ENVIRONMENTAL CONSULTING Pty Ltd

PRELIMINARY ACID SULFATE SOIL INVESTIGATION

PROPOSED SUBDIVISON

March 2024

Prepared For: John Tilton

Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859,
Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886
133-193 Dulguigan Road
Dulguigan NSW

HMC2024.616.03

RE: Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886, 133-193 Dulguigan Road, Dulguigan NSW.

HMC Environmental Consulting Pty Ltd is pleased to present our report for a Preliminary Acid Sulfate Soil Investigation for the abovementioned site.

We trust this report meets with your requirements. If you require further information, please contact HMC Environmental Consulting directly on the numbers provided.

HMC Environmental Consulting Suite 29, Level 2, 75-77 Wharf Street PO Box 311 Tweed Heads NSW 2485		PH: Email: Web: ABN:	0755368863 admin@hmcenvironment.com.au www.hmcenvironment.com.au 60 108 085 614
Title: Job No: Client:	Preliminary Acid Sulfate Soil Investigation 2023.616.03 John Tilton		

Document Record:				
Version	Date	Prepared by	Checked by	Approved for issue by
Draft Issue A	7.03.2024	MF	MT	KH
Final Issue A	4.04.2024	KH		

Distribution List	Date	Version	Comments
J. Tilton, B & P surveys	7.03.2024	Draft Issue A	For review
J. Tilton, B & P surveys	4.04.2024	Final Issue A	For lodgement

This report should be cited as '*HMC Environmental Consulting (2024). Preliminary Acid Sulfate Soil Investigation, Proposed Subdivision: Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886, 133-193 Dulguigan Road, Dulguigan NSW. Report No. HMC2023.616.03.*'

EXECUTIVE SUMMARY

A six lot subdivision is proposed for the rural landholding located at Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886, 133-193 Dulguigan Road, Dulguigan NSW. It is proposed to amalgamate the existing lots and subdivide into six new lots that include residential dwelling sites. The landholding includes Low Density Residential R2 zoned land on the elevated western portion of the site, with the floodplain to the east currently zoned as RU1 Primary Production, with sugar cane cropping. The proposed subdivision and future dwelling sites are wholly withing the R2 zoned area.

The large rural landholding and surrounds are mapped as Class 2, 3 & 5 acid sulfate soil (ASS), with the existing and proposed future dwelling sites within the elevated Class 5 areas only. No disturbance of ASS would be expected as the maximum excavation depth would not be expected to extend below RL 18m AHD, and no lowering of the groundwater table below 1m AHD within any Class 2, 3 or 4 ASS would occur.

Following a desktop assessment of the NSW acid sulfate soil planning, soil landscape, and geology mapping, together with a detailed site inspection, it is concluded that no ASS would be disturbed with the proposed subdivision development. All future proposed dwelling sites are located above RL 20m AHD, with a significant buffer to the expected elevation of ASS, where present. No lowering of the groundwater table below 1m AHD in any Class 2, 3 or 4 ASS would occur. The topography, soil landscape and geology mapping does not indicate the presence of ASS on the site. It does not appear, based on likely proposed earthworks, that groundwater drawdown would occur, impacting on off-site ASS. The Tweed Local Environmental Plan 2014 states that work within Class 5 ASS areas only require investigation if the land is below 5m AHD and in which the water table is likely to be lowered below 1m AHD in any adjacent Class 2,3 or 4 ASS within 500m. No groundwater lowering is expected on the elevated proposed dwelling site locations.

Acid sulfate soil has not have been identified as being a constraint to the proposed six lot subdivision proposed to be located at Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886, 133-193 Dulguigan Road, Dulguigan NSW.

No further investigation or management is required.

TABLE OF CONTENTS

1 INTRODUCTION

A six lot subdivision is proposed for the rural landholding located at Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886, 133-193 Dulguigan Road, Dulguigan NSW. It is proposed to amalgamate the existing lots and subdivide into six new lots that include residential dwelling sites. The landholding includes Low Density Residential R2 zoned land on the elevated western portion of the site, with the floodplain to the east currently zoned as RU1 Primary Production, with sugar cane cropping. The proposed subdivision and future dwelling sites are wholly withing the R2 zoned area.

