SP21-CT19400-C

CUSTOM TANKS



TYPICAL BASE RECESS DETAIL



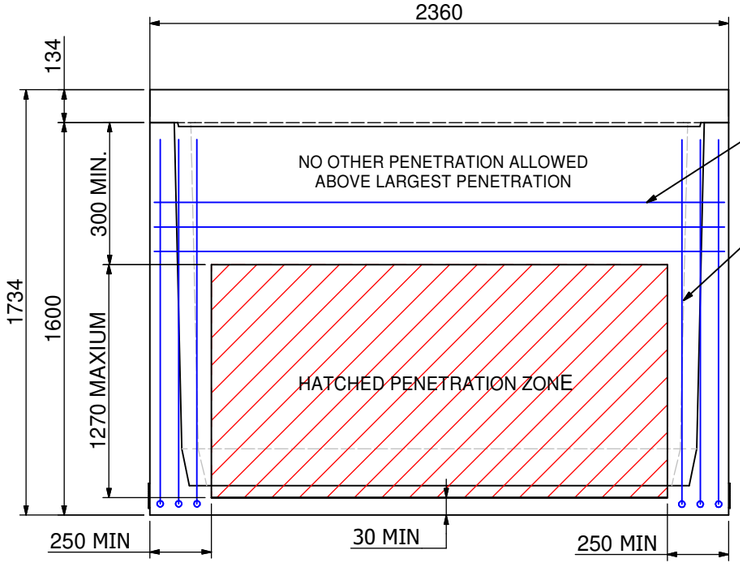
LONG WALL - 2x LARGEST PERMISSIBLE PENETRATIONS

IMPORTANT NOTE:

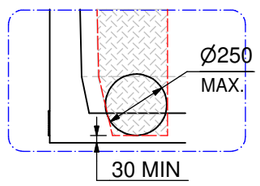
THESE PENETRATIONS CANNOT BE PERFORMED TO A STANDARD TANK.

THEY ARE REQUIRED TO BE ARRANGED WITH SPEL, PRIOR TO POURING THE TANK SO ADDITIONAL REINFORCEMENT CAN BE INCLUDED.

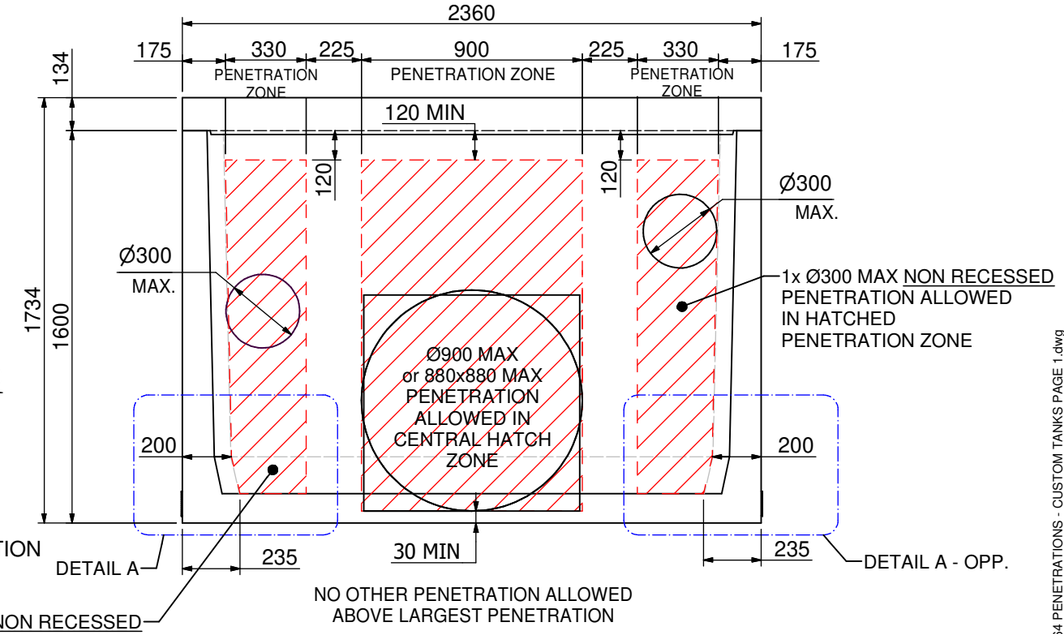
FOR STANDARD PERMISSIBLE PENETRATION REFER DRAWING SP21-CT19400-C SHEET 1
FOR ADDITIONAL PENETRATION COMBINATIONS CONTACT SPEL FOR DESIGN / ENGINEERING ASSISTANCE.



SHORT WALL - MAX. CUSTOM PENETRATION



DETAIL A
MAX. RECESSED PENTRATION (SHORT WALL ONLY)



SHORT WALL - Ø 900 MAX PENETRATION

SV.5023-1464 PENETRATIONS - CUSTOM TANKS PAGE 1.dwg

REV	DATE	BY	DESCRIPTION	CHK
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Drawn GT	Date 7/04/2021
Check	Date
Verified	Date
Approved	Date
Request No.	

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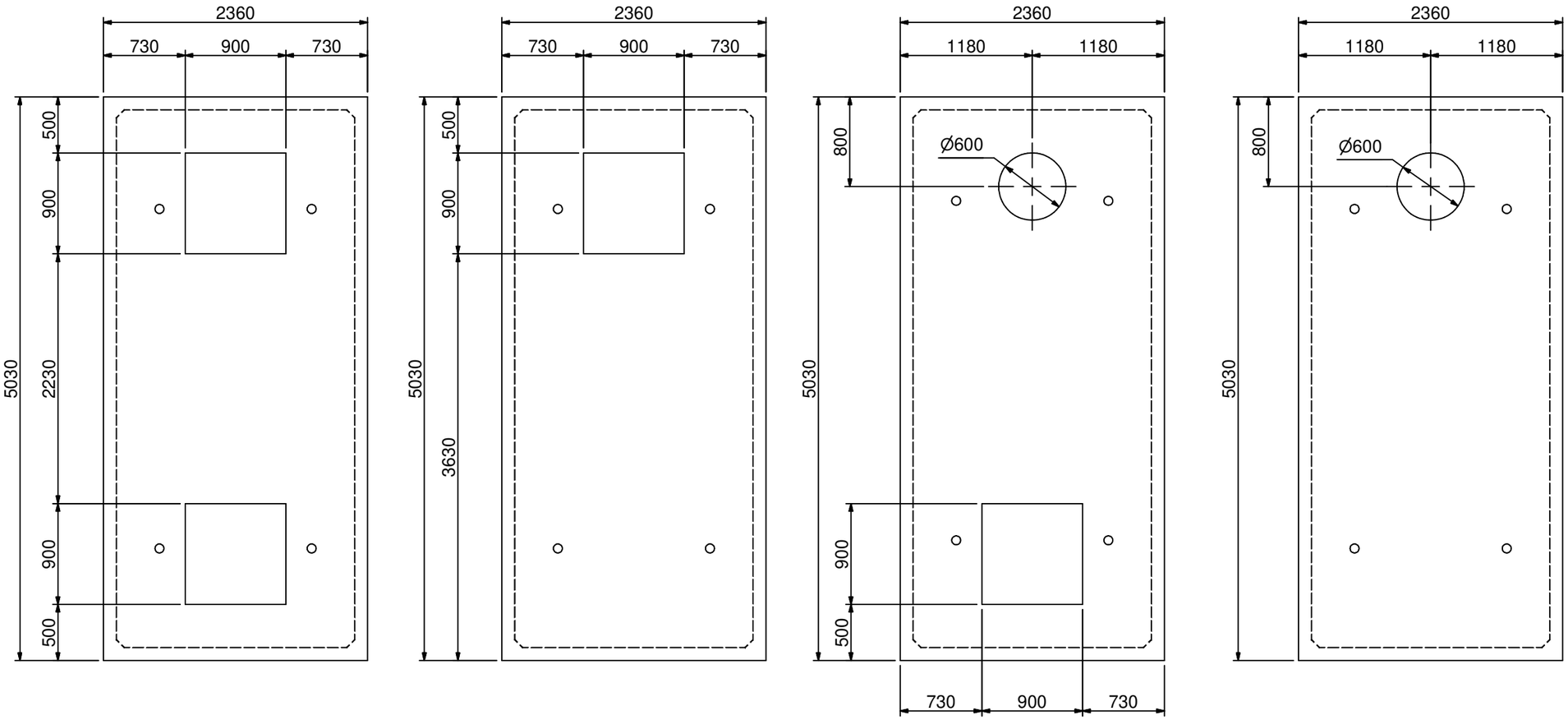
PROJECT :

TITLE
PERMISSIBLE PENETRATIONS
14.88 kL SPEL PRECAST CONCRETE TANK
SV.5023-1464- CUSTOM TANKS

SCALE	SIZE	SHEET	REV
N.T.S	A3	2	1

CUSTOMER CODE : | DWG No. SP21-CT19400-C



STANDARD LID FORMATIONS

FOR ADDITIONAL ACCESS OPENING AND POSITIONING OPTIONS
CONTACT SPEL

SV.5023- STD LID TYPES.dwg

REV	DATE	BY	DESCRIPTION	CHK
1	08/04/21	G.T	INITIAL RELEASE	

CLIENT:

Drawn	G.T	Date 9/04/2021
Check		Date
Verified		Date
Approved		Date
Request No.		

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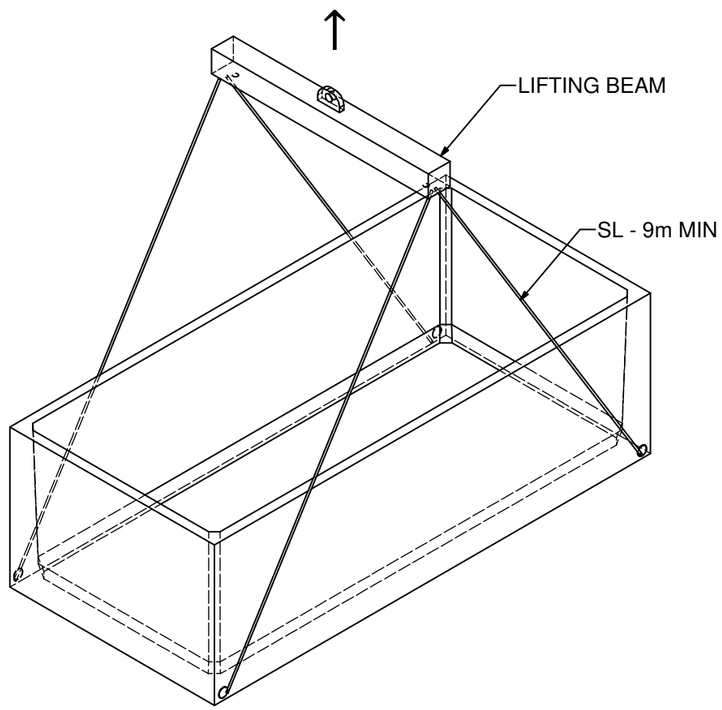
PROJECT :

TITLE TANK LID PENETRATION OPTIONS
SPEL PRECAST CONCRETE TANK
SV.5023

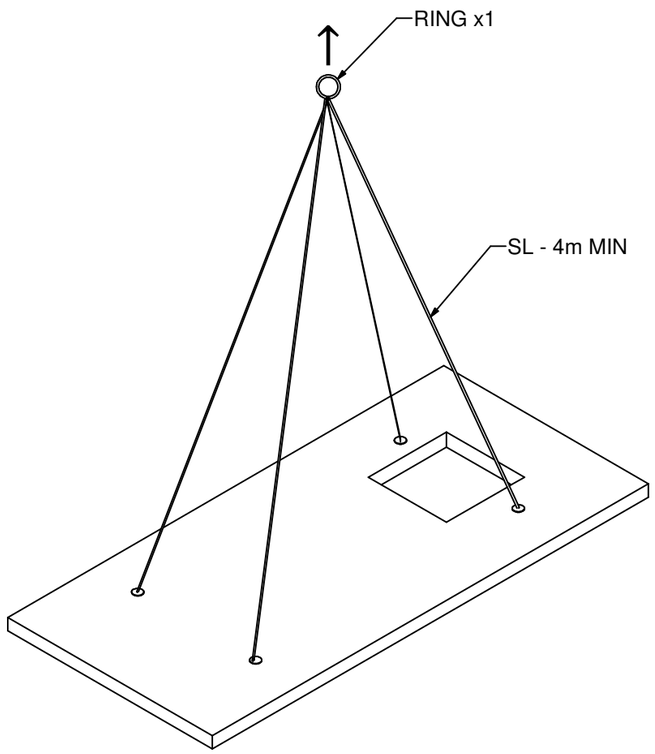
SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

CUSTOMER CODE :

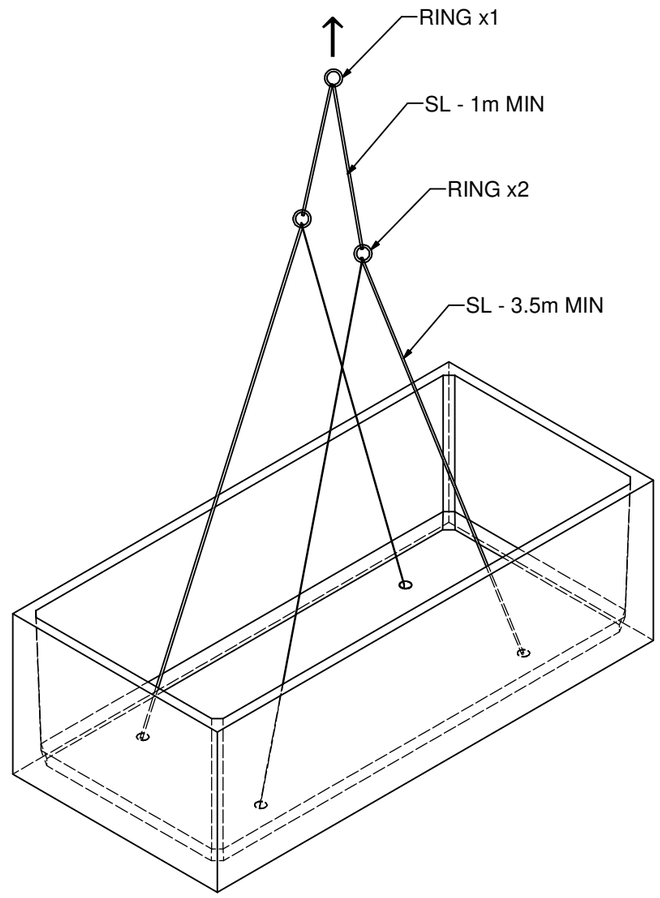
DWG No. SP21-CT24070-C



EXTERNAL LIFTING OPTION
LIFTING BEAM w/ SL=9m MIN



TYPICAL LID LIFTING
FLAT LIFT - 4 POINT LOAD
SL = 4m MIN. EACH



INTERNAL LIFTING OPTION
SL = 3.5m MIN. EACH

SV.5023- GENERAL LIFTING ARRANGEMENTS.dwg

REV	DATE	BY	DESCRIPTION	CHK
1	11/21	GT	INITIAL ISSUE	

CLIENT:

Drawn	GT	Date 9/11/2021
Check		Date
Verified		Date
Approved		Date
Request No.		

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PROJECT :

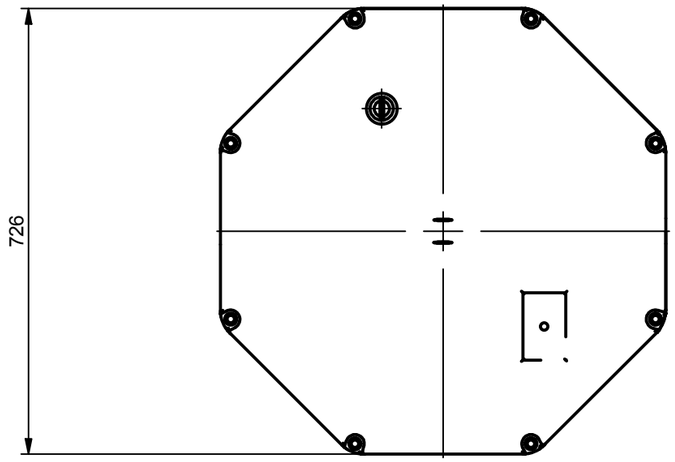
TITLE
GENERAL LIFTING ARRANGEMENT
SPEL PRECAST CONCRETE TANK
SV.5023

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

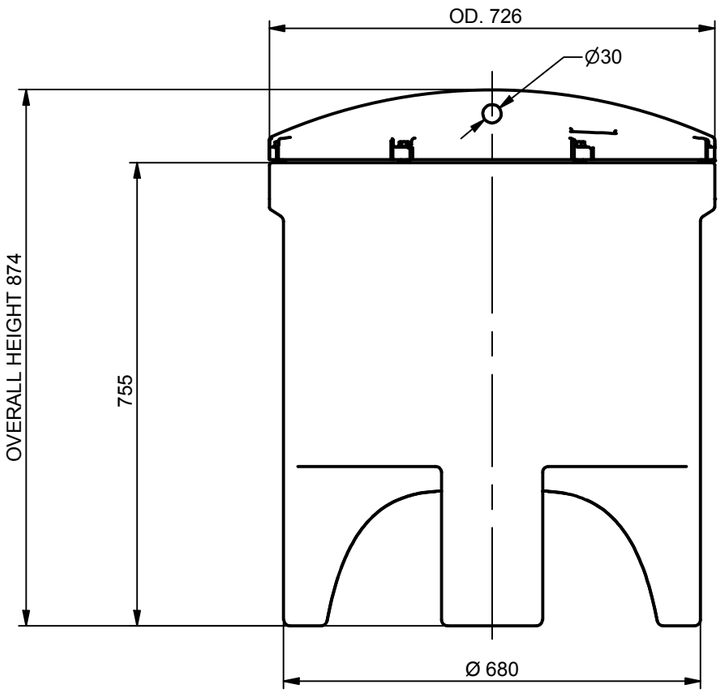
CUSTOMER CODE :

DWG No. SP21-CT48180-C

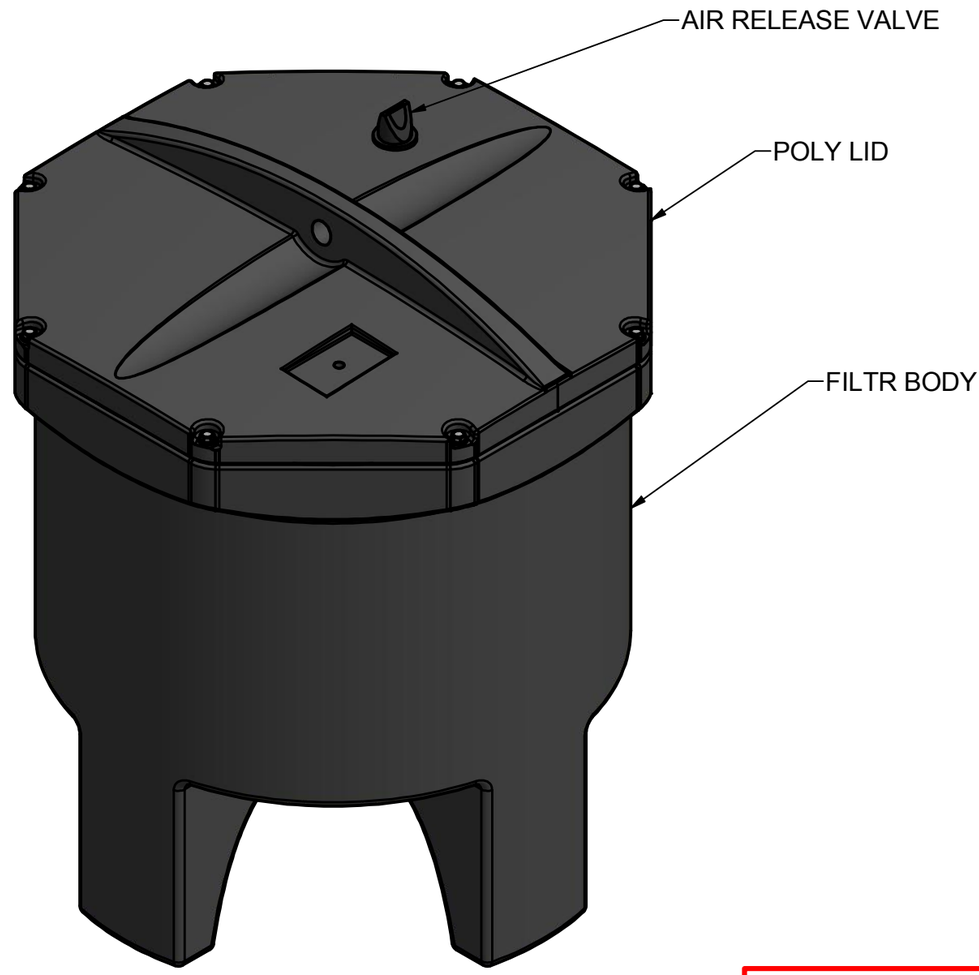
REVISION HISTORY				
REV	DESCRIPTION	DESIGNER	CREATION DATE	CHECKED BY
1	INITIAL RELEASE	M.MAKIN	7/08/2018	



PLAN VIEW



ELEVATION VIEW



ISOMETRIC VIEW

APPROVED..... ☐

NAME.....

SIGNED.....

DATE...../...../.....

ISSUED FOR CONSTRUCTION

TOLERANCE: ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

CLIENT:

DISTRIBUTOR :

Drawn	M.MAKIN	Date 7/08/2018
Check		Date
Verified		Date
Approved		Date
Request No.		

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | E: sales@spel.com.au
www.spel.com.au

PROJECT :

TITLE: SPEL FILTER
MODEL : SF-3.0-EMC-M
GENERAL ARRANGEMENT

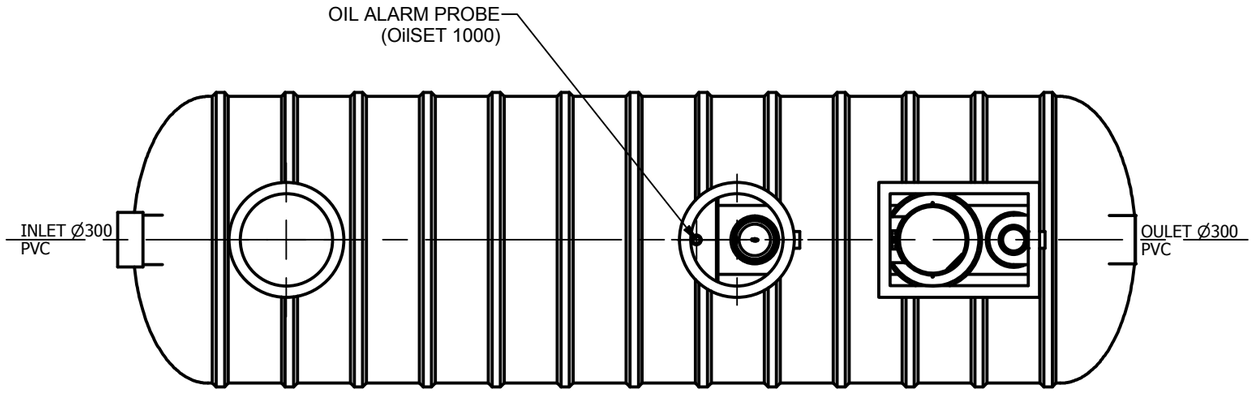
SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

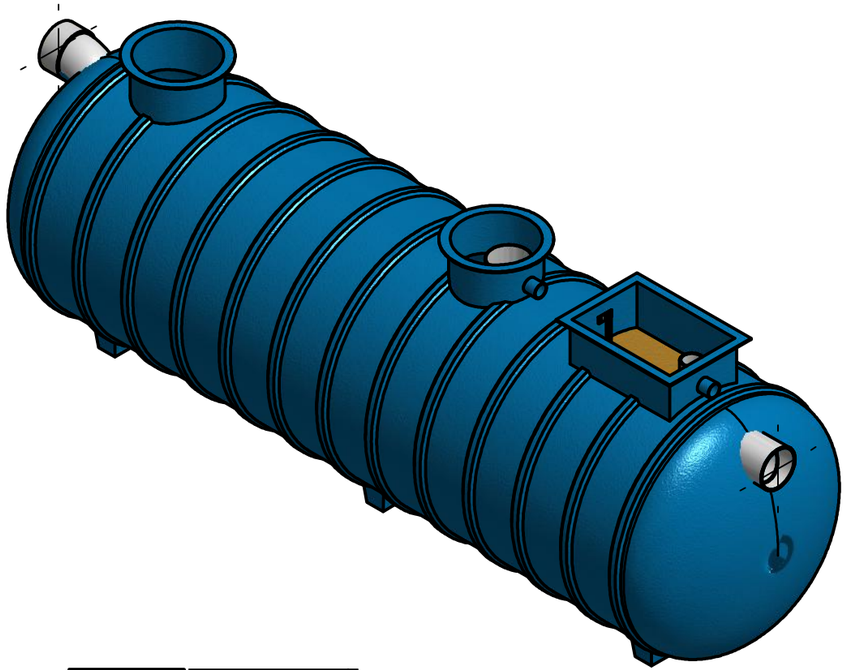
CUSTOMER CODE :

DWG No. SP18-SF21760-S

D:\Vault Working Folder\Designs\SPEL\STD ITEMS\PRODUCTS\FILTER\POLY SPEL FILTER\SP18-SF21760-S.idw

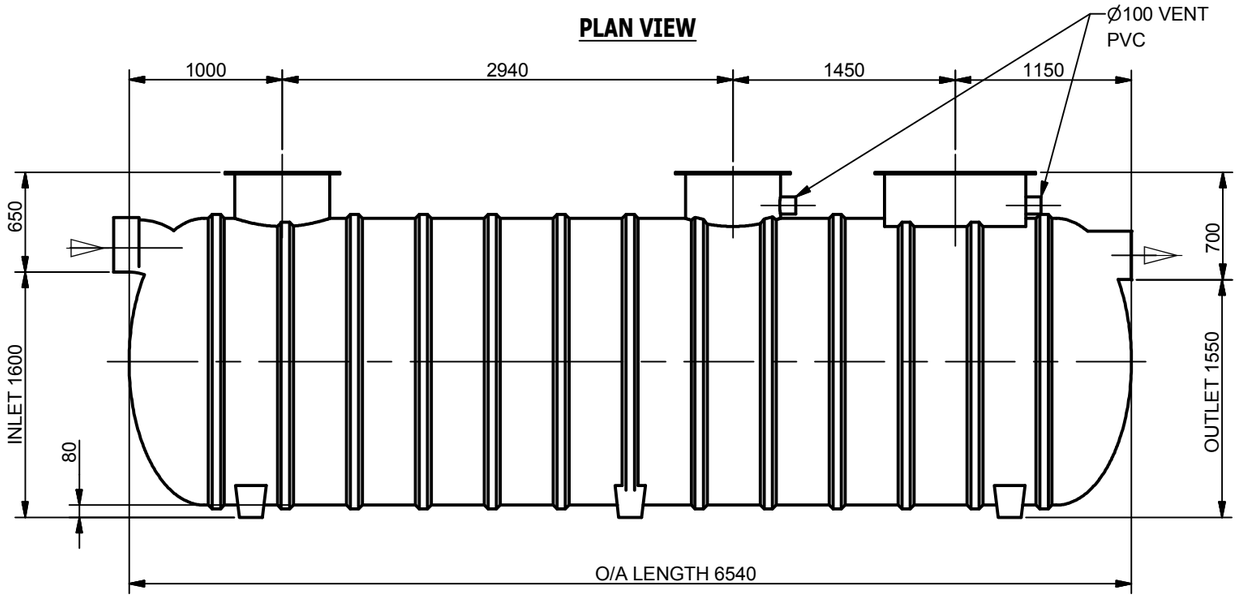
REVISION HISTORY				
REV	DESCRIPTION	DESIGNER	DATE	CHECKED BY
1	INITIAL RELEASE	M.M.	13/09/2013	J.L.



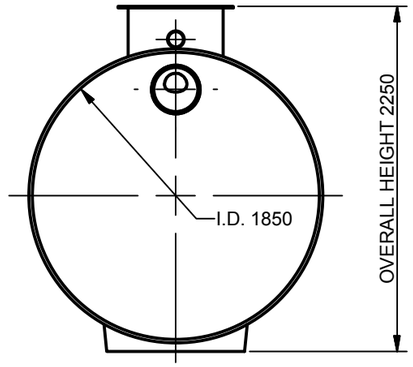


ISOMETRIC VIEW

PLAN VIEW



ELEVATION VIEW



END VIEW
OUTLET

APPROVED.....
NAME.....
SIGNED.....
DATE...../...../.....

Site Level Confirmation	
Finished Surface Level (FSL)	RL:
Access Cover Thickness	mm
Inlet Invert Level	RL:
Outlet Invert Level	RL:
Company:	
Name:	
Date:	

ISSUE FOR APPROVAL
NOT FOR CONSTRUCTION

CLIENT:

DISTRIBUTOR :

Drawn	Date
M.M.	13/09/2013
CHECKED BY	Date
Verified	Date
Approved	Date
Dig. Add.	

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | E: sales@spel.com.au
www.spel.com.au

TITLE SPEL PURACEPTOR
P.040.C1.2C.A.300
GENERAL ARRANGEMENT

CODE	SIZE	SHEET	REV
500060	A3	1	1

SCALE	DWG No.
N.T.S	SP13-PC1560-S

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: AP2024/012

SEDGMAN
Prudentia

Queensland Resources Common User Facility

Waste Management Strategy Plan

Prepared for: Queensland Treasury

Prudentia Project No: **MC23059**

Prudentia Document No: MC23059-RPT-002

Revision: D

Revision	Description	Date	By	Checked
A	Issued For Information	24/04/2024	B. O'Shea	M. Campbell
B	Issued For Information	15/11/2024	J. Gooch	
C	Issued For Information	13/12/2024	J. Gooch	M. Campbell
D	Liquid waste generation clarified	16/12/2024	J. Gooch	B. O'Shea

Contents

List of Tables

List of Figures

1 Executive Summary

This report outlines the basis for waste management to support development of the Queensland Resources Council Common User Facility (QRCUF). The basis for the waste characteristics and throughputs is based on the current QRCUF design basis at the time of this report. Being a test facility, future customers' requirement and third-party waste management requirements may change as the design is progressed further. The volumes and cost estimate would need to be re-evaluated if the basis changes.

Below is a summary of daily waste disposal from the facility.

Table 1-1: Daily Waste Disposal Summary

Waste	Indicative Composition	Daily Flow Estimate
	Continuous Solids Waste	**Total = 30.9 tonne/ day**
1. Leach Residue	pH: 2-4 60% solids containing: • 30% alumina, • 30% limestone, • 30% silica, • balance carbon, Na2O and K2O 30% liquid, • ~15g/L of sulphate salt (including K, Na, Al, V)	8.1 tonne/ day
2. Impurity Removal Residue	pH: 2-4 60% solids containing: • 40% calcium silicate, • 40% gypsum, • balance iron oxide 30% liquid, • ~5g/L vanadyl sulphate,	0.3 tonne/day
3. Reject Filter Residue	pH: 6-8 60% solids containing various concentrations of: • Metal sulphate salt (K, Mn, Fe, Na, Al, Va) • Gypsum, • silica, • carbon, • Na2O, K2O and gypsum 40% liquid containing • 80g/L sulphate salt including Fe, Na, Al, 1000 ppm D70 SX diluent (kerosene like)	0.7 tonne/day
4. Tailings	60% solids, containing various concentration of • silica ~26% w/w • limestone ~47% w/w • balance, iron oxide, alumina, organic material found with shale ore 40% liquid, • Water with a composition similar to Townsville town water supply	20.8 tonne/day
5. Drum Scrubber Oversize	80% solids, containing various concentration of • silica ~26% w/w • limestone ~47% w/w • balance, iron oxide, alumina, organic material found with shale ore 20% liquid, • Water with a composition similar to Townsville town water supply	1 tonne/day
	Continuous Liquid Waste	**Total = 20.9m^3/day**
6. Neutralised liquid waste	80g/L sulphate salt including Fe, Na, Al, 1000 ppm D80 SX diluent (kerosene like).	20.9m^3 per day *
	Intermittent Wastes	
7. Sampling waste	General lab wastes containing various metal salt, organics, and solids residue	1 x 1000L IBC per week

*** Note:** Includes 3.1m^3/day of Neutralisation Reagent, in addition to the 17.8m^3/day liquid waste generation documented under Section 4.1.

The size of waste disposal equipment and containers is described in Section 5. In general the liquid waste is taken away in 20kL tankers. The solids waste will be disposed in various sized bins. Roll on / roll off bins are available in the following sizes: 12m^3, 15m^3 and 30m^3.

2 Introduction

The Queensland Government (hereinafter referred as “the State”) is developing the Queensland Resources Common Users Facility (QRCUF). This facility is delivering common user infrastructure at the Cleveland Bay Industrial Park in Townsville to support the development, extraction and production of critical minerals.

The intent of the facility is to support prospective mining companies in demonstrating their flowsheet at demonstration scale to validate commerciality and technical viability to secure finance, investor interest, off-take agreements and partnerships. The initial focus will be on vanadium with capacity to expand over time to encompass processing other critical minerals like cobalt and rare earth elements.

Prudentia was engaged as the design subcontractor to perform design work and produce the draft design documentation to support the project.

This report outlines the basis for waste management to support development of the facility. The basis for the waste characteristics and throughputs is based on the current QRCUF design basis as the time of this report.

2.1 Objective

The objective of this report is to document the waste management philosophy proposed for QRCUF to support the on-going project development. Specifically, this report:

- describes the waste management philosophy that is appropriate for QRCUF
- outlines the necessary facilities such as tanks and filters for waste management
- provides options for waste treatment and disposal methods based on feedback from a third party waste management company, e.g. Cleanaway

2.2 Project Location

The Queensland Resources Common User Facility will be located at the Cleveland Bay Industrial Park in Townsville.

Cleanaway waste services, waste management company in Townsville, is located approximately 20km northeast of the site.

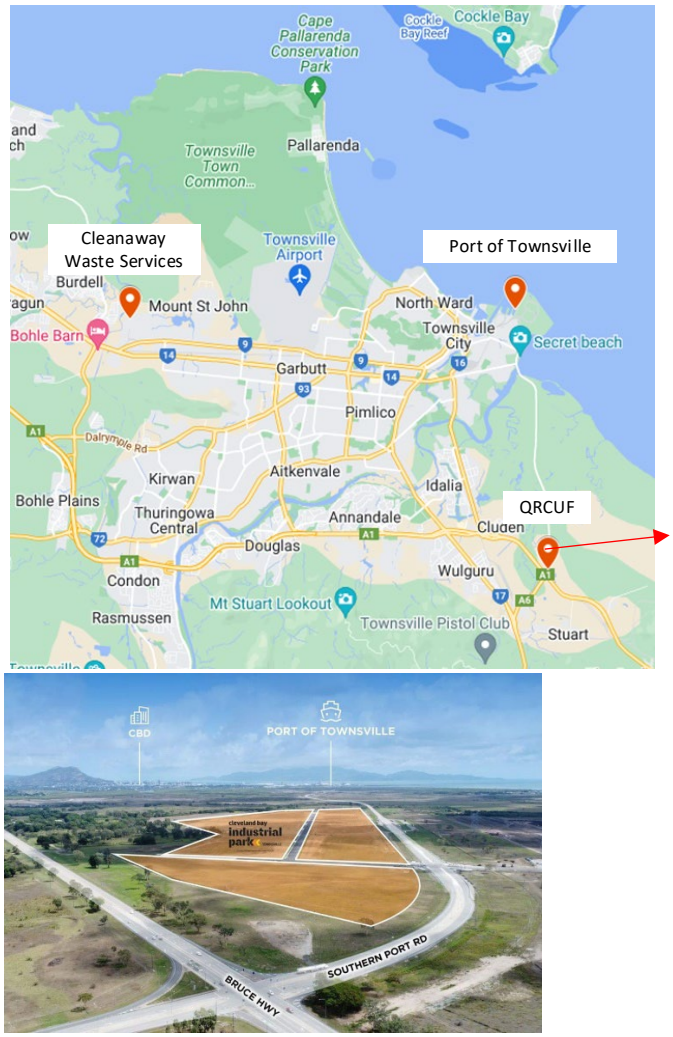


Figure 2-1 QRCUF Site Location

2.2.1 Site Layout Showing Waste Point of Production

The key wastes generated and the point of generation within the plant is presented on the site layout in Figure 2-2 below. The raffinate, spent wash, product filtrate and scrubber bleed waste is processed through effluent treatment before direct discharge.

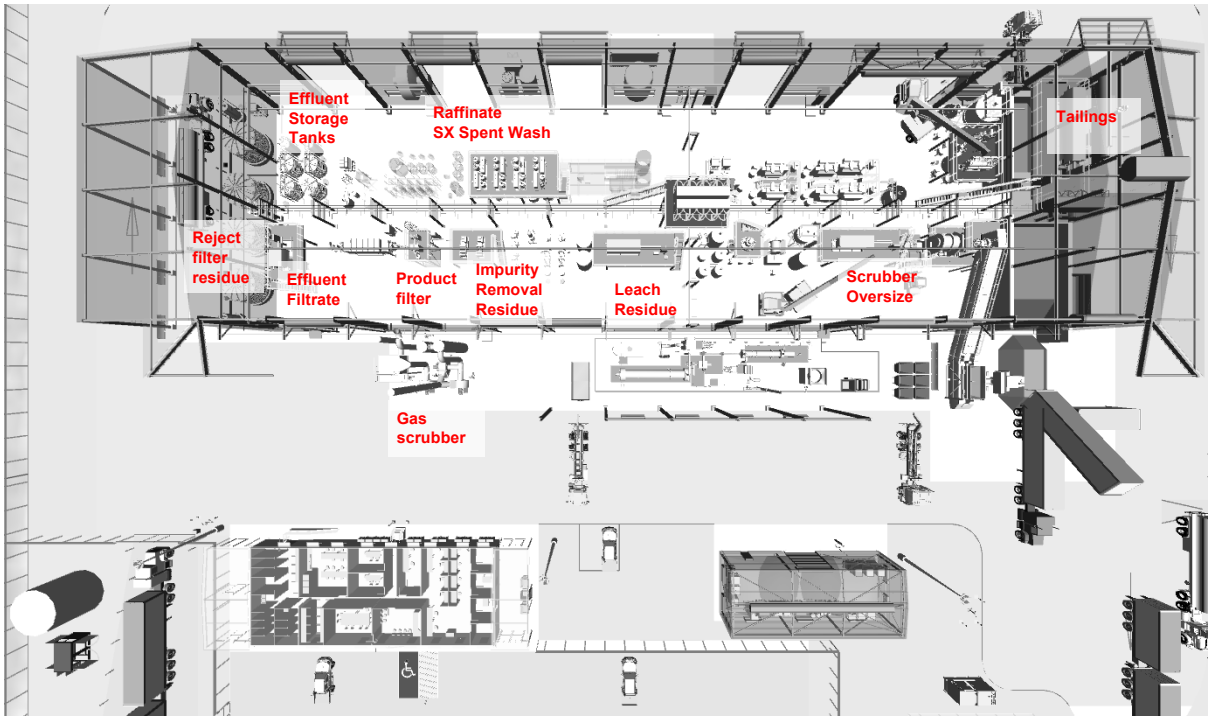


Figure 2-2 QRCUF Site Layout – Waste Generation Points

3 Waste Management Strategy Scope

The scope of this document includes:

- Outline the on-site waste management strategy and philosophy
- Define the waste treatment and storage requirements for various waste streams
- Provide a workable framework for the development of a waste management plan for QRCUF.

The scope of this document does not consider stormwater catchment or run-off that falls outside the building footprint and loading/unloading bunds and this has not been factored in to process water capture. Stormwater capture and treatment requirements will be addressed separately through the Site-Based Stormwater Management Plan (SBSMP) for the development.

The key inputs and outputs for the QRCUF Vanadium flowsheet are summarised in the figure below. The scope of this report is highlighted in a red box. Water reuse within the QRCUF vanadium flowsheet is incorporated into the design to reduce waste.

