Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Geotechnical Desktop Review

Tuggerah Gateway Development
60 Wyong Road, Tuggerah

Prepared for
Scentre Limited

Project 202794.00
September 2021

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		8 September 2021
Reviewer		8 September 2021

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Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
Unit 5, 3 Teamster Close
Tuggerah NSW 2259
Phone (02) 4351 1422

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Tuggerah Gateway Development
60 Wyong Road, Tuggerah

1. Introduction

This report presents the results of a geotechnical desktop review undertaken in connection with the proposed Tuggerah Gateway Development at 60 Wyong Road, Tuggerah. The assessment was commissioned in an email dated 7 April 2021 by Adam Achterstraat of Scentre Limited and was undertaken with reference to Douglas Partners Pty Ltd (DP) proposal 202794.00.P.001.Rev0 dated 15 March 2021.

On behalf of Scentre Group, this geotechnical desktop review supports a Planning Proposal and Structure Plan prepared by Urbis and provides preliminary comment on the geotechnical aspects of the site, including anticipated constraints to the proposed development. The Planning Proposal facilitates the proposed amendment to the Local Environmental Plan at the Tuggerah Gateway Site, known as Lot 2 DP1056960 and Lot 3 DP1084221, which will enable residential, mixed-use and recreational land uses.

The site is approximately 41.6 hectares and is currently zoned RU6 Transition, B4 Mixed Use and E2 Environmental Conservation.

The Planning Proposal seeks to rezone land comprising (part) Lot 2 in DP 1056960 and Lot 3 in DP 1084221 from RU6 Transition to R1 General Residential. The B4 Mixed Use zone in the north-east of the site and E2 Environmental Conservation zone in the south-east is to be retained.

It is understood that the proposed development will comprise a mix of low and medium to high rise buildings (up to 12 storeys).

The long-term development yield capable of being accommodated on the site comprises of 2,177 dwellings including a mix detached housing lots, medium density townhouses/terraces, apartments and seniors living. A number of internal roads and areas dedicated to open space / public domain are also proposed.

Consistent with the Structure Plan, as shown Figure 1 on the following page, the future development of the site is to be staged in accordance with market demand and infrastructure requirements. In the short-term employment uses in the form of bulky goods / large format retailing will be prioritised in part of the B4 Mixed Use zone. In the longer term this area is envisaged as a mixed-use precinct.

The desktop study comprised a detailed review of published geological maps, soil landscape and acid sulfate soil maps and previous site investigation records. A site inspection was also undertaken.

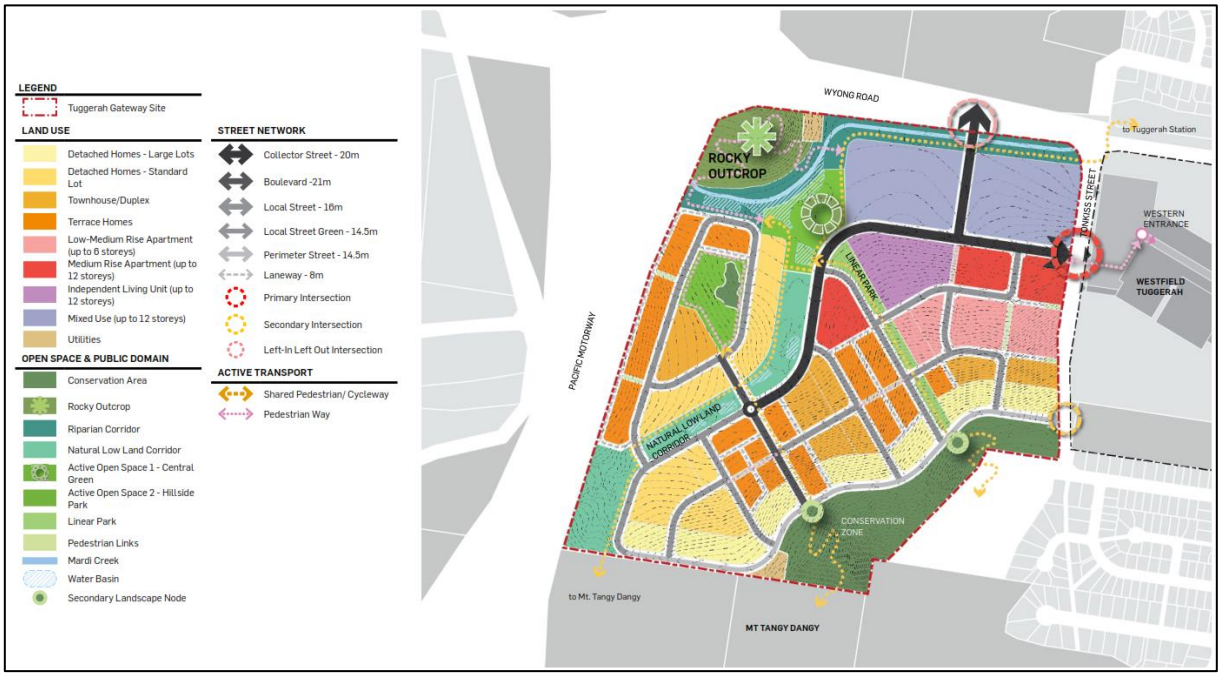

Figure 1: Concept Plan

2. Site Description

The site is located at 60 Wyong Road, Tuggerah and comprises the following individual lots:

- Lot 3 in DP 1084221; and
- Lot 2 in DP 1056960.

The site has a combined area of approximately 41.6 ha and is bounded by Wyong Road to the north, Pacific Motorway to the west, Tonkiss Street to the east and undeveloped land to the south. The Westfield Tuggerah Shopping Centre is located east of Tonkiss Street.

An aerial view of the site is shown in Figure 2 below.

Figure 2: Aerial view of the site

At the time of the investigation, the site was unoccupied and generally grass covered.

A large grass covered stockpile was present within the north-eastern area of the site and was up to approximately 10 m high with dimensions of about 225 m by 70 m. Based on anecdotal information, it is understood that the stockpiled material was sourced during the construction of the nearby Tuggerah Westfield development which was first constructed in 1995 and extended in 2005.

Further evidence of fill material and disturbance was present at the site, particularly in the southern area of the site which is understood to have been formerly used as an abattoir site. Fill material was also evident along the western and eastern boundaries of the site.

Some ponds / farm dams, associated with the former abattoir works were also observed in the southern area of the site.

Surface levels at the site typically fall toward drainage gullies / intermittent watercourse within the site, and then to the north-east toward a tributary of Mardi Creek (within the site), which discharges to the northern side of Wyong Road. Review of local topographical mapping indicates that surface levels range from about RL 80 m AHD in the south-eastern corner of the site, to about RL 10 m AHD in the northern area of the site.

Benching or recontouring of the hill slopes and excavation of drainage gullies to control surface water runoff was also observed throughout the site.

Rock outcropping / cuttings were also observed in the south-eastern and north-western corners of the site. Excavation/quarrying of the area adjacent to the southern site boundary was also observed.

Photographs taken at the time of the walkover inspection are provided in the photo plates in Appendix B.

3. Published Data

The desktop assessment included review of the following available information:

- Geological mapping;
- Soil landscape mapping;
- Acid sulfate soil risk mapping; and
- Previous investigations undertaken by DP.

The results of the desktop assessment are discussed below.

3.1 Geology

The NSW Seamless Geology dataset, made available by the NSW Government Department of Regional New South Wales, has been referenced to determine the varying geology within the site.

Drawing 2 in Appendix C shows the mapped geology within the site. A summary of the expected geology is provided in Table 1 below.

Table 1: Summary of Geological Units

Unit ID	Unit Name	Unit Description
Tngb	Burralow Formation (aka Terrigal Formation)	Fine-grained, micaceous, quartz- to quartz-lithic sandstone; interbedded with siltstone, grey shale and red-brown claystone.
Tncp	Patonga Claystone	Red-brown claystone and siltstone, light green-grey fine-grained sandstone.
Q_av	Alluvial Valley Deposits	Silt, clay, (fluvially deposited) lithic to quartz-lithic sand, gravel.
QH_af	Alluvial Floodplain Deposits	Silt, very fine- to medium-grained lithic to quartz-rich sand, clay.

3.2 Soil Landscape

Reference has been made to the 1:100,000 scale soil landscape sheets for Gosford-Lake Macquarie to determine the varying soil landscapes at the site.

Drawing 3 in Appendix C shows the mapped soil landscape units within the site. A summary of the expected geology is provided in Table 2 below.

Table 2: Summary of Geological Units

Unit ID	Unit Name	Unit Description	Typical Limits / Hazards
Wn	Watagan (Colluvial)	Rolling to very steep hills on fine-grained Narrabeen Group sediments. Local relief 50-220m, slopes >25%. Narrow convex crests and ridges, steep colluvial side slopes, occasional sandstone boulders and benches.	Mass movement hazard, steep slopes, soil erosion hazard, foundation hazard, occasional rock outcrop, seasonal waterlogging (localised).
Er	Erina (Erosional)	Undulation to rolling rises and low hills on the Terrigal Formation. Local relief <60 m, slopes <25% . Rounded narrow crests with moderately inclined slopes.	Mass movement (localised), high soil erosion hazard, foundation hazard (localised), localised high run-on, seasonal waterlogging of footslopes, strongly acid soils of low fertility.
Wo	Woodburys Bridge (Residual)	Gently undulating rises to rolling low hills on Patonga Claystone. Local relief 40-80m and slope gradients up to 20%. Sandstone capping on crests of steeper hills is common. Predominantly cleared tall open-forest.	Extreme erosion hazard, high foundation hazard, seasonal waterlogging (localised), acid soils of very low fertility, low wet bearing strengths and high erodibility.
Wy	Wyong (Alluvial)	Broad poorly drained deltaic floodplains and alluvial flats of Quaternary sediments on the Central Coast Lowlands. Slope Gradients <3%; local relief <10m.	Flooding, seasonal waterlogging, foundation hazard, permanent waterlogging (localised), stream bank erosion (localised), acid sulfate potential (localised), strongly acid, poorly drained, impermeable soils of very low fertility with saline subsoils.

3.3 Acid Sulfate Soils

Review of the local acid sulfate soil mapping indicates that the lower, northern area of the site is mapped as having a low probability of acid sulfate soils at depths greater than 3 m of the natural ground surface.

Drawing 4 in Appendix C shows the mapped acid sulfate soil risk for the site.

3.4 Previous Investigations

DP has undertaken numerous previous investigations within and adjacent to the site. A brief summary of the relevant conditions encountered previously is provided below in Table 3.

Table 3: Summary of Relevant Previous Investigations Undertaken by DP

Project No.	Location	Type of Investigation	Summary Subsurface Conditions
75905.00	North-eastern Area of Site Large Stockpile and Surrounds	Acid Sulfate Soil Assessment – Boreholes	Stockpile fill material comprised mix of sand, silt and clay soils to depths up to approximately 10.5 m. Natural alluvial soils below comprised 0.5 m to 1.0 m layer of clayey / sandy silt, underlain by silty sandy clay or clay. Free groundwater observed at about RL 6 m AHD in one of the boreholes, however, this appeared to be coincidental with a sandy layer and may represent a seepage path rather than true groundwater. Groundwater / leachate was also measured at 6.5 m depth in an existing well installed within the stockpiled material. No free groundwater was observed in the remaining bores, which were drilled to deepest RL 4.9 m AHD. Both acid sulfate soils and acidic soils were found to present in this area of the site and an acid sulfate soil management plan was prepared.
75905.01	North-eastern Area of Site Large Stockpile and Surrounds	Subsurface Conditions (Factual) – Boreholes and Test Pits	Boreholes drilled to north of large stockpile comprised weak sandy and silty clay soils to RL 2.5 m to 7 m AHD. Weak soils typically underlain by stiff or stronger clay soils or at least medium dense sands. Test pits excavated on southern side of stockpile generally comprised relatively shallow (up to ~1m) weak sandy or silty soils underlain by stiff or stronger clay soils. Fill material with building waste was encountered in some pits. Free groundwater was observed near the ground surface during drilling of the bores north of the large stockpile. Groundwater seepage was also observed within the fill material or in sandy layers at other locations within 1 m to 2 m of the ground surface.
16159.00	Tuggerah Westfield Development	Geotechnical Investigation – Cone Penetration Tests, Boreholes and Test Pits	In the northern, lower, area of the site, alluvial soils were encountered to up to 23 m depth, comprising interbedded stiff to hard clays and loose to dense sands. In the southern, higher, area of the site, stiff or stronger residual clay soils were encountered, with bedrock encountered as shallow as 0.5 m within the ground surface. Three groundwater monitoring wells were installed and standing groundwater was measured to be present at about RL 5 m to 8 m AHD.

