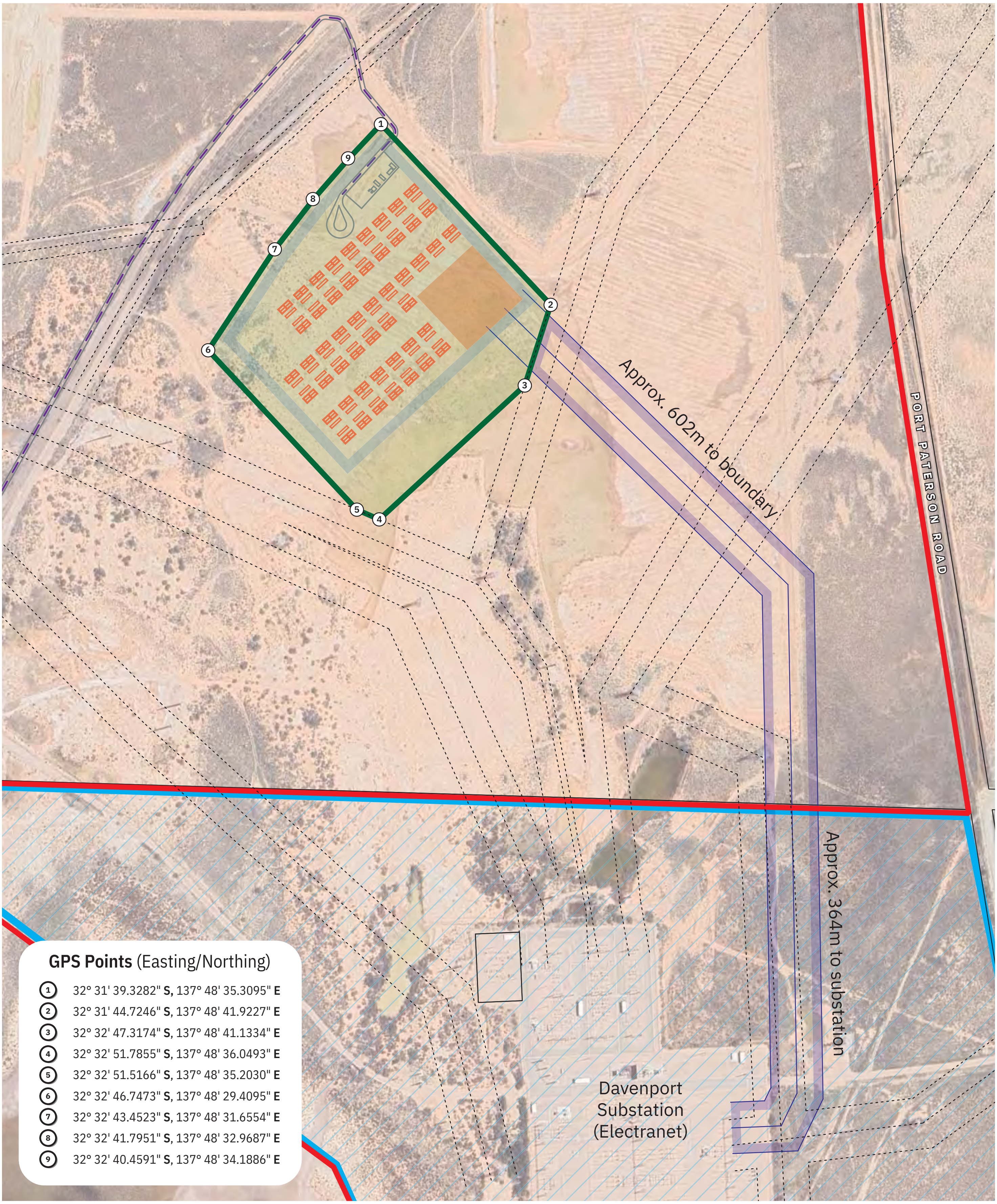
Attachment A

Plans and Technical Specifications

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977



Subject Land – Allotment 8
Lease Area Reserve of BESS – Area Approx. 7.0ha
Indicative underground transmission line corridor
Davenport Substation (Electranet)
Site Access Road

SITE PLAN
Northern Battery Project

420 Northern Power Station Road
PORT PATERSON

for Davenport BESS Pty Ltd

1:5000 @ A4
0 100

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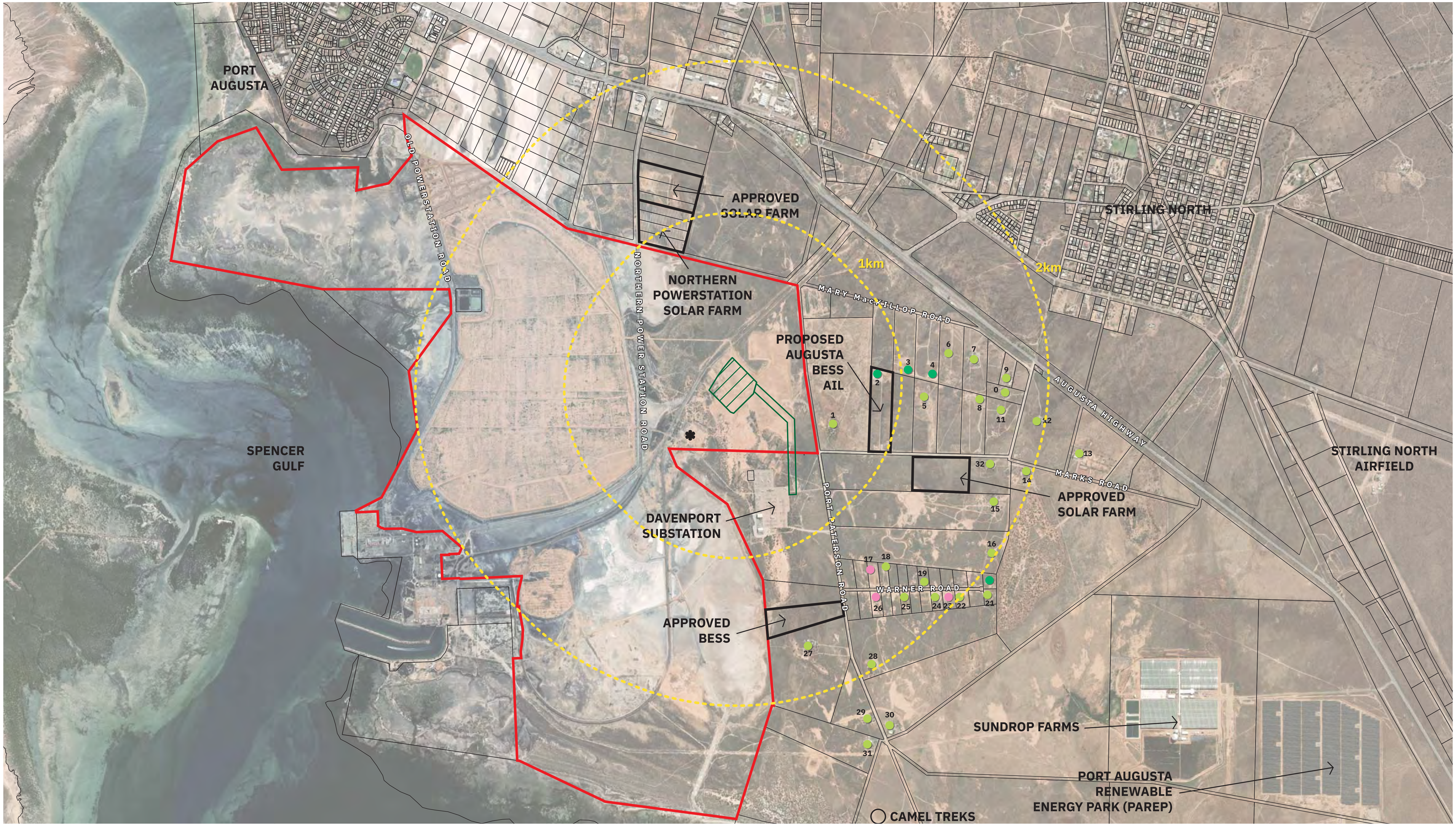

Subject Land – Approx. 990.7ha
Allotment 8, D55700, Hundred of Davenport in Certificate of Title Volume 6226/253
Development Site of BESS – Area Approx. 7.0ha
Indicative Underground Transmission Line Corridor

Non involved dwelling
Proposed dwelling (non involved)
Non Residential land use (non involved)
Site Constraint

1km Offset from BESS Development Site
2km Offset from BESS Development Site

LOCALITY PLAN

Proposed Battery Energy Storage System

420 Northern Power Station Road
PORT PATERSON

for Davenport BESS Pty Ltd

1:25000 @ A3
0 500

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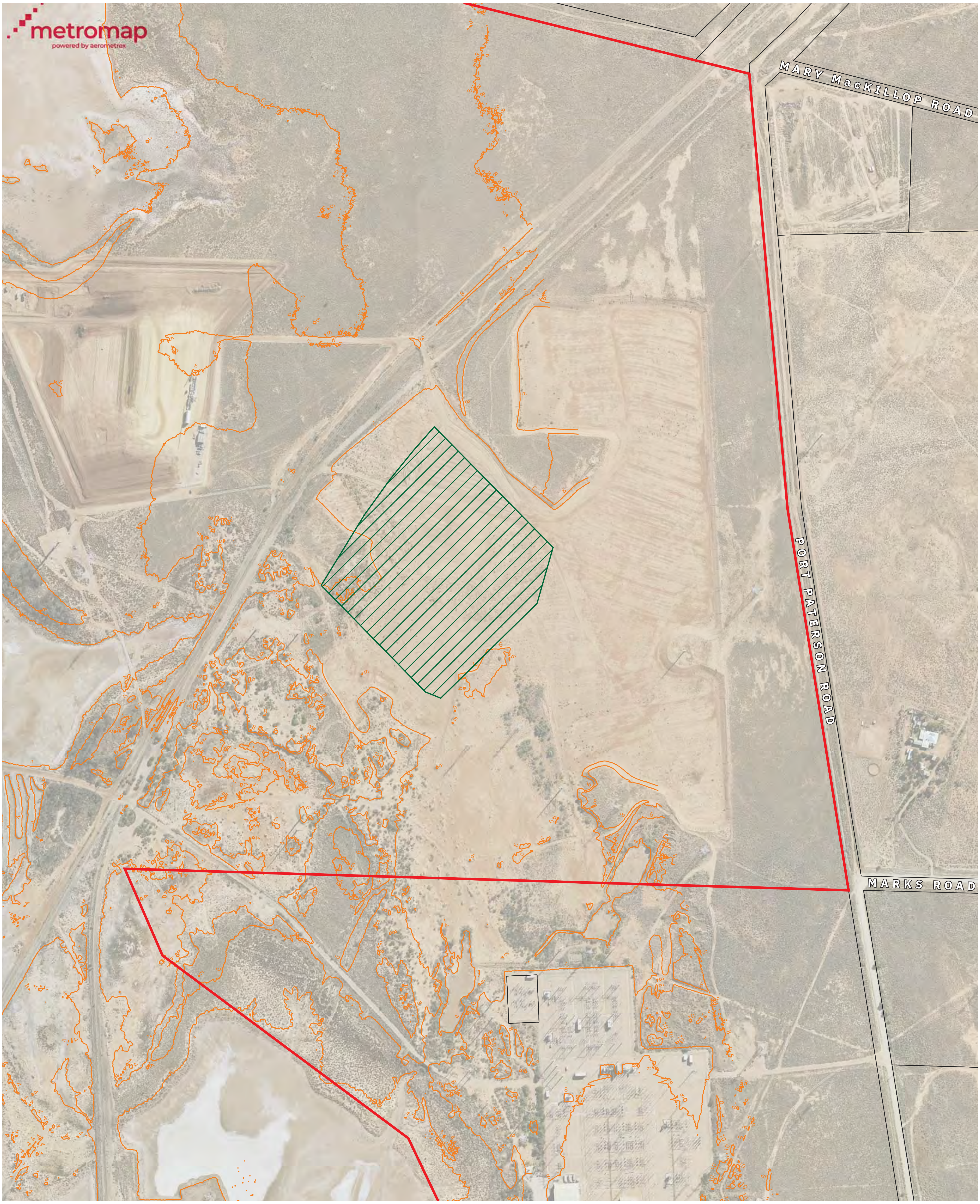

Subject Land – Approx. 990.7ha
Allotment 8, D55700, Hundred of Davenport in Certificate of Title Volume 6226/253
Development Site of BESS – Area Approx. 7.0ha
Contours - 2m Intervals

CONTOUR PLAN

Proposed Battery Energy Storage System

420 Northern Power Station Road
PORT PATERSON

for Davenport BESS Pty Ltd

1:5000 @ A3
0 100

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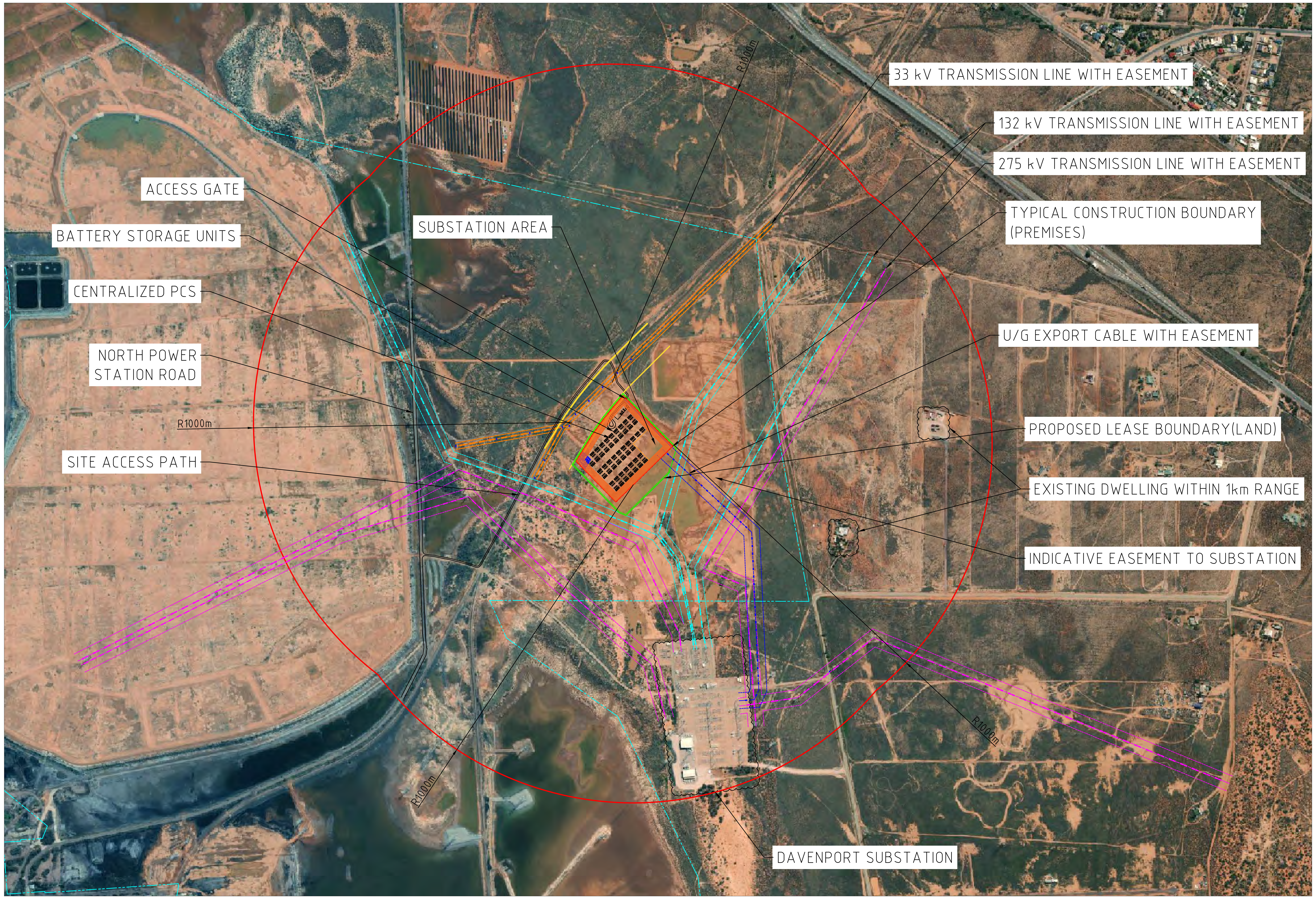


LOCALITY PLAN

0 125 250 375 500 METRES

NOTES

1. ACTUAL DIMENSIONS AND CLEARANCES MAY VARY SUBJECT TO SITE CONDITIONS.
2. THE NUMBER OF BATTERY CONTAINERS IS SUBJECT TO FINAL EPC DECISION.
3. DETAILS OF SUBSTATION AREA REFER TO TYPICAL SUBSTATION LAYOUT PLAN.
4. SITE ACCESS TO BE INSPECTED AND PAVED APPROPRIATELY TO ALLOW HEAVY TRUCK DELIVERY. DETAILS OF ACCESS REFER TO TRAFFIC IMPACT ASSESSMENT

LEGEND

- SCREEN VEGETATION
- 2.1m CHAINMESH SECURITY FENCE IN SILVER FINISH
- 275kV TRANSMISSION LINE WITH EASEMENT
- 132kV TRANSMISSION LINE WITH EASEMENT
- 33kV OVERHEAD LINE WITH EASEMENT
- TYPICAL INVERTER & BATTERY COMPLEX UNIT
- PROPOSED LEASE BOUNDARY (LAND)
- RAILWAY & 100m OFFSET
- PROPOSED UNDERGROUND CABLE

SITE SPECIFICATIONS		
FENCE	927	m
SITE AREA WITHIN FENCE	5.4	Ha
INTERNAL ROAD	TBD	m
SITE LAY DOWN	1176	m^2
SUBSTATION	6751	m^2
LEASED AREA	7	Ha

FOR INFORMATION

No	DATE	DRN	CHK	ENG	Q.A.	PROJECT	DESCRIPTION
F	29/09/25	D.S.	ACE	D.S.	ACE		UPDATE DETAILS
E	11/09/25	D.S.	ACE	D.S.	ACE		UPDATE CABLES
D	26/08/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
C	25/08/25	M.G.	ACE	M.G.	ACE		ADD SITE TRACK
B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
G	21/11/25	D.S.	ACE	D.S.	ACE		UPDATE NOTES & VMZ

REVISION

GREEN GOLD ENERGY

DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
LOCALITY PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD.

SCALE: NTS

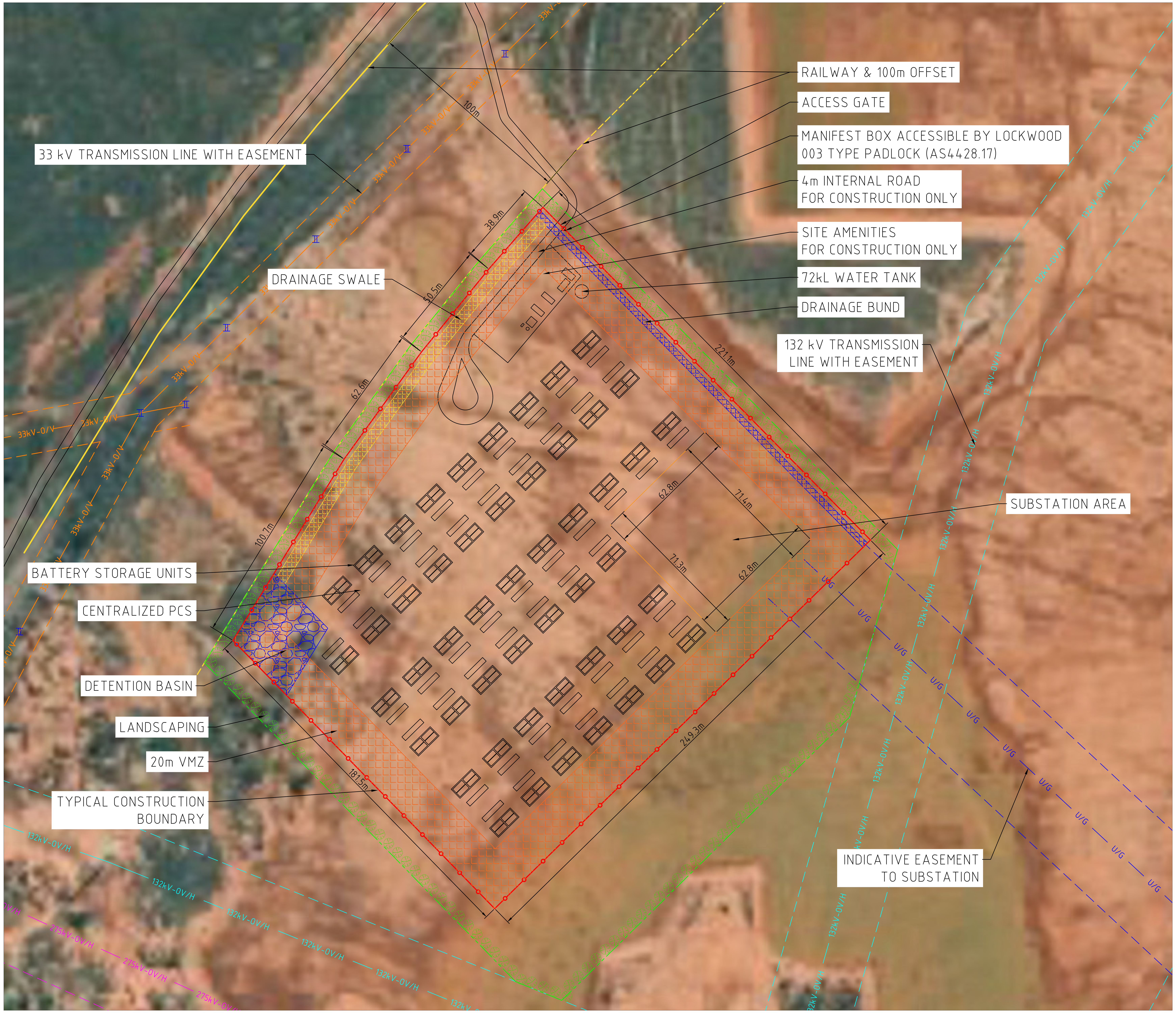
PROJ No

DRG No

REV G

AUTOCAD

A1SHEET



0 25 50 75 100
METRES

ENLARGED SITE LAYOUT

BATTERY STORAGE SYSTEM SPECIFICATIONS

AC	270	MW		
NUMBER OF INVERTERS	52	-	INVERTER MODEL	SG-6900UD-MV
NUMBER OF BATTERIES	208	-	BATTERY MODEL	ST5015UX
BATTERY CAPACITY	1043.1	MWh		

SITE SPECIFICATIONS

FENCE	901	m
FENCED AREA	5.1	Ha
LEASED AREA	7.0	Ha
SUBSTATION AREA	5200	m^2

NOTES

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3. DETAILS OF SUBSTATION AREA REFER TO TYPICAL SUBSTATION LAYOUT PLAN.
4. SITE ACCESS TO BE INSPECTED AND PAVED APPROPRIATELY TO ALLOW HEAVY TRUCK DELIVERY. DETAILS OF ACCESS REFER TO TRAFFIC IMPACT ASSESSMENT
5. ALL EXISTING VEGETATION IS TO BE REMOVED FROM THE LEASE AREA SUBJECT TO A CLEARANCE PERMIT FROM THE NATIVE VEGETATION COUNCIL.
6. ALL INFRASTRUCTURE IS SITED A MINIMUM OF 20METRES FROM ALL LEASE BOUNDARIES (REFER TO THE VEGETATION MANAGEMENT ZONE (VMZ)).
7. THE VEHICLE ACCESS SHALL ACHIEVE A MAXIMUM GRADIENT OF 1:16 IN ACCORDANCE WITH AS2890.2 (REFER TRAFFIC IMPACT ASSESSMENT).
8. ALL ACCESS GATES WILL BE READILY ACCESSIBLE TO ATTENDING FIRE SERVICE UNITS AND FITTED WITH A 003 TYPE PADLOCK IN ACCORDANCE WITH AS4828.17.
9. A VEGETATION MANAGEMENT ZONE (VMZ) SHALL BE ESTABLISHED AND MAINTAINED IN ACCORDANCE WITH THE BUSHFIRE MANAGEMENT AND EMERGENCY MANAGEMENT PLAN CONTAINED WITHIN THE OPERATIONAL MANAGEMENT PLAN (OMP).
10. A FIRE TANK (MINIMUM 72,000 LITRES) WILL BE PROVIDED ON-SITE IN ACCORDANCE WITH AS2419.1.
11. A MANIFEST BOX (OR SIMILAR) WILL BE PROVIDED NEAR THE SITE ACCESS IN ACCORDANCE WITH THE REQUIREMENTS OF SACFS. THE BOX WILL BE FITTED WITH A 003 TYPE PADLOCK IN ACCORDANCE WITH AS4828.17.

LEGEND

- SCREEN VEGETATION
- 2.1m CHAINMESH SECURITY FENCE IN SILVER FINISH
- 275kV TRANSMISSION LINE WITH EASEMENT
- 132kV TRANSMISSION LINE WITH EASEMENT
- 33kV OVERHEAD LINE WITH EASEMENT
- TYPICAL INVERTER & BATTERY COMPLEX UNIT
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E	11/09/25	D.S.	ACE	D.S.	ACE		UPDATE CABLES
D	26/08/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
C	25/08/25	M.G.	ACE	M.G.	ACE		ADD SITE TRACK
B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
G	21/11/25	D.S.	ACE	D.S.	ACE		UPDATE NOTES & VMZ

REVISION

GREEN GOLD ENERGY

DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
SITE PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD.
SCALE: NTS
PROJ No
DRG No
REV G

AUTOCAD
A1SHEET

SC5500UD-MV/SC6300UD-MV/ SC6900UD-MV

Power Conversion System

HIGH YIELD

- Advanced three-level technology,max. efficiency 99%
- Effective forced air cooling,no derating up to 45°C
- Wide DC voltage operation window, full power operation at 1500V

SMART O&M

- Modular design,easy for maintenance
- IP65 protection degree, easy for outdoor installation
- C5 anti-corrosion degree, adjust to applications close to the sea

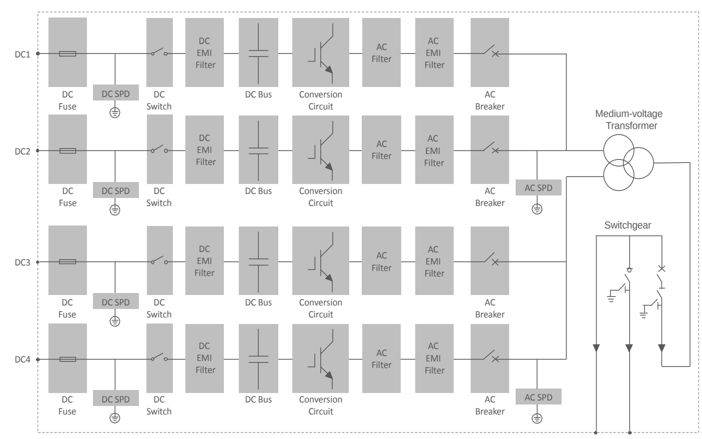
FLEXIBLE APPLICATION

- Bidirectional power conversion system with full four-quadrant operation
- Compatible with high voltage battery system,low system cost
- Battery charge & dis-charge management and black start function integrated

GRID SUPPORT

- Compliant with CE, IEC 62477, IEC 61000 and grid regulations
- Fast active/reactive power response
- L/HVRT,FRT, soft start/stop, specified power factor control and reactive power support

CIRCUIT DIAGRAM



Type Designation	SC5500UD-MV	SC6300UD-MV	SC6900UD-MV
DC side			
Max. DC voltage	1500 V		
Min. DC voltage	800 V	915 V	1000 V
DC voltage range	800 – 1500 V	915 – 1500 V	1000 – 1500 V
Max. DC current	1935 A * 4		
No. of DC inputs	4		
AC side (Grid)			
AC output power	5500 kVA @ 45 ℃ 6050 kVA @ 30 ℃	6300 kVA @ 45 ℃ 6930 kVA @ 30 ℃	6900 kVA @ 45 ℃ 7590 kVA @ 30 ℃
Converter port max. AC output current	1587 A*4		
Converter port nominal AC voltage	550 V	630 V	690 V
Converter port AC voltage range	484 – 605 V	554 – 693 V	607 – 759 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz		
Harmonic (THD)	< 3 % (at nominal power)		
Power factor at nominal power / Adjustable power factor	>0.99 / 1 leading – 1 lagging		
Adjustable reactive power range	-100 % – 100 %		
Feed-in phases / AC connection	3 / 3		
AC side (Off-Grid)			
Converter port nominal AC voltage	550 V	630 V	690 V
Converter port AC voltage range	484 – 605 V	554 – 693 V	607 – 759 V
AC voltage Distortion	< 3 % (Linear load)		
DC voltage component	< 0.5 % Un (Linear balance load)		
Unbalance load Capacity	100 %		
Nominal frequency / Frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz		
Efficiency			
Converter max. efficiency	99%		
Transformer			
Transformer rated power	5500 kVA	6300 kVA	6900 kVA
Transformer max. power	6050 kVA	6930 kVA	7590 kVA
LV / MV voltage	0.55 kV / 20 – 35 kV	0.63 kV / 20 – 35 kV	0.69 kV / 20 – 35 kV
Transformer vector	Dy11y11		
Transformer cooling type	ONAN		
Oil type	Mineral oil(PCB free) or degradable oil on request		
Protection			
DC input protection	Load break switch + fuse		
Converter output protection	Circuit breaker		
AC output protection	Circuit breaker		
Surge protection	DC Type II / AC Type II		
Grid monitoring / Ground fault monitoring	Yes / Yes		
Insulation monitoring	Yes		
Overheat protection	Yes		
General Data			
Dimensions (W*H*D)	12192*2896*2438 mm		
Weight	29000 kg		
Degree of protection	IP54 (Converter: IP65)		
Operating ambient temperature range	-35 to 60 ℃ (> 45 ℃ derating)		
Allowable relative humidity range	0 – 100 %		
Cooling method	Temperature controlled forced air cooling		
Max. operating altitude	4000 m (> 2000 m derating)		
Display	LED, WEB HMI		
Communication	RS485, CAN, Ethernet		
Compliance	CE, IEC 62477-1, IEC 61000-6-2, IEC 61000-6-4		
Grid support	L/HVRT, FRT, active & reactive power control and power ramp rate control, Volt-var, Volt-watt, Frequency-watt		

ST5015UX-S-2H-AU / ST5015UX-S-4H-AU

PowerTitan 2.0 Liquid Cooled Energy Storage System

Preliminary

OPTIMAL COST

- Intelligent liquid-cooled temperature control system to optimize the auxiliary power consumption
- Pre-assembled, no battery module handling on site, transportation of complete system

SAFETY AND RELIABLE

- Electrical safety management, overcurrent fast breaking and arc extinguishing protection
- The electrical cabinet and battery cabinet are separated to prevent thermal runaway

EFFICIENT AND FLEXIBLE

- High-efficiency heat dissipation, increase battery life and system discharge capacity
- Front single-door-open design, supporting back to back layout drawing
- Function test in factory, limited on-site work, accelerate commissioning process

CONVENIENT O&M

- One-click system upgrade
- Automatic coolant refilling design
- Online intelligent monitoring

Product name	ST5015UX-S-2H-AU / ST5015UX-S-4H-AU
DC side	
Cell type	LFP 3.2 V / 314 Ah
Battery configuration	416S12P
Nominal capacity	5015 kWh
Nominal voltage range	1123.2 V - 1497.6 V
System parameter	
Battery container size(W * H * D)	6058 mm * 2896 mm * 2438 mm
Battery container weight	42 T
Degree of protection	IP55
Anti-corrosion degree	C4
Fire resistance time	1 h
Operation temperature range	-30 ℃ - 50 ℃
Operation humidity range	0 % - 100 % (Non-condensing)
Highest altitude	3000 m
Temperature control method	Intelligent liquid cooling
Fire suppression system	Default: FACP, FK5112, Flammable gas detector, Smoke detector, Heat detector, Sounder beacon, Alarm bell, Extinguishant abort button, Ventilation system, Pressure relief port, Manual automatic switching and emergency starting device Optional: Sprinkler, Explosion vent panel, Aerosol
Communication interface	Ethernet
Communication protocol	Modbus TCP
Standard	IEC 61000, IEC 62619, IEC 62933, UN 38.3 / UN 3536, UL 9540A, UL 1973, AS / NZS 3000

Attachment B

Traffic Impact Assessment by CIRQA

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977

PORT PATERSON BESS FACILITY
420 NORTHERN POWER STATION ROAD

TRAFFIC IMPACT ASSESSMENT

CIRQA™

DISCLAIMER

DOCUMENT CONTROL

Report title:	Port Paterson BESS Facility Traffic Impact Assessment 420 Northern Power Station Road, Port Paterson
Project number:	25370
Client:	Davenport BESS Pty Ltd ATF Davenport BESS 2 Trust
Client contact:	Elton Zhang

Version	Date	Details/status	Prepared by	Approved by
Draft 1	12 Sep 25	For review	BNW	BNW
V1.0	07 Oct 25	For submission	BNW	BNW

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ABN 17 606 952 309
PO Box 144, Glenside SA 5065
Level 1, 27 Halifax Street, Adelaide SA 5000
(08) 7078 1801
www.cirqa.com.au

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

It is proposed to develop a battery energy storage system (BESS) at 420 Northern Power Station Road, Port Paterson (south-east of Port Augusta). The proposed BESS will have a 1,043.1 MWh capacity.

The proposal will require the site to be accessed by heavy vehicles and light vehicles during its construction and operation phases. The site can (currently) legally be accessed by vehicles as large as a 36.5 m Road Trains. However, should the site require access by Restricted Access Vehicles (RAVs) and/or Over-Dimension and Over-Mass (OSOM) vehicles, applications must be made to the National Heavy Vehicle Regular (NHVR) with approvals sought from road managers (Port Augusta City Council and the Department for Infrastructure and Transport).

The facility is proposed to be accessed via Northern Power Station Road, which is currently a sealed public road (north of the site) and continues as a private road through the subject site (ultimately providing access to the former Augusta Power Station to the south). Movements to/from the site will be undertaken via Northern Power Station Road and the Augusta Highway (including the associated intersection of the two roads).

Typical traffic volumes generated during the peak period of the construction phase are expected to be in the order of 66 movements per day (light and heavy vehicle movements combined). Volumes distributed to the adjacent network during the construction phase would typically be in the order of 20 peak hour movements (of which the majority would be associated with light vehicles). Such volumes are very low and will be well within the capacity of the adjacent road network.

Typical traffic volumes generated during the site's operational phase will be extremely low (typically less than one movement per day on average), with negligible impact on the adjacent road network. It is considered that the volumes will be easily accommodated without the requirement for upgrade of Northern Power Station Road nor its intersection with Augusta Highway.

2. BACKGROUND

2.1 SUBJECT SITE

The subject site comprises approximately 5.7 ha area within a larger 994 ha allotment (420 Northern Power Station Road, Titel Ref: CT6226/253, Plan Parcel: D55700 A8). The site is located approximately 4.5 km south-east of Port Augusta. Figure 1 illustrates the location of the subject site with respect to the adjacent road network.

Figure 1 - Subject site, broader (overall) allotment and key adjacent roads

The Planning and Design Code identifies that the site is located within a Strategic Employment Zone, with the following Overlays applicable to the subject site (note additional Overlays apply to other portions of the broader allotment):

- Hazards (Bushfire – Regional);
- Hazards (Flooding – Evidence Required); and
- Native Vegetation.

The subject site is currently vacant. Vehicle access is provided via internal access roads within the broader allotment providing connection to the private portion of

Northern Power Station Road and then the public section north of the overall allotment.

It is also noted that a 'green cement facility' has also been proposed within the broader site. The associated development application has received planning consent and initial site works have commenced. Of particular note, a traffic assessment was previously prepared (by CIRQA) in respect to the green cement facility. The traffic assessment was prepared for both construction and operational phases and confirmed that there would be minimal traffic impacts associated with the green cement facility. Notably, the assessment identified significant capacity on the surrounding road network to accommodate additional movements.

2.2 ADJACENT ROAD NETWORK

Northern Power Station Road is a local road under the care and control of the Port Augusta City Council. The road continues into the overall allotment (still referred to as Northern Power Station Road) but is a private road within this portion). In the vicinity of the site, Northern Power Station Road comprises a 6.9 to 7.0 m wide sealed, two-way carriageway (approximate) with additional shoulders on each side. The road is gazetted for use by Restricted Access Vehicles (RAVs) up to 36.5 m in length (Road Trains) and PBS Level 3A vehicles. It is noted that there are vehicle height restrictions of 4.3 m for vehicles utilising the private portion of Northern Power Station Road. This restriction should be taken into account by the construction contractor and its suppliers.

Northern Power Station Road terminates approximately 2 km to the south-east of the subject site (at the former Port August Power Station site). Access is, however, restricted to the section south of the subject land. At its northern end, Northern Power Station Road forms a priority-controlled (Give Way) T-intersection with the Augusta Highway.

Augusta Highway is part of the National Highway (A1) and under the care and control of the Commissioner of Highways/Department for Infrastructure and Transport (DIT). In the vicinity of its intersection with Northern Power Station Road, the Augusta Highway comprises two traffic lanes and a bicycle lane in each direction separated by a wide central median (as well as the additional turn lanes noted above). An 80 km/h speed limit applies on Augusta Highway. Traffic data recorded by DIT indicates that the Highway accommodates up to 10,800 vehicles per day in the vicinity of the intersection (recorded to the west of the intersection, whereas slightly lower volumes are identified for the section to the east of the intersection). Augusta Highway is gazetted for use by Restricted Access Vehicles (RAVs) up to 36.5 m in length (Road Trains) and PBS Level 3B vehicles.

The Augusta Highway/Northern Power Station Road intersection treatment includes provision of separated right turn and left turn lanes on August Highway (for movements into Northern Power Station Road). The wide median opening also incorporates two-stage right out movements from Northern Power Station Road. A short acceleration lane is also provided within the median for the right-out movement.

A review of turn paths for PBS Level 3A vehicles has been undertaken for the intersection as illustrated in Figure 2. The turn paths illustrate that the movements are generally easily accommodated, albeit the left turn from Augusta Highway to Northern Power Station Road is relatively tight (the turn path suggests the vehicles need to slightly overhang the adjacent splitter island and central painted median to complete the turn within the carriageway). Nevertheless, turn path analysis is typically conservative (particularly in relation to PBS standard vehicles) and the subject movements are already gazetted and legally permitted at the intersection.

Figure 2 - PBS Level 3A Vehicle Turns at the Augusta Highway/Northern Power Station Road intersection

In respect to existing traffic movements at the intersection, specific turn count data is not available. The level of traffic currently utilising Northern Power Station Road would be low – particularly immediately adjacent to the subject site. The majority of movements currently associated with Northern Power Station Road would be related to the two retail fuel outlets at its northern end (adjacent to its intersection with Augusta Highway.

As noted above, the primary movements associated with Northern Power Station Road would currently be generated by the two retail fuel outlets either side of the intersection with Augusta Highway. Based on typical traffic generation rates, each retail fuel outlet would be conservatively forecast to generate in the order of 150 peak hour trips (such a figure is based on higher generating metropolitan fuel outlets, regional outlets would realistically generate lower levels). In addition to the access points on Northern Power Station Road, the two retail fuel outlets also include access direct to or from Augusta Highway. A reasonable proportion of movements associated with the retail fuel outlets would be via these direct access points. Nevertheless, for simplicity it has been assumed all movements associated with the fuel outlets are distribution to/from the subject intersection. This conservatism also allows for additional movements associated with other properties access via Northern Power Station Road (albeit such movements would be very low).

Crash data from the SA Government's Location Viewer has been reviewed. The available data indicates that, between 2019 and 2023 (inclusive), there have been three reported crashes at the intersection. Two of the crashes resulted in property damage only, whereas one resulted in injury (no fatalities have occurred within the above timeframe). The crash types were one rear-end, one right-angle and one right-turn. Such a crash rate would not be considered to be 'high' (typically classed as an average of 5 or more crashes per year at an intersection). No reported crashes have been reported on the remaining section of Northern Power Station Road within the above time period.

2.3 REFERENCE DOCUMENTS

The following legislation, standards and guidelines have been considered in the preparation of this Traffic Impact Assessment (TIA):

- Planning Development and Infrastructure Act 2016;
- Road Traffic Act 1961;
- Australian Road Research Board (ARRB) Best Practice Guide for Unsealed Roads October 2020, Edition 2;
- Australian Standard 'Parking Facilities – Part 1: Off-Street Car Parking' (AS/NZS 2890.1:2004);
- Australian Standard 'Parking Facilities – Part 2: Off-Street Commercial Vehicle Facilities' (AS 2890.2:2018);
- Austroads' 'Guide to Road Design – Part 3: Geometric Design' (2021); and
- Austroads' 'Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections' (2023).

3. PROPOSED DEVELOPMENT

3.1 OVERVIEW

It is proposed to construct a battery energy storage system (BESS) on the subject site (towards the western side of the property). The facility will have a 1,043.1 MWh capacity and include a substation. The proposal is depicted on the Locality Plan and Site Plan prepared by Green Gold Energy (both dated 29 September 2025) as attached in Appendix A.

3.2 ACCESS CONSIDERATIONS

Vehicle access to the facility is proposed via an existing internal access road (unsealed) that links to the private section of Northern Power Station Road and ultimately the public portion of Northern Power Station Road to the north. Figure 3 illustrates the proposed access route.

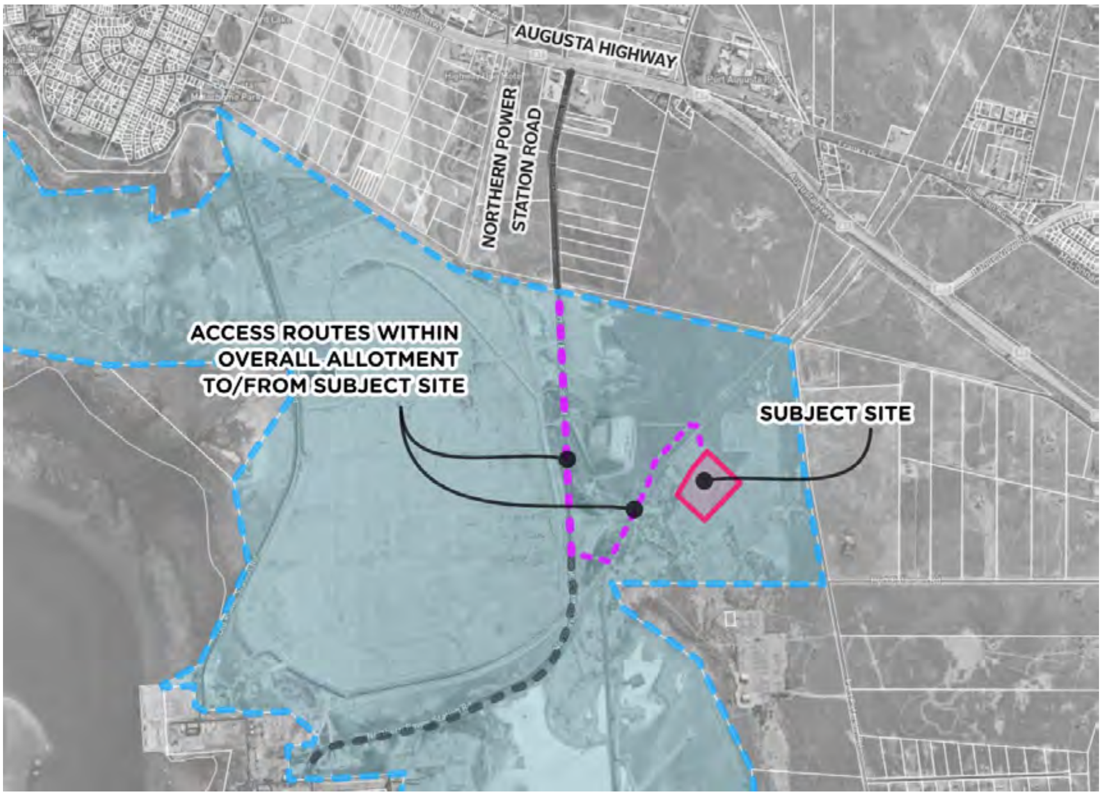


Figure 3 - Proposed access route within the broader allotment for access to/from the subject site (via Northern Power Station Road)

These existing connections generally have formed widths in the order of 6.0 m and will adequately accommodate movements to and from the site. Given that Northern Power Station Road provides limited connectivity to/from the south-west, movements will be to/from the public portion of Northern Power Station Road and Augusta Highway.

Noting the previous earthworks undertaken within the subject portion of the overall site, the new access track connection within in it should be developed with appropriate gradients to ensure safe operation of commercial vehicles during both construction and operation. Gradients should be no steeper than 1 in 6.5 with a maximum rate of grade change of 1 in 16 in 10 m of travel (as per the recommendations of AS 2890.2). These grades are based on commercial vehicles up to 19.0 m Semi-Trailers. Should larger vehicle combinations (such as RAV/OSOM vehicles) be required for access, further advice in respect to gradients should be sought.

The internal 'intersection' of the proposed access track with the private section of Northern Power Station Road will adequately accommodate two-way movements of a 36.5 m Road Train (largest vehicle currently gazetted on Northern Power Station Road) entering the access track while an exiting commercial vehicle gives way as illustrated in Figure 4. OSOM vehicles (if utilised) may required a greater swept path through the intersection and, as such, appropriate traffic management measures shall be implemented if such vehicles are used.

Figure 4 - Internal 'intersection' of access track and (private section of) Northern Power Station Road

Other intersections and bends in the access track further east of Northern Power Station Road would not accommodate simultaneous commercial vehicle movement. The construction contractor shall implement appropriate traffic management measures (such as operational controls and communication protocols and/or localised widening) to ensure safe accommodation of the required vehicles.

The proposed connection of the access track to Northern Power Station Road will be able to achieve the sight distance requirements of Austroads' "*Guide to Road Design – Part 3: Geometric Design*" and "*Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections*". Of particular note, the access has sufficient separation to the closest bends in Northern Power Station Road (approximately 300 m to the south). This would allow sight distance provision at this location to exceed the 290 m Safe Intersection Sight Distance requirement for a 110 km/h design speed (as per the Austroads' road design guidelines).

Vehicles will be required to be driven along Northern Power Station Road between Augusta Highway and the site. This will require drivers to utilise the intersection of Northern Power Station Road /Augusta Highway in order to access the broader road network. The trafficable surface of Northern Power Station Road is considered generally adequate to accommodate vehicular movements associated with both the construction and operation of the facility. However, there is potholing in numerous locations which should be considered as part of the eventual construction contractor's Construction Environment Management Plan or Access Management Plan as well as by Council as part of its routine maintenance responsibilities.

As identified in Figure 2 (above), a review of turn paths at the intersection of Northern Power Station Road/Augusta Highway indicates commercial vehicles can be adequately accommodated. It is therefore considered that the typical vehicles anticipated to be utilised for construction of the facility will be able to be safely accommodated at the intersection (in respect to geometric extents of the intersection).

A review of sight distance provisions at the intersection of Northern Power Station Road/Augusta Highway indicates that the recommended provision of 214 m of Safe Intersection Sight Distance for a 90 km/h design speed (10 km/h above the posted limit) would be achieved at the intersection.

The proposal would generate traffic movements primarily during construction. The types of commercial vehicles expected to access the site during the construction phase are consistent with vehicles required for earthworks and delivery of infrastructure (i.e. panels, batteries, etc.) and associated equipment (i.e., low loaders/semi-trailers, rigid trucks etc.).

Once constructed and operational, vehicle movements would be expected to be associated with maintenance requirements (typically light vehicles only with commercial vehicle access infrequent). Therefore, the number of traffic movements during the operational phase is expected to be very low. Traffic generation is detailed further in Section 4 below.

3.3 PARKING AND MANOEUVRING CONSIDERATIONS

With regard to vehicle storage/parking on-site, the plans do not currently identify a specific parking area. However, there is ample area within the site to accommodate a parking area compliant with the requirements of the Australian/New Zealand Standard 2890.1:2004 "*Parking Facilities – Part 1: Off-street parking*" and Australian/New Zealand Standard 2890.2:2018 "*Parking Facilities – Part 2: Off-street commercial vehicle facilities*". Other informal opportunities for the parking of service and maintenance vehicles will also be provided via internal circulation tracks.

4. TRAFFIC IMPACT

4.1 CONSTRUCTION PHASE

The primary traffic generating period associated with the proposal will occur during the construction phase. This will include a requirement for commercial vehicle access to/from the site. The applicant has advised that construction vehicles accessing the site will typically be 19 m Semi-Trailers or smaller.

The import and export of civil construction (earthworks) machinery to/from the site is also likely to require infrequent access by Restricted Access Vehicle (RAV) /Oversize-Overmass (OSOM) vehicles. RAV/OSOM access may require an application to be made to the NHVR (if vehicles proposed are not covered by existing gazettals).

It is understood that the construction process is anticipated to take 18 months. During construction, the peak activity period would take approximately 6 months.

In respect to the traffic generation associated with the construction of the BESS, standalone BESS projects reviewed by CIRQA have been forecast to generate in the order of 20 commercial vehicle movements per MWh during and across the full period of the construction phases. For the subject proposal, this would equate to 20,862 commercial vehicle movements through the construction period. The above generation rate has been identified for smaller BESS facilities and, in reality, it is anticipated that volumes would be lower.

Based on similar projects reviewed by CIRQA, the following approximate break-down/composition of vehicle types is anticipated (albeit specific vehicle types/sizes will be confirmed as construction methodology is refined):

- 11% medium rigid truck movements;
- 3% heavy rigid truck movements;
- 30% truck and dog movements;
- 36% Semi-Trailer movements;
- 18% B-Double movements;
- <2% Low Loader movements; and
- <1% Over-dimension and/or Over-mass vehicle movements.

Assuming the proposal takes 18 months to construct (with 450 effective work days), there would be a conservatively forecast average of 46 daily commercial vehicle movements associated with the proposed facility's construction. In reality, the level of construction traffic will vary depending on the project phase, however, it is considered that realistic commercial vehicle volumes would generally be less than 20 movements per day.

In addition to commercial vehicles, assuming all construction staff are accommodated off-site, it is assumed that in the order of an additional 40 light vehicle movements would be experienced per day. This may be reduced if construction staff are transferred to/from the site via mini-buses.

The above level of movements is very low. There would typically be in the order of 5 movements per hour or less (with potential for up to 10 vehicles per hour during the peak of construction activity). Such volumes would be well below any warrants for upgrade requirements along the subject roads and intersections other than works at the proposed access point and internal connections within the site (taking into account the requirements of the relevant Austroads' guides).

4.2 OPERATIONAL PHASE

Once operational, the level of traffic generation associated with the site will be very low. Movements would generally be associated with routine inspections and/or maintenance which are expected to be occur up to 10 times per year. The movements would typically be undertaken by light vehicles, with even less frequent commercial vehicle access (likely to be medium rigid vehicles or smaller).

The vehicle movements anticipated during the site's regular operational phase are lower than that forecast to occur during the site's construction period and hence, will continue to be readily accommodated by the surrounding road network irrespective of access route.

5. FINDINGS AND CONCLUSIONS

A review of the access arrangements and traffic impacts associated with the construction and operation of the proposed BESS facility has been undertaken.

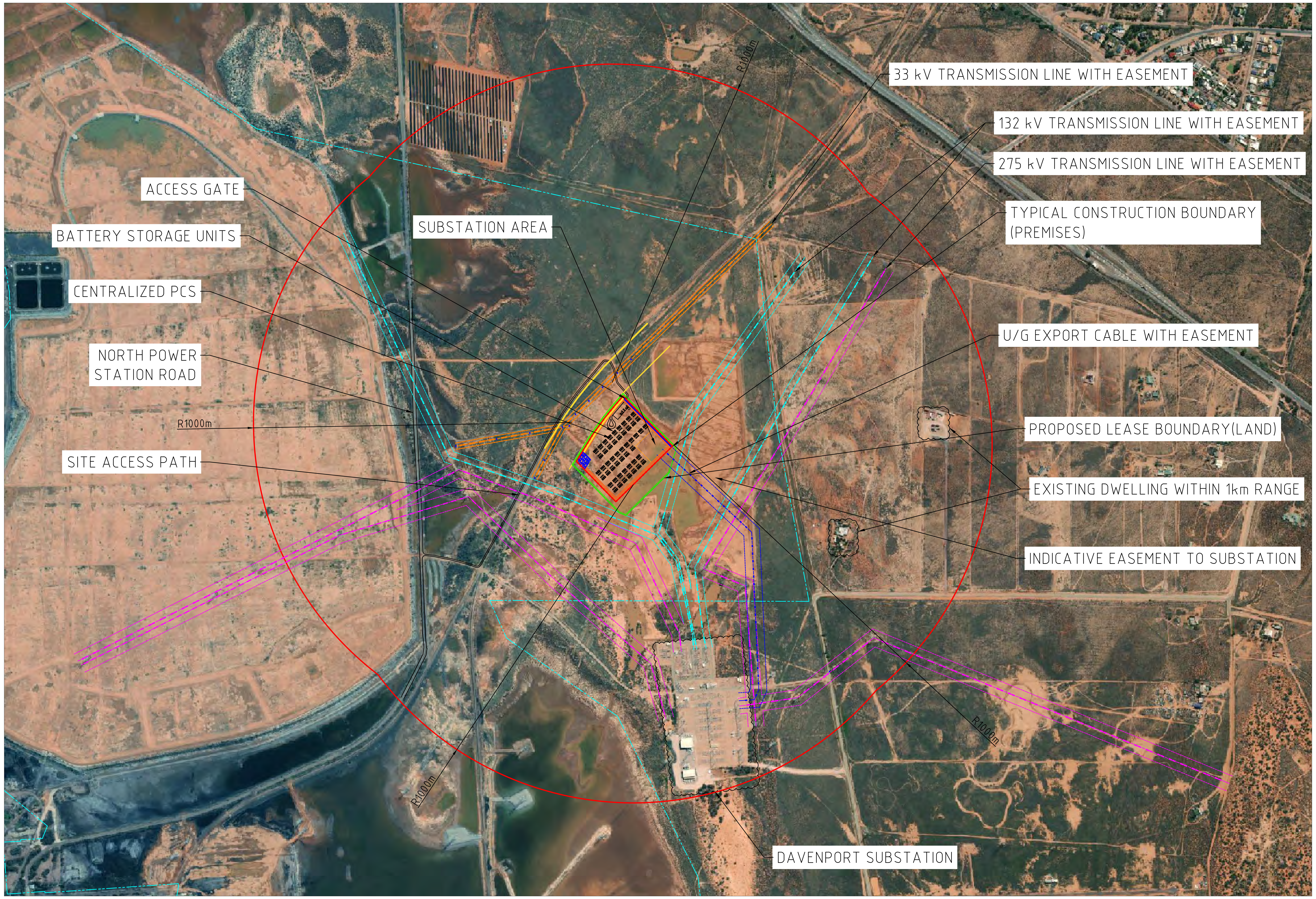
The existing condition of Northern Power Station Road is generally considered adequate and appropriate to accommodate the additional movements during both construction and operation of the facility. Similarly, it is considered that the current arrangement of the intersection of Northern Power Station Road /Augusta Highway is appropriate to safely and efficiently accommodate the forecast volumes (noting the adequacy of the intersection geometry as well as available sight distance provisions).

RAV/OSOM vehicle access (if proposed) may require an application (for either permits or gazettal) to be made to the NHVR if the associated vehicle is a type outside of the current gazettals.

Typical traffic volumes generated from commencement to completion of the project are expected to be very low and within the capacity of the adjacent road network. Typical traffic volumes generated during the site's operational phase will be extremely low (typically less than one movement per day on average), with negligible traffic impact on the adjacent road network.

APPENDIX A

PROPOSAL PLANS



LOCALITY PLAN

0 125 250 375 500 METRES

NOTES

1. ACTUAL DIMENSIONS AND CLEARANCES MAY VARY SUBJECT TO SITE CONDITIONS.
2. THE NUMBER OF BATTERY CONTAINERS IS SUBJECT TO FINAL EPC DECISION.
3. DETAILS OF SUBSTATION AREA REFER TO TYPICAL SUBSTATION LAYOUT PLAN.
4. SITE ACCESS TO BE INSPECTED AND PAVED APPROPRIATELY TO ALLOW HEAVY TRUCK DELIVERY. DETAILS OF ACCESS REFER TO TRAFFIC IMPACT ASSESSMENT

LEGEND

- SCREEN VEGETATION
- 2.1m CHAINMESH SECURITY FENCE IN SILVER FINISH
- 275kV TRANSMISSION LINE WITH EASEMENT
- 132kV TRANSMISSION LINE WITH EASEMENT
- 33kV OVERHEAD LINE WITH EASEMENT
- TYPICAL INVERTER & BATTERY COMPLEX UNIT
- PROPOSED LEASE BOUNDARY (LAND)
- RAILWAY & 100m OFFSET
- PROPOSED UNDERGROUND CABLE

SITE SPECIFICATIONS		
FENCE	927	m
SITE AREA WITHIN FENCE	5.4	Ha
INTERNAL ROAD	TBD	m
SITE LAY DOWN	1176	m^2
SUBSTATION	6751	m^2
LEASED AREA	7	Ha

FOR INFORMATION

No	DATE	DRN	CHK	ENG	Q.A.	PROJECT	DESCRIPTION
F	29/09/25	D.S.	ACE	D.S.	ACE		UPDATE DETAILS
E	11/09/25	D.S.	ACE	D.S.	ACE		UPDATE CABLES
D	26/08/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
C	25/08/25	M.G.	ACE	M.G.	ACE		ADD SITE TRACK
B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
A	27/05/25	D.S.	ACE	D.S.	ACE		DRAFT SITE PLAN

REVISION

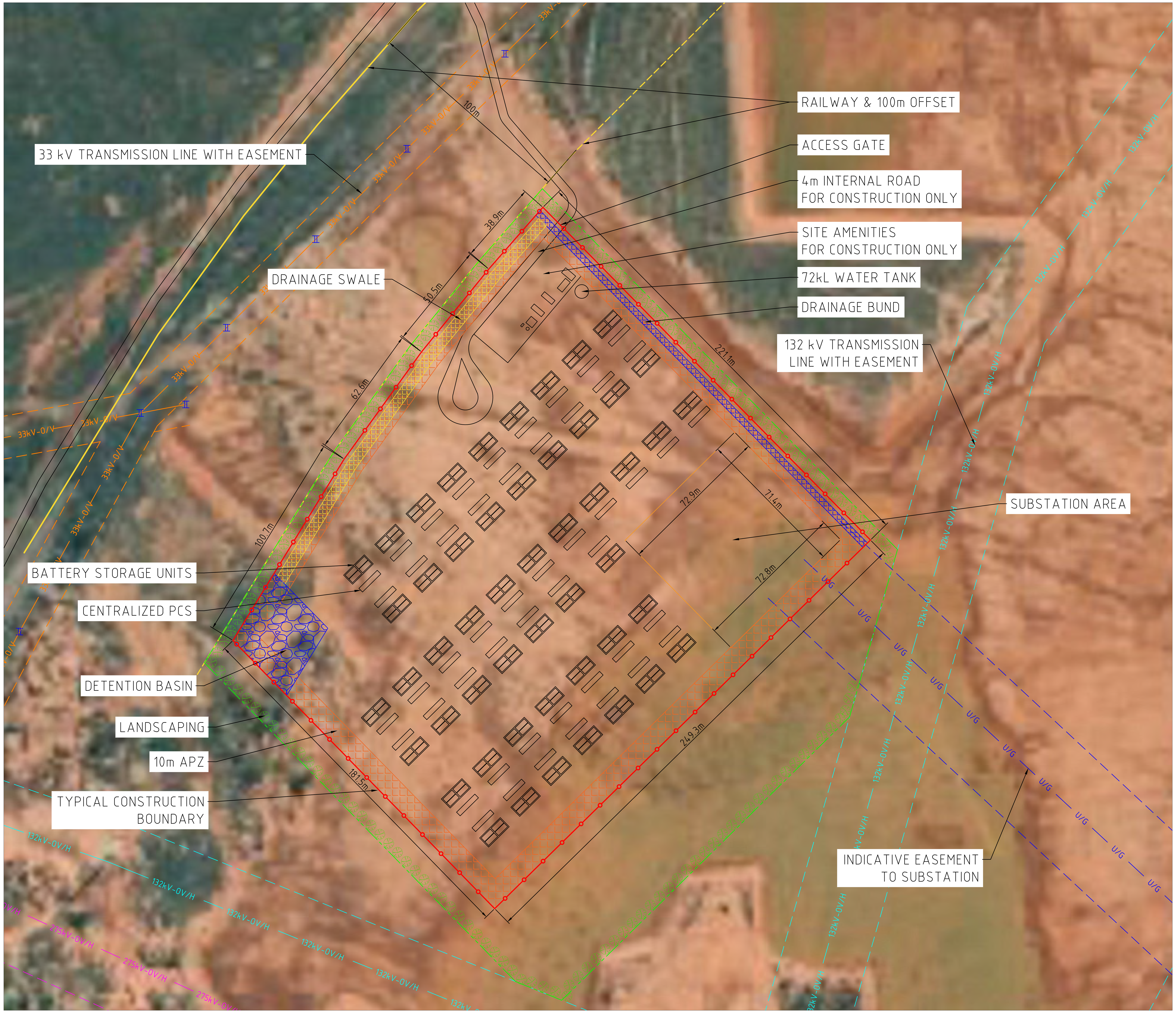
GREEN GOLD ENERGY

DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
LOCALITY PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD. SCALE: NTS

PROJ No | DRG No | REV F

AUTOCAD A1SHEET



0 25 50 75 100
METRES

ENLARGED SITE LAYOUT

BATTERY STORAGE SYSTEM SPECIFICATIONS

AC	270	MW		
NUMBER OF INVERTERS	52	-	INVERTER MODEL	SG-6900UD-MV
NUMBER OF BATTERIES	208	-	BATTERY MODEL	ST5015UX
BATTERY CAPACITY	1043.1	MWh		

SITE SPECIFICATIONS

FENCE	901	m
FENCED AREA	5.1	Ha
LEASED AREA	7.0	m
SUBSTATION AREA	5200	m^2

NOTES

1. ACTUAL DIMENSIONS AND CLEARANCES MAY VARY SUBJECT TO SITE CONDITIONS.
2. THE NUMBER OF BATTERY CONTAINERS IS SUBJECT TO FINAL EPC DECISION.
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D	26/08/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
C	25/08/25	M.G.	ACE	M.G.	ACE		ADD SITE TRACK
B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
A	27/05/25	D.S.	ACE	D.S.	ACE		DRAFT SITE PLAN

REVISION

GREEN GOLD ENERGY

DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
SITE PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD. SCALE: NTS

PROJ No | DRG No | REV F

AUTOCAD A1SHEET

Attachment C

Native Vegetation Clearance Assessment by Environments by Design

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977

Native Vegetation Clearance

420 Northern Power Station Road
Port Paterson

Data Report

Clearance under the *Native Vegetation Regulations 2017*

20/10/2025

Prepared by Wayne A Brown

Transmission line

BESS

Table of contents

1. Application information

Application Details

Applicant:	Davenport BESS Pty Ltd ATF Davenport BESS 2 Trust		
Key contact:	Elton Zhang 0447 026 237 E: elton.zhang@greengoldenergy.com.au 216 Glen Osmond Rd, Fullarton SA 5063.		
Landowner:	Approval letter to be provided		
Site Address:	420 Northern Power Station Rd, Port Paterson SS 5700		
Local Government Area:	Port Augusta	Hundred:	Davenport
Title ID:	CT/6226/253	Parcel ID	D55700 A8

Summary of proposed clearance

Purpose of clearance	To establish a 270 MVA BATTERY ENERGY STORAGE SYSTEM
Native Vegetation Regulation	Regulation 12, Schedule 1; clause 34, Infrastructure
Description of the vegetation under application	Size, type and general condition -Low Coastal shrubland Atriplex vesicaria, Rhagodia spinescens and Tecticornia sp (samphire) in very poor condition.
Total proposed clearance - area (ha) and number of trees	Development area of BESS is 7ha, with an indicative transmission corridor of 2.7ha = 9.7ha less 3ha of bare soil total = 6.7ha
Level of clearance	Level 3
Overlay (Planning and Design Code)	Native Vegetation Overlay
Map of proposed clearance area property boundary shown in red with impact are shown in green.	
Mitigation hierarchy	The applicant has chosen this site because it is mostly free of native vegetation. This site is a soil borrow pit which is the most degraded area around the site having been scalped and later spoil dumped back on the site. They are avoiding native vegetation and minimising impacts by placing the proposed development in an area mostly free of native vegetation.
SEB Offset proposal	On-ground or payment of $14,635.22 into the Fund

2. Purpose of clearance

2.1 Description

The native vegetation disturbance required to establish a Battery storage system – (270 MVA BESS SYSTEM) and associated transmission corridor.

The build requires 2 concrete slabs to be laid which will accommodate 4 containerised batteries on the slab, with one concrete slab required for the inverter. This inverter will manage power from 4 containerised batteries.

This proposal requires 208 battery containers and 52 inverters along with a 275kV underground transmission line.

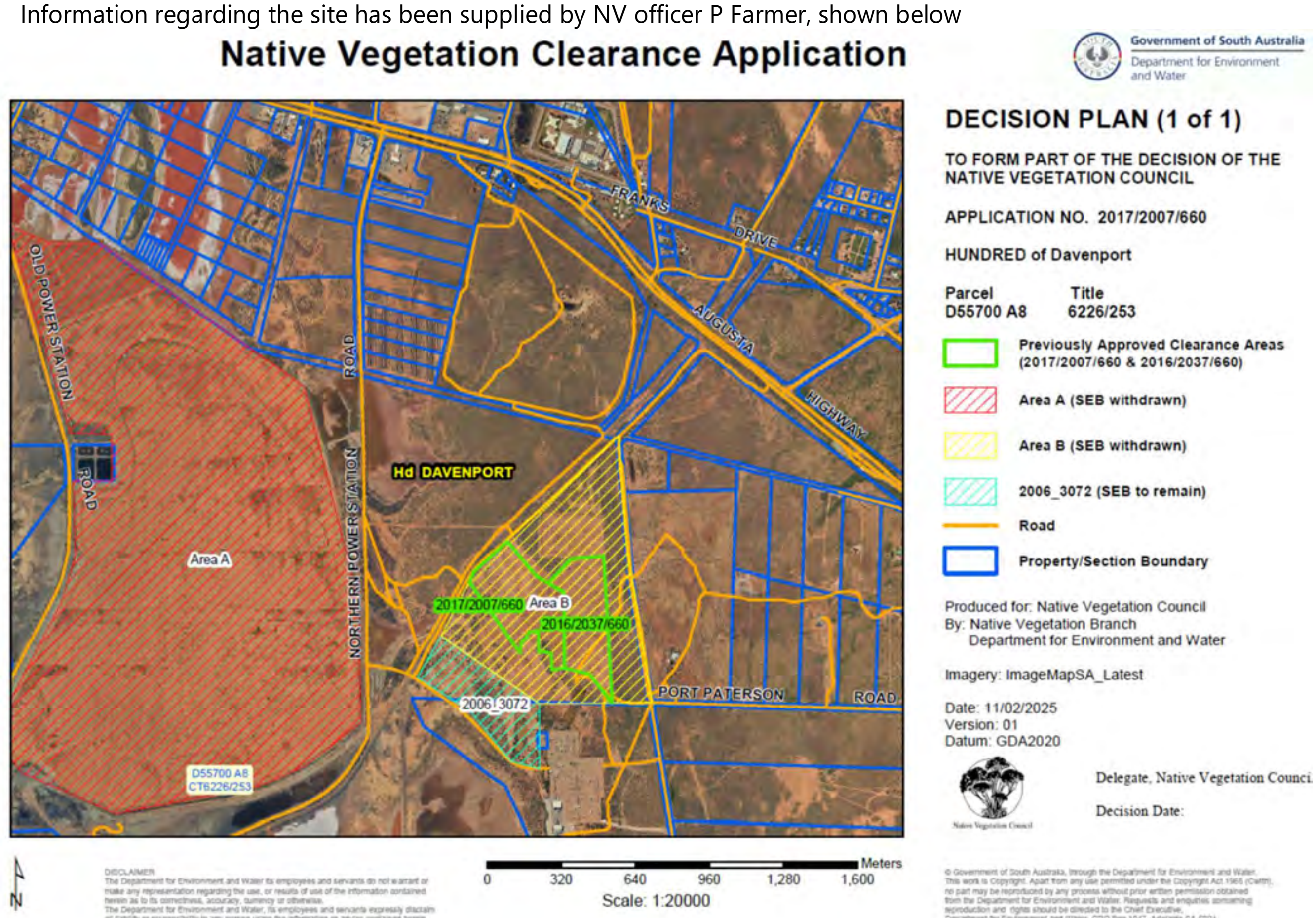
The site would be fenced with a chain mesh fence to 2.4m high, removing any large grazing animal (sheep goats, pigs, emu's or kangaroo's).

Lifespan of this development is estimated to be 30 years.

2.2 Background

The proposed development area has had a long history of disturbance. It is largely a bare site with scattered native vegetation naturally regenerating. The site shows signs of considerable soil movement. The site became a borrow pit to source material to cap the ash dam at the defunct Port Augusta power station

Information regarding the site has been supplied by NV officer P Farmer, shown below



It appears most of the proposed development site was approved for clearance in 2017. It was subsequently cleared and then revegetated by Succession Ecology as a proposed SEB. This SEB was subsequently withdrawn and clearance costs paid (refer letter 18/02/2025.

Native Vegetation Council

Reference: 2016/2037/660

Contact: Gayle Grieger
Telephone: 0419 223 875

81-95 Waymouth St
ADELAIDE SA 5000

GPO Box 1047
Adelaide SA 5001

Ph| 08 8303 9777

nvc@sa.gov.au

18 February 2025

Mr Craig Cresp
General Manager Operations
Hallett Group
42 Northern Power Station Road
Port Augusta SA 5700
Email: craig.cresp@hallett.com.au

DECISION NOTIFICATION

Dear Craig

I refer to your letter to the Native Vegetation Council dated 19 December 2024 on behalf of Hallett Construction Materials Pty Ltd seeking the consent of the Native Vegetation Council to amend Decision Notifications 2016/2037/660 and 2017/2007/660. The Native Vegetation Assessment Panel (NVAP) would like to thank you and Mr Louis Mourtzios, for attending its meeting held on 28 January 2025.

At the meeting NVAP considered your letter seeking an amendment to the conditions of the Decision Notification to change the offset requirements from on-ground to payment into the Native Vegetation Fund. It is understood that this is required to gain access to the legacy flyash within the Ash Dam requiring clearance of the vegetation on the SEB site.

On the basis of the information presented, NVAP resolved to remove the 2016_2037 SEB status on parcel CT6226/253 and achieve the SEB requirement by making a payment of $381,972.50 ($362,059.24 - GST exclusive - for the clearance and $19,913.26 for administration – GST inclusive) to the Native Vegetation Fund, to be made within one month of invoice date.

The invoice will be sent once you have signed and returned the attached 'Decision Acknowledgement'. You are required to sign and return the Decision Acknowledgement form prior to undertaking any activity on the site. Once the signed Decision Acknowledgement is received, the SEB will be removed from the site records and the vegetation on site will no longer meet the definition of native vegetation under the *Native Vegetation Act 1991*. Therefore no clearance consent will be required to remove the vegetation.

Please contact Dr Gayle Grieger, Manager, Native Vegetation Branch on phone 0419 223 875 or email gayle.grieger@sa.gov.au if you wish to discuss the matter further.

Yours sincerely,

M.Henderson

Dr Marilyn Henderson
Chair
Native Vegetation Assessment Panel

The site still shows signs of vehicle access and soil excavation/ dumping. Where possible the site is naturally regenerating. There is a small patch of native vegetation that appears better condition than the rest of the site.

The total development area is 9.7ha however a soil mound of 3ha is free of native vegetation or natural regeneration leaving 6.7ha under application.

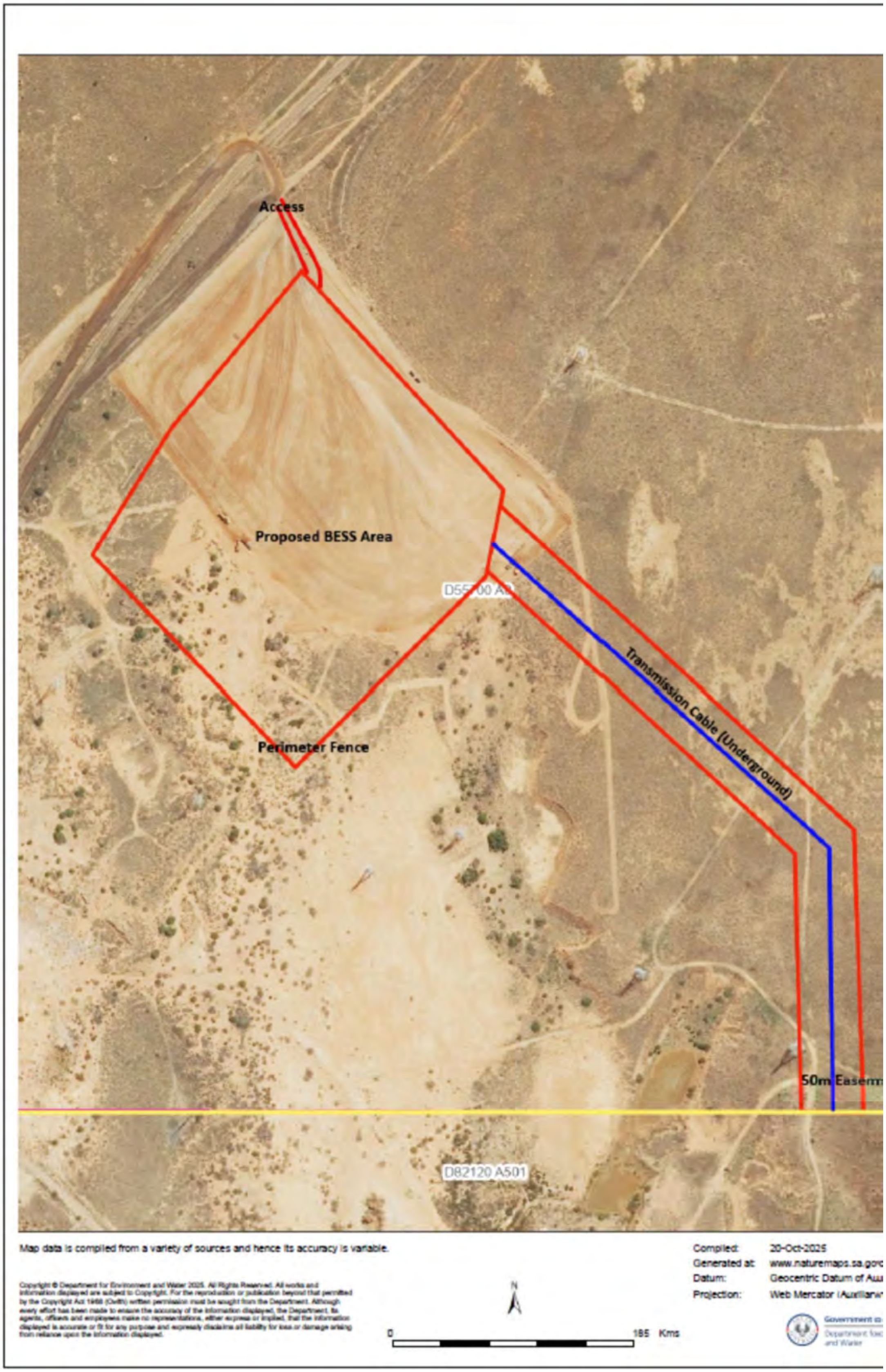
Surrounding the land is the old power station land to the West of the site. There are many transmission lines dotted across the landscape and a wind farm operation to the south of the site.

Surrounding vegetation is chenopod shrubland in various health conditions, impacted by human activities such as 4x4 and trail bike activities.

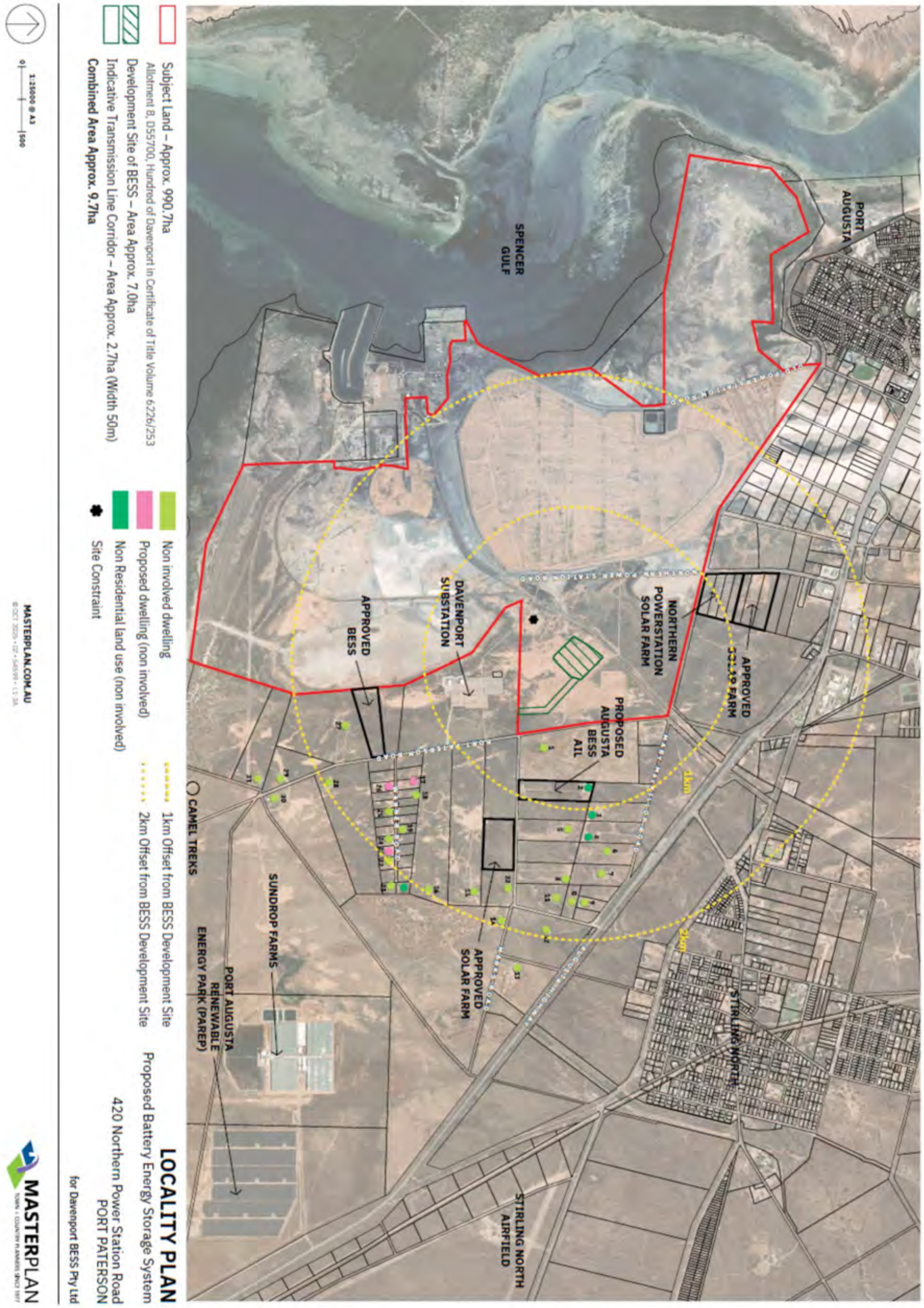
2.3 General location map

- Site map(s) Scale 1:36, 112 showing the boundary of the property in yellow with impact in red.

Close-up Map showing impact area.



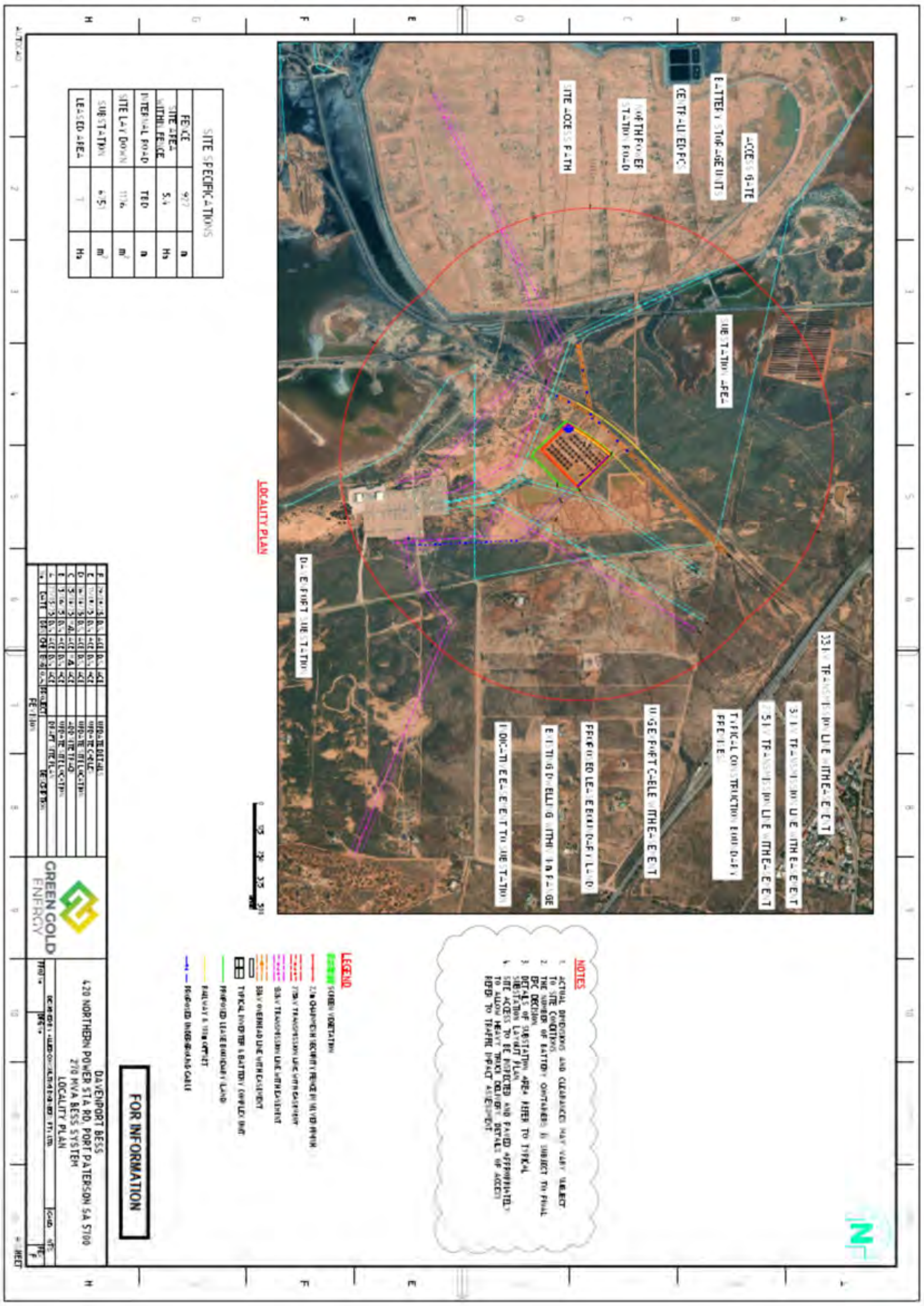
- Location map –Showing proximity to the gulf, old power station, other approved solar and wind farms and City of Port Augusta.

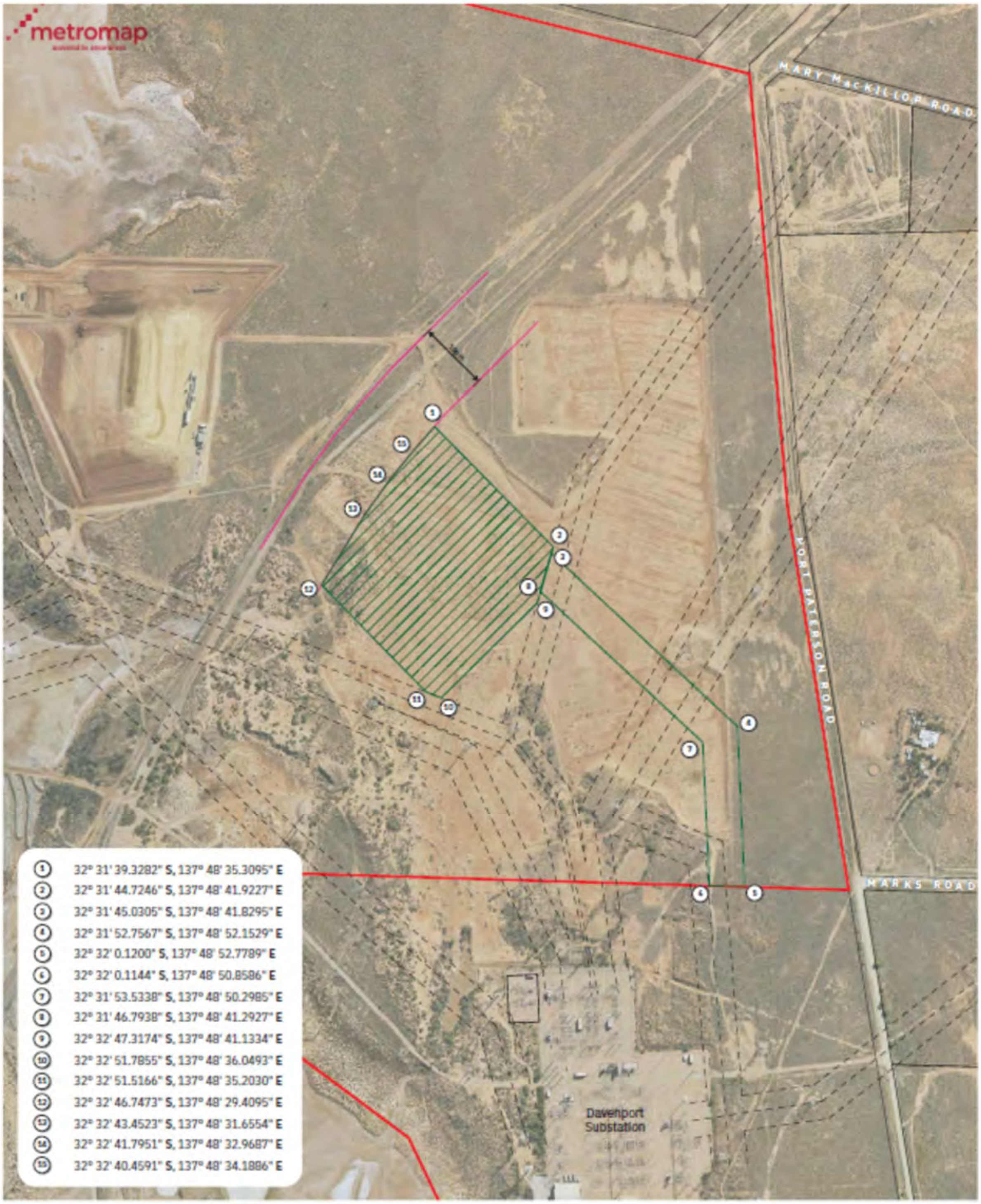


2.4 Details of the proposal

The build requires 2 concrete slabs to be laid which will accommodate 4 containerised batteries on the slab, with one concrete slab required for the inverter. This inverter will manage power from 4 containerised batteries.

This proposal requires 208 battery containers and 52 inverters, long with a 275kV underground transmission line. No trench will be dug the soil has already been removed enabling the cable to simply be covered with soil. There is a requirement for a 25m easement each side of the cable, making it 50m wide in total.





Subject Land – Approx. 990.7ha
Allotment 8, D55700, Hundred of Davenport in Certificate of Title Volume 6226/253
Development Site of BESS – Area Approx. 7.0ha
Transmission Line Corridor – Area Approx. 2.7ha (Width 50m)
Combined Area Approx. 9.7ha
Easements
Railway Line Setback – 100m

SITE PLAN
Proposed Battery Energy Storage System

420 Northern Power Station Road
PORT PATERSON

for Davenport BESS Pty Ltd

MASTERPLAN.COM.AU

MASTERPLAN

Approvals <u>required</u> *or* <u>obtained</u>

Provide details of the following approvals or applications under the follow legislation, where relevant:

- *Native Vegetation Act 1991* (provide details of any previous approvals that are relevant)
  The site had native vegetation decisions for applications 2016/2037 decision granted 2/12/16 expired 2/1/2/18 approved and 2017/2007 which was for pit expansion. The actual approval area differs to that defined in Nature Maps possibly due to amendment. The clearance related to a borrow pit to source material to cap the ash dam at the defunct Port Augusta power station. The SEB area is the capped ash dam that was revegetated by however, on ground SEB was terminated for 2016/2037 and SEB for 2017/2007 was never registered as approved Succession Ecology

  There is native vegetation present that hasn't been cleared or has regenerated post clearance therefore requiring a new application as the proposed land use differs from previous use.

- *Planning, Development and Infrastructure Act 2016* (provide Development Application number/s)

  Application Number – Hydrogen and Renewable Energy Act 2023 - AILA 16

- *Water Resources Act 1997* (e.g. a water license)
  Not applicable

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (impacts on Matters of National Environmental Significance – MNES)

An assessment using the Australian Government Protective Matters Search Tool indicated possible 14 bird and 5 plant EPBC listed threatened species.

Two bird species Curlew Sandpipers, a coastal species and Grey Falcon have been past surveyed within 5km of the proposed clearance area.

On review of the site and using a 5km radius analysis it was found these species would not be impacted on by the proposed development therefore no EPBC referral has occurred.

- *National Parks and Wildlife Act 1972* (NP&W Act) (e.g. flora collection permit)

  Not applicable

- *Landscapes SA Act 2019* (e.g. water affecting activity permit)

  Not applicable

- *Aboriginal Heritage Act 1988.*

  No referral has occurred

2.5 Native Vegetation Regulation

Regulation 12, Schedule 1; clause 34, Infrastructure

2.6 Development Application information (if applicable)

Native Vegetation Overlay

3. Method

3.1 Flora assessment

A desktop search of possible flora species listed under the NP&W 1972 or the EPBC Act 1999 growing within the general area was made prior to an on-site review using Nature Maps as a source of review. During that review 7 species were noted as possible listed species with 1 species Malacocera gracilis NP&W 1972 (R) more likely.

A desktop assessment using the Protected Matters Tool was also completed and assessed prior to the visitation.

The flora assessment was made by Wayne Brown accredited Native Vegetation consultant and Dr Geoffrey Bishop on 20/08/25 using the NVC Bushland Assessment Manual.

The site was walked to understand species diversity and analyse possible land for changes. The site was found to be highly disturbed and modified with scattered fauna species found with natural regeneration process occurring.

Field data was collected using the Bushland Assessment Field Datasheet.

Collecting information on site entailed.

- Positively identify species requiring assessment.
- Record species on bushland assessment field data sheet.
- Completing the additional information on the bushland assessment field data sheet.
- Taking photographic evidence of the site and species present.
- Taking samples for further positive identification back in the office.

In the office species were checked against

- Reference books Acacia's of South Australia and Outback plants of SA.
- Further review of past survey data using nature maps.
- Providing species to Dr Geoffrey Bishop for positive identification.
- An assessment using the Australian Government Protective Matters Search Tool.

After positively identifying species found within the site no listed species (NP&W Act or EPBC Act) were found.

Total time on the site was around 2hrs over 1 visit.

Time taken review and Identify species was around 1 hr.

A search list of Environment Protection and Biodiversity Conservation Act 1999 , potential impacts on MNES flora species is found on page 15.

3.2 Fauna assessment

Prior to the site visitation a desktop search of possible flora species listed under the NP&W 1972 or the EPBC Act 1999, within 5km radius of the general area, was made using Nature Maps as a source of review. During that review potentially 4 species maybe interacting with the native vegetation.

A desktop assessment using the Protected Matters Tool was also completed and assessed prior to the visitation.

The site was visited early in the morning Wednesday 20th /August/2025. Once at the site species were recorded as they were sighted or from scratching or diggings. Binoculars were use to search the area whilst walking around the property.

Only 2 introduced fauna species were recorded, during the middle of the day, a western grey Kangaroo and European Rabbit.

These fauna sightings were recorded on the Bushland Assessment Field Datasheet.

Reference book Simpson and Day; Field Guide to the Birds of Australia to positively identify any bird sightings.

Once back in the office, a further review of NP&W 1972 or the EPBC Act 1999 fauna species was conducted by mapping suspected rated species from prior surveys recorded on the nature maps data base. One NP&W 1972 species has been surveyed in the past within 5km of the site Elegant Parrot (Neophema elegans elegans (R))

Further investigation was made by searching Australian Government Protective Matters Search Tool, indicated possible 14 bird and 5 plant EPBC listed threatened species. On review of the site and using a 5km radius analysis found none of these species are likely to be impacted on by the proposed development. This proposal has not been referred to the Australian Government at this stage.

The rated species likely to be attracted to this site was also analysed against the vegetation type and condition found at the site. Fauna species analysis was assisted using;

- Nature Maps
- Birds in backyards
- Birdlife.org
- Ebirds.org
- A of LA
- EPBC Act
- NP&WS list
- Birds Australia

Total time on the site was around 2hrs over 1 visit (morning only).

A search list of Environment Protection and Biodiversity Conservation Act 1999 , potential impacts on MNES fauna species is found on the following page.

Protective Matters Search Tool review

14 Bird and 5 Plant species were found not to be impacted by the proposed clearance.

MNES						
Scientific Name	**Common Name**	**Class**	**Simple Presence**	**Presence Text**	**Threatened Category**	reviewed
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Bird	May	Species or species habitat may occur within area	Critically Endangered	recorded outside of 5km radius
Calidris ferruginea	Curlew Sandpiper	Bird	May	Species or species habitat may occur within area	Critically Endangered	Unlikley
Pezoporus occidentalis	Night Parrot	Bird	May	Species or species habitat may occur within area	Endangered	recorded outside of 5km radius
Rostratula australis	Australian Painted Snipe	Bird	May	Species or species habitat may occur within area	Endangered	recorded outside of 5km radius
Frankenia plicata	null	Plant	May	Species or species habitat may occur within area	Endangered	no local recording
Melanodryas cucullata cucullata	South-eastern Hooded Robin, Hooded Robin (south-eastern)	Bird	May	Species or species habitat may occur within area	Endangered	recorded outside of 5km radius
Caladenia tensa	Greencomb Spider-orchid, Rigid Spider-orchid	Plant	May	Species or species habitat may occur within area	Endangered	Unsuitable habitat
Calidris canutus	Red Knot, Knot	Bird	May	Species or species habitat may occur within area	Endangered	recorded outside of 5km radius
Stagonopleura guttata	Diamond Firetail	Bird	May	Species or species habitat may occur within area	Vulnerable	recorded outside of 5km radius
Swainsona pyrophila	Yellow Swainson-pea	Plant	May	Species or species habitat may occur within area	Vulnerable	Unsuitable habitat
Limosa lapponica baueri	Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit	Bird	May	Species or species habitat may occur within area	Vulnerable	recorded outside of 5km radius
Aphelocephala leucopsis	Southern Whiteface	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	recorded outside of 5km radius
Neophema chrysostoma	Blue-winged Parrot	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	recorded outside of 5km radius
Falco hypoleucos	Grey Falcon	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	Unlikley
Grantiella picta	Painted Honeyeater	Bird	May	Species or species habitat may occur within area	Vulnerable	recorded outside of 5km radius
Pterostylis xerophila	Desert Greenhood	Plant	May	Species or species habitat may occur within area	Vulnerable	Unsuitable habitat
Amytornis textilis myall	Western Grasswren (Gawler Ranges)	Bird	May	Species or species habitat may occur within area	Vulnerable	recorded outside of 5km radius
Sternula nereis nereis	Australian Fairy Tern	Bird	May	Species or species habitat may occur within area	Vulnerable	recorded outside of 5km radius

4. Assessment Outcomes

Provide information on the following assessment criteria. For more information see the Native Vegetation Council (NVC) Guide for Applications to Clear Native Vegetation.

4.1 Vegetation Assessment

General description of the vegetation, the site and matters of significance

Provide a general description of the site including the following;

- *Landform, geography and soils*

  The site is a borrow pit showing significant soil movement and disturbance. Some of the area is now around a good 2m below natural land. The surrounding landscape is very flat.

  Soils show signs of salt deposits and are a loam over clay.

- *Landform feature of significance (rivers, creeks, rocky outcrops, etc.)*

  Spencer Gulf is just 3k to the west of the site with the Flinders Ranges rising sharply around 10km to the East.

- *General overview of the vegetation under application as a whole (e.g. contains x number of vegetation associations / trees)*

  The vegetation at the site is scattered natural regeneration with some revegetation. The original vegetation (adjacent) is a low chenopod shrubland

- *General description of the vegetation relating to type and condition (i.e. is the vegetation relatively homogeneous, or there significant variation)*

  The natural regeneration at the site is most likely a mix of nature under restoration and the germination of seeds used in revegetation. Some of the impacted area is artificial showing a more dominant Atriplex nummularia, although a local species, is growing unnaturally when comparing the untouched native vegetation to the East.

- *Provide a description of the landscape context for the vegetation (e.g. isolated patch of vegetation in cropping landscape) and proximity to protected areas (Conservation Parks, Heritage Agreements, etc.)*

  95% Native Vegetation is remaining in the IBRA association Arden and 62% within the IBRA subregion.

  Winninowie CP, 126,232,414ha is located 15km to the south encompassing some similar vegetation.

  Mount Brown CP, 32,062,944 ha is located 17km to the Nth West of the site.

  Location of localized SEB sites include

  - Site 2014-3056 = 113 ha is 2km to the south
  - Site 2016-2037 = 266 ha is 2km to the North West
  - Site 2017 – 3013 = 1471 ha is 7km to the North

Details of the vegetation associates

Vegetation Association	Vegetation Association Chenopod low shrubland
Representative photo(s)	
	Photo 1 – Direction South East 32°31'42"S 137°48'33"E
	Photo 2 – Direction South East Over looking dumped soil

Photo 3 – South East

Transmission line

Photo 4 – facing South

Entry to the site

General description	Highly disturbed site with dominant species Atriplex nummularia (suspect some direct seeded) and Tecticornia (Samphire species) with Nitraria billardierei and Atriplex vesicaria.				
Threatened species or community	Threatened fauna under the NP&W Act - Neophema elegans elegans (R)				
Landscape context score	1.06	Vegetation Condition Score	16.45	Conservation significance score	1.02
Unit biodiversity Score	17.79	Area (ha)	6.7	Total biodiversity Score	119.19

<u>Site map</u> showing areas of proposed impact

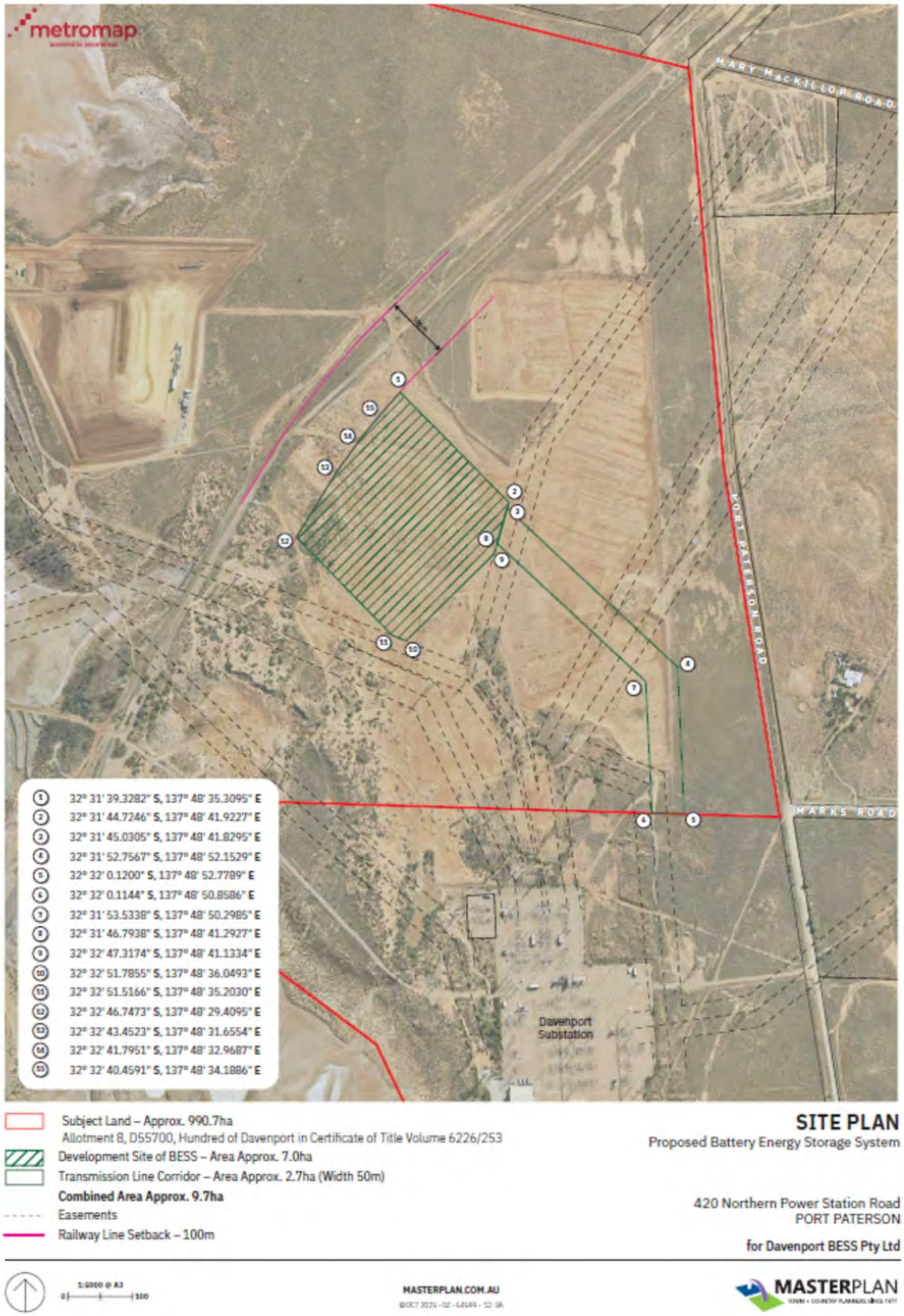


Photo log

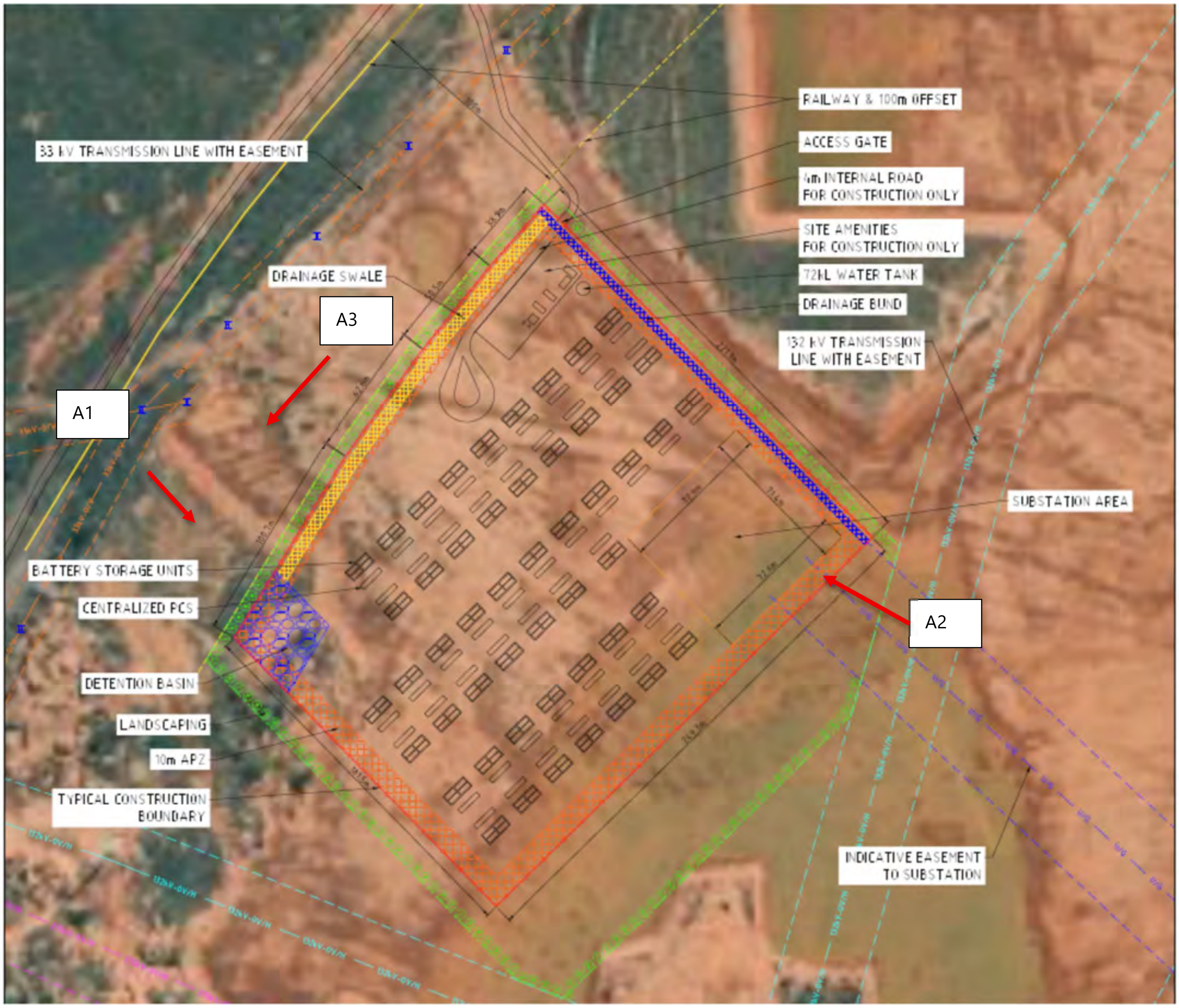
A 1 - Area to avoid

A 2 - Looking North where the transmission line will run – site has soil removed.

A3 – Lines indicating a revegetation attempt

Looking West

Photo Log Map



4.2 Threatened Species assessment

For level 3 applications, complete the following habitat suitability table.

Species observed on site, or recorded within 5 km of the application area since 1995, or the vegetation is considered to provide suitable habitat

SPECIES	COMMON NAME	NP&W	EPBC	# rec	DATE OF LAST RECORD	Species known habitat preferences	Likelihood of use for habitat – Comments
Calidris acuminata	Sharp-tailed Sandpiper		VU	2	25-Jan-2000	Prefers the grassy edges of shallow inland freshwater wetlands.	Unlikley - Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.
Calidris ferruginea	Curlew Sandpiper	E	CR	2	25-Jan-2000	Found on intertidal mudflats of estuaries, lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters	Unlikley - Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.
Cladorhynchus leucocephalus	Banded Stilt	V		2	25-Jan-2000	Prefers large shallow saline lakes or near the coast.	Unlikley - Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.
Falco hypoleucos	Grey Falcon	R	VU	1	20-Sep-2001	Usually confined to the arid inland. It inhabits Triodia grassland, Acacia shrubland and lightly timbered arid woodland.	Unlikley - Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.
Lophochroa leadbeateri	Major Mitchell's Cockatoo	R	ssp	6	17-Mar-2019	live mostly in semi-arid and arid areas, in dry woodlands, particularly mallee	Unlikley - Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.

SPECIES	COMMON NAME	NP&W	EPBC	# rec	DATE OF LAST RECORD	Species known habitat preferences	Likelihood of use for habitat – Comments
Neophema elegans elegans	Elegant Parrot	R		2	19-Aug-1996	Parrot lives in open forests, woodlands, mallee, mulga, salt marsh	Possible - Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provide limited habitat or feeding resources for the species.
Falco subniger	Black Falcon	R	VU	1	07-Dec-2006	Is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. It roosts in trees at night and often on power poles by day	Unlikley - Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.
Pteropus poliocephalus	Grey-headed Flying-fox	R	VU	1	29-Jul-2024	Found in urban areas, forests and woodlands, intertidal mangroves	Unlikley - Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.

Source; 1- BDBSA, 2 - AoLA, 3 – NatueMaps 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others
NP&W Act; E= Endangered, V = Vulnerable, R= Rare
EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable

Criteria for the likelihood of occurrence of species within the Study area.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provide limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provide no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

4.3 Cumulative impact

When exercising a power or making a decision under Division 5 of the Regulations, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity.

Source of likely Impact on Native Vegetation	**Expected extent**	**Expected severity**
Grading the site flat	Moving soil to make the area once again flat will occur across the 7ha BESS	High – All scattered vegetation removed by machinery.
Foundation footprint of the Battery and Inverters	52 concrete slabs Pads for Battery containers and 52 pads for inverters to be laid.	High - Grading areas for foundations and laying concrete slabs.
Boundary fence chain mesh replacement to existing	Perimeter around activity to keep people out	Low – Natural regeneration will occur
Trenching from Batteries to HV switchboard	Within the 7ha	Medium – Natural regeneration will occur where no concrete is placed.
Maintenance of the site	All of the area not covered by the concrete pads slashed to keep regeneration low.	Medium – may improve species diversity.
Area for amenities and office block and road	Site to be covered with gravel.	High – When removed after building natural regeneration is highly likely to occur.
Storm water pond and drains	Digging the pond and associated drainage into the pond	High although natural regeneration is likely.
Connecting to the grid	Laying transmission cable to enable connection to the existing transmission line. The activities width is around 5m on a mostly cleared area	High – scattered natural regeneration coverd when line is covered with soil. Natural regeneration is likely to cover soil.

4.4 Address the Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Regulations, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimise, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation

This project is about clearing natural regeneration. 3ha of the 9.7ha is bare ground with nothing growing on it.

The project's design and location have been changed to avoid a small patch of native vegetation found in the North Western corner of the development area. Much of the vegetation in near this area has been direct seeded.
The transmission line is an underground cable. The soil has already been removed therefore it requires filling using disturbed soil from the site.

b) Minimisation – if clearance cannot be avoided, outline measures taken to minimise the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).

Although all of the area surveyed has been damaged or modified in some way there is a small patch of better cover along the northern and north western area. The impact area under proposed development has been moved away to position earthworks away from any reasonable native vegetation to an area fully degraded by past activities.
The underground transmission line does not require trenching with activity around 5m wide to lay the cable and cove it.

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimised, such as allowing for the re-establishment of the vegetation.

Natural regeneration is highly likely around the site once works have been completed. The transmission line and easement will naturally regenerate.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimised should be offset by the achievement of a significant environmental benefit that outweighs that impact.

No Offset is available
The NVC will only consider an offset once avoidance, minimisation and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

4.5 Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The NVC will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The NVC will consider all the Principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

Data Report for level 3 application associated with a Development application

Principle of clearance	**Considerations**
Principle 1a - it comprises a high level of diversity of plant species	Relevant information The number of plant species recorded (native and introduced) for each vegetation association Patches; 1 @ 6.7ha Bushland Plant Diversity Score – 20
	Assessment against the principles At Variance – with principle 1a Chenopod shrubland
	Moderating factors that may be considered by the NVC Only a very small area if vegetation will be impacted relative to the amount of vegetation within the local vicinity (Less than 10% of the native Vegetation within 5km radius to be impacted). This would suggest the proposed clearance to be reduced to Not at Variance against the principles.
Principle 1b - significance as a habitat for wildlife	Relevant information *List of threatened species that were recorded or may use the vegetation.* 1. Neophema elegans elegans (R) Elegant Parrot, *Detail if the vegetation support a high diversity of animal species?* After a site review of the site showing highly impacted landscape and desktop searches, it is unlikely this vegetation would support a high diversity of animal species. *Detail if the vegetation provide a corridor for movements between other areas of native vegetation, or a habitat refuge, especially in heavily cleared areas.* Given the relatively small area to be impacted, not completely cleared, and the remaining vegetation surrounding the site it is unlikely the area provides a corridor between other areas of native vegetation or provides a habitat refuge. Patches; 1 – 6.7ha Threatened Fauna Score – 0.02 Unit biodiversity Score – 17.79

	Assessment against the principles At Variance – with principle 1b - List vegetation – Chenopod shrubland
	Moderating factors that may be considered by the NVC Due to the highly disturbed nature of the site and relatively recent disturbance the area is unlikely to have significant impact on threatened species. Therefore; • unlikely to lead to a long-term decrease in the size of a population • unlikely to reduce the area of occupancy of any of the species identified • unlikely to fragment an existing population into two or more populations • unlikely to adversely affect habitat critical to the survival of a species • unlikely modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • unlikely to result in invasive species that are harmful to threatened species becoming established in the threatened species habitat • unlikely to interfere with the recovery of species. This would suggest a reduction to "Not At variance" with principle 1b.
Principle 1c - plants of a rare, vulnerable or endangered species	Relevant information *List threatened species that were recorded for the site or that may be present but undetectable at the time of assessment (e.g. orchids)* A search of possible threatened species did not find species that maybe undetectable at the time of assessment. The site has been significantly altered over time suggesting the chance of finding other species is low. *Identify the distribution of species within the area of impact* No threatened species were identified within the area of impact. *What level of impact on the local population of the plant species?* There is not likely to be a negative impact on threatened species by the proposed actions. Number of plants likely to be impacted in the clearance area No threatened plant species are likely to be impacted by the proposed actions. Threatened Flora Score(s) -0
	Assessment against the principles Not at Variance against Principle 1C
	Moderating factors that may be considered by the NVC No threatened species were identified or are likely to present themselves at this site.

Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered:	<u>Relevant information</u> Identify any threatened communities under the EPBC Act or threatened ecosystems under the DEW Provisional list of threatened ecosystems present? A search using the Protected Matters tool indicated a potential for Subtropical and Temperate Coastal Saltmarsh communities however this has since been Repealed on 01 October 2023 No threatened communities under the EPBC Act or threatened ecosystems under the DEW Provisional list of threatened ecosystems were present. Threatened Community Score - 1
	<u>Assessment against the principles</u> Not a variance with principle 1d
	<u>Moderating factors that may be considered by the NVC</u> No threatened communities under the EPBC Act or threatened ecosystems under the DEW Provisional list of threatened ecosystems were present.
Principle 1e - it is significant as a remnant of vegetation in an area which has been extensively cleared.	<u>Relevant information</u> Provide remnancy figures for IBRA Association and IBRA Subregion IBRA Association / Arden =95% IBRA Subregion / Gawler Lakes =62% Discuss the health and likely longevity of remnants. An excellent remnancy figure of 95% in the IBRA Association / Arden suggests this association has not been as impacted by wholesale clearance as some other areas. A general consideration is human and livestock grazing impacts, which appear to be low. Most high impacts are associated with human clearance around structures and towns or infrastructure whilst graziers maintain good ground cover using low numbers of livestock to graze the saltbush dominated vegetation association with low impact. Total Biodiversity Score – 71.16
	<u>Assessment against the principles</u> <u>At Variance</u> with principle 1e
	<u>Moderating factors that may be considered by the NVC</u> • The vegetation under the proposal is not a high-quality example. • The installation of hard surfaces is likely to concentrate available moisture to the plants therefore improving the growth of species around the hard surfaces at the site over the long-term. This would suggest a reduction to "Not At variance" with principle 1e

Principle 1f - it is growing in, or in association with, a wetland environment.	Relevant information *Discuss if any of the vegetation is associated with a wetland* This site is not associated with a wetland.
	Assessment against the principles Not at variance against principle 1f
	This site is not associated with a wetland.
Principle 1g - it contributes significantly to the amenity of the area in which it is growing or is situated.	Relevant information Detail the location of trees or vegetation relative to sites frequented by the public (e.g. roads, towns, lookout, etc.) The site is located in an area of human interference. A retired coal power station is 200m to the west of the site. An electrical substation is 400m to the south and wind farms and sundrop solar farm is found 1800m to the South East of the site. Provide details of cultural or historical values Historically this is a well impacted landscape with low controls on human activities as it was once land developed for a coal fired power station. Discuss possible effect on landscape character The project Is likely to have a positive effect on a landscape that has been badly impacted by machines, clearance and soil disturbance. The site will be stabilised with new equipment making it visually improved at an old industrial site.
	N/A
	Moderating factors that may be considered by the NVC

Principles of Clearance (h-m) will be considered by comments provided by the local NRM Board or relevant Minister. The Data Report should contain information on these principles where relevant and where sufficient information or expertise is available.