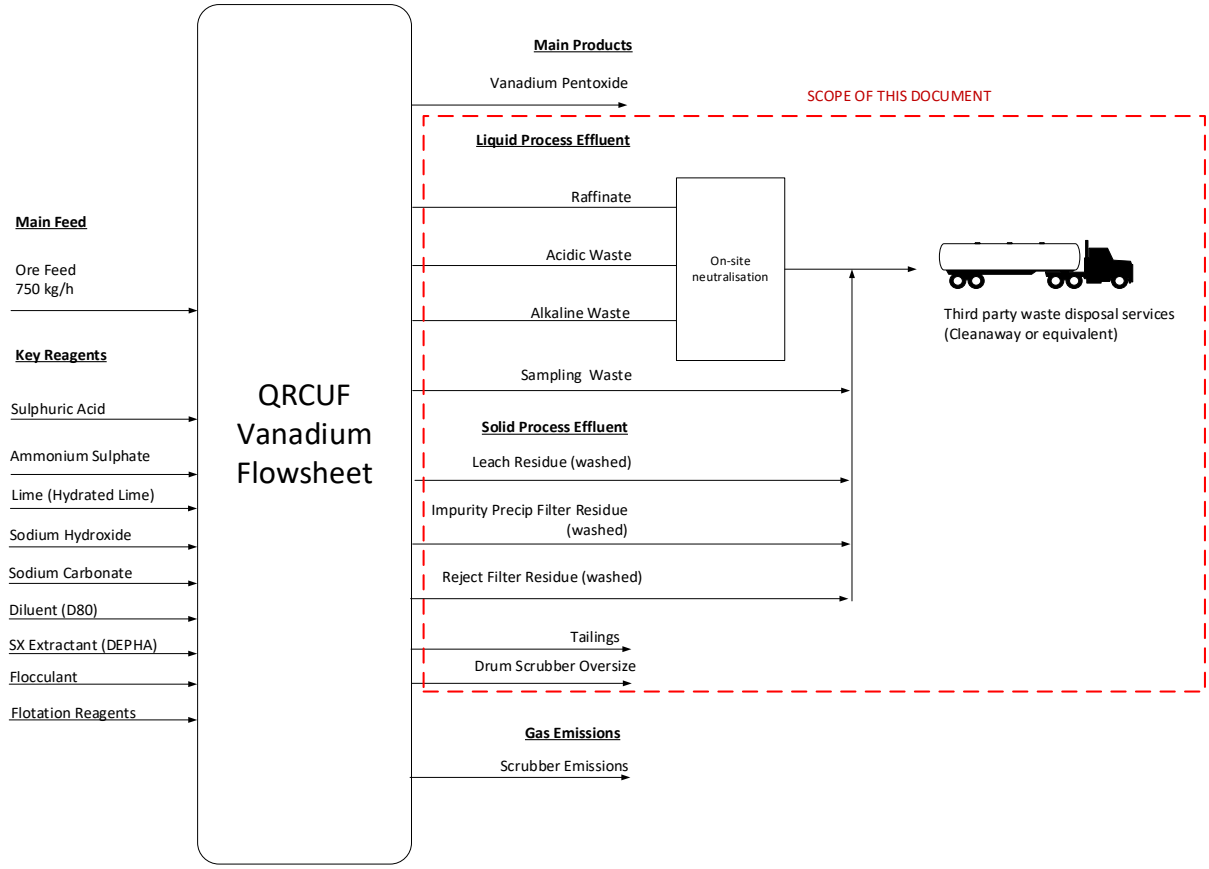


Figure 3-1 QRCUF Key Input and Outputs

4 Waste Overview

4.1 Waste Flows and Composition Summary

QRCUF is intended to be a multi-use hub that is used by future customers for flowsheet and technology demonstration purposes. It is expected that the flowsheets will not be optimised or fully incorporate recycle streams and may produce a large variety of wastes at varying flows and compositions. It is not possible to accurately predict the range of waste properties that different future customers will generate due to both to limited data or customers still developing technologies. Therefore, the waste management plan is developed based on the flows and composition indicated by the mass balance model (MC23059-CAL-001_RevD) for the QRCUF project. This has been developed with a combination of testwork, relevant published data and assumptions.

The plant is expected to operate in approx. 2-week campaigns followed by a period of downtime either due to future customer change-over, waiting for future customers, or no demand. The waste flows and composition for the flowsheet considered are summarized in Table 4-1 below.

Table 4-1 QRCUF Waste Flow and Composition Summary

Waste	Indicative Composition	Waste Generation Rate	Waste Storage	Collection Frequency
	Continuous Solids Waste	**Total = 30.9 tonne per day**		
1. Leach Residue	60% solids: • 30% alumina, • 30% limestone, • 30% silica, • balance carbon, Na_2O and K_2O 40% liquid: • ~15g/L sulphate salt ~15g/L sulphuric acid	8.1 tonne/ day	Stored in skips $12m^3$ /$15m^3$/ $30m^3$ and collected by roll on roll off skips	Approx. 2-3 days
2. Impurity Removal Residue	60% solids, • 40% calcium silicate, • 40% gypsum, • balance iron oxide 40% liquid: • ~20g/L sulphate salt (5g/L as Vanadyl sulphate)	0.3 tonne/day	Stored in skips $1m^3$, and collected by a skip loader	Approx.1-2 weeks
3. Reject Filter Residue	60% solids, containing various concentration of • Iron sulphate • Aluminium sulphate • Gypsum • Manganese sulphate 40% liquid, • 80g/L sulphate salt including Fe, Na, Al, 1000 ppm D70 SX diluent (kerosene like)	0.7 tonne/day	Stored in skips $1m^3$ and collected by a skip loader	Approx.1-2 weeks
4. Tailings	60% solids, containing various concentration of • silica ~26% w/w • limestone ~47% w/w • balance, iron oxide, alumina, organic material found with shale ore 40% liquid, • Water with a composition similar to Townsville town water supply	20.8 tonne/day	Stored in skips $12m^3$ /$15m^3$/ $30m^3$ and collected by roll on roll off skips	Approx.2-3 days
5. Drum Scrubber Oversize	80% solids, containing various concentration of • silica ~26% w/w • limestone ~47% w/w • balance, iron oxide, alumina, organic material found with shale ore 20% liquid, • Water with a composition similar to Townsville town water supply	1.0 tonne/day	Stored in skips $1m^3$ and collected by a skip loader	Approx.2-3 days
	Continuous Liquid Waste	**Total = 17.8m^3/day**		
6. Raffinate	pH: 2-4 100% liquid containing: • 80g/L sulphate salt including Fe, Na, Al , • 1000 ppm D70 SX diluent (kerosene like)	10.8m^3per day	Stored in Effluent Storage Tanks and Collect by	Approx.2 days

			~20m^3 Tanker Trucks	
7. SX Spent Wash	pH: 2-4 100% liquid containing: • <1% sulphuric acid • <10g/L sulphate salts	0.5m^{3}per day	Stored in Effluent Storage Tanks and Collect by ~20m^3 Tanker Trucks	Approx.2 days
8. Product Filtrate	pH 2-4 100 % liquid containing: • <1% sulphuric acid • Sodium ~ 5.4 %	1.9 m^3 per day	Stored in Effluent Storage Tanks and Collect by ~20m^3 Tanker Trucks	Approx.2 days
9. Scrubber Bleed	pH 2-4 100 % liquid containing: • <0.1% sulphuric acid • Trace of aluminium and sodium	4.6 m^3 per day	Stored in Effluent Storage Tanks and Collect by ~20m^3 Tanker Trucks	Approx.2 days
Intermittent Waste				
10. Sampling waste	General lab wastes containing various metal salt, organics, and solids residue	Allow for 1000L IBC per week	Stored in Effluent Storage Tanks and Collect by ~20m^3 Tanker Trucks	Approx.1-2 weeks

In addition to the above process plant and laboratory generated waste, the operation of the facility will also generate general waste, some recyclable, through functions such as operations deliveries (packaging waste) and through the general use of the administration and operations building.

Waste is also expected to be generated during the construction period of the facility, including delivery packaging and pallets, and general construction material off-cuts (steel, timber, other materials).

Refer Section 5 for details on the planned management and disposal of the waste categories outlined above.

4.2 Regulated Waste Assessment/ Hazardous Material

The Environmental Protection Regulation (2019) specifies waste categories as summarised below:

- Category 1 regulated waste (highest risk)
- Category 2 regulated waste (moderate risk)
- Non-regulated waste/general waste

Some examples of Category 1 and 2 wastes relevant to the facility as listed below:

Category 2 (moderate risk):

- Acidic solutions and acids in solids form
- Basic (alkaline) solutions and bases (alkalis) in solid form
- Non-toxic salts, including, for example, saline effluent
- Oil and water mixtures or emulsions, or hydrocarbons and water mixtures or emulsions
- Organic solvents, other than halogenated solvents, including, for example, ethanol
- vanadium compounds

Category 1 (highest risk):

- filter cake, other than filter cake waste generated from the treatment of raw water for the supply of drinking water
- oxidising agents

Regulated wastes require a more stringent management requirements than unregulated wastes. It is the waste generators' responsibility to identify, categorise and track the wastes.

For the assessment completed in this report, apart from the tailings and drum scrubber oversize solid waste (non-regulated / benign general waste), the wastes generated from the facility are assumed to be a mix of Category 1 and 2.

4.3 Third-Party Waste Disposal Facility

It is proposed that a third-party waste disposal service provider is engaged to support the development of the site waste management strategy. Hence, Prudentia has approached Cleanaway managers in their Townsville office to review the disposal options of the following wastes:

1. Leach Residue
2. Impurity Residue
3. Tailings
4. Process solids wastes
5. Raffinate
6. Product filtrate
7. Scrubber liquid bleed
8. General acidic waste (5% sulphuric acid)
9. General alkaline waste (5% caustic, 5% ammonia and 100g/L ammonium salt).
10. Treated process liquid wastes (neutralised liquid wastes)

Key outcomes identified from this exercise are:

- Receipt and disposal of neutralised liquid waste is preferred.
- Cleanaway had not been able to provide a quote for disposal of alkaline wastes.
- Cleanaway is able to receive solids waste in skips (as long as there is no free liquid that could leak during transport).
- Cleanaway can provide options for 10kL or 20kL collection on a schedule or adhoc basis.
- Lift on / lift off bins are available in $6m^3$ and $12m^3$. Roll on / roll off bins are available in $12m^3$, $15m^3$ and $30m^3$.

It is further noted that a licensed contractor such as Cleanaway or another waste disposal contractor would also be proposed to remove and dispose of the non-regulated (tailings) waste. This provides opportunity to streamline the removal of regulated and non-regulated waste from the facility.

Following this Prudentia had formulated a process liquid waste treatment strategy in Section 5.1 and defined the storage requirements for solids waste in Section 5.2.

5 Waste Management Strategy

5.1 Process Liquid Waste

A request for information from Cleanaway identified two key outcomes driving the liquid waste strategy:

1. Cleanaway does not have capability to handle alkaline wastes; therefore, alkaline waste must be neutralised prior to disposal, and
2. Cleanaway does have capability to handle acid waste: however, there is a substantial cost saving by neutralising onsite prior to disposal, hence this is the basis.

The following strategy is proposed for the neutralisation of process liquid wastes:

- Two acidic waste treatment are provided. The tanks will be operating batchwise in a parallel arrangement to allow for manual sampling of the neutralised wastes for QA/QC purposes. There are no alkaline waste produced on-site based on the mass balance model however it is suggested that a similar arrangement is allowed for due to the flexibility nature of the facility.
- Then the neutralised waste is transferred to a common filter feed tank and the operator can initiate the filter sequence to remove the precipitations that resulted from the neutralisation process. The solid waste is collected in a skip bin and stored on-site.
- The filtrate is stored in the filtrate tank to allow for a final check of the quality (e.g. clarity and colour) before transferring to the storage tanks.
- Two storage tanks were allowed for segregation of neutralised wastes if required. The waste will be collected by tanker trucks which are self-loading (with pump on board).

A Block Flow Diagram (BFD) is provided below for reference:

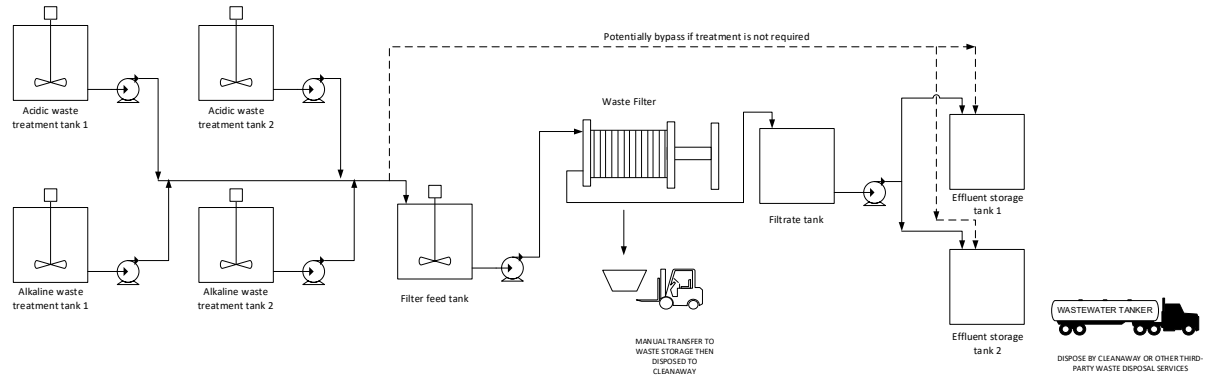


Figure 5-1 Process Liquid Waste Treatment BFD

The proposed tank sizes are summarised in the table below:

Tanks	Quantity	Tank sizes	Residence time (Based on mass balance model)
Acidic Waste Treatment Tank	2	$9m^3$ each	9 hours
Alkaline Waste Treatment Tank	2	$3m^3$ each	9 hours
Filter feed tank	1	$9m^3$	9 hours
Filtrate Tank	1	$9m^3$	9 hours
Effluent Storage Tanks	2	$12m^3$ each	23 hours (1.9 days)

5.2 Process Solids Waste

Regarding regulated waste, there is no apparent benefit to further process waste solids based on the information provided by Cleanaway. Therefore, it is proposed that the solid wastes are stored in skip bins as is, with delineation of waste, and removed by the waste disposal service provider.

The proposed solids storage arrangement is as follows:

- 1 x 10 tonne and 2 x 2.5 tonnes skips for solid storage
- A tailing bunker with a capacity of 75 m3 (105 m3 with FEL management)

5.3 Bund Water

Bund water is collected in various process bunds and directed to either the acidic waste or alkaline waste tanks (based on the expected material pH) and treated as per described in Section 5.1

5.4 Waste Movement and Storage Area

Figure 5-2 illustrates the movement of waste solids to storage areas and the process of liquid effluent from the treatment area to the effluent storage tanks. The red lines represent leach filter residue solid waste movement, the yellow lines represent the reject and impurity removal filter residue movement, the green line will be offspec concentrate stored with or near the tailings, and the blue arrow is liquid waste storage.

Section 4.1 further details the quantum and frequency of these expected waste removal movements.

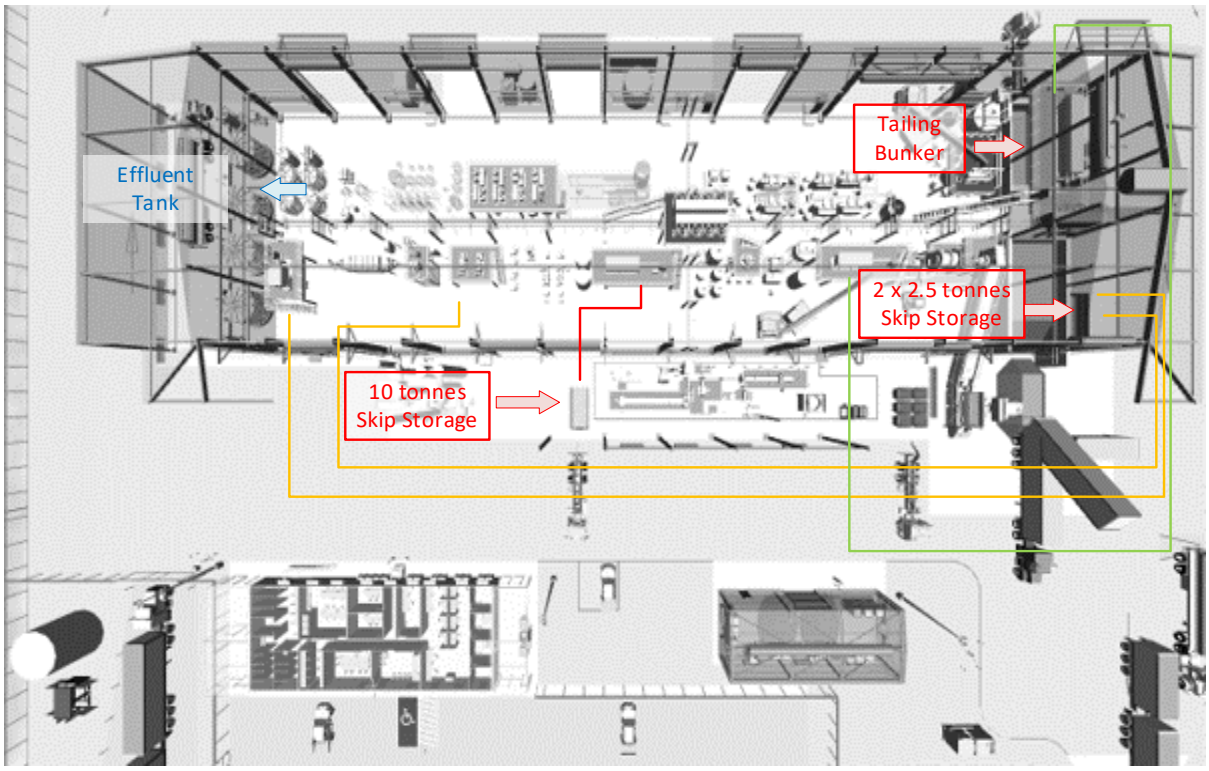


Figure 5-2 QRCUF Site Layout – On-Site Waste Movements

5.5 General Waste

General waste generated through the day-to-day use of the operations buildings will be captured and stored in the general and recyclable waste bins located within the refuse yard adjacent to the main administration building. The waste in these bins will be collected via front-loader garbage truck on an as-required (e.g. weekly) basis via the public carpark.

Non-typical waste generated through the operation of the facility (e.g. material off-cuts resulting from ongoing maintenance of the facility) would be assessed on a case-by-case basis, generally managed through the use of skip bins provided and removed by licensed operators.

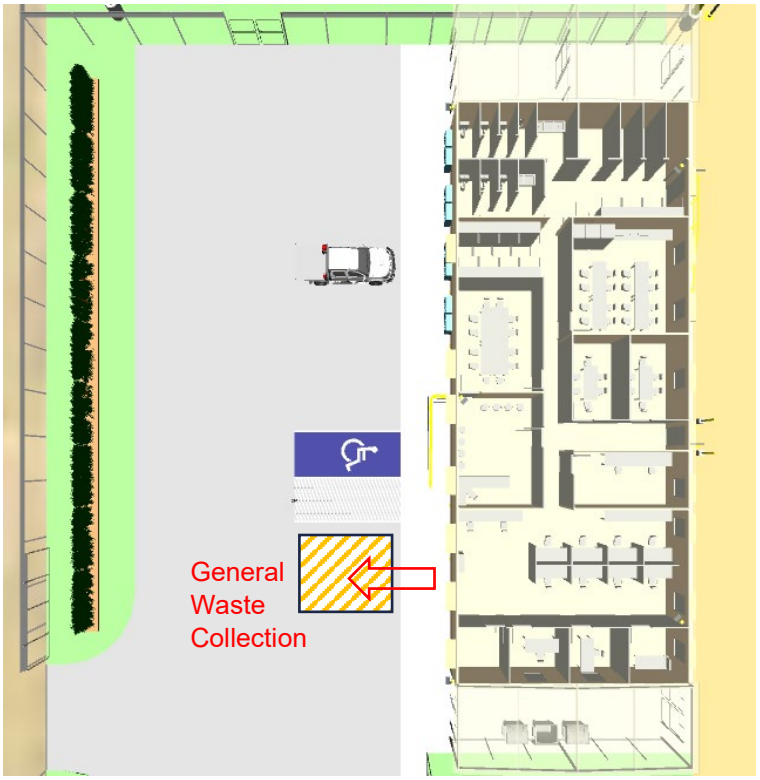


Figure 5-3: QRCUF General Waste Collection

During the construction period, waste generated from construction activities and deliveries will be managed and disposed of consistent with relevant industry practice – i.e.:

- Generated waste will be temporarily held within appropriate delineated skip bins (e.g. metal, general, timber) and delivery pallets will be stored in a designated area ready for truck load-out.
- Area supervisor will assess the generated waste at regular intervals to coordinate removal from site and replacement with new (empty) skip bins as required.

6 References

Environmental Protection Regulation (2019)

https://www.business.qld.gov.au/running-business/environment/waste-management/regulated-waste/classification

Disclaimer

Sedgman Prudentia (Prudentia) has, in preparing this Report, exercised due care, using its professional judgment and reasonable care. No warranty is provided or implied by Prudentia, its employee's, sub-contractors or directors as to the opinions, information, findings, observations, conclusions, estimates or values in the Report. The Report is to be read in the context of the methodology, procedures and techniques used, as well as the assumptions, and the circumstances and constraints under which the Report was written. Where information, documents, samples and/or assumptions (if any) supplied by the Client or others has been used it has been assumed that the information, documents, samples and/or assumptions are accurate and relevant unless otherwise stated.

Recipients of this Report, including third parties, are responsible for assessing the relevance and accuracy of the information, findings, observations and conclusions set out in this Report, as well as the information, documents, samples and/or assumptions (if any) provided by the Client or others that were used by Prudentia. Third parties who rely upon the Report do so at their own risk and Prudentia will not be liable for any loss, damage, cost or expense incurred or arising with respect to such reliance.

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: AP2024/012

Queensland Government

1.1 QUEENSLAND RESOURCES COMMON USER FACILITY

LEGEND

1. Open planting areas
2. Open turfed areas
3. Street trees
4. 2m screen planting along eastern boundary
5. Carpark planting
6. Proposed development buildings
7. Hardstand

Building awning extents

Scale 1:1000 @ A3

0 2 5 10 25 50

N

1.2 PLANTING PALETTE

Street / Carpark Trees

CUPANIOPSIS anacardioides - street / carpark tree

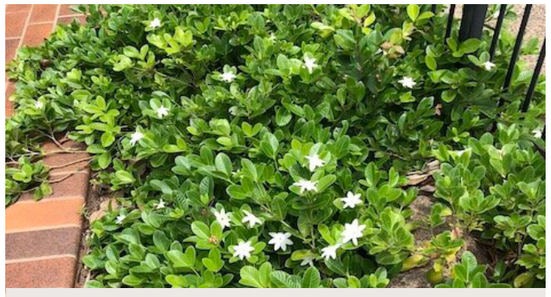
GREVILLEA baileyana - street / carpark tree

Screening Shrubs

SCAEVOLA taccada

SOPHORA tomentosa

Groundcovers



GARDENIA psidioides

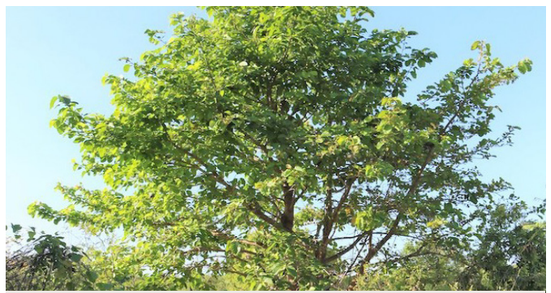
LOMANDRA hystrix

LIRIOPE muscari

OPHIOPOGON intermedians

Planting Area Trees

TERMINALIA sericocarpa - planting area trees



NAUCLEA orientalis - planting area trees

NOTE:

Soil prep (Planting):

Mulch:

Imported weathered pine chip bark

Depth: 100mm - Refer to specifications for details.

_____

Horizon A:

Soil Classification: Landscape Soils (on Grade) per section 5.1 of AS4419 (2018).

Organic matter: Medium Organic Content Per Table 1 of AS4419 (2018) Phosphorus:

Low Phosphorus Per Table 1 of AS4419 (2018)

pH: Neutral Soil Per section 5.2 of AS4419 (2018)

Soil Grade: Sandy loam, fine Sandy Loam or Loam in accordance with table K1 of

AS4419 (2018)

Depth: 300mm consolidated depth

Or equal plant media certified as "fit for purpose" by qualified soil scientist, agronomist

or analyst in accordance with the specifications and approved by the Contract

Administrator.

_____

Horizon B: Ripped in-situ subsoil with addition of:

- gypsum @ 1000g/m2
- sulphur @ 100g/m2

Confirm subgrade additions with site specific soil testing.

Soil prep (Turf):

Species: Cynodon dactylon 25mm thick – First grade, 100% cover.

_____

Horizon A:

Soil Classification: Soils for turf and lawns Per section 5.1 of AS4419 (2018).

Organic matter: Percentage to requirements of "Sport Fields" Per Table

3 of AS4419 (2018).

Phosphorus: levels to requirements of "Sport Fields" Per Table 3 of AS4419 (2018)

pH: Neutral Soil Per section 5.2 of AS4419 (2018)

Depth: 100mm consolidated depth

Or equal plant media certified as "fit for purpose" by qualified soil scientist, agronomist or analyst in accordance with the specifications

and approved by the Contract Administrator.

_____

Horizon B: Ripped in-situ subsoil with addition of:

- gypsum @ 1000g/m2
- sulphur @ 100g/m2

Confirm subgrade additions with site specific soil testing.

Irrigation Strategy:

To TCC Irrigation specification - SPEC-PPL-CW-01 Rev 7

Carpark Tree Requirements:

1 per 6 Parks to TCC - SC6.4.12.5 (7)

Queensland Resources Common User Facility (QRCUF)

Air Quality Impact Assessment

RPS

Level 8/31 Duncan St, Fortitude Valley QLD 4006

Prepared by:

SLR Consulting Australia

Level 16, 175 Eagle Street, Brisbane QLD 4000,
Australia

SLR Project No.: 623.030270.00003

3 March 2025

Revision: V2.2

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: AP2024/012

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
V2.2	03 March 2025	G. Starke	F. Rahaman	G. Starke
V2.1	10 December 2024	J. Boreham	G. Starke	G. Starke
V2.0	18 September 2024	G. Starke	F. Rahaman	F. Rahaman
V1.0	20 May 2024	D D'Souza	G. Starke	G. Starke
	Click to enter a date.			
	Click to enter a date.			

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 RPS (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.

Table of Contents

Tables in Text

Figures in Text

1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by RPS AAP Consulting Pty Ltd (RPS) to undertake an air quality impact assessment to inform an application for a State Development Area (SDA) application for a Research and Technology Industry associated with the Queensland Resources Common User Facility (QRCUF, the Development).

The purpose of the assessment is to evaluate the air quality impacts associated with the proposed Development on neighbouring receptors.

2.0 Project Description

The Queensland Government plans to develop the QRCUF to support demonstration scale trials of processing methods and technologies for critical minerals and rare earth elements. The objective in developing the QRCUF is to accelerate the development of commercial projects, promote investment in advanced mineral manufacturing opportunities, enable development of supply chain and supporting industries, and position Queensland's resources industry for long-term, sustainable growth over the next 30 years.

QRCUF is intended to be a flexible, modern, efficient, and environmentally responsible mineral processing demonstration facility capable of processing a variety of ores to extract and produce high purity critical mineral chemical products. It will be designed with a focus initially on processing ores to produce high purity chemical products of vanadium, with future allowance for additional functionality for cobalt, molybdenum-rhenium, and rare earth elements (REE). Processing of other ores and materials may be accommodated over time.

2.1 Site Location

The Development will be based in Townsville, with construction and operation at 109 Penelope Road, Stuart (described as Lot 14 on SP 338024) within the Cleveland Bay Industrial Park (see **Figure 1**), approximately 6.5 km south of Townsville city centre. The site is bordered by a watercourse and residential zoning to the west as well as Special Purpose zoned lots 82, 96, 110 and 124 and Penelope Road to the east. Special Purpose zoned lots 131 and 91/77 are located to the north and south respectively. The special Purpose zone corresponds to the Townsville State Development Area which is intended to accommodate a range of industrial uses, including those which support or have a nexus to mineral processing.

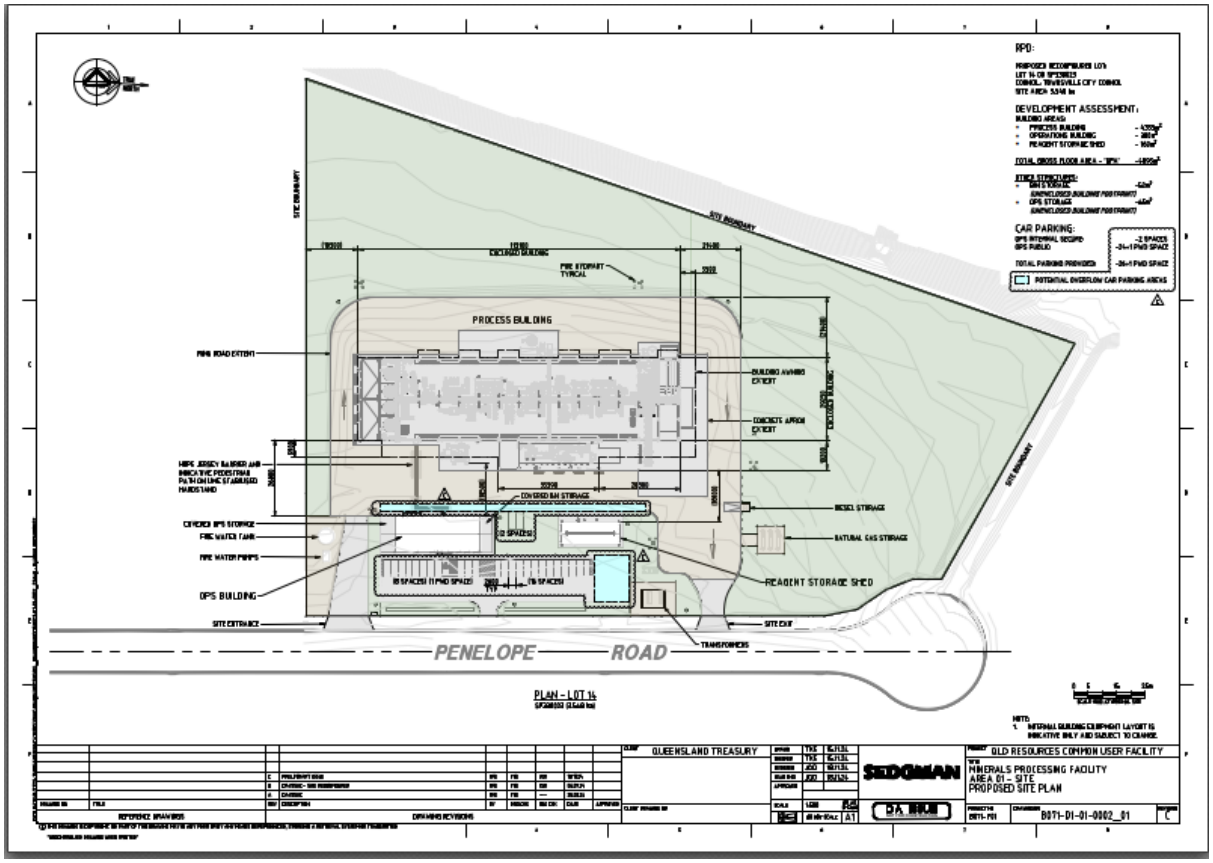
The proposed site layout for the facility is shown in **Figure 2** and incorporates the following primary features:

- Mineral processing facility (enclosed shed)
- Office and services building
- Site ancillaries including:
    - Gas and diesel storage
    - Reagent storage
    - Solid waste storage areas
    - Fire water pump station, hydrants and water storage
    - Electrical pad-mount transformer and substation
    - Site entry/ exits for heavy and light vehicles

- Light vehicle parking
- Heavy vehicle turning and unloading areas
- Fenced and gated compound

Figure 1 Location of Proposed Development Site

Figure 2 Proposed Site Layout – Stage 1



2.2 Proposed Activities

A detailed description of the proposed process is still being developed at this stage. However, the process will generically include the following key steps (shown schematically in **Figure 3**):

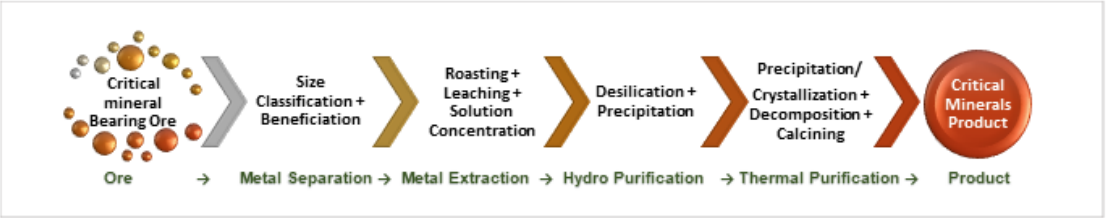
- Ore material will be delivered to site via truck and stored in an enclosed area of the facility.
- A front-end loader will retrieve the ore from the stockpile and load it into a hopper that will feed a conveyor.
- The conveyor will feed the material into a drum scrubber as the first step of the metal separation process. Oversized material will be discharged, and the remaining material will continue through the process where it will go through classification, dewatering, flotation and finally concentrate thickening and filtering. Tailings will be collected through this stage, thickened and sent to tailing storage.
- The metal extraction phase will include concentrate dryer and roasting, regrind, leaching, neutralisation and solvent extraction. LPG gas will be combusted to provide heat required for these operations. Off-gas will be created during drying and roasting, and also during the leaching process. The off gas will be sent to a gas scrubbing system.
- The product will then enter the hydro purification stage to remove impurities.

- The product will then enter the thermal purification process, where the product will be precipitated out of solution, dried, and roasted. LPG gas will be combusted to provide heat required for these operations. Off-gas produced during drying and roasting will be sent to a gas scrubbing system.
- Throughout the process waste product will be collected and sent to effluent treatment. Effluent treatment will produce solid and liquid waste. Waste product will be sent to waste storage where it is collected by a licensed waste contractor for disposal.

It is noted that all operations described above will be conducted within an enclosed shed.

The QRCUF is anticipated to operate in approximate 2-week campaigns followed by a period of downtime either due to future customer change-over, waiting for future customers or no demand. During the campaigns operations are expected to be 24 hours per day.

Figure 3 Draft Mineral Recovery Process



3.0 Identified Emission Sources and Air Pollutants

Based on proposed activities described in **Section 2.2**, the sources of air emission identified for the Development are discussed below -

- Air emissions generated by operations on site will be captured and treated via a gas scrubber and baghouse system prior to release via a stack.
- All material handling activities are proposed to be conducted in enclosed sheds thus significant emissions from these activities are not anticipated.
- Vehicle movements anticipated on site include truck and light vehicle movements and forklift operations. However, these emissions will be managed by the Site by minimising idling times and installing signage to turn off engines while loading/unloading etc. Furthermore, all areas accessed by these vehicles will be either paved or hard stand rather than dirt which will further mitigate any potential for particulate emissions due to vehicle movements. Given this, potential air quality impacts associated with vehicle movements within the site can be considered to be minimal and therefore have not been considered any further in this assessment.

Based on these considerations, the air emissions released via the stack after treatment using proposed baghouse and venturi gas scrubber has been identified to be the key source of air emissions associated with the Development. These emissions are discussed in detail below.

3.1 Air Emissions Released via Stack

The following gas feeds and pollutant contained in each feed are anticipated to be generated from the proposed operations:

- **Duty 1 Feed – from operations such drum scrubber and Run of Mine Ore (ROM) handling sent to Baghouse for treatment:**
  - Particulate matter
- **Duty 2 Feed – from operations such as drying and roasting, sent to venturi gas scrubber:**
  - Particulate matter
  - Oxides of nitrogen ($NO_{x)}$)
  - Sulfur Oxides ($SO_{x)}$)
  - Total Volatile Organic Compounds (VOC)
  - Ammonia (NH_3)

A description of these pollutants is provided below -

- Oxides of nitrogen (NO_x): NO_x is a mixture of gases that are composed of nitrogen and oxygen. The most toxicologically significant compound is nitrogen dioxide (NO_2). Other gases belonging to this group are nitric oxide (NO), nitrous oxide (N_2O) and nitrogen pentoxide (N_2O_5). The majority of NO_x (90 to 95%(v/v)) generated by the combustion of fossil fuels is in the form of NO, with NO_2 contributing the remaining 5 to 10%(v/v) along with traces of N_2O. However, the NO reacts in the atmosphere to form NO_2 as the plume travels downwind.
- Sulfur oxides (SOx): Emissions of SOx from fossil fuel combustion are directly proportional to the sulfur content of the fuel. Sulfur dioxide (SO_2) and Sulfur trioxide

(SO_3) are the main components of SOx. SO_3 readily combines with water to give sulfuric acid (H_2SO_4)

- Particulate matter: Small quantities of particulate matter are formed during gas combustion, predominantly in the fine particulate size range, from carry-over of non-combustible trace constituents in the fuel and lubricating oil and as products of incomplete combustion.

  From a health and nuisance impact perspective, particles are classified primarily by size, as TSP (total suspended particulates), PM_{10} (particulate matter with an aerodynamic diameter up to 10 microns (µm)) and $PM_{2.5}$ (particulate matter with an aerodynamic diameter up to 2.5 µm).

  Emissions of TSP have the potential to result in nuisance impacts due to increased rates of dust deposition in the surrounding area.

  Human health effects of dust tend to be associated with particles with an aerodynamic diameter of 10 µm or less (≤ PM_{10}). These smaller particles tend to remain suspended in the air for longer periods and can penetrate into the lungs. The $PM_{10-2.5}$ fraction (coarse fraction) is termed “thoracic particles”. These particles are inhaled into the upper part of the airways and lung. $PM_{2.5}$ particles are fine particles that are inhaled more deeply and lodge in the gas exchange region (alveolar region) of the human lung and are termed “respirable dust”.

  It is noted that the $PM_{2.5}$ fraction is often associated with combustion emissions, thus only this fraction has been considered further for this source.

- Volatile Organic Compounds (VOCs): VOCs is a collective term used to describe organic carbon-based compounds with the ability to enter the atmosphere as a vapour. Due to the ubiquitous nature of organic compounds emitted from natural and anthropogenic processes, there is a myriad of organic compounds that fall under the definition of VOCs. The environmental, human-health and amenity (i.e. odour) impacts of ambient concentrations of VOCs depend on the composition of the gases, hence there are no ambient air quality criteria for “Total VOCs”, only for selected key individual VOC constituents.

- Ammonia (NH_3): NH_3 is a corrosive gas, and the severity of health effects depends on the dose of gas inhaled. Exposure to high concentrations of NH_3 in air causes immediate burning of the eyes, nose, throat and respiratory tract and can result in blindness, lung damage or death.

SLR was provided with the anticipated emission rates for these pollutants as well as removal efficiency for the air treatment equipment. This information is summarised in **Table 1**.

Importantly, from a nuisance perspective, no odour emissions are anticipated from the proposed operations. It is noted that only pollutants and emission rates provided were considered in the modelling.

Table 1 Emissions and treatment efficiency anticipated from proposed operations

Pollutant	Feed Source	Treatment Method	Untreated Emission rate estimated by preliminary process design (kg/h)	Expected removal efficiency (%) [a]	Treated Emissions (kg/h)
Particulates	Duty 1 Feed	Baghouse	25	99 [b]	0.25
	Duty 2 Feed	Venturi gas scrubber	0.29	99 [c]	0.003
NO_2			4.7	90	0.47
SO_2			4.5	90	0.45
NH_3			1.16	99 [d]	0.012
VOCs			0.05	90	0.005
H_2SO_4 Mist/SO_3			2.92	90 [e]	0.29

(a) It is noted that the expected removal efficiency is based on conservative assumptions for these technologies unless mentioned otherwise
(b) Based on PM control efficiency of 99% for baghouse filters as per *Chapter 11.24 Metallic Minerals Processing* (US EPA 1995)
(c) Based on PM_{10} control efficiency of 99% as detailed in Table 17 of the *Emission Estimation Manual for Non-Ferrous Metal Manufacture* (NPI 2001)
(d) Since NH_3 is hygroscopic and highly soluble in water, with the venturi scrubber the removal efficiency is expected to be >99%
(e) All SO_3 contained in gas stream will turn into H_2SO_4

4.0 Regulatory Framework

4.1 Queensland Environmental Protection Act 1994 (EP Act)

The *Environmental Protection Act 1994* (EP Act) enables the framework for environmental assessments to be developed in Queensland. The EP Act is applicable to all members and bodies in the community, including industry and government. It provides a method for government departments to incorporate environmental factors into their decision-making process.

A summary of the objective of the EP Act is as follows:

> *The object of the Environmental Protection Act 1994 is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.* (EPP (Air) Explanatory Notes, General outline)*.*

There is a general environmental duty to prevent and minimise environmental harm under section 319 of the EP Act. The EP Act specifically states:

> *A person must not carry out an activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm (the general environment duty).*

To decide the measures required to meet the general environmental duty in accordance with the EP Act, regard must be had to:

- the nature of the harm or potential harm;
- the sensitivity of the receiving environment;
- the current state of technical knowledge for the activity;
- the current state of successful application of the different measures that might be taken; and
- the financial implications of the different measures as they would relate to the type of activity.

The EP Act allows the Environment Minister to produce Environmental Protection Policies, designed to protect environmental aspects in Queensland. The *Environmental Protection (Air) Policy* was developed under this framework in 2008, with the most recent revision being published in September 2019.