Project No.	Location	Type of Investigation	Summary Subsurface Conditions
75831.00	Tuggerah Westfield Expansion (South)	Geotechnical Investigation – Cone Penetration Tests, Boreholes and Test Pits	The subsurface conditions comprised stiff, very stiff or hard clays to about 8 – 10 m depth, medium dense, dense or very dense sand or clayey sand to depths of about 10.5 – 13.5 m, and then mainly hard clay thereafter, to maximum depth of 24 m. Free groundwater observed in CPT holes at depths of approximately 2 m to 3.5 m. No free groundwater was observed in any of the boreholes or test pits.

4. Comments

4.1 Geological Model

Based on results of the desktop assessment and previous investigations, it is expected that two main subsurface profiles will be encountered. That is, an alluvial profile with deep soils of variable density / strength and a residual profile of at least stiff residual clays overlying bedrock. The extent of these profiles are expected to match roughly with the geology mapping as shown in Drawing 2, Appendix C.

Fill material is also present at the site as described below.

Standing groundwater levels are expected to be at approximately RL 4 m to 8 m AHD. Some perched groundwater may be present within fill material. Groundwater may also be encountered within preferential flows paths within bedrock, at higher elevations.

4.2 Anticipated Constraints

The anticipated constraints to the proposed development, from a geotechnical perspective, are summarised below. Drawing 1, in Appendix C also shows the approximate extent of the affected areas.

4.2.1 Waterlogged Soils

Based on the results of the walkover inspection, waterlogged soils are likely to be present during construction, particularly in the northern, low lying, area of the site and where drainage gullies are present. The extent shown on Drawing 1 (Appendix C) is indicative of the waterlogged soils observed at the time of the site walkover. Depending on the conditions leading up to and at the time of construction, other areas may be affected by waterlogged soils.

Waterlogged soils, if present at the time of construction may affect trafficability of construction plant as well as site preparation for earthworks (i.e. placement of fill material for pavements and/or buildings). Unsuitable materials would need to be improved or replaced in order to provide suitable working platforms.

In order to minimise the risk of having waterlogged soils during construction, it is recommended that appropriate drainage be installed ahead of construction. This may include, but not limited to, catch drains to divert stormwater run-on away from the low-lying areas an into formal stormwater drainage. Detail on formal stormwater drainage is provided in the Stormwater Report prepared by Infrastructure & Development Consulting.

4.2.2 Possible Soft Soils

Based on the results of previous investigations at and adjacent to the site, weak alluvial soils may be present in the northern, low lying area of the site. Based on previous investigations, the weak soils may extend to depths up to approximately 5 m below the natural ground surface and hence may be considered unsuitable for support of high level footings.

The area of expected weak soils, as show in Drawing 1 in Appendix C, encroaches upon areas of proposed detached homes, townhouses and terrace homes in the western areas of the site as well as the medium rise apartment, independent living and mixed use development in the central northern area of the site.

In this regard, pile footings may be required to support buildings in this area and further investigation is recommended to determine the extent of weak soils across the site. Increased settlements, particularly in areas of proposed fill, may also occur where deep weak soils are present.

4.2.3 Fill Material

A large stockpile of fill material is present within the northern area of the site (refer Drawing 1, Appendix C). Based on the results of previous investigations, the fill material comprises a mix of sand, silt, clay and gravel, as well as some building waste (i.e. concrete etc.). Assessment of the stockpiled fill material has also identified that the fill material comprises a mix of acid sulfate and acidic soil.

Fill material is also expected to be present in other areas of the site (refer Drawing 1, Appendix C), some of which appears to be associated with former abattoir works at the site. It is expected that the fill material may include building waste, based on site observations and previous investigations undertaken.

Where existing fill material is present at design level or in areas to receive additional fill, then reworking or removal of the fill material will be required. The existing fill should be considered uncontrolled and should not be relied upon for support of proposed structures.

4.2.4 Steep Ground and Shallow Bedrock

Steep ground (i.e. slopes greater than say 10°) may impact on the proposed development and may be subject to slope stability assessment. In such areas, consideration needs to be given to global slope stability, soil creep and any upslope impact such as unstable boulders etc. Specific slope stability assessment should be carried out once the concept design and finished levels have finalised.

The areas identified on Drawing 1, Appendix C, include areas of rock cuttings that will be subject to stabilisation. Further detailed assessment will be required to provide advice on appropriate stabilisation measures.

Shallow bedrock is expected at higher elevations and consideration should be given to this where excavation is proposed. Rock strengths are expected to be initially of very low to low strength, however, medium and high strength rock may also be present at depth and investigation should be carried to confirm rock strengths where required.

5. Conclusion

As outlined above, the main anticipated constraints to the proposed development include the presence of waterlogged and weak soils, fill material, steep ground and shallow bedrock. Notwithstanding this, these constraints can be overcome / managed during the design and construction phases and would not prohibit the proposed development.

6. Limitations

Douglas Partners (DP) has prepared this report for this project at 60 Wyong Road, Tuggerah in accordance with DP's proposal 202794.00.P.001.Rev0 dated 15 March 2021 and acceptance received from Adam Achterstraat dated 7 April 2021. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Scentre Limited for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The interpretation and advice provided is of a general nature only and is based upon the conditions indicated by published maps and encountered during past investigations. The accuracy of the advice provided by DP in this report may be affected by undetected variations in the ground conditions along the alignment, which can change abruptly due to variable geological processes and also as a result of human influences.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

Report Notes

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

Photo Plates

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (1)

Photo (2)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
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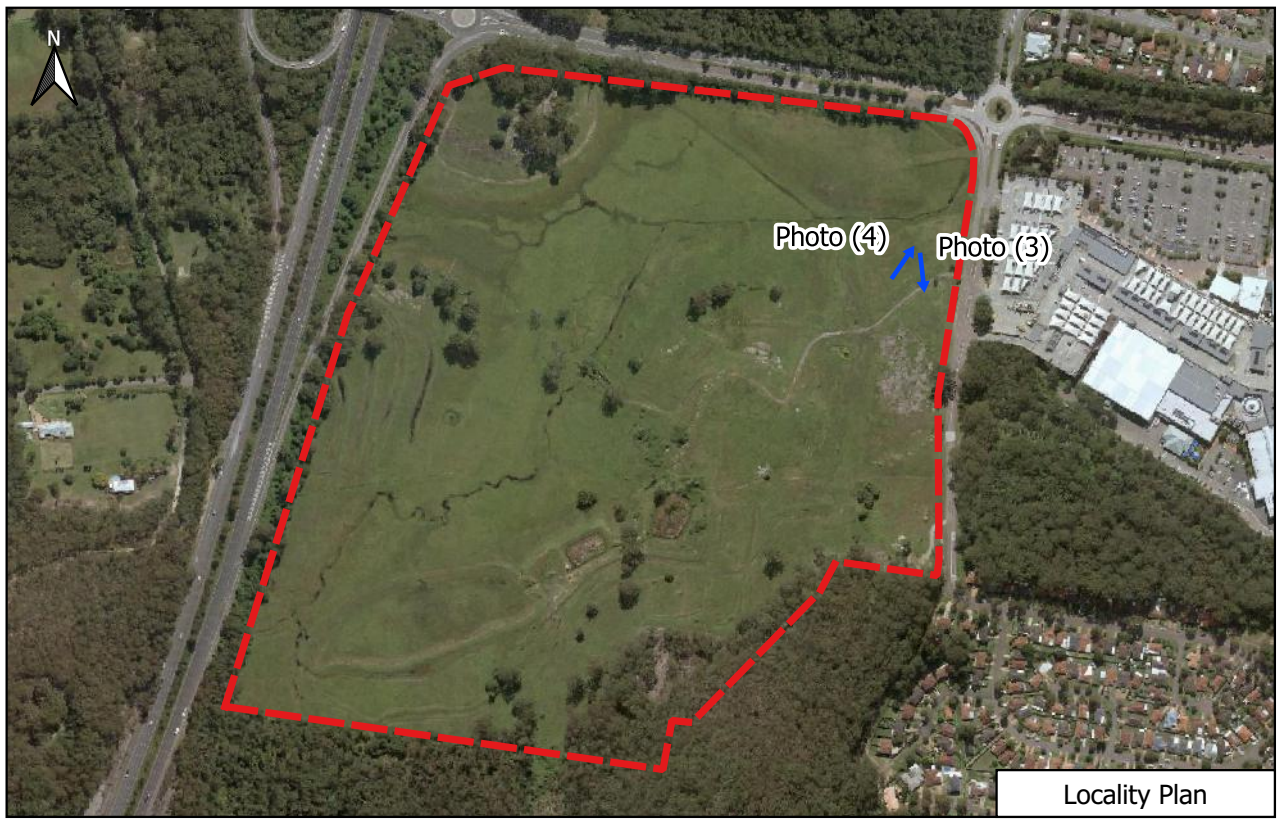

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (3)

Photo (4)

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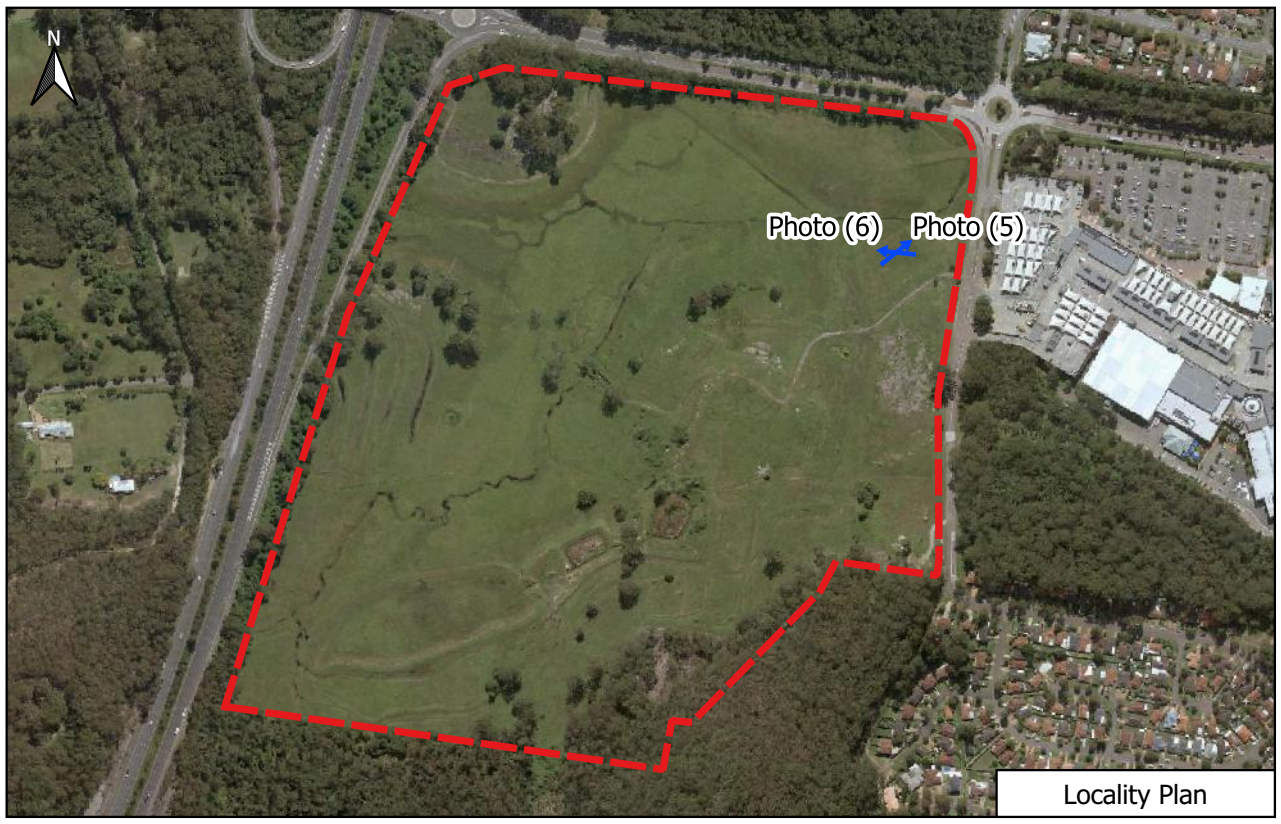