4.6 Risk Assessment

Determine the level of risk associated with the application

Total clearance	No. of trees	0
	Area (ha)	6.7
	Total biodiversity Score	119.19
Seriously at variance with principle 1(b), 1(c) or 1 (d)		
Risk assessment outcome		Level 3

4.7 NVC Guidelines

Provide any other information that demonstrates that the clearance complies with any relevant NVC guidelines related to the activity.

Not applicable

5. Clearance summary

Clearance Area(s) Summary table

Bushland Assessment														
Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
1	1	20	1	0	0.02	17.79	6.7	119.19	1.0			131.11	$13,872.25	$762.9
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
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								0.00				0.00	$0.00	$0.0
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								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
								0.00				0.00	$0.00	$0.0
If more rows required, unhide the rows between 30 and 112						**Total**	**6.7**	**119.19**				**131.11**	**$13,872.25**	**$762.9**

Totals summary table

Economies of Scale Factor	0.11	**SEB Uplift Factor**	1.10
Rainfall Factor (mm)	265		
SEB Points of Gain/ha Factor	7	**Management Cost ($/ha)**	$25,408.00

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	119.19	131.11	$13,872.25	$762.97	$14,635.22

Risk level Level 2, 3 or 4	**3**

6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the Regulations. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that a SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING A SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

☐ Establish a new SEB Area on land owned by the proponent. Provide information below.

☐ Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. ___________

☐ Apply to have SEB Credit assigned from another person or body. The application form needs to be submitted with this Data Report.

☐ Apply to have a SEB to be delivered by a Third Party. The application form needs to be submitted with this Data Report.

√Pay into the Native Vegetation Fund. Provide details below

PAYMENT SEB

The SEB Policy states that if a SEB is required as a result of an approved activity undertaken under the Regulations, the applicant has a choice of either providing an on-ground SEB or a Payment SEB. However, if a proposed clearance will have an offset obligation of greater than 150 SEB Points Required, the NVC will first request that a reasonable attempt be made to identify an on-ground SEB before a payment will be accepted.

If a proponent proposes to achieve the SEB by paying into the Native Vegetation Fund, summary information must be provided on the amount required to be paid and the manner of payment:

SEB Payment	Admin Fee	Total Payment
$13,872.25	$762.97	$14,635.22

7. Appendices

Appendix 1. Fauna Species List (where applicable)

Appendix 2. Bushland, Rangeland or Scattered Tree Vegetation Assessment Scoresheets associated with the proposed clearance and SEB Area (to be submitted in Excel format)

Appendix 3. Flora Species List

Appendix 4. SEB Native Vegetation Management Plan

Appendix 5. Copies of associated approvals

Attachment D

Visual Impact Assessment by Landskap

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977

420 NORTHERN POWER STATION ROAD, PORT PATTERSON

VISUAL IMPACT ASSESSMENT

Project	Davenport BESS
Ref No.	23.052
Client	Davenport BESS Pty Ltd ATF Davenport BESS 2 Trust
Date	08.10.2025
Issue	Planning

OVERVIEW

This visual assessment relates to the proposed battery storage facility at 420 Northern Power Station Road, Port Paterson, SA, 5700. The purpose of the report is to provide an assessment and opinion of the suitability of the proposal with consideration of the existing landscape context.

INSPECTION

The subject site and locality were inspected on Wednesday 27 August 2025 to take photographs, assess the character and amenity of the area and determine the possible visual impact of the proposal prior to preparation of this report.

BACKGROUND DOCUMENTS

The following documents have been considered in this report:

- Site Plan, Allied Consulting Engineers, dated 29 September 2025

LANDSKĀP

LOCATION

	Project site property boundary
	Project site lease area ('project site')
	Secure site gate
1	Davenport Substation
2	Port Augusta Prison
3	Sundrop Farms
4	Former Playford A Power Station
5	Caroona Solar Farm
6	Effluent Ponds
7	Stirling North Airfield
8	Solar farm

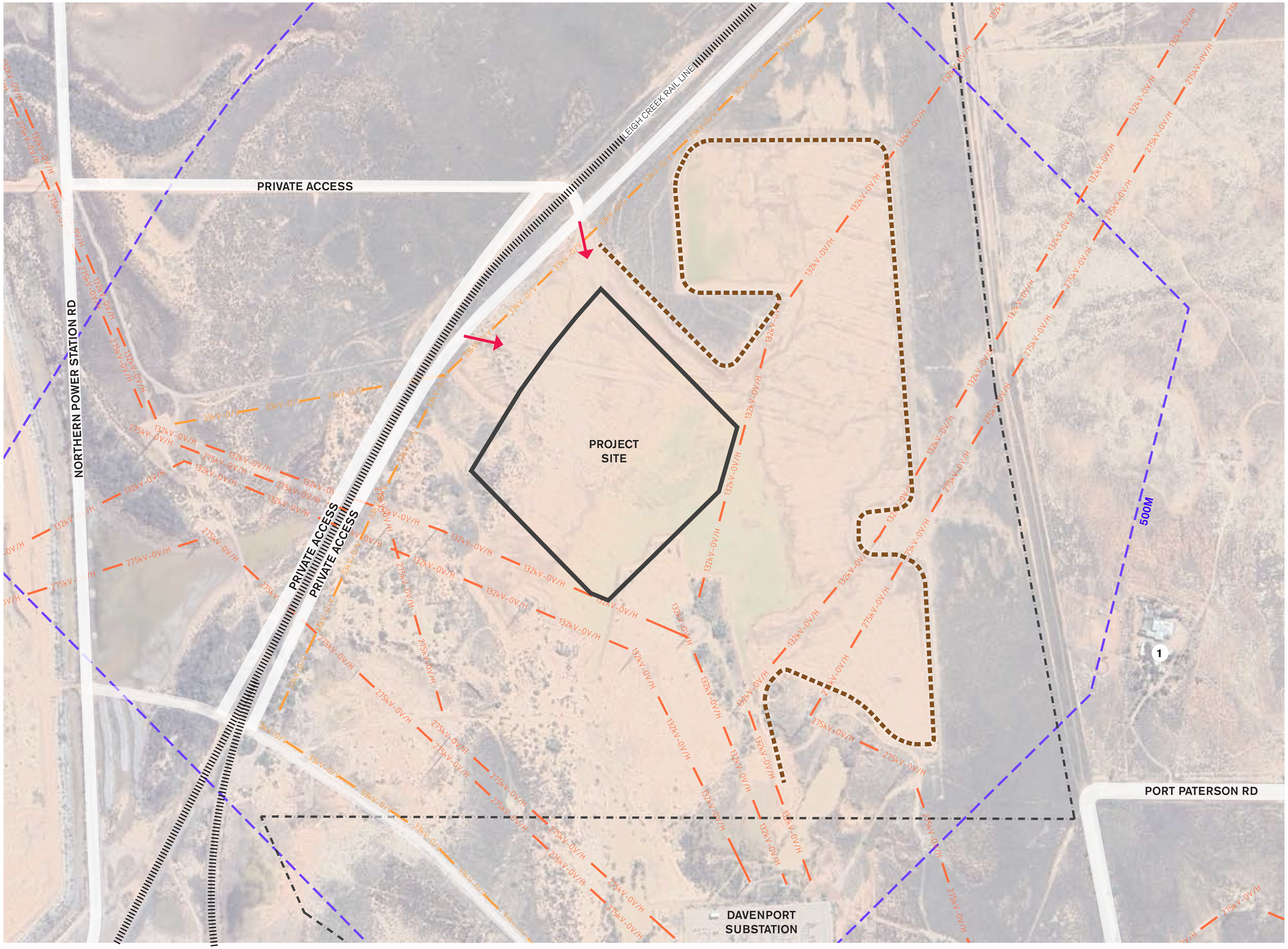
SITE LOCATION

- The site is located approximately 10 km south-east of Port Augusta within the Port Augusta City Council area.
- Access to the site is provided via private roads from Northern Power Station Road.

North

0 100 500 1000

SITE



- Project site property boundary
- Project site lease area ('project site')
- Existing site access
- Extent of batter to perimeter of the site
- High voltage transmission line (132 & 275kv)
- High voltage overhead line (33kV)
- 500m offset from lease boundary
- 1 Dwelling at 190 Port Paterson Road

SITE

- The project site forms part of a larger allotment at 420 Northern Power Station Road, Port Paterson, SA 5700.
- The lease area is approximately 7 hectares in size and is bound on all sides by private land within the same allotment.
- The site has been previously cleared of vegetation, and evidence of significant earthworks is present.
- The lease area is located within a substantial cut and sits approximately 4-5 metres below the level of the adjacent access road and land to the north, based on site inspection. To the south, the landform transitions back to natural ground levels adjacent to the Davenport Substation.
- The site is bound by the Leigh Creek rail line and private access roads to the west, with unused private land to the north, east, and south. The Davenport Substation forms a notable feature immediately south of the site. Several high-voltage transmission lines are located in close proximity. These lines have been identified with reference to aerial imagery and ElectraNet's Network Maps.
- Rural dwellings are concentrated to the east of the site, accessed via Port Paterson Road. The closest dwelling is located at 190 Port Paterson Road.

North

1:5000 / A3

0 50 100 150 200 250

LOCAL AREA CHARACTER

OVERVIEW

Location	420 Northern Power Station Road, Port Paterson, SA, 5700
P&D Zone	Coastal Waters and Offshore Islands Conservation Strategic Employment
P&D Overlay	Building Near Airfields Coastal Areas Hazards (Flooding) Hazards (Bushfire - Regional) Hazards (Flooding - Evidence Required) Marine Parks (Managed Use) Native Vegetation Water Resources
Council Area	Port Augusta City Council

LANDSCAPE CHARACTER

- The site is located within a predominantly infrastructure, agriculture and rural living setting, approximately 10 km south-east of Port Augusta.
- The local character is strongly influenced by the following large-scale energy and agricultural infrastructure:
  - Davenport Substation
  - Sundrop Farms tower and solar farm
  - Caroona Solar Farm
  - Extensive high-voltage transmission lines
  - Wind farms and solar farms located further to the east
- Rural dwellings and outbuilding are concentrated to the east of the site, along Port Paterson Road and Wagner Road. Dwellings are typically detached and located on large allotments.
- Vegetation within the local area is sparse, comprising low chenopod shrubland and scattered small trees, with planting largely confined to road corridors and adjacent rural dwellings.
- The overall landscape character is highly modified, reflecting extensive clearance and earthworks associated with infrastructure, rural living and agricultural activity.

TOPOGRAPHY & VIEWS

- The topography of the area is flat to gently undulating, allowing broad panoramic views.
- To the east, the southern Flinders Ranges form a dominant backdrop at the broader landscape scale. To the west, views extend across Spencer Gulf towards the distant ranges of the Eyre Peninsula.
- The Augusta Highway, elevated above the surrounding land, provides open views across Port Paterson.
- Local roads, including Northern Power Station Road and Port Paterson Road, also provide open viewing corridors.
- While views within the local area are generally open, they are visually influenced by infrastructure.

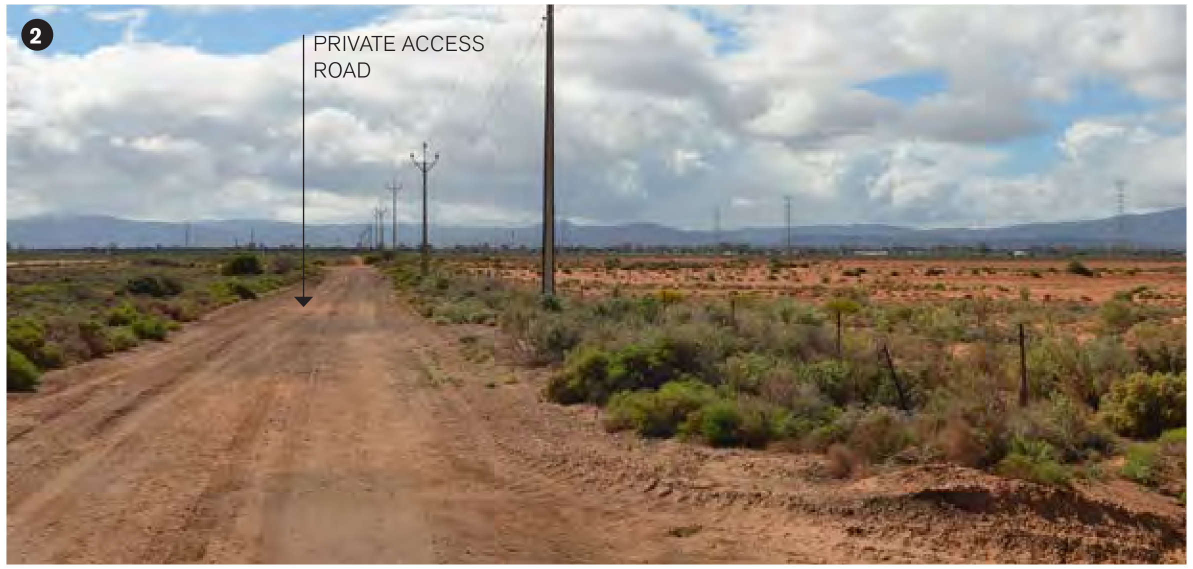
LAND USE & BUILT FORM

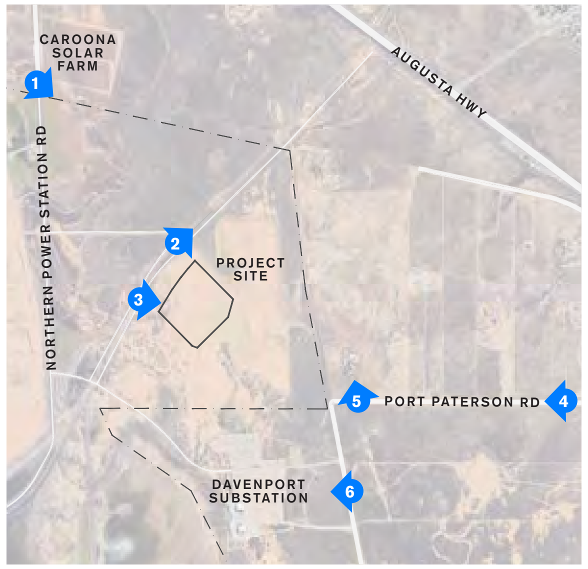
- Land use in the local area comprises a mix of infrastructure, agricultural activity, and dispersed rural dwellings.
- Rural dwellings are primarily located to the east of the site along Port Paterson Road and Warner Road, with the nearest residence at 190 Port Paterson Road.
- The built form is characterised by low-density, single-storey detached dwellings with associated outbuildings, rainwater tanks, and farm infrastructure.
- Building styles are varied, with a concentration of newer dwellings along Warner Drive.

VISUAL INTERFERENCE & INFRASTRUCTURE

- The local character is heavily influenced by the prominence of infrastructure.
- High-voltage transmission lines, the Davenport Substation, Sundrop Farms, Caroona Solar Farm and wind farms to the east all form dominant visual elements within the landscape.
- The sparse vegetation and absence of significant tree cover contribute to open and largely uninterrupted views, which increases the visual prominence of these infrastructure elements.

LOCAL AREA CHARACTER





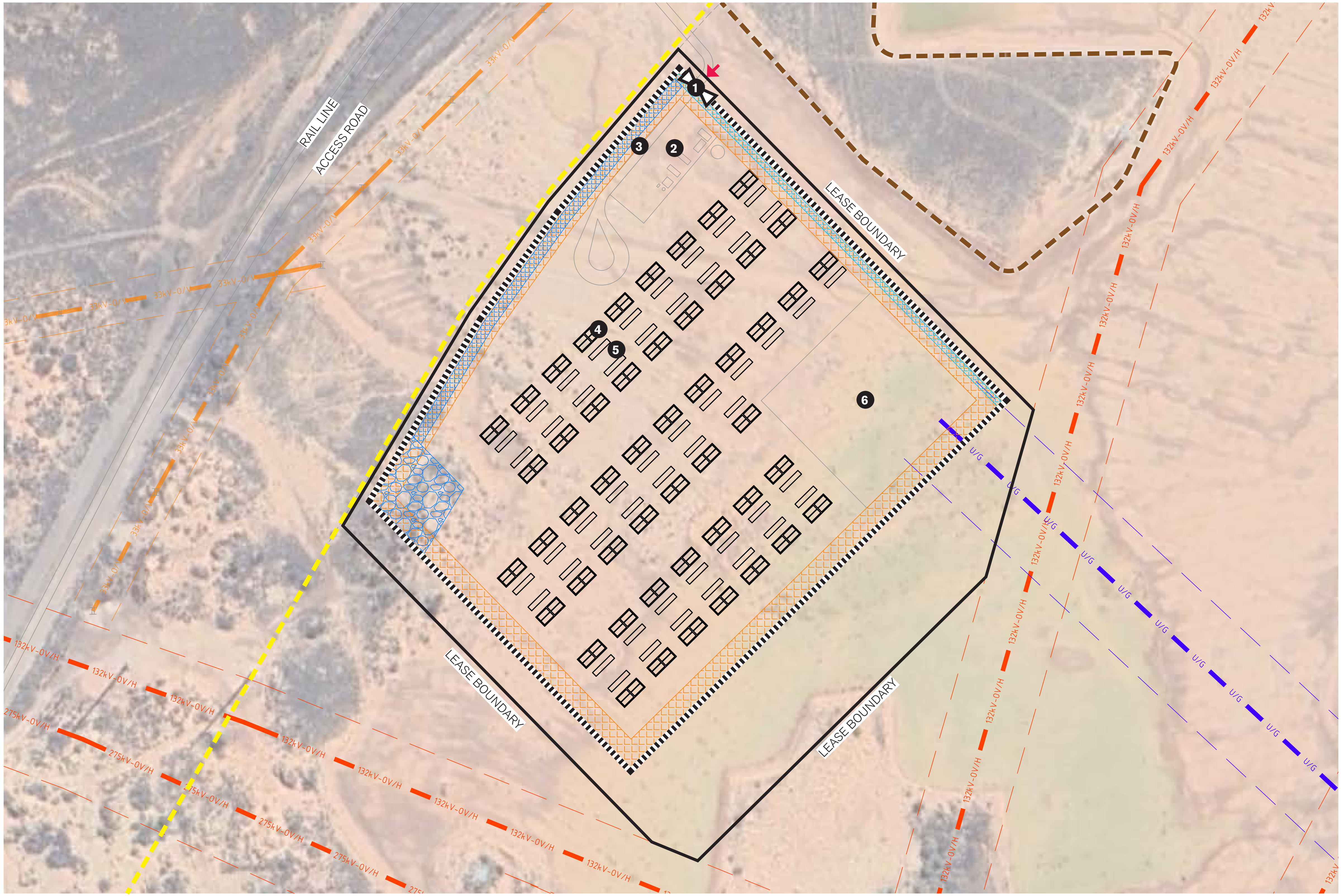
PROPOSED DEVELOPMENT

We understand the proposal comprises the following:

- 208 battery storage units.
- 52 centralised inverters.
- 1 Substation.
- 4m wide internal access road.
- 2.1m height chain-mesh security fencing around the perimeter of the site.

Refer to the Green Gold Energy drawings for further information.

PROPOSED BATTERY STORAGE FACILITY



	Project site lease area ('project site')
	2.1 height chainmesh fence
	Site access
	High voltage transmission line & easement (132 & 275kV)
	High voltage overhead line & easement (33kV)
	Underground export cable & easement
	Drainage swale
	Drainage bund
	Stormwater basin
	Asset Protection Zone
	Extent of batter to perimeter of the site
	100m rail offset
1	Access gate
2	Site amenities (for construction only)
3	Internal road (for construction only)
4	Battery storage units
5	Centralised inverters
6	Substation

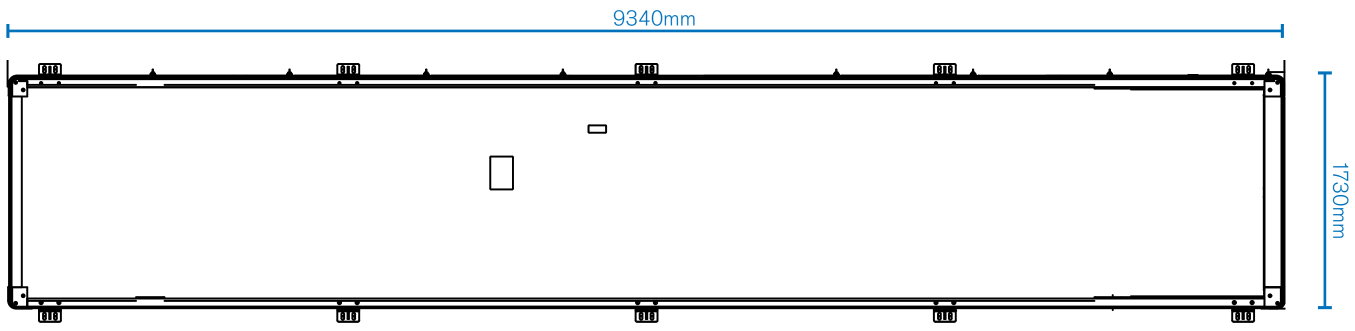
North

1:2000 / A3

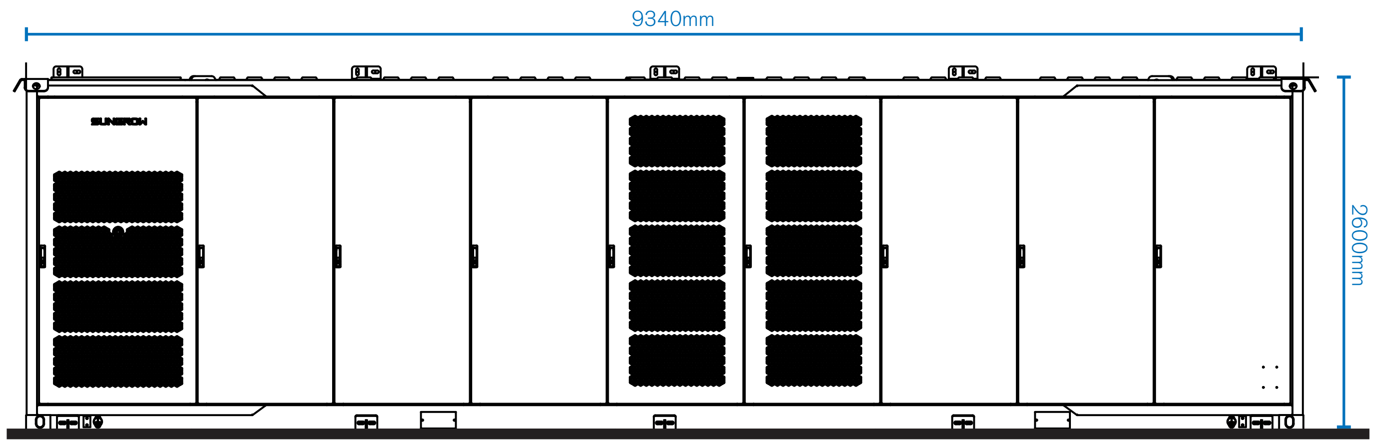
0 10 25 50 100

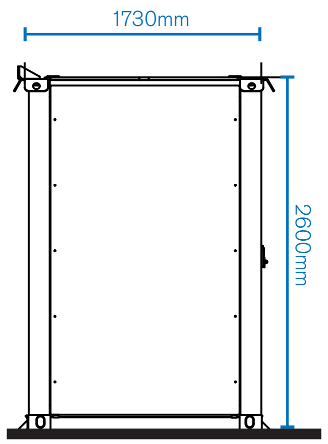
SUMMARY PLAN FOR INFORMATION ONLY. REFER TO GREEN GOLD ENERGY FOR DETAILED PLANS & SPECIFICATIONS

EXAMPLE BATTERY



PLAN 01





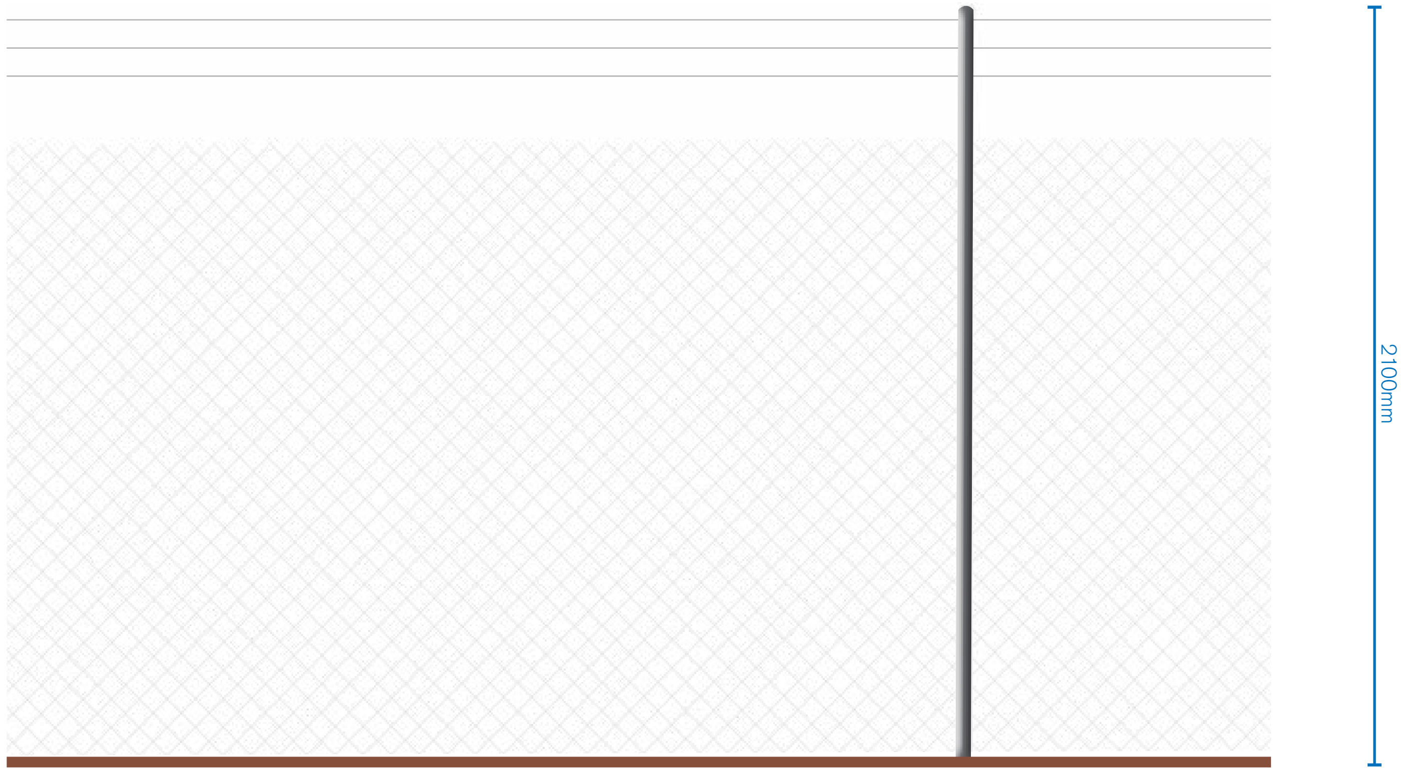
ELEVATION 01

ELEVATION 02

EXAMPLE BATTERY DRAWINGS PROVIDED BY GREEN GOLD ENERGY

EXAMPLE BATTERY, HORNSDALE POWER RESERVE, SA

EXAMPLE SECURITY FENCING

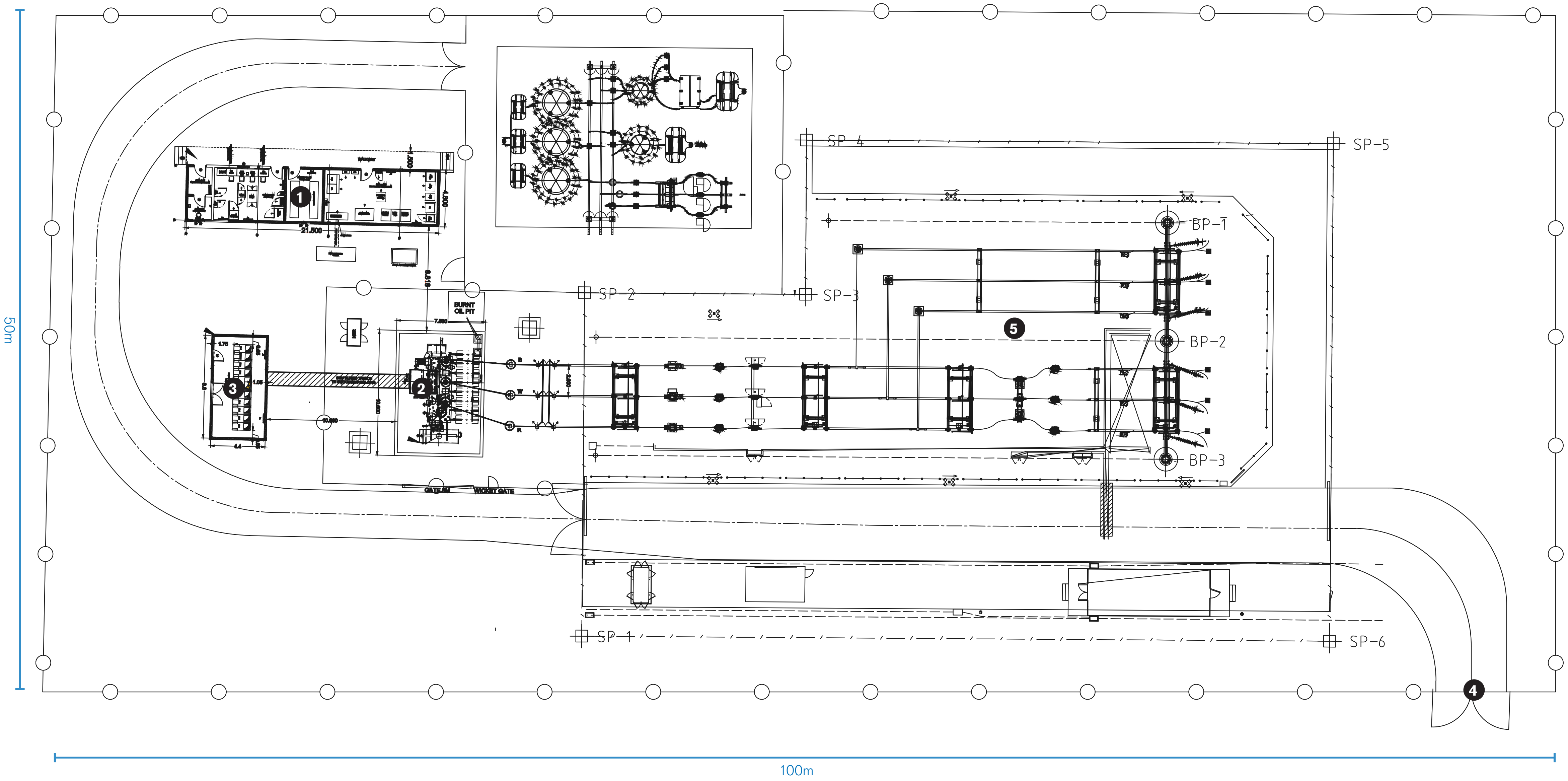


ELEVATION

EXAMPLE SECURITY FENCE

EXAMPLE SECURITY FENCE

EXAMPLE SUBSTATION



PLAN

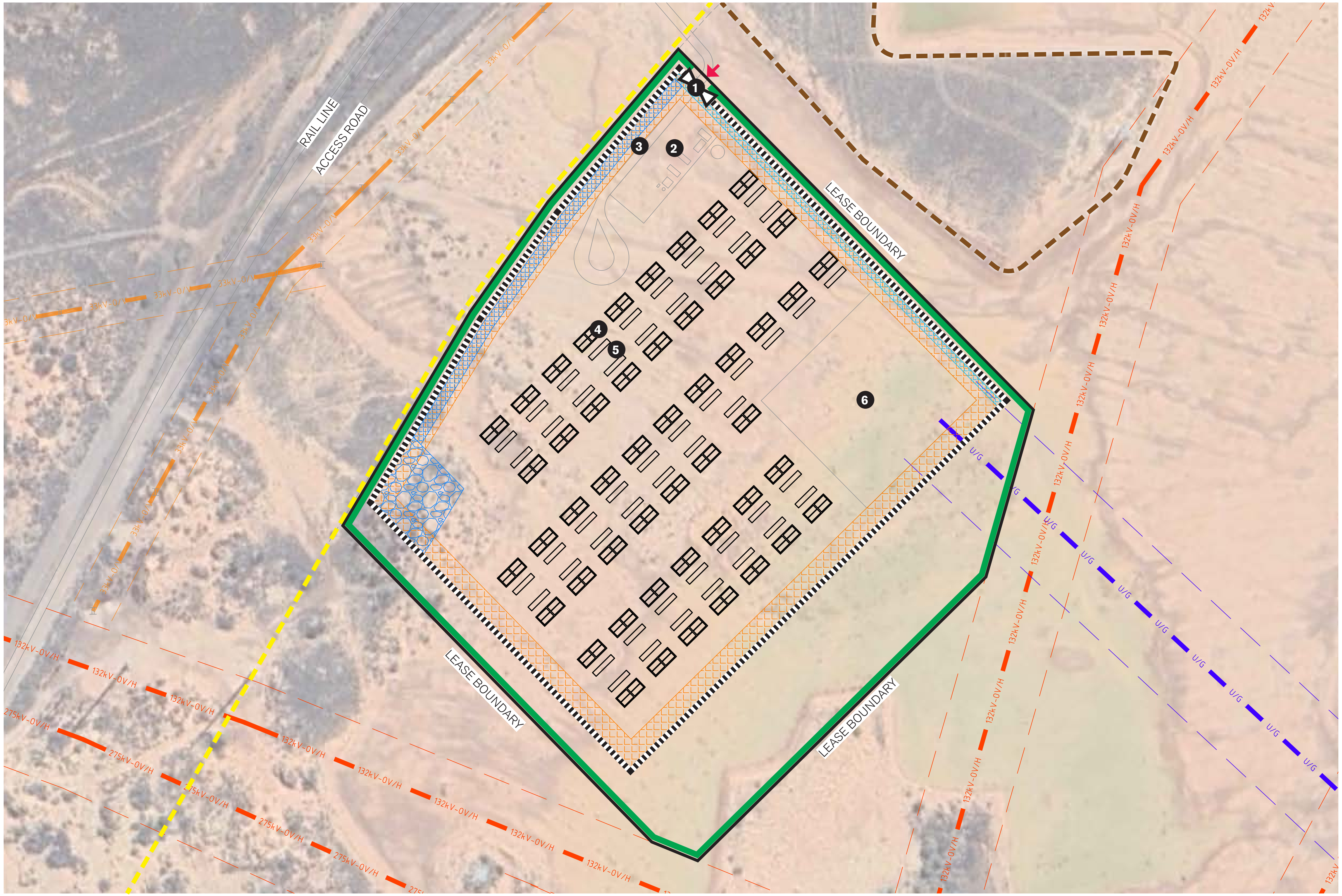
EXAMPLE SUBSTATION PLAN PROVIDED BY GREEN GOLD ENERGY

1	Control room
2	HV E-house
3	Step-up transformer
4	Access
5	Bus pipes

EXAMPLE BUS PIPES, 6-10m IN HEIGHT

LANDSCAPE STRATEGY

PROPOSED LANDSCAPE PLAN



	Project site lease area ('project site')
	2.1 height chainmesh fence
	Site access
	High voltage transmission line & easement (132 & 275kV)
	High voltage overhead line & easement (33kV)
	Underground export cable & easement
	5m width landscape zone, refer landscape approach
	Drainage swale
	Drainage bund
	Stormwater basin
	Asset Protection Zone
	Extent of batter to perimeter of the site
	100m rail offset
1	Access gate
2	Site amenities (for construction only)
3	Internal road (for construction only)
4	Battery storage units
5	Centralised inverters
6	Substation

LANDSCAPE APPROACH

The landscape approach aims to:

– Maximise opportunities for local native revegetation and biodiversity habitat.

– Promote establishment and long-term planting success.

– Minimise the visual impact of the proposal, noting the visual impact of the proposal is anticipated to be low.

North

1:2000 / A3

0 10 25 50 100

SUMMARY PLAN FOR INFORMATION ONLY. REFER TO GREEN GOLD ENERGY FOR DETAILED PLANS & SPECIFICATIONS

PROPOSED LANDSCAPE STRATEGY

LANDSCAPE STRATEGIES

The landscape approach is reinforced with the following key strategies:

- Planting of new trees and shrubs comprising semi-advanced trees and tubestock.
- Automatic irrigation through the establishment period. This will provide planting stock with the best possible chance of establishment and long term success.
- A minimum two year maintenance and establishment period where all failed stock are replaced.

PLANTING NOTES

- Proposed planting species have been selected with consideration of local growing conditions, including soil, coastal proximity and watering requirements.
- Soil mapping and vegetation mapping sourced from Data SA had been used to inform species selections.
- Proposed planting species have been designed to provide appropriate greening, landscape amenity and visual screening for the proposal.
- Species selected are available from retail and/or State Flora nurseries.
- Tubestock planting is not recommended during peak summer. Direct seeding must be undertaken during June/ July.

EXPECTED GROWTH

- A range of shrubs and trees have been selected to provide adequate screening and vegetation buffer to the surrounding roads.
- Species are proposed to be mixed together and it is anticipated that their varied heights and forms will provide a dense and multi-layered buffer.
- The inclusion and guarantee of irrigation provides the stock with the best possible chance of healthy growth.

PLANTING STRATEGIES

SEMI-ADVANCED

Source: Contract grown with State Flora Pt Augusta

Use: Planted at a rate of 1 plant per 5 sqm

Protection: Stakes and ties

Watering: Establishment only

TUBESTOCK

Source: Contract grown with State Flora Pt Augusta

Use: Planted at a rate of 1 plant per 2 sqm

Protection: Coreflutes

Watering: Establishment only

PROPOSED SPECIES

MELALEUCA HALMATURORUM

KI Paperbark

Small tree

EUCALYPTUS PETIOLARIS

Eyre Peninsula Blue Gum

Medium tree

ACACIA LIGULATA

Dune Wattle

Small tree

ALLOCASUARINA VERTICILLATA

Drooping Sheoak

Medium tree

VISUAL ASSESSMENT

METHODOLOGY

METHODOLOGY

Photography was undertaken using the following methodology:

- All photos were taken on a Nikon D7000.
- Focal length was set at 22mm.
- All photos were taken at eye level, with no filter.
- Photos were taken from within the subject site and within publicly accessible locations.
- Photos were taken and viewpoint locations were geo-referenced using Google Earth.
- A 5.0m height mast was fixed to an existing star dropper within the project site to identify the project site within the local area. The location of the mast was geo-referenced using Google Earth.
- A series of locations were selected to illustrate the visual impact of proposal.

PHOTOGRAPH OF THE 5.0M HEIGHT STAFF, ON-SITE

The following rating scale has been used to determine the visual notability of the proposal at each viewpoint:

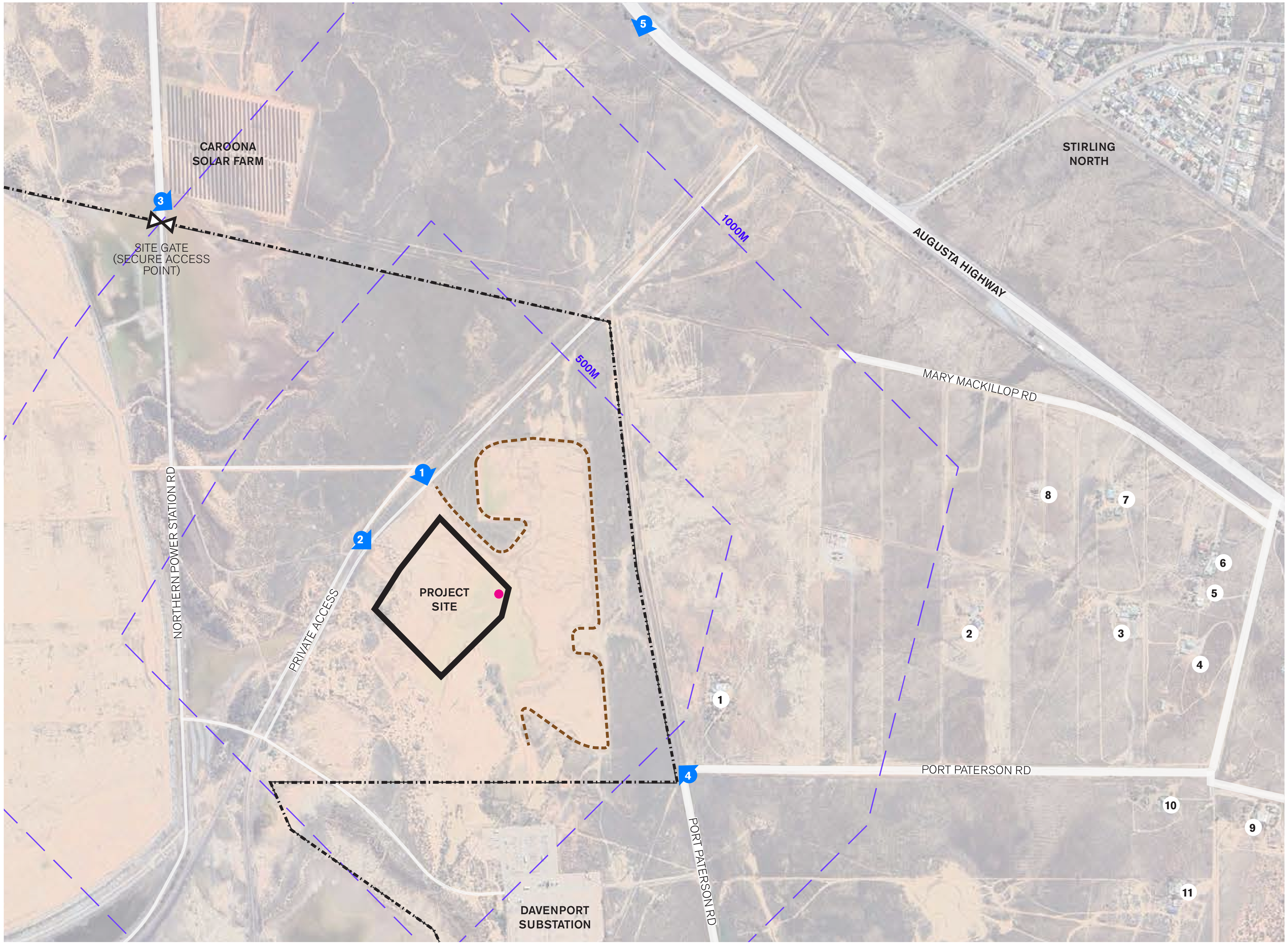
VISUAL NOTABILITY	DESCRIPTION
Negligible	Subject cannot be seen
Low	Subject can be seen
Moderate	Subject is reasonably visible
High	Subject is highly visible
Very High	Subject is highly visible and prominent

The following rating scale has been used to determine the visual impact of the proposal at each viewpoint. The visual impact takes into account how sensitive to change the existing landscape is.

IMPACT OF PROPOSAL	DESCRIPTION
Negligible	Will **not** be noticed and has a negligible to no impact on the visual amenity of the area
Low	Will just be noticed and has a low impact on the visual amenity of the area
Moderate	Will be noticed and has a moderate impact on the visual amenity of the area
High	Will be noticed and has a high impact on the visual amenity of the area
Very High	Will be noticed and has a very high impact on the visual amenity of the area

GLOSSARY OF TERMS	
Skylining	An outline or silhouette of a building or structure against the background of the sky
Viewpoint	The specific location of a view, typically used for assessment purposes
Viewshed	The area that the proposal can be seen from
Visibility	The state or fact of being visible or seen
Visual impact	The impacts on the views from residences, workplaces and public places

VIEWPOINTS



- Project site property boundary
- Project site lease area ('project site')
- Photographic viewpoint
- Extent of batter to perimeter of the site
- 500m offset from lease boundary
- Approximate location of 5.0m height mast

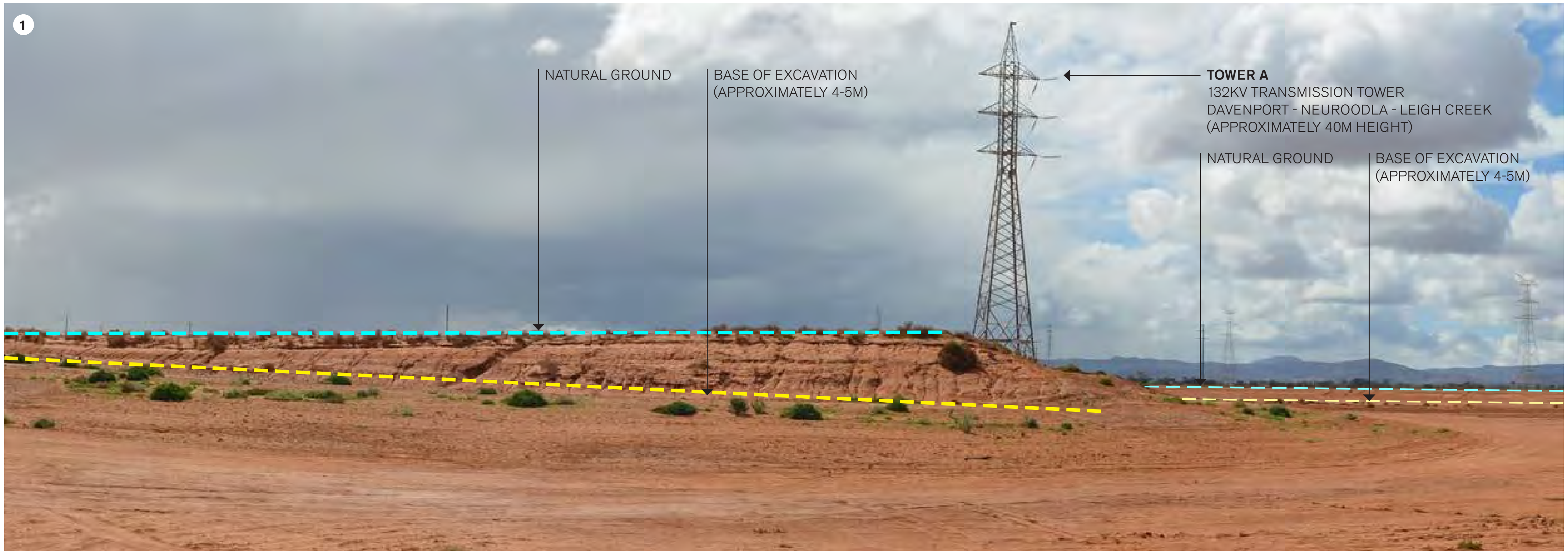
1	Dwelling at 190 Port Paterson Road
2	Dwelling at 124 Port Paterson Road
3	Dwelling at 90 Port Paterson Road
4	Dwelling at 40 Port Paterson Road
5	Dwelling at 24 Port Paterson Road
6	Dwelling at 15 Mary Mackillop Road
7	Dwelling at 41 Mary Mackillop Road
8	Dwelling at 75 Mary Mackillop Road
9	Dwelling at 2B Marks Road
10	Dwelling at 2A Marks Road
11	Dwelling at 2C Marks Road

North

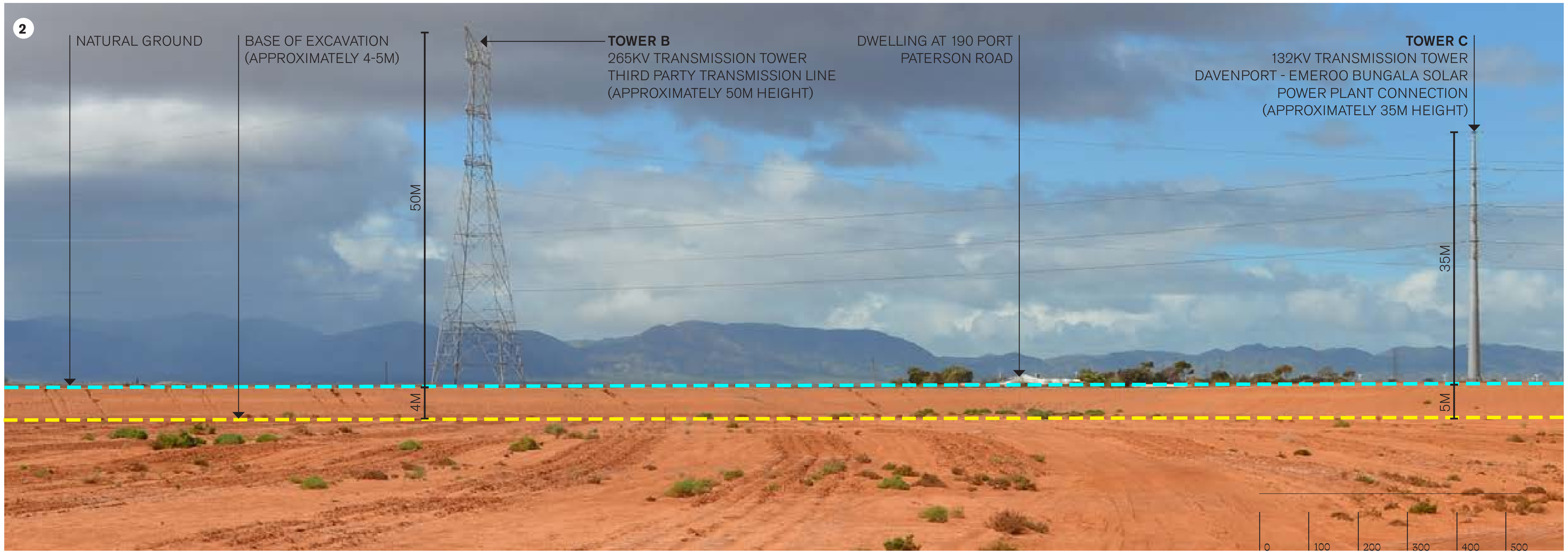
1:20,000 / A3

0 100 200 300 400 500

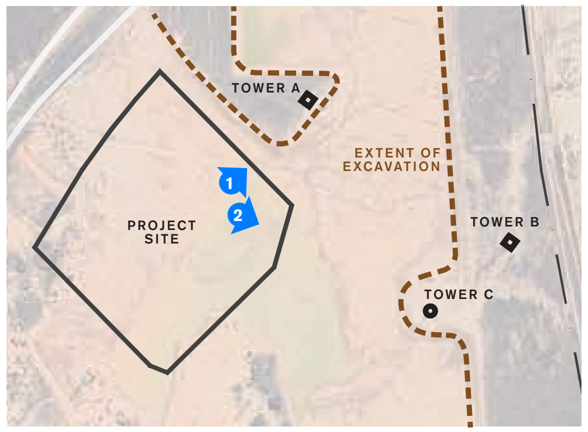
SITE TOPOGRAPHY



VIEW LOOKING NORTH-EAST FROM THE PROJECT SITE

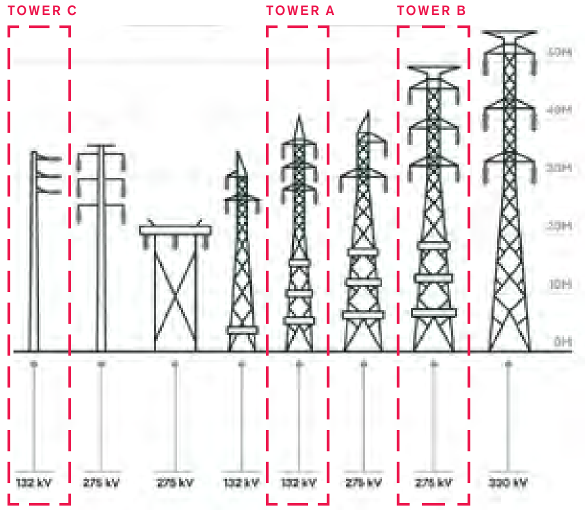


VIEW LOOKING WEST FROM THE PROJECT SITE



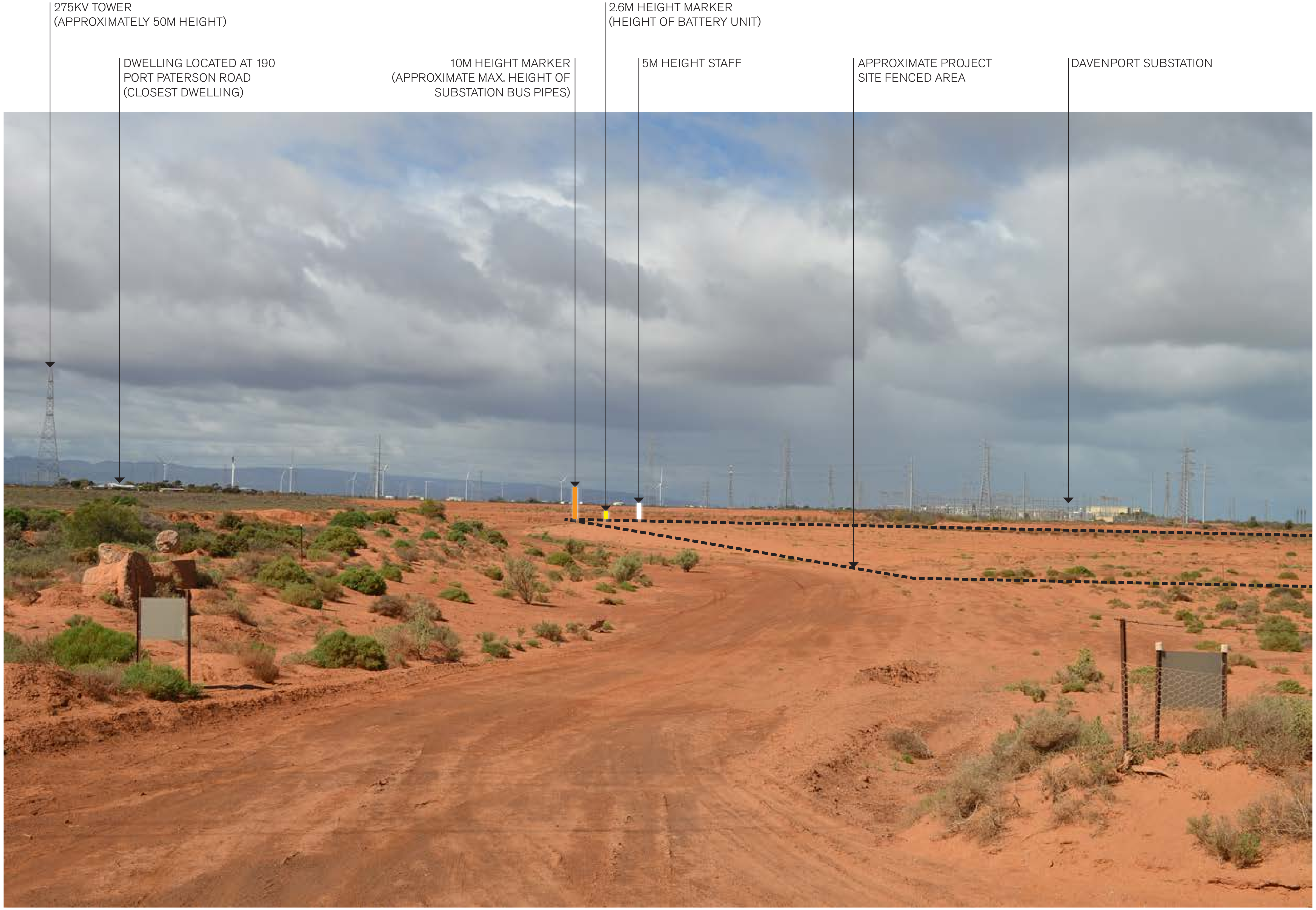
NOTES

- The proposal is located within the low point of a previously excavated area.
- While detailed survey or topographic data are not available, the excavation depth has been approximated at 4–5m, based on reference to the height of existing transmission towers.
- As a result of this siting, views of the proposal are expected to be extremely limited, with the battery units and fencing anticipated to have low visual prominence.



STRUCTURE TYPES & VOLTAGES, ELECTRANET
(HTTPS://ELECTRANET.COM.AU/SAFETY/TRANSMISSION-LINES/)

VIEWPOINT 01



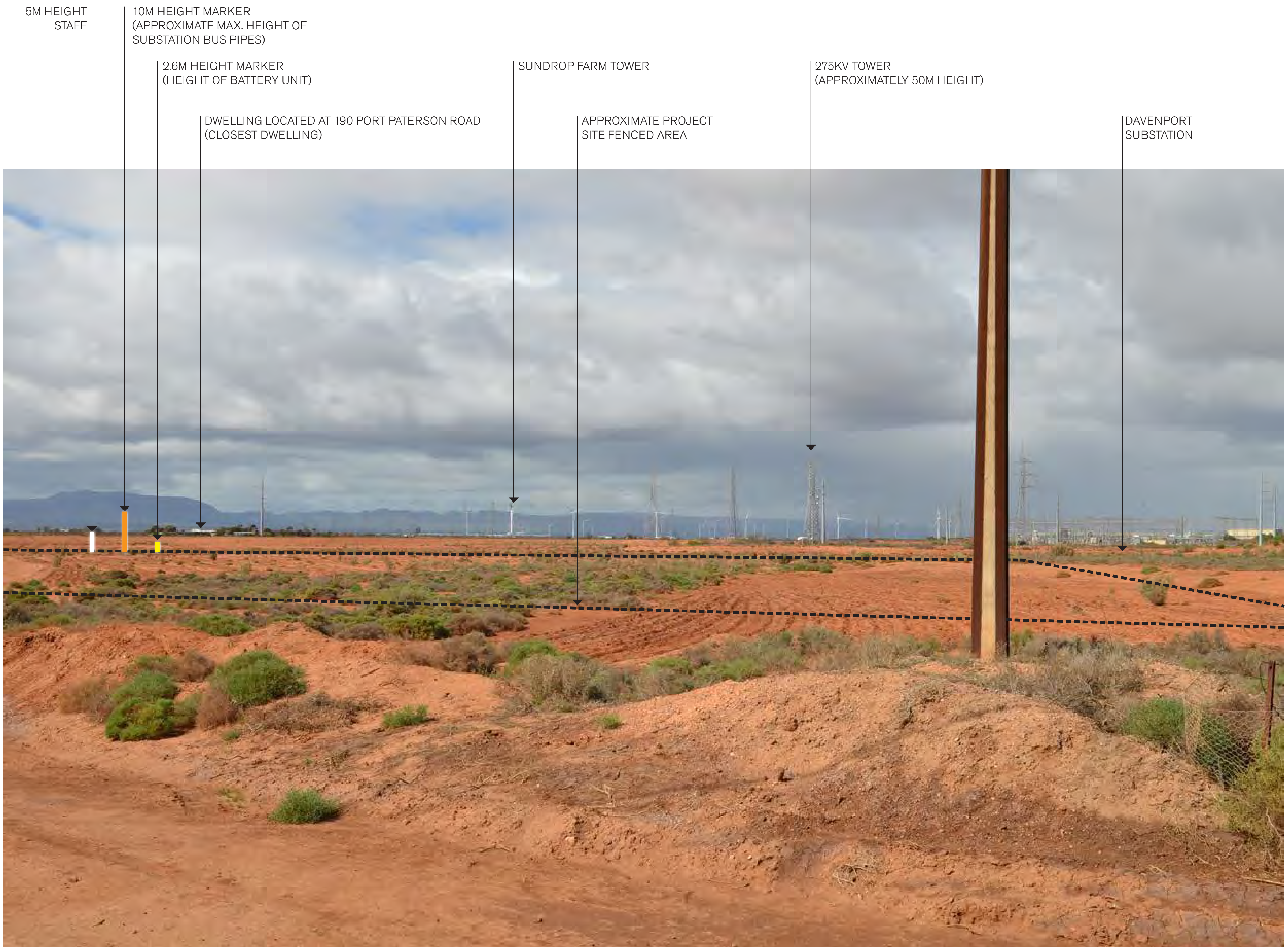
VIEWPOINT 01 - ORIGINAL

Location	Private Access Road
Distance from the site	120m
Date & time	27.08.2025 - 12:00pm
Image modifications	None
Visual notability	Moderate
Visual impact	Low

NOTES

- This view is from the private access road (location of the proposed site access).
- The visual impact is assessed as low for the following reasons:
  - The viewpoint is from a private access road and is only available to staff and approved visitors. It is not available to the public.
  - The site is already heavily modified and largely devoid of vegetation, with low landscape quality and scenic value.
  - Existing views are dominated by the Davenport Substation, high-voltage transmission lines, and nearby windfarms.
  - The proposal will result in a minor scenic change.
- The inclusion of new landscaping as part of the proposal presents an opportunity to enhance the overall landscape quality of the site.

VIEWPOINT 02



VIEWPOINT 02

Location	Private Access Road
Distance from the site	120m
Date & time	27.08.2025 - 12:00pm
Image modifications	None
Visual notability	Moderate
Visual impact	Low

NOTES

- This view is from the private access road (location of the proposed site access).
- The visual impact is assessed as low for the following reasons:
  - The viewpoint is from a private access road and is only available to staff and approved visitors. It is not available to the public.
  - The site is already heavily modified and largely devoid of vegetation, with low landscape quality and scenic value.
  - Existing views are dominated by the Davenport Substation, high-voltage transmission lines, and nearby windfarms.
  - The proposal will result in a minor scenic change.
- The inclusion of new landscaping as part of the proposal presents an opportunity to enhance the overall landscape quality of the site.

VIEWPOINT 03

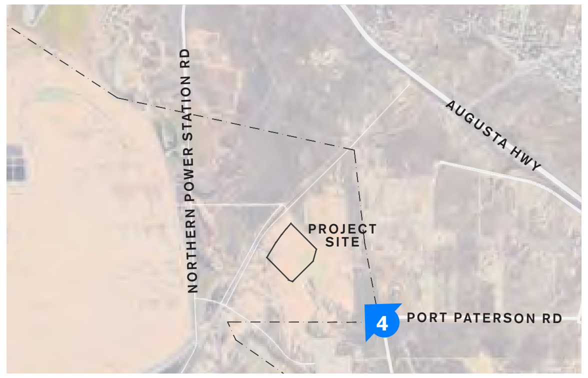
VIEWPOINT 03

Location	Northern Power Station Road
Distance from the site	1,050m
Date & time	27.08.2025 - 12:00pm
Image modifications	None
Visual notability	Negligible
Visual impact	Negligible

NOTES

- This view is from Northern Power Station Road, prior to the private access gate.
- The visual impact is assessed as negligible for the following reasons:
  - The significant distance between the viewpoint and the project site.
  - The moderate scale of the proposal relative to the surrounding infrastructure.
  - The existing visual clutter caused by high-voltage transmission lines, the Davenport Substation, and the Caroona Solar Farm.
  - Northern Power Station Road functions as a service road providing access to private property, including the project site, and experiences very low levels of use.

VIEWPOINT 04



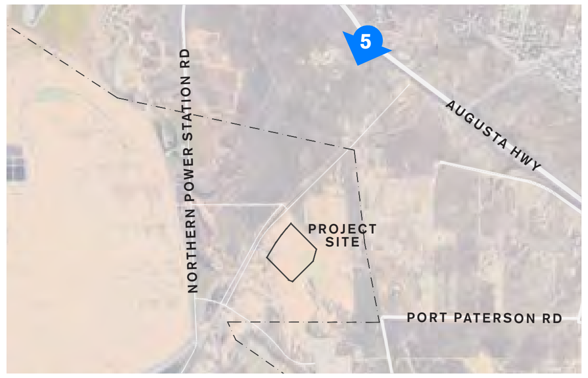
VIEWPOINT 04

Location	Port Paterson Road
Distance from the site	600m
Date & time	27.08.2025 - 12:00pm
Image modifications	None
Visual notability	Negligible
Visual impact	Negligible

NOTES

- This view is from Port Paterson Road, adjacent to the dwelling at 190 Port Paterson Road.
- The visual impact is assessed as negligible for the following reasons:
  - The distance between the viewpoint and the project site.
  - The siting of the proposal within an excavated area, which results in very low visibility.
  - The presence of existing visual clutter, including high-voltage transmission lines, the Davenport Substation, and the Caroona Solar Farm.
  - Port Paterson Road provides access to approximately 20 dwellings and experiences very low traffic volumes.
- The inclusion of new landscaping as part of the proposal offers an opportunity to enhance the overall landscape quality of the site.

VIEWPOINT 05



VIEWPOINT 05

Location	Princes Highway
Distance from the site	1,300m
Date & time	27.08.2025 - 12:00pm
Image modifications	None
Visual notability	Negligible
Visual impact	Negligible

NOTES

- This view is from Princes Highway.
- The visual impact is assessed as negligible for the following reasons:
  - The distance between the viewpoint and the project site.
  - The siting of the proposal within an excavated area, which results in very low visibility.
  - The presence of existing visual clutter, including high-voltage transmission lines, the Davenport Substation, and the Caroona Solar Farm.
- The inclusion of new landscaping as part of the proposal offers an opportunity to enhance the overall landscape quality of the site.

SUMMARY

SUMMARY

Following assessment of the visual impact of the proposed Port Paterson battery storage facility, we have formed the opinion that the proposal, including landscaping, will have a low visual impact on the local area that will lessen over time.

The local area already has a strong infrastructure focus, which in our view supports the proposed facility and reduces its overall visual impact. This is most notably due to the following factors:

1. The site is heavily modified and largely devoid of vegetation, with low landscape quality and scenic value.
2. The local area is visually cluttered and dominated by overhead high-voltage transmission lines, the Davenport Substation, Sundrop Farms, and infrastructure associated with rural dwellings.
3. The proposal is sited within a lower lying excavated area, resulting in very low visibility.
4. Visibility from publicly accessible viewpoints will be very limited, restricted to a short section of Port Paterson Road and the Princes Highway.
5. The surrounding topography is relatively flat, further limiting the visual scale of the facility within the local landscape, and minimising possible skylining.
6. Landscaping around the perimeter of the facility will assist in screening views from adjacent roads and private allotments.
7. The landscaping will contribute positively to landscape amenity and biodiversity.

It is acknowledged that a photographic visual assessment was not undertaken from private properties. However, a desktop review of comparable viewpoints and site conditions indicates that the proposal will also have a low visual impact from nearby dwellings to the east.

The closest residence, at 190 Port Paterson Road, may have limited visibility of the proposed substation buspipes, although the majority of the facility, including battery units and fencing, will be screened by its siting. Given the surrounding infrastructure-focused land uses, the substation and buspipes are not anticipated to result in an unacceptable visual change.

In conclusion, the visual assessment demonstrates that the proposed facility will have low visibility within the local area and will not compromise the landscape character of the locality. Over time, the successful establishment of proposed landscaping will further reduce visual impacts while providing tangible landscape and biodiversity benefits.

Urban Design, Landscape
Architecture & Gardens

hello@landskap.com.au
landskap.com.au

LANDSKĀP

Attachment E

Environmental Impact Assessment by Echo Acoustic Consulting

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977

Port Paterson BESS

Environmental Impact Assessment - Noise

9 October 2025
Reference ID: 326-6

Acoustic Consulting

Contents

Figures

Tables

Abbreviations

Assessment	Echo Acoustics *Environmental Impact Assessment - Noise* with Reference ID: 326-6, dated 9 October 2025
BESS	Battery Energy Storage System including battery and inverter systems proposed at 420 Northern Power Station Road, Port Paterson
dB	Decibel
dB(A)	An A-weighted Decibel
EP Act	*Environment Protection Act 1993*
HRE Act	*Hydrogen and Renewable Energy Act 2023*
L_{Aeq}	The A-weighted equivalent time-averaged noise level
MW	Mega Watt
MWh	Mega Watt Hour
Noise control measures	Noise control and management strategies to reduce environmental damage as far as reasonably practicable in accordance with the HRE Act
Policy	The *Environment Protection (Commercial and Industrial Noise) Policy 2023*
Standard	International Standard ISO 9613-2:2024 *"Acoustics - Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors"*
Receptor	Environmental receptors as referenced under the HRE Act, being the surrounding dwellings to the BESS as identified in Figure 2 of the assessment

Glossary

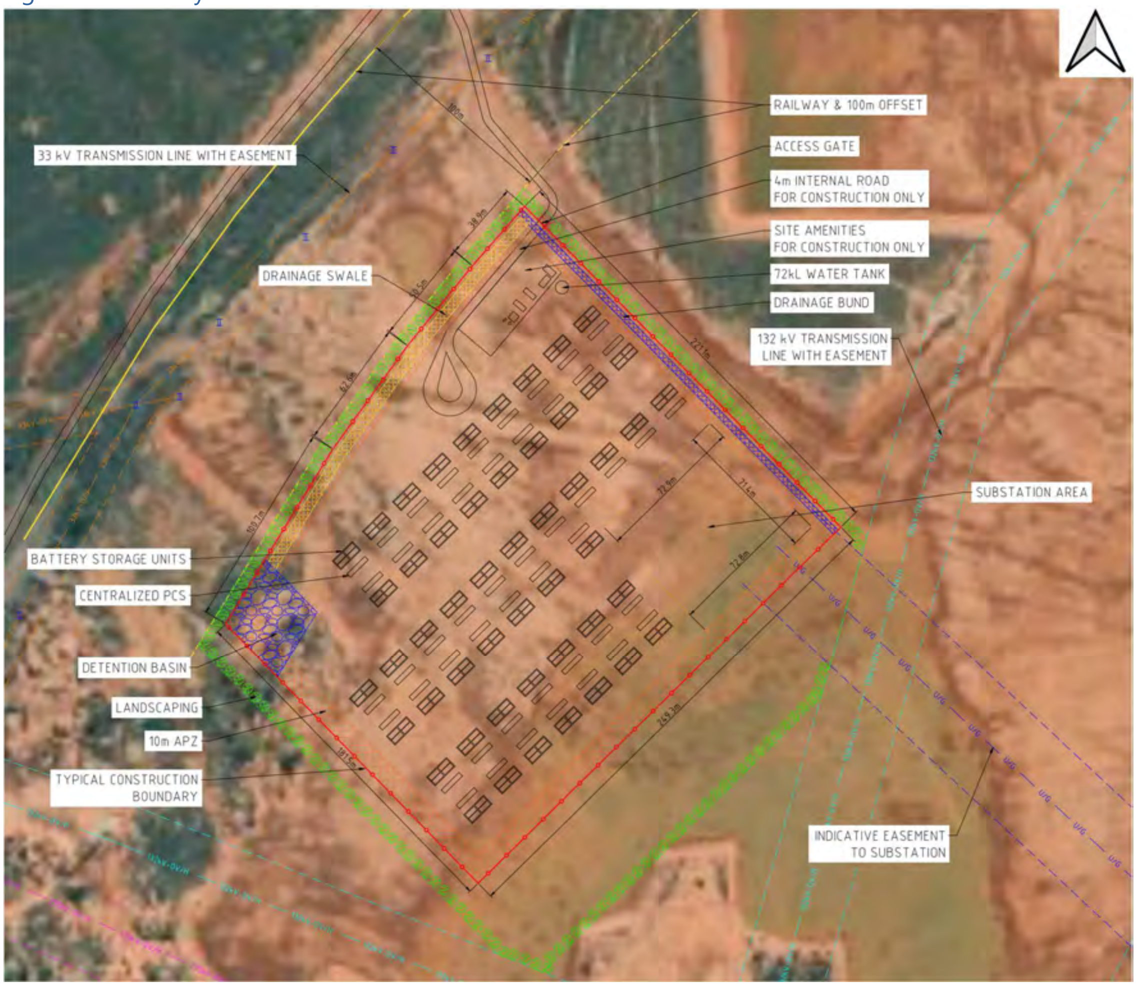
A-weighting	A mathematical adjustment to the measured noise levels to represent the human response to sound. An A-weighted noise level is presented as dB(A)
Ambient environment	The environment in the absence of the BESS
Candidate BESS	Candidate battery and inverter systems used as an example in an assessment to indicate the ability to comply with legislative requirements. Candidate battery and inverter systems are indicative of equipment which might be procured at a future design and tender stage of the BESS
Characteristic	A characteristic determined in accordance with the Policy to be fundamental to the nature and impact of the noise. For example, a noise source is deemed to exhibit a characteristic if it produces distinctive tonal, impulsive, low frequency, intermittent or modulating features
Day	A period defined by the Policy as between 7.00am and 10.00pm
Decibel	The logarithmic unit of measurement to define the magnitude of a fluctuating air pressure wave. Used as the unit for sound or noise level
Equivalent noise level	The A-weighted noise level which is equivalent to a noise level which varies over time. The descriptor is L_{Aeq} and it is the A-weighted source noise level (continuous) referenced in the Policy

Frequency	Represents the number of fluctuating air pressure waves in one second. High frequency sound (high pitch or squeal) will generate many waves and low frequency sound (bass or rumble) will generate a small number of waves. The unit of frequency is Hertz
Indicative noise level	The noise level assigned by the Policy at a location to represent an impact on the acoustic amenity at that location. No further action is required to be taken under the EP Act for noise levels which are lower than the Indicative Noise Level
Night	A period defined by the Policy as between 10.00pm and 7.00am
Noise	An interchangeable term with sound but which is most often described as unwanted sound
Noise control measures	Noise attenuation and/or reduction in operating capacity applied to the batteries and inverters
Noise criteria	The noise levels established to objectively assess whether adverse effects on the environment are managed so as to reduce environmental damage as far as reasonably practicable in accordance with the HRE Act
Sound	An activity or operation which generates a fluctuating air pressure wave. The ear drum can perceive both the frequency (pitch) and the magnitude (loudness) of the fluctuations to convert those waves to sound
Sound power level	The amount of sound energy an activity produces for a given operation. The sound power level is a constant value for a given activity. The sound power level is analogous to the power rating on a light globe (which remains constant), whereas the lighting level in a space (sound pressure level in this analogy) will be influenced by the distance from the globe, shielding and different locations within the space
Sound pressure level	The magnitude of sound (or noise) at a position. The sound pressure level can vary according to location relative to the noise source, and operational, meteorological and topographical influences. The terms Sound Pressure Level and Noise Level are used interchangeably in this assessment

Introduction

The Port Paterson Battery Energy Storage System including battery and inverter systems with a combined 270 Mega Watt (**MW**) / 1040 Mega Watt Hour (**MWh**) capacity is proposed at 420 Northern Power Station Road, Port Paterson, within the Port Augusta City Council area (the **BESS**). Figure 1 provides the BESS layout.

Figure 1 BESS Layout



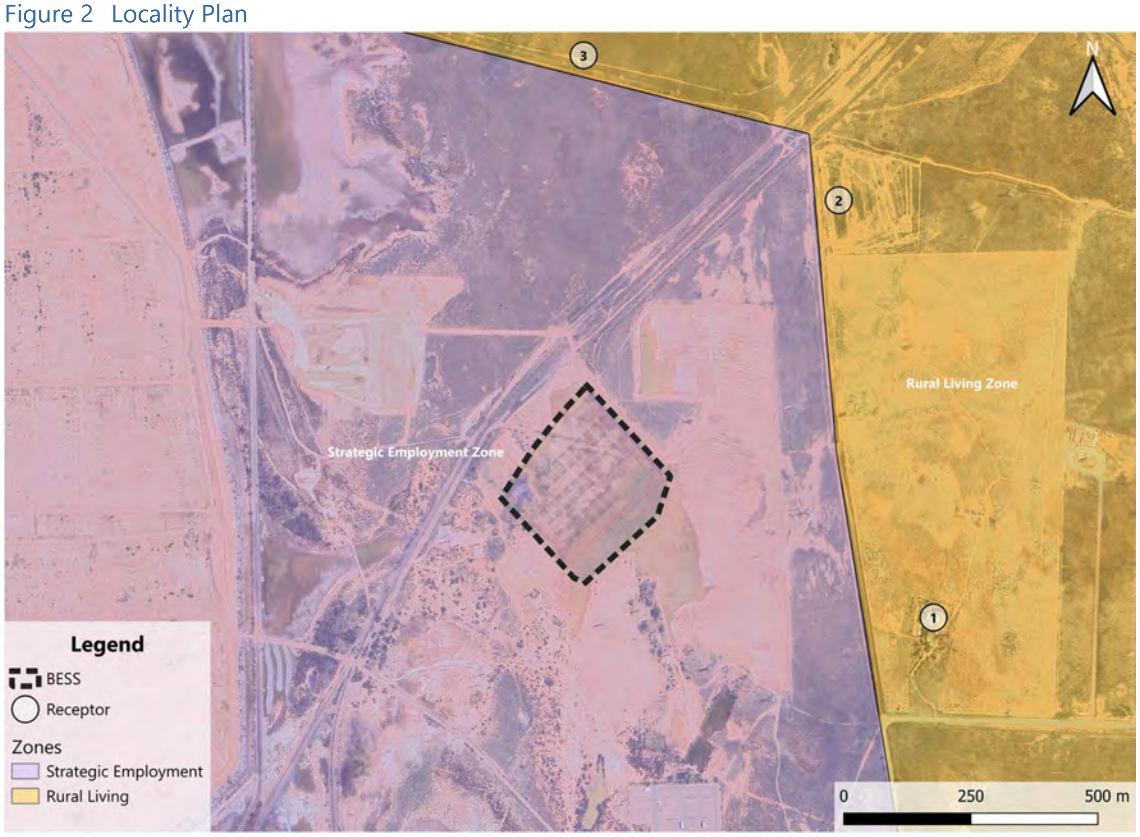
Source Plan SA – SA Property & Planning Atlas, and Green Gold Energy - Site Plan

This environmental impact assessment (the **assessment**) has been prepared to consider the operational noise from the BESS in accordance with the assessment pathway established by the *Hydrogen and Renewable Energy Act 2023* (the **HRE Act**). The assessment:

- identifies noise levels to objectively assess whether adverse effects on the environment are managed so as to reduce environmental damage as far as reasonably practicable (the **noise criteria**)
- identifies the potential environmental receptors, being the surrounding dwellings and vacant land principally allotted for future dwellings (the **receptors**)
- predicts the noise levels associated with the operation of the proposed batteries and inverters (the **candidate BESS**)
- develops noise control and management strategies (the **noise control measures**) to achieve the noise criteria.

The BESS is well located from an acoustic perspective in a Strategic Employment Zone of the *Planning and Design Code,* with a separation distance of more than 500m to the nearest receptors. Figure 2 provides the locality plan showing the BESS and receptors[1].

Figure 2 Locality Plan



Source Plan SA – SA Property & Planning Atlas, and Green Gold Energy - Site Plan

[1] Receptors 2 and 3 represent the closest vacant land principally allotted for future dwellings

Assessment Criteria

Hydrogen and Renewable Energy Act 2023

The *Hydrogen and Renewable Energy Act 2023* (the **HRE Act**) requires that adverse effects on the environment are managed so as to reduce environmental damage as far as reasonably practicable and that an environmental impact assessment be prepared to:

- take into account the environment
- take into account risks inherent to the health and safety of the public
- contain sufficient information to make possible an informed assessment of the likely impact on the environment
- include comparison against environmental impact assessment criteria.

The HRE Act and the *Hydrogen and Renewable Energy Regulations 2024* do not include objective environmental noise impact assessment criteria.

Environment Protection (Commercial and Industrial Noise) Policy 2023

Reference is made to the *Environment Protection (Commercial and Industrial Noise) Policy 2023* (the **Policy**) to provide objective environmental noise impact assessment criteria.

The Policy is an objective instrument under the *Environment Protection Act 1993* (the **EP Act**). The General Environmental Duty under the EP Act requires that a *person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm*.

The Policy provides an objective approach to satisfy the general environmental duty of the EP Act with reference to the land uses promoted by the *Planning and Design Code*.

With the objectives of the HRE Act being aligned with the EP Act, it is considered that by achieving the Policy at receptors, adverse effects on the environment will be managed to reduce environmental damage as far as reasonably practicable.

Noise Criteria

The Policy establishes indicative noise levels that apply at receptors for both the day (7.00am to 10.00pm) and night (10.00pm to 7.00am the following day).

For a new development, the noise levels which apply at:

- vacant land principally allotted for future dwellings are the indicative noise levels of the Policy
- existing dwellings are the indicative noise levels of the Policy minus 5 dB(A), in recognition of the increased sensitivity to a new noise source in the ambient environment.

In this circumstance, the Policy assigns the noise levels in Table 1 at the receptors identified in Figure 2 (the **noise criteria**) when assessing the continuous operating noise from the BESS. The noise criteria account for the BESS in a Strategic Employment Zone and receptors being located in a Rural Living Zone of the *Planning and Design Code Version 2025.17 dated 11 September 2025*.

Table 1 Noise Criteria

Receptor	Equivalent Noise Level (L_{Aeq})	
	Day	Night
1	51 dB(A)	43 dB(A)
2 and 3	56 dB(A)	48 dB(A)

The noise criteria apply over a default assessment period of 15 minutes.

For a noise source that operates during the day and night, the more onerous noise level during the night is often the most relevant to the assessment, however the day noise level can also be important if the operational noise from the BESS varies[2] at different times during the day and night.

It is noted that for an existing receptor in a Rural Living Zone, the Policy also assigns a maximum noise level criterion. For a noise source that generates a constant noise level related to the discharge rate of the batteries and the ambient temperatures experienced at the BESS, the instantaneous maximum noise level is not relevant and not considered further in this assessment.

When predicting noise levels for comparison to the Policy, the predicted equivalent noise levels are to be adjusted (increased) where the BESS exhibits “annoying” characteristics (dominant tonal, impulsive, low frequency content, intermittent or modulation characteristics) in comparison to the ambient environment.

[2] the operational noise can vary at different times during the day and night due to the discharge rate of the batteries and the ambient temperatures experienced at the BESS

Assessment

Noise Model

A three-dimensional noise model of the BESS has been developed based on the algorithm provided by the International Standard ISO 9613-2:2024 *"Acoustics - Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors"* (the **Standard**).

The Standard specifies a method for predicting noise levels at a distance from a source under meteorological conditions favourable to noise propagation, being downwind (wind blowing from the BESS to receptors) or temperature inversion conditions.

The noise model incorporates the following:

- the location of the BESS as detailed in Figure 2
- the locations of receptors as detailed in Figure 2.
- topographical ground contours
- favourable propagation conditions between the BESS and all receptors
- Noise modelling inputs detailed below:
    - Battery and Inverter systems for the BESS
    - 10°C temperature
    - 70% relative humidity
    - 50% acoustically hard ground and 50% acoustically soft ground.

Sound Power Levels

Battery and Inverter Systems

The noise from a BESS is predominantly associated with the systems used to control the temperature of the batteries and inverters.

The noise from the temperature control systems varies depending on the expected discharge rate of the batteries and the ambient temperatures experienced at the BESS.

The following proposed battery and inverter systems (the **candidate BESS**) have been used as the basis of this assessment:

- 52 Sungrow inverters (SC-6900UD-MV), each with a sound power level up to 100 dB(A)[3]
- 208 Sungrow batteries (ST5015UX_2H-UD), each with a sound power level up to 111 dB(A)[4].

[3] Sungrow SC3450UD Noise Test Report

[4] Sungrow PowerTitan 2.0 (2H-UD) Noise Test Report (V1), dated 21 March 2021

The above sound power levels are conservative as they represent operation at 100% capacity and without any specific noise control measures. In practice, the batteries and inverters can incorporate noise control measures and operate with temperature control systems at reduced operating capacity (especially during the night).

Predicted Noise Levels

Noise level predictions have been made using the noise model, inputs and assumptions detailed above and compared with the noise criteria.

The predicted noise level at each receptor is provided in Table 2 for the candidate BESS operation at 100% capacity and without any specific noise attenuation.

The noise levels in Table 2 include an (increase) of 5 dB(A) as the predictions indicate that a tonality noise characteristic will be present at receptors for the candidate BESS without any specific noise attenuation and/or reduction in operating capacity (**noise control measures**).

Table 2 Noise Predictions – No Noise Control Measures

Receptor	Predicted L_{Aeq} (dB(A))	
	Day	Night
Noise Criteria	51	43
1	69	
Noise Criteria	56	48
2	70	
3	68	

The predicted noise levels indicate the noise criteria will be exceeded without noise control measures.

Noise Control Measures

The noise predictions indicate that noise control measures would be required to achieve the noise criteria. The candidate BESS could reasonably include the following noise control measures available as standard equipment selections from the manufacturer:

- 52 Sungrow "noise attenuated" inverters (SC-6900UD-MV), each with a maximum sound power level of 86 dB(A)[5]
- 208 Sungrow "noise attenuated" batteries (ST5015UX_2H-UD), each with a maximum sound power level of 84 dB(A)[6].

The predicted noise level at each receptor is provided in Table 3 for the candidate BESS with above noise control measures incorporated.

[5] Sungrow SC3450UD Noise Test Report - Australian Noise Reduction Version (V1), dated 05 September 2025, based on 85% operating capacity

[6] Sungrow PowerTitan 2.0 (2H-UD) Noise Test Report - Noise Reduction Version (V1)

The noise levels in Table 3 do not include an adjustment for noise characteristics as the predictions indicate that noise characteristics will not be present, noting that tonality will not be a feature of the candidate BESS where noise control measures are incorporated.

Table 3 Noise Predictions – Noise Control Measures

Receptor	Predicted L_{Aeq} (dB(A))	
	Day	Night
Noise Criteria	**51**	**43**
1	38	
Noise Criteria	**56**	**48**
2	39	
3	37	

The predicted noise levels indicate the noise criteria can be easily achieved by the candidate BESS at all receptors with reasonable and practicable noise control measures incorporated, being the selection of "noise attenuated" inverters and batteries.

Where the noise criteria are achieved, then it is considered that adverse effects on the environment from the BESS are managed so as to reduce environmental damage as far as reasonably practicable in accordance with the HRE Act.

Uncertainty

The three-dimensional noise model of the BESS has been developed based on the algorithm provided by the Standard. The Standard states an estimated accuracy (uncertainty) of ±3dB(A) at distances of 1000m under meteorological conditions favourable for noise propagation. There will also be inherent uncertainty in the candidate's battery and inverter system noise data.

The assessment reduces uncertainty by using noise data that is representative of the highest likely operating noise levels in combination with the input assumption of 50% acoustically hard ground and 50% acoustically soft ground (which is a conservative assumption for a rural environment particularly over the large separation distances involved for the BESS).

The conservative inputs result in the predicted noise levels representing the highest likely noise level that is expected to occur in practice.

Based on the above, the noise modelling approach means any adjustment for uncertainty would typically result in lower noise levels at the receptors than presented in this assessment.

Statement of Environmental Objectives

The environmental objective established by this assessment is to achieve the noise criteria of the Policy at receptors, and in so doing, to ensure adverse effects on the environment will be managed to reduce environmental damage as far as reasonably practicable.

The Policy establishes noise criteria to be achieved when accounting for the presence of characteristics (dominant tonal, impulsive, low frequency content, intermittent or modulation characteristics) in comparison to the ambient environment in accordance with the Policy.

This assessment indicates that compliance with the noise criteria of the Policy can be achieved at all receptors subject to the BESS incorporating reasonable and practicable noise control measures available from the manufacturer of the candidate BESS.

The BESS will easily satisfy the noise criteria and the environmental objectives where:

- each of the 52 inverters achieve a maximum sound power level of 86 dB(A)
- each of the 208 batteries achieve a maximum sound power level of 84 dB(A)
- the BESS is designed and operated such that it does not generate dominant noise characteristics at the receptors.

Alternatively, a final noise assessment which accounts for the noise levels from the procured battery and inverter systems could be made to ensure the BESS satisfies the noise criteria and the environmental objectives.

Conclusion

This assessment has been made to consider the noise from the BESS proposed at 420 Northern Power Station Road, Port Paterson.

The environmental objective of the assessment is to achieve the noise criteria of the *Environment Protection (Commercial and Industrial Noise) Policy 2023* at environmental receptors, and in so doing, to ensure adverse effects on the environment will be managed to reduce environmental damage as far as reasonably practicable.

The assessment determines the noise from the operation of the BESS can achieve the requirements of the *Environment Protection (Commercial and Industrial Noise) Policy 2023* and the *Hydrogen and Renewable Energy Act 2023* at all environmental receptors subject to the incorporation of reasonable and practicable noise control measures available from the manufacturer of the candidate BESS, including:

- Ensuring each of the 52 inverters achieve a maximum sound power level of 86 dB(A)
- Ensuring each of the 208 batteries achieve a maximum sound power level of 84 dB(A)
- Ensuring the BESS is designed and operated such that it does not generate dominant noise characteristics at the receptors.

Alternatively, a final noise assessment which accounts for the noise levels from the procured battery and inverter systems could be made to ensure the BESS satisfies the noise criteria and the environmental objectives.

References

Environment Protection Act 1993, Government of South Australia

Environment Protection (Commercial and Industrial Noise) Policy 2023, South Australian Environment Protection Authority

Guidelines For the Use of the Environment Protection (Commercial and Industrial Noise) Policy 2023, South Australian Environment Protection Authority

Green Gold Energy - Site Plan - 420 Northern Power Station Road, Port Paterson SA, Rev F, dated 29 September 2025

Hydrogen and Renewable Energy Act 2023, Government of South Australia

Hydrogen and Renewable Energy Regulations 2024, Government of South Australia

International Standard ISO 9613-2:2024 *"Acoustics - Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors"*

Planning and Design Code Version 2025.17 dated 11 September 2025, PlanSA

Sungrow PowerTitan 2.0 (2H-UD) Noise Test Report - Noise Reduction Version (V1)

Sungrow PowerTitan 2.0 (2H-UD) Noise Test Report (V1), dated 21 March 2021

Sungrow SC3450UD Noise Test Report

Sungrow SC3450UD Noise Test Report - Australian Noise Reduction Version (V1), dated 05 September 2025

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echo

Acoustic Consulting

Attachment F

Stormwater Management Strategy by WGA

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977

Davenport BESS Pty Ltd

Port Paterson Battery Energy Storage System

STORMWATER MANAGEMENT STRATEGY

WGA251654

WGA251654-RP-CV-0001_B

8 October 2025

Revision History

REV	DATE	ISSUE	ORIGINATOR	CHECKER	APPROVER
A	18/09/2025	DRAFT	GR	XT	XT
B	08/10/2025	Issue for Approval	GR	XT	OO

CONTENTS

Figures

Tables

Appendices

1 INTRODUCTION

Wallbridge Gilbert Aztec (WGA) was engaged by Green Gold Energy on behalf to the Davenport BESS Pty Ltd ATF Davenport BESS 2 Trust to prepare a stormwater management strategy and surface water assessment for the proposed Port Paterson battery energy storage system (BESS) at 420 Northen Power Station Road, Port Paterson, refer to Appendix A for site plan.

The Development site as depicted in Figure 1 is approximately 5.4 hectares in area and is located approximately 5km southeast of Port Augusta. The site is located northwest of Port Paterson Road and east of Northern Power Station Road.

This report provides a high-level stormwater management strategy for the site.

Figure 1: Locality Plan

2 CATCHMENT OVERVIEW

2.1 Existing Site Conditions

The assessment of site conditions is based on desktop review of aerial imagery and publicly available information. A site visit has not been undertaken.

The site covers 5.4 hectares of vacant land with some shrubs and vegetation visible. There is a 132 kV electrical transmission line that traverses the site in the southwestern corner and a 33 kV transmission line northwest of the site.

Available Digital Elevation Models obtained from ELVIS have been used to develop 1 m contours across the site. Review of the contours shows that the general grade of the site is from northwest to southeast at a slope of less than 0.5%. There are no visible major flow paths within the site.

The site is in an area which has previously been the subject of flood mapping (Water Technology, 2020). Review of the available flood mapping for the 1% annual exceedance probability (AEP) event indicates that the site is in an area which is subject to shallow flooding (refer Figure 2). The maps indicate that while there are areas of inundation around the site, there is likely to be minimal inundation within the site boundary in a 1% AEP event.

While the results of the previous flood study provide a useful guide as to the potential inundation levels and associated flood risk, it is recommended that independent, project specific flood modelling be carried out in detailed design. The potential impacts of climate change on flooding should also be considered. The full 1% AEP Water Technology flood maps have been provided in Appendix D.

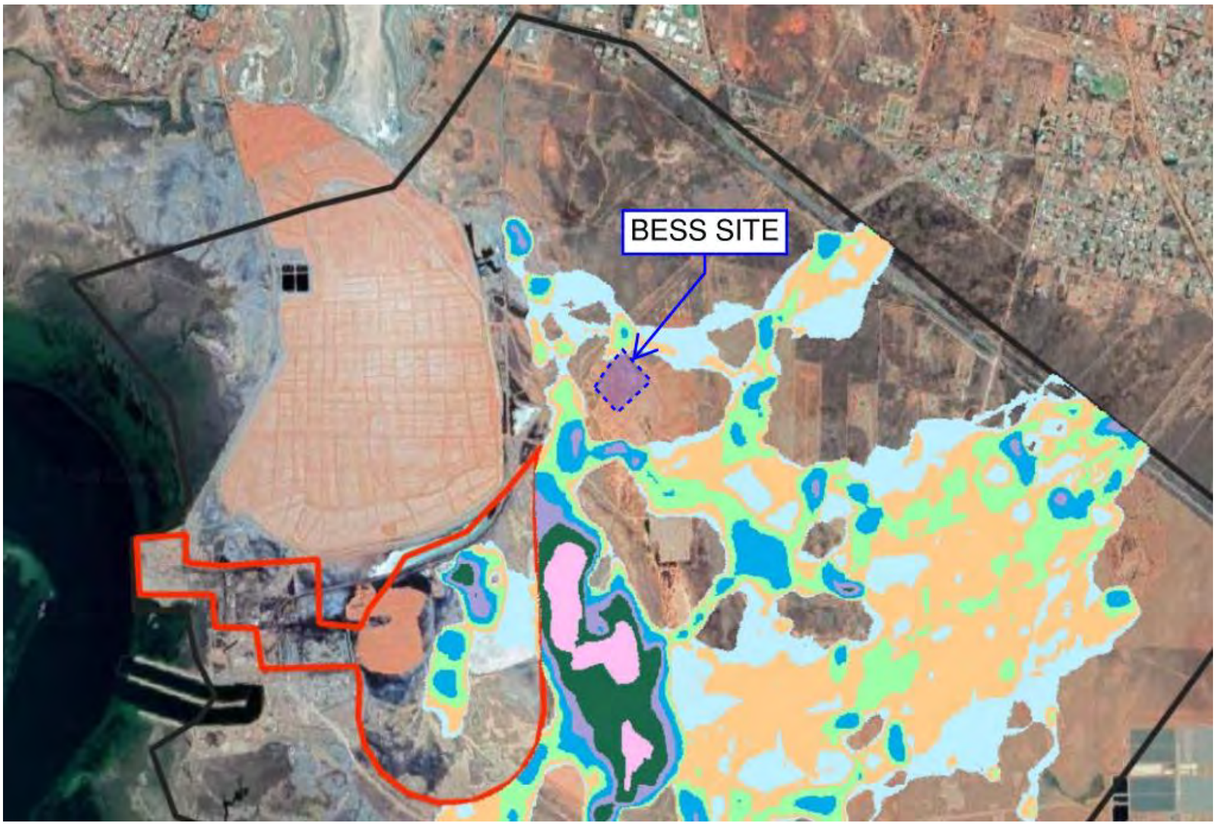


Figure 2: Water Technology 1% AEP Flood Inundation Map, Site Outline in Blue

2.2 Proposed Development and Design Requirements

The development will introduce impervious areas onto the site. A review of plans for the proposed development was undertaken to identify the impervious catchment areas, which include the substation (6750 m^2), batteries with associated inverters (5500 m^2) and a laydown area (1180 m^2). No further impervious areas are proposed for the site, and all undisturbed areas will remain as existing.

In lieu of development-specific stormwater management standards for this type of development, WGA has recommended industry best practice design standards to develop the stormwater management strategy. These are summarised below:

- Protect the site from upstream runoff;
- Control excess runoff to ensure it does not impact downstream properties and assets;
- Manage stormwater discharge from the site to allow it to be dispersed overland; and
- Manage runoff within the site to ensure that erosion is minimised.
- Manage water quality to meet EPA SA pollutant reduction targets:
  - Total Gross Pollutants (kg/yr) 100%
  - Total Suspended Solids removed (kg/yr) 80%
  - Total Phosphorus removed (kg/yr) 60%
  - Total Nitrogen removed (kg/yr) 40%

2.3 References

- Australian Rainfall and Runoff (2019);
- EPA Environment Protection Act (1993);
- Surface Water Management Assessment - Port Augusta Operations, Doc number 20030027, Water Technology (2020).

3 STORMWATER MANAGEMENT STRATEGY

3.1 Stormwater Management Approach

The development will increase the volumes and rates of runoff from the site through the introduction of impervious elements. The stormwater management approach is based on providing a detention basin to capture and control site flows up to the 1% AEP event. It is proposed that the site be graded to direct stormwater north-west in the direction of the proposed detention basin. A swale along the western boundary is proposed to intercept site flows and direct them to the basin. The swale and basin will provide detention storage and assist in preventing any concentrated discharge from the site. The swales have been sized to convey the 1% AEP flow and are shown indicatively in Appendix B.

Formal basin design, discharge outlets and erosion controls are to be confirmed at detailed design. Discharge from the site will continue along the natural flow path westerly towards Spencer Gulf. A bund has been proposed along the northeastern boundary to prevent flood flows or any upstream surface water from entering the site. Refer Appendix B for stormwater management plan layout.

3.1.1 Detention Assessment

Four methods have been used to determine indicative detention volumes. These include using DRAINS modelling, the rational method and volume calculations to give a guide of required detention volume. The runoff coefficients used for the existing site condition is 0.1, while the post-development coefficient of runoff used was 0.4. Results of these calculations are provided in Table 1 and further details of these calculations are provided in Appendix C.

Table 1: Detention Basin Sizing Summary

METHOD	BASIN VOLUME (m^2)
Rational Method *(1% AEP)*	610 m^3
Volumetric Runoff *(1% AEP, 1.5 hr duration)*	1250 m^3
Volumetric Runoff *(10% AEP, 24 hr duration)*	1320 m^3
DRAINS modelling *(1% AEP)*	500 m^3

For the purpose of this high-level strategy, a conservative approach has been adopted with a detention basin volume of 1320 m^3 proposed. The stormwater management plan in Appendix B depicts the approximate detention basin footprint and recommended location. The required basin volume should be confirmed during detailed design, with design to ensure post-development flows from the site do not exceed pre-development peak flows. The detailed design will also need to consider safety in design and measures at the outlet to disperse flows to minimise risks of erosion.

3.2 Overflow and Erosion Protection

The detention basin overflow and erosion protection elements are to be considered at detailed design.

3.3 Water Quality

All site flows will be intercepted by the western boundary swale and diverted to the detention basin. The detention basin will allow settlement of most site pollutants and any sediment.

A preliminary water quality assessment has been undertaken using the program MUSIC to confirm the pollutant reductions from the site can meet EPA standards. A screenshot of the MUSIC model is shown in Figure 3, below and the results are presented in Table 2. The results demonstrate that the GP, TSS TP and TN reductions will meet the required performance criteria.

It is assumed that measures to manage the risks associated with oily water will be developed separately during detailed design.

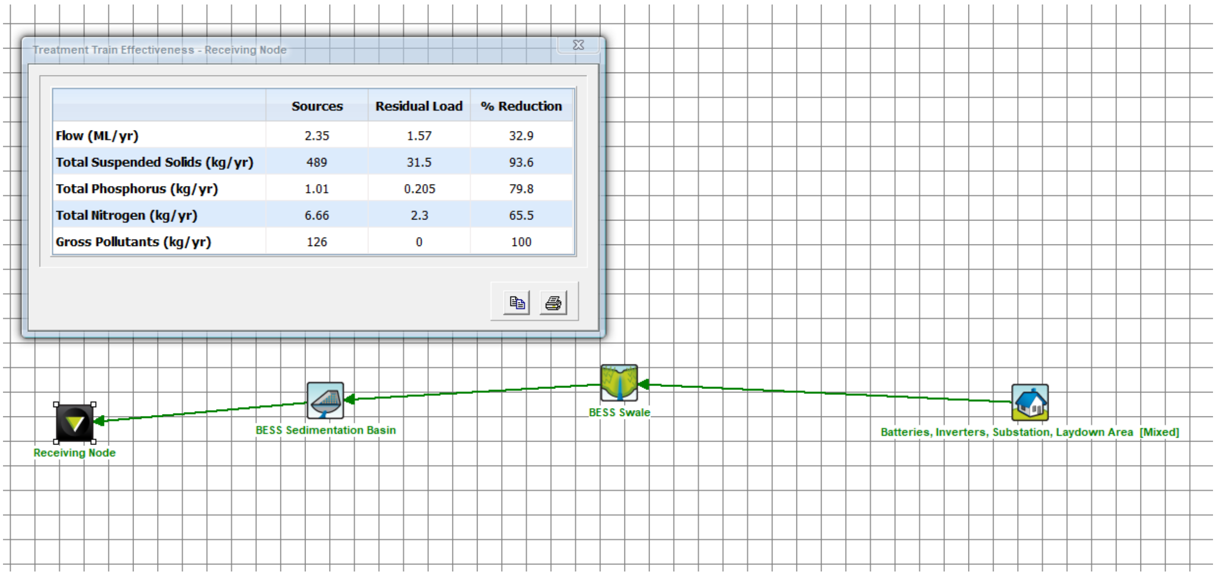


Figure 3: MUSIC Model Layout

Table 2: Water Quality Results Compared to WSUD 2013 Targets

POLLUTANT TYPE	TSS	TP	TN	GROSS POLLUTANTS
Target Percentage Reduction	80%	60%	40%	100%
Resultant Percentage Reduction	94%	80%	65%	100%

3.4 Management of External Catchment Flows

The existing flood mapping shows areas of shallow inundation around the site. The flood mapping shows a flow path near the site boundary. There is noticeable ponding to the north of the site.

Based on these observations, it is recommended that finished floor levels of critical infrastructure are set at a minimum of 300mm above the current surface level. It is also recommended that the design includes localised earthworks on the northern edges of the site to ensure that the flows from the external catchment do not enter the site. Given the nature of the external flow paths, this is not expected to impact flooding on adjacent properties.

Impacts of inundation on access to the site in a major storm event will also need to be investigated during detailed design.

4 SUMMARY

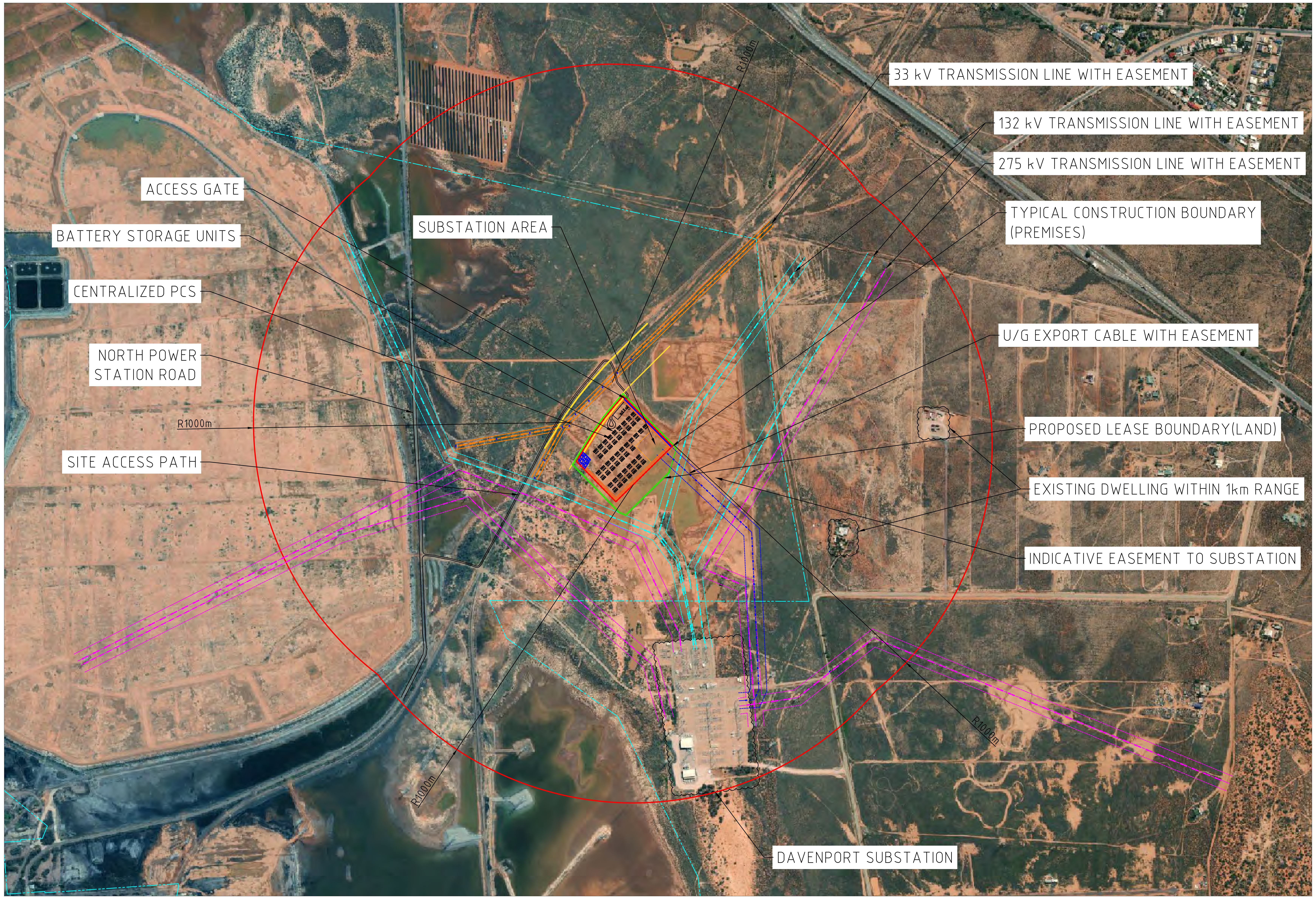
This document provides a high-level stormwater management strategy for the proposed BESS site at 420 Northen Power Station Road. It also identifies additional detailed design works required.

The key components of the strategy are:

- All site stormwater will be directed towards a swale along the western boundary. The flows will then be discharged to a detention basin which will limit peak flows to pre-development flow rates. The approximate detention storage volume required for the development site to be 1320 m^3.
- The swale and detention basin will provide the required water quality treatment for runoff from the site.
- Localised earthworks in the northern section of the site will prevent external catchment runoff from entering the site.
- Finished floor levels of critical infrastructure should be a minimum of 300 mm above the surface level for flood protection.

During detailed design it is recommended that flood modelling, including consideration of climate change be undertaken. The design of the stormwater management elements will also need to be refined to ensure that they can meet the overarching objectives of this strategy.

APPENDIX A
LOCALITY PLAN



LOCALITY PLAN

0 125 250 375 500 METRES

NOTES

1. ACTUAL DIMENSIONS AND CLEARANCES MAY VARY SUBJECT TO SITE CONDITIONS.
2. THE NUMBER OF BATTERY CONTAINERS IS SUBJECT TO FINAL EPC DECISION.
3. DETAILS OF SUBSTATION AREA REFER TO TYPICAL SUBSTATION LAYOUT PLAN.
4. SITE ACCESS TO BE INSPECTED AND PAVED APPROPRIATELY TO ALLOW HEAVY TRUCK DELIVERY. DETAILS OF ACCESS REFER TO TRAFFIC IMPACT ASSESSMENT

LEGEND

- SCREEN VEGETATION
- 2.1m CHAINMESH SECURITY FENCE IN SILVER FINISH
- 275kV TRANSMISSION LINE WITH EASEMENT
- 132kV TRANSMISSION LINE WITH EASEMENT
- 33kV OVERHEAD LINE WITH EASEMENT
- TYPICAL INVERTER & BATTERY COMPLEX UNIT
- PROPOSED LEASE BOUNDARY (LAND)
- RAILWAY & 100m OFFSET
- PROPOSED UNDERGROUND CABLE

SITE SPECIFICATIONS		
FENCE	927	m
SITE AREA WITHIN FENCE	5.4	Ha
INTERNAL ROAD	TBD	m
SITE LAY DOWN	1176	m^2
SUBSTATION	6751	m^2
LEASED AREA	7	Ha

FOR INFORMATION

No	DATE	DRN	CHK	ENG	Q.A.	PROJECT	DESCRIPTION
F	29/09/25	D.S.	ACE	D.S.	ACE		UPDATE DETAILS
E	11/09/25	D.S.	ACE	D.S.	ACE		UPDATE CABLES
D	26/08/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
C	25/08/25	M.G.	ACE	M.G.	ACE		ADD SITE TRACK
B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
A	27/05/25	D.S.	ACE	D.S.	ACE		DRAFT SITE PLAN

REVISION

GREEN GOLD ENERGY

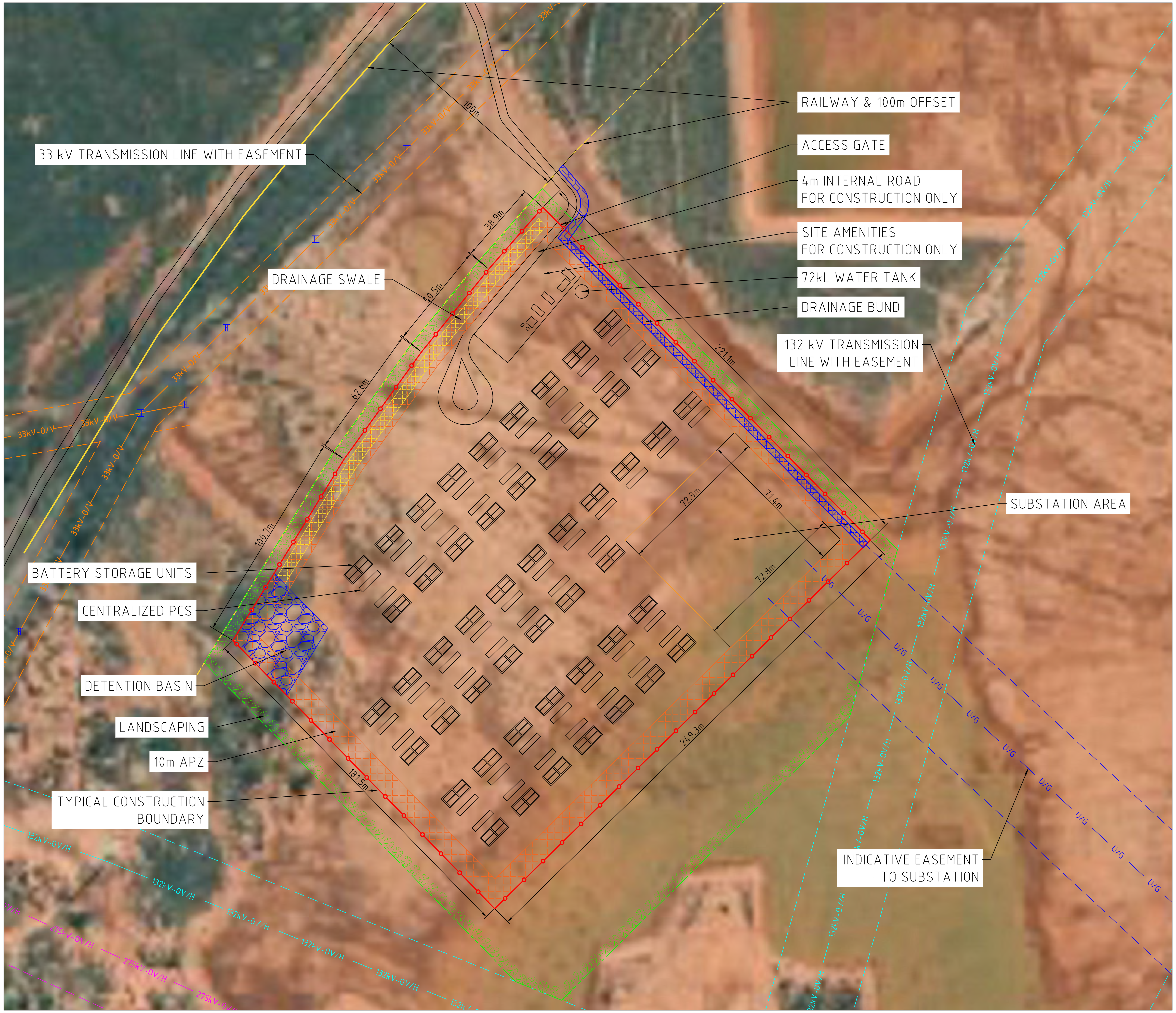
DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
LOCALITY PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD. SCALE: NTS

PROJ No DRG No REV F

AUTOCAD A1SHEET

APPENDIX B
STORMWATER MANAGEMENT STRATEGY



0 25 50 75 100
METRES

ENLARGED SITE LAYOUT

N

BATTERY STORAGE SYSTEM SPECIFICATIONS				
AC	270	MW		
NUMBER OF INVERTERS	52	-	INVERTER MODEL	SG-6900UD-MV
NUMBER OF BATTERIES	208	-	BATTERY MODEL	ST5015UX
BATTERY CAPACITY	1043.1	MWh		

SITE SPECIFICATIONS		
FENCE	901	m
FENCED AREA	5.1	Ha
LEASED AREA	7.0	m
SUBSTATION AREA	5200	m^2

NOTES

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B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
A	27/05/25	D.S.	ACE	D.S.	ACE		DRAFT SITE PLAN

REVISION

GREEN GOLD ENERGY

DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
SITE PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD.