4.2 Queensland Environmental Protection (Air) Policy 2019

The *Environmental Protection (Air) Policy 2019* (EPP Air 2019) provides for the management and regulation of commercial and industrial air emissions that could adversely impact on sensitive receptors.

The purpose of the EPP (Air) is summarised below:

> *The purpose of the EPP (Air) is to achieve the object of the Act in relation to the air environment* (EPP (Air) Part 2, Section 3)*. The purpose of this policy is achieved by –*

a) Identifying environmental values to be enhanced or protected; and

b) Stating indicators and air quality objectives for enhancing or protecting the environmental values; and

c) Providing a framework for making consistent, equitable and informed decisions about the air environment.

The environmental values listed in the EPP (Air) that are to be enhanced or protected under the policy are:

a) The qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems; and

b) The qualities of the air environment that are conducive to human health and wellbeing; and

c) The qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and

d) The qualities of the air environment that are conducive to protecting agricultural use of the environment.

Queensland air quality guidelines are published in Schedule 1 of the EPP (Air) to protect the environmental values listed above. The air quality goals prescribed for the key pollutants of concern in this study are shown in **Table 2**.

Table 2 Relevant EPP (Air) 2019 Ambient Air Quality Objectives

Indicator	Environmental Value	Air Quality Objectives (µg/m^3 at 0°C)	Averaging Period
PM_{10}	Health and wellbeing	50	24 hours
		25	1 year
$PM_{2.5}$	Health and wellbeing	25	24 hours
		8	1 year
TSP	Health and wellbeing	90	1 year
NO_2	Health and wellbeing	250	1 hour
	Health and wellbeing	62	1 year
SO_2	Health and wellbeing	570	1 hour
		229	1 day
		57	1 year
	Protecting agriculture	31	1 year
	Health and biodiversity of ecosystems	21	1 year
Benzene	Health and wellbeing	5.4	1 year
Toluene	Health and wellbeing	4.1 mg/m^3	24 hours
		400	1 year
Xylenes (as a total of ortho, meta and para isomers)	Health and wellbeing	1.2 mg/m^3	24 hours
		950	1 year

4.3 NSW Approved Methods (2022)

In the absence of state specific guidelines for toxic pollutants such as H_2SO_4 gas and NH_3, the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* [hereafter the Approved Methods] (NSW EPA 2022) was used to establish ambient air quality guidelines for this Development. These are summarised in **Table 3**.

Table 3 Impact Assessment Citeria for Toxic Air Pollutants defined in the Approve Methods

Substance	Averaging period	Assessment criteria
NH_3	1hour	0.11 mg/m^3 110 µg/m^3
H_2SO_4	1hour	0.018 mg/m^3 18 µg/m^3
Ethylbenzene	1hour	8.0 mg/m^3 8000 µg/m^3

5.0 Existing Environment

5.1 Climate and Meteorology

Local climactic conditions can impact the dispersion of pollutant plumes. Parameters such as temperature, rainfall for its ability to scrub pollutants, wind speed and direction, solar radiation for its heating properties and relative humidity particular interest to air quality assessments. The nearest meteorological monitoring station to the proposed Development Site operated by the Bureau of Meteorology (BoM) is the Townsville Aero automatic weather station (AWS), located approximately 11 km to the northwest. This station (Station ID 032040) was commissioned in 1940 and has long-term meteorological data for the following parameters:

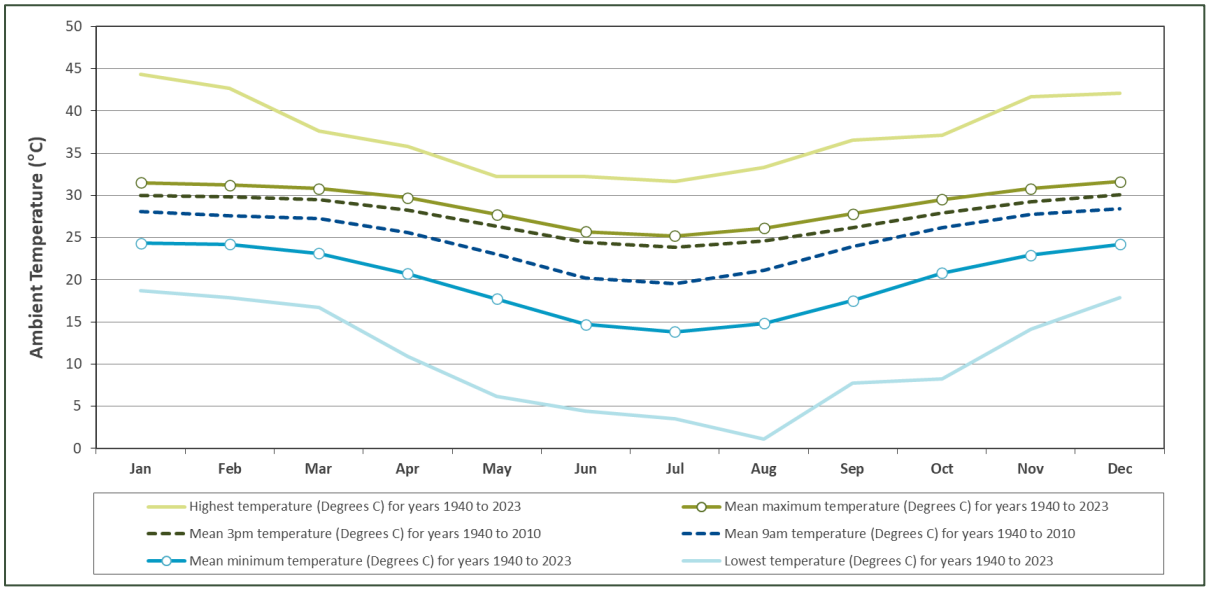
- Temperature (°C)
- Rainfall (mm)
- Solar radiation (MJ/m^2)
- Relative humidity (%)
- Wind speed (m/s) and wind direction (degrees).

A review of the long-term data collected is provided in the following sections below.

5.1.1 Temperature

Long-term temperature statistics for Townsville Aero AWS are summarised **Figure 4**. Mean maximum temperatures range from 25.2°C in winter to 31.6°C in summer, while mean minimum temperatures range from 13.8°C in winter to 24.3°C in summer. Maximum temperatures above 44°C and minimum temperatures less than 1.1°C have been recorded. Temperature impacts plume dispersion through thermal mixing of the atmosphere.

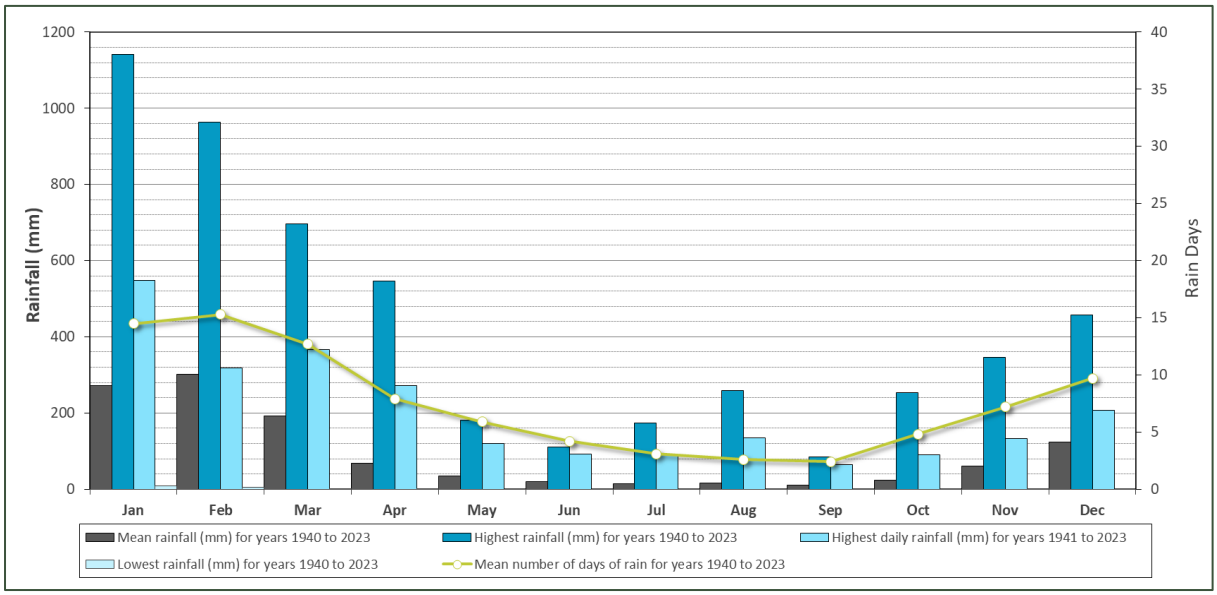
Figure 4 Long-term Temperature Data – Townsville Aero AWS



5.1.2 Rainfall

Long-term rainfall statistics reported for Townsville Aero AWS are summarised in **Figure 5**. Rainfall is relatively high in summer, reducing over autumn into winter, with the lowest average of 10 mm recorded during September. Rainfall has the potential to scrub pollutants from the atmosphere.

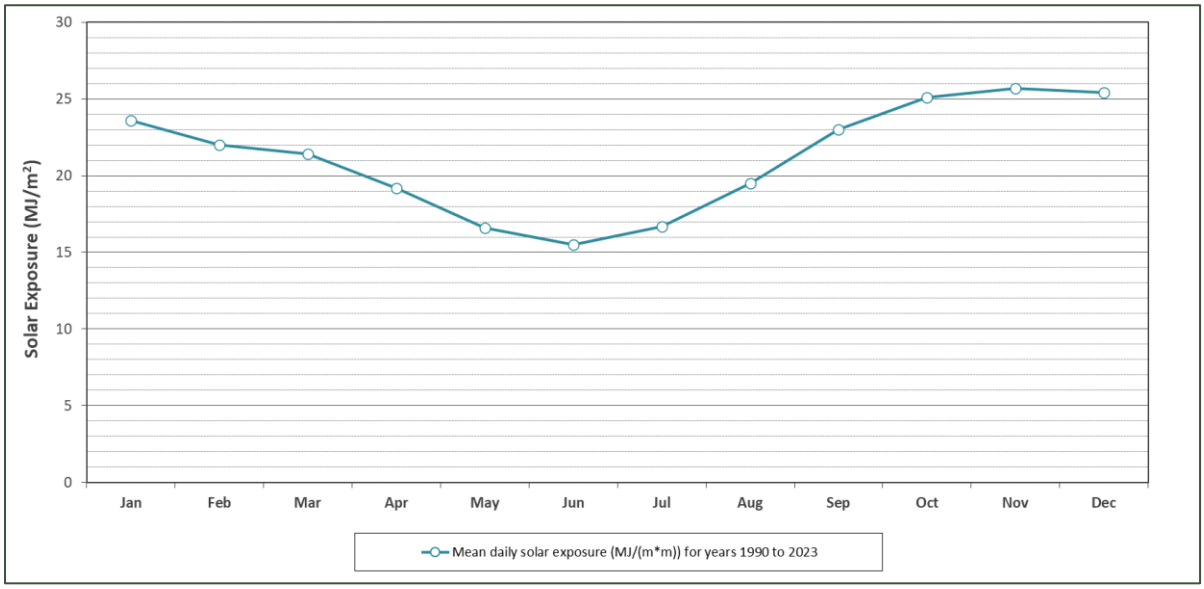
Figure 5 Long-term Rainfall Data – Townsville Aero AWS



5.1.3 Solar Radiation

As would be expected, the mean daily solar exposure levels (see **Figure 6**) are highest in summer (peaking at 25.4 MJ/m^2 in December) and lower in winter (dropping to 15.5 MJ/m^2 in June). Solar radiation impacts the ground temperature which can influence thermal mixing of the atmosphere.

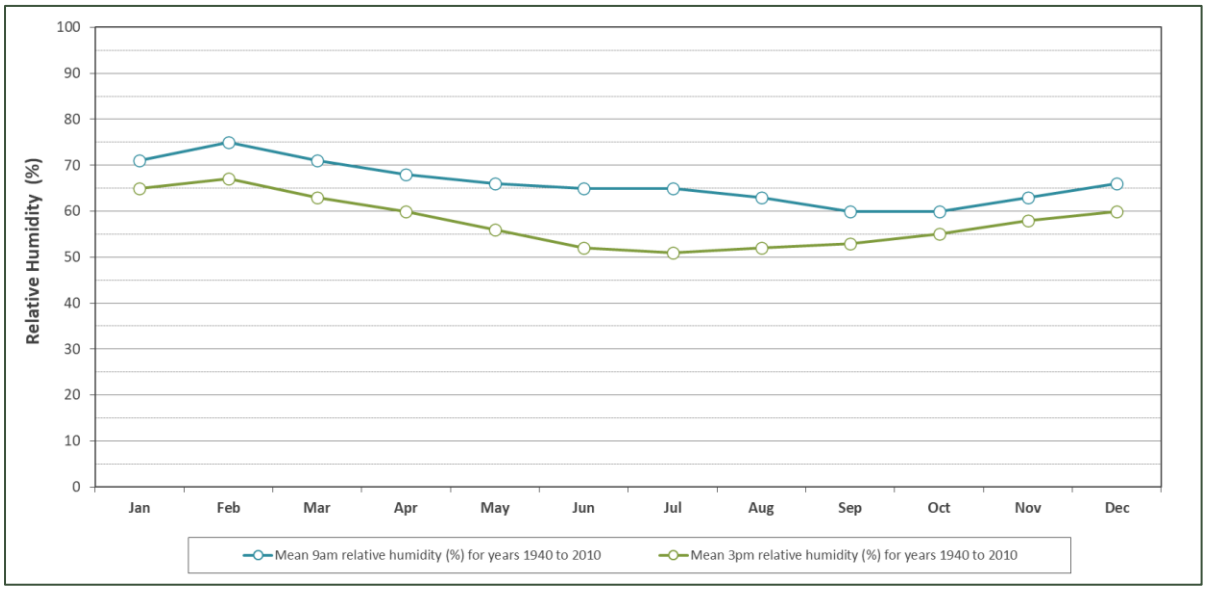
Figure 6 Solar Radiation Data – Townsville Aero AWS



5.1.4 Relative Humidity

Long-term humidity statistics (9 am and 3 pm monthly averages) are summarised in **Figure 7**. Morning humidity levels range from an average of around 60% in mid spring to around 75% in late summer. Afternoon humidity levels are lower, at around 55% in mid spring and 67% in late summer.

Figure 7 Humidity Data – Townsville Aero AWS



5.1.5 Wind Speed and Direction

Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from north). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e., northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing

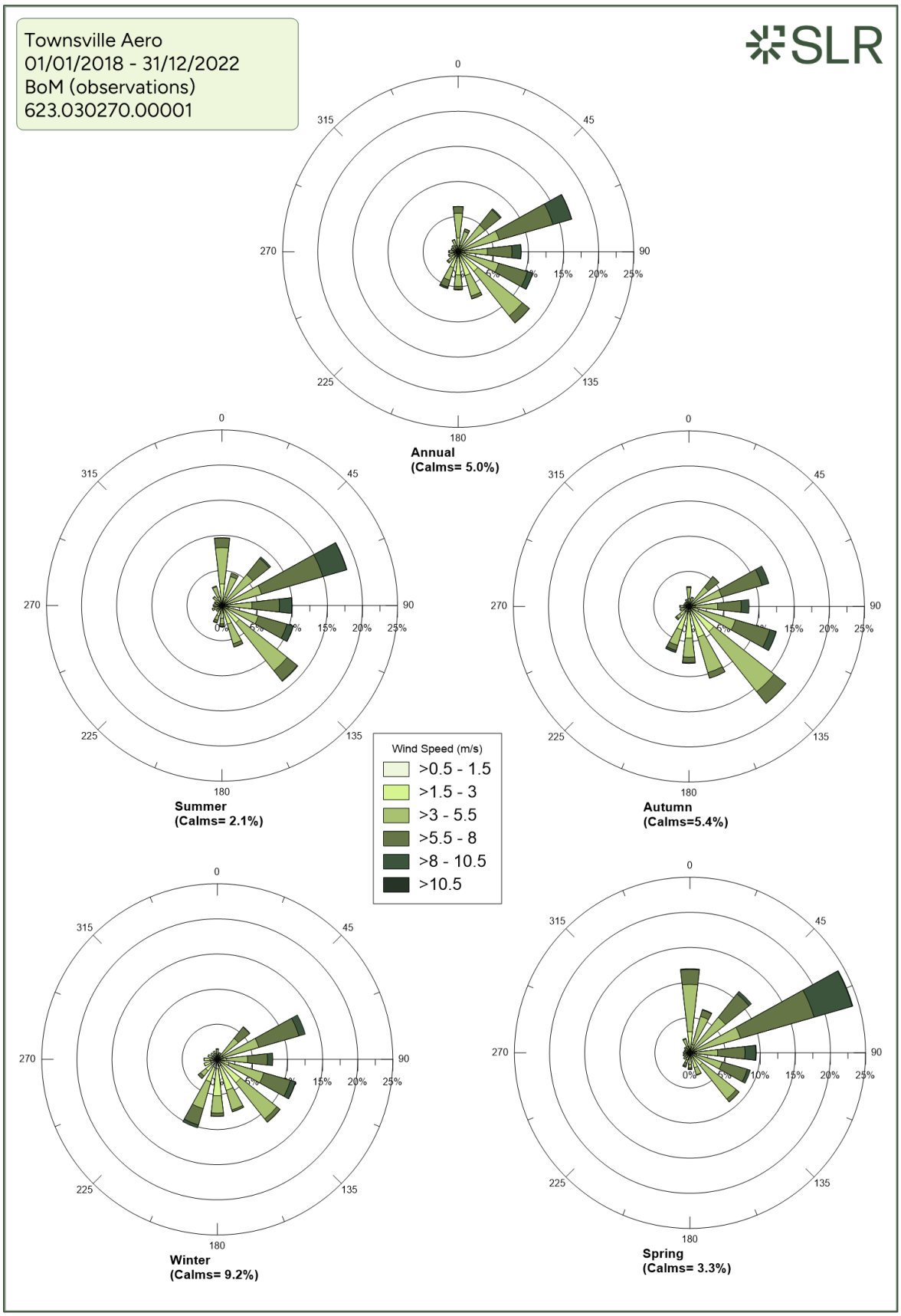
the lightest winds. Thus, it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

Hourly average wind data recorded over the five-year period 2018-2022 by the Townsville Aero AWS are also presented as wind roses in **Figure 8**.

On an annual basis the greatest frequency of wind occurs from the east-northeast direction with winds also occurring on a less frequent basis between the east and southeast directions. A similar distribution of winds occurs during summer. During autumn, winds occur most frequently between the southeast direction, with winds between the east and south occurring at a lower frequency. During winter, winds occur most frequently between the eastern and southern quadrants, with winds between the north and west occurring at lower frequency. Winds during spring are dominated by stronger winds occurring from the east-northeast and north direction, with winds between the east occurring at a lower frequency.

Overall, winds that would blow emissions from the Development Site towards the residences and Big 4 holiday park to the west occur frequently, approximately 35% of the time.

Figure 8 Wind Rose - Townsville Aero AWS (2018 – 2022)



5.2 Sensitive Receptors and Land Zoning

The closest sensitive receptors identified for this study are shown in **Figure 9** and **Table 4**. The nearest receptor (R2) is located approximately 550m to the southwest. Additionally, as shown **Figure 10** the proposed development and the area surrounding it is zoned as Special Purpose, where in the Townsville State Development Area applies (City of Townsville 2020). It is noted that as per the city plan this Development is located on area classified as Medium Impact Industry. Additionally, it is likely the areas within around the Development site may be approved for other industrial uses and thus may contain industrial receptors.

Figure 9 Residential Receptors

Table 4 Residential Receptor Location

Receptor Id	X Coordinate (m)	Y Coordinate (m)
R1	482,963	7,863,742
R2	482,866	7,863,898
R3	482,608	7,863,918
R4	482,477	7,864,046
R5	482,356	7,864,186
R6	482,351	7,864,386

Figure 10 Land Zoning

Source - (City of Townsville 2020)

5.3 Ambient Air Quality

The air quality in the region surrounding the Development Site is influenced by emissions generated by a range of sources, originating from both within and outside of the local area. This includes air emissions from other regional sources in the area and local traffic-generated pollution.

Queensland Government Department of Environment and Science undertakes air quality monitoring at a number of locations, to characterise air quality in the environment and to determine the potential exposure of sensitive receptors to dust and air contaminant emissions.

The North Ward Air Quality Monitoring Station (AQMS) is located approximately 8.5 km north from the Development Site and is the nearest station that monitors particulate matter as well as NO_2. Whilst the Lennon Drive AQMS is located closer to the Site, it is also located in a industrial area and is likely to not be representative of air quality at neighbouring receptors. Hence North Ward has been selected as a background location for this study.

5.3.1 Particulate Matter

A summary of the North Ward AQMS 24-hour average PM_{10} and $PM_{2.5}$ can be seen below in **Figure 11** for the 2022 calendar year. Additionally, a summary of data collected for this year is provided in **Table 5**.

5.3.2 NO_2 and Ozone

Figure 12 presents a summary of 2022 calendar year data for 1-hour average NO_2 from the North Ward AQMS and average 1-hour Ozone (O_3), sourced from the Deception Bay monitoring station in South East Queensland. The data is presented in **Table 5** and **Table 6**. The O_3 data was drawn from the Deception Bay AQMS, in preference to the nearest ozone monitoring station to Townsville located in Memorial Park, Gladstone which recorded relatively lower average concentrations. It was considered the Deception Bay data presented a more conservative approach, which was appropriate for this assessment.

5.3.3 SO_2

A summary of data collected for the 2022 calendar year for 1-hour and 24-hour average SO_2 is provided in **Table 5** and **Table 6.** It is noted that for extended periods of time the measured hourly SO_2 concentration were reported to very low, hence hourly variation of this data is presented as a chart.

Table 5 Air Quality Monitoring Data 24-hour average Summary (2022)

	North Ward AQMS		
	24 - hour average PM_{10} ($\mu g/m^3$)	24 -hour average $PM_{2.5}$ ($\mu g/m^3$)	24- hour average SO_2 ($\mu g/m^3$)
Maximum	71.1	55.1	2.1
Average	15.8	6.1	0.4
70th Percentile	17.1	6.5	0.5

Table 6 Air Quality Monitoring Data 1-hour average Summary (2022)

	North Ward AQMS		Deception Bay AQMS
	1-hour average SO_2 ($\mu g/m^3$)	1- hour average NO_2 ($\mu g/m^3$)	1- hour average O_3 ($\mu g/m^3$)
Maximum	17.2	49.2	134.8
Average	0.4	5.5	40.8
70th Percentile	<0.1	6.2	53.5

Figure 11 North Ward AQMS PM_{10} and $PM_{2.5}$ data (2022)

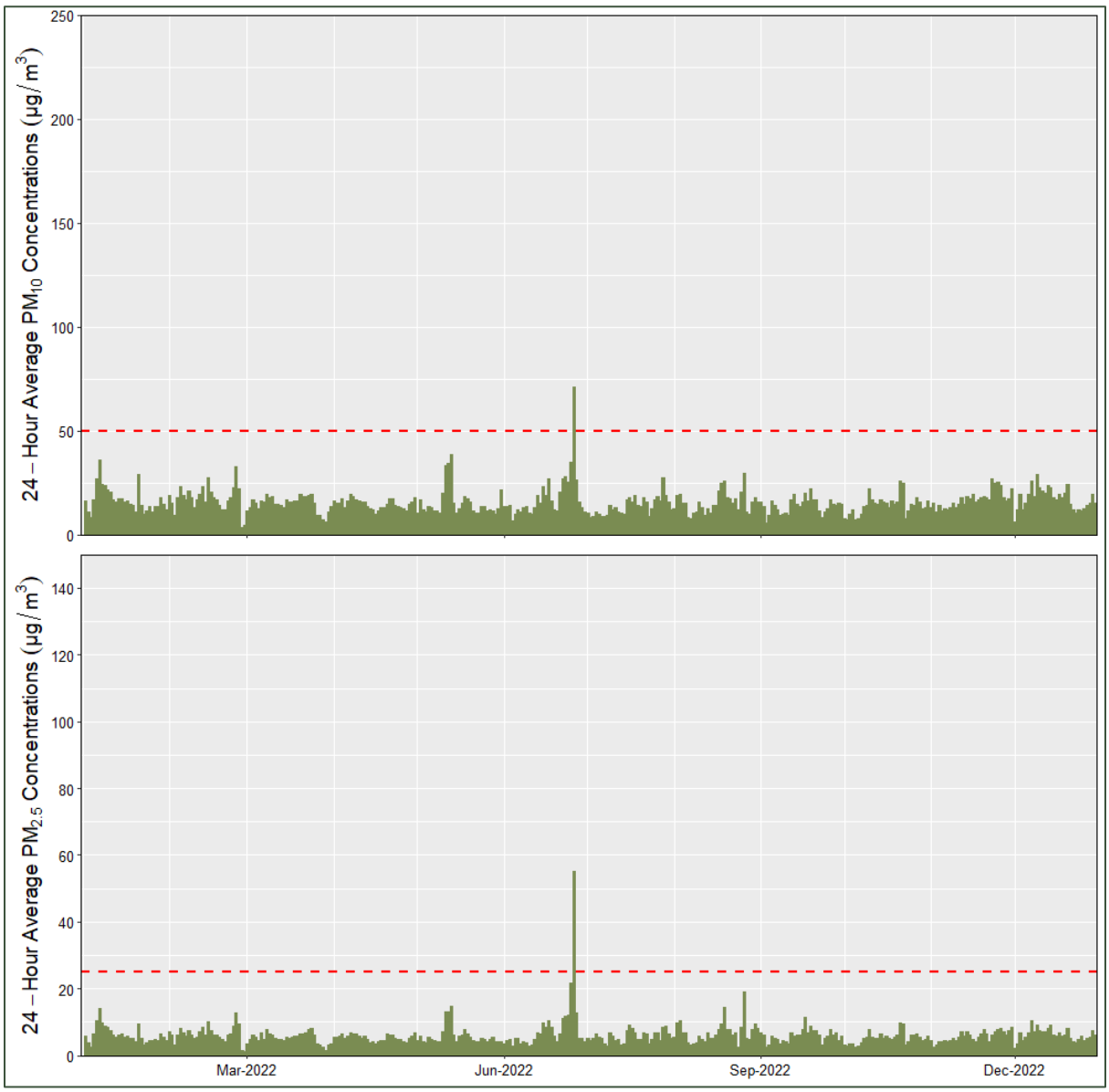
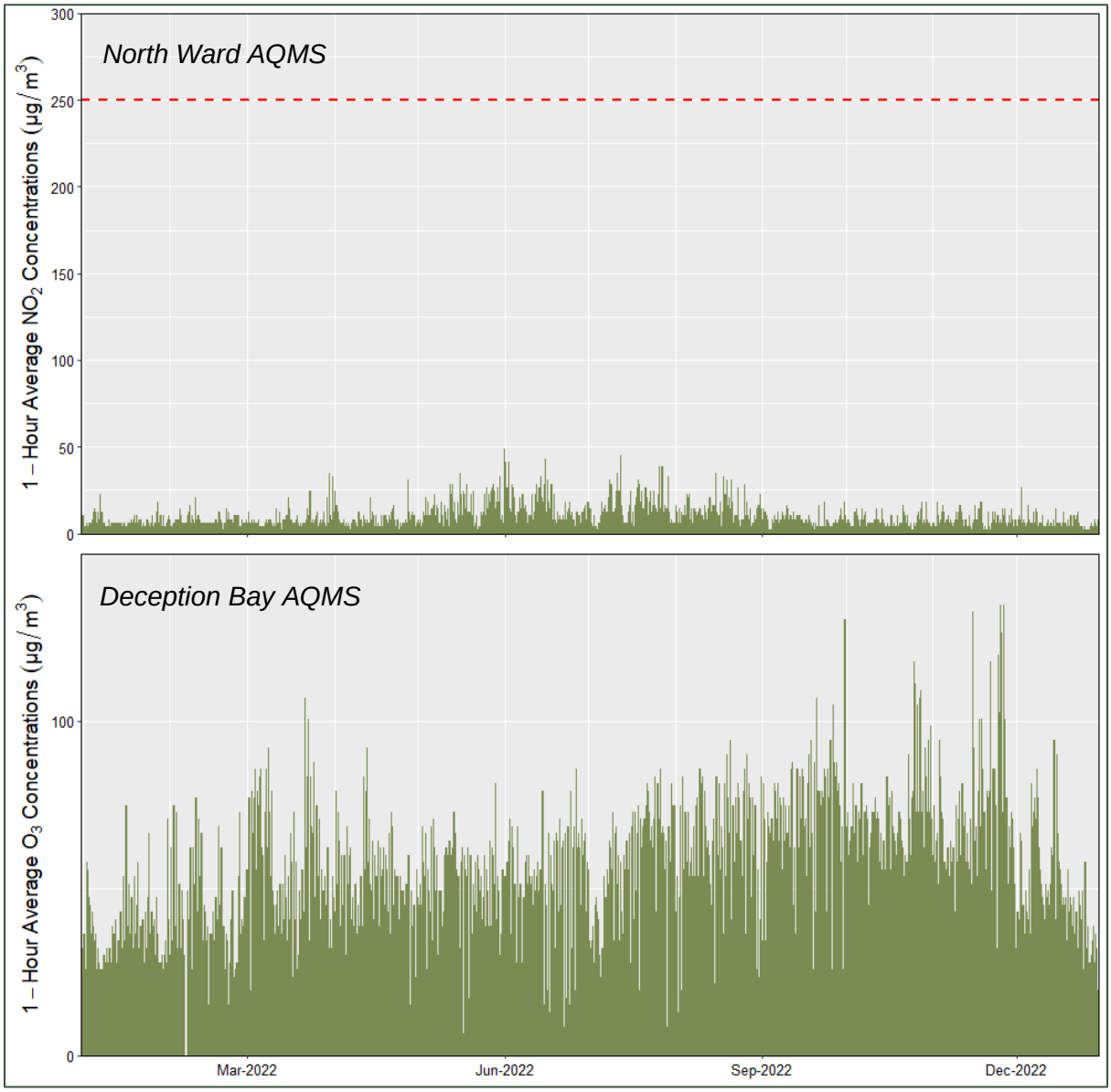


Figure 12 North Ward AQMS NO_2 and Deception Bay AQMS O_3 data (2022)



5.3.4 Adopted Background

The site-representative background ambient air quality concentrations adopted for use in this assessment are summarised in **Table 7**.

Table 7 Adopted Background Data

Pollutant	Averaging Period	Regional Background ($\mu g/m^3$)	Notes
NO_2	1-hour	6.2	70th percentile of North Ward data (2022)
	Annual	5.5	Average of North Ward data (2022)
SO_2	1-hour	17.2	Maximum of North Ward data (2022) as 70th Percentile was estimated to be 0 $\mu g/m^3$
	24-hour	0.5	70th percentile of North Ward data (2022)
	Annual	0.4	Average of North Ward data (2022)
$PM_{2.5}$	24-hour	6.5	70th percentile of North Ward data (2022)
	Annual	6.1	Average of North Ward data (2022)
O_3	1-hour	53.5	70th Percentile of data recorded at Deception Bay

It is noted that no major sources of NH_3 were identified around the proposed development, thus it assumed that NH_3 background concentrations are negligible.

6.0 Assessment Methodology

6.1 Modelling Methodology

6.1.1 Model Selection and Configuration

Emissions from the stack at the proposed facility have been modelled using a combination of TAPM, CALMET and CALPUFF models to predict the potential impacts at ground level receptors. CALPUFF is a transport and dispersion model that ejects “puffs” of material emitted from modelled sources, simulating dispersion and transformation processes along the way. In doing so it typically uses the fields generated by a meteorological pre-processor CALMET, discussed further below. Temporal and spatial variations in the meteorological fields selected are explicitly incorporated in the resulting distribution of puffs throughout a simulation period. The primary output files from CALPUFF contain either hourly concentration or hourly deposition fluxes evaluated at selected receptor locations. The CALPOST post-processor is then used to process these files, producing tabulations that summarise results of the simulation for user-selected averaging periods.

Steady state models assume that meteorology is unchanged by topography over the modelling domain and may result in significant over or under estimation of air quality impacts. The CALPUFF dispersion model has the ability to handle calm wind speeds (<0.5 m/s) and complicated terrain and therefore was considered to be appropriate for this assessment.

6.1.1.1 TAPM

TAPM prognostic model, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) was used to generate the upper air data required for CALMET modelling.

TAPM model predicts wind speed and direction, temperature, pressure, water vapour, cloud, rain water and turbulence. The program allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses) which are subsequently used in the model input to generate 1 full year of hourly meteorological observations at user-defined levels within the atmosphere.

Additionally, the TAPM model may assimilate actual local wind observations so that they can optionally be included in a model solution. The wind speed and direction observations are used to realign the predicted solution towards the observation values. Wind data from surrounding Bureau of Meteorology (BOM) stations (Townsville Airport and Mount Stuart (Defence)) were used to nudge the TAPM predictions. **Table 8** details the parameters used in the TAPM meteorological modelling for this assessment.

Table 8 Meteorological Parameters used for this Study – TAPM

TAPM (v 4.0)	
Number of grids (spacing)	4 (30 km, 10 km, 3 km and 1 km)
Number of grid points	25 x 25 x 35
Year of analysis	2022
Centre of analysis	483,442 m E 7,864,317 m S
Data assimilation	Townsville Airport and Mount Stuart (Defence)

6.1.1.2 CALMET

In the simplest terms, CALMET is a meteorological model that develops hourly wind and other meteorological fields on a three-dimensional gridded modelling domain that are required as inputs to the CALPUFF dispersion model. Associated two dimensional fields such as mixing height, surface characteristics and dispersion properties are also included in the file produced by CALMET. The interpolated wind field is then modified within the model to account for the influences of topography, sea breeze, as well as differential heating and surface roughness associated with different land uses across the modelling domain. These modifications are applied to the winds at each grid point to develop a final wind field. The final hourly varying wind field thus reflects the influences of local topography and land uses.

TAPM generated three-dimensional meteorological data was used as the initial guess wind field and the local topography and land use data for the modelling domain were used to refine the wind field predetermined by TAPM data. **Table 9** details the parameters used in the meteorological modelling to drive the CALPUFF model.

Table 9 Meteorological Parameters used for this Study – CALMET (v 6.2)

CALMET	
Meteorological grid	10 km × 10 km
Meteorological grid resolution	0.1 km
Initial guess filed	3D output from TAPM modelling
Surface station data	No surface data

6.1.2 Meteorological Data

A one year, site-representative meteorological dataset, containing hourly records of key meteorological parameters, has been compiled for the development site using the methodology outlined above. This dataset is based on predicted data collected in the region for the 2022 calendar year, and key characteristics of the meteorological dataset, as relevant to the dispersion of air emissions from the site is presented below.

6.1.2.1 Wind Speed and Direction

A summary of the annual wind behaviour predicted at the development site for the 2022 calendar year is presented as wind roses in **Figure 13**. The wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from North). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e., northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus, it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

Figure 13 indicates that winds predicted at the site predominantly blow from the southeast quadrant followed by lower frequency of winds from the northeast quadrant. The seasonal wind roses indicate that typically:

- In summer and spring, winds are predicted to be predominantly light (0.5 m/s - 3 m/s) and generally blow from the southeastern and northeastern quadrants, with very low frequency of winds from the southwest and northwest quadrants.
- In Autumn and winter, light to moderate (0.5m/s to 5m/s) winds from the southern quadrant are predominant with very low frequency of winds predicted to be blowing from the north.

A wind speed frequency chart is shown in **Figure 14**. This chart shows that the proposed development site is predicted to experience predominantly low to moderate wind speeds (up to 6 m/s).

6.1.2.2 Atmospheric Stability

Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion. The Pasquill-Gifford-Turner (PGT) assignment scheme identifies six Stability Classes, A to F, to categorise the degree of atmospheric stability as follows:

- A = Extremely unstable conditions
- B = Moderately unstable conditions
- C = Slightly unstable conditions

- D = Neutral conditions
- E = Slightly stable conditions
- F = Moderately stable conditions

The meteorological conditions defining each PGT stability class are shown in **Table 10**. The frequency of each stability class predicted by CALMET at the site during the modelling period is presented in **Figure 15**.

The results indicate a high frequency of conditions typical to Stability Class F, with a low frequency of very unstable conditions (Stability Class A). Stability Class F represents moderate stability conditions that tend to inhibit pollutant dispersion at night time.

