metasite

12 December 2019

Mr Paul Hoye
C/- Daniel Lamond
Manager Environmental and Planning
Douglas Shire Council
Po Box 723
MOSSMAN QLD 4873

By email - Daniel.Lamond@douglas.qld.gov.au

Dear Daniel,

Response to Information Request
Development Application: MCUI3171/2019
Street Address: Cape Tribulation Road CAPE TRIBULATION, 4/3910 Cape Tribulation Road CAPE TRIBULATION
Real Property Description: Lot 0 TYP: SP PLN 219085, LOT: 4 TUP: SP PLN: 219085
Optus reference: B8857 Cape Tribulation

We refer to Council's information request dated 31 July 2019 and to subsequent discussions including the meeting held at Council's office between Council staff and Optus, Huawei and Metasite representatives.

We note Council's clear position that the planning intent for Cape Tribulation is to only accommodate one (1) telecommunications structure and the advice that Telstra had submitted an application for a telecommunications facility at 3726 Cape Tribulation Road, Cape Tribulation. We also recognize Council's desire to facilitate competitive service provision in Cape Tribulation.

As discussed, Optus had been working with Telstra to develop one site and Optus' application provided for co-location by Telstra. Unfortunately Telstra submitted their application without reference to Optus.

Optus and Telstra have consulted further about the provision of telecommunications services to the Cape Tribulation area and we are pleased to provide this RFI response along with confirmation that the proposal has been amended, at Telstra's request, to formally include Telstra's facilities.

Optus also sought to investigate using the proposed Telstra facility at 3726 Cape Tribulation Road, Cape Tribulation but those investigations were not able to be progressed. Because of this, at this point there is no possibility that Optus can provide services from that location. We understand that Telstra will not be proceeding with that proposed facility.

Revised Design
The original application showed Telstra's antennas as indicative at 37m on the proposed tower. The proposal has been amended to formally incorporate Telstra's facilities. The proposed facilities are shown in the attached plans. For assessment purposes these plans supersede the plans submitted with the original application.

The proposal now consists of the following:

- 1 x 50m lattice tower and headframes
- 4 x Optus panel antennas (49m)
- 16 x Optus Remote Radio Units (at 50m)
- 8 x Optus ancillary radio units (49m)
- 1 x Optus 1800m face mounted parabolic antenna (45m)
- 1 x Telstra 1800m face mounted parabolic antenna (40m)
- 6 x Telstra panel antennas (37.5m) with ancillary radio units
- 1 x Telstra 1800m face mounted parabolic antenna (35m)
- 1 x Optus equipment shelter on steel platform
- 1 x Telstra equipment shelter on steel platform
- 1 x Telstra standby generator
- 1 x 1.8m Telstra satellite dish on steel base frame
- Security fencing
- Ancillary items as shown in the attached plans
- Removal of some existing trees surrounding the facility location.

Excavation and Fill
We note your comments that the site area was observed to be soft and wet.

Although this may be the case, the structural adequacy of the tower and footing will be certified and signed off as required to comply with relevant Australian Standards and the Building Code of Australia.

The volume of fill required for the project has been assessed by the design engineers as per the information request from council (item 1) to be as follows:

a) Volume of fill required for vehicle access:
   3.0m x 0.1m x 60m length = approx. 18m^3
b) Volume of excavation required for structure footing (assuming worse case of pad footing):
   7.5mm x 7.5m x 1.5m depth = approx. 84m^3
c) Volume of fill required to be imported for the construction of the proposal:
   No additional fill will be required to be imported as the soil excavated can be reused, with excess to be distributed throughout the parcel. 'Grey Metal' will be imported and spread over the unpaved area of the existing access route as per the proposed plans.
d) Volume of excavation required for trenching for service cables:
   0.3m x 0.5m x 282m length = approx. 42m^3
e) Please find attached an assessment of acid sulfate soils in accordance with the relevant guidelines. As per the report, no acid sulfate soils were detected.

sydney Level 2, 71 Alexander Street
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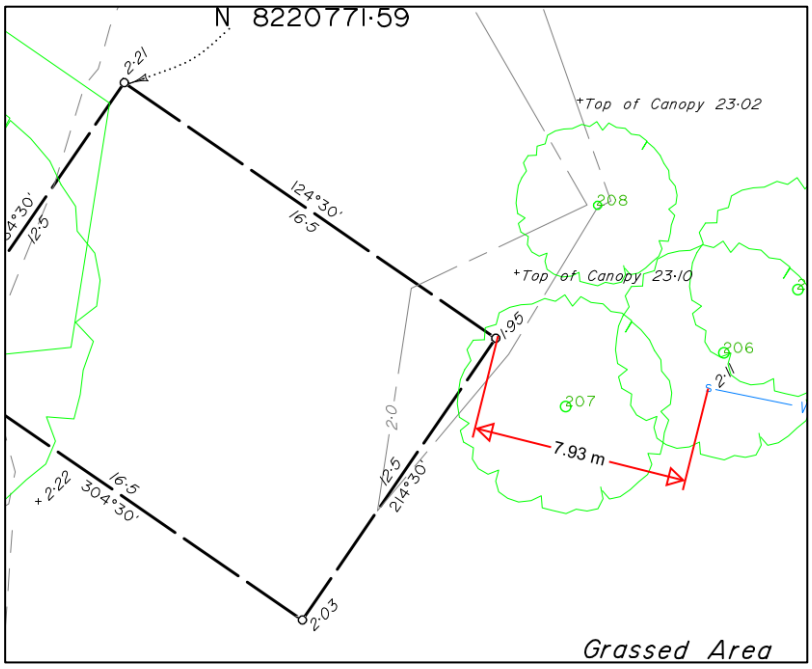
Siting of the Proposed Development
The site has been surveyed with reference to the existing on-site effluent system. The survey plan attached shows the extent the system. The below image shows the distance from the associated sprinklers, which have an approximate maximum reach of 5m. The proposed site does not interfere with the existing system.



Plan of Development
The site has now been surveyed and attached plan shows the requested information. Updated design drawings have also been submitted with this response.

Visual Impact
We note that council has concerns regarding the visual impact the proposed structure may have on the Cape Tribulation area. We note that as per the tree canopy measurements recorded on the attached site survey, the existing tree canopy surrounding the facility is between 22 and 32 meters in height. We also note that the proposed tower is located around 235m back from this roadway and the existing properties in the cape tribulation township. As such, we believe that the proposed tower will have a very minimal visual impact onto the Cape Tribulation township, as much of the facility will be obstructed by this existing vegetation.

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Image 1 – photo facing towards the tower location from Cape Tribulation Road

Image 2 – photo of the existing trees along Cape Tribulation Road

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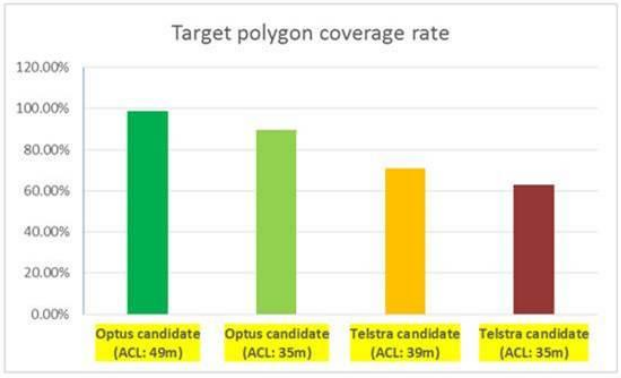
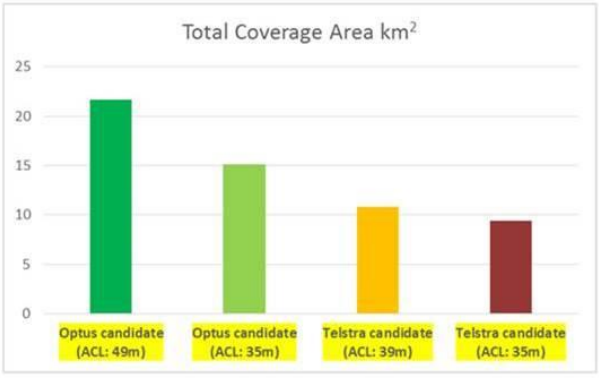
Coverage Test Metrics
The table and graphs shown below demonstrate predicted radio performance levels at varying heights at both the proposed Optus location and the proposed Telstra location.

Note that predictions between 34-36m would show negligible differences and are not modelled.

The predictions demonstrate a material difference in radio performance for Optus between the two sites. This is the primary reason that the Optus location is strongly preferred by Optus.

	Target polygon coverage rate	Total Coverage Area km²
Optus candidate (ACL: 49m)	98.74%	21.64
Optus candidate (ACL: 35m)	89.54%	15.13
Telstra candidate (ACL: 39m)	70.82%	10.82
Telstra candidate (ACL: 35m)	63.02%	9.42





We trust that this information satisfies the request for information and ask that Council continue with the assessment.

If there are any queries about the information provided or if any further information is required please feel free to contact the undersigned.

Yours sincerely,

Joel Stuart
Environmental Planner
Metasite Pty Limited

Attachments:

Appendix A – Proposed Plans (updated)

Appendix B – Survey Plan

Appendix C – Acid Sulfate Soil Assessment Report

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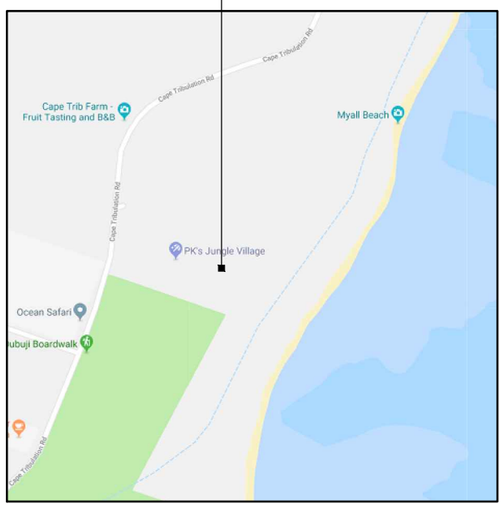


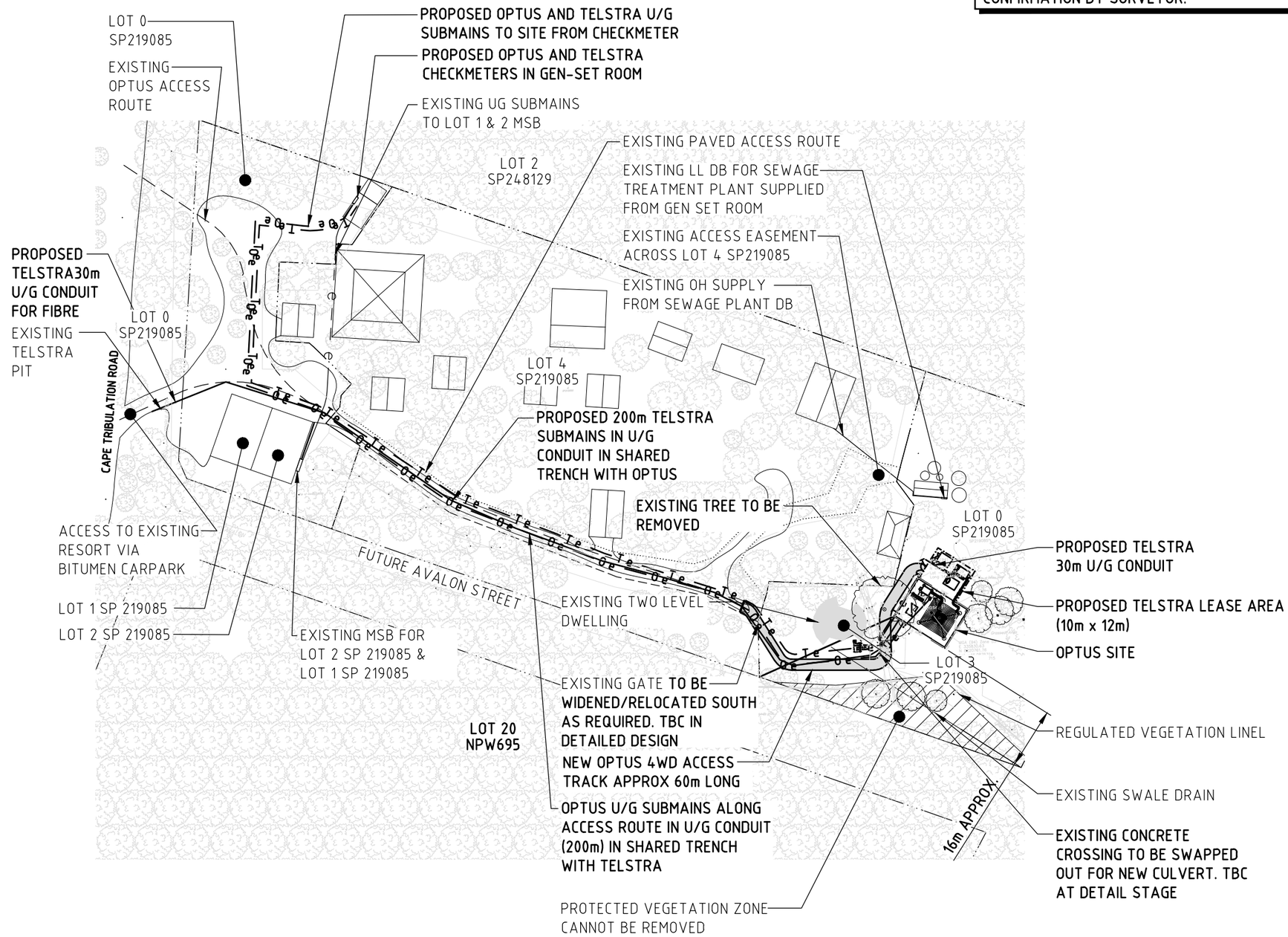
PROPOSED OPTUS BASE STATION

LOCALITY MAP

NOTE:
THIS DRAWING IS DIAGRAMMATIC ONLY AND SHOULD NOT BE SCALED. DIMENSIONS, COORDINATES, AND LEVELS SHOWN ARE NOMINAL AND SUBJECT TO CONFIRMATION BY SURVEYOR.