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (5)

Photo (6)

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					PHOTO PLATE No: 3
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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (7)

Photo (8)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No:202794.00
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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (9)

Photo (10)

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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (11)

Photo (12)

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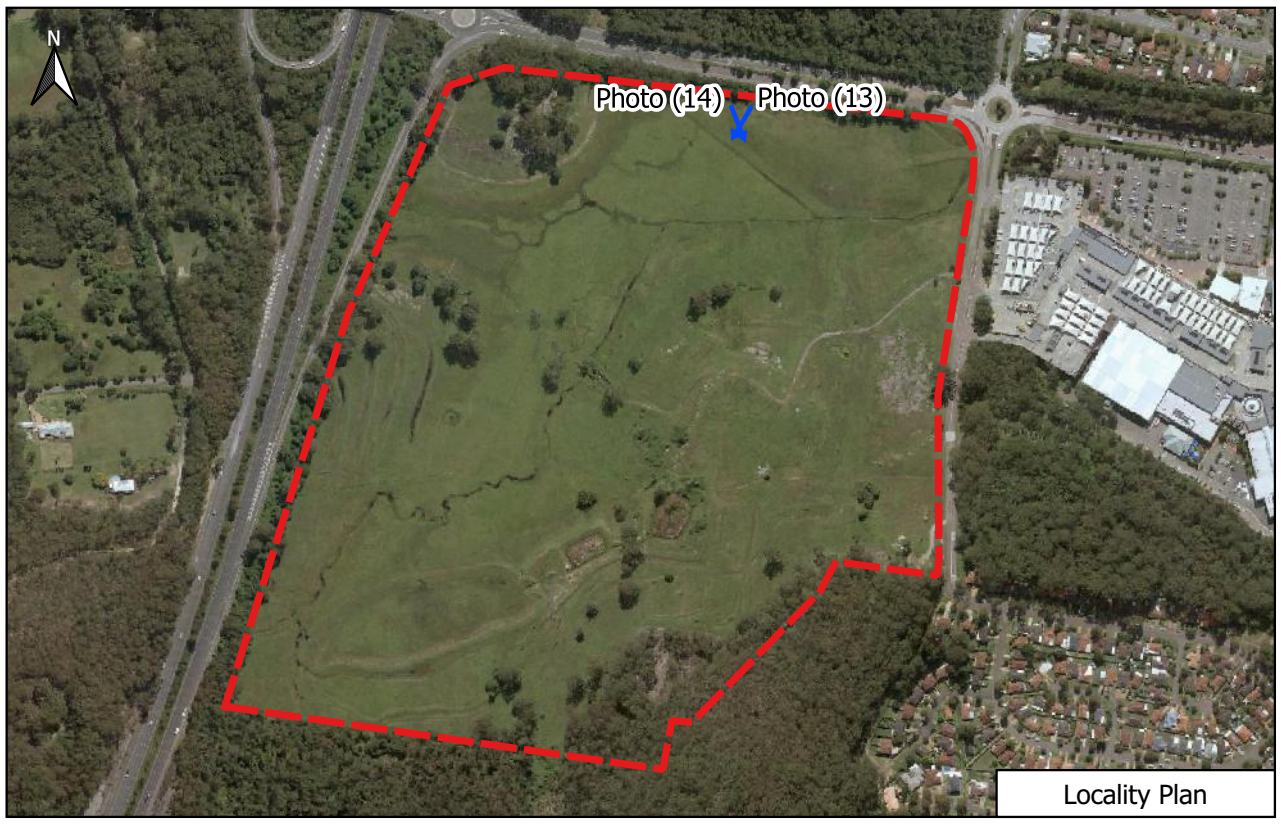

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (13)

Photo (14)

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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (15)

Photo (16)

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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (17)

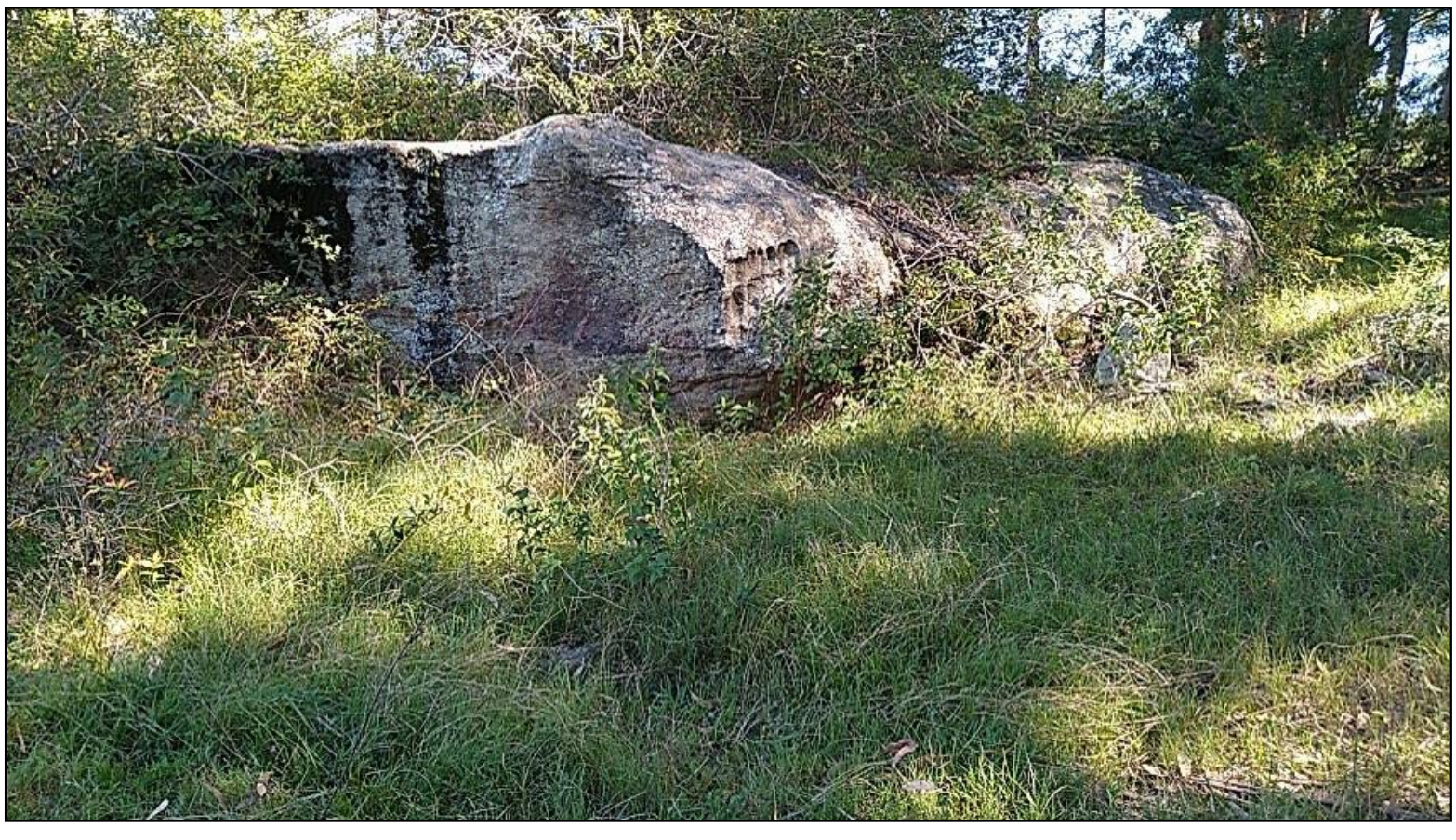

Photo (18)

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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (19)

Photo (20)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (21)

Photo (22)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
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Locality Plan

Legend

Approximate Photo Location / Direction

Photo (23)

Photo (24)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
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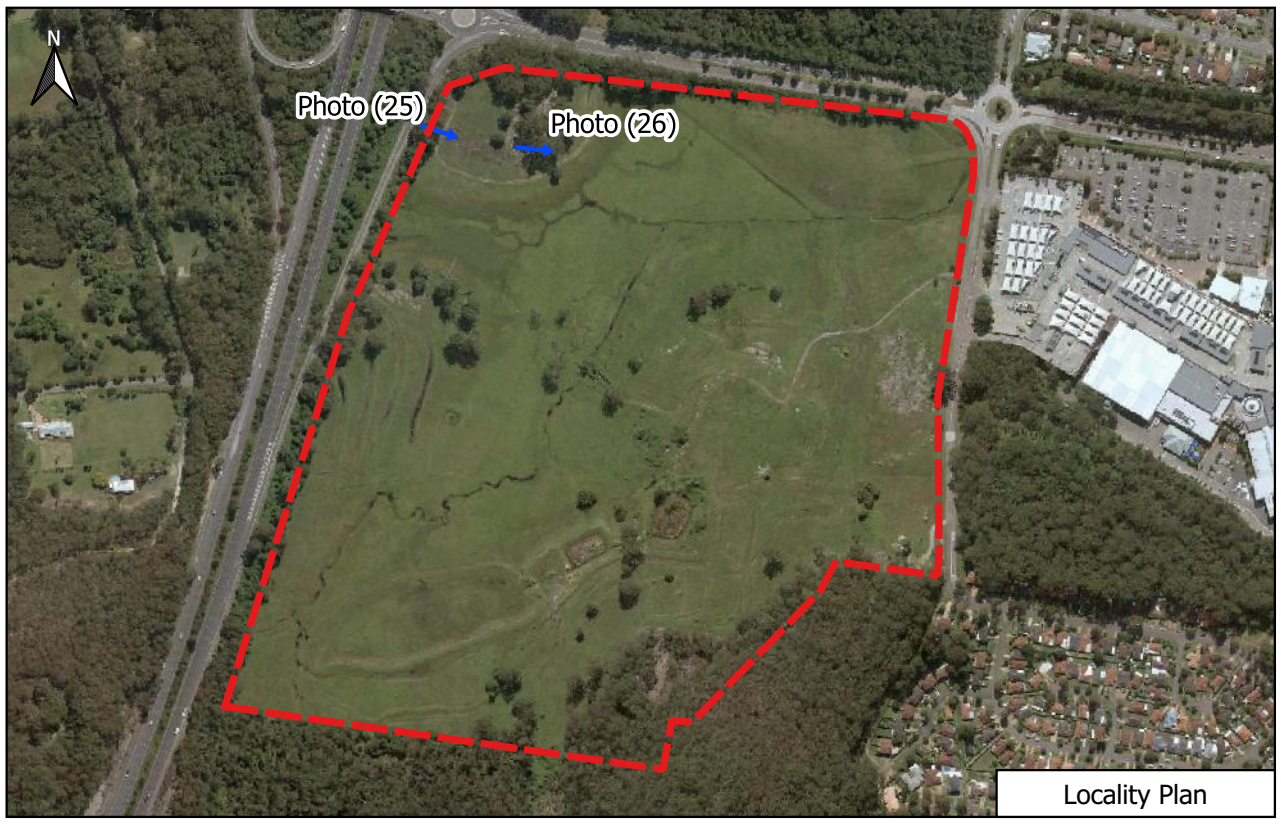