SCALE: NTS

PROJ No | DRG No | REV F

AUTOCAD

A1SHEET

APPENDIX C
CALCULATIONS

Rational Method

Pre-Development

Region	Runoff Coefficient	Area	C x A	C weighted average		C	I	I	Q	Q
		m2	m2				mm/hr	m/s	m3/s	l/s
Undeveloped	0.1	53,769	5,377	1.000	1 in 100	0.12	93.6	2.6E-05	0.17	167.81
		53,769	**5,377**	**0.100**	**fraction impervious**	-				

Time of Concentration - Kinematic Wave

L	280	m
n	0.035	grass
S	0.0036	m/m

1 in 100		
I	93.63	mm/hr
tc	24.1	mins
	0.0	
tc	24.1	mins
1 in 100	93.6	mm/hr

Post-Development

Region	Runoff Coefficient	Area	C x A	C weighted average		C	I	I	Q	Q
		m2	m2				mm/hr	m/s	m3/s	l/s
Undeveloped	0.1	40,319	4,032	0.750	1 in 100	0.36	110.2	3.06E-05	0.6	592.93
Batteries & Inverters	0.9	5,500	4,950	0.102						
Laydown	0.9	1,200	1,080	0.022						
Substation	0.9	6,750	6,075	0.126						
		53,769	**16,137**	**0.300**	**fraction impervious**	-				

Time of Concentration - Kinematic Wave

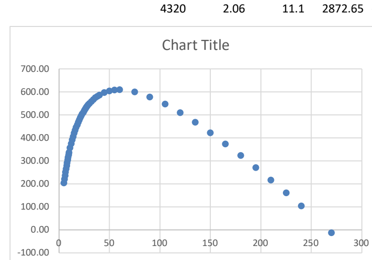
L	280	m
n	0.025	*average of grass and pavement*
S	0.0036	m/m

1 in 100		
I	110.23	mm/hr
tc	18.4	mins
	0.0	
tc	18.4	mins
1 in 100	110.2	mm/hr

Detention Assessment - Post Development

Area	53,769	m^2
Coeff Permeability	0.36	
Time of conc.	18.4	min
ARI Storm	100	year
Max Outflow (Pre)	167.81	l/sec
1 in 100 year pre development peak flow		
Max Storage Required	609	m3
Basin Footprint		

Duration	Intensity ARI event	Inflow rate	Inflow Vol Vi	Max Storage
min	mm/hr	l/sec	m3	Smax m3
5	199.23	1071.7	321.50	203.70
5.5	192.08	1033.2	340.94	220.63
6	185.57	998.2	359.35	236.52
6.5	179.63	966.2	376.83	251.48
7	174.17	936.8	393.48	265.61
7.5	169.12	909.7	409.37	278.98
8	164.44	884.5	424.58	291.67
8.5	160.08	861.1	439.15	303.73
9	156.01	839.2	453.16	315.22
9.5	152.19	818.6	466.63	326.17
10	148.60	799.3	479.60	336.63
11	142.03	764.0	504.21	356.21
12	136.13	732.2	527.22	374.18
13	130.81	703.6	548.81	390.74
14	125.97	677.6	569.16	406.05
15	121.54	653.8	588.38	420.23
16	117.47	631.9	606.59	433.41
17	113.71	611.7	623.89	445.68
18	110.23	592.9	640.36	457.12
19	106.99	575.5	656.07	467.79
20	103.97	559.2	671.09	477.78
21	101.14	544.0	685.46	487.12
22	98.48	529.7	699.25	495.86
23	95.98	516.3	712.48	504.06
24	93.63	503.6	725.21	511.76
25	91.40	491.6	737.46	518.97
26	89.29	480.3	749.26	525.74
27	87.29	469.5	760.66	532.10
28	85.39	459.3	771.66	538.07
29	83.58	449.6	782.30	543.68
30	81.86	440.3	792.60	548.94
32	78.65	423.0	812.23	558.51
34	75.70	407.2	830.71	566.92
36	73.00	392.7	848.16	574.29
38	70.50	379.2	864.66	580.73
40	68.19	366.8	880.32	586.32
45	63.09	339.3	916.22	597.05
50	58.76	316.1	948.24	603.90
55	55.04	296.1	977.07	607.56
60	51.81	278.7	1003.26	608.58
75	44.19	237.7	1069.74	599.55
90	38.67	208.0	1123.25	577.54
105	34.47	185.4	1167.94	546.71
120	31.15	167.5	1206.29	509.56
135	28.46	153.1	1239.92	467.67
150	26.23	141.1	1269.92	422.16
165	24.36	131.0	1297.04	373.77
180	22.75	122.4	1321.85	323.06
195	21.37	114.9	1344.75	270.44
210	20.16	108.4	1366.06	216.24
225	19.09	102.7	1386.03	160.70
240	18.14	97.6	1404.86	104.02
270	16.52	88.9	1439.68	-12.19
300	15.20	81.7	1471.46	-131.43
360	13.15	70.8	1528.30	-376.65
420	11.65	62.6	1578.69	-628.31
480	10.49	56.4	1624.49	-884.56
540	9.56	51.4	1666.84	-1144.27
600	8.81	47.4	1706.47	-1406.69
660	8.19	44.0	1743.91	-1671.30
720	7.66	41.2	1779.51	-1937.76
840	6.81	36.6	1846.21	-2475.17
960	6.16	33.1	1908.06	-3017.42
1080	5.64	30.3	1966.00	-3563.58
1200	5.22	28.1	2020.67	-4113.03
1320	4.86	26.2	2072.50	-4665.30
1440	4.57	24.6	2121.83	-5220.07
1800	3.89	20.9	2257.16	-6897.07
2160	3.41	18.3	2376.73	-8589.81
2520	3.05	16.4	2483.33	-10295.53
2880	2.77	14.9	2578.82	-12012.36
3240	2.55	13.7	2664.55	-13738.95
3600	2.36	12.7	2741.56	-15474.26
3960	2.20	11.8	2810.69	-17217.45
4320	2.06	11.1	2872.65	-18967.81



Volumetric Basin Calculations

1% AEP 1.5 hour strom event

Region	Duration (Hrs)	Area	C	I	I	Q	Volume
		m2		*mm/hr*	*m/s*	*m3/s*	*m3*
BESS Site	1.5	53,769	0.40	38.70	**1.08E-05**	**0.23**	**1,249**

10% AEP 24 hour strom event

Region	Duration (Hrs)	Area	C	I	I	Q	Volume
		m2		*mm/hr*	*m/s*	*m3/s*	*m3*
BESS Site	24.0	53,769	0.40	2.55	**7.08E-07**	**0.02**	**1,316**

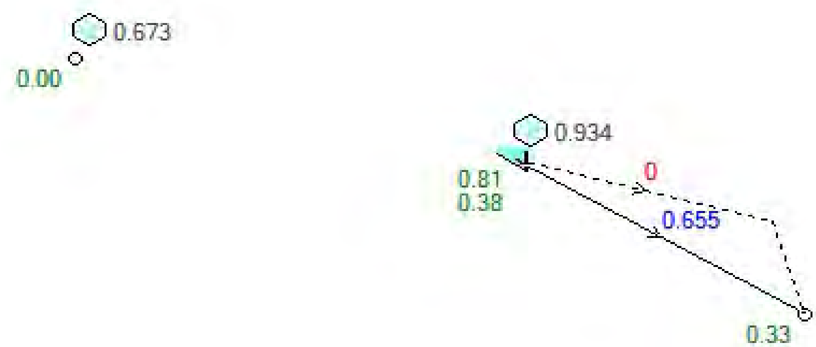
DRAINS

inputs

		Area (%)	Time of Concentration (min)
Pre development	Pervious	100%	36
	Impervious	0%	-
Post development	Pervious	60%	36
	Impervious	40%	16

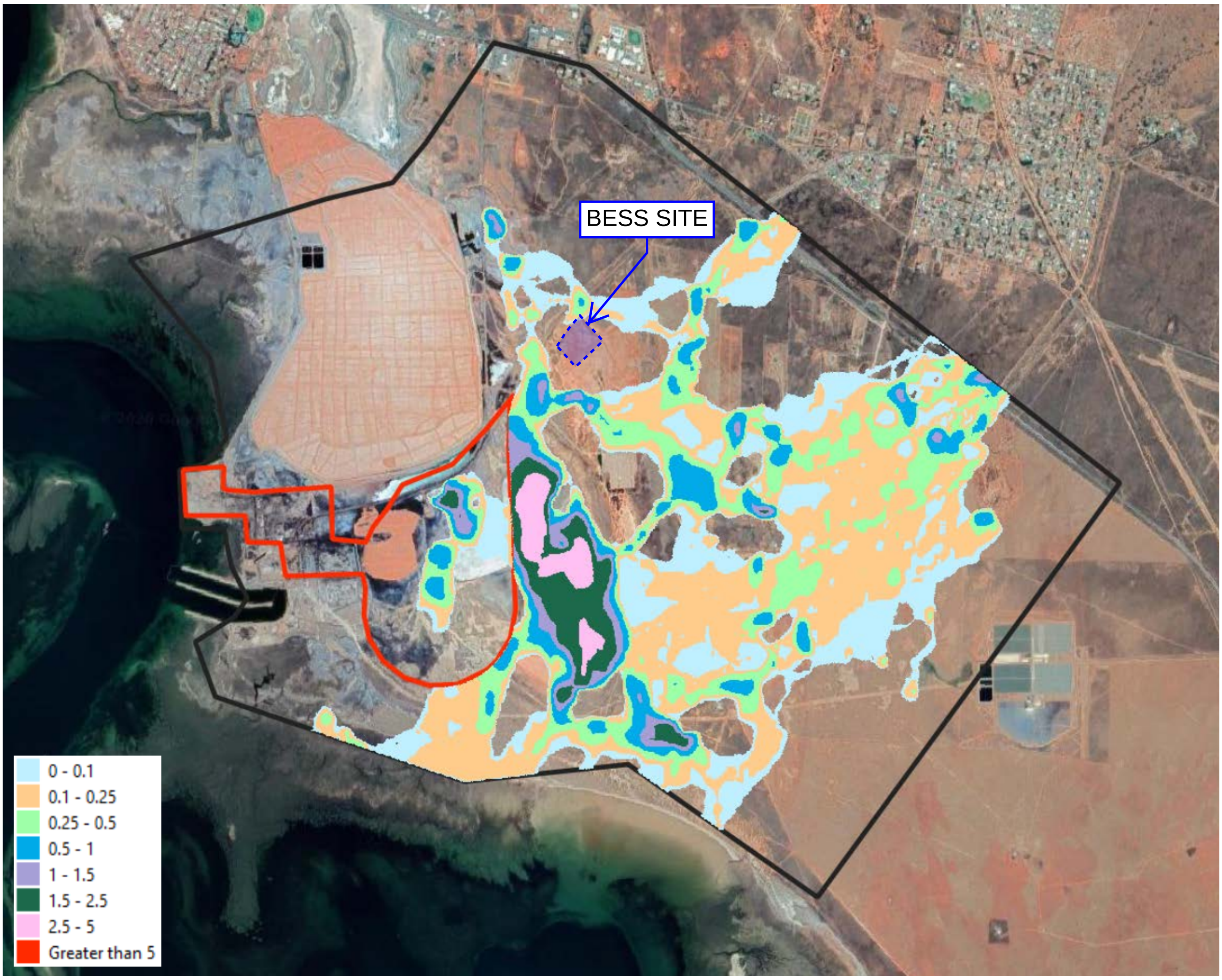
results

	Flow (m^3/s)	Basin Volume (m^3)
Pre development	0.673	-
Post development	0.934	460



APPENDIX D
FLOOD MAP

FLOOD INUNDATION MAP - 1% AEP EVENT



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Attachment G

A Preliminary Site Investigation (PSI) by Gama Environmental

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977

Preliminary Site Investigation

Northern Battery Project

Portion of 420 Northern Power Station Road, Port Paterson

Prepared For

Green Gold Energy

Gama References

Job # 251008E
Doc # 2025.11.19.251008E.REP.PSI.R1

19/11/2025

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Prepared For

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Job Title

Northern Battery Project

Site Address

Portion of 420 Northern Power Station Road, Port Paterson

Gama Job Number

251008E

Document Title

Preliminary Site Investigation

Document Number

2025.11.19.251008E.REP.PSI.R1

Revision History

Rev No.	Revision Date	Details of Revision	Authorised By Name / Position	Signature
-	11/11/2025	Final – report sent to client	Mark Vial Principal Environmental Scientist	
R1	19/11/2025	Updated report as per clients' comments		

Limitations

This report has been prepared by Gama Environmental Pty Ltd (Gama) exclusively for the Client's designated purposes, as described in this document. It is intended for use only by the Client or relevant statutory authorities, within two (2) years of its issue date. Gama has conducted this work with the standard level of professional care, skill, and diligence expected in our industry and locality as of the date services were provided, without any additional warranties or guarantees, express or implied.

The conclusions, opinions, and recommendations herein are based on specific data and observations gathered during this engagement, which may not represent all possible site conditions. Gama does not assume responsibility for any changes in conditions, unobserved variables, or future legislative changes that may affect the ongoing relevance of this report.

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Executive Summary

Gama Environmental Pty Ltd (Gama) was engaged by Green Gold Energy to undertake a Preliminary Site Investigation (PSI) in relation to a Northern Battery Project at the site located at Portion of 420 Northern Power Station Road, Port Paterson.

The main objectives of a PSI are to:

- Establish whether any potentially contaminating activities (PCAs) have been undertaken on-site, or within the immediate surroundings (no more than 60 m), which may have resulted in site contamination that poses an unacceptable risk to current and/or future receptors;
- Where PCAs are identified, determine the relevant chemicals of potential concern (COPC), areas of interest and potentially impacted media; and
- Determine whether site contamination exists, may exist or is unlikely to exist at the site.

Based on all the site history searches, site inspection and anecdotal information, *there are no PCAs* within the specific development area or within 60m.

However, on the greater overall area the historical contamination at the former Port Augusta Power Station is located approximately 1.6-1.8km to the south-west from the proposed development area, with impacts largely confined to local soils and shallow groundwater.

The closest known investigation area was approximately 450m to the west and did not identify any results above NEPM health guidelines

Given the distance, the hydraulic gradient, and the low-intensity nature of the BESS development, it is considered highly unlikely that any off-site contamination would pose a risk to human health or the environment at the development site.

As the proposed development involves the construction of an energy storage facility, a low-intensity land use with minimal soil disturbance and no chemical or waste generation that could interact with off-site contamination. As such, the potential for exposure to humans or the environment is **negligible**, and any historical contamination at the former power station is not expected to pose a risk to the proposed development site.

Therefore, site contamination at the specific development site is considered *unlikely and a low risk* to the future development and environment.

This report should be read in conjunction with limitations on **Page 2**.

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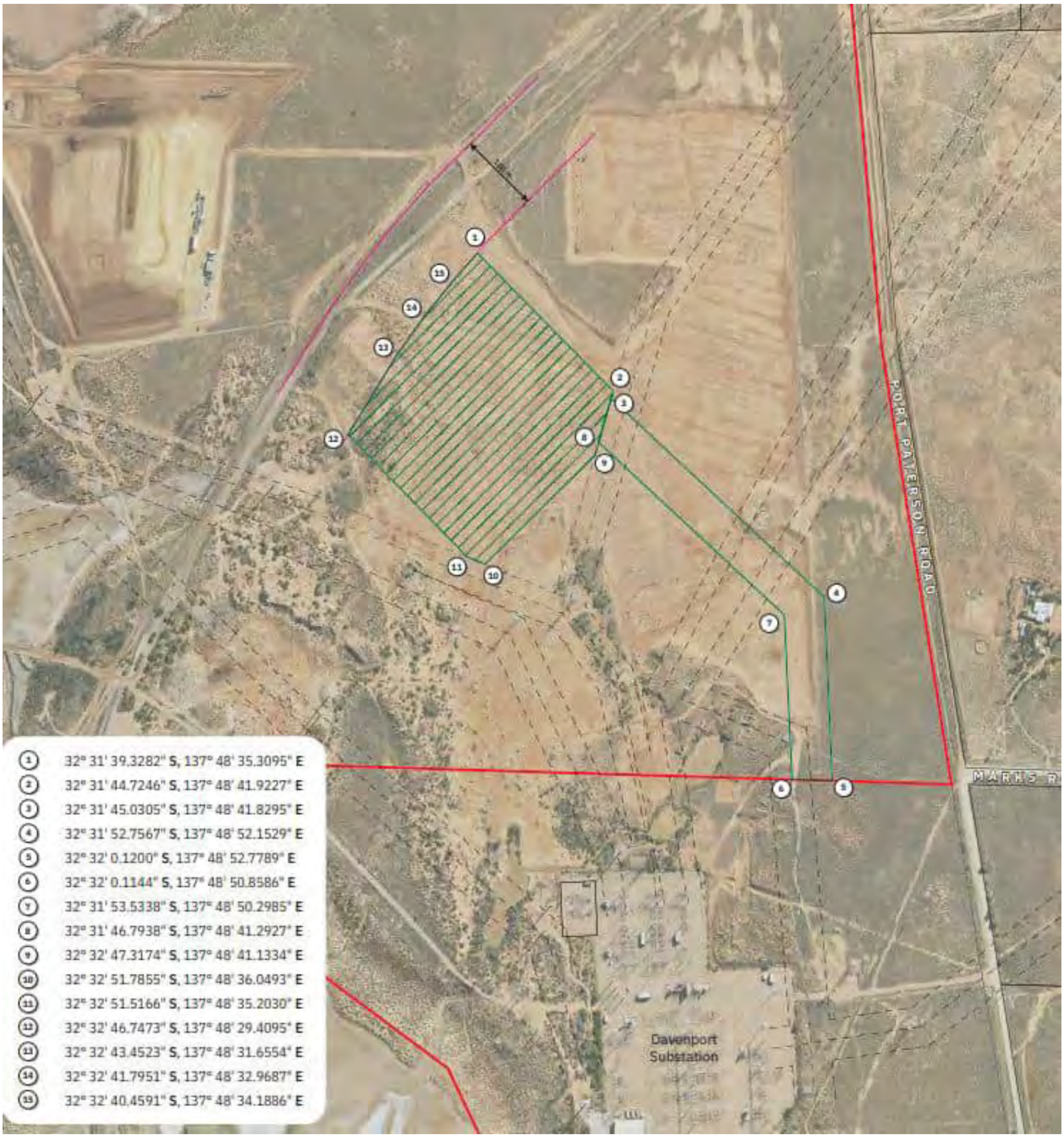
1. Introduction

1.1. General

Gama Environmental Pty Ltd (Gama) was engaged by Green Gold Energy to undertake a Preliminary Site Investigation (PSI) in relation to the Northern Battery Project at the site located at Portion of 420 Northern Power Station Road, Port Paterson, as shown **in the Figure 1-1** below and in **Figure 1 & 2, Appendix A.**

Figure 1-1: Site Plan from the Associated Infrastructure Licence (Masterplan October 2025)



It is understood that site will be used for a Battery Energy Storage System (BESS) facility and requires a PSI in conjunction with Associated Infrastructure Licence (AIL) the prior to development can commence. The AIL is provided in **Appendix I**.

1.2. Objectives

As stated in the State Planning Commission, Practice Direction 14 (PD14), Site Contamination Assessment 2021, the objectives of this PSI are to:

- Establish whether any potentially contaminating activities (PCAs) have been undertaken on-site, or within the immediate surroundings (no more than 60 m), which may have resulted in site contamination that poses an unacceptable risk to current and/or future receptors;
- Where PCAs are identified, determine the relevant chemicals of potential concern (COPC), areas of interest and potentially impacted media; and
- Determine whether site contamination exists, may exist or is unlikely to exist at the site.

1.3. Previous Environmental Reports

Flinders Power Partnership commissioned environmental investigations regarding contaminating activity impacts related to the Port Augusta power station. A total of 7 environmental investigations and reports were completed and listed at 420 Northern Power Station Road below.

- Flinders Power Partnership Detailed Site Investigation – Version 2 (Coffey 2017)
- Flinders Power Partnership Augusta Power Stations Version 1 Phase 3 Plan (Coffey 2017)
- Flinders Power Partnership Augusta Power Stations Sampling, Analysis and Quality Plan - Phase 3 Version 1 (Coffey 2017)
- Flinders Power Partnership Augusta Power Stations Remediation Options Assessment Northern Store UST (Area 12, AEC 35) (Coffey, 2017)
- Flinders Power Partnership Augusta Power Stations Remediation Options Assessment Playford Fuel Oil Plume (Area 1, AEC 1) (Coffey, 2017)
- Flinders Power Partnership Augusta Power Stations Remediation Management Plan Area 8 - AEC 25 (Coffey, 2017)
- Flinders Power Partnership Augusta Power Stations 2017 Fieldworks Report (Coffey, 2017)

Provided in **Figure 1-2** is the specific area map and potential contaminating areas in relation to the Port Augusta Power Station.

Figure 1-2. Environmental Potential Contaminating Areas from the Port Augusta Power Station.

FIGURE 3A-3E	AREA 1	PLAYFORD A & B STATIONS
FIGURE 4	AREA 2	PLAYFORD B SWITCH YARD
FIGURE 5A-5B	AREA 3	PLAYFORD BUILDINGS
FIGURE 6	AREA 4	SAPN SWITCH YARD
FIGURE 7A-7B	AREA 5	STEEL LAYDOWN AREA
FIGURE 8A-8C	AREA 6	SPEL DRAIN OUTLETS
FIGURE 9A-9B	AREA 7	FUEL OIL STORAGE AREA
FIGURE 10A-10C	AREA 8	STORAGE & MAINTENANCE AREA
FIGURE 11A-11B	AREA 9	RECYCLING AREA
FIGURE 12A-12B	AREA 10	FORMER COAL LOADING AREA AND STOCKPILES
FIGURE 13A-13C	AREA 11	WASTEWATER, FUEL STORAGE & WASH DOWN AREA
FIGURE 14A-14E	AREA 12	NORTHERN STATION
FIGURE 15A-15B	AREA 13	NORTHERN STATION INFRASTRUCTURE
FIGURE 16A-16B	AREA 14	STEEL LAYDOWN AREA
FIGURE 17A-17F	AREA 15	COAL LOADING AREA
FIGURE 18A-18C	AREA 16	TRAIN UNLOADING AREA AND WASTE DUMPS
FIGURE 19A-19E	AREA 17	ASH POND
FIGURE 20A-20B	AREA 18	RAIL FILLING AREA

Conclusions from the investigations are as follows:

- With the exception of previously identified areas of historical fuel losses, there is no evidence of widespread soil or groundwater contamination across the site (Area 1 through 18).
- Isolated minor hydrocarbon impacts were detected in shallow soils within various areas within the power plant located approximately 1.6-1.8km to the south-west, however these are localised and unlikely to pose unacceptable risks to human health under current or future commercial/industrial land uses.

- Localised hydrocarbon impacts within the primary aquifer are consistent with historical contamination, and available data suggest that natural reduction processes are occurring. The secondary aquifer remains unaffected.
- Historical impacts associated with the Playford fuel oil loss and the coal loading area (Area 15 – located approx. 1.7km to the south-west) are limited to defined areas and would only pose potential dermal contact or inhalation risks if the ground surface is disturbed without appropriate management controls.
- Area 18 along the rail line did not identify any results above NEPM assessment criteria.
- Trace PFOS detections in groundwater and minor hydrocarbon impacts around historical infrastructure (fuel pad, wash down bay, and UST locations) located in Area 14 (approximately 1.8km to the south-west) are considered unlikely to present health risks given the absence of exposure pathways.
- The ash storage area (ash pond) nominated at Area 17 contains material within expected chemical ranges for bottom ash and has been effectively managed through dust suppression and planned revegetation, significantly reducing the potential for airborne particulate exposure. Previous short-term dust events have been linked to surface degradation, highlighting the importance of ongoing dust control. The main potential for contamination is defined as a waste dump for acid located near the southern boundary of this area (Shown in **Figure 1-3**). The closest point for defined Area 17 is approximately 450m to the west. The waste dump is located approximately 1.5km to the south-west. Due to the distance from the proposed development area and known as down hydraulic gradient it is considered a very low likelihood to impact the development area.

Figure 1-3. Location of the waste dump for acid – located approx. 1.5km to the south-west

Overall, potential risks to human health are considered **low** for the current and proposed land uses, provided appropriate environmental management measures are maintained during any intrusive works or site redevelopment activities.

It should be noted that the areas discussed in the investigations and reports above are located between approximately 450m through 1.5km to the west, south-west, with the higher risk potential contaminating activities associated with the Port Augusta Power Station at least 1.5km to the south-west. All of the investigated areas are considered downward hydraulic gradient, which would significantly reduce the potential for contamination to reach the site.

Therefore, the reports above are unlikely to have impacted the proposed site development.

2. Regulatory Framework

2.1. General

All assessment, management and remediation of site contamination within South Australia is regulated by the EP Act. Section 5B of the EP Act defines site contamination as follows:

1. For the purposes of this Act, site contamination exists at a site if —
    a. chemical substances are present on or below the surface of the site in concentrations above the background concentrations (if any); and
    b. the chemical substances have, at least in part, come to be present there as a result of an activity at the site or elsewhere; and
    c. the presence of the chemical substances in those concentrations has resulted in —
        i. actual or potential harm to the health or safety of human beings that is not trivial, taking into account current or proposed land uses; or
        ii. actual or potential harm to water that is not trivial; or
        iii. other actual or potential environmental harm that is not trivial, taking into account current or proposed land uses.
2. For the purposes of this Act, environmental harm is caused by the presence of chemical substances —
    a. whether the harm is a direct or indirect result of the presence of the chemical substances; and
    b. whether the harm results from the presence of the chemical substances alone or the combined effects of the presence of the chemical substances and other factors.
3. For the purposes of this Act, site contamination does not exist at a site if circumstances of a kind prescribed by regulation apply to the site.

The first stage in determining whether site contamination exists is to assess whether chemical substances have been added to the site through an activity, and whether these substances are above background concentrations. The second stage is to assess whether the chemical substances have resulted in actual or potential harm to the health or safety of human beings or the environment (including water) that is not trivial.

If site contamination is determined to be present at a site, the EP Act provides mechanisms to assign responsibility for the contamination and appropriate assessment and/or remediation of the contamination.

The professional assessment of site contamination and consequential risk to human health and the environment is guided by NEPC 1999, National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council (the ASC NEPM, as amended 2013), Australian Standards and numerous other guidelines and technical publications prepared by the EPA and other scientific organisations.

2.2. Hydrogen and Renewable Energy Act 2023 (HRE Act)

The HRE Act 2023 establishes the licensing regime for hydrogen and grid-scale renewable energy projects in South Australia and creates the Associated Infrastructure Licence category. The Act sets out licensing rules and that licences may be subject to environmental assessment requirements.

The HRE Regulations prescribe specific requirements for associated infrastructure licences, including what must be provided when applying (e.g. environmental impact materials) and the Minister's decision-making powers.

The Department for Energy and Mining (DEW / DEM) provides licensing guidance (licence types, application steps) and requires an Environmental Assessment or equivalent documentation to demonstrate how adverse environmental impacts will be managed. The Department's guidance and the HRE Act/Regulations together form the practical compliance pathway.

The HRE regime also establishes a public register and requires early consultation with rights-holders and the community; environmental documents are typically made available via the HRE Register.

3. Methodology

3.1. Guidance

The adopted methodology is based primarily on guidance provided in the following documents:

- Environment Protection Act, 1993 (the Act), and sub-ordinate Environment Protection Regulations, 2023.
- Hydrogen and Renewable Energy Act 2023 – South Australian Legislation.
- The National Environment Protection Measure 1999 (Assessment of Site Contamination), as amended 2013 (referred to as the NEPM herein).
- South Australia (SA) Environmental Protection Authority (EPA) Guideline for Assessment and Remediation (GAR) of Site Contamination.

To achieve the objectives outlined in **Section 1.2**, Gama completed a desktop review of the following sources:

- Land titles records accessed via South Australian Integrated Land Information System (SAILIS) website.
- SA EPA records, including;
  - Section 7 search
  - Site Contamination Index
- Sands and McDougall public register
- Selected historical aerial photographs for the site and surrounding area
- South Australian Resource Information Geoserver for details relating to local geology
- National Geospatial-Intelligence Agency for topographic data
- Australian Soil Resource Information System for details relating to likelihood of encountering acid sulphate soils
- Department for Environment and Water (DEW) “WaterConnect” database of registered groundwater bores within a 2-kilometer (km) radius of the site

In addition to the desktop information review outlined above, an inspection of the site and surrounding area was undertaken for the purpose of observing the physical setting and structures, as well as identifying any associated PCAs and/or other potentially significant environmental activities.

4. Site Details

Table 1. Site identification details.

Item	Description
Site Address	Portion of 420 Northern Power Station Road, Port Paterson
Certificate of Title (CT)	CT 6226/253
Plan and Parcel	D55700A8
Site Area	Allotment 8 – 995.9ha Development site BESS (approximately 7ha lease area and transmission connection corridor) – 9.7ha
Site Zoning	Coastal Waters and Offshore Islands (Z0902) - CWOI Conservation (Z0904) - Con Strategic Employment (Z5720) - SE
Local Council	Port Augusta City Council
Current Land Use (proposed development area)	Vacant Land
Proposed Land Use	Northern Battery Project

4.1. Site Description

An inspection of the site was undertaken by Gama scientists on 28 October 2025. Key observations from the inspection are listed below:

The site located within an industrial and semi-rural area to the north of Port Augusta. The surrounding land comprises a mix of vacant parcels, light industrial facilities, and former infrastructure associated with the Northern Power Station complex.

Structures on Site

The proposed development area contains no structures, however there are electrical towers located around the perimeter of the overall site related to the substation to the south-west. There are no residential dwellings present, and one brick structure that does not have hardstands.

Ground Coverage

Ground coverage across the site is a mix of bare soil and limited vegetated areas. Most of the surface is unsealed, particularly in open yard and access areas, with some concrete hardstand near the main structure and entry points. Sparse vegetation and minor grass growth occur around the periphery of the property.

Current Site Activities

At the time of inspection, the site appeared to be largely inactive, with no significant industrial or commercial operations observed. The area is understood to be part of or adjacent to infrastructure previously associated with the Northern Power Station site, and may be intermittently accessed for maintenance, storage, or site management purposes. There was no evidence of active vehicle servicing, waste storage, or large-scale material handling.

Evidence of Staining, Odours, or ACM

No visible soil staining, chemical odours, or evidence of recent spills or leaks were observed during the site inspection. No asbestos-containing materials (ACM) were visibly identified; however, given the age and industrial nature of the existing buildings, the potential for ACM in roofing or cladding materials cannot be ruled out without further assessment.

Other Observations / Main Concerns

The site's proximity to the former Northern Power Station and associated industrial activities represents a potential source of regional contamination, particularly relating to fill materials, ash residues, or hydrocarbon use in the surrounding area.

However, within the boundaries of the subject site itself, no direct evidence of contamination or environmental concern was noted.

Surface drainage appears to be relatively flat, with runoff likely directed toward the southern and western boundaries. No standing water, sumps, or drainage infrastructure was observed on-site.

A photographic log presenting images **1-7** depicting the site, is provided in **Appendix C**.

4.2. Surrounding Land Use

Table 2. Surrounding land use details.

Direction from Site	Land Use
North	Vacant Land, followed by an access road.
East	Port Paterson Road, followed by vacant land and Talley Vale Australian White Sheep.
South	Vacant land, followed by Davenport substation.
West	Vacant land followed by Northern power station road.

5. Environmental Setting

5.1. Geology

The Australian Government Geoscience Australia Portal 1:250,000 soils map indicates the dominant surface geology comprises of the St Kilda Formation unit 5. The Atlas of Australian Soils has a soil classification of Chromosol outwash plains of hard alkaline red soils. The local and regional geology within the vicinity of the site is presented in the Lotsearch report (**Page 41-42, Appendix D**).

5.2. Acid Sulphate Soils

Details obtained from the Atlas Australian Acid Sulfate Soils indicates an extremely low likelihood across most of the site, and a high likelihood in the top northeastern corner that acid sulphate soils are present at the site. The local and regional acid sulphate soil probability within the vicinity of the site is presented in the Lotsearch report (**Page 45-46, Appendix D**).

5.3. Topography

The topography at the site is relatively flat lying at 10m Australian Height Datum (AHD). An elevation t map of the area is provided in the Lotsearch report (**Page 6, Appendix D**).

5.4. Hydrology

As outlined in the SA EPA GAR (2019), surface water bodies and water courses within 500m of the site should be considered for potential impacts if site contamination exists. As presented in the Lotsearch report (**Page 5, Appendix D**). There are serval large bodies of water, mainly the ocean, there are however, no water courses identified within the 500m boundary.

5.5. Local Hydrogeology

The site lies on the eastern shore of Spencer Gulf near Port Augusta, within a coastal plain setting where Quaternary-aged sediments overlie fractured basement rock and older alluvial deposits. Regional studies indicate that the uppermost sedimentary units in the upper Spencer Gulf region consist of thin Holocene and Pleistocene deposits (aeolian, beach, sub-tidal facies) above basement rock. Given the coastal proximity, shallow groundwater may be present within these unconsolidated sediments, and the groundwater regime is likely influenced by marine-adjacent conditions, including high evaporation rates, limited freshwater recharge, and potential saline intrusion typical of an “inverse” estuarine environment where salinity increases toward the northern end of Spencer Gulf. The groundwater flow system is generally from inland toward the gulf, following the natural gradient from fractured rock aquifers and basin sediments to the marine margin. For contamination and remediation purposes, it should be expected that shallow aquifers may have relatively high salinity, surface recharge is limited, and contaminant migration may be influenced by the flat coastal terrain, shallow groundwater depths and proximity to the gulf, requiring careful characterisation of groundwater levels, flow directions, salinity, and stratigraphy prior to any remediation or land-use change.

As per the SA EPA GAR (2019), groundwater wells within a 2km radius of the site should be considered when determining the environmental values of groundwater. The environmental values, as defined by the South Australia Environment Protection Authority Water Quality Environment Protection Policy 2015 (WQEPP) include:

- Drinking water for human consumption
- Primary industries— irrigation and general water uses
- Primary industries— livestock drinking water
- Primary industries— aquaculture and human consumption of aquatic foods

A review of the DEW WaterConnect groundwater database indicated a total of 110 registered groundwater wells are located within a 2 km radius of the Site and are presented in the Lotsearch report, **Page 33-39, Appendix D**. An assessment of the chemical characteristics and likelihood of groundwater wells being utilised for the environmental values outlined above was completed and is provided in **Appendix E**.

Based on the information provided in **Appendix E**, labelled "Groundwater Environmental Values", the environmental value of groundwater within 2km of the site is considered limited with no realistic beneficial use.

5.6. PFAS Investigation and Management Programs

There are no PFAS Investigation or Management Programs, SA EPA Site Investigations relating to PFAS located within 2km of the site.

Information regarding Investigation and Management programs is provided in the Lotsearch Report (**Page 14, Appendix D**).

5.7. Mining

No Mining or mineral deposits are located within 2km of the site. Information mining is provided in the Lotsearch Report (**Page 32, Appendix D**).

5.8. Heritage

There are no heritage listings at the site which relate to either Commonwealth, National, State, SA or Aboriginal Land. Heritage information is provided in the Lotsearch Report (**Page 53, Appendix D**).

5.9. Natural Hazards

Bushfire

As part of the Bushfire overlay from the Planning Design Code, the site is within the regional category. This category seeks to ensure development is located to minimise the threat and impact of bushfires on life and property and facilitate access for emergency service vehicles in regional areas.

The bushfire overlay is provided in the Lotsearch Report (**Page 54-55, Appendix D**).

Flooding

As part of the Flooding overlay from the Planning Design Code, the site is within the evidence required category. This category adopts a precautionary approach to mitigate potential impacts of potential flood risk through appropriate siting and design of development.

The flooding overlay is provided in the Lotsearch Report (**Page 56-57, Appendix D**).

Ecological

The site does hold some native vegetation, however, there are no ecological constraints or protective areas related to terrestrial or marine ecosystems.

Groundwater at the site is likely inflow dependant on wetland ecosystems.

The ecological constraints is provided in the Lotsearch Report (**Page 58-65, Appendix D**).

6. Site History

6.1. History of Ownership

An assessment of the current and historical ownership of the site was undertaken by Gama to determine whether the ownership may be associated with PCAs. The land has historically been owned by various energy companies and government bodies. The details for the relevant certificate titles are presented in **Appendix F**.

6.2. Historical Aerial Photography

An assessment of the current and historical aerial photographs in the vicinity of the site was undertaken by Gama to ascertain whether activities onsite or within the vicinity of the site may have resulted in site contamination. A review of the aerial photography is summarised in **Table 3** below.

Table 3. Summary of historical aerial photography.

Image Data	Features Identified
1954-1974	**Image** Low resolution aerial photograph (black and white). **Development area** Site is vacant with no signs of any activities. **Surrounding Land** Surrounding land in all directions is vacant land consistent with the site.
1984-1996	**Image** Medium to low resolution aerial photograph (colour and black and white). **Development area** Consistent with previous images. **Surrounding Land** Relatively consistent with the previous images, extra roads added surrounding the site, and development of the power station building to the southwest of the site.
2004	**Image** Low resolution aerial photograph (colour). **The Site** Consistent with previous images. **Surrounding Land** Consistent with previous images.
2013	**Image** High resolution aerial photograph (colour). **The Site** The site is consistent with the previous Image. **Surrounding Land** Further extension of the power station to the north.
2024	**Image** High resolution aerial photograph (colour). **The Site** The site has experienced civil and excavation work alongside some clearing of vegetation.

	Surrounding Land Solar power grid was built directly to the north. Salt pan and further civil and excavation work seems to have taken place by changing the groundcover aesthetic, in all directions. More roads have been built at the power station and an extension to the southwest.

Historical aerial photos are provided in **Appendix D**.

6.3. Public Register Search

A public register search (Sands and McDougall) was undertaken by Gama to identify whether the historical businesses in the surrounding area of the site may have been associated with PCAs. The Area is large and isolated with limited sections where borders interact.

Information regarding historical business information is provided in the Lotsearch report, **Page 17**, **Appendix D.**

6.4. Site Contamination Index Search

A review of the site on the South Australian Environment Protection Authority's (SA EPA) Site Contamination Index identified several entries associated with the property. A summary of these results is provided in the table below.

Table 4. Summary of results from the Site Contamination Index Search.

Map ID	Notification No	Type	Address	Activity	Status	Location Confidence	Distance (m)	Direction
1	61756 - 03	S83A Notification	420 Northern Power Station Road, Lots 2 & 710 Port Patterson Road PORT PATERSON SA 5700	Electricity generation or power plants; Fuel burning facilities	Current EPA List	Premise Match	0	On-site
	61756 - 01	S83A Notification	Lot 8 & 420 Northern Power Station Road PORT PATERSON SA 5700	Electricity generation or power plants	Current EPA List	Premise Match	0	On-site
	61607	Audit Notification	Lot 8 and 420 Northern Power Station Road, Lot 2 Old Power Station Road and Lot 9 Spencer Terrace PORT PATERSON SA 5700	Electricity generation or power plants; Fuel burning facilities; Listed Substances (storage)	Current EPA List	Premise Match	0	On-site
	61607 - 001	Audit Report	Lot 8 and 420 Northern Power Station Road, Lot 2 Old Power Station Road and Lot 9 Spencer Terrace PORT PATERSON SA 5700	Electrical substations; Fuel burning facilities; Listed Substances (storage)	Current EPA List	Premise Match	0	On-site
	61756 - 02	S83A Notification	Lot 8 & 420 Northern Power Station Road PORT PATERSON SA 5700	Electricity generation or power plants	Current EPA List	Premise Match	0	On-site
	62143 - 01	S83A Notification	420 Northern Power Station Road PORT PATERSON SA 5700	Electrical substations	Current EPA List	Premise Match	0	On-site
2	62158	Liability Transfer	420 & Lot 8 Northern Power Station Road and Lot 2 Old Power Station Road, Port Paterson and Lots 6 & 50 Augusta Highway, Stirling North PORT PATERSON SA 5700	Electricity generation or power plants; Fuel burning facilities; Listed Substances (storage)	Current EPA List	Premise Match	0	On-site
3	63002	S83 Notification	230 Port Paterson Road, Port Paterson 230 Port Paterson Road PORT PATERSON SA 5700	Electrical substations	Current EPA List	Premise Match	0	South

Information regarding the EPA's site contamination index is provided in the Lotsearch report, **Page 8**, **Appendix D.**

6.5. EPA Section 7

Gama requested Section 7 documentation from the SA EPA, which identifies known particulars of mortgages, charges, and prescribed encumbrances affecting land with a particular Certificate Title/Folio.

In relation to the subject site, the EPA Register holds information relating to:

- Material of serious environmental harm caused or threatened during the course of an activity
- Site contamination notified to the EPA under section 83A of the Environment Protection Act 1993
- Section 103P - Notation of site contamination audit report in relation to the land.
- Environmental assessment report(s) or site contamination audit report(s)
- details of a current licence issued under Part 6 of the Environment Protection Act 1993 to conduct any prescribed activity of environmental significance under Schedule 1 of that Act at the land
- details of a licence no longer in force issued under Part 6 of the Environment Protection Act 1993 to conduct any prescribed activity of environmental significance under Schedule 1 of that Act at the land
- details of a licence issued under the repealed South Australian Waste Management Commission Act 1979 to produce waste of a prescribed kind (within the meaning of that Act) at the land
- details of a licence issued under the repealed Waste Management Act 1987 to produce prescribed waste (within the meaning of that Act) at the land
- details of site contamination notified to the EPA under section 83A of the Environment Protection Act 1993
- details of an agreement for the exclusion or limitation of liability for site contamination to which section 103E of the Environment Protection Act 1993 applies
- details of an agreement entered into with the EPA relating to an approved voluntary site remediation proposal under section 103K of the Environment Protection Act 1993
- details of records, held by the former South Australian Waste Management Commission under the repealed Waste Management Act 1987, of waste (within the meaning of that Act) having been deposited on the land between 1 January 1983 and 30 April 1995
- details (which may include a report of an environmental assessment) relevant to an agreement entered into with the EPA relating to an approved voluntary site contamination assessment proposal under section 103I of the Environment Protection Act 1993
- details (which may include a report of an environmental assessment) relevant to an agreement entered into with the EPA relating to an approved voluntary site remediation proposal under section 103K of the Environment Protection Act 1993

Gama formally requested further information in relation to the Section 7 notifications, all notifications related to the site as presented in **Table 4**. A high-level summary is discussed in **Section 1.3**, the most recent Detailed Site Investigation is provided in **Appendix H**.

The EPA Section 7 documentation is included in **Appendix G**.

6.6. Dangerous Goods License Search

A review of historical property information and review of the aerial photographs indicates the proposed development area has remained as vacant land. Therefore, a search for the Dangerous Goods License information in relation to the specific area was not considered necessary.

7. Conceptual Site Model

A conceptual site model (CSM) is a qualitative description of the mechanisms by which potential and/or complete exposure pathways exist between known or potential sources of Property impacts, and human or environmental receptor. In order for a human receptor to be exposed to a chemical contaminant derived from the Property, a complete exposure pathway must exist. An exposure pathway describes the course a chemical or physical agent takes from the source to the exposed individual and generally includes the following elements (USEPA, 1989):

- A source and mechanism of chemical release
- A retention or transport medium (or media where chemicals are transferred between media)
- A point of potential human contact with the contaminated media
- An exposure route (e.g., ingestion, inhalation) at the point of exposure.

Based on the work undertaken by Gama, there are PCAs for the specific develop area or within 60m.

However, on the greater site the following PCAs are listed below in **Table 5**.

Table 5. Conceptual Site Model.

Potentially contaminating activity PD14 Classification	Contaminants of interest (COI)	Area of Interest	Potentially affected media	Pathway(s)	Onsite Receptor(s)	Does complete pathway exist?
Off-site PCA – greater than 60m from the proposed development area						
Activities related to Port Paterson Power station	Various. Not limited to, PAH's, BTEX, hydrocarbons, pesticides, heavy metals and asbestos.	600m to the west	Soil	Direct contact, dust, inhalation, ingestion	Construction/civil workers, future site residents	**Unlikely** Isolated minor hydrocarbon impacts were detected in shallow soils within various areas within the power plant located approximately 1.6-1.8km to the south-west, however these are localised and unlikely to pose unacceptable risks to human health under current or future commercial/industrial land uses. The closest environmental investigated area is located approximately 450km to the west. Results from Area 18 (Closest to the development area) did not identify any results above NEPM health criteria. Due to the distance from the proposed development area, and considered down hydraulic gradient, this is considered an unlikely risk to the proposed development.

8. Conclusions

The main objective of the PSI was to establish whether any potentially contaminating activities (PCAs) have been undertaken on-site, or within the immediate surroundings (no more than 60 m), which may have resulted in site contamination that poses an unacceptable risk to current and/or future receptors.

Based on all the site history searches, site inspection and anecdotal information, *there are no PCAs* within the specific development area or within 60m.

However, on the greater overall area the historical contamination at the former Port Augusta Power Station is located approximately 1.6-1.8km to the south-west from the proposed development area, with impacts largely confined to local soils and shallow groundwater.

The closest known investigation area was approximately 450m to the west and did not identify any results above NEPM health guidelines

Given the distance, the hydraulic gradient, and the low-intensity nature of the BESS development, it is considered highly unlikely that any off-site contamination would pose a risk to human health or the environment at the development site.

As the proposed development involves the construction of an energy storage facility, a low-intensity land use with minimal soil disturbance and no chemical or waste generation that could interact with off-site contamination. As such, the potential for exposure to humans or the environment is **negligible**, and any historical contamination at the former power station is not expected to pose a risk to the proposed development site.

Therefore, site contamination at the specific development site is considered *unlikely and a low risk* to the future development and environment.

This report should be read in conjunction with limitations on **Page 2**.

9. References

- ASRIS 2025, Australian Soil Resource Information System website, Australian Government. http://www.asris.csiro.au/
- Australian Government, Geoscience Australia, Geoscience Australia Portal, 1:250k map series https://portal.ga.gov.au/
- Hydrogen and Renewable Energy Act 2023 – South Australian Legislation
- Lotsearch 2025, 420 Northern Power Station Road, Port Paterson, SA 5700 Ref: LS104553 EP, dated 23 Oct 2025
- Masterplan 2025, Associated Infrastructure Licence, Northern Batterym 420 Northern Power Station Road, October 2025
- National Environment Protection Council of Australia, 1999. National Environment Protection (Assessment of Site Contamination) Measures. As amended May 2013 (ASC NEPM).
- SARIG 2021, South Australian Resources Information Gateway website, Government of South Australia. Accessed, 2025. https://map.sarig.sa.gov.au/
- South Australian Environment Protection Agency, 2019. Guidelines for Assessment and Remediation of Site Contamination, November 2019.
- South Australian Environment Protection Agency, 2023. Environmental Protection Regulation, March 2025
- WaterConnect 2025, WaterConnect website, Government of South Australia. https://www.waterconnect.sa.gov.au/Pages/Home.aspx

Appendix A - Figures

GAMA CONSULTING

Project: Preliminary Site Investigation

Site Address: 420 Northern Power Station Road, Port Paterson

Scale: 1:30,000 A4

0 500 1,000 1,500 m

Figure: 1

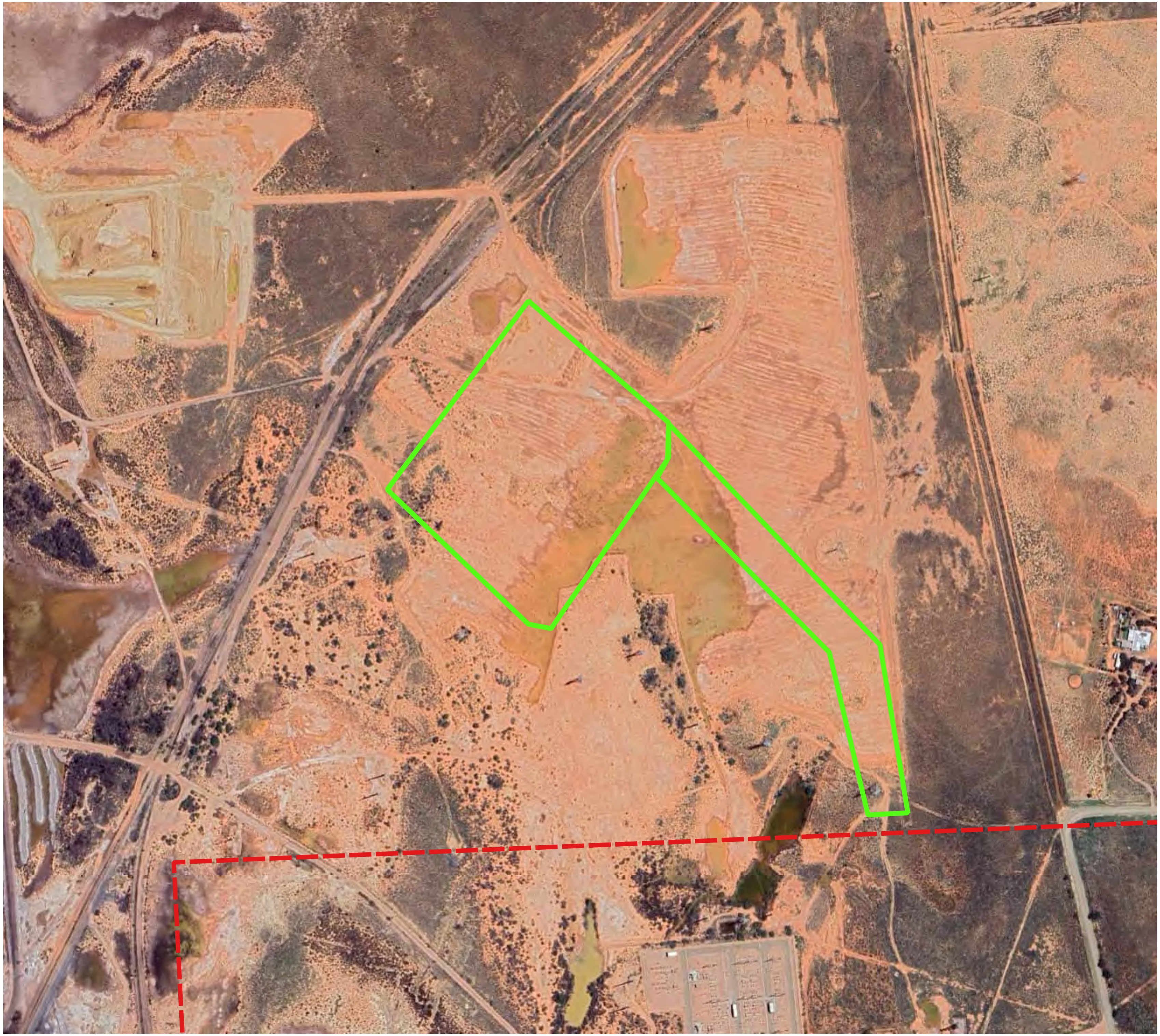
Green Gold Energy

Legend

Approximate Site Boundary

Development/Transmission Line Corridor

Site Layout



GAMA CONSULTING

Project: Preliminary Site Investigation

Site Address: 420 Northern Power Station Road, Port Paterson

Scale: 1:6,000 A4

0 100 200 300 m

Figure: 2

Green Gold Energy

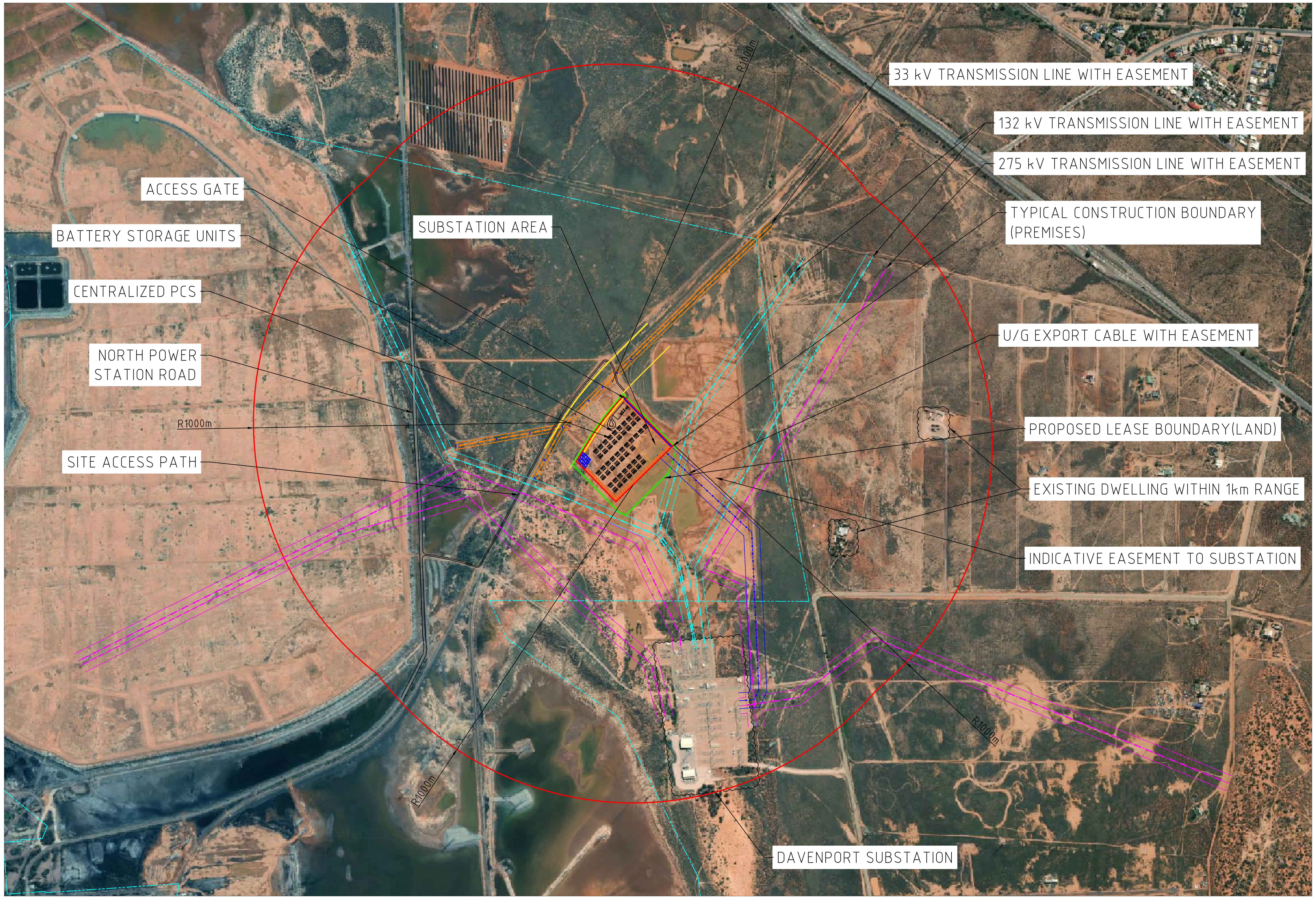
Legend

Approximate Site Boundary

Development/Transmission Line Corridor

Site Layout

Appendix B – Proposed Development Plans



LOCALITY PLAN

0 125 250 375 500 METRES

N

NOTES

1. ACTUAL DIMENSIONS AND CLEARANCES MAY VARY SUBJECT TO SITE CONDITIONS.
2. THE NUMBER OF BATTERY CONTAINERS IS SUBJECT TO FINAL EPC DECISION.
3. DETAILS OF SUBSTATION AREA REFER TO TYPICAL SUBSTATION LAYOUT PLAN.
4. SITE ACCESS TO BE INSPECTED AND PAVED APPROPRIATELY TO ALLOW HEAVY TRUCK DELIVERY. DETAILS OF ACCESS REFER TO TRAFFIC IMPACT ASSESSMENT

LEGEND

- SCREEN VEGETATION
- 2.1m CHAINMESH SECURITY FENCE IN SILVER FINISH
- 275kV TRANSMISSION LINE WITH EASEMENT
- 132kV TRANSMISSION LINE WITH EASEMENT
- 33kV OVERHEAD LINE WITH EASEMENT
- TYPICAL INVERTER & BATTERY COMPLEX UNIT
- PROPOSED LEASE BOUNDARY (LAND)
- RAILWAY & 100m OFFSET
- PROPOSED UNDERGROUND CABLE

SITE SPECIFICATIONS		
FENCE	927	m
SITE AREA WITHIN FENCE	5.4	Ha
INTERNAL ROAD	TBD	m
SITE LAY DOWN	1176	m^2
SUBSTATION	6751	m^2
LEASED AREA	7	Ha

FOR INFORMATION

No	DATE	DRN	CHK	ENG	Q.A.	PROJECT	DESCRIPTION
F	29/09/25	D.S.	ACE	D.S.	ACE		UPDATE DETAILS
E	11/09/25	D.S.	ACE	D.S.	ACE		UPDATE CABLES
D	26/08/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
C	25/08/25	M.G.	ACE	M.G.	ACE		ADD SITE TRACK
B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
A	27/05/25	D.S.	ACE	D.S.	ACE		DRAFT SITE PLAN

REVISION

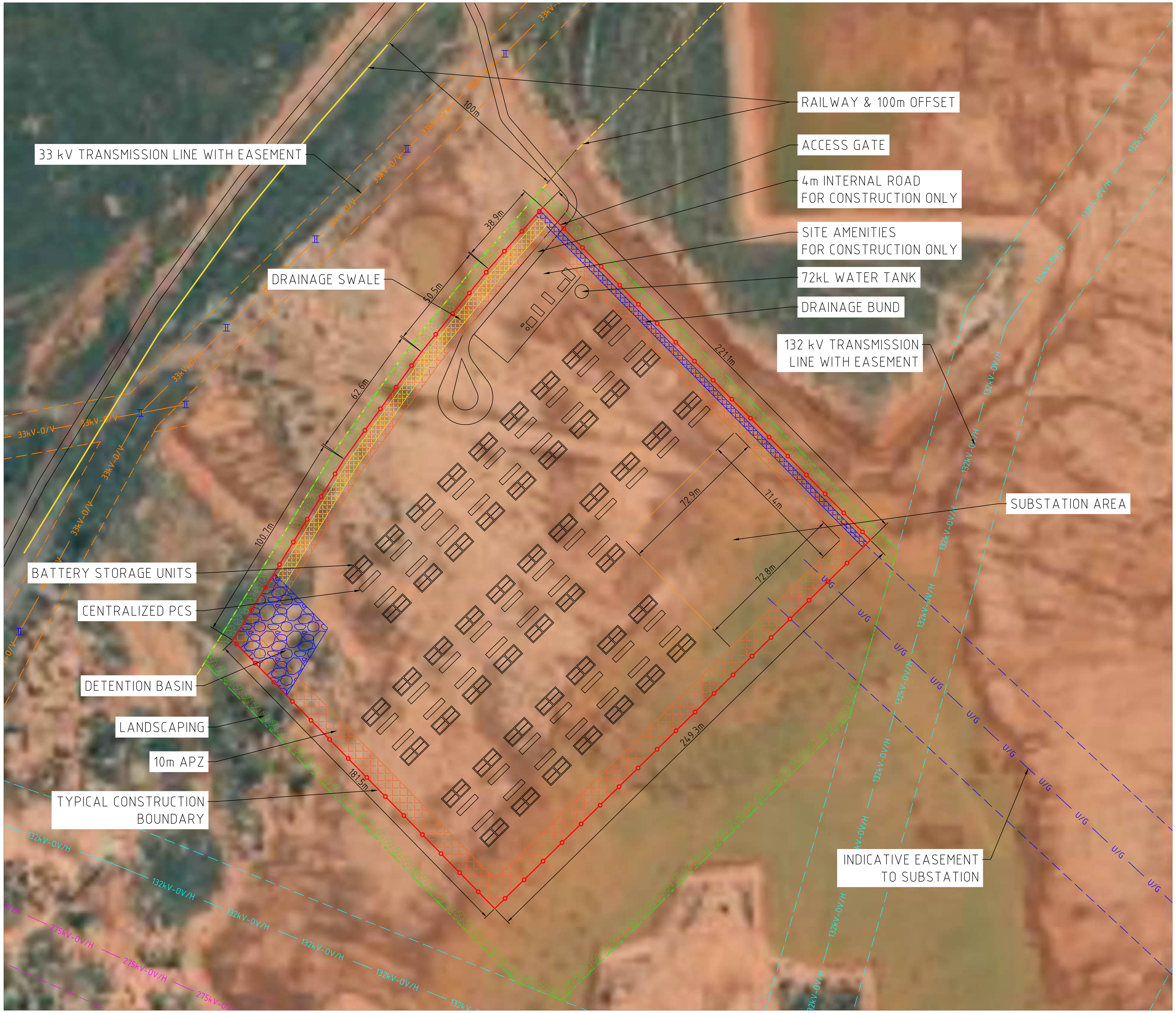
GREEN GOLD ENERGY

DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
LOCALITY PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD. SCALE: NTS

PROJ No | DRG No | REV F

AUTOCAD A1SHEET



0 25 50 75 100
METRES

ENLARGED SITE LAYOUT

N

BATTERY STORAGE SYSTEM SPECIFICATIONS				
AC	270	MW		
NUMBER OF INVERTERS	52	-	INVERTER MODEL	SG-6900UD-MV
NUMBER OF BATTERIES	208	-	BATTERY MODEL	ST5015UX
BATTERY CAPACITY	1043.1	MWh		

SITE SPECIFICATIONS		
FENCE	901	m
FENCED AREA	5.1	Ha
LEASED AREA	7.0	m
SUBSTATION AREA	5200	m^2

NOTES

1. ACTUAL DIMENSIONS AND CLEARANCES MAY VARY SUBJECT TO SITE CONDITIONS.
2. THE NUMBER OF BATTERY CONTAINERS IS SUBJECT TO FINAL EPC DECISION.
3. DETAILS OF SUBSTATION AREA REFER TO TYPICAL SUBSTATION LAYOUT PLAN.
4. SITE ACCESS TO BE INSPECTED AND PAVED APPROPRIATELY TO ALLOW HEAVY TRUCK DELIVERY. DETAILS OF ACCESS REFER TO TRAFFIC IMPACT ASSESSMENT

LEGEND

- SCREEN VEGETATION
- 2.1m CHAINMESH SECURITY FENCE IN SILVER FINISH
- 275kV TRANSMISSION LINE WITH EASEMENT
- 132kV TRANSMISSION LINE WITH EASEMENT
- 33kV OVERHEAD LINE WITH EASEMENT
- TYPICAL INVERTER & BATTERY COMPLEX UNIT
- PROPOSED LEASE BOUNDARY (LAND)
- RAILWAY & 100m OFFSET
- PROPOSED UNDERGROUND CABLE

FOR INFORMATION

No	DATE	DRN	CHK	ENG	Q.A.	PROJECT	DESCRIPTION
F	29/09/25	D.S.	ACE	D.S.	ACE		UPDATE DETAILS
E	11/09/25	D.S.	ACE	D.S.	ACE		UPDATE CABLES
D	26/08/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
C	25/08/25	M.G.	ACE	M.G.	ACE		ADD SITE TRACK
B	13/06/25	D.S.	ACE	D.S.	ACE		UPDATE SITE LOCATION
A	27/05/25	D.S.	ACE	D.S.	ACE		DRAFT SITE PLAN

REVISION

GREEN GOLD ENERGY

DAVENPORT BESS
420 NORTHERN POWER STA RD, PORT PATERSON SA 5700
270 MVA BESS SYSTEM
SITE PLAN

DESIGNED BY ALLIED CONSULTING ENGINEERS PTY LTD. SCALE: NTS

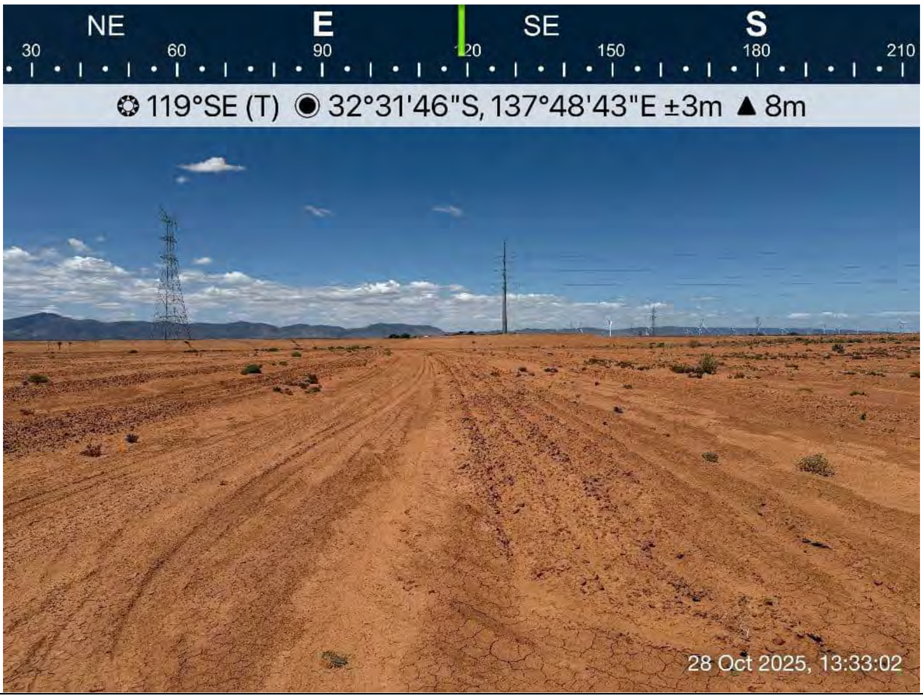
PROJ No | DRG No | REV F

AUTOCAD A1SHEET

Appendix C – Site Investigation Photographs

GAMA CONSULTING
Structural, Civil & Environmental Engineering

Suite 3/83 Fullarton Road
Kent Town SA 5067
(08) 7123 4050
gamaconsulting.com.au

Project: 240972	**Address: 4a Scotia Street, Croydon**	**Date: 1 November 2024**
Photo 1 **Description:** Facing Southeast. Entrance to area of the site. Access road, site is vacant, groundcover is exposed red soil and sparse low-lying vegetation. Substation building can be seen in distance.		
Photo 2 **Description:** Facing East-southeast. Located centrally within the site. General site overview.		

Suite 3/83 Fullarton Road
Kent Town SA 5067
(08) 7123 4050
gamaconsulting.com.au

Photo 3

Description:

Facing southeast

Away from Northern Power station Road across the site.

Photo 4

Description:

Facing Northeast

Vacant land, sparse low lying vegetation and red soil.

Located along the western boundary facing inwards across the site

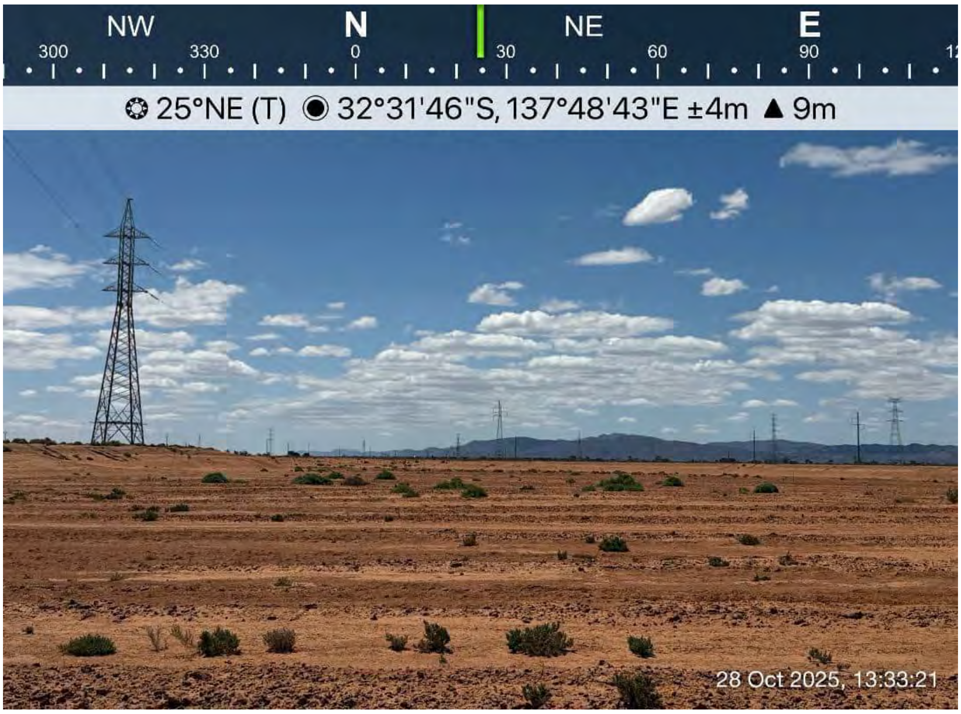


Photo 5

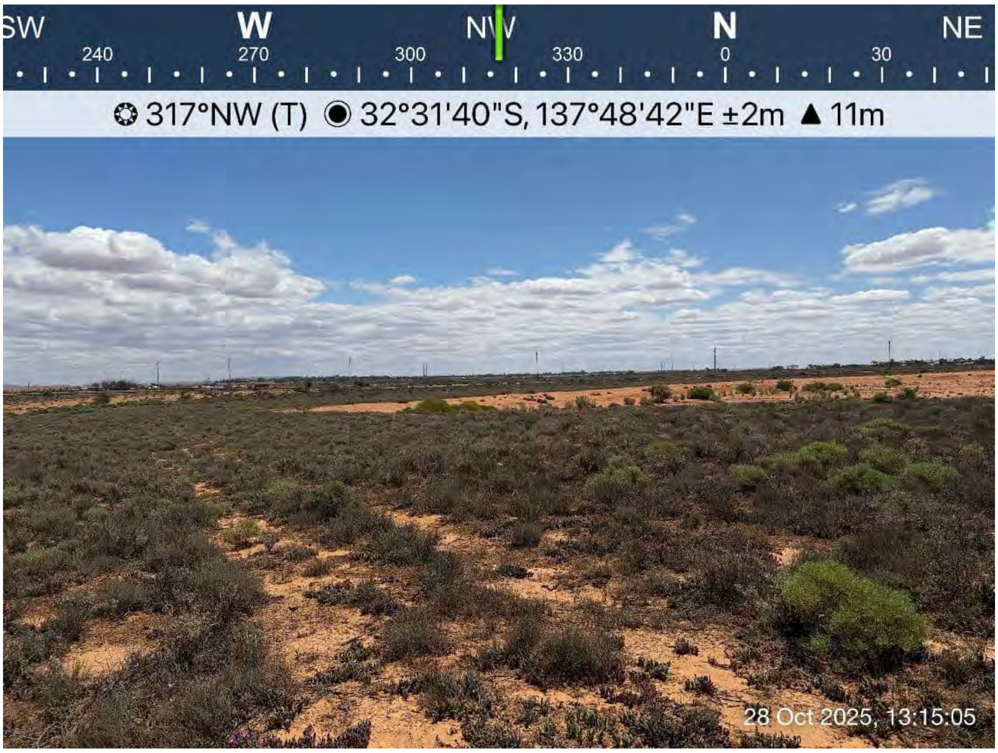
Description:

Brick structure surrounded by sparse low-lying vegetation.

Photo 6

Description:

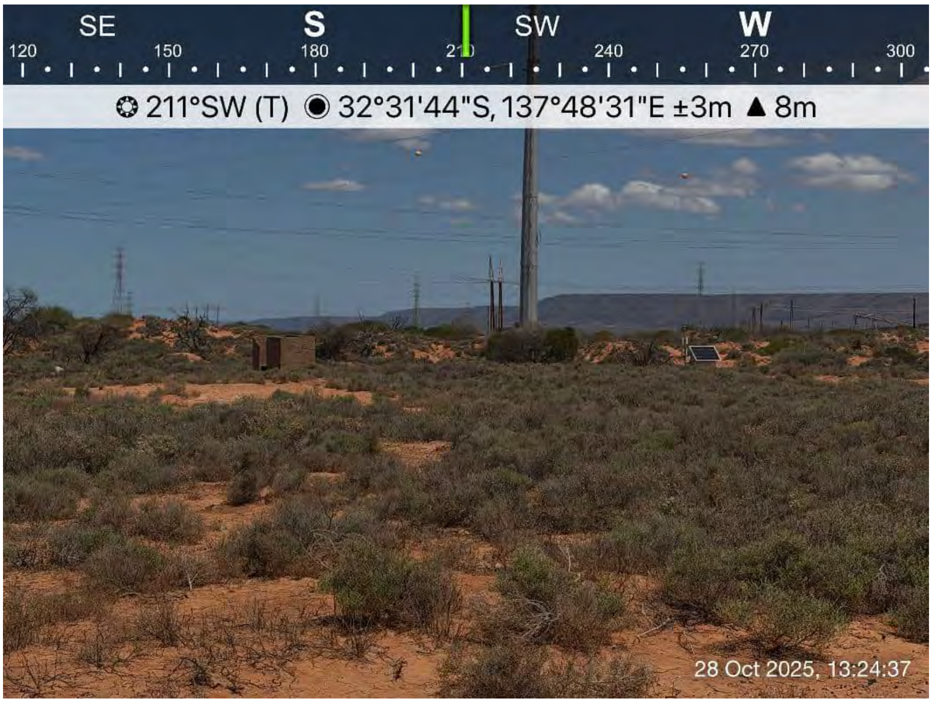
Facing Northwest looking across the site towards Northern Power station road.



<table>
<tr><td>Photo 7

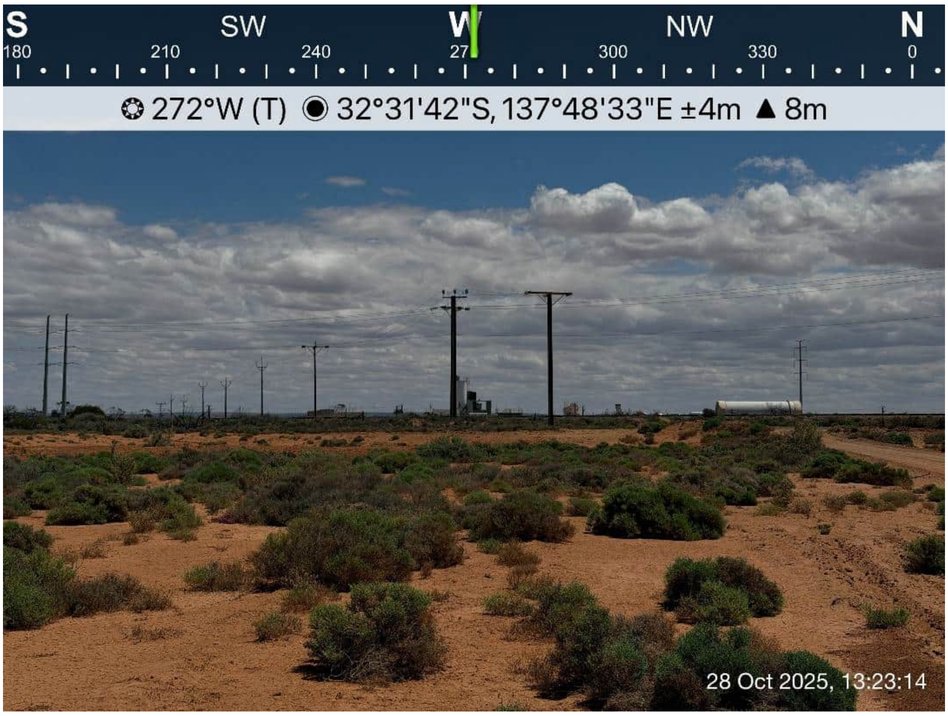
Description:

Facing South-southwest near the south-eastern boundary.

Overview of the site.</td><td>
</td></tr>
<tr><td>Photo 8

Description:

Facing west, located within the central-eastern portion of the site.

View of the entrance.</td><td>
</td></tr>
</table>

Appendix D – Lotsearch Report

GAMA
CONSULTING

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 23 Oct 2025 10:51:35

Reference: LS104553 EP

Address: 420 Northern Power Station Road, Port Paterson, SA 5700

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
SA Cadastre	Land Services SA	30/09/2025	22/09/2025	Quarterly	-	-	-	-
EPA Site Contamination Index	Environment Protection Authority SA	02/10/2025	02/10/2025	Monthly	1000m	7	8	9
EPA Environmental Protection Orders	Environment Protection Authority SA	26/09/2025	25/09/2025	Monthly	1000m	1	1	3
EPA Environmental Authorisations	Environment Protection Authority SA	26/09/2025	25/09/2025	Monthly	1000m	7	7	7
Contamination Assessment Areas	Environment Protection Authority SA	16/10/2025	16/10/2025	Quarterly	1000m	0	0	0
EPA Groundwater Prohibition Areas	Environment Protection Authority SA	24/09/2025	30/05/2025	Monthly	1000m	0	0	0
EPA PFAS Site Investigations	Environment Protection Authority SA	21/10/2025	05/03/2025	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Australian Department of Defence	16/10/2025	16/10/2025	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Australian Department of Defence	16/10/2025	16/10/2025	Monthly	2000m	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	15/10/2025	15/10/2025	Monthly	2000m	0	0	0
Defence Controlled Areas	Australian Department of Defence	16/10/2025	16/10/2025	Quarterly	2000m	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Australian Department of Defence	14/08/2025	02/09/2022	Quarterly	2000m	0	0	0
National Unexploded Ordnance (UXO)	Australian Department of Defence	16/10/2025	16/10/2025	Quarterly	2000m	0	0	0
National Waste Management Facilities Database	Geoscience Australia	30/05/2025	19/01/2023	Annually	1000m	0	0	0
EPA Collection Depots	Environment Protection Authority SA	15/09/2025	20/08/2022	Quarterly	1000m	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	16/10/2024	19/01/2023	Annually	1000m	0	0	0
Historical Business Directories (Premise & Intersection Matches)	Hardie Grant, Sands & McDougall			Not required	150m	0	0	0
Historical Business Directories (Road & Area Matches)	Hardie Grant, Sands & McDougall			Not required	150m	-	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant, Sands & McDougall			Not required	500m	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant, Sands & McDougall			Not required	500m	-	0	0
Mines and Mineral Deposits	SA Department for Energy and Mining	19/08/2025	19/08/2025	Quarterly	1000m	0	0	0
Hydrogeology Map of Australia	Geoscience Australia	22/04/2025	19/08/2019	Annually	1000m	1	1	1
Drillholes	SA Department for Environment and Water	08/10/2025	30/09/2025	Quarterly	2000m	5	8	110
Surface Geology 1:100,000	SA Department for Energy and Mining	06/05/2025	22/10/2024	Annually	1000m	2	2	2
Geological Linear Structures 1:100,000	SA Department for Energy and Mining	06/05/2025	22/10/2024	Annually	1000m	0	0	0
Atlas of Australian Soils	Australian Bureau of Agricultural and Resource Economics and Sciences	15/01/2025	17/02/2011	Annually	1000m	1	1	2
Soil Types	SA Department for Environment and Water	07/05/2025	01/02/2019	Annually	1000m	0	0	0
Atlas of Australian Acid Sulfate Soils	CSIRO	15/01/2025	21/02/2013	Annually	1000m	2	2	2
Acid Sulfate Soil Potential	SA Department for Environment and Water	26/05/2025	01/02/2019	Annually	1000m	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Soil Salinity - Watertable Induced	SA Department for Environment and Water	17/12/2024	18/02/2020	Annually	1000m	0	0	0
Soil Salinity - Non-watertable	SA Department for Environment and Water	17/12/2024	18/02/2020	Annually	1000m	0	0	0
Soil Salinity - Non-watertable (magnesia patches)	SA Department for Environment and Water	17/12/2024	18/02/2020	Annually	1000m	0	0	0
Planning and Design Code - Zones	Attorney-General's Department	29/09/2025	11/09/2025	Monthly	1000m	1	2	6
Planning and Design Code - Subzones	Attorney-General's Department	29/09/2025	27/02/2025	Monthly	1000m	0	0	0
Land Use Generalised 2024	SA Department for Trade and Investment	13/03/2025	29/01/2025	Annually	1000m	1	3	7
Commonwealth Heritage List	Australian Department of Climate Change, Energy, the Environment and Water	23/10/2024	13/04/2022	Annually	1000m	0	0	0
National Heritage List	Australian Department of Climate Change, Energy, the Environment and Water	23/10/2024	13/04/2022	Annually	1000m	0	0	0
State Heritage Areas	SA Department for Environment and Water	30/05/2025	23/05/2025	Annually	1000m	0	0	0
SA Heritage Places	SA Department for Environment and Water	19/08/2025	10/04/2025	Quarterly	1000m	0	0	0
Aboriginal Land	SA Department for Energy and Mining	30/05/2025	25/05/2025	Annually	1000m	0	0	0
Planning and Design Code - Overlays - Bushfire	SA Department for Trade and Investment	29/09/2025	22/09/2025	Monthly	1000m	1	1	1
Bushfires and Prescribed Burns History	SA Department for Environment and Water	29/09/2025	27/06/2025	Monthly	1000m	0	0	0
Planning and Design Code - Overlays - Flooding	SA Department for Trade and Investment	29/09/2025	22/09/2025	Monthly	1000m	1	1	1
Native Vegetation Floristic Areas - NVIS - State-wide	SA Department for Environment and Water	23/04/2025	14/02/2022	Annually	1000m	3	3	4
Collaborative Australian Protected Areas Database (CAPAD) 2022 - Terrestrial	Australian Department of Climate Change, Energy, the Environment and Water	20/03/2025	19/06/2024	Annually	1000m	0	0	0
Collaborative Australian Protected Areas Database (CAPAD) 2022 - Marine	Australian Department of Climate Change, Energy, the Environment and Water	20/03/2025	30/06/2022	Annually	1000m	0	0	0
Groundwater Dependent Ecosystems Atlas	Bureau of Meteorology	30/05/2025	07/05/2020	Annually	1000m	3	3	3
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	30/05/2025	07/05/2020	Annually	1000m	4	4	5
Ramsar Wetland Areas	SA Department for Environment and Water	19/05/2025	05/03/2025	Annually	1000m	0	0	0

Site Diagram

420 Northern Power Station Road, Port Paterson, SA 5700

Legend

Site Boundary

Internal Parcel Boundaries

Total Area: 1.11km²

Total Perimeter: 4.25km

Disclaimers:

Measurements are approximate only and may have been simplified or smaller lengths removed for readability.

Parcels that make up a small percentage of the total site area have not been labelled for increased legibility.

Scale:

0 25 50 100 150 200 250
Meters

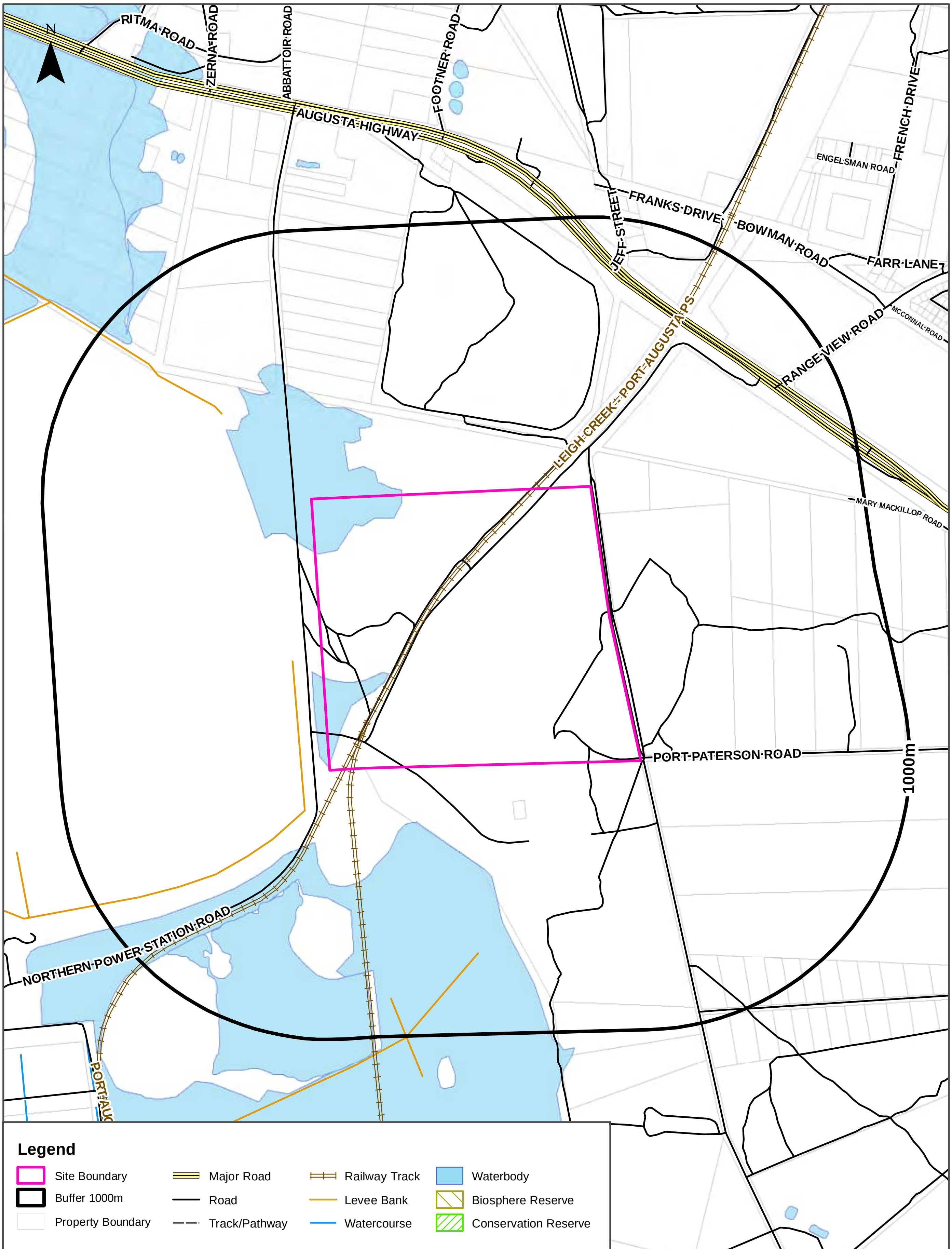
Data Sources:
Property Boundaries Sourced by Land Services SA
©Land Services SA

Coordinate System:
GDA 1994 MGA Zone 54

Date: 23 October 2025

Topographic Features

420 Northern Power Station Road, Port Paterson, SA 5700



Scale: 0 100 200 400 600 800 1,000 Meters

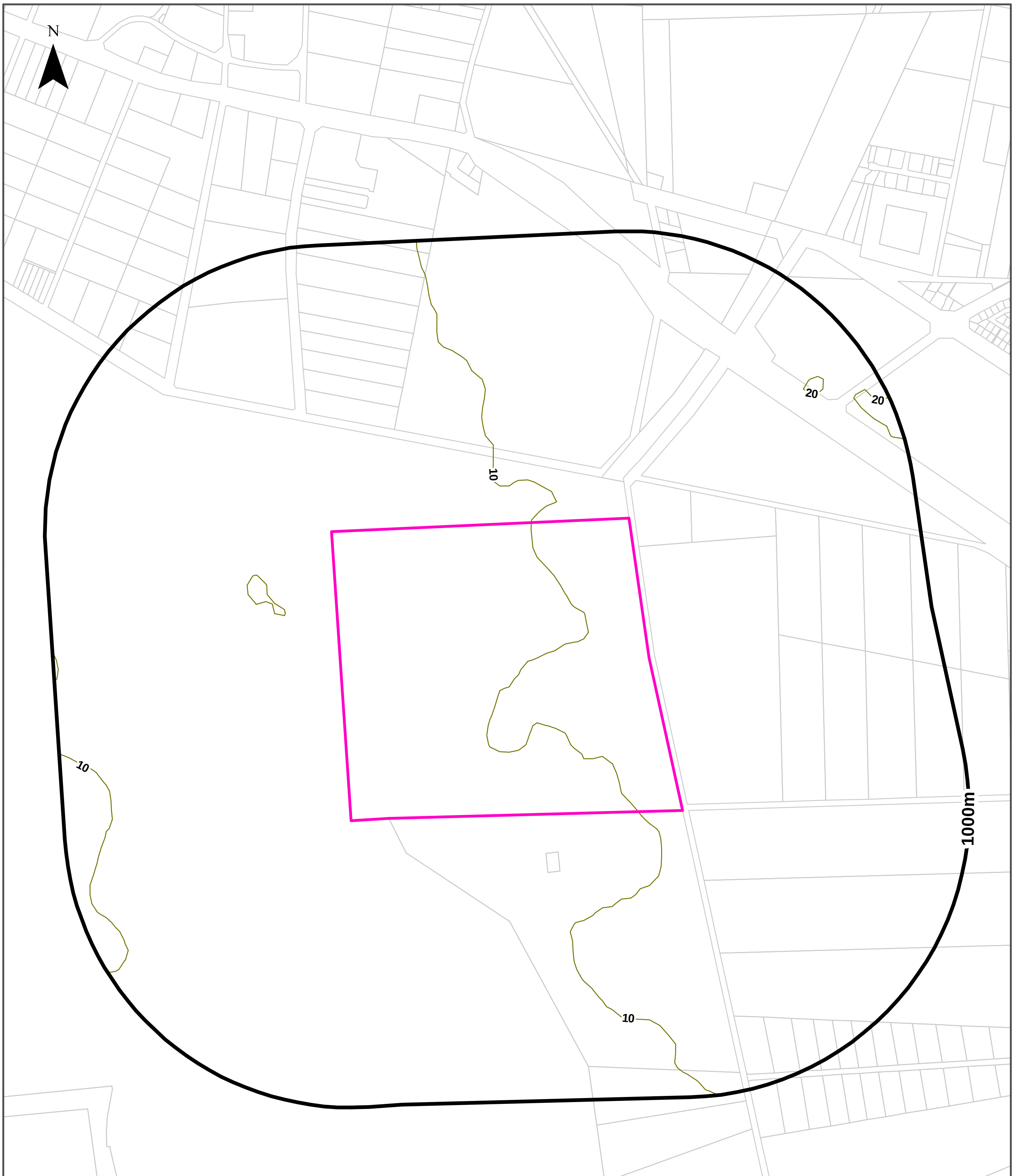
Data Sources:
Property Boundaries Sourced by Land Services SA
©Land Services SA

Coordinate System:
GDA 1994 MGA Zone 54

Date: 23 October 2025

Elevation Contours

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

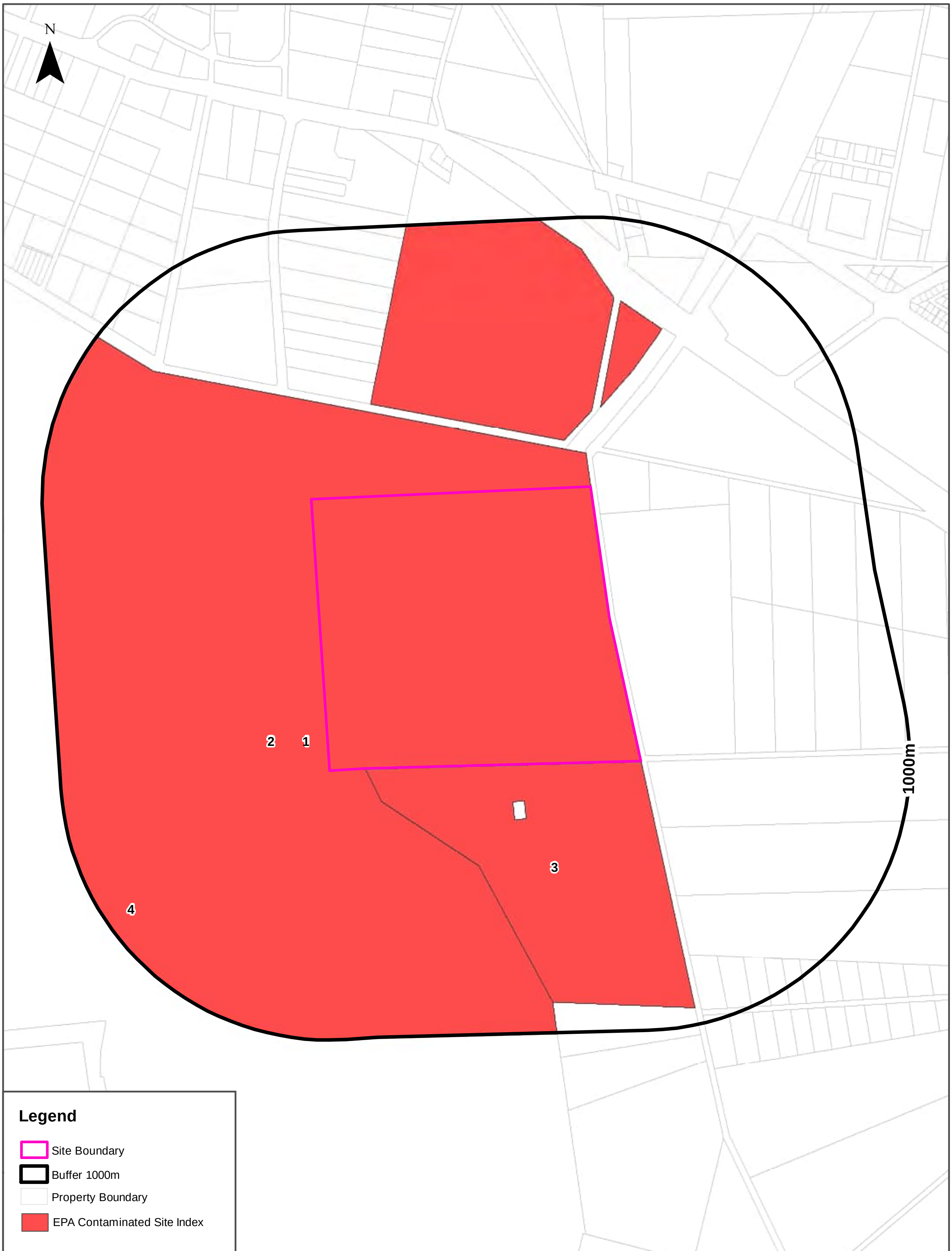
- Site Boundary
- Buffer 1000m
- Property Boundaries
- Elevation Contour 10m

10m contours derived from SRTM-derived 1 second digital elevation model, supplied by Geoscience Australia. The smoothed digital elevation model (DEM-S) represents ground surface topography, excluding vegetation features, and has been smoothed to reduce noise and improve the representation of surface shape. An adaptive smoothing process applied more smoothing in flatter areas than hilly areas, and more smoothing in noisier areas than in less noisy areas. This DEM-S supports calculation of local terrain shape attributes such as slope, aspect and curvature that could not be reliably derived from the unsmoothed 1 second DEM because of noise.

Scale:	Data Sources:	Coordinate System:	Date: 23 October 2025
0 100 200 400 600 800 1,000 Meters	Property Boundaries Sourced by Land Services SA ©Land Services SA	GDA 1994 MGA Zone 54	

EPA Site Contamination Index

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary
- EPA Contaminated Site Index

Scale: 0 100 200 400 600 800 1,000 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

EPA Contaminated Land

420 Northern Power Station Road, Port Paterson, SA 5700

EPA Site Contamination Index

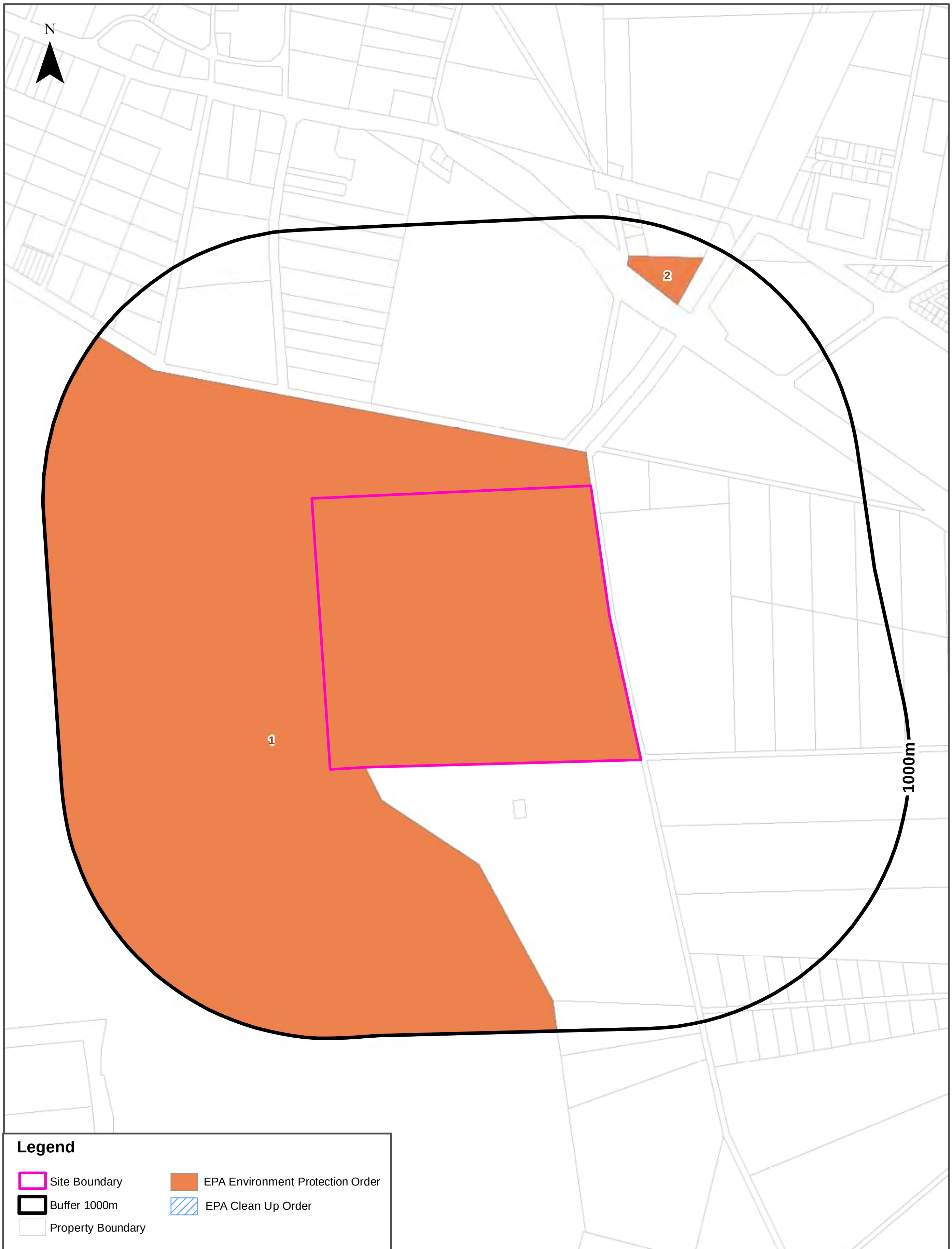
Sites on the EPA Contamination Index within the dataset buffer:

Map ID	Notification No	Type	Address	Activity	Status	LocConf	Dist	Dir
1	61756 - 01	S83A Notification	Lot 8 & 420 Northern Power Station Road PORT PATERSON SA 5700	Electricity generation or power plants	Current EPA List	Premise Match	0m	On-site
	61756 - 03	S83A Notification	420 Northern Power Station Road, Lots 2 & 710 Port Patterson Road PORT PATERSON SA 5700	Electricity generation or power plants; Fuel burning facilities	Current EPA List	Premise Match	0m	On-site
	61607	Audit Notification	Lot 8 and 420 Northern Power Station Road, Lot 2 Old Power Station Road and Lot 9 Spencer Terrace PORT PATERSON SA 5700	Electricity generation or power plants; Fuel burning facilities; Listed Substances (storage)	Current EPA List	Premise Match	0m	On-site
	61607 - 001	Audit Report	Lot 8 and 420 Northern Power Station Road, Lot 2 Old Power Station Road and Lot 9 Spencer Terrace PORT PATERSON SA 5700	Electrical substations; Fuel burning facilities; Listed Substances (storage)	Current EPA List	Premise Match	0m	On-site
	61756 - 02	S83A Notification	Lot 8 & 420 Northern Power Station Road PORT PATERSON SA 5700	Electricity generation or power plants	Current EPA List	Premise Match	0m	On-site
	62143 - 01	S83A Notification	420 Northern Power Station Road PORT PATERSON SA 5700	Electrical substations	Current EPA List	Premise Match	0m	On-site
2	62158	Liability Transfer	420 & Lot 8 Northern Power Station Road and Lot 2 Old Power Station Road, Port Paterson and Lots 6 & 50 Augusta Highway, Stirling North PORT PATERSON SA 5700	Electricity generation or power plants; Fuel burning facilities; Listed Substances (storage)	Current EPA List	Premise Match	0m	On-site
3	63002	S83 Notification	230 Port Paterson Road, Port Paterson 230 Port Paterson Road PORT PATERSON SA 5700	Electrical substations	Current EPA List	Premise Match	0m	South
4	11037	S83 Notification	A1 & 2 D55666 and A8 D55770 Government Road PORT AUGUSTA SA 5700	Electricity generation or power plants; Listed Substances (storage)	Current EPA List	Premise Match	715m	South West

Site Contamination Index Data Source: EPA South Australia

EPA Environment Protection and Clean Up Orders

420 Northern Power Station Road, Port Paterson, SA 5700



Scale: 0 100 200 400 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

EPA Public Register

420 Northern Power Station Road, Port Paterson, SA 5700

EPA Environment Protection and Clean Up Orders

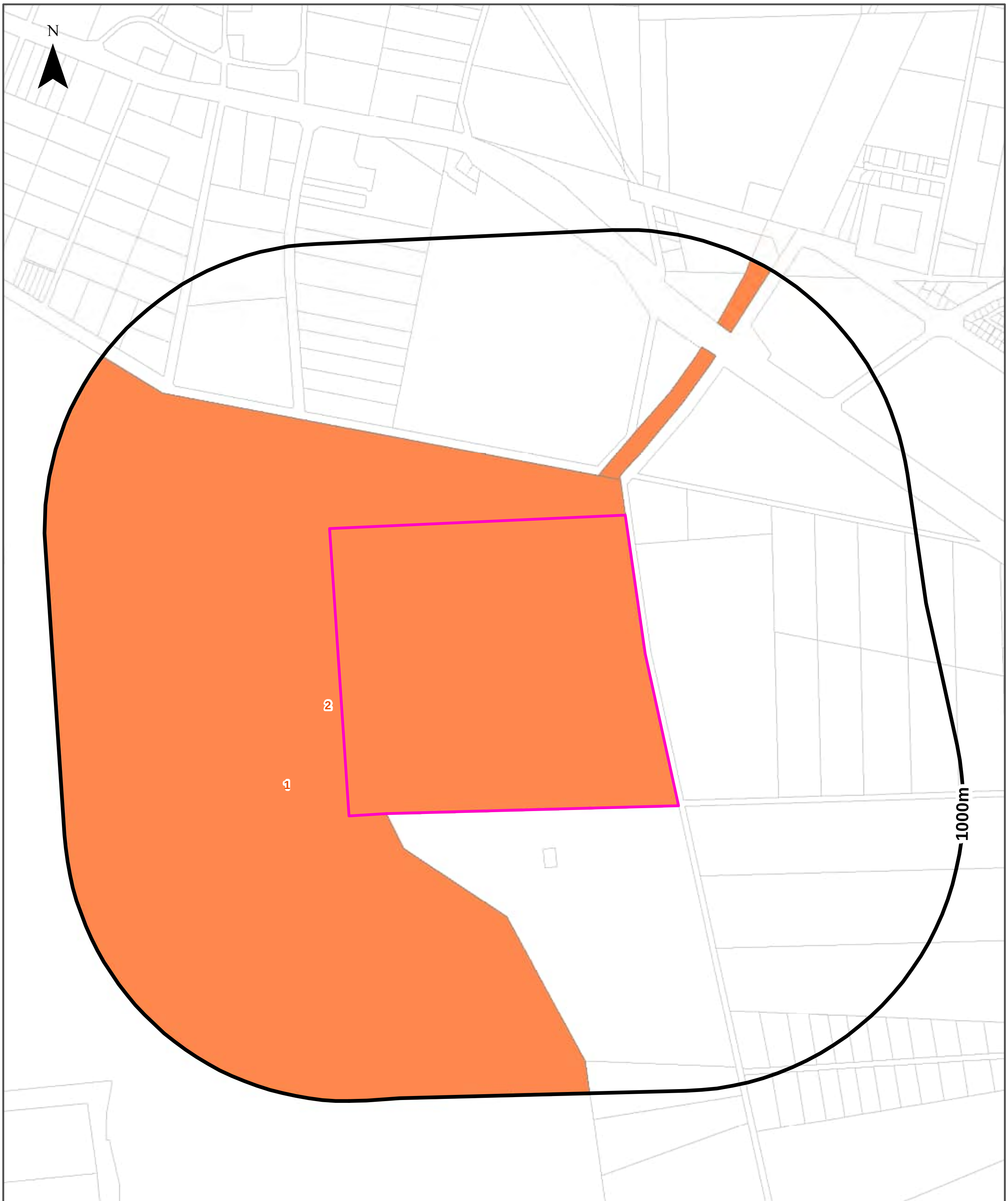
EPA Environment Protection and Clean Up Orders, within the dataset buffer:

Map ID	Record No.	Record Type	Record Status	Entity	Site Address	Activity	EPA Register Status	LocConf	Dist	Dir
1	36890	ENVIRONMENT PROTECTION ORDER	CLOSED	FLINDERS POWER HOLDINGS GMBH, FLINDERS LABUAN (NO 1) LTD, FLINDERS LABUAN (NO 2) LTD	Power Station Road, Port Augusta SA 5700	Cause environmental nuisance and/or material environmental harm due to significant amounts of airborne dust emanating from the ash dam of the power station sites travelling across Port Augusta.	Current EPA Register	Premise Match	0m	On-site
2	14117	ENVIRONMENT PROTECTION ORDER	CLOSED		Jeff Street, Stirling North SA 5710	Caused or permitted the receipt, storage and/or disposal of waste at the site without an environmental authorisation (licence).	Current EPA Register	Premise Match	748m	North East
	14116	ENVIRONMENT PROTECTION ORDER	ISSUED	Commissioner of Highways	Jeff Street, Stirling North SA 5710	Caused or permitted the receipt, storage and/or disposal of waste at the site without an environmental authorisation (licence).	Current EPA Register	Premise Match	748m	North East

Authorisations Data Source: EPA South Australia

EPA Authorisations and Applications

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary
- EPA Authorisation
- EPA Authorisation Application

Scale: 0 100 200 400 600 800 1,000 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

EPA Public Register

420 Northern Power Station Road, Port Paterson, SA 5700

EPA Authorisations and Applications

EPA Authorisations and Authorisation Applications within the dataset buffer:

Map ID	Record No.	Record Type	Record Status	Entity	Site Address	Activity	EPA Register Status	LocConf	Dist	Dir
1	50677	LICENCE	Transferred	CU-RIVER MINING AUSTRALIA PTY LTD	Northern Power Station and Playford Power Station, Power Station Road, PORT AUGUSTA SA 5700	Coal handling and storage,Discharges to marine or inland waters,Fuel burning coal or wood	Current EPA Register	Premise Match	0m	On-site
	13006	LICENCE	Transferred	FLINDERS OPERATING SERVICES PTY LTD	Northern Power Station and Playford Power Station, Power Station Road, PORT AUGUSTA SA 5700	Coal handling and storage,Discharges to marine or inland waters,Fuel burning coal or wood	Current EPA Register	Premise Match	0m	On-site
	13007	LICENCE	Cancelled	FLINDERS POWER HOLDINGS GMBH, FLINDERS LABUAN (NO 1) LTD, FLINDERS LABUAN (NO 2) LTD	Playford Power Station, Power Station Road, PORT AUGUSTA SA	grinding or milling works (rock, or antibiotic or chemical water treatments) -, ores or minerals),Abrasive blasting,Crushing,Discharges to marine or inland waters (heat,Fuel burning coal or wood	Current EPA Register	Premise Match	0m	On-site
	50757	LICENCE	Issued	CU-RIVER PORT AUSTRALIA PTY LTD	Northern Power Station and Playford Power Station, Power Station Road, PORT AUGUSTA SA 5700	Coal handling and storage,Discharges to marine or inland waters,Fuel burning coal or wood	Current EPA Register	Premise Match	0m	On-site
	1532	LICENCE	Issued	SOUTH AUSTRALIAN WATER CORPORATION	Port Augusta East WWTP Allotment 7 (D55700) Hundred of Davenport, PORT AUGUSTA, 5700, SA	Wastewater treatment works (outside MLR WPA)	Current EPA Register	Premise Match	0m	On-site
2	13011	LICENCE	Transferred	FLINDERS OPERATING SERVICES PTY LTD	Pt Augusta Power Station to Leigh Creek Rail Line, PORT AUGUSTA, 5700, SA	Railway operations	Current EPA Register	Premise Match	0m	On-site
	50368	LICENCE	Surrendered	MINISTER FOR TRANSPORT AND INFRASTRUCTURE	Pt Augusta Power Station to Leigh Creek Rail Line, PORT AUGUSTA, 5700, SA	Railway operations	Current EPA Register	Premise Match	0m	On-site

Authorisations Data Source: EPA South Australia

Contamination Assessment and Groundwater Prohibition Areas

420 Northern Power Station Road, Port Paterson, SA 5700

Contamination Assessment Areas

Contamination Assessment Areas published by the EPA within the dataset buffer:

Map Id	Area Name	Map Link	Status	Location Confidence	Distance	Direction
N/A	No records in buffer					

Assessment Areas Data Source: EPA South Australia

EPA Groundwater Prohibition Areas

EPA Groundwater Prohibition Areas within the dataset buffer:

Map Id	Site Name	Location Confidence	Distance	Direction
N/A	No records in buffer			

Groundwater ProhibitionAreas Data Source: EPA South Australia

PFAS Investigation & Management Programs

420 Northern Power Station Road, Port Paterson, SA 5700

EPA PFAS Site Investigations

Sites identified by the EPA as requiring PFAS contamination investigation within the dataset buffer:

Record ID	Site Name	Document Link	Location Confidence	Distance	Direction
N/A	No records in buffer				

EPA PFAS Site Investigations Custodian: EPA South Australia

Defence PFAS Investigation & Management Program Investigation Sites

Sites being investigated by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

Defence PFAS Investigation & Management Program Data Custodian: Department of Defence, Australian Government

Defence PFAS Investigation & Management Program Management Sites

Sites being managed by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

Defence PFAS Investigation & Management Program Data Custodian: Department of Defence, Australian Government

Airservices Australia National PFAS Management Program

Sites being investigated or managed by Airservices Australia for PFAS contamination within the dataset buffer:

Map ID	Site Name	Impacts	Location Confidence	Distance	Direction
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites and Unexploded Ordnance

420 Northern Power Station Road, Port Paterson, SA 5700

Defence Controlled Areas (DCA)

Defence Controlled Areas provided by the Department of Defence within the dataset buffer:

Site ID	Location Name	Loc Conf	Dist	Dir
N/A	No records in buffer			

Defence Controlled Areas, Data Custodian: Department of Defence, Australian Government

Defence 3 Year Regional Contamination Investigation Program (RCIP)

Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

Property ID	Base Name	Address	Known Contamination	Loc Conf	Dist	Dir
N/A	No records in buffer					

Defence 3 Year Regional Contamination Investigation Program, Data Custodian: Department of Defence, Australian Government

National Unexploded Ordnance (UXO)

Sites which have been assessed by the Department of Defence for the potential presence of unexploded ordnance within the dataset buffer:

Site ID	Location Name	Category	Area Description	Additional Information	Commonwealth	Loc Conf	Dist	Dir
N/A	No records in buffer							

National Unexploded Ordnance (UXO), Data Custodian: Department of Defence, Australian Government

Waste Management and Liquid Fuel Facilities

420 Northern Power Station Road, Port Paterson, SA 5700

National Waste Management Facilities Database

Sites on the National Waste Management Facilities Database within the dataset buffer:

Map ID	Owner	Name	Address	Management Type	Facility Type	Status	Loc Conf	Dist	Dir
N/A	No records in buffer								

Source: Waste Management Facilities Database

EPA Approved Container Collection Depots

EPA approved container collection depots within the dataset buffer:

MapId	Name	Address	Suburb	Loc Conf	Distance	Direction
N/A	No records in buffer					

Collection Depot Data Source: EPA South Australia

National Liquid Fuel Facilities

National Liquid Fuel Facilties within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist	Dir
N/A	No records in buffer										

National Liquid Fuel Facilities Data Source: Geoscience Australia

Historical Business Directories

420 Northern Power Station Road, Port Paterson, SA 5700

Business Directory Records 1910-1991 Premise or Road Intersection Matches

Potentially contaminative business activities extracted from Universal Business Directory and Sands & McDougall Directory records, from years 1991, 1973, 1965, 1955, 1950, 1940, 1930, 1920 & 1910, mapped to a premise or road intersection within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
N/A	No records in buffer						

Business Directory Content reproduced with permission of UBD and Hardie Grant Media Pty Ltd DD 01/08/2018 and Sands & McDougall's Directory of South Australia

Business Directory Records 1910-1991
Road or Area Matches

Potentially contaminative business activities extracted from Universal Business Directory and Sands & McDougall Directory records, from years 1991, 1973, 1965, 1955, 1950, 1940, 1930, 1920 & 1910, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer					

Historical Business Directories

420 Northern Power Station Road, Port Paterson, SA 5700

Dry Cleaners, Motor Garages & Service Stations 1930-1991 Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories and Sands & McDougall's Directories, from years 1991, 1973, 1965, 1955, 1950, 1940 & 1930, mapped to a premise or road intersection, within the dataset buffer.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
N/A	No records in buffer						

Dry Cleaners, Motor Garages & Service Stations 1930-1991
Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories and Sands & McDougall's Directories, from years 1991, 1973, 1965, 1955, 1950, 1940 & 1930, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer					

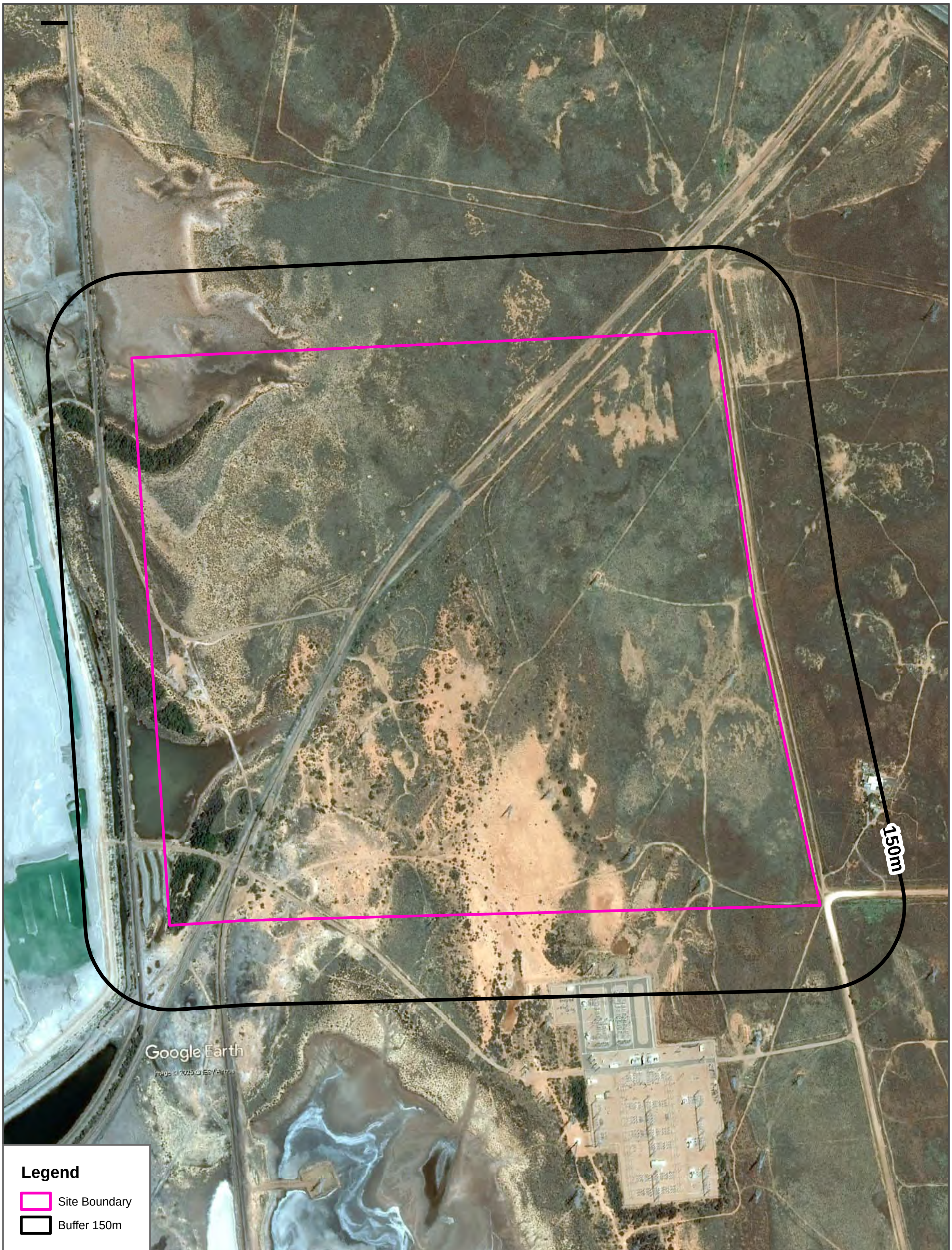
Aerial Imagery 2024

420 Northern Power Station Road, Port Paterson, SA 5700

Scale: 0 110 220 330 440 Meters	Data Source Aerial Imagery: © 2025 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Aerial Imagery 2013

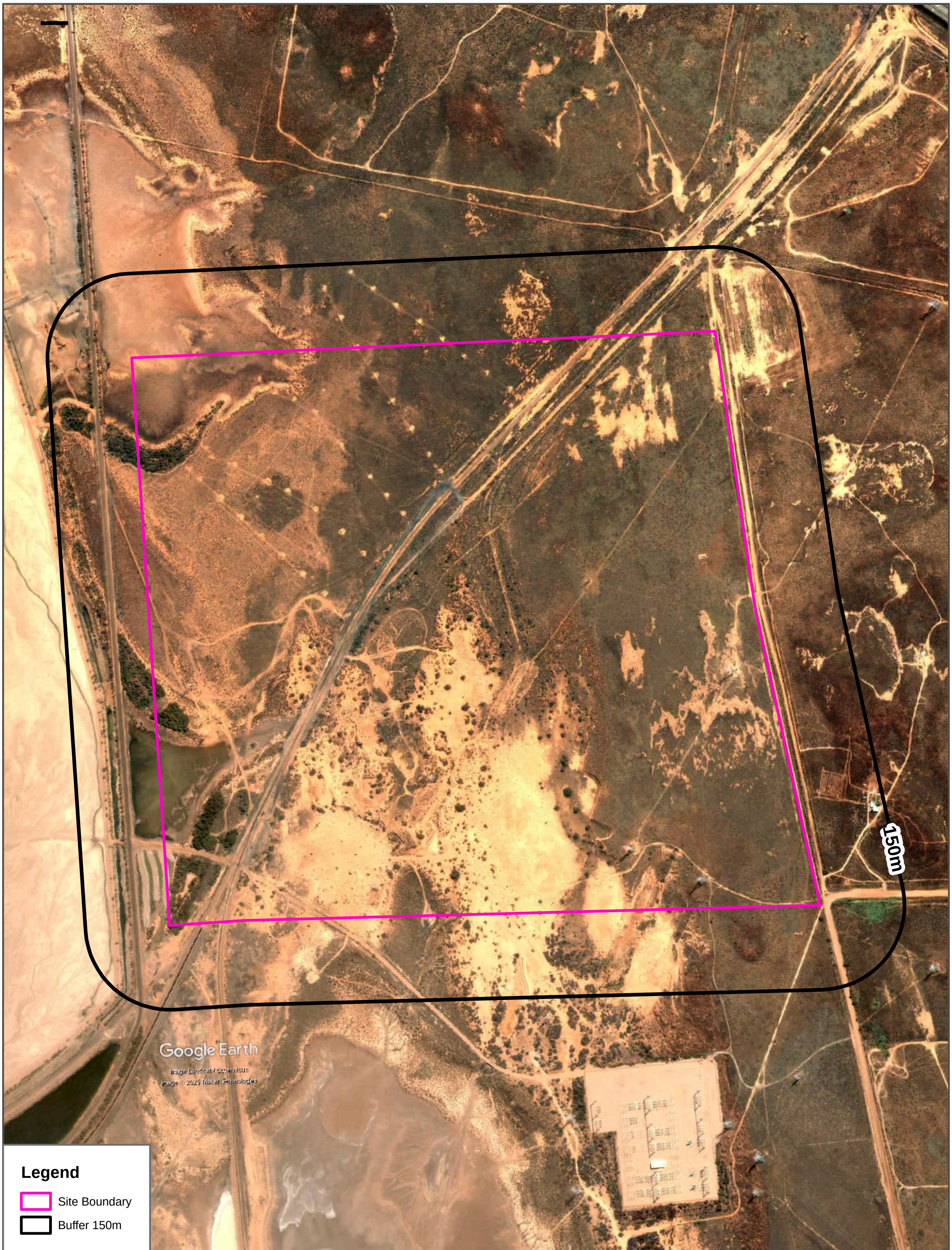
420 Northern Power Station Road, Port Paterson, SA 5700