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This report addresses an investigation to determine the presence of, and any measures to be implemented to ameliorate any existing acidity or acid generation due to the possible disturbance of acid sulfate soils during construction of the proposed development.

2 SITE INFORMATION

Table 1 – Project Summary

Street Address		133-193 Dulguigan Road, Dulguigan NSW
Allotment Description		Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886
Allotment size		105 Hectares
Property No.		5184
Local Government		Tweed Shire
Parish		Berwick
County		Rous
Geographical Coordinates (MGA Zone 56)		Easting: -28.287296m E Northing: 153.400974 m S (Approximate centre of site).
Zoning		RU1 - Primary Production, RU2 - Rural Landscape
Land use - Existing		Agriculture, Farming
Land use - Proposed		Rural residential
Site Services		Mains Power, Tank, OSSM
Surrounding land uses	North	Rural , Uncleared bushland
	East	Rural Agriculture, Rural farming
	South	Rural Residential, Rural , Rural farming
	West	Rural Residential
Closest Sensitive Environment		The Rous River is located adjacent south to the subject site. Surface runoff would flow into the various farm drains and intermittent water courses before discharging into the Rous River.

Topography	Landform: Ridge , Slope Upper, Slope Middle Aspect: East Slope: Divergent, Waxing Gradient: <3% Elevation: Approximately 1m - 45m AHD across the property All dwelling sites would be located above 18m AHD.

Regional Geology (Hashimoto el al 2008)	Quaternary Alluvial Deposits Current and recent mud, silt, sand, and gravel deposited by river (alluvial) systems. Bedrock Geology Pzs characterised by Cambro-Ordovician, Devonian and Carboniferous sedimentary rocks, minor volcanic rocks (Central Block and Coffs Harbour Block
Soil Landscape (Morand, 1996)	Billinudgel (bi) landscape: Rolling hills on metamorphics of the Neranleigh-Fernvale Group. Soils: Deep, moderately well-drained Red Podzolic Soils on crests; moderately deep, moderately well-drained Yellow Podzolic Soils on slopes. Geology: Palaeozoic Neranleigh-Fernvale Group. Thinly bedded fissile shales, siltstones and sandstones with occasional more massive greywackes, volcanic tuffs, agglomerates, sandstones, and massive cobble conglomerates. Tweed (tw) landscape: Extensive marine plain of lower Tweed catchment consisting of deep Quaternary alluvium and estuarine sediments. Soils: Deep, poorly drained Brown Alluvial Clays on levees; deep, poorly drained Humic Gleys, on backplain. Geology: Deep Quaternary alluvium and estuarine sediments. Marine clays are predominant
Australian Soil Classification	Hydrosols (HY) Soils that are saturated in the major part of the soil profile for at least 2-3 months in most years (ie. includes tidal waters). Kurosols (KU) Soils with strong texture contrast between A horizons and strongly acidic B horizons. Many of these soils have some unusual subsoil chemical features (high magnesium, sodium, and aluminium).
Regional Hydrogeology (TSC GIS)	Groundwater vulnerability is mapped as moderate – moderately high over the elevated portion of the property and proposed dwelling locations. The flats are mapped as high groundwater vulnerability. Shallow groundwater (<5m depth) is not expected to be encountered on the elevated areas where future residential development is proposed.
Groundwater Database Search	The online NSW Office of Water groundwater mapping (http://allwaterdata.water.nsw.gov.au/water.stm) shows the nearest mapped registered groundwater bores is GW049343 & GW300324 located within 100m of the site. GW049343 bore use is unknown and GW300324 is registered for domestic use.

3 PROJECT DESCRIPTION

A six lot subdivision is proposed for the large rural landholding located at Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886, 133-193 Dulguigan Road, Dulguigan NSW. The development proposal would rationalise and reorganise the lot layout to provide flood free dwelling sites on the elevated parts of the site. The proposed Lots would comprise:

Lot 1 53.5Ha
Lot 2 19.19 Ha
Lot 3 2.0 Ha
Lot 4 1.65 Ha
Lot 5 1.72 Ha
Lot 6 22.86 Ha:

4 PROPOSED EARTHWORKS

Landform modification would be required for the proposed dwelling sites on the elevated undulating land to achieve final levels. No excavation for the proposed dwelling sites would occur below approximately 18m AHD.