Locality Plan

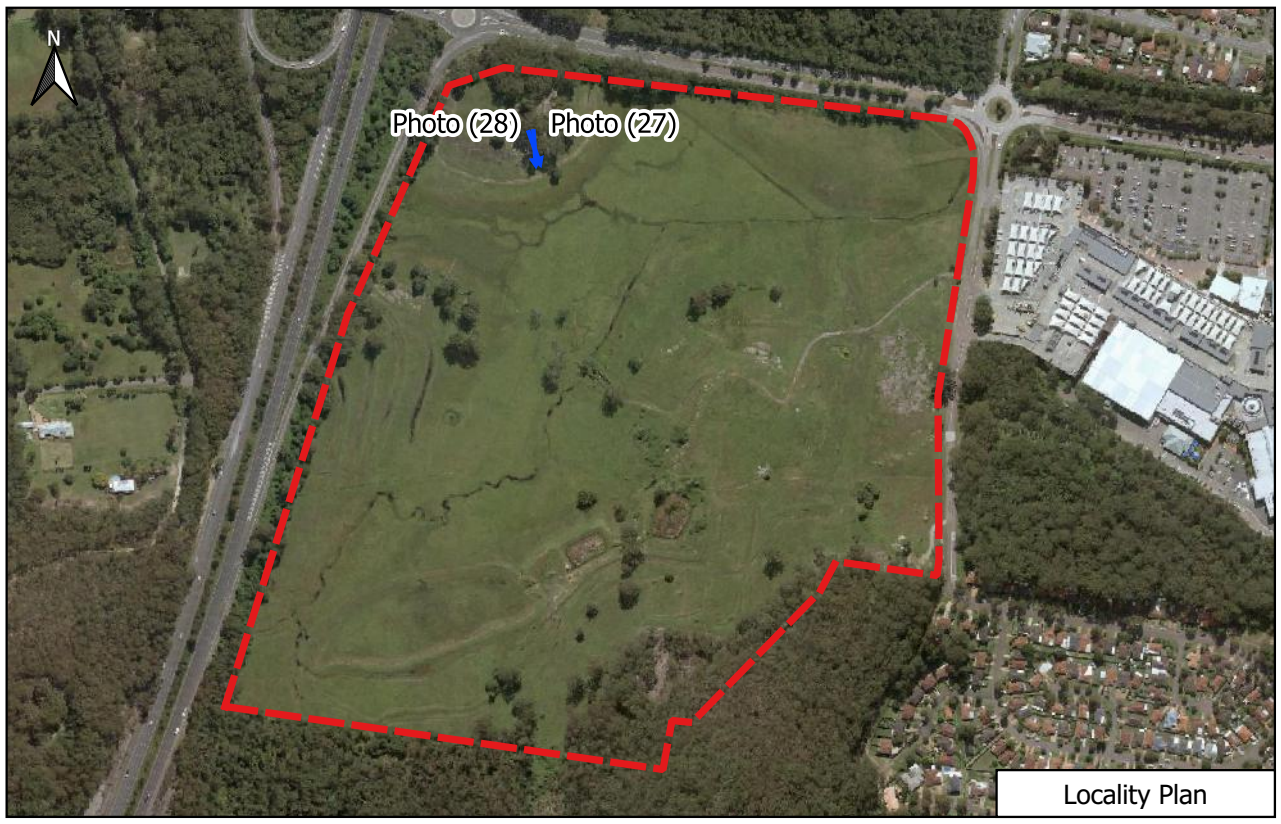
Legend

Approximate Photo Location / Direction

Photo (25)

Photo (26)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 13
					REVISION: 0



Locality Plan

Legend

Approximate Photo Location / Direction

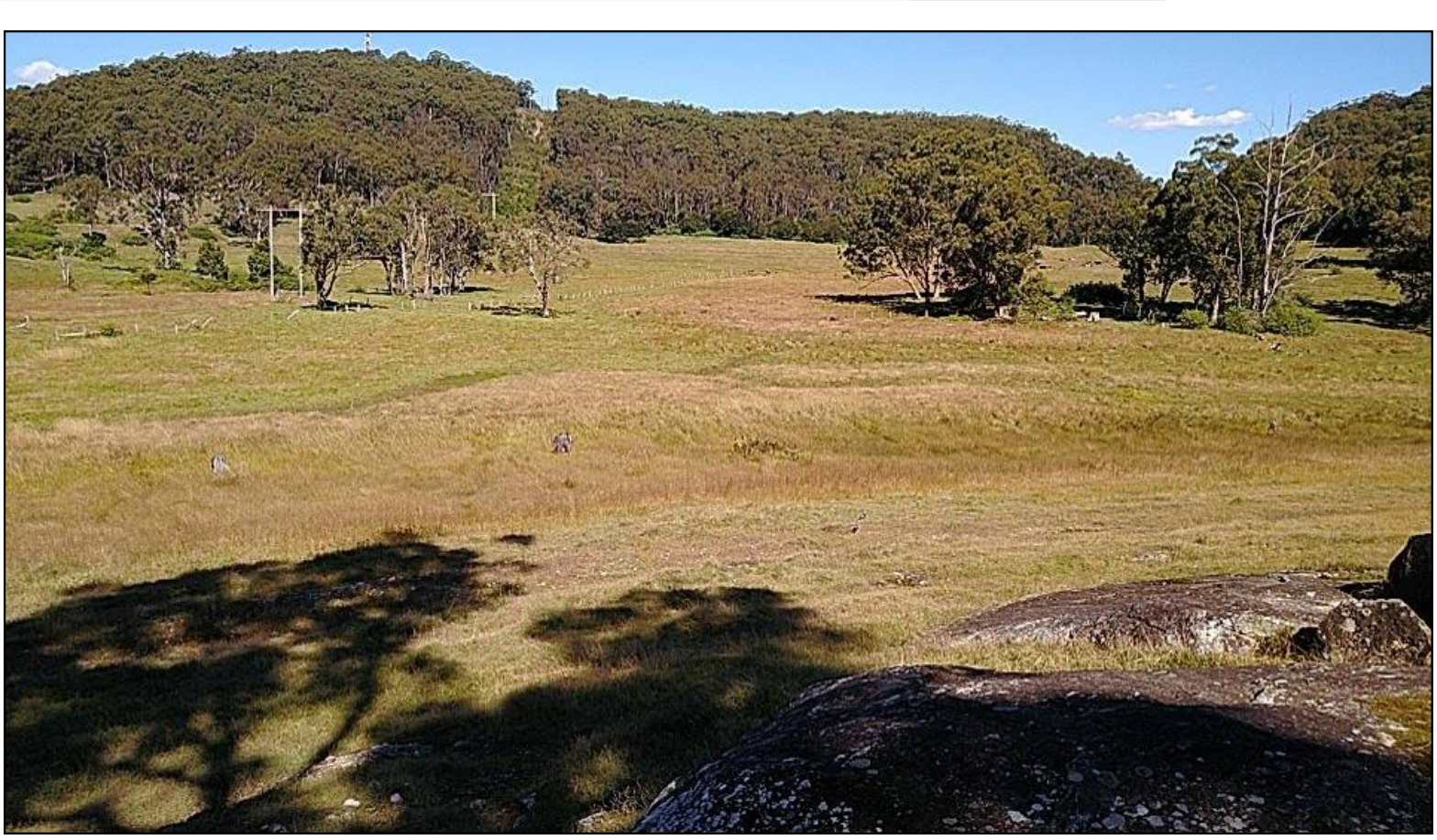


Photo (27)

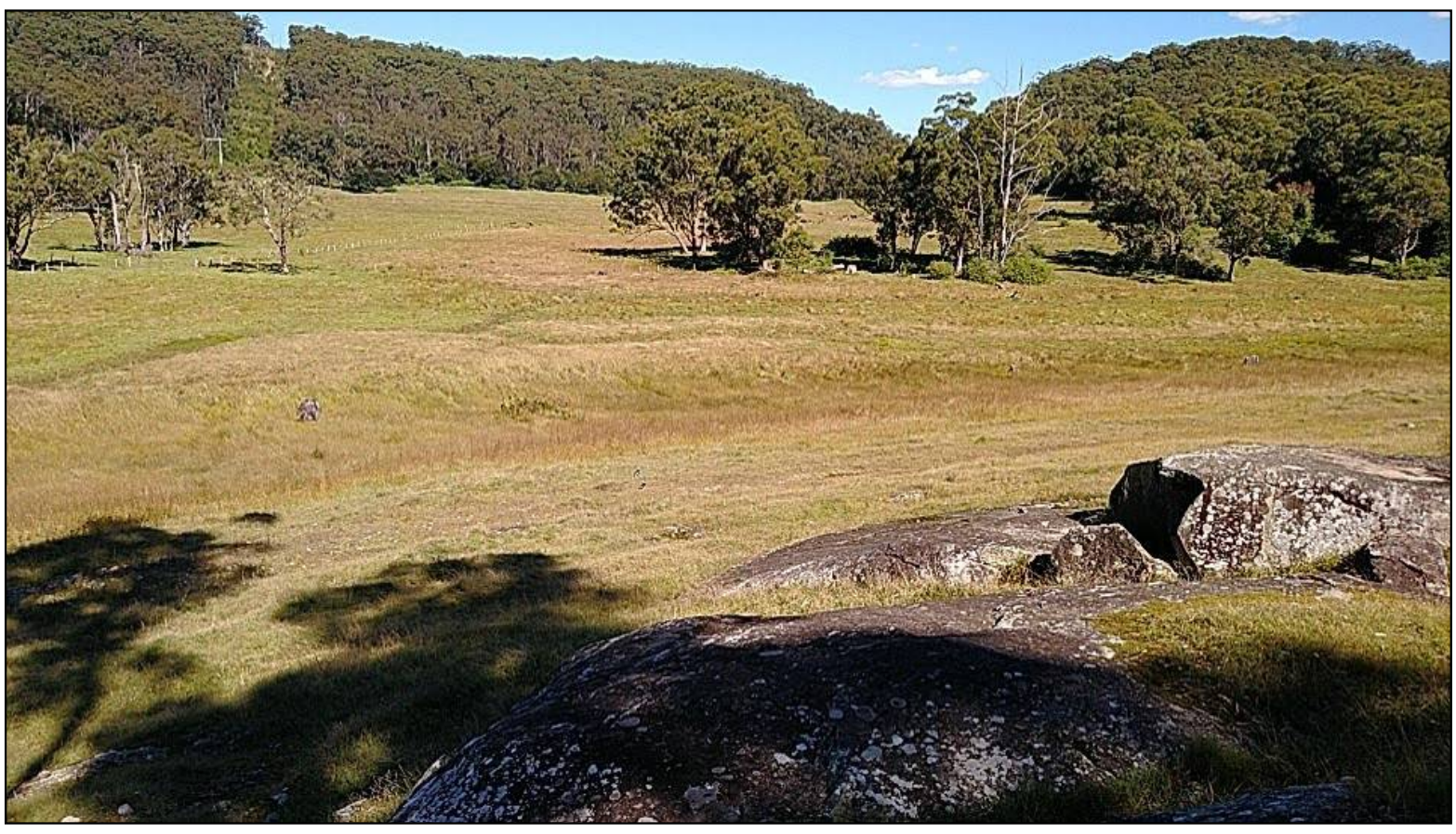


Photo (28)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 14
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (29)

Photo (30)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21 PHOTO PLATE No: 15 REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (31)

Photo (32)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No:202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 16
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (33)

Photo (34)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 17
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (35)

Photo (36)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 18
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (37)

Photo (38)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 19
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (39)

Photo (40)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 20
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (41)

Photo (42)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
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					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (43)

Photo (44)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 22
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (45)

Photo (46)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
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					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (47)

Photo (48)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 24
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (49)

Photo (50)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 25
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (51)

Photo (52)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 26
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