LEGEND:

- LOT BOUNDARIES
- OPTUS SUBMAINS
- TELSTRA SUBMAINS
- SURVEY MARKER
- EXISTING ELECTRICAL CABLES
- OPTUS SITE ACCESS ROUTE
- EXISTING PAVED ACCESS ROUTE
- EXISTING EASEMENT
- PROPOSED ACCESS TRACK



OVERALL SITE PLAN

SCALE 1:1250

Rev	Date	Revision Details	Consultant	CAD	Designer	Verifier	Approver
03	05.12.19	ISSUED FOR APPROVAL	METASITE	AU	RT	RT	PJ
02	28.06.19	ISSED FOR APPROVAL	HUAWEI	BL	AP	BC	JH
01	22.12.17	ISSUED FOR APPROVAL	OPUS	AW	AP	BC	JH

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Client: OPTUS

Project: MOBILE NETWORK AUSTRALIA
SITE No. B8857 - Q
CAPE TRIBULATION
CAPE TRIBULATION ROAD, CAPE TRIBULATION

Drawing Title: ACCESS TRACK PLAN

Drawing Status: FOR APPROVAL

Drawing No. B8857-P1

Revision 03

20 10 0 10 20 30 40 50mm

A3

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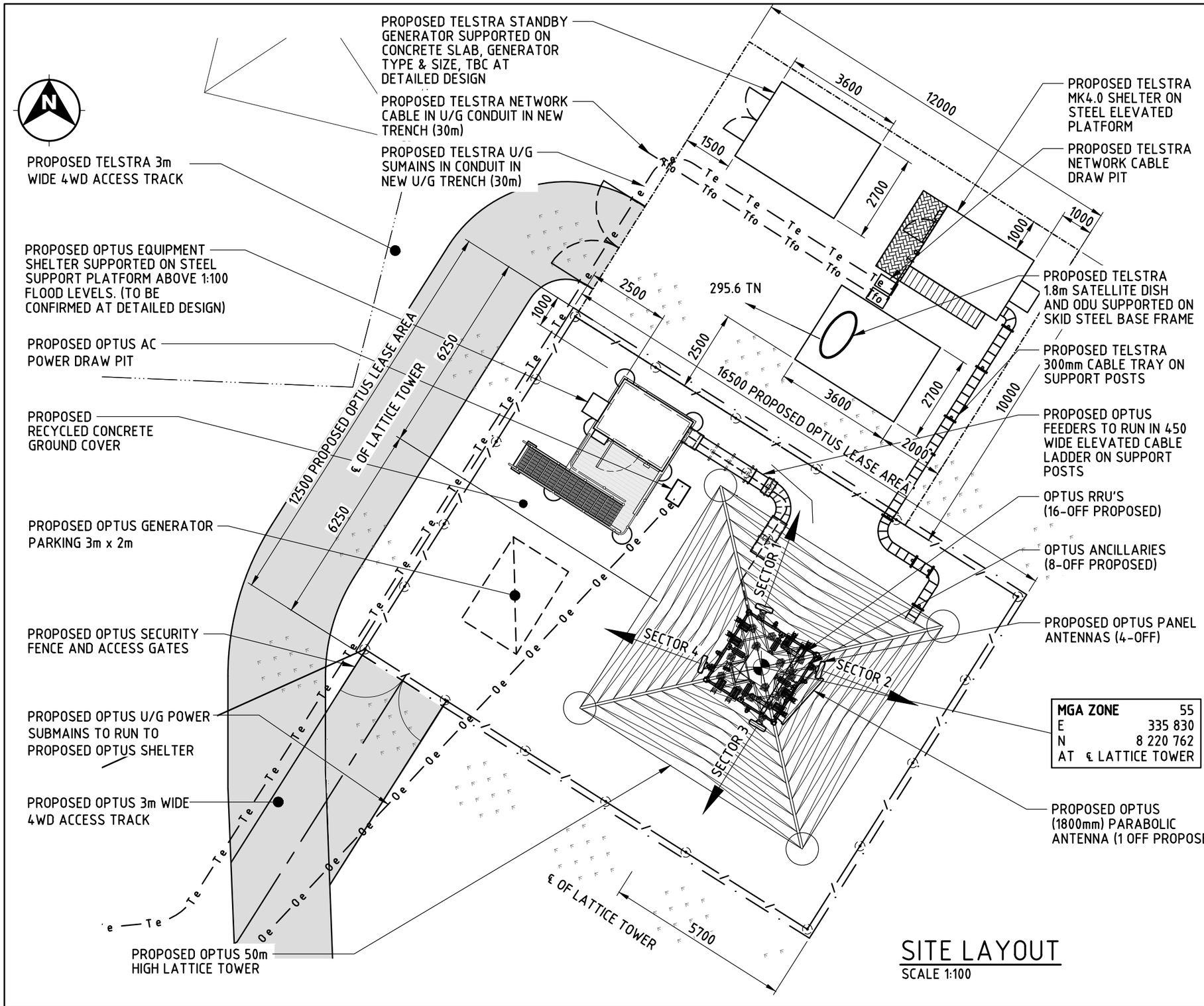

MGA ZONE	55
E	335 830
N	8 220 762
AT ℄ LATTICE TOWER	

SITE ADDRESS:
LOT 0 / SP219085
CAPE TRIBULATION ROAD,
CAPE TRIBULATION, QLD 4873

NOTES:

1. **BASIS OF DESIGN**
   - SITE INSPECTION 19/06/2019
2. **PANEL ANTENNAS**
   - 1-OFF PROPOSED HUAWEI ASI4517R1 12 PORT ANTENNA PER SECTOR (EACH 2.8m MAX. LONG) AT EL 49.00m.
   - SECTOR 1 - 20°, SECTOR 2 - 110°, SECTOR 3 - 210°, SECTOR 4 - 290°
   - MOUNTED TO STAND OFF MOUNTS ON HEADFRAME.
3. **TRANSMISSION**
   - ø1800 PARABOLIC ANTENNA AT EL 45.00m (1 OFF PROPOSED)
4. **EQUIPMENT SHELTER**
   - PROPOSED ICS TYPE A2 SHELTER (2.5m x 1.8m WITH AIRCONS).
   - SUPPORTED ELEVATED STEEL PLATFORM ABOVE 1:100 LEVEL.
5. **OPTUS LATTICE TOWER**
   - PROPOSED 50m HIGH LATTICE TOWER WITH OPTUS SQUARE HEADFRAME AT EL 49.00m.
6. **FEEDER CABLES**
   - SIZE: 6/12 (4 OFF) TRUNK CABLE
   - LENGTH: 60m
   - PROPOSED TRUNK CABLES TO RUN FROM SHELTER IN 450 WIDE ELEVATED CABLE LADDER THEN RUN UP LATTICE TOWER UTILISING FEEDER SUPPORT BRACKETS.
7. **SITE ACCESS**
   - SITE ACCESS VIA EXISTING BITUMEN CARPARK AND THEN VIA NEW 50m APPROX. 4WD ACCESS TRACK. ENTRY OFF CAPE TRIBULATION ROAD.
   - OPTUS SITE 250m FROM CAPE TRIBULATION ROAD ENTRY.
8. **ANTENNA ACCESS**
   - CLIMBING LADDER AND DOUBLE LANYARD ACCESS PROVIDED ON LATTICE TOWER.
9. **POWER SUPPLY**
   - PROPOSED OPTUS CHECK METER TO BE INSTALLED IN LANDLORDS' GEN SET ROOM AND 3-PHASE AC POWER TO BE PROVIDED FROM THE GEN SET. OPTUS AC POWER SUBMAINS TO TAKE SHORTEST ROUTE TO OPTUS SHELTER.
   - PROPOSED U/G OPTUS AC POWER SUBMAINS >320m APPROX.
   - DETAILS TO BE CONFIRMED AT DETAILED DESIGN.
10. **OTHER (PAINTING, LANDSCAPING, SCREENING)**
    - PROPOSED OPTUS EQUIPMENT INCLUDES, LATTICE TOWER, HEADFRAME, MOUNTS, SHELTER, SHELTER PLATFORM, ANTENNAS, RRUS, ANCILLARIES TO BE PAINTED PALE EUCALUPT.

SITE LAYOUT
SCALE 1:100

Rev	Date	Revision Details	Consultant	CAD	Designer	Verifier	Approver
03	05.12.19	ISSUED FOR APPROVAL	METASITE	AU	RT	RT	PJ
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Client: OPTUS

Project: MOBILE NETWORK AUSTRALIA
SITE No. B8857 - Q
CAPE TRIBULATION
CAPE TRIBULATION ROAD, CAPE TRIBULATION

Drawing Title: DRAFT SITE LAYOUT SHEET 1

Drawing Status: FOR APPROVAL

Drawing No. B8857-P1

Revision 03

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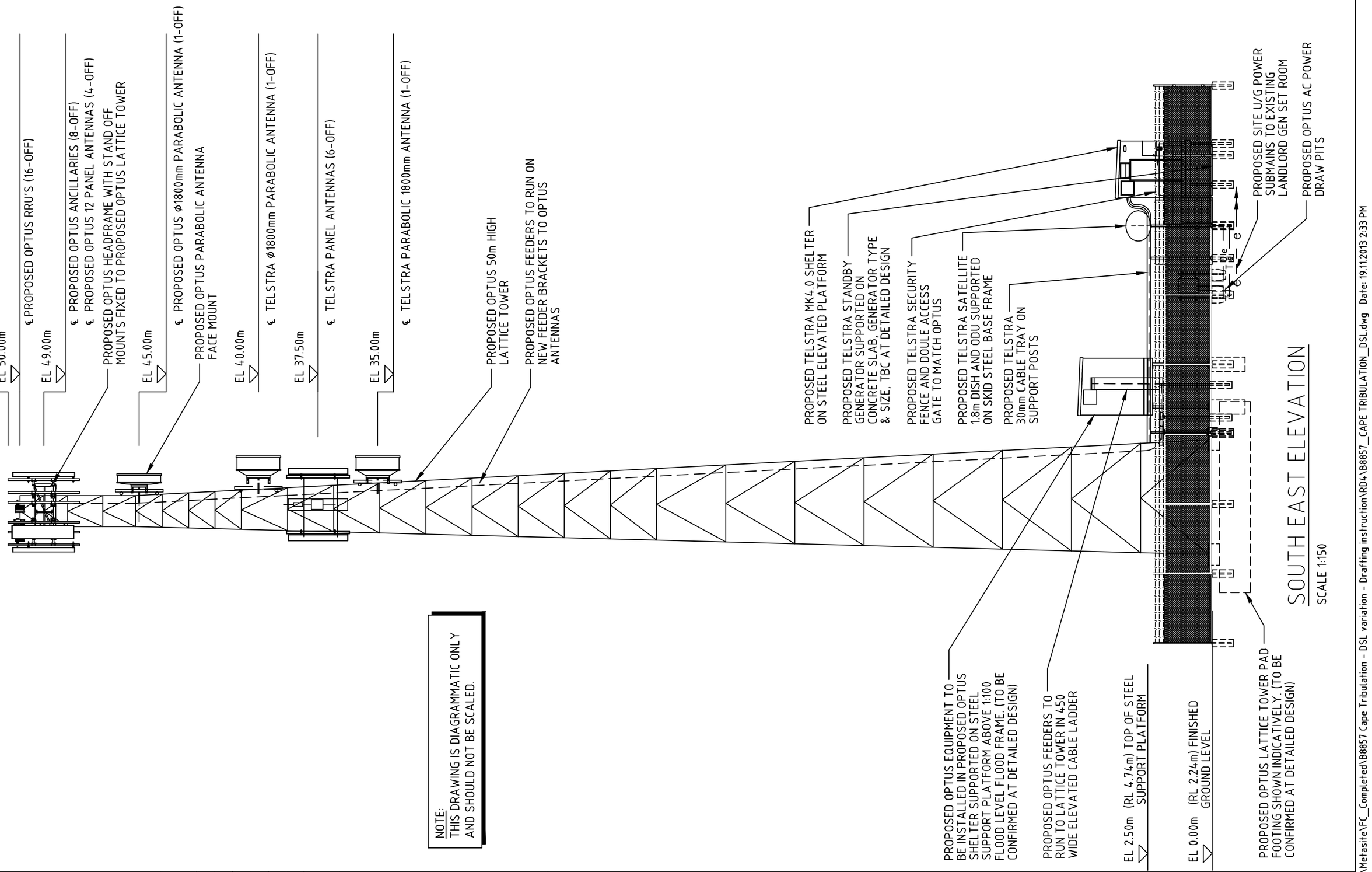
A3