5 TWEED LOCAL ENVIRONMENT PLAN 2014

The NSW Legislation 1:25 000 Acid Sulfate Soil Planning Maps – *7550_COM_ASS_004_040_20140303* indicates the large rural landholding is located within a Class 2, 3 & 5 area. All the existing and proposed dwelling sites are on elevated land (~20-30m AHD) within the class 5 ASS mapped area. The Department of Land and Water Conservation (now NSW DPI) ASS Risk Map Ed. 2 1997 *Cudgen 9641 N3* shows all existing and proposed future dwelling sites are outside the area mapped as either low or high probability ASS.

Table 2.1 in the Assessment Guidelines of the Acid Sulfate Soil Manual (ASSMAC, 1998) and Clause 7.1 of Tweed LEP 2014 (TLEP) indicate for each class of land the types of works likely to present an environmental risk if undertaken in the particular class of land. The maps do not describe the actual severity of ASS in a particular area but provide a first indication that ASS **may** be present.

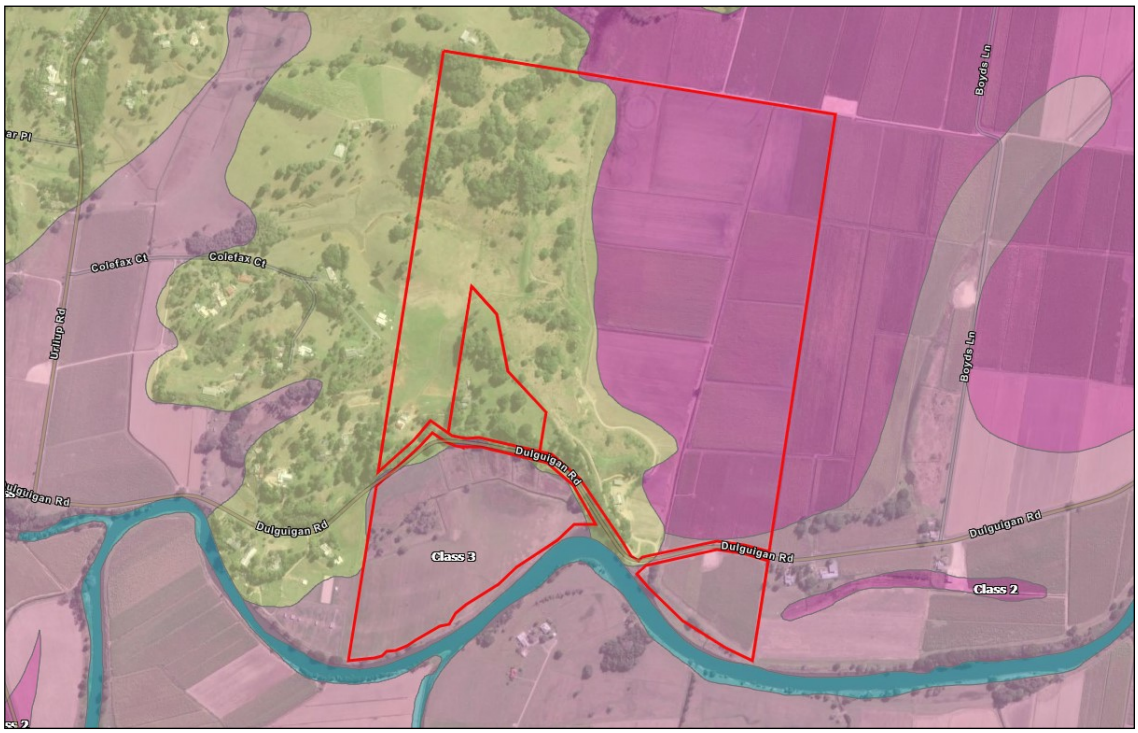

Figure 1 - ASS Planning Map (https://www.legislation.nsw.gov.au/maps.pdf)

Figure 1 - ASS Risk Map (https://www.legislation.nsw.gov.au/maps.pdf)

Clause 7.1 of the TLEP 2014 requires that works proposed in Class 5 areas in which works are within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land, require a preliminary acid sulfate soil assessment prior to consent. A management plan is required should it be confirmed that acid sulfate soil is present above action criteria and likely to be disturbed. If a management plan is required, it must be prepared in accordance with the Acid Sulfate Soil Manual produced

by the Acid Sulfate Soil Management Advisory Committee (ASSMAC). All proposed future dwelling sites are located >20m AHD, with no lowering of groundwater expected.