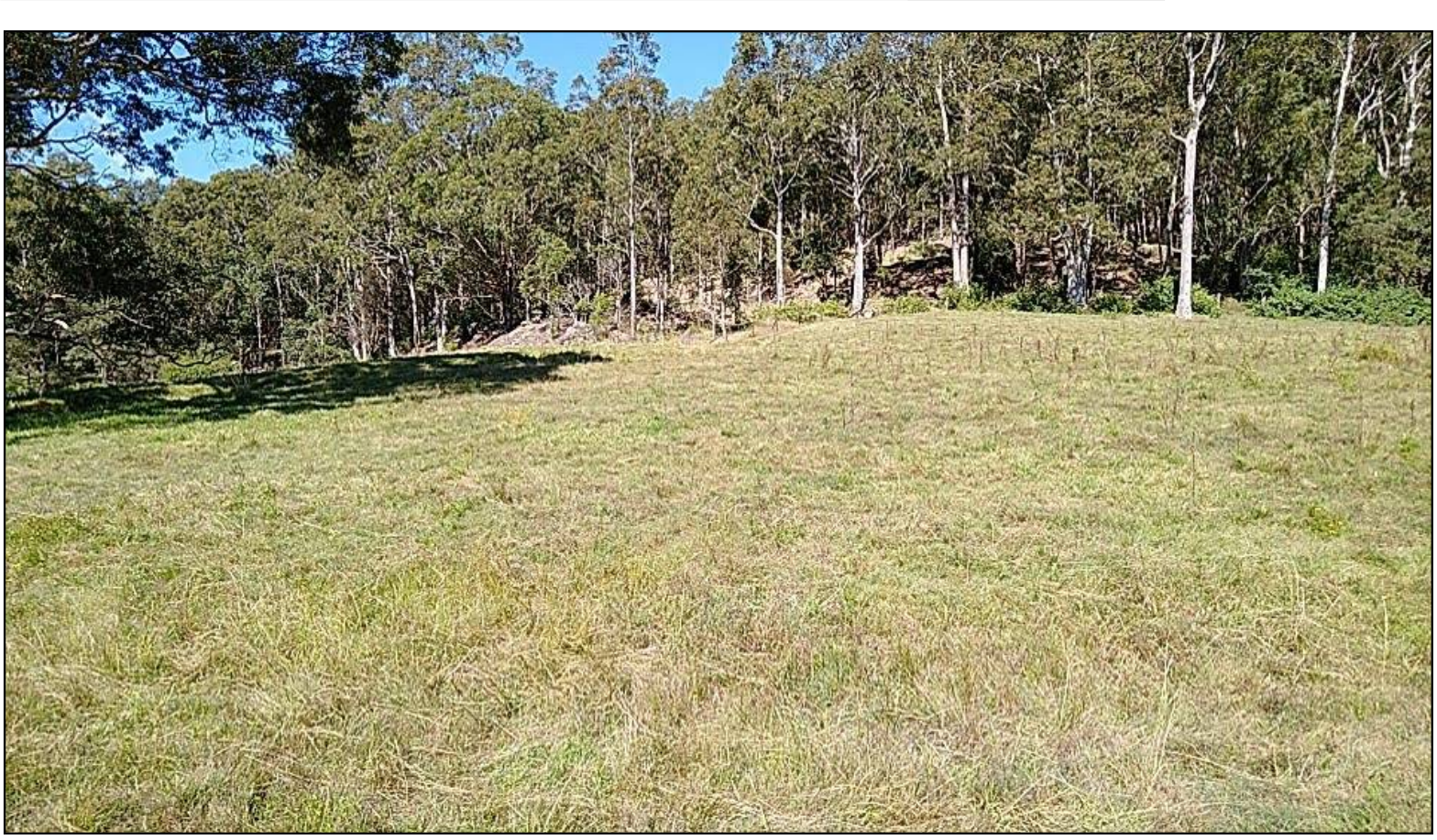

Photo (53)

Photo (54)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 27
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (55)

Photo (56)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 28
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (57)

Photo (58)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
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					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

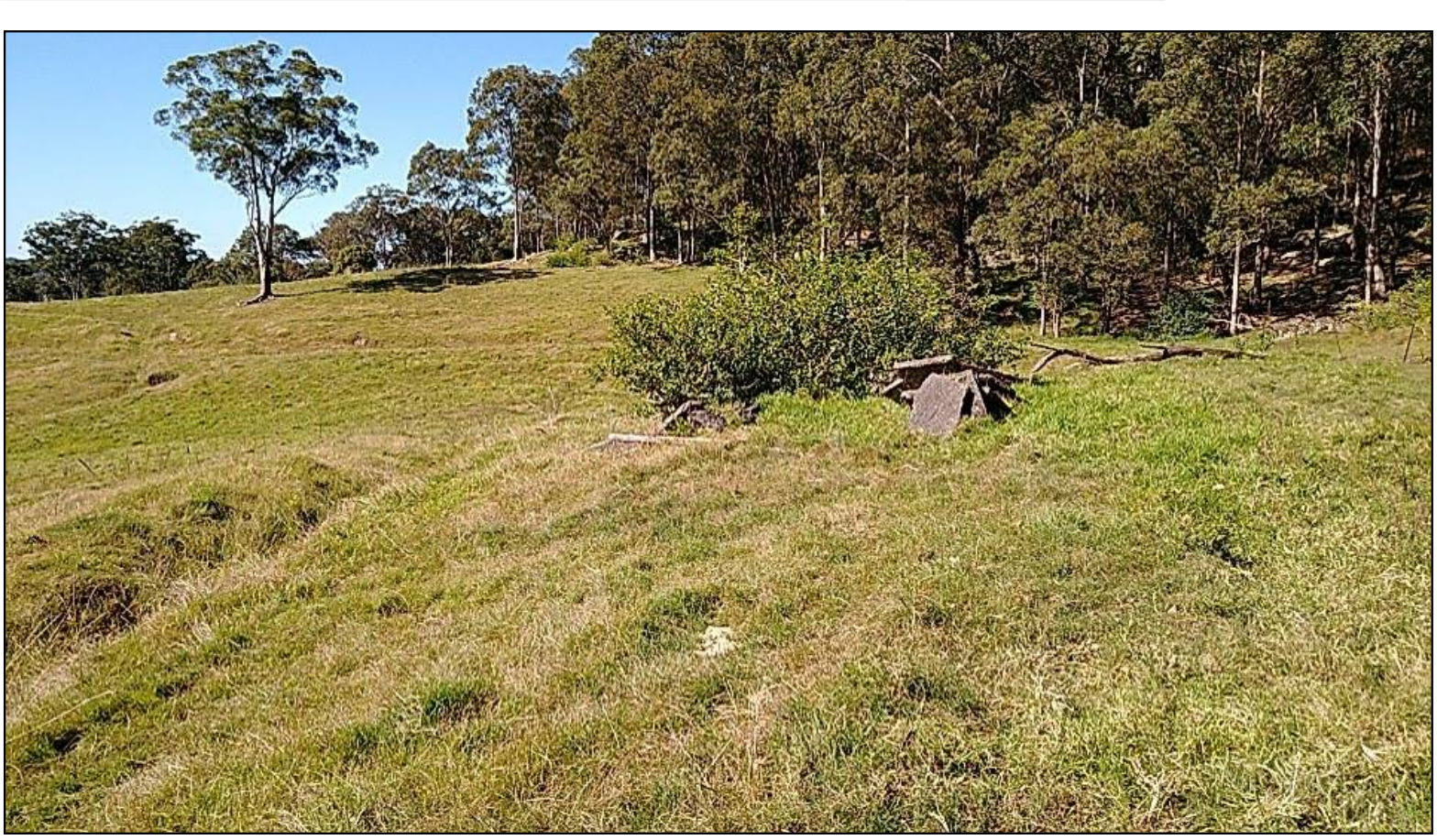


Photo (59)

Photo (60)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 30
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (61)

Photo (62)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 31
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (63)

Photo (64)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 32
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (65)

Photo (66)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No:202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 33
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (67)

Photo (68)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 34
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (69)

Photo (70)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 35
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (71)

Photo (72)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 36
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (73)

Photo (74)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 37
					REVISION: 0

Locality Plan

Legend

↘ Approximate Photo Location / Direction

Photo (75)

Photo (76)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 38
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

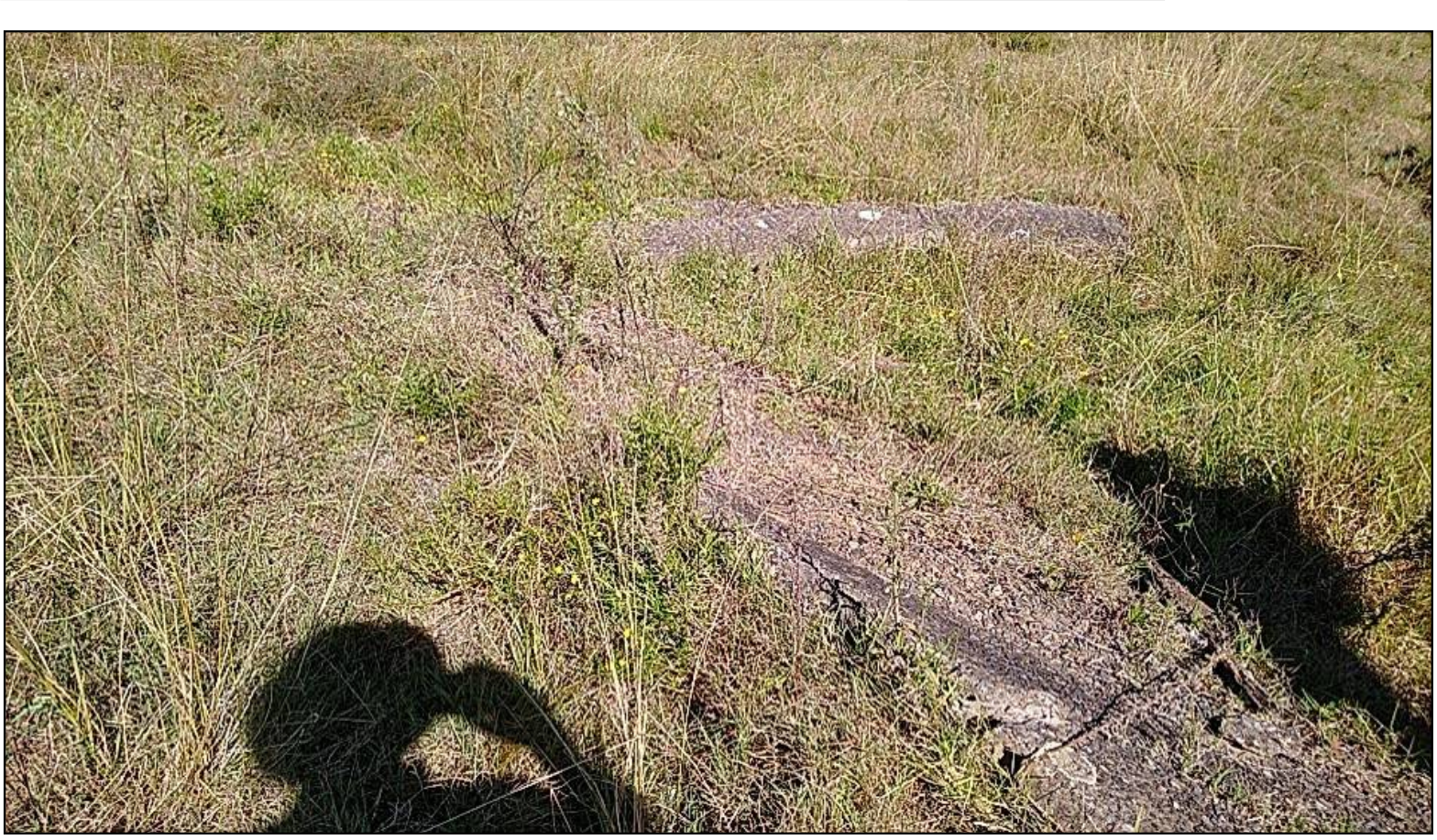


Photo (77)

Photo (78)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 39
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (79)

Photo (80)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 40
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (81)

Photo (82)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 41
					REVISION: 0