Figure 13 Seasonal Wind Roses for the Development Site

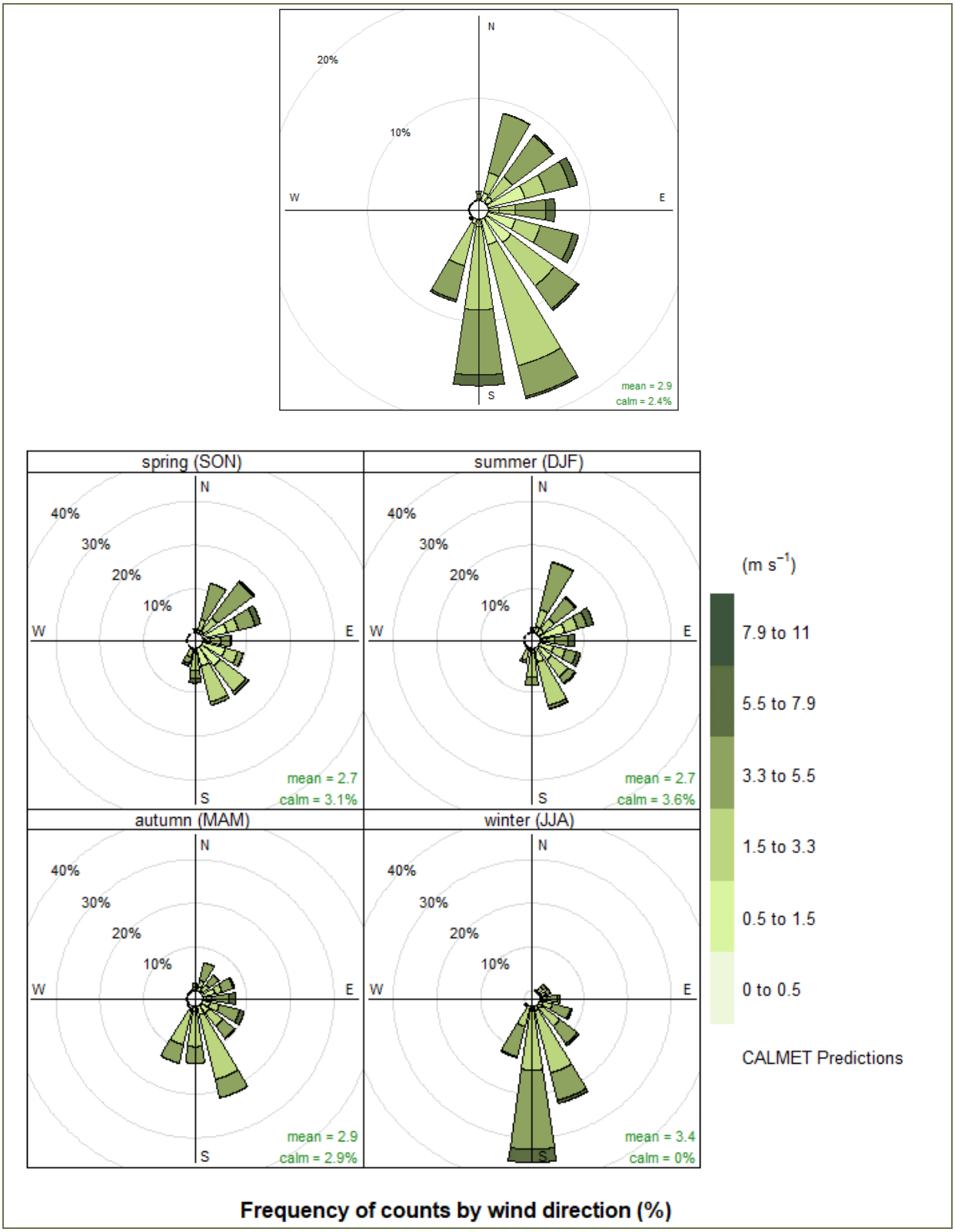


Figure 14 Wind Speed Frequencies at the Development Site (CALMET, 2022)

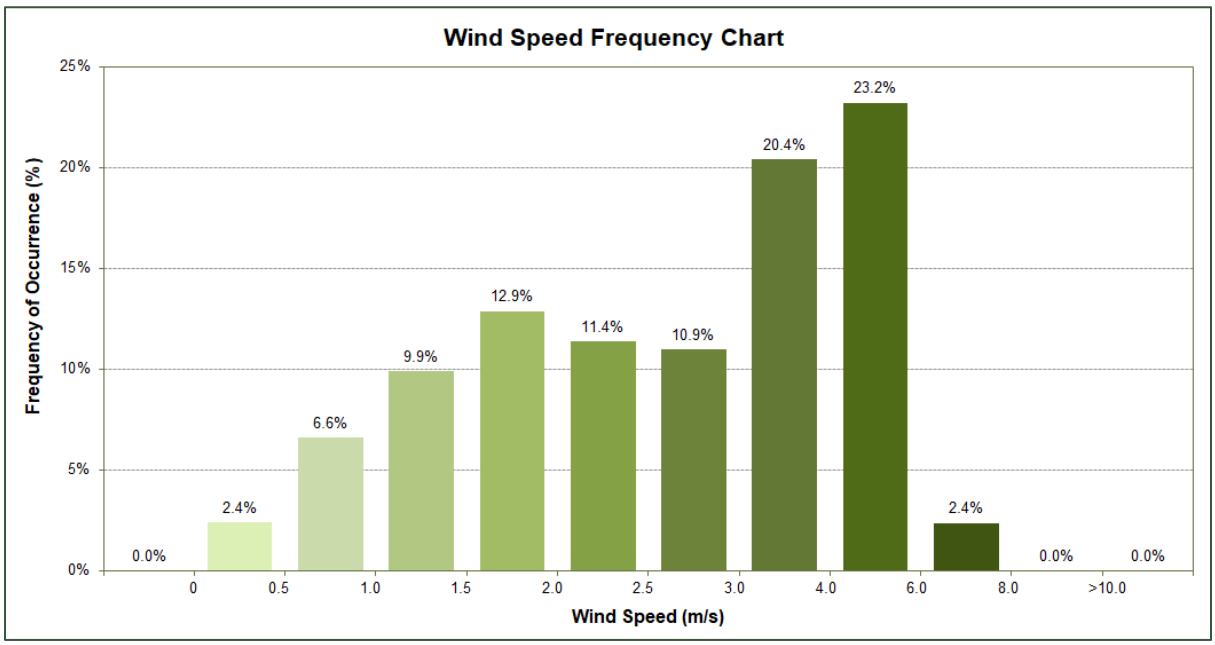


Table 10 Meteorological Conditions Defining PGT Stability Classes

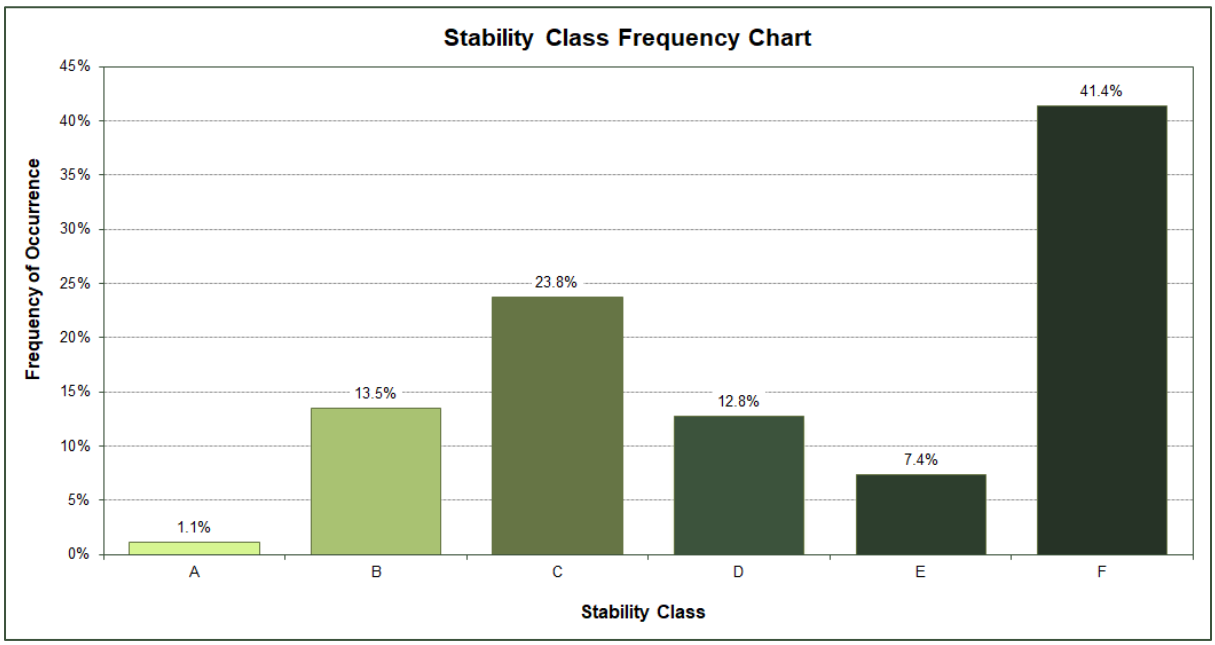
Surface Wind Speed (m/s)	Day-time Insolation			Night-time Conditions	
	Strong	Moderate	Slight	Thin overcast or > 4/8 low cloud	≤ 4/8 Cloudiness
< 2	A	A - B	B	E	F
2 - 3	A - B	B	C	E	F
3 - 5	B	B - C	C	D	E
5 - 6	C	C - D	D	D	D
> 6	C	D	D	D	D

SOURCE: (NOAA 2018)

Notes:

1. Strong insolation corresponds to sunny midday in midsummer in England; slight insolation to similar conditions in midwinter.
2. Night refers to the period from 1 hour before sunset to 1 hour after sunrise.
3. The neutral category D should also be used, regardless of wind speed, for overcast conditions during day or night and for any sky conditions during the hour preceding or following night as defined above.

Figure 15 Stability Class Frequencies at the Development Site (CALMET, 2022)

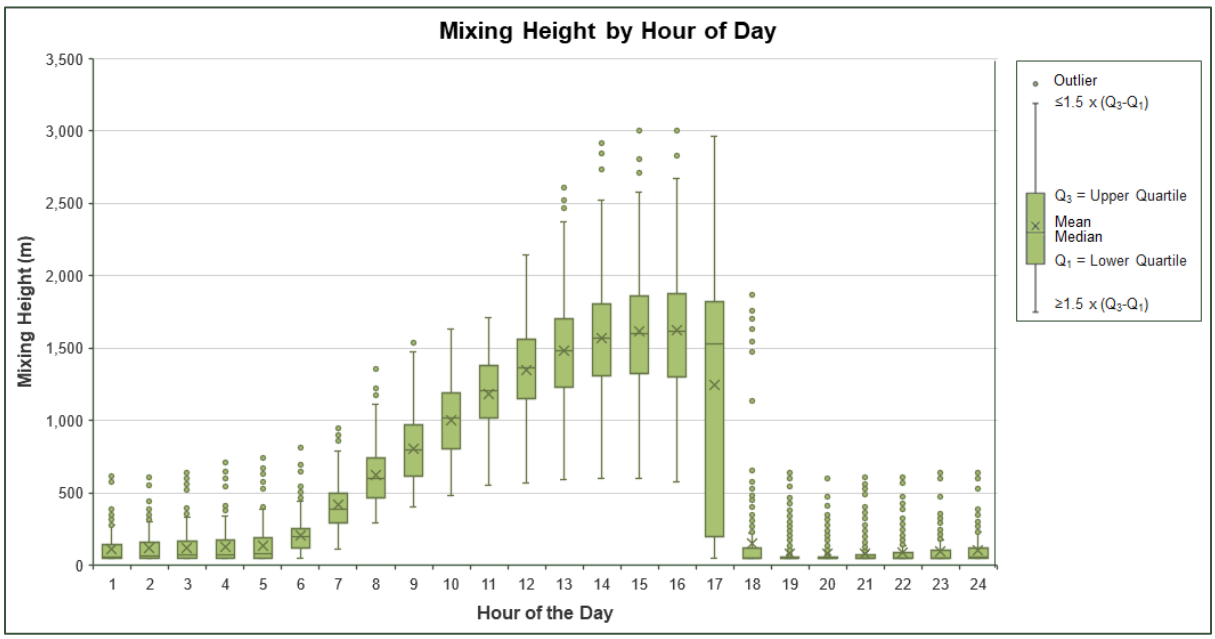


6.1.2.3 Mixing Heights

Diurnal variations in maximum and average mixing depths predicted by CALMET at the site during the 2022 modelling period are illustrated in **Figure 16**.

As would be expected, an increase in mixing depth during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground based temperature inversions and growth of the convective mixing layer.

Figure 16 Predicted Mixing Heights at the Development Site (CALMET, 2022)



6.1.3 Stack Parameters and Modelling Scenarios

The stack parameters provided by RPS based on preliminary design used in this study are presented in **Table 11**.

Table 11 Modelling parameters

Parameter	Data	Unit
Source Location	483,450 E 7,864,360 N	UTM
Flowrate	10,000	Am³/hr
	12,198	m³/hr
Temperature	45	°C
Diameter	0.7	m
Height	15	m
Exit velocity	8.8	m/s
Modelled minimum exit velocity *	6	m/s
* modelled exit velocity is below those provided as it represents a conservative approach		

Emission rates adopted for the modelling as presented in **Section 3.1** are shown in **Table 12** with the assumptions relating to emission mitigation detailed in **Table 13**.

Table 12 Emission Rates Used for Modelling

Pollutant	Modelled Emission Rates	
	kg/h	**g/s**
$PM_{2.5}$	0.25[(a)]	0.07
NO_x	0.47	0.131
SO_2	0.45	0.125
NH_3	0.012	0.0032
VOCs[(b)]	0.0005	0.00014
H_2SO_4/SO_3[(c)]	0.292	0.081

(a) Conservatively assumed all particulate emissions are $PM_{2.5}$

(b) It is noted that as there is no ambient air quality criteria applicable to impacts associated with VOCs emissions, it is conservatively assumed that all VOCs released will be assessed against the benzene criterion defined in **Section 4.0**. Compliance with the benzene criterion is likely to indicate low risk of exceedance of other VOCs.

(c) As mentioned in **Section 3.1**, all SO_3 contained in gas stream will convert to H_2SO_4 when it comes in contact with water. Thus, emission rates presented here represent emissions of H_2SO_4 after this conversion.

Table 13 Emission rate mitigation summary

Pollutant	Emission source	Untreated Emission rate	Reduction Efficiency	Treated Emissions	Modelled Emission Rates
		(kg/h)	(%)	(kg/h)	(g/s)
Particulates as $PM_{2.5}$	Baghouse	25	99	0.25(a)	
	Scrubber	0.29	99	0.003	
Total $PM_{2.5}$				0.253	0.070
NO_2	Scrubber	4.7	90	0.47	0.131
SO_2	Scrubber	4.5	90	0.45	0.125
NH_3	Scrubber	1.16	99	0.0116	0.0032
Volatile Organics	Scrubber	0.05	90	0.0050	0.00014
H_2SO_4 Mist/SO_3	Scrubber	2.92	90	0.292	0.081

(a) Conservatively assumed all particulate emissions are $PM_{2.5}$

(b) It is noted that as there is no ambient air quality criteria applicable to impacts associated with VOCs emissions, it is conservatively assumed that all VOCs released will be assessed against the benzene criterion defined in **Section 4.0**. Compliance with the benzene criterion is likely to indicate low risk of exceedance of other VOCs.

(c) As mentioned in **Section 3.1**, all SO_3 contained in gas stream will convert to H_2SO_4 when it comes in contact with water. Thus, emission rates presented here represent emissions of H_2SO_4 after this conversion.

6.2 Building Downwash

Building downwash is a phenomenon caused by structures near to pollutant emission sources influencing atmospheric turbulence. Airflow is rapidly mixed to the ground as frictional forces and pressure gradients cause stagnations and eddies to develop in the wake of buildings downwind of elevated sources. CALPUFF contains the Prime algorithm, which was used in this study to predict building downwash effects. Influencing building dimensions were calculated using the USEPA's Building Profile Input Program (BPIP).

The proposed buildings at the Development site were included in the modelling to account for potential building wakes. All buildings were modelled with a height of 10 m in the absence of detailed design information.

7.0 Assessment of Potential for Air Impacts

7.1 NO_2

A summary of the predicted incremental and cumulative maximum 1-hour and annual average NO_2 concentrations at the identified nearest residential receptors are presented in **Table 14**.

The modelling results show that the cumulative maximum 1-hour average and annual average NO_2 concentrations are well below the relevant air quality objectives (as per **Section 4.0**) at the identified residential receptors.

In order to assess impacts at neighbouring industrial receptors, predicted maximum off-site impacts are also presented in **Table 14.** It can be observed that impacts at adjacent industrial receptors are also predicted to be below relevant air quality objectives.

The isopleths of predicted incremental 1-hour and annual average NO_2 concentrations are presented in **Appendix A.**

Table 14 Predicted Incremental and Cumulative NO_2 Concentrations

Receptors	Maximum 1-hour Average NO_2 Concentrations		Annual Average NO_2 Concentrations	
	Incremental	Cumulative	Incremental	Cumulative
R1	5.6	11.7	0.2	5.7
R2	5.3	11.5	0.2	5.7
R3	3.7	9.8	0.1	5.6
R4	3.3	9.4	0.1	5.6
R5	3.0	9.2	0.1	5.6
R6	3.0	9.2	0.1	5.6
Max- Offsite	28.3	34.4	2.7	8.3
Guideline	**-**	**250**	**-**	**62**

7.2 $PM_{2.5}$

A summary of predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the identified residential receptors are presented in **Table 15**.

The modelling results show that the cumulative 24-hour average and annual average $PM_{2.5}$ concentrations are well below the relevant air quality objectives (as per **Section 4.0**) at the identified residential receptors as well as at maximum offsite locations (that represent industrial receptors).

The isopleths of predicted incremental 1-hour and annual average NO_2 concentrations are presented in **Appendix A.**

Table 15 Predicted Incremental and Cumulative $PM_{2.5}$ Concentrations

Receptors	Maximum 24-hour Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)		Annual Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)	
	Incremental	Cumulative	Incremental	Cumulative
R1	0.6	7.1	<0.1	<6.2
R2	0.4	6.9	<0.1	<6.2
R3	0.4	6.9	<0.1	<6.2
R4	0.4	7.0	<0.1	<6.2
R5	0.4	6.9	<0.1	<6.2
R6	0.3	6.8	<0.1	<6.2
Max- Offsite	7.1	13.6	1.5	7.6
Guideline	**-**	**25**	**-**	**8**

7.3 SO_2

A summary of the predicted incremental and cumulative maximum 1-hour and24-hour average and annual average SO_2 concentrations at the identified nearest residential receptors are presented in **Table 16**. The modelling results show that the predicted SO_2 concentrations are well below the relevant air quality objectives (as per **Section 4.0**) at the identified residential receptors as well as at maximum offsite locations (that represent industrial receptors).

The isopleths of predicted incremental 1-hour, 24-hour and annual average SO_2 concentrations are presented in **Appendix A.**

Table 16 Predicted Incremental and Cumulative SO_2 Concentrations

Receptors	Maximum 1-hour Average SO_2 Concentrations ($\mu g/m^3$)		Maximum 24-hour Average SO_2 Concentrations ($\mu g/m^3$)		Annual Average SO_2 Concentrations ($\mu g/m^3$)	
	Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
R1	5.3	22.5	1.1	1.6	0.2	0.6
R2	5.1	22.3	0.7	1.2	0.2	0.6
R3	3.5	20.7	0.7	1.2	0.1	0.5
R4	3.1	20.3	0.8	1.3	0.1	0.5
R5	2.9	20.1	0.7	1.2	<0.1	<0.5
R6	2.9	20.1	0.5	1.0	<0.1	<0.5
Max-Offsite	27.1	44.3	45.2	45.7	2.6	3.0
Guideline	**-**	**570**	**-**	**229**	**-**	**57**

7.4 Other pollutants

A summary of the predicted incremental maximum 1-hour average NH_3 and H_2SO_4 concentrations and annual average benzene concentrations at the identified nearest residential receptors are presented in **Table 16**. The modelling results show that the predicted concentrations for these pollutants are well below the relevant air quality objectives (as per **Section 4.0**) at the identified residential receptors as well as at maximum offsite locations (represent industrial receptors).

Table 17 Predicted Incremental Concentrations of Other Pollutants

Receptors	Maximum 1-hour Average NH_3 Concentrations ($\mu g/m^3$)	1-hour Average H_2SO_4 Concentrations ($\mu g/m^3$)	Annual Average Benzene Concentrations ($\mu g/m^3$)
R1	<0.1	3.5	<0.1
R2	<0.1	3.3	<0.1
R3	<0.1	2.3	<0.1
R4	<0.1	2.0	<0.1
R5	<0.1	1.9	<0.1
R6	<0.1	1.9	<0.1
Max-Offsite	0.7	13	<0.1
Guideline	**110**	**18**	**5.4**

8.0 Mitigation Measures

The following additional measures are recommended to further reduce the risk of air quality or nuisance impacts:

- Signage should be displayed to remind drivers to turn off vehicle engines when stationary to minimise exhaust emissions.
- All staff and contractors should be instructed to report any undue pollutant release (including odour) and visible emissions from the exhaust vents to the site manager.
- Ensure paved areas accessed by truck and other heavy vehicles will be maintained to ensure no excessive build up of spilt material.
- The site should be inspected daily and good housekeeping practices employed (e.g. ensuring the timely clean-up of any spills, identifying and rectifying any leaks that could contribute to fugitive emissions, etc.).
- In the event of any complaint, ensure these are investigated as soon as possible so that effective appraisal of the complaint can be carried out by subjective assessment.
- Upon commissioning emission testing from stack is to be conducted. If measured emission parameters are different from those adopted in this study, the assessment may require to be updated to ensure compliance with relevant criteria.

9.0 Conclusion

SLR Consulting Australia Pty Ltd has been engaged by RPS to undertake an air quality impact assessment to inform an application for a State Development Area application for a Research and Technology Industry associated with the Queensland Resources Common User Facility.

Based on preliminary design and emission information provided to SLR, dispersion modelling of these emissions was conducted.

Dispersion modelling of emissions from the Development site showed that predicted impacts at all existing residential receptors and potential future industrial receptors are well below the relevant criteria for all pollutants assessed in this report.

Additionally, mitigation measured were also provided to address any residual impacts from the proposed development. Given the proximity to industrial receptors it is recommended that mitigation measures are adopted, air emission treatment are designed appropriately, maintained and serviced as per manufacturers recommendations.

It is also recommended that emission testing from stack is to be conducted upon commissioning. If measured emission parameters are different from those adopted in this study, the assessment may require to be updated to ensure compliance with relevant criteria.

Based on the findings of this assessment, it is concluded that the proposed operations are unlikely to cause any adverse air quality impacts at the surrounding sensitive receptors and would comply with the relevant ambient air quality guidelines.

10.0 References

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Appendix A Contour Plots Scenario 1 (highest predicted impact scenario)

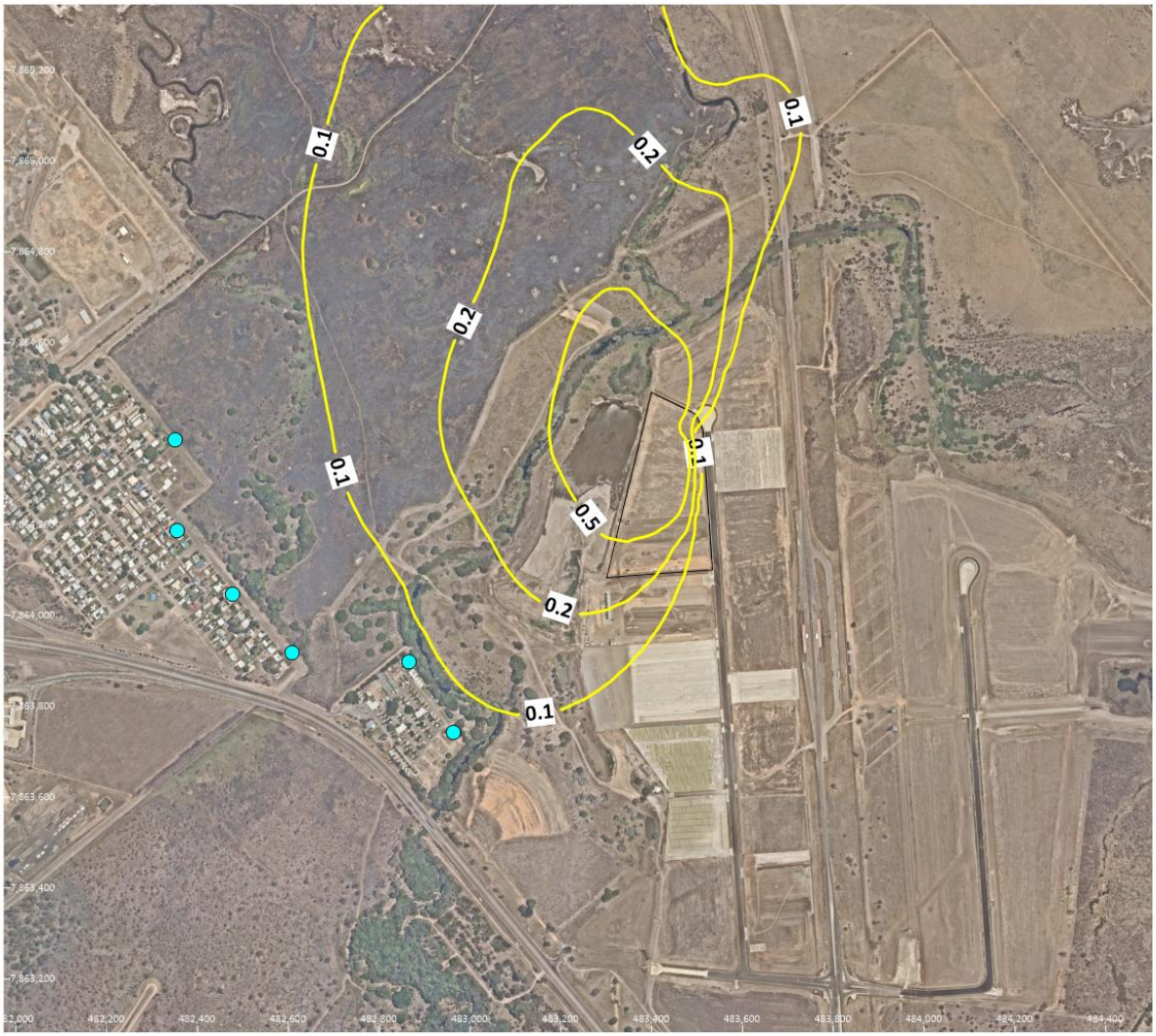
Queensland Resources Common User Facility (QRCUF)

Air Quality Impact Assessment

RPS

SLR Project No.: 623.030270.00003

3 March 2025



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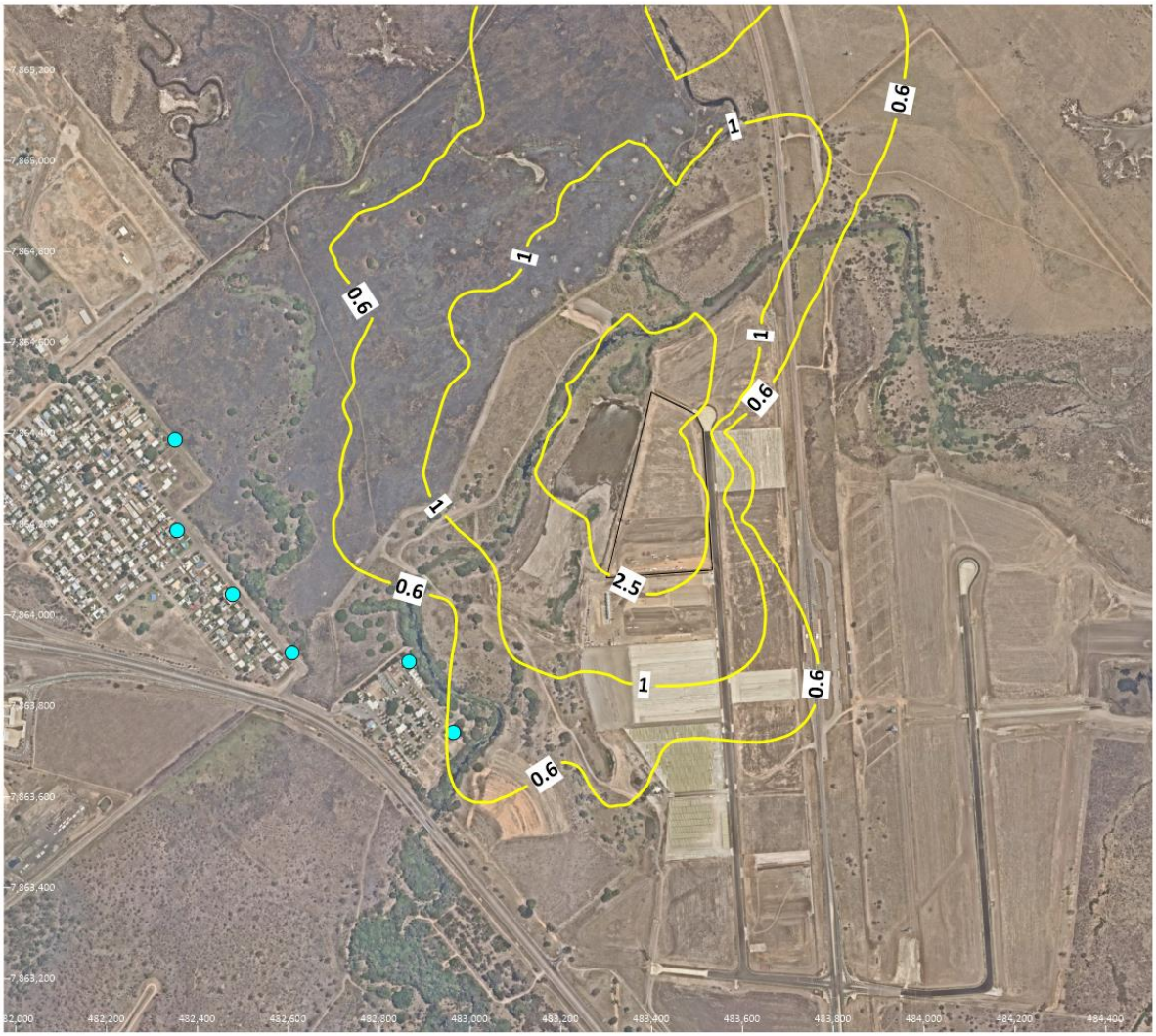
Project Number:	623.030270
Dispersion Model:	CALPUFF
Modelling Period:	2022
Projection:	GDA 1994 MGA Zone 55
Date:	11/09/2024

RPS

Townsville Common User Facility Air Quality Impact Assessment

Incremental Impact

Pollutant	$PM_{2.5}$	Avg Period	Annual	Unit	µg/m³



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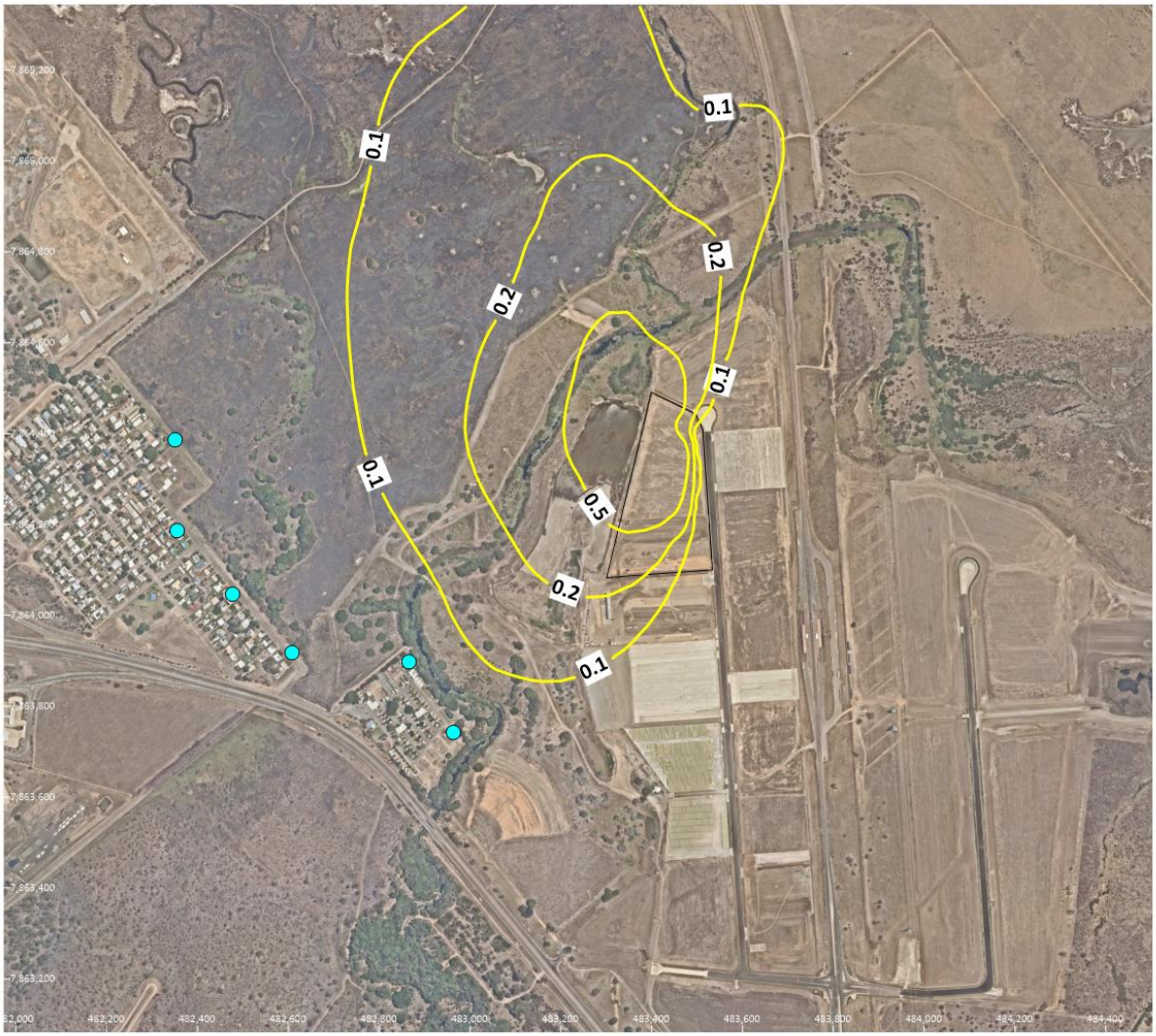
Modelling Period:	2022
Projection:	GDA 1994 MGA Zone 55
Date:	11/09/2024

RPS

Townsville Common User Facility
Air Quality Impact Assessment

Incremental Impact

Pollutant	$PM_{2.5}$	Avg Period	24-Hour	Unit	µg/m³



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Date:	11/09/2024

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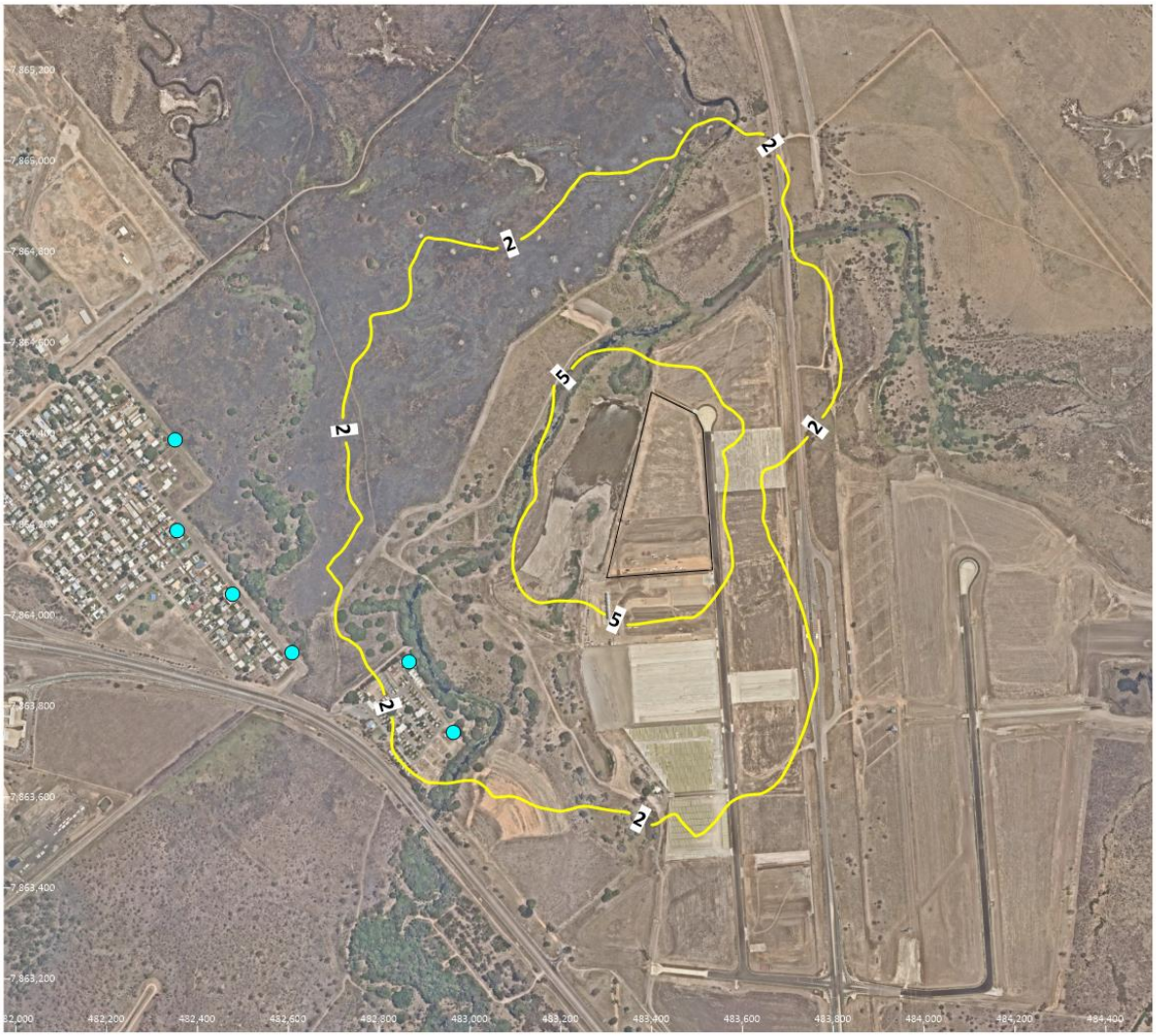
Townsville Common User Facility
Air Quality Impact Assessment

Incremental Impact

Pollutant	NO_2	Avg Period	Annual	Unit	µg/m³



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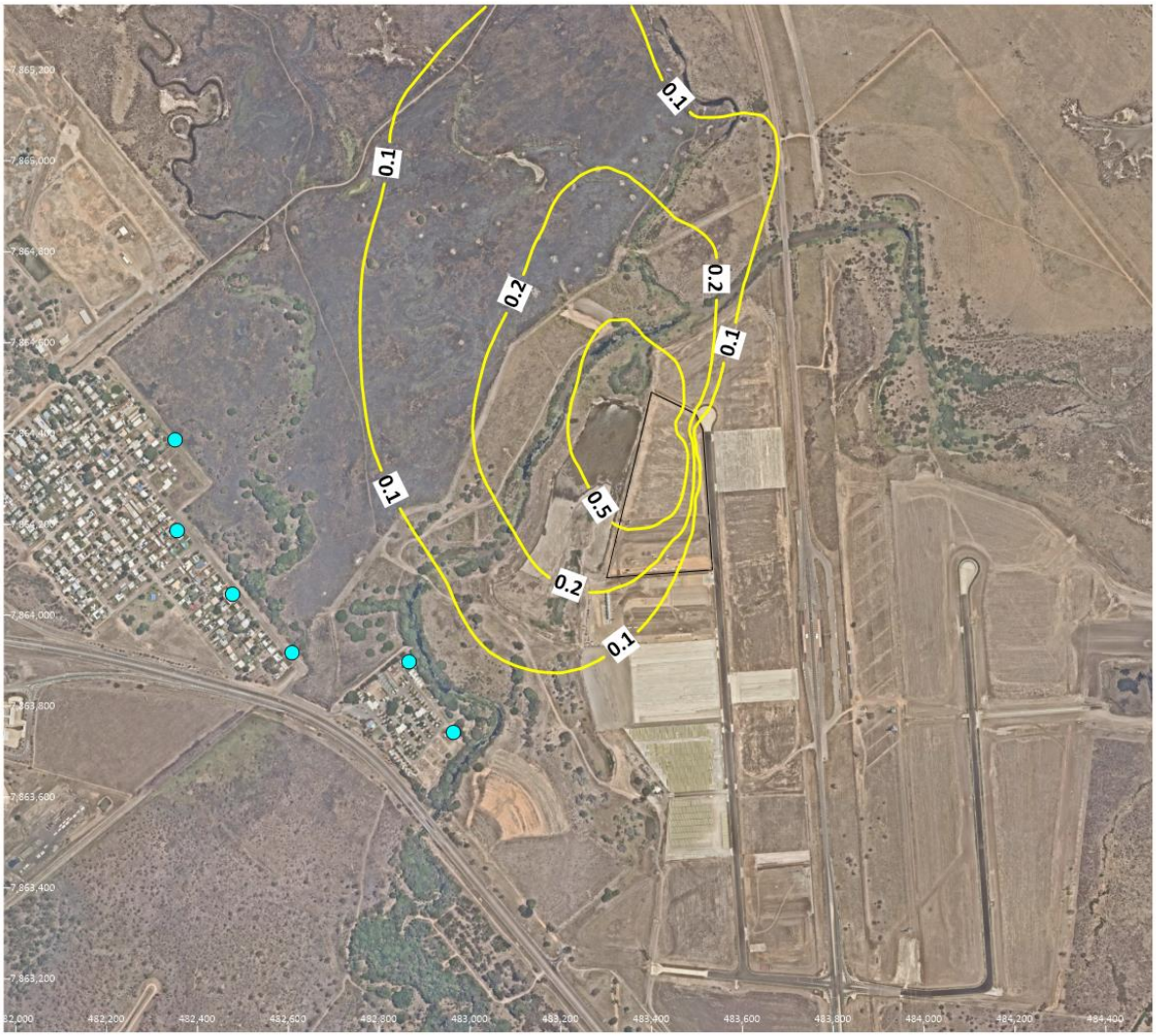
Townsville Common User Facility
Air Quality Impact Assessment

Incremental Impact

Pollutant	NO_2	Avg Period	1-Hour	Unit	µg/m³



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Date:	11/09/2024

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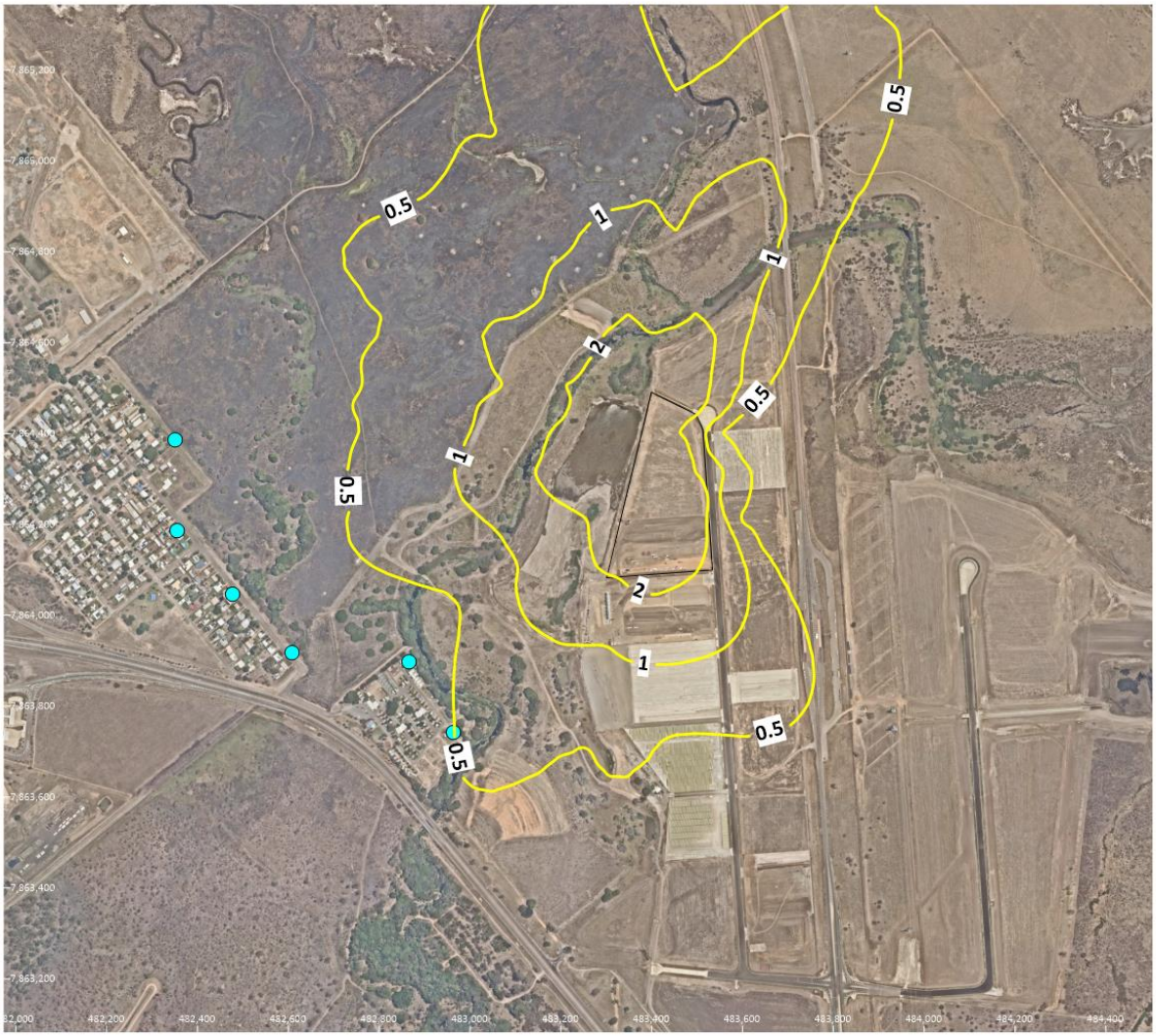
Townsville Common User Facility
Air Quality Impact Assessment