6 GEOLOGY & SOIL LANDSCAPE

According to the NSW Department of Land & Water Conservation *Soil Landscapes of the Murwillumbah-Tweed Heads* 1:100 000 Sheet (Morand, 1996), the existing and proposed future dwelling sites are located within a Billinudgel (bi) soil landscape characterised as rolling hills on metamorphics of the Neranleigh-Fernvale Group, while the low-lying flood plains are located within a Tweed (tw) soil landscape: characterised as extensive marine plain of lower Tweed catchment consisting of deep Quaternary alluvium and estuarine sediments. It is also located within a. Table 4.1 in Morand (1996) shows no acid sulfate potential within Billinudgel soil landscapes.

The 1:25000 *Coastal Quaternary Geology Map - Tweed Heads* (Hashimoto, 2008) shows the floodplain area of the landholding is generally within the Quaternary Alluvial Deposits: The current and recent mud, silt, sand, and gravel is deposited by river (alluvial) systems. The elevated parts of the landholding with the existing and proposed future dwelling sites is located in bedrock geology (Pzs) characterised by Cambro-Ordovician, Devonian and Carboniferous sedimentary rocks, minor volcanic rocks (Central Block and Coffs Harbour Block). This material is non-Holocene and non-ASS.

Figure 3 – Soil Landscape Map (Source: eSPADE NSW)