Legend

Approximate Photo Location / Direction

Locality Plan

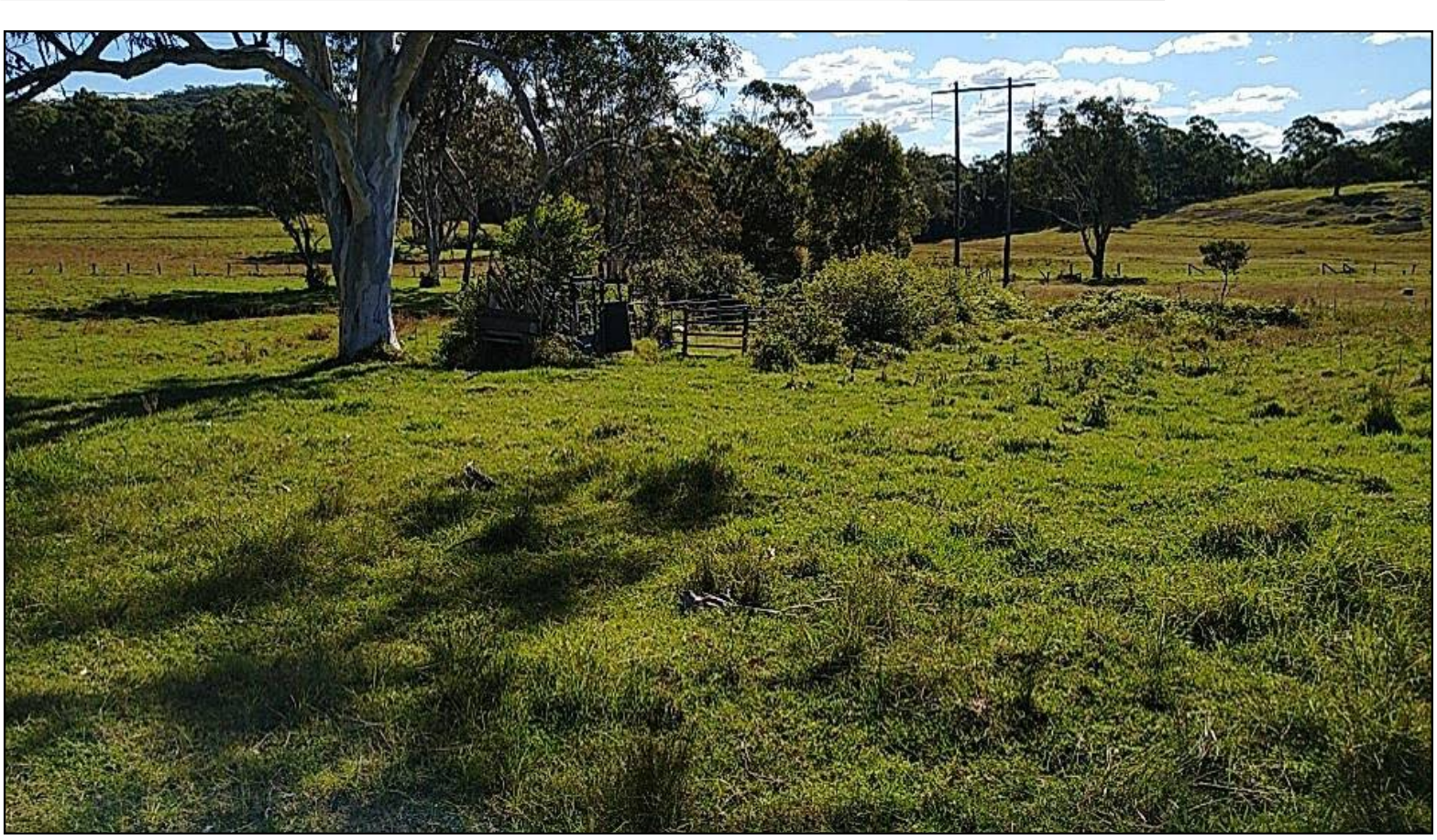


Photo (83)

Photo (84)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 42
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (85)

Photo (86)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 43
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (87)

Photo (88)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 44
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (89)

Photo (90)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 45
					REVISION: 0

Locality Plan

Legend

→ Approximate Photo Location / Direction

Photo (91)

Photo (92)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 46
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (93)

Photo (94)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 47
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (95)

Photo (96)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 48
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (97)

Photo (98)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 49
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (99)

Photo (100)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 50
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (101)

Photo (102)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 51
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (103)

Photo (104)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 52
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (105)

Photo (106)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 53
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

Photo (107)

Photo (108)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 54
					REVISION: 0

Locality Plan

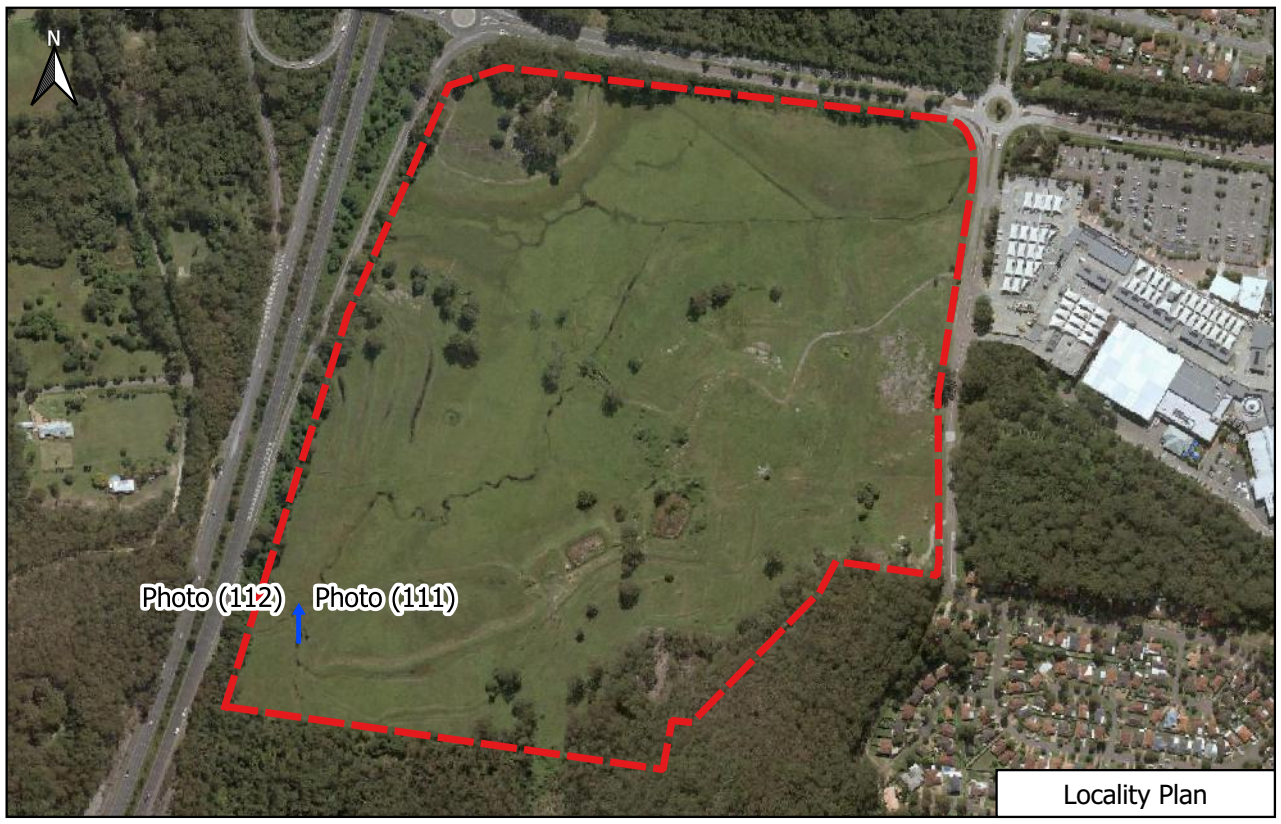
Legend

→ Approximate Photo Location / Direction

Photo (109)

Photo (110)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 55
					REVISION: 0



Locality Plan

Legend

Approximate Photo Location / Direction

Photo (111)

Photo (112)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 56
					REVISION: 0

Locality Plan

Legend

Approximate Photo Location / Direction

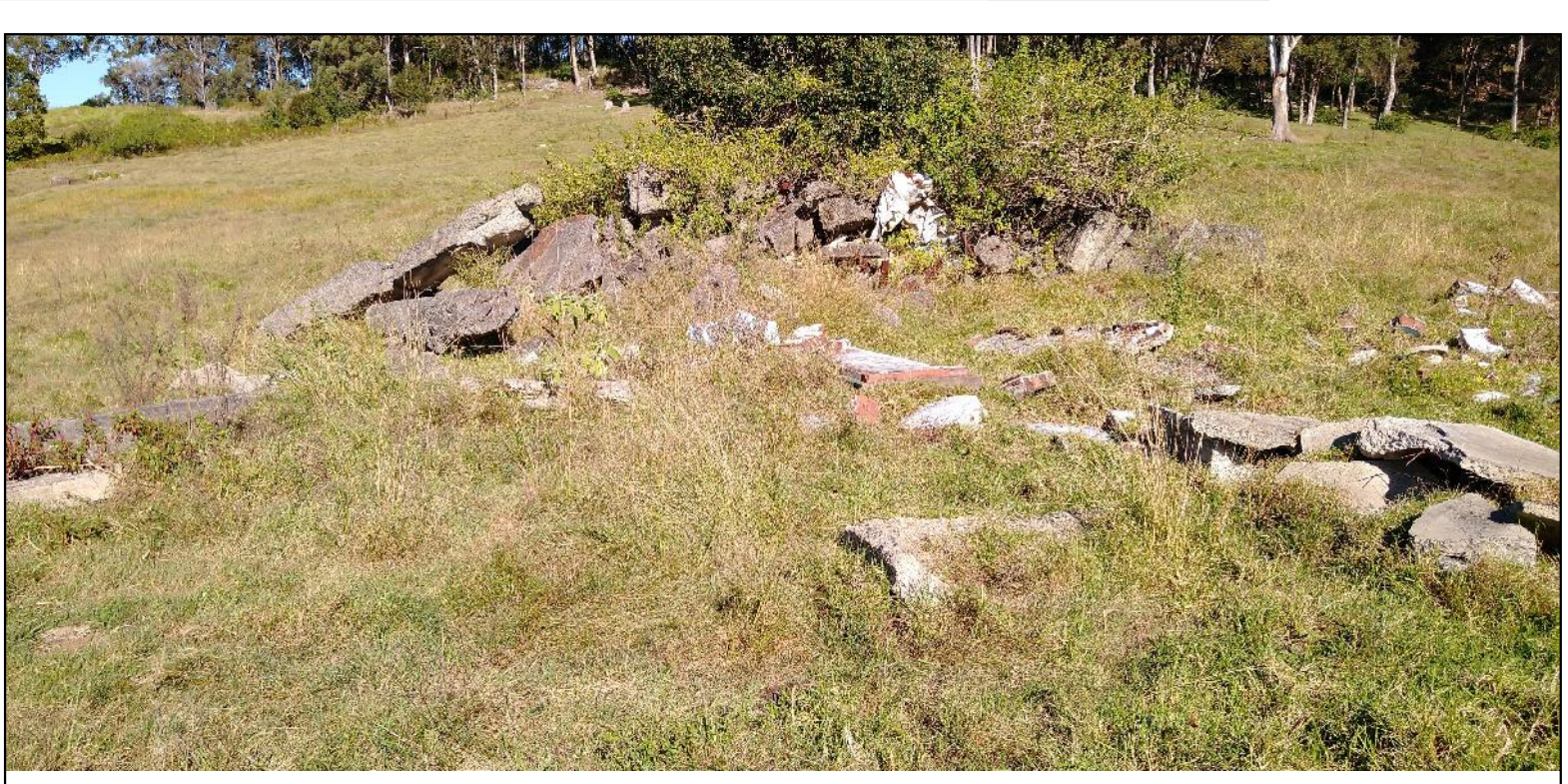


Photo (113)

Photo (114)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No:202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 57
					REVISION: 0