Incremental Impact

Pollutant	SO_2	Avg Period	Annual	Unit	µg/m³



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Projection:	GDA 1994 MGA Zone 55
Date:	11/09/2024

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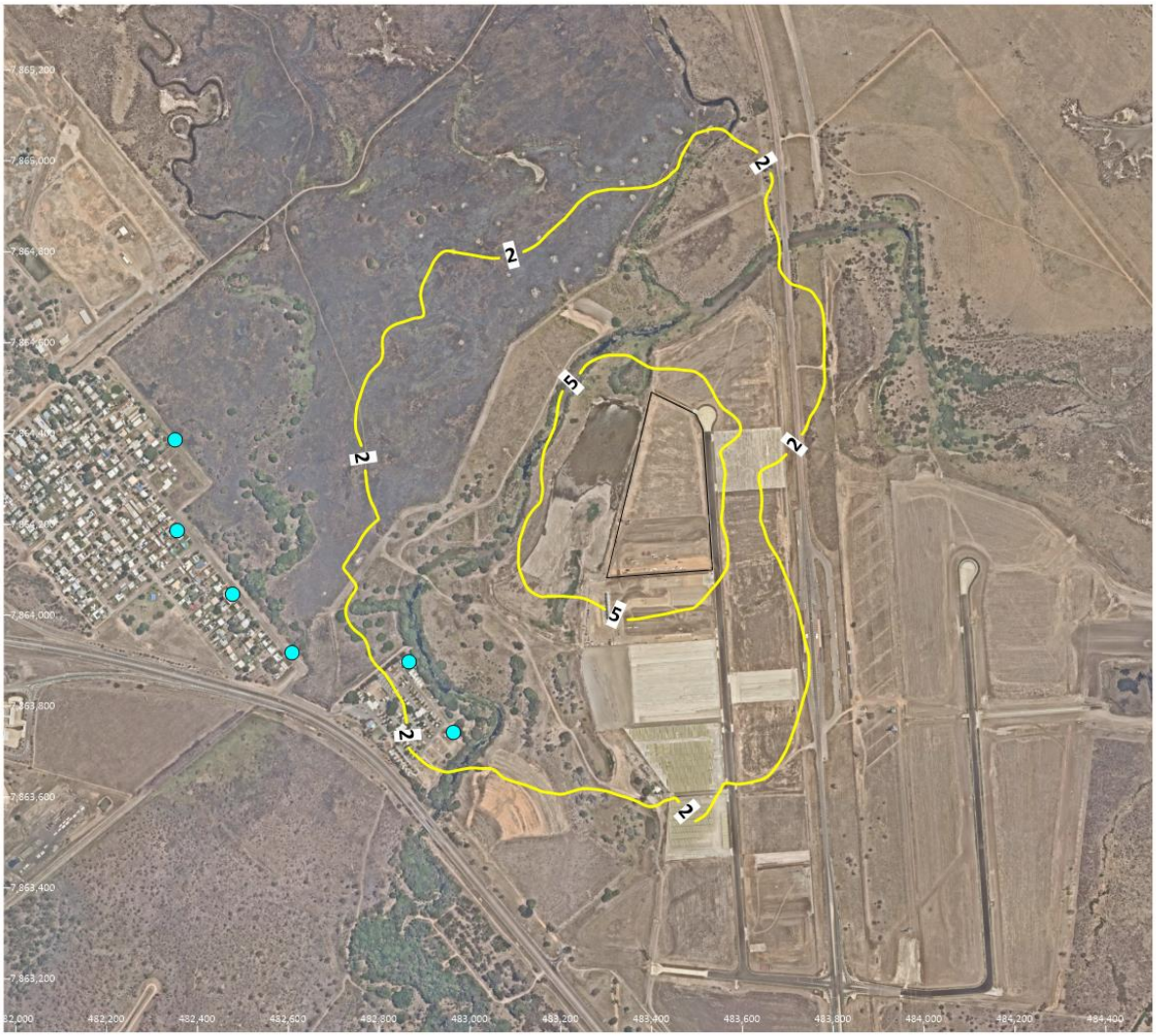
Townsville Common User Facility
Air Quality Impact Assessment

Incremental Impact

Pollutant	SO_2	Avg Period	24-Hour	Unit	µg/m³



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Modelling Period:	2022
Projection:	GDA 1994 MGA Zone 55
Date:	11/09/2024

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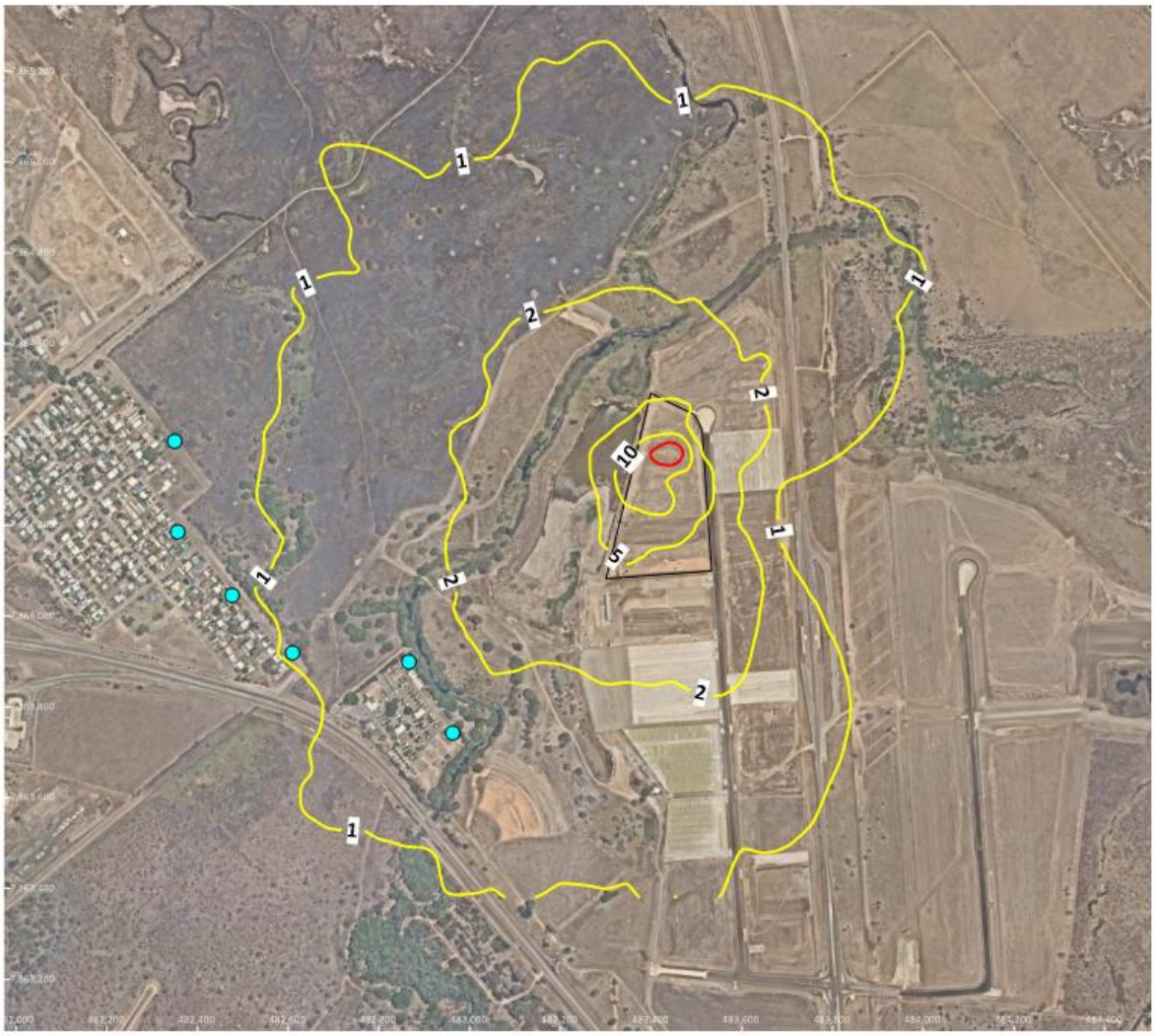
Air Quality Impact Assessment

Incremental Impact

Pollutant	SO_2	Avg Period	1-Hour	Unit	µg/m³



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Project Number:	623.030270
Dispersion Model:	CALPUFF
Modelling Period:	2022
Projection:	GDA 1994 MGA Zone 55
Date:	03/03/2025

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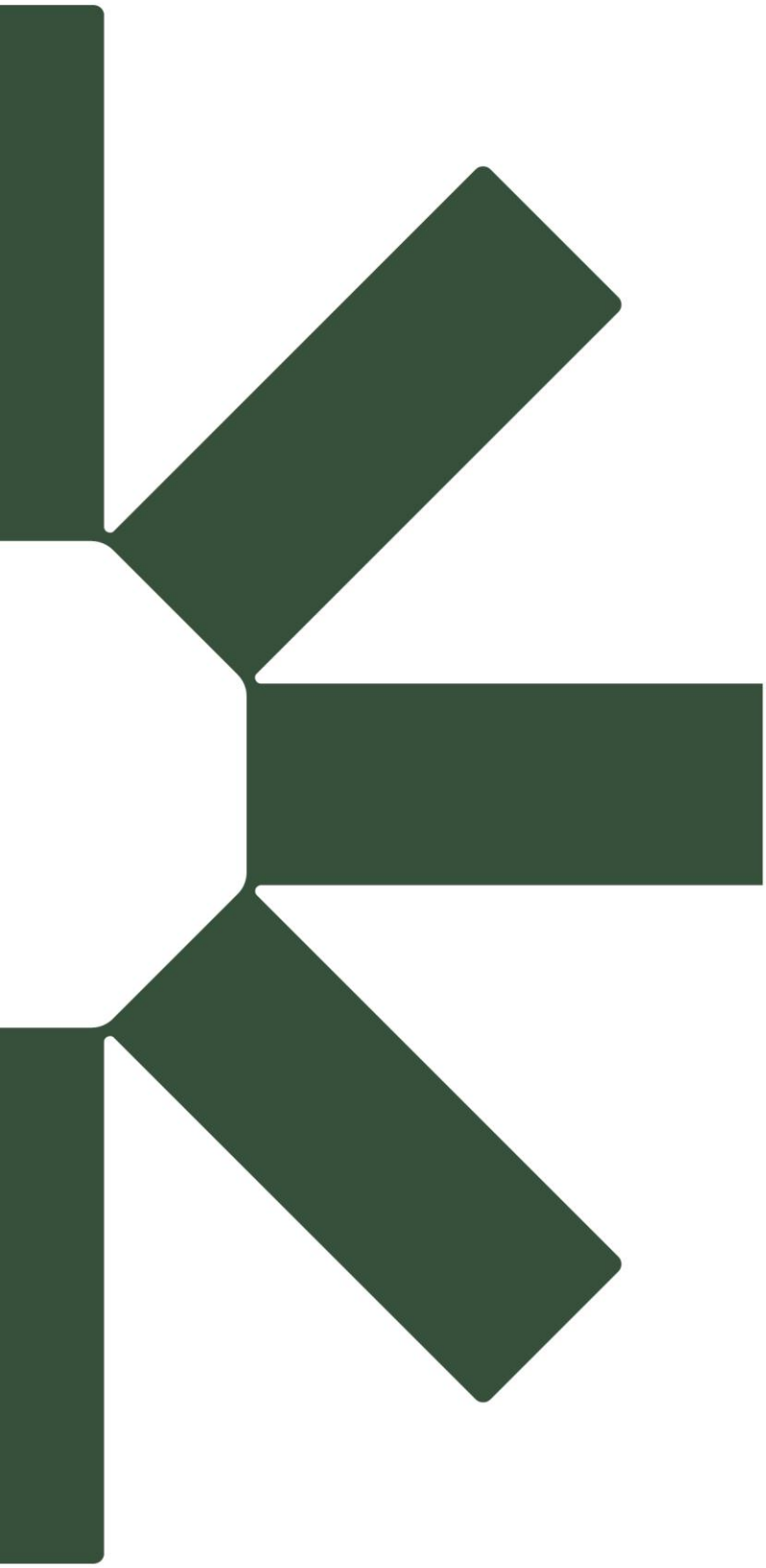
Townsville Common User Facility Air Quality Impact Assessment

Incremental Impact

Pollutant	H_2SO_4	Avg Period	1-Hour	Unit	µg/m³



Making Sustainability Happen

Queensland Resources Common User Facility, Townsville

Noise Impact Assessment

RPS

Level 8, 31 Duncan Street, Fortitude Valley, Qld, 4006

Prepared by:

SLR Consulting Australia

Level 16, 175 Eagle Street, Brisbane QLD 4000, Australia

SLR Project No.: 623.030270.00008

29 November 2024

Revision: R01 V2.0

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2024/012

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
V2.0	29 November 2024	S Thoppil	T Trewin	T Trewin
V1.0	4 October 2024	S Thoppil	T Trewin	T Trewin

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 RPS (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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Figures

Appendices

1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by RPS AAP Consulting Pty Ltd (RPS) to undertake a noise impact assessment to support the proposed Queensland Resources Common User Facility (the Development).

The purpose of the assessment is to evaluate compliance of the Project from an environmental noise perspective by assessing predicted noise levels onto external noise sensitive (residential) receptors against the requirements in the Queensland Environmental Protection Noise Policy (EPP (Noise)) Acoustic Quality Objectives, and additionally with reference to Australian Standard AS 1055:1997 Description and Measurement of Environmental Noise Parts 1, 2 and 3 (AS 1055) and in accordance with the Environmental Protection Act 1994 (EP Act) and the Department of Environment and Sciences' (DES) Noise Measurement Manual (NMM).

An explanation of common acoustic terms is provided in **Appendix A**.

The assessment takes into consideration the following:

- Project drawings and sketch layouts received on 1 and 19 November 2024.
- Equipment layout and brief dated 2 and 24 September 2024 respectively, prepared by Sedgman Pty Ltd.
- Baseline Air Quality and Noise Monitoring report ref.: 230801D02 by SEG, dated October 2023.

As revealed in **Section 6.0**, noise emissions from the development are expected to comply with the noise criteria during all periods with the inclusion of noise control as outlined in **Section 7.0**.

2.0 Scope of Work

Activities undertaken in the completion of this noise assessment included:

- A site visit to the Project site and surrounding areas to gain an appreciation of the site and the nature of the existing noise environment surrounding the site.
- Environmental noise logging within the receptor catchment areas to obtain baseline information required to establish noise criteria in accordance with the relevant legislation and guidelines.
- Preparation of a digital noise model (including all acoustically significant plant and equipment and features of the surrounding topography) for the site to predict representative operational noise emission levels at the nearest noise sensitive receptors. The operating scenarios was modelled to represent typical case noise emission levels at the closest noise sensitive receptors.
- Determination of compliance of the predicted operational noise emissions from the subject site with the noise criteria.
- Using the SoundPLAN noise model for the site to determine noise mitigation measures required to achieve compliance with the relevant criteria.

3.0 Project Description

The Queensland Government plans to develop the Queensland Resources Common User Facility (QRCUF) to support pilot and demonstration scale trials of processing methods and technologies for critical minerals and rare earth elements. The objective in developing the QRCUF is to accelerate the development of commercial projects, promote investment in advanced mineral manufacturing opportunities, enable development of supply chain and supporting industries, and position Queensland's resources industry for long-term, sustainable growth over the next 30 years. RPS has been engaged by the Queensland Treasury for the development approval phase of the project.

3.1 Site Location

The Development will be located on Lot 14 on SP338024 at the new Cleveland Bay Industrial Park (see **Figure 1**), approximately 6.5 km south of Townsville city centre. The land is predominantly undeveloped land, the site is bordered by a watercourse and wetland to the west, Penelope Road to the east and lots 13 and 15 to the north and south.

The concept design for the facility incorporates the following primary features:

- Mineral processing facility (enclosed shed).
- Operations building.
- Reagent Shed
- Site ancillaries including:
    - Gas and diesel storage,
    - Solid waste storage areas,
    - Fire water pump station, hydrants and water storage,
    - Electrical pad-mount transformer and substation,
    - Site entry/exits for heavy and light vehicles,
    - Light vehicle parking,
    - Heavy vehicle turning and unloading areas.

Figure 1 Location of Proposed Development Site

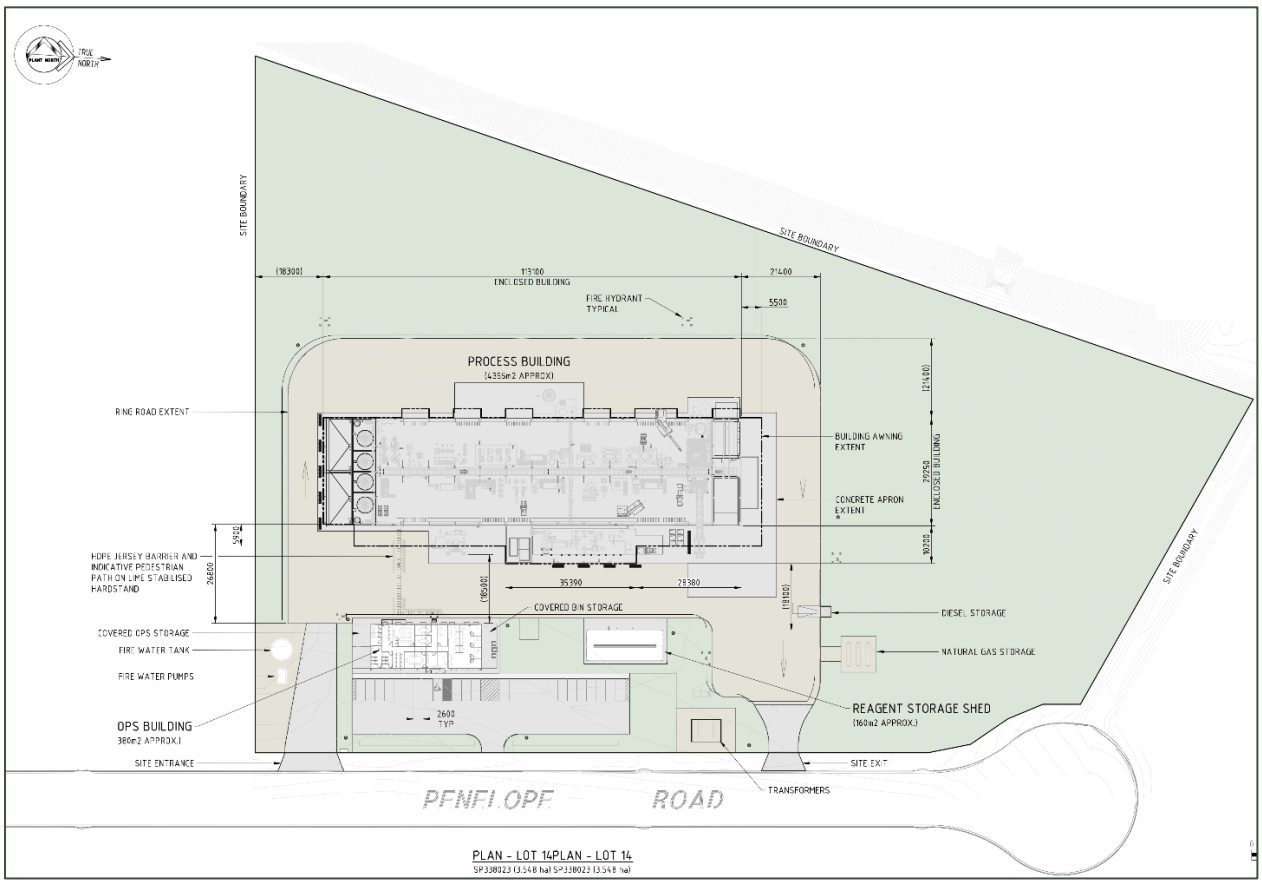
3.2 Site Operation

Diagrams illustrating the site operation is shown in **Figure 2** and include the following main items:

- Process building (Mineral processing facility approx. 4,265m^2)
- Operations building (approx. 495m^2)
- Reagent Storage Shed (approx. 160m^2)
- And the outdoors ancillaries' areas mentioned in **Section 3.1**.

Site plans and elevations are detailed in **Appendix D**.

Figure 2 Site Layout



Sourced from Drawing No. Ref.: B071-D1-01-0001_01_H, dated 05.09.24.

Sources of noise and vibration associated with the Project will generally occur from:

- Vehicle movement (i.e. trucks delivery, car park and forklift),
- Facility operation (Noise breakout from the machinery within the process building),
- External plant and machinery mechanical plant.

Hours of Operation.

The Common User Facility (QRCUF) is expected to operate in approximate 2-week campaigns followed by a period of downtime either due to future customer change-over, waiting for future customers or no demand. During the campaigns operation is expected to

be 24 hours per day. The majority of the processing operations will be undertaken inside the Process Building. Operations external to the building will comprise use of mobile plant for carting and loading of raw materials. External activity during night-time will be reduced as outlined in **Section 5.2**.

4.0 Assessment Methodology

4.1 Offsite Sensitive Receptors

The nearest identified residential receptors are the first row of houses (Holiday Village complex – Caravan Park) at 86 Minehane St, (Lot 2SP275824) Cluden QLD 4811, located at approximately 570m from the south-western boundary of the project site.

The noise sensitive receptors (NSRs) are located at South-west and West form the subject QRCUF, their address and approximate nearest distance to the proposed QRCUF are summarised in

Table 1 and also shown in **Figure 3**.

In opposite directions, there are no existing or expected residences. Thus, predicted compliance in the near noise-sensitive receptors assumes compliance in further directions.

Table 1 Nearest Sensitive Receptors

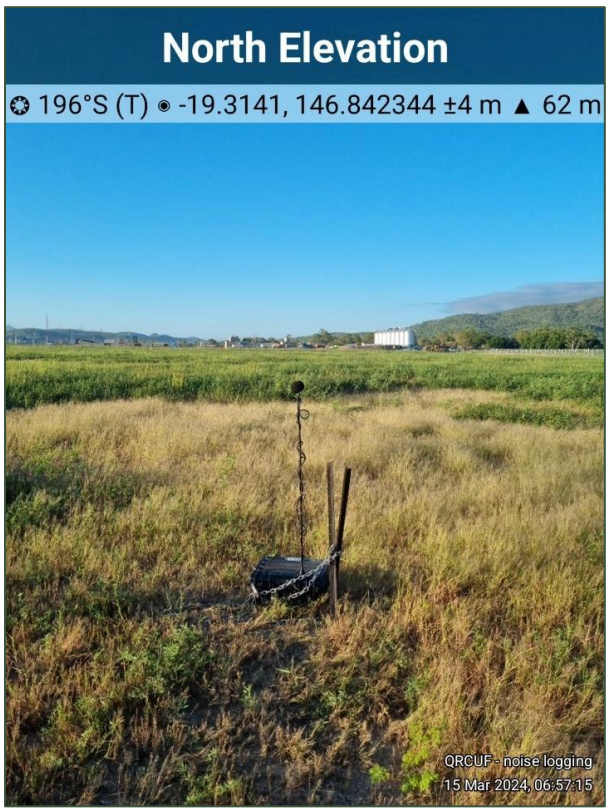
NSR No.	Address	Number of Storeys	Approx. distance from the proposed site boundary
NSR1	86 Minehane St	1-2	570 m (Nearest NSR)
NSR2	73 Minehane St	2	814 m
NSR3	71 Minehane St	1	820 m
NSR4	69 Minehane St	1	826 m
NSR5	67 Minehane St,	2	835 m
NSR6	65 Minehane St,	2	833 m
NSR7	63 Minehane St,	1	854 m
NSR8	61 Minehane St,	1	860 m
NSR9	59 Minehane St,	1	864 m
NSR10	57 Minehane St,	1	872 m
NSR11	55 Minehane St,	2	881 m
NSR12	53 Minehane St,	1	881 m
NSR13	51 Minehane St,	1	898 m
NSR14	49 Minehane St,	2	906 m
NSR15	47 Minehane St,	2	920 m
NSR16	45 Minehane St,	1	929 m
NSR17	43 Minehane St,	2	939 m
NSR18	30 Minehane St	1	1000 m (Nearest NSR at west)

Figure 3 Location of Noise Sensitive Receptors and Monitoring Location in Relation to the Project Site

4.2 Existing Acoustic Environment

The objective of the noise monitoring was to quantify the existing noise levels in the area surrounding the subject site and to assist in determining appropriate noise criterion. SLR undertook continuous unattended noise logging from 15 March 2024 to 22 March 2024 to determine the RBL[1] results at the location as shown in **Figure 3** and **Figure 4**.

Figure 4 Unattended noise monitoring at the proposed site - Cleveland Bay industrial park



Monitoring was carried out using an ARL Ngara Sound Level Meter (SLM) – SN: 8781C7. The SLM was configured to record a range of A-weighted fast-response statistical noise levels, including the L_{Amax}, L_{A10}, L_{A90}, L_{Aeq} and L_{Amax} noise levels over consecutive 15 minute periods. The SLM was checked for calibration before and after the monitoring, using a SVAN SV30A Sound Level Calibrator and no significant drift in calibration was detected. The measurement was conducted in a free-field with a microphone height of 1.2 m above the existing ground level.

Raw readings were identified to be influenced by insects and filtering was undertaken between 5kHz to 8 kHz 1/3 octave bands only as shown in the summary of the ambient noise levels presented in **Table 2**.

The recent results obtained are similar to logging results obtained previously by SEG, which were summarised in the noise monitoring report Ref.: 230801D02 by SEG 20, dated October 2023. The RBL results described in the SEG report were 38dBA during day, 40dBA in evening period and 35dBA at night-time.

[1] Rating Background Level

Table 2 Summary of measured ambient noise levels

Parameter	Period	Average of 15 minute Measured Noise Levels (dBA)
L_{Amax}	Daytime (7 am-6 pm)	61
	Evening (6 pm-10 pm)	63
	Night (10 pm-7 am)	61
L_{A10}	Daytime (7 am- 6pm)	50
	Evening (6 pm-10 pm)	55
	Night (10 pm-7 am)	55
Rating Background Level	Daytime (7 am-6 pm)	36
	Evening (6 pm-10 pm)	33 (Pre-insect corrected level was 41)
	Night (10 pm-7 am)	32 (Pre-insect corrected level was 49)
L_{Aeq}	Daytime (7 am-6 pm)	48
	Evening (6 pm-10 pm)	54
	Night (10 pm-7 am)	55

The measured statistical noise levels and daily weather parameters are displayed graphically in **Appendix C.**

4.3 Noise Assessment Criteria

We understand planning approval is to be granted by the State and therefore the relevant noise legislation applicable to the assessment is the:

- Queensland Environmental Protection Noise Policy (EPP) 2019.
- Townsville City Plan (which references the EPP Noise Policy).

In satisfying the requirements of the EPP Noise, it is considered the Townsville City Plan and Development Scheme for the Townsville State Development Area will also be satisfied.

The *Environmental Protection (Noise) Policy 2019* (EPP(Noise)) is subordinate legislation under the EP Act and the environmental values to be enhanced or protected under the EPP(Noise) are:

- The qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems.
- The qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following: sleep, study or learn or be involved in recreation, including relaxation and conversation.
- The qualities of the acoustic environment which are conducive to protecting the amenity of the community.

The EPP (Noise) contains Acoustic Quality Objectives (AQO) for receptors potentially sensitive to noise. Where the overall level of noise at the receptors, from all sources but excluding road and rail transport noise, are within the AQO, the environmental values are considered to be achieved. The AQO for the noise sensitive receptors and land use surrounding the Project are presented in **Table 3**. Project operations require continuous operation of plant and equipment, as such this assessment has referenced the 1-hour L_{Aeq} and L_{A1} AQO to assess the noise emissions from Project noise sources.

Table 3 EPP (Noise) Acoustic Quality Objectives

Sensitive receptor	Time of day	Acoustic Quality Objectives (measured at receptor) dBA			Environmental value
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$	
Residence (for outdoors)	Daytime and evening	50	55	65	Health and wellbeing
Residence (for indoors)	Daytime and evening	35	40	45	Health and wellbeing
	Night-time	30	35	40	Health and wellbeing, in relation to the ability to sleep

The external AQO has been adopted during the day and evening periods, while the internal criteria have been adopted for the night. The internal noise targets have been adjusted by a correction to allow for the direct assessment of external free field noise predictions in the vicinity of dwellings, which accounts for the reduction of noise achieved by the building (with windows open). For this assessment, a 7 dBA façade noise reduction has been applied in line with the DES guideline titled 'Noise and Vibration EIS Information Guideline', which states:

> *When assessing outdoor to indoor noise attenuation at sensitive receptors … use an outdoor to indoor attenuation value of 7dB, which is appropriate for typical Queensland buildings with open windows.*

Based on the above adopted targets and corrections, the residential criteria applicable to the Project is shown in **Table 4**.

Table 4 External Noise Criteria for the Project – Residential Receptors

Receptors	Day and evening (7:00 am – 10:00 pm)	Night (10:00 pm – 7:00 am)
Dwellings (for outdoors)	50 dBA $L_{Aeq,adj,1hr}$	37 dBA $L_{Aeq,adj,1hr}$
	55 dBA $L_{A10,adj,1hr}$	42 dBA $L_{A10,adj,1hr}$
	65 dBA $L_{A1,adj,1hr}$	47 dBA $L_{A1,adj,1hr}$

4.4 Assessment of Low Frequency Noise Characteristics

Consideration for the potential presence of tonal, impulsive and/or low frequency noise characteristics was investigated and the inclusion of 1/3 octave data was required. The EPP(Noise) does not detail specific criteria for assessing low frequency noise (which can be defined as noise from the 10 Hz to 200 Hz frequency range[2]). In the absence of specific low frequency noise assessment requirements, the following document and associated criteria are referenced to provide consideration of low frequency noise impact from potential low frequency emitter plant items onto the assessed noise sensitive receptors:

- The former Ecoaccess *Assessment of Low Frequency Noise* Guideline, which contains an initial screening test at noise sensitive receptors whereby the overall noise level should not exceed 50 dBL L_{eq} (internal) and the difference between the overall dBL and dBA L_{eq} (internal) noise levels should not exceed 15 dB. For this Assessment, a (conservative) 5 dB façade reduction has been applied to convert the 50 dBL internal level to an external level (i.e. 55 dBL L_{eq} external).

5.0 Assessment of Noise Impacts

5.1 Noise Modelling Parameters

Modelling of Project noise emission was conducted using the ISO 9613-2:2024 - *Acoustics attenuation of sound during propagation outdoors Part 2: Engineering method for the prediction of sound pressure levels outdoors* incorporated in the SoundPLAN (version 8.2) noise modelling software. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. The model used this map, together with noise source data provided by the client along with source data measured at other similar sites (or from SLR's noise source database), ground cover and atmospheric information to predict noise levels at the nearest potentially affected receptors.

Information provided by the plant designer Sedgman Pty Ltd has been used to set up the scenario modelled for the Project noise assessment.

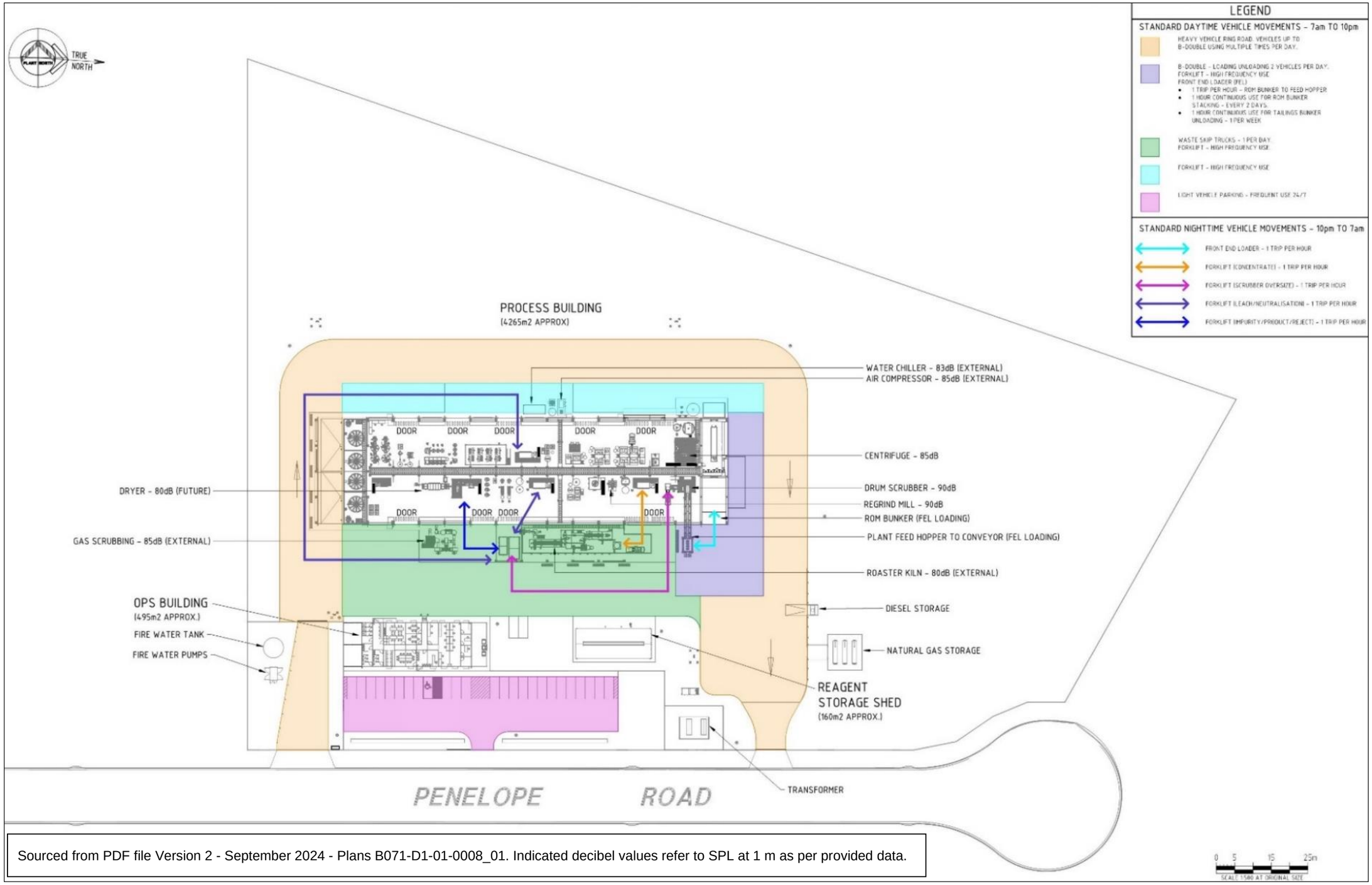
5.2 Noise Source Emissions

Details of the noise emissions of the activities pertaining the development are presented in this section. The noise sources digitised in the computer model are based on the operational layouts as shown in **Figure 5** and details provided by Sedgman. At this stage of the design development, SLR understands that the plant items are fixed within the indicated general positions.

Where noted in the figure, the noise emissions are specified as sound pressure level at 1 m distance (source: Sedgman). The noise emissions were converted into sound power level for noise prediction purposes using acoustic formulae.

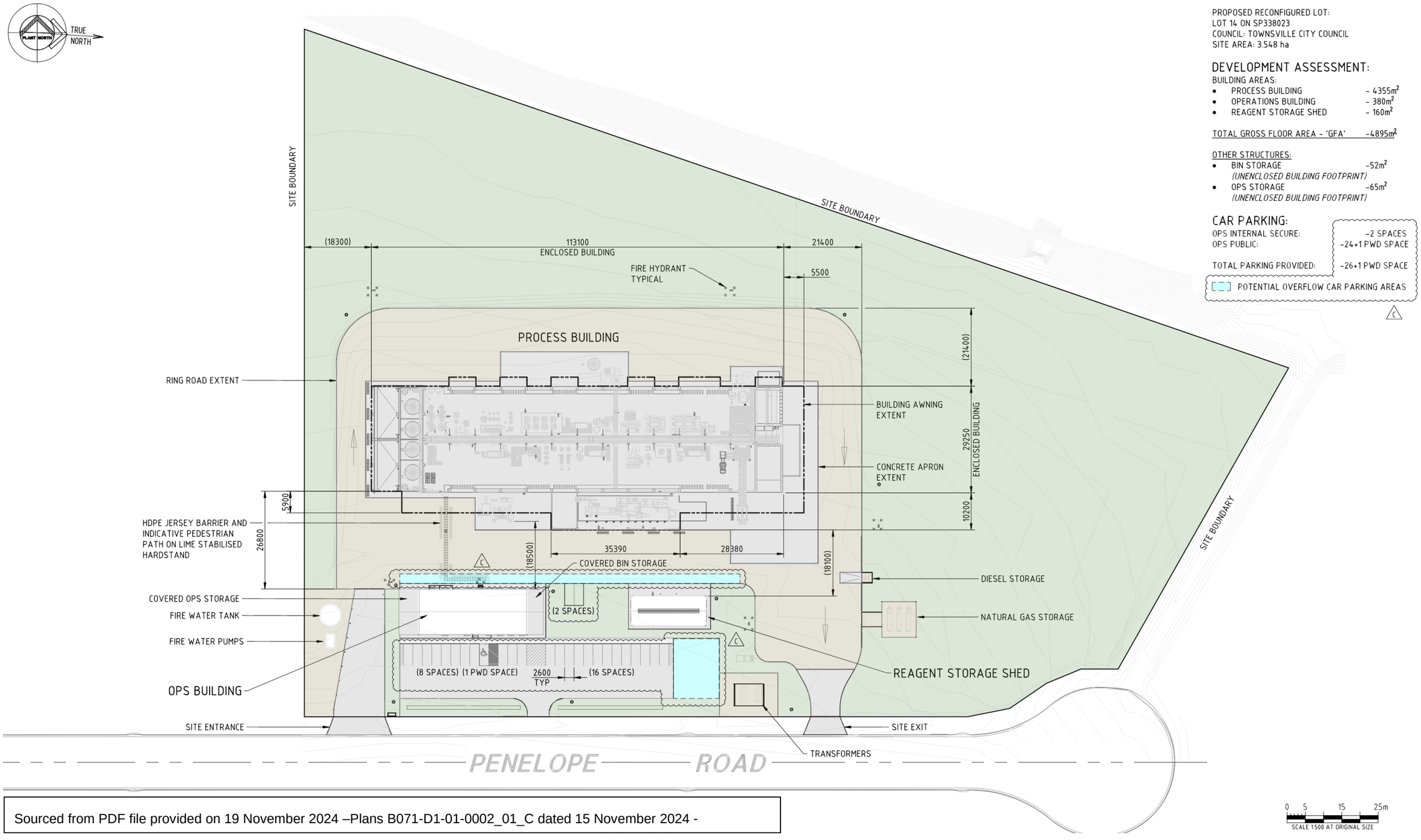
[2] With reference to DES Noise Measurement Manual and the former Ecoaccess *Assessment of Low Frequency Noise* Guideline.

Figure 5 Modelled Noise Sources at Process Building, Vehicles and Mobile Plant Layout



Sourced from PDF file Version 2 - September 2024 - Plans B071-D1-01-0008_01. Indicated decibel values refer to SPL at 1 m as per provided data.