SOUTH EAST ELEVATION

SCALE 1:150

NOTE:
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03	05.12.19	ISSUED FOR APPROVAL	METASITE	AU	RT	RT	PJ
02	28.06.19	ISSED FOR APPROVAL	HUAWEI	BL	AP	BC	JH
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Client: OPTUS

Project:
MOBILE NETWORK AUSTRALIA
SITE No. B8857 - Q
CAPE TRIBULATION
CAPE TRIBULATION ROAD, CAPE TRIBULATION

Drawing Title:
DRAFT SITE ELEVATION

Drawing Status: FOR APPROVAL

Drawing No. B8857-P3

Revision 03

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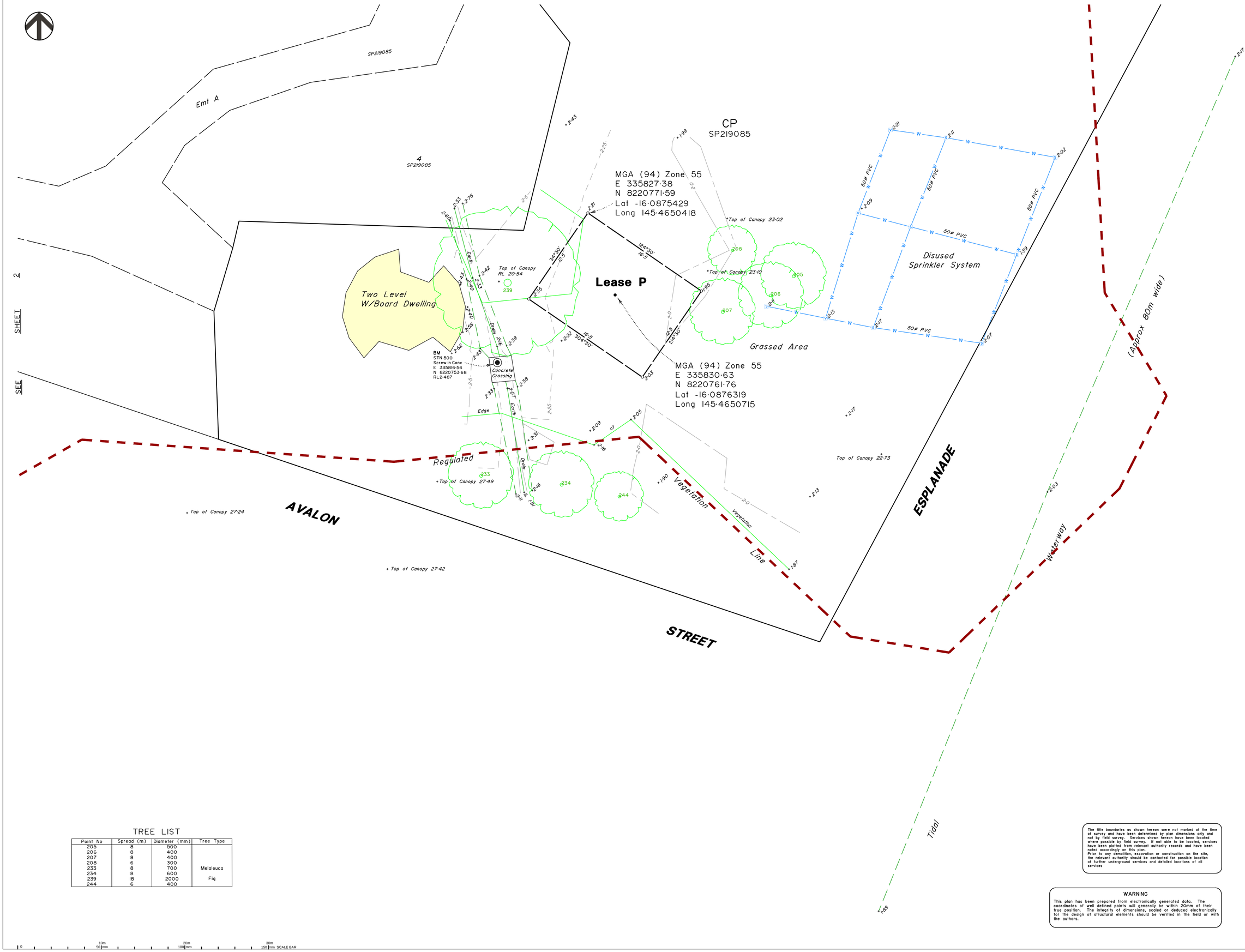
A3



TREE LIST

Point No	Spread (m)	Diameter (mm)	Tree Type
205	8	500	
206	8	400	
207	8	400	
208	6	300	
233	8	700	Melaleuca
234	8	600	
239	18	2000	Fig
244	6	400	

0 10m 50mm 20m 100mm 30m 150mm SCALE BAR

The title boundaries as shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey. Services shown hereon have been located where possible by field survey. If not able to be located, services have been plotted from relevant authority records and have been noted accordingly on this plan.
Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services

WARNING

This plan has been prepared from electronically generated data. The coordinates of well defined points will generally be within 20mm of their true position. The integrity of dimensions, scaled or deduced electronically for the design of structural elements should be verified in the field or with the authors.

LEGEND

- Bench Mark
- S Sprinkler
- V Sprinkler Valve
- SW Drain
- W Water

Symbols indicated on this plan are representative only and do not relate to the actual attributes of the physical object

Contour Interval: 0.25m

Optus Mobile Site: B8857
Cape Tribulation

For

Metasite

IMPORTANT NOTES:
(These notes are an integral part of this plan)
This plan has been prepared for Metasite for the purposes of Design. It is not to be used by any other person or corporation or for any other purpose.

Data Sources

Cadastral Boundaries	Survey
Contours / Topographic	Survey
Aerial Images	*
Flood Level	*
Engineering Design	*
Architectural Design	*
Landscape Design	*

Issue	Revisions	Date	Drawn
B	Add Regulated Vegetation	14.10.2019	RCS
A	Original	09.10.2019	RCS

Locality:	Cape Tribulation
Local Authority:	Douglas Shire Council
Projection:	*
Horizontal Meridian:	MGA Zone 55
Vertical Level Datum:	AHD
Level Origin:	PM53554 RL 6.496
Scale:	1:200 @ A1
Surveyed:	KET 2/10/19
Designed:	*
Drawn:	RCS 9/10/19
Checked:	KJJ 22/10/19
Plot Date:	28 Oct, 2019
Computer File Ref:	431900-028-DS01_RevB.dwg

Plan of Level & Detail Survey over part of Common Property on SP219085
3910 Cape Tribulation Rd, Cape Tribulation
Sheet 1 of 2

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WHITSUNDAYS (07) 4945 1722
MACKAY (07) 4951 2911
CAIRNS (07) 4051 6722

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Drawing No 431900-028-DS01
Issue B

CAPE TRIBULATION ROAD

AVALON STREET

4
SP219085

CP
SP219085

Emt A

4·38
Edge
4·27
4·16
SP219085
of
4·04
+Top of Canopy 24·07
Vegetation
3·81
3·75
+Top of Canopy 32·69
+Top of Canopy 24·38

SHEET 1

SEE

LEGEND

- Bench Mark
- S Sprinkler
- V Sprinkler Valve
- SW Drain
- W Water

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Optus Mobile Site: B8857 Cape Tribulation

For

Metasite

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Drawn:	RCS 9/2/19
Checked:	KJ 22/10/19
Plot Date:	28 Oct, 2019
Computer File Ref:	431900-028-DS01_RevB.dwg

Plan of Level & Detail Survey over part of Common Property on SP219085 3910 Cape Tribulation Rd, Cape Tribulation

Sheet 2 of 2

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0 10m 50mm 20m 100mm 30m 150mm SCALE BAR

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Drawing No: 431900-028-DS01
Issue: B

PRELIMINARY ACID SULFATE SOIL INVESTIGATION FOR SITE NO: B8857-Q CAPE TRIBULATION ROAD, CAPE TRIBULATION QLD 4873

PREPARED FOR METASITE

LEVEL 5/3 BOWEN CRESENT

MELBOURNE VIC 3004

Report Date: 12 December 2019

Report Number: RM618-M

Prepared/Submitted by:

Emmanuel Ernest

Senior Environmental Scientist

MSc (Geol) BSc (Chem) Grad Dip (Env Mngt)

12 December 2019 Our Reference: RM618-M

Metasite
Level 5/3 Bowen Crescent
MELBOURNE VIC 3004

Attention: Raj Talpade

Dear Raj

RE: PRELIMINARY ACID SULFATE SOIL INVESTIGATION FOR SITE NO: B8857-Q CAPE TRIBULATION ROAD, CAPE TRIBULATION QLD 4873

Geoaquitards Environmental has conducted soil sampling and laboratory analysis from one (1) test location and the findings are presented in this report. This Preliminary Acid Sulfate Investigation has been undertaken as part of your correspondence received by Jim Perry from Civiltest Pty Ltd on behalf of Metasite. The report and associated attachments are presented in this report and my qualification experience is as follows:

Qualification and Experience

- I am a Senior Environmental Scientist with 23 years of experience providing consulting services in contaminated land projects, hydrogeological assessments, NATA signatory for soil testing and more than five years' experience in providing consulting services for acid sulphate soil assessments;
- I have a Bachelor of Science Degree in Chemistry, Botany and Geology, Master of Science Degree in Geology with a specialisation in Hydrogeology and Graduate Diploma in Environmental Management;
- I am experienced (15 years) in designing and implementing ASS investigations, ASS treatment programs and environmental management plans (EMPs). The range and scope of ASS, contaminated land projects hydrogeological investigation projects, salinity assessment projects evidence of previous approved EMP's from EPA Victoria are provided in Appendix H.

Professional Affiliations

- Member of the International Association of Hydrogeologists (IAH)
- Member of Geological Society of Australia

Please do not hesitate to contact the undersigned if you require further information.

Prepared /Submitted by

GEOAQUITARDS ENVIRONMENTAL

Emmanuel Ernest

Senior Environmental Scientist

MSc (Geol) BSc (Chem) Grad Dip (Env Mngt)

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Report

No. of copies	Report File Name	Report Status	Date	Prepared for:	Initials
1	RM618-M	Final	12 December 2019	Metasite	EE

1 Introduction

Geoaquitards Environmental was requested Civiltest Pty Ltd on behalf of Metasite to undertake an Acid Sulphate Soil Assessment for Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873.

This preliminary assessment has been requested as part of the proposed construction of a 50 metre high lattice tower with Optus Square Headframe at EL 49.00m at the site the investigation was limited to sampling from one (1) test location covering an area of 4m x 4.0m. It comprised a desktop review of the potential for ASS to exist at proposed tower construction area, as well as preliminary soil sampling and laboratory analysis.

1.1 Site Identification

Summary of site information is as follows. (Refer to Appendix E for Site Plan).

TABLE 1– SITE INFORMATION

Site Address	Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873 (“Site”)
Lot Plan Number	0SP219085
Local Government	Douglas Shire Council
Regional land use categories	Category - Regional Landscape and Rural Production Area Region - Far North Queensland Status - Current - February 2009
Regional planning boundary	Far North Regional Plan
State Planning Policy mapping layers	AGRICULTURE - Agricultural land classification - class A and B BIODIVERSITY - MSES - Wildlife habitat - MSES - Regulated vegetation (category B) - MSES - Regulated vegetation (essential habitat) - MSES - Regulated vegetation (wetland) - MSES - High ecological significance wetlands - MSES - High ecological value waters (wetland) COASTAL ENVIRONMENT - Coastal management district CULTURAL HERITAGE - National heritage place WATER QUALITY - High ecological value water areas NATURAL HAZARDS RISK AND RESILIENCE - Flood hazard area - Level 1 - Queensland floodplain assessment overlay* - Bushfire prone area - Erosion prone area - Medium storm tide inundation area - High storm tide inundation area

1.2 Surrounding Land uses and site existing features

Site is located in a Regional Landscape and Rural Production Area and surrounding land uses are rural residential, national parks, horticultural, holiday resorts and vacant lands.