Locality Plan

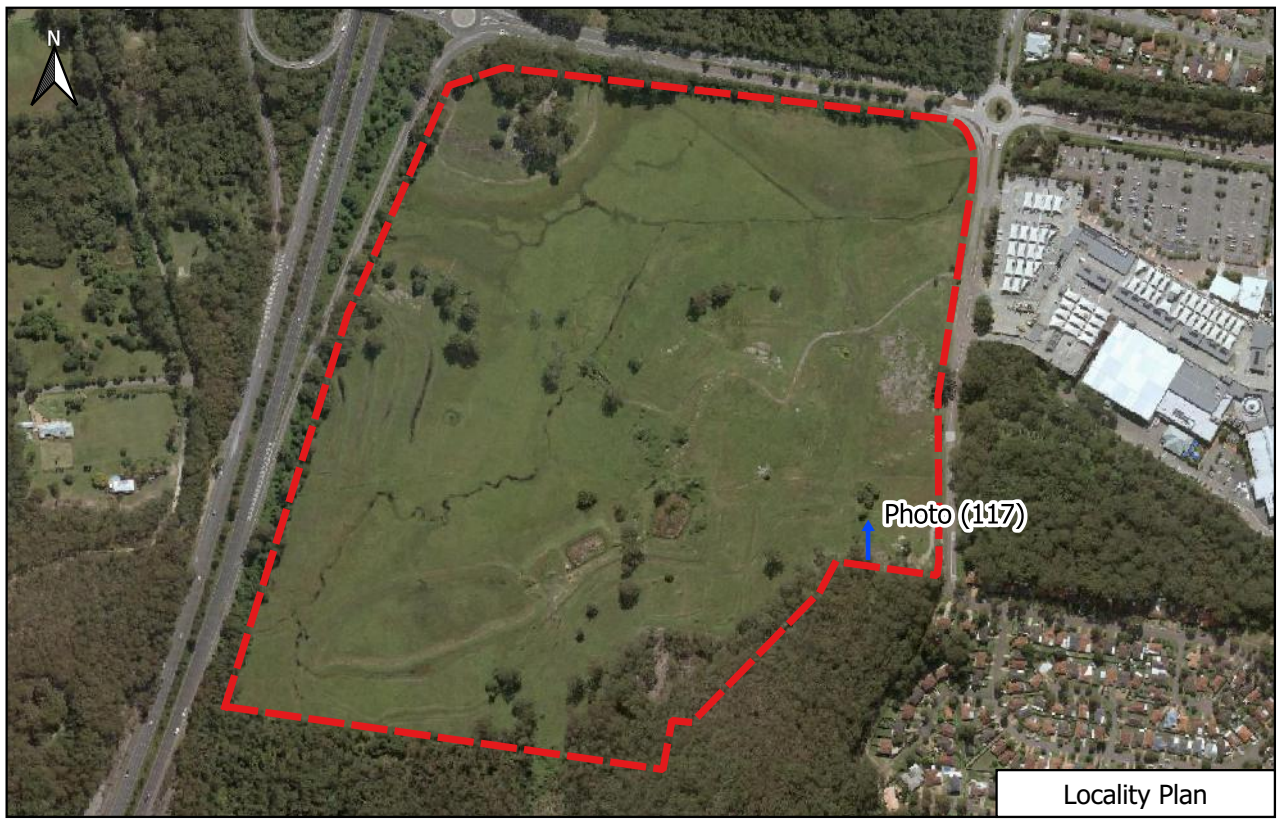
Legend

Approximate Photo Location / Direction

Photo (115)

Photo (116)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No:202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 58
					REVISION: 0



Locality Plan

Legend

Approximate Photo Location / Direction

Photo (117)

CLIENT: Scentre Limited	OFFICE: Central Coast	DRAWN BY: TDM	SCALE: N/A		PROJECT No: 202794.00
Douglas Partners Geotechnics / Environment / Groundwater	TITLE: **Photo Plates** **Tuggerah Gateway Project** **60 Wyong Road, Tuggerah**				DATE: 30.07.21
					PHOTO PLATE No: 59
					REVISION: 0

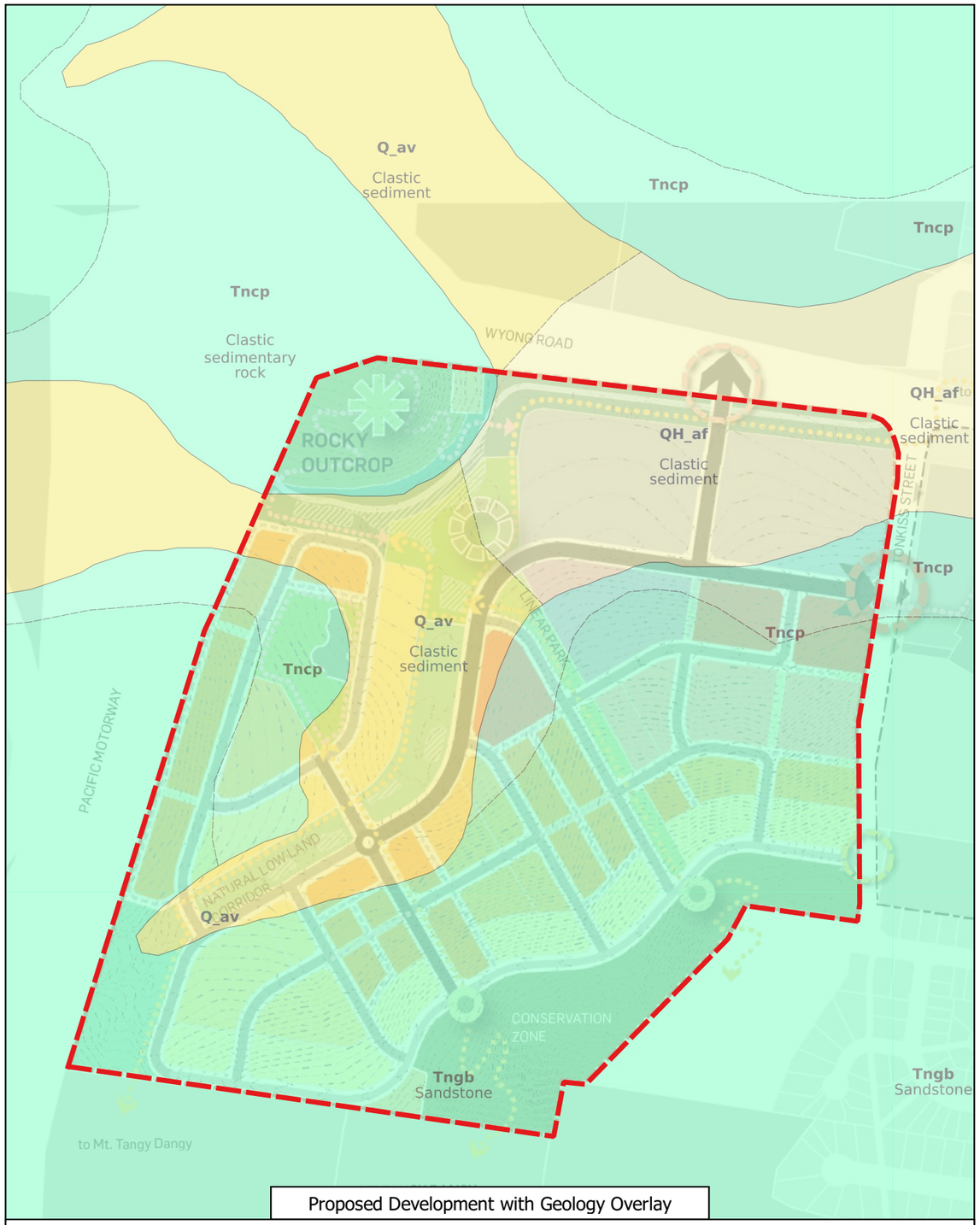
Appendix C

Drawings

Drawing adapted from Metromap Image, dated 6 April 2020

Douglas Partners
Geotechnics / Environment / Groundwater

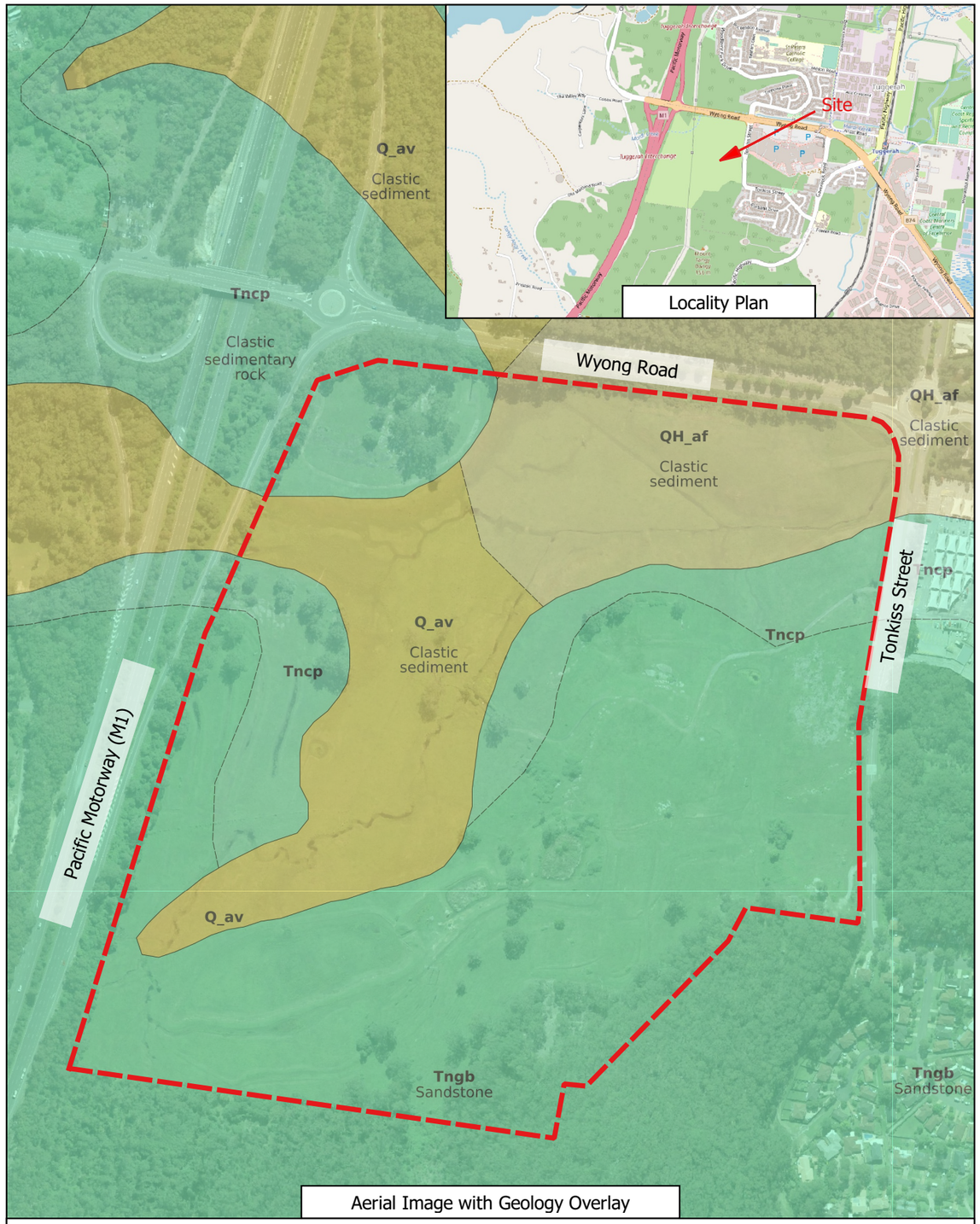
CLIENT: Scentre Limited		TITLE: **Geotechnical Constraints Map - Encumbered Land with Mitigation**	PROJECT No:202794.00
OFFICE: Central Coast	DRAWN BY: BJK	**Tuggerah Gateway Project**	DRAWING No: 1
SCALE: 1:3500 @ A3	DATE: 12.05.2021	**60 Wyong Road, Tuggerah**	REVISION: 1



Proposed Development with Geology Overlay

Drawing adapted from RPT_TGP_Structure Plan-210830 and NSW Seamless Geology Dataset