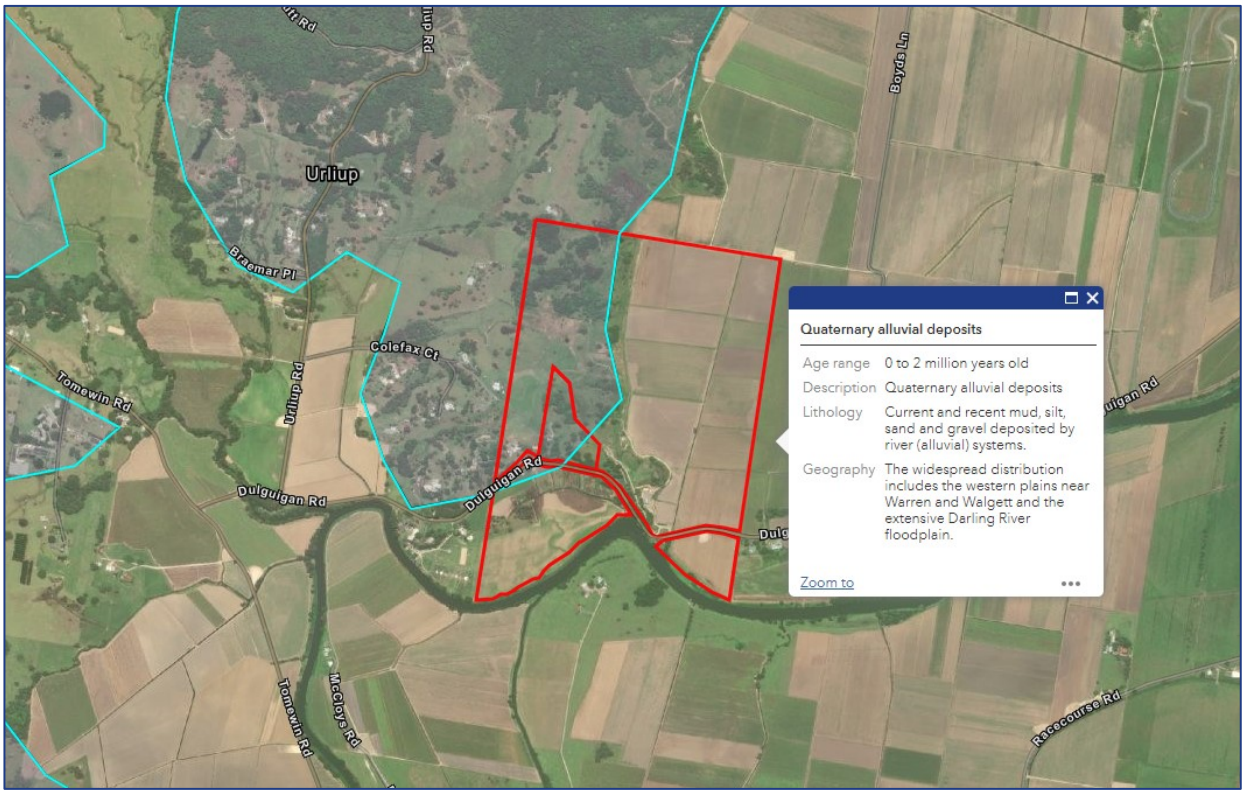

Figure 4 - Geology Map (Source: Geoscience Australia)

7 ASS ELEVATION

White et al (1997) note that "*the top of the sulfidic horizon should be close to where it was last formed, at about mean high tide sea level (about **1m AHD** in eastern Australia).* Naylor et al (1998) also conclude following the extensive ASS mapping project across NSW that an "*analysis of the relationships between elevation levels (AHD) and soil data established the critical level at which the upper limit of ASS occurs. This is at or less than about **1m AHD***". The 1m AHD benchmark can also be confirmed via the wording of provisions relating to class 5 land and water table elevation.

Wilson (2005) also reports a maximum elevation of ASS of 1m AHD after reviewing soil investigation results for the NSW ASS mapping program.

All existing and proposed future dwelling sites are located on elevated land with RL >20m AHD. The minimum excavation would be not expected to be below RL 18m AHD and, therefore, provide a significant buffer to estimated maximum ASS elevation.

8 GROUNDWATER ELEVATION AND DEWATERING

The groundwater elevations have not been established for the site, however given the elevated property and the expected maximum excavation depth to be approximately RL >18m AHD, it is not expected that groundwater would be intercepted nor dewatering required for the proposed future dwelling sites. No drawdown of groundwater in Class 2, 3 or 4 ASS below 1m AHD would be expected.

9 ASS CONCLUSION

Following a desktop assessment of the NSW acid sulfate soil planning, soil landscape, and geology mapping, together with a detailed site inspection, it is concluded that no ASS would be disturbed with the proposed subdivision development. All future proposed dwelling sites are located above RL 20m AHD, with a significant buffer to the expected elevation of ASS, where present. No lowering of the groundwater table below 1m AHD in any Class 2, 3 or 4 ASS would occur. The topography, soil landscape and geology mapping does not indicate the presence of ASS on the site. It does not appear, based on likely proposed earthworks, that groundwater drawdown would occur, impacting on off-site ASS. The Tweed Local Environmental Plan 2014 states that work within Class 5 ASS areas only require investigation if the land is below 5m AHD and in which the water table is likely to be lowered, which neither are the case for any of the proposed future dwelling sites.

Acid sulfate soil has not have been identified as being a constraint to the proposed six lot subdivision proposed to be located at Lot 8 DP 755685, Lot 1 DP 364474, Lot 1 DP 410859, Lot 1 DP 376131, Lot 1 DP 328107 & Lot A DP 174886, 133-193 Dulguigan Road, Dulguigan NSW.

No further investigation or management is required.

10 SIGNATURE

This report has been prepared by Mark Tunks of HMC Environmental Consulting, a suitably qualified environmental consultant, in accordance with the *Protection of the Environment and Operations Act 1997, NSW Acid Sulfate Soil Manual 1998* and other relevant statutes, policy and guidelines.

…

7 March 2024
Completion Date

Mark Tunks
Principal

11 LIMITATIONS

Any conclusions presented in this report are relevant to the site condition at the time of inspection and legislation enacted as at date of this report. Actions or changes to the site after time of inspection or in the future will void this report as will changes in relevant legislation.

The findings of this report are based on the objectives and scope of work outlined in Section 1. HMC Environmental has performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties or guarantees expressed or implied, are given. This report does not comment on any regulatory issues arising from the findings, for which a legal opinion should be sought. This report relates only to the objectives and scope of work stated and does not relate to any other works undertaken for the client. The report and conclusions are based on the information obtained at the time of the assessment.