Figure 6 Car Parking Areas including Designated Overflow Areas



Sourced from PDF file provided on 19 November 2024 –Plans B071-D1-01-0002_01_C dated 15 November 2024 -

5.2.1 External Noise Sources – Both Fixed and Mobile Plant

The proposed development will include an on-site external car parking facility (25 spaces).and an additional 2 car spaces for potential overflow. Furthermore, vehicles up to an articulated truck size are anticipated to be operated on site. All vehicles are assumed to move at a maximum 10 km/h whilst in the development and follow movement paths shown in **Figure 5.**

Based on the client inputs and SLR's understanding of the proposed operations the typical daily worst-case 1-hour scenario is as outlined below:

- **Carpark**: Noise will be generated by activities associated with cars arriving and leaving the site (opening/closing of doors, starting and moving), sources are broken down into:
  - 27 Light vehicle movements per hour in the car parking area (assumed frequent use at any time of day/night), located in the car parking section and the potential overflow car parking areas indicated in the site layouts in **Appendix D**. Each movement is assumed to be 30 seconds.

    Noise source: Parking lot (Area) source 1m above the ground.
  - Additional door closure events per hour linked to the movement of vehicles are modelled as a point source.

    Noise source: Point source 1 sec duration per event, 1m above the ground.
- **Truck movements:** Up to five (5) articulated trucks (vehicles up to B double size) per hour (during day and evening period only) to account for deliveries/pickup undertaken as part of the operations at the development. These were assumed to follow a full path around the development site. No truck movements are expected during the night (10pm to 7am).

  Noise source: Moving point source, 3m above the ground at 10 km/hr.
- **Truck idling:**, One (1) truck idling continuously for any given hour (day and evening). No truck idling at night-time.

  Noise source: Point source, 2 m above the ground.
- **Front End Loader:** Average 3 movements per hour (day and evening) and 2 movements per hour (night). Each movement ≤ 5 minutes.

  Noise source: Moving Point source, 2 m above the ground.
- **Forklifts:** Five (5) LPG forklift operating continuously throughout the external loading area during Day and Evening periods. Night-time 1 movement per hour for Concentrate, 1 movement per hour for Scrubber Oversize, 1 movement per hour for Leach Neutralisation and 1 movement per night for Impurity Product and Resin. Each night-time movement has a 5 minute duration.

  Noise source types:
  - Area source (1.5m above the ground) – Day and evening period movements.
  - Line source (1.5m above the ground) – Night time movements.
- **Plant Feeder Hopper to conveyor**: Continuous during day, evening and night. Nominal 1.5kW conveyor drive unit and 750kg/hour feed rate.
- **Roaster Kiln:** Continuous during day, evening and night.

- **Skip:** Solid waste is to be collected in skip bins to be collected one time a day and only between the times of 7 am and 10 pm. For modelling purposes we have assumed one event during the typical worst hour (day/evening) and no events during the night which has ben captured by the modelled truck and forklift movements.
- **Emergency vehicles:** not considered part of typical daily operations.

A summary of the modelled external noise sources is shown in **Table 5**.

Table 5 Modelled External Noise Sources - SWL and Spectra per Item

Noise source	Source type	Octave band frequency spectrum (Hz), dB Linear								Overall Leq SWL, dBA	Lmax dBA	Penalty adjustment	Time "ON" within the hour
		63	125	250	500	1K	2K	4K	8K				
Mobile Plant													
Carpark vehicle movement Note 1	Area	93	87	83	81	81	77	73	70	85	+8	N/A	27 events x 20 sec = 9mins (-8.2dB total)
Door closure (Carpark) Note 1	Point	93	86	83	88	86	78	75	72	89	+5	+5 dBA, door closure	27 events x 1 sec = 27 seconds (-21.2dB total)
Truck movement Note 1	Line	100	98	96	96	96	94	87	76	100	+8	+5 dBA, reverse beeper	Day/ev: 1 truck continuous Night: Nil
Gas Forklift movement Note 1	line	88	80	85	95	94	97	89	80	101	+8	+5 dBA, impulsive penalty	Day/ev: 3 x continuous Night: 20 mins (-4.8dB)
Front End Loader loading hopper Note 2	Line	111	105	98	98	98	96	92	86	103	+8	+5 dBA, impulsive penalty	Day/ev: 15min (-6dB) Night: 10 mins (-7.8dB)
Truck idling Note 1	Point	77	79	78	78	76	72	65	61	80	+5	Nil	Day/ev: 5 minutes (-10.8dB) Night: Nil
Fixed plant													
Plant Feed Hopper conveyor drive unit Note 4	Point	99	96	80	91	94	90	86	79	97	+5	Nil	Cont.
Roaster Kiln Note 3	Point	64	70	78	80	80	82	81	81	88	+3	Nil	Continuous

Noise source	Source type	Octave band frequency spectrum (Hz), dB Linear								Overall Leq SWL, dBA	Lmax dBA	Penalty adjustment	Time "ON" within the hour
		63	125	250	500	1K	2K	4K	8K				
Gas Scrubber Fowlerex Main Fan FC680 Note 5	Point	73	81	82	77	71	71	69	67	80	+10	Nil	Cont.
Chiller package 80kW	point	85	86	87	88	87	84	80	75	91	+3	Nil	Cont.
Air Compressor package	Point	76	77	78	79	78	75	71	66	82	+3	Nil	Cont.
Electrical transformer	Point	75	77	72	72	66	61	56	49	72	+1	Nil	Cont.

Note 1: SWL from SLR database from previous DA noise assessments.

Note 2: SWL obtained from Spectrum from BS5228 Part 1 2009.

Note 3: Overall SPL from Sedgman with spectrum applied from SLR database.

Note 4: SWL obtained from BS5228 Part 1 2009 for a 6kW unit and reduced by 6dB to scale for the proposed 1.5kW unit.

Note 5: Overall SPL for main fan FC680 from Sedgman with spectrum applied from SLR database. Main fan SWLs have been applied to indicated smaller fans to be modelled conservatively

Time histograms, speed correction and penalty adjustments were applied in the acoustic model to represent the above started operational parameters.

5.2.2 Internal Noise Sources – Process Building Operations

The proposed development may operate 24 hours per day subject to user requirements. The following has been considered for the operational assessment:

- According to the process layout (**Figure 5**) and equipment list [3], it has been identified the main contributing noise sources, as follows:
  - Internal equipment: Drum Scrubber, Discharge dewatering centrifuge, Regrind Mill and Flash dryer (Future use) have been considered inclusive of start ups.
  - External equipment: Chiller package, pumps, Gas scrubber, Compressor, Plant feed hopper and Roaster kiln dust collector.
- Five internal forklift paths. LPG Forklift movement inside the warehouse (high frequency use).
- Process building is assumed as follows,
  - Façade construction of the profiled metal sheeting 0.48mm thick.
  - Rooftop vents active openings (with fans, nominal 70 dBA sound power level for each fan is presumed).
  - Roller doors were assumed to be open for natural ventilation (worsts-case scenario).
- Future dryer indicated in **Figure 5** was modeled as a single point noise source. The resultant noise impacts have been assessed separately to the initial development and are presented in **Table 8**.

[3] Equipment list prepared by Sedgman Pty Ltd. File Ref.: B071-P01-06020-LI-0002-XLS_A

- Emergency stop alarms have not been modelled as they are assumed to be non tonal alarms and the resultant contributions to the 1 hour assessment period is expected to be negligible.

Sound powers used for assessment are presented in **Table 6**. Process plant overall sound levels were provided by Sedgman. A typical spectrum shape was applied to each from the SoundPLAN library.

Table 6 Modelled Process Building Internal Noise Sources – SWL and Spectra per Item

Noise source	Source type	Octave band frequency spectrum (Hz), dB								Overall Leq SWL, dBA	Lmax dBA	Penalty adjustment	Time "ON" within the hour
		63	125	250	500	1K	2K	4K	8K				
Mobile Plant													
Gas Forklift movement Note 1	line	88	80	85	95	94	97	89	80	101	+8	+5 dBA, impulsive penalty	Assumes one continuous
Fixed plant													
Drum Scrubber (2.2kW)	Point source	78	83	85	88	92	92	91	88	98	+3	Nil	Cont.
Regrind Mill	Point source	81	81	86	91	96	86	86	81	98	+3	Nil	Cont.
Centrifuge - Discharge dewatering (48kW)	Point source	86	87	88	85	87	87	83	76	93	+3	Nil	Cont.
Future Fixed plant													
Flash dryer (20kW)	Point source	78	78	77	80	83	83	81	78	89	+3	Nil	Cont.

Note 1: SWL from SLR database from DA noise assessments

5.2.3 Externally Located Air Conditioning and Ventilation Plant

At this stage, exact details of the proposed mechanical plant are not known, as the final specification of this equipment will take place during the detailed design stage of the project.

In the absence of detailed information, the below result is considered preliminary to show the feasibility of introducing typical mechanical plant. Potential sources of noise from mechanical plant at the development stage may include equipment associated with the following:

- Air conditioning plant,
- Condensers, and
- Ventilation/exhaust fans.

The maximum allowable sound power level has been calculated for all combined mechanical plant associated with the development with reference to the LAeq,adj,1hr criteria specified in **Table 4**. The sound power levels (SWLs) derived in **Table 7** identifies the maximum mechanical plant noise emission levels to be complaint at the closest noise sensitive receptors, in the presence of the other development noise sources. The effective SWL is based on the assumption that mechanical plant is unscreened; therefore, it is a conservative value.

Table 7 Maximum Predicted Sound Power Level for Combined External Mechanical Plant, Located on Rooftop

Source	Maximum Sound Power Level (SWL dBA) of combined rooftop plant	Comments
Proposed development combined mechanical plant	85	Combined SWL noise level for all outdoor plant items of the operations building.

6.0 Noise Assessment Results

As previously mentioned the proposed facility development may operate 24-hours per day during campaigns, albeit with reduced external activities to occur during the night-time (10pm to 7am) period. The cumulative noise emissions emanating from the premises due to the described occupant activities, vehicle movements and plant items during the hourly maximum events over the day/evening (7 am to 10 pm) and night-time (10 pm to 6 am) period have been assessed against the $L_{Aeq,1hour}$ and $L_{A1,1hour}$ AQO criteria is listed **Table 4.**

Noise predictions external to the noise sensitive receptors assume implementation of noise mitigation treatments listed in **Section 7.0.** The results are summarised in **Table 8.** Noise maps showing the predicted noise emissions have been provided in **Appendix B.**

Table 8 Predicted Noise Levels at Nearby Sensitive Receptors with Noise Mitigation Treatment.

Noise Assessment Limits derived from EPP Noise 2019	Predicted noise levels at noise sensitive receivers, dBA			
	NSR 1 86 Minehane St		NSR 2 73 Minehane St	
	Proposed development	With future works	Proposed development	With future works
Day and Evening, $L_{Aeq,Adj,1hr}$, 50 dBA $L_{A1,Adj,1hr}$, 65 dBA	41 $L_{Aeq,Adj,1hr}$, 41 $L_{A1,Adj,1hr}$	41 $L_{Aeq,Adj,1hr}$, 41 $L_{A1,Adj,1hr}$	39 $L_{Aeq,Adj,1hr}$, 40 $L_{A1,Adj,1hr}$	39 $L_{Aeq,Adj,1hr}$, 40 $L_{A1,Adj,1hr}$
Night-time, $L_{Aeq,Adj,1hr}$, 37 dBA $L_{A1,Adj,1hr}$, 47 dBA	32 $L_{Aeq,Adj,1hr}$, 41 $L_{A1,Adj,1hr}$	32 $L_{Aeq,Adj,1hr}$, 41 $L_{A1,Adj,1hr}$	32 $L_{Aeq,Adj,1hr}$, 39 $L_{A1,Adj,1hr}$	32 $L_{Aeq,Adj,1hr}$, 39 $L_{A1,Adj,1hr}$
Complies with EPP day and evening criterion?	Yes	Yes	Yes	Yes
Complies with EPP night-time criterion?	Yes	Yes	Yes	Yes
	Note: The highest noise level has been presented at these receptors (nearest noise sensitive receivers).			

Based on the noise prediction results presented in **Table 8** the acoustic noise emissions from the development are expected to comply with the noise criteria. For day and evening (7am to 10pm) periods the highest 1 hour noise emissions are expected to be relatively steady state and thus the predicted L_{Aeq} and L_{A1} levels are near identical. For night-time (10pm to 7am), the external on-site activities are less regular and thus some divergence between L_{Aeg} and L_{A1} becomes apparent as expected.

Regarding low frequency noise characteristics, consistent with the overall A-weighted predicted noise levels, the predicted overall dBL $L_{eq\ (internal)}$ from the 1/3 octave data is 33 dB and 32 dB at NSR 1 and NSR 2 respectively. With a difference of 4 dB at NSR 1 and 5 dB at NSR 2 between the overall dBL and dBA Leq (internal) noise levels, low frequency noise is predicted to be compliant with the nominated design standard.

According to the above mentioned, proposed noise control recommendations are described in **Section 7.0.**

7.0 Noise Control Recommendations

Based on the analysis outlined, SLR recommends the following noise mitigation measures and operational recommendations to be implemented in order to achieve the nominated environmental noise criteria limits. Maintaining compliance on an ongoing basis is also expected to rely upon careful and responsible use of the facility, (i.e. responsible use of external mobile plant and equipment). SLR recommend that the operator of the facility develop and implement a noise management plan that recognises the following requirements.

7.1 General

As outlined earlier in this assessment, environmental noise predictions have assumed certain typical maximum 1-hour operating conditions. For clarity, key assumptions are repeated below. Should plant operation be expected to exceed these amounts then this would likely alter the findings of this assessment.

- **Truck movements:** Up to five (5) articulated trucks (vehicles up to B double size) per hour (during day and evening period only) to account for deliveries/pickup undertaken as part of the operations at the development. Truck movements should generally be avoided during the night (10pm to 7am).
- **Front End Loader:** Average 3 movements per hour (day and evening) and 2 movements per hour (night). Each movement generally ≤ 5 minutes.
- **Forklifts:** Five (5) LPG forklift operating continuously in throughout the external loading area during Day and Evening periods. Night-time (10pm to 7am) forklift operations to be restricted to, 1 movement per hour for Concentrate, 1 movement per hour for Scrubber Oversize, 1 movement per hour for Leach Neutralisation and 1 movement per hour for Impurity Product and Resin. Night-time cumulative forklift use should be no more than 20 minutes in the hour.
- **Operator training:** Assessment presumes responsible driver behaviour. The Facility Management is to provide driver training and implement responsible driver behaviour practices. For example, responsible handling of materials to reasonably avoid dropping off heavy objects from height onto the ground or trucks. Excessive idling of engines to be avoided. Engines to be turned off, namely trucks upon deliveries. Signage to be installed to this effect.
- **Trafficable surfaces:** To minimise tyre squeal from on-site vehicle movements the trafficable surfaces are to be of a 'low-squeal' compound. Asphalt, plain concrete or textured surfaces are expected to satisfy this requirement. Polished concrete or high-gloss painted surfaces are not. A 10 km/h speed limit be set for the on-site vehicle movements. Metal grates and manhole covers be well fixed to avoid rattling.
- **Beepers:** On-site mobile plant (i.e. forklift and loader) reverse beepers/alarms assumed to be of broadband squawker type, avoiding tonal sirens.
- **Other unlisted equipment:** Unlisted equipment such as internal Motors, Pumps and Drives are negligible as is expected to be 10 dB below the main noise sources.
- **External fixed plant**: External equipment has been assessed based on the sound powers listed in **Section 0**. During commissioning of plant it is recommended that near-field operator attended noise monitoring be undertaken as a quality check of the final selected plant.
- **Internal Plant:** Plant internal to the Process Building has been assessed based on the sound powers listed in **Section 5.2.2** which resulted in predicted internal reverberant

level inside the building no greater than 78 dBA. It is recommended a final check to be undertaken once final equipment selections have been made. Presented results assume roof treatment listed in **Section 7.2.**

- Final gross area of roller door and ventilation openings in general accordance with those identified on the current plans.
- Air conditioning / ventilation mechanical plant sound powers for the operations building have been assessed on the sound powers listed in **Section 5.2.3.** Refer **Section 7.3** for recommendations.

7.2 Process Building Roof Upgrade

The roof was identified as one of the dominant noise transmission sources. An upgrade is proposed for the roof construction of the process building in order to improve its sound insulation performance and also provide reverberation noise control to the internal space. The required roof acoustic performance acoustic specification is a Weighted Sound Reduction Index (R_w) not less than 25 and a Noise Reduction Coefficient (NRC) not less than 0.9. Suitable materials are expected to include, but are not limited to,

- Min. 0.6mm steel roof deck plus Min. 75 mm thick acoustic fibrous insulation (type mineral wool, density 75 kg/m^3).
- min. 0.6mm steel roof deck plus Min. 80 mm thick acoustic fibrous insulation (type blow-in or spray cellulose fibre, density 30 kg/m^3).

The absorptive material is required to have min. NRC 0.9 (mineral wool / fibrous insulation) and must be exposed on the inner side of the roof but may be physically protected by perforated steel/aluminium sheet with perforations 10% to 20%.

7.3 Air Conditioning and Ventilation Mechanical Plant

In the absence of detailed information, a preliminary prediction showed the feasibility of introducing typical mechanical (condenser) plant for the operations building. The noise emission of the actual plant proposed for the development should be reviewed during the following design stages to confirm compliance with the noise criterion presented in **Table 4**. The combined rooftop plant maximum noise level has been assessed in the noise predictions as described at **Table 7.**

The following general principles may be implemented to control noise emissions from mechanical plant located on site:

- Air conditioning / ventilation mechanical plant sound powers not exceeding those listed in **Section 5.2.3.**
- Install plant on the rooftop at a location that maximises the distance to the closest noise sensitive receptors to the south of the development.

On the completion of construction, noise testing should be conducted to confirm noise emissions meet the specified noise limits in this report.

7.4 Design Validation, Certification, and Testing

7.4.1 Design Validation

The above sub-sections in this report outlines the minimum acoustic performance requirements and recommended methods and details to achieve the environmental noise criteria outlined in **Section 4.3**. Equipment selection sound emission details including any

proposed alternative methods, system variations or modifications are required to be professionally reviewed for suitability before final commitment. Requests for approvals need to demonstrate that the required performance standard can be achieved, via supply of either construction details and/or a statement of acoustic opinion as detailed below:

- Full acoustic performance details:
  - Equipment and construction details as appropriate including descriptive literature of installed equipment/construction, independent laboratory or field results of testing completed, in accordance with relevant Australian or International Standards, e.g. AS ISO 140 and AS/NZS ISO 717, or
  - A professional letter of opinion from either a member firm of the Association of Australian Acoustic Consultants or a suitably qualified Member of the Australian Acoustical Society, which certifies, on the basis of supporting technical data and risk management that the installed construction as installed will provide the specified performance.

    Where applicable, testing authority reports to document procedures in accordance with relevant Australian and International standards including AS ISO 140 and AS ISO 717. The testing authority must be either, NATA approved measuring laboratory, Member firm of the Association of Australian Acoustical Consultants, CSIRO, National Acoustic Laboratories, RMIT.
- Manufacturers published data:
  - technical specifications,
  - type test or factory test data,
  - description of construction materials and description of finishes to the frame, and
  - recommendations for installation and service use and the like.

7.4.2 Certification and Testing

Physical testing is recommended to scoped into the successful contractor's works such that there is a clear responsibility to demonstrate compliance to the specified acoustic performance requirements. Notionally this testing would be conducted at or near the completion of works (ie. during commissioning phase) with results reported to the State. Acoustic testing should be undertaken by an eligible member firm of the Association of Australian Acoustic Consultants or eligible Member of the Australian Acoustical Society. Acoustic testing would be undertaken over a sufficiently representative period; likely a series of operator attended near-field measurements of individual plant items plus supported by 15 minute measurements of plant cumulative noise levels during both day/evening and night periods.

8.0 Conclusion

SLR has been commissioned to undertake a noise impact assessment of the proposed development to be located on Lot 14 on SP338024 at the new Cleveland Bay Industrial Park, Townsville, QLD.

A noise model was developed in order to predict representative industrial and operational activities at the proposed development to assess potential noise emission onto surrounding noise sensitive receptors to confirm acceptable noise levels are achieved against the adopted EPP Noise 2019 Acoustic Quality Objectives (referenced to the EP Act 1994). In satisfying the requirements of the EPP Noise, it is considered the Townsville City Plan and Development Scheme for the Townsville State Development Area will also be satisfied.

Associated noise activities modelled and assessed were mobile plant (vehicle activities), Internal Plant (Process building operations) and expected mechanical plant (air conditioning and ventilation).

Noise predictions (**Section 6.0**) as part of this assessment show that noise intrusive activities from the development are expected to comply with the noise criteria during day, evening and night periods with the inclusion of noise control recommendations listed in **Section 7.0**.

Appendix A Terminology

Queensland Resources Common User Facility, Townsville

Noise Impact Assessment

RPS

SLR Project No.: 623.030270.00008

29 November 2024

Term	Description
‘A’ weighted	A frequency adjustment which represents how humans hear sounds.
ABL	Assessment Background Level. The single-figure background level representing each assessment period (day, evening and night). Defined in the *Noise Policy for Industry*.
Ambient noise level	The all-encompassing sound associated with an environment or area.
Background creep	The incremental increase in background noise levels over time as new developments are built in an area.
Ctr	A frequency adaptation term applied in accordance with the procedures described in ISO 717, generally to account for increased significance of low-frequency noise transfer being assessed.
dB	Decibel
dBA	‘A’ weighted decibel
DW	The weighted level difference between two rooms, that is, the on-site sound insulation between two spaces.
Facade affected	A monitoring location which is influenced by facade reflections. Measurements at facades are typically taken at a distance of 1 m away and the measured noise level generally regarded as being +2.5 dB higher than ‘free field’.
Free field	A monitoring location where the microphone is positioned sufficiently far from nearby surfaces for the measured data to not be influenced by reflected noise.
Hz	Hertz
Impulsive noise	Noise with a high peak of short duration, or sequence of peaks.
Intermittent noise	Noise which varies in level with the change in level being clearly audible
L90 , L10, etc.	Statistical exceedance levels, where LN is the sound pressure level exceeded for N% of a given measurement period.
LAE (or SEL)	Sound Exposure Level. This is the constant sound level that has the same amount of energy in one second as the original noise event.
LAeq	The ‘A’ weighted equivalent noise level. It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
LAmax	The A’ weighted maximum sound pressure level of an event.
LnTw	The weighted, standardised impact sound pressure level of a floor/ceiling system. A lower LnTw value represents a better acoustic performance.
LnTw+Ci	The combined weighted, standard plus spectrum adaption term that describes the impact sound insulation performance of floor and ceiling systems. A lower LnTw value represents a better acoustic performance.
Term	Description
Low frequency	Noise containing energy in the low frequency range.
LP or SPL	Sound Pressure Level
Lw or SWL	Sound Power Level
Noise logger	A self-contained, battery powered item of equipment that is used to measure noise levels over several days.
Noise reduction	The difference in sound pressure level between any two areas.
NR noise rating	Single number evaluation of the background noise level in a space. The NR level is typically around 5 to 6 dB below the ‘A’ weighted noise level.
Octave-band	A frequency band where the highest frequency is twice the lowest frequency.
Offensive noise	Noise that is considered harmful or which interferes unreasonably with affected receivers.

Term	Description
Over pressure	A term used to describe the air pressure pulse emitted during blasting or similar events.
PNTL	Project Noise Trigger Levels. Target noise levels for a particular noise generating development.
RBL	Rating Background Level. The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. Defined in the *Noise Policy for Industry*.
Reverberation time (or RT or T-60)	The time taken (in seconds) for a sound to decay by 60 dB within a space.
Rw	Weighted Sound Reduction Index of a building element. That is, the laboratory tested (or theoretically calculated) sound insulation performance of a single element.
Sound Insulation	A reference to the degree of acoustical separation between any two areas.
Steady state noise	Noise which remains relatively constant in level over time, as opposed to time-varying noise which fluctuates over time.
Speech privacy	The privacy achieved between two spaces, being a combination of source strength (vocal effort), sound insulation (D_W) between the spaces and the background noise levels in the receiving location.
Time weighting	Sound level meters can be set to 'fast' or 'slow' response. 'Fast' corresponds to a 125 ms time constant and 'slow' corresponds to a 1 second time constant.
Tonality	Noise containing a prominent frequency.
Transmission loss (or sound transmission loss or sound reduction index)	A test which rates the sound transmission properties of a wall, floor or roof construction.

A.1 Sound Level (or Noise Level)

The terms sound and noise are almost interchangeable, except that in common usage noise is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear (and those of other species) responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (dB or dBL) scale reduces this ratio to a more manageable size by the use of logarithms.

A.2 A-weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to human hearing.

A.3 Change in Sound Pressure Levels

For human perception, a change of 1 dBA or 2 dBA in the level of a sound is considered to be indiscernible, while a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. As noted in Section 2.4 of the TMR CoP Vol 1, while the above noted changes in sound pressure level are *not precisely verifiable for road traffic noise, it is useful in understanding the significance of change in environmental noise exposure*.

Additional facts about road traffic noise as stated in Section 2.4 of the TMR CoP Vol 1:

- A 3 dBA change in noise level is equivalent to halving or doubling the traffic volumes.

- A 10 dBA change in noise level is equivalent to halving or doubling the subjective or perceived loudness or a tenfold increase or decrease in traffic volume.
- A 10 km/h increase in speed will increase the noise level by approximately 1 dBA.
- A 3.5% compound annual growth rate in traffic will increase the noise level by approximately 1.5 dBA over a 10-year horizon.
- An 8% compound annual growth rate in traffic will increase the noise level by approximately 3.0 dBA over a 10-year horizon.

A.4 Typical Sound Pressure Levels

The table below lists examples of typical sound pressure levels.

Table A-1: Examples of Typical Sound Pressure Levels

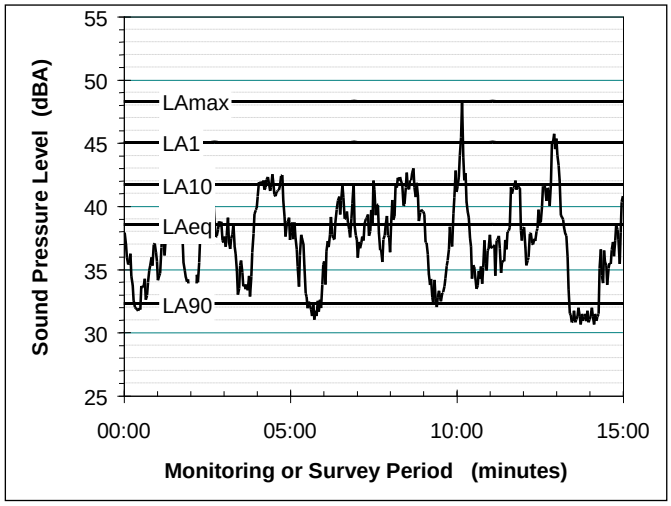
Sound pressure level (dBA)	Typical example
130	Threshold of pain
120	Metal hammering
110	Grinding on steel
100	Loud car horn at 3 metres (m)
90	Dog bark at 1 m
80	Cicadas at 1 m
70	Noise level directly adjacent to a busy main road
60	Ambient noise level in urban area close to main roads
50	Day time in a quiet suburban environment with background or distant road traffic noise
40	Night-time in a quiet suburban environment with background or distant road traffic noise Ambient noise level in rural to semi-rural environments with light breezes and some noise from insects, birds and distant traffic
30	Ambient noise level in a typical rural noise environment in the absence of insect noise and wind. Inside bedroom
20	Ambient noise level in remote rural environment away from main roads with no wind and no insect noise

A.5 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels (LAN), where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time and LA10 the noise exceeded for 10% of the time.

Figure 9 below presents a hypothetical 15-minute noise measurement, illustrating various common statistical indices of interest.

Figure 7 Hypothetical 15 Minute Noise Measurement



Of particular relevance to this study, are:

- LAmax: The A-weighted maximum sound pressure level of any given measurement period.
- LA1: The A-weighted noise level exceeded for 1% during any given measurement period.
- LA10: The A-weighted noise level exceeded for 10% during any given measurement period. This is commonly referred to as the average maximum noise level.
- LA90: The A-weighted noise level exceeded for 90% during any given measurement period, often referred to as the 'background' noise level.
- LAeq: The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

Additionally,

- $L_{A10(18hour)}$ Road Traffic Noise Level: the level exceeded for 10% of any measurement period; the usual period of measurement is 1 hour. The hourly L_{A10} level, therefore, is the traffic noise level exceeded for 6 minutes in the hour. The 18-hour L_{A10} level ($L_{A10(18hour)}$) is the arithmetic average of 18, hourly L_{A10} traffic noise levels measured in consecutive hours between 6:00 am and 12:00 midnight.
- $L_{A10(12hour)}$ Road Traffic Noise Level – is the arithmetic average of 12 hourly L_{A10} traffic noise levels measured in consecutive hours between 6:00 am and 6:00 pm.
- $L_{An(1hour)}$ Road Traffic Noise Level – the level exceeded for n% of a 1-hour period.

A.6 Noise Propagation

Provided the receptor is in the far-field of the noise source, noise levels will reduce as a receptor moves further away from the source. This is due to spreading of the noise source energy over distance. For a simple point source (for example, a motor) the theoretical reduction in noise levels is 6 dBA per doubling of distance. For a line source (for example, a busy road) the theoretical reduction is 3 dBA per doubling of distance. In reality however other factors affect noise propagation. These include ground absorption, air absorption, acoustic screening, and meteorological effects.

Appendix B Grid Noise Maps

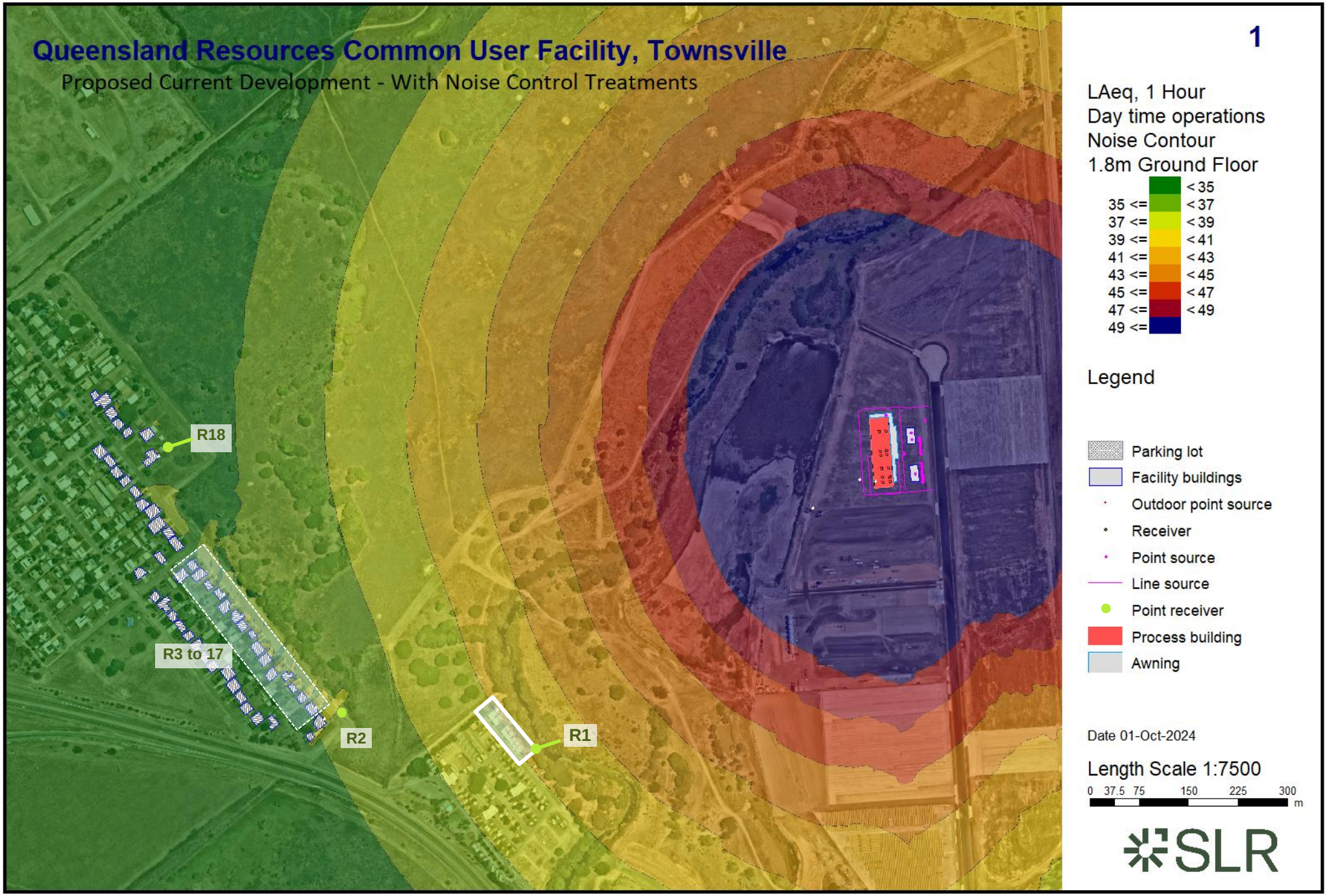
Queensland Resources Common User Facility, Townsville

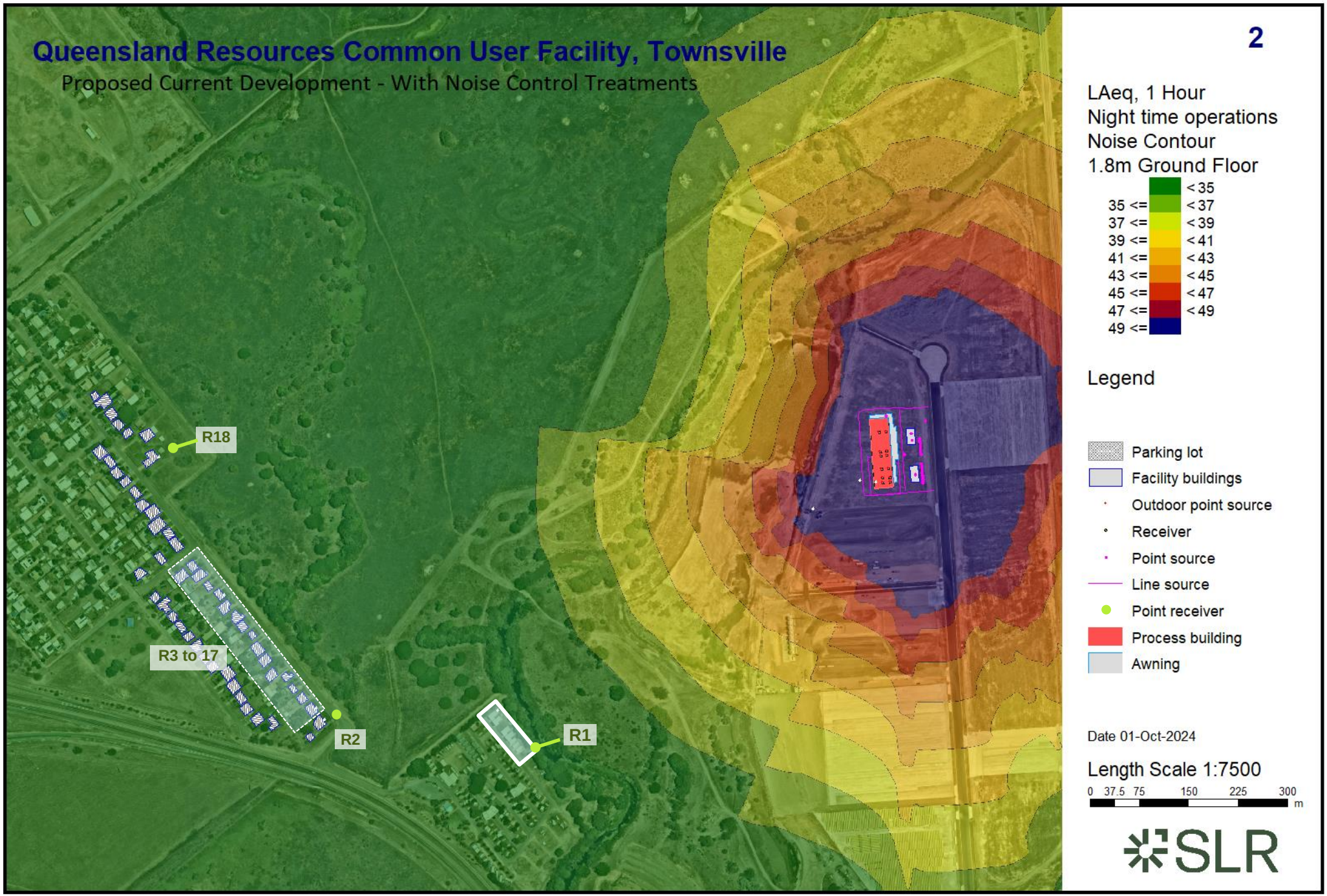
Noise Impact Assessment

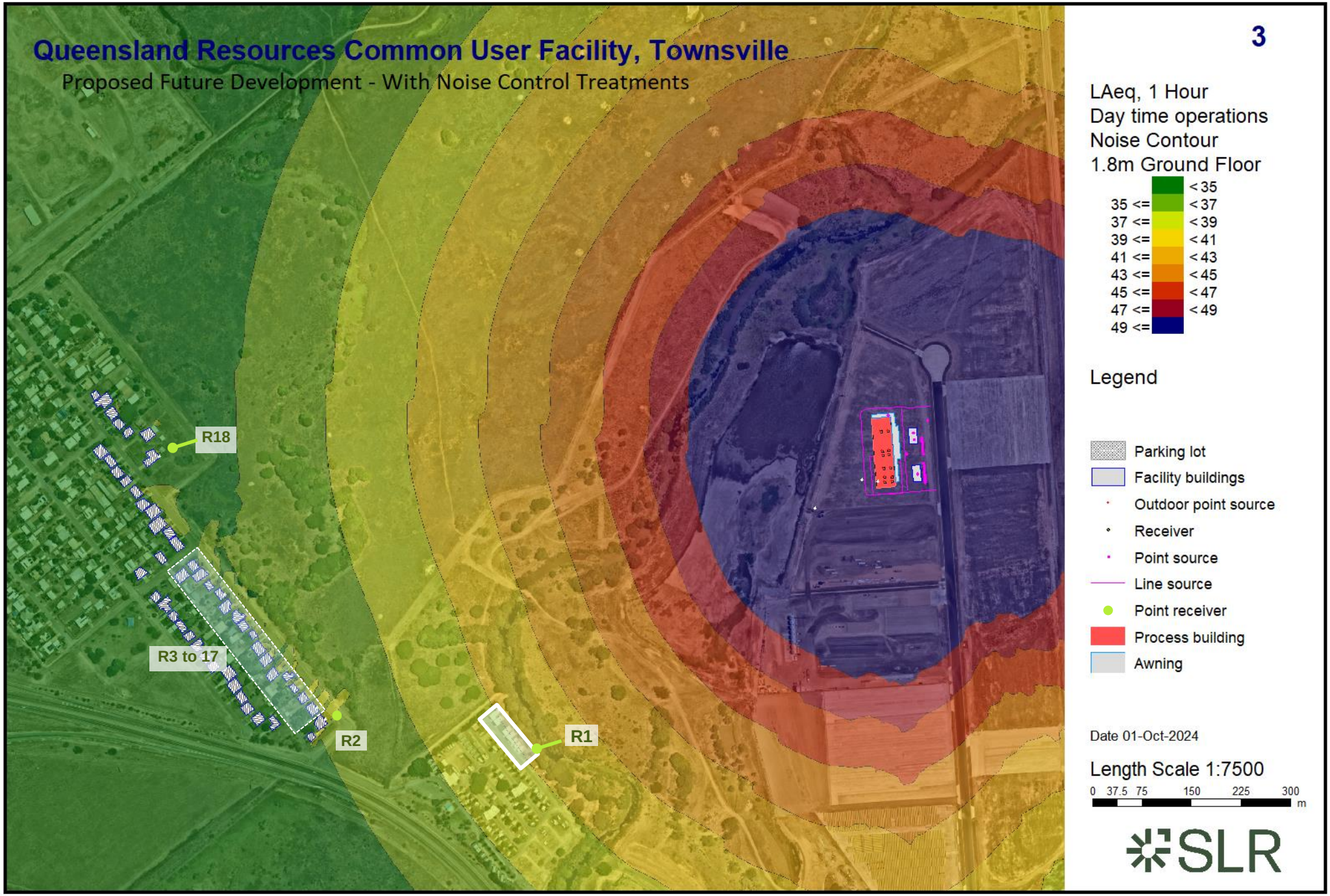
RPS

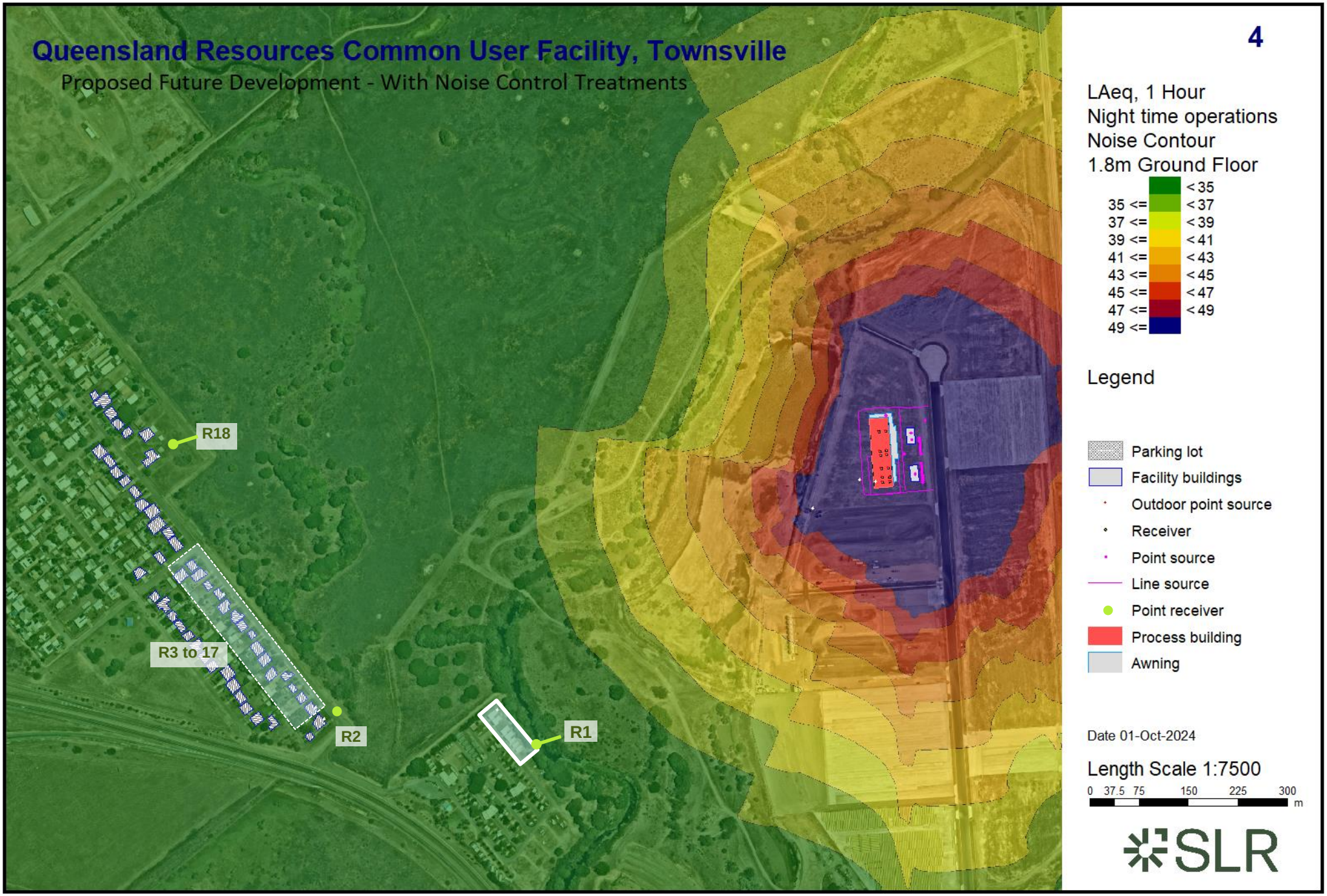
SLR Project No.: 623.030270.00008

29 November 2024


Queensland Resources Common User Facility, Townsville
Proposed Current Development - With Noise Control Treatments
R18
R3 to 17
R2
R1
1
LAeq, 1 Hour
Day time operations
Noise Contour
1.8m Ground Floor
< 35
35 <= < 37
37 <= < 39
39 <= < 41
41 <= < 43
43 <= < 45
45 <= < 47
47 <= < 49
49 <=
Legend
Parking lot
Facility buildings
Outdoor point source
Receiver
Point source
Line source
Point receiver
Process building
Awning
Date 01-Oct-2024
Length Scale 1:7500
0 37.5 75 150 225 300
m
SLR