100 0 100 200 300 400 m



Aerial Image with Geology Overlay

Drawing adapted from Metromap Image and NSW Seamless Geology Dataset

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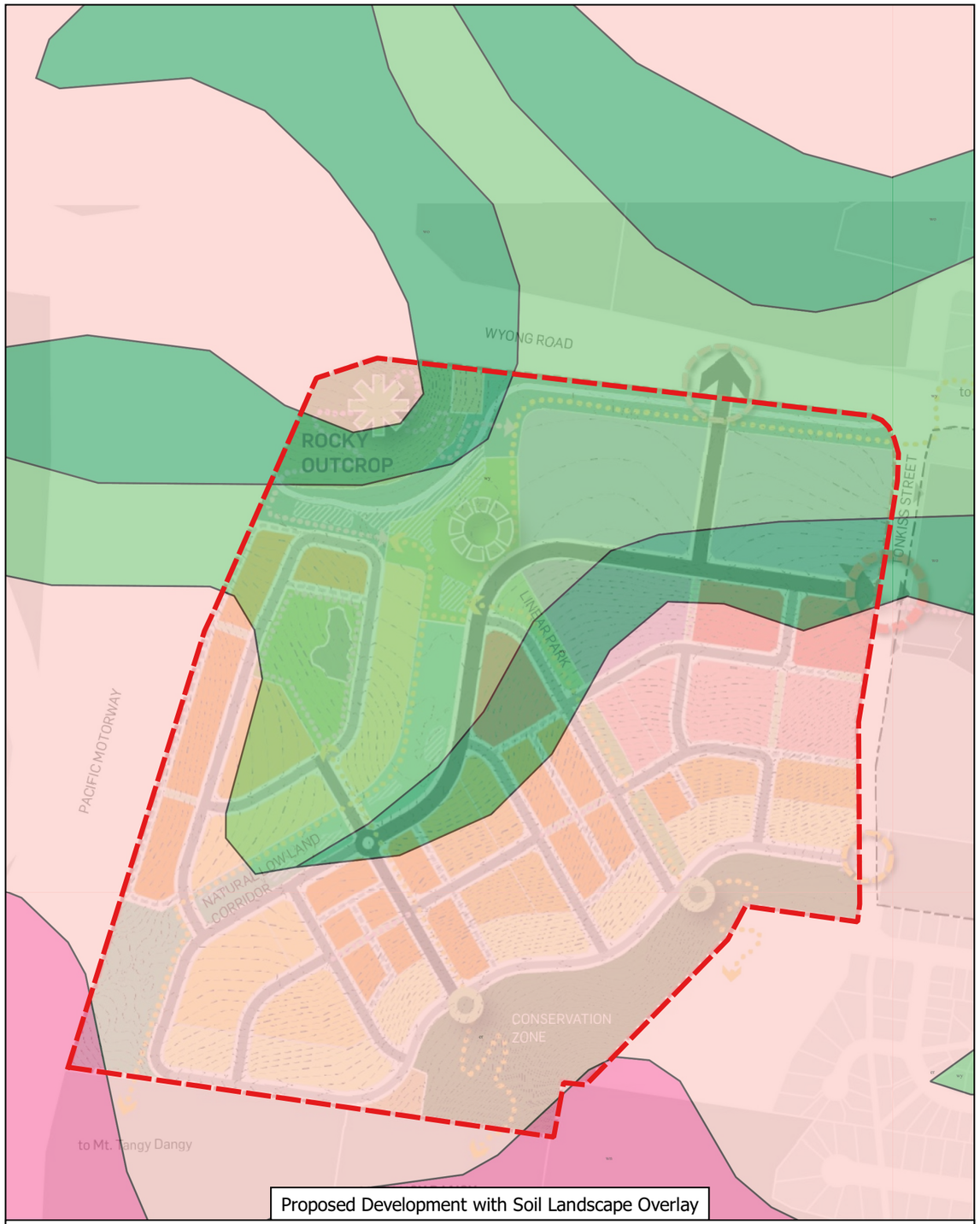
CLIENT: Scentre Limited		
OFFICE: Central Coast	DRAWN BY: TDM	
SCALE: 1:5000 @ A3	DATE: 08.09.2021	

TITLE: **Geology Mapping**
Tuggerah Gateway Project
60 Wyong Road, Tuggerah

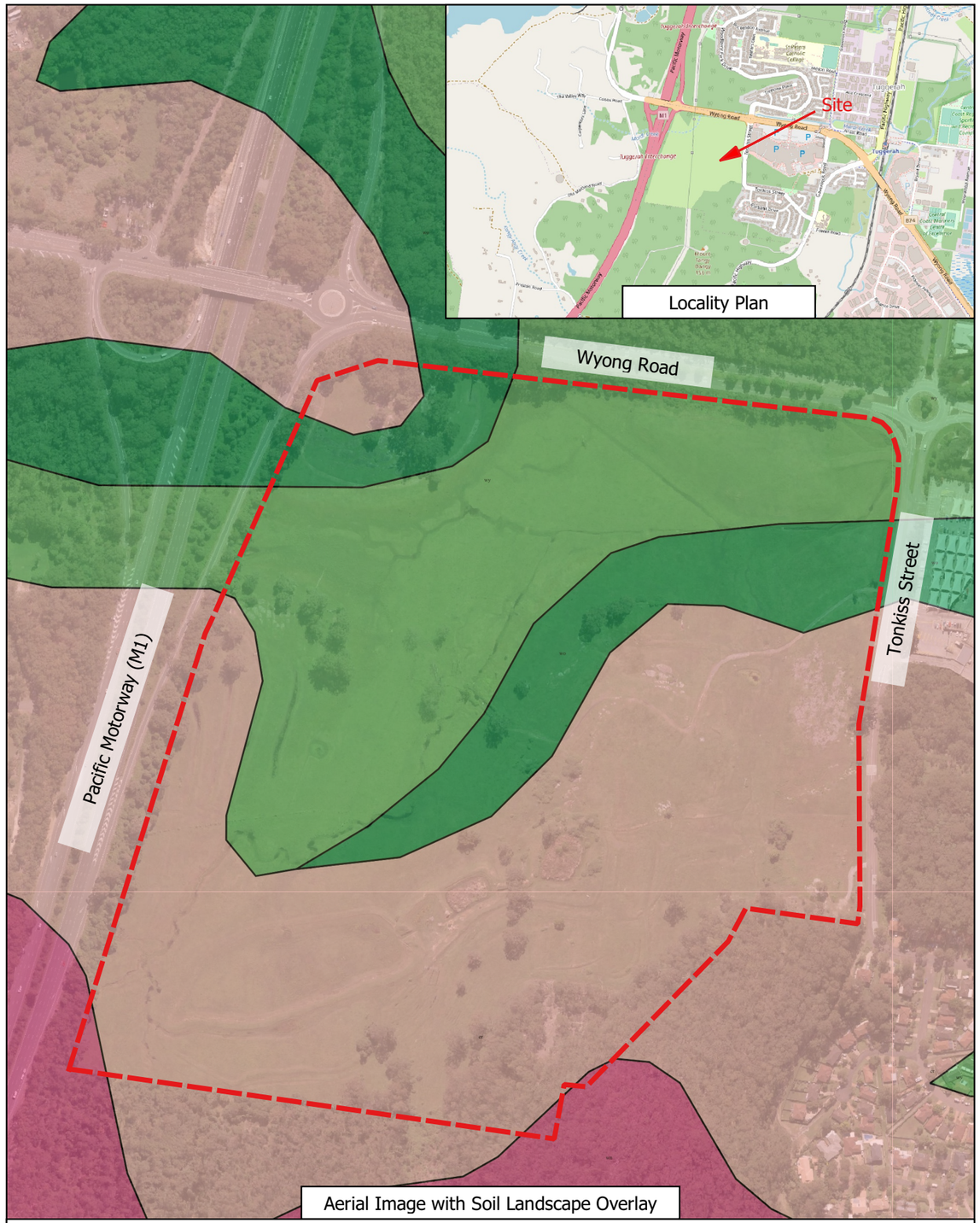
PROJECT No:	202794.00
DRAWING No:	2
REVISION:	1



Proposed Development with Soil Landscape Overlay

Drawing adapted from RPT_TGP_Structure Plan-210830 and Gosford-Lake Macquarie 1:100,000 Soil Landscapes Sheet

100 0 100 200 300 400 m



Aerial Image with Soil Landscape Overlay

Drawing adapted from Metromap Image and Gosford-Lake Macquarie 1:100,000 Soil Landscapes Sheet

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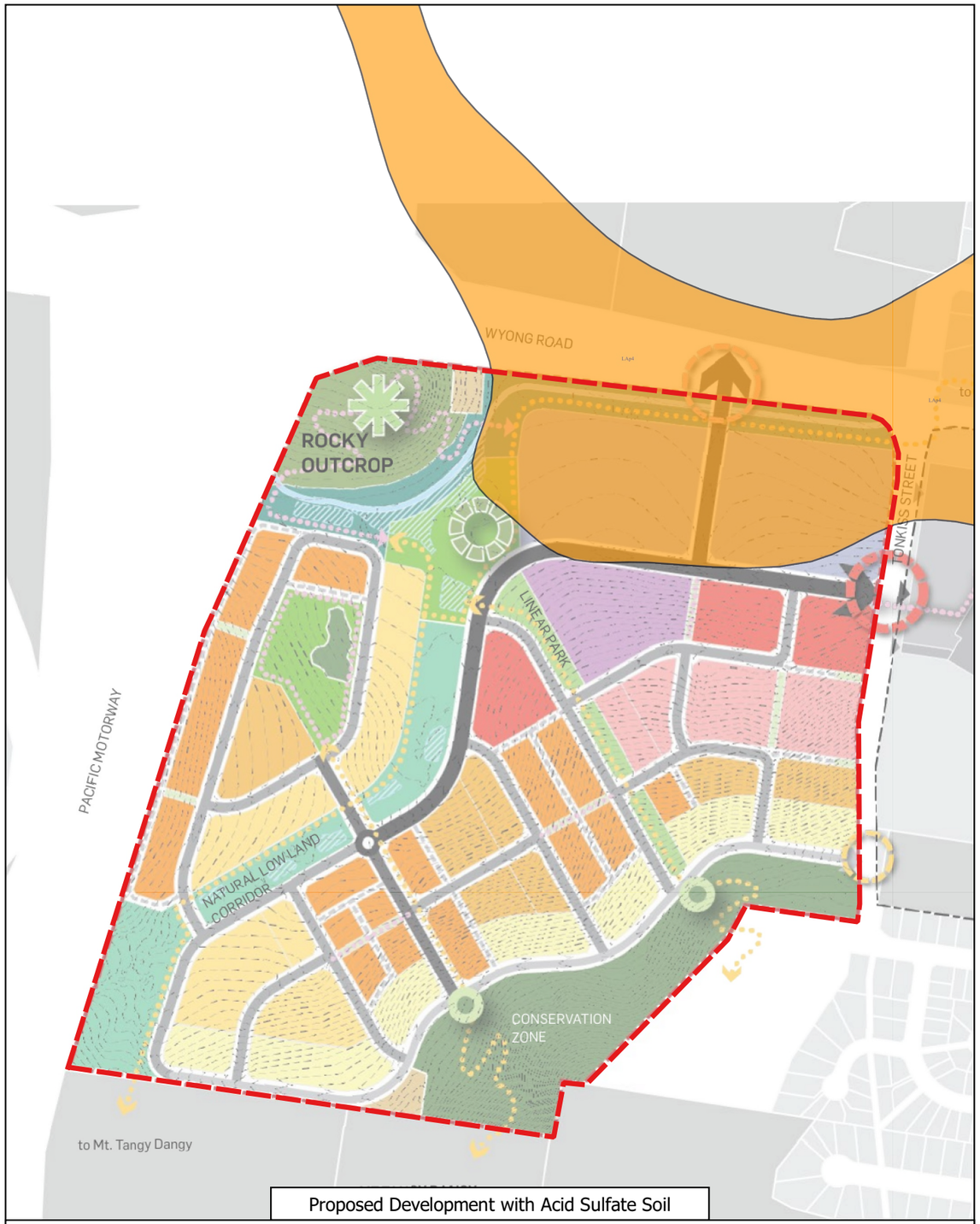
CLIENT: Scentre Limited		TITLE: **Soil Landscape Mapping**	PROJECT No:202794.00
OFFICE: Central Coast	DRAWN BY: TDM	**Tuggerah Gateway Project**	DRAWING No: 3
SCALE: 1:5000 @ A3	DATE: 08.09.2021	**60 Wyong Road, Tuggerah**	REVISION: 1



Proposed Development with Acid Sulfate Soil

Drawing adapted from RPT_TGP_Structure Plan-210830 and NSW Acid Sulfate Soil Risk Mapping

100 0 100 200 300 400 m

Aerial Image with Acid Sulfate Soil Overlay

Drawing adapted from Metromap Image and NSW Acid Sulfate Soil Risk Mapping

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CLIENT: Scentre Limited		TITLE: **Acid Sulfate Soil Mapping**	PROJECT No:202794.00
OFFICE: Central Coast	DRAWN BY: TDM	**Tuggerah Gateway Project**	DRAWING No