Scale: 0 110 220 330 440 Meters	Data Source Aerial Imagery: © 2025 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Aerial Imagery 2004

420 Northern Power Station Road, Port Paterson, SA 5700



Scale: 0 110 220 330 440 Meters	Data Source Aerial Imagery: © 2025 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Aerial Imagery 1996

420 Northern Power Station Road, Port Paterson, SA 5700

Scale:
0 100 200 300 400
Meters

Scale: 0 100 200 300 400 Meters	Data Sources Aerial Imagery: © South Australia Department for Environment & Water	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Aerial Imagery 1984

420 Northern Power Station Road, Port Paterson, SA 5700

Scale: 0 110 220 330 440 Meters

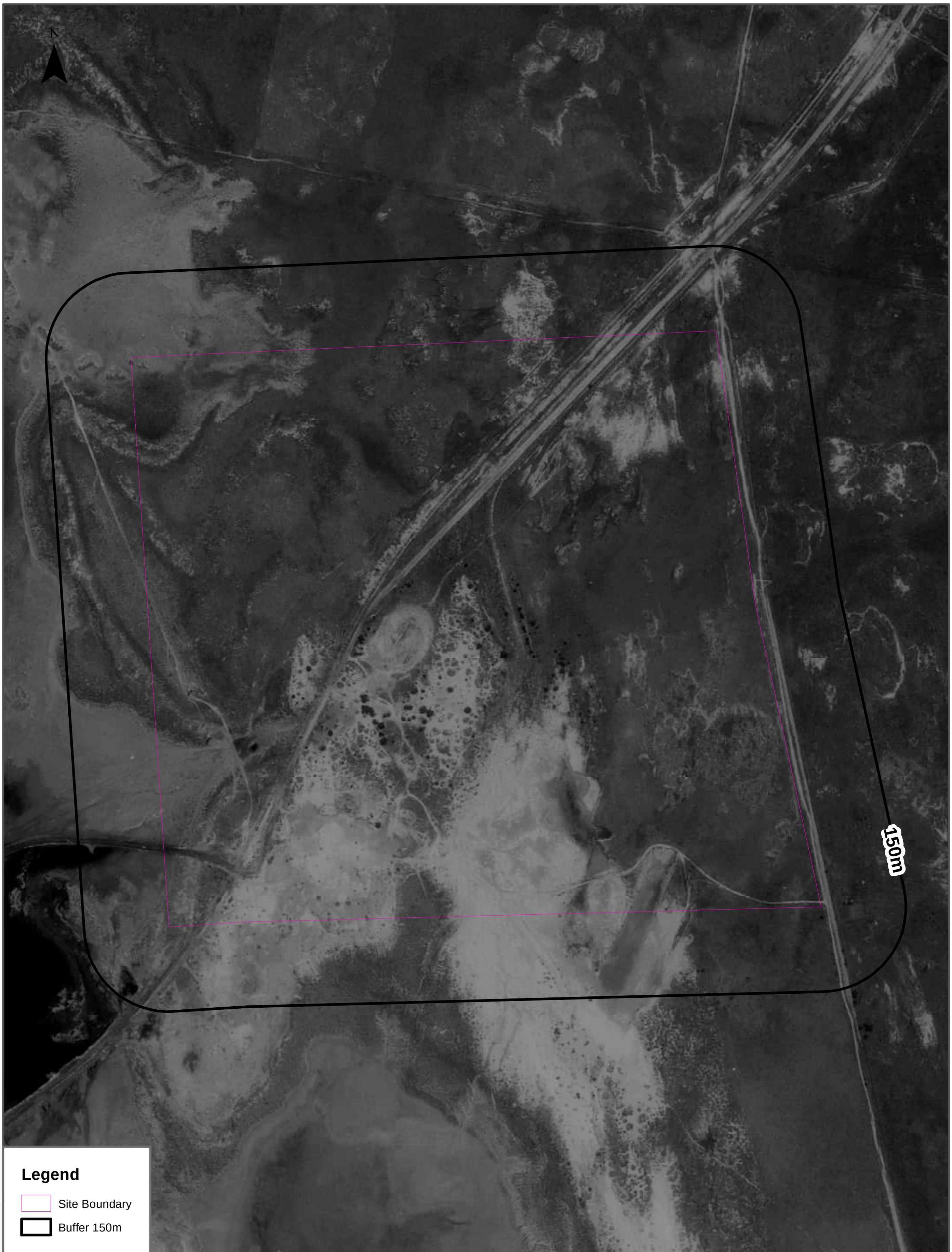
Data Sources Aerial Imagery: © South Australia Department for Environment & Water

Coordinate System: GDA 1994 MGA Zone 54

Date: 23 October 2025

Aerial Imagery 1974

420 Northern Power Station Road, Port Paterson, SA 5700

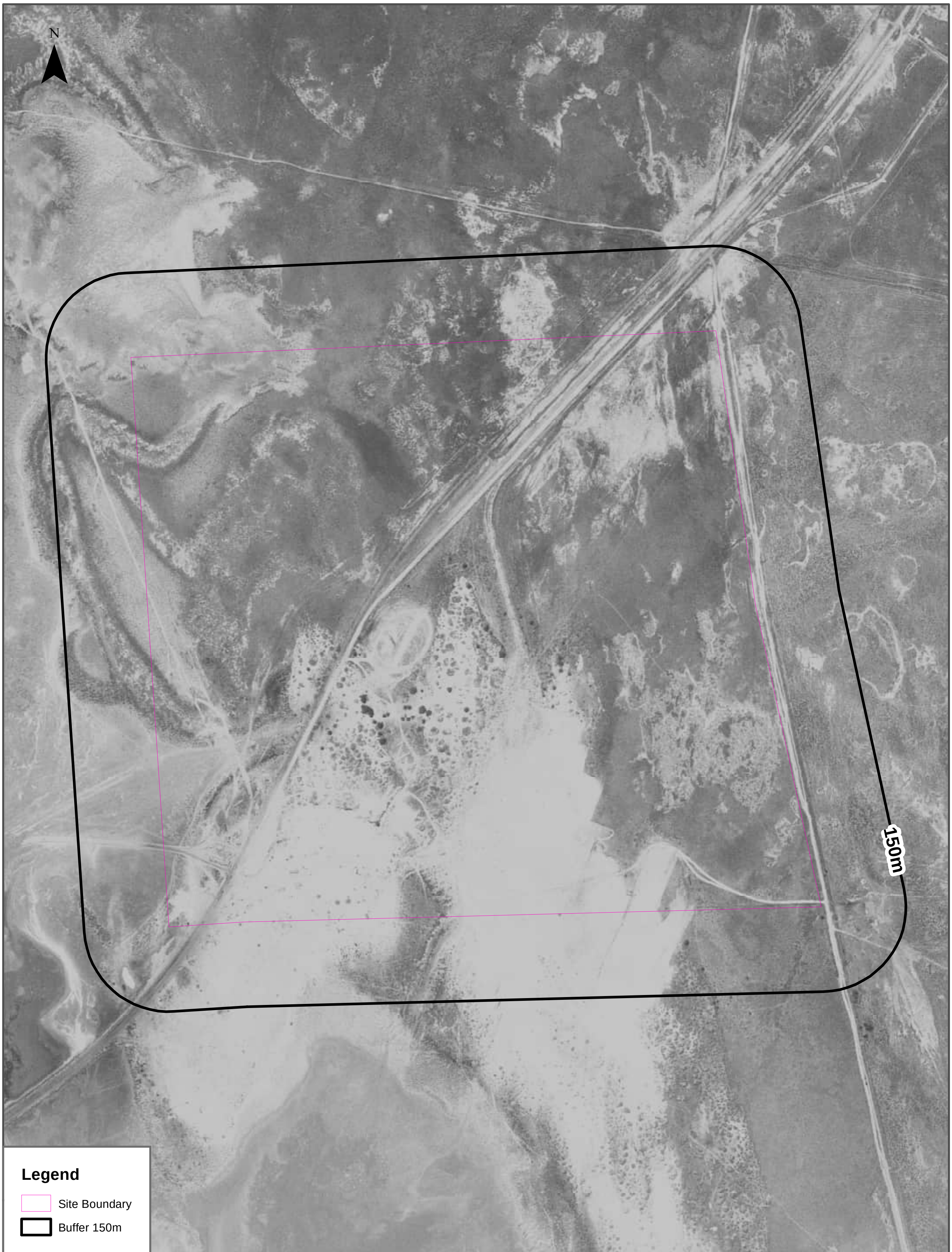


Scale:
0 100 200 300 400
Meters

	Data Sources Aerial Imagery: © South Australia Department for Environment & Water	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Aerial Imagery 1969

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

Site Boundary

Buffer 150m

Scale: 0 100 200 300 400 Meters	Data Sources Aerial Imagery: © South Australia Department for Environment & Water	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Aerial Imagery 1965

420 Northern Power Station Road, Port Paterson, SA 5700

Scale:
0 100 200 300 400
Meters

Data Sources Aerial Imagery: © South Australia Department for Environment & Water

Coordinate System:
GDA 1994 MGA Zone 54

Date: 23 October 2025

Aerial Imagery 1954

420 Northern Power Station Road, Port Paterson, SA 5700

Scale: 0 100 200 300 400 Meters	Data Sources Aerial Imagery: © South Australia Department for Environment & Water	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

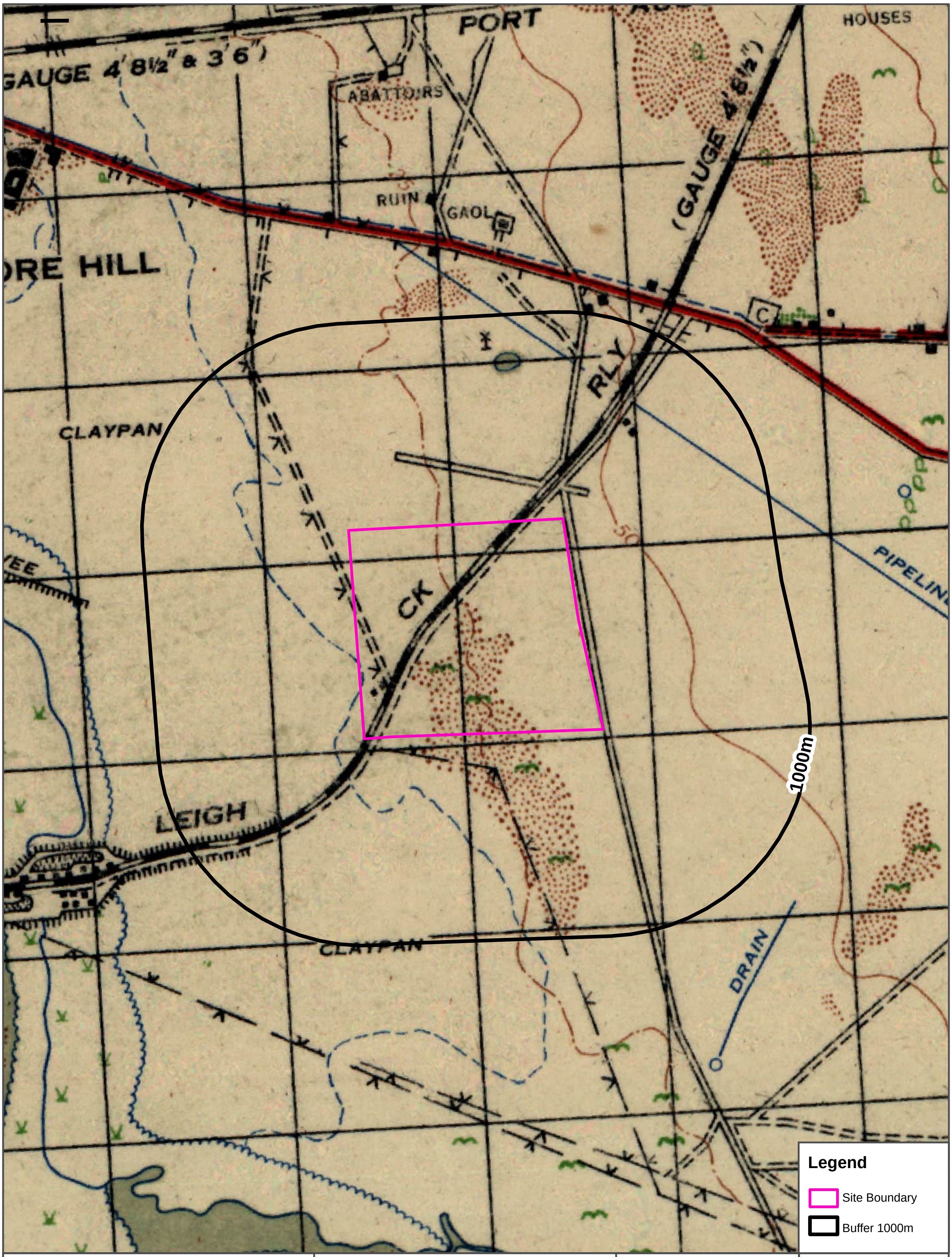
Historical Map 1982

420 Northern Power Station Road, Port Paterson, SA 5700

Scale: 0 200 400 800 1,200 Metres	Data Sources: NATMAP 1:100,000 Topographic Maps Geoscience Australia	Coordinate System: GDA 1994 MGA Zone 54	Date: 24 October 2025

Historical Map c.1955

420 Northern Power Station Road, Port Paterson, SA 5700



Scale: 0 200 400 800 1,200 Metres

Data Sources: Australia 1:63,360 Prepared by Commonwealth Section Imperial General Staff

Coordinate System: GDA 1994 MGA Zone 54

Date: 24 October 2025

Mining

420 Northern Power Station Road, Port Paterson, SA 5700

Mines and Mineral Deposits

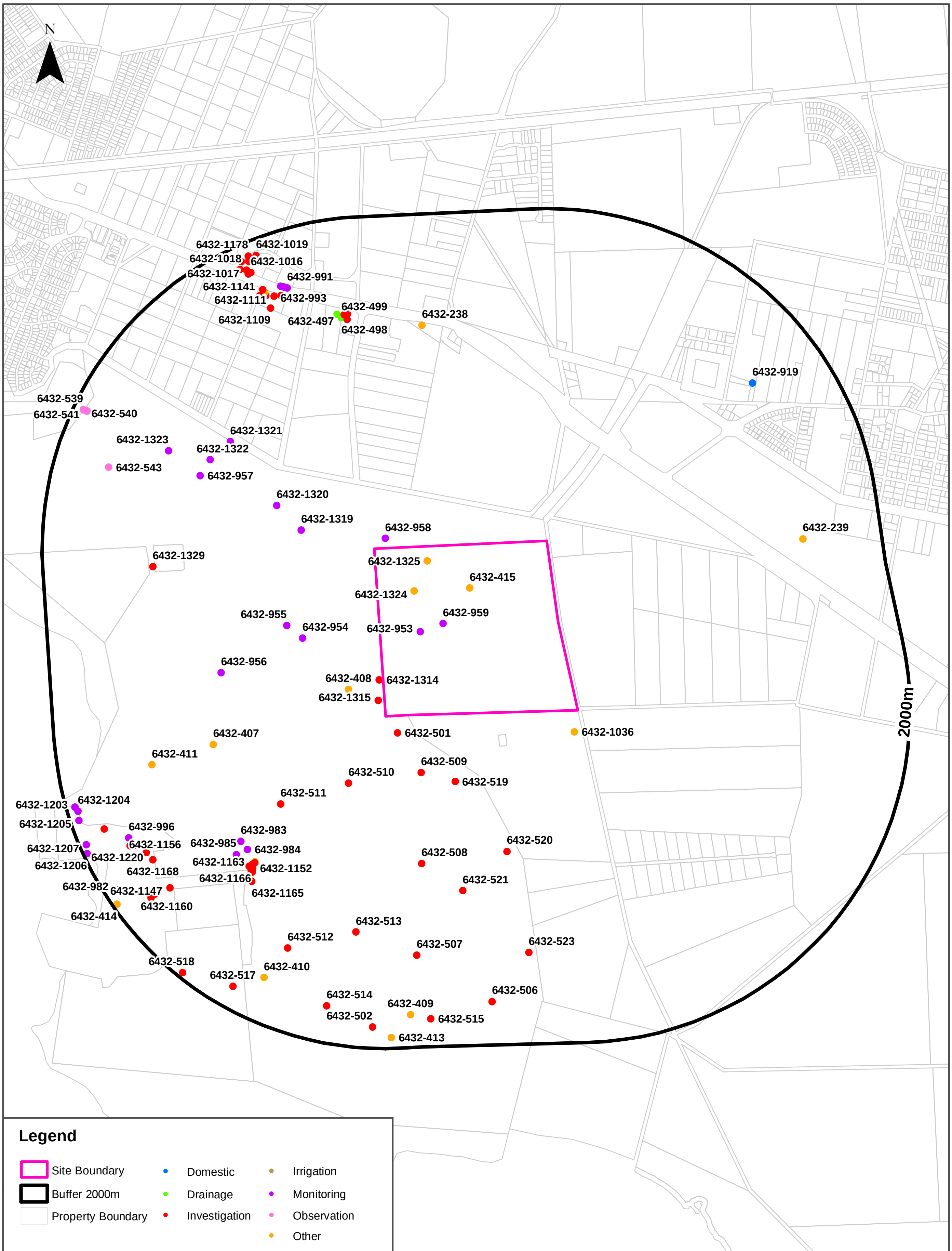
Mines and mineral deposits within the dataset buffer:

Deposit No.	Name	Class	Status	Commodity	Year	Description	Dist	Dir
N/A	No records in buffer							

All Mines and Mineral Deposits Data Source: Dept. of State Development, Resources and Energy - South Australia

Drillholes

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

Site Boundary	Domestic	Irrigation
Buffer 2000m	Drainage	Monitoring
Property Boundary	Investigation	Observation
		Other

Scale: 0 200 400 800 1,200 1,600 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Hydrogeology & Groundwater

420 Northern Power Station Road, Port Paterson, SA 5700

Hydrogeology

Description of aquifers within the dataset buffer:

Description	Distance	Direction
Porous, extensive aquifers of low to moderate productivity	0m	On-site

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

Drillholes

Drillholes within the dataset buffer:

Unit No	Drillhole No	Status	Purpose	Drill Date	Max Depth (m)	Ref Elev (m AHD)	Ground Elev (m)	pH	TDS (mg/L)	Yield (L/sec)	DTW (m)	SWL (m)	RSWL (m AHD)	Dist	Dir
6432-1324	386851	Backfilled												0m	On-site
		Aquifer Description								**Class**	Water Well				
6432-1325	386852	Backfilled												0m	On-site
		Aquifer Description								**Class**	Water Well				
6432-415	24508	Abandoned		1976-03-22	6.75				16359		3.75	3.75		0m	On-site
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Engineering Well				
6432-953	171190		Monitoring	1998-10-22	7.00		7.10			0.1000	2.60	2.60	4.50	0m	On-site
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-959	171295		Monitoring	1998-10-22	7.00		8.30			0.1000	2.60	2.60	5.70	0m	On-site
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1314	371196	Backfilled	Investigation	2022-08-16			7.40							24m	South West
		Aquifer Description								**Class**	Water Well				
6432-1315	371197	Backfilled	Investigation	2022-08-17			7.00							37m	South West
		Aquifer Description								**Class**	Water Well				
6432-958	171294		Monitoring	1998-10-22	7.00		5.60			0.1000	2.60	2.60	3.00	59m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-501	24594	Operational	Investigation; Observation	1981-11-23	1.84		6.20	7.80	55563		0.83	0.83	5.37	101m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1036	239680	Suspended		2009-03-02	372.20	8.32	8.32							127m	South East
		Aquifer Description								**Class**	Petroleum Well				
6432-408	24501	Abandoned		1976-03-19	6.90			7.10	110500		1.85	1.85		213m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Engineering Well				
6432-509	24602	Operational	Investigation; Irrigation; Observation	1981-11-23	1.11		5.20	7.00	143647		0.36	0.36	4.84	348m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-519	24612	Operational	Investigation; Observation	1981-11-23	0.94		5.80	7.00	142116		0.17	0.17	5.63	407m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1319	386843	Dry	Monitoring	2023-12-06	5.00									456m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				

Unit No	Drillhole No	Status	Purpose	Drill Date	Max Depth (m)	Ref Elev (m AHD)	Ground Elev (m)	pH	TDS (mg/L)	Yield (L/sec)	DTW (m)	SWL (m)	RSWL (m AHD)	Dist	Dir
6432-510	24603	Operational	Investigation; Observation	1981-11-23	1.16		5.30	6.90	139819		0.14	0.14	5.16	458m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-954	171290		Monitoring	1998-10-22	7.00		7.90			0.1000	2.60	2.60	5.30	468m	West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-955	171291		Monitoring	1998-10-22	7.00		7.60			0.1000	2.60	2.60	5.00	557m	West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-1320	386844	Dry	Monitoring	2023-12-06	3.70									643m	North West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-511	24604	Operational	Investigation; Observation	1981-11-23	0.98		8.70	7.30	120084		0.23	0.23	8.47	822m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-520	24613	Operational	Investigation; Observation	1981-11-23	1.19		6.00	7.30	99744		0.68	0.68	5.32	835m	South
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-508	24601	Operational	Investigation; Observation	1981-11-23	1.59		4.40	6.80	145179		0.44	0.44	3.96	896m	South
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-956	171292		Monitoring	1998-10-22	7.00		9.60			0.1000	2.60	2.60	7.00	970m	West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-407	24500	Abandoned		1976-03-17	9.45			7.10	137258		1.67	1.67		1051m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Engineering Well				
6432-521	24614	Operational	Investigation; Observation	1981-11-23	1.51		4.00	7.50	103813		0.71	0.71	3.29	1064m	South
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-1321	386845	Dry	Monitoring	2023-12-07	4.70									1081m	North West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-1322	386846	Dry	Monitoring	2023-12-07	5.00									1124m	North West
		Aquifer Description								**Class**	Water Well				
6432-957	171293		Monitoring	1998-10-22	7.00		7.60			0.1000	2.60	2.60	5.00	1138m	North West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-983	191106	Backfilled	Monitoring	1999-03-03	6.00		8.00			0.1000	2.00	2.00	6.00	1150m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-984	191107		Monitoring	1999-03-03	6.00		8.60			0.1000	2.00	2.00	6.60	1155m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-1153	289555	Backfilled		2016-06-15	4.50		9.70							1178m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-1159	289561	Backfilled	Investigation	2016-06-07	11.50		9.70							1179m	South West
		Aquifer Description								**Class**	Water Well				
6432-1217	313542		Investigation	2018-08-06	4.50		9.60							1195m	South West
		Aquifer Description								**Class**	Water Well				
6432-1163	289566		Investigation	2016-06-21	5.50		9.60				3.50	3.50	6.10	1200m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				
6432-1218	313541		Investigation	2018-08-06	4.50		10.00							1210m	South West
		Aquifer Description								**Class**	Water Well				
6432-1166	289569		Investigation		4.50		9.60				2.40	2.40	7.20	1211m	South West
		Aquifer Description	Saint Kilda Formation [SU4572]							**Class**	Water Well				

Unit No	Drillhole No	Status	Purpose	Drill Date	Max Depth (m)	Ref Elev (m AHD)	Ground Elev (m)	pH	TDS (mg/L)	Yield (L/sec)	DTW (m)	SWL (m)	RSWL (m AHD)	Dist	Dir
6432-1152	289554	Backfilled	Investigation	2016-06-15	4.50		10.00							1215m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1219	313540		Investigation	2018-08-07	4.50		9.60							1220m	South West
		Aquifer Description								**Class**	Water Well				
6432-985	191108		Monitoring	1999-03-03	6.00		7.30			0.1000	2.00	2.00	5.30	1222m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1164	289567		Investigation	2016-06-20	4.50		10.00				2.80	2.80	7.20	1228m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1117	262697	Backfilled	Investigation	2010-08-27	4.60		8.20				2.50	2.50	5.70	1229m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1167	289570		Investigation	2016-06-20	4.50		10.10				2.70	2.70	7.40	1233m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1165	289568		Investigation	2016-06-21	4.50		9.50				2.40	2.40	7.10	1278m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-513	24606	Operational	Investigation; Observation	1981-11-23	2.69		4.60	7.40	101372		1.02	1.02	3.58	1310m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-238	24331	Backfilled			140.82		10.30		8282					1332m	North
		Aquifer Description		Gibbon Beds [SU3595]						**Class**	Water Well				
6432-1329	391370		Investigation	2024-07-09	6.00						2.90	2.90		1338m	West
		Aquifer Description								**Class**	Water Well				
6432-1323	386847		Monitoring	2023-12-07	5.00									1372m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1326	391171		Investigation	2024-05-04	5.00						2.60	2.60		1391m	North
		Aquifer Description								**Class**	Water Well				
6432-499	24592	Operational	Drainage	1986-12-01	13.40		7.40	7.50	14677	0.4500				1405m	North
		Aquifer Description								**Class**	Water Well				
6432-497	24590	Operational	Drainage	1986-11-29	48.00		7.40	7.20	11908	0.2500				1406m	North
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-498	24591	Operational	Drainage	1986-11-30	15.00		7.40		13397	0.7600				1406m	North
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-1328	391173		Investigation	2024-05-04	5.00						2.20	2.20		1422m	North
		Aquifer Description								**Class**	Water Well				
6432-1327	391172		Investigation	2024-05-03	5.00						2.60	2.60		1423m	North
		Aquifer Description								**Class**	Water Well				
6432-500	24593	Operational	Drainage	1986-12-03	6.00		7.30	7.60	14611	1.2600				1430m	North West
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-411	24504			1976-03-26	21.00				46200		5.50	5.50		1437m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Engineering Well				
6432-507	24600	Operational	Investigation; Observation	1981-11-23	2.75		6.80	7.30	99744		1.36	1.36	5.44	1445m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-523	24616	Operational	Investigation; Observation	1981-11-23	2.01		5.30	7.40	102999		0.34	0.34	4.96	1448m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				

Unit No	Drillhole No	Status	Purpose	Drill Date	Max Depth (m)	Ref Elev (m AHD)	Ground Elev (m)	pH	TDS (mg/L)	Yield (L/sec)	DTW (m)	SWL (m)	RSWL (m AHD)	Dist	Dir
6432-512	24605	Operational	Investigation; Observation	1981-11-23	2.64		5.50	7.30	116016		1.69	1.69	3.81	1514m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-239	24332	Unknown			15.24		21.90			0.0789				1529m	East
		Aquifer Description								**Class**	Water Well				
6432-919	169782	Abandoned	Domestic	1998-07-31	41.00		24.10		10318	0.2000	23.00	23.00	1.10	1562m	North East
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-1109	258850		Investigation	2010-08-25	3.50		5.20				0.74	0.74	4.46	1579m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1112	258855		Investigation	2010-08-24	3.50		6.00				0.54	0.54	5.46	1626m	North West
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-1111	258852		Investigation	2010-08-25	3.50		5.80				0.58	0.58	5.22	1636m	North West
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-1168	289591		Investigation	2016-06-10	4.30		6.00							1646m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-991	197165		Monitoring	2002-09-12	3.50		5.90				0.94	0.94	4.96	1655m	North West
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-1110	258851		Investigation	2010-08-26	3.50		3.80				0.98	0.98	2.82	1657m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1147	289445		Investigation	2016-06-03	4.80		6.20							1657m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1169	289592		Investigation	2016-06-10	4.30		5.70							1658m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1140	287495			2014-01-30	3.50		3.80				1.00	1.00	2.80	1667m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-992	197166		Monitoring	2002-09-12	3.50		5.80				0.79	0.79	5.01	1669m	North West
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-1142	287497		Investigation	2014-01-30	3.50		3.30				0.70	0.70	2.60	1673m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-543	24636	Operational	Observation	1988-09-13	1.47		4.20	7.00	65259		0.41	0.41	3.79	1674m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1139	287494			2014-01-29	3.50		4.20							1679m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-993	197167		Monitoring	2002-09-12	3.50		5.80				0.75	0.75	5.05	1680m	North West
		Aquifer Description		Pooraka Formation [SU4073]						**Class**	Water Well				
6432-1141	287496		Investigation	2014-01-30	3.50		4.80				0.50	0.50	4.30	1699m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1158	289560		Investigation	2016-06-09	4.30		5.30							1701m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-996	198205		Monitoring	2003-09-17	4.00		4.90			0.0100	2.13	2.13	2.77	1709m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1220	313550		Investigation	2018-08-07	4.50		5.20							1725m	South West
		Aquifer Description								**Class**	Water Well				
6432-410	24503	Abandoned		1976-04-01	9.90						2.45	2.45		1734m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Engineering Well				

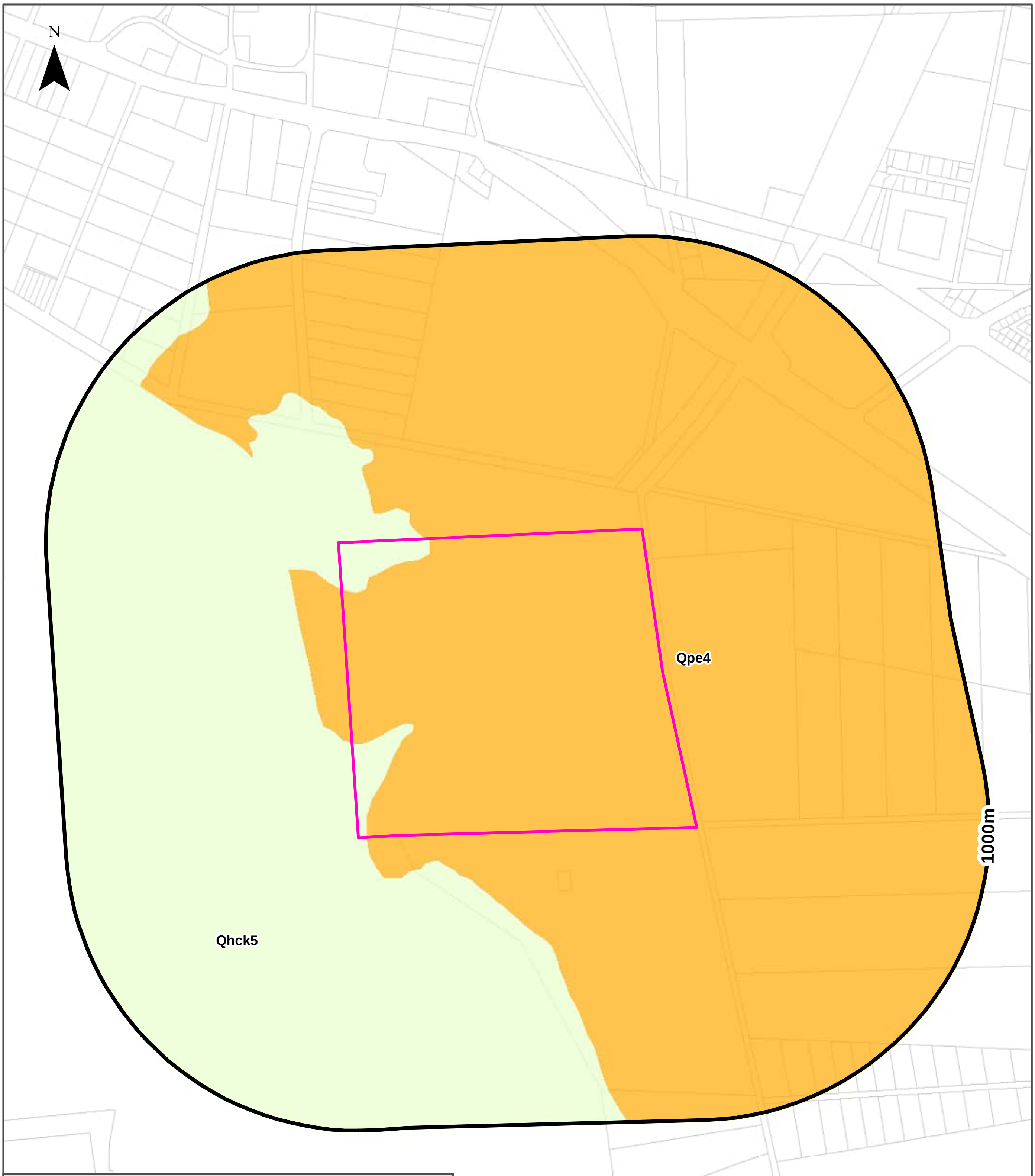
Unit No	Drillhole No	Status	Purpose	Drill Date	Max Depth (m)	Ref Elev (m AHD)	Ground Elev (m)	pH	TDS (mg/L)	Yield (L/sec)	DTW (m)	SWL (m)	RSWL (m AHD)	Dist	Dir
6432-506	24599	Operational	Investigation; Observation	1981-11-23	2.70		5.20	7.30	113575		0.85	0.85	4.35	1736m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1222	313538		Investigation	2018-08-08	4.50		6.00							1748m	South West
		Aquifer Description								**Class**	Water Well				
6432-1160	289562		Investigation	2016-06-14	12.50		6.70							1755m	South West
		Aquifer Description								**Class**	Water Well				
6432-1156	289558		Investigation	2016-06-09	6.50		5.40							1756m	South West
		Aquifer Description								**Class**	Water Well				
6432-514	24607	Operational	Investigation; Observation	1981-11-23	2.22		4.80	7.40	98931		1.22	1.22	3.58	1779m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1221	313539		Investigation	2018-08-07	4.50		6.50							1783m	South West
		Aquifer Description								**Class**	Water Well				
6432-409	24502	Abandoned		1976-04-10	20.00				51800		4.65	4.65		1800m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Engineering Well				
6432-1016	241617		Investigation	2008-08-04	4.50		5.20				0.80	0.80	4.40	1822m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1181	294180		Investigation	2017-02-21	3.50		4.60				0.90	0.90	3.70	1822m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1146	289444		Investigation	2016-06-02	5.00		5.70							1826m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-515	24608	Operational	Investigation; Observation	1981-11-23	3.22		6.60	7.60	85171		1.92	1.92	4.68	1829m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1017	241618		Investigation	2008-08-04	4.50		5.10				0.80	0.80	4.30	1845m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1180	294179		Investigation	2017-02-21	3.50		3.20				0.60	0.60	2.60	1865m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-517	24610	Operational	Investigation; Observation	1981-11-23	1.92		6.30	7.40	89168		0.95	0.95	5.35	1866m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-502	24595	Operational	Investigation; Observation	1981-11-23	2.30		5.60	7.40	88354		1.30	1.30	4.30	1869m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1018	241619		Investigation	2008-08-04	4.50		5.40				0.80	0.80	4.60	1888m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1019	241620		Investigation	2008-08-04	4.50		5.80				0.80	0.80	5.00	1904m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1179	294178		Investigation	2017-02-21	3.50		4.70				1.00	1.00	3.70	1906m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-541	24634	Operational	Observation	1988-09-12	1.82		5.40	6.80	93155		0.98	0.98	4.42	1918m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-542	24635	Operational	Observation	1988-09-13	1.15		5.40	7.00	74648		0.05	0.05	5.35	1918m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1178	294177		Investigation	2017-02-21	3.50		5.50				1.00	1.00	4.50	1920m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				

Unit No	Drillhole No	Status	Purpose	Drill Date	Max Depth (m)	Ref Elev (m AHD)	Ground Elev (m)	pH	TDS (mg/L)	Yield (L/sec)	DTW (m)	SWL (m)	RSWL (m AHD)	Dist	Dir
6432-982	191105		Monitoring	1999-03-03	6.00		5.70			0.1000	2.00	2.00	3.70	1928m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-413	24506	Abandoned		1976-04-07	3.00									1931m	South
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Engineering Well				
6432-540	24633	Operational	Observation	1988-09-12	1.96		5.40	6.90	65722		0.69	0.69	4.71	1936m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1204	316795		Monitoring	2019-03-13	5.50		5.90							1937m	South West
		Aquifer Description								**Class**	Water Well				
6432-539	24632	Operational	Observation	1988-09-12	2.18		5.50	6.70	67203		0.53	0.53	4.97	1942m	North West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-1203	316797		Monitoring	2019-03-13	5.50		5.90							1947m	South West
		Aquifer Description								**Class**	Water Well				
6432-1205	316794		Monitoring	2019-03-13	5.70		6.00							1949m	South West
		Aquifer Description								**Class**	Water Well				
6432-1207	316792		Monitoring	2019-03-16	5.90		6.50							1960m	South West
		Aquifer Description								**Class**	Water Well				
6432-518	24611	Operational	Investigation; Observation	1981-11-23	1.10		8.40	7.00	158885		0.20	0.20	8.20	1967m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Water Well				
6432-414	24507	Abandoned		1976-04-13	11.40				46900		1.10	1.10		1973m	South West
		Aquifer Description		Saint Kilda Formation [SU4572]						**Class**	Engineering Well				
6432-1206	316793		Monitoring	2019-03-16	5.80		6.40							1976m	South West
		Aquifer Description								**Class**	Water Well				

Drillholes Data Source: Dept of Environment, Water and Natural Resources - South Australia

Geology 1:100,000

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary

Linear Feature

- Alluvial fan
- Dyke
- Fault
- Fold
- Gilgai
- Joint
- Lineament
- Open cut quarry
- Shear zone
- Other Linear Feature

Scale: 0 100 200 400 600 800 1,000 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Geology

420 Northern Power Station Road, Port Paterson, SA 5700

Surface Geology 1:100,000

Surface Geology Units within the dataset buffer:

Map Unit Code	Name	Description	Parent Name	Province	Age	Min Age	Max Age	Dist	Dir
Qhck5	Saint Kilda Formation unit 5	Supratidal sand/mud flats: gypseous clay.	Saint Kilda Formation	UNKNOWN	HOLOCENE	Holocene	Holocene	0m	On-site
Qpe4	Pleistocene aeolian unit 4	Pleistocene coastal plain dune sand.	Pleistocene aeolian sediments	UNKNOWN	PLEISTOCENE	Pleistocene	Pleistocene	0m	On-site

Geology Data Source: Dept of Environment, Water and Natural Resources - South Australia

Linear Structures 1:100,000

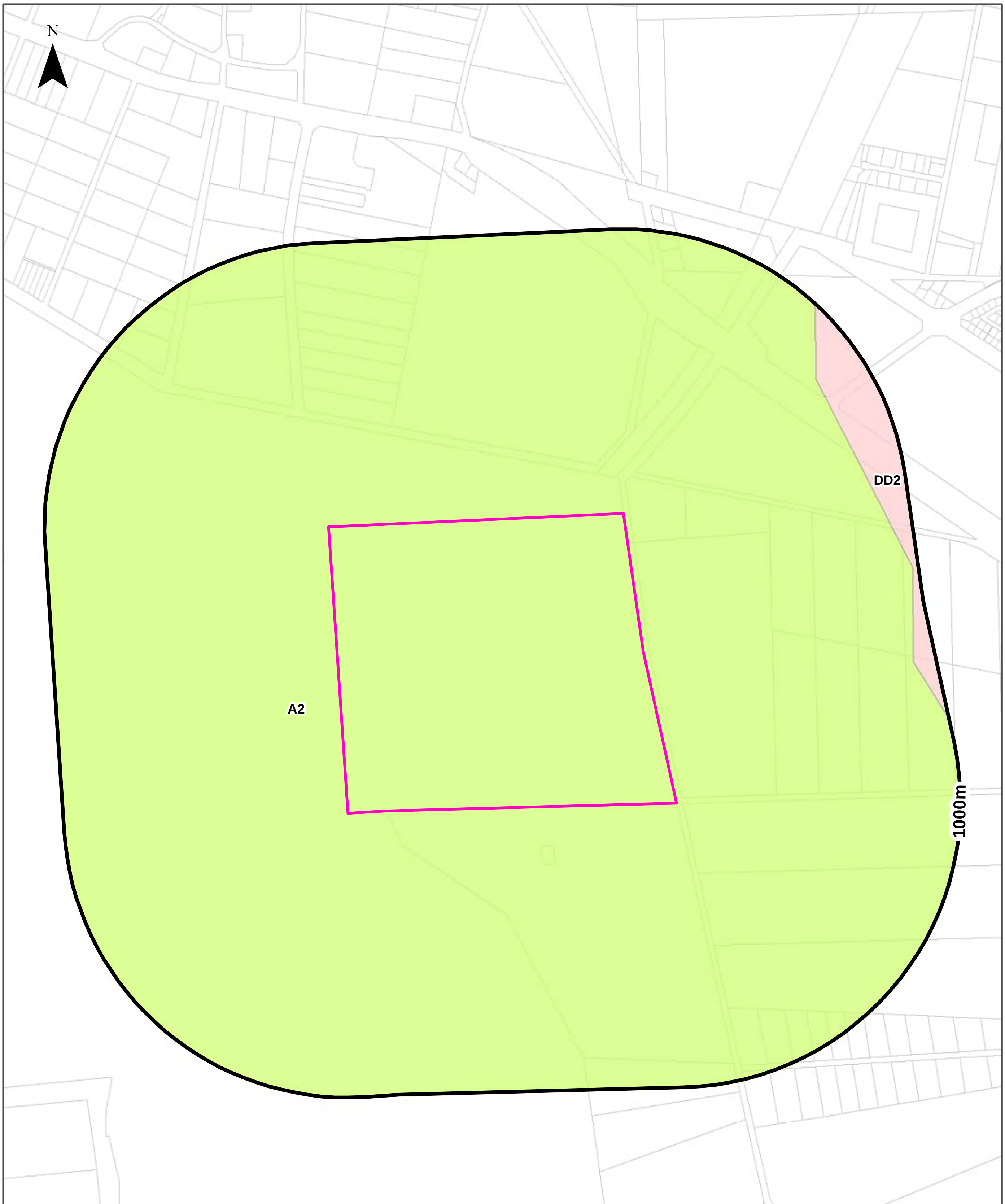
Linear geological structures within the dataset buffer:

Map Code	Description	Distance	Direction
N/A	No records in buffer		

Geology Data Source: Dept of Environment, Water and Natural Resources - South Australia

Atlas of Australian Soils

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

Site Boundary
Buffer 1000m
Property Boundary

Australian Soil Classification Orders

Anthroposol
Calcarosol
Chromosol
Dermosol
Ferrosol
Hydrosol
Kandosol
Kurosol
Organosol
Podosol
Rudosol
Sodosol
Tenosol
Vertosol
Lake
No Data

Scale: 0 100 200 400 600 800 1,000 Meters

Data Sources:
Property Boundaries Sourced by Land Services SA
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Coordinate System:
GDA 1994 MGA Zone 54

Date: 23 October 2025

Soils

420 Northern Power Station Road, Port Paterson, SA 5700

Atlas of Australian Soils

Soil mapping units and Australian Soil Classification orders within the dataset buffer:

Map Unit Code	Soil Order	Map Unit Description	Distance	Direction
A2	Rudosol	Coastal dunes and plains with some swamps: dunes of calcareous sands (Uc1.11) and also siliceous sands (Uc1.22); plains of various saline soils (unclassified) and lesser areas of brown calcareous earths (Gc1.1 and Gc1.2).	0m	On-site
DD2	Calcarosol	Plains with more or less isolated tracts of dunes: broad plains of brown calcareous earths (especially Gc1.12) with areas of exposed caliche and crusty loamy soils (Dr1.33), (Dr1.43), and (Dr1.13), with clay pans, saline soils (unclassified), swamps, and intermittent lakes in the lower-lying portions; also dunes of brown sands (Uc5.1) and brown calcareous earths (Gc1.22).	818m	North East

Atlas of Australian Soils Data Source: CSIRO

Soils

420 Northern Power Station Road, Port Paterson, SA 5700

Soil Types

Soil types within the dataset buffer:

Map category code	Soil type description	Distance	Direction
N/A	No records in buffer		

Soil Types Data Source: Dept of Environment, Water and Natural Resources - South Australia

Atlas of Australian Acid Sulfate Soils

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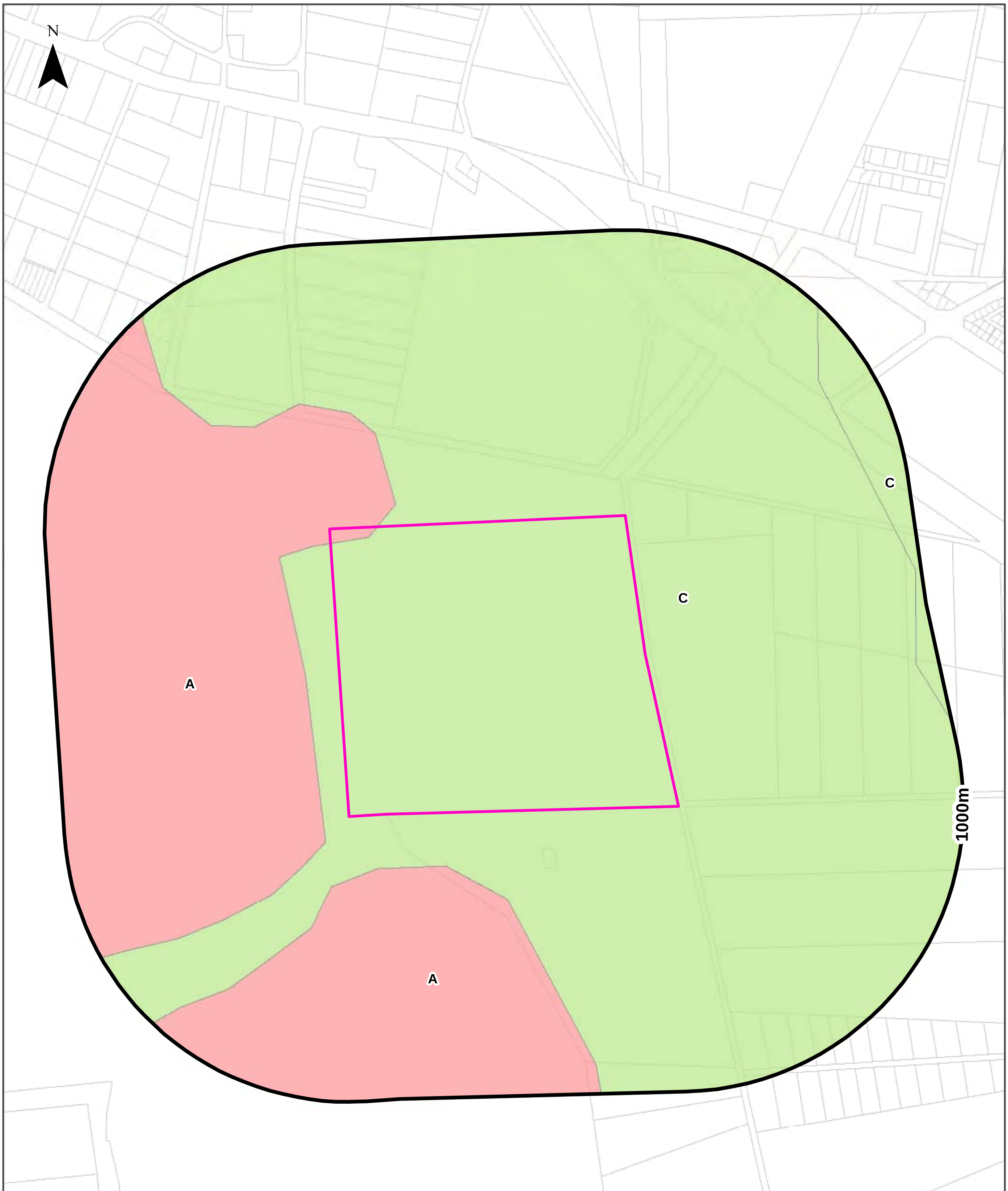

Legend

Site Boundary	**Probability of occurrence of Acid Sulfate Soils**		
Buffer 1000m	A. High (>70%)	C. Extremely Low (1-5%)	
Property Boundary	B. Low (6-70%)	D. No Chance (0%)	

Scale: 0 100 200 400 600 800 1,000 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Acid Sulfate Soils

420 Northern Power Station Road, Port Paterson, SA 5700

Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance	Direction
A	High Probability of occurrence. >70% chance of occurrence.	0m	On-site
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m	On-site

Atlas of Australian Acid Sulfate Soils Data Source: CSIRO

Acid Sulfate Soils

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Acid Sulfate Soil Potential

Acid sulfate soil potential within the dataset buffer:

Map category code	Proportion of land susceptible to the development of acid sulfate soils	Distance	Direction
N/A	No records in buffer		

Acid Sulfate Soils Data Source: Dept of Environment, Water and Natural Resources - South Australia

Soil Salinity

420 Northern Power Station Road, Port Paterson, SA 5700

Soil Salinity - Watertable Induced

Watertable induced soil salinity within the dataset buffer:

Map category code	Severity description	Distance	Direction
N/A	No records in buffer		

Salinity Watertable Induced Data Source: Dept of Environment, Water and Natural Resources - South Australia

Soil Salinity - Non-Watertable

Non-watertable soil salinity within the dataset buffer:

Map category code	Severity description	Surface ECe (dS/m)	Subsoil ECe (dS/m)	Distance	Direction
N/A	No records in buffer				

Salinity Non-Watertable Data Source: Dept of Environment, Water and Natural Resources - South Australia

Soil Salinity - Non-Watertable (Magnesia Patches)

Magnesia patches within the dataset buffer:

Map category code	Proportion of land affected by magnesia patches	Distance	Direction
N/A	No records in buffer		

Salinity Non-Watertable (Magnesia Patches) Data Source: Dept of Environment, Water and Natural Resources - South Australia

Planning and Design Code Zones

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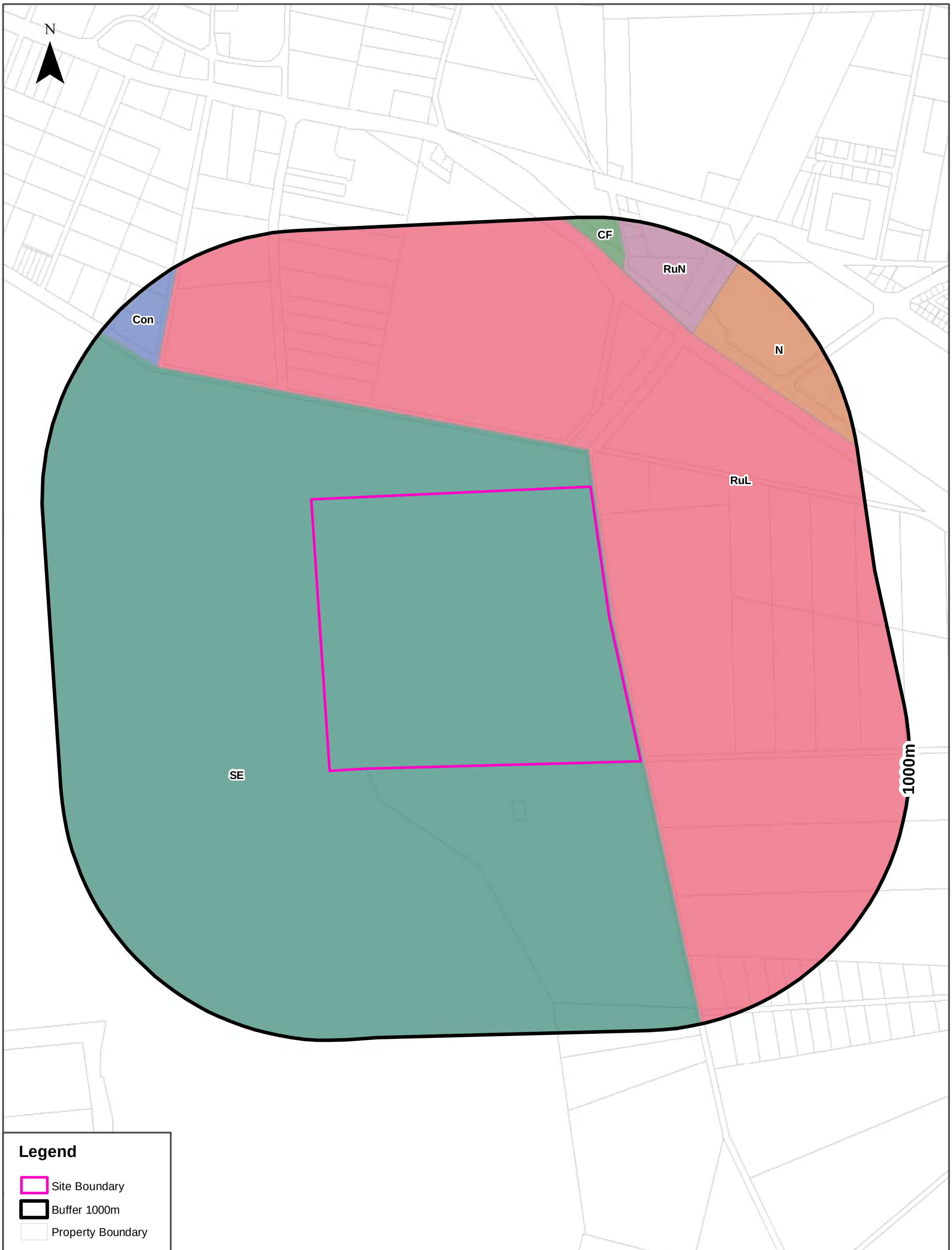

Legend

- Site Boundary
- Buffer 1000m
- Property Boundary

Scale: 0 100 200 400 600 800 1,000 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Planning

420 Northern Power Station Road, Port Paterson, SA 5700

Planning and Design Code - Zones

Planning and Design Code zones within the dataset buffer:

Map Id	Zone Code	Zone Name	Legal Start Date	Status	Distance	Direction
SE	Z5720	Strategic Employment	19/03/2021	0	0m	On-site
RuL	Z5405	Rural Living	19/03/2021	0	10m	North East
N	Z4201	Neighbourhood	19/03/2021	0	683m	North East
RuN	Z5408	Rural Neighbourhood	19/03/2021	0	685m	North East
Con	Z0904	Conservation	19/03/2021	0	756m	North West
CF	Z0903	Community Facilities	19/03/2021	0	815m	North

Planning and Design Code Zones Data Source: Attorney-General's Department - South Australia

Planning and Design Code - Subzones

Planning and Design Code subzones within the dataset buffer:

Map Id	Subzone Code	Subzone Name	Legal Start Date	Status	Distance	Direction
N/A	No records in buffer					

Planning and Design Code Subzones Data Source: Attorney-General's Department - South Australia

Land Use Generalised

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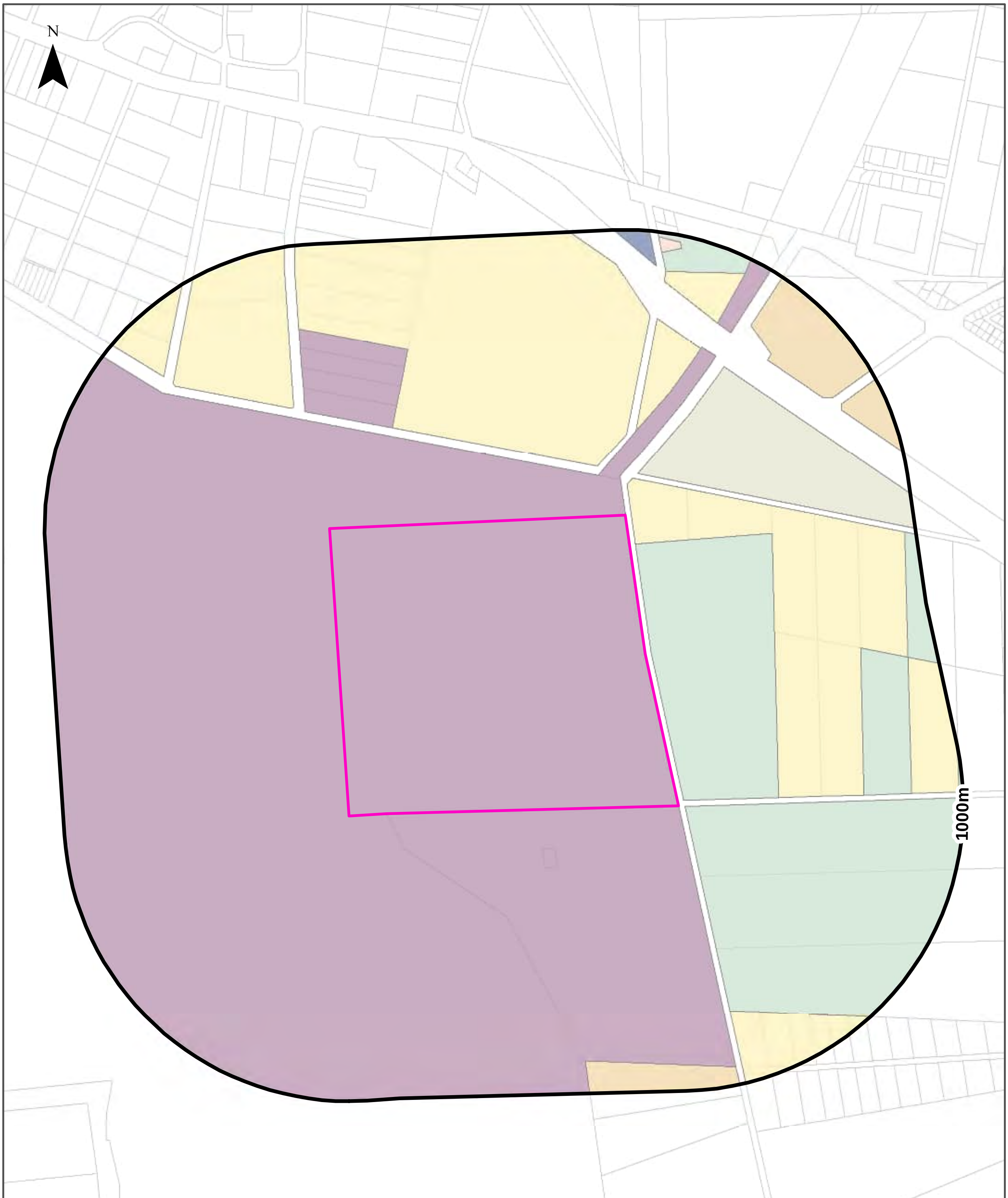

Legend

Site Boundary	No Description	Forestry	Non Private Residential	Retail Commercial
Buffer 1000m	Agriculture	Golf	Public Institution	Rural Residential
Property Boundary	Commercial	Horticulture	Recreation	Utilities or Industry
	Education	Livestock	Reserves	Vacant
	Food Industry	Mining or Quarrying	Residential	Vacant Urban Land

Scale: 0 100 200 400 600 800 1,000 Meters

Data Sources:
Property Boundaries Sourced by Land Services SA
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Coordinate System:
GDA 1994 MGA Zone 54

Date: 23 October 2025

Planning

420 Northern Power Station Road, Port Paterson, SA 5700

Land Use Generalised

Land use classes within the dataset buffer:

Description	Distance	Direction
Utilities or Industry	0m	On-site
Rural Residential	20m	East
Vacant	20m	East
Livestock	154m	North East
Vacant Urban Land	739m	North East
Public Institution	881m	North
Residential	932m	North

Land Use Generalised Data Source: Dept of Planning, Transport and Infrastructure - South Australia

Heading

420 Northern Power Station Road, Port Paterson, SA 5700

Commonwealth Heritage List

What are the Commonwealth Heritage List Items located within the dataset buffer?

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch

National Heritage List

What are the National Heritage List Items located within the dataset buffer?
Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch

State Heritage Areas

State Heritage Areas within the dataset buffer:

Heritage Id	Name	Distance	Direction
N/A	No records in buffer		

Heritage Areas Data Source: Dept of Environment, Water and Natural Resources - South Australia

SA Heritage Places

SA Heritage Places within the dataset buffer:

Heritage No	Location	Heritage Class	Australian Class	Details	Auth Date	Distance	Direction
N/A	No records in buffer						

Heritage Places Data Source: Dept of Environment, Water and Natural Resources - South Australia

Aboriginal Land

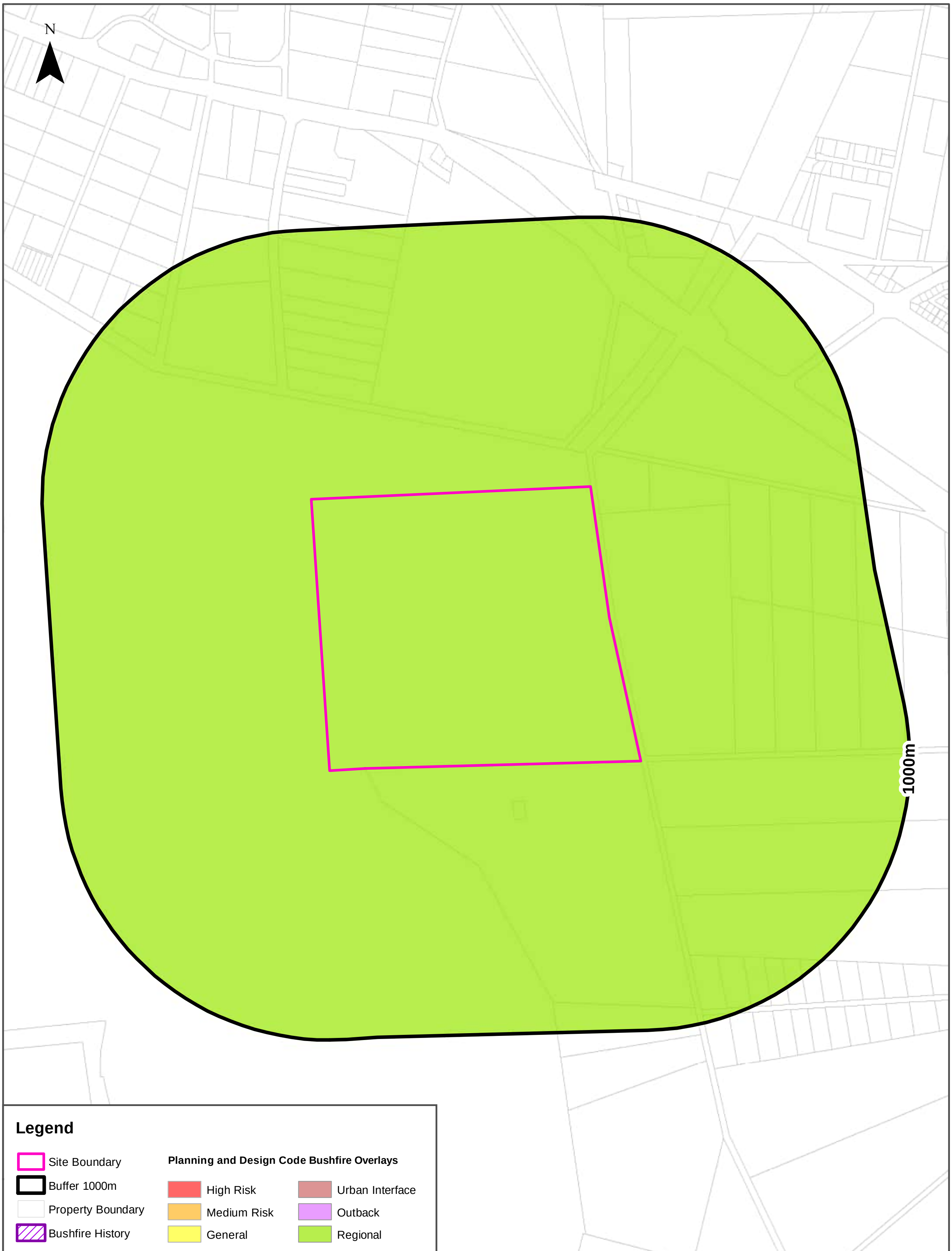
Aboriginal Land within the dataset buffer:

Map Id	Grant Date	Address	Locality	Description	Title	Distance	Direction
N/A	No records in buffer						

Aboriginal Land Data Source: Department of State Development, Resources and Energy - South Australia

Natural Hazards - Bushfire

420 Northern Power Station Road, Port Paterson, SA 5700



Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Natural Hazards

420 Northern Power Station Road, Port Paterson, SA 5700

Bushfire Overlays

Bushfire Overlays from the Planning and Design Code within the dataset buffer:

Overlay Id	Name	Description	Legal Start Date	Legal End Date	Distance	Direction
O2408	Hazards (Bushfire - Regional)	The Hazards (Bushfire - Regional) Overlay seeks to ensure development is located to minimise the threat and impact of bushfires on life and property and facilitate access for emergency service vehicles in regional areas.	19/03/2021		0m	On-site

Bushfire Overlays Data Source: Attorney-General's Department - South Australia

Bushfires and Prescribed Burns History

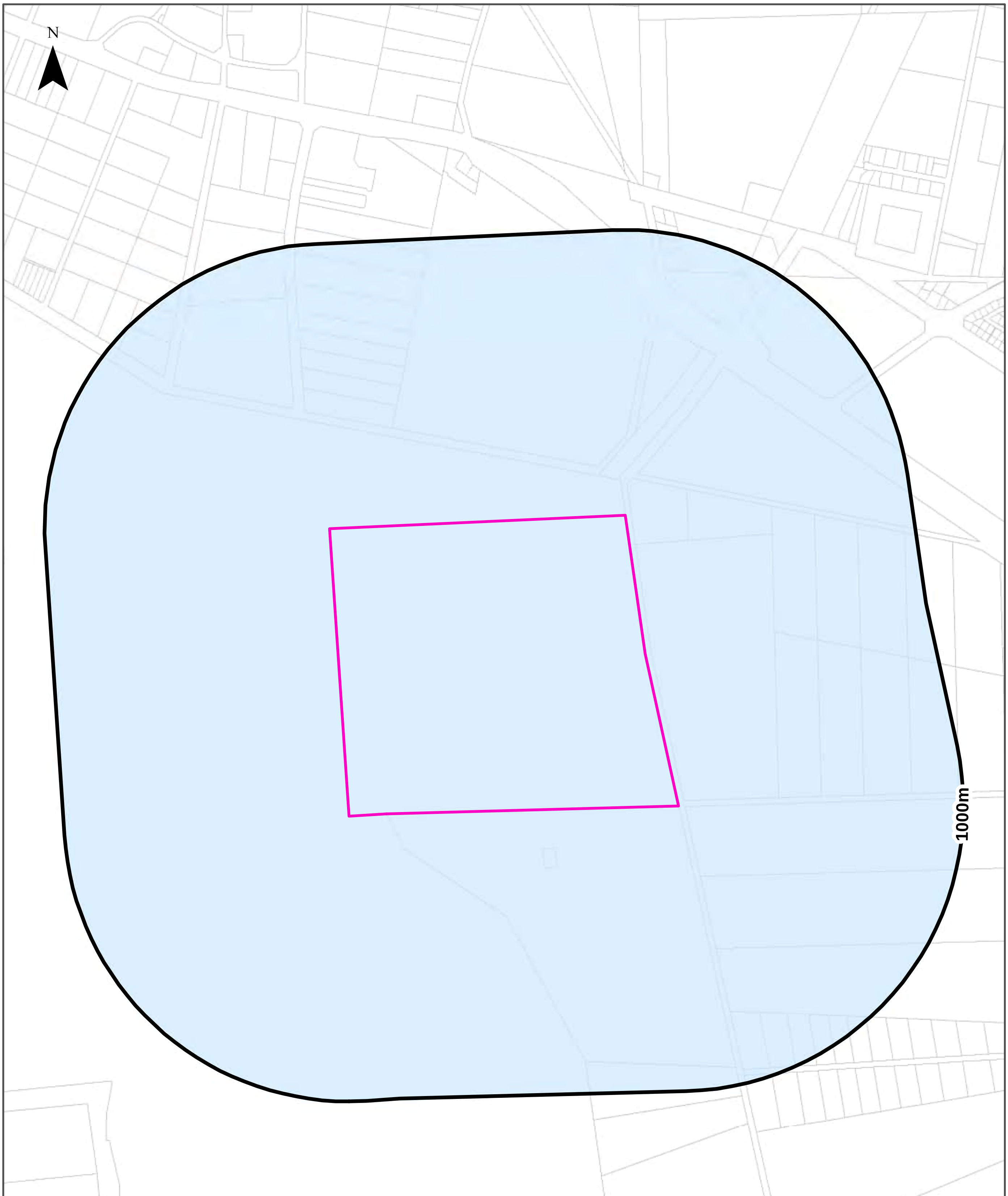
Bushfires and prescribed burns within the dataset buffer:

Map Id	Incident No.	Incident Name	Incident Type	Date of Fire	Area of Fire (ha)	Distance	Direction
N/A	No records in buffer						

Bushfires and Prescribed Burns History Data Source: Dept of Environment, Water and Natural Resources - South Australia

Natural Hazards - Flood

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

Site Boundary
Buffer 1000m
Property Boundary

Planning and Design Code - Flooding Overlay

Flooding
Flooding - General
Flooding - Evidence Required
Coastal Flooding
River Murray Flood Plain Protection

Scale: 0 100 200 400 600 Meters

Data Sources:
Property Boundaries Sourced by Land Services SA
©Land Services SA

Coordinate System:
GDA 1994 MGA Zone 54

Date: 23 October 2025

Natural Hazards

420 Northern Power Station Road, Port Paterson, SA 5700

Flooding Overlays

Flooding Overlays from the Planning and Design Code within the dataset buffer:

Overlay Id	Name	Description	Legal Start	Legal End	Distance	Direction
O2416	Hazards (Flooding - Evidence Required)	The Hazards (Flooding - Evidence Required) Overlay adopts a precautionary approach to mitigate potential impacts of potential flood risk through appropriate siting and design of development.	29/02/2024		0m	On-site

Flooding Overlays Data Source: Attorney-General's Department - South Australia

Ecological Constraints - Native Vegetation

420 Northern Power Station Road, Port Paterson, SA 5700

Legend

Site Boundary
Buffer 1000m
Property Boundaries
Native Vegetation

Scale: 0 100 200 400 600 800 1,000 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Ecological Constraints

420 Northern Power Station Road, Port Paterson, SA 5700

Native Vegetation

Record ID	Vegetation Group	Vegetation Group Percentage	Structural Formation Description	Species and Stratum Details	Description of the Environment	Ground Truth Methodology	Capture Scale	Distance	Direction
53572	YE0003	100	chenopod shrubland	Atriplex vesicaria ssp. +/-Maireana sedifolia +/-Maireana pentatropis low shrubland	Pan;Saline soils;Sandy loam - Loamy clay;Over moist compacted clay;Salt lake margin	Needs Checking – based on interpretation during mapping	27000	0m	On-site
87691	YE0003	100	chenopod shrubland	Atriplex vesicaria ssp. +/-Maireana sedifolia +/-Maireana pentatropis low shrubland	Pan;Saline soils;Sandy loam - Loamy clay;Over moist compacted clay;Salt lake margin	Needs Checking – based on interpretation during mapping	27000	0m	On-site
112349	SD0009	100	hummock grassland	Zygochloa paradoxa,Crotalaria eremaea ssp.+/-Rhagodia spinescens +/-Triodia basedowii +/-Cynanchum floribundum+/-Rhagodia spinescens tall open hummock grassland	Dunes and Plains;Sand	Needs Checking – based on interpretation during mapping	27000	0m	On-site
149161	YE0003	100	chenopod shrubland	Atriplex vesicaria ssp. +/-Maireana sedifolia +/-Maireana pentatropis low shrubland	Pan;Saline soils;Sandy loam - Loamy clay;Over moist compacted clay;Salt lake margin	Needs Checking – based on interpretation during mapping	27000	749m	North East

Department for Environment and Water Data Source: Native Vegetation Floristic Areas - NVIS - State-wide

Ecological Constraints

420 Northern Power Station Road, Port Paterson, SA 5700

Collaborative Australian Protected Areas Database - Terrestrial

Protected areas in terrestrial environments identified by the CAPAD within the dataset buffer:

Map ID	Area Name	Area Details	Management Category	Authority	Jurisdiction	Dist	Dir
N/A	No records in buffer						

Collaborative Australian Protected Areas Database - Marine

Protected areas in marine environments identified by the CAPAD within the dataset buffer:

Map ID	Area Name	Area Details	Management Category	Authority	Jurisdiction	Dist	Dir
N/A	No records in buffer						

Source: Collaborative Australian Protected Areas Database (CAPAD) 2022

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

420 Northern Power Station Road, Port Paterson, SA 5700

Legend

- Site Boundary
- Buffer 1000m
- Property Boundaries
- High potential GDE - from national assessment
- High potential GDE - from regional studies
- Moderate potential GDE - from national assessment
- Moderate potential GDE - from regional studies
- Low potential GDE - from national assessment
- Low potential GDE - from regional studies
- Known GDE - from regional studies
- Unclassified potential GDE - from national assessment
- Unclassified potential GDE - from regional studies

Scale: 0 100 200 400 Meters	Data Sources: Property Boundaries Sourced by Land Services SA ©Land Services SA	Coordinate System: GDA 1994 MGA Zone 54	Date: 23 October 2025

Ecological Constraints

420 Northern Power Station Road, Port Paterson, SA 5700

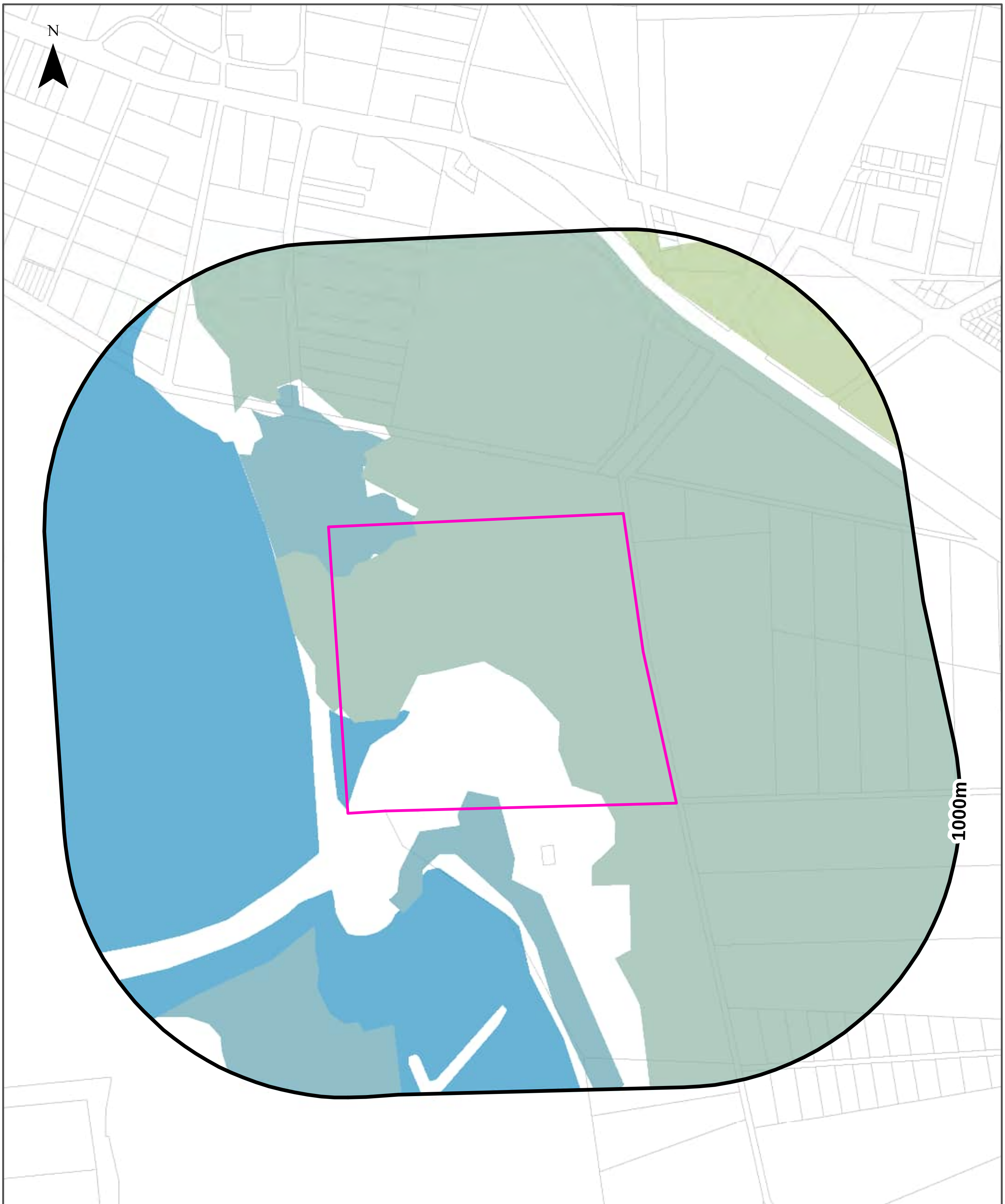
Groundwater Dependent Ecosystems Atlas

Type	Name	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic		Moderate potential GDE - from national assessment	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Wetland		0m	On-site
Aquatic		High potential GDE - from national assessment	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Wetland		0m	On-site
Terrestrial		High potential GDE - from national assessment	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Vegetation		0m	On-site

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

420 Northern Power Station Road, Port Paterson, SA 5700



Legend

Site Boundary	NULL
Buffer 1000m	1 (Low)
Property Boundaries	2
	3
	4
	5
	6
	7
	8
	9
	10 (High)

Scale: 0 100 200 400 600 800 1,000 Meters

Data Sources:
Property Boundaries Sourced by Land Services SA
©Land Services SA

Coordinate System:
GDA 1994 MGA Zone 54

Date: 23 October 2025

Ecological Constraints

420 Northern Power Station Road, Port Paterson, SA 5700

Inflow Dependent Ecosystems Likelihood

Type	Name	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic		9	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Wetland		0m	On-site
Aquatic		10	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Wetland		0m	On-site
Terrestrial		9	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Vegetation		0m	On-site
Terrestrial		8	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Vegetation		0m	On-site
Terrestrial		7	Salt lake and bahadas in north; alluvial and littoral plains in south; north-west/south-east longitudinal dunes, mainly stabilized.	Vegetation		749m	North East

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology

Ecological Constraints

420 Northern Power Station Road, Port Paterson, SA 5700

Ramsar Wetlands

What Ramsar wetland areas exist within the dataset buffer?

Wetland	Distance	Direction
No records in buffer		

Ramsar Wetlands Data Source: Dept of Environment, Water and Natural Resources - South Australia

Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
Premise Match	Georeferenced to the site location / premise or part of site
Area Match	Georeferenced to an approximate or general area
Road Match	Georeferenced to a road or rail corridor
Road Intersection	Georeferenced to a road intersection
Buffered Point	A point feature buffered to x metres
Adjacent Match	Land adjacent to a georeferenced feature
Network of Features	Georeferenced to a network of features
Suburb Match	Georeferenced to a suburb boundary
As Supplied	Spatial data supplied by provider

Click for Use of Report - Applicable Terms

Appendix E – Well Details

GROUNDWATER ENVIRONMENTAL VALUES

Information relating to the protection of and management of water quality for South Australia can be obtained from:

- Government of Australia, 2018, Australian and New Zealand Guidelines for Fresh and Marine Water Quality (AWQG); and
- Government of South Australia, Environment Protection (Water Quality) Policy 2015 (WQEPP).

The WQEPP references the AWQG as the overarching document relating to the protection and management of water quality in South Australia. In addition, the EPA (2019) Guidelines for the Assessment and remediation of Site Contamination (GAR 2019) provides processes to determine whether there is actual or potential harm to water that is not trivial, through consideration of environmental values. The four-step process to determine the environmental values of groundwater at the site is presented below.

Gama has followed the four-step process as discussed below:

Step 1: Determination of protected environmental values of groundwater using the WQEPP.

The following environmental values of groundwater may relate to the site:

- Drinking water for human consumption
- Primary industries— irrigation and general water uses
- Primary industries— livestock drinking water
- Primary industries— aquaculture and human consumption of aquatic foods

A summary of groundwater wells with environmental values outlined above within 2 km of the site is provided in the table below.

Table1: Number of groundwater bores in use with 2km radius.

Use	Number of Registered Bores
Domestic	1
Drainage	4
Investigation	58
Monitoring	25
Observation	5
Unknown	17

Step 2: Application of a buffer distance for the protection of surface waters. Surface water has been considered in a relevant section in the body of the report and is therefore not considered further in this assessment of groundwater environmental values.

Step 3: Review of available groundwater data using WaterConnect.

As per Schedule 1, Table 3 in the WQEPP, the potential for groundwater to be utilised is based on total dissolved solids concentrations (TDS). The relative TDS concentration and corresponding potential use are provided in the table 2 below.

Table 2: Relative TDS concentrations and corresponding potential uses.

TDS (mg/L)	Drinking Water	Irrigation and General Use in Primary Production	Livestock Drinking Water	Aquaculture for human consumption
<1,200	✓	✓	✓	✓
>1,200 <3,000	-	✓	✓	✓
>3,000 <13,000	-	-	✓	✓

Gama completed a review of the DEW (Government of South Australia) WaterConnect groundwater database for groundwater wells utilised for WQEPP environmental values and located within a 2 km radius of the site are presented in the table 3.

Table 3: Environmental values with a 2km radius.

Use & Characteristics	Min	Max
Domestic		
Drilled Depths (m)	41.0	41.0
Standing Water Level (m-bgl)	23.00	23.00
Total Dissolved Solids (milligrams per litre) mg/L	10,318	10,318
pH	NM	NM
Yield (litres per second) L/S	0.20	0.20
Drainage		
Drilled Depths (m)	6.0	48.0
Standing Water Level (m-bgl)	NM	NM
Total Dissolved Solids (milligrams per litre) mg/L	11,908	14,677
pH	7.2	7.6
Yield (litres per second) L/S	0.25	1.26
Investigation		
Drilled Depths (m)	0.94	12.5
Standing Water Level (m-bgl)	0.14	3.5
Total Dissolved Solids (milligrams per litre) mg/L	55563	158885
pH	6.9	7.8
Yield (litres per second) L/S	0	0
Monitoring/Investigation/Observation		
Drilled Depths (m)	3.5	7.0
Standing Water Level (m-bgl)	0.75	2.60
Total Dissolved Solids (milligrams per litre) mg/L	NM	NM

pH	0.0	0.0
Yield (litres per second) L/S	0.01	0.10
Observation		
Drilled Depths (m)	1.15	2.18
Standing Water Level (m-bgl)	0.05	0.98
Total Dissolved Solids (milligrams per litre) mg/L	65259	93155
pH	6.7	7
Yield (litres per second) L/S	NM	NM
Unknown		
Drilled Depths (m)	1.6	372.2
Standing Water Level (m-bgl)	0.44	5.50
Total Dissolved Solids (milligrams per litre) mg/L	8,282	145,179
pH	6.8	7.1
Yield (litres per second) L/S	0.08	0.08

*NM Stands for Not Measured

Step 4: Determination of whether actual or potential harm to groundwater that is not trivial, through the application of SA EPA recognised criteria.

Table 4. Evaluation of groundwater values in the site area, considering potential and realistic application.

Potential Environmental Values	Environmental Value Considered	Realistic Use	Justification
Drinking water for human consumption	Yes	Unlikely	Wells registered for domestic use are located within a 2 km radius of the site. It is unlikely groundwater within the 2 km radius is used for potable purposes given the availability of reticulated mains.
Primary industries – irrigation and general water uses	Yes	Unlikely	There are bores registered for irrigation within a 2 km radius of the site. There is also potential for groundwater extracted from the domestic bores to be used for irrigation, however, this is considered unlikely due to the presence of a reticulated water supply.
Primary industries – livestock drinking water	Yes	Unlikely	There are bores registered for stock watering within a 2 km radius of the site. Stock watering is considered unlikely, given the semi urban setting of the site and surrounding area.
Primary industries – aquaculture and human consumption of aquatic foods	No	No	Assumed groundwater is not used in the vicinity of the site for fresh-water aquaculture, given the site setting and local TDS concentrations.

Based on the table provided above, the environmental value of groundwater within 2km of the site is considered limited, with no realistic beneficial use.

Appendix F – Certificate of Title Information

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
23.07.2019 (2019-present)	CU-River Port Australia Pty. Ltd.	Volume 6226 Folio 253
23.06.2019 (2019-2019)	CU-River Port Australia Pty. Ltd.	Volume 6224 Folio 185
6.10.2017 (2017-2019)	Transmission Lessor Corporation Electranet Pty Ltd	Volume 6197 Folio 682
20.09.2016 (2016-2017)	Transmission Lessor Corporation Electranet Pty Ltd Flinders Power Holdings GMBH	Volume 6180 Folio 724
05.12.2001 (2001-2019)	Transmission Lessor Corporation Electranet Pty Ltd Flinders Power Holdings GMBH	Volume 5861 Folio 274
20.03.2001 (2001-2016)	Flinders Power Holdings Flinders Labaun (No. 2) Flinders Labuan (No.1) Sundrop Port Augusta Holdco2 Pty Ltd	Volume 5843 Folio 691
16.02.2001 (2001-2001)	Transmission Lesser Corporation	Volume 5838 Folio 798
26.10.2000 (2000-2001)	Transmission Lessor Corporation The Corporarion for the City of Port Augusta Minister for Government Enterprises	Volume 5819 Folio 683
17.02.2000 (2000-2000)	Generation Lessor Corporation Flinders Power Pty. Ltd	Volume 5735 Folio 328
10.09.1998 (1998-2000)	WMC (Olympic Dam Corporation Pty Ltd) Flinders Power Pty. Ltd.	Volume 5574 Folio 277
13.04.1985 (1985-1997)	MAGLIP Limited - 6 January 1986 Agridev Aquaculture Technologies Limited - 14 July 1989 SA Generation Corporation - 20 June1997 WMC (Olympic Dam Coproration) Pty Ltd. - 4 July 1997	Volume 4244 Folio 737

*Site ownership has been owned between private companies.
Certificate Titles reviewed as part of this assessment are provided on the following pages.

Fill in as appropriate below.

The site ownership is summarised below:

1985 – present: Private Ownership;

Certificate of Title

Title Reference:	CT 6226/253
Status:	CURRENT
Parent Title(s):	CT 6224/185
Dealing(s) Creating Title:	RT 13141095
Title Issued:	23/07/2019
Edition:	2

Certificate of Title

Title Reference:	CT 6224/185
Status:	CANCELLED
Parent Title(s):	CT 5861/274, CT 6197/682
Dealing(s) Creating Title:	VE 13105666
Title Issued:	12/06/2019
Title Cancelled:	23/07/2019
Edition:	4

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 6226/253	CURRENT	FEE SIMPLE	D55700 ALLOTMENT 8	CU-RIVER PORT AUSTRALIA PTY. LTD.

Certificate of Title

Title Reference:	CT 6197/682
Status:	CANCELLED
Parent Title(s):	CT 6180/724
Dealing(s) Creating Title:	TG 12789372
Title Issued:	06/10/2017
Title Cancelled:	12/06/2019
Edition:	2

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 6224/184	CURRENT	EASEMENT ONLY	D55700 ALLOTMENT 8	TRANSMISSION LESSOR CORPORATION ELECTRANET PTY. LTD.
CT 6224/185	CANCELLED	FEE SIMPLE	D55700 ALLOTMENT 8	FLINDERS POWER HOLDINGS GMBH FLINDERS LABUAN (NO.2) LTD. FLINDERS LABUAN (NO.1) LTD.

Certificate of Title

Title Reference:	CT 6180/724
Status:	CANCELLED
Parent Title(s):	CT 5843/691
Dealing(s) Creating Title:	TG 12577097
Title Issued:	20/09/2016
Title Cancelled:	06/10/2017
Edition:	2

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 6197/681	CURRENT	EASEMENT ONLY	D55700 ALLOTMENT 8	TRANSMISSION LESSOR CORPORATION ELECTRANET PTY. LTD.
CT 6197/682	CANCELLED	FEE SIMPLE	D55700 ALLOTMENT 8	FLINDERS POWER HOLDINGS GMBH FLINDERS LABUAN (NO.2) LTD. FLINDERS LABUAN (NO.1) LTD.

Certificate of Title

Title Reference:	CT 5861/274
Status:	CANCELLED
Parent Title(s):	CT 5843/695
Dealing(s) Creating Title:	V 9134012, RT 9134013
Title Issued:	05/12/2001
Title Cancelled:	12/06/2019
Edition:	1

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 6224/184	CURRENT	EASEMENT ONLY	D55700 ALLOTMENT 8	ELECTRANET PTY. LTD. TRANSMISSION LESSOR CORPORATION
CT 6224/185	CANCELLED	FEE SIMPLE	D55700 ALLOTMENT 8	FLINDERS LABUAN (NO.2) LTD. FLINDERS LABUAN (NO.1) LTD. FLINDERS POWER HOLDINGS GMBH

Certificate of Title

Title Reference:	CT 5843/691
Status:	CANCELLED
Parent Title(s):	CT 5838/805
Dealing(s) Creating Title:	RT 9055724
Title Issued:	20/03/2001
Title Cancelled:	20/09/2016
Edition:	5

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 6180/724	CANCELLED	FEE SIMPLE	D55700 ALLOTMENT 8	FLINDERS POWER HOLDINGS GMBH FLINDERS LABUAN (NO.2) LTD. FLINDERS LABUAN (NO.1) LTD.
CT 6180/725	CANCELLED	FEE SIMPLE	H330600 SECTION 709	SUNDROP PORT AUGUSTA HOLDCO2 PTY. LTD.
CT 6180/726	CANCELLED	FEE SIMPLE	H330600 SECTION 710	SUNDROP PORT AUGUSTA HOLDCO2 PTY. LTD.

Certificate of Title

Title Reference:	CT 5838/798
Status:	CANCELLED
Parent Title(s):	CT 5819/693
Dealing(s) Creating Title:	TG 8958469
Title Issued:	16/02/2001
Title Cancelled:	20/03/2001
Edition:	1

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 5843/695	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	TRANSMISSION LESSOR CORPORATION

Certificate of Title

Title Reference: CT 5819/693

Status: CANCELLED

Parent Title(s): CT 5735/328, CR 5759/857

Dealing(s) Creating Title: RTD 8951871, V 8954022, VM 8957467

Title Issued: 26/10/2000

Title Cancelled: 16/02/2001

Edition: 1

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 5838/790	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	DISTRIBUTION LESSOR CORPORATION
CT 5838/794	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	DISTRIBUTION LESSOR CORPORATION
CT 5838/795	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	THE CORPORATION OF THE CITY OF PORT AUGUSTA
CT 5838/796	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	MINISTER FOR GOVERNMENT ENTERPRISES
CT 5838/797	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	TRANSMISSION LESSOR CORPORATION
CT 5838/798	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	TRANSMISSION LESSOR CORPORATION
CT 5838/799	CANCELLED	EASEMENT ONLY	D55700 ALLOTMENT 8	TRANSMISSION LESSOR CORPORATION
CT 5838/801	CANCELLED	FEE SIMPLE	D55666 ALLOTMENT 1	GENERATION LESSOR CORPORATION
CT 5838/804	CANCELLED	FEE SIMPLE	D55666 ALLOTMENT 5	MINISTER FOR GOVERNMENT ENTERPRISES
CT 5838/805	CANCELLED	FEE SIMPLE	D55700 ALLOTMENT 8	MINISTER FOR GOVERNMENT ENTERPRISES

Certificate of Title

Title Reference:	CT 5735/328
Status:	CANCELLED
Parent Title(s):	CT 5574/277, CT 5700/141
Dealing(s) Creating Title:	VE 8709857, TG 8709858
Title Issued:	17/02/2000
Title Cancelled:	26/10/2000
Edition:	6

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 5819/687	CANCELLED	FEE SIMPLE	D55666 ALLOTMENT 1	GENERATION LESSOR CORPORATION
CT 5819/688	CANCELLED	FEE SIMPLE	D55666 ALLOTMENT 2	FLINDERS POWER PTY. LTD.
CT 5819/689	CANCELLED	FEE SIMPLE	D55666 ALLOTMENT 3	FLINDERS POWER PTY. LTD.
CT 5819/690	CANCELLED	FEE SIMPLE	D55666 ALLOTMENT 5	FLINDERS POWER PTY. LTD.
CT 5819/691	CANCELLED	FEE SIMPLE	D55666 ALLOTMENT 6	GENERATION LESSOR CORPORATION
CT 5819/693	CANCELLED	FEE SIMPLE	D55700 ALLOTMENT 8	FLINDERS POWER PTY. LTD.

Certificate of Title

Title Reference: CT 5574/277

Status: CANCELLED

Parent Title(s): CT 4244/737

Dealing(s) Creating Title: TG 8324155

Title Issued: 10/09/1998

Title Cancelled: 17/02/2000

Edition: 3

Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 5735/327	CANCELLED	EASEMENT ONLY	H330600 SECTION 1245	WMC (OLYMPIC DAM CORPORATION) PTY. LTD.
CT 5735/328	CANCELLED	FEE SIMPLE	H330600 SECTION 1245 H330600 SECTION 1246	FLINDERS POWER PTY. LTD.

ORIGINAL
LAND GRANT

South Australia

REGISTER BOOK
Volume 4244 Folio 737

(Comprising 4 Sheets)

Deputy Registrar-General

FOR ELECTRICITY GENERATION PURPOSES

HIS EXCELLENCY THE GOVERNOR DOTH HEREBY in the name and on behalf of HER MAJESTY and by virtue of the powers vested by the Crown Lands Act 1929 and of all other powers thereunto enabling him GRANT UNTO THE ELECTRICITY TRUST OF SOUTH AUSTRALIA of 220 Greenhill Road Eastwood 5063 hereinafter called the Grantee ALL those pieces of land containing one thousand one hundred and seventy three (1 173) hectares or thereabouts situate and being Sections numbered 1245 and 1246 in the Hundred of DAVENPORT County of FROME and delineated in the Public Maps deposited in the Department of Lands at ADELAIDE and in the plan annexed hereto EXCEPT AND RESERVED unto Her Majesty the Queen full free and unrestricted right and liberty for Herself and Her agents servants and workmen from time to time and at all times hereafter to break the surface of dig open up and use that portion of said Section 1245 marked "EASEMENT" in the said plan annexed for the purpose of laying down fixing installing taking up repairing relaying or examining pipes therein on under or above the said portion of Section 1245 and of using and maintaining such pipes and also for such purposes aforesaid full free and unrestricted right and liberty of entry egress and regress from time to time and at all times hereafter with or without horses plant equipment carts motor vehicles and other carriages laden or unladen for Her Majesty the Queen and Her agents servants and workmen in through over across and along the said portion of land TO HOLD unto and to the use of the Grantee its Successors and Assigns for ever IN TRUST to permit and suffer the said pieces of land to be used at all times for Electricity Generation purposes

GIVEN under the hand of the Governor and the Public Seal of South Australia this thirtieth day of April one thousand nine hundred and eighty five

Exd. Certified correct,

P.B. Harlin

....
Acting Registrar, Land Office

BY COMMAND,

....
The Minister of Lands

F.P. 22990
APPROVED

G.R.O. PLAN No. 353 of 1989
FOR LEASING PURPOSES DEPOSITED OVER ~~WHOLE~~/PORTION OF THE WITHIN LAND

LEASE 6136076 to MAGILP LIMITED of portion of the within land Term of 25 years commencing on 7.1.1986 and terminating on 6.1.2011
Produced 6.1.1986 at 12:25

L6136076

LEASE 6136076 is surrendered as regards the piece marked "A" in GRO Plan 353 of 1989 vide 6768968 Produced 14.7.1989 at 11:45

over

LEASE 6768969 to AGRIDEV AQUACULTURE TECHNOLOGIES LIMITED of portion of the within land (being pieces marked "A" and "B" in G.R.O. Plan 353/1989) Term of five years commencing on 28.6.1989 Produced 14.7.1989 at 11:45

REGISTRAR-GENERAL SOUTH AUSTRALIA

SURRENDER of Lease 6768969 vide 7462282 Produced 8.3.1993 at 11:05

SOUTH AUSTRALIA

APPLICATION 8314380 The within land is vested in SA GENERATION CORPORATION of 168 Greenhill Road Parkside 5063 pursuant to Clause 4(1) of Schedule 3 of the Electricity Corporations Act 1994 Produced 20.6.1997 at 10:50

REGISTRAR-GENERAL SOUTH AUSTRALIA

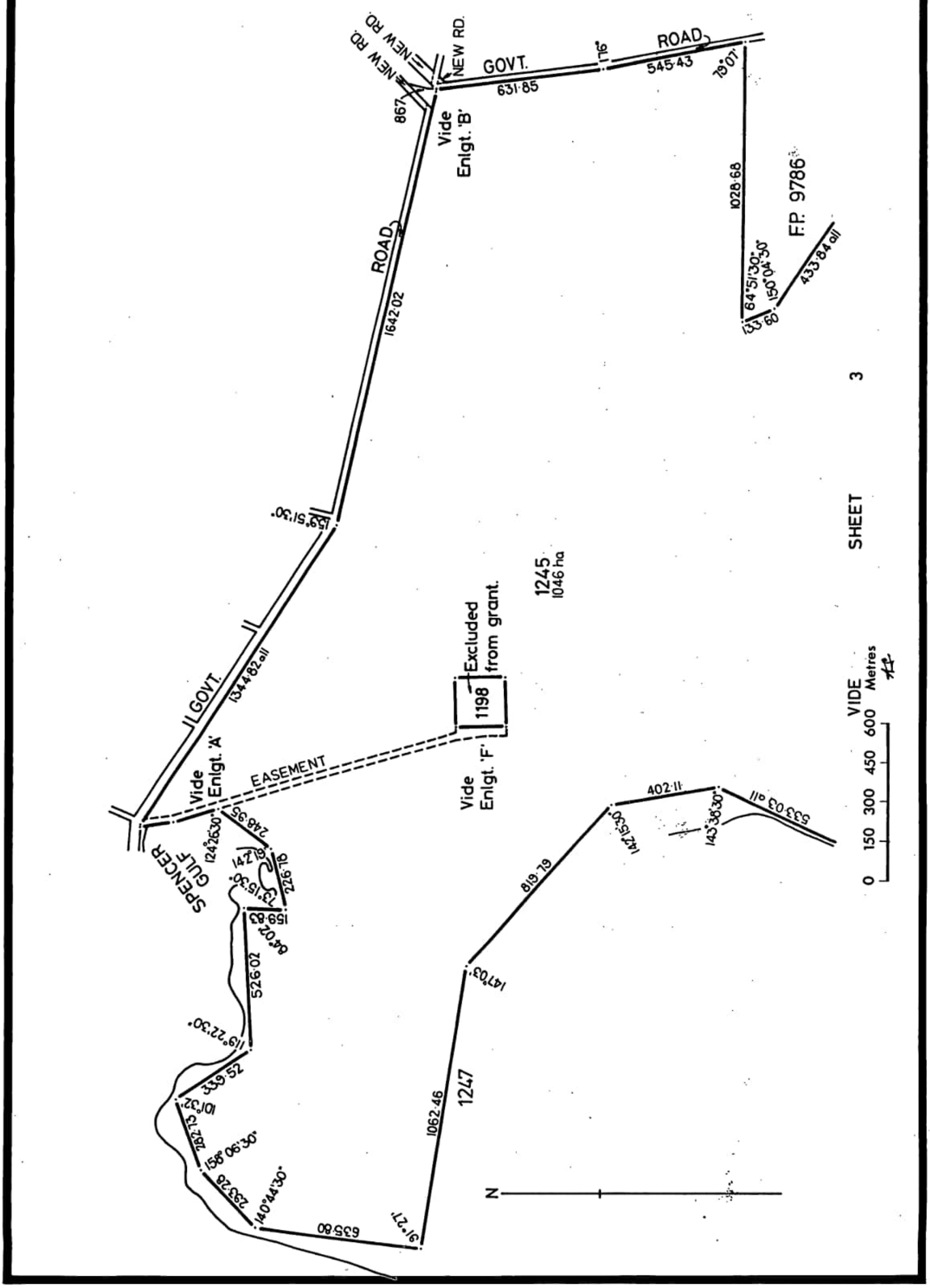
TRANSFER 8324155 to WMC (OLYMPIC DAM CORPORATION) PTY. LTD. of an Easement over PORTION of the within land Produced 4.7.1997 at 11:50

REGISTRAR-GENERAL SOUTH AUSTRALIA

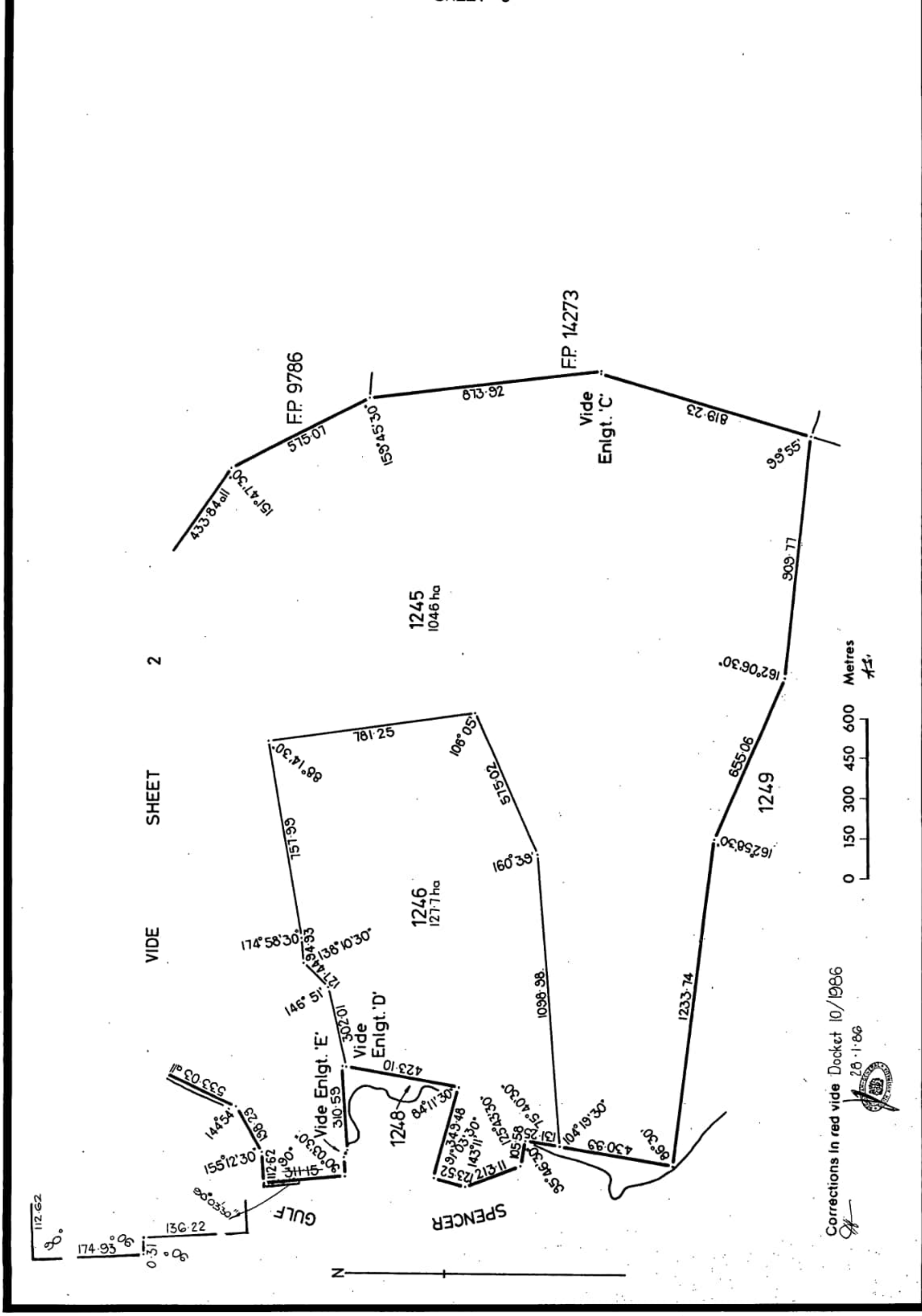
CANCELLED AS REGARDS
~~PORTION~~ BALANCE OF
THE WITHIN LAND AND
NEW COMPUTERISED TITLE(S) ISSUED

VOL 4244 FOL 737

SHEET 2



SHEET 3

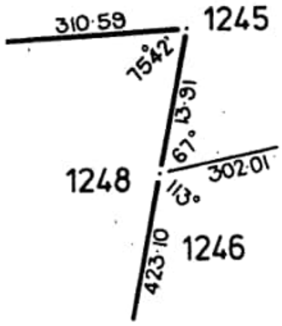

F.P. 9786
F.P. 14273
Vide
Enlgt. 'C'
1245
1046 ha
1246
127.7 ha
1249
1248
VIDE SHEET 2
Vide
Enlgt. 'D'
Vide Enlgt. 'E'
GULF
SPENCER
433.84 all
151°47'30"
575.07
159°45'30"
873.92
819.23
99°55'
909.77
162°06'30"
655.06
162°58'30"
1233.74
781.25
106°05'
88°14'30"
575.02
157.93
160°39'
1098.98
174°58'30"
138°10'30"
34.93
127.44
146°51'
302.01
423.10
310.59
84°11'30"
349.48
430.99
104°19'30"
86°30'
533.03 all
144°54'
198.23
155°12'30"
112.62
136.22
174.93
0.31
Metres
0 150 300 450 600
Corrections in red vide Docket 10/1986
28.1.86

VOL 4244 FOL 737

SHEET 4

ENLARGEMENT 'A'
(Not to scale)

ENLARGEMENT 'D'
(Not to scale)



ENLARGEMENT 'E'
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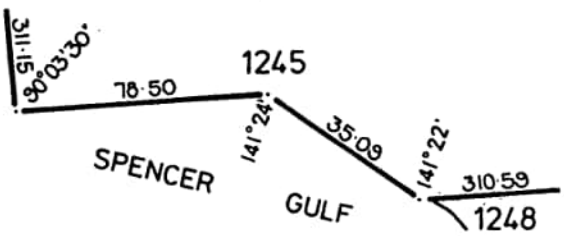

ENLARGEMENT 'B'
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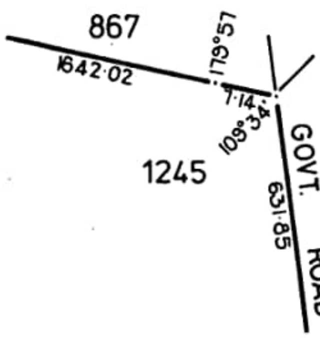

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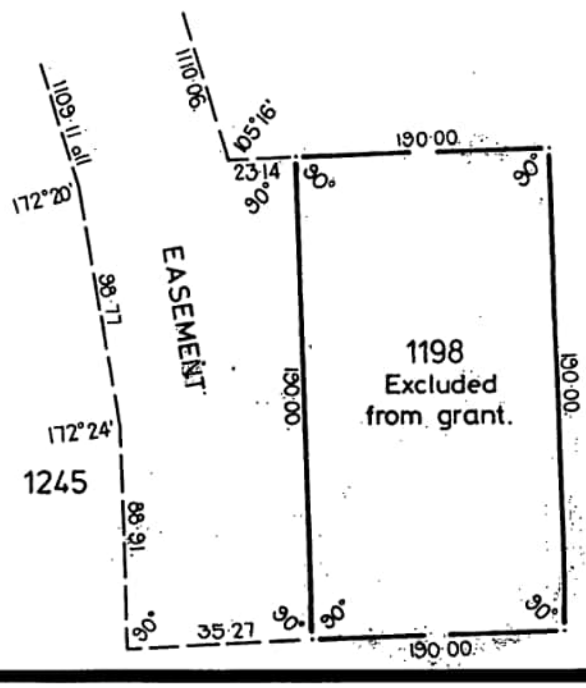


ENLARGEMENT 'C'
(Not to scale)

Appendix G – EPA Section 7

Environment Protection Authority
GPO Box 2607 Adelaide SA 5001
211 Victoria Square Adelaide SA 5000
T (08) 8204 2004
Country areas 1800 623 445

Receipt No :
Admin No : 91077 (95702)

GAMA Consulting
Suite 3
83 Fullarton Road
KENT TOWN SA 5067

Contact: Section 7
Telephone: (08) 8204 2026
Email: epasection7@sa.gov.au

Contact: Public Register
Telephone: (08) 8204 9128
Email: epa.publicregister@sa.gov.au

31 October, 2025

EPA STATEMENT TO FORM 1 - CONTRACTS FOR SALE OF LAND OR BUSINESS

The EPA provides this statement to assist the vendor meet its obligations under section 7(1)(b) of the *Land and Business (Sale and Conveyancing) Act 1994*. A response to the questions prescribed in Schedule 1-Contracts for sale of land or business-forms (Divisions 1 and 2) of the *Land and Business (Sale and Conveyancing) Act 1994* is provided in relation to the land.

I refer to your enquiry concerning the parcel of land comprised in

Title Reference	CT Volume 6226 Folio 253
Address	Allotment 8 (DP 55700), 420 North Power Station Road, PORT PATERSON SA 5700

Schedule – Division 1 – *Land and Business (Sale and Conveyancing) Regulations 2010*

PARTICULARS OF MORTGAGES, CHARGES AND PRESCRIBED ENCUMBRANCES AFFECTING THE LAND

8. Environment Protection Act 1993

Does the EPA hold any of the following details relating to the *Environment Protection Act 1993*:

8.1	Section 59 - Environment performance agreement that is registered in relation to the land.	NO
8.2	Section 93 - Environment protection order that is registered in relation to the land.	NO
8.3	Section 93A - Environment protection order relating to cessation of activity that is registered in relation to the land.	NO
8.4	Section 99 - Clean-up order that is registered in relation to the land.	NO
8.5	Section 100 - Clean-up authorisation that is registered in relation to the land.	NO
8.6	Section 103H - Site contamination assessment order that is registered in relation to the land.	NO
8.7	Section 103J - Site remediation order that is registered in relation to the land.	NO

8.8	Section 103N - Notice of declaration of special management area in relation to the land (due to possible existence of site contamination).	NO
8.9	Section 103P - Notation of site contamination audit report in relation to the land.	**YES**
8.10	Section 103S - Notice of prohibition or restriction on taking water affected by site contamination in relation to the land.	NO

Schedule – Division 2 – *Land and Business (Sale and Conveyancing) Regulations 2010*

PARTICULARS RELATING TO ENVIRONMENT PROTECTION

3-Licences and exemptions recorded by EPA in public register

Does the EPA hold any of the following details in the public register:

a)	details of a current licence issued under Part 6 of the *Environment Protection Act 1993* to conduct any prescribed activity of environmental significance under Schedule 1 of that Act at the land?	**YES**
b)	details of a licence no longer in force issued under Part 6 of the *Environment Protection Act 1993* to conduct any prescribed activity of environmental significance under Schedule 1 of that Act at the land?	**YES**
c)	details of a current exemption issued under Part 6 of the *Environment Protection Act 1993* from the application of a specified provision of that Act in relation to an activity carried on at the land?	NO
d)	details of an exemption no longer in force issued under Part 6 of the *Environment Protection Act 1993* from the application of a specified provision of that Act in relation to an activity carried on at the land?	NO
e)	details of a licence issued under the repealed *South Australian Waste Management Commission Act 1979* to operate a waste depot at the land?	NO
f)	details of a licence issued under the repealed *Waste Management Act 1987* to operate a waste depot at the land?	NO
g)	details of a licence issued under the repealed *South Australian Waste Management Commission Act 1979* to produce waste of a prescribed kind (within the meaning of that Act) at the land?	**YES**
h)	details of a licence issued under the repealed *Waste Management Act 1987* to produce prescribed waste (within the meaning of that Act) at the land?	**YES**

4-Pollution and site contamination on the land - details recorded by the EPA in public register

Does the EPA hold any of the following details in the public register in relation to the land or part of the land:

a)	details of serious or material environmental harm caused or threatened in the course of an activity (whether or not notified under section 83 of the *Environment Protection Act 1993*)?	**YES**

b)	details of site contamination notified to the EPA under section 83A of the *Environment Protection Act 1993*?	**YES**
c)	a copy of a report of an environmental assessment (whether prepared by the EPA or some other person or body and whether or not required under legislation) that forms part of the information required to be recorded in the public register?	**YES**
d)	a copy of a site contamination audit report?	**YES**
e)	details of an agreement for the exclusion or limitation of liability for site contamination to which section 103E of the *Environment Protection Act 1993* applies?	**YES**
f)	details of an agreement entered into with the EPA relating to an approved voluntary site contamination assessment proposal under section 103I of the *Environment Protection Act 1993?*	**YES**
g)	details of an agreement entered into with the EPA relating to an approved voluntary site remediation proposal under section 103K of the *Environment Protection Act 1993?*	**YES**
h)	details of a notification under section 103Z(1) of the *Environment Protection Act 1993* relating to the commencement of a site contamination audit?	**YES**
i)	details of a notification under section 103Z(2) of the *Environment Protection Act 1993* relating to the termination before completion of a site contamination audit?	NO
j)	details of records, held by the former *South Australian Waste Management Commission* under the repealed *Waste Management Act 1987*, of waste (within the meaning of that Act) having been deposited on the land between 1 January 1983 and 30 April 1995?	**YES**

5-Pollution and site contamination on the land - other details held by EPA

Does the EPA hold any of the following details in relation to the land or part of the land:

a)	a copy of a report known as a "Health Commission Report" prepared by or on behalf of the *South Australian Health Commission* (under the repealed *South Australian Health Commission Act 1976*)?	NO
b)	details (which may include a report of an environmental assessment) relevant to an agreement entered into with the EPA relating to an approved voluntary site contamination assessment proposal under section 103I of the *Environment Protection Act 1993?*	**YES**
c)	details (which may include a report of an environmental assessment) relevant to an agreement entered into with the EPA relating to an approved voluntary site remediation proposal under section 103K of the *Environment Protection Act 1993*?	**YES**
d)	a copy of a pre-1 July 2009 site audit report?	NO
e)	details relating to the termination before completion of a pre-1 July 2009 site audit?	NO

Records identified in this EPA Statement to Form 1: **EPA/1108; EPA/1296; EPA/1532; EPA/2926; EPA/10712; EPA/11342; EPA/11529; EPA/11977; EPA/13006; EPA/13007; EPA/13011; EPA/50368; EPA/50677; EPA/50757; P0161; W0079; SC61607; SC63397; SC11037; SC61756-01; SC61756-02; SC61756-03; SC62143-01; SC61672; SC61946; SC61950; SC62158**

The above records have been identified with a YES response in this EPA Statement to Form 1 and can be obtained by contacting the Public Register on (08) 8204 9128 or email epa.publicregister@sa.gov.au

All care and diligence has been taken to access the above information from available records. Historical records provided to the EPA concerning matters arising prior to 1 May 1995 are limited and may not be accurate or complete.