Queensland Resources Common User Facility, Townsville
Proposed Current Development - With Noise Control Treatments
2
LAeq, 1 Hour
Night time operations
Noise Contour
1.8m Ground Floor
< 35
35 <= < 37
37 <= < 39
39 <= < 41
41 <= < 43
43 <= < 45
45 <= < 47
47 <= < 49
49 <=
Legend
Parking lot
Facility buildings
Outdoor point source
Receiver
Point source
Line source
Point receiver
Process building
Awning
R18
R3 to 17
R2
R1
Date 01-Oct-2024
Length Scale 1:7500
0 37.5 75 150 225 300 m
SLR


Queensland Resources Common User Facility, Townsville
Proposed Future Development - With Noise Control Treatments
3
LAeq, 1 Hour
Day time operations
Noise Contour
1.8m Ground Floor
< 35
35 <= < 37
37 <= < 39
39 <= < 41
41 <= < 43
43 <= < 45
45 <= < 47
47 <= < 49
49 <=
Legend
Parking lot
Facility buildings
Outdoor point source
Receiver
Point source
Line source
Point receiver
Process building
Awning
R18
R3 to 17
R2
R1
Date 01-Oct-2024
Length Scale 1:7500
0 37.5 75 150 225 300
m
SLR


Queensland Resources Common User Facility, Townsville
Proposed Future Development - With Noise Control Treatments
4
LAeq, 1 Hour
Night time operations
Noise Contour
1.8m Ground Floor
< 35
35 <= < 37
37 <= < 39
39 <= < 41
41 <= < 43
43 <= < 45
45 <= < 47
47 <= < 49
49 <=
Legend
Parking lot
Facility buildings
Outdoor point source
Receiver
Point source
Line source
Point receiver
Process building
Awning
R18
R3 to 17
R2
R1
Date 01-Oct-2024
Length Scale 1:7500
0 37.5 75 150 225 300 m
SLR

Appendix C Noise Monitoring Charts

Queensland Resources Common User Facility, Townsville

Noise Impact Assessment

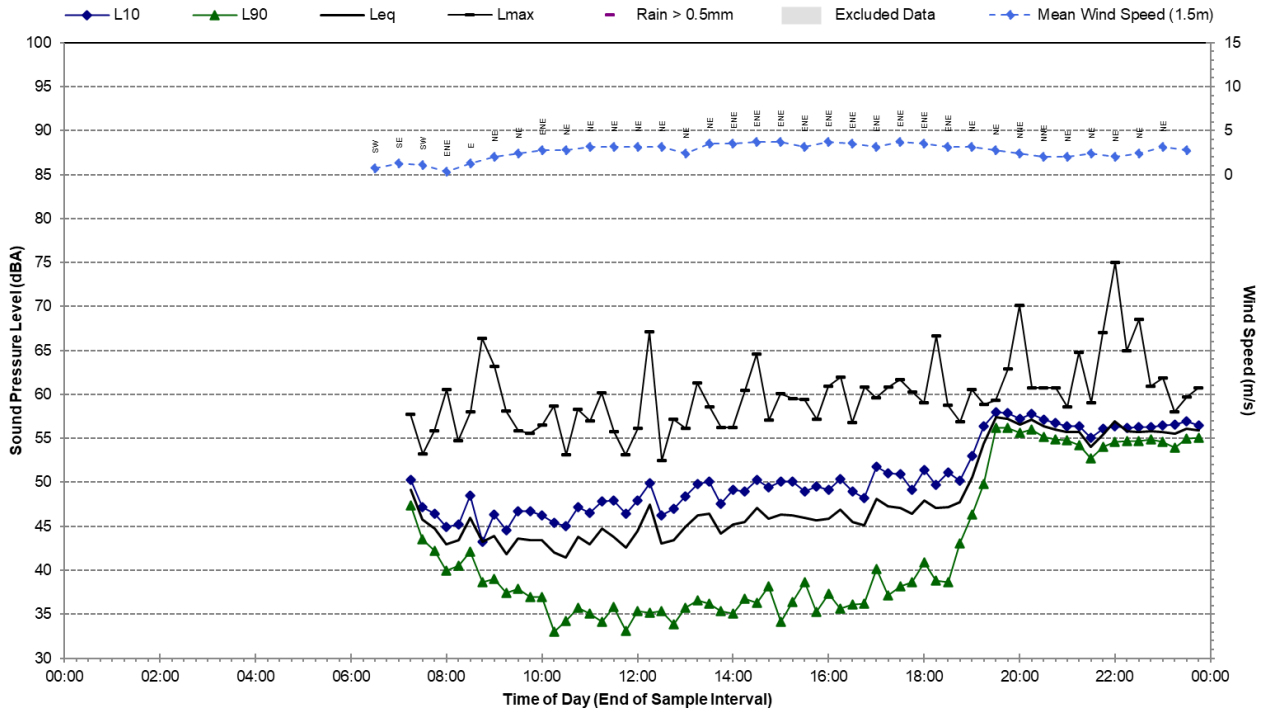
RPS

SLR Project No.: 623.030270.00008

29 November 2024

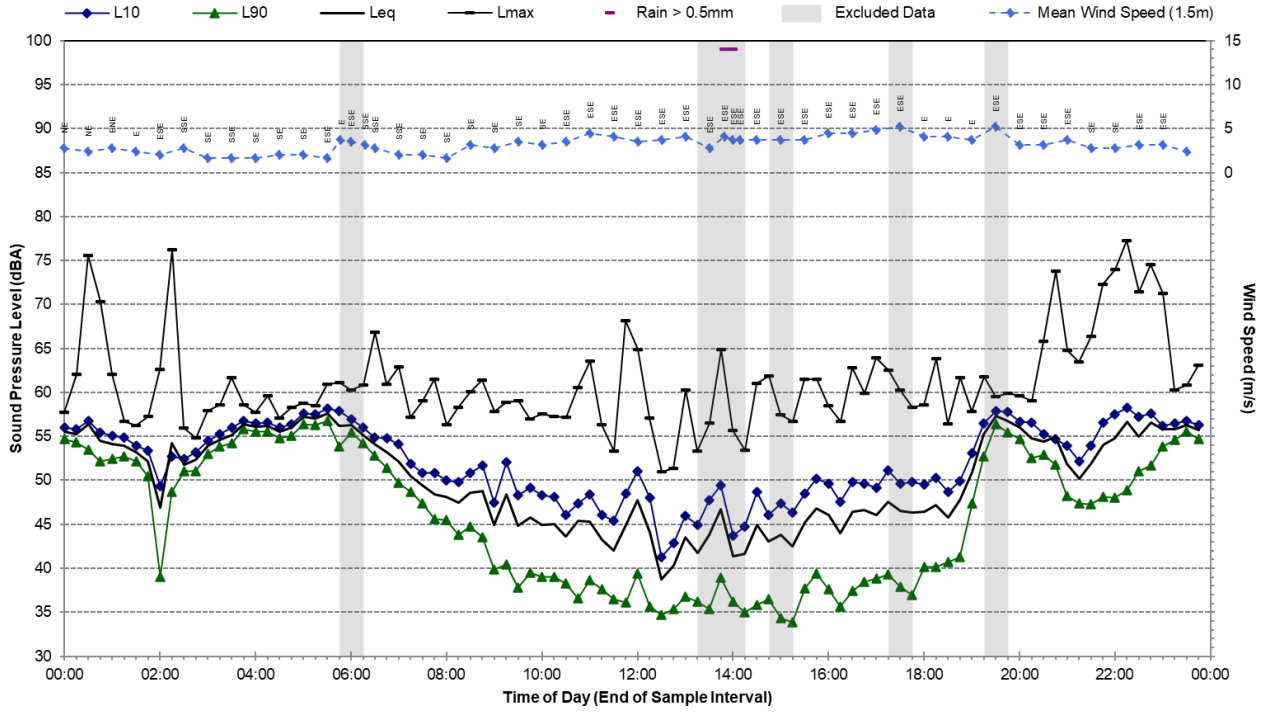
Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Friday, 15 March 2024



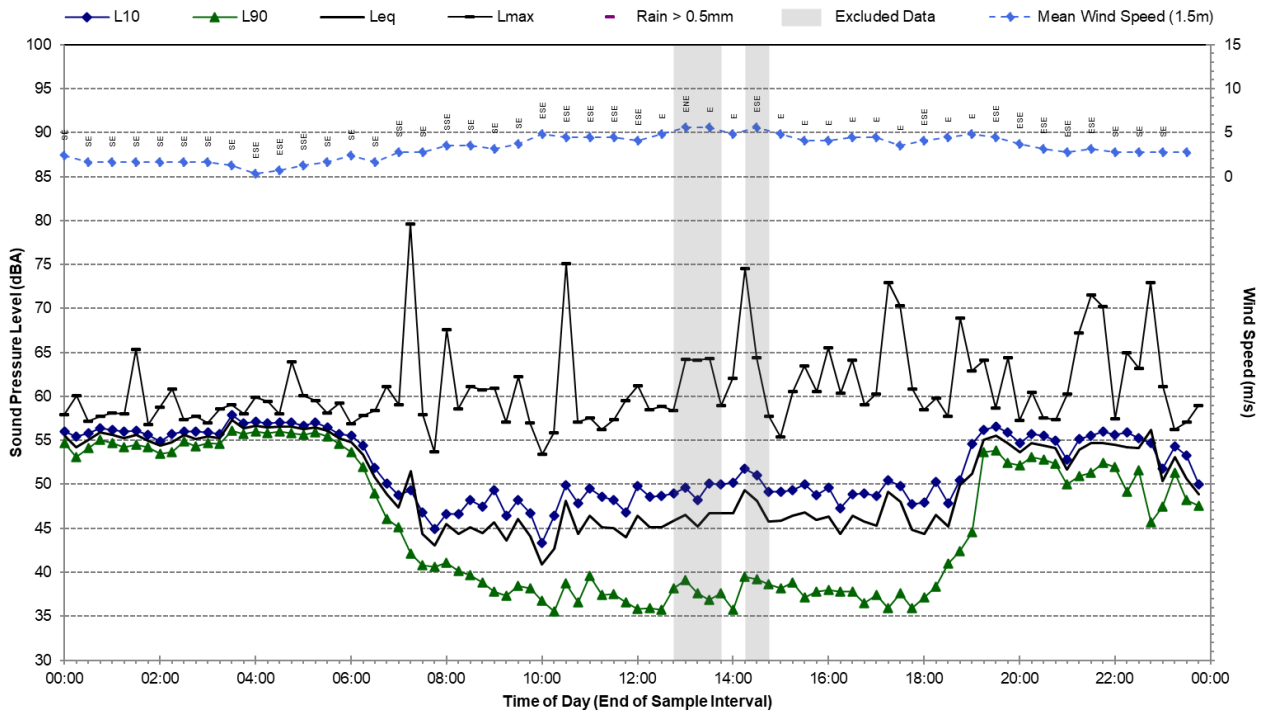
Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Saturday, 16 March 2024



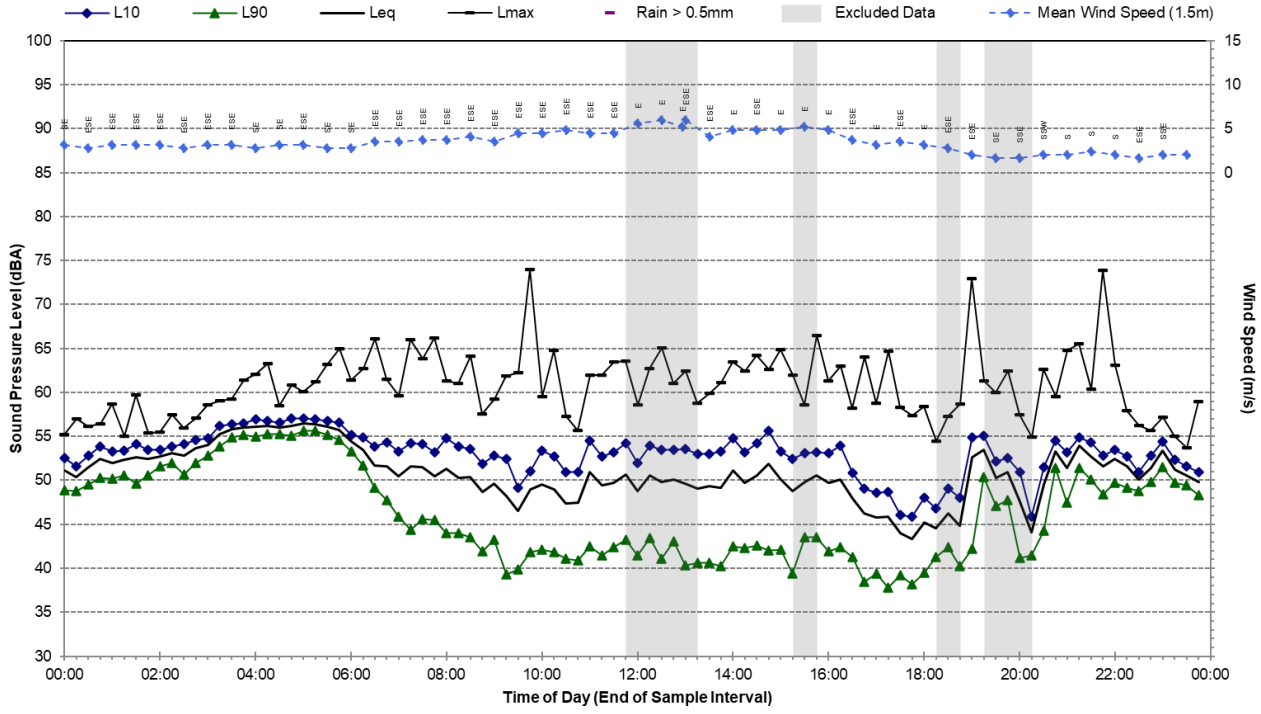
Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Sunday, 17 March 2024



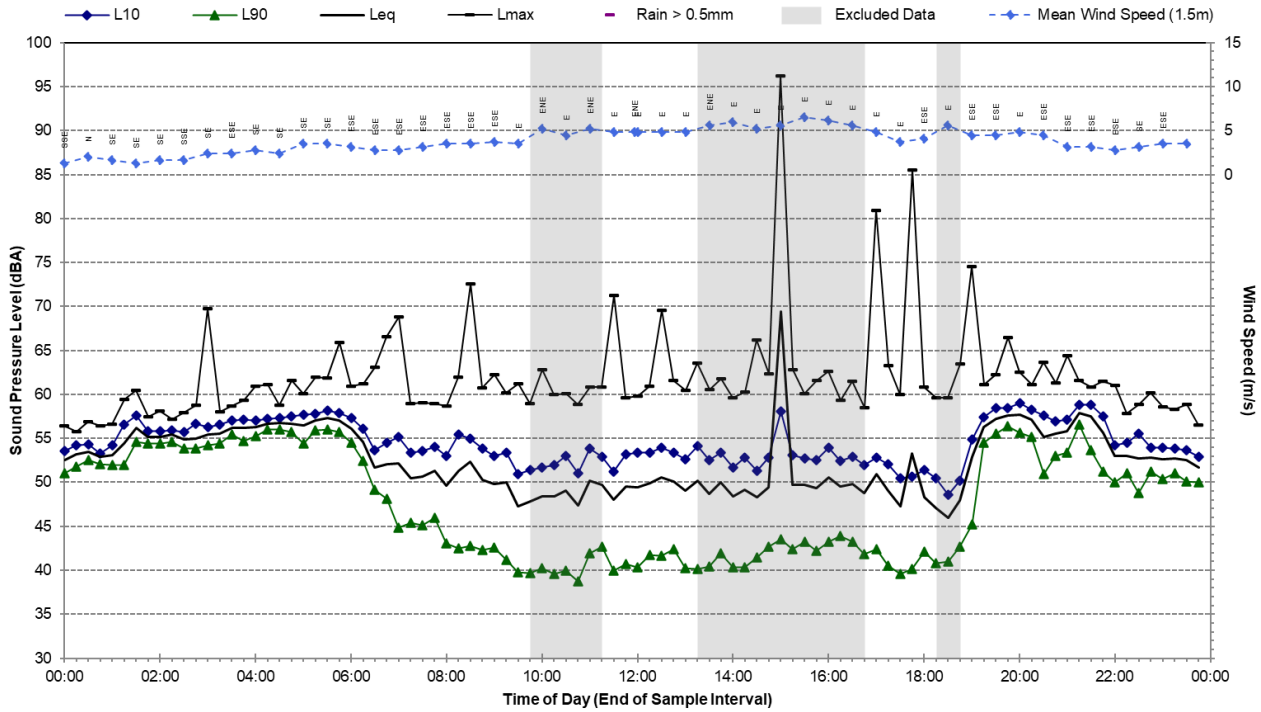
Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Monday, 18 March 2024



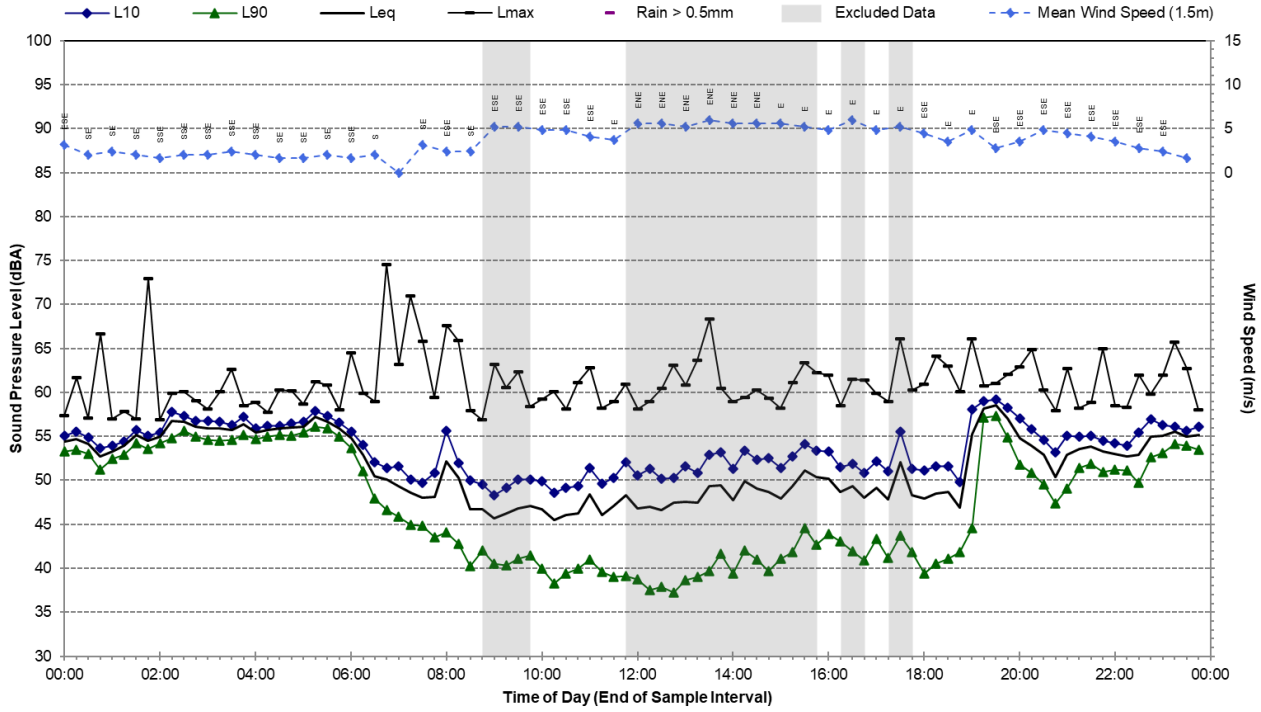
Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Tuesday, 19 March 2024



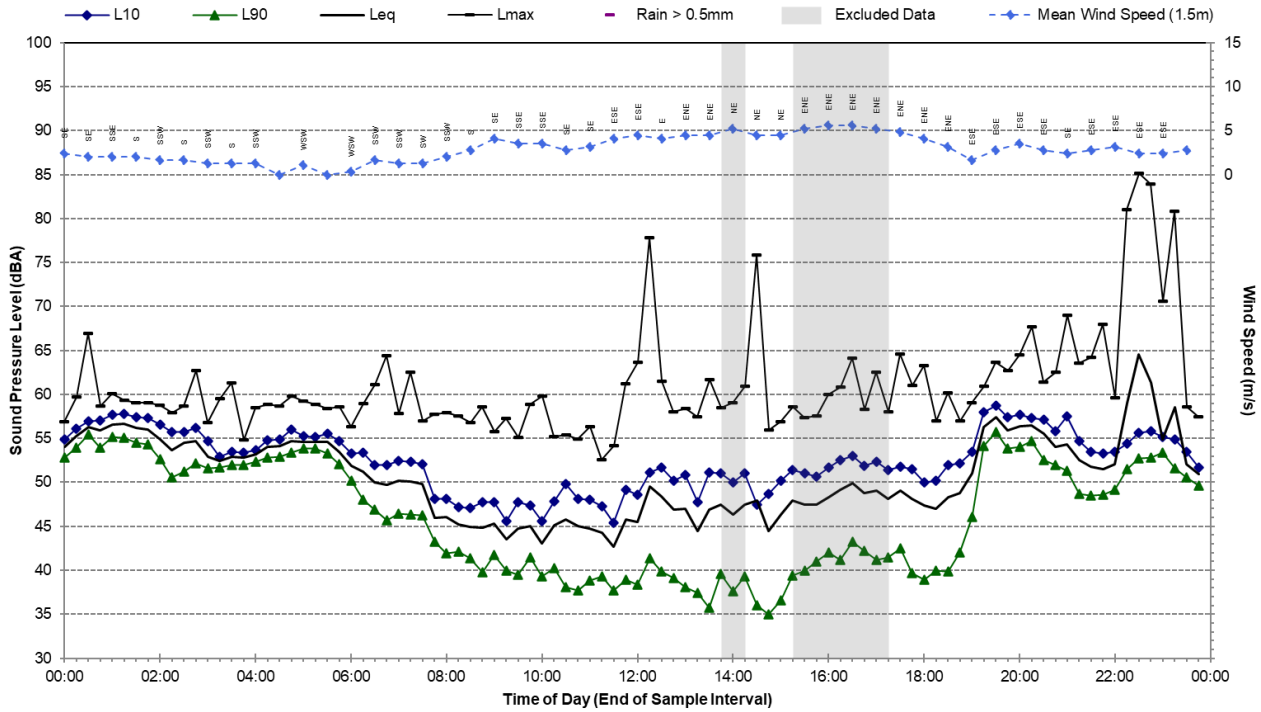
Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Wednesday, 20 March 2024



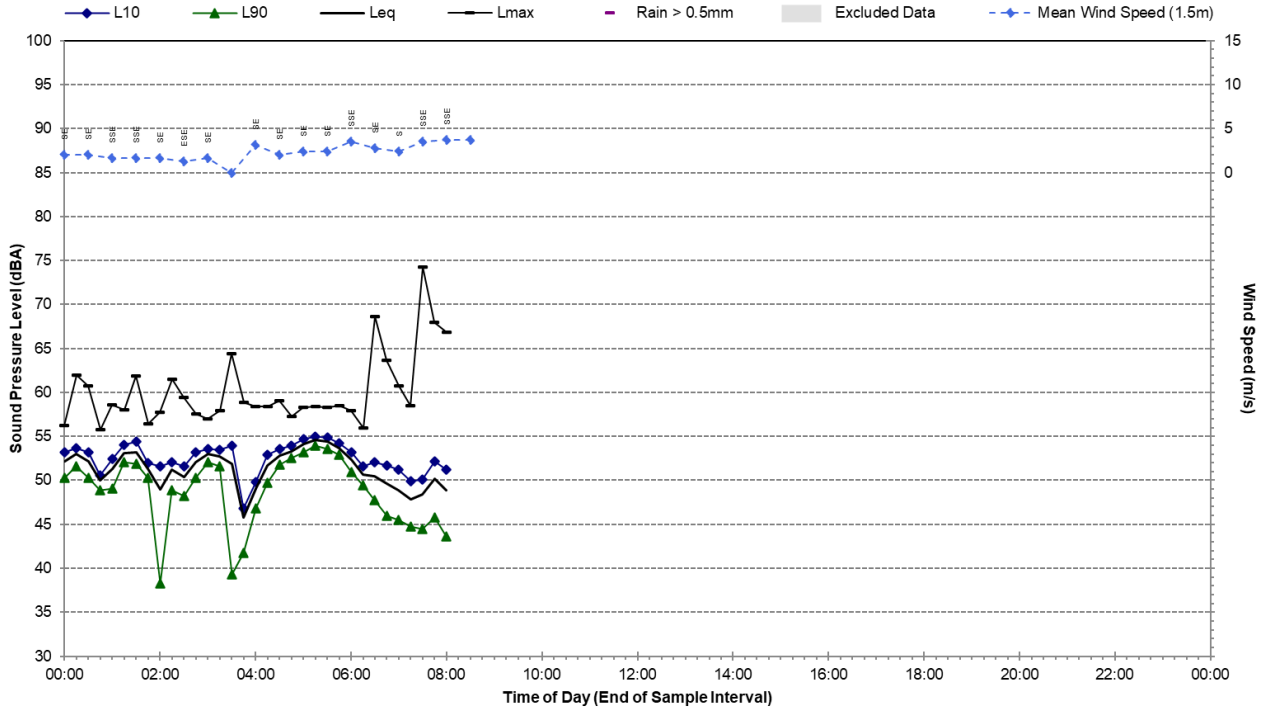
Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Thursday, 21 March 2024



Statistical Ambient Noise Levels

Noise Monitoring Location - Cleveland Bay Industrial Park - Friday, 22 March 2024



Appendix D Project Site Plans and Elevations

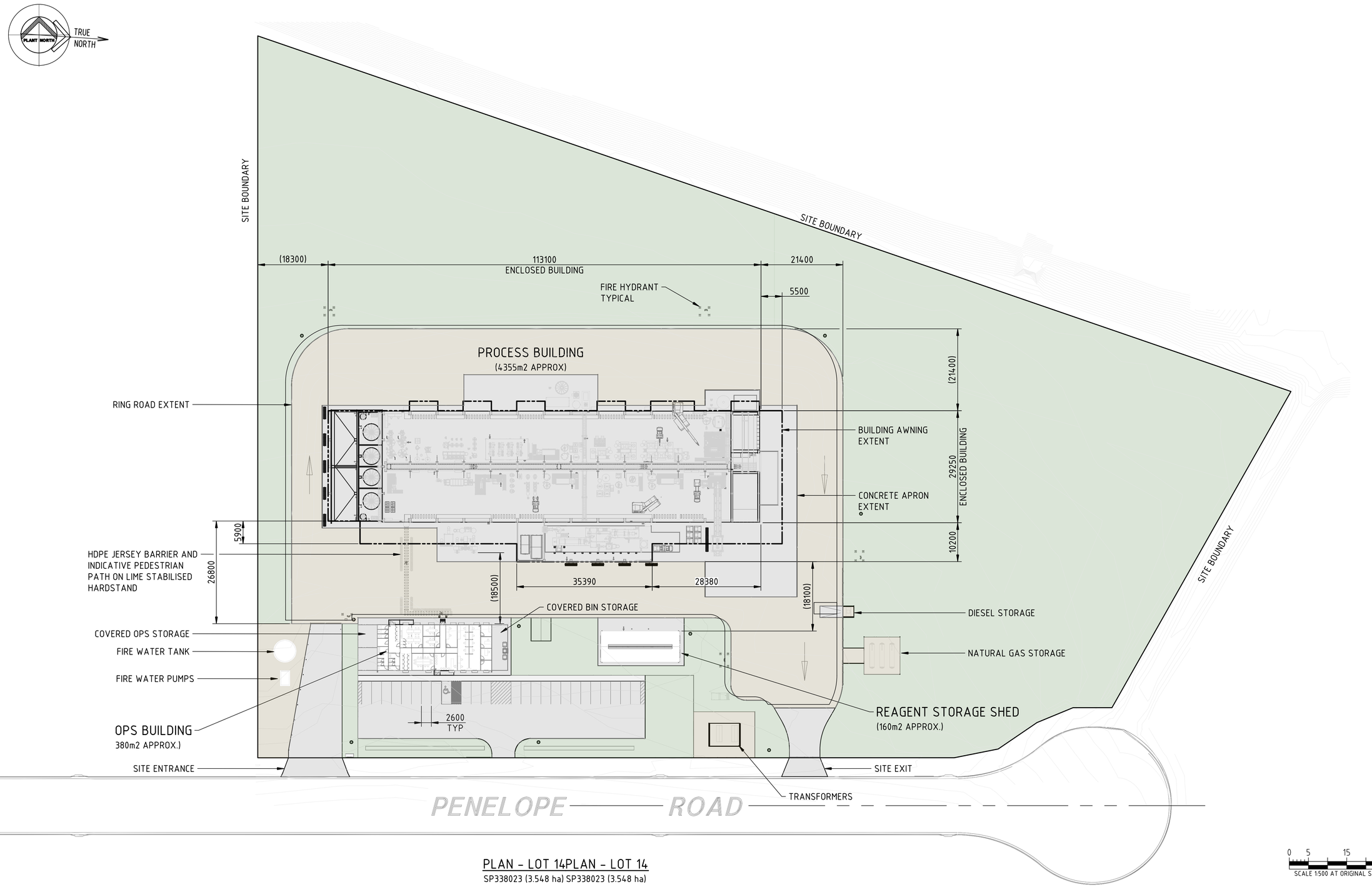
Queensland Resources Common User Facility, Townsville

Noise Impact Assessment

RPS

SLR Project No.: 623.030270.00008

29 November 2024



PLAN - LOT 14PLAN - LOT 14

SP338023 (3.548 ha) SP338023 (3.548 ha)

NOTE:
1. INTERNAL BUILDING EQUIPMENT LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE.

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		H	TRANSFORMER YARD AND REAGENT SHED RELOCATED	TKE	TKE	PJO	02.08.24	
		G	SITE RECONFIGURED	RWE	RWE	PJO	03.07.24	
		F	PRELIMINARY ISSUE - LAYOUT UPDATED	RWE	RWE	PJO	07.06.24	
		E	PRELIMINARY ISSUE - STORAGE AREAS ADDED AND BUILDING SIZES UPDATED	TKE	TKE	TKE	15.03.24	
		D	PRELIMINARY ISSUE - EQUIPMENT ADDED AND ADMIN BUILDING SIZE UPDATED	TKE	TKE	---	07.02.24	
		J	PRELIMINARY ISSUE	TKE	TKE	TKE		

REFERENCE DRAWINGS

DRAWING REVISIONS

CLIENT: QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	TKE	05.09.24
CHECKED	TKE	05.09.24
DESIGNED	TKE	02.09.24
LEAD ENG	TKE	02.09.24
APPROVED		

SCALE 1:500 OR AS SHOWN

DO NOT SCALE A1

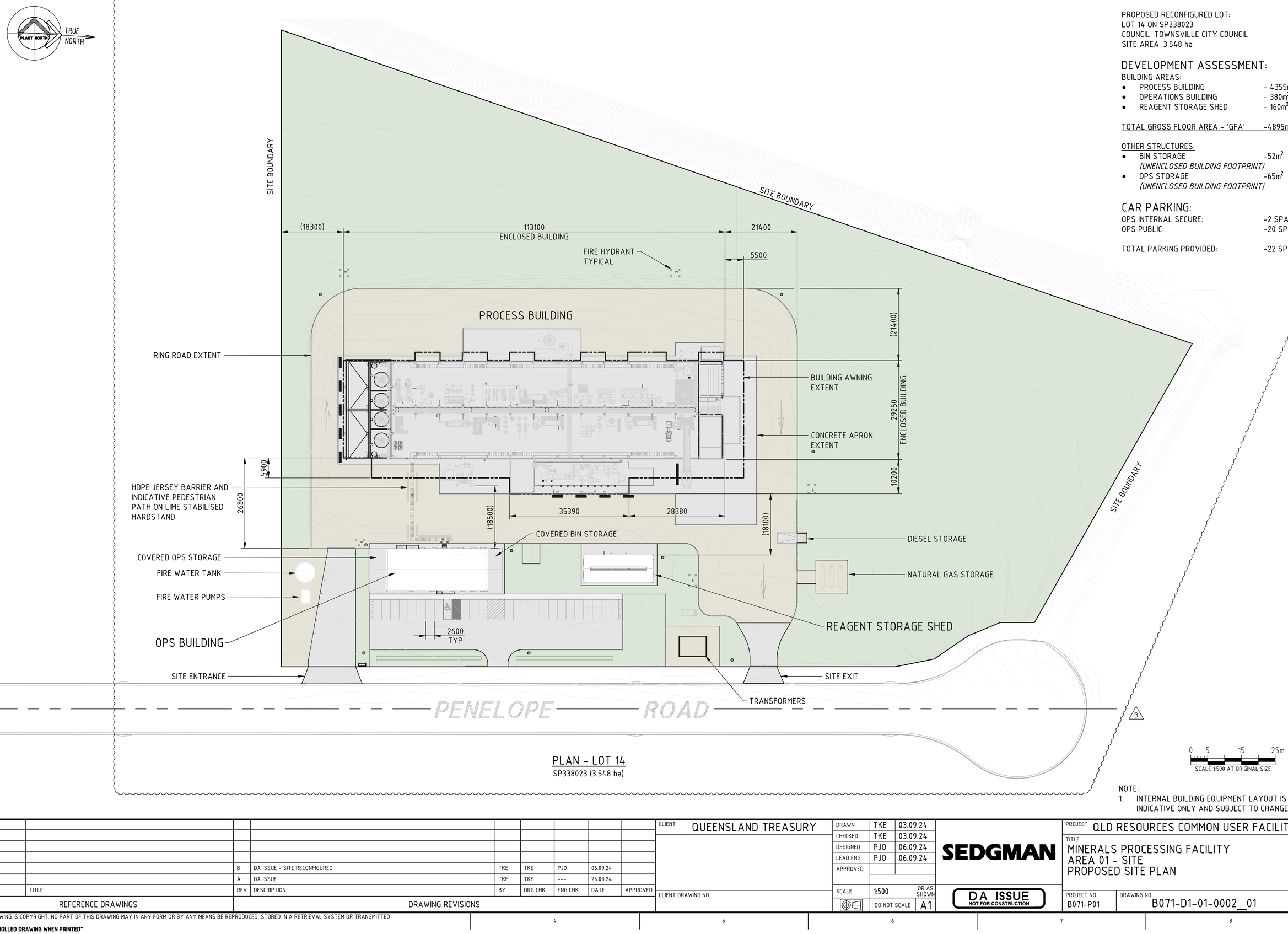
SEDGMAN

PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
SITE PLAN

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0001__01	J



PLAN - LOT 14
SP338023 (3.548 ha)

RPD:

PROPOSED RECONFIGURED LOT:
LOT 14 ON SP338023
COUNCIL: TOWNSVILLE CITY COUNCIL
SITE AREA: 3.548 ha

DEVELOPMENT ASSESSMENT:

BUILDING AREAS:

- PROCESS BUILDING – 4355m^2
- OPERATIONS BUILDING – 380m^2
- REAGENT STORAGE SHED – 160m^2

TOTAL GROSS FLOOR AREA – 'GFA' –4895m^2

OTHER STRUCTURES:

- BIN STORAGE –52m^2
  (UNENCLOSED BUILDING FOOTPRINT)
- OPS STORAGE –65m^2
  (UNENCLOSED BUILDING FOOTPRINT)

CAR PARKING:

OPS INTERNAL SECURE:	–2 SPACES
OPS PUBLIC:	–20 SPACES
TOTAL PARKING PROVIDED:	–22 SPACES

NOTE:
1. INTERNAL BUILDING EQUIPMENT LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE.