The subject land is located on the east side of Cape Tribulation Road and in Cape Tribulation QLD. The subject site contains some building structures and appears to be a holiday resort. Most of the site area is covered in small to large trees. Area under investigation is vacant and covered in grass (Refer to Appendix E for Investigation Site).

Desktop study indicates that the site is not located in a land with probability of occurrence of Acid Sulphate Soil within the soil profile (Ref: Acid Sulphate Soil Map Refer to Figure 2), however preliminary confirmation tests pHFOX, Chromium suite SCR and groundwater SO_4^{2-}: Cl^- Ratio tests were undertaken) test were undertaken.

1.3 Proposed Works

It is proposed to construct a 50 metre high lattice tower with Optus Square Headframe at EL 49.00m at the site.

2 QLD Acid Sulfate Soils Technical Manual

The Queensland Acid Sulfate Soil Technical Manual encompasses four individual guidelines: a legislation and policy guide; laboratory methods guidelines; (this) soil management guidelines; and guidelines for sampling and analysis of lowland acid sulfate soils.

This document, the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines* is based on earlier versions prepared with funding from the Queensland Government and the National Landcare Program (NLP) of the Natural Heritage Trust (NHT). The guidelines have been refined following 10 years of use. Some material in this document (including earlier versions) builds on information from the *NSW Acid Sulfate Soil Manual* (Stone, Ahern, & Blunden, 1998) and guidelines and policy developed by the WA Department of Environment and Conservation. Elements of these guidelines have been incorporated into ASS guidelines of other Australian states.

These guidelines describe best practice standards for managing coastal acid sulfate soil material. The laboratory methods guideline describes techniques for quantifying the status of acid sulfate soils and determining treatment rates. The management guideline contains information on how to conduct a risk assessment, avoid or minimise soil disturbance, and manage unavoidable disturbances. Techniques like chemical neutralisation and controlled dewatering are discussed in detail.

The guidelines should be used by consultants, earth moving contractors, developers, agricultural and aquaculture producers, sand and gravel extraction operators, community groups and administering authorities from state and local government.

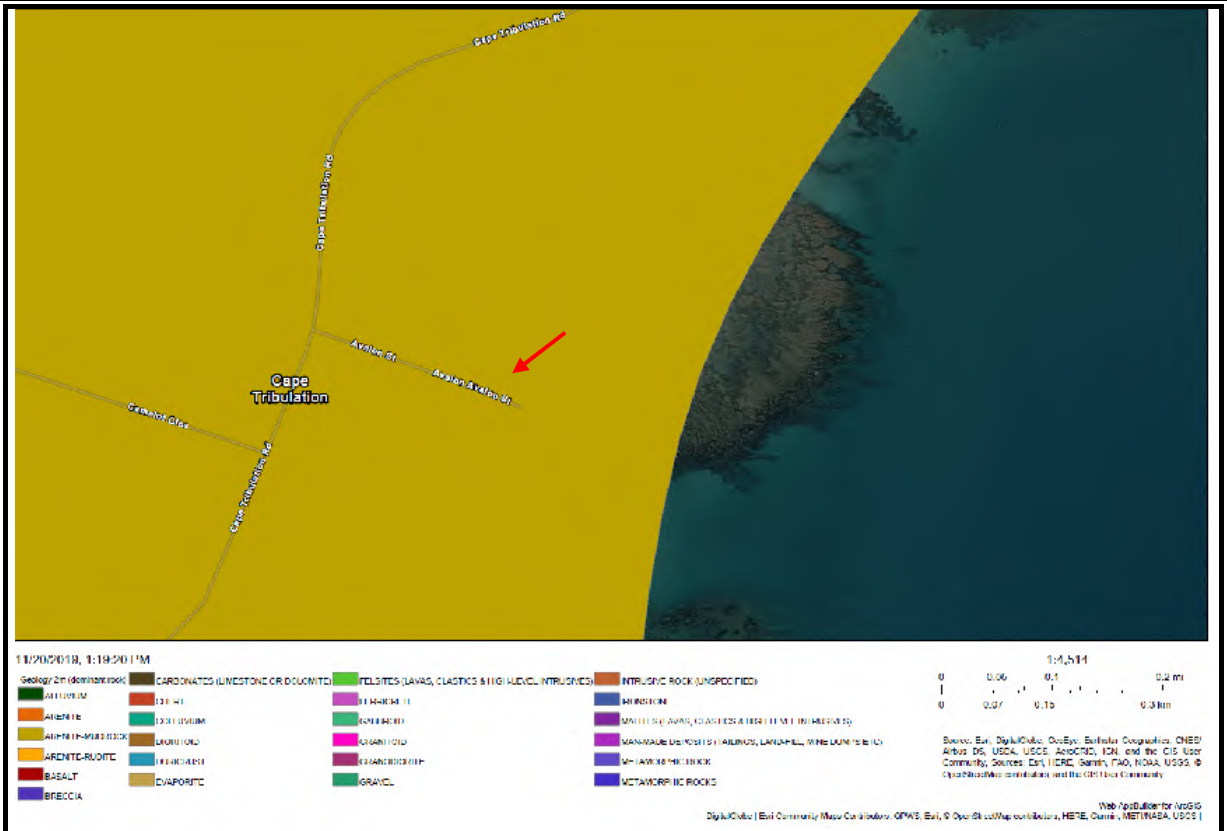
3 Geology

The geology of the site is located on Hodgkinson Formation and information is as follows (Refer to Table 3 - Site and Surrounding Geological Information and Figure 1 for Geological Map).

TABLE 2 - SITE AND SURROUNDING GEOLOGICAL INFORMATION

Rock Unit Key (Surface)	657
Rock Unit Name	Hodgkinson Formation
Map Symbol	Dh
Lithological Summary	Mainly Pale To Dark Or Greenish Grey, Fine To Medium-Grained, Medium To Thick-Bedded, Quartz-Intermediate Greywacke, Rhythmically Interbedded With Siltstone And Mudstone; Minor Conglomerate, Conglomeratic Greywacke
Dominant Rock	Arenite-Mudrock
Rock Type	Stratified Unit (Including Volcanic And Metamorphic)
Age	Devonian
Legend Sequence	3,963

FIGURE 1 - GEOLOGICAL MAP



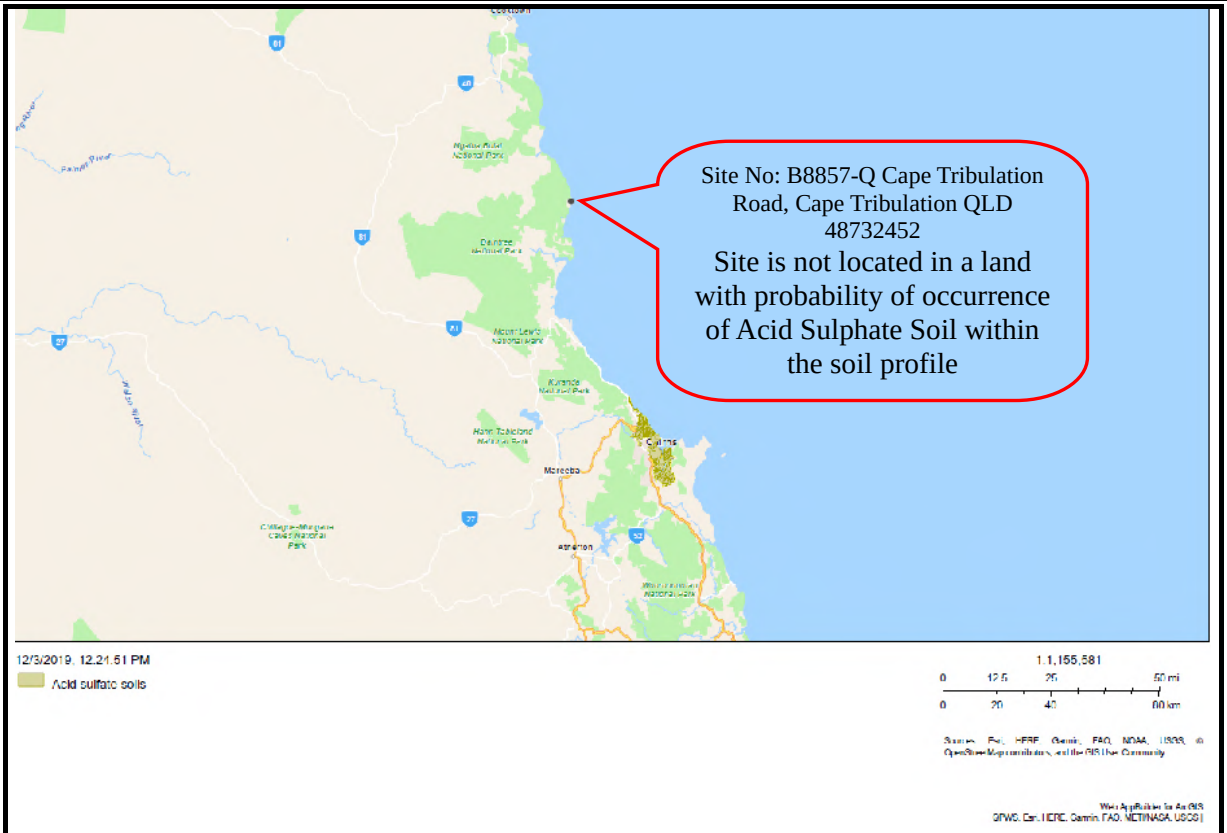
Geoaquitards Environmental ABN 80 683 110 579

Job Number	RM618-M	Map Description	Site and Surrounding Geological Map
Location	Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873	Project	Acid Sulphate Soil Assessment
Date	3 December 2019	Source	Wetland*Maps* - Interactive Maps and Wetlands Data in Queensland, Wetland*Info*, Department of Environment and Science, Queensland, viewed 3 December 2019, <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/get-mapping-help/wetland-maps/>.

4 Review of Acid Sulfate Soil Risk Map

As part of the Acid Sulfate Soils Assessment a review of Acid Sulfate Soils Risk Map for Cape Tribulation QLD was undertaken on 3 December 2019 through Wetland*Maps* - Interactive Maps and Wetlands Data in Queensland, Wetland*Info*, Department of Environment and Science, Queensland. The results indicated that Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873 is not located in a land with probability of occurrence of Acid Sulphate Soil within the soil profile. (Refer to Figure 2)

FIGURE 2 – ACID SULFATE SOIL RISK MAP



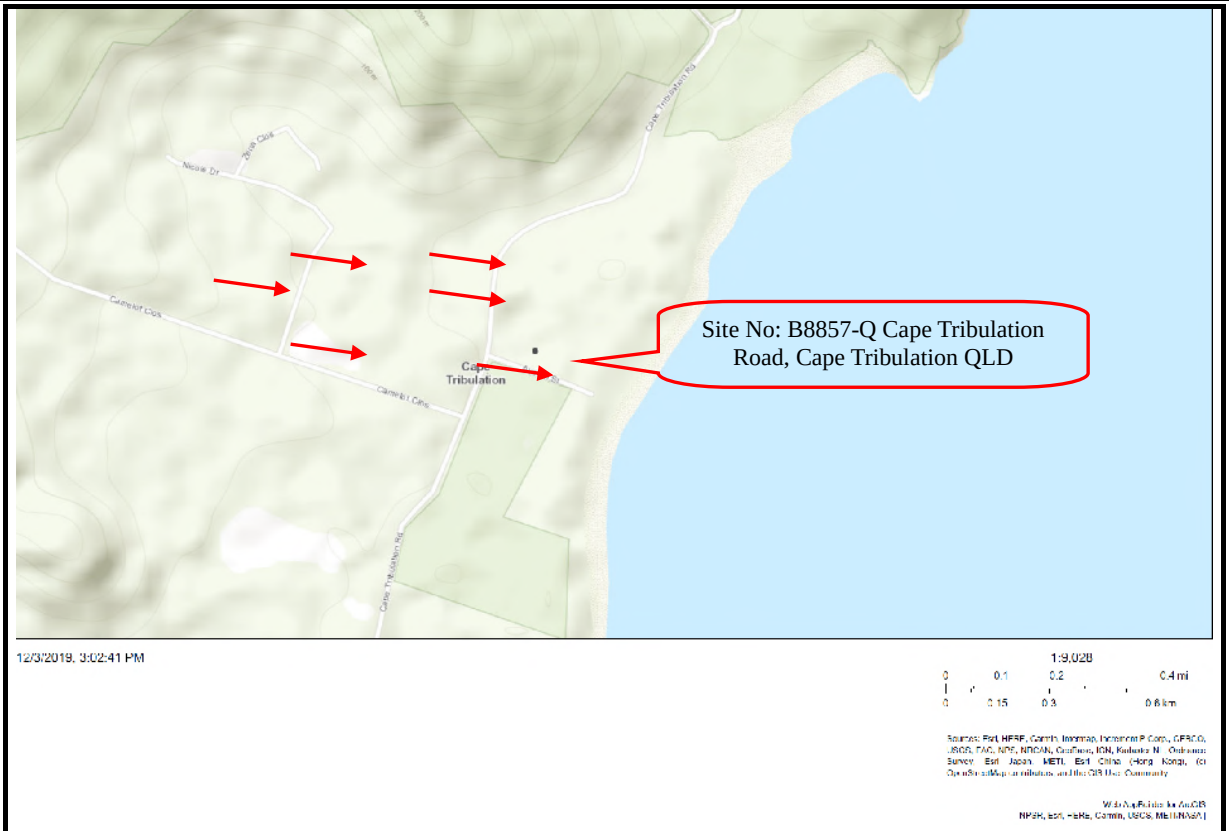
Geoaquitards Environmental ABN 80 683 110 579

Job Number	RM618-M	Map Description	Acid Sulphate Soil Map
Location	Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873	Project	Acid Sulphate Soil Assessment
Date	3 December 2019	Sources	Wetland*Maps* - Interactive Maps and Wetlands Data in Queensland, Wetland*Info*, Department of Environment and Science, Queensland, viewed 3 December 2019, <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/get-mapping-help/wetland-maps/>.