The results of this assessment are based upon site inspections and fieldwork conducted by HMC Environmental personnel and information provided by the client. All conclusions regarding the property area are the professional opinions of the HMC Environmental personnel involved with the project, subject to the qualifications made above. HMC Environmental assume no responsibility or liability for errors in any data obtained from regulatory agencies, information from sources outside of HMC Environmental, or developments resulting from situations outside the scope of this project.

12 REFERENCES

- Acid Sulfate Soil Management Advisory Committee, "*Acid Sulfate Soil Manual*", Wollongbar, 1998.
- Ahern CR, McElnea A E, Sullivan L A,. (2004). *Acid Sulfate Soils Laboratory Methods Guidelines. In Queensland Acid Sulfate Soils Manual 2004*. Department of Natural Resources, Mines and Energy. Indoorapilly, Queensland, Australia
- Hashimoto T.R & Troedson A.I. 2008 *Tweed Heads 1:100 000 and 1:25 000, Coastal Quaternary Geology Map Series*. Geological Survey of New South Wales, Maitland
- Morand, D.T., *Soil Landscapes of the Tweed Heads - Murwillumbah 1:100 000 Sheet*", 1996.
- Naylor,S.D., Chapman,G.A., Atkinson,G., Murphy,C.I., Tulau,M.J., Flewin,T.C., Milford,H.B., Morand,D.T.1998 *Guidelines for the Use of Acid Sulfate Soil Risk Maps*. 2nd ed. Department of Natural

- Sullivan. L. et al, 2018. *National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual*
- White, I. et al, "*Fixing Problems Caused by Acid Sulphate Estuarine Soils*," *In* C. Copeland, C. (Ed.) Ecosystem Management: the Legacy of Science, Halstead Press, Sydney 1995.
- White, I., Melville, M.D., Wilson, B.P., and Sammut, J. 1997 *Reducing Acidic Discharges from Coastal Wetlands in Eastern Australia.* Wetlands Ecology and Management 5 : 55-72
- Wilson, B. (2005). *Elevations of sulfurous layers in acid sulfate soils: What do they indicate about sea levels during the Holocene in eastern Australia?* Catena 45-56