Appendix H – EPA Notifications

coffey
A TETRA TECH COMPANY

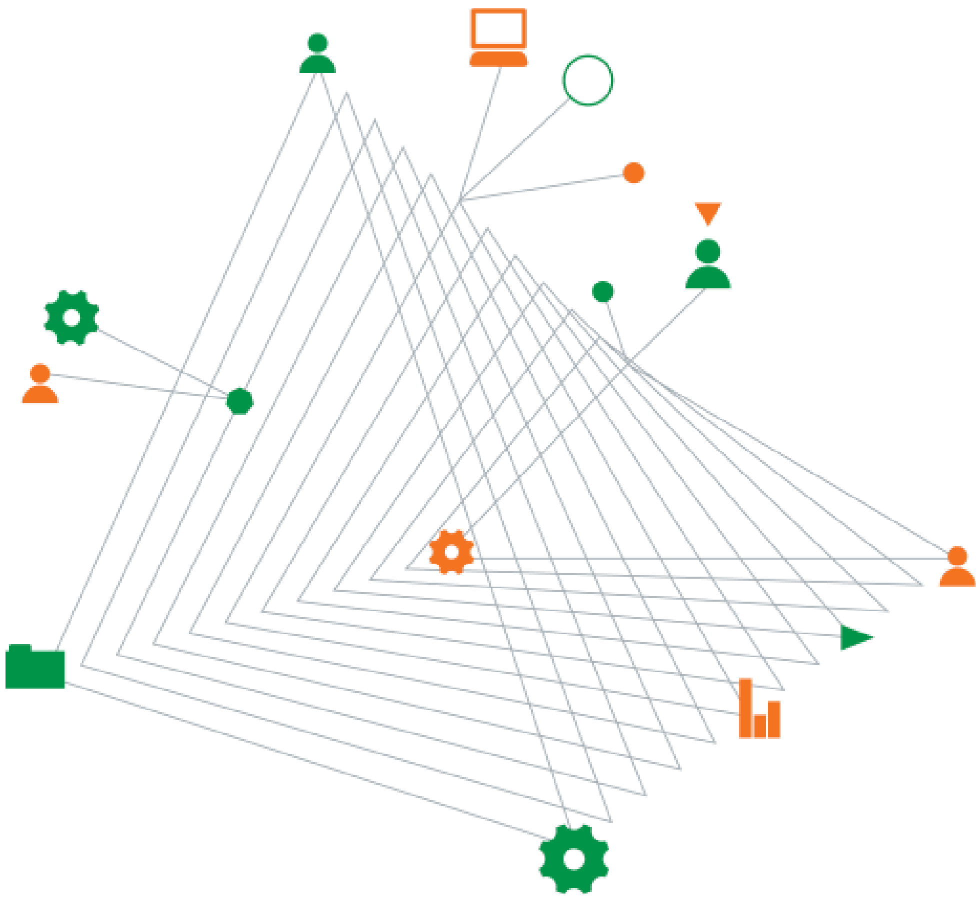
Flinders Power Partnership

Detailed Site Investigation – Version 2

Augusta Power Stations

28 February 2017

FlindersPower



Experience
comes to life
when it is
powered by
expertise

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Detailed Site Investigation – Version 2

Prepared for
Flinders Power Partnership

Prepared by
Coffey Environments Australia Pty Ltd
Coffey World Park 33-39 Richmond Rd
Keswick SA 5035 Australia
t: +61 8 8375 4523 f: +61 8 8375 4499
ABN: 65 140 765 902

Project Director	Dr David Tully Senior Principal Geoenvironmental Engineer
Project Manager	Felicia Mellors Senior Environmental Scientist

28 February 2017

754-ENAUKESW01445AD-R01 Version 2

Quality information

Revision history

Revision	Description	Date	Author	Reviewer
0	754-ENAUKESW01445AD-R01A	15/12/2016	Felicia Mellors	David Tully
1	754-ENAUKESW01445AD-R01 Version 1	20/02/2017	Felicia Mellors	David Tully
2	754-ENAUKESW01445AD-R01 Version 2	28/02/2017	Felicia Mellors	David Tully

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Version 2	1	PDF	Flinders Power Partnership	28/02/2017
Version 2	1	PDF	Kirsa Environmental	28/02/2017
Version 2	1	PDF	SA EPA	28/02/2017

Executive summary

Background Information	The Leigh Creek Coal Mine supplied coal exclusively for Flinders Power Partnership (FPP) Augusta Power Stations (APS). The coal was transported by rail to Port Augusta which is approximately 250 km south of the mine. The mine, the power stations and the railway facilities linking the two sites are known collectively as the Flinders Operations. FPP have appointed Coffey Environments Australia Pty Ltd to undertake a Detailed Site Investigation (DSI) of APS was part of a phased program of site contamination assessment works. The power station was in operation since the mid 1950's with the full extent of operations from 1985 with the Northern Station commencing production. FPP has had site ownership since 2000 with the Electricity Trust of South Australia formerly owning and operating the site until that time. Prior to the 1940's the site was primarily mangrove swamps associated with Northern Spencer Gulf. Two portions of the mangrove swamp habitat along the eastern edge of the Spencer Gulf were reclaimed, initially to create the power station facility associated with the Playford Stations and later to construct water channels for the Northern Station. The site ceased power generation in May 2016 and entered site closure with the demolition program commencing in June 2016. Some infrastructure such as road ways, northern infrastructure pad, cooling water inlet/outlet infrastructure, sheds, switch yards and site drainage infrastructure including ABC Lake (situated immediately south of the ash storage area) are expected to remain at the site for future use. A number of options for site reuse including the ash ponds are being considered that will benefit the local community. A Preliminary Site Investigation (PSI) was completed for the site which identified 52 areas of environmental concern (AEC) from site historical activity that had the potential to cause site contamination at 18 defined areas across the site. On the basis of the PSI, a Sampling, Analysis and Quality Plan (SAQP) was developed to facilitate further detailed investigation of the site. It is noted that prior to land transfer to FPP from the state government, reports were undertaken by FPP and BRW into the site contamination issues at the site that may present liability risks to FPP. These reports were utilised in our development of the PSI. A Site Contamination Auditor, Steven Kirsanovs of Kirsa Environmental has been appointed to the site by FPP to undertake a site contamination audit as part of the closure plan. The DSI is also a requirement of a Voluntary Site Contamination Assessment Proposal (VSCAP), dated 9 September 2016, which the South Australia Environment Protection Authority (SA EPA) has reviewed and considered appropriate for the site. Ultimately, the phased assessments being undertaken at the site will assist in FPP's process to divest the site and/or hand back the lease(s) for future ongoing non-sensitive commercial/industrial land use.
Objective	The objective of this DSI was to assess the nature and extent of potential site contamination within the AECs, determine if a potential risk exists to the identified potential receptors from identified site contamination, and provide recommendations for further assessment or risk mitigation (Phase 3), if required to facilitate site closure.
Scope of works	The fieldworks program undertaken at the site in accordance with the SAQP was completed between 23 May and 19 July 2016 and 7 and 9 November 2016 and comprised of the following: • Underground service location across the site; • Drilling of a total of 36 soil bores across the AECs with completion of 25 soil bores as monitoring wells including four monitoring wells installed into the secondary aquifer; • Excavation of a total of 151 test pits across the AECs; • Collection of 13 soil/sediment samples from within mangrove areas; • Collection of six grab soil samples from a fuel infrastructure bund; • Sampling & analysis of soil samples for a range of chemicals of potential concern (COPCs); • Gauging, purging and sampling of 64 existing and newly installed monitoring wells for submission of chemical analysis of COPCs; • Investigation of historical waste dumps across the site; and • Engagement of a suitably qualified subcontractor to complete a flora and fauna assessment of particular mangrove areas at the site. The data collected was used to undertake tier one screening assessment in line with a non-sensitive site use and update the exposure scenarios established by the preliminary conceptual site model set out in the PSI. An ecological risk assessment was completed for the assessment of historical activities on the mangrove swamp adjacent to the site.

Conclusions	The subsurface conditions encountered beneath the site have indicated deeper fill areas are present closer to the Spencer Gulf where reclamation of land was undertaken for the site construction, and at lesser extents where site surface build up for construction occurred. Where the site surface has been built up outside of the Playford areas, ash material is present in the fill. The natural soil surface is encountered at shallower depths further from the Spencer Gulf which is consistent with the site construction through land reclamation over time. Unburnt coal remains at the site in a defined area west of the coal loading area and fuel pad and this area will be included in the future management plan for the site. With the exception of previously known areas of historical fuel losses, gross soil and groundwater impacts have not been identified from the DSI works completed in relation to the previously defined AECs. Minor hydrocarbon impacts not previously identified have been noted in shallow soils in various areas within the site but are generally considered to be isolated and unlikely to present an unacceptable dermal contact or inhalation risk to current and future identified receptors with respect to ongoing commercial/industrial land use. Localised previously identified hydrocarbon impacts to the primary aquifer have been confirmed, however, there is potential for natural attenuation to be occurring and occur into the future which will continue to reduce the severity and extent of these impacts. The secondary aquifer was investigated in areas of historical petroleum hydrocarbon impacts. Vertical migration of impacts into the secondary aquifer was not apparent. Known historical impacts associated with the Playford fuel oil loss (AEC 1) in the 1990s have been confirmed within the unsaturated zone and within the primary aquifer. The impacts identified are considered to potentially pose an unacceptable dermal contact and ingestion risk to current workers if the ground surface in this area is disturbed and to future users and structures, if the impacts remain following closure and if strict management protocols are not implemented. The previous DRA completed for the Playford fuel oil loss indicated that the plume is stable and shrinking and unlikely to expand to reach the marine ecosystem. Information obtained from the DSI support these findings. Petroleum hydrocarbons are also present in soils and dissolved in groundwater in the vicinity of the sea wall adjacent to Playford B Station and adjacent to the SPEL tank and sump (AEC 7A) to the north west of Playford B Station. The impacts noted are considered to be at concentrations that are unlikely to pose a potential risk to current and future identified receptors unless the area is excavated and appropriate management protocols are not implemented. Hydrocarbon impacts were noted at concentrations above generic ecological screening levels locally at the vehicle storage and maintenance area (AEC 25) which potentially pose a risk to ecological receptors. The soils in the vicinity of the fuel transfer pipeline (AEC 31B) and wash down bay (AEC 32) reported some minor petroleum hydrocarbon impacts at the depth of groundwater. It is considered likely that these sources have been sources of impact to the soils and groundwater historically and have been reported in the smear zone in the current investigation. The soils and groundwater in the vicinity of the northern store underground storage tank (UST) (AEC 35) located at the Northern Station are confirmed to be impacted in line with historical data and confirm an unleaded petrol source based on the composition of chemicals reported. The impacts noted are considered unlikely to present an unacceptable risk to current and future receptors, unless the subsurface is removed and contact with the impacted soils and groundwater occurs. A trace concentration of perfluorooctane sulfonate (PFOS) was reported in the groundwater in the vicinity of the firefighting training area (fire extinguisher training) (AEC 43B). Around the fuel pad (AEC 44) at the coal loading area, soil and groundwater impacts have been reported that could pose a potentially unacceptable risk to current workers if the ground is disturbed and to future users and structures if the impacts remain following closure and if strict management protocols are not implemented. The groundwater impacts reported to the south of the fuel pad remain undelineated down gradient to the south west. It is understood that this area is to be revegetated and the fuel pad will be removed. Previous testing of the ash material within the ash storage area (ash pond) (AEC 50A) reported the material to be consistent with bottom ash and within the expected ranges for this type of material. The ash pond is well defined with an up to date survey plan which will be included in the future management plan for the site. It is considered unlikely that given the chemicals reported in the ash material, dust migration to the residential occupants and commercial workers within Port Augusta Township to the north/north west is unlikely to cause potential risks to human health. It is also unlikely an inhalation risk from ash pond material is present to the nearby receptors given the ash pond has since been covered with a dust suppressant and revegetation is to commence in the near future. However it is noted that SA Health have expressed concern about the high overall dust level measured on 1 January 2017 at monitoring stations in Stirling North and at Lea Memorial Oval in the southern outskirts of Port Augusta Township immediately after the dust suppressant had been degraded due to a storm and heavy rain, with that they refer to as "*a high fraction of particulate matter less than 10 microns in diameter (PM10)*". It is considered unlikely chemicals from the ash pond would have leached to the subsurface and the groundwater conditions reported around the ash pond support this conclusion. Engineering solutions to avoid seepage from the ash pond are understood to have been implemented in the 1980's following seepage from the ash pond to the subsurface.

	Groundwater testing completed in the vicinity of the ash pond did not report chemicals above background concentrations. The ecological risk assessment undertaken for the small area of mangrove swamp located in the man-made inlet south of the Playford Stations has identified that sediments from site drainage water may have impacted the mangrove area with concentrations of some metals and heavy end petroleum hydrocarbons reported at levels that may present an unacceptable risk to ecological receptors within the mangrove in this small localised area. The extent of metal and petroleum hydrocarbon impact in sediments appear to be localised. The flora and fauna assessment completed determined that the mangrove area consisted of a poor habitat for marine fauna, however this area is highly disturbed from known diebacks in the 1950's and construction of the Northern Station and infrastructure including the water inlet/outlet channel in the 1980's. A number of replanting events have also occurred over time in this area. Historical aerial photography between 1963 and 2016 shows the mangroves recovered from the 1950's dieback, and stabilised following the Northern Station construction disruption. Seagrass monitoring has been undertaken in the area since the 1980's has determined no significant changes in the seagrass communities in and around the power station indicating any discharge from the mangroves to the Spencer Gulf is not having a detrimental effect on the marine ecosystem.
Recommendations	Based on the results of this investigation as described in the Sections above, the following recommendations will be considered for the next phase of contamination assessment, Phase 3 remediation.

Area/AEC	Recommendations
Area 1 – AEC 1 Playford fuel oil loss Petroleum hydrocarbon impacts to soils and shallow groundwater may potentially pose an unacceptable dermal contact and ingestion risk to current workers if the ground surface in this area is disturbed and to future users and structures, if the impacts remain following closure and if strict management protocols are not implemented	Following the demolition works, the impacts noted are to be further assessed and appropriate mitigation measures will be implemented to manage identified potential risks to human health, likely to comprise removal of gross impacted soils
Area 1 – AEC 5 Transformers and AEC 7A SPEL sump and tank Minor petroleum hydrocarbon impacts to groundwater are unlikely to pose a potential risk to current and future identified receptors unless the area is excavated and appropriate management protocols are not implemented	Future potential risk associated with excavation works can be managed through the implementation of a site management plan following completion of Phase 3 works
Area 3 – Playford buildings Limited assessment to date due to access constraints	Following demolition, soil validation beneath the building footprints
Area 6 – AEC 7B SPEL drain outlets Discharge to mangroves may be contributing to the overall health of the mangrove ecosystem, however a number of factors are considered to be affecting the highly disturbed ecosystem	Inclusion in the future management plan to continue discharge monitoring as well as monitoring of the mangrove ecosystem health
Area 7 – AEC 23A & 23B Fuel storage area Limited assessment to date due to access constraints	Validation following removal of fuel infrastructure
Area 8 – AEC 25 Maintenance shed and wash down bay Petroleum hydrocarbon impacts to soils potentially pose a risk to ecological receptors	Additional tiers of risk assessment to further evaluate potential risks or potential risk mitigation by remediation of the impacted soils
Area 11 – AEC 31B fuel transfer pipeline Limited assessment to date due to access constraints	Validation following removal of fuel infrastructure
Area 12 – AEC 35 Northern store UST Petroleum hydrocarbon impacts to groundwater unlikely to present an unacceptable risk to current and future receptors, unless the	Validation following the excavation and removal of the UST, dispensing pump, and any other fuel related infrastructure in the area and the impacted soils.

subsurface is removed and contact with the impacted soils and groundwater occurs	
Area 14 – AEC 43B Firefighting area PFOS reported in groundwater at the laboratory LOR	Soil testing to determine if gross impacts to the soils are present from firefighting activities
Area 15 – AEC 44 Fuel pad Petroleum hydrocarbon impacts to soils and groundwater that may pose a potentially unacceptable risk to current workers if the ground is disturbed and to future users and structures if the impacts remain following closure and if strict management protocols are not implemented	Further assessment and/or risk mitigation following removal of the fuel pad and associated infrastructure
Area 15 – AEC 45 Diesel ASTs Limited assessment to date due to access constraints	Validation following removal of fuel infrastructure
Area 17 – AEC 50A Ash pond Discrepancies in the results of testing conducted by FPP and Coffey in June 2016 from wells around the ash pond	Groundwater sampling to confirm the chemical concentrations
Area 17 – AEC 51E Acid clean pit dump Known material deposited in this dump comprises hydrochloric acid and stabilised cyanide (<1kg)	Further investigation of the acid clean pit

Monitoring wells within areas to be subject to excavation during Phase 3 works are likely to be destroyed through this process. It is recommended that prior to any excavation works commencing, wells likely to be destroyed are decommissioned by a licensed driller and following excavation works, replacement monitoring wells are installed to determine the success of remediation activities undertaken. Any additional delineation wells required can also be installed at this time.

Historical waste dumps were investigated with the extents defined and it is considered that potential risks associated with these areas can be managed through implementation of a site management plan.

Bulk fuel storage areas are to be removed including any bunds as part of the site closure and following removal will be required to be validated along with any building footprints, wash down bays, sumps, tanks etc. if they are removed.

This sheet is intended to provide a summary only of the assessment of the site. It does not provide a definitive environmental or engineering analysis and is for an introduction only. It should be read in conjunction with the full report. Limitations and assumptions used to reach the conclusions of the executive summary are contained within the report and have not necessarily been included in this executive summary. This report must be read in conjunction with the attached 'Important information about your Coffey environmental report" included in Section 13.

Abbreviations

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
APS	Augusta Power Stations
AEC	Area of Environmental Concern
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
AST	Aboveground Storage Tank
C_6-C_{40}	Hydrocarbon chainlength fraction
bgs	Below ground surface
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
btoc	Below top of casing
COC	Chain of Custody
COPC	Chemical of potential concern
CSM	Conceptual Site Model
DEWNR	Department of Environment, Water and Natural Resources
DO	Dissolved Oxygen
DSI	Detailed Site Investigation
EC	Electrical Conductivity
eH	Oxidation/Reduction Potential
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
Eurofins	Eurofins Environment Testing Australia Pty Ltd, trading as Eurofins MGT
FPP	Flinders Power Partnership
IP	Interface Probe
LNAPL	Light Non-Aqueous Phase Liquid
LOR	Limit of Reporting
µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MW	Monitoring Well
NATA	National Association of Testing Authorities
OCP	Organochlorine Pesticide

OPP	Organophosphorous Pesticide
PAH	Polycyclic Aromatic Hydrocarbon
PCA	Potentially Contaminating Activity
PCB	Polychlorinated Biphenyl
PID	Photoionisation Detector
ppm_v	parts per million by volume
PSI	Preliminary Site Investigation
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference
SA EPA	South Australian Environment Protection Authority
SAQP	Sampling, Analysis and Quality Plan
SB	Soil Bore
SMF	Synthetic Mineral Fibre
SWL	Standing Water Level
TDS	Total Dissolved Solid
TOC	Top of Casing
TP	Test Pit
TRH	Total Recoverable Hydrocarbon
UST	Underground Storage Tank
VHC	Volatile Halogenated Compound
VOC	Volatile Organic Compound

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1. Introduction

1.1. Background

Flinders Power Partnership (FPP) required a Detailed Site Investigation (DSI) to be undertaken at the Augusta Power Stations, located between Power Station and North Power Station Road, Port Augusta, South Australia ('the site') as part of a phased approach to site contamination assessment at the site. A site location plan is provided as Figure 1.

Coffey Environments Australia Pty Ltd (Coffey) have completed a Preliminary Site Investigation (PSI) (Coffey 2016a) for the site as the first phase of the site contamination assessment which identified key areas of environmental concern (AEC) requiring further assessment. On the basis of the PSI findings, a Sampling, Analysis and Quality Plan (SAQP) (Coffey 2016b) was developed to facilitate further investigation of the identified AECs.

A Site Contamination Auditor, Mr Steven Kirsanovs of Kirsa Environmental has been appointed to the site by FPP to undertake a site contamination audit as part of the closure plan.

The DSI is also a requirement of a Voluntary Site Contamination Assessment Proposal (VSCAP), dated 9 September 2016, which the South Australia Environment Protection Authority (SA EPA) has reviewed and considered appropriate for the site (SA EPA letter to FPP ref:61672;05/23359, dated 22 September 2016).

The site ceased power generation in May 2016 and entered site closure with the demolition program commencing in June 2016. Some infrastructure such as road ways, northern infrastructure pad, cooling water inlet/outlet infrastructure, sheds, switch yards and site drainage infrastructure including ABC Lake (situated immediately south of the ash storage area) are expected to remain at the site for future use. A number of options for site reuse including the ash ponds are being considered that will benefit the local community.

The Leigh Creek Coal Mine supplied coal exclusively for FPP's Augusta Power Stations. The coal was transported by rail to Port Augusta which is approximately 250km south of the mine. The rail service was provided by Pacific National under contract. The Leigh Creek Coal Mine, Augusta Power Stations and the Leigh Creek to Port Augusta Railway facilities are known collectively as the Flinders Operations.

Ultimately, the phased assessments being undertaken at the site will assist in FPP's process to divest the site and/or hand back the lease(s) for future ongoing non-sensitive commercial/industrial land use.

The site was notified to SA EPA under Section 83A of the EP Act (1993) of site contamination to underground water on the basis of the results of this investigation on 7 February 2017.

1.2. Objective

The objective of the DSI was to assess the nature and extent of potential site contamination within the AECs, determine if a potential risk exists to the identified potential receptors from identified site contamination, and provide recommendations for further assessment or risk mitigation (Phase 3), if required to facilitate site closure.

1.3. Standards and guidance documents

The DSI was performed general accordance with the following:

- National Environment Protection Council (NEPC) (1999) *National Environment Protection (Assessment of Site Contamination) Measure* (ASC NEPM) as amended in 2013;
- Standards Australia (2005) *Guide to the Sampling and Investigation of Potentially Contaminated Soil. Part 1: Non-volatile and semi-volatile compounds*, AS 4482.1-2005;
- Standards Australia (1999) *Guide to the Sampling and Investigation of Potentially Contaminated Soil. Part 2: Volatile substances*, AS 4482.2-1999; and
- Current relevant South Australian Environment Protection Authority (SA EPA) guidelines including:
  - SA EPA (2008) Guideline Site Contamination: Determination of background concentrations;
  - SA EPA (2009) Site Contamination: Guidelines for the Assessment and Remediation of Groundwater Contamination; and
  - SA EPA (2015) Environment Protection Policy (Water Quality EPP).

2. Geoenvironmental setting

2.1. Location and history

The site is located in the south of the Port Augusta Township, to the west of the Stirling North Township. The site is accessed by both the Power Station Road in the north and Northern Power Station Road in the east.

The power station was in operation since the mid 1950's with the full extent of operations from 1985 with the Northern Station commencing production. FPP has had site ownership since 2000 with the Electricity Trust of South Australia (ETSA) formerly owning and operating the site until that time. Prior to the 1940's the site was primarily mangrove swamps associated with Northern Spencer Gulf. Two portions of the mangrove swamp habitat along the eastern edge of the Spencer Gulf were reclaimed, initially to create the power station facility associated with the Playford Stations and later to construct water channels for the Northern Station.

Site operations ceased completely with power generation ceasing at the Northern Station on 9 May 2016. The site commenced closure works at this time with demolition works commencing at the Playford Stations.

2.2. Site description and identification

Site plans showing land tenure and key features (including designated investigation areas) are included as Figures 2A and 2B respectively.

The power generation infrastructure is located in the western portion of the site, adjacent to the tip of Spencer Gulf with the Playford Stations on the western boundary adjacent to Spencer Gulf, the Northern Station in the south west. The ash ponds make up the northern portion of the site and the former coal loading area and the railway loop make up the eastern portion. The railway line from Leigh Creek enters the site from Stirling North in the north east and extends into the site and loops around the former coal loading area. To the south is vacant land formerly owned by Primary Industries and Regions SA (PIRSA) which operated as a marine research centre up to approximately four years ago.

A number of site buildings associated with the former power station operations are located in the central and southern portion of the site adjacent to the Playford and Northern Stations. These include transformers, switch yards, maintenance and workshop sheds/buildings, steel laydown/recycling areas, fuel oil storage and dispensing (former and current), waste oil storage and the water infrastructure across the site. Some of these structures have since been cleared with steel and other materials for recycling removed and other items auctioned.

Demolition works were in progress at the site at the time of the investigation fieldworks in the second half of 2016. At this time demolition works were primarily focussed in the area of the Playford Stations. Site photographs are provided in Appendix A from the DSI investigation. Detailed site photographs are provided in Coffey's (2016a) PSI report.

Site identification details are provided below in Table 2.1.

Table 2.1: Site identification

Site Location	Power Station and Northern Power Station Roads, Port Augusta
Property description and Certificate of Title	• Certificate of title CT 6134/241, Allotment 1; • Certificate of title CT 5843/692, Allotment 2; • Certificate of title CT 6134/240, Allotment 6; and • Certificate of title CT 5843/691, Allotment 8. Note a portion of the site is land not within a plan/parcel, located to the west of the ash ponds. Refer Figure 2A for site area details.
Surrounding environment	• Bird Lake is located to the north of the ash ponds; • To the north west is the Port Augusta Township, residential allotments; • To the east is pastoral land and the Princes Highway; • To the west and south is Spencer Gulf and associated mangroves. It is noted that a sea wall provides the site boundary on the west of the Playford stations.
Zoning information	The site is currently zoned as 'Industry in the Development Plan for Port Augusta (City) (DPTI, 2012). The zone's objectives are: 1. A zone primarily accommodating a wide rand of industrial, warehouse, storage and transport land uses; and 2. Development that contributes to the desired character of the zone. The land within Allotment 8, 9 and land not within a plan/parcel in the north west of the site are zoned within the Coastal Conservation Zone.

2.3. Previous environmental investigations

A number of previous environmental investigations have been undertaken at the site focused in areas of fuel infrastructure. Groundwater monitoring commenced at the site due to a fuel oil leak detected in April 1995 between the Playford A and B stations. Following the soil and groundwater investigations of the fuel oil loss area, the assessment areas were expanded from 1998 onwards to include other potential areas of groundwater contamination from petroleum hydrocarbon sources. Recovery of light non aqueous phase liquid (LNAPL) commenced in February 1998 at the wells located within the Playford fuel oil loss area ceasing sometime in 2015.

A detailed summary of the previous environmental investigations is provided within the PSI report (Coffey 2016a).

2.4. Geology

2.4.1. Regional geology

According to the Geological Survey of South Australia, Port Augusta Mapsheet (1968), the geological profile beneath the area of investigation is generally characterised by the St Kilda Formation: Sands, shelly silts and clays of the littoral lagoons and mangrove swamps.

2.4.2. Local geology

Information reviewed as part of the PSI (Coffey 2016a) details local geological profile beneath the site to comprise of sand, silty clays and sandy silts with shell grit a common component given the location of the site.

Monitoring wells installed at the site around the ash pond and the rail loop in the 1990s (Woodward-Clyde, 1994) indicated the site lithology comprises of silt/silty sand with shell grit of the St Kilda Formation underlain by clays of the Pooraka Formation.

The Playford and Northern Stations are constructed on reclaimed land incorporating imported fill and ash. Dredged spoil from construction of the cooling water channels was also utilised as fill in the vicinity of the Northern Station. The spoil from a channel cut to divert Saltia Creek to the south when the rail loop was constructed, was used to build the coal stockpile pad.

Further information on the local geology encountered during the DSI is provided in Section 5.1. Geological cross sections of the Playford Stations (Area 1), Northern Station (Area 12) and coal loading area (Area 15) are provided as Figures 3E, 14E and 17F respectively.

2.5. Hydrogeology

2.5.1. Regional hydrogeology

A registered groundwater bore search was undertaken during the PSI (Coffey 2016a) which reported numerous groundwater bores registered within the Port Augusta Township to the north of the site. These are primarily registered as observation, monitoring or investigation bores with the depth to standing water levels (SWLs) recorded as between 0.05m and 10m below the surface with the majority of the wells having SWLs recorded at less than 3m. Relatively high total dissolved solids (TDS) values are recorded for the registered bores given the proximity of the Spencer Gulf, which would limit the beneficial use of the aquifer for any use in accordance with the SA EPA (2015) Environment Protection Policy (Water Quality EPP).

A deeper underlying aquifer is expected to exist beneath the site between 8 and 10m below ground surface (bgs) within the gravelly sand lithology encountered at the base of the deeper bores installed in the vicinity of the Playford power stations (wells installed to 8mbgs).

2.5.2. Local hydrogeology

In 1994 AGC Woodward-Clyde Pty Ltd (Woodward-Clyde) undertook an assessment of the groundwater characteristics and flow patterns at the site, primarily focused around the coal loading area and rail loop which was at the time proposed as a potential area for a secondary ash pond for the Northern Station.

As part of the investigation Woodward-Clyde installed 11 monitoring wells to the south of the ash pond, around and to the south of the coal loading area/rail loop and to the east of the ash ponds. These wells still remain at site and are named APS 1 through to APS 11 (refer Figure 19E). A further 11 monitoring wells were found in the southern area of the site during the investigation, installed by others and were numbered from 12 through to 22, within current nomenclature APS 12 to APS 22. A monitoring installed by Port Augusta City Council (APS 23) at the north of the ash pond, adjacent to Hospital Creek was also utilised for the investigation.

The investigation determined that the shallow groundwater gradient flows south west towards the Spencer Gulf. A shallower gradient was present in the vicinity of the rail loop where low lying ground and salt encrustation was present and groundwater mounding was present in the vicinity of the ash pond, particularly around the southern area. It was noted that relatively high TDS values were recorded in the vicinity of the rail loop where the low lying area and salt evaporation was present.

Investigations undertaken to date at the site have identified groundwater to be encountered between 2 and 4mbgs across the site with groundwater flow west towards the Spencer Gulf. Relatively high TDS values are recorded for the groundwater system (PB, 2015).

2.6. Hydrology

2.6.1. Surface water bodies

Spencer Gulf is located adjacent to the site's western boundary.

Saltia Creek enters the site from the south east with a channel diversion present to the south of the rail loop that discharges to the Spencer Gulf.

Seawater from Spencer Gulf was used as cooling water at the station and mixed with ash from the boilers to allow the waste ash to be pampered as a slurry to the Ash Storage Area.

In order to improve the appearance of the entrance to the township of Port Augusta it is understood that in the late 1960s ETSA diverted discharge water from the power station to create Bird Lake, an artificial lake on dry clay pans to the north of the site. Bird Lake was fed through overflow from the ash ponds on-site via the final polishing pond with a levee which was constructed in 1987. Water discharges into Spencer Gulf via Hospital Creek which is a mainly natural tidally influenced creek system (see Figure 2.1 below).

There is community concern that following the closure of the site, Bird Lake is expected to become dry as water is no longer pumped into the ash ponds as part of the power generation process. Port Augusta City Council is leading the process of identifying and implementing a solution to the drying out of the lake, and working to identify a long-term solution to this issue, with support from the EPA and the state government.

2.6.2. Surface water monitoring

Surface water monitoring has been undertaken at regular intervals from a number of points across the site, particularly around the ash storage area as part of the marine monitoring program required for the site EPA license agreement(s). The results were included in annual verification reports conducted by an independent auditor, EnviroManagement Pty Ltd. A summary of these reports are provided in the PSI (Coffey, 2016a).

Coffey has been provided with water quality data collected between May 2007 and August 2015 from Hospital Creek, Bird Lake Jetty, Mid Gulf Point and at a background location called Transect 7. Water collected at each event was tested for trace elements and nutrients, results are presented in Table 24 and locations are presented below.

Figure 2.1: Surface water quality collection points (FPP)

Figure 2.2: Surface water quality collection points – Transect 7 (FPP)

The results reported over this time period have been compared against the SA EPA (1994) Environment Protection (Marine) Policy (superseded) and SA EPA (2003) Environment Protection (Water Quality) Policy criteria (superseded) as reported within the verification reports. Some trace metals have been reported above the criteria at some instances, however these were not considered to be an indication of a pattern of concentrations above the criteria for the trace elements monitored as no significant changes to the concentrations were observed (EnviroManagement, 2014).

In 2010, the South Australian Research and Development Institute (SARDI) completed an assessment of the potential impacts of Hospital Creek discharges to the Spencer Gulf from the power station activities. The process water from power generation at the site was previously discharged into the ash storage area where the most of the ash settled, and flowed through to the polishing pond before being discharged into the upper end of Hospital Creek and into the Spencer Gulf.

Four components of the ecosystem were investigated (sediment, mangroves, seagrasses and infauna) at the outflow of Hospital Creek as well as at three control mangrove creeks in the Upper Spencer Gulf. In addition the area around the inflow from the polishing pond to Hospital Creek was assessed. The results of the assessment concluded that the environment at Hospital Creek was within the range of natural variability of the region and did not appear to be affected by site activities (SARDI 2010).

2.6.3. Site drainage water infrastructure on-site

Site drainage water infrastructure is present across the site for the purpose of draining surface water, infrastructure water and recycling of the process water. It is understood that the drainage water infrastructure will remain in place following site demolition works for future use.

In Area 1 – Playford Stations, surface and formerly process water from the stations and water from the basements was drained to a tank which overflows to the adjacent sump located in the north western portion of the area (Figure 3A, AEC 7A). The water from the sump was pumped through underground pipes to the ‘SPEL’ drain (oil interceptor) located to the east and then to the ash pond sump located within Area 2 – Playford B switch yard (Figure 4A). Water from the ash pond sump was transferred via surface pipework to the ash pond Stage 2 pumps which pumped the water into the ash storage area (Figure 19A).

Three ‘SPEL’ drains are located along the southern boundary of the Playford area. These drains were utilised for the collection of surface water from the Playford infrastructure such as the buildings, switch yards, maintenance and workshop sheds, equipment laydown areas and the transformer bunds. The water drains out to the mangrove area and ultimately the Spencer Gulf (Area 6, Figure 9A). The health of the mangrove swamp in this small area was observed to be poorer than nearby mangrove areas. Anecdotal evidence of dieback occurring in the mangroves south of the Playford area suggests two dieback events occurred in the 1980s and 1990s, with replanting of the mangroves following at least one of these events. A fourth SPEL drain is also located adjacent to the south of the Playford A Station which drains directly to the Spencer Gulf.

The ‘SPEL’ system is believed to have been installed at the site in the year 2000. Prior to the SPEL system installation, the drainage system existed predominately in its current form. Outfalls were directed into the Spencer Gulf around the Playford Stations – this was redirected to the SPEL tank and sump following SPEL installation, and into the Spencer Gulf south of the Playford buildings and SA Power Networks (SAPN) switch yard where SPEL drain outlets have since been installed.

The Northern Station (Area 12) contains a series of spoon drains surrounding the station for surface/storm water and spill/leak management that drained to an oily water skimmer pit to the south west of the station (Figure 15A), followed by the intermediate oily water skimmer pit located to the west of the station and north of administration building (Figure 14A). The water was separated from product and pumped via sub-surface water pipework to the main ‘contaminated drains pond’ (Figure 13A). The product (oil) formerly was skimmed from both pits into 205L drums that when full were triggered through an internal system and stored in a designated waste oil storage area (Figure 15A) pending collection for off-site disposal.

Water from the ‘contaminated drains pond’ (Figure 13A) flows through an interceptor weir and is pumped to the ABC Lake to the east (Figure 17A). During site operation, when the ABC Lake reached capacity through this process, the overflow water was pumped into the ash storage area. The ABC Lake also collects seepage water from the ash storage area and surface water from the immediate vicinity.

2.6.4. Site drainage water monitoring

The water infrastructure including the ‘SPEL’ drains and sumps across the site, various drains, sumps, weirs and groundwater wells around the ash pond and the ‘contaminated drains pond’ were monitored annually for chemicals of potential concern. The results from the SPEL drain monitoring is provided in Table 8B.

Seepage from the ash pond to the surrounding environment has been assessed from the monitoring of site drainage water, reported annually within the verification reports prepared by EnviroManagement Pty Ltd. The samples collected have been tested for trace metals as well as nutrients and Coffey has been provided with the results of this testing between 2007 and 2016 as presented in Tables 25A and 25B. Locations of monitoring are provided on Figure 21.

It is noted that data from the locations in the vicinity of the SA Water Port Augusta East Waste Water Treatment Ponds in the north west area of the ash pond have reported nutrients ammonia, phosphorus and nitrogen above data collected from other locations around the ash pond. Coffey have been provided with SA Water data collected from the effluent post treatment between 2011 and 2017 which reports median concentrations of ammonia at 12mg/L, nitrogen at 35mg/L and phosphorus at 9mg/L which are in some cases an order of magnitude higher than the data collected by FPP from the locations around the waste water treatment ponds (sewer pond north, sewer pond south, Playford Drain 5 and Playford Drain 8) indicating seepage from these waste treatment ponds is not considered to be significantly impacting the surrounding environment.

2.7. Mangroves

Prior to the construction of the Northern Station, an Environmental Impact Statement was undertaken by Kinhill Stearn in 1985, with a supplementary statement provided in 1986 (Kinhill Stearn, 1985 and 1986). Within the assessment, mangrove health around the power station was discussed. Figure 2.3 shows the areas that had been surveyed and were the subject of the assessment:

Figure 2.3: Mangrove areas surveyed (Kinhill Stearn, 1985)

Prior to 1961, it is recorded that the mangroves to the north (Area A) and south (Area C) of the Playford Stations had a number of die backs. It was determined that this was caused by sulphur dioxide emissions from the Playford chimneys (six short 40m high chimneys), these chimneys were replaced in 1961 by one 80m chimney (Kinhill Stearn, 1985). Aerial photographs reviewed between 1972 and 1984 showed a recovery and stabilisation of the mangrove community in these areas (Kinhill Stearn, 1986).

Further dieback to the mangroves north of the Playford (Area A) was observed in 1985 and it was determined that this was due to a 'slug' of highly saline groundwater migrating through these mangroves from the ash pond. It was recommended to direct water flows into the eastern side of the ash pond during summer to avoid future die back from saline water as well as installing a drain system along the Playford Station access road on the western side of the ash pond (Kinhill Stearn, 1986). It is understood both of these measures were implemented at the site.

It was also noted that through the construction of the Northern Station including the cooling water channels, some areas of the mangroves, particularly Transect 4 and 5 and the southern area of Area C as shown in Figure 2.3 above were markedly changed by mechanical disruption (Kinhill Stearn, 1986) and as such, the mangrove community within this area has been highly modified.

2.8. Seagrass monitoring

Seagrass monitoring has been undertaken regularly for the site as part of the Environmental Improvement Program (Schedule 1, Environmental Compliance Agreement) for the site (EnviroManagement, 2014). The seagrass monitoring was undertaken by assessment from biennial aerial photographs of the area (map land) and observations based on historical data, results of which were presented in the annual verification reports by EnviroManagement Pty Ltd. Monitoring of the seagrass since 2002 has been observed to not report significant changes in the seagrass communities in and around the power station (Alinta Energy, 2015).

An assessment of the growth of seagrass in the vicinity of the power station discharge to the Spencer Gulf was undertaken in 1994 (Ainslie, et al, 1994.) This assessment included monitoring three areas of seagrass between 1986 and 1990, one in the vicinity of the discharge point, one at a Gulf ambient site and one at a site in Port Paterson (approximately 3km south east of the site). The assessment concluded that relatively minor growth reductions were present in the seagrass in the vicinity of the discharge point when compared to the Gulf ambient seagrass, despite the higher summer water temperatures.

However, the seagrass in the vicinity of Port Paterson, where naturally warm waters are present, was observed to have significant growth reduction in relation to the ambient Gulf seagrass. It was noted that the higher water temperatures observed at Port Paterson were the upper limits of what the seagrass are comfortable with and as such, any future localised increases in water temperature around the power station discharge point may cause seagrass growth reductions.

The seagrass assessed as part of the SARDI assessment (SARDI, 2010) indicated that the seagrass observed within the control sites and within the area of discharge did not have any significant differences. It was also observed that there had been no significant decline in seagrass health since the assessment conducted in 1994 (Ainslie, et al, 1994).

2.9. Waste dumps

Information obtained in the PSI (Coffey 2016a) from site interviews conducted identified seven waste dumps were known to exist across the site area from historical practices (pre 2000). The staff interviewed to obtain this information as presented in the PSI are:

Table 2.2: Staff interviewed during PSI

Staff name	Role	Approximate years of experience at APS
Kym Maule	Facility Manager, APS	15
Terry Manning	Environmental Coordinator	39
Brendan Lynch	Superintendent Site Services Augusta	45
John Atkinson	Specialist Contract Services	44
Bruce French	Manager Production Augusta	41
Robert Ash	Superintendent Lubrication Augusta	43

The approximate locations of the waste dumps are indicated on the site figures and are summarised as follows:

- Within the steel laydown area (Figure 16A), there is a former waste dump for chlorine plant residue and waste treatment plant residue. Anecdotal evidence suggests this dump was removed/excavated in 2000 (AEC 51C);

- A chlorine plant residue waste dump is located adjacent to the rail line loop and the ABC Lake (AEC 51D, Figure 17B);
- A synthetic mineral fibre (SMF) (AEC 51A) and a general waste dump (AEC 51B) are located adjacent to each other to the south of the train unloading area (Figure 18B). It was noted that this area was regularly checked for any material on the surface by FPP staff;
- An acid clean pit is located within the southern portion of the ash pond (AEC 51E, Figure 19C). The BRW Land Contamination Issues report (2000) noted that the acid clean pit contained small quantities of stabilised sodium cyanide. The Contaminated Lands Identification, Management and Liability report by FPP in 2000 further confirmed material disposed of in the acid clean pit as low level hydrofluoric acid from acid cleaning of the Northern Station boilers in the mid-1980s as well as minor quantities (up to 1kg) of stabilised sodium cyanide; and
- To the north west of the former coal loading area, two general waste dumps (AEC 51F) were located adjacent to each other (Figure 19B).

It is also noted that general construction type waste (i.e. concrete and scrap metal) was dumped along South Coast Road on the southern site boundary, outside of FPPs' lease boundary (Figure 6A). It is understood that the construction waste located in this area is from upgrades to the SAPN switch yard undertaken by SAPN.

2.10. Ash storage area (Ash Pond)

In January 2016 Golder Associates Pty Ltd (Golder) collected three samples of ash from the ash storage area for geotechnical and chemical testing to provide a 'Product Data Sheet' for the ash (Golder, 2016). The results of the chemical testing reported dry weight concentrations of barium and manganese exceeding the SA EPA waste fill criteria (SA EPA, 2013).

To provide further data to complement the Golder data, during the course of the DSI fieldworks, an assessment of chemicals concentrations within ash samples from the ash storage area was undertaken by Coffey and reported separately (Coffey, 2016c). The objective was to determine reuse options for the ash material including potential use as backfill material at the site following demolition of surface infrastructure. Coffey collected 15 samples of ash material from four locations across the ash pond as directed by FPP (for safety) with samples submitted for a range of chemical testing.

The chemical results indicated the ash sampled had chemical concentrations typical for bottom ash and in line with Golder investigation indicating the material within the ash pond is likely to be consistent. Barium and manganese were reported above the SA EPA waste fill criteria (SA EPA, 2013) but below the relevant health guidance.

The assessment concluded that the ash material within the storage area may be suitable for reuse in a commercial/industrial land use setting, would be unlikely to degrade concrete foundation piles and may be suitable for reuse as a recycled material for transport infrastructure.

It is noted that the coal from Leigh Creek has been tested as part of the "A Survey of Naturally Occurring Radioactive Material Associated with Mining" (Australian Radiation Protection and Nuclear Safety Agency, 2013). Previous elemental and radiological analysis of Leigh Creek coal and ash from APS indicate levels of natural radiation that are extremely low and analogous with the background natural environment. The Resources and Energy Branch of the SA EPA has directed FPP to assess if naturally occurring radioactive materials (NORMs) present in coal and ash continue to be present on site during closure and demolition.

As documented in the FPP Environmental Closure and Post Closure Plan for APS (October 2016), during the closure process:

- FPP will assemble available test data which will form the basis of an environmental and safety risk assessment;

- A NORM screening assessment will be undertaken by competent FPP personnel, utilising a radiation survey meter to the satisfaction of the SA EPA Resources and Energy Branch, particularly focussing on the ash storage area, along with heat exchangers and locations within the boiler structures of the Northern Station and Playford Stations where NORMs may be present; and
- FPP will assess test data against screening limits provided by the SA EPA Resources and Energy Branch, appropriate actions resulting from exceedances of screening limits will be taken in consultation with SA EPA.

Following cessation of power generation operations and the pumping of cooling water/ash slurry into the ash storage area in May 2016, and after the storage area had dried sufficiently FPP instigated the aerial application of an acrylic polymer dust suppressant in November 2016 as an interim measure prior to capping of the ash storage area.

In late December 2016, approximately 60mm of rain flooded parts of Port Augusta. The rainfall created pooling and ponding on the ash storage area surface and caused degradation of the dust suppressant layer. Immediately after this occurred, strong southerly winds caused dust from the ash storage area to migrate towards the Port Augusta Township.

SA Health completed a risk assessment of airborne dust from the ash pond in early January 2017. The results of the dust samples tested reported concentrations of metallic fractions in the nanogram and microgram level. The levels for many metals were consistent with normal background levels elsewhere. Other metal concentrations are consistent with levels found near coal/oil/industrial combustion sites worldwide (SA Health 2017a). SA Health have confirmed that the ash analysis has shown it "to be very similar to dusts from the desert" (SA Health, 2017b). SA Health have expressed concern about the high overall dust level measured on 1 January 2017 at monitoring stations in Stirling North and at Lea Memorial Oval in the southern outskirts of Port Augusta Township, with that they refer to as "*a high fraction of particulate matter less than 10 microns in diameter (PM10)*" (SA Health 2017a).

SA EPA received information from a member of the local community that the ash storage area may contain asbestos. The EPA acted immediately to analyse existing dust samples for asbestos. The results confirmed that no asbestos fibres were present. To further confirm these results, six samples were sent to an independent specialist NATA accredited laboratory for asbestos analysis and results confirmed that asbestos was not detected in the samples (Bureau Veritas, 2017). Five out of six samples were collected on 1 January 2017 in residential areas and the other sample was collected immediately adjacent to the ash storage area over a two and a half week period in October 2016 (SA EPA, 2017).

A survey plan of the ash storage area completed by Greenhill Engineers Pty Ltd on behalf of FPP in 2016 indicates the maximum depth of ash to be approximately 8m from the surface in the southern portion (where the ash material was discharged) to 4-5m below the surface in the north (adjacent to the polishing pond). This survey plan is provided in Appendix C.

To rehabilitate the ash storage area, FPP proposes to cover the area with soil and vegetate with plant species suited to local conditions.

2.11. Coal remaining at the site

Unburnt coal that is remaining at the site comprises of coal rejects that could not be burned in the power generation process, unburnt coal removed from the coal conveyor including the bins and bunkers over time as well as the coal cleaned out of the coal conveyor bins during the site demolition works. The unburnt coal is deposited in the area as shown in Figure2.4 below, east of the fuel pad and rail loop (Area 15) with an approximate volume, as of December 2016, estimated to be 5,200m^3 (1.2m deep). There is approximately 200m^3 of coal remaining within the coal conveyor bins to be added to this area. This area is noted to be included within the future management plan for the site and is currently intended to be revegetated.

Figure 2.4: Unburnt coal remaining (FPP)

In addition, some coal that could not be removed from the coal loading area surface during the clearance of this area was ripped and mixed into the subsurface of the stockpile pad fill. It is noted that this area has since been revegetated.

2.12. Background concentrations

2.12.1. Overview

As part of the process to establish if site contamination exists within the area of investigation and the nature of any site contamination, a process to establish background concentrations of chemical substances in soil and groundwater has been undertaken in accordance with SA EPA Guideline Site Contamination: Determination of background concentrations (EPA 838/08, 2008). SA EPA defines the conditions that contribute to the background concentration as:

- **Natural:** This is the amount of naturally occurring chemical substances derived/originating from natural processes in the environment as close as possible to natural conditions, exclusive of specific anthropogenic activities or sources; and
- **Ambient:** The concentration of chemical substances in the environment that are representative of the area surrounding the site not attributable to a single identifiable source. These are typically from historic activities, widespread diffuse impacts, e.g. fallout from motor vehicles.

2.12.2. Soil

Much of the site comprises reclaimed land and is therefore in effect a man-made structure. Given the site area is primarily reclaimed land, limited soil data related to natural soils is available to establish background soil conditions. Based on the data collected from natural soils across the site within Areas 1, 8, 11, 12, 15 and 16, background soil conditions are considered to be less than the laboratory limits of reporting (LOR) for petroleum hydrocarbons (benzene, toluene, ethylbenzene, and xylenes and naphthalene (BTEXN compounds and total recoverable hydrocarbons (TRH)), volatile halogenated compounds (VHCs), polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

As limited data is available for background concentrations of metals across the site, the following typical range of metals concentrations in soils in South Australia have been adopted as background concentrations of metals, along with the available data from one soil sample collected from natural soils within Area 14 (the steel laydown area) that was analysed for metals.

Table 2.3: Background concentrations – metals in soils

Metal	Typical range* (mg/kg)	Concentration reported at Area 14 (mg/kg)
Antimony	**	<10
Arsenic	0.2-16	3.1
Beryllium	**	<2
Boron	**	75
Cadmium	0.1-4.7	<0.4
Chromium	2-31	17
Cobalt	**	5.3
Copper	4-128	32
Iron	**	-
Lead	16-185	15
Manganese	**	96
Mercury	0.01-2.3	<0.1
Molybdenum	**	<10
Nickel	3-41	10
Selenium	**	<2
Silver	**	<5
Tin	**	<10
Vanadium	**	41
Zinc	12-420	10

* based on data available from Australian literature as published in "An Investigation of Inorganic Background Soil Constituents with a Focus on Arsenic Species" (Diomides, C.J. 2005)
** data not available

Further discussion of ambient concentrations of chemicals of potential concern for each area investigated at the site is presented in Section 6.2.2.

2.12.3. Sediment

In the discharge assessment conducted by SARDI in 2010, sediment samples were collected from three control sites as well as at the Hospital Creek discharge point. These samples were tested for heavy metals as well as other property characteristics and the data collected from the three control sites is considered likely to be representative of background concentrations for the mangrove sediments in the area. The areas sediments were collected from are indicated on the plan below:

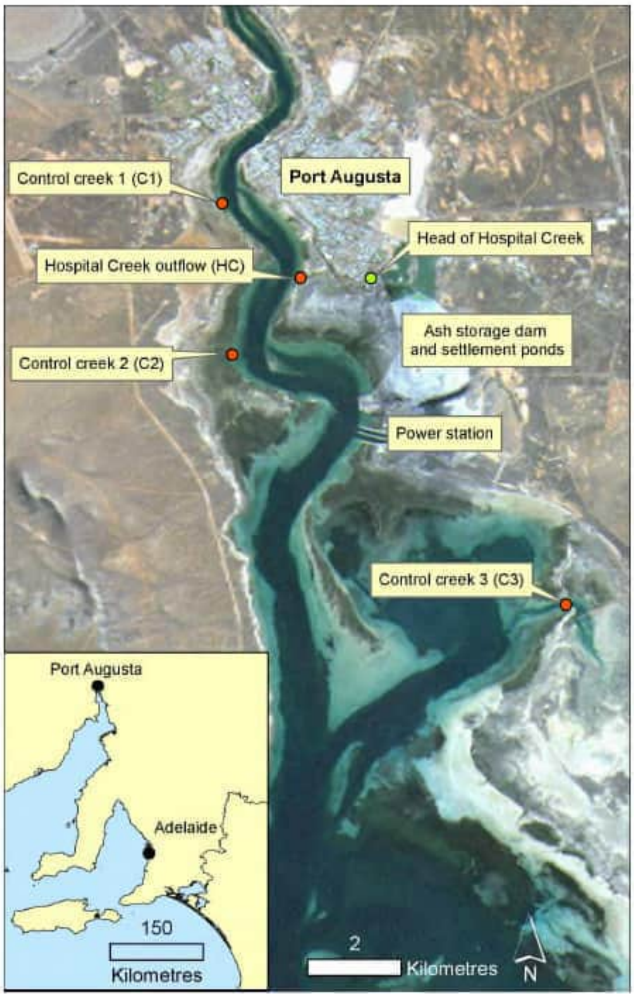

Figure 2.5: Mangrove sediment background locations (SARDI 2010)

As part of the assessment of the three SPEL drains discharging on the mangrove ecosystem located to the south of the Playford areas (Area 6, formerly Area C as referenced in Kinhill Stearn, 1985), Coffey collected two background sediment sample locations (BGSS1 and BGSS2) from the mangrove area located to the north east of the Playford B Station (refer Figure 8C, formerly Area A as referenced in Kinhill Stearn, 1985). There appears to be limited runoff from the site to this area of mangroves and historical anecdotal information available from FPP indicates there have been no known diebacks in this mangrove area since the mid 1980's (refer to Section 2.10 above). Following the initial sampling conducted at Area 6 (refer Section 4.2), further sampling was conducted to collect more data and in addition, two additional background locations were collected from within Area 6 mangrove area, as far from influence as possible (BS1 and BS2, refer Figure 4B).

The data from the SARDI (2010) assessment as well as the sediment data collected from background locations within this DSI assessment are provided below.

Table 2.4: Background concentrations – mangrove sediments

Analyte	SARDI (2010) background locations concentration range (mg/kg)	Coffey DSI background locations concentration range (mg/kg)
TRH C_6-C_{40}	-	<100
BTEXN	-	<LOR
PAHs	-	<LOR
PCBs	-	<LOR
Arsenic	3-13	<2-13
Barium	-	960
Beryllium	-	<2-3.4
Boron	-	160-220
Cadmium	<0.2	<0.4-0.5
Chromium	5-19	5.8-26
Cobalt	-	7.7-17
Copper	4-13	5.2-43
Lead	6-31	<5-32
Manganese	-	185-500
Mercury	<0.05-0.07	<0.1
Nickel	2-9	<5-26
Vanadium	-	58
Zinc	11-45	16-300

<LOR = less than laboratory LOR
- = not tested

2.12.4. Groundwater

There are a number of groundwater wells installed at the site for licensing requirements outside of the main infrastructure areas that are considered to be background locations as site activities would have limited influence on the groundwater system in these areas (refer Figure 19D and 19E). The historical data from compliance monitoring between June 2008 and June 2016 is presented in Table 22B and a median concentration value is presented on Figure 19E.

APS wells APS 9 and APS 10 are considered to provide information on background chemical concentrations as they are located far from areas of potentially contamination activities. However on review of logs within the Woodward-Clyde (1994) report, the response zones for these two wells appear to be installed within a different lithology to the majority of wells within the site (Pooraka Formation with no occurrence of St Kilda Formation) and as such, groundwater chemical data from these locations are not considered to be representative of background concentrations for the shallow groundwater body beneath most of the site.

APS wells APS 7, APS 30, APS 32, APS 33 and APS 34 are located to the east of the ash pond, and are assumed to be installed within the same lithology as the wells across the majority of the site based on the log for well APS 7 (Woodward-Clyde 1994) and the total depth of wells gauged during the current event. Given the location of the wells, the groundwater flow and gradient (see Section 5.2), it is considered that the ash pond would have limited effect on the groundwater within these wells and as such, it is considered that samples from these wells provide background information with regard to shallow groundwater beneath much of the site.

It is noted there are no logs available for wells APS 30, APS 32, APS 33 and APS 34, it is understood that these were installed by push tube method by on-site staff.

It is noted that there are a number of APS wells installed to the south of the ash pond, around the rail loop and further to the south. Based on the log available for APS 11 only (Woodward-Clyde 1994), it is considered that the sample data from wells located to the south of the rail loop (APS 11, APS 12, APS 15 to APS 18) area are also likely to be representative of background information for the groundwater system at the site.

Coffey sampled 12 of the APS wells located around the ash pond as part of the current investigation including wells APS 7, APS 30, APS 32, APS 33 and APS 34, the results of which are presented in Table 19B. The current data collected from these wells as well as the median concertation value from FPP data for background locations as noted above is presented below.

It is noted that on comparison of data collected from APS wells in June 2016 by FPP staff versus data collected from the same APS wells by Coffey staff in June 2016, discrepancies between metal concentrations tested are present. This may be due to different sampling techniques such as filtration of groundwater samples prior to submission to the analytical laboratory or different extraction process at different analytical laboratories. It is recommended that a further round of groundwater sampling of the identified background well locations (at least) is undertaken to confirm the chemical concentrations.

It is noted that wells located to the south, APS 12, APS 15 to APS 18 appear to have lower metal concentrations than the wells located to the east of the ash pond, this may be due to the low lying ground in this area of the site creating surface water infiltration. The median concentrations are overall similar to those observed to the east of the ash pond and as such this is not considered to have an effect on the background concentrations discussion.

It is also noted that samples from well APS 11 located adjacent to Saltia Creek diversion in the south appear to have generally higher metal concentrations than samples from other wells at the site, this may be due to higher volume of surface water in this area due to the diversion, however the median concentrations are overall similar to those observed in this area of the site. A review of activities undertaken in the area of well APS 11 revealed that in 2015 SunDrop constructed an access road and water pipeline near APS 11, based on the data collected this does not appear to have influenced the groundwater conditions in this area of the site.

Table 2.5: Background concentrations – groundwater

Analyte	Coffey DSI testing - APS 7, APS 30, APS 32, APS 33 & APS 34 concentration range (mg/L)	FPP historic groundwater testing concentration range, 2008 to 2016 (mg/L)
TRH C_6-C_{40}	<100	-
Antimony	<0.005 to <0.025	<0.0005 to 0.008
Arsenic	<0.005 to 0.007	<0.003 to 0.386
Barium	-	0.02 to 1.08
Beryllium	<0.001 to <0.01	-
Boron	<0.25 to 19	3.1 to 18.6
Cadmium	<0.0002 to <0.002	<0.001 to 0.005
Chromium	<0.001 to <0.01	<0.001 to 0.158
Cobalt	<0.005 to 0.022	<0.001 to 0.082
Copper	<0.001 to <0.005	<0.010 to 0.441
Iron	-	0.09 to 169
Lead	<0.001 to <0.01	<.0.01 to 0.174
Manganese	0.12 to 3.7	<0.001 to 6
Mercury	<0.0001 to 0.001	-
Molybdenum	<0.025 to 0.052	0.008 to 0.221
Nickel	<0.005 to 0.01	<0.001 to 0.119
Selenium	<0.005 to 29	<0.001 to 0.117
Silver	<0.005 to <0.025	<0.0003 to 0.0049
Thallium	-	<0.0001 to 0.002
Tin	<0.005 to <0.025	-
Titanium	-	<0.003 to 3
Vanadium	<0.02 to 0.005	<0.001 to 0.628
Zinc	0.006 to 0.053	<0.003 to 0.296
Ammonia	0.07 to 6.1	-
Nitrate	<0.02 to 0.05	-
Phosphate	0.14 to 0.97	-
Sulphate	-	3,510 to 9,960
TDS	76,000 to 190,000	57,000 to 230,000

<LOR = less than laboratory LOR
- = not tested

3. Preliminary conceptual site model

3.1. Elements of a conceptual site model

A preliminary conceptual site model (CSM) was formulated during the PSI (Coffey 2016a) utilising available information to determine the presence of plausible exposure pathways and hence the presence of significant risk to susceptible receptors such as humans, ecosystems or the built environment. For a significant or identifiable risk to exist an exposure pathway must be present which requires each of the following to be identified:

- The presence of substances that may cause harm (SOURCE);
- The presence of a receptor which may be harmed at an exposure point (RECEPTOR); and
- The existence of means of exposing a receptor to the source (EXPOSURE ROUTE).

In the absence of a plausible exposure pathway there is no risk. Therefore, the presence of measurable concentrations of chemical substances resulting from previous site activities does not automatically imply that the impacts will cause harm. In order for this to be the case a plausible exposure pathway must be present allowing a source to adversely affect a receptor. The nature and importance of both receptors and exposure routes, which are relevant to any particular site, will vary according to its characteristics, intended end-use and its environmental setting.

3.2. Identified or potential sources of site contamination

During the development of the PSI (Coffey 2016a), 51 AECs within the following areas at the site (shown on Figure 2B) were identified:

- Area 1 – Playford A and B Stations;
- Area 2 – Playford B Switch Yard;
- Area 3 – Playford Buildings;
- Area 4 – SAPN Switch Yard;
- Area 5 – Steel laydown area;
- Area 6 – SPEL drain outlets;
- Area 7 – Fuel oil storage area;
- Area 8 – Storage and maintenance area (AEC 24 to 27);
- Area 9 – Recycling area;
- Area 10 – Former coal loading area;
- Area 11 – Waste water, fuel storage and wash down area (AECs 30 to 32);
- Area 12 – Northern station;
- Area 13 – Northern station infrastructure;
- Area 14 – Steel laydown area;
- Area 15 – Coal loading area;
- Area 16 – Train unloading area and waste dumps;
- Area 17 – Ash pond (ash storage area); and
- Area 18 – Rail filling area.

Chemicals of potential concern (COPCs) associated with the potentially contaminating activities undertaken at the site have been identified as including:

- Petroleum hydrocarbons, including benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN compounds) and volatile and semi-volatile aliphatic and aromatic compounds ranging up to carbon fraction C_{40} (most commonly evaluated by determination of ‘total recoverable hydrocarbon’ (TRH) concentrations);
- Volatile halogenated compounds (VHCs);
- Polycyclic aromatic hydrocarbons (PAHs);
- Polychlorinated biphenyls (PCBs);
- Perfluorinated chemicals (PFCs);
- Asbestos containing materials (ACMs);
- Heavy metals and metalloids; and
- Nutrients.

3.3. Potential transport mechanisms and exposure routes

The main transport mechanisms and exposure routes that could be feasible for the future use(s) of the site are:

- Via dermal contact by on-site workers and subsurface utility and demolition/excavation workers;
- Surface water infiltration leading to downward leaching of contaminants within shallow soils and in collection ponds/sumps;
- Inhalation of asbestos during asbestos removal;
- Airborne migration of coal, ash, impacted dust and/or soil particles leading to inhalation. Although it is noted that potential dust migration from the ash storage area is currently managed by a dust suppressant layer and will be managed by construction of a permanent vegetated cover layer in the future;
- Groundwater and surface water infiltration via backfilled areas and waste dumps;
- Via leaching of surface water in the ash ponds to groundwater; and
- Migration of groundwater.

3.4. Groundwater beneficial use assessment

A groundwater beneficial use assessment (BUA) was undertaken within the PSI (Coffey 2016a) which identified the groundwater system beneath the site is required to be protected given the locality of the site to Spencer Gulf and the possibility of aquaculture use in the site vicinity.

3.5. Potential receptors

The following key site specific receptors are feasible:

- Current and future workers of the site (limited);
- Current and future users of the site including decommissioning workers;
- Residential occupants and commercial workers of Port Augusta Township to the north/north west;
- Mangroves and marine ecosystems within Spencer Gulf; and
- Users of Spencer Gulf.

3.6. Plausible exposure pathways

On the basis of the available information gathered as part of the PSI, the preliminary CSM in terms of site conditions known prior to any intrusive assessment, other than what has been documented in background reports associated with the fuel oil leaks between the Playford buildings and other known hydrocarbon source areas on-site, is provided in the following table:

Table 3.1: Plausible potentially complete exposure pathways

Hazard/source of contamination	Key areas affected	Potential transport mechanisms and exposure routes	Key potential receptors
Hydrocarbon impacted soils and groundwater	• Playford stations • Northern station • In the vicinity of the unleaded underground storage tank (UST) at the Northern station store • Bulk fuel oil storage areas • Fuel oil pumping station and along the transfer pipeline • Diesel above ground storage tanks (ASTs) adjacent to the coal loading area • Fuel pad within the coal loading area • Former UST locations – within Playford buildings and adjacent to the water tanks • Steel laydown areas and recycling area • Waste oil storage area to the south of the Northern station • Within and surrounding the maintenance and workshop sheds across the site • To the south of the Northern station in and around the diesel generator shed and AST • Waste water collection and treatment system (i.e. ponds, interceptors and drains) across the site • Former coal loading areas • Train unloading and refuelling areas • Wash down bays associated with workshop areas, fuel oil storage area, fuel oil pumping station and train unloading wash down area • In vicinity of the waste dumps • Potentially all areas of the site adjacent to roadways	• Dermal contact & ingestion • Surface water infiltration • Volatilisation leading to inhalation • Inhalation of dust • Lateral and vertical migration through permeable strata and groundwater	• Current and future workers at the site • Current and future users of the site • Mangrove ecosystems • Marine ecosystems within Spencer Gulf • Users of Spencer Gulf
PCB impacted soils and groundwater	• Switch yards • Current and historical areas of transformer storage in the vicinity of the stations • Waste water system across the site • Historic storage of PCBs within the shed adjacent to Northern station	• Dermal contact & ingestion • Surface water infiltration • Lateral and vertical migration through permeable strata and groundwater	• Current and future workers at the site • Current and future users of the site • Mangrove ecosystems • Marine ecosystems within Spencer Gulf • Users of Spencer Gulf

Hazard/source of contamination	Key areas affected	Potential transport mechanisms and exposure routes	Key potential receptors
Metals impacted soils and groundwater	• Waste water system across the site • Within and surrounding the maintenance and workshop sheds across the site • In the vicinity of the grit blasting shed • In the vicinity of the waste dumps • Steel laydown areas and recycling area • Waste oil storage area to the south of the Northern station • Along the length of the coal conveyor • Surrounding the ash pond • Area of firefighting training	• Dermal contact & ingestion • Inhalation of dust • Surface water infiltration • Lateral and vertical migration through permeable strata and groundwater	• Current and future workers at the site • Current and future users of the site • Mangrove ecosystems • Marine ecosystems within Spencer Gulf • Users of Spencer Gulf
PFC impacted soils and potentially groundwater	• Area of firefighting training – it is noted that this area of firefighting training has since been confirmed as fire extinguisher training with fires set within a drum and extinguished. Little firefighting foam from the fire extinguishers would have connected with the ground surface	• Dermal contact & ingestion • Surface water infiltration • Lateral and vertical migration through permeable strata and groundwater	• Current and future workers at the site • Current and future users of the site • Mangrove ecosystems • Marine ecosystems within Spencer Gulf • Users of Spencer Gulf
Asbestos impacted soils	• Known asbestos waste dump • In the vicinity of the grit blasting shed	• Inhalation of fibres	• Current and future workers at the site • Current and future users of the site
Solvents	• Within and surrounding the maintenance and workshop sheds across the site • In the vicinity of the grit blasting and spray painting area • In the vicinity of the waste dumps • Waste oil and lubricant/chemical storage area to the south of Northern station	• Dermal contact & ingestion • Surface water infiltration • Volatilisation leading to inhalation • Lateral and vertical migration through permeable strata and groundwater	• Current and future workers at the site • Current and future users of the site • Marine ecosystems within Spencer Gulf • Users of Spencer Gulf
Material within the ash pond	• Surrounding the ash pond	• Airborne migration leading to inhalation of fine particulates should the dust suppressant suffer degradation or future proposed management measures not be fully implemented	• Current and future on-site workers • Residential occupants and commercial workers within Port Augusta Township to the north/north west

4. Fieldwork and laboratory testing

4.1. Fieldwork methodologies

4.1.1. Field staff

The fieldworks program undertaken at the site in general accordance with the SAQP (Coffey 2016b), was completed between 23 May and 19 July 2016 and 7 and 9 November 2016.

Coffey's field staff utilised for the fieldworks program are well experienced for the tasks undertaken and their details are as follows:

Table 4.1: Field staff

	Geoff Harris	Andrew James
Tasks completed	Supervision and direction of: • Underground service location; • Soil bore drilling; • Monitoring well installations and development; and • Test pit excavation. Soil sampling from soil bores and test pits and sediment sampling. Groundwater gauging and sampling.	Supervision and direction of: • Underground service location; and • Test pit excavation. Soil sampling from test pits and sediment sampling. Groundwater gauging and sampling, aquifer hydraulic tests.
Number of years' experience	Over 10 years' experience with Coffey.	Five years' experience with Coffey.
Competency training	• Coffey's Health, Safety, Security and Environment induction training and yearly refresher; • First aid; • Driver training; • Fire extinguisher training; • Work Place Clearance Group; • FPP on-line and on-site safety induction.	

4.1.2. Underground services location

Prior to the DSI fieldworks commencing, Dial Before You Dig (DBYD) plans along with the service plans provided by FPP were reviewed. Professional underground service location was completed across the areas to be investigated between 23 and 27 May 2016.

In addition, FPP ground disturbance permits were acquired for all works, issued on-site.

4.1.3. Soil/sediment assessment methodology

The following methodology was undertaken across the site during the soil assessment fieldworks:

- All test pits were excavated across the site through use of a backhoe with excavated material utilised to backfill each individual test pit;
- Soil samples from test pits were collected either from the test pit walls or directly from the excavator bucket (from soils that had not come into contact with the bucket);
- The soil bore and monitoring well locations were completed using a hand auger to a depth of 1.0mbgs. Some locations could only be hand augered to 0.5mbgs due to encountering refusal or compacted materials;
- Following hand auger clearance, soil bores and monitoring wells were mechanically drilled using push tube and hollow auger split spoon drilling methods to the target depths;
- Excess drilling spoil from the soil bores was used to backfill each individual soil bore with drilling spoil from the monitoring well drilling placed at a designated area on-site;
- Soil samples collected from sediment areas and bund walls were collected utilising a stainless steel trowel or hand auger;
- Soil samples were typically collected at each investigation location from the surface (0-0.2m), sub surface (0.5m) and at one metre intervals and where changes in lithology were observed and visual/olfactory observations indicate the presence of impacts for submission of selected laboratory analysis;
- Soil returns were logged in accordance with the Unified Soil Classification System (USCS) and field screened for the presence of volatile organic compounds (VOCs) using a photoionisation detector (PID) that was calibrated daily;
- All equipment used to collect soil samples (i.e. augers, hand trowels) was decontaminated between sample locations by removing soil, washing with a solution of Decon 90 (or similar), rinsing with potable water and then with distilled water;
- Soil samples were collected in new laboratory supplied containers and placed in a cooler with ice for transport under chain of custody procedures to the analytical laboratories; and
- Quality assurance/quality control samples were collected and analysed in accordance with the ASC NEPM and Coffey's SAQP (2016b).

4.1.4. Groundwater assessment methodology

The following methodology was undertaken across the site during the groundwater assessment fieldworks:

- Following drilling to the target depths as described above, the monitoring wells were completed in accordance with the SAQP (Coffey 2016b) with slotted 50mm PVC screen installed generally 2m below the depth of water cut and 1m above with slotted PVC casing to surface. The well annulus was backfilled with graded sand and bentonite, with wells finished with flush mounted gatic covers or stand pipes where required;
- Monitoring wells targeting the secondary aquifer were drilled and installed through double completion method. Drilling was undertaken to the primary aquifer using a 9 inch solid auger, installing a pre-collar 150-200mm PVC casing and grouting the annulus to surface to ensure no cross contamination of the aquifers occurs and following a week of stabilisation, drilling to the secondary aquifer for well completion;
- Following installation, the new wells were developed by removing water and purging the standing water column using a stainless steel bailer until a minimum of three well volumes were removed, and the produced water shows significant reduction in suspended sediment;

- A registered surveyor was engaged to survey the location of the new groundwater monitoring well (MGA coordinates), and the elevation of each well (to Australian Height Datum) and in addition, a number of existing monitoring wells were also surveyed;
- Following at least a seven days after installation to allow for stabilisation, the groundwater monitoring event (GME) was conducted at all new and existing monitoring wells;
- All groundwater monitoring wells were gauged for depth to water, total depth and depth to LNAPL (if present) from a clearly marked and designated point at the top each well casing using an interface probe (IP). The IP was decontaminated using a solution of Decon 90 (or similar), followed by rinsing in potable water between locations;
- Monitoring wells not containing LNAPL were purged using a new dedicated disposable bailer for each location until groundwater quality parameters stabilised and sampled thereafter;
- Groundwater field quality parameters were collected during the purging of the monitoring wells where hydrocarbon sheen was not encountered;
- All purged water was disposed of in an on-site container;
- Groundwater samples were collected in new laboratory supplied containers and placed in a cooler for transport under chain of custody procedures to the analytical laboratories;
- Quality assurance/quality control samples were collected and analysed in accordance with the ASC NEPM (2013) and Coffey's SAQP (2016b); and
- The monitoring well installed and sampled within Area 14 for the assessment of PFCs was undertaken in accordance with the WA DER (2017) Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS):
  - Field clothing worn was clothing that had been worn and washed at least six times and no water resistant clothing was worn during the installation and sampling;
  - Drilling fluid containing PFAS was not utilised;
  - No waterproof notebooks or sample labels were used;
  - Reusable field equipment (IP and water quality probe) were decontaminated with water only prior to use;
  - The new dedicated disposable bailer utilised for groundwater development, purging and sampling did not contain any Teflon material;
  - Purged groundwater was emptied to the site surface in the vicinity of the well;
  - All disposable material used for the sampling was bagged separately and disposed of in an on-site container; and
  - The sample was collected into a new laboratory supplied container specifically for PFC analysis and placed in a cooler with free ice double bagged in plastic (polyethylene) bags.

Aquifer hydraulic tests

During the GME, aquifer hydraulic tests were conducted at three wells within Area 1 – Playford Stations at two wells within AEC 1 – Playford fuel oil loss (GW1 and GW3) and one well located down gradient on the sea wall (GW8) to confirm the hydraulic conditions of the aquifer. The following was conducted on 14 June 2016:

- Prior to conducting slug tests, the pre-test water-levels were measured and noted;
- Each data logger was placed in the well below the pre-test water level at a sufficient depth to permit testing (removing a "slug" of water);
- The data logger recorded water depth above before, during, and after the "slug" of water was removed;

- The “slug” was removed by a bailer at each well location by lowering the water level and a series of water level versus time measurements were made as the water level changed toward an equilibrium situation;
- The measurements were collected automatically by the data-logger, at pre-programmed time intervals of one second; and
- At equilibrium, the data loggers were removed and the water level recorded.

The data logger interpretation is provided in Section 5.2.2.

4.2. Intrusive investigations

Table 4.1 details the intrusive investigation scope of works completed for each area during the fieldworks program. Deviations from the scope set out in the SAQP occurred due to site conditions, these are noted in Table 4.1.

Some well repairs were completed at existing wells to replace gatics/standpipes as required and where this occurred, the existing wells were resurveyed.

Note, no assessment works were required at the following AECs:

- AEC 6 – Cooling water inlet (Area 1) given the activities associated with the cooling water inlet did not comprise of any chemical introduction as the cooling water inlet does not include any treatment of the sea water;
- AEC 20 – SAPN switch yard (Area 4) was not required to be investigated as part of the DSI given the use of the area and ownership;
- AEC 22 – General waste dump (Area 6) as this area is outside of FPPs lease boundary and known to be of origin from SAPN activities;
- AEC 38 – Chlorine treatment plant (Area 13) given the use of this AEC did not introduce chemicals into the environment, it is unlikely any impacts to the surrounding environment would be present. No intrusive investigation of this area was considered to be warranted;
- AEC 41 – Ammonia gas storage (Area 13) given the use of this AEC, and the fact that the ammonia solutions stored is a gas, it is unlikely any impacts to the surrounding environment would be present from activities in this area. No intrusive investigation of this area was considered to be warranted;
- AEC 46 – Coal loading activities (Area 15). The use of heavy machinery for coal loading may have the potential to cause impacts to surrounding soils and groundwater, however given the remnant inert coal remaining after closure was removed including some surface soils, the soils were not investigated in this area as it is considered that any impacts to soils would have been removed. It is noted this area has since been revegetated. Groundwater is assessed by the wells located around AEC 44; and
- AEC 51E – Waste dumps: Acid clean pit (Area 17) as historical aerial photography was provided to indicate the extent of this dump located on the boundary of the ash pond. In addition, due to safety reasons, excavating within the ash pond could not be undertaken. While the area of this known waste dump is clearly defined, given the material disposed in this dump (low level hydrofluoric acid and up to 1kg of stabilised sodium cyanide), further assessment in Phase 3 may be required to determine if any of this material has leached into the groundwater system. It is noted that water from the former coal loading area adjacent to the waste dump may be able to be sampled in Phase 3 for this purpose (refer Figure 19C).

Table 4.2: Intrusive investigations completed

AEC	Scope of works	Investigation location
Area 1 – Playford A & B Stations (Figure 3A)		
1 Playford fuel oil loss	Two monitoring wells installed into the secondary aquifer to determine if vertical migration of the known impacts had occurred. Groundwater monitoring of all new and existing wells to update the groundwater conditions beneath the area.	Area1-MW101 and Area1-MW102 installed to depths of 12.2 and 12.3mbgs respectively. Wells were completed with a 2m screen with the secondary aquifer encountered at 11.7 and 11.2mbgs respectively. Existing wells WC, GW1 to GW5, GW7 to GW9 and GW11A and new wells Area1-MW101 and Area1-MW102. Area1-MW107 was resampled in November 2016 to confirm the chemical concentrations reported from sampling conducted in June 2016.
2 & 5 Storage and use of transformers	To assess potential leaks/spills from the most current transformer use, two soil bores were drilled adjacent to the transformers located east of the administration building and two monitoring wells were drilled and installed adjacent to the transformers on the sea wall. Groundwater monitoring of the new wells to determine the groundwater conditions beneath the area.	Area1-SB101 and Area1-SB102 were drilled to depth of 2.0mbgs. Area1-MW103 and Area1-MW104 were drilled and installed to a depth of 5.5mbgs and completed with a 3m screen. New wells Area1-MW103 and Area1-MW104.
3 Historic storage of transformers	To assess potential leaks/spills from the historic transformer use, two soil bores and two monitoring wells were drilled and installed in the areas of historic transformer storage between the Playford A Station and Administration Building. Groundwater monitoring of the new wells to determine the groundwater conditions beneath the area.	Area1-SB103 and Area1-SB104 were drilled to depth of 2.0mbgs. Area1-MW105 and Area1-MW106 were drilled and installed to a depth of 5.5 and 5.0mbgs respectively and completed with a 3m screen. New wells Area1-MW105 and Area1-MW106. One of the monitoring wells (Area1-MW106) was drilled to the south east of the Administration Building due to access restrictions in regard to safety concerns regarding the Playford A stack.
4 Compressor shed	To assess for significant impacts to the subsurface from this activity, one soil bore in conjunction with AEC 3 was drilled adjacent to the compressor shed.	Area1-SB104 was drilled to depth of 2.0mbgs.
7A Waste water system	To assess for leaks from the SPEL tank and sump, one monitoring well was drilled and installed. Groundwater monitoring of the new well to determine the groundwater conditions beneath the area	Area1-MW107 drilled to a depth of 3.0mbgs and completed with a 2.5m screen. It is noted that this area of the site is approximately 2.0mbgs below grade (at basement level). New well Area1-MW107. Note this well was resampled on 7 November 2016 to confirm the June 2016 results.
Area 2 – Playford buildings (Figure 4A)		
7B Waste water system	Two soil bores targeting the SPEL drains to assess for any leaks over time.	Area2-SB105 and Area2-SB106 were drilled to 2.0mbgs.

AEC	Scope of works	Investigation location
8 **Switch yard**	Existing groundwater wells monitored to update the groundwater conditions.	Existing wells GW25 and GW27.
9 **Workshop activities (coal/ash workshop)**	Existing groundwater well located adjacent monitored to update groundwater conditions.	Existing well GW25.
10 **Waste water system** **Ash pond sump**	Two soil bores targeting the ash pond sump to determine if leaks had occurred over time.	Area2-SB107 and Area2-SB108 were drilled to 4.0mbgs.
Area 3 – Playford buildings (Figure 5A)		
11, 12, 13A, 13B 15, 16 & 17 **Maintenance and workshop activities**	To assess the soil conditions surrounding the maintenance and workshop activities, 12 soil bores were targeted across the area.	Area3-SB109 to Area 3-SB120 were drilled to 2.0mbgs.
14 **Storage and dispensing of diesel**	To understand what material was utilised to backfill the UST pit following removal and if remnant impacts exist in shallow soils, one soil bore was drilled. Existing groundwater well located in the area of the former UST monitored to update groundwater conditions.	Area3-SB108 to a depth of 4.0mbgs. GW14
18 **Grit blasting and spray painting**	Two soil bores in conjunction with the above works were targeted around the grit blasting and spray painting area.	Area3-SB119 and Area3-120 were drilled to 2.0mbgs.
Area 5 – Steel laydown area (Figure 7A)		
21 **Steel laydown area**	To determine site characterisation and identify hot spots from historical storage, 21 test pits were undertaken across the area.	Area5-TP102 to Area5-TP105, Area5-TP107 to Area5-TP110, and Area5-TP113 to Area5-TP125 were excavated to 2.0mbgs. 25 test pits were to be undertaken in this area, however due to site conditions (services), particularly in the western half of the area which is bituminised, four of these locations could not be completed.
Area 6 – SPEL Drain outlets (Figure 8A)		
7B **SPEL drains**	It is noted this area is outside of FPP's lease boundary. Assessment of the SPEL drain outlets (AEC 7B) has been undertaken given these SPEL drain outlets discharge the surface water collected from across Area 3 workshop and maintenance areas. At each SPEL drain (3), three soil samples were collected initially in June 2016 at the sediment/soil area at each outlet. To aid in the assessment of the effect of the discharge from the SPEL drain outlets to the mangroves at Area 6, a flora and fauna assessment was completed by Ecological Associates for the mangrove area in Area 6 and for comparison	Surface samples Area6-SPEL1-2 to 1-3, Area6-SPEL 2-1 to 2-3, Area6-SPEL 3-1 to 3-3 and background locations BGSS1 and BGSS2 within the control site. Hand auger locations Area6-SPEL1-4 to 1-6 to depths of 1.0, 0.8 and 0.9mbgs respectively; Area6-SPEL2-4 to 2-6 to depths between 0.5 and 0.6mbgs; Area6-SPEL3-4 to 3-6 to depths between 0.5 and 0.6mbgs and locations BS1 and BS2 to depths of 0.1mbgs. The hand auger locations were completed at the site in November 2016 following review of the data collected from the surface samples.

AEC	Scope of works	Investigation location
	purposes, also of the control site (refer Section 9, Figure 8C).	
Area 7 – Fuel oil storage area (Figure 9A)		
23A & 23B Storage and dispensing of diesel	To assess the ground conditions around the fuel storage area, six test pits were excavated around the AST infrastructure including the former AST repair pad and one monitoring well was drilled and installed to the south west of the AST farm. Groundwater monitoring of the new well and three existing wells to update the conditions of the groundwater beneath this area of the site.	Area7-TP262 to Area7-TP267 to depths between 2.1 and 2.4mbgs. Area6-MW108 was drilled to a depth of 5.3mbgs and installed with a 3m screen. Area6-MW108, GW12, GW13 and GW6. The SAQP detailed six hand auger bores to be completed within the AST tank farm bund. Due to the bund floor comprising of concrete of unknown thickness, the hand auger bores could not be undertaken in this area. Four test pits were completed around the bund during the current works as an alternative to determine if gross contamination existed. Soil testing beneath the bund will form part of Phase 3 works at the site. Four soil bores were to be drilled within the area of the former AST repair pad, three test pits were completed in this area instead to provide a more visual assessment of the area.
Area 8 – Storage and maintenance area (Figure 10A)		
24 Former UST location	One soil bore drilled within area of former UST excavation to understand what material was utilised to backfill the UST pit and identify residual impacts in shallow soils. Groundwater monitoring of the existing wells to update the conditions of the groundwater beneath this area of the site.	Area8-SB125 drilled to a depth of 4.0mbgs. GW26A and GW30. Existing well GW28A could not be located.
25 & 26 Maintenance and wash down bay activities	To assess the subsurface conditions, six test pits were excavated around the maintenance shed and wash down bay along with one monitoring well drilled and installed. Groundwater monitoring of the new well to understand the groundwater conditions.	Area8-TP131 to Area8-TP136 were excavated to depths between 1.8 and 2.0mbgs. Area8-MW109 was drilled to a depth of 4.3mbgs and installed with a 3m screen.
26 Former coal line maintenance workshop activities	To assess the subsurface conditions, two test pits were excavated around the former coal line maintenance workshop along with one monitoring well drilled and installed. Groundwater monitoring of the new well to understand the groundwater conditions.	Area8-TP137 and Area8-TP138 were excavated to a depth of 2.0mbgs. Area8-MW110 was drilled to a depth of 6.5mbgs and installed with a 3m screen.
27 Storage of PCB containing equipment	Two test pits were excavated around the shed to determine the soil conditions.	Area8-TP139 and Area8-TP140 were excavated to a depth of 2.0mbgs.

AEC	Scope of works	Investigation location
Area 9– Recycling area (Figure 11A)		
28 Recycling area	To determine site characterisation and any hot spots from historical storage, 20 test pits were excavated across the area in a grid based pattern.	Area9-TP141 to Area9-160 were excavated to depths between 1.3 and 1.9mbgs.
Area 10 – Former coal loading area (Figure 12A)		
29 Former coal loading area	To determine site characterisation and residual impacts from historical storage, 15 test pits were excavated around the former coal loading area.	Area10-TP161 to Area10-TP175 were excavated to depths between 0.7 and 2.0mbgs.
	To understand the condition of the surface water within the former coal loading area, a sample was collected.	Area10-GS101
		A total of 20 test pits were intended to be completed at Area 10, however the north eastern area could not be accessed due to a number of services being present and this area consisting of the ash dam wall.
Area 11 – Waste water, fuel storage and wash down area		
30 Waste water system Main 'contaminated drains pond'	To provide information up and down the hydraulic gradient around the pond, two monitoring wells were drilled and installed.	Area11-MW112 and Area13-MW113 were drilled to a depth of 4.3mbgs and installed with 3m screens.
	Groundwater monitoring of all new and existing wells to update the groundwater conditions beneath the area.	Area11-MW112, Area11-MW113, GW23A and GW24.
31A & 31B Former fuel oil pumping station	For assessment of the soils within the former AST area, four test pits were excavated and six samples of the bund material were collected.	Area11-TP181 to Area11-TP184 were excavated to a depth of 2.0mbgs. Area11-GS102 to GS107 were collected.
	To determine if historical leaks have impacted the surrounding soils along the fuel transfer pipeline from the former AST to the northern station, ten test pits were excavated.	Area8-TP187 to Area8-TP196 were excavated to depths between 1.7 and 2.2mbgs.
	One monitoring well was drilled and installed adjacent to the fuel transfer pipeline valve box to assess groundwater conditions.	Area11-MW114 was drilled to a depth of 4.3mbgs and installed with a 3m screen.
	Groundwater monitoring of all new and existing wells to update the groundwater conditions beneath the area.	Area11-MW114 and GW15.
		Eight samples of the bund material were to be collected. The north eastern bund wall had been removed since development of the SAQP for access into the bund and the western side of the bund could not be accessed due to the pipework present.
32 Wash down bay	For the assessment of shallow soils, two test pits were excavated.	Area11-TP185 and Area11-TP186 were excavated to a depth of 1.9mbgs.
	To determine impacts from the wash down bay and nearby surface water run-off pond, one monitoring well was drilled and installed.	Area11-MW111 was drilled to a depth of 4.0mbgs and installed with a 3m screen.
	Groundwater monitoring of the new well to understand the groundwater conditions.	Area11-MW111.

AEC	Scope of works	Investigation location
		Three test pits were intended in this area, due to the concrete base of the wash down bay, only two test pits were completed.
Area 12 – Northern Station (Figure 14A)		
33 Main fuel oil service ASTs	A monitoring well was drilled and installed to the south west (down hydraulic groundwater gradient) of the ASTs for groundwater data collection in this area of the site. Groundwater monitoring of the new and existing wells to update the groundwater conditions beneath the area.	Area12-MW117 was drilled to a depth of 4.5mbgs and installed with a 3m screen. Area12-MW117, GW22 and GW29.
34 Waste water system Intermediate oily water skimmer pit	To determine if any leaks have occurred over time from this infrastructure, one soil bore was drilled and one monitoring well was drilled and installed. Groundwater monitoring of the new well to understand the groundwater conditions.	Area12-SB127 was drilled to a depth of 4.0mbgs and Area12-MW118 was drilled to a depth of 4.5mbgs and installed with a 3m screen. Area12-MW118.
35 Northern store UST	To assess the soils in the vicinity of the UST and dispensing pump, determine if the deeper underlying aquifer is impacted and to provide vertical delineation, one monitoring well was drilled and installed. Groundwater monitoring of the new and existing wells to update the groundwater conditions beneath the area.	Area12-MW115 was drilled to a depth of 12.5mbgs and installed with a 2m screen. The secondary aquifer was encountered at 11.0mbgs. Area12-MW115 and GW16.
36 & 37 Workshop and maintenance activities	To assess the ground conditions, one monitoring well was drilled and installed targeting the Mills workshop wash down bay and one soil bore was drilled targeting the flammable shed. Groundwater monitoring of the new well to understand the groundwater conditions.	Area12-MW116 was drilled to a depth of 4.5mbgs and installed with a 3m screen. Area12-SB126 was drilled to a depth of 2.0mbgs. Area12-MW116.
Area 13 – Northern station infrastructure (Figure 15A)		
5 Storage and use of transformers	To assess for potential leaks/spills from the most current transformer use, two soil bores were drilled.	Area13-SB113 and Area13-SB134 were drilled to a depth of 2.0mbgs.
39 Backup diesel generator	Two soil bores were drilled to determine if leaks or spills have occurred that have impacted the surrounding environment.	Area13-SB130 and Area13-SB131 were drilled to a depth of 2.0mbgs. A third soil bore was intended for this area, however due to the presence of services, this third location could not be accessed.
40 Waste water system Main oily water skimmer put	To determine the soil and groundwater conditions, two soil bores were drilled and one monitoring well was drilled and installed.	Area13-SB128 and Area13-SB129 were drilled to a depth of 3.6mbgs. Area13-MW119 was drilled to a depth of 4.5mbgs and installed with a 3m screen.

AEC	Scope of works	Investigation location
	Groundwater monitoring of the new well to understand the groundwater conditions.	Area13-MW119
42 Waste oil storage	Five soil bores were drilled around the waste oil storage area with one monitoring well drilled and installed targeting the bulk storage shed and AST (south eastern corner of area). Groundwater monitoring of the new well to understand the groundwater conditions.	Area13-SB135 to Area13-SB139 were drilled to a depth of 2.0mbgs. Area13-MW120 was drilled to a depth of 4.5mbgs and installed with a 3m screen. Area13-MW120.
Area 14 – Steel laydown area (Figure 16A)		
43A Steel laydown area	To determine site characterisation and hot spots from historical storage, 24 test pits were excavated in a grid based pattern.	Area14-TP197 to Area14-TP203 and Area14-TP205 to Area14-TP221 were excavated to depths between 1.8 and 2.2mbgs. A total of 25 test pits were planned for this area, however one test pit could not be completed due to services.
43B Firefighting activities	One monitoring well was drilled and installed to assess the soil and groundwater conditions. Groundwater monitoring of the new well to understand the groundwater conditions. It is noted that this area of firefighting training has since been confirmed as fire extinguisher training with fires set within a drum and extinguished. Little firefighting foam from the fire extinguishers would have connected with the ground surface.	Area14-MW121 was drilled to a depth of 4.8mbgs and installed with a 3m screen. Area14-MW121. The monitoring well was installed and sampled prior to test pitting in this area to determine if impacts to soils and groundwater were present within this AEC and if additional soil testing was required.
51C Waste dump	One grid based test pit for AEC 43A was undertaken in this area to determine the backfill material used.	Area14-TP203 was excavated to a depth of 2.0mbgs.
Area 15 – Coal loading area (Figure 17A)		
19 Coal conveyor sediment ponds (several locations)	To target the run-off from the sediment pond in this area, eight test pits were excavated.	Area15-TP224 to Area15-TP231 to depths between 0.1 and 0.2mbgs.
44 Fuel pad	To assist in the delineation of the known impacts, two monitoring wells were drilled and installed within the primary aquifer. To determine if the deeper underlying aquifer is impacted and to provide vertical delineation, one monitoring well was drilled and installed within the secondary aquifer. Groundwater monitoring of the new and existing wells to update the groundwater conditions beneath the area.	Area15-MW123 and Area15-MW124 were drilled to a depth of 4.5mbgs and installed with a 3m screen. Area15-MW122 was drilled to a depth of 11.5mbgs and installed with a 2m screen. The secondary aquifer was not encountered at this location when drilling, groundwater was present during the groundwater sampling. Area 15-MW122 to Area15-MW124, GW18 and GW21A. Area15-MW123, Area15-MW124 and GW21A were resampled in November 2016 to confirm the chemical concentrations reported from sampling conducted in June 2016.

AEC	Scope of works	Investigation location
45 Diesel ASTs	To assess the soil conditions, two test pits were excavated around the ASTs and six test pits were excavated along the alignment of fuel oil transfer line between ASTs bund and fuel pad. Groundwater monitoring of the existing well to update the groundwater conditions beneath the area.	Area15-TP232 to Area15-TP239 were excavated to depths between 2.0 and 2.1mbgs. GW17
47 Coal line workshop	To assess historic activities associated with the coal line workshop, two test pits were excavated.	Area15-TP222 and Area15-TP223 were excavated to depths of 2.0 and 2.4mbgs respectively.
51D Waste dump, chlorine plant residue	To determine the extent and nature of the waste dump, test pitting was undertaken across the area.	Refer Figure 17B. No soil sampling was required, visual assessment only.
Area 16 – Train unloading area (Figure 18A)		
48A & 48B Train unloading area	To determine if leaks or spills have occurred over time from train unloading activities, three test pits were excavated across the area, one soil bore was drilled and one monitoring well was drilled and installed adjacent to carriage gripper unit that was noted to have had a leak historically. Groundwater monitoring of the new well to understand the groundwater conditions.	Area 16-TP240 to Area16-TP242 and Area16-SB140 were excavated to a depth of 2.0mbgs. Area16-MW125 was drilled and installed to a depth of 5.5mbgs with a 3m screen. Area6-MW125. It is noted that a test pit was planned for the same location as Area16-SB140, however due to the bitumen surface, a soil bore was drilled to cause less impact.
49A & 49B Wash down of carriages	To assess the wash down practices, nine shallow test pits were excavated along the soil swale alignment.	Area16-TP244 to Area16-TP253 were excavated to a depth of 0.1mbgs.
51A & 51B Waste dumps, SMF/asbestos and general waste	To determine the extent and nature of the waste dump, test pitting was undertaken across the area.	Refer Figure 18B. No soil sampling was required, visual assessment only.
Area 17 – Ash pond (Figure 19A)		
50A Ash pond	Groundwater monitoring of the selected existing wells to understand the groundwater conditions.	APS-1, APS-5, APS-7, APS-23 and APS-30 to APS-37.
50B Waste water system Ash pond Stage 2 pumps	To determine if any leaks have occurred over time from the ash pond stage 2 pumps, two test pits were excavated.	Area17-TP254 and Area17-TP255 were excavated to a depth of 0.5mbgs.
51F Waste dump, general waste	To determine the extent and nature of the waste dump, test pitting was undertaken across the area.	Refer Figure 19B. No soil sampling was required, visual assessment only
Area 18 – Rail filling area (Figure 20A)		
52 Rail diesel filling area	To assess the soils for spill/leaks that may have occurred over time, six test pits were excavated along the alignment of HDPE liner under railway line.	Area18-TP256 to Area18-TP261 were excavated to a depth of 2.0mbgs.

4.3. Laboratory testing

Laboratory testing of soil and groundwater samples was completed in accordance with the SAQP (Coffey 2016b) and was undertaken for the following numbers of primary samples at each area:

Table 4.3: Primary laboratory analysis – number of samples

Area	Matrix	TRH	BTEXN	PAHs	Metals	PCBs	VHCs	Solvent screen	PFCs	Nutrients
1	Soil Groundwater	23 14	10 12	3 1	5 9	13 3	10 11	- 11	-	-
2	Soil Groundwater	8 2	8 2	8 2	8 -	8 2	- 2	-	-	-
3	Soil Groundwater	22 1	20 -	22 1	22 -	-	8 1	6 1	-	-
5	Soil	26	26	26	-		7	-	-	-
6	Soil/sediment	30	11	11	30	30	-	-	-	-
7	Soil Groundwater	8 4	-	8 4	-	-	-	-	-	-
8	Soil Groundwater	16 4	14 2	16 4	-	4 -	10 2	1 2	-	-
9	Soil	32	31	31	30	-	12	-	-	-
10	Soil Surface water	19 1	7 -	19 1	-	-	7 -	7 -	-	-
11	Soil Groundwater	35 7	5 -	31 6	1 -	-	8 5	- 4	-	-
12	Soil Groundwater	12 7	5 3	13 7	2 1	1 -	8 4	- 4	- 1*	-
13	Soil Groundwater	24 2	- 1	21 2	7 1	5 1	16 2	- 1	-	-
14	Soil Groundwater	32 1	30 -	32 1	30 1	-	15	12	2 1	-
15	Soil Groundwater	26 9	5 8	18 6	9 -	-	3 -	3 -	-	-
16	Soil Groundwater	18 1	11 -	18 1	-	-	15 1	11 1	-	-
17	Soil Groundwater	4 12	-	- 12	4 12	-	-	-	-	- 12
18	Soil	12	-	12	-	-	-	-	-	-

* PFCs tested at Area 12 existing well GW16 as part of the assessment works at Area 14.

Laboratory analysis also included ASC NEPM soil screen for selected soils samples across the site, total organic carbon (TOC) nitrate and phosphate at selected soil samples within Area 1, AEC 1 – Playford fuel oil loss and monitored natural attenuation evaluation parameters for groundwater at selected wells across the site.

4.4. Analytical laboratories

All soil and groundwater primary and intra-laboratory replicate (duplicate) sample analysis was undertaken by Eurofins mgt (Eurofins) and all soil and groundwater inter-laboratory replicate (triplicate) sample analysis was undertaken by ALS Global (ALS). Eurofins and ALS are National Association of Testing Authorities (NATA) accredited for all requested analyses.

5. Ground conditions encountered

5.1. Site specific geology

The subsurface conditions encountered beneath the areas of investigation comprised the following lithology, generally consistent with previous investigations undertaken across the site:

- Fill materials associated with the reclamation of land and build up of the site levels extending to a maximum encountered depth of 7.2mbgs within Area 1 and consisting of sands and clays including some material with sea shells present and some material with ash;
- Fill materials are generally underlain by silts, sands and silty clays to a maximum depth of investigation at 12.3mbgs;
- Fill materials were encountered at greater depths closer to the Spencer Gulf, particularly around Areas 1, 12 and 13;
- The secondary aquifer was encountered within a clay layer between the depths of 11.2 and 12.0mbgs; and
- The lithology encountered in Area 6, at the SPEL drain outlets consisted of silty clayey sand fill materials underlain by silty and gravelly sands to at least the maximum depth of investigation at 1.0mbgs.

Observations that indicated potential impacts to the subsurface were observed as follows:

- Hydrocarbon odour noted at soils from:
  - Area1-MW101 between 2 and 5mbgs;
  - Area1-MW102 between 3.5-5.6mbgs;
  - Area8-SB125 between 1.7-2.0mbgs;
  - Area11-TP189 between 1.0-1.2mbgs;
  - Area12-MW115 between 4.0 to 8.9mbgs; and
  - Area15-MW122 at 2.0mbgs.
- Slag material was noted in fill materials across Area 5. It is likely that this material is ash fragments rather than slag; and
- PID readings were recorded between 0.0ppm$_v$ at many locations to 121ppm$_v$ at Area8-TP136 0.4-0.5mbgs.

Geological cross sections of the Playford Stations (Area 1), Northern Station (Area 12) and coal loading area (Area 15) are provided as Figures 3E, 14E and 17F respectively.

The cross section of the Playford Stations (Figure 3E) shows that within this area of the site where the reclamation of the land for the Playford Stations was undertaken, fill materials extend to a depth of 7.2mbgs. The natural surface, comprising the St Kilda Formation with sea shells and seaweed present in some locations is encountered from approximately 5.0mbgs with clays present from depths of 8.0mbgs.

The cross section through the Northern Station area (Figure 14E) shows a generally shallower depth of fill material is present, which correlates with the construction of this area of the site comprising of build up of the surface level rather than reclamation of land. There is ash material present in some of the fill, indicative of anecdotal evidence of utilising ash material for fill at the site. The natural surface, comprising the St Kilda Formation with sea shells and seaweed present in some locations is encountered from approximately 3.0mbgs with clays present from depth of 10.0mbgs. It is noted that fill materials were found to extend to 4.5mbgs adjacent to the intermediate oily water skimmer pit, north west of the Northern Station. It is considered likely that these fill materials are associated with fill material from the construction of the skimmer pit rather than build up of surface levels in this area.

Fill material with ash present is shown in the cross section of the coal loading area (Figure 17F) to depths of 2.4mbgs, this fill is associated with the locations being present in the coal loading area and in areas where surface level build up was undertaken for construction of the coal conveyor infrastructure. Natural soils comprising of silts, sands and clays are encountered beneath the fill. It is noted that sea shells and seaweed was observed in some shallower soils.

Overall the cross sections show the lithology of the site with deeper fill areas closer to the Spencer Gulf where reclamation of land was undertaken, and at lesser extents where site surface build up for construction occurred. Where site surface has been built up outside of the Playford areas, ash material is present in the fill. The natural soil surface is encountered at shallower depths further from the Spencer Gulf which is consistent with the site construction over time.

A historical photograph during the construction of Playford A Station is provided below that shows the natural layout of the site:

Figure 5.1: Playford A Station foundation construction, circa 1950's (FPP)

Monitoring well, soil bore and test pit locations are presented the figure sets marked A. A detailed description of the lithology logged in each soil bore, monitoring well and test pit location and the field VOC screening results are given on investigation logs included in Appendix B. Well permit and survey documentation is included in Appendix C.

5.2. Site hydrogeological information

5.2.1. Overview

The groundwater assessment of the site undertaken by Woodward-Clyde in 1994 determined the shallow groundwater gradient flowed south west towards the Spencer Gulf. A shallower gradient was present in the vicinity of the rail loop where low lying ground and salt encrustation was present and groundwater mounding was present in the vicinity of the ash pond, particularly around the southern area. It was noted that relatively high TDS values were recorded in the vicinity of the rail loop where the low lying area and salt evaporation was present and data from previous environmental investigations (PB 2015) as well as the current investigation report high TDS values across the site.

5.2.2. Groundwater elevation and LNAPL

Current groundwater gauging data collected during field activities conducted between 15 and 29 June 2016 and on 7 November 2016 is presented in attached Table 1. Current groundwater gauging results as recorded in June 2016 indicate groundwater flows generally to the west, towards the Spencer Gulf. Results are summarised in Table 5.1 as follows:

Table 5.1: Groundwater gauging data

Area	Depth to water	Groundwater elevation	Presence of LNAPL
1 (Figure 3C)	Within the primary aquifer, ranged between 3.197mbtoc at GW1 to 3.791mbtoc at GW9 Area1-MW107 located adjacent to the SPEL tank and sump, which is located approximately 2m below grade reported depth to water at 0.446mbtoc Within the secondary aquifer, at 4.193 and 4.135mbtoc. This depth was indicative of the groundwater being under pressure and rising within the well casing	Ranged between -0.380mAHD at Area1-MW103 located on the sea wall to 0.599mAHD at GW1 located to the east of the Playford stations Elevation at Area1-MW107 - 1.095mAHD Elevation at secondary aquifer wells was recorded at -0.334 and - 0.244mAHD	Hydrocarbon sheen was noted at well GW2 and LNAPL apparent thickness was noted at WC (0.273m), GW4 (0.004m) and GW5 (0.005m) located within AEC 1, Playford fuel oil loss Hydrocarbon sheen was noted at Area1-MW107 located adjacent to the SPEL tank and sump (AEC 7A) and was confirmed during resampling in November 2016
2 (Figure 3C)	3.210mbtoc at GW25 and 3.439mbtoc at GW27	Ranged between 0.253mAHD at GW27 located to the north to 0.463mAHD at GW25 located in the south west	Nil
3 (Figure 3C)	3.080mbtoc at GW14	0.892mAHD at GW14	Nil
7 (Figure 9B)	Between 2.472mbtoc at GW6 to 3.693mbtoc at GW13	Ranged between 0.981mAHD at GW13, the western most well to 1.756mAHD at GW6, located	Nil

Area	Depth to water	Groundwater elevation	Presence of LNAPL
		adjacent to the former coal loading area	
8 (Figure 10C)	Between 1.893mbtoc at Area8-MW109 and 2.734mbtoc at GW30 It is noted that existing well GW28A could not be located during the works	Groundwater elevations were recorded between 1.465mAHD at Area8-MW110 located in the south west to 1.639mAHD at GW26A located in the north of the area It is noted that well survey data does not exist for existing well GW30	Nil
11 (Figure 13C)	Depth to water ranged between 2.224mbtoc at Area11-MW111 to 2.843mbtoc at Area11-MW114	Ranged between 1.602mAHD at Area11-MW114 located to the north west to 2.220mAHD at Area11-MW111, the eastern most well	Nil
12 (Figure 14C)	Within the primary aquifer, ranged between 2.245mbtoc at GW29 to 3.506mbtoc at Area12-MW118 Within the secondary aquifer, at 2.830mbtoc. This depth was indicative of the groundwater being under pressure and rising within the well casing	Ranged between 1.005mAHD at Area12-MW117 the south western most well to 1.512mAHD at GW16 located to the north east of the station building in the vicinity of the northern store UST (AEC 35) Elevation at secondary aquifer well was recorded at 0.933mAHD	Nil
13 (Figure 14C)	2.395mbtoc at Area13-MW119 and 2.711mbtoc at Area13-MW120	0.958mAHD at Area13-MW119 located in the south west to 0.981mAHD at Area13-MW120 located in the east of the area	Nil
14 (Figure 14C)	2.934mbtoc at Area14-MW121	1.466mAHD at Area14-MW121	Nil
15 (Figure 17D)	Within the primary aquifer, ranged between 2.184mbtoc at GW19 to 2.976mbtoc at Area15-MW124 Within the secondary aquifer, at 2.740mbtoc. This depth was indicative of the groundwater being under pressure and rising within the well casing It was noted that existing well GW18 situated within the fuel pad area (AEC 44) could not be located	Ranged between 2.102mAHD at GW17 located adjacent to the diesel ASTs (AEC 45) to 2.602mAHD at GW19 located to the north east of the fuel pad (AEC 44) Elevation at secondary aquifer well was recorded at 2.281mAHD	Hydrocarbon sheen was noted at well Area15-MW124 located to the south west of the fuel pad (AEC 44) and was confirmed during resampling in November 2016
16 (Figure 18C)	3.893mbtoc at Area16-MW125	1.425mAHD at Area16-MW125	Nil
17 (Figure 19D)	0.603mbtoc at APS-34 to 1.276mbtoc at APS-1	Ranged between 1.345mAHD at APS-37 located at the south western most area to 4.210mAHD at APS-33 located to the east of the ash pond	Nil

Notes:
mbtoc = metres below top of casing
mAHD = metres Australian Height Datum

5.2.3. Aquifer hydraulic testing

Aquifer hydraulic testing was completed at three wells within Area 1 – Playford A & B Stations at two wells within AEC 1 – Playford fuel oil loss (GW1 and GW3) and one well located down gradient on the sea wall (GW8) to confirm the hydraulic conditions of the aquifer previously calculated by PPK in 1996, presented in the Environmental Projects (EP) Detailed Risk Assessment (DRA) report, conducted specifically for the Playford fuel oil loss (EP 2014).

The tests were completed as single-well rising-head slug tests and the data from EP DRA (2014) was also reviewed to ensure that consistent assumptions were adopted across all wells tested. The rising-head test data was analysed using the Bouwer-Rice and Dagan solutions, the results of which are presented in Table 5.2. Analytical outputs are provided in Appendix D.

Table 5.2: Rising head test result summary

	Test Date	Screened Formation	Screened Interval (mbgs)	Unconfined Bouwer-Rice		Unconfined Dagan	
Parameter				K	y_o	K	y_o
Well/Unit				m/day	m	m/day	m
GW1	14 June 2016	Fill: clayey sand	2.0-8.0	0.081	0.6933	0.07821	0.6727
GW3	14 June 2016	Fill: clayey sand	2.0-8.0	0.05057	0.3538	0.04801	0.3576
GW8	14 June 2016	Fill: silty sand	2.0-8.0	0.1355	0.4054	0.1289	0.3671

K = Hydraulic conductivity

The hydraulic conductivites ranged from 0.04m/day at GW3 to 0.13m/day at GW8. Previous conductivity calculations in this area in 1996 (EP 2014) were calculated at 0.04 to 0.24m/day. Based on the lithology across the site where the primary aquifer was encountered is generally consistent as sand material, the conductivity calculated from the hydraulic aquifer tests completed is considered to be representative of the site.

In addition, Coffey completed an assessment of this area in regard to tidal influence, reported in Coffey's letter report 'Tidal logging results, Augusta Power Stations' (Coffey 2016d) to determine the extent of potential tidal influences in the vicinity of the Playford Stations basements and across the inferred extent of the fuel oil plume. This assessment concluded the tidal effects are present in this area of the site with observed tidal efficiencies and the distance from the tidal boundary correlating with the general form of the relationship predicted by the theory, an exponential decrease of tidal efficiency with distance. This report is provided in Appendix L.

5.2.4. Groundwater flow characteristics

The hydraulic gradient and seepage velocity was calculated as follows in each of the assessment areas where monitoring wells exist. It is noted that areas in close vicinity to another, hydraulic gradient and flow characteristics were calculated in a wider sense. The effective porosity was estimated to be approximately 0.20 (Domenico and Schwartz, 1990), based on the saturated sand soil profile.

The general groundwater flow across the site is to the west, towards the Spencer Gulf.

Table 5.3: Groundwater flow characteristics

Areas of assessment	Hydraulic gradient	Seepage velocity
Area 1 – Playford A & B Stations Area 2 – Playford Switch Yard Area 3 – Playford Buildings	0.005 north west	0.46 to 1.2m/year
Area 7 – Fuel oil storage area	0.004 north west	0.37 to 0.95m/year
Area 8 – Storage and maintenance area	0.003 west-south west	0.3 to 0.7m/year
Area 11 – Wastewater, fuel storage and wash down area	0.003 west-south west	0.3 to 0.7m/year
Area 12 – Northern Station Area 13 – Northern Station Infrastructure Area 14 – Steel Laydown Area	0.002 south west	0.18 to 0.5m/year
Area 15 – Coal Loading Area	0.007 west	0.64 to 1.7m/year
Area 17 – Ash Pond	0.002 west-south west	0.2 to 0.5m/year

5.2.5. Groundwater quality results

Current groundwater quality results collected during field activities conducted between 15 and 29 June 2016 and on 7 November 2016 is presented in Table 2 with field data sheets presented in Appendix E. Current groundwater quality results as recorded in June 2016 are summarised in Table 5.4 as follows:

Table 5.4: Groundwater quality results

Parameter	Range	Comment
Dissolved oxygen (DO)	0.1mg/L (Areas 7, 8 and 15) to 5.3mg/L (Area 12)	Indicates groundwater with a range of low to moderate oxygen content.
Redox potential (Eh)	-391mV (Area 8) to 88mV (Area 1)	Indicates that reducing and oxidising conditions exist in groundwater across the site.
pH	6.19 (Area 7) to 8.43 (Area 1)	Indicates groundwater has generally neutral pH.
Electrical conductivity (EC)	2,222 µS/cm (Area 1) to 465,965µS/cm (Area 17)	Indicates saline conditions.
Estimated total dissolved solids (TDS)	1,444 to 302,877 mg/L	
Temperature	13.9°C (Area 17) to 24.5ºC (Area 1)	Is within expected range for a shallow aquifer during the winter season.

5.2.6. Historical groundwater elevation and LNAPL

A comparison of historical groundwater elevation and LNAPL data for existing monitoring wells installed prior to the 2016 DSI works is presented in Table 3 (where data was available) with observations over time noted below:

- LNAPL apparent thickness within the Playford fuel oil loss (AEC 1, Area 1) has been generally consistent since 1996 with some variations where groundwater elevations have varied;
- Groundwater elevations have generally fluctuated within 0.1m over time; and
- LNAPL apparent thickness and/or hydrocarbon sheen at the fuel pad (AEC 44, Area 15) has not been observed within the existing monitoring wells since the monitoring event in August 2006. It is noted that newly installed monitoring well Area15-MW124 was observed with a hydrocarbon sheen during the 2016 monitoring event.

5.3. Presence of waste dumps

During the DSI fieldworks, the presence of recorded waste dumps across the site was investigated visually by test pitting/trenching through nominated areas. The following visual conditions were noted and the areas as defined in this investigation are to be included in the future management plan for the site:

- A series of trenches were undertaken across the area of AEC 51A SMF dump and AEC 51B general waste dump located to the south of the train unloading area (refer Figure 18B). The works identified general waste and SMF waste buried in the area with the maximum vertical extent noted at 3mbgs. No asbestos containing material was encountered within this dump.
- A test pit (Area14-TP203) was undertaken in the area of the former waste dump (AEC 51C) located in the steel laydown area (Area 14, Figure 16A). The test pit confirmed that the waste in this area had previously been excavated and backfilled with fill material.
- A series of trenches and test pits were undertaken across the area of AEC 51D chlorine plant residue waste dump (refer Figure 17B) following discussions with on-site staff about the likely location of the waste dump area. The trenches completed identified some salt like residue in the trenches, indicative of chlorine residue and were excavated to a maximum of 3mbgs.
- Three test pits were undertaken in the area of the general waste dumps (AEC 51F). The area was fenced and the test pits did not identify any waste buried in this area (refer Figure 19B). It is possible this area was previously excavated and backfilled with fill materials. It appeared the area had been used as a trial revegetation plot.
- The acid clean pit (AEC 51E, Figure 19C) was clearly defined through provision of aerial photographs. While the area of this known waste dump is clearly defined, given the material disposed in this dump (low level hydrofluoric acid and up to 1kg of stabilised sodium cyanide), further assessment in Phase 3 may be required to determine if any of this material has leached into the groundwater system. It is noted that water from the former coal loading area adjacent to the waste dump may be able to be sampled in Phase 3 for this purpose.

Field data sheets are provided in Appendix E.

6. Tier 1 screening assessment

6.1. Overview of Tier 1 assessment process

Tier 1 screening assessment criteria was selected during the development of the SAQP (Coffey 2016b) and were selected with consideration of the site conditions and the proposed land use to continue as commercial/industrial. The criteria presented below are generic Tier 1 risk based criteria. Where concentrations of a COPC exceed the generic assessment criteria, then further consideration of the specific exposure pathway is required which may warrant further investigation, assessment or the development of a strategy to mitigate the potential risks identified.

6.2. Soil screening assessment criteria

6.2.1. Overview

The screening criterion has been derived on the basis of conservative assumptions relating to land use, receptor behaviour, site, building and soil characteristics.

Within the body of this report soil analytical results have been discussed against ASC NEPM (NEPC 2013) Health Investigation Levels (HILs) HIL D – commercial/industrial developed based on assumptions regarding exposure settings related to non-sensitive land use.

Discussion of results has also been related to the ASC NEPM Health Screening Levels (HSLs) (derived from CRC CARE HSLs (CRC CARE, 2011)) for vapour intrusion for further evaluation of potential risks to human health resulting from intrusion of hydrocarbon vapours emanating from soil impacts at the site. HSLs have been adopted based on the potential receptors, subsurface lithology and depth of impacts to soil. In addition, to assess the top 2 metres of soil for potential risks associated with dermal contact with petroleum hydrocarbons and vapour intrusion for maintenance workers, the CRC CARE (2011) direct contact and vapour intrusion HSLs for have been adopted.

To assess the top 2 metres of soils for potential effects of petroleum hydrocarbons associated with formation of LNAPL, fire and explosives hazards and effects on buried structures, the ASC NEPM (2013) Management Limits for TRH have also been adopted.

The ASC NEPM (NEPC 2013) requires consideration of Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) on sites (relevant to soils that will be within 2m of the surface). Soil data from the top 2m was also compared to these EILs and ESLs and site specific data collected to determine site specific EILs with calculations presented in Appendix F and summarised below. The commercial and industrial criteria have been adopted. It should be noted that the ASC NEPM states that ESLs presented for hydrocarbon fractions >C_{16} are regarded as being of low reliability.

Applicable screening criteria are listed as follows:

- **ASC NEPM (NEPC 2013)** HIL D Commercial/Industrial;
- **ASC NEPM (NEPC 2013)** HSL D, Commercial/Industrial, sandy, 0 to 4m+;
- **ASC NEPM (NEPC 2013)** Management Limits for TRH Fractions F1-F4;
- **ASC NEPM (NEPC 2013)** EIL Commercial/Industrial;
- **ASC NEPM (NEPC 2013)** ESL Commercial/Industrial;
- **CRC CARE (2011)** Direct Contact HSL D Commercial/Industrial & Intrusive Maintenance Workers; and
- **CRC CARE (2011)** HSL Intrusive Maintenance Worker, sandy, 0 to 4m+.

The soil screening assessment criteria are for comparative purposes only and should not be regarded as “clean-up” levels. The HSL checklist is provided in Appendix G. The screening assessment criteria are included in the soil analytical tables Table 4A, 5A, 6A, 7, 9A, 9B, 10A, 10B, 11, 12A, 13A, 13B, 14A, 15A, 16A, 16B, 17A, 17B, 18A, 18B, 19A and 20.

Aesthetic issues for soil at the site in accordance with Section 3.6 of ASC NEPM (NEPC 2013 (Schedule B1) has also been considered.

6.2.2. EIL calculations

The ASC NEPM provides an approach for calculating soil-specific EILs for copper, nickel and zinc. This requires consideration of the added contaminant limit (ACL), ambient background concentration (ABC) and key soil characteristics (i.e. pH, cation exchange capacity (CEC), clay content). Chromium speciation has not been considered as part of this assessment as chromium VI is not considered as a COPC. Calculation of an EIL for chromium III has therefore not been conducted in this assessment.