5 Topography

The subject land and regional topography is sloping to the east direction towards Coral Sea. The site lies approximately between 0 to 10 meters above the sea level. (Refer to Figure 3 for site contour map).

FIGURE 3 - SITE CONTOUR MAP



Geoaquitards Environmental ABN 80 683 110 579

Job Number	RM618-M	Map Description	Site Contour Map
Location	Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873	Project	Acid Sulphate Soil Assessment
Date	3 December 2019	Sources	Wetland*Maps* - Interactive Maps and Wetlands Data in Queensland, Wetland*Info*, Department of Environment and Science, Queensland, viewed 3 December 2019, <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/get-mapping-help/wetland-maps/>.

6 Subsurface Conditions

Based on the field observations and borehole, logs the subsurface conditions at the site are summarised in Table 4 and the borehole logs are included in Appendix D.

TABLE 3 - GENERALISED SUBSURFACE PROFILE

Soil Horizon	Depth (m)	Material Description
FILL	0.0 – 1.00	FILL, sandy silty CLAY/SAND/CRUSHED ROCK/silty CLAY, gravel, red brown/grey brown/dark brown grey, dry/moist, firm/medium dense/firm to stiff, no odour detected
Natural	1.00 – 5.90	silty SAND, pale grey/pale grey brown/yellow brown, trace gravel, moist to wet/moist, medium dense, no odour detected
Natural	5.90 – 8.00	extremely weathered ROCK/sandy GRAVEL/ extremely weathered GRANITE ROCK, occasional fractures with sand lenses, dark grey/pale brown, dry to moist/moist, low strength/dense/very low strength, no odour detected

7 Soil Assessment

Soil sampling was undertaken from one (1) test location at the proposed tower area. Samples were retrieved at 0.50m, 1.00m, 1.50m, 2.00m, 2.50m, 3.00m, 3.50m, 4.00m, 4.50m, 5.00m and 6.00m, 7.0m and 8.0m.

7.1 Scope of Works

The aim of this Acid Sulphate soil assessment was to collect soil samples from one (1) test locations and to submit the soil samples to a NATA registered laboratory for analysis. Soil samples were analysed for chromium reducible sulphur method.

The works carried out as follows generally can be considered in the following order:

- Collection of soil samples in accordance with relevant Acid Sulfate Soils Guidance for Construction Activities;
- Review of previous site history was not requested by the client and therefore was not undertaken as a part of this project works;
- Sampling and analysis of soil samples collected during the drilling program; Interpretation and reporting of the works conducted at one (1) test location (at the proposed 50m high lattice tower with Optus square headframe at EL49m).
- Analysis of soil samples on selected soil samples by Eurofins; and
- Preparation of a report detailing the findings of the investigation works.

Initial Assessment field assessment of Acid Sulfate soils was undertaken as follows:

- A field description of the soil was noted;
- Including: location, depth, colour, texture, and presence of field indicators organic matter or shell fragments; and
- All visible shell fragments if any were removed during sampling.
- pH tests were carried out to indicate the likely presence of PASS or AASS.

7.2 Summary of Soil Sampling

Eleven (11) soil samples were retrieved from one (1) test locations on 13 November 2019. Boreholes were drilled at locations one (1) as shown in the attached Test Location Plan

(Appendix E). Drilling sampling was undertaken by Civiltest Pty Ltd (Drilling Method: Mechanical Auger Drilling).

7.3 Decontamination

Decontamination of sampling equipment was completed in accordance with the Standard Procedures. Decontamination of the solid augers comprised removal of encrusted materials; brush scrubbing with detergent cleaning solution and a rinse in potable water. Disposable gloves were worn during collection of samples. Gloves were replaced after each sample was collected, to prevent cross contamination.

TABLE 4 - SUMMARY OF SAMPLING PROGRAM

Sampling Date	Sample Number	Lab Number	Soil Description
13 November 2019	1 AT 0.5m	M19-No21102	FILL, SAND/CRUSHED ROCK, grey brown, dry to moist, medium dense, no odour detected
13 November 2019	1 AT 1.0m	M19-No21103	FILL, silty CLAY, gravel, dark brown grey, moist, firm to stiff, no odour detected
13 November 2019	1 AT 1.5m	M19-No21104	silty SAND, pale grey, moist to wet, medium dense, no odour detected
13 November 2019	1 AT 2.0m	M19-No21105	silty SAND, pale grey, moist to wet, medium dense, no odour detected
13 November 2019	1 AT 2.5m	M19-No21106	silty SAND, pale grey, moist to wet, medium dense, no odour detected
13 November 2019	1 AT 3.0m	M19-No21107	silty SAND, yellow brown, moist, medium dense, no odour detected
13 November 2019	1 AT 3.5m	M19-No21108	silty SAND, yellow brown, moist, medium dense, no odour detected
13 November 2019	1 AT 4.0m	M19-No21109	silty SAND, yellow brown, moist, medium dense, no odour detected
13 November 2019	1 AT 4.5m	M19-No21110	silty SAND, yellow brown, moist, medium dense, no odour detected
13 November 2019	1 AT 5.0m	M19-No21111	silty SAND, yellow brown, moist, medium dense, no odour detected
13 November 2019	1 AT 6.0m	M19-No21112	extremely weathered ROCK, dark grey, dry to moist, low strength, no odour detected

7.4 Laboratory Analysis Program for Soil

All analyses were completed by NATA registered Laboratory Eurofins. Selected soil samples were analysed individually as follows:

Preliminary laboratory soil testing;

Eurofins (Report number: 688205-S)

- Eleven (11) soil samples from one (1) test location were analysed for Acid Sulfate Soils Field pH Tests.

7.4.1 Acid Sulphate Initial Field pH Assessment

Field pH tests were carried out to indicate the likely presence of PASS or AASS. Field tests were conducted by NATA registered Laboratories, Principal laboratory – Eurofins (Report number: 688205-S). The tests involved measuring soil pH before and after oxidation using the following parameters:

- pHF - measure of soil pH of a soil: water paste;
- pHFOX - measure of soil pH after rapid oxidation with hydrogen peroxide (H2O2); and
- Effervescence (or reaction rate) - a visual measure of the vigorousness of the oxidation reaction where: 1 = slight; 2 = moderate; 3 = high; and 4 = extreme.

Interpretation of the results and actions required are summarised in Table 7. Even if only one positive result is obtained, the required action should be followed.

TABLE 5 - FIELD DATA INTERPRETATIONS

Parameters	Action	Field pH	Field pH of Peroxide Extract	Change in pH	Reaction Rate 1- Slight 2- Moderate 3- High 4- Very Vigorous
1	**No Action**	**>5.0**	**<5.0**	**<2**	**1-2**
2	**PASS may be present**	**4 - 5**	**3 - 5**	**>2**	**>2**
3	**AASS or PASS likely**	**<4**	**<3**	**>2**	**>2**

Interpretation of field pH results:

- Parameter 1- If no other field indicators or acid sulfate soil risk indicators are present, no further action is required;
- Parameter 2- PASS may be present, further assessment is required; and
- Parameter 3 - AASS or PASS are likely to be present, further assessment is required.
- Initial Field pH tests indicated slight reaction rate indicating that no further action is required for the soil samples tested.
- pHF readings less than 4, along with other indicators of ASS such as jarosite and/or reddish-orange iron mineral staining in the horizon, or the presence of jarosite and/or reddish-orange iron mineral staining or PASS in the vicinity, indicates the soil is an AASS with past oxidation of RIS, resulting in an acidic soil material (and acidic soil pore water).
- pHF readings greater than 4 may indicate the absence of AASS but PASS may still be present.
- soil pHF < 4 (when soil pHF > 4 but < 5 this may indicate some existing acidity and other indicators should be used to confirm presence or absence of AASS)

Screening Test Results

- Assessment of screening test results (pHF and pHFox) and their indications of actual or potential ASS were based on QASSIT (1998) and can be described as follows (Table 6).
- The field pH test (pHF) measures the existing acidity of the soil and is used to help identify whether actual ASS is present. If pHF is less than 4, it is considered that either actual ASS is present or soils contain a high organic content. A pHF is between 4 and 5 indicates acidic soils. All natural horizon soil samples reported a pHF greater than 5.8 to or equal to 6.2 with a median value of 6.0, which indicates that actual ASS is not present.
- Natural horizon - The change in pH (ApH) is also used as an indicator of potential ASS. Generally, the greater the ApH, the more likelihood there is of potential ASS being present. A pHFox value at least one unit below pHF may also indicate potential ASS. Calculated ApH values varied between 1.3 and 1.9 with a median value of 1.3 in the natural horizon.
- FILL horizon - The change in pH (ApH) is also used as an indicator of potential ASS. Generally, the greater the ApH, the more likelihood there is of potential ASS being present. A pHFox value at least one unit below pHF may also indicate potential ASS. Calculated ApH values varied between 1.8 and 2.0 with a median value of 1.9 in the FILL horizon.
- The strength of reaction with peroxide is rated between 1 and 4, where 1 represents no reaction and 4 represents a violent reaction. This is a useful indicator that must be considered in conjunction with other field test results (pHF, pHFox, ApH). All samples reported reaction rate of in the natural horizon and in the FILL horizon 2 and FILL horizon sample location 1.00m was further tested for chromium suite laboratory analysis.
- On the basis of the qualitative screening results, the likelihood of actual and/or potential ASS is considered to be low. However one fill horizon sample which detected Field pH peroxide extract reading of 3.8 pH units was requested for further confirmation tests for chromium suite SCR laboratory analysis (Table 7).

TABLE 6 - FIELD INVESTIGATION DATA FOR ACID SULPHATE SOIL

Client:		Metasite			**Office:**		Melbourne	
Project:		Acid Sulphate Soil Assessment			**Job Number:**		RM618-M	
Location:		Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873			**Sampling Date:**		13 November 2019	
Parameters	**Action**	**Field pH**	**Field pH of Peroxide Extract**	**Change in pH**	**Reaction Rate**		**Reaction Rate:** 1- **Slight** 2- **Moderate** 3- **High** 4- **Very Vigorous**	
1	**No Action**	**>5.0**	**<5.0**	**<2**	**1-2**			
2	**PASS may be present**	**4-5**	**3-5**	**>2**	**>2**			
3	**AASS or PASS likely**	**<4**	**<3**	**>2**	**>2**			
Field ID\ Depth	**FILL Horizon**	**Natural Horizon**	**Matrix Description**	**Field pH**	**Field pH of Peroxide Extract**	**Change in pH**	**Reaction**	**Action**
1 AT 0.5m	FILL		FILL, SAND/ CRUSHED ROCK	6.1	4.3	1.8	2	No Action
1 AT 1.0m	FILL		FILL, silty CLAY	5.8	**3.8**	**2**	**2**	Further confirmation test for Chromium Reducible Sulphate required
1 AT 1.5m		Natural	silty SAND	6.1	4.8	1.3	1	No Action
1 AT 2.0m		Natural	silty SAND	6.1	4.5	1.6	1	No Action
1 AT 2.5m		Natural	silty SAND	6	4.1	1.9	1	No Action
1 AT 3.0m		Natural	silty SAND	5.9	5.1	0.8	1	No Action
1 AT 3.5m		Natural	silty SAND	6	5.1	0.9	1	No Action
1 AT 4.0m		Natural	silty SAND	6	5.1	0.9	1	No Action
1 AT 4.5m		Natural	silty SAND	5.9	5.3	0.6	1	No Action
1 AT 5.0m		Natural	silty SAND	6.2	4.7	1.5	1	No Action
1 AT 6.0m		Natural	extremely weathered ROCK	6.2	4.7	1.5	1	No Action

TABLE 7 - SUMMARY OF ACID SULFATE SOIL LABORATORY RESULTS

Chromium Suite Test Results (%S) for Sample number 1 at 1.0m in the FILL Horizon							
pHKCI (pH units)	**Reducible Sulfur, SCR**	**Titratable Actual Acidity, TAA**		**Sulfur in KCI extract, SKCI**	**Retained Acidity (NASS)**	**Acid Neutralising Capacity, ANC**	**Net Acidity**
		mol H+/t	**% pyrite S**				
5.1	<0.005	18	0.030	-	-	-	<0.02

Note: Yellow cells indicate a net acidity greater than or equal to the guideline level of 0.03% S

On the basis of the qualitative screening results, the likelihood of actual and/or potential ASS is considered to be low. Chromium suite laboratory analysis was conducted on selected samples to confirm this (Table 7). Results can be interpreted as follows:

The majority of samples returned no action required values for all the samples tested except for one (1) sample at 1.0m depth in the FILL horizon ***indicate a net acidity greater than or equal to the guideline level of 0.03% S.*** Therefore it is considered that negligible amounts of sulfides were identified.