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		B	DA ISSUE - SITE RECONFIGURED	TKE	TKE	PJO	06.09.24	
		A	DA ISSUE	TKE	TKE	---	25.03.24	

REFERENCE DRAWINGS | DRAWING REVISIONS

CLIENT: QUEENSLAND TREASURY
CLIENT DRAWING NO

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CHECKED	TKE	03.09.24
DESIGNED	PJO	06.09.24
LEAD ENG	PJO	06.09.24
APPROVED		
SCALE	1:500	OR AS SHOWN
	DO NOT SCALE	A1

SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

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TITLE: MINERALS PROCESSING FACILITY
AREA 01 - SITE
PROPOSED SITE PLAN

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0002_01	B

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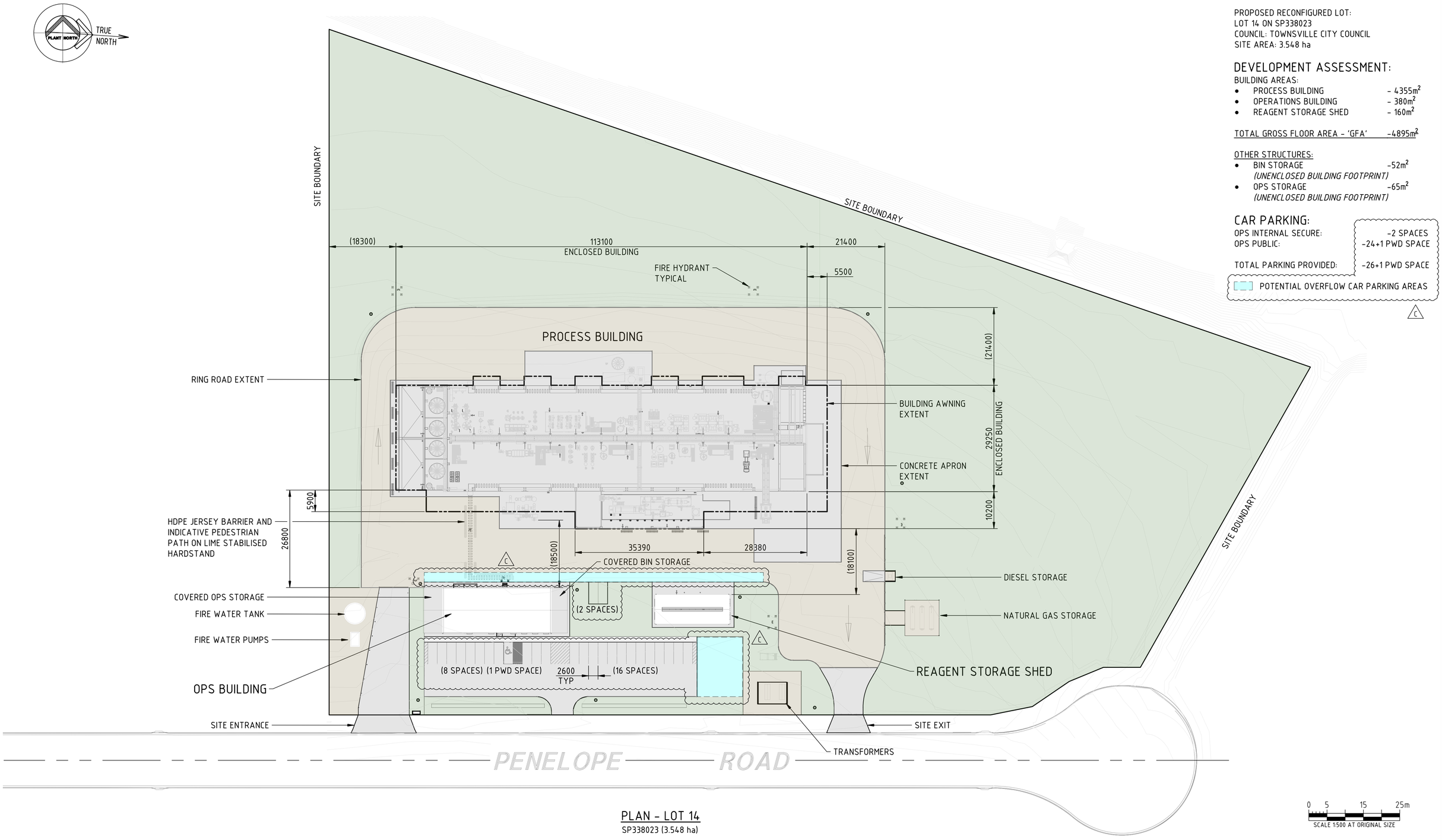

RPD:

PROPOSED RECONFIGURED LOT:
LOT 14 ON SP338023
COUNCIL: TOWNSVILLE CITY COUNCIL
SITE AREA: 3.548 ha

DEVELOPMENT ASSESSMENT:

BUILDING AREAS:

- PROCESS BUILDING – 4355m^2
- OPERATIONS BUILDING – 380m^2
- REAGENT STORAGE SHED – 160m^2

TOTAL GROSS FLOOR AREA – 'GFA' –4895m^2

OTHER STRUCTURES:

- BIN STORAGE –52m^2
  (UNENCLOSED BUILDING FOOTPRINT)
- OPS STORAGE –65m^2
  (UNENCLOSED BUILDING FOOTPRINT)

CAR PARKING:

OPS INTERNAL SECURE:	–2 SPACES
OPS PUBLIC:	–24+1 PWD SPACE
TOTAL PARKING PROVIDED:	–26+1 PWD SPACE

POTENTIAL OVERFLOW CAR PARKING AREAS

C

PLAN – LOT 14

SP338023 (3.548 ha)

0 5 15 25m
SCALE 1:500 AT ORIGINAL SIZE

NOTE:
1. INTERNAL BUILDING EQUIPMENT LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE.

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
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		B	DA ISSUE – SITE RECONFIGURED	TKE	TKE	PJO	06.09.24	
		A	DA ISSUE	TKE	TKE	---	25.03.24	

REFERENCE DRAWINGS | DRAWING REVISIONS

CLIENT: QUEENSLAND TREASURY
CLIENT DRAWING NO

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CHECKED	TKE	15.11.24
DESIGNED	JGO	18.11.24
LEAD ENG	JGO	18.11.24
APPROVED		
SCALE	1:500	OR AS SHOWN
	DO NOT SCALE	A1

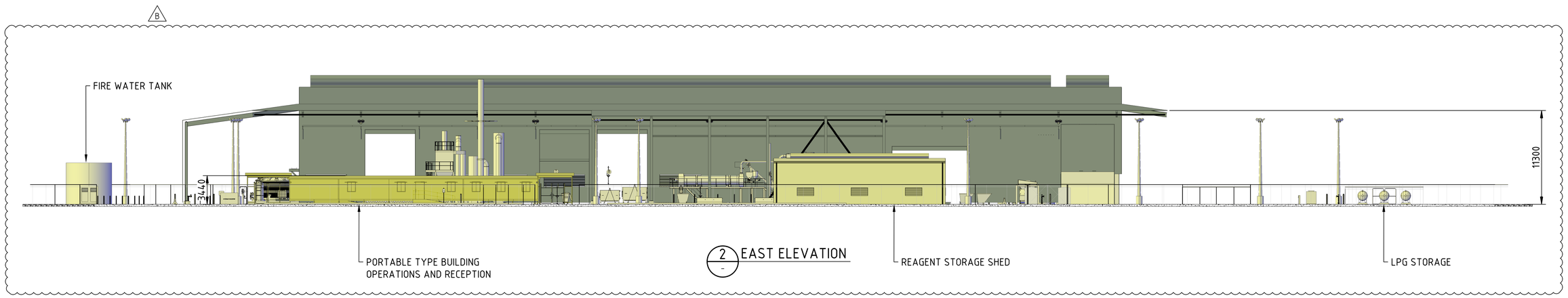
SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY
TITLE: MINERALS PROCESSING FACILITY
AREA 01 – SITE
PROPOSED SITE PLAN

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0002__01	C

1 - WEST ELEVATION



2 - EAST ELEVATION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SITE PLAN DRAWING No. B071-D1-01-0002_01
2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
REFERENCE DRAWINGS		DRAWING REVISIONS						
		B	DA ISSUE - SITE RECONFIGURED	TKE	TKE	PJO	06.09.24	
		A	DA ISSUE	TKE	TKE	TKE	25.03.24	

CLIENT: QUEENSLAND TREASURY

CLIENT DRAWING NO:

DRAWN	TKE	04.09.24
CHECKED	TKE	04.09.24
DESIGNED	PJO	06.09.24
LEAD ENG	PJO	06.09.24
APPROVED		

SCALE: 1:250 OR AS SHOWN — DO NOT SCALE — A1

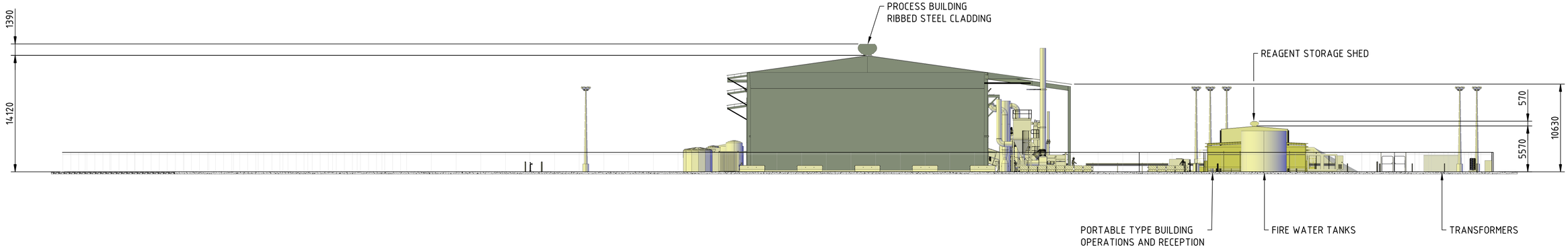
SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

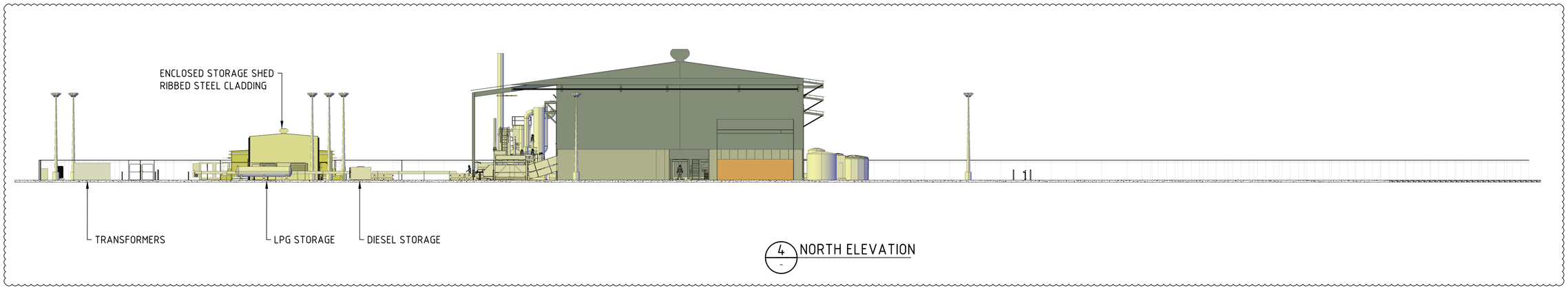
PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE:
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
EAST AND WEST ELEVATIONS

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0002_02	B



3 SOUTH ELEVATION



4 NORTH ELEVATION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SITE PLAN DRAWING No. B071-D1-01-0002_01
2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
B	DA ISSUE - SITE RECONFIGURED	TKE	TKE	PJO	06.09.24	
A	DA ISSUE	TKE	TKE	TKE	25.03.24	

REFERENCE DRAWINGS | DRAWING REVISIONS

CLIENT QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	TKE	04.09.24	
CHECKED	TKE	04.09.24	
DESIGNED	PJO	06.09.24	
LEAD ENG	PJO	06.09.24	
APPROVED			
SCALE	1:250	OR AS SHOWN	
	DO NOT SCALE	A1	

SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT QLD RESOURCES COMMON USER FACILITY

TITLE
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
NORTH AND SOUTH ELEVATIONS

PROJECT NO B071-P01 | DRAWING NO B071-D1-01-0002_03 | REVISION B

5 SOUTH EAST ISOMETRIC

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SITE PLAN DRAWING No. B071-D1-01-0002_01
2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		B	DA ISSUE - SITE RECONFIGURED	TKE	TKE	PJO	06.09.24	
		A	DA ISSUE	TKE	TKE	---	25.03.24	

REFERENCE DRAWINGS

DRAWING REVISIONS

CLIENT QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	TKE	04.09.24
CHECKED	TKE	04.09.24
DESIGNED	PJO	06.09.24
LEAD ENG	PJO	06.09.24
APPROVED		

SCALE NTS OR AS SHOWN

DO NOT SCALE A1

SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT QLD RESOURCES COMMON USER FACILITY

TITLE
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
SOUTH EAST ISOMETRIC

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0002__04	B

6 NORTH WEST ISOMETRIC

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SITE PLAN DRAWING No. B071-D1-01-0002_01
2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		B	DA ISSUE - SITE RECONFIGURED	---	---	---	06.09.24	
		A	DA ISSUE	TKE	TKE	TKE	25.03.24	

REFERENCE DRAWINGS

DRAWING REVISIONS

CLIENT QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	---	04.09.24
CHECKED	---	04.09.24
DESIGNED	---	06.09.24
LEAD ENG	---	06.09.24
APPROVED		

SCALE NTS OR AS SHOWN

DO NOT SCALE A1

SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT QLD RESOURCES COMMON USER FACILITY

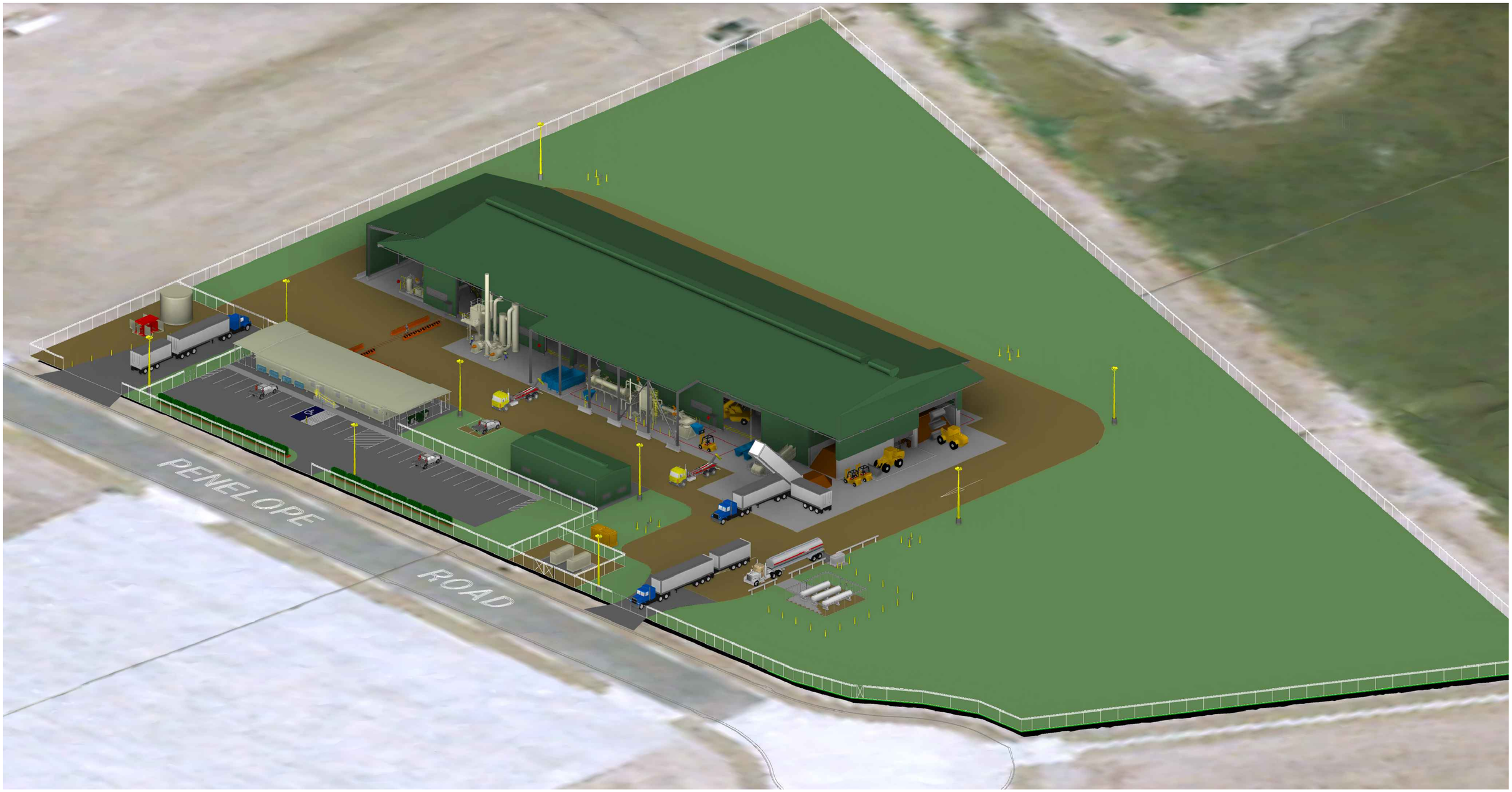
TITLE
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
NORTH WEST ISOMETRIC

PROJECT NO B071-P01

DRAWING NO B071-D1-01-0002_05

REVISION B

PLOT DATE:6/09/24 11:42:47 AM File:C:\TEMP\Vault Designs\B071\DWGs Development\D1\B071-D1-01-0002_05.dwg - By:VaultJobProcessor



7 NORTH EAST ISOMETRIC

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SITE PLAN DRAWING No. B071-D1-01-0002_01
2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		B	DA ISSUE - SITE RECONFIGURED	TKE	TKE	PJO	06.09.24	
		A	DA ISSUE	TKE	TKE	TKE	25.03.24	
REFERENCE DRAWINGS		DRAWING REVISIONS						

CLIENT QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	TKE	04.09.24
CHECKED	TKE	04.09.24
DESIGNED	PJO	06.09.24
LEAD ENG	PJO	06.09.24
APPROVED		
SCALE	NTS	OR AS SHOWN
DO NOT SCALE	A1	

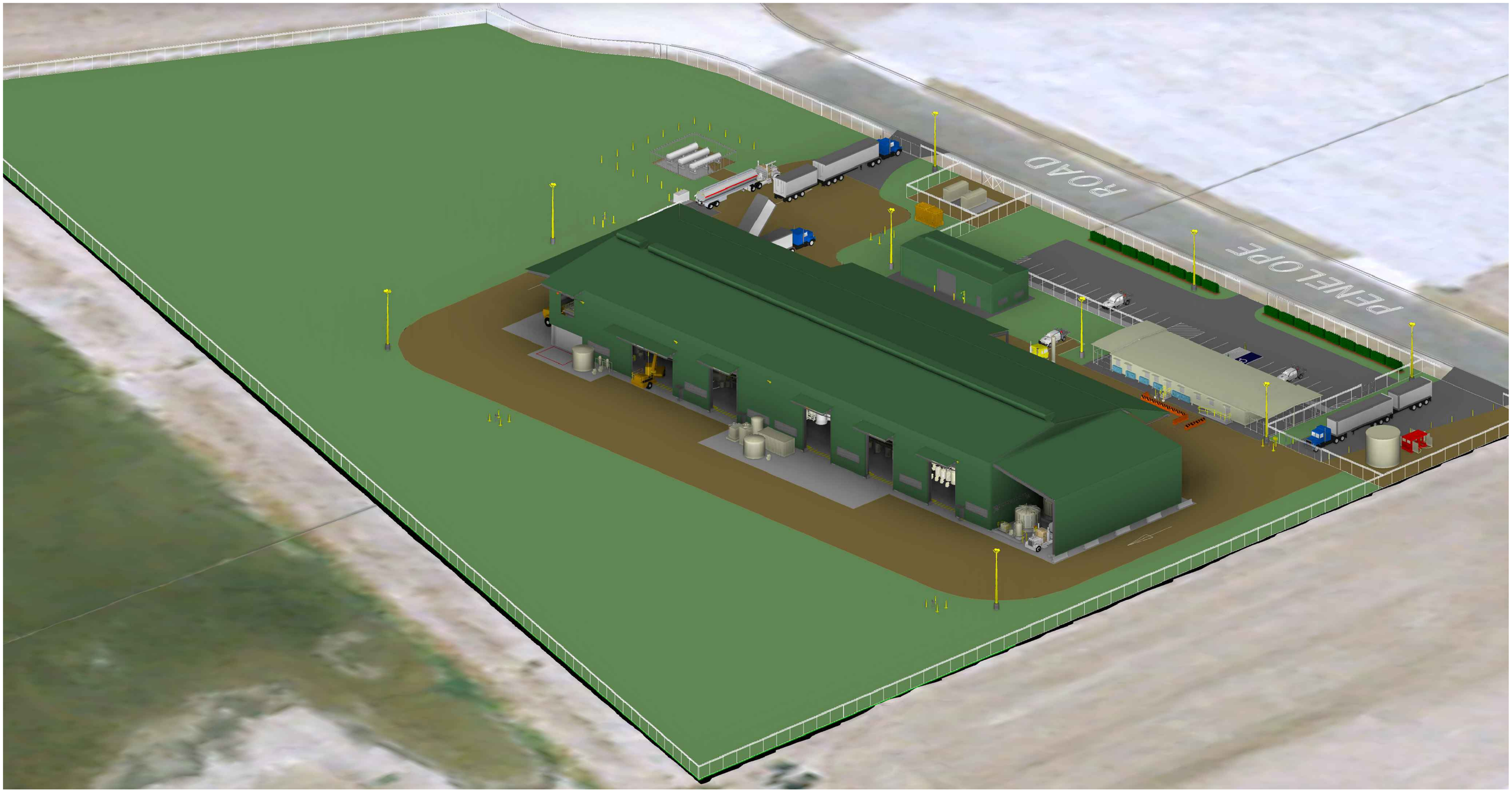
SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT QLD RESOURCES COMMON USER FACILITY

TITLE
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
NORTH EAST ISOMETRIC

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0002_06	B



7 SOUTH WEST ISOMETRIC
-

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SITE PLAN DRAWING No. B071-D1-01-0002_01
2. COLORS SHOWN ARE NOT INDICATIVE OF FINAL DESIGN COLORS

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		B	DA ISSUE - SITE RECONFIGURED	---	---	PJO	06.09.24	
		A	DA ISSUE	TKE	TKE	TKE	25.03.24	

REFERENCE DRAWINGS

DRAWING REVISIONS

CLIENT QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	---	04.09.24
CHECKED	---	04.09.24
DESIGNED	PJO	06.09.24
LEAD ENG	PJO	06.09.24
APPROVED		
SCALE	NTS	OR AS SHOWN
	DO NOT SCALE	A1

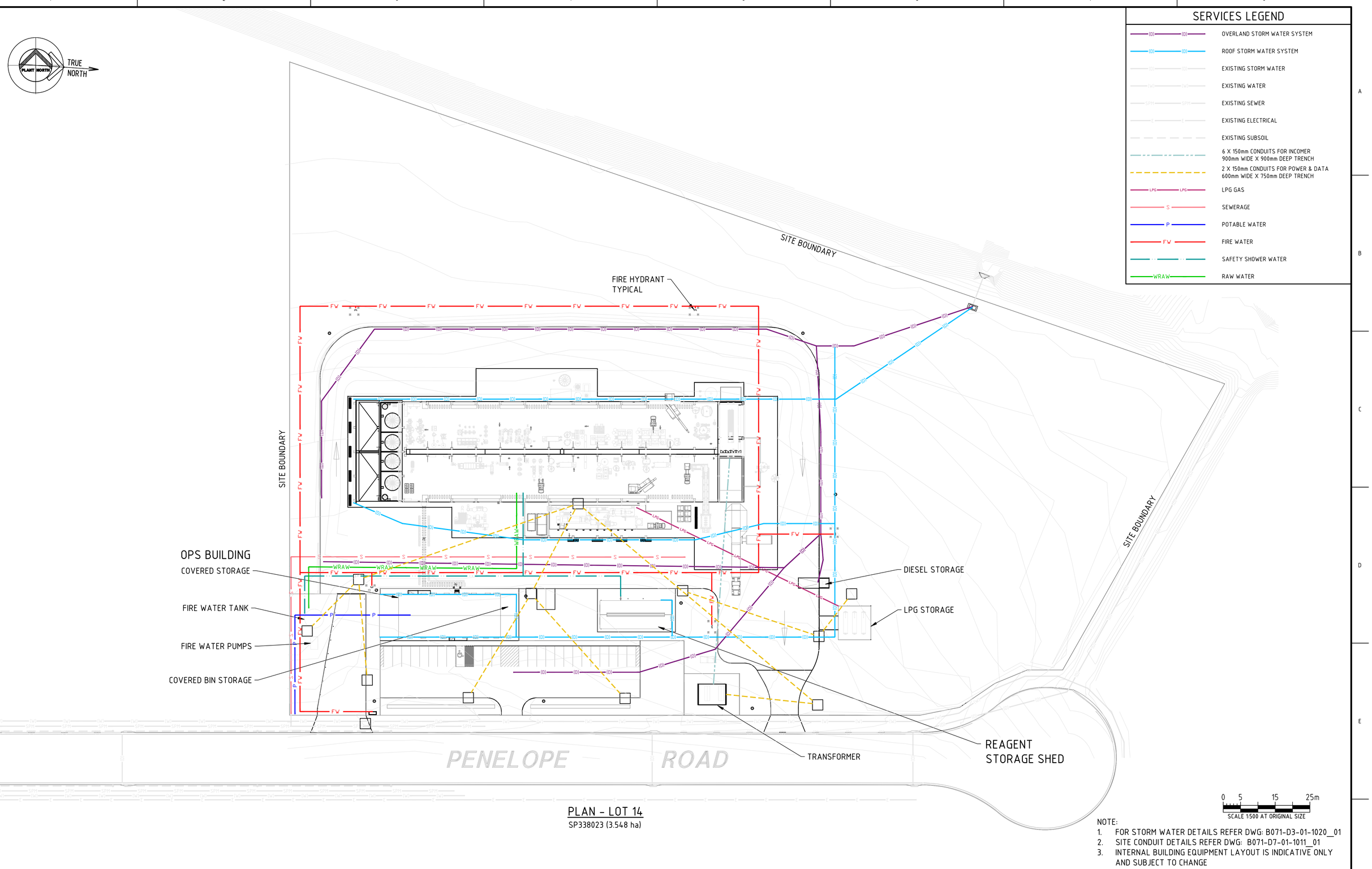
SEDGMAN

DA ISSUE
NOT FOR CONSTRUCTION

PROJECT QLD RESOURCES COMMON USER FACILITY

TITLE
MINERALS PROCESSING FACILITY
AREA 01 - SITE
BUILDING ELEVATIONS AND PERSPECTIVES
SOUTH WEST ISOMETRIC

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0002_07	B



SERVICES LEGEND

- OVERLAND STORM WATER SYSTEM
- ROOF STORM WATER SYSTEM
- EXISTING STORM WATER
- EXISTING WATER
- EXISTING SEWER
- EXISTING ELECTRICAL
- EXISTING SUBSOIL
- 6 X 150mm CONDUITS FOR INCOMER 900mm WIDE X 900mm DEEP TRENCH
- 2 X 150mm CONDUITS FOR POWER & DATA 600mm WIDE X 750mm DEEP TRENCH
- LPG GAS
- SEWERAGE
- POTABLE WATER
- FIRE WATER
- SAFETY SHOWER WATER
- RAW WATER

PLAN - LOT 14

SP338023 (3.548 ha)

0 5 15 25m
SCALE 1:500 AT ORIGINAL SIZE

NOTE:
1. FOR STORM WATER DETAILS REFER DWG: B071-D3-01-1020__01
2. SITE CONDUIT DETAILS REFER DWG: B071-D7-01-1011__01
3. INTERNAL BUILDING EQUIPMENT LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
		B	PRELIMINARY ISSUE	BWE	BWE	PJO	06.09.24	
		A	PRELIMINARY ISSUE	RWE		PJO	06.06.24	

REFERENCE DRAWINGS | DRAWING REVISIONS

CLIENT: QUEENSLAND TREASURY
CLIENT DRAWING NO

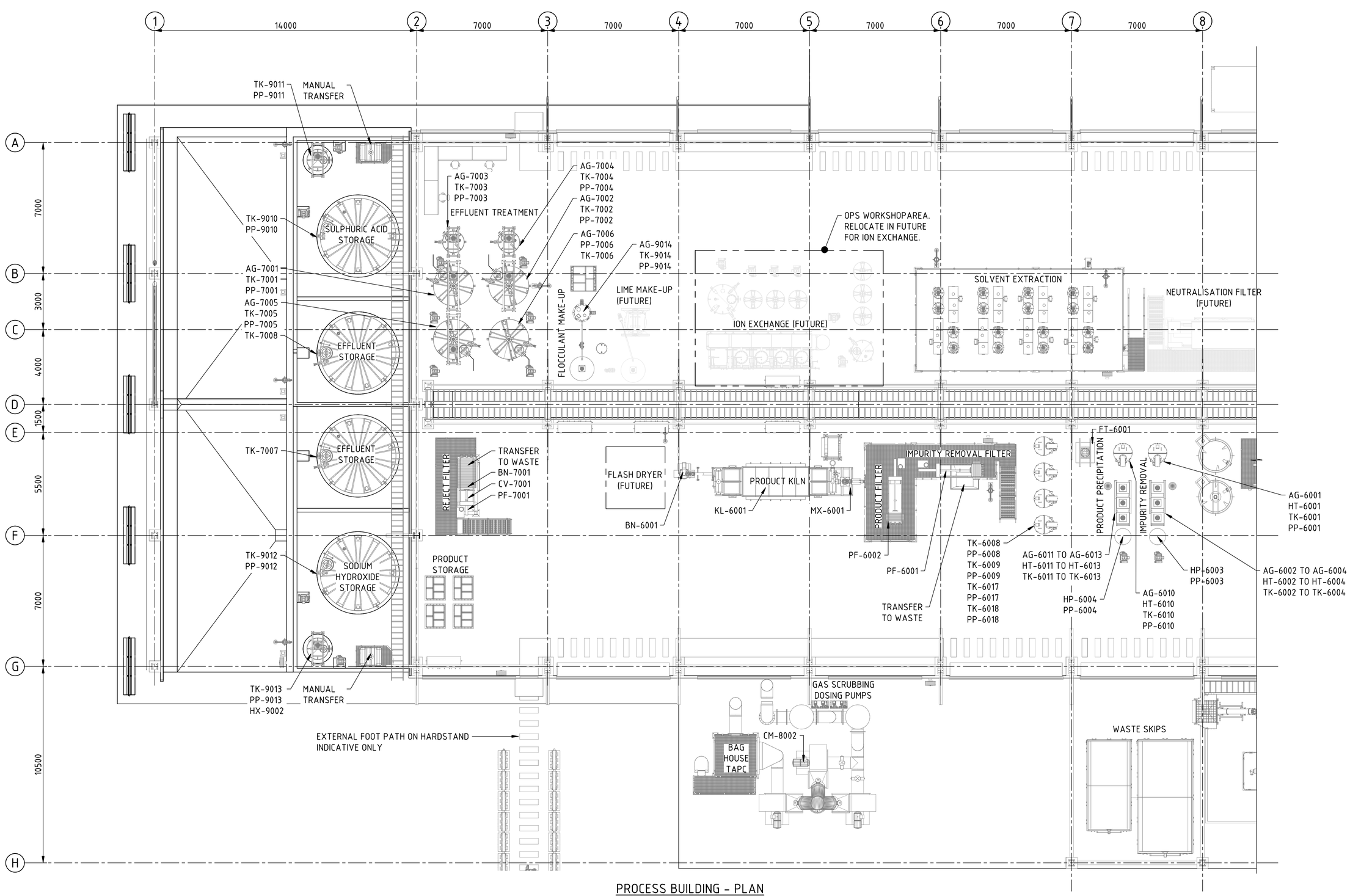
DRAWN	BWE	04.09.24
CHECKED	BWE	04.09.24
DESIGNED	PJO	06.09.24
LEAD ENG	PJO	06.09.24
APPROVED		
SCALE	1:500	OR AS SHOWN
	DO NOT SCALE	A1

SEDGMAN

PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY
TITLE: MINERALS PROCESSING FACILITY AREA 01 - SITE UNDERGROUND PIPES AND SERVICES PLAN

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-0005__01	B



PROCESS BUILDING - PLAN

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
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		B	PRELIMINARY ISSUE - LAYOUT UPDATED	RWE	RWE	PJO	07.06.24	
		A	PRELIMINARY ISSUE	TKE	TKE	TKE	18.04.24	

REFERENCE DRAWINGS

DRAWING REVISIONS

CLIENT QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	BWE	05.09.24	
CHECKED	BWE	05.09.24	
DESIGNED	PJO	06.09.24	
LEAD ENG	PJO	06.09.24	
APPROVED			
SCALE	1:100	OR AS SHOWN	
	DO NOT SCALE	A1	

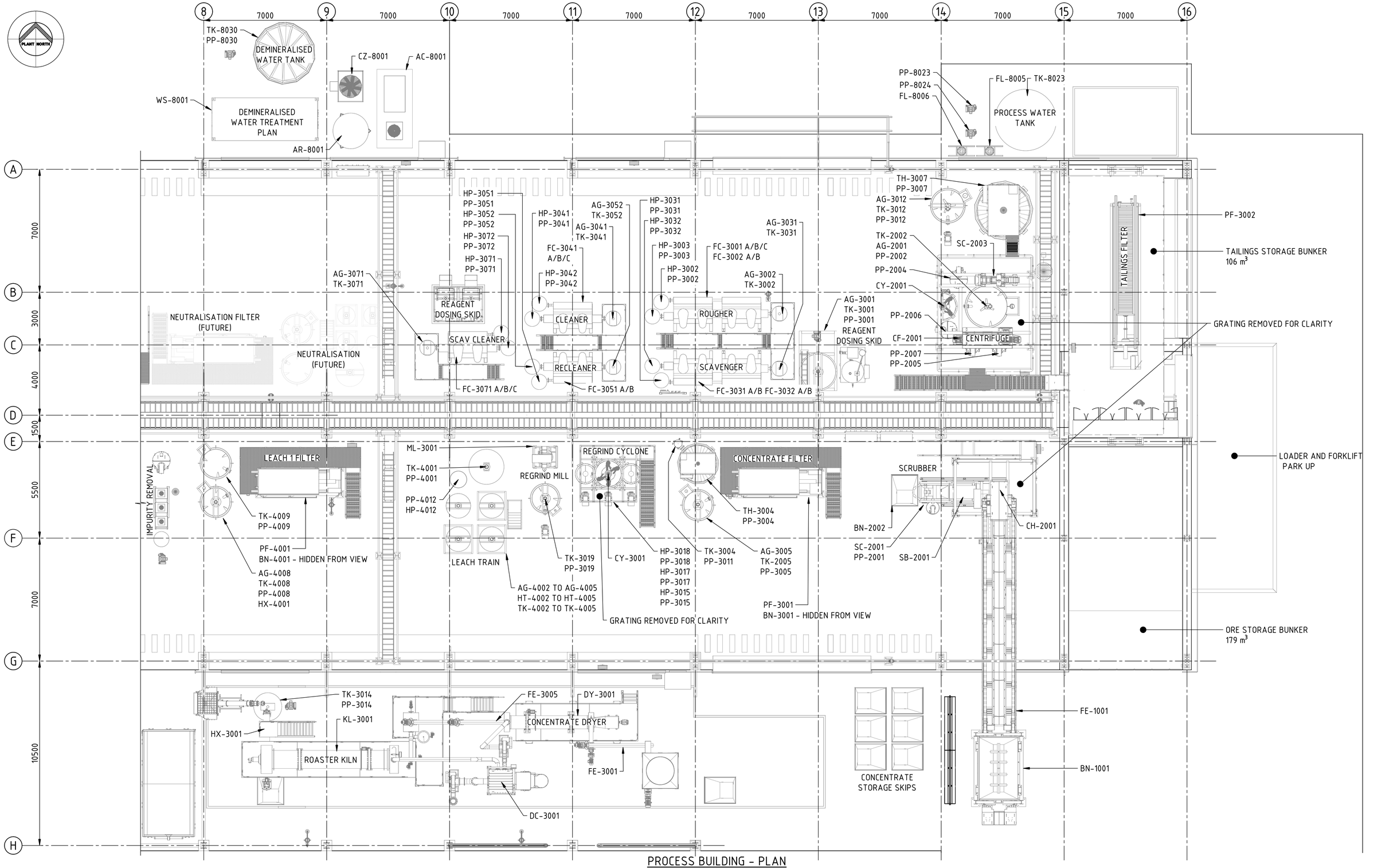
SEDGMAN

PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT QLD RESOURCES COMMON USER FACILITY

TITLE
MINERALS PROCESSING FACILITY
GENERAL ARRANGEMENT
PLAN - GRIDS 1 TO 8

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-8000__01	C



PROCESS BUILDING - PLAN

DRAWING NO	TITLE	REV	DESCRIPTION	BY	DRG CHK	ENG CHK	DATE	APPROVED
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		B	PRELIMINARY ISSUE	RWE	RWE	PJO	07.06.24	
		A	PRELIMINARY ISSUE	TKE	TKE	TKE	18.04.24	

REFERENCE DRAWINGS

DRAWING REVISIONS

CLIENT: QUEENSLAND TREASURY

CLIENT DRAWING NO

DRAWN	BWE	05.09.24	
CHECKED	BWE	05.09.24	
DESIGNED	---	06.09.24	
LEAD ENG	---	06.09.24	
APPROVED			
SCALE	1:100	OR AS SHOWN	
	DO NOT SCALE	A1	

SEDGMAN

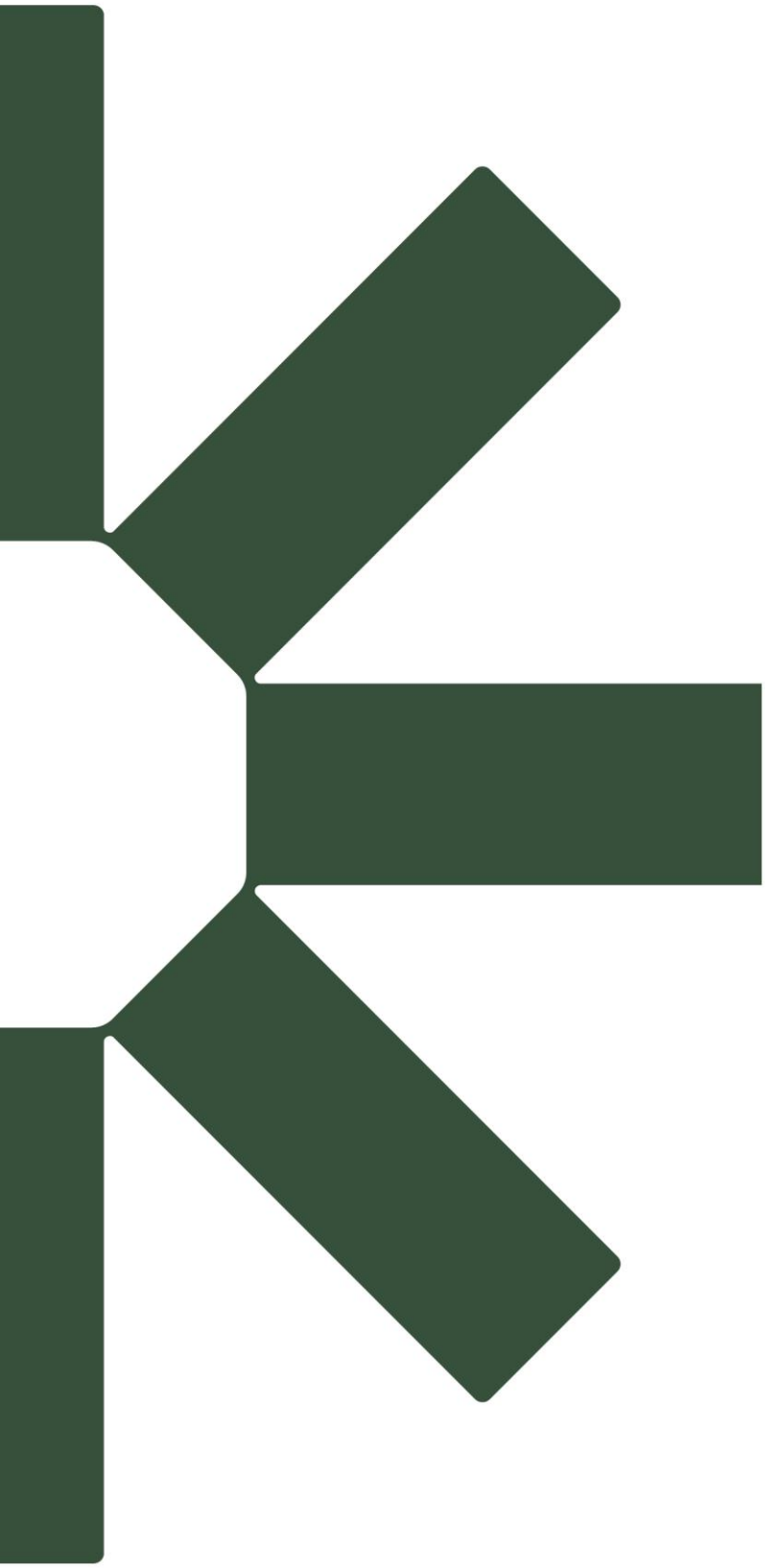
PRELIMINARY NOT FOR CONSTRUCTION

PROJECT: QLD RESOURCES COMMON USER FACILITY

TITLE: MINERALS PROCESSING FACILITY GENERAL ARRANGEMENT PLAN - GRIDS 8 TO 16

PROJECT NO	DRAWING NO	REVISION
B071-P01	B071-D1-01-8000__02	C

PLOT DATE: 6/09/24, 3:47:51 PM | File: C:\TEMP\Vault\Designs\B071\Dwgs_Development\01\B071-D1-01-8000__02.dwg | By: Vault Job Proc BNE01



Making Sustainability Happen