Much of the site comprises reclaimed land and is in effect a man-made structure. The relevance of ecological risk assessment following the ASC NEPM methodology for much of the reclaimed land could therefore be questioned. However, for the purposes of this assessment in order to evaluate the potential impact of identified potentially contaminating activities (PCAs) on soil with respect to ecological receptors, the ASC NEPM approach has been followed. Key soil characteristics for EIL calculation have been determined for fill soils within the top 2m within 10 assessment areas and are presented in Table 6.1.

Also shown in Table 6.1 are the average concentrations of copper, nickel and zinc within the fill calculated from the chemical analytical data for the purposes of estimating ambient concentrations for calculating EILs. These have been calculated for the fill materials in the top 2m across the site from the data collected in each area. These are not considered to be natural background concentrations of metals in soils as described in Section 2.9.2, these are specific to the fill material in each area of the site. However it is noted that the average ambient concentrations calculated are all within the relevant typical ranges for South Australian soils and are of a similar order of magnitude to the natural soil background concentrations at Area 14 presented in Table 2.2 (Section 2.9.2).

Table 6.1: Key soil characteristics

Area	Soil characteristic concentrations					Average metal concentrations		
	Iron %	Clay %	pH	CEC meq/100g	Carbon content %	Copper mg/kg	Nickel mg/kg	Zinc mg/kg
Area 1	0.8	20	8.8	27	0.4	4.4	3.5	9
Area 2	1.2	25	8.6	32	0.05	2.5	2	5.2
Area 3	5.5	7.5	8.2	25	2.9	5.8	6.3	31.2
Area 8 & 9	10	5	7.8	16	3.3	11.4	4.9	8.1
Area 11	3.6	6.8	7.7	14	1.1	36	10	10
Area 12	6.5	6.3	8.3	32.5	1.4	47.6	12	11.7
Area 13	3.9	18	8.9	32	1	10.5	36.8	26.3
Area 15	3.5	18	11	72	4.7	23.9	6.1	41.6
Area 16	1.2	13	8.6	32	0.05	27.5	13.5	48.8

CEC = Cation exchange capacity

EIL calculations are presented in Appendix F.

6.2.3. Sediment screening criteria

For the assessment of the SPEL drain outlets in Area 6 (AEC 7B), Coffey has compared results reported against both the soil assessment screening criteria as detailed above as well as the following guideline:

- **ANZECC & ARCMANZ (2000)** Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Interim Sediment Quality Guidelines (ISQG).

The assessment criteria is included in the analytical Table 8A.

6.3. Soil screening assessment

6.3.1. Data presentation

Soil analytical results are presented in the appended tables and figures as noted below. Chain of custody documentation and laboratory certificates of analysis are presented in Appendices J and K respectively.

6.3.2. Soil analytical results

The soil analytical results reported across the site were generally representative of background levels and were reported below the nominated screening assessment criteria. Where impacts have been reported, these are in areas where previous impacts were known to exist.

The following petroleum hydrocarbon impacts to soils above background levels were noted:

Table 6.2: Soil analytical results

AEC	Investigation location	COPCs reported
Area 1 – Playford A & B Stations (Table 4A, Figure 3B)		
AEC 1	Area1-MW101 2.9-3.1mbgs	• Minor concentrations of ethylbenzene, xylenes and naphthalene; • Elevated concentrations of TRH $>C_{10}-C_{16}$ (F2) and TRH $>C_{34}-C_{40}$ below screening assessment criteria; and • Elevated concentrations of TRH $>C_{10}-C_{16}$ (4,200mg/kg) and TRH $>C_{16}-C_{34}$ (10,000mg/kg) above the ASC NEPM (2013) Management Limits for TRH.
	Area1-MW101 3.4-3.6mbgs	• Minor concentrations of ethylbenzene and naphthalene; • Elevated concentrations of TRH $>C_{10}-C_{16}$ (F2) and TRH $>C_{34}-C_{40}$ below screening assessment criteria; and • Elevated concentrations of TRH $>C_{10}-C_{16}$ (3,100mg/kg) and TRH $>C_{16}-C_{34}$ (5,000mg/kg) above the ASC NEPM (2013) Management Limits for TRH.
	Area1-MW102 3.9-4.1mbgs	Minor concentrations of naphthalene, TRH $>C_{10}-C_{16}$ and TRH $>C_{16}-C_{34}$.
AEC 2&5	Area1-SB101 0.4-0.5mbgs	Minor concentrations of TRH $C_{29}-C_{36}$.
AEC 3	Area1-MW105 0.4-0.5mbgs	Minor concentrations of TRH $>C_{16}-C_{34}$.
	Area1-SB103 0.3-0.4mbgs	Minor concentrations of TRH $>C_{16}-C_{34}$ and TRH $>C_{34}-C_{40}$.
AEC7A	Area1-MW107 0.7-0.8mbgs	

AEC	Investigation location	COPCs reported
Area 3 – Playford Buildings (Table 6A, Figure 5B)		
AEC 11, 12, 13A, 13B 15, 16 & 17	Area3-SB112 0.4-0.5mbgs	Minor concentrations of TRH >C_{16}-C_{34}.
	Area3-SB117 0.4-0.5mbgs	Minor concentrations of TRH >C_{16}-C_{34}. It is noted that the TRH concentrations at Area3-SB117 increase from 150mg/kg at the sample analysed from 0.4-0.5mbgs to 250mg/kg at the sample analysed from 1.8-2.0mbgs. Given the concentrations present, and the lack of field observations and PID screening indicating a hydrocarbon source, it is considered unlikely that gross hydrocarbon impact is present at deeper depths.
	Area3-SB117 1.8-2.0mbgs	
	Area3-SB115 0.3-0.5mbgs	Minor concentrations of TRH C_{29}-C_{36}.
	Area3-SB115 1.8-2.0mbgs	Minor concentrations of TRH >C_{10}-C_{16}, TRH >C_{16}-C_{34} and TRH >C_{34}-C_{40}.
Area 5 – Steel Laydown Area (Table 7, Figure 7B)		
AEC 21	Area5-TP125 2.0mbgs	Minor concentrations of TRH >C_{16}-C_{34}. TRH concentrations at TP125 2.0mbgs sample were reported at 110mg/kg. Given the concentrations present, and the lack of field observations and PID screening indicating a hydrocarbon source, it is considered unlikely that gross hydrocarbon impact is present at deeper depths. Monitoring wells located nearby do not report groundwater impacts.
	Area5-TP103 0.3-0.5mbgs	Minor concentrations of TRH C_{29}-C_{36}.
Area 8 – Storage and Maintenance Area (Tables 10A & 10B, Figure 10B)		
AEC 25	Area8-TP136 0.4-0.5mbgs	• Elevated concentrations of TRH >C_{10}-C_{16} (F2) and TRH >C_{34}-C_{40} below screening assessment criteria; and • Elevated concentrations of TRH >C_{10}-C_{16} (350mg/kg) and TRH >C_{16}-C_{34} (4,700mg/kg) above the ASC NEPM (2013) ESL for commercial/industrial land use.
	Area8-TP136 1.6-1.7mbgs	• Elevated concentrations of TRH >C_{10}-C_{16} and TRH >C_{34}-C_{40} below screening assessment criteria; and • Elevated concentrations of TRH >C_{16}-C_{34} (2,600mg/kg) above the ASC NEPM (2013) ESL for commercial/industrial land use.
	Area8-MW109 2.0-2.3mbgs	Minor concentrations of TRH >C_{16}-C_{34}.
Area 9 – Recycling Area (Table 11, Figure 11B)		
AEC 28	Area9-TP141 0.4-0.5mbgs	Minor concentrations of TRH >C_{16}-C_{34}.
Area 10 – Former Coal Loading Area (Table 12A, Figure 12B)		
AEC 29	Area10-TP161 0.4-0.5mbgs	Minor concentrations of TRH >C_{16}-C_{34}.
	Area10-TP166 0.3-0.4mbgs	
	Area10-TP167 0.4-0.5mbgs	
	Area10-TP172 0.4-0.5mbgs	
	Area10-TP175 0.4-0.5mbgs	
	Area10-TP170 0.1-0.2mbgs	Minor concentrations of TRH >C_{16}-C_{34} and TRH >C_{34}-C_{40}.
Area 11 – Wastewater, Fuel Storage and Washdown Area (Tables 13A & 13B, Figure 13B)		
AEC 31A	Area11-TP184 0.4-0.5mbgs.	Minor concentrations of TRH >C_{16}-C_{34}.
AEC 31B	Area11-MW114 2.4-2.7mbgs	Minor concentrations of TRH >C_{16}-C_{34}.

AEC	Investigation location	COPCs reported
AEC 32	Area11-MW111 1.8-2.0mbgs	Minor concentrations of TRH >C_{16}-C_{34}.
Area 12 – Northern Station (Table 14A, Figure 14B)		
AEC 34	Area11-SB127 1.5-1.6mbgs	Minor concentrations of TRH C_{15}-C_{28} and TRH >C_{16}-C_{34}.
	Area12-SB127 2.8-3.0mbgs	
AEC 35	Area12-MW115 2.0mbgs	Minor concentrations of benzene, ethylbenzene, xylenes, naphthalene and TRH C_6-C_{10}.
Area 13 – Northern Station Infrastructure (Table 15A, Figure 15B)		
AEC 39	Area13-SB131 0.4-0.5mbgs	Minor concentrations of TRH >C_{10}-C_{16} and TRH >C_{16}-C_{34}.
AEC 42	Area13-SB138 0.5-0.6mbgs	Minor concentrations of TRH C_{29}-C_{36}.
Area 15 – Coal Loading Area (Tables 17A & 17B, Figure 17C)		
AEC 19	Area15-TP227	Elevated concentrations of TRH >C_{16}-C_{34} below screening assessment criteria.
	Area15-TP229	Elevated concentrations of TRH >C_{16}-C_{34} below screening assessment criteria.
	Area15-TP230	Elevated concentrations of TRH >C_{10}-C_{16} above screening criteria and elevated concentrations of TRH >C_{16}-C_{34} below screening assessment criteria.
	Area15-TP231	Minor concentrations of TRH C_{29}-C_{36}.
AEC 44	Area15-MW122 2mbgs	Elevated concentrations of TRH >C_{10}-C_{16} above screening criteria and elevated concentrations of TRH C_{16}-C_{34} below screening assessment criteria.
	Area 15-MW123 2.1-2.3mbgs	Minor concentrations of TRH >C_{16}-C_{34}.
Area 16 – Train Unloading Area (Tables 18A & 18B, Figure 18C)		
AEC 49B	Area16-TP245	Minor concentrations of TRH >C_{16}-C_{34}.
	Area 16-TP250	
Area 17 – Ash Pond (Table 19A, Figure 19B)		
AEC 50B	Area17-TP254 0-0.1mbgs	Minor concentrations of TRH C_{29}-C_{36}.
Area 18 – Rail Filling Area (Table 18, Figure 20B)		
AEC 52	Area18-TP257 0.1-0.2mbgs	Minor concentrations of TRH >C_{16}-C_{34}.
	Area18-TP260 0-0.1mbgs	Minor concentrations of TRH C_{15}-C_{28} and TRH C_{29}-C_{36}.
	Area18-TP261 0-0.1mbgs	Minor concentrations of TRH >C_{16}-C_{34}.

6.3.3. Sediment analytical results

The analytical results reported from the soils/sediment collected at each SPEL drain outlet (nine samples at each outlet) reported the following elevated results, presented in Table 8A and Figure 8B:

- Concentrations of TRH >C_{10}-C_{16} were reported in two samples collected from SPEL 1 between 74mg/kg and 140mg/kg;
- Concentrations of TRH >C_{16}-C_{34} were reported at all samples collected from SPEL 1 between 330mg/kg and 7,000mg/kg. The concentration of 7,000mg/kg was reported above the ASC NEPM (2013) Management Limits for TRH at sample SPEL 1-4 0.4-0.5mbgs;
- Concentrations of TRH >C_{16}-C_{40} were also reported in samples collected from SPEL 2 between 110 and 330mg/kg and from SPEL 3 between 100 and 290mg/kg;

- Concentrations of PCBs above the laboratory limit of reporting (LOR) were reported in samples collected from SPEL 3;
- Elevated concentrations of the following metals were reported above the sediment quality guidelines at all three SPELs:
  - Arsenic above the sediment quality guideline in samples SPEL 2-5 0.1-0.2mbgs, SPEL 3-4 0.4-0.5mbgs and SPEL 3-6 0.4-0.5mbgs;
  - Copper above the sediment quality guideline in six samples analysed from SPEL-1 with concentrations reported between 74 and 190mg/kg; in three samples analysed from SPEL-2 with concentrations reported between 74 and 89mg/kg; and in five samples analysed from SPEL-3 with concentrations reported between 66 and 1,400mg/kg;
  - Lead above the sediment quality guideline in six samples analysed from SPEL-1 with concentrations reported between 51 and 210mg/kg; in one sample analysed from SPEL-2 (61mg/kg); and in three samples analysed from SPEL-3 with concentrations reported between 55 and 210mg/kg;
  - Mercury above the sediment quality guideline in six samples analysed from SPEL-1 with concentrations reported between 0.2 and 0.3mg/kg; in two samples analysed from SPEL-2 with concentrations reported at 0.2mg/kg; and in five samples analysed from SPEL-3 with concentrations reported between 0.2 and 75mg/kg;
  - Nickel above the sediment quality guideline in five samples analysed from SPEL-1 with concentrations reported between 24 and 33mg/kg; in four samples analysed from SPEL-2 with concentrations reported between 22 and 35mg/kg; and in three samples analysed from SPEL-3 with concentrations reported between 27 and 120mg/kg; and
  - Zinc above the sediment quality guideline in all nine samples analysed from SPEL-1 with concentrations reported between 330 and 1,400mg/kg; in eight samples analysed from SPEL-2 with concentrations reported between 210 and 1,500mg/kg; and in eight samples analysed from SPEL-3 with concentrations reported between 420 and 2,800mg/kg.

The elevated concentration of mercury reported in sample SPEL 3-4 0.4-0.5mbgs at 75mg/kg is an order of magnitude higher than any other sample analysed. The sample result along with all mercury results reported was checked with the analytical laboratory and confirmed to be correct. The elevated concentrations found in this single sample are delineated laterally and not considered to be generally representative of the material in the area.

6.3.4. Comparison to background concentrations

Based on the background information available from the testing conducted by SARDI (2010) as well as background testing completed by Coffey during the current investigation, a comparison of the elevated metals results reported against the background concentrations is presented below along with the sediment quality guideline values.

Table 6.3: Comparison against background concentrations (sediment)

Analyte	Concentration range (mg/L)	Background concentration range (mg/L)	Sediment quality guideline (mg/L)
Arsenic	<2 to 44	<2 to 13	20
Barium	200 to 390	960	-
Beryllium	<2 to 4.7	<2 to 3.4	-
Boron	15 to 200	160 to 220	-
Cadmium	<0.4 to 1.4	<0.4 to 0.5	1.5
Chromium	13 to 60	5 to 26	80
Cobalt	5.1 to 85	7.7 to 17	-
Copper	9 to 210	4 to 43	65
Lead	<5 to 210	<5 to 32	50
Manganese	140 to 4,100	185 to 500	-
Mercury	<0.1 to 75	<0.1 to 0.07	0.15
Nickel	<5 to 120	<5 to 26	21
Vanadium	22 to 32	58	-
Zinc	45 to 2,800	11-300	200

Notes:
"-" no guideline value

The comparison of analytical results against the background concentrations indicate some sediment samples may contain concentrations of the metals arsenic, cadmium, cobalt, copper, lead, manganese, mercury, nickel and zinc above general background levels.

Concentrations of the metals barium, beryllium, boron, cadmium, chromium and vanadium report concentrations generally consistent with background concentrations.

FPP have historically sampled water from within the SPEL drains for a limited analytical suite on an annual basis from May 2007, results of which are presented in Table 8B. The results of this testing reported requested metals (arsenic, chromium, copper and lead), grease and suspended solids in all samples tested and TRH in samples tested primarily from SPEL-1.

An assessment of the chemicals reported in this area and the affect they may have had on the mangrove ecosystem and ultimately the Spencer Gulf is further discussed in Section 9. The Flora and Fauna Assessment is presented in Appendix I.

6.4. Groundwater screening assessment criteria

Based on the groundwater BUA undertaken in the PSI report (Coffey 2016a) marine water aquatic ecosystems, recreational and aesthetic use of the Spencer Gulf and the possibility of future aquaculture industries have been identified as the realistic potential beneficial uses of water in the site's vicinity.

The amended ASC NEPM (NEPC 2013) provides health-based groundwater investigation screening levels (GILs) for assessment of the marine ecosystem and recreational and aesthetic use and HSLs for various exposure settings for some of the chemicals tested.

In line with the ASC NEPM (2013), the NHMRC (2008) guidelines are adopted for assessment of recreational waters. The NHRMC (2008) guidelines do not specify actual guideline values which chemical concentrations can be compared against; however it is recommended that expected exposure in terms of dose and frequency are considered in developing GILs. A conservative assumption has been made that approximately 200ml/day of water is ingested undertaking recreational activities involving extracted groundwater. Therefore a factor of 10 has been applied to the Australian Drinking water Guidelines (ADWG) (NHMRC & NRMMC 2011) to assess risk to potential beneficial uses with the exception of some analytes with aesthetic guidelines where this value has been adopted as the appropriate guideline for direct contact.

The HSLs for vapour intrusion for further evaluation of potential risks to human health resulting from intrusion of hydrocarbon vapours emanating from groundwater impacts at the site has also been adopted for assessing the groundwater at the site. In addition, to assess vapour intrusion for intrusive maintenance workers, the CRC CARE (2011) HSLs have been adopted. HSLs have been adopted based on the potential receptors, sand lithology and depth of groundwater.

To assess the presence of PFCs within the groundwater where known firefighting activities were undertaken within Area 14 – AEC 43B, the interim guidance from WA Department of Environment and Regulation (DER) (2016) Interim Guideline on the Assessment and Management of PFAS and an enHealth statement of PFCs issued in June 2016 (enHealth 2016) have been adopted for screening for protection of non-potable and recreational uses and freshwater ecosystems. No criteria is available at this time for marine ecosystems.

The regulatory criteria adopted for assessing groundwater at the site is therefore based on the following guidelines:

- **ASC NEPM (NEPC 2013)** GILs marine water ecosystem;
- **NHMRC (2008)** Guidelines for managing risks in recreational water;
- **ANZECC & ARMCANZ (2000)** Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Primary Industries – Aquaculture;
- **ASC NEPM (NEPC 2013)** HSLs, petroleum hydrocarbons for vapour intrusion, Commercial/Industrial HSL D;
- **CRC CARE (2011)** HSLs for intrusive maintenance workers (shallow trench); and
- **WA DER (2017)** Interim Guideline on the Assessment and Management of PFAS and **enHealth (2016)** statement: Interim national guidance on human health reference values for per- and poly-fluoroalkyl substances for use in site investigations in Australia – Area 14 only.

It is noted that there are no criteria for the assessment of groundwater within the ANZECC & ARMCANZ (2000) primary industry guidance for aquaculture and human consumption of aquatic foods. The guidance is based around influent (i.e. water that is entering the aquaculture operation) and source water quality, and it also addresses the safety of aquatic foods for human consumers. As the GIL for protection of marine ecosystems has been adopted, protection of influent for any future aquaculture activities is protected. As such this guideline is noted, but not included in our analytical tables for screening assessment purposes.

In their publication *Implementation of the National Environment Protection (Assessment of Site Contamination) Measure 1999* (Updated July 2016), the EPA has stated that during the review of existing site contamination guidance which is currently being undertaken, the approach to the determination of harm to water remains as set out in their publication *Site contamination: How to determine actual or potential harm to water that is not trivial resulting from site contamination* (EPA 839/08), in that the EPA considers that actual harm to water that is not trivial has occurred if chemical substances are in excess of background concentrations and are:

- Above the water quality criteria for the appropriate protected environmental value; and

- Or where there is no value, above the laboratory limit of reporting using a laboratory method approved by the Authority.

The EPA states that this involves comparison of groundwater quality against the water quality criteria for the relevant protected environmental values included in Schedule 2 of the former *Environment Protection (Water Quality) Policy 2003* (the former Water Quality EPP 2003), notwithstanding that these criteria were removed from the Policy when it was amended in 2015. The marine quality investigation levels, where available, have therefore been compared against the groundwater data collected as part of this investigation and presented in a separate table, Table 21.

The groundwater screening assessment criteria are for comparative purposes only and should not be regarded as "clean-up" levels. The HSL checklist is provided in Appendix G. The screening assessment criteria are included in the groundwater analytical tables Table 4B, 5B, 6B, 9B, 10C, 12B, 13C, 14B, 15B, 16C, 17C, 18C and 19B.

6.5. Groundwater screening assessment

6.5.1. Data presentation

Groundwater analytical results are presented in the appended tables by sequence and figures as presented below. Chain of custody documentation and laboratory certificates of analysis are presented in Appendices J and K respectively.

6.5.2. Groundwater analytical results

Groundwater analytical results were reported across the site generally below background concentrations with the exception of known areas of historical groundwater impacts. The following results were noted:

Area 1 – Playford A & B Stations (Table 4B, Figure 3D)

- Minor concentrations of TRH C_6-C_{10} were reported at the groundwater sample collected from Area1-MW103 and TRH >C_{10}-C_{40} were reported at the groundwater sample collected from Area1-MW104 located on the sea wall targeting AEC 2&5 (storage and use of transformers); and
- Minor concentrations of TRH >C_{10}-C_{40} were reported at the groundwater sample collected from Area1-MW107 located adjacent to the SPEL tank and sump, north west of the Playford B Station (AEC 7A).

It is noted that concentrations of 1,1-dichloroethane was reported at the groundwater sample collected from Area1-MW102 (AEC 1) at 1µg/L

Area 12 – Northern Station (Table 14B, Figure 14D)

- Elevated concentrations of benzene and ethylbenzene above the screening criteria for recreational waters and minor concentrations of xylenes and TRH C_6-C_{10} were reported in the groundwater sample collected from GW16, existing well located adjacent to the northern store UST (AEC 35).

Area 14 – Steel Laydown Area (Table 16C, Figure 19B

- Minor concentration of perfluorooctanesulfonic acid (PFOS) was reported in the groundwater sample collected from Area14-MW121 (0.00001mg/L) within the firefighting area (AEC 43B).

Area 15 – Coal Loading Area (Table 17C, Figure 17E)

- Elevated concentrations ethylbenzene, xylenes, naphthalene and TRH C_6-C_{34} were reported in the groundwater sample collected from Area15-MW124 targeting the fuel pad (AEC 44); and
- A minor concentration of naphthalene was reported in the groundwater sample collected from existing well GW21A located in the vicinity of the fuel pad (AEC 44).

6.5.3. Comparison to background concentrations

Heavy metal and metalloid concentrations were reported across the site (where analysed), with some metals (arsenic, cobalt, copper, iron, manganese, mercury, selenium, zinc) in some groundwater samples from the June 2016 monitoring event reported above the screening assessment criteria for the protection of marine ecosystems and/or recreational waters.

In addition, sulphate, ammonia and TDS concentrations were also reported above the screening assessment criteria at some locations. Ammonia was not noted to be elevated in the vicinity of the SA Water sewage ponds when compared to other wells, and in addition, no other nutrients were reported to be elevated. It is considered that only well APS 35 is in close enough proximity to the sewage ponds to be influenced.

The concentrations detected as noted above, are shown below in comparison to background concentrations of metals, metalloids and organics/inorganics (as determined in Section 2.12.4).

Table 6.4: Comparison against background concentrations (groundwater)

Analyte	Concentration range (mg/L)	Background concentration range (mg/L)
Arsenic	<0.005 to 0.017	<0.003 to 0.386
Cobalt	<0.001 to 0.022	<0.001 to 0.082
Copper	<0.001 to 0.013	<0.010 to 0.441
Iron	<0.05 to 3.6	0.09 to 169
Manganese	0.015 to 3.8	<0.001 to 6
Mercury	<0.0001 to 0.0003	<0.0001 to 0.001
Selenium	<0.001 to 29	<0.001 to 29
Zinc	<0.001 to 0.53	<0.003 to 0.296
Ammonia	0.07 to 6.1	0.07 to 6.1
Sulphate	350 to 2,300	3,510 to 9,960
TDS	54,000 to 190,000	57,000 to 230,000

The concentrations reported in groundwater samples collected are generally consistent with background concentrations. As such, on the basis of the available information, the above metals, metalloids and organics/inorganics are not considered to represent site contamination within groundwater at these locations at the site.

6.5.4. Historical groundwater analytical results

Historical groundwater data available for existing wells is presented in Table 22A for TRH, BTEXN and 1,1-dichloroethane concentrations. A comparison of historical and current analytical data is summarised below:

- Dissolved phase petroleum hydrocarbon impacts reported over time within Area 1 have generally decreased where present to less than the laboratory LOR. It is noted that LNAPL present in this area has remained generally consistent in reported thickness;
- Dissolved phase petroleum hydrocarbon impacts reported over time within Area 12 in the vicinity of the northern store UST (GW16) have shown a decreasing trend in concentrations; and
- 1-1-dichloroethane reported at GW8 on the sea wall at Area 1 at 0.1µg/L concentration at the previous monitoring event in June 2015 was not reported during the current event.

In addition, available historical groundwater data collected by FPP from APS wells since 2008 is presented in Table 22B. The results of the testing conducted indicate generally consistent concentrations over time. It is noted on comparison of results from the wells sampled by Coffey and FPP in June 2016, discrepancies in concentrations are present with the results Coffey reported lower than the FPP results. It is suggested that a selection of the APS wells around the site are sampled at least once within the Phase 3 program of works to confirm results reported.

6.6. Natural attenuation of contaminants in groundwater

6.6.1. Overview

The primary lines of evidence for natural attenuation are provided by observed reductions in impacted area geometry and contaminant concentrations. A shrinking or stable plume is evidence of natural attenuation, while for an expanding plume, the mass loading rate of the contaminants exceeds the natural attenuation rate.

Geochemical indicators of naturally-occurring biodegradation provide for secondary lines of evidence for natural attenuation. These natural attenuation indicators are useful because the biological transformation of petroleum hydrocarbons is the single most important process contributing to the natural attenuation of petroleum constituents. Geochemical natural attenuation indicators were collected during the current monitoring event and are presented in appended Table 2 (dissolved oxygen and redox) and groundwater analytical results tables (sulphate, nitrate, iron, manganese and alkalinity).

In general, biodegradation follows an order of favourable electron acceptor availability (O_2 > NO_3^- > Mn^{4+} >Fe >SO_4^{2-} >CO_2) due to the decreasing amount of energy gained through the reduction of these compounds. Nitrate, manganese, iron and sulphate are all electron acceptors which may be utilised in contaminant oxidation in the absence of dissolved oxygen.

Natural attenuation indicators assessed in June 2016 in groundwater wells at the site included:

- Dissolved oxygen (DO);
- Redox potential;
- Nitrate;
- Dissolved iron;
- Dissolved manganese (Mn^{4+});
- Sulphate; and
- Alkalinity.

This site-specific assessment of natural attenuation of the site follows the ASTM (2004) guidance document. This document states that at a minimum, primary lines of evidence are required to demonstrate the effectiveness of natural attenuation. If the primary lines of evidence are inconclusive, it may be necessary to obtain secondary lines of evidence.

6.6.2. Primary lines of evidence

Natural attenuation processes, particularly biodegradation, are often well documented at petroleum release sites where the configuration of the area of impacted groundwater is controlled by the source mass-loading rate relative to the removal rate provided by natural attenuation processes. Typically, the area impacted will expand until it reaches steady state where the rate of petroleum constituents contributed from the source is balanced with the rate of natural attenuation (ASTM, 2004). At steady-state (i.e. where concentrations are invariant with time) the area of impact stabilises. When the source area is depleted to the point that the rate of natural attenuation exceeds the source input, the result will be a shrinking area of impact over time.

The body of groundwater data collected at the site since 1996 indicates decreasing and stable groundwater concentrations across the areas investigated, the primary lines of evidence indicate that natural attenuation processes are likely to have occurred over time.

6.6.3. Secondary lines of evidence

As there was limited geochemical data available for the site, this data was collected during the current event in historical areas of impact to indicate further if natural attenuation processes were occurring in the groundwater system. Secondary lines of evidence for natural attenuation can be established through evaluation of geochemical indicators of the biodegradation processes. These parameters are useful for evaluating the occurrence and extent of biodegradation processes.

Table 6.5: Geochemical data

Well	TRH (mg/L)	Dissolved Oxygen (mg/L)	Redox (mV)	Nitrate (mg/L)	Manganese (mg/L)	Iron (mg/L)	Sulphate (mg/L)	Alkalinity (mg/L)
Area 1 Playford A & B Stations – AEC 1 Playford fuel oil loss								
GW1 Up gradient well	<LOR	0.5	-261	0.03	0.33	0.44	1500	740
GW7 Cross gradient well	<LOR	3.6	-210	1.2	0.015	<LOR	56	520
GW8 Down gradient well	<LOR	4.7	-34	0.1	0.42	<LOR	350	1000
Area 2 Playford B Switch Yard – AEC 8 Switch yard								
GW27 North west well	<LOR	2.2	-7	0.5	0.68	<LOR	1300	410
GW25 South west well	<LOR	1.1	-140	0.27	2.5	3.6	1600	620
Area 7 Fuel Oil Storage Area – AEC 23A Storage and dispensing of diesel								
Area7-MW108	<LOR	0.2	-310	0.05	0.86	0.32	2300	1000
GW12 Down gradient well	<LOR	0.1	-368	<LOR	0.41	0.25	1800	860
Area 8 Storage and Maintenance Area – AEC 24 Former UST location								
GW26A	<LOR	0.1	-391	<LOR	0.18	<LOR	1800	1500

Area 12 Northern Station – AEC 35 Northern store UST								
GW16	40	4.6	-128	<LOR	<LOR	<LOR	660	1300
Area 15 Coal Loading Area – AEC 44 Fuel padArea15-MW123								
Area15-MW123	<LOR	2.9	-32	1.6	0.49	1.3	620	300
GW19	<LOR	1.0	-27	<LOR	0.38	<LOR	370	200

Notes:
<LOR = results reported less than the laboratory LOR

Oxygen

Decreased DO indicates that where oxygen is available it is being used for the aerobic degradation of petroleum hydrocarbons. Concentrations of dissolved oxygen (DO) in groundwater are low to moderate across the site, but frequently notably low within and hydraulically down gradient of known areas of petroleum hydrocarbon release and groundwater impact.

Nitrate

Nitrate is at full depletion within previously impacted areas Area 7 and 8 and impacted areas Area 12 and 15. The depletion of nitrate indicates that anaerobic degradation, utilising nitrate as an electron acceptor, is occurring in the groundwater in these areas where it is available.

Manganese

Under anaerobic conditions manganese (IV) (Mn^{4+}) may be utilised as an electron acceptor, typically following the depletion of oxygen and nitrate within the groundwater. Increased dissolved manganese (predominantly Mn^{2+}) therefore indicates that Mn^{4+} is being utilised for biodegradation. The data does not show clear evidence indicating that manganese has been used as an electron acceptor.

Iron

Under anaerobic conditions, ferric iron (Fe^{3+}) may be utilised as an electron acceptor, and reduced to ferrous iron (Fe^{2+}) typically following the depletion of oxygen, nitrate and manganese within the groundwater. Iron concentrations are reported either below the laboratory LOR or at low concentrations across the site indicating no clear evidence of ferrous iron being produced as a result of anaerobic biodegradation.

Sulphate

Utilisation of sulphate as an electron acceptor in the biodegradation process typically occurs under strongly reducing conditions following the depletion of oxygen, nitrate and ferric iron. Sulphate concentrations were generally consistent at all locations where it was measured and at levels indicating that this electron receptor is not generally being utilised for biodegradation. It is noted a low concentration of sulphate was reported at GW7 located on the plume fringe of the Playford fuel oil loss (AEC 1) which may indicate that sulphate is being used in this area for biodegradation of the fuel oil in this area.

Alkalinity

Alkalinity, measured as bicarbonate, can be used as an indication of carbon dioxide production where biodegradation is occurring. Alkalinity measured in the groundwater samples was generally consistent at all locations where it was measured and at moderate levels. Therefore not providing clear evidence of carbon dioxide production as a result of biodegradation of hydrocarbon impacts.

Future for hydrocarbon degradation

Based on the natural attenuation data, it appears that natural attenuation has and is occurring within Area 1 in the vicinity of the fuel oil loss plume (AEC 1), within the vicinity of the northern store UST at Area 12 (AEC 35) and in the vicinity of the fuel pad (AEC 44) in Area 15. Given the groundwater conditions, there is potential for natural attenuation to be occurring and occur into the future.

7. Quality of analytical data

Field and laboratory quality assurance and quality control (QA/QC) results have been reviewed and verified for this phase of work. Coffey considers the fieldwork undertaken and soil, sediment and groundwater laboratory analysis are acceptable for the purposes of confirming the reliability and repeatability of the sampling and laboratory analysis procedures. A comprehensive review of the QA/QC results is provided in Appendix H.

8. Summary of results

The investigation undertaken at the site was completed in general accordance with the SAQP (Coffey 2016b). The subsurface conditions encountered beneath the site have indicated deeper fill areas are present closer to the Spencer Gulf where reclamation of land was undertaken for the site construction, and at lesser extents where site surface build up for construction occurred. Where site surface has been build up outside of the Playford areas, ash material is present in the fill. The natural soil surface is encountered at shallower depths further from the Spencer Gulf which is consistent with the site construction with land reclamation activities occurring over time.

Unburnt coal remains at the site in a defined area west of the coal loading area and fuel pad (Area 15) and this area will be included in the future management plan for the site along with the known waste dumps investigated and defined as part of these works.

The DSI has identified that historical activities, as defined in the AECs have caused some impacts to the subsurface. The impacts reported are primarily in line with known historical impacts at the site as identified below. It is noted metals have been reported across the site in fill material and groundwater. The concentrations reported within groundwater are considered to be generally reflective of background levels based on information collected from background locations in the site vicinity over time.

Area 1 – Playford A & B stations

Petroleum hydrocarbon impacts as a result of the historic Playford fuel oil loss (AEC 1) were identified in soils at the depth of the shallow aquifer while installing the secondary aquifer wells. Some TRH chain lengths were reported above the management limits for TRH reflective of a 'smear zone' in the soil in the vicinity of the phreatic surface. Groundwater impacts in the form of LNAPL and TRH were also confirmed as expected in this area of the site. The impacts noted are considered to potentially cause an unacceptable dermal contact and ingestion risk to current workers if the ground surface in this area is disturbed and to future users and structures if the impacts remain following closure if strict management protocols are not implemented. The investigation of the secondary aquifer in this area did not find that vertical migration of the impacts down to this water body had occurred.

Soil and groundwater impacts in the form of heavy end TRH have been identified to the north west of Playford B Station, in the vicinity of the SPEL tank and sump (AEC 7A). It is considered likely that the impacts noted are a result of the waste water infrastructure leaks/spills over time and/or surface water seepage due to this area of the site being 2m below the basement grade and the primary aquifer being encountered at 0.4mbgs. The impacts noted are considered to be at concentrations that do not pose a potential unacceptable risk to current and future identified receptors unless the area is excavated.

Shallow heavy end TRH impacts were noted in soils in the areas of the former spoon drains and transformer bunds, likely a result of the storage of the historic transformer storage in these areas of the site (AECs 2, 3 and 5). The minor TRH impacts noted in shallow soils are considered to be isolated and are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Heavy end TRH impacts were also noted in groundwater at the wells on the sea wall installed around the transformer bund (AEC 2 and 5). The impacts to groundwater noted could be a result of transformer oil leaking over time or could be a result of other activities undertaken along the sea wall associated with the Playford B Station such as equipment storage and vehicular traffic. The impacts noted are considered to be at concentrations that do not pose a potential unacceptable risk to current and future identified receptors unless the area is excavated.

The petroleum hydrocarbon groundwater impacts in the vicinity of the SPEL tank and sump (AEC 7A), from the sample from well MW107 and adjacent to the transformers on the sea wall (AEC 2 and 5) were not previously known. As was the case with 1,1 dichloroethane detected in the deeper aquifer at well MW102 beneath the fuel oil plume. These impacts are considered to be of anthropogenic origin and above background concentrations. As there are no water quality criteria within the now withdrawn 2003 Water Quality EPP, in accordance with SA EPA publication *Implementation of the National Environment Protection (Assessment of Site Contamination) Measure 1999* (Updated July 2016) which references SA EPA publication, and the referenced publication *Site contamination: How to determine actual or potential harm to water that is not trivial resulting from site contamination* (EPA 839/08), it is apparent that the EPA would likely consider that actual harm to water that is not trivial has occurred. On this basis these impacts were included in a notification to SA EPA under Section 83A of the EP Act (1993) of site contamination to underground water on 7 February 2017.

Area 2 – Playford B switch yard

The investigation completed around the AECs at Area 2 did not report notable impacts to the subsurface.

Area 3 – Playford buildings

Minor impacts to shallow soils were noted as heavy end TRH across Area 3. The impacts noted could be a result of vehicular traffic through the area and/or activities associated with the maintenance and workshop areas and are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Given the area is primarily made up of maintenance and workshop buildings, the subsurface conditions are unknown beneath the building footprints and as such impacts to the subsurface may exist in areas that have not been investigated as part of this DSI. It is recommended to consider assessment in Phase 3 beneath the building footprints once demolition has occurred.

Area 5 – Steel laydown area

Limited minor TRH impacts in shallow soils were noted at two isolated areas across the steel laydown area, possibly due to the storage of material over time (AEC 21). Given the concentrations noted, the impacts reported are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Area 6 – SPEL drain outlets

Elevated impacts to the sediments have been reported at Area 6 as discussed in Section 6.3.3. Further discussion of these impacts and the potential risk they may pose has been undertaken in Section 9.

Area 7 – Bulk fuel oil storage

The investigation completed around the AECs at Area 7 did not report notable impacts to the subsurface. It is noted that this area will be validated in Phase 3 following the removal of the fuel infrastructure including the AST bund.

Area 8 – Vehicle storage and maintenance area

Elevated concentrations of TRH were noted in soils from one isolated area located to the south of the vehicle maintenance shed and wash down bay (AEC 25) where surface water pools from drainage from the wash down bay (refer Photograph 9). Some TRH chain lengths were reported above the ESLs and it is noted that the impacts reported were not vertically delineated past 1.7mbgs. A potential risk to ecological receptors in this area of the site has been identified on the basis of the Tier 1 assessment.

Minor TRH impacts to soils were also reported at the monitoring well installed to the west of the maintenance shed and wash down bay at the depth of the shallow aquifer. Groundwater impacts were not reported above background levels indicating the soil impacts at this well are not at levels considered to present an unacceptable risk to current and future receptors of the site.

Area 9 – Recycling area

Limited minor TRH impacts in shallow soils were noted in at one isolated area within the recycling area, possibly due to the storage of material over time (AEC 28). Given the isolated nature and low concentrations reported, the impacts are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Area 10 – Former coal loading area

Minor impacts to shallow soils in the form of TRH were noted at a number of locations around the former coal loading area (AEC 29). Given the historical activities undertaken in this area associated with coal loading activities included use of heavy machinery, the former coal conveyor and railway line, it is considered likely that the shallow impacts noted are from these historical activities. Given the concentrations reported it is considered unlikely that these impacts would present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Area 11 – Wastewater, fuel storage and washdown area

Limited minor TRH impacts in shallow soils were noted at one isolated area in the vicinity of the former diesel AST footprint and pumping station (AEC 31A). The impacts noted are possibly from the storage of diesel in this area over time, or could be associated with the transfer of diesel. Given the concentrations reported it is considered unlikely that these impacts would present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Minor TRH impacts to soils were reported at the monitoring well installed adjacent to the fuel transfer pipeline (AEC 31B) at the depth of the shallow aquifer as well as at the monitoring well installed adjacent to the wash down bay (AEC 32). It is considered likely that the former fuel transfer pipeline (AEC 31B) and wash down bay (AEC 32) have been sources of impact to the soils and groundwater historically and have been reported in the smear zone in the current investigation. Given impacts were not reported in the groundwater from these locations, it is considered that impacts may have existed historically that have since decreased and it is unlikely that gross hydrocarbon impacts beneath the subsurface exist that are considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Area 12 – Northern station

Adjacent to the intermediate oily skimmer pit (AEC 34), minor impacts to soils in the form of TRH were reported at the depth of the shallow aquifer. This soil bore was located to the north of the pit where transfer pipework extends and it is possible this infrastructure or releases into the pit have leaked over time. The soil impacts reported were not vertically delineated past 3.0mbgs, however the monitoring well installed on the southern side of the pit did not report any impacts to soils or groundwater indicating the soil impacts are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Soil and groundwater impacts were reported in the form of BTEX and light end TRH in the vicinity of the northern store UST (AEC 35). Historic groundwater impacts were known to exist in this area and were confirmed during the 2016 works to be present in the primary aquifer. On the basis of the available information it is considered unlikely that these impacts would present an unacceptable risk to current and future receptors, unless the subsurface is removed and contact with the impacted soils and groundwater occurs. During the installation of the secondary aquifer well in this area, soil impacts were reported in soils at the depth of the primary aquifer. Vertical migration of impacts to the secondary aquifer has not appeared to have occurred.

Area 13 – Northern station infrastructure

Limited minor TRH impacts in shallow soils were noted at two isolated areas adjacent to the backup diesel generator and shed (AEC 39) and the north eastern side of the main waste oil storage area (AEC 42). The impacts noted are considered likely due to surface spills or leaks rather than the infrastructure leaking given the depth to impacts is less than 0.5mbgs. They are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Area 14 – Steel laydown area

The monitoring well installed to target the area of historic firefighting activities (fire extinguisher training) (AEC 43B) reported a trace concentration of PFOS in the groundwater below interim guidance. The concentrations reported are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use, however soil testing to determine if these impacts are present within the soils is recommended to be completed in Phase 3.

Furthermore PFOS groundwater impacts in the sample from well MW121 were not previously known and are considered to be of anthropogenic origin and above background concentrations. As there are no water quality criteria within the now withdrawn 2003 Water Quality EPP, in accordance with SA EPA publication *Implementation of the National Environment Protection (Assessment of Site Contamination) Measure 1999* (Updated July 2016) which references SA EPA publication, and the referenced publication *Site contamination: How to determine actual or potential harm to water that is not trivial resulting from site contamination* (EPA 839/08), it is apparent that the EPA would likely consider that actual harm to water that is not trivial has occurred. On this basis these impacts were included in a notification to SA EPA under Section 83A of the EP Act (1993) of site contamination to underground water on 7 February 2017.

Area 15 – Coal loading area

Along the coal conveyor sediment area (AEC 19), TRH impacts were noted in shallow soils. This area was utilised as the runoff for the coal conveyor when it was emptied and as such is considered a result of this activity. The concentrations reported are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

During the installation of the secondary aquifer well to the north of the fuel pad (AEC 44), elevated soil impacts in the form of TRH were reported above the ESL and management limits at the depth of the primary aquifer. Minor TRH impacts were also reported at the depth of the primary aquifer from the primary aquifer well installed adjacent. Historic groundwater results indicate this area has been historically impacted by activities associated with the fuel pad. It is considered likely that impacts would have extended to include the area to the north (MW122, MW123 and GW19) historically and have been reported in the smear zone in the current investigation. Given impacts were not reported in the groundwater from these locations, it is considered that impacts may have existed previously that have since decreased and it is unlikely that gross hydrocarbon impacts beneath the subsurface exist. The secondary aquifer groundwater results did not indicate vertical migration of impacts had occurred.

The groundwater in the vicinity of the fuel pad was reported to be impacted with LNAPL and petroleum hydrocarbons to the south of the fuel pad, down gradient form historically reported LNAPL. The impacts noted are considered to potentially pose an unacceptable dermal contact and ingestion risk to current workers if the ground surface in this area is disturbed and to future users and structures if the impacts remain following closure and strict management protocols are not implemented. It is expected that this area will be addressed in Phase 3 following the fuel pad infrastructure removal and at that time the extent of the impacts can be further determined and replacement monitoring wells installed will be utilised to further delineate the known groundwater impacts (if required).

The petroleum hydrocarbon groundwater impacts down hydraulic gradient of the fuel pad (AEC 44), from the sample from well MW124 were not previously known. These impacts considered to be of anthropogenic origin and above background concentrations. As there are no water quality criteria within the now withdrawn 2003 Water Quality EPP, in accordance with SA EPA publication *Implementation of the National Environment Protection (Assessment of Site Contamination) Measure 1999* (Updated July 2016) which references SA EPA publication, and the referenced publication *Site contamination: How to determine actual or potential harm to water that is not trivial resulting from site contamination* (EPA 839/08), it is apparent that the EPA would likely consider that actual harm to water that is not trivial has occurred. On this basis these impacts were included in a notification to SA EPA under Section 83A of the EP Act (1993) of site contamination to underground water on 7 February 2017.

Area 16 – Train unloading area

Along the swale soil drain (AEC 49B) where surface water is drained from this area to the north, minor TRH impacts were noted at two isolated locations not considered to pose an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Area 17 – Ash storage area (Ash pond)

One of the locations undertaken adjacent to the ash pond stage 2 pumps (AEC 50B) reported surface impacts in the form of TRH which are likely associated with a surface spill or vehicular traffic rather than the stage 2 pumps given the sample tested at 0.5mbgs did not report any TRH concentrations. The impacts reported are not considered to present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

Groundwater testing completed in the vicinity of the ash pond at existing APS wells reported some metal concentrations which on the basis of available information, appear to be generally consistent with background concentrations. The presence of the SA Water Waste Water Treatment Ponds in the north west of the ash ponds do not appear to have had a notable influence on the groundwater system with nutrients tested in the wells not noted to be elevated in the vicinity of the sewage ponds when compared to samples from other well locations.

Previous testing of the ash material within the ash pond (Golder 2016 and Coffey 2016c) reported some metals in the material below relevant health guidance. The characteristics of the ash material were reported to be consistent with bottom ash and within the expected ranges for this type of material. It was considered the ash material may be suitable for reuse in a commercial/industrial land use setting, would not degrade concrete piles and may be suitable for reuse as a recycled material for transport infrastructure. It is considered unlikely that given the chemical concentrations reported in the ash material, dust migration to the residential occupants and commercial workers within Port Augusta Township to the north/north west is unlikely to cause potential risks to human health. It is also unlikely an inhalation risk from ash pond material is present to the nearby receptors given the ash pond has since been covered with a dust suppressant and revegetation is to commence in the near future. However it is noted that SA Health have expressed concern about the high overall dust level measured on 1 January 2017 at monitoring stations in Stirling North and at Lea Memorial Oval in the southern outskirts of Port Augusta Township immediately after the dust suppressant had been degraded due to a storm and heavy rain, with that they refer to as "*a high fraction of particulate matter less than 10 microns in diameter (PM10)*" (SA Health 2017a).

It is also considered unlikely, given the concentrations of chemicals reported, that chemicals from the ash material would have leached to the subsurface and the groundwater conditions reported around the ash pond support this conclusion. Engineering solutions to avoid saline seepage from the ash pond are understood to have been implemented in the 1980's following previous saline seepage from the ash pond to the subsurface, particularly down gradient to the west which affected mangroves nearby (refer Section 2.9).

Area 18 – Rail filling area

Some minor TRH impacts were noted along the rail filling area (AEC 52) outside of the HDPE liner at levels that are considered unlikely to pose an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

9. Ecological screening risk assessment – Area 6

9.1. Background

9.1.1. Initiation

Following a review of the analytical results reported from the sediment samples collected in the discharge areas of the three SPEL drains located in Area 6 in June 2016, additional works were undertaken in early November 2016 which included further sampling for supplementary data collection and a flora and fauna assessment of two mangrove areas (refer Sections 4.2 and 6.3.3).

The data collected has been used to undertake this Ecological Risk Assessment (ERA) to evaluate any potential ecological impacts of the discharge from the SPEL drains has had on the mangrove ecosystem located to the south of the Playford area between the Playford Stations and Northern Station. The mangrove ecosystem area under investigation ('the mangrove') is shown in Figure 9.1 below and presented in the overall site plan (Figure 8D).

Figure 9.1: Mangrove swamp - area of investigation

The Playford area referred to herein includes the Playford Stations, switch yards, maintenance and workshop sheds and equipment laydown areas, all located north of the mangrove swamp. The Playford area investigations undertaken as part of this DSI, which provide the information for this ERA, include Area 1 (Playford A and B stations), Area 3 (Playford buildings), Area 5 (steel laydown area) and Area 6 (SPEL drain outlets).

9.1.2. Objective

The purpose of the ERA was to assess the potential ecological risks to the mangrove adjacent to the Playford area, primarily relating to discharge waters from the three SPEL drain outlets located north of the mangrove. This information is required to support decisions regarding further remediation or management options that would potentially improve the overall health of the small mangrove swamp under assessment in this area.

Furthermore, this ERA is limited to contaminants previously identified within the swamp sediments and drain waters sampled and does not include an assessment of risks to ecological receptors due to potential impacts from other sources such as atmospheric deposition or the gulf.

9.1.3. Risk assessment approach

The assessment of potential environmental risks was undertaken using a tiered approach as outlined in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000). The approach is outlined as follows:

- Tier 1 – Sediment/surface water contaminant characterisation and comparison to guideline values.
- Tier 2 – Comparison to background concentrations, examination of factors controlling bioavailability and ecological surveys.
- Tier 3 – Acute and chronic toxicity testing.

The scope of work for this investigation is a Tier 1 assessment of the mangrove swamp with some Tier 2 considerations, specifically a comparison to sediment quality in the swamp at a greater distance from the SPEL drains and in a background reference mangrove. In addition a visual evaluation of the ecosystem as provided in a Flora and Fauna Assessment undertaken in November 2016 (refer Appendix I). A more detailed Tier 2 or Tier 3 would only be considered where a potential environmental risk is indicated.

The ecological risk assessment approach adopted is also consistent with the ASC NEPM. The guideline on ERA methodology described in Schedule B5a of the ASC NEPM provides the framework for this preliminary assessment.

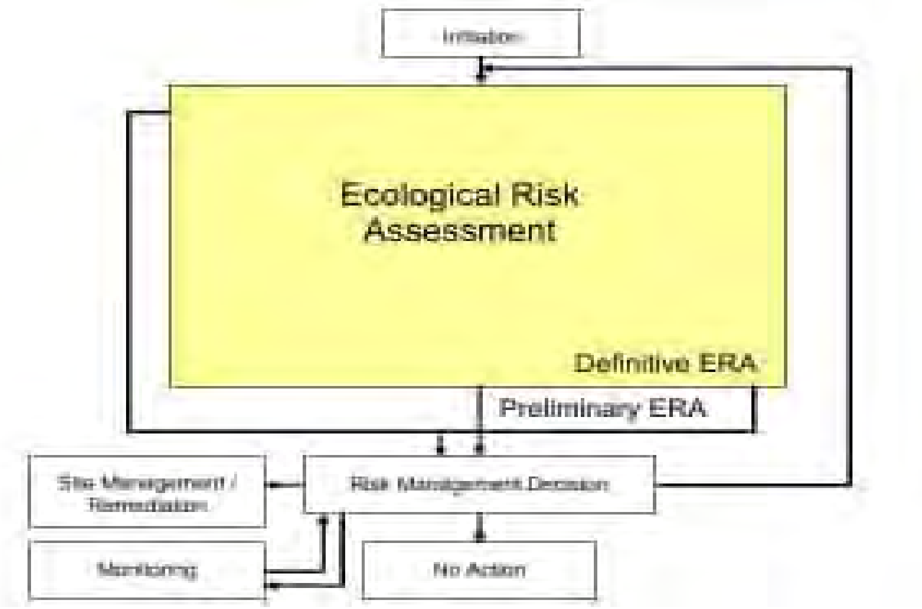

Figure 9.2: ERA framework. ASC NEPM Schedule B5a (2013)

9.2. Site details and surrounding environment

The site is located in the Northern Spencer Gulf which forms part of the South Australia coastal marine environment, located approximately 6km south of Port Augusta. The Northern Spencer Gulf is considered to be an inverse estuary (Baker, 2004) given the salinity increases toward the north resulting from increased evaporation, low rainfall and low surface water runoff. The sheltered shores of the Northern Spencer Gulf, the high salinity, tidal amplitude and warm water temperatures all contribute to conditions that are not found elsewhere in South Australia. The region provides temperate habitats such as coastal saltmarshes, mud flats, seagrass meadows and mangrove forests that contain both tropical and sub-tropical species as well as endemic species.

Although there are mangroves present along the eastern side of the Northern Spencer Gulf in this region, both to the north and south of the site, the Mangrove Area that is the focus of this ERA is surrounded by the power plant facilities (see Figure 9.1):

- Playford A & B Stations and buildings, steel laydown area and the switch yard directly to the north;
- Maintenance and storage area and the Northern Station facility to the east; and
- Process water inlet and outlet channels to the south.

The site has an extensive waste water network across the site, the majority of collected water drained to the ash pond (Area 17) or the contaminated drains pond (Area 11) (refer Section 2.6.4). There are three SPEL drainage outlets located along the south of South Coast Road, adjacent to the northern area of the mangrove swamp as indicated on Figure 8B. Surface water collected from the Playford area infrastructure, primarily the switch yards, maintenance and workshop sheds, equipment laydown areas is discharged to the north and north east of the mangrove swamp via the three SPEL drain outlets. The ‘SPEL’ system is believed to have been installed at the site in the year 2000. Prior to the SPEL system installation, the drainage system existed predominately in its current form. Outfalls were directed into the Spencer Gulf around the Playford Stations – this was redirected to the SPEL tank and sump following SPEL installation, and into the Spencer Gulf south of the Playford buildings and SAPN switch yard where SPEL drain outlets have since been installed.

The intertidal zone is approximately 470m wide in the vicinity of the site and mangroves occupy the upper region. During high tide, the mangrove trees can be flooded to 1.2m in the deeper area and less than 0.1m in the higher areas (Ecological Associates, 2016).

The mangrove is part of the Upper Spencer Gulf Marine Park and is zoned under the General Managed Use Zone. The zoning is intended to provide protection for habitats and biodiversity within the marine park, while allowing ecologically sustainable development and use. The management of marine parks in South Australia is currently regulated under the Marine Parks Act, 2007.

Seagrass monitoring has been undertaken by FPP as well as others in the area since the 1980's and has determined no significant changes in the seagrass communities in and around the power station (refer Section 2.8 above).

An assessment of the Hospital Creek discharge to Spencer Gulf undertaken in 2010 by SARDI investigated four components of the ecosystem (sediment, mangroves, seagrasses and infauna) within three control mangrove sites in the area as well as the discharge area to the Spencer Gulf and did not conclude that the environment at Hospital Creek was affected by site activities (refer Section 2.6.2 above).

9.3. Mangrove assessment methodology

9.3.1. Investigations undertaken

Two sediment investigations were undertaken in the vicinity of the SPEL outlets in June 2016 and November 2016 and the results are presented in Table 8A. Two background locations (BS1 and BS2) to the south of the mangrove swamp were also sampled in the November 2016 investigation (refer Sections 2.12.3 and 4.2 and Figure 8B). Additional background samples (BGSS1 and BGSS2) were obtained from the mangrove located to the north east of the Playford B Station (refer Sections 4.2 and 6.3.3 and Figure 8C). It is noted that this mangrove area had die backs in the 1950's and 1980's and has had a number of replanting events over time.

In order to understand the potential impacts of the site's activities on the mangrove swamp, a flora and fauna assessment was undertaken by Ecological Associates in November 2016 (Appendix I). The assessment included an evaluation of the mangrove swamps located north and south of the Playford infrastructure to determine whether the mangrove swamp area subject to this ERA had been significantly degraded as a result of the power station activities. The two swamp sites were of similar areas and classified into condition zones based on aerial photograph review and visual inspection of the sites. It is noted that these same two areas were assessed as part of the EIS for the construction of the Northern Station as described in Section 2.7 above.

A general visual inspection of the condition of the mangrove swamp under ERA and the background mangrove swamp was conducted based on the selected transects and quadrants (Ecological Associates, 2016). The visual assessment included:

- Number of trees;
- Height of each tree;
- Health of each tree based on 5 categories ranging from dead to very good;
- Overall canopy cover of the quadrant;
- Sediment texture;
- Abundance of pneumatophores (aerial roots);
- Abundance of barnacles;
- Presence of woody debris; and

- Presence of other plants such as filamentous algae and samphire which affect mangrove tree health.

Whilst other flora and fauna may have present at both mangrove sites assessed, it should be noted that a formal ecological survey was not conducted as part of the assessment.

9.3.2. Beneficial uses and guidelines

In order to decide on the appropriate guideline values to be applied to the mangrove swamp, the environmental values, or beneficial uses must be determined based on local environmental conditions.

Generally, mangrove swamps and forests are considered to be important coastal ecosystems as they stabilise mudflats, and offer ecological niches for important species such as crabs, fishes, molluscs spiders and birdlife. On the basis mangroves provide refuge and sources of food for a vast number of organism, they are often considered to have high ecological value. At present, the mangrove under ERA is considered to be part of the Upper Spencer Gulf Marine Park but is currently not within a habitat protection, sanctuary or restricted access zone.

The condition of the mangrove ecosystem under assessment is determined based on its location, condition and ecological value. Based on the following information, the mangrove is considered to be highly disturbed:

- Located in a marine park however is adjacent to a former power station facility;
- Outcomes of the flora and fauna assessment undertaken in November 2016 report the ecosystem of the mangrove swamp under ERA is considered to be degraded with some areas more severely disturbed than others; and
- Mangrove swamps are considered to have high ecological value however the mangrove under ERA is in the vicinity of larger mangrove swamps that are relatively un-impacted.

9.4. Mangrove area conceptual site model

9.4.1. Mangroves adjacent to APS

In South Australia mangrove distribution is limited given the climate. *Avicennia marina*, the white or grey mangrove, is the only mangrove species found in South Australia. Mangrove swamps are considered to be depositional environments where sediments are consistently deposited as a result of decomposing organic material from mangrove trees, detritus feeders and sediments transported via tidal flows. The ecology of mangroves is diverse as they support a wide variety of fauna.

As detailed in Section 2.7 above, the area of mangroves under ERA had a number of die backs in the 1950's from the sulphur dioxide emissions from the Playford chimneys. These chimneys were replaced by the one 80m chimney in 1961 and aerial photography up to 1984 showed recovery and stabilisation of the mangroves from this event (Kinhill Stearn, 1986).

The health of the mangrove swamp under ERA varies considerably and observations indicate a number of factors are likely to be contributing. A potential source of contaminants to the mangrove is via the three SPEL drains that have discharged surface water from the Playford area. The condition of the mangroves down gradient of SPEL 1, and along assumed drainage lines, were noted to be particularly degraded.

Run-off from roads adjacent to the eastern and southern boundaries of the mangrove are also likely to occur. Historical activities such as vehicle washing are understood to have occurred in the areas adjacent to the mangrove swamp and associated water run-off to the swamp.

The development of the Northern Station included the removal of mangrove habitat in the construction of the Northern Station infrastructure including the cooling water channels to direct water from the gulf into the plant for cooling purposes. The returned warm water was via the more southern channel outlet. The sand bars created to direct gulf water extends beyond the mangrove vegetated areas into the open water. The sand bars are likely to impact the movement of water flow and tidal flushing in the mangrove. The mangroves in this area were markedly changed in the 1980's by mechanical disruption and as such, the mangrove community within this area has been highly modified.

Groundwater flow direction beneath the former power station site is towards the west. The recent groundwater monitoring event indicated immediately up-gradient monitoring wells in Areas 8, 11 and 12 (refer to Figure 2B) reported all analyte concentrations below the laboratory LOR. Metals were not included in the analytical suite for these areas during the current investigation, however based on the soil analytical data known and activities undertaken in these areas, it is unlikely elevated concentrations of metals would be present in the groundwater system as a result of site contamination.

Mangroves ideally prefer a mix of fresh and marine waters however the ongoing discharge of freshwater to certain areas may impact the balance required for healthy tree growth. The vegetation at the SPEL 1 discharge area, and along associated drainage lines, are further up the shore line and potentially receive reduced tidal saline water exposure and hence may be more susceptible to exposure to excess freshwater as a result.

Sediments are important, particularly in a mangrove swamp or forest, as they act as both a source and as a sink of dissolved metals. As well as influencing surface water quality, sediments represent a source of bioavailable metals to benthic biota and hence potentially to the aquatic food chain.

9.4.2. Mangrove assessment observations

The flora and fauna assessment undertaken by Ecological Associates (2016) (included in Appendix I) classified the vegetation conditions of the mangrove under ERA and background mangrove site into three zones (refer to Figure 8F). The following summarises the findings of the assessment.

Figure 9.3: Vegetation condition mapping for the mangrove control site based on 2009 imagery (Ecological Associates, 2016)

The northern control site as shown in Figure 9.3 above, mangrove vegetation is in good condition, with the presence of barnacles and dense pneumatophores, and does not appear to show signs of environmental impact. The mangrove tree condition was generally considered be moderate to very good. The canopy cover ranged from 75% shade in the Shore Zone to 20% in other areas where the tree density was less but the trees were generally in good health. Tree height was more than 2m in most trees however tree density across the zones was considered low, attributable to presence of largely mature trees.

It is noted this area of mangroves has suffered die backs on numerous occasions due to the sulphur dioxide emissions from the Playford chimneys in the 1950's as well as a 'slug' of highly saline groundwater migrating through these mangroves from the ash pond in the 1980's (Kinhill Stearn, 1986).

Figure 9.4. Vegetation condition mapping for the mangroves based on 2009 imagery (Ecological Associates, 2016)

The mangrove under ERA as shown in Figure 9.4 above, was observed to be in poorer condition. For the purposes of this assessment the investigation area has been divided into three zones on the basis of vegetation mapping. Refer to Figure 9.4 for the location and extent of the designated zones. Tree condition in Zone C, located in the deepest waters, were in good condition however Zone B trees in the central area of the mangroves were mainly moderate or good condition with a significant portion in poor condition. Trees in Zone A were mostly dead. Zone A generally includes the discharge area related to SPEL 1 and the eastern portion of the mangrove. Canopy coverage ranged from 20-30% in Zones B and C due to low tree density and <1% in Zone A. Tree height in Zone A was mostly <1m and included dead seedlings and stumps of dead immature trees. Zone B also contained a large number of trees < 1m, including many juvenile trees. The majority of trees in Zone C were 2-3m tall. Tree density in Zone C was low however Zone A and B were considered high due to the high numbers of seedlings and immature trees in Zone B.

While the flora and fauna assessment indicated that degradation of this area appears to have occurred between 2002 and 2009, historical aerial photography between the 1950's and 2016 does not support this and indicates the area has recovered from the 1950's dieback, and stabilised following the Northern Station construction disruption. This area has also had a number of replanting events.

Figure 9.5: Historical aerial photography, 1963 (DEWNR, 2015)

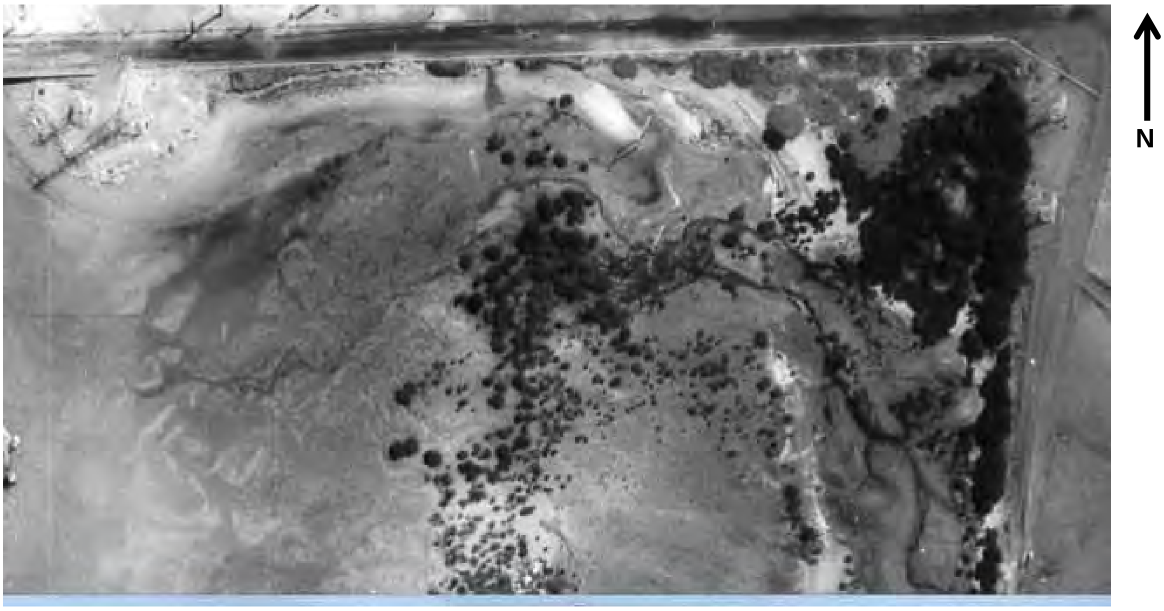

Figure 9.6: Historical aerial photography, 1972 (DEWNR, 2015)

Figure 9.7: Historical aerial photography, 1984 (DEWNR, 2015)

Figure 9.8: Historical aerial photography, 2016 (Google Earth, 2016)

9.4.3. Sediment results

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality –Interim Sediment Quality Guidelines (ISQG) (ANZECC/ARMCANZ, 2000) were adopted for the assessment of sediments (refer Section 6.3). The ISQG are adopted from international data given limited Australian information is available. The ISQG are applicable to both marine and fresh water environments.

A number of the screening criteria have a low trigger level value ($ISQG_{low}$) where detected concentrations below this value are considered to pose a low risk and require no further action. Where a measured concentration is in-between the low and high ISQG, the background concentrations are considered to ascertain local or regional natural levels of a chemical. Where background concentrations are similar, the risk of effects to the ecology are considered to be low. In the event both the background concentrations and the high ISQG criteria are exceeded, further evaluation of the contaminant’s bioavailability is recommended.

Background sediment samples collected in the mangrove control site (BGSS1 and BGSS2) are considered to be more representative of background concentrations in this portion of the Northern Spencer Gulf as opposed to the samples obtained further south of the SPEL drains in the mangrove under ERA (BS1 and BS2). In addition, sediment results from the SARDI (2010) investigation are considered to be representative of background conditions in the area.

Sample locations relating to the mangrove area are presented in Figure 8A and 8B and background sample locations from the north are shown in Figure 8C. Full analytical results from both the June and November 2016 sediment investigations are presented in Table 8A. A summary of the analytes detected above the laboratory LOR in sediments are presented below in Table 9.1.

Table 9.1: Sediment screening assessment

Chemical	ISQG[1]		Alternative guideline	Maximum concentration (mg/kg)	Background concentration (mg/kg)		Samples that exceed guidelines
	Low	High			Mangrove control site (BGSS1 & BGSS2)	In the south of the mangrove under ERA (BS1 & BS2)	
TRH $C_6 - C_9$	NE		500 (5)	<20	<20	<20	Not applicable
TRH $C_{10} - C_{14}$	NE			110	<50	<50	-
TRH $C_{14} - C_{28}$	NE			3400	<50	68	SPEL1-1, 1-2,1-3, 1-4, 1-5, 1-6
TRH $C_{28} - C_{36}$	NE			3900	<50	<50	
Arsenic	20	70	-	44	2.5	9.8	-
Boron	NE		440 (4)	200	-	220	-
Beryllium	NE		6.8 (4)	4.7	-	3.4	-
Cadmium	1.5	10	-	1.4	0.5	<0.4	-
Chromium (III)	80	370		-	-	<1	-
Chromium (VI)				60	8.5	-	-
Cobalt	NE		34 (4)	85	-	17	SPEL1-5, SPEL3-4, 3-5, 3-6
Copper	65	270	-	1400	6.7	43	SPEL3-4
Lead	50	220	-	210	<5	30	-
Manganese	NE		1100 (6)	4100	-	500	SPEL1-5, SPEL3-4, 3-5
Mercury	0.15	1	-	75	<0.1	<0.1	SPEL3-4, 3-6
Nickel	21	52	-	120	<5	26	SPEL3-4, 3-6
Selenium	NE		2 (7)	<2	-	<2	-
Zinc	200	410	-	2800	26	300	SPEL1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 2-1, 2-2, 2-3, 2-5, 2-6, 3-1, 3-3, 3-4, 3-5, 3-6
Total PCB	23	-	-	10	<0.1	<0.1	-

NE = Not established

Shading indicates the adopted screening criteria is exceeded

1 ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Interim Sediment Quality Guidelines (ISQG).

2 Mangrove swamp located north of Playford facility.

3 Located in southern portion of mangrove swamp, furthest from SPEL outlets.

4 Based on 2 x background concentration (ANZECC/ARMCANZ, 2000)

5 Atlantic PIRI (2012)

6 Based on freshwater. OMOE (2008)

7 Based on freshwater. BC MOE (2006)

9.4.4. Annual SPEL drain water monitoring

Annual monitoring of the drain water collected at the three SPEL locations was undertaken by FPP staff from 2007 to 2016 as part of the site's environmental licence compliance. The analysis included arsenic, chromium, copper, lead, TRH fractions, grease and total suspended solids. Given the drain waters are assumed to be discharging to a marine environment, the marine water guidelines were adopted. Exceedances of the marine investigation levels relating to chromium, copper, lead and TRH were detected at various times. Lead and chromium exceedances were reported at all locations, with lead detected in every investigation at one or more locations. Copper exceedances reported at SPEL 1 and SPEL 2. Grease and suspended solids were detected at each location in most annual events however whilst no guidelines have been established for these parameters, both have potential to impact mangrove habitat.

Full analytical results as provided by FPP from the annual SPEL water sampling are presented in Table 8B.

9.4.5. Chemicals of potential concern

Historical site information indicates that the groundwater collected area north of the mangrove may have contained a number of chemicals that were associated with the power station activities including fuel oil loss, storage and use of transformers, maintenance and workshop and general dumping of waste. It is understood the waste dump in immediately north of the mangroves comprises construction waste from SAPN upgrades to the SAPN switch yard (Area 4).

Hazardous substances associated with the these activities could include petroleum hydrocarbons, chlorinated hydrocarbons, PCBs, PAHs, and metals, such as arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, zinc.

Concentrations of COPCs identified in the sediments associated with the SPEL 1, SPEL 2 and SPEL 3 outfalls above the ANZECC/ARMCANZ (2000) sediment investigation levels or adopted guideline values, during the June and November 2016 investigations include cobalt, copper, manganese, mercury, nickel, zinc and TRH. As these substances were detected above the high ISQG as well as the expected background levels, they were considered COPCs for the mangrove swamp.

Whilst TRH has been detected in the sediment in the mangrove and some uncertainty may be present as it is not known whether these concentrations may include hydrocarbons due to other sources, including natural organic matter, given the TRH measured in the un-impacted northern mangrove was not detected above the LOR, the TRH impacts noted are assumed to be due to petroleum hydrocarbons rather than natural organic matter.

The COPCs potentially associated with the SPEL drain discharges and other surface water runoff sources from adjacent roads, were therefore considered to be:

- Metals:
  - Cobalt
  - Copper
  - Manganese
  - Mercury
  - Nickel
  - Zinc
- Heavy TRH fractions $>C_{14}$; and
- Grease.

9.5. Exposure assessment

9.5.1. COPC toxicity and bioavailability

Mangroves are, however, particularly susceptible to heavy metal build up because of their particular habitat, for instance, sediments tend to be fine grained and rich in organic matter. The dissolved metals readily bind to organic carbon and for that reason mangrove sediments are considered to be a sink for heavy metals.

Sediment and water concentrations alone do not determine availability or uptake of metals by organisms. Metal bioavailability to ecological receptors is controlled by complex physical, chemical, and biological factors that affect exposure and uptake patterns. These factors include metal speciation, metal concentration in aqueous and particulate (food) phases, and ecological processes such as feeding strategies and the position in the food chain of exposed organisms (Chen et al, 2016).

Adverse ecological effects arising from exposure to hazardous substances are dependent on a large variety of factors. These factors include the intrinsic toxicity of the substance; the characteristics of the environment; the intensity and duration of the exposure; the biological and behaviour characteristics of the exposed species; and concurrent exposure to other hazardous substances with similar toxic effects.

Metals such as copper, manganese, mercury, nickel and zinc are known to bioaccumulate in organisms. All of these metals are considered to be toxic. They cannot be biologically degraded and become concentrated in sediments over time as a result of pollution and other industrial and urbanisation activities. Mercury can be methylated to form the more toxic methylmercury compound. Methylmercury has been shown to bioaccumulate in biota at higher concentrations than found in sediments.

Petroleum hydrocarbons are not considered to bioaccumulate as they are readily metabolised. Heavier TRH fractions readily adsorb to organic matter.

9.5.2. Receptors of potential concern

Mangroves produce large amounts of organic litter such as leaves, twigs, bark, flowers and seeds which are consumed by detritus feeders. Whilst some of the detritus is consumed by crabs, fungi and bacteria are vital in the process as these micro-organisms produce waste which provides food for molluscs, small crustaceans and fish.

In the mangrove areas where roots are permanently submerged, the organisms living there include algae, barnacles, oysters, sponges, and bryozoans. Shrimps and mud lobsters use the muddy bottoms as their home. Mangrove crabs mulch the mangrove leaves, adding nutrients to the mud for other bottom feeders.

Mangroves also provide safe nesting and feeding sites for herons, egrets and other birds and are also home to a variety of snakes and spiders.

The mangroves are used by spawning adult fish and post-larvae of Mud Cockles. They provide a nursery area for juvenile Blue Swimmer Crabs, Western King Prawns, juvenile baitworms and Mud Cockles. Juvenile of fish species that use these as a food source include School Whiting, King George Whiting, West Australia Salmon, Tommy Ruff, Southern Sea Garfish, Yellow-eye Mullet, flathead species and flounder species (Ecological Associates, 2016).

A detailed flora and fauna survey has not been conducted however based on general mangrove ecosystems and the information provided in the flora and fauna assessment (Ecological Associates, 2016) (Appendix I) the ecological receptors at the wetland include:

- Avicennia marina, the white or grey mangrove tree;
- Aquatic benthic macroinvertebrates (crabs, polychaetes, bivalves and barnacles);
- Aquatic microinvertebrates;
- Fish; and
- Avifauna.

9.5.3. Exposure evaluation

Adverse effects may be associated with chemical exposure to flora and fauna via ingestion, respiration and/or direct contact pathways. An exposure pathway consists of the following elements:

- A source and mechanism for release;
- A storage and/or transport medium (e.g. contaminants stored in soil, volatilise and are transported into the atmosphere);
- An exposure point, where the receptor comes in contact with the contamination; and
- An exposure route (e.g. respiration and dermal).

The physico-chemical characteristics of the COPC and the behaviour of the receptor of interest will determine the method of exposure and subsequent systemic absorption.

The potential exposure pathways are presented in Table 9.2, based on ecological receptors within the Mangrove.

Table 9.2: Exposure pathways checklist - sediment

Source	Transport	Exposure point	Exposure route	Potential receptors[1]	Complete pathway[2]
SPEL discharge water	Volatilisation	Outdoor air[3]	Respiration	• Flora • Fauna	×
	Plant Uptake		Plant uptake	• Flora	✓
			Bioaccumulation	• Fauna	✓
	Drainage lines	Surface water	Ingestion	• Flora • Fauna	✓
			Aerosol	• Flora • Fauna	×
			Respiration	• Flora • Fauna	✓
			Direct contact	• Flora • Fauna	✓
			Plant uptake	• Flora	✓
			Bioaccumulation	• Fauna	✓
		Sediment	Ingestion	• Flora • Fauna	✓
			Direct contact	• Flora • Fauna	✓
			Plant uptake	• Flora	✓
			Bioaccumulation	• Fauna	✓

1 Assessment of human receptors was outside the scope of works.

2 Includes both current and future pathways.

3 Emissions from groundwater to outdoor are considered to be negligible.

Metals and TRH in sediment and pore-water are considered to be important routes of exposure in coastal food webs. Exposure is expected to be greatest for vegetation, aquatic microinvertebrates, benthic invertebrates and fish due to longer exposure durations to the COPC. Avifauna may potentially be exposed to COPC predominantly via direct contact and bioaccumulation of some COPC in plants and other fauna.

9.6. Risk characterisation

The detection of cobalt, copper, manganese, mercury, nickel, zinc and heavy chained TRH in sediments in the vicinity of the SPEL drain outlets, at concentrations exceeding the screening criteria, indicates ecological receptors in these areas are likely to be impacted. This is generally confirmed in the flora and fauna assessment which found the habitat in the vicinity of SPEL 1 to have dead vegetation and the absence of barnacles.

The extent of impacts in sediments beyond the area sampled is not known. Background samples collected from the southern extent of the mangrove (BS1 & BS2) suggest the impact is potentially concentrated in the north. The flora and fauna report found the poorest habitat at the mangrove (Zone A) extends approximately 130m south and south west of SPEL 1 (refer to Figure 9:4 above in Section 9.4.1 for Zone A extents).

Other factors are also likely to be impacting the mangrove and should be taken into consideration. Surface water run-off from adjacent roads is also likely to be contributing to the TRH and metal impact. In addition, the area immediately adjacent to the roads, SPEL drains and along drainage lines are likely to be exposed to more freshwater than other areas of the mangrove.

Whilst a detailed flora and fauna survey was not conducted as part of this assessment, it is possible that mangrove areas that are in poor health are more susceptible to plant disease such as phytophthora cinnamomi root rot fungus and excessive algal growth that would further impact the mangrove ecosystem.

Physical changes to the mangrove habitat as a result of the construction of the Playford Stations and Northern Station water channels have potentially altered tidal flushing and drainage patterns.

Metal impact in groundwater discharging to the mangrove is not expected to be occurring given the known soil conditions and activities undertaken in the vicinity of the mangroves. The contribution of TRH is considered to be negligible given groundwater results in up-gradient areas (Area 8 and 12) adjacent to mangrove are generally below the laboratory LOR.

Sediment sampling and flora and fauna assessment of the background mangrove located north of the Playford Stations suggest other potential sources of impact such as the gulf waters are unlikely to be contributing factors in the health of the mangrove.

9.7. ERA conclusions

A qualitative ecological risk assessment has been conducted to evaluate the potential impacts on ecological receptors within the small area of highly disturbed mangrove swamp situated to the south of the Playford Stations posed by the historical activities of the site. Based on available data, concentrations of cobalt, copper, manganese, mercury, nickel, zinc and heavy chained TRH fraction in sediment, as presented in this report, may present an unacceptable risk to ecological receptors within the mangrove swamp immediately south of the Playford Stations. The extent of metal and TRH impact in sediments is considered to be localised with samples collected in the south of the mangrove not exceeding screening criteria.

Annual water sampling of the SPEL water outlets collected by FPP staff only tested for a limited range of chemicals, however reported concentrations of copper, chromium and lead exceeded the marine ecological risk screening criteria. Grease and TRH were consistently detected in the highest concentrations at SPEL 1, located at the north eastern area of the mangrove swamp. It is possible surface runoff collected from the adjacent roads and washing areas have contributed to the TRH impacts in the drain water.

Suspended solid concentrations varied across the SPEL drains over the 10 year sampling period. Whilst there is no criteria for this parameter, excess suspended particulate matter may cause smothering of benthic organisms and carry chemicals such as metals. Grease and particulates may contribute to the suffocation of the mangrove trees' important oxygen obtaining pneumatophore roots, limiting the plants ability to obtain oxygen.

The flora and fauna assessment concluded the observed mangrove vegetation generally provided a poor habitat for marine fauna. The impacts were noted to be greatest in the east of the swamp and extended through the drainage lines toward the west. The dead vegetation in Zone A also represented a poor physical habitat. The upper vegetation in Zone B is considered poor however the understorey appeared to be more hospitable to fish and benthic invertebrates. The least impacted Zone C, located to the west of the mangrove area closest to the gulf waters, was healthy and compared favourably with the unaffected background mangrove swamp. It is noted that the mangrove area has suffered known die backs in the 1950’s and aerial photography shows the recovery of the mangrove community since this point as well as following on from the disruption caused by the Northern Station construction. It is noted a number of replanting events of the mangroves to the south of the Playford Stations has occurred over time.

The quantity and frequency of discharge of waters from the SPEL outlets is not known however the impact of freshwater is also likely to affect the flora and fauna of the swamp. Mangrove trees are well adapted to a saline environment and ideally prefer a 50/50 mix of marine and freshwater. Trees, particularly located near the drain outlets or roadway runoff and along drainage lines that were subjected to higher levels of freshwater may have suffered a decline in health as a result.

The physical change to tidal flows as a result of the Northern Stations process water inlet and outlet channels, as well as the reclaimed land for the Playford areas, may also contribute to impact to sediment deposition in the swamp area and drainage of both tidal and surface waters.

Sediment sampling and flora and fauna assessment of the background mangrove located north of the Playford stations suggest other potential sources of impact such as the gulf waters are unlikely to be contributing factors in the health of the mangrove area under assessment. It must be noted that this area of mangroves has suffered die backs in the 1950’s and 1980’s.

Seagrass monitoring has been undertaken by FPP as well as others in the area since the 1980’s and has determined no significant changes in the seagrass communities in and around the power station indicating any discharge from the mangroves to the Spencer Gulf is not having a detrimental effect on the marine ecosystem. On the basis the flora and fauna assessment concluded the mangrove vegetation in the area subject to this ERA was degraded and provided a poor habitat for marine fauna, the location and activities of the power station, particularly the construction of the Northern Station are considered to have contributed to the environmental degradation of the mangrove. Although waters discharging from the SPEL drains are potentially a source of the impact in north and east of the mangrove, other factors are also likely to be contributing to the deteriorating health of the mangrove habitat.

10. Conceptual site model update

10.1. Human health risk assessment

The ASC NEPM (NEPC, 2013) provides a framework for undertaking assessment of potential risk to human health caused by site contamination. The framework comprises the following components:

- Issues identification;
- Hazard assessment (often called toxicity assessment);
- Exposure assessment;
- Risk characterisation; and
- Risk communication and management.

The issues identification process was undertaken during the previous PSI which lead to the compilation of a preliminary CSM. Hazard assessment, exposure assessment and risk characterisation have been achieved through detailed site characterisation and a Tier 1 generic screening level assessment through comparison of site data with relevant ASC NEPM health risk screening criteria.

10.2. Ecological risk assessment

The ASC NEPM (NEPC, 2013) provides a framework for undertaking assessment of potential risk to the environment which is essentially similar to that adopted for human health risk assessment.

The current investigation has identified localised TRH concentrations that could potentially result in an unacceptable risk to ecological receptors. It should be noted that the ASC NEPM states that ESLs presented for hydrocarbon fractions $>C_{16}$ are regarded as being of low reliability.

The impacts noted above the ESLs in Area 8 can be addressed by remediation of the impacted soils or through additional tiers of risk assessment following the ASC NEPM framework. The impacts noted above ESLs in Area 15 around the fuel pad were revealed during installation of a monitoring well and as such are unable to be addressed at this time by remediation but could be subject to additional tiers of risk assessment following the ASC NEPM framework. It is noted the fuel pad area will be further evaluated in Phase 3 works following fuel infrastructure removal.

Refer to Section 9 on the site-specific ecological risk assessment undertaken for Area 6.

10.3. Aesthetics and other potential risks

In accordance with Section 3.6 of ASC NEPM (NEPC 2013) (Schedule B1), observations on the aesthetics of the site were noted, however given the site is currently being demolished, any aesthetic issues that may be present will be assessed following the completion of the site demolition works. It is noted that remaining coal was removed from the coal loading area prior to the DSI fieldworks to the extent practicable with this area since revegetated and remaining coal was being removed from the coal conveyor prior to demolition during the DSI fieldworks. An area of unburnt coal remains at the site and is defined for inclusion in the future management plan for the site.

The extent of the ash storage area is well defined with a detailed survey plan available. The area has been covered with a dust suppressant to avoid any future dust events towards the Port Augusta Township and rehabilitation through revegetation of the area will be undertaken in the near future to further limit airborne ash material migrating to nearby receptors.

Historical waste dumps were investigated with the extents defined and these areas can be managed through implementation of a site management plan for the site following completion of Phase 3 works.

Within Area 1 around the Playford fuel oil loss, and Area 15 around the fuel pad, soil impacts were reported above the ASC NEPM Management Limits. As indicated in Section 6.2, the purpose of management limits is to “avoid or minimise” potential effects of petroleum hydrocarbons and the ASC NEPM Schedule B (1) identifies these effects as:

- Formation of observable LNAPL;
- Fire and explosive hazards; and
- Effects on buried infrastructure.

Given the areas these impacts have been reported have had historical LNAPL impacts reported, the impacts noted above management limits are expected to represent the formation of observed LNAPL within the subsurface. As both of these areas will be addressed within Phase 3 works, it is not considered that these impacts will present a potential risk of fire and explosives hazards or degradation of buried infrastructure in the future.

10.4. Summary of evaluation of exposure pathways

The plausible potentially complete exposure pathways identified from the preliminary CSM set out in Section 3, Table 3.1 have been re-evaluated on the basis of the findings of the current investigation. The findings of this re-evaluation are presented in Table 10.1 below.

Table 10.1: Re-evaluation of exposure pathways identified from preliminary CSM

Hazard/source of contamination	Key areas affected	Potential transport mechanisms and exposure routes	Key potential receptors
Hydrocarbon impacted soils/sediments and groundwater	• Playford stations – Playford fuel oil loss, sea wall around the transformer storage area and adjacent to the SPEL sump and tank • Northern station – in the vicinity of the unleaded UST at the Northern station store • Fuel pad within the coal loading area • SPEL drain outlets at Area 6 • Possibly beneath existing fuel infrastructure including the bulk fuel oil storage areas, fuel transfer pipelines and diesel ASTs • Possibly beneath wash down areas, maintenance and workshop sheds across the site	• Dermal contact & ingestion • Surface water infiltration • Lateral and vertical migration through permeable strata and groundwater	• Current and future workers of the site • Future users of the site • The flora and fauna within the mangrove ecosystem • Marine ecosystems within Spencer Gulf • Users of Spencer Gulf
Metals impacted soils/sediments	• SPEL drain outlets at Area 6	• Surface water infiltration	• The flora and fauna within the mangrove ecosystem

11. Conclusions

The objective of the DSI reported herein was to assess if site historical activities as defined in the AECs have caused site impacts and if these impacts present a potential risk to identified site receptors under the proposed continued commercial/industrial land use.

The subsurface conditions encountered beneath the site have indicated deeper fill areas are present closer to the Spencer Gulf where reclamation of land was undertaken for the site construction, and at lesser extents where site surface build up for construction occurred. Where the site surface has been built up outside of the Playford areas, ash material is present in the fill. The natural soil surface is encountered at shallower depths further from the Spencer Gulf which is consistent with the site construction through land reclamation over time.

Unburnt coal remains at the site in a defined area west of the coal loading area and fuel pad (Area 15) and this area will be included in the future management plan for the site.

With the exception of previously known areas of historical fuel losses, gross soil and groundwater impacts have not been identified from the DSI works completed in relation to the previously defined AECs. The minor hydrocarbon impacts not previously identified have been noted in shallow soils in various areas within the site but are generally considered to be isolated and unlikely to present an unacceptable dermal contact or inhalation risk to current and future identified receptors with respect to ongoing commercial/industrial land use.

Localised previously identified hydrocarbon impacts to the primary aquifer have been confirmed, however given the groundwater conditions, there is potential for natural attenuation to be occurring and occur into the future which will continue to reduce the severity and extent of these impacts.

The secondary aquifer was investigated in areas of historical petroleum hydrocarbon impacts (Area 1, Area 12 and Area 15). Vertical migration of impacts into the secondary aquifer was not apparent in these areas.

Known historical impacts associated with the Playford fuel oil loss (AEC 1) have been confirmed within the unsaturated zone and within the primary aquifer during the investigation as LNAPL and dissolved phase petroleum hydrocarbons. The impacts identified are considered to potentially pose an unacceptable dermal contact and ingestion risk to current workers if the ground surface in this area is disturbed and to future users and structures, if the impacts remain following closure and if strict management protocols are not implemented. The previous DRA completed for the Playford fuel oil loss (EP 2014) indicated that the plume is stable and shrinking and unlikely to expand to reach the marine ecosystem. Information obtained from the DSI support these findings.

The Playford area is currently being demolished with demolition of the area expected to be completed in 2018, no ground disturbance in the vicinity of the fuel oil loss plume is expected during demolition as the plume is located between the Playford A and B Stations. Following the demolition works, the impacts noted are to be further assessed as part of Phase 3 of the site contamination assessment and appropriate mitigation measures will be implemented to manage identified potential risks to human health.

Petroleum hydrocarbons are also present in soils and dissolved in groundwater in the vicinity of the sea wall adjacent to Playford B Station (AEC 5) and adjacent to the SPEL tank and sump to the north west of Playford B Station (AEC 7A). The impacts noted are considered to be at concentrations that are unlikely to pose a potential risk to current and future identified receptors unless the area is excavated and appropriate management protocols are not implemented.

TRH impacts were noted at concentrations above generic ASC NEPM ESLs locally at the vehicle storage and maintenance area (Area 8, AEC 25) which potentially pose a risk to ecological receptors.

The soils in the vicinity of the fuel transfer pipeline (AEC 31B) and wash down bay (AEC 32) (Area 11) reported some minor TRH impacts at the depth of groundwater. It is considered likely that these sources have been sources of impact to the soils and groundwater historically and have been reported in the smear zone in the current investigation. Given impacts were not reported in the groundwater from these locations, it is considered that impacts may have existed historically that have since attenuated and it is considered unlikely that gross hydrocarbon impacts beneath the subsurface exist that present an unacceptable risk to current and future receptors at the site with respect to ongoing commercial/industrial land use.

The soils and groundwater in the vicinity of the northern store UST located at the Northern Station (Area 12, AEC 35) are confirmed to be impacted in line with historical data and confirm an unleaded petrol source based on the composition of chemicals reported. It is likely the impacts reported are from surface spills/leaks from the dispensing pump associated with the UST leaching into the soil and shallow groundwater from surface water infiltration rather than a breach in the UST given the up and down gradient monitoring wells do not report impacts to groundwater. The impacts noted are considered unlikely to present an unacceptable risk to current and future receptors, unless the subsurface is removed and contact with the impacted soils and groundwater occurs.

A trace concentration of PFOS was reported in the groundwater in the vicinity of the firefighting training area (fire extinguisher training) (AEC 43B, Area 14).

Around the fuel pad (AEC 44) at the coal loading area (Area 15), soil and groundwater impacts have been reported that could pose a potentially unacceptable risk to current workers if the ground is disturbed and to future users and structures if the impacts remain following closure and if strict management protocols are not implemented. The groundwater impacts reported to the south of the fuel pad remain undelineated down gradient to the south west. It is understood that this area is to be revegetated and the fuel pad will be removed.

Groundwater testing completed in June 2016 in the vicinity of the ash pond (AEC 50A) did not report chemicals above likely background concentrations. The presence of the SA Water Waste Water Treatment Ponds in the north west of the ash ponds do not appear to have had a notable influence on the groundwater system with nutrients tested in the wells not noted to be elevated in the vicinity of the sewage ponds when compared to other well locations. It is noted there are discrepancies in the results of testing conducted by FPP and Coffey in June 2016 from wells around the ash pond and it is recommended that groundwater sampling of the identified background well locations (at least) is undertaken to confirm the chemical concentrations.

Previous testing of the ash material within the ash storage area reported the material to be consistent with bottom ash and within the expected ranges for this type of material. The ash pond is well defined with an up to date survey plan which will be included in the future management plan for the site. It is considered unlikely that given the chemicals reported in the ash material, dust migration to the residential occupants and commercial workers within Port Augusta Township to the north/north west is unlikely to cause potential risks to human health. It is also unlikely an inhalation risk from ash pond material is present to the nearby receptors given the ash pond has since been covered with a dust suppressant and revegetation is to commence in the near future. However it is noted that SA Health have expressed concern about the high overall dust level measured on 1 January 2017 at monitoring stations in Stirling North and at Lea Memorial Oval in the southern outskirts of Port Augusta Township immediately after the dust suppressant had been degraded due to a storm and heavy rain, with that they refer to as "*a high fraction of particulate matter less than 10 microns in diameter (PM10)*" (SA Health 2017a).

It is also considered unlikely, given the testing results of the ash material, that chemicals from the ash pond would have leached to the subsurface and the groundwater conditions reported around the ash pond support this conclusion. Engineering solutions to avoid seepage from the ash pond are understood to have been implemented in the 1980's following seepage from the ash pond to the subsurface.

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The ecological risk assessment undertaken for the small highly modified mangrove swamp at Area 6, within the man-made inlet immediately south of the Playford Stations has identified that sediments from site drainage water may have impacted the mangrove area with concentrations of some metals and heavy end TRH reported at levels that may present an unacceptable risk to ecological receptors within the mangrove swamp. The extent of metal and TRH impact in sediments appear to be localised. The flora and fauna assessment completed determined that the mangrove area consisted of a poor habitat for marine fauna, however this area is highly disturbed from known diebacks in the 1950's and construction of the Northern Station and infrastructure including the water inlet/outlet channel in the 1980's. It is also noted that this area has been replanted on a number of occasions. The influx of freshwater from the SPEL drains along with the change to tidal flows as a result of the construction of the Northern Station process water inlet/outlet channel may have also had an effect on the mangrove health. It is possible surface runoff collected from the adjacent roads and washing areas have also contributed to the TRH impacts in the SPEL water along with the surface water drainage. Historical aerial photography between 1963 and 2016 shows the mangroves recovered from the 1950's dieback, and stabilised following the Northern Station construction disruption. Seagrass monitoring has been undertaken by FPP as well as others in the area since the 1980's has determined no significant changes in the seagrass communities in and around the power station indicating any discharge from the mangroves to the Spencer Gulf is not having a detrimental effect on the marine ecosystem.

12. Recommendations

Based on the results of this investigation as described in the Sections above, the following recommendations will be considered for the next phase of contamination assessment, Phase 3 remediation.

Table 12.1: Phase 3 recommendations

Area/AEC	Recommendations
Area 1 – AEC 1 Playford fuel oil loss Petroleum hydrocarbon impacts to soils and shallow groundwater may potentially pose an unacceptable dermal contact and ingestion risk to current workers if the ground surface in this area is disturbed and to future users and structures, if the impacts remain following closure and if strict management protocols are not implemented	Following the demolition works, the impacts noted are to be further assessed and appropriate mitigation measures will be implemented to manage identified potential risks to human health, likely to comprise removal of gross impacted soils
Area 1 – AEC 5 Transformers and AEC 7A SPEL sump and tank Minor petroleum hydrocarbon impacts to groundwater are unlikely to pose a potential risk to current and future identified receptors unless the area is excavated and appropriate management protocols are not implemented	Future potential risk associated with excavation works can be managed through the implementation of a site management plan following completion of Phase 3 works
Area 3 – Playford buildings Limited assessment to date due to access constraints	Following demolition, soil validation beneath the building footprints
Area 6 – AEC 7B SPEL drain outlets Discharge to mangroves may be contributing to the overall health of the mangrove ecosystem, however a number of factors are considered to be affecting the highly disturbed ecosystem	Inclusion in the future management plan to continue discharge monitoring as well as monitoring of the mangrove ecosystem health
Area 7 – AEC 23A & 23B Fuel storage area Limited assessment to date due to access constraints	Validation following removal of fuel infrastructure
Area 8 – AEC 25 Maintenance shed and wash down bay Petroleum hydrocarbon impacts to soils potentially pose a risk to ecological receptors	Additional tiers of risk assessment to further evaluate potential risks or potential risk mitigation by remediation of the impacted soils
Area 11 – AEC 31B fuel transfer pipeline Limited assessment to date due to access constraints	Validation following removal of fuel infrastructure
Area 12 – AEC 35 Northern store UST Petroleum hydrocarbon impacts to groundwater unlikely to present an unacceptable risk to current and future receptors, unless the subsurface is removed and contact with the impacted soils and groundwater occurs	Validation following the excavation and removal of the UST, dispensing pump, and any other fuel related infrastructure in the area and the impacted soils.
Area 14 – AEC 43B Firefighting area PFOS reported in groundwater at the laboratory LOR	Soil testing to determine if gross impacts to the soils are present from firefighting activities
Area 15 – AEC 44 Fuel pad Petroleum hydrocarbon impacts to soils and groundwater that may pose a potentially unacceptable risk to current workers if the ground is disturbed and to future users and structures if the impacts remain following closure and if strict management protocols are not implemented	Further assessment and/or risk mitigation following removal of the fuel pad and associated infrastructure

Area/AEC	Recommendations
Area 15 – AEC 45 Diesel ASTs Limited assessment to date due to access constraints	Validation following removal of fuel infrastructure
Area 17 – AEC 50A Ash pond Discrepancies in the results of testing conducted by FPP and Coffey in June 2016 from wells around the ash pond	Groundwater sampling to confirm the chemical concentrations
Area 17 – AEC 51E Acid clean pit dump Known material deposited in this dump comprises hydrochloric acid and stabilised cyanide (<1kg)	Further investigation of the acid clean pit

Monitoring wells within areas to be subject to excavation during Phase 3 works are likely to be destroyed through this process. It is recommended that prior to any excavation works commencing, wells likely to be destroyed are decommissioned by a licensed driller and following excavation works, replacement monitoring wells are installed to determine the success of remediation activities undertaken. Any additional delineation wells required can also be installed at this time.

Historical waste dumps were investigated with the extents defined and it is considered that potential risks associated with these areas can be managed through implementation of a site management plan.

Bulk fuel storage areas are to be removed including any bunds as part of the site closure and following removal will be required to be validated along with any building footprints, wash down bays, sumps, tanks etc. if they are removed.

All conclusions and findings presented in this report must be read in accordance with ‘Important information about your Coffey environmental report’ provided in Section 13.

13. Important information about your Coffey Environmental Report

1. Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

2. Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination posed in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

3. Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

4. Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

5. Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

6. Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

7. Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

8. Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

9. Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

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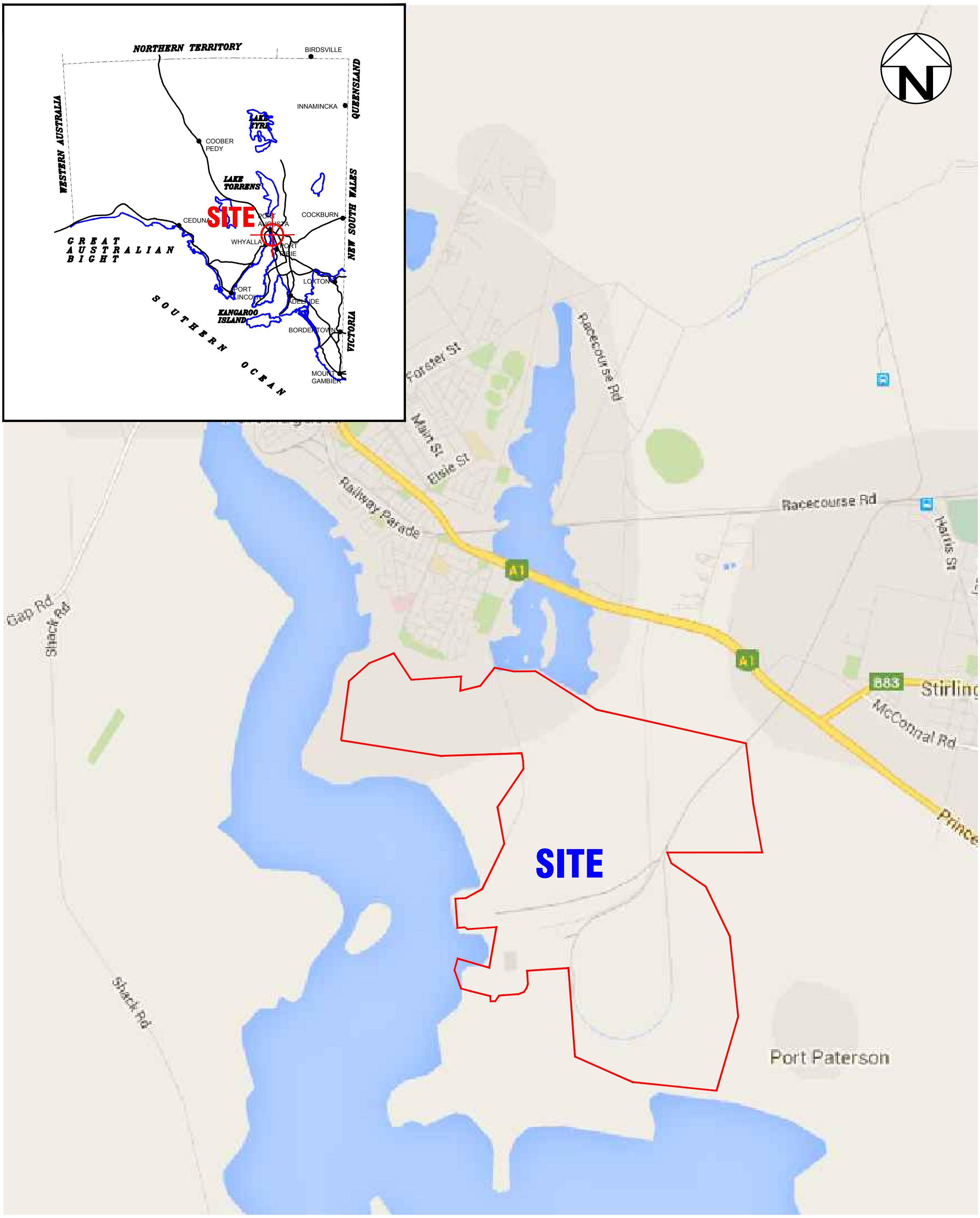
Figures



AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041

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0 0.6 1.2 1.8 2.4 3

SCALE 1:60000 (A3) KILOMETRES

drawn	JO	coffey A TETRA TECH COMPANY	client:	FLINDERS POWER PARTNERSHIP
approved	FM		project:	FLINDERS POWER PARTNERSHIP AUGUSTA POWER STATIONS DSI POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA
date	09/02/17		title:	SITE LOCATION PLAN
scale	AS SHOWN		project no: ENAUKESW01445AD-R01-D01	figure no: FIGURE 1 rev: B
original size	A4			

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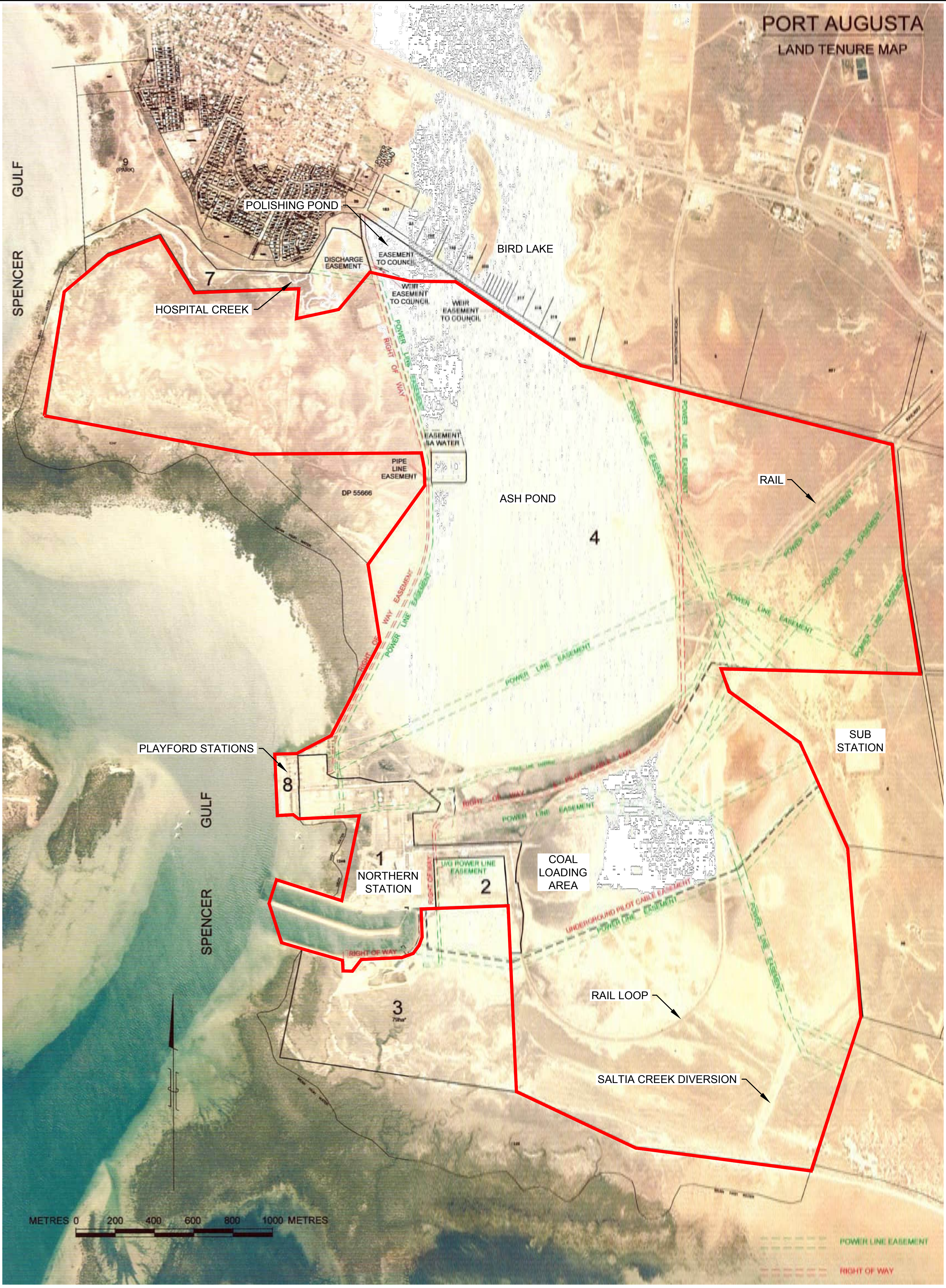

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

LEGEND

APPROXIMATE SITE BOUNDARY

NOTE:
ALL LOCATION ARE APPROXIMATE
DIMENSIONS IN METRES.

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: SITE PLAN

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 2A | rev: B

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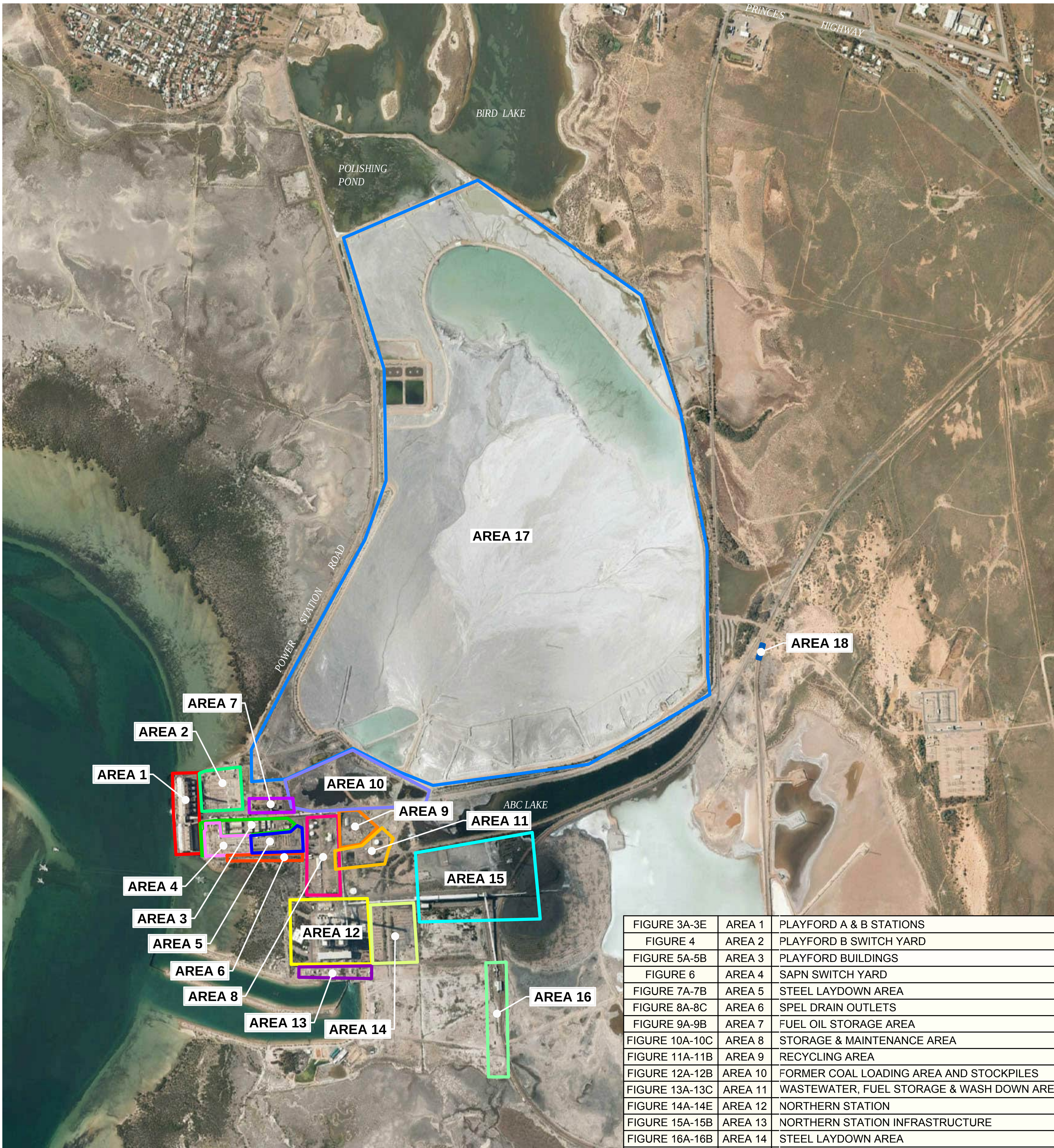

FIGURE 3A-3E	AREA 1	PLAYFORD A & B STATIONS
FIGURE 4	AREA 2	PLAYFORD B SWITCH YARD
FIGURE 5A-5B	AREA 3	PLAYFORD BUILDINGS
FIGURE 6	AREA 4	SAPN SWITCH YARD
FIGURE 7A-7B	AREA 5	STEEL LAYDOWN AREA
FIGURE 8A-8C	AREA 6	SPEL DRAIN OUTLETS
FIGURE 9A-9B	AREA 7	FUEL OIL STORAGE AREA
FIGURE 10A-10C	AREA 8	STORAGE & MAINTENANCE AREA
FIGURE 11A-11B	AREA 9	RECYCLING AREA
FIGURE 12A-12B	AREA 10	FORMER COAL LOADING AREA AND STOCKPILES
FIGURE 13A-13C	AREA 11	WASTEWATER, FUEL STORAGE & WASH DOWN AREA
FIGURE 14A-14E	AREA 12	NORTHERN STATION
FIGURE 15A-15B	AREA 13	NORTHERN STATION INFRASTRUCTURE
FIGURE 16A-16B	AREA 14	STEEL LAYDOWN AREA
FIGURE 17A-17F	AREA 15	COAL LOADING AREA
FIGURE 18A-18C	AREA 16	TRAIN UNLOADING AREA AND WASTE DUMPS
FIGURE 19A-19E	AREA 17	ASH POND
FIGURE 20A-20B	AREA 18	RAIL FILLING AREA

NOTE:
ALL LOCATION ARE APPROXIMATE
DIMENSIONS IN METRES.