8 Groundwater Assessment

8.1 Depth to Watertable

Standing Water Level measurements was undertaken by Civiltest Pty Ltd following the completion of drilling and also after development of the bores that is after the bores were pumped and allowed to recover.

Standing Water Level (SWL) for the GWB1 on 13 November 2019 was 1.60mbgl.

8.2 Anticipated Groundwater Flow Direction

The subject land and regional topography is sloping to the east direction towards Coral Sea.

The anticipated groundwater flow direction at the site is to eastern direction, towards the Coral Sea. (Refer to Figure 4 for Site Contour Map).

8.1 Summary of Groundwater Sampling

The following Groundwater sampling program was completed as part of Acid Sulphate soil assessment:

TABLE 8 – GROUNDWATER SAMPLING PROGRAM

Date	Works
13 November 2019	Groundwater samples from one (1) groundwater bore (GWB 1)

8.2 Summary of Laboratory Analysis for Groundwater Sampling

Analyses for Groundwater sampling are as follows:

TABLE 9 – ANALYSIS OF GROUNDWATER SAMPLING PROGRAM

Bore Identification	Analysis
GWB 1	Total Dissolved Solids, Sulphate (as SO4), pH, Chloride, calculated Sulphate : Chloride Ratio

8.3 Findings of Groundwater Analysis

The laboratory analysis of the groundwater samples reported concentrations for Chloride, pH, Sulphate (as SO4), Total Dissolved Solids and SO_4^{2-}: Cl^- Ratio as follows:

TABLE 10 - GROUNDWATER INVESTIGATION DATA

Sample Number	Chloride	pH	TDS	Sulphite as SO4	SO_4^{2-}: Cl^- Ratio
	mg/L	pH Units	mg/L	mg/L	%
GWB 1	68	6.5	38	<5	0.026

9 Assessment Results Summary and Conclusions

Soil analytical results and laboratory data are presented in Appendix E. Certified laboratory reports are included in Appendix A, Chain of Custody (COC) documentation is presented in Appendix D and borehole logs are presented in Appendix F. Soil analytical results comparison with *Acid Sulfate Soils Assessment Guidelines, NSW Acid Sulfate Soils Management Advisory Committee August 1998 (ASSMAC, 1998)* are summarised in Appendix E.

9.1 Desktop Review of CASS:

As part of the Acid Sulfate Soils Assessment a review of Acid Sulfate Soils Risk Map for Cape Tribulation QLD was undertaken on 3 December 2019 through Wetland*Maps* - Interactive Maps and Wetlands Data in Queensland, Wetland*Info*, Department of Environment and Science, Queensland. The results indicated that Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873 is not located in a land with probability of occurrence of Acid Sulphate Soil within the soil profile.

Based on preliminary assessment of the site (Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873) it is considered site is not located in a potential Acid Sulphate Soil risk area.

9.2 Soil Assessment Results

Soil assessment comprised a soil assessment at one (1) location drilled, within the site area. All the eleven (11) soil samples from one (1) test location were assessed for pH-F and pH-FOX.

Soil Field pH (pH-F) results ranged from 5.8 to 6.2 pH units. Following oxidation in peroxide, pH-FOX results ranged from 3.8 to 5.3 pH units.

No samples were reported a decrease of >2 units between pHF and pHFOX.

Reaction Rate for all the soil samples tested were one to two (1-2), which indicated that AASS or PASS may not present in these soil samples.

On the basis of the qualitative screening results, the likelihood of actual and/or potential ASS is considered to be low. However one (1) fill horizon sample which detected Field pH peroxide extract reading of 3.8 pH units was requested for further confirmation tests for chromium suite SCR laboratory analysis.

The majority of samples returned no action required values for all the samples tested except for one (1) sample at 1.0m depth in the FILL horizon ***indicate a net acidity greater than or equal to the guideline level of 0.03% S.*** Therefore it is considered that negligible amounts of sulfides were identified.

9.3 Groundwater Test Results

Samples of the groundwater were collected from GWB1 and were tested for a standard suite of possible contaminants. Refer to Appendix C for detailed laboratory data presentation table for Groundwater sampling.

- Standing Water Level (SWL) for the GWB1 on 13 November 2019 was 1.60mbgl.
- The anticipated groundwater flow direction at the site is to eastern direction, towards the Coral Sea.

Summary of groundwater test results at GWB1:

- Salinity results in the groundwater monitoring bore GWB1 is 38 mg/L;
- The results indicate pH values in the groundwater monitoring bore GWB1 as 6.5 pH units.
- Sulfate results (as SO4) in the groundwater monitoring bore GWB1 is <5 mg/L.
- Chloride results in the groundwater monitoring bore GWB1 is 68 mg/L.
- Sulphate: Chloride (SO_4^{2-}: Cl^-) Ratio in the groundwater monitoring bore GWB1 is 0.026 %.

Groundwater quality parameters that can be used to indicate the presence of ASS materials include a soluble sulfate to soluble chloride (SO_4^{2-}: Cl^-) of more than 0.25 (Mulvey 1993),

The analysis of groundwater (and drain water) for SO_4^{2-}: Cl^- ratio has frequently been used as an indicator of ASS. As seawater has a sulfate concentration of approximately 2700 mg/L and chloride concentration of approximately 19400 mg/L, the SO_4^{2-}: Cl^- ratio of seawater and coastal landscapes on a mass basis is 0.14. The ratio of dominant ions in saline water remains approximately the same when diluted with rainwater, and therefore, estuaries, coastal saline creeks and associated groundwater can be expected to have similar dominant anion ratios to seawater. Any other source of sulfate ions (such as the oxidation of RIS) in these locations can lower this ratio and hence provide an indication of the possible presence of ASS materials in the surrounding landscape.

A SO_4^{2-}: Cl^- ratio of greater than 0.5 is a strong indicator of an extra source of sulfate from RIS oxidation (Mulvey 1993).

The SO_4^{2-}: Cl^- ratio of groundwater (or indeed of the soil material's soluble ions) is especially useful to help discriminate between Actual ASS materials and naturally-occurring acidic soil materials.

However detected concentration does not show indication of an extra source of sulfate from previous sulfide oxidation.

9.4 Conclusions

Initial Field pH tests indicated slight reaction rate and no samples were reported a decrease of >2 units between pHF and pHFOX, indicating that no further action is required for the soil samples tested except for one (1) sample at 1.0m depth in the FILL horizon ***indicate a net acidity greater than or equal to the guideline level of 0.03% S.*** Therefore it is considered that negligible amounts of sulfides were identified.

In addition to the above one (1) groundwater monitoring bore was installed and sampled and tested for SO_4^{2-}:Cl^- Ratio detected concentration does not show indication of an extra source of sulfate from previous sulfide oxidation.

Standing Water Level (SWL) for the GWB1 on 13 November 2019 was 1.60mbgl.

This report was intended to identify areas of potential environmental concern at one (1) test location to represents the proposed tower area.

10 Recommendations

Presence of potential ASS (PASS) as well as AAS action criteria exceedances were not identified at the proposed construction site area.

11 Limitations

Geoaquitards Environmental (GE) has performed investigation and consulting services for this project in accordance with current professional and industry standards for environmental site assessments. GE's assessment is necessarily based on the results of limited site investigations and upon the restricted program of surface and subsurface sample screening and chemical testing. Neither GE, nor any other reputable consultant, can provide unqualified warranties, nor does GE assume any liability for site conditions not observed or inaccessible during the time of the investigations.

Despite all reasonable care and diligence, the ground conditions encountered and concentrations of analytes measured may not be representative of conditions between the locations sampled and investigated. In addition, site characteristics may change at any time in response to variations in natural conditions, chemical reactions and other events, e.g. groundwater movement. These changes may occur after GE's investigations and assessment.

The investigation addresses the likelihood of the presence of acid sulfate soils within the substrate. As a result, certain environmental characteristics at the site may not be revealed; inter alia these may include background levels of toxins in the substrate including soils, rock, water and biomass in the site.

No site investigations can be thorough enough to provide absolute confirmation of the presence or absence of acid sulfate soils. Similarly the level of testing cannot be considered to unequivocally characterise the degree or extent of acid sulfate soils on the site. In addition regulatory or guideline criteria for the evaluation of environmental soil and groundwater quality are frequently being reviewed and thresholds which are considered acceptable now may in the future be considered to exceed or meet acceptance criteria.

This report and associated documentation and the information herein have been prepared solely for the use of Metasite , and any reliance assumed by other parties on this report shall be at such parties' own risk. Local Council, State and Federal government departments may also use the report solely to review the assessment of acid sulfate soils at the site. Any ensuring liability resulting from use of the report by other parties cannot be transferred to GE.

Geoaquitards Environmental has conducted work concerning the limited preliminary soil sampling from one (1) test location, laboratory analysis and reporting the findings which is the subject of this report, and has prepared this report based on this investigation. The work was conducted, and the report has been prepared, in response to specific instructions received from client to whom this report is addressed, within the time and budgetary requirements of the client, and in reliance on certain data and information made available to Geoaquitards Environmental. The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete. The findings contained within this assessment are the result of standard assessment techniques used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the current conditions. Under no circumstances, however, do these findings represent the exact physical conditions of the site at all points. It is also noted that sub-surface conditions can change with time, and the report is based on data that was gathered at the time of the report.

Soil, rock and aquifer conditions are variable, resulting in non-homogenous distribution of analyte concentrations across the site. Analyte concentrations have been measured at chosen sample locations. However, conditions between sample locations can only be inferred based on the estimated geological and hydrological conditions and the nature and extent of the identified concentrations. Boundaries between different zones of analyte concentrations are indistinct and may not identify analyte concentrations occurring in unexpected locations or sources.

This report has been interpreted based on the available information and the application of professional judgement.

This document does not purport to provide legal advice and any conclusions or recommendations herein must not be relied as substitute for such advice. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by Geoaquitards Environmental. The advice provided herein relates only to these purposes and must be reviewed by a competent Environmental Scientist/Engineer, experienced in contaminated site investigation, before being used for any other purpose and Geoaquitards Environmental accept no responsibility for other use of the advice. No warranties, expressed or implied, are offered to any third parties. No liabilities will be accepted for use of this report by any third party. This report should not be altered, amended or abbreviated, issued in part and issued incomplete in any way without prior checking and approved by Geoaquitards Environmental. Geoaquitards Environmental accepts no responsibility for any circumstances that arise from issue of the report that has been modified in any way as outlined above.

This report was intended to identify areas of potential environmental concern at one (1) test locations as shown in the Appendix E and this report cannot be used as substitute for classification of wastes for off-site disposal (Note: If off-site disposal of the soil is required then Classification of Wastes in accordance with Queensland *New Regulated Waste Classification and Waste-related Environmentally Relevant Activity (ERA) Regulations* must be undertaken.

Prepared /Submitted by

GEOAQUITARDS ENVIRONMENTAL

Emmanuel Ernest

Senior Environmental Scientist

MSc (Geol) BSc (Chem) Grad Dip (Env Mngt)

12 References

- *Queensland Acid Sulfate Soil Tenniel Manual, Soil Management Guidelines V4.0;*
- *Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT. CC BY 4.0.*
- *Acid Sulfate Soils Laboratory Methods Guidelines< Version 2.1, 20004, Published by Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland, Australia, June 2004.*

APPENDIX A - LABORATORY ANALYTICAL REPORTS

Geoaquitards Environmental
PO Box 4040
Dandenong Sth
VIC 3175

Attention: **Emmanuel Ernest**

Report **688205-S**
Project name SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873
Received Date Nov 15, 2019

Client Sample ID			**1 AT 0.5m**	**1 AT 1.0m**	**1 AT 1.5m**	**1 AT 2.0m**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M19-No21102**	**M19-No21103**	**M19-No21104**	**M19-No21105**
Date Sampled			**Nov 13, 2019**	**Nov 13, 2019**	**Nov 13, 2019**	**Nov 13, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	5.8	6.1	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	3.8	4.8	4.5
Reaction Ratings*[S05]		comment	2.0	2.0	1.0	1.0

Client Sample ID			**1 AT 2.5m**	**1 AT 3.0m**	**1 AT 3.5m**	**1 AT 4.0m**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M19-No21106**	**M19-No21107**	**M19-No21108**	**M19-No21109**
Date Sampled			**Nov 13, 2019**	**Nov 13, 2019**	**Nov 13, 2019**	**Nov 13, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	5.9	6.0	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	5.1	5.1	5.1
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0

Client Sample ID			**1 AT 4.5m**	**1 AT 5.0m**	**1 AT 6.0m**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M19-No21110**	**M19-No21111**	**M19-No21112**
Date Sampled			**Nov 13, 2019**	**Nov 13, 2019**	**Nov 13, 2019**
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	5.9	6.2	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	4.7	4.7
Reaction Ratings*[S05]		comment	1.0	1.0	1.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Nov 19, 2019	7 Days

- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests

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Site # 1254 & 14271

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: Geoaquitards Environmental
Address: PO Box 4040
Dandenong Sth
VIC 3175

Project Name: SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873

Order No.:
Report #: 688205
Phone: 03 9554 3258
Fax: 03 9705 7948

Received: Nov 15, 2019 10:57 AM
Due: Nov 19, 2019
Priority: 2 Day
Contact Name: Emmanuel Ernest

Eurofins Analytical Services Manager : Savini Suduweli

Sample Detail						Chloride	pH (at 25°C)	Sulphate (as SO4)	Sulphate : Chloride Ratio	Total Dissolved Solids Dried at 180°C ± 2°C	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	GWB1	Nov 13, 2019		Water	M19-No21101	X	X	X	X	X	
2	1 AT 0.5m	Nov 13, 2019		Soil	M19-No21102						X
3	1 AT 1.0m	Nov 13, 2019		Soil	M19-No21103						X
4	1 AT 1.5m	Nov 13, 2019		Soil	M19-No21104						X
5	1 AT 2.0m	Nov 13, 2019		Soil	M19-No21105						X
6	1 AT 2.5m	Nov 13, 2019		Soil	M19-No21106						X
7	1 AT 3.0m	Nov 13, 2019		Soil	M19-No21107						X
8	1 AT 3.5m	Nov 13, 2019		Soil	M19-No21108						X
9	1 AT 4.0m	Nov 13, 2019		Soil	M19-No21109						X
10	1 AT 4.5m	Nov 13, 2019		Soil	M19-No21110						X

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NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	Geoaquitards Environmental	**Order No.:**		**Received:**	Nov 15, 2019 10:57 AM
Address:	PO Box 4040	**Report #:**	688205	**Due:**	Nov 19, 2019
	Dandenong Sth	**Phone:**	03 9554 3258	**Priority:**	2 Day
	VIC 3175	**Fax:**	03 9705 7948	**Contact Name:**	Emmanuel Ernest
Project Name:	SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873				

Eurofins Analytical Services Manager : Savini Suduweli

Sample Detail						Chloride	pH (at 25°C)	Sulphate (as SO4)	Sulphate : Chloride Ratio	Total Dissolved Solids Dried at 180°C ± 2°C	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
11	1 AT 5.0m	Nov 13, 2019		Soil	M19-No21111						X
12	1 AT 6.0m	Nov 13, 2019		Soil	M19-No21112						X
Test Counts						1	1	1	1	1	11

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram | **mg/L:** milligrams per litre | **ug/L:** micrograms per litre

ppm: Parts per million | **ppb:** Parts per billion | **%:** Percentage

org/100mL: Organisms per 100 millilitres | **NTU:** Nephelometric Turbidity Units | **MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	M19-No21102	CP	pH Units	6.1	6.0	pass	30%	Pass	
Reaction Ratings*	M19-No21102	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	M19-No21112	CP	pH Units	6.2	6.2	pass	30%	Pass	
Reaction Ratings*	M19-No21112	CP	comment	1.0	1.0	pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Savini Suduweli	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Certificate of Analysis

Geoaquitards Environmental
PO Box 4040
Dandenong Sth
VIC 3175

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Emmanuel Ernest**

Report **688205-W**
Project name SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873
Received Date Nov 15, 2019

Client Sample ID			**GWB1**
Sample Matrix			**Water**
Eurofins Sample No.			**M19-No21101**
Date Sampled			**Nov 13, 2019**
Test/Reference	LOR	Unit	
Chloride	1	mg/L	68
pH (at 25°C)	0.1	pH Units	6.5
Sulphate (as SO4)	5	mg/L	< 5
Sulphate : Chloride Ratio		%	0.026
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	38

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chloride	Melbourne	Nov 15, 2019	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
pH (at 25°C)	Melbourne	Nov 15, 2019	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Sulphate (as SO4)	Melbourne	Nov 15, 2019	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Total Dissolved Solids Dried at 180°C ± 2°C	Melbourne	Nov 15, 2019	7 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			

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Site # 23736

Company Name: Geoaquitards Environmental
Address: PO Box 4040
Dandenong Sth
VIC 3175

Project Name: SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873

Order No.:
Report #: 688205
Phone: 03 9554 3258
Fax: 03 9705 7948

Received: Nov 15, 2019 10:57 AM
Due: Nov 19, 2019
Priority: 2 Day
Contact Name: Emmanuel Ernest

Eurofins Analytical Services Manager : Savini Suduweli

Sample Detail						Chloride	pH (at 25°C)	Sulphate (as SO4)	Sulphate : Chloride Ratio	Total Dissolved Solids Dried at 180°C ± 2°C	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	GWB1	Nov 13, 2019		Water	M19-No21101	X	X	X	X	X	
2	1 AT 0.5m	Nov 13, 2019		Soil	M19-No21102						X
3	1 AT 1.0m	Nov 13, 2019		Soil	M19-No21103						X
4	1 AT 1.5m	Nov 13, 2019		Soil	M19-No21104						X
5	1 AT 2.0m	Nov 13, 2019		Soil	M19-No21105						X
6	1 AT 2.5m	Nov 13, 2019		Soil	M19-No21106						X
7	1 AT 3.0m	Nov 13, 2019		Soil	M19-No21107						X
8	1 AT 3.5m	Nov 13, 2019		Soil	M19-No21108						X
9	1 AT 4.0m	Nov 13, 2019		Soil	M19-No21109						X
10	1 AT 4.5m	Nov 13, 2019		Soil	M19-No21110						X

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
11	1 AT 5.0m	Nov 13, 2019		Soil	M19-No21111						X
12	1 AT 6.0m	Nov 13, 2019		Soil	M19-No21112						X
Test Counts						1	1	1	1	1	11

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
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Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

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mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

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%: Percentage

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MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Chloride			mg/L	< 1			1	Pass	
Sulphate (as SO4)			mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C			mg/L	< 10			10	Pass	
LCS - % Recovery									
Chloride			%	116			70-130	Pass	
Sulphate (as SO4)			%	103			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C			%	112			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Sulphate (as SO4)	M19-No19834	NCP	%	102			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M19-No19804	NCP	mg/L	48	47	21	30%	Pass	
pH (at 25°C)	M19-No16995	NCP	pH Units	7.0	6.9	pass	30%	Pass	
Sulphate (as SO4)	M19-No20777	NCP	mg/L	1100	1100	5.0	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	M19-No16112	NCP	mg/L	24000	19000	8.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Savini Suduweli	Analytical Services Manager
Julie Kay	Senior Analyst-Inorganic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

APPENDIX B - CHAIN-OF-CUSTODY FORMS

CHAIN OF CUSTODY DOCUMENTATION

Geoaquitards Environmental

COMPANY NAME: GEOAQUITARDS ENVIRONMENTAL

ADDRESS / OFFICE: PO BOX 4040 DANDENONG SOUTH VIC 3164

CONTACT NAME: EMMANUEL ERNEST

PHONE NO:03 9554 3258

MOBILE NO : 03 0434 890 678 FAX NO:03 9705 7948

TURNAROUND TIME: 1 Day Turnaround

Job No: RM618-M

Project: Site No. B8857-Q, Cape Tribulation Rd, Cape Tribulation QLD 4873

Date 13/11/2019

EMAIL REPORT TO:geo@iprimus.com.au Attention: Emmanuel Ernest

SPECIAL DIRECTIONS & COMMENTS

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES

Secondary Lab Address

No Total Number of samples

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		pH F O X		pH	TDS	Soluble Cl⁻ Concentration for Groundwater	Soluble SO_4^{2-} Concentration for Groundwater	Cl:SO_4 Ratio					
No	SAMPLE ID	MATRIX	DATE	Lab ID	Comments	Other												
1	GWB 1	Water	13/11/19						Y	Y	Y	Y	Y					
2	1 at 0.50m	Soil	13/11/19				Y											
3	1 at 1.00m	Soil	13/11/19				Y											
4	1 at 1.50m	Soil	13/11/19				Y											
5	1 at 2.00m	Soil	13/11/19				Y											
6	1 at 2.50m	Soil	13/11/19				Y											
7	1 at 3.00m	Soil	13/11/19				Y											
8	1 at 3.50m	Soil	13/11/19				Y											
9	1 at 4.00m	Soil	13/11/19				Y											
10	1 at 4.50m	Soil	13/11/19				Y											
11	1 at 5.00m	Soil	13/11/19				Y											
12	1 at 6.00m	Soil	13/11/19				Y											

RELINQUISHED BY:

Name: EMMANUEL ERNEST

Signature:

Date: 13/11/2019

Time: 5:00 p.m.

RECEIVED BY

Name: ANNA TG Eurofins

Signature:

Date: 15/11/19

Time 10-57am

METHOD OF SHIPMENT

Courier:

Hand Delivered: Y

Transport Co:

Postal

Y= Yee Anelysis Required

698205

JCE. 7.3

COC Page 1 of 1

Geoaquitards Environmental ABN 80 683 110 579
Postal Address: PO Box 4040 Dandenong South VIC 3164
Street Address Suite 49, 160 South Gippsland Highway, Dandenong South, VIC 3175
T (+61) (3) 9554 3258
F (+61) (3) 9705 7948
M 0434 890 678

eurofins | Environment Testing

Melbourne
6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Geoaquitards Environmental**
Contact name:	Emmanuel Ernest
Project name:	SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873
COC number:	Not provided
Turn around time:	2 Day
Date/Time received:	Nov 15, 2019 10:57 AM
Eurofins reference:	**688205**

Sample information

- ☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ Attempt to chill was evident.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Appropriate sample containers have been used.
- ☑ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Savini Suduweli on Phone : or by e.mail: SaviniSuduweli@eurofins.com

Results will be delivered electronically via e.mail to Emmanuel Ernest - geo@geoaquitards.com.au.

eurofins | Environment Testing

ABN – 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
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Sydney
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NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: Geoaquitards Environmental
Address: PO Box 4040
Dandenong Sth
VIC 3175

Project Name: SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873

Order No.:
Report #: 688205
Phone: 03 9554 3258
Fax: 03 9705 7948

Received: Nov 15, 2019 10:57 AM
Due: Nov 19, 2019
Priority: 2 Day
Contact Name: Emmanuel Ernest

Eurofins Analytical Services Manager : Savini Suduweli

Sample Detail						Chloride	pH (at 25°C)	Sulphate (as SO4)	Sulphate : Chloride Ratio	Total Dissolved Solids Dried at 180°C ± 2°C	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	GWB1	Nov 13, 2019		Water	M19-No21101	X	X	X	X	X	
2	1 AT 0.5m	Nov 13, 2019		Soil	M19-No21102						X
3	1 AT 1.0m	Nov 13, 2019		Soil	M19-No21103						X
4	1 AT 1.5m	Nov 13, 2019		Soil	M19-No21104						X
5	1 AT 2.0m	Nov 13, 2019		Soil	M19-No21105						X
6	1 AT 2.5m	Nov 13, 2019		Soil	M19-No21106						X
7	1 AT 3.0m	Nov 13, 2019		Soil	M19-No21107						X
8	1 AT 3.5m	Nov 13, 2019		Soil	M19-No21108						X
9	1 AT 4.0m	Nov 13, 2019		Soil	M19-No21109						X
10	1 AT 4.5m	Nov 13, 2019		Soil	M19-No21110						X

eurofins | Environment Testing

ABN – 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
6 Monterey Road
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Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: Geoaquitards Environmental
Address: PO Box 4040
Dandenong Sth
VIC 3175

Project Name: SITE NO B8857-Q CAPE TRIBULATION RD QLD 4873

Order No.:
Report #: 688205
Phone: 03 9554 3258
Fax: 03 9705 7948

Received: Nov 15, 2019 10:57 AM
Due: Nov 19, 2019
Priority: 2 Day
Contact Name: Emmanuel Ernest

Eurofins Analytical Services Manager : Savini Suduweli

Sample Detail						Chloride	pH (at 25°C)	Sulphate (as SO4)	Sulphate : Chloride Ratio	Total Dissolved Solids Dried at 180°C ± 2°C	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
11	1 AT 5.0m	Nov 13, 2019		Soil	M19-No21111						X
12	1 AT 6.0m	Nov 13, 2019		Soil	M19-No21112						X
Test Counts						1	1	1	1	1	11

APPENDIX C - LABORATORY DATA COMPILATION

						ASS Field Screening Analysis				
						pH (Field)	pH-FOX (Field pH Peroxide test)	Change in pH	Reaction Ratings*	Action
						pH_Units	PH UNITS	pH Unit	-	-
EQL						0.1	0.1	0.1	-	-
Field ID	**Sampled Date**	**SampleCode**	**Lab Report Number**	**Sample Depth**	**Lithological Description**					
1 AT 0.5m	13/11/2019	M19-No21102	688205	0.50m	FILL, SAND	6.1	4.3	1.8	2	No Action
1 AT 1.0m	13/11/2019	M19-No21103	688205	1.00m	FILL, silty CLAY	5.8	3.8	2	2	No Action
Statistical Summary										
Number of Results						2	2			
Minimum Concentration						5.8	3.8			
Maximum Concentration						6.1	4.3			
Average Concentration										
Median Concentration						5.95	4.05			

Interpretation of field pH results

Parameters	Action	Field pH	Field pH of Peroxide Extract	Change in pH	Reaction Rate*
1	No Action	>5.0	<5.0	<2	1 - 2
2	PASS may be present	4 - 5	3 - 5	>2	>2
3	AASS or PASS likely	<4	<3	>2	>2

* Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Geoaquitards Environmental						ASS Field Screening Analysis				
						pH (Field)	pH-FOX (Field pH Peroxide test)	Change in pH	Reaction Ratings*	Action
						pH_Units	PH UNITS	pH Unit	-	-
EQL						0.1	0.1	0.1	-	-
Field ID	**Sampled Date**	**SampleCode**	**Lab Report Number**	**Sample Depth**	**Lithological Description**					
1 AT 1.5m	13/11/2019	M19-No21104	688205	1.50m	silty SAND	6.1	4.8	1.3	1	No Action
1 AT 2.0m	13/11/2019	M19-No21105	688205	2.00m	silty SAND	6.1	4.5	1.6	1	No Action
1 AT 2.5m	13/11/2019	M19-No21106	688205	2.50m	silty SAND	6	4.1	1.9	1	No Action
1 AT 3.0m	13/11/2019	M19-No21107	688205	3.00m	silty SAND	5.9	5.1	0.8	1	No Action
1 AT 3.5m	13/11/2019	M19-No21108	688205	3.50m	silty SAND	6	5.1	0.9	1	No Action
1 AT 4.0m	13/11/2019	M19-No21109	688205	4.00m	silty SAND	6	5.1	0.9	1	No Action
1 AT 4.5m	13/11/2019	M19-No21110	688205	4.50m	silty SAND	5.9	5.3	0.6	1	No Action
1 AT 5.0m	13/11/2019	M19-No21111	688205	5.00m	silty SAND	6.2	4.7	1.5	1	No Action
1 AT 6.0m	13/11/2019	M19-No21112	688205	6.00m	Extremely Weathered ROCK	6.2	4.7	1.5	1	No Action
Statistical Summary										
Number of Results						9	9			
Minimum Concentration						5.9	4.1			
Maximum Concentration						6.2	5.3			
Average Concentration						6	4.8			
Median Concentration						6	4.8			

Interpretation of field pH results

Parameters	Action	Field pH	Field pH of Peroxide Extract	Change in pH	Reaction Rate*
1	**No Action**	**>5.0**	**<5.0**	**<2**	**1 - 2**
2	**PASS may be present**	**4 - 5**	**3 - 5**	**>2**	**>2**
3	**AASS or PASS likely**	**<4**	**<3**	**>2**	**>2**

* Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

APPENDIX D- BOREHOLE LOG

Geoaquitards Environmental
Suite 23, 160 South Gippsland Highway
Dandenong South, VIC, 3175
Telephone: 03 9554 3258
Fax: 03 9705 7948

LOCATION NUMBER: GWB1

CLIENT _____ **PROJECT NAME** Acid Sulphate Soil Assessment

PROJECT NUMBER RM618-M **PROJECT LOCATION** Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873

DATE STARTED _____ **COMPLETED** _____ **R.L. SURFACE** _____ **DATUM** _____

DRILLING CONTRACTOR Civil Test Pty Ltd **SLOPE** 90° **BEARING** ---

EQUIPMENT Mechanical Auger Drilling **HOLE LOCATION** _____

HOLE SIZE _____ **LOGGED BY** _____ **CHECKED BY** _____

NOTES _____

Method	Water	RL (mAHD)	Depth (m)	Graphic Log	Material Description	Sample Numbers PID Values (ppm)	Additional Observations
					FILL, sandy silty CLAY, red brown, dry to moist, firm		No odour detected
					FILL, SAND/CRUSHED ROCK, grey brown, dry to moist, medium dense, no odour detected		No odour detected
						1 AT 0.5m	
			1.00		FILL, silty CLAY, gravel, dark brown grey, moist, firm to stiff		No odour detected
					silty SAND, pale grey, moist to wet, medium dense	1 AT 1.0m	No odour detected
	GWL					1 AT 1.5m	
			2.00			1 AT 2.0m	
						1 AT 2.5m	
					silty SAND, trace gravel, pale grey brown, moist to wet, medium dense		No odour detected
			3.00		silty SAND, yellow brown, moist, medium dense		No odour detected
						1 AT 3.0m	
						1 AT 3.5m	
			4.00			1 AT 4.0m	
						1 AT 4.5m	
			5.00			1 AT 5.0m	
			6.00		extremely weathered ROCK, dark grey, dry to moist, low strength	1 AT 6.0m	No odour detected
					sandy GRAVEL, pale brown, moist, dense		No odour detected
			7.00		extremely weathered GRANITE ROCK, occasional fractures with sand lenses, dark grey, dry to moist, low strength		No odour detected
			8.00		Location GWB1 terminated at 8m		
			9.00				

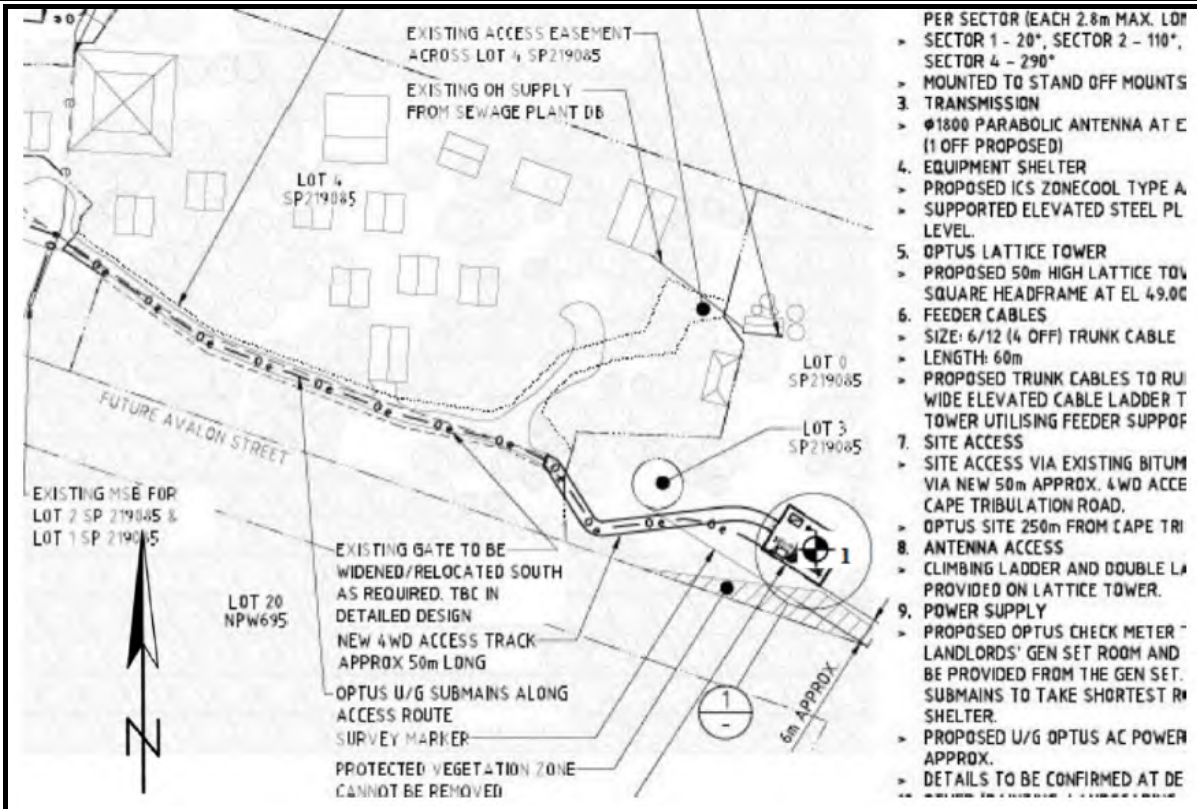
APPENDIX E - SITE LOCATION PLAN, TEST LOCATIONS PLAN

FIGURE 4 – SITE LOCATION

Geoaquitards Environmental ABN 80 683 110 579

Job Number	RM618-M	Scale	Not to Scale
Location	Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873	Locations	Site Location
Date	3 December 2019	Project	Acid Sulphate Soil Assessment

FIGURE 5 – TEST LOCATIONS PLAN



Geoaquitards Environmental ABN 80 683 110 579

Job Number	RM618-M	Map Description	Test Location Plan
Location	Site No: B8857-Q Cape Tribulation Road, Cape Tribulation QLD 4873	Sampling Date	13 November 2019
Date	3 December 2019	Project	Acid Sulphate Soil Assessment

APPENDIX F – CONFIRMATION OF PREVIOUS WORK

EPA VICTORIA

27 October 2010

Our Ref: 68133-1

Emmanuel Ernest
Senior Environmental Scientist
PO Box 4040
DANDENONG SOUTH VIC 3164

Lvl 3, 200 Victoria Street
Carlton
Victoria 3053
GPO Box 4395
Melbourne Victoria 3001
T: 03 9695 2722
F: 03 9695 2610
DX 210082
www.epa.vic.gov.au

Dear Mr Ernest,

ASS EMP FOR 211-212 NEPEAN HIGHWAY, SEAFORD

Thank you for the Acid Sulfate Soil Environment Management Plan ("EMP") submitted on behalf of Cockram Group Pty Ltd. The EMP was submitted to the Authority for approval in accordance with *Industrial Waste Management Policy (Waste Acid Sulfate Soils)*("IWMP") and concerns the on-site handling of acid sulfate soil at 211-212 Nepean Highway, Seaford.

The Authority has reviewed the EMP and determined that it meets the general intent of the IWMP. Notwithstanding the above, as best practice[i] measures will be implemented to manage waste acid sulfate soils on site, Cockram Group Pty Ltd is exempted[ii] under section 10(1) of the IWMP from the need to obtain EPA's approval of the EMP.

If you need additional information or assistance, please contact the undersigned on 9695 2522.

Yours sincerely

STEFAN VAN RHYN
STATUTORY FACILITATION

Via email: emmanuelernest@iprimus.com.au

[i] Refer to section 10(2) of the IWMP
[ii] Refer to section 10(1) of the IWMP

Victoria
The Place To Be

EPA
VICTORIA

3 May 2012

Emmanuel Ernest
Geoaquitards Environmental
PO Box 4040
DANDENONG SOUTH VIC 3164

Via email: geoaquitards@iprimus.com.au

Lvl 3, 200 Victoria Street
Carlton
Victoria 3053
GPO Box 4395
Melbourne Victoria 3001
T: 03 9695 2722
F: 03 9695 2610
DX 210082
www.epa.vic.gov.au

Dear Mr Ernest,

ACID SULFATE ENVIRONMENTAL MANAGEMENT PLAN (ASS EMP) - 117 GOULD STREET, FRANKSTON

Thank you for your Addendum (dated 30 April 2012) to the ASS EMP (dated 24 February 2012) for the above described address ("the site").

I understand that the acid sulphate soil ("ASS") will now be managed according to best practice methods, including:

- minimising the potential for the ASS to oxidise by limiting the maximum storage period at the site to 24 hours;
- crushed limestone will be placed below the cut site to neutralize any potential acidic runoff; and
- the ASS will be disposed of at a site licensed to take ASS, or a site with an approved ASS EMP;

As such, under section 10(1) of the *Industrial Waste Management Policy (Waste Acid Sulfate Soil)* the site is now exempted from the requirement to have the ASS EMP further assessed and formally approved by EPA. The exemption is given on the following provisos in relation to ASS handling activities at the site:

- that no additional ASS will be received onto the site;
- that no liming of ASS occur at the site; and
- that the best practice methods described above are implemented.

Please ensure that a signed copy of the Addendum is returned to both Council and EPA.

If you need additional information or assistance, please contact the undersigned on 9695 2522.

Yours sincerely

STEFAN VAN RHYN
DEVELOPMENT ASSESSMENTS