13 APPENDICES

See following pages

APPENDIX 1 - LOCATION MAPS

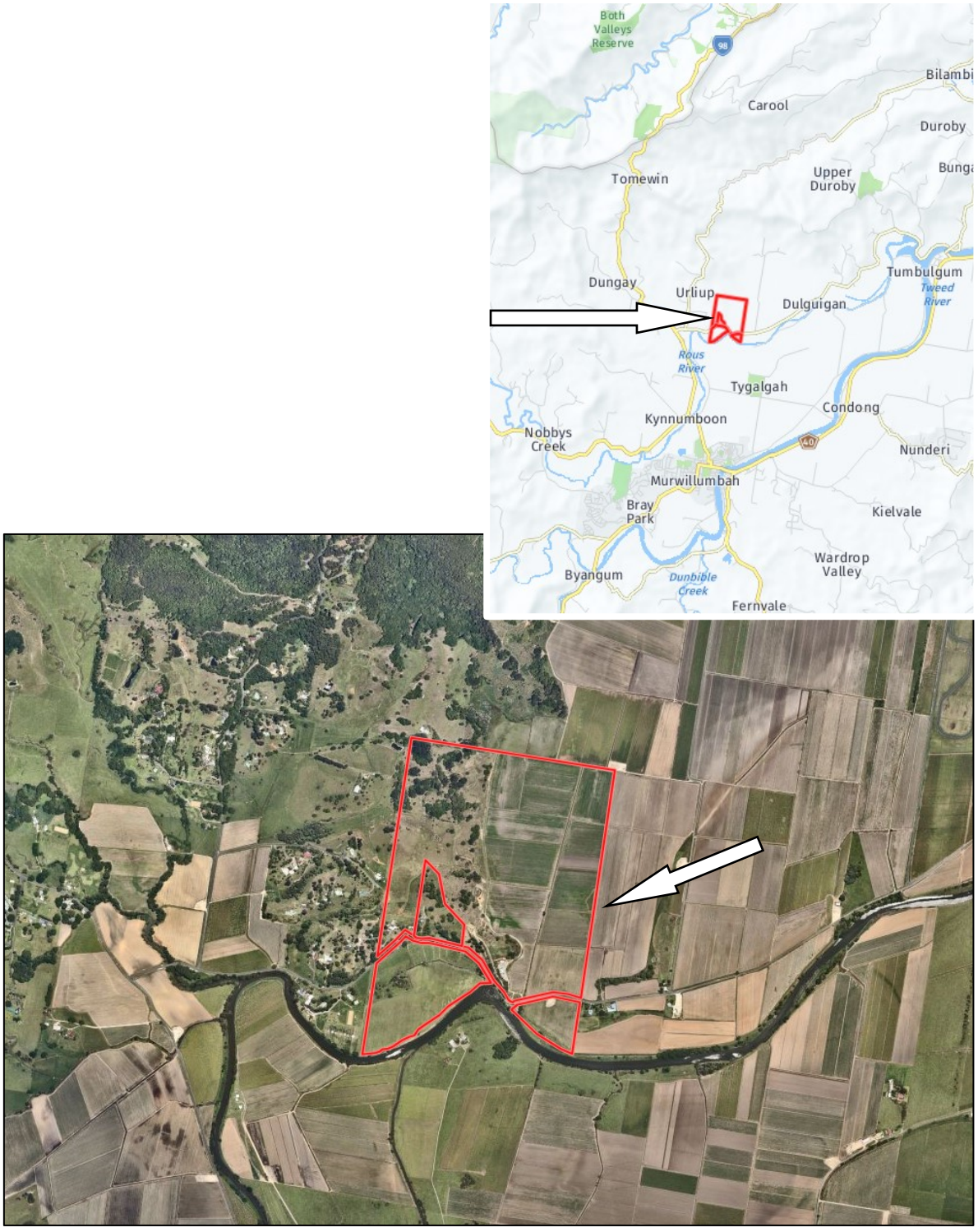

Figure 1 - Surrounding Area (Source: Nearmap 2023)

Figure 2 – Subject Site (Source: Nearmap 2023)

APPENDIX 2 - SITE PLAN PROPOSED DEVELOPMENT

PRELIMINARY
ONLY
29/8/2023

M.G.A.

PRELIMINARY
ONLY
29/8/2023

Revision | Chk

Client:

MR JOHN TILTON

IMPORTANT NOTES :

THE PROPOSED BOUNDARIES AS SHOWN HEREON ARE PRELIMINARY ONLY AND ARE SUBJECT TO FINAL DESIGN, LOCAL AUTHORITY APPROVAL AND REGISTRATION WITH NSW LAND REGISTRY SERVICES.

DIMENSIONS & AREAS SHOWN HEREON ARE SUBJECT TO FIELD SURVEY AND LOCAL AUTHORITY APPROVAL.

CONTOUR INTERVAL - 1m

CONTOURS HAVE BEEN DERIVED FROM NSW SPATIAL SERVICES 1m LIDAR DATA GATHERED APRIL 14.

PROPOSED SUBDIVISION PLAN

LOT 8 IN DP755685,
LOT 1 IN DP364474,
LOT 1 IN DP410859,
LOT 1 IN DP328107,
LOT 1 IN DP376131
& LOT A IN DP174886

DULGUIGAN ROAD
DULGUIGAN

Parish of BERWICK — County of Rous

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A QUALITY ASSURED COMPANY

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SCALE AT A1	Level DATUM	Drawn	Chk'd	F.Bk	L.Bk
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APPENDIX 3 - ELEVATION OF ASS IN NSW (WILSON ET AL FIG. 2)

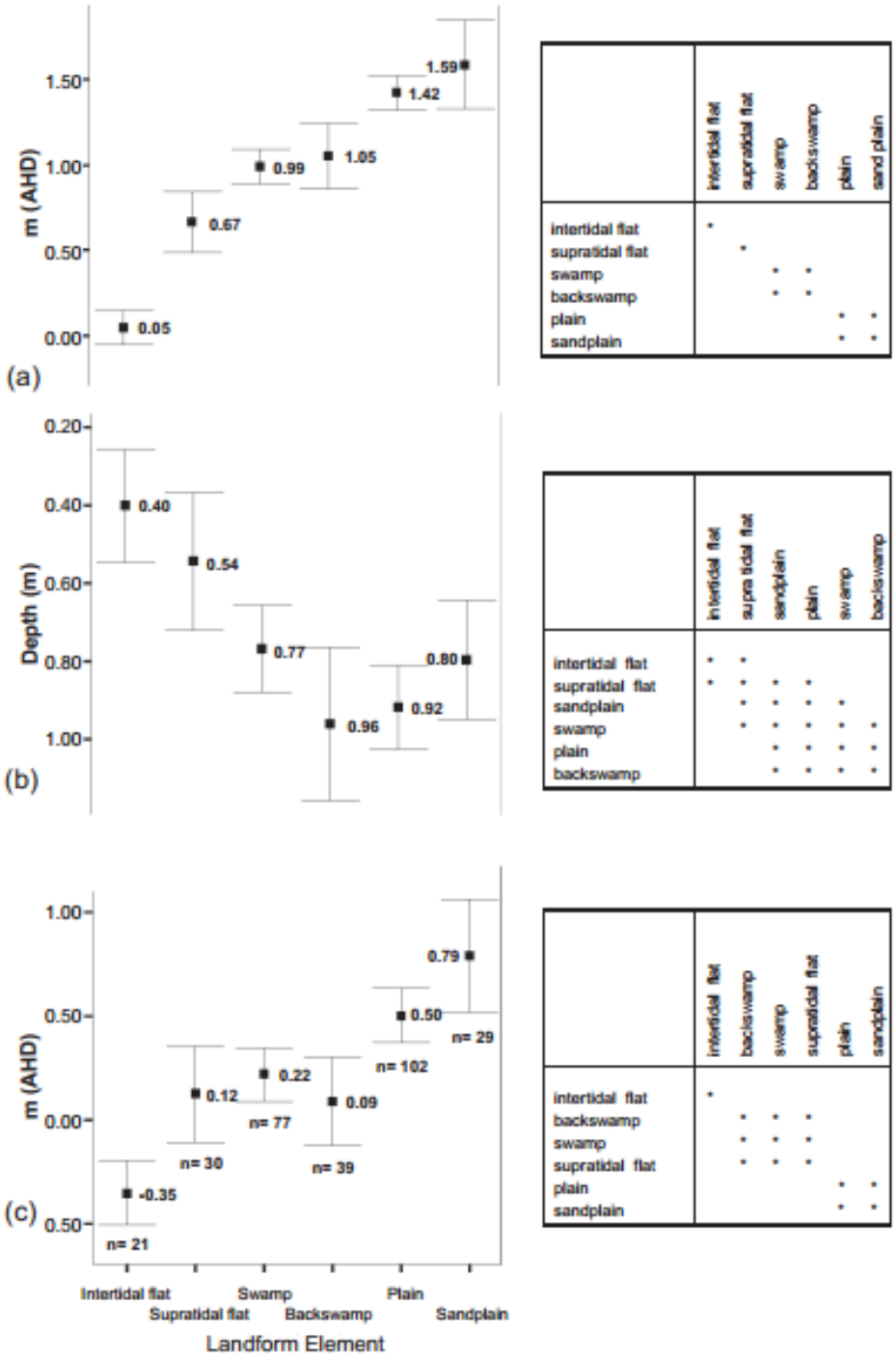

Fig. 2. Stratigraphic characteristics of all ASS profiles. Surface elevation (a), depth to sulfurous materials (b), and elevation of sulfurous materials (c). Error bars are 95% confidence interval of the mean. An asterisk (*) in similarity matrices indicates that mean difference between landforms is not significant (P<0.05).

APPENDIX 4 - PHOTOGRAPHIC LOG

Photo No.	Date
1	6.12.2023

Description:
View NW from Proposed lot dwelling site across historic structure location towards elevated Proposed Lot 6 dwelling site near cattle yards

Photo No.	Date
2	6.12.2023

Description:
View SE from former structure location towards elevated Proposed Lot 1 dwelling site

Photo No.	Date
3	6.12.2023

Description:
View towards sugar cane from elevated Proposed Lot 1 dwelling site

Photo No.	Date
4	6.12.2023

Description:
Undulating elevated house sites