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A	ORIGINAL ISSUE	HU	FM	28/11/16
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0 150 300 450 600 750
SCALE 1:15000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: SITE PLAN SHOWING INVESTIGATION AREAS

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 2B | rev: B

PLOT DATE: 9/02/2017 5:29:50 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

LEGEND

	APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
	NEW GROUNDWATER BORE LOCATION (SHALLOW)
	NEW GROUNDWATER BORE LOCATION (DEEP)
	SOIL BORE LOCATION
AEC 1	PLAYFORD STATION OIL LEAK GROUNDWATER PLUME
AEC 2	TRANSFORMER LEAKING
AEC 3	FORMER TRANSFORMER BUNDS AND OPEN SPOON DRAINS
AEC 4	COMPRESSOR SHED
AEC 5	TRANSFORMERS
AEC 6	COOLING WATER INLET
AEC 7A	SPEL TANK AND SUMP

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:29:51 PM

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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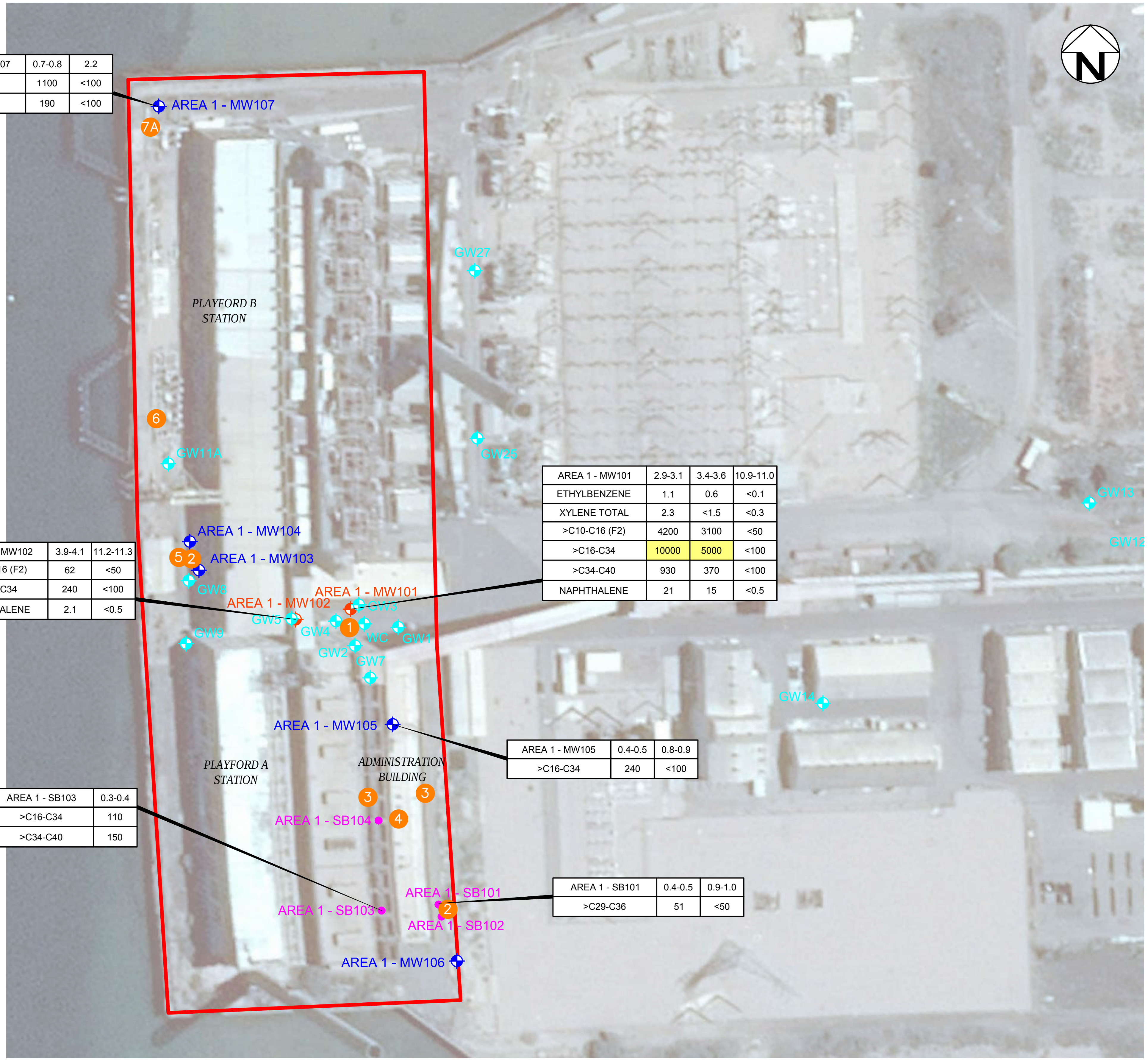
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 1 - PLAYFORD A & B STATIONS (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 3A | rev: B



AREA 1 - MW107	0.7-0.8	2.2
>C16-C34	1100	<100
>C34-C40	190	<100

AREA 1 - MW102	3.9-4.1	11.2-11.3
>C10-C16 (F2)	62	<50
>C16-C34	240	<100
NAPHTHALENE	2.1	<0.5

AREA 1 - MW101	2.9-3.1	3.4-3.6	10.9-11.0
ETHYLBENZENE	1.1	0.6	<0.1
XYLENE TOTAL	2.3	<1.5	<0.3
>C10-C16 (F2)	4200	3100	<50
>C16-C34	10000	5000	<100
>C34-C40	930	370	<100
NAPHTHALENE	21	15	<0.5

AREA 1 - MW105	0.4-0.5	0.8-0.9
>C16-C34	240	<100

AREA 1 - SB103	0.3-0.4
>C16-C34	110
>C34-C40	150

AREA 1 - SB101	0.4-0.5	0.9-1.0
>C29-C36	51	<50

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION (SHALLOW)
- NEW GROUNDWATER BORE LOCATION (DEEP)
- SOIL BORE LOCATION

AEC 1 PLAYFORD STATION OIL LEAK GROUNDWATER PLUME
AEC 2 TRANSFORMER LEAKING
AEC 3 FORMER TRANSFORMER BUNDS AND OPEN SPOON DRAINS
AEC 4 COMPRESSOR SHED
AEC 5 TRANSFORMERS
AEC 6 COOLING WATER INLET
AEC 7A SPEL TANK AND SUMP

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

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revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES 1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 1 - PLAYFORD A & B STATIONS**
SOIL ANALYTICAL RESULTS PLAN (31 MAY - 9 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 3B | rev: B

DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG
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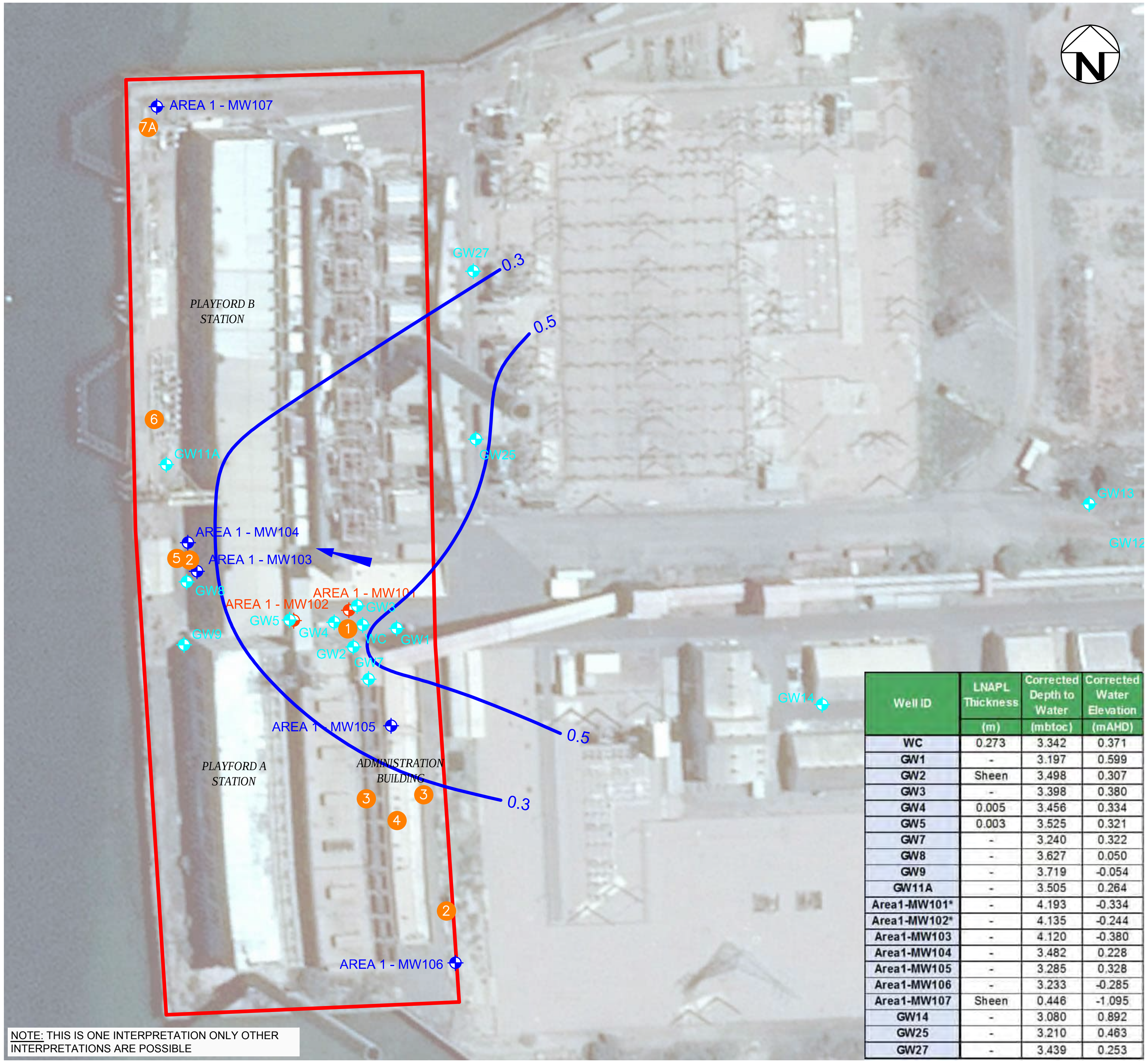

Well ID	LNAPL Thickness (m)	Corrected Depth to Water (mbtoc)	Corrected Water Elevation (mAHD)
WC	0.273	3.342	0.371
GW1	-	3.197	0.599
GW2	Sheen	3.498	0.307
GW3	-	3.398	0.380
GW4	0.005	3.456	0.334
GW5	0.003	3.525	0.321
GW7	-	3.240	0.322
GW8	-	3.627	0.050
GW9	-	3.719	-0.054
GW11A	-	3.505	0.264
Area1-MW101*	-	4.193	-0.334
Area1-MW102*	-	4.135	-0.244
Area1-MW103	-	4.120	-0.380
Area1-MW104	-	3.482	0.228
Area1-MW105	-	3.285	0.328
Area1-MW106	-	3.233	-0.285
Area1-MW107	Sheen	0.446	-1.095
GW14	-	3.080	0.892
GW25	-	3.210	0.463
GW27	-	3.439	0.253

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION (SHALLOW)
- NEW GROUNDWATER BORE LOCATION (DEEP)

AEC 1 PLAYFORD STATION OIL LEAK GROUNDWATER PLUME
AEC 2 TRANSFORMER LEAKING
AEC 3 FORMER TRANSFORMER BUNDS AND OPEN SPOON DRAINS
AEC 4 COMPRESSOR SHED
AEC 5 TRANSFORMERS
AEC 6 COOLING WATER INLET
AEC 7A SPEL TANK AND SUMP

INFERRED GROUNDWATER FLOW DIRECTION
1.550 INFERRED GROUNDWATER ELEVATION CONTOUR (mAHD)

NOTE: *DEEP WELLS NOT INCLUDED IN GROUNDWATER ELEVATION CONTOURS

INFERRED HYDROGEOLOGICAL INFORMATION

HYDRAULIC GRADIENT (i)	= 0.005 WEST NORTH WEST
HYDRAULIC CONDUCTIVITY (K) (COFFEY 2016)	= 0.05 to 0.13m/day
SEEPAGE VELOCITY	= 0.46 to 1.2 m/year

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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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A TETRA TECH COMPANY

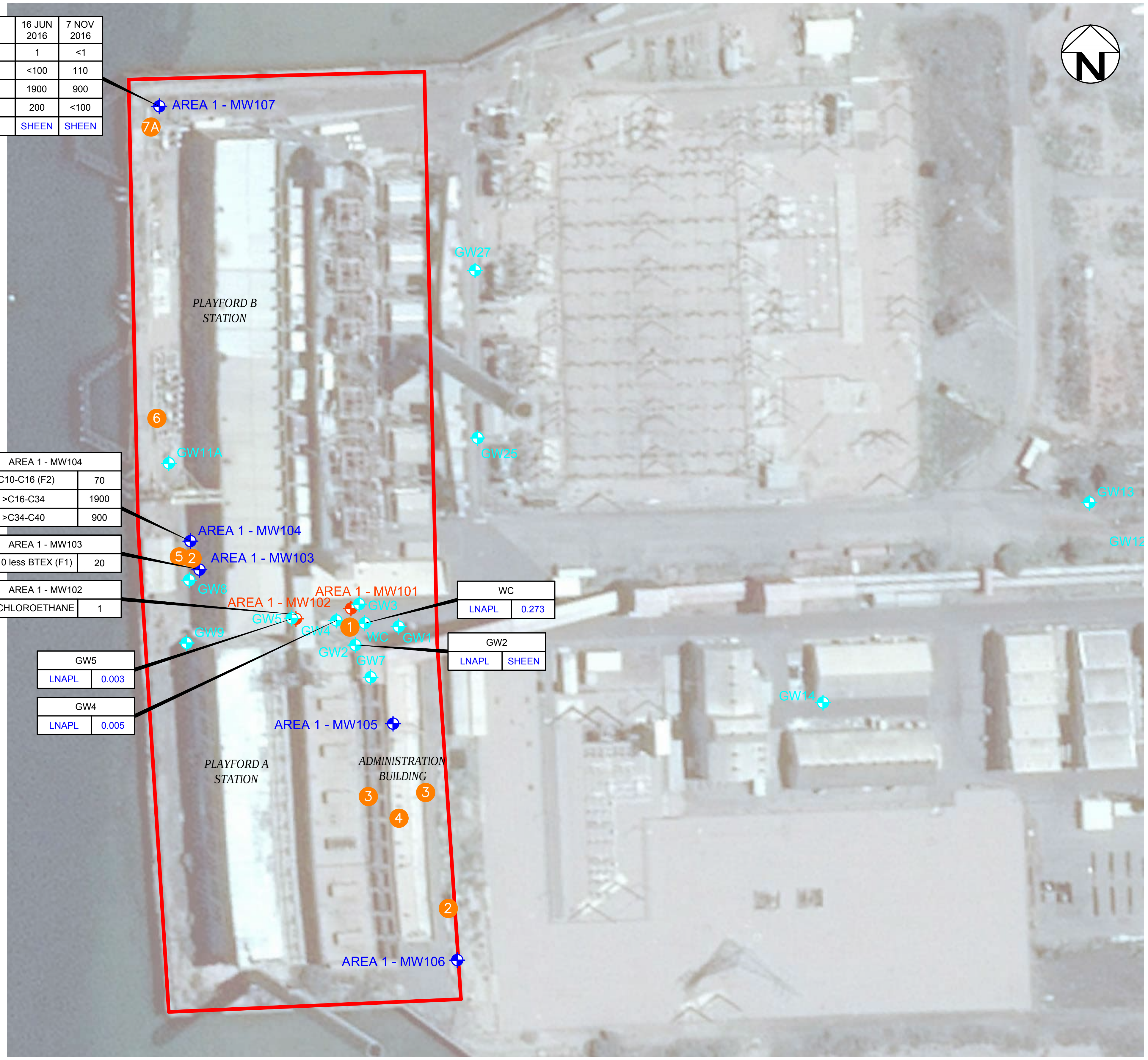
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: AREA 1 - PLAYFORD A & B STATIONS
GROUNDWATER GRADIENT PLAN AREAS 1, 2 AND 3 (15-17 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 3C | rev: B

PLOT DATE: 9/02/2017 5:29:57 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



AREA 1 - MW107	16 JUN 2016	7 NOV 2016
TOLUENE	1	<1
>C10-C16 (F2)	<100	110
>C16-C34	1900	900
>C34-C40	200	<100
LNAPL	SHEEN	SHEEN

AREA 1 - MW104	
>C10-C16 (F2)	70
>C16-C34	1900
>C34-C40	900

AREA 1 - MW103	
C6-C10 less BTEX (F1)	20

AREA 1 - MW102	
1,1-DICHLOROETHANE	1

GW5	
LNAPL	0.003

GW4	
LNAPL	0.005

WC	
LNAPL	0.273

GW2	
LNAPL	SHEEN

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION (SHALLOW)
- NEW GROUNDWATER BORE LOCATION (DEEP)

AEC 1 PLAYFORD STATION OIL LEAK GROUNDWATER PLUME
AEC 2 TRANSFORMER LEAKING
AEC 3 FORMER TRANSFORMER BUNDS AND OPEN SPOON DRAINS
AEC 4 COMPRESSOR SHED
AEC 5 TRANSFORMERS
AEC 6 COOLING WATER INLET
AEC 7A SPEL TANK AND SUMP

ANALYTE	(µg/L)

LNAPL	(m)

(µg/L) MICROGRAMS PER LITRE
12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA
LNAPL LIGHT NON-AQUEOUS PHASE LIQUID THICKNESS (METRES)

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

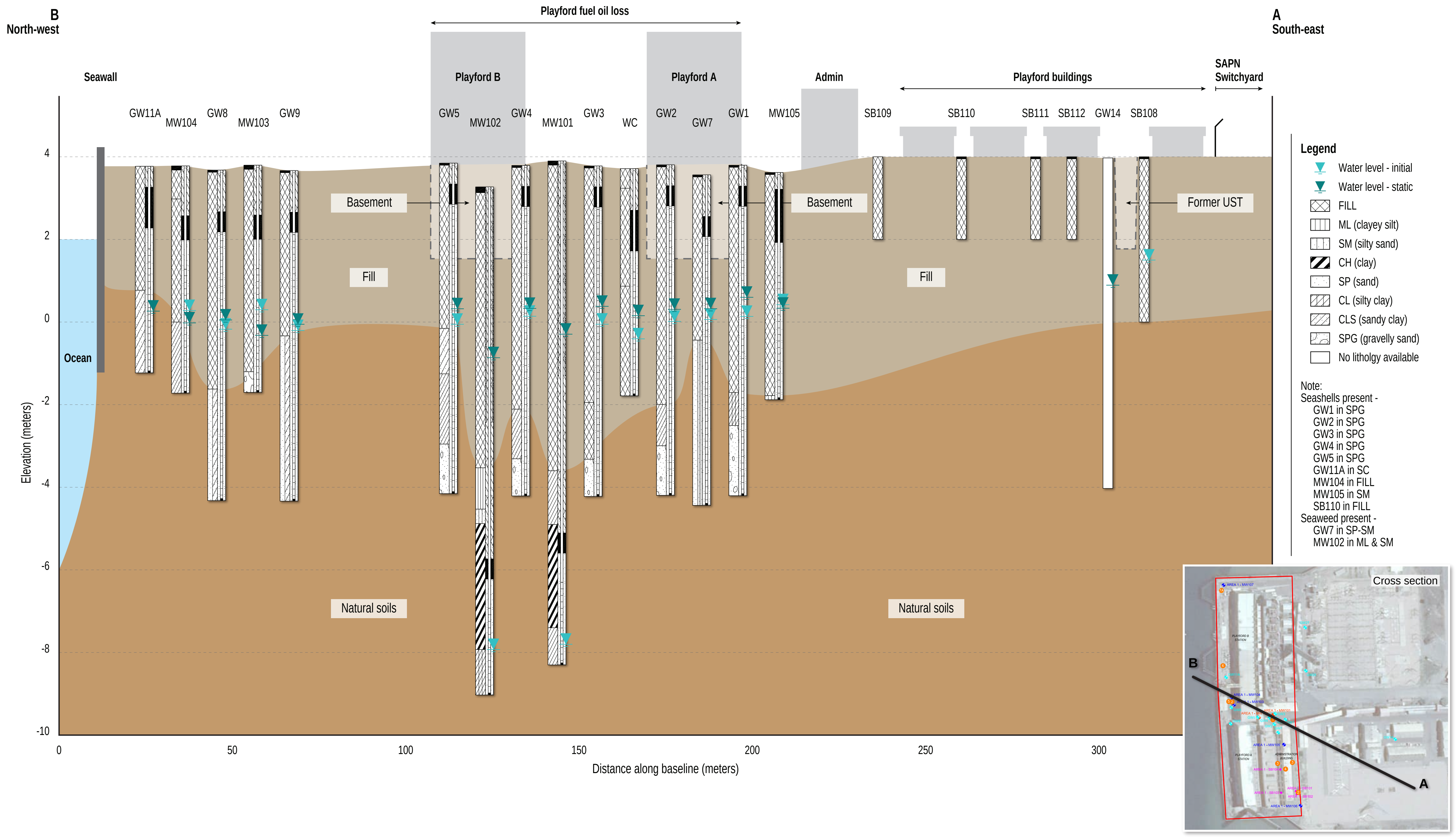
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 1 - PLAYFORD A & B STATIONS GROUNDWATER ANALYTICAL RESULTS PLAN (15-16 JUNE & 7 NOVEMBER 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 3D | rev: B



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B	REVISION 1	JO	FM	14.02.17

revision

drawn	JO
approved	FM
date	14.02.2017
scale	NOT TO SCALE
original size	A3

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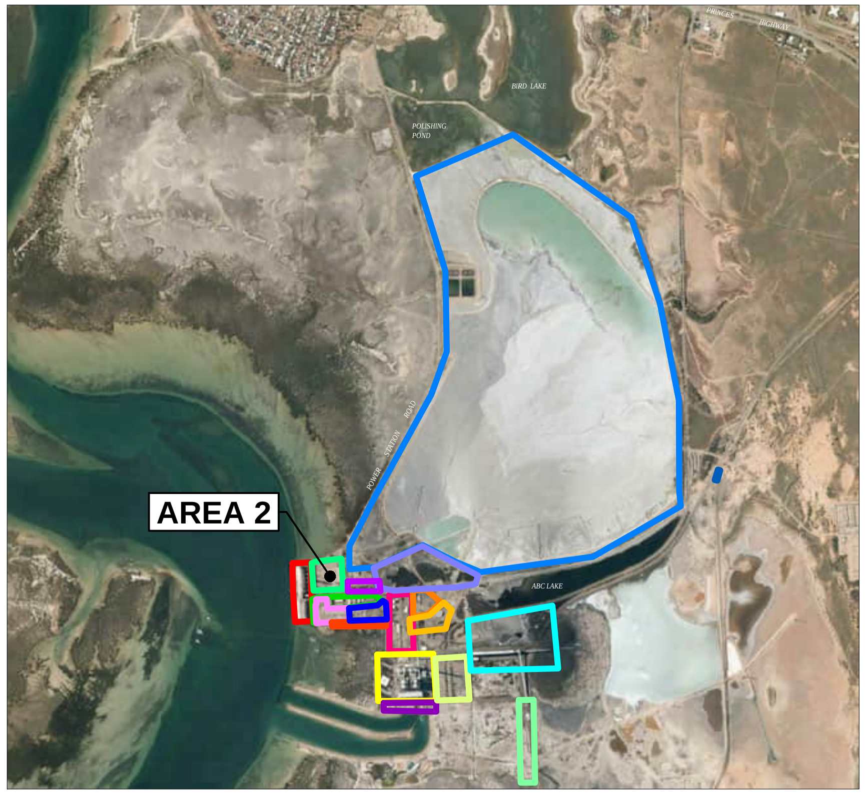
client:	FLINDERS POWER PARTNERSHIP
project:	FLINDERS POWER PARTNERSHIP AUGUSTA POWER STATIONS DSI POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA
title:	AREA 1 - PLAYFORD A & B STATIONS GEOLOGICAL CROSS SECTION
project no:	ENAUKESW01445AD-R01-D01
figure no:	FIGURE 3E
rev:	B



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SOIL BORE LOCATION

AEC	7B	SPEL DRAIN
AEC	8	PLAYFORD B SWITCH YARD
AEC	9	COAL / ASH WORKSHOP
AEC	10	ASH POND SUMP
DTSWL		GAUGED DEPTH TO WATER (METRES)
SWL mAHD		GROUNDWATER ELEVATION (mAHD)

NOTE: SOIL AND GROUNDWATER ANALYTICAL RESULTS FROM AREA 2 ARE REPORTED BELOW BACKGROUND LEVELS

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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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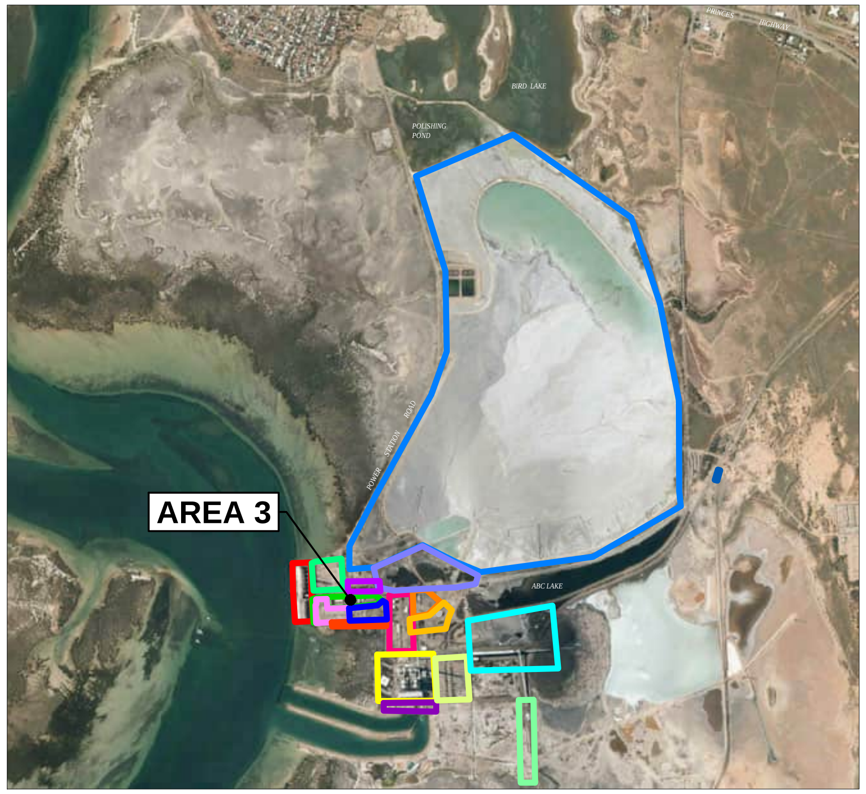
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 2 - PLAYFORD B SWITCH YARD (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 4 | rev: B



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SOIL BORE LOCATION

AEC	11	SHEET METAL AND BOILER MAINTENANCE SHED
AEC	12	BOILERMARKERS WORKSHOP
AEC	3A	FIBREGLASS WORKSHOP
AEC	3B	FIBREGLASS WORKSHOP WASH DOWN AREA
AEC	14	FORMER UST LOCATION
AEC	15	FABRICATION, FITTING AND MAINTENANCE SHEDS
AEC	16	OLD TRAIN SERVICE SHED
AEC	17	COAL LINE MAINTENANCE SHED
AEC	18	GRIT BLASTING AND SPRAY PAINTING SHED

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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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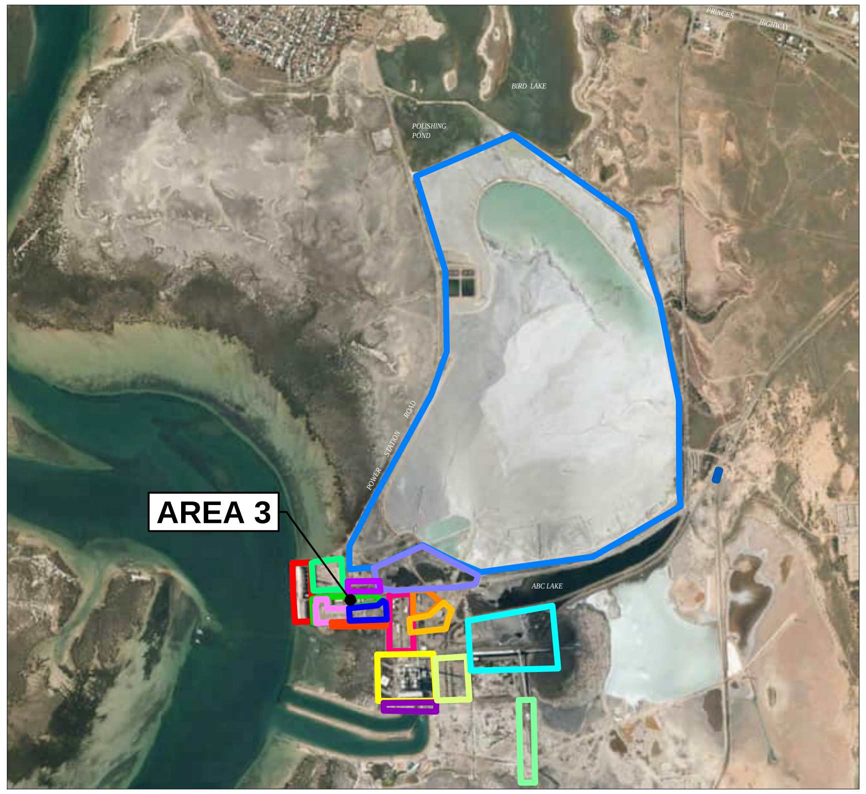
A TETRA TECH COMPANY

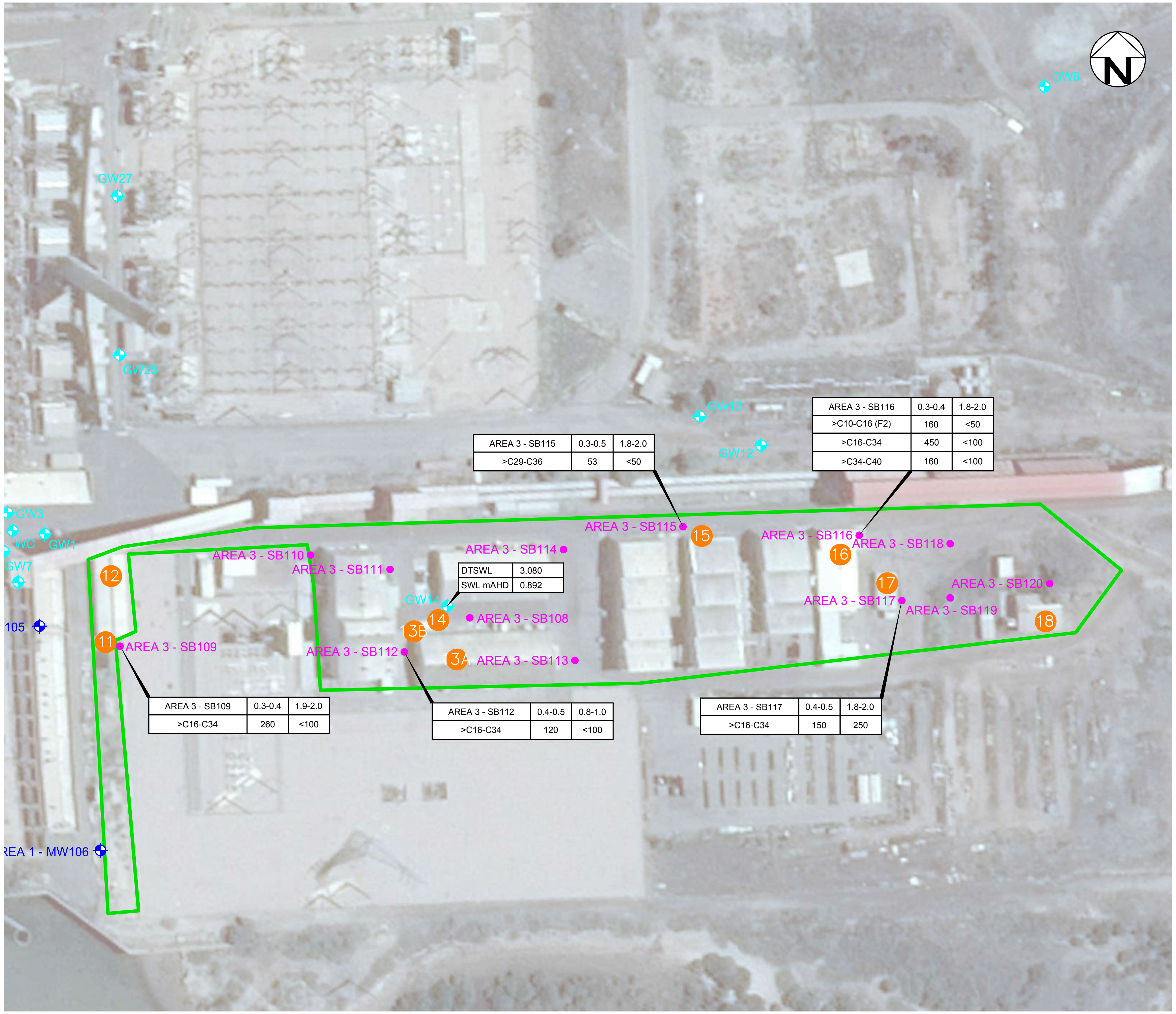
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 3 - PLAYFORD BUILDINGS (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01
figure no: FIGURE 5A
rev: B





AREA 3 - SB115	0.3-0.5	1.8-2.0
>C29-C36	53	<50

AREA 3 - SB116	0.3-0.4	1.8-2.0
>C10-C16 (F2)	160	<50
>C16-C34	450	<100
>C34-C40	160	<100

DTSWL	3.080
SWL mAHD	0.892

AREA 3 - SB109	0.3-0.4	1.9-2.0
>C16-C34	260	<100

AREA 3 - SB112	0.4-0.5	0.8-1.0
>C16-C34	120	<100

AREA 3 - SB117	0.4-0.5	1.8-2.0
>C16-C34	150	250

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SOIL BORE LOCATION

AEC 11 SHEET METAL AND BOILER MAINTENANCE SHED
AEC 12 BOILERMARKERS WORKSHOP
AEC 3A FIBREGLASS WORKSHOP
AEC 3B FIBREGLASS WORKSHOP WASH DOWN AREA
AEC 14 FORMER UST LOCATION
AEC 15 FABRICATION, FITTING AND MAINTENANCE SHEDS
AEC 16 OLD TRAIN SERVICE SHED
AEC 17 COAL LINE MAINTENANCE SHED
AEC 18 GRIT BLASTING AND SPRAY PAINTING SHED

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM
12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA
DTSWL GAUGED DEPTH TO WATER (METRES)
SWL mAHD GROUNDWATER ELEVATION (mAHD)

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

PLOT DATE: 9/02/2017 5:30:02 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 3 - PLAYFORD BUILDINGS**
SOIL ANALYTICAL RESULTS PLAN (16 & 17 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 5B | rev: B

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- AEC 20 SAPN SWITCH YARD

NOTE: NO ASSESSMENT WORKS REQUIRED IN THIS AREA

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:30:04 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM\AUIDATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 4 - SAPN SWITCH YARD (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 6 | rev: B

PLOT DATE: 9/02/2017 5:30:06 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- AEC 21 STEEL LAYDOWN AREA

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 5 - STEEL LAYDOWN AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 7A | rev: B

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- AEC 21 STEEL LAYDOWN AREA

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 5 - STEEL LAYDOWN AREA**
SOIL ANALYTICAL RESULTS PLAN (29 & 30 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 7B | rev: B

PLOT DATE: 9/02/2017 5:30:07 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM\AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SEDIMENT SAMPLE LOCATION
- BACKGROUND SEDIMENT SAMPLE LOCATION
- SPEL DRAIN
- AEC 7B SPEL DRAIN
- AEC 22 GENERAL WASTE DUMP

NOTE: ASSESSMENT NOT REQUIRED FOR AEC 22

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 6 - SPEL DRAIN OUTLETS (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 8A | rev: B

PLOT DATE: 9/02/2017 5:30:09 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SEDIMENT SAMPLE LOCATION
- BACKGROUND SEDIMENT SAMPLE LOCATION
- SPEL DRAIN
- AEC 7B SPEL DRAIN
- AEC 22 GENERAL WASTE DUMP

ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

\- NOT ANALYSED

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041

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revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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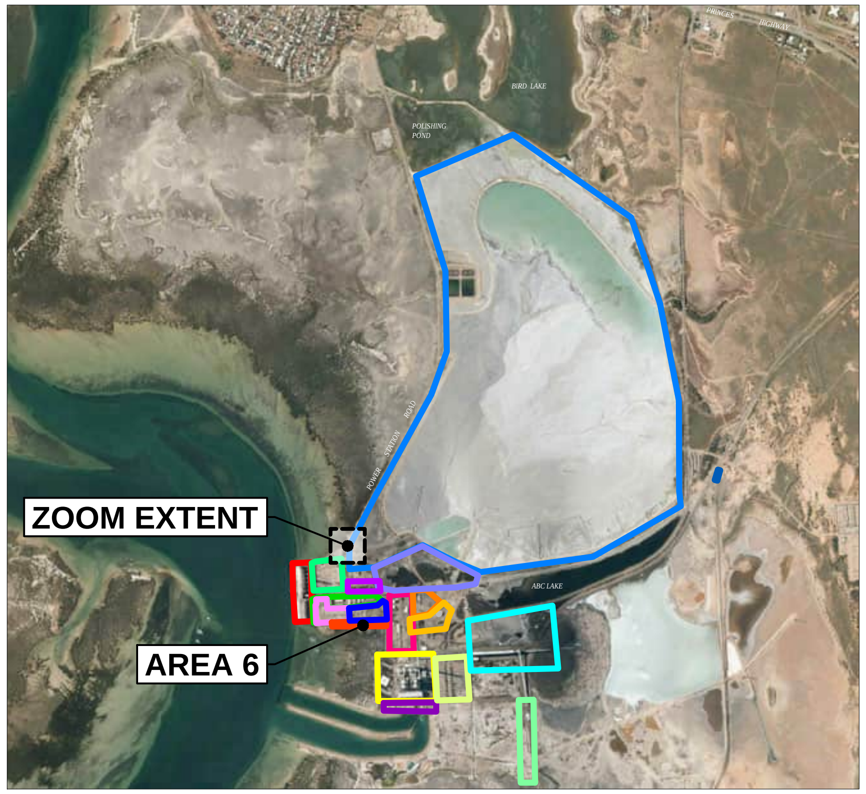
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 6 - SPEL DRAIN OUTLETS**
SEDIMENT ANALYTICAL RESULTS PLAN (17 JUNE & 8-9 NOVEMBER 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 8B | rev: B



LEGEND

BACKGROUND SEDIMENT SAMPLE LOCATION

ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 10 20 30 40 50
SCALE 1:1000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 6 - SPEL DRAIN OUTLETS - BACKGROUND SEDIMENT LOCATION AND ANALYTICAL RESULTS PLAN (17 JUNE 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 8C | rev: B

PLOT DATE: 9/02/2017 5:30:13 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

NOTE:
ALL LOCATION ARE APPROXIMATE
DIMENSIONS IN METERES.

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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0 150 300 450 600 750
SCALE 1:15000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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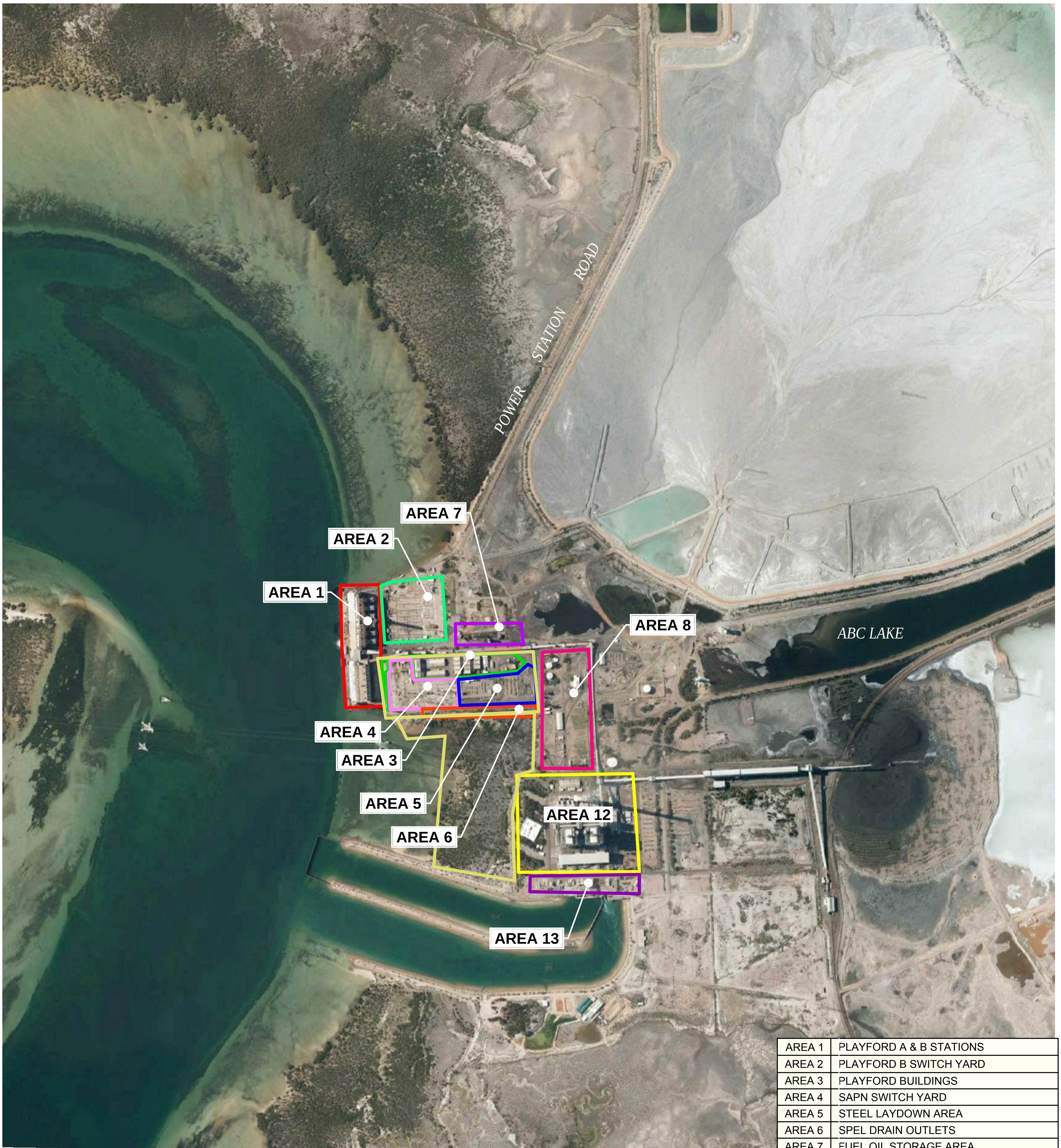
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: MANGROVE AREA OF INVESTIGATION

project no: ENAUKESW01445AD-R01-D01
figure no: FIGURE 8D
rev: B

PLOT DATE: 9/02/2017 5:30:14 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM\AUDATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



AREA 1	PLAYFORD A & B STATIONS
AREA 2	PLAYFORD B SWITCH YARD
AREA 3	PLAYFORD BUILDINGS
AREA 4	SAPN SWITCH YARD
AREA 5	STEEL LAYDOWN AREA
AREA 6	SPEL DRAIN OUTLETS
AREA 7	FUEL OIL STORAGE AREA
AREA 8	STORAGE & MAINTENANCE AREA
AREA 12	NORTHERN STATION
AREA 13	NORTHERN STATION INFRASTRUCTURE

NOTE:
ALL LOCATION ARE APPROXIMATE
DIMENSIONS IN METERES.

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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0 100 200 300 400 500
SCALE 1:10000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: POTENTIAL SOURCE AREAS AND PHYSICAL ASPECTS

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 8E | rev: B

PLOT DATE: 9/02/2017 5:30:16 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

NOTE:
ALL LOCATION ARE APPROXIMATE
DIMENSIONS IN METERES.

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

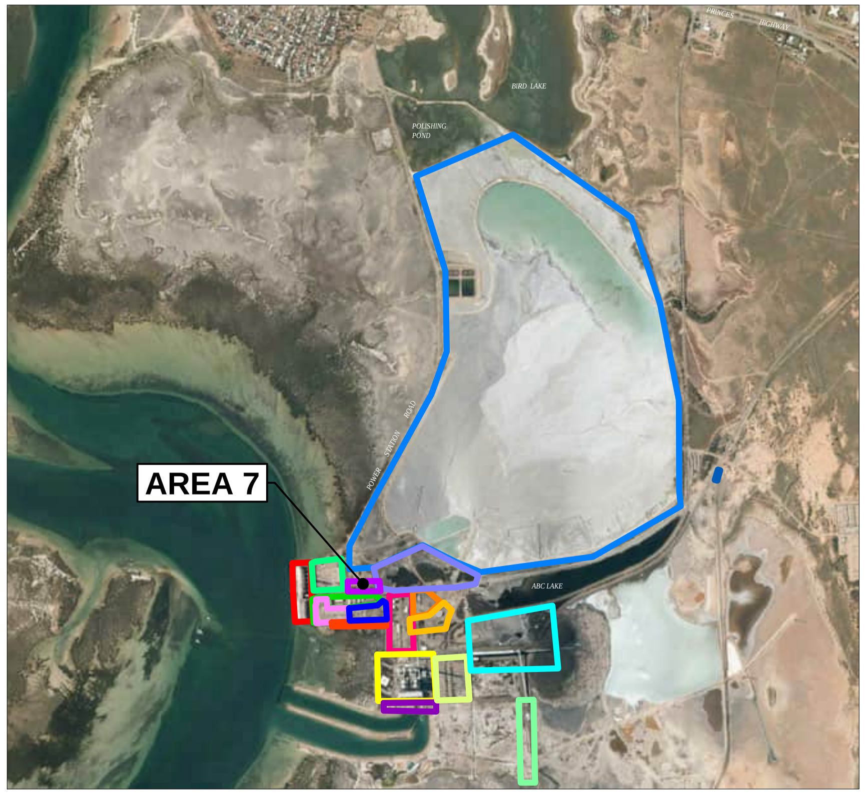
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: FLORA AND FAUNA ASSESSMENT ZONES - ECOLOGICAL REPORT (2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 8F | rev: B

PLOT DATE: 9/02/2017 5:30:18 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- AEC 23A FUEL OIL STORAGE
- AEC 23B FUEL OIL TEMPORARY BUND AREA

NOTE: SOIL ANALYTICAL RESULTS REPORTED BELOW THE BACKGROUND LEVELS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:30:19 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES 1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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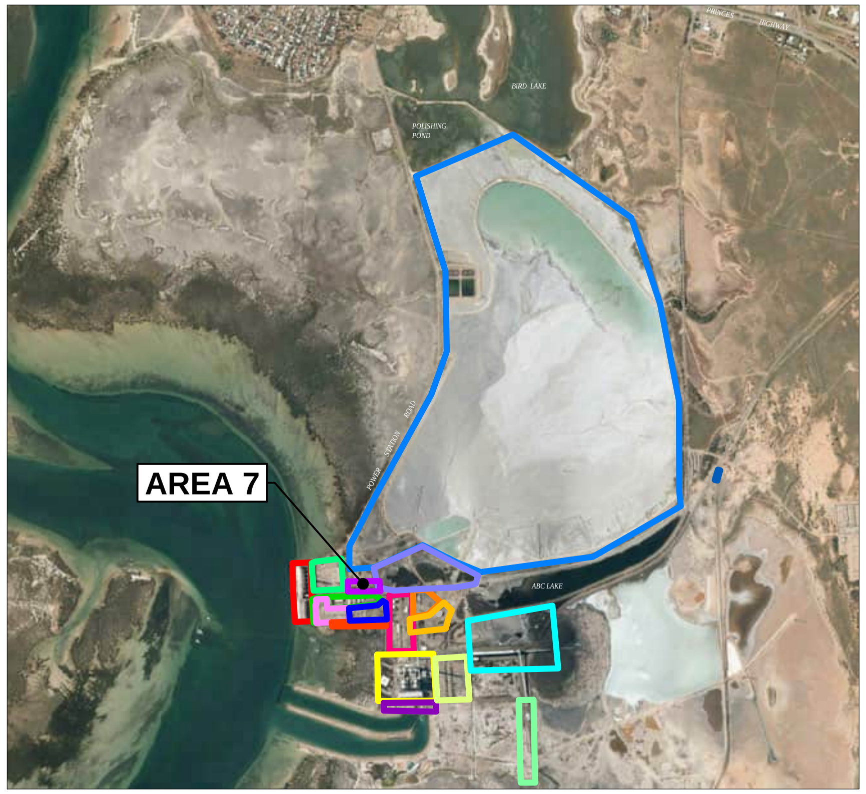
A TETRA TECH COMPANY

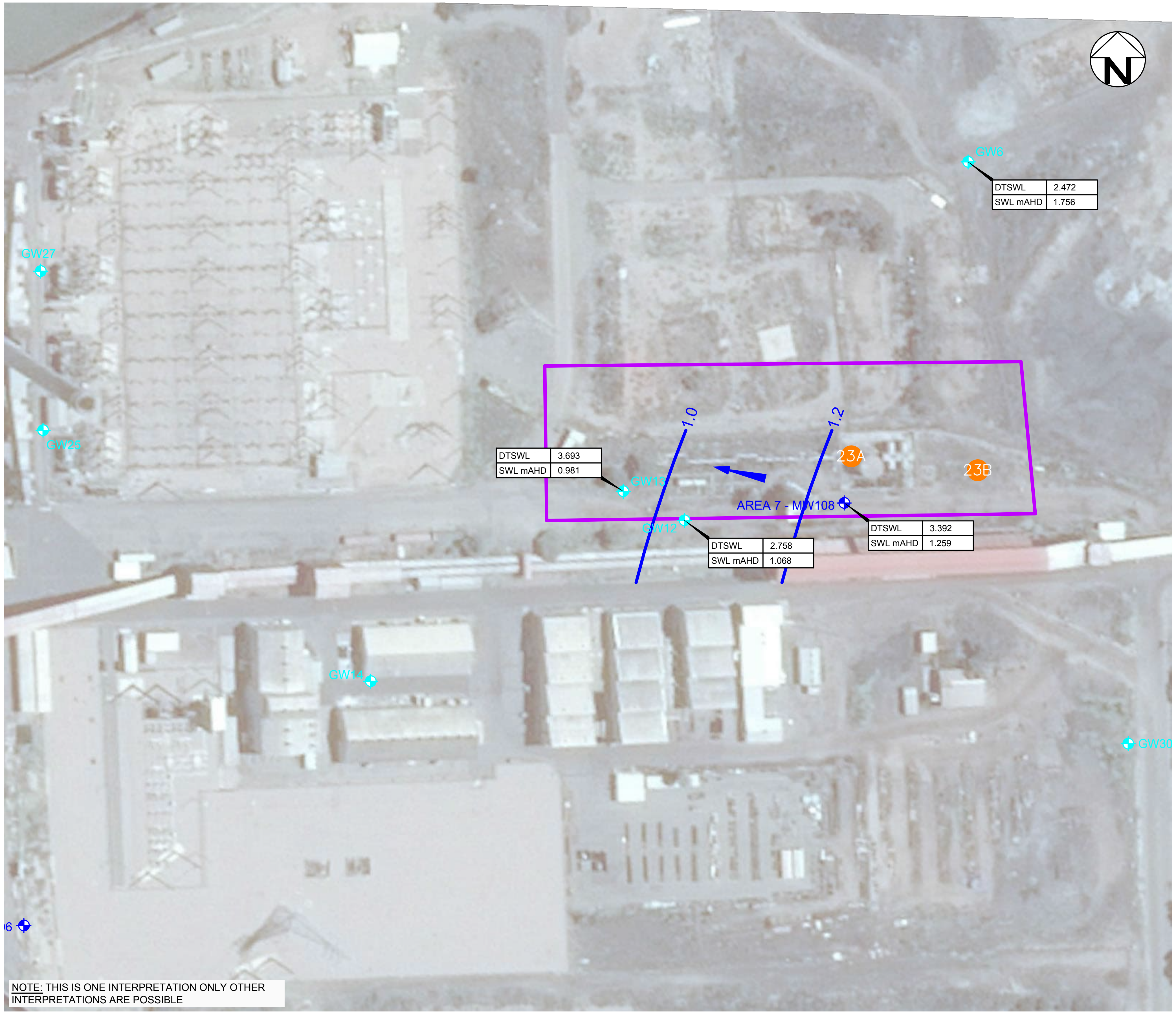
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 7 - FUEL OIL STORAGE AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 9A | rev: B





LEGEND

APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)

NEW GROUNDWATER BORE LOCATION

AEC 23A FUEL OIL STORAGE

AEC 23B FUEL OIL TEMPORARY BUND AREA

INFERRED GROUNDWATER FLOW DIRECTION

1.550 INFERRED GROUNDWATER ELEVATION CONTOUR (mAHD)

DTSWL GAUGED DEPTH TO WATER (METRES)

SWL mAHD GROUNDWATER ELEVATION (mAHD)

INFERRED HYDROGEOLOGICAL INFORMATION

HYDRAULIC GRADIENT (i)	= 0.004 WEST NORTH WEST
HYDRAULIC CONDUCTIVITY (K) (COFFEY 2016)	= 0.05 to 0.13m/day
SEEPAGE VELOCITY	= 0.37 to 0.95m/year

NOTE: GROUNDWATER ANALYTICAL RESULTS REPORTED BELOW THE BACKGROUND LEVELS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:30:21 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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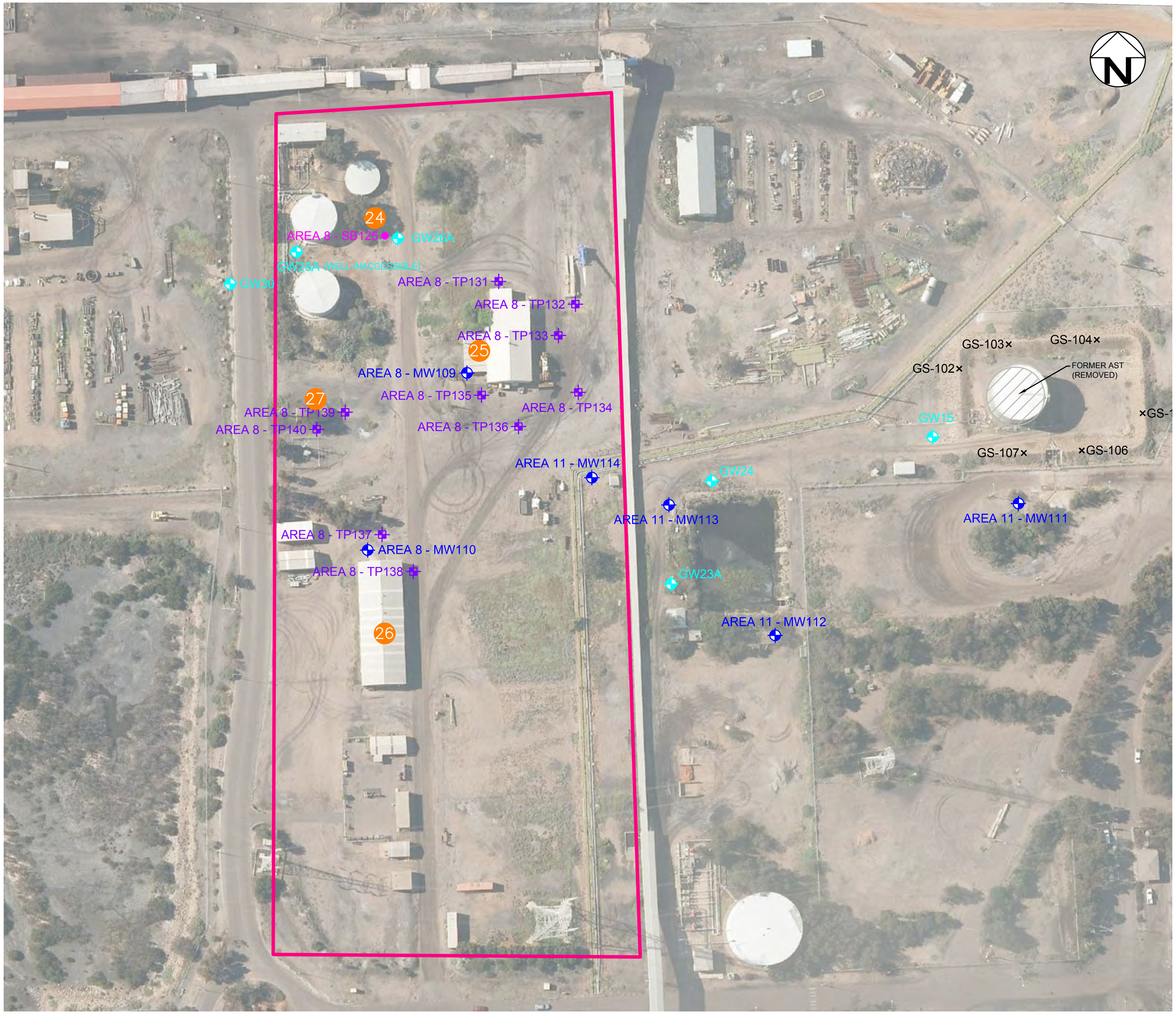
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 7 - FUEL OIL STORAGE AREA**
GROUNDWATER GRADIENT PLAN (27&28 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 9B | rev: B



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- SOIL BORE LOCATION

AEC 24 FORMER UST LOCATION

AEC 25 MAINTENANCE SHED & WASH DOWN BAY

AEC 26 FORMER COAL LINE MAINTENANCE WORKSHOP

AEC 27 FORMER PCB STORAGE SHED

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:30:23 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

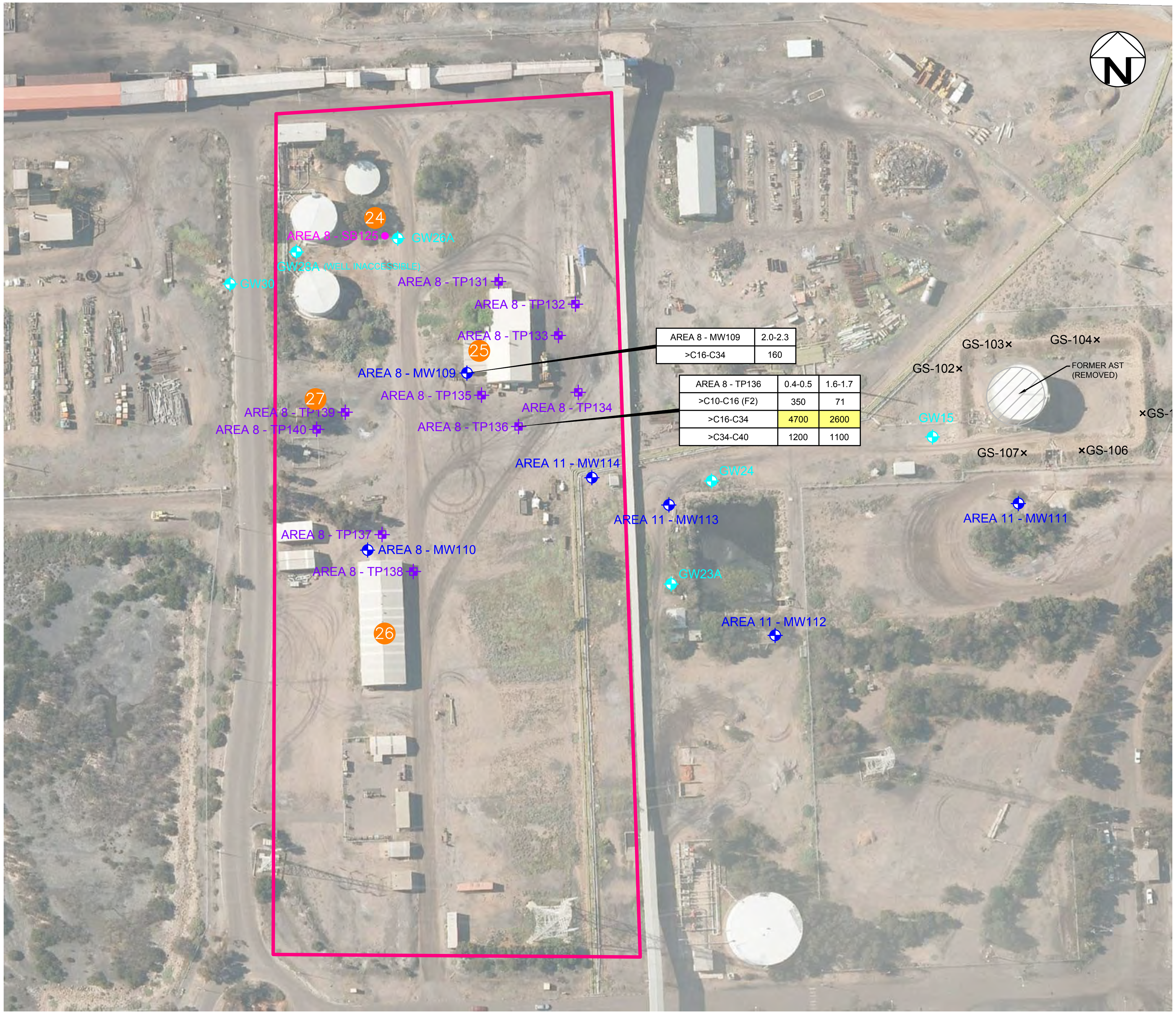
project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 8 - STORAGE AND MAINTENANCE AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 10A | rev: B

DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

PLOT DATE: 9/02/2017 5:30:24 PM



AREA 8 - MW109	2.0-2.3
>C16-C34	160

AREA 8 - TP136	0.4-0.5	1.6-1.7
>C10-C16 (F2)	350	71
>C16-C34	4700	2600
>C34-C40	1200	1100

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- SOIL BORE LOCATION

- AEC 24 FORMER UST LOCATION
- AEC 25 MAINTENANCE SHED & WASH DOWN BAY
- AEC 26 FORMER COAL LINE MAINTENANCE WORKSHOP
- AEC 27 FORMER PCB STORAGE SHED

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES 1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

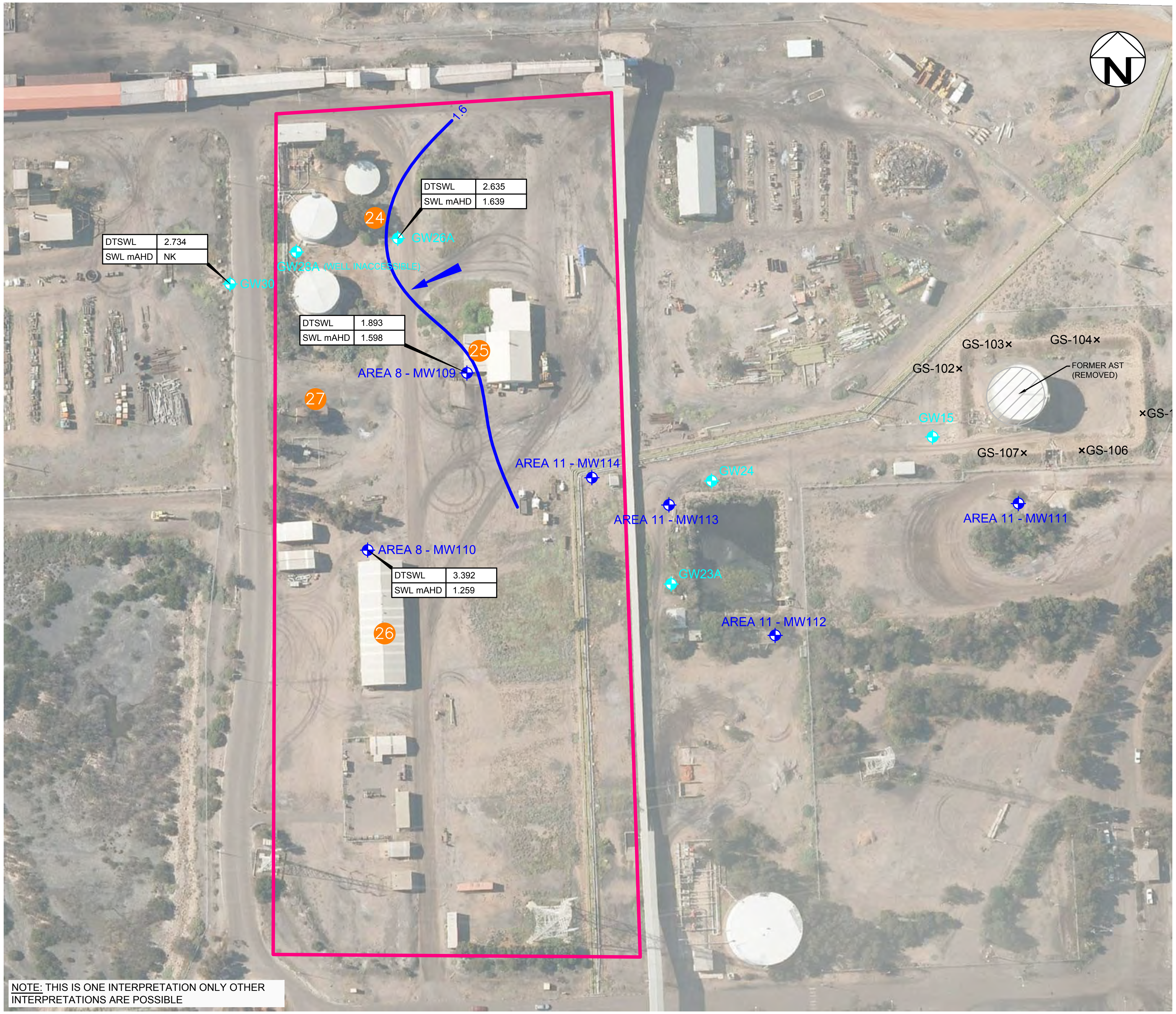
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 8 - STORAGE AND MAINTENANCE AREA
SOIL ANALYTICAL RESULTS PLAN (9 JUNE & 4 JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 10B | rev: B



LEGEND

APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)

NEW GROUNDWATER BORE LOCATION

AEC 24 FORMER UST LOCATION

AEC 25 MAINTENANCE SHED & WASH DOWN BAY

AEC 26 FORMER COAL LINE MAINTENANCE WORKSHOP

AEC 27 FORMER PCB STORAGE SHED

INFERRED GROUNDWATER FLOW DIRECTION

1.550 INFERRED GROUNDWATER ELEVATION CONTOUR (mAHD)

DTSWL GAUGED DEPTH TO WATER (mBTOC)

SWL mAHD GROUNDWATER ELEVATION (mAHD)

INFERRED HYDROGEOLOGICAL INFORMATION

HYDRAULIC GRADIENT (i)	= 0.003 WEST SOUTH WEST
HYDRAULIC CONDUCTIVITY (K) (COFFEY 2016)	= 0.05 to 0.13m/day
SEEPAGE VELOCITY	= 0.3 to 0.7m/year

NOTE: GROUNDWATER ANALYTICAL RESULTS REPORTED BELOW THE BACKGROUND LEVELS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:30:26 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

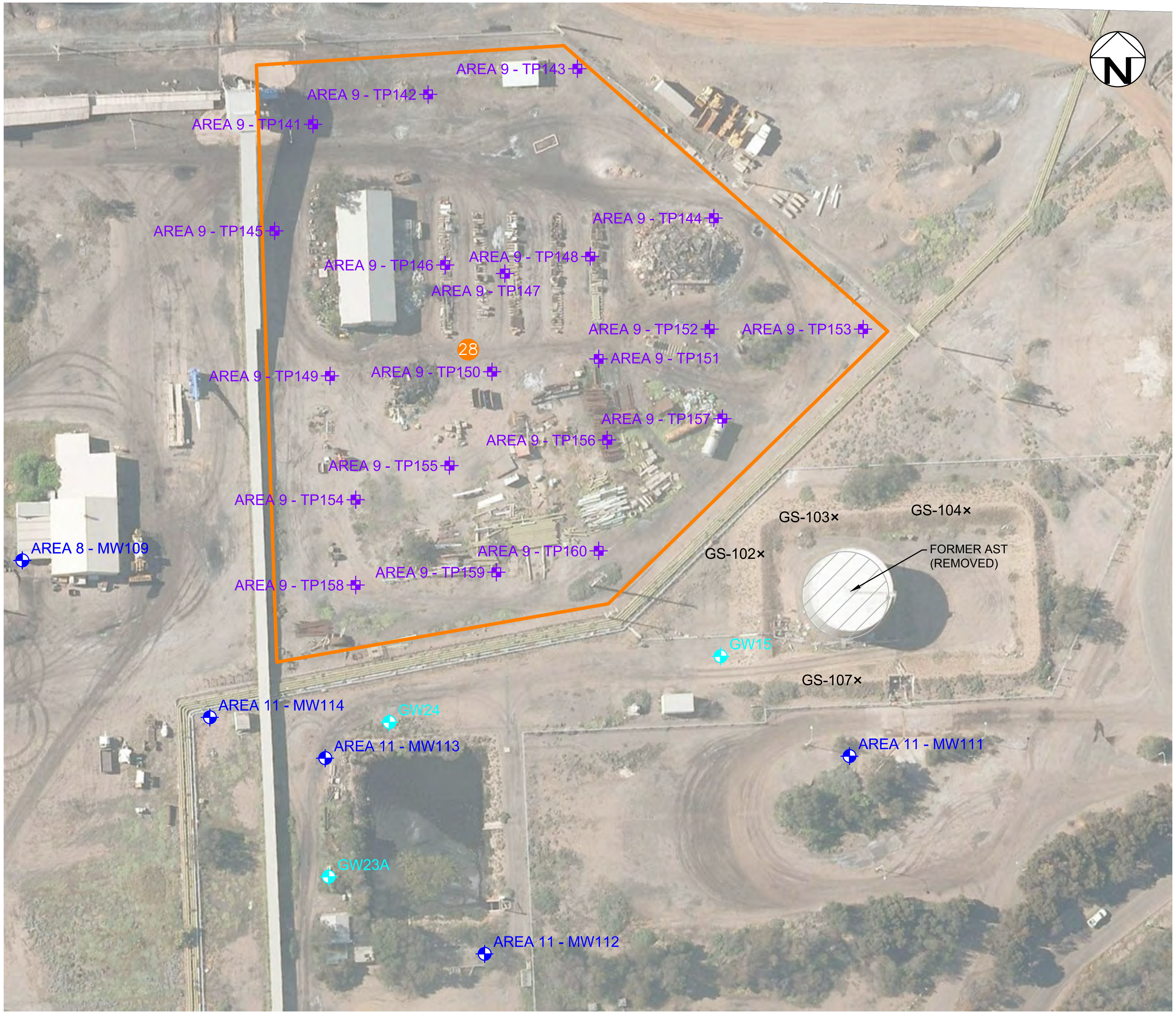
NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client:	FLINDERS POWER PARTNERSHIP
project:	FLINDERS POWER PARTNERSHIP AUGUSTA POWER STATIONS DSI POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA
title:	**AREA 8 - STORAGE AND MAINTENANCE AREA GROUNDWATER GRADIENT PLAN (27 JUNE 2016)**
project no:	ENAUKESW01445AD-R01-D01
figure no:	FIGURE 10C
rev:	B



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- AEC 28 RECYCLING AREA

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

PLOT DATE: 9/02/2017 5:30:29 PM

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 10 20 30 40 50 METRES 1:1000 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: AREA 9 - RECYCLING AREA (MAY-JULY 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 11A | rev: B

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- AEC 28 RECYCLING AREA

DEPTH	(mBGS)
ANALYTE	(mg/kg)

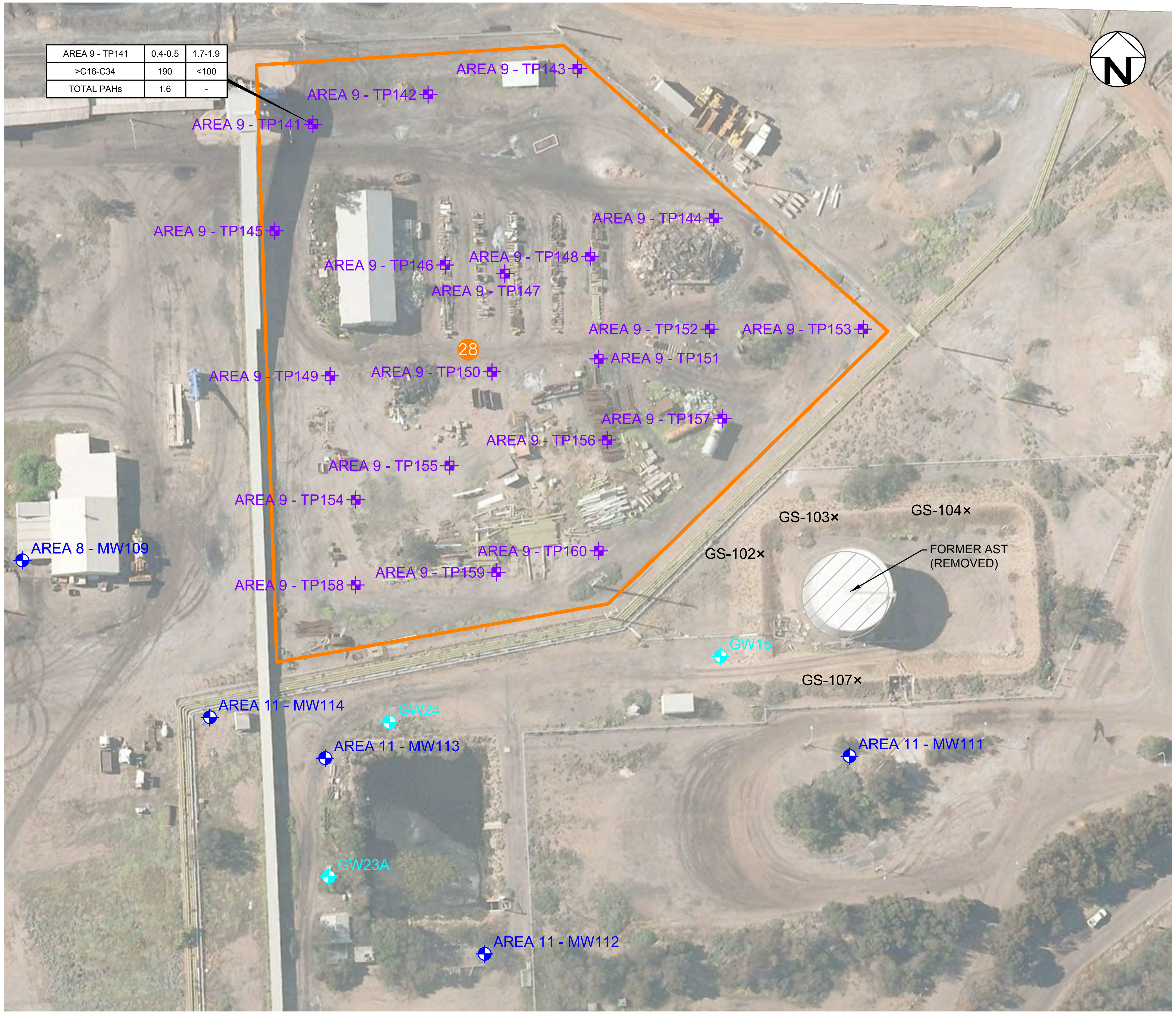
mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

- NOT ANALYSED

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE



AREA 9 - TP141	0.4-0.5	1.7-1.9
>C16-C34	190	<100
TOTAL PAHs	1.6	-

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 10 20 30 40 50
SCALE 1:1000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

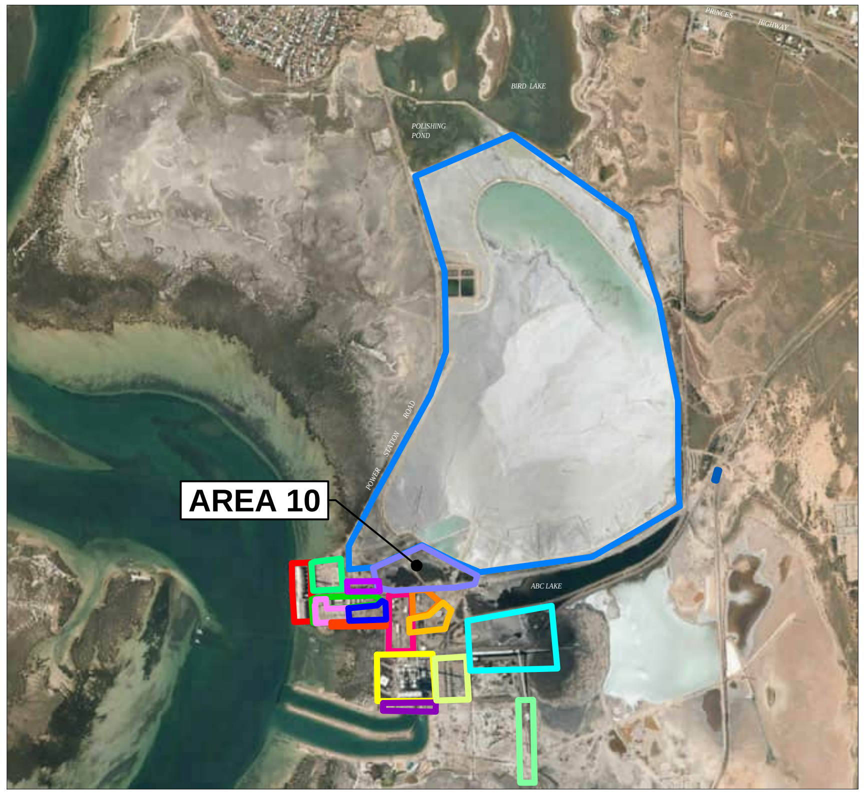
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 9 - RECYCLING AREA**
SOIL ANALYTICAL RESULTS PLAN (5 JULY 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 11B | rev: B

PLOT DATE: 9/02/2017 5:30:31 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVI\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- SURFACE WATER SAMPLE LOCATION
- AEC 29 FORMER COAL LOADING AREA

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:30:32 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 20 40 60 80 100 METRES
1:2000 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

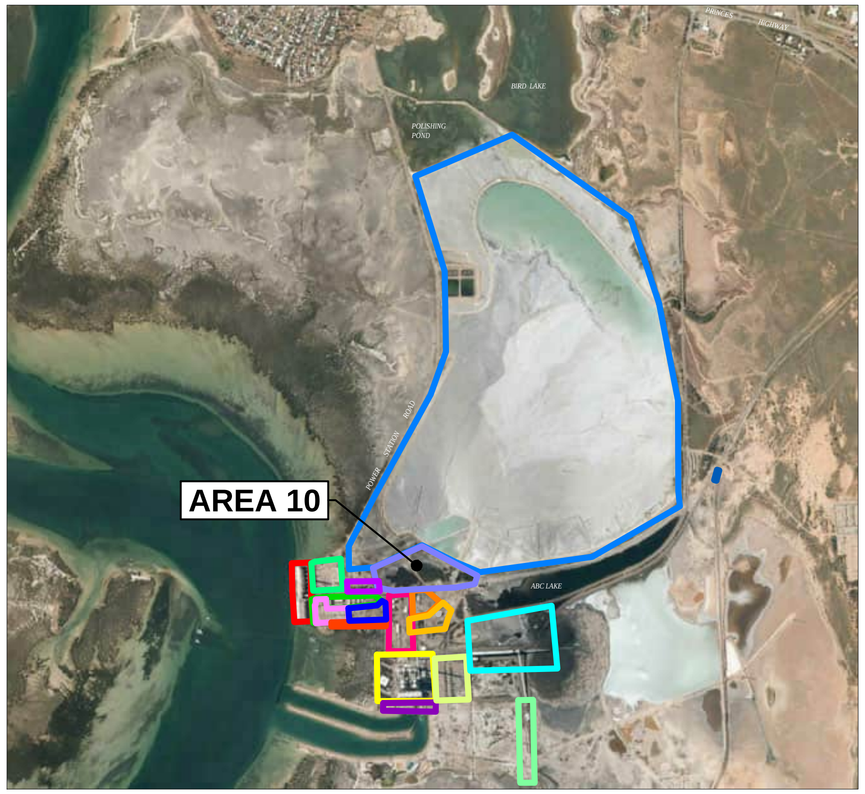
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 10 - FORMER COAL LOADING AREA AND STOCKPILES (MAY - JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 12A | rev: B



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- SURFACE WATER SAMPLE LOCATION
- AEC 29 FORMER COAL LOADING AREA

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: SURFACE WATER ANALYTICAL RESULTS REPORTED IN AREA 10 ARE BELOW THE LABORATORY LORs.

ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 20 40 60 80 100 METRES 1:2000 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

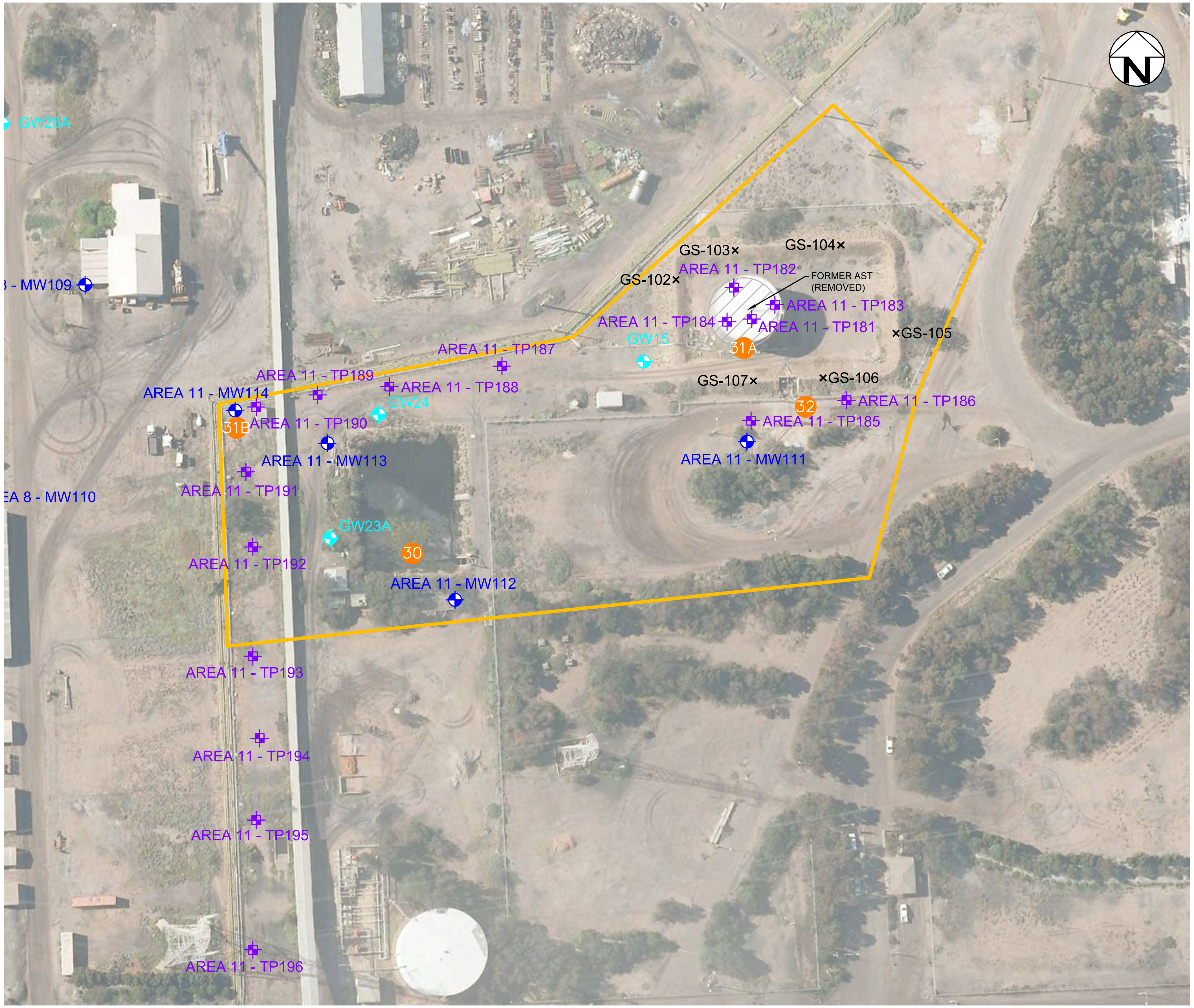
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 10 - FORMER COAL LOADING AREA AND STOCKPILES ANALYTICAL RESULTS PLAN (14 JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 12B | rev: B

PLOT DATE: 9/02/2017 5:30:34 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVI\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- × BUND WALL GRAB SAMPLE (GS) LOCATION

AEC	30	MAIN CONTAMINATED DRAIN POND
AEC	31A	FORMER FUEL OIL PUMPING STATION
AEC	31B	FUEL OIL TRANSFER PIPELINE
AEC	32	FUEL TANKER WASH DOWN BAY

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:30:36 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 12.5 25 37.5 50 62.5
SCALE 1:1250 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

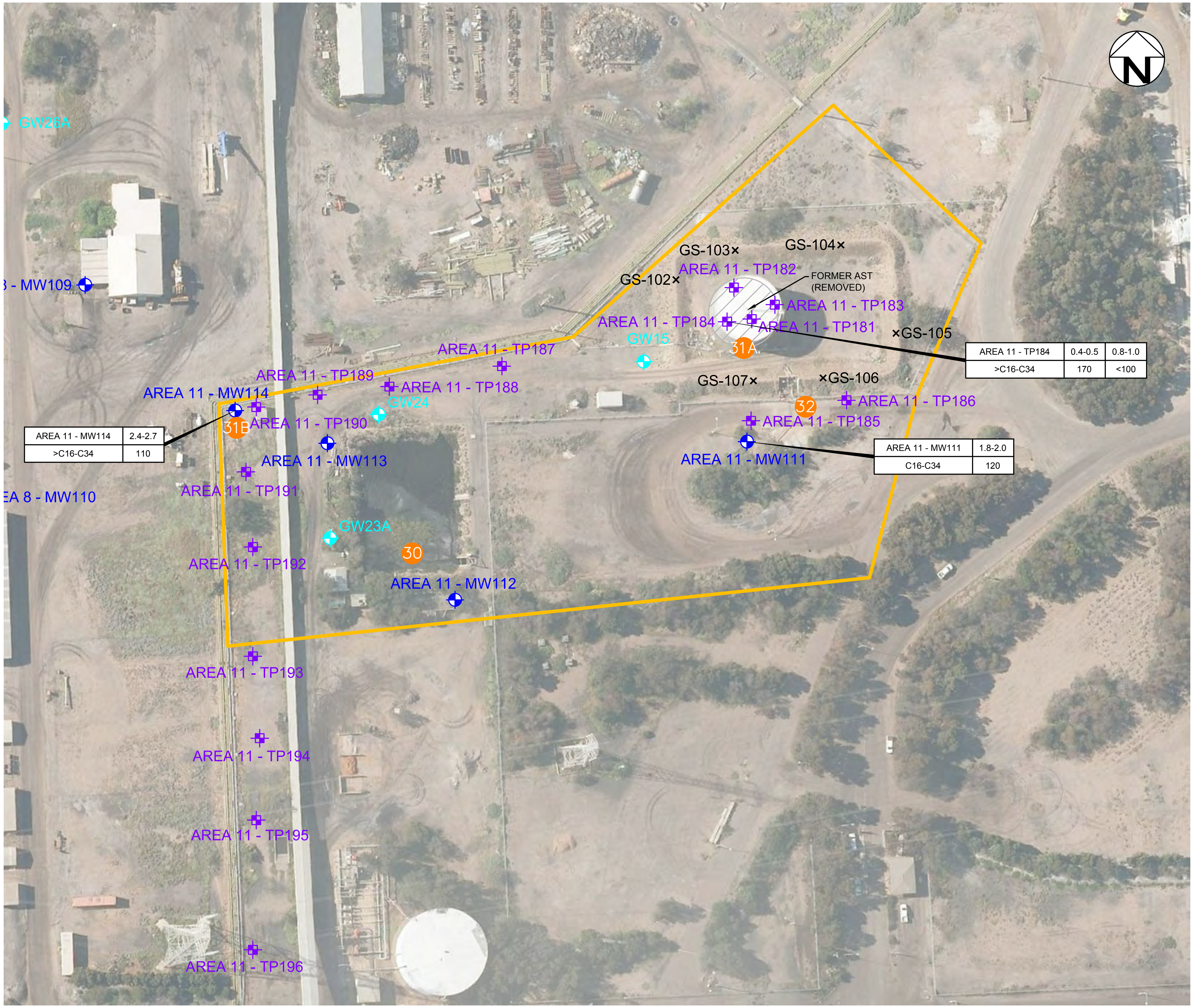
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 11 - WASTEWATER, FUEL STORAGE & WASH DOWN AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 13A | rev: B



AREA 11 - TP184	0.4-0.5	0.8-1.0
>C16-C34	170	<100

AREA 11 - MW114	2.4-2.7
>C16-C34	110

AREA 11 - MW111	1.8-2.0
C16-C34	120

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- × BUND WALL GRAB SAMPLE (GS) LOCATION

AEC 30 MAIN CONTAMINATED DRAIN POND

AEC 31A FORMER FUEL OIL PUMPING STATION

AEC 31B FUEL OIL TRANSFER PIPELINE

AEC 32 FUEL TANKER WASH DOWN BAY

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:30:38 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIAD\L_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 12.5 25 37.5 50 62.5
SCALE 1:1250 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

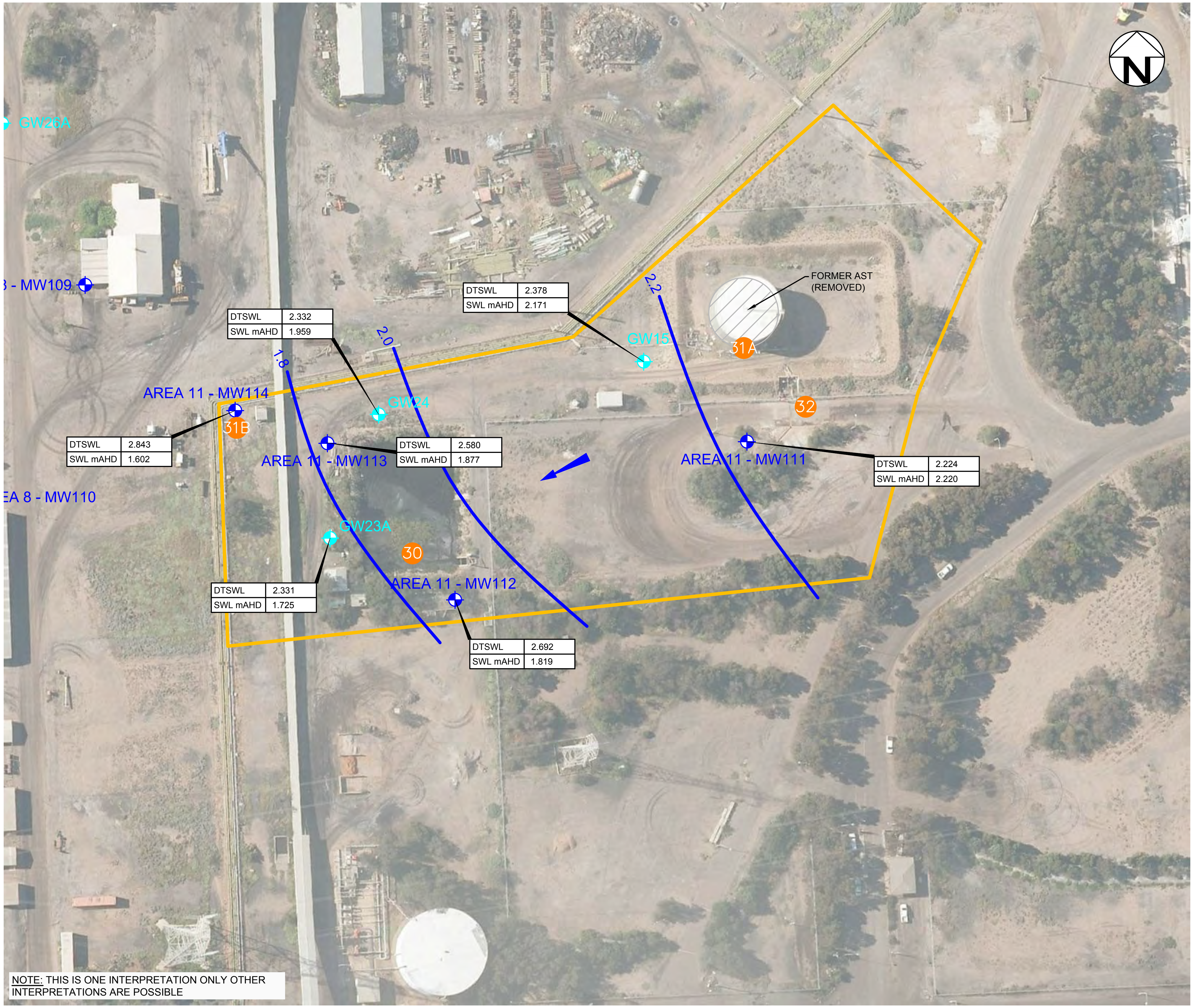
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 11 - WASTEWATER, FUEL STORAGE & WASH DOWN AREA SOIL ANALYTICAL RESULTS PLAN (9 JUNE & 7 JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 13B | rev: B



LEGEND

	APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
	NEW GROUNDWATER BORE LOCATION
AEC 30	MAIN CONTAMINATED DRAIN POND
AEC 31A	FORMER FUEL OIL PUMPING STATION
AEC 31B	FUEL OIL TRANSFER PIPELINE
AEC 32	FUEL TANKER WASH DOWN BAY
	INFERRED GROUNDWATER FLOW DIRECTION
1.550	INFERRED GROUNDWATER ELEVATION CONTOUR (mAHD)
DTSWL	GAUGED DEPTH TO WATER (mBTOC)
SWL mAHD	GROUNDWATER ELEVATION (mAHD)

INFERRED HYDROGEOLOGICAL INFORMATION

HYDRAULIC GRADIENT (i)	= 0.003 WEST SOUTH WEST
HYDRAULIC CONDUCTIVITY (K) (COFFEY 2016)	= 0.05 to 0.13m/day
SEEPAGE VELOCITY	= 0.3 to 0.7m/year

NOTE: GROUNDWATER ANALYTICAL RESULTS REPORTED BELOW THE BACKGROUND LEVELS

PLOT DATE: 9/02/2017 5:30:39 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 12.5 25 37.5 50 62.5
SCALE 1:1250 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

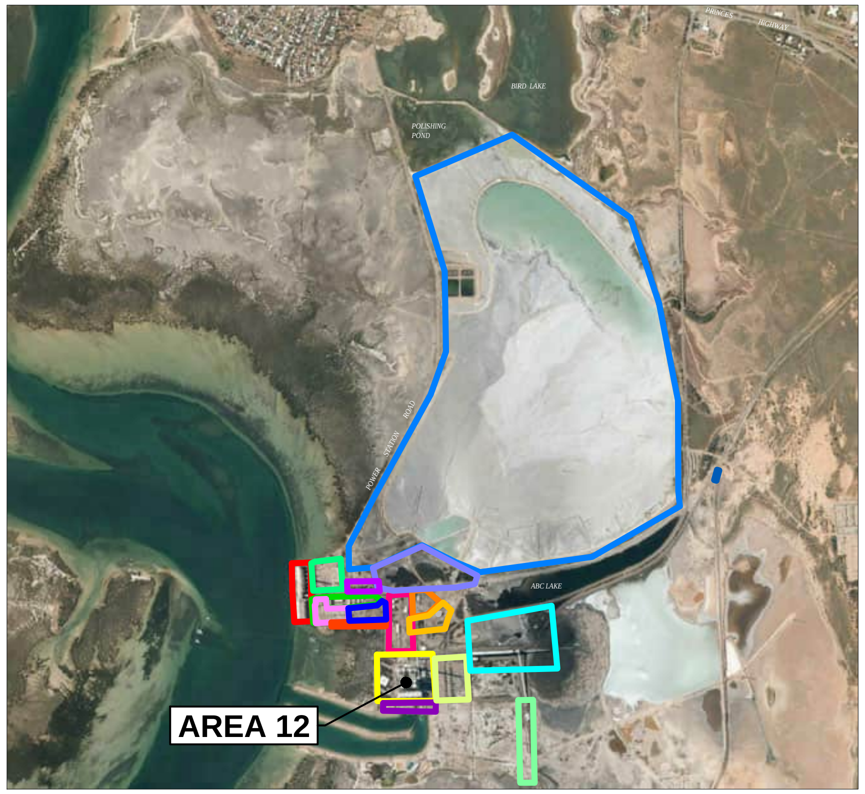
client: FLINDERS POWER PARTNERSHIP

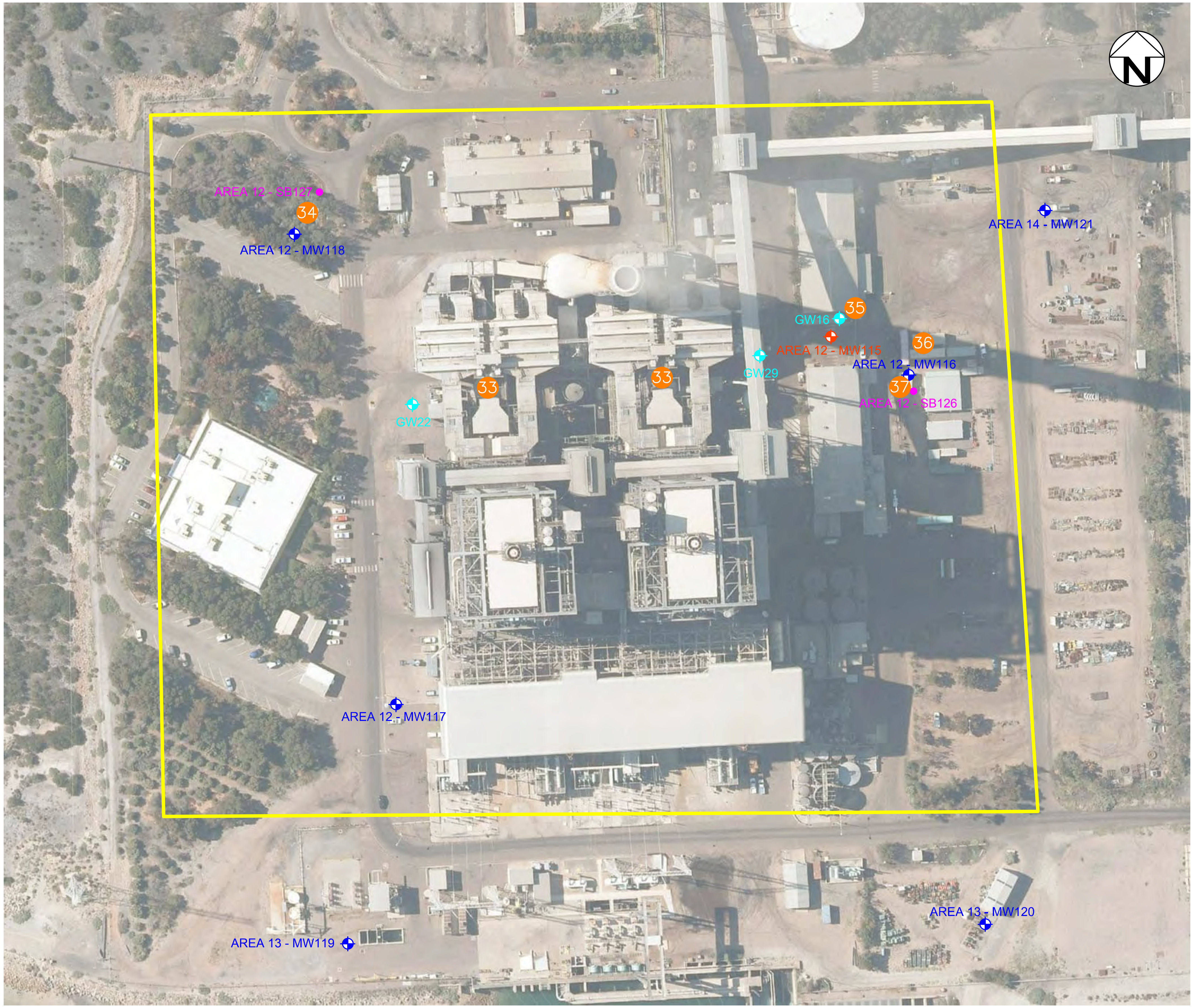
project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 11 - WASTEWATER, FUEL STORAGE & WASH DOWN AREA GROUNDWATER GRADIENT PLAN (20 & 21 JUNE 2016)**

project no:	figure no:	rev:
ENAUKESW01445AD-R01-D01	FIGURE 13C	B

PLOT DATE: 9/02/2017 5:30:41 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM\AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG





LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- NEW GROUNDWATER BORE LOCATION (DEEP)
- SOIL BORE LOCATION

- AEC 33 MAIN FUEL OIL SERVICE AST
- AEC 34 INTERMEDIATE OILY WATER SKIMMER PIT
- AEC 35 NORTHERN STORE AREA UST
- AEC 36 MILLS WORKSHOP AREA
- AEC 37 FLAMMABLE SHED

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

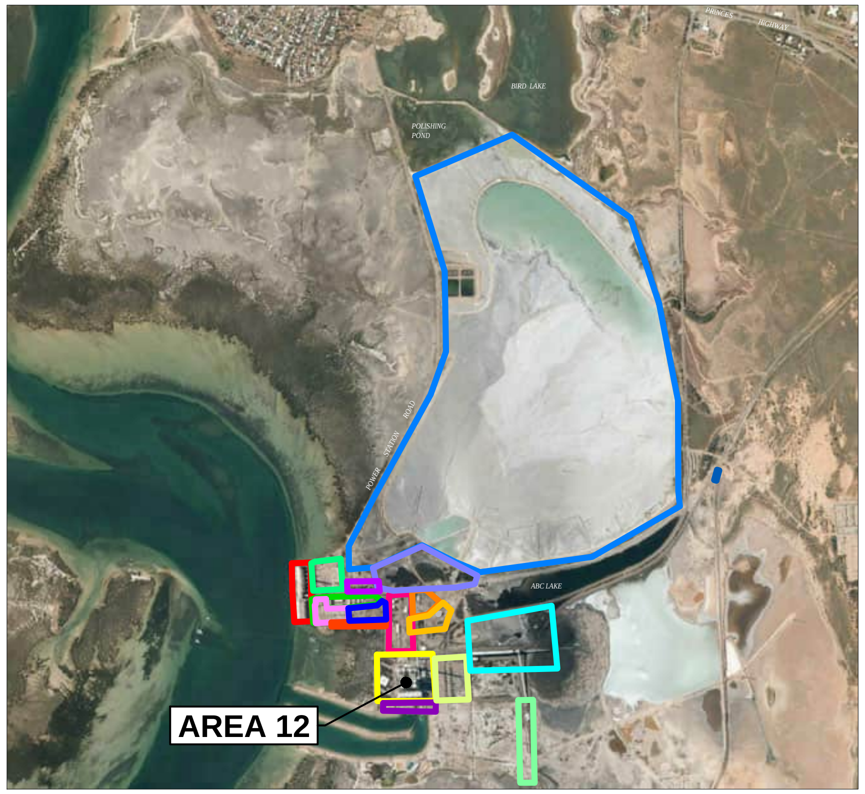
NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

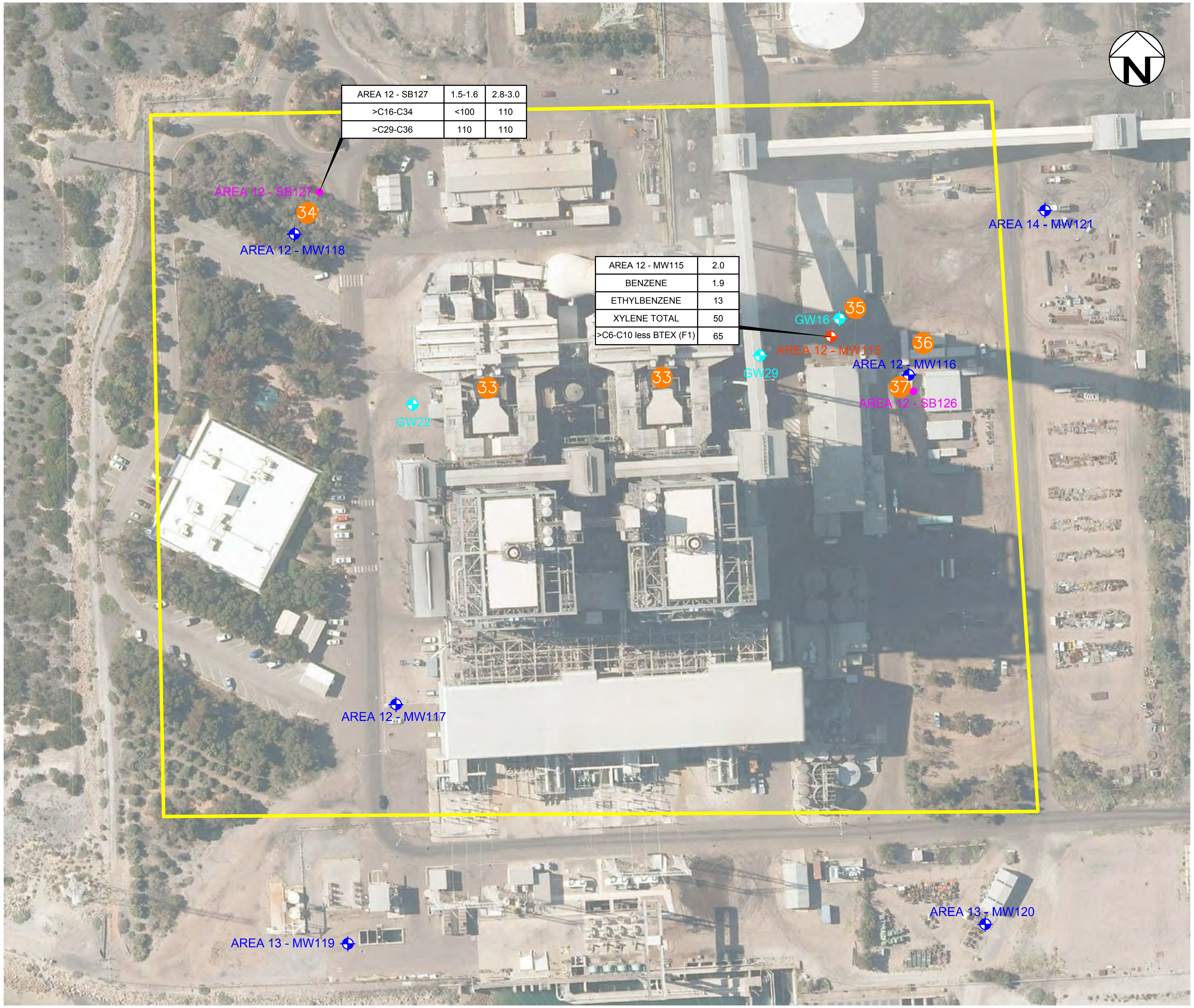
0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client:	FLINDERS POWER PARTNERSHIP
project:	FLINDERS POWER PARTNERSHIP AUGUSTA POWER STATIONS DSI POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA
title:	**AREA 12 - NORTHERN STATION (MAY-JULY 2016)**
project no: ENAUKESW01445AD-R01-D01	figure no: FIGURE 14A — rev: B





AREA 12 - SB127	1.5-1.6	2.8-3.0
>C16-C34	<100	110
>C29-C36	110	110

AREA 12 - MW115	2.0
BENZENE	1.9
ETHYLBENZENE	13
XYLENE TOTAL	50
>C6-C10 less BTEX (F1)	65

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- NEW GROUNDWATER BORE LOCATION (DEEP)
- SOIL BORE LOCATION

- AEC 33 MAIN FUEL OIL SERVICE AST
- AEC 34 INTERMEDIATE OILY WATER SKIMMER PIT
- AEC 35 NORTHERN STORE AREA UST
- AEC 36 MILLS WORKSHOP AREA
- AEC 37 FLAMMABLE SHED

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:30:43 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

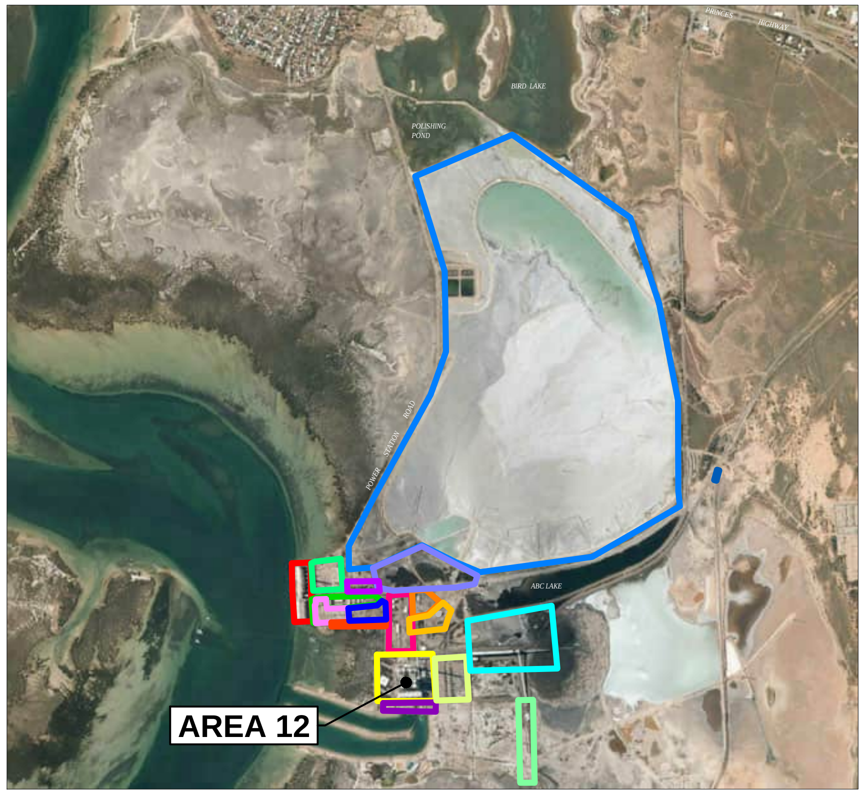
coffey
A TETRA TECH COMPANY

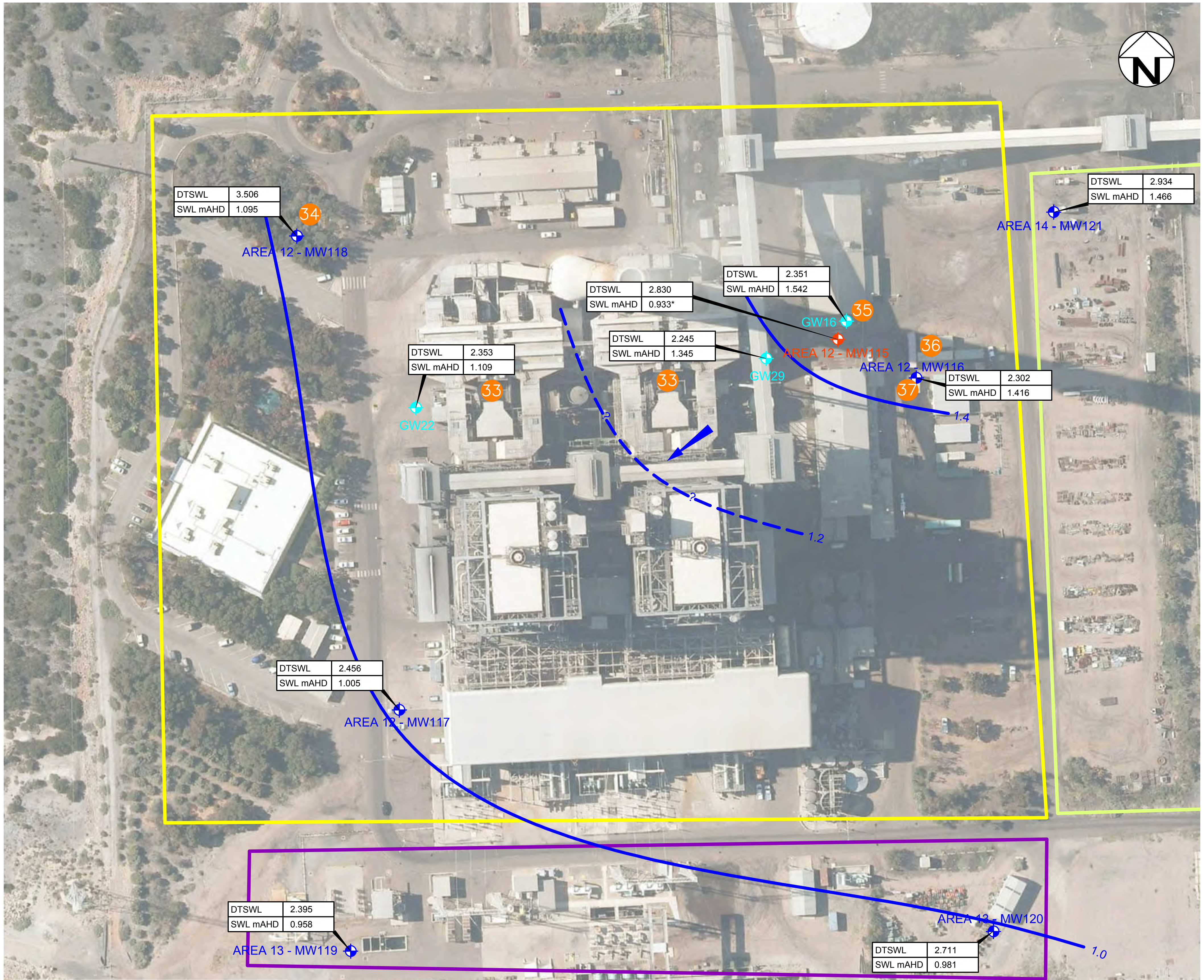
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 12 - NORTHERN STATION**
SOIL ANALYTICAL RESULTS PLAN (23 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 14B | rev: B





NOTE: THIS IS ONE INTERPRETATION ONLY OTHER INTERPRETATIONS ARE POSSIBLE

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- NEW GROUNDWATER BORE LOCATION (DEEP)

AEC 33 MAIN FUEL OIL SERVICE AST
AEC 34 INTERMEDIATE OILY WATER SKIMMER PIT
AEC 35 NORTHERN STORE AREA UST
AEC 36 MILLS WORKSHOP AREA
AEC 37 FLAMMABLE SHED

INFERRED GROUNDWATER FLOW DIRECTION
1.550 INFERRED GROUNDWATER ELEVATION CONTOUR (mAHD)
DTSWL GAUGED DEPTH TO WATER (mBTOC)
SWL mAHD GROUNDWATER ELEVATION (mAHD)

NOTE: *DEEP WELLS NOT INCLUDED IN GROUNDWATER ELEVATION CONTOURS

INFERRED HYDROGEOLOGICAL INFORMATION

HYDRAULIC GRADIENT (i)	= 0.002 SOUTH WEST
HYDRAULIC CONDUCTIVITY (K) (COFFEY 2016)	= 0.05 to 0.13m/day
SEEPAGE VELOCITY	= 0.18 to 0.5m/year

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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A TETRA TECH COMPANY

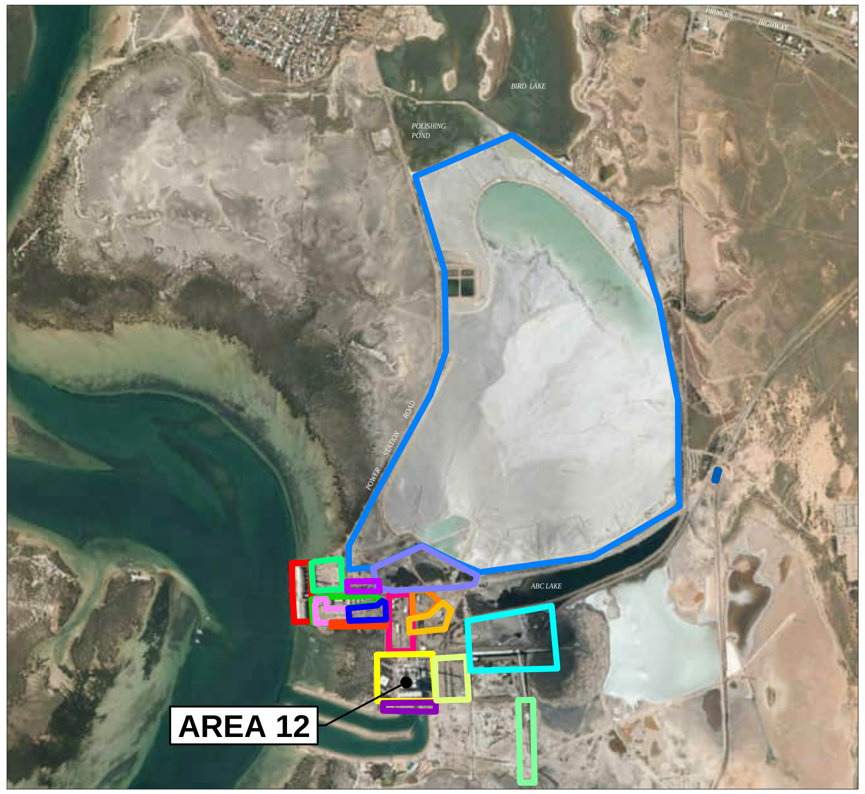
client: FLINDERS POWER PARTNERSHIP

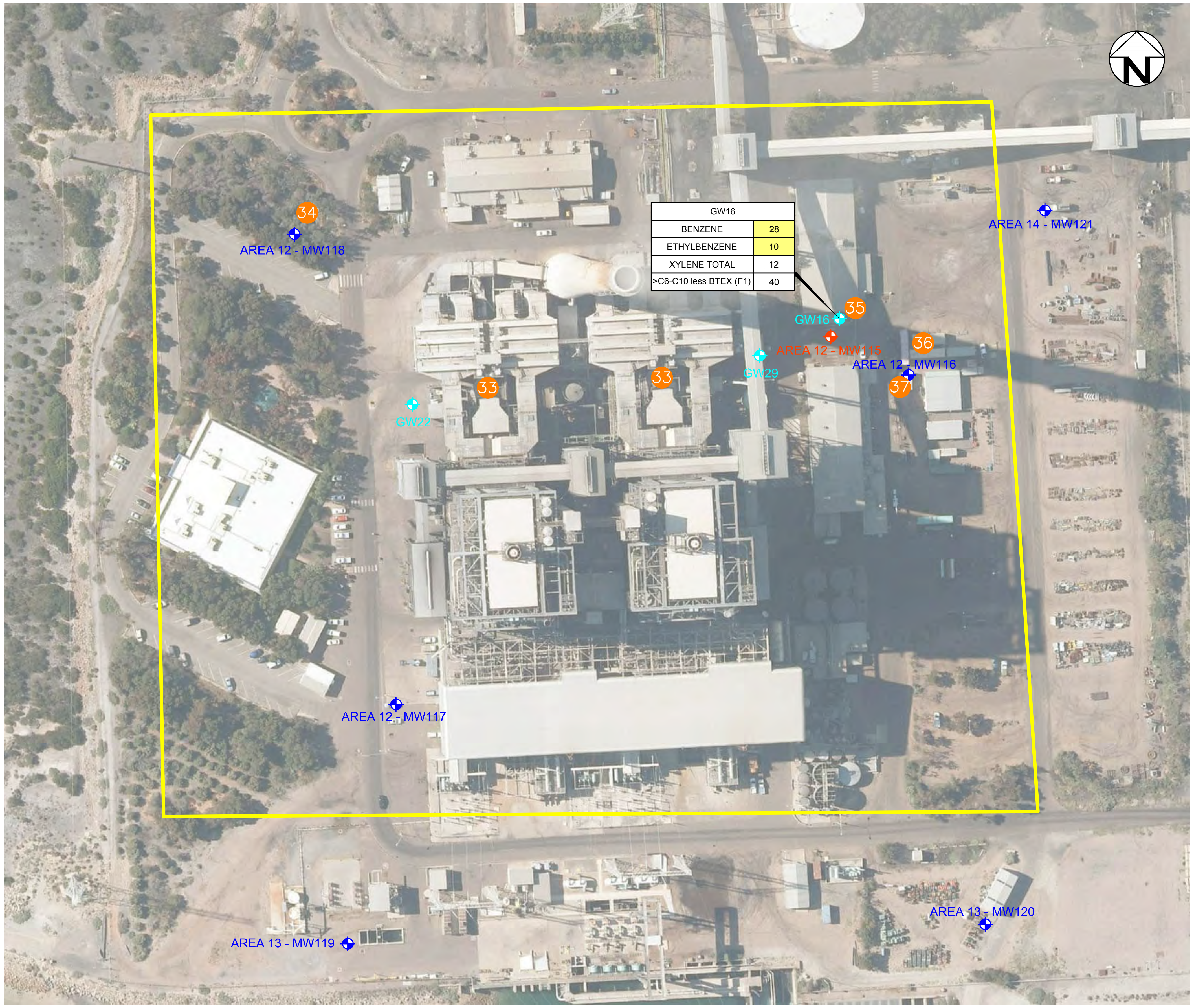
project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: AREA 12 - NORTHERN STATION - GROUNDWATER GRADIENT PLAN
AREAS 12, 13 AND 14 (17, 22, 23 & 28 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01
figure no: FIGURE 14C
rev: B

PLOT DATE: 9/02/2017 5:30:45 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM\AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKES\W01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG





GW16	
BENZENE	28
ETHYLBENZENE	10
XYLENE TOTAL	12
>C6-C10 less BTEX (F1)	40

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- NEW GROUNDWATER BORE LOCATION (DEEP)

- AEC 33 MAIN FUEL OIL SERVICE AST
- AEC 34 INTERMEDIATE OILY WATER SKIMMER PIT
- AEC 35 NORTHERN STORE AREA UST
- AEC 36 MILLS WORKSHOP AREA
- AEC 37 FLAMMABLE SHED

ANALYTE	(µg/L)

(µg/L) MICROGRAMS PER LITRE

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

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revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

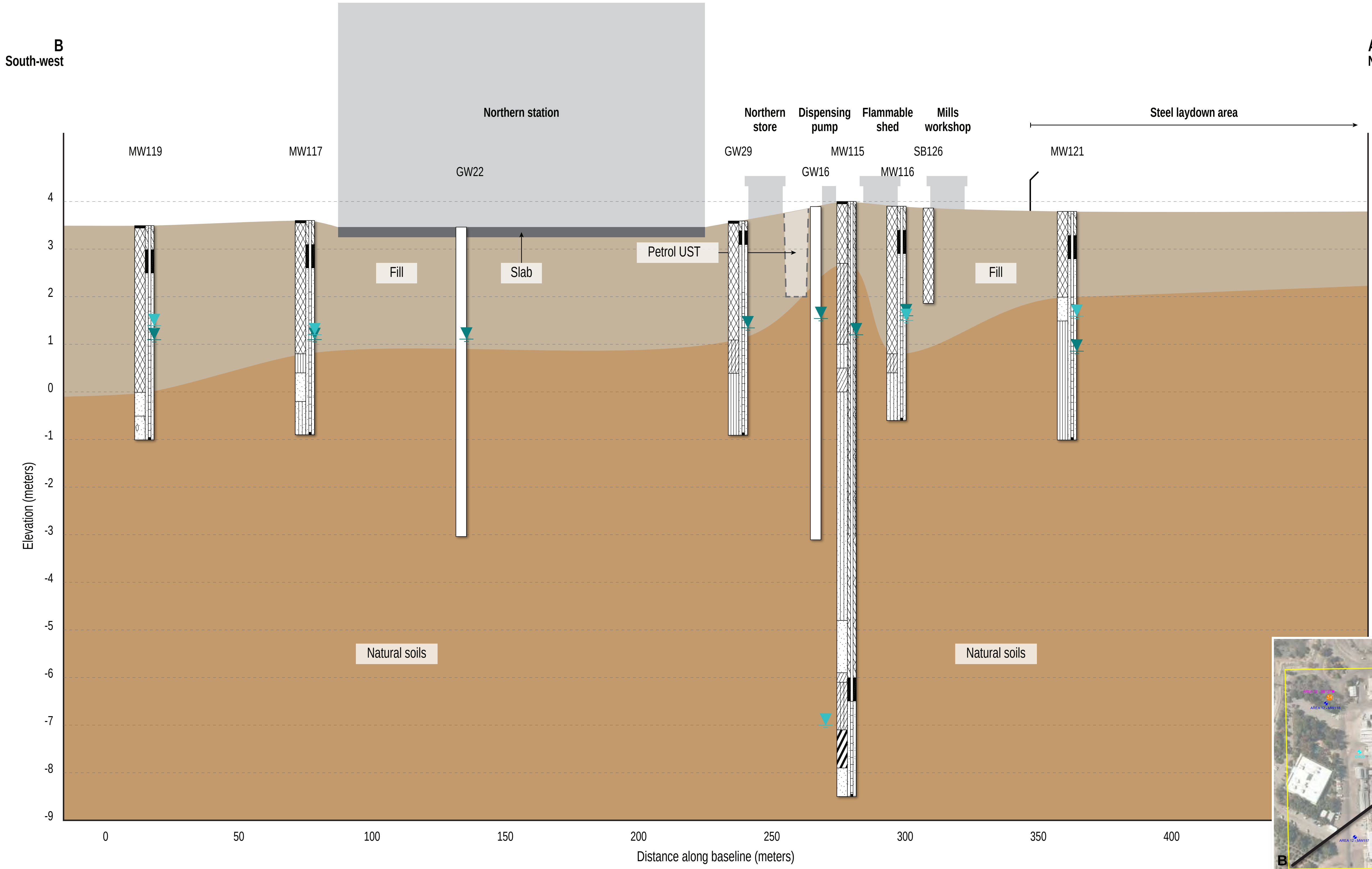
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 12 - NORTHERN STATION**
GROUNDWATER ANALYTICAL RESULTS PLAN (22 JUNE 2016)

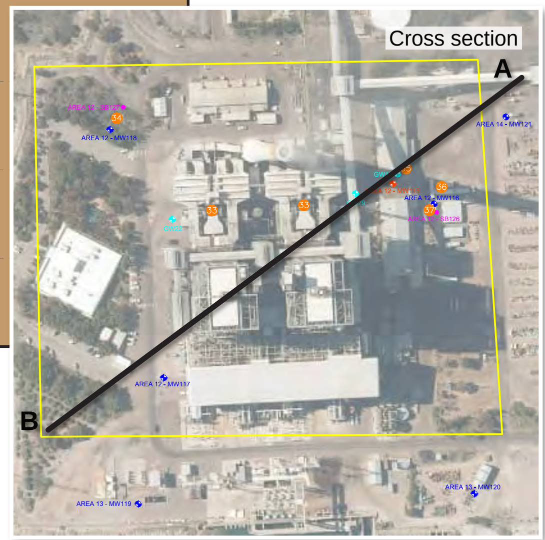
project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 14D | rev: B



Legend

- Water level - initial
- Water level - static
- FILL
- ML (clayey silt)
- SM (silty sand)
- CH (clay)
- SP (sand)
- CL (silty clay)
- CLS (sandy clay)
- SPG (gravelly sand)
- No litholgy available

Note:
Seashells present -
GW29 in ML
MW115 in SM, SP & CLS (3-10.1 m)
MW116 in SM
MW117 in SM
Seaweed present -
GW29 in ML
MW116 in SM
Ash present -
MW115 in FILL (1-1.3 m)
MW117 in FILL
MW121 in FILL (1-1.8 m)
MW126 in FILL (0.9-2 m)



revision	no.	description	drawn	approved	date
	B	REVISION 1	JO	FM	14.02.17

drawn	JO
approved	FM
date	14.02.2017
scale	NOT TO SCALE
original size	A3

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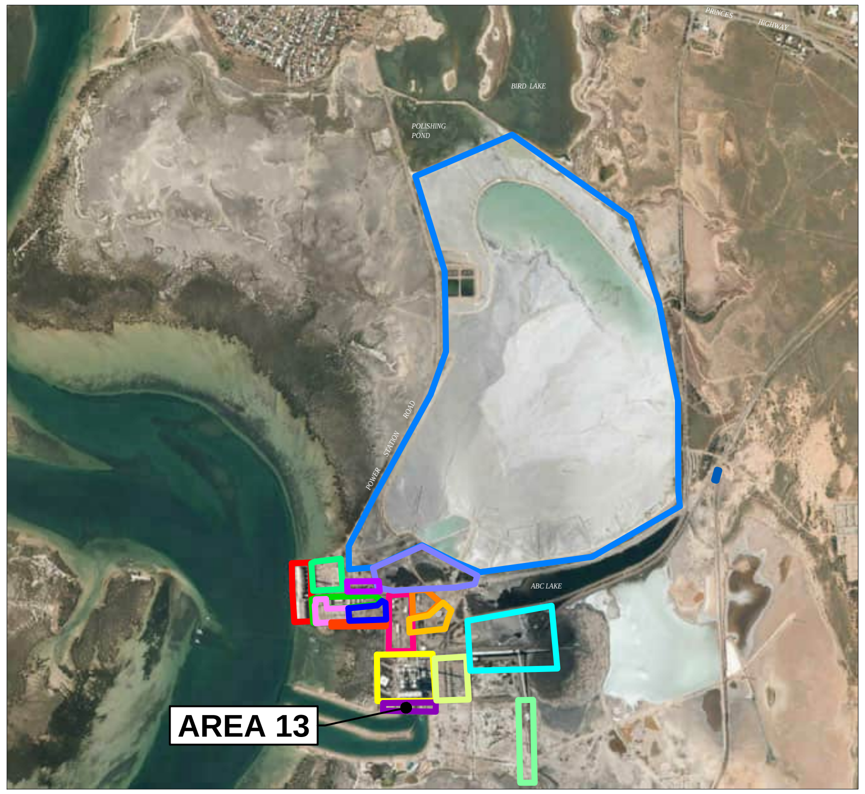
client:	FLINDERS POWER PARTNERSHIP
project:	FLINDERS POWER PARTNERSHIP AUGUSTA POWER STATIONS DSI POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA
title:	AREA 12 - NORTHERN STATION GEOLOGICAL CROSS SECTION
project no: ENAUKESW01445AD-R01-D01	figure no: FIGURE 14E — rev: B



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SOIL BORE LOCATION

AEC	5	TRANSFORMER
AEC	38	CHLORINE TREATMENT PLANT
AEC	39	BACKUP DIESEL GENERATOR SHED AND AST
AEC	40	MAIN OILY / WATER SKIMMER PIT
AEC	41	AMMONIA SOLUTIONS AST AND BUND
AEC	42	MAIN WASTE OIL STORAGE AREA

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revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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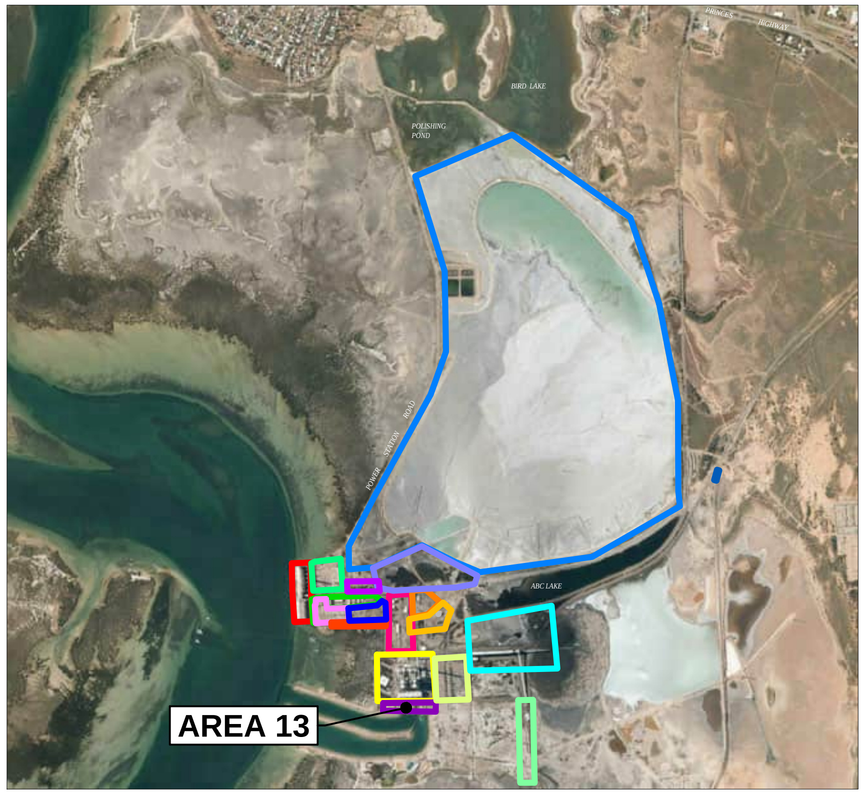
A TETRA TECH COMPANY

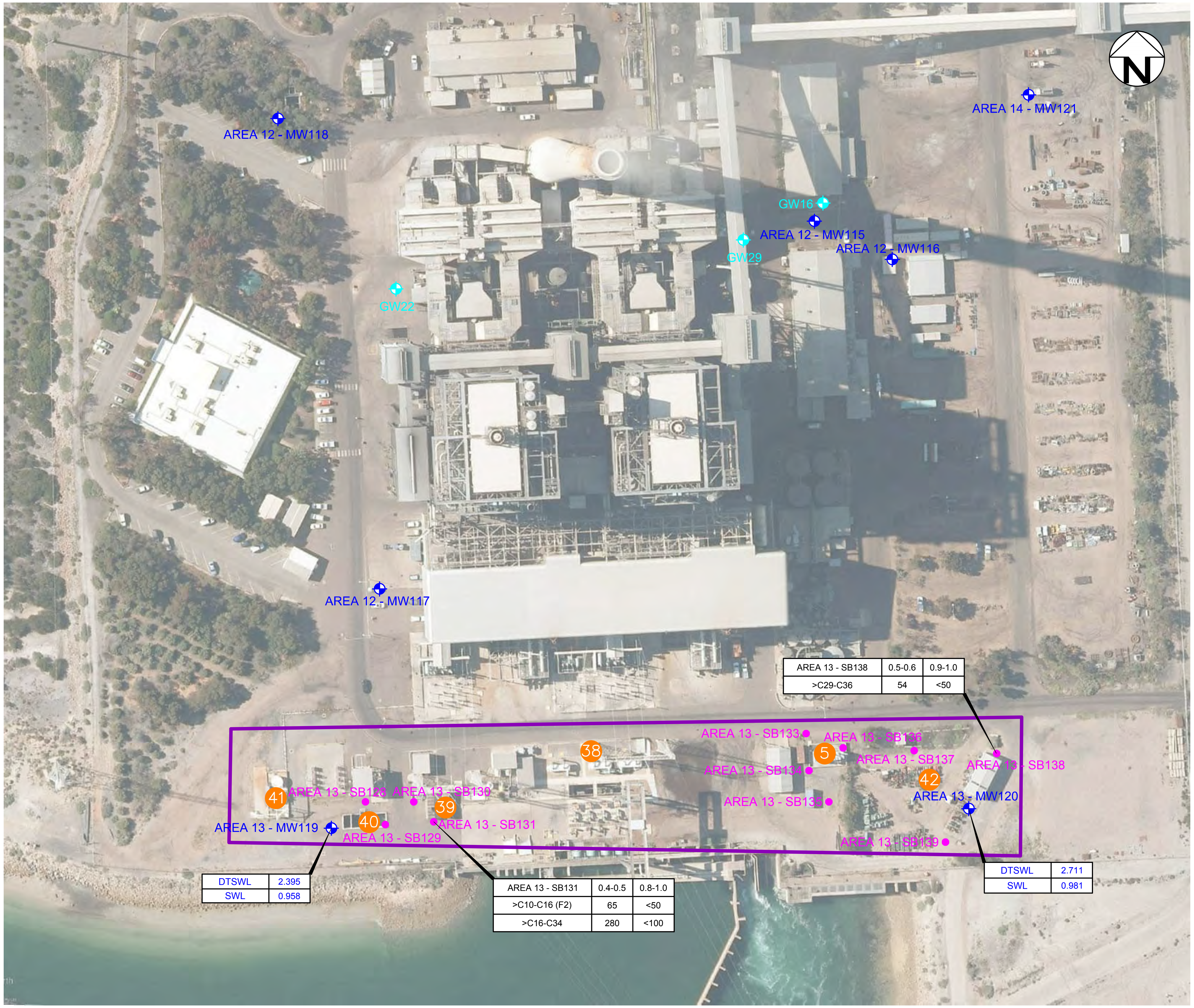
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 13 - NORTHERN STATION INFRASTRUCTURE (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 15A | rev: B





AREA 13 - SB138	0.5-0.6	0.9-1.0
>C29-C36	54	<50

DTSWL	2.395
SWL	0.958

AREA 13 - SB131	0.4-0.5	0.8-1.0
>C10-C16 (F2)	65	<50
>C16-C34	280	<100

DTSWL	2.711
SWL	0.981

LEGEND

APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)

NEW GROUNDWATER BORE LOCATION

SOIL BORE LOCATION

AEC 5 TRANSFORMER

AEC 38 CHLORINE TREATMENT PLANT

AEC 39 BACKUP DIESEL GENERATOR SHED AND AST

AEC 40 MAIN OILY / WATER SKIMMER PIT

AEC 41 AMMONIA SOLUTIONS AST AND BUND

AEC 42 MAIN WASTE OIL STORAGE AREA

DEPTH	(mBGS)
ANALYTE	(mg/kg)

DTSWL	(mBTOC)
SWL mAHD	(mAHD)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

DTSWL GAUGED DEPTH TO WATER (mBTOC)

SWL mAHD GROUNDWATER ELEVATION (mAHD)

NOTE: ALL OTHER SOIL AND GROUNDWATER ANALYTICAL RESULTS REPORTED IN AREA 13 ARE BELOW THE LABORATORY LORs

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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

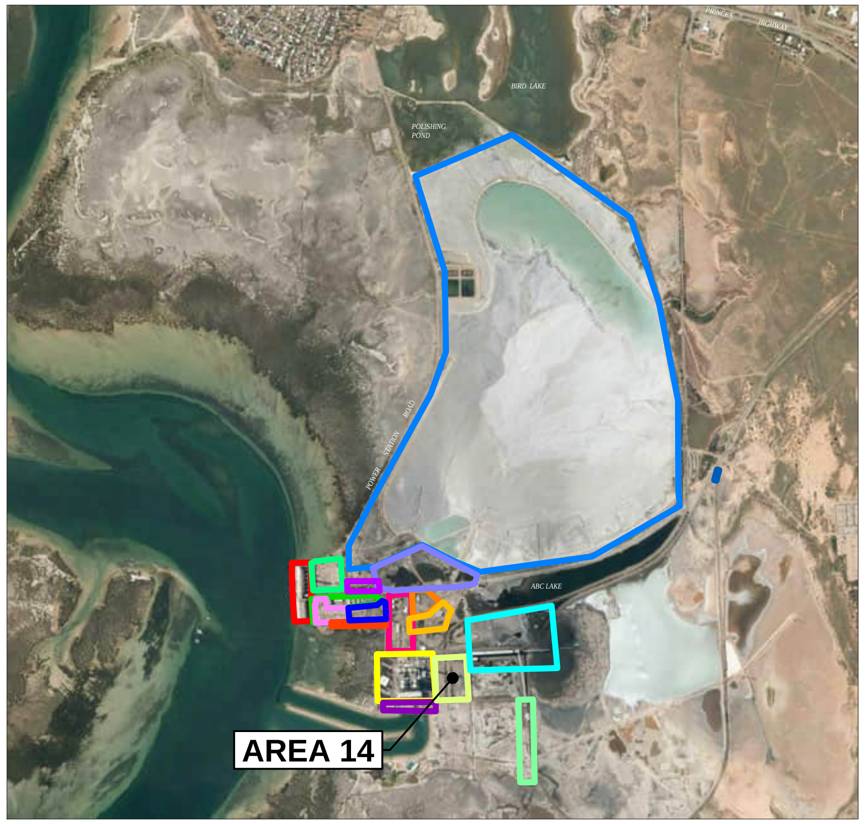
client: FLINDERS POWER PARTNERSHIP

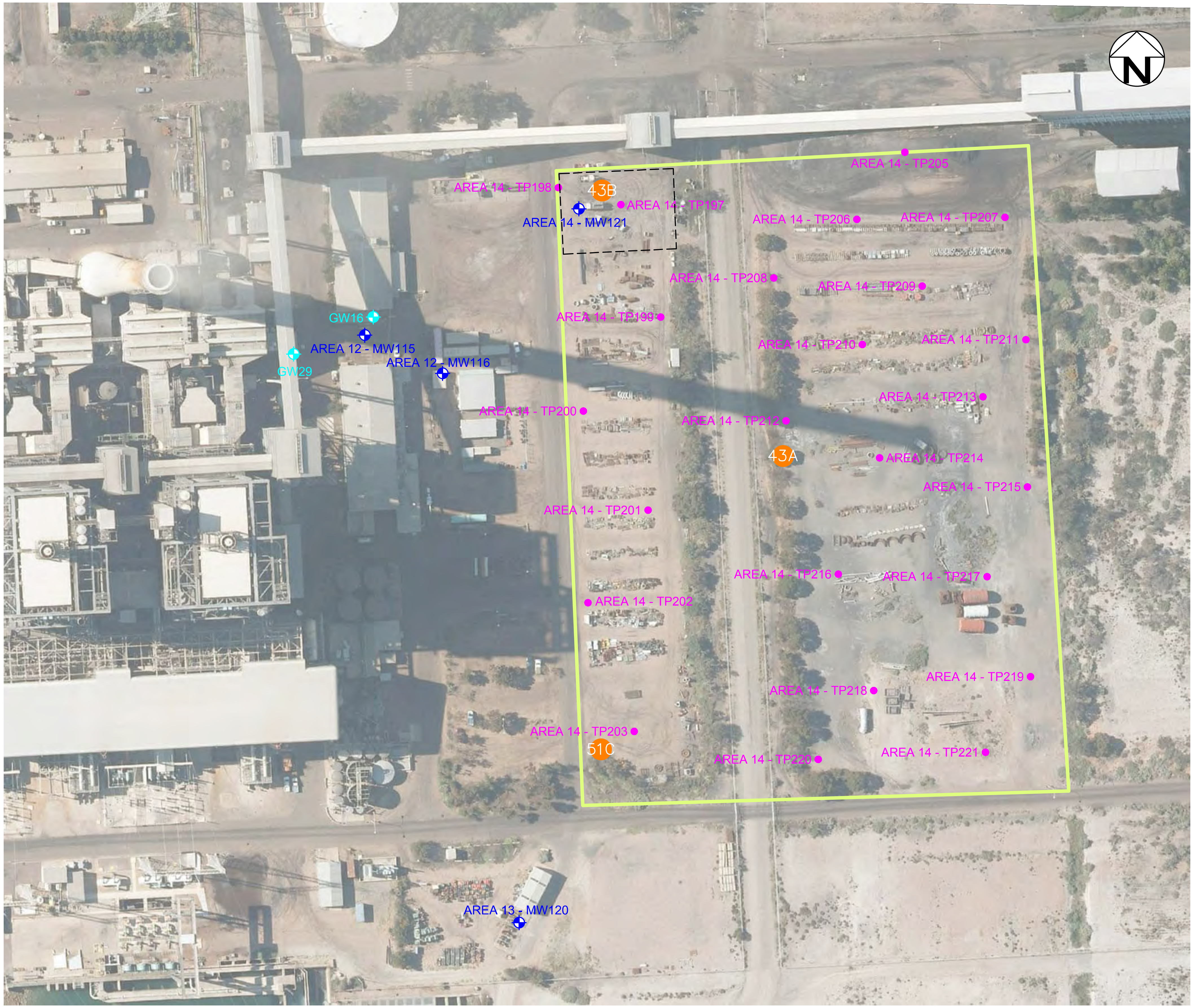
project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 13 - NORTHERN STATION INFRASTRUCTURE SOIL ANALYTICAL RESULTS PLAN (22 & 23 JUNE 2016)**

project no: ENAUKESW01445AD-R01-D01 figure no: FIGURE 15B rev: B

PLOT DATE: 9/02/2017 5:30:50 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM\AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG





LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SOIL BORE LOCATION
- AEC 43A STEEL LAYDOWN AREA
- AEC 43B FIRE FIGHTING TRAINING AREA
- AEC 51C WASTE DUMP - WTP RESIN AND CHLORINE PLANT RESIDUE

NOTE: SOIL ANALYTICAL RESULTS REPORTED BELOW THE BACKGROUND LEVELS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES
1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

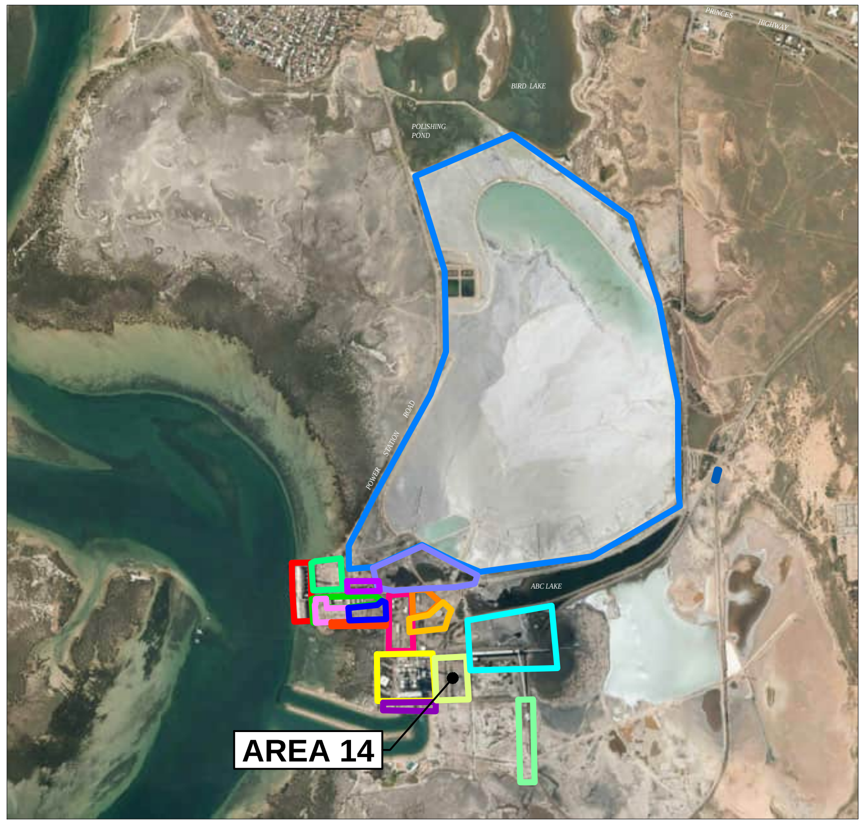
client: FLINDERS POWER PARTNERSHIP

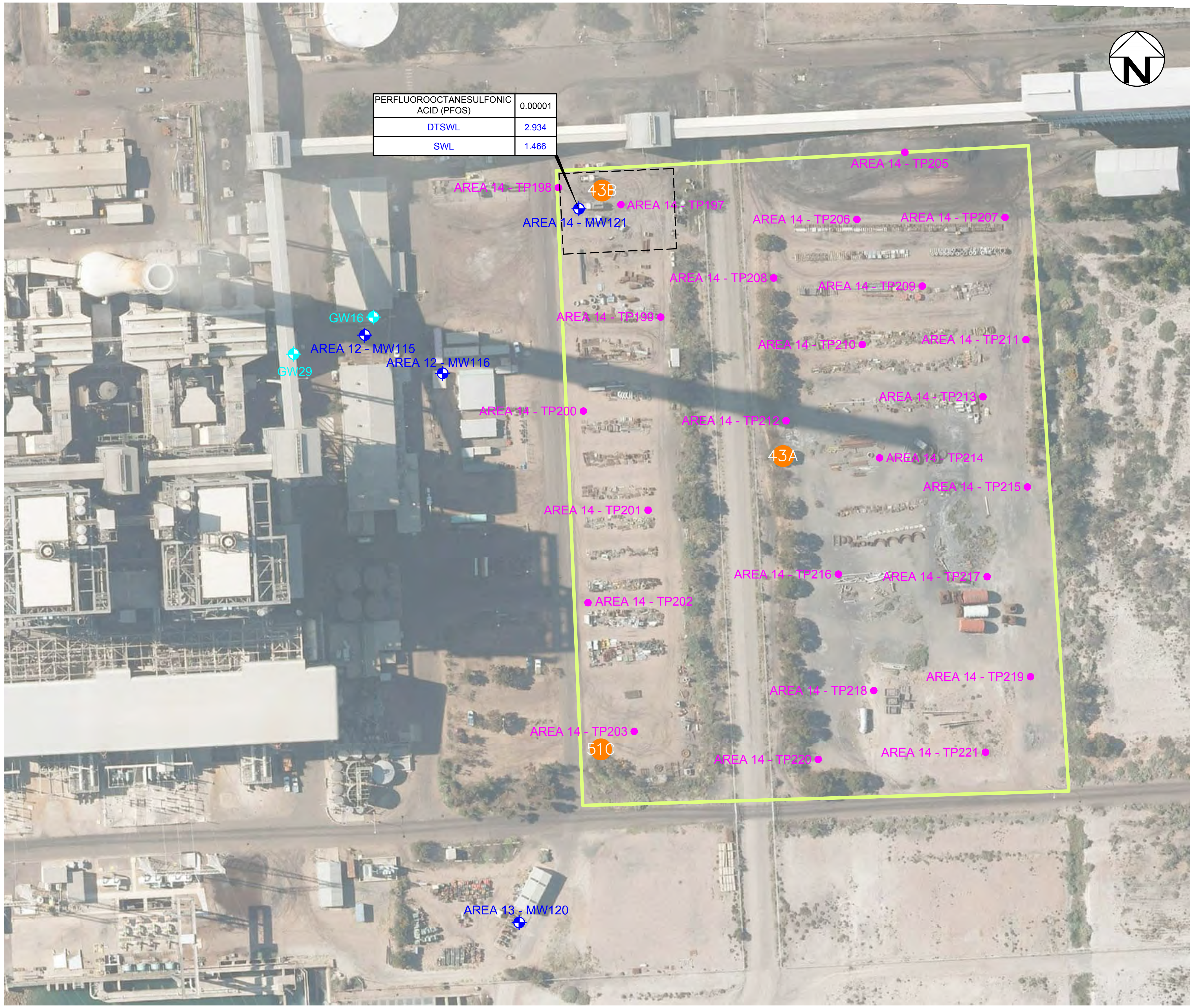
project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 14 - STEEL LAYDOWN AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 16A | rev: B

PLOT DATE: 9/02/2017 5:30:53 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM\AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKES\W01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG





LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- NEW GROUNDWATER BORE LOCATION
- SOIL BORE LOCATION

AEC 43A STEEL LAYDOWN AREA

AEC 43B FIRE FIGHTING TRAINING AREA

AEC 51C WASTE DUMP - WTP RESIN AND CHLORINE PLANT RESIDUE

ANALYTE	(mg/L)
DTSWL	(mBTOC)
SWL	(mAHD)

(µg/L) MICROGRAMS PER LITRE

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

DTSWL GAUGED DEPTH TO WATER (mBTOC)

SWL mAHD GROUNDWATER ELEVATION (mAHD)

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revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
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NOTE:
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DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES 1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

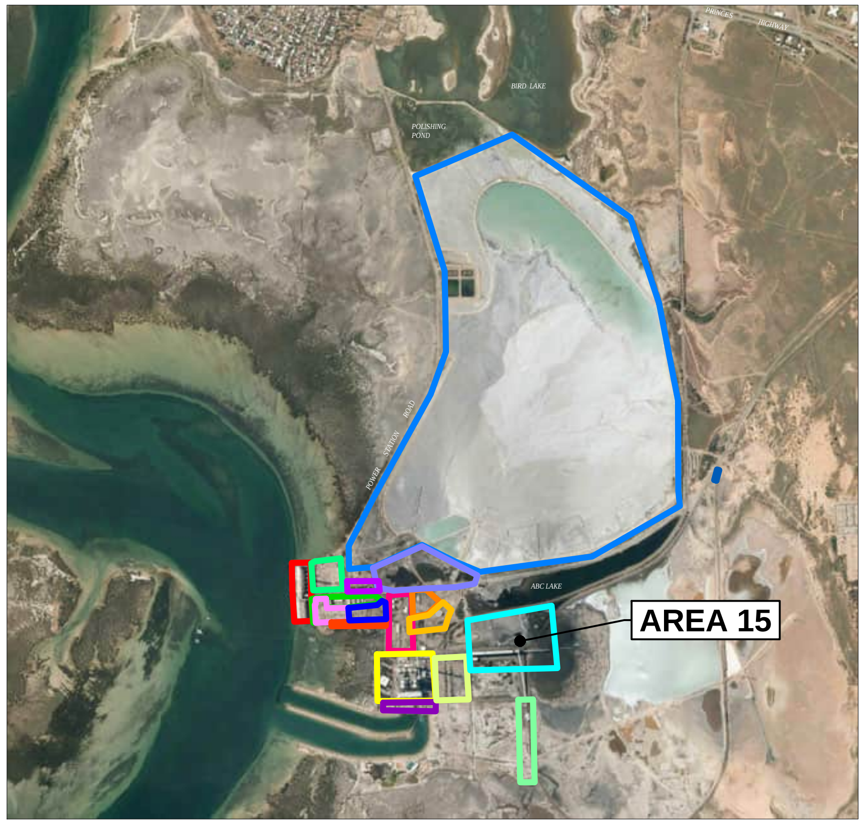
coffey
A TETRA TECH COMPANY

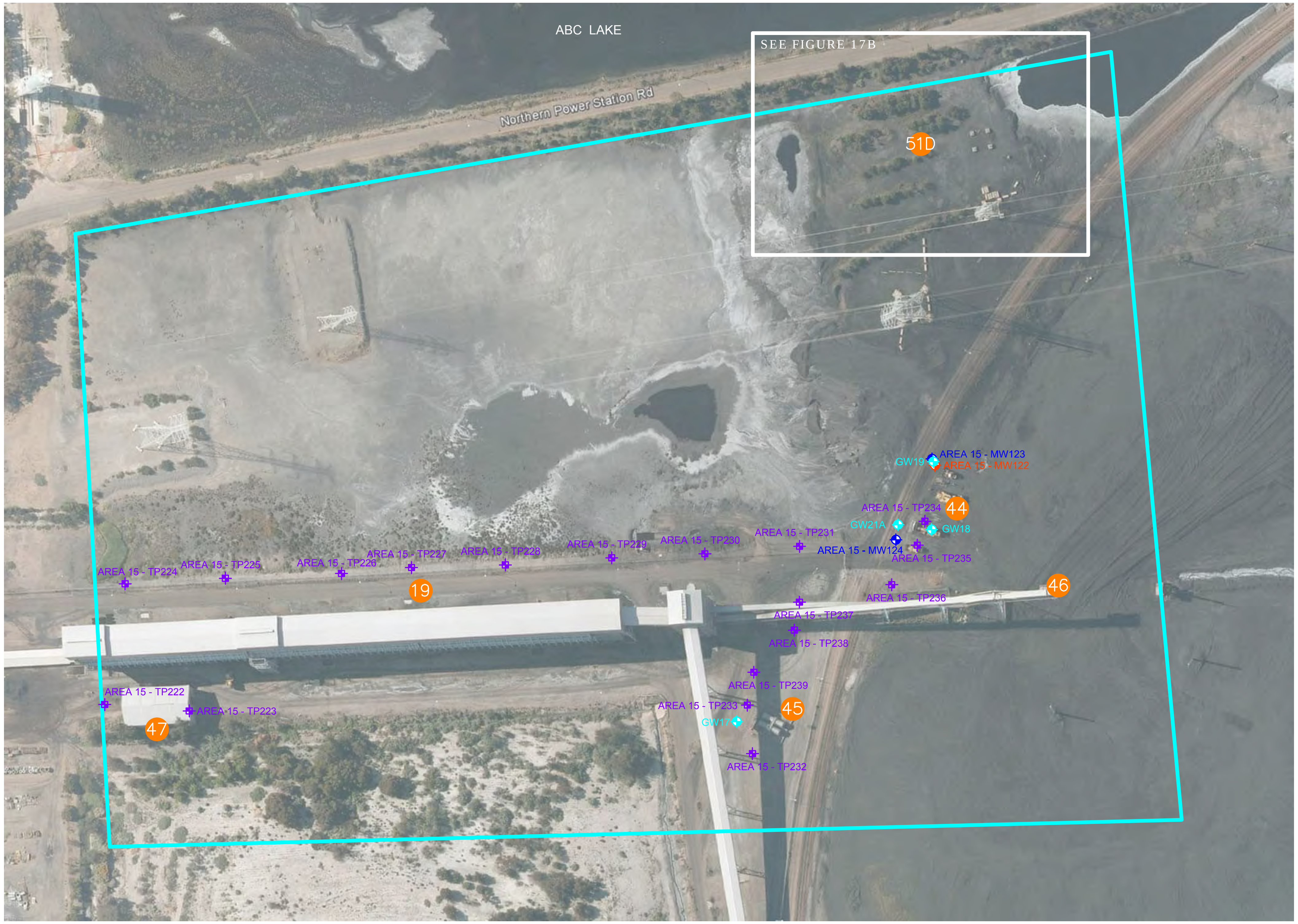
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 14 - STEEL LAYDOWN AREA**
GROUNDWATER ANALYTICAL RESULTS PLAN (17 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 16B | rev: B





LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION
- NEW GROUNDWATER BORE LOCATION (SHALLOW)
- NEW GROUNDWATER BORE LOCATION (DEEP)
- TEST PIT LOCATION

AEC	19	CONVEYOR SEDIMENT POND
AEC	44	FUEL PAD
AEC	45	DIESEL ASTs
AEC	46	COAL LOADING AREA & STOCKPILES
AEC	47	COAL MACHINE WORKSHOP
AEC	51D	WASTE DUMP - CHLORINE PLANT RESIDUE

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:30:55 PM

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 20 40 60 80 100
SCALE 1:2000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

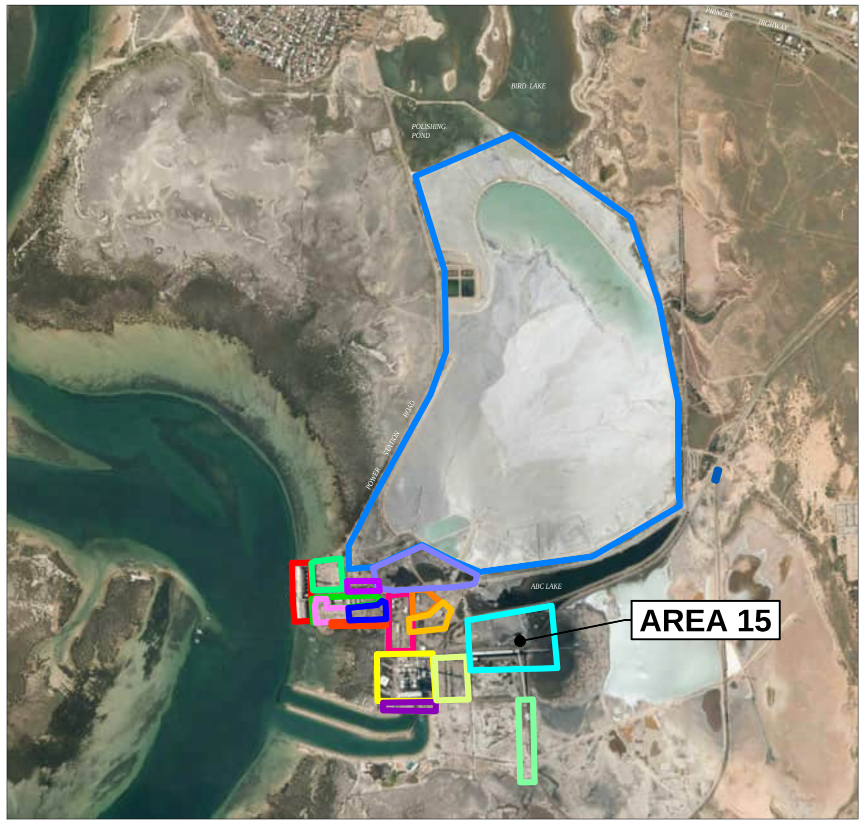
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 15 - COAL LOADING AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 17A | rev: B



LEGEND

APPROXIMATE AREA OF CHLORINE RESIDUE

TRENCH LOCATION

AEC 51D WASTE DUMP - CHLORINE PLANT RESIDUE

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 5 10 15 20 25
SCALE 1:500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

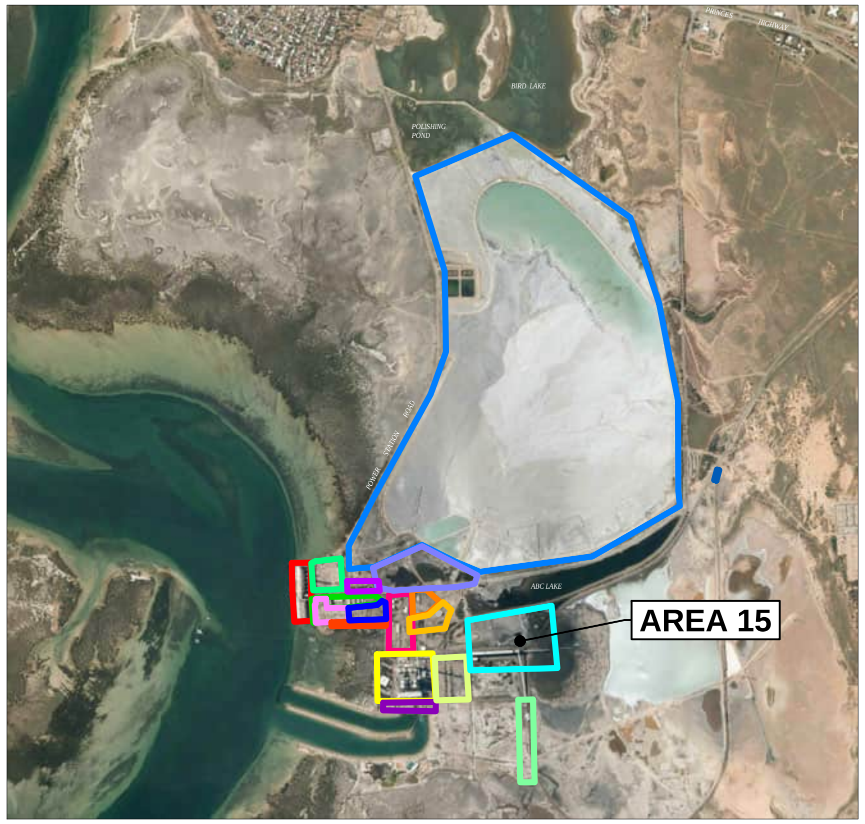
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 15 - COAL LOADING AREA (19 JULY 2016)**
WASTE DUMP- CHLORINE PLANT RESIDUE

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 17B | rev: B

PLOT DATE: 9/02/2017 5:30:57 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVI\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION
- NEW GROUNDWATER BORE LOCATION (SHALLOW)
- NEW GROUNDWATER BORE LOCATION (DEEP)
- TEST PIT LOCATION
- AEC 19 CONVEYOR SEDIMENT POND
- AEC 44 FUEL PAD
- AEC 45 DIESEL ASTs
- AEC 46 COAL LOADING AREA & STOCKPILES
- AEC 47 COAL MACHINE WORKSHOP
- AEC 51D WASTE DUMP - CHLORINE PLANT RESIDUE

DEPTH	(mBGS)
ANALYTE	(mg/kg)

- \- SURFACE TEST PIT LOCATION
- mg/kg MILLIGRAMS PER KILOGRAM
- 12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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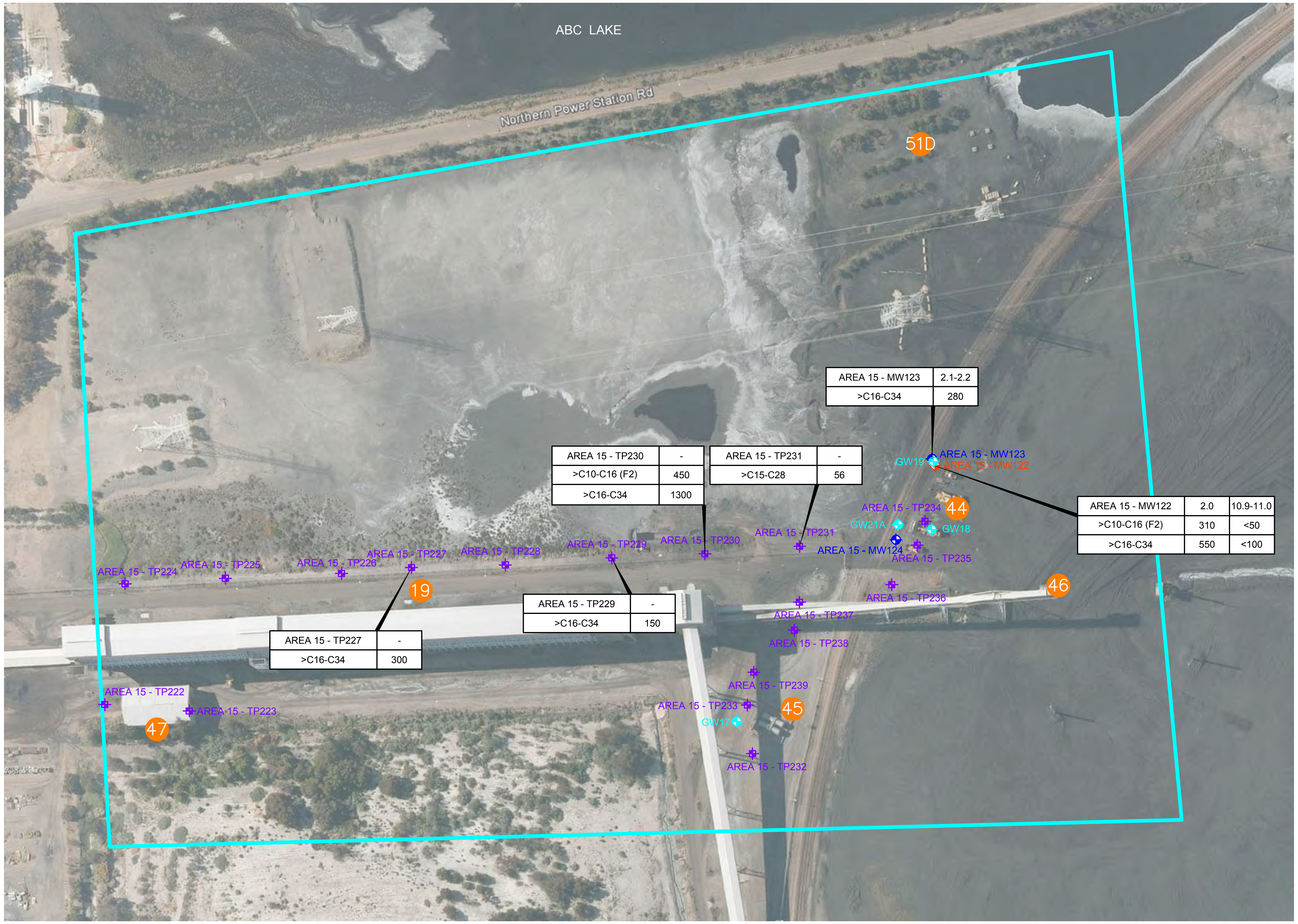


no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 20 40 60 80 100
SCALE 1:2000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

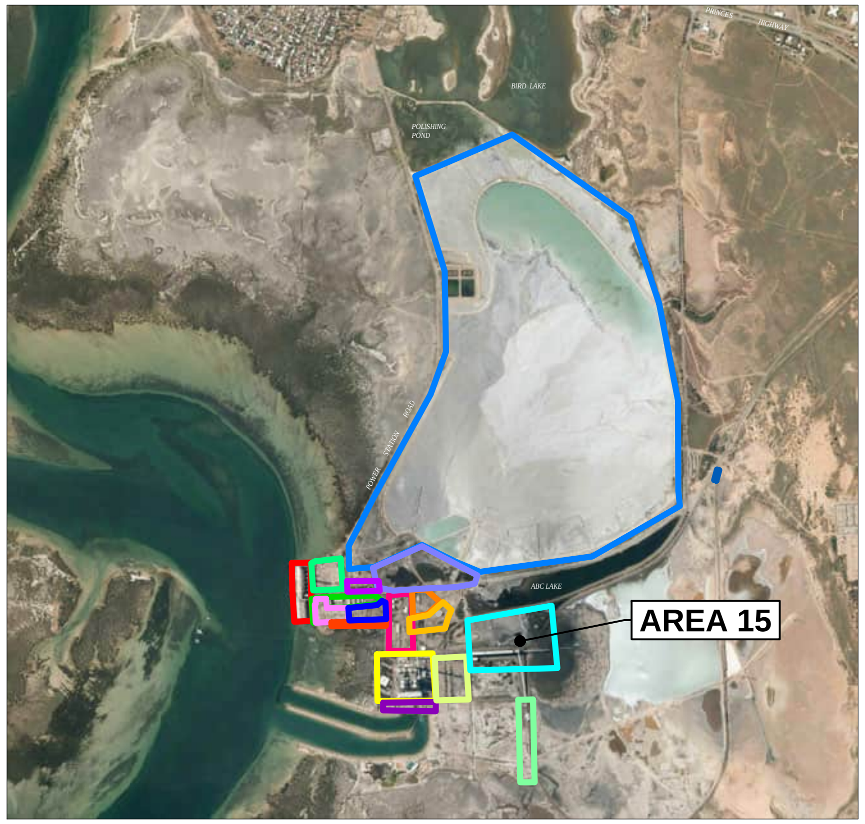
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 15 - COAL LOADING AREA**
SOIL ANALYTICAL RESULTS PLAN (6, 15 JUNE & 13 JULY 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 17C | rev: B



LEGEND

APPROXIMATE GROUNDWATER BORE LOCATION

NEW GROUNDWATER BORE LOCATION (SHALLOW)

NEW GROUNDWATER BORE LOCATION (DEEP)

AEC 19 CONVEYOR SEDIMENT POND

AEC 44 FUEL PAD

AEC 45 DIESEL ASTs

AEC 46 COAL LOADING AREA & STOCKPILES

AEC 47 COAL MACHINE WORKSHOP

AEC 51D WASTE DUMP - CHLORINE PLANT RESIDUE

DTSWL	(mBTOC)
SWL mAHD	(mAHD)

LNAPL	(m)

INFERRED GROUNDWATER FLOW DIRECTION

1.550 INFERRED GROUNDWATER ELEVATION CONTOUR (mAHD)

DTSWL GAUGED DEPTH TO WATER (mBTOC)

SWL mAHD GROUNDWATER ELEVATION (mAHD)

LNAPL LIGHT NON-AQUEOUS PHASE LIQUID THICKNESS (METRES)

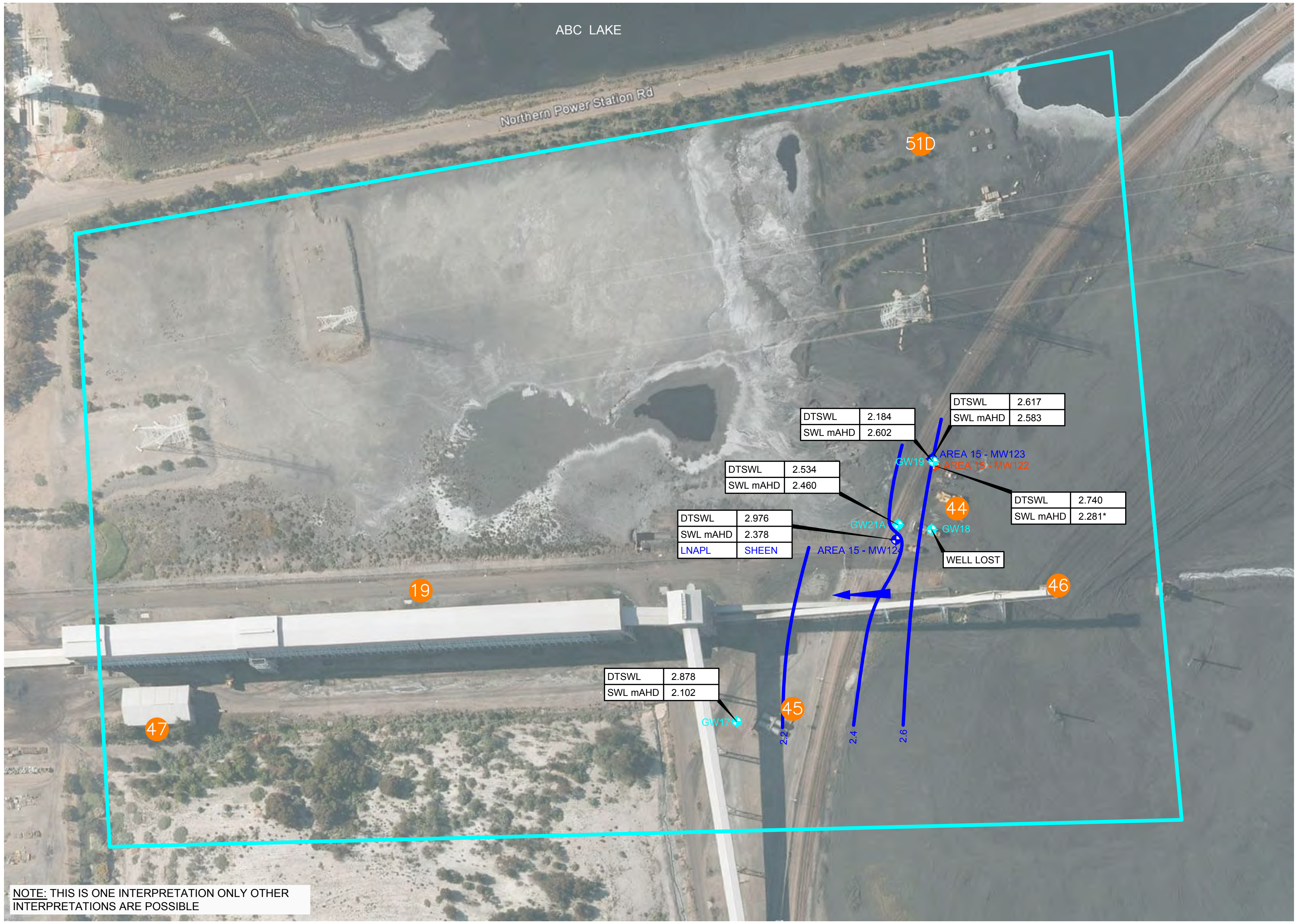
NOTE: *DEEP WELLS NOT INCLUDED IN GROUNDWATER ELEVATION CONTOURS

INFERRED HYDROGEOLOGICAL INFORMATION

HYDRAULIC GRADIENT (i) = 0.007 WEST

HYDRAULIC CONDUCTIVITY (K) (COFFEY 2016) = 0.05 to 0.13m/day

SEEPAGE VELOCITY = 0.64 to 1.7m/year



no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 20 40 60 80 100 METRES 1:2000 (A3)

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

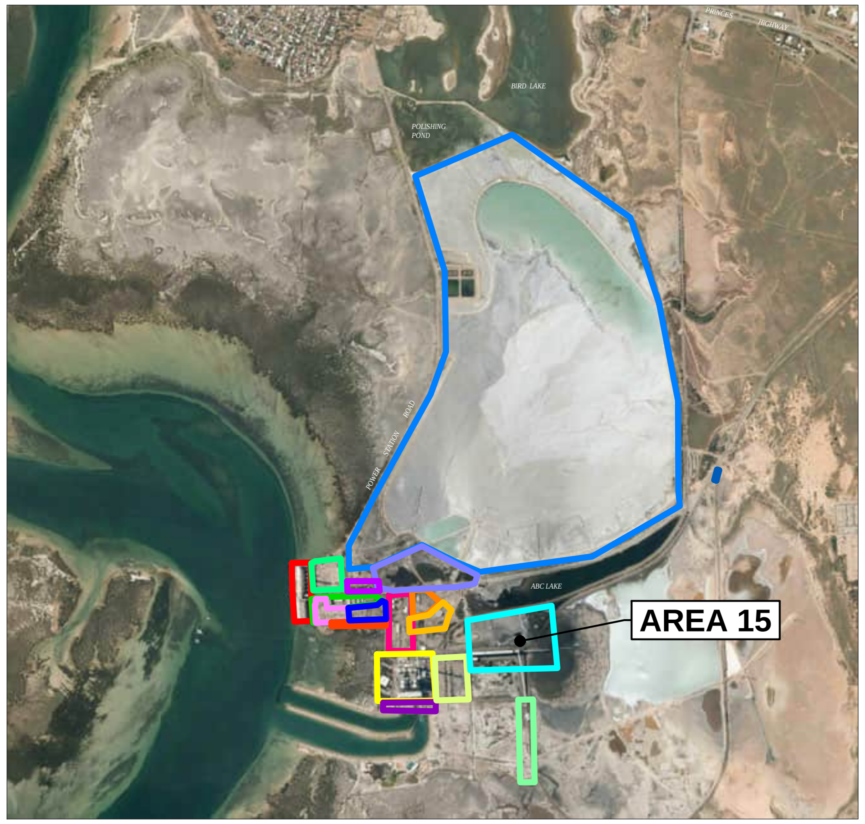
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 15 - COAL LOADING AREA**
GROUNDWATER GRADIENT PLAN (23 & 24 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 17D | rev: B

PLOT DATE: 9/02/2017 5:31:01 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION
- NEW GROUNDWATER BORE LOCATION (SHALLOW)
- NEW GROUNDWATER BORE LOCATION (DEEP)
- AEC 19 CONVEYOR SEDIMENT POND
- AEC 44 FUEL PAD
- AEC 45 DIESEL ASTs
- AEC 46 COAL LOADING AREA & STOCKPILES
- AEC 47 COAL MACHINE WORKSHOP
- AEC 51D WASTE DUMP - CHLORINE PLANT RESIDUE

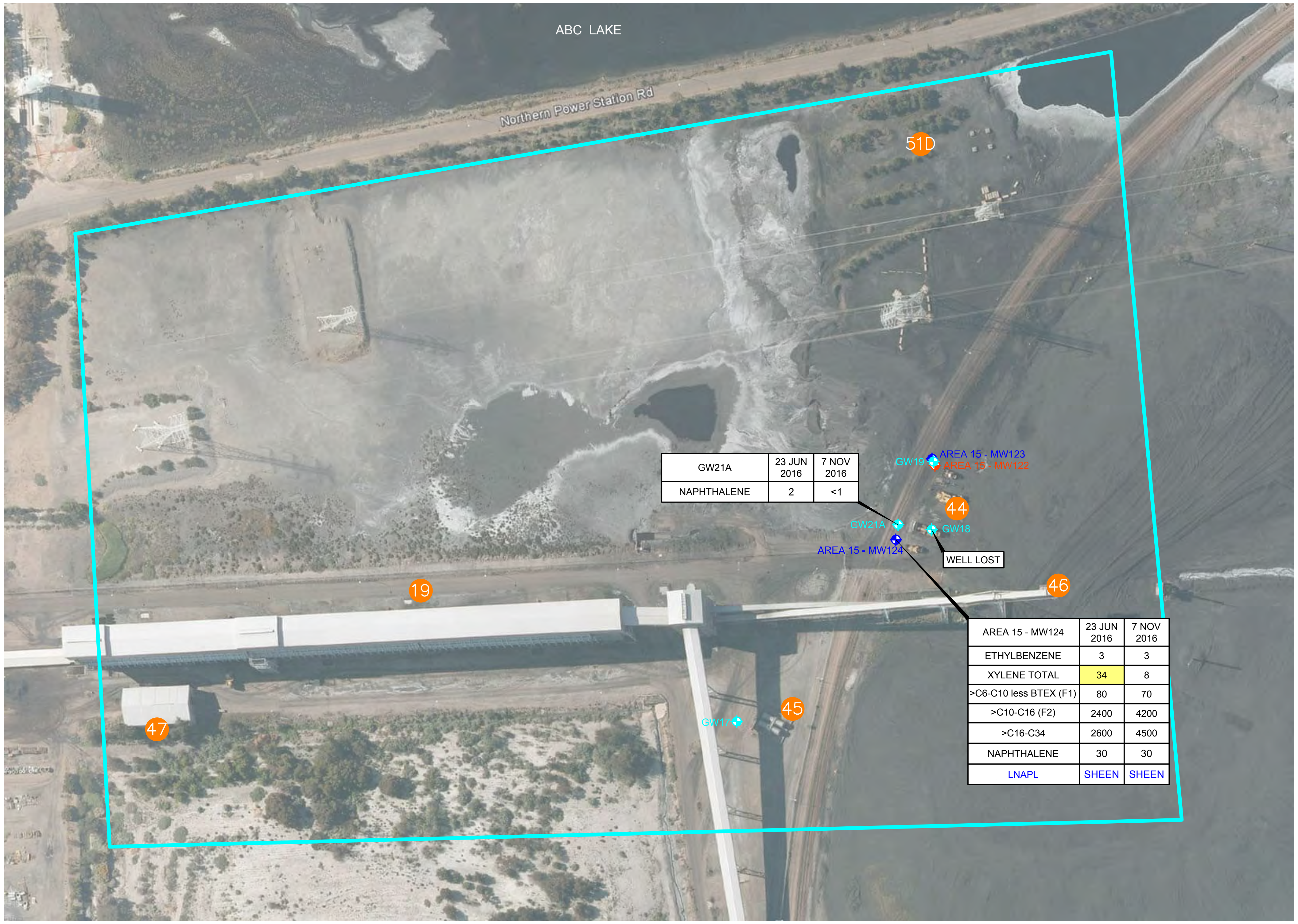
ANALYTE	(µg/L)

LNAPL	(m)

(µg/L) MICROGRAMS PER LITRE

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

N



GW21A	23 JUN 2016	7 NOV 2016
NAPHTHALENE	2	<1

AREA 15 - MW124	23 JUN 2016	7 NOV 2016
ETHYLBENZENE	3	3
XYLENE TOTAL	34	8
>C6-C10 less BTEX (F1)	80	70
>C10-C16 (F2)	2400	4200
>C16-C34	2600	4500
NAPHTHALENE	30	30
LNAPL	SHEEN	SHEEN

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 20 40 60 80 100
SCALE 1:2000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

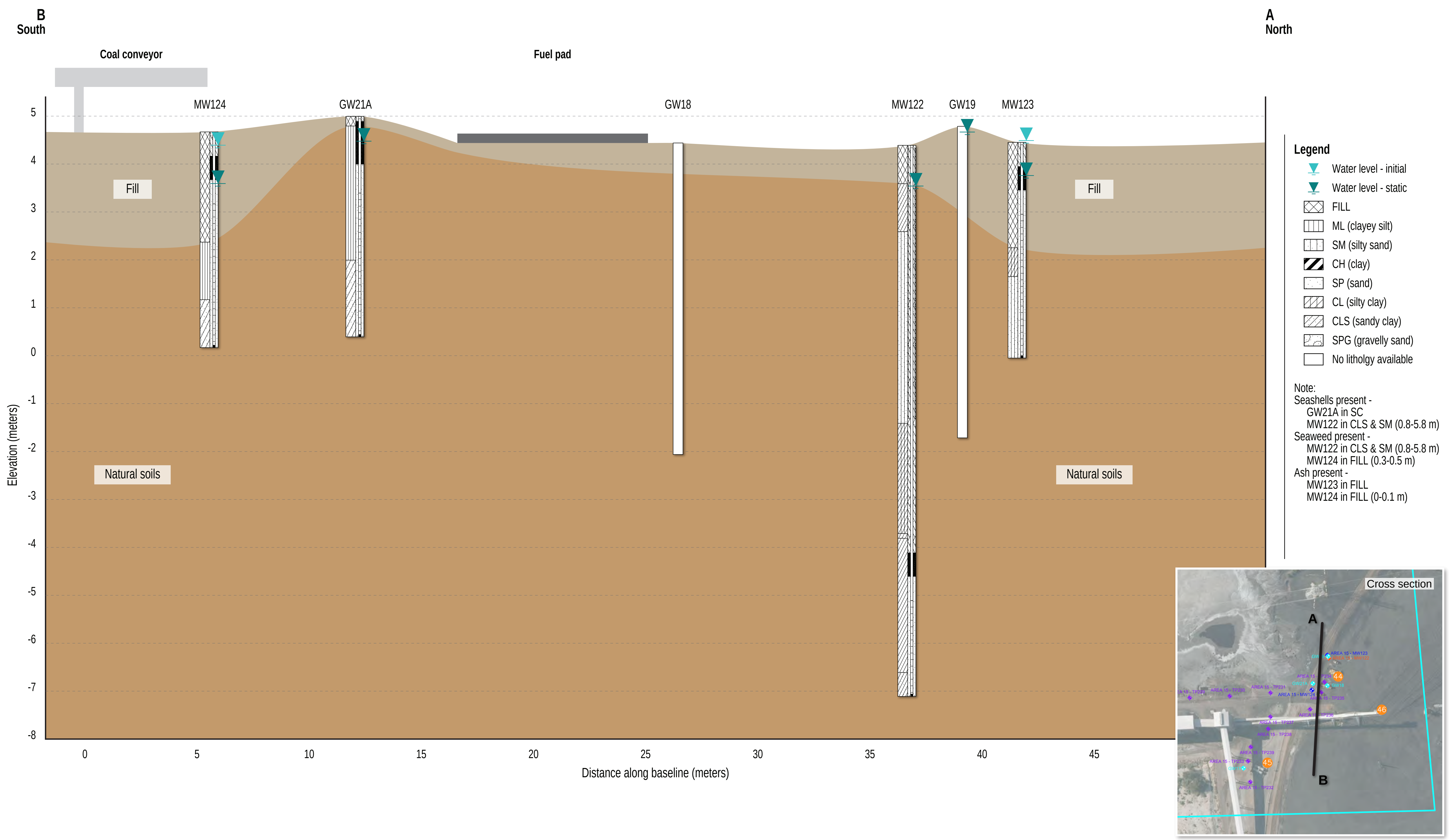
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 15 - COAL LOADING AREA GROUNDWATER ANALYTICAL RESULTS PLAN (23-24 JUNE & 7 NOVEMBER 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 17E | rev: B

PLOT DATE: 9/02/2017 5:31:02 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVIADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



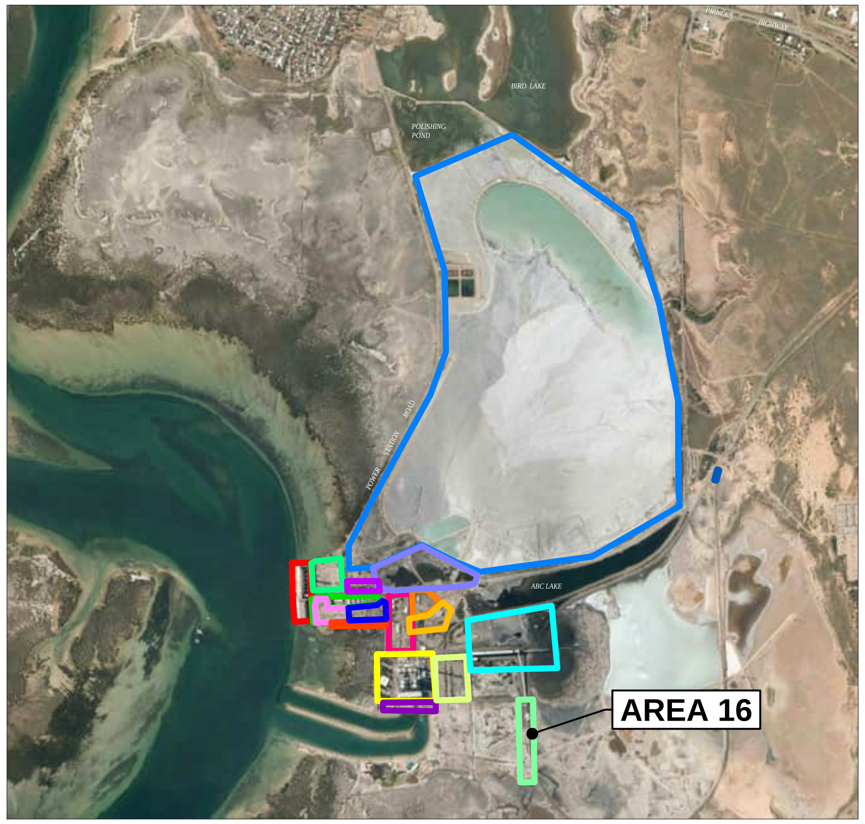
revision	no.	description	drawn	approved	date
	B	REVISION 1	JO	FM	15.02.17

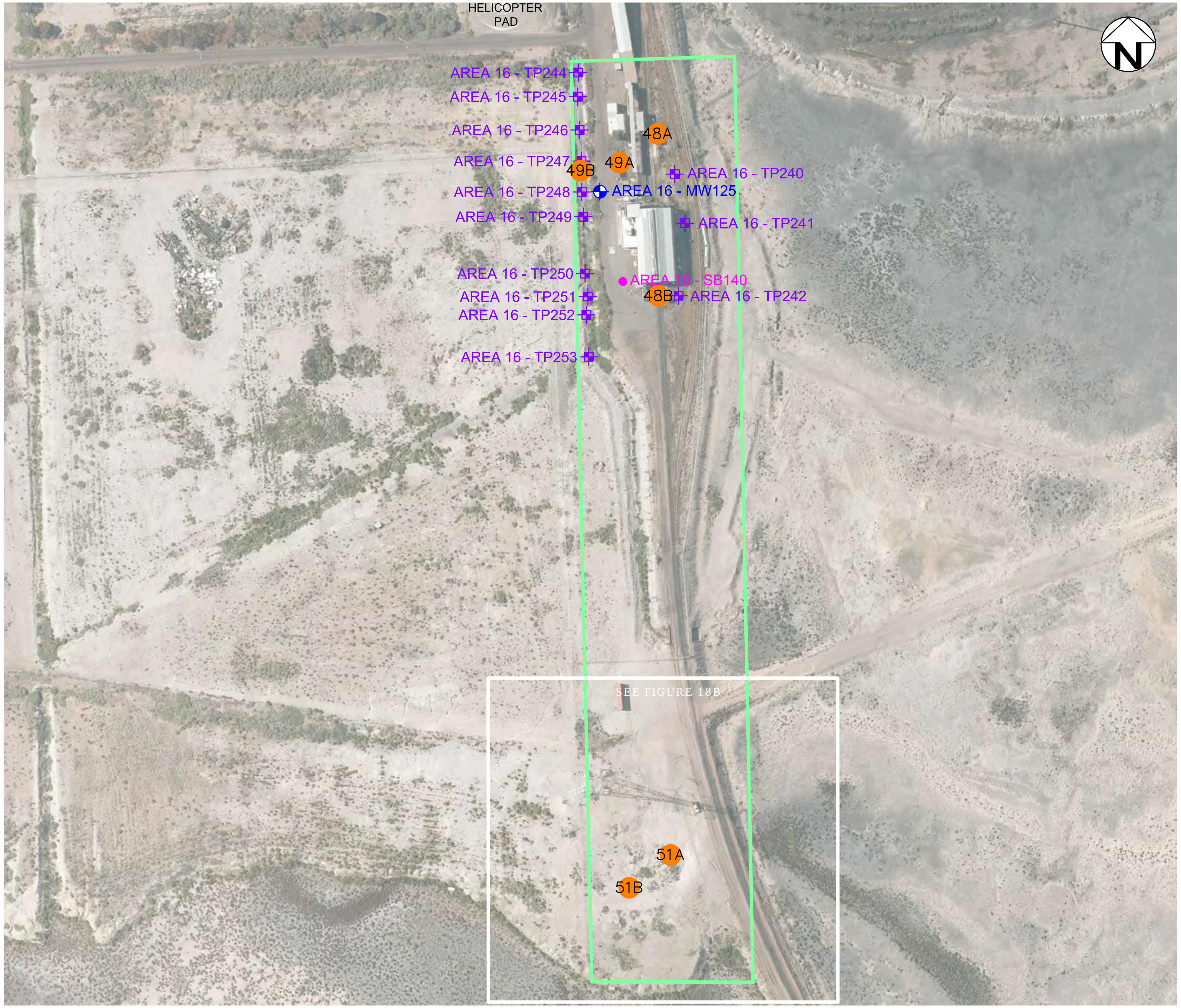
drawn	JO
approved	FM
date	15.02.2017
scale	NOT TO SCALE
original size	A3

coffey
A TETRA TECH COMPANY

client:	FLINDERS POWER PARTNERSHIP
project:	FLINDERS POWER PARTNERSHIP AUGUSTA POWER STATIONS DSI POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA
title:	AREA 15 - COAL LOADING AREA GEOLOGICAL CROSS SECTION
project no:	ENAUKESW01445AD-R01-D01
figure no:	FIGURE 17F
rev:	B

PLOT DATE: 9/02/2017 5:31:04 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKES\W01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG





LEGEND

- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- SOIL BORE LOCATION
- AEC 48A FORMER CARRIAGE GRIPPER UNIT
- AEC 48B FORMER CARRIAGE GRIPPER UNIT
- AEC 49A SETTLEMENT TRAP
- AEC 49B SWALE SOIL DRAIN
- AEC 51A WASTE DUMP - SMF
- AEC 51B WASTE DUMP - GENERAL WASTE

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 20 40 60 80 100 METRES
1:2000 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 16 - TRAIN UNLOADING AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 18A | rev: B

LEGEND

- GENERAL WASTE WITHIN TRENCH
- GENERAL AND SMF WASTE WITHIN TRENCH
- NO WASTE WITHIN TRENCH
- SMF WASTE WITHIN TRENCH
- SLEEPERS OR RAILS STACKED ON SURFACE

AEC 51A WASTE DUMP - SMF

AEC 51B WASTE DUMP - GENERAL WASTE

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:31:06 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVI\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 7.5 15 22.5 30 37.5
SCALE 1:750 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

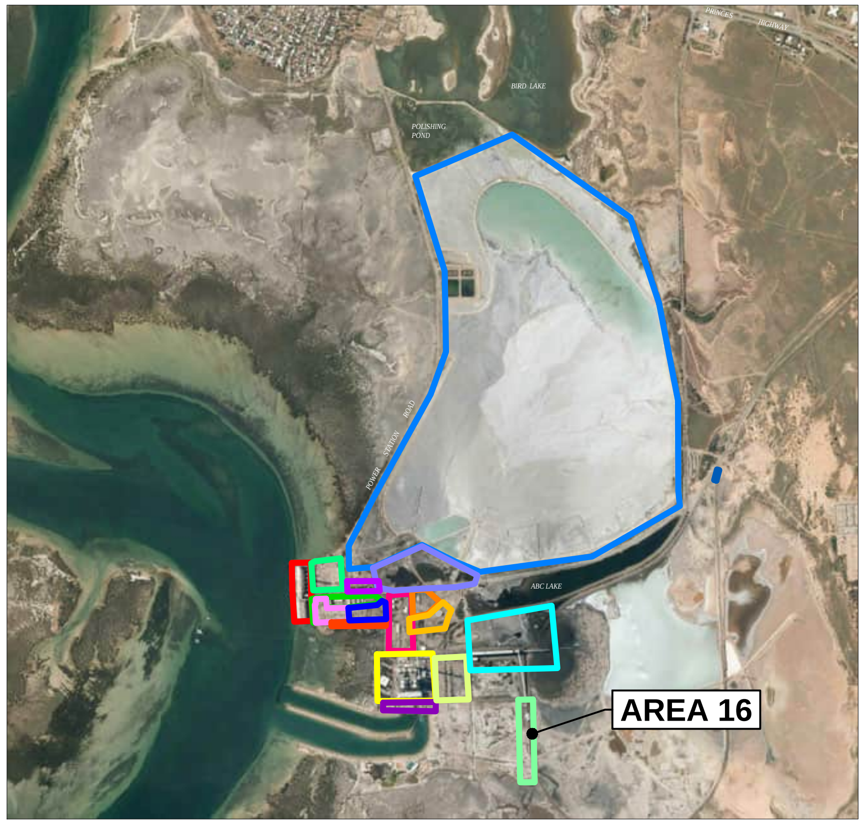
coffey
A TETRA TECH COMPANY

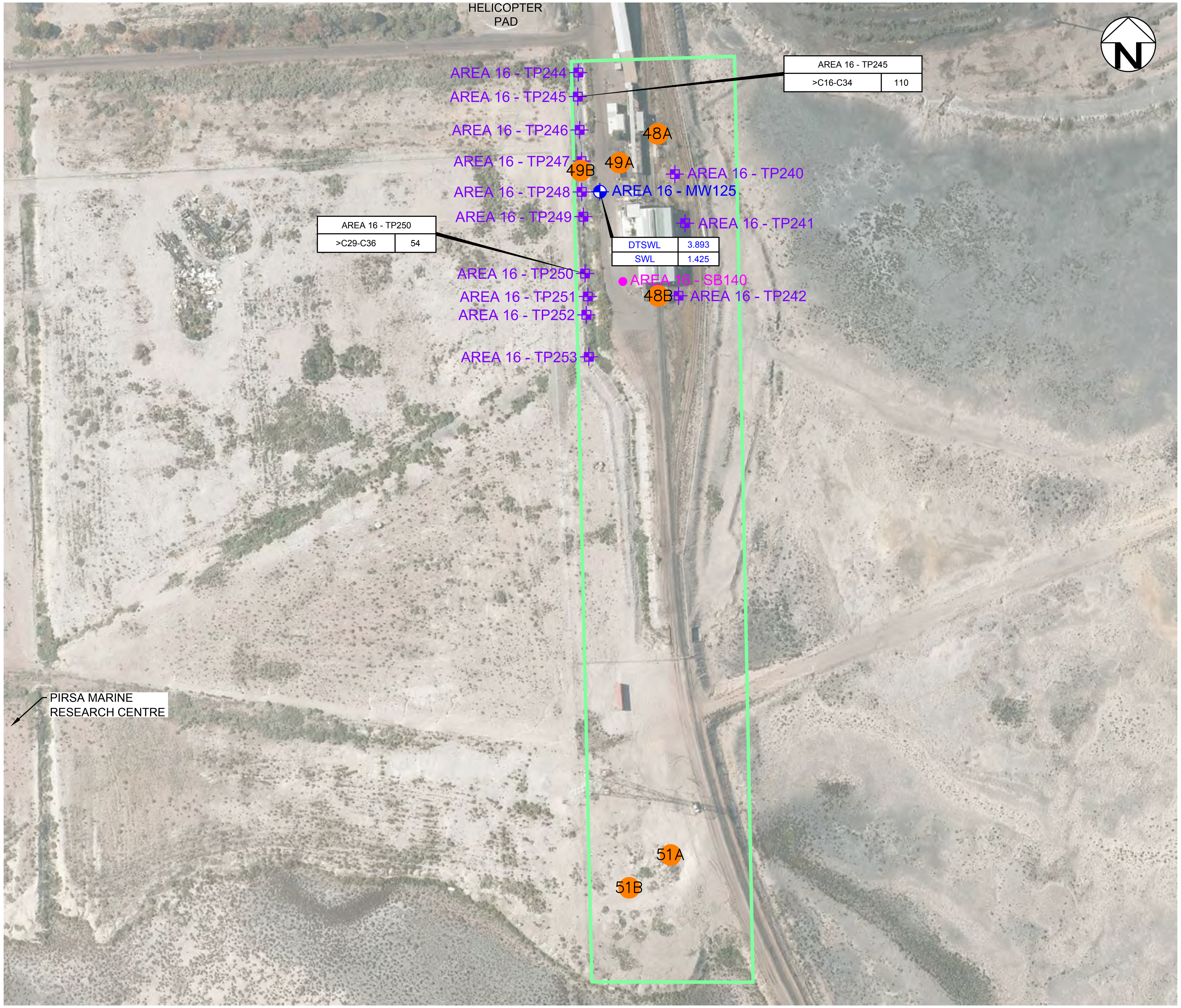
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 16 - TRAIN UNLOADING AREA**
WASTE DUMP - SMF/ASBESTOS & GENERAL WASTE (19 JULY 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 18B | rev: B





LEGEND

- NEW GROUNDWATER BORE LOCATION
- TEST PIT LOCATION
- SOIL BORE LOCATION

AEC 48A FORMER CARRIAGE GRIPPER UNIT
AEC 48B FORMER CARRIAGE GRIPPER UNIT
AEC 49A SETTLEMENT TRAP
AEC 49B SWALE SOIL DRAIN
AEC 51A WASTE DUMP - SMF
AEC 51B WASTE DUMP - GENERAL WASTE

ANALYTE	(mg/kg)
DTSWL	(mBTOC)
SWL	(mAHD)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

DTSWL GAUGED DEPTH TO WATER (mBTOC)

SWL mAHD GROUNDWATER ELEVATION (mAHD)

NOTE: GROUNDWATER ANALYTICAL RESULTS REPORTED IN AREA 16 ARE BELOW THE BACKGROUND CONCENTRATION LEVELS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 20 40 60 80 100
SCALE 1:2000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

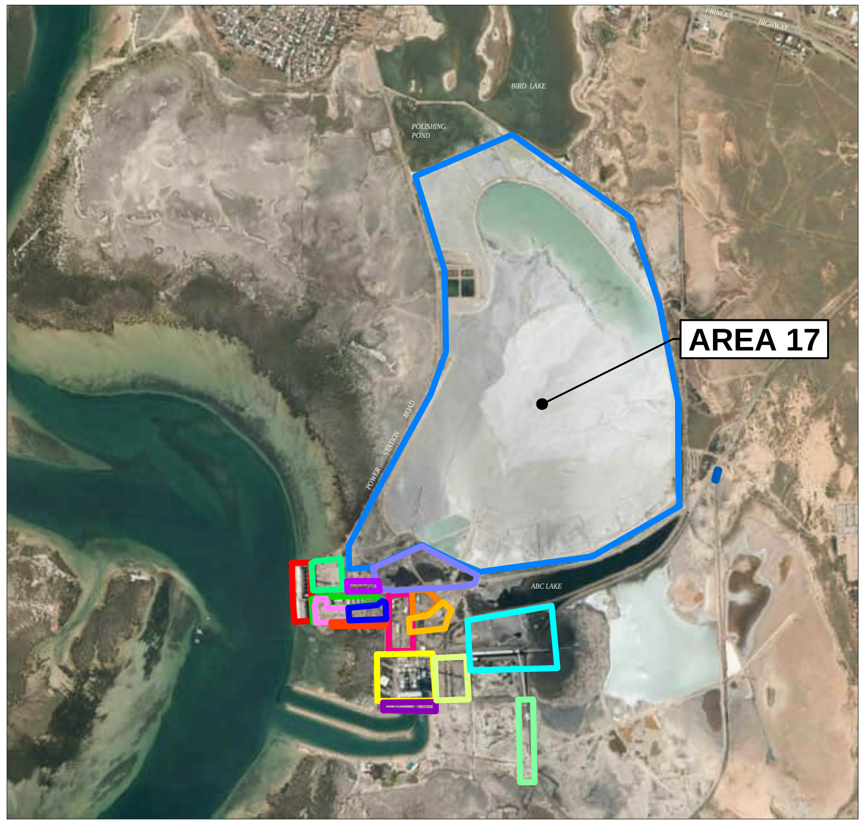
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 16 - TRAIN UNLOADING AREA**
SOIL ANALYTICAL RESULTS PLAN (13 JULY 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 18C | rev: B

PLOT DATE: 9/02/2017 5:31:08 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



LEGEND

- APS WELL LOCATION (EXISTING)
- TEST PIT LOCATION
- AEC 50A ASH POND
- AEC 50B ASH POND STAGE 2 PUMPS
- AEC 51E WASTE DUMP - ACID CLEAN PIT
- AEC 51F WASTE DUMP - GENERAL WASTE X 2

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 125 250 375 500 625 METRES 1:12500 (A3)

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

revision

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

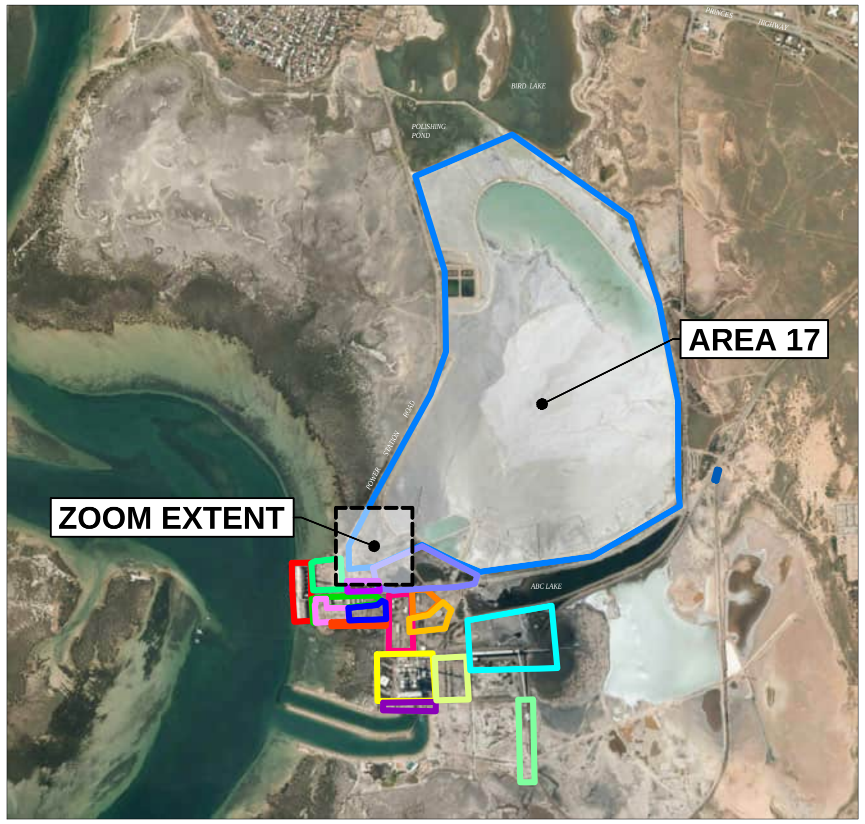
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: AREA 17 - ASH POND (MAY-JULY 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 19A | rev: B

PLOT DATE: 9/02/2017 5:31:10 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



AREA 17 - TP254	0-0.1	0.4-0.5
>C15-C28	62	<50

LEGEND

- APPROXIMATE GROUNDWATER BORE LOCATION (EXISTING)
- APS WELL LOCATION (EXISTING)
- TEST PIT LOCATION
- AEC 50B ASH POND STAGE 2 PUMPS
- AEC 51F WASTE DUMP - GENERAL WASTE X 2

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:31:12 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

SCALE 0 15 30 45 60 75 METRES 1:1500 (A3)

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

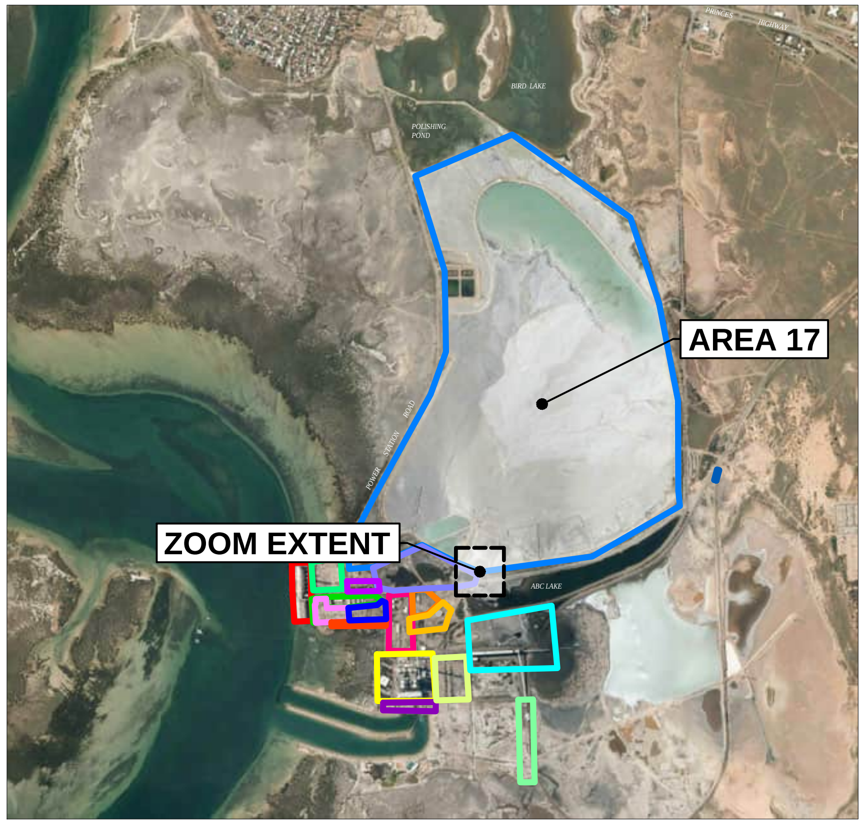
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

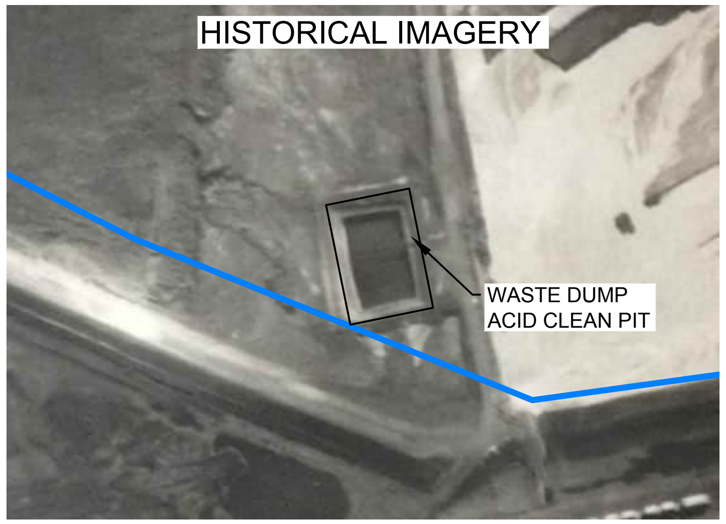
title: **AREA 17 - ASH POND - GENERAL WASTE DUMP AND SOIL ANALYTICAL RESULTS PLAN (15 & 19 JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 19B | rev: B



LEGEND

AEC 51E WASTE DUMP - ACID CLEAN PIT



AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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PLOT DATE: 9/02/2017 5:31:14 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 10 20 30 40 50
SCALE 1:1000 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

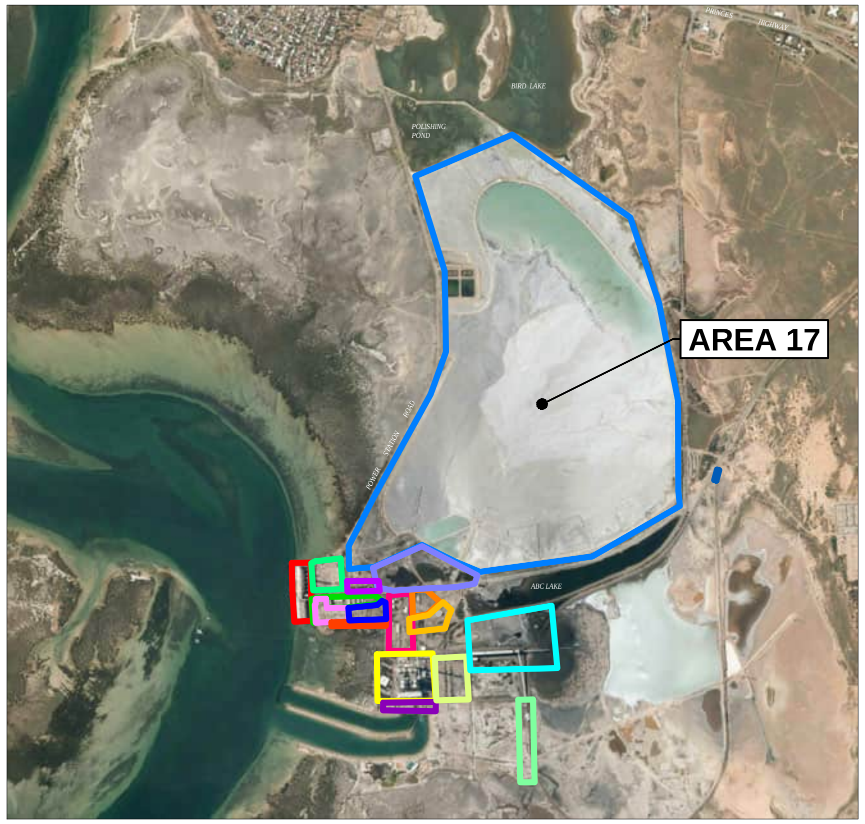
coffey
A TETRA TECH COMPANY

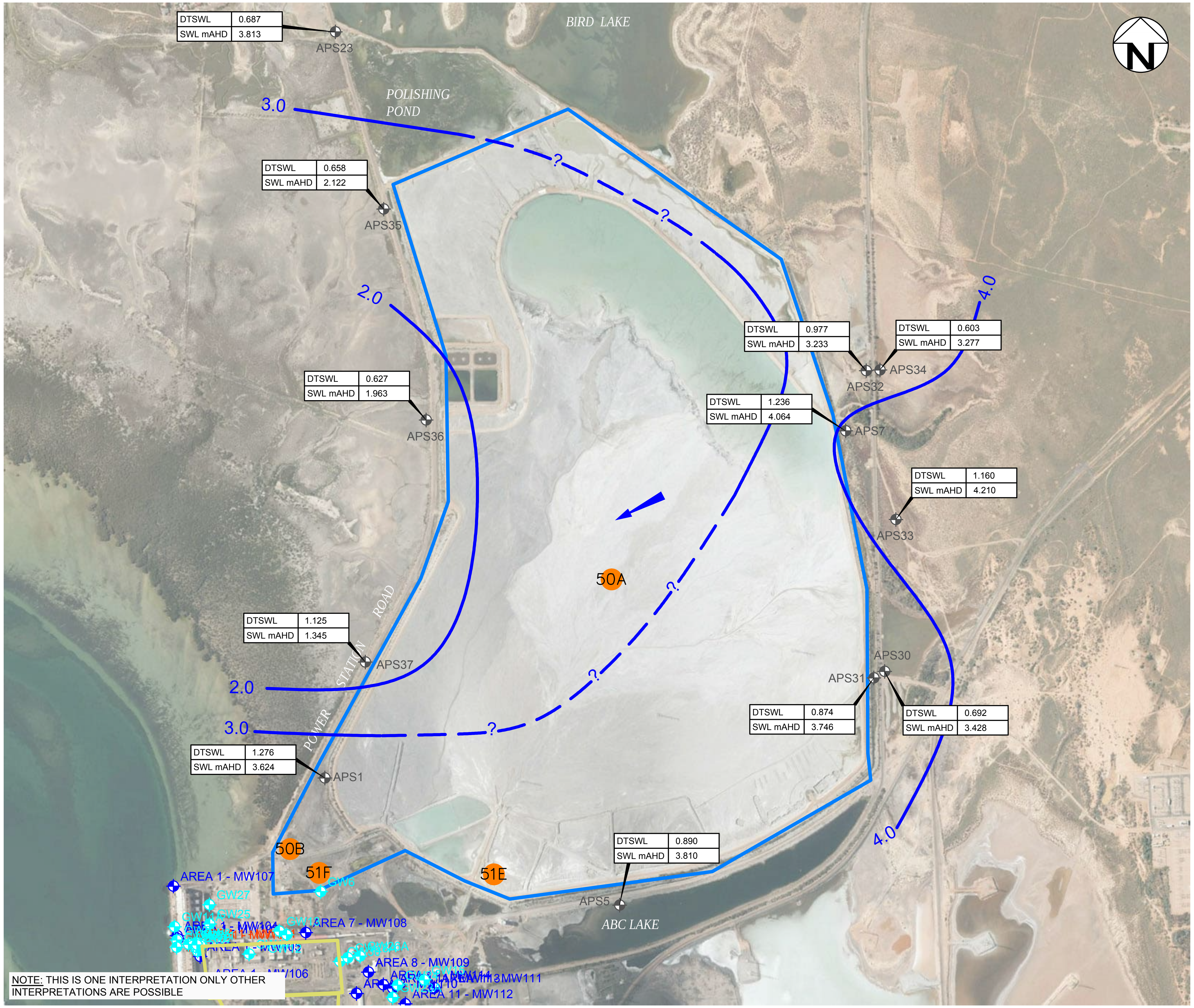
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 17 - ASH POND**
WASTE DUMP - ACID CLEAN PIT

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 19C | rev: B





LEGEND

APS WELL LOCATION (EXISTING)

AEC 50A ASH POND

AEC 50B ASH POND STAGE 2 PUMPS

AEC 51E WASTE DUMP - ACID CLEAN PIT

AEC 51F WASTE DUMP - GENERAL WASTE X 2

INFERRED GROUNDWATER FLOW DIRECTION

1.550 INFERRED GROUNDWATER ELEVATION CONTOUR (mAHD)

DTSWL GAUGED DEPTH TO WATER (mBTOC)

SWL mAHD GROUNDWATER ELEVATION (mAHD)

INFERRED HYDROGEOLOGICAL INFORMATION

HYDRAULIC GRADIENT (i) = 0.002 WEST SOUTH WEST

HYDRAULIC CONDUCTIVITY (K) (COFFEY 2016) = 0.05 to 0.13m/day

SEEPAGE VELOCITY = 0.2 to 0.5m/year

NOTE: GROUNDWATER ANALYTICAL RESULTS REPORTED IN AREA 17 ARE BELOW THE BACKGROUND CONCENTRATION LEVELS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:31:17 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENVI\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 125 250 375 500 625
SCALE 1:12500 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

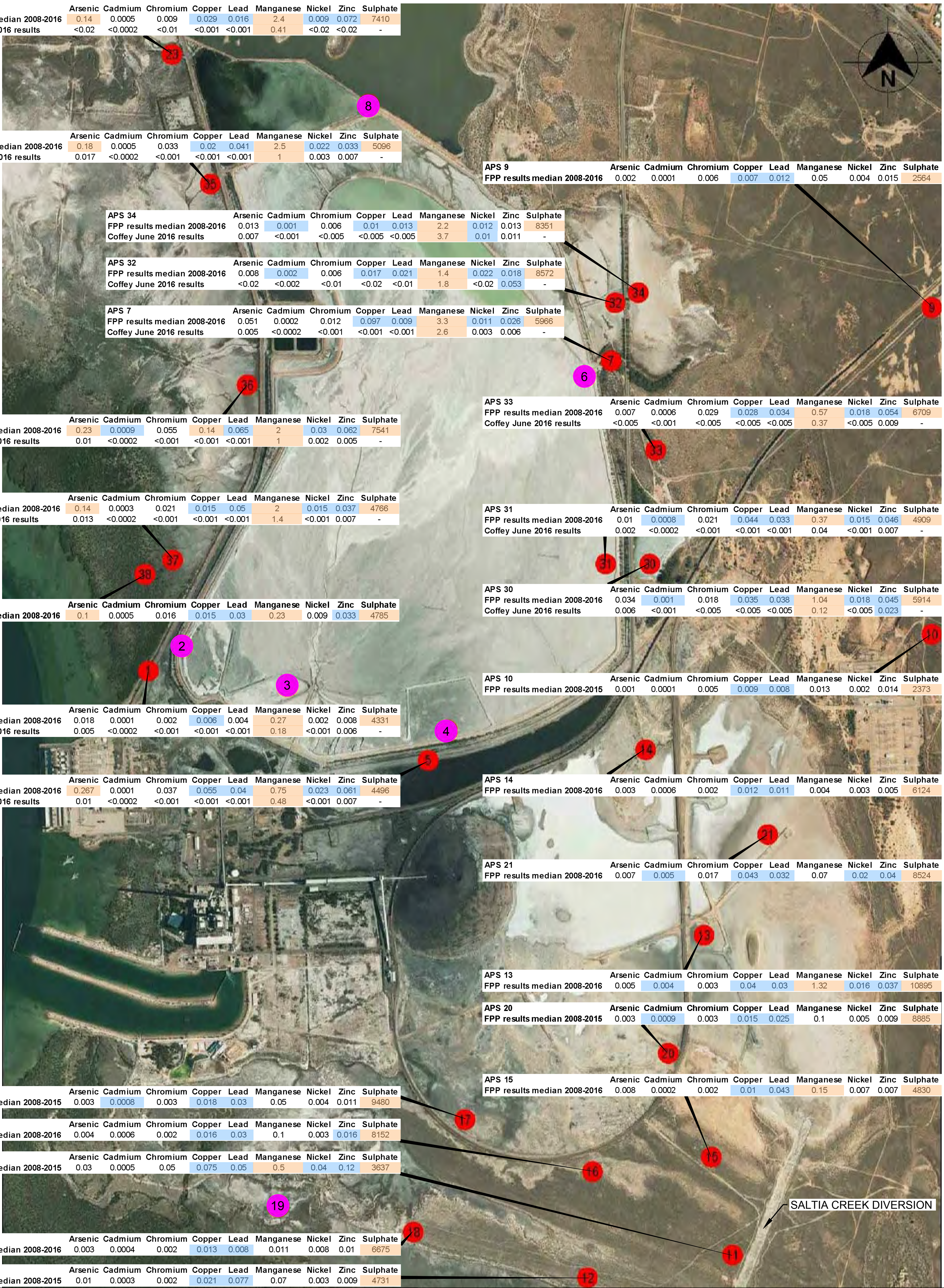
coffey
A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: AREA 17 - ASH POND
GROUNDWATER GRADIENT PLAN (23, 24 & 29 JUNE 2016)

project no: ENAUKESW01445AD-R01-D01 figure no: FIGURE 19D rev: B



Well		Arsenic	Cadmium	Chromium	Copper	Lead	Manganese	Nickel	Zinc	Sulphate
APS 23	FPP results median 2008-2016	0.14	0.0005	0.009	0.029	0.016	2.4	0.009	0.072	7410
	Coffey June 2016 results	<0.02	<0.0002	<0.01	<0.001	<0.001	0.41	<0.02	<0.02	-
APS 35	FPP results median 2008-2016	0.18	0.0005	0.033	0.02	0.041	2.5	0.022	0.033	5096
	Coffey June 2016 results	0.017	<0.0002	<0.001	<0.001	<0.001	1	0.003	0.007	-
APS 9	FPP results median 2008-2016	0.002	0.0001	0.006	0.007	0.012	0.05	0.004	0.015	2564
APS 34	FPP results median 2008-2016	0.013	0.001	0.006	0.01	0.013	2.2	0.012	0.013	8351
	Coffey June 2016 results	0.007	<0.001	<0.005	<0.005	<0.005	3.7	0.01	0.011	-
APS 32	FPP results median 2008-2016	0.008	0.002	0.006	0.017	0.021	1.4	0.022	0.018	8572
	Coffey June 2016 results	<0.02	<0.002	<0.01	<0.02	<0.01	1.8	<0.02	0.053	-
APS 7	FPP results median 2008-2016	0.051	0.0002	0.012	0.097	0.009	3.3	0.011	0.026	5966
	Coffey June 2016 results	0.005	<0.0002	<0.001	<0.001	<0.001	2.6	0.003	0.006	-
APS 33	FPP results median 2008-2016	0.007	0.0006	0.029	0.028	0.034	0.57	0.018	0.054	6709
	Coffey June 2016 results	<0.005	<0.001	<0.005	<0.005	<0.005	0.37	<0.005	0.009	-
APS 36	FPP results median 2008-2016	0.23	0.0009	0.055	0.14	0.065	2	0.03	0.062	7541
	Coffey June 2016 results	0.01	<0.0002	<0.001	<0.001	<0.001	1	0.002	0.005	-
APS 37	FPP results median 2008-2016	0.14	0.0003	0.021	0.015	0.05	2	0.015	0.037	4766
	Coffey June 2016 results	0.013	<0.0002	<0.001	<0.001	<0.001	1.4	<0.001	0.007	-
APS 31	FPP results median 2008-2016	0.01	0.0008	0.021	0.044	0.033	0.37	0.015	0.046	4909
	Coffey June 2016 results	0.002	<0.0002	<0.001	<0.001	<0.001	0.04	<0.001	0.007	-
APS 30	FPP results median 2008-2016	0.034	0.001	0.018	0.035	0.038	1.04	0.018	0.045	5914
	Coffey June 2016 results	0.006	<0.001	<0.005	<0.005	<0.005	0.12	<0.005	0.023	-
APS 38	FPP results median 2008-2016	0.1	0.0005	0.016	0.015	0.03	0.23	0.009	0.033	4785
APS 10	FPP results median 2008-2015	0.001	0.0001	0.005	0.009	0.008	0.013	0.002	0.014	2373
APS 1	FPP results median 2008-2016	0.018	0.0001	0.002	0.006	0.004	0.27	0.002	0.008	4331
	Coffey June 2016 results	0.005	<0.0002	<0.001	<0.001	<0.001	0.18	<0.001	0.006	-
APS 14	FPP results median 2008-2016	0.003	0.0006	0.002	0.012	0.011	0.004	0.003	0.005	6124
APS 5	FPP results median 2008-2016	0.267	0.0001	0.037	0.055	0.04	0.75	0.023	0.061	4496
	Coffey June 2016 results	0.01	<0.0002	<0.001	<0.001	<0.001	0.48	<0.001	0.007	-
APS 21	FPP results median 2008-2016	0.007	0.005	0.017	0.043	0.032	0.07	0.02	0.04	8524
APS 13	FPP results median 2008-2016	0.005	0.004	0.003	0.04	0.03	1.32	0.016	0.037	10895
APS 20	FPP results median 2008-2015	0.003	0.0009	0.003	0.015	0.025	0.1	0.005	0.009	8885
APS 17	FPP results median 2008-2015	0.003	0.0008	0.003	0.018	0.03	0.05	0.004	0.011	9480
APS 15	FPP results median 2008-2016	0.008	0.0002	0.002	0.01	0.043	0.15	0.007	0.007	4830
APS 16	FPP results median 2008-2016	0.004	0.0006	0.002	0.016	0.03	0.1	0.003	0.016	8152
APS 11	FPP results median 2008-2015	0.03	0.0005	0.05	0.075	0.05	0.5	0.04	0.12	3637
APS 18	FPP results median 2008-2016	0.003	0.0004	0.002	0.013	0.008	0.011	0.008	0.01	6675
APS 12	FPP results median 2008-2015	0.01	0.0003	0.002	0.021	0.077	0.07	0.003	0.009	4731

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

LEGEND

- # FPP GROUNDWATER MONITORING WELL
- # FPP GROUNDWATER MONITORING WELL (DESTROYED)

All results in mg/L

- above ASC NEPM Marine GIL
- above NHMRC Rec Waters GIL
- \- Not analysed

PDF SOURCE: ALINTA ENERGY, 211-ZBD-0018, 03.07.14.

alintaenergy

drawn	JO
approved	FM
date	09/02/17
scale	NTS
original size	A3

coffey
A TETRA TECH COMPANY

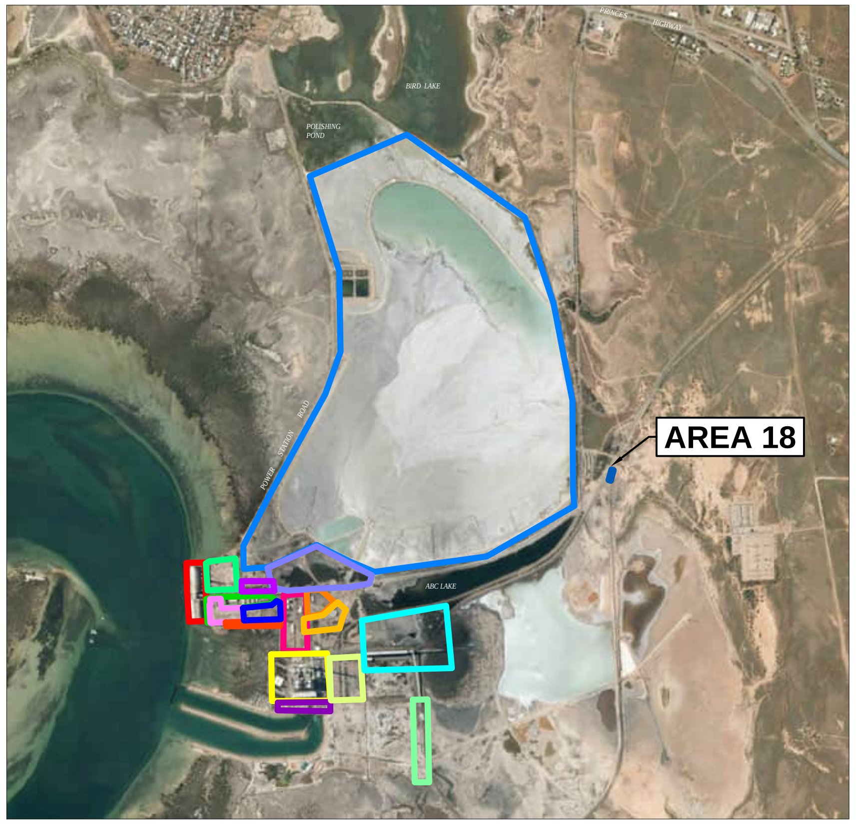
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: FPP GROUNDWATER MONITORING WELL LOCATIONS AND HISTORICAL GROUNDWATER RESULTS

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 19E | rev: B

PLOT DATE: 9/02/2017 5:31:18 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG



LEGEND

TEST PIT LOCATION

AEC 52 RAIL DIESEL FILLING AREA

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

PLOT DATE: 9/02/2017 5:31:20 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 6 12 18 24 30
SCALE 1:600 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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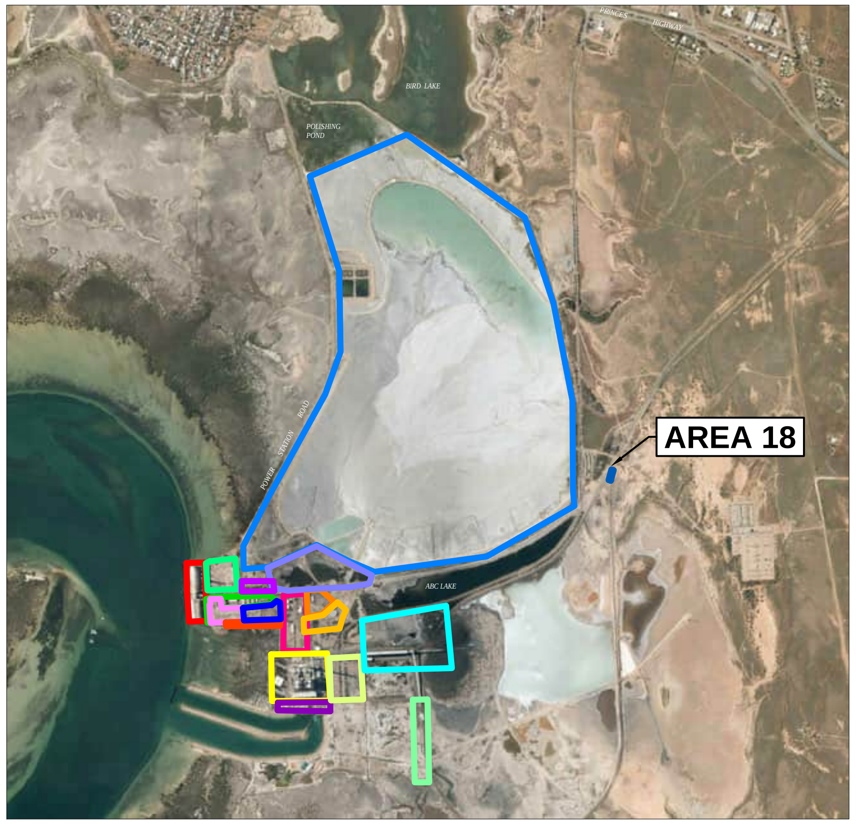
A TETRA TECH COMPANY

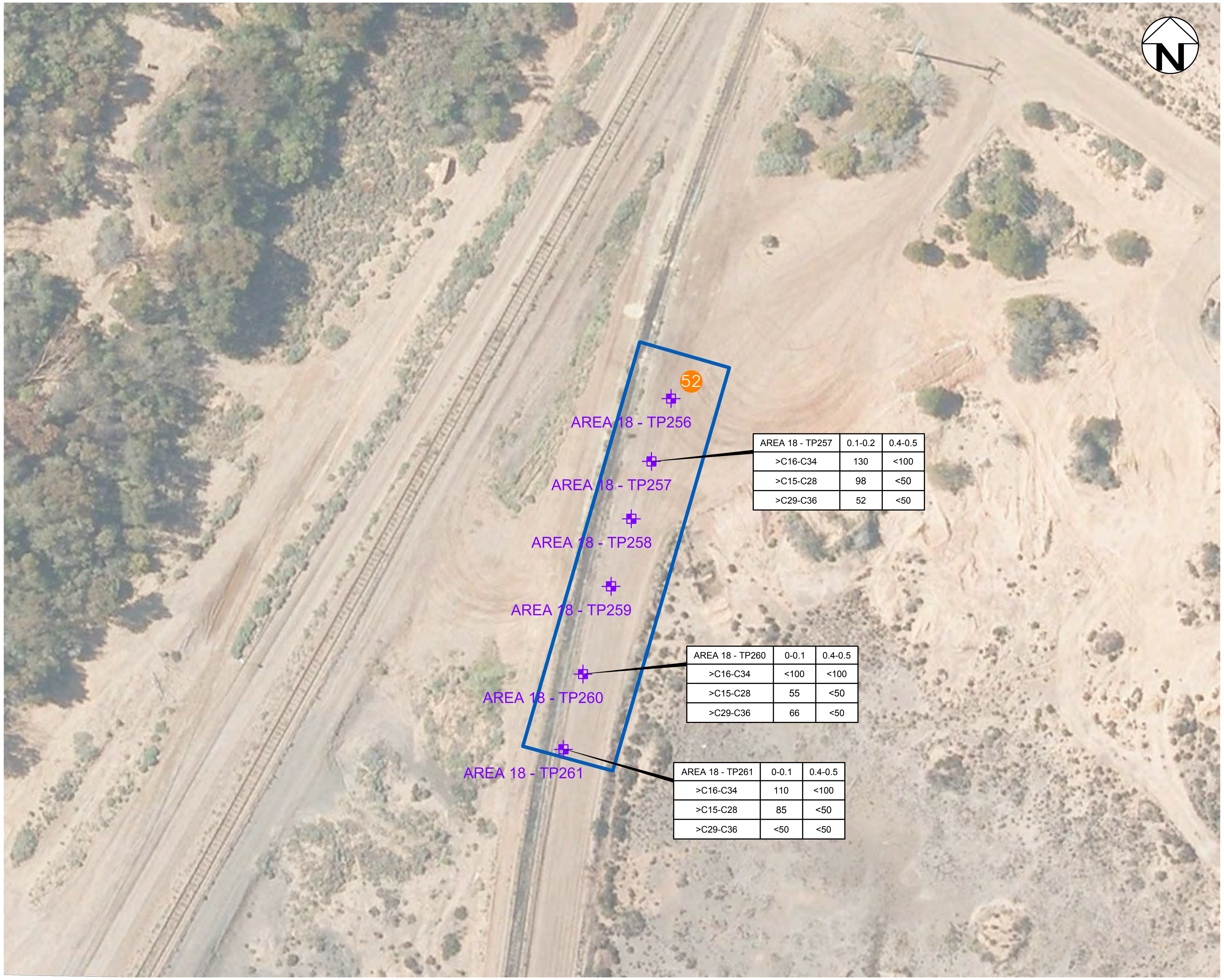
client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 18 - RAIL FILLING AREA (MAY-JULY 2016)**

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 20A | rev: B





AREA 18 - TP257	0.1-0.2	0.4-0.5
>C16-C34	130	<100
>C15-C28	98	<50
>C29-C36	52	<50

AREA 18 - TP260	0-0.1	0.4-0.5
>C16-C34	<100	<100
>C15-C28	55	<50
>C29-C36	66	<50

AREA 18 - TP261	0-0.1	0.4-0.5
>C16-C34	110	<100
>C15-C28	85	<50
>C29-C36	<50	<50

LEGEND

TEST PIT LOCATION

AEC 52 RAIL DIESEL FILLING AREA

DEPTH	(mBGS)
ANALYTE	(mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

12 HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED NOMINATED CRITERIA

NOTE: ALL OTHER ANALYTICAL RESULTS WERE REPORTED BELOW BACKGROUND CONCENTRATIONS

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	HU	FM	28/11/16
B	REVISION 1	JO	FM	09/02/17

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

0 6 12 18 24 30
SCALE 1:600 (A3) METRES

drawn	JO
approved	FM
date	09/02/17
scale	AS SHOWN
original size	A3

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A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: **AREA 18 - RAIL FILLING AREA**
SOIL ANALYTICAL RESULTS PLAN (13 JULY 2016)

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 20B | rev: B

no.	description	drawn	approved	date
B	REVISION 1	JO	FM	09/02/17

revision

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AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
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drawn	JO
approved	FM
date	09/02/17
scale	NTS
original size	A3

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A TETRA TECH COMPANY

client: FLINDERS POWER PARTNERSHIP

project: FLINDERS POWER PARTNERSHIP
AUGUSTA POWER STATIONS DSI
POWER STATION ROAD, PORT AUGUSTA, SOUTH AUSTRALIA

title: FPP SITE DRAINAGE WATER MONITORING LOCATIONS

project no: ENAUKESW01445AD-R01-D01 | figure no: FIGURE 21 | rev: B

PLOT DATE: 9/02/2017 5:31:25 PM DWG FILE: \\KESWFS02.CORP.COFFEY.COM.AU\DATA$\ENV\ADL_OPS\PROJECTS\ENAUKESW01400 - ENAUKESW01499\ENAUKESW01445 - ALINTA ENERGY - POWER STATIONS\ENAUKESW01445AD - APS DSI\DRAFTING\ENAUKESW01445AD-R01-D01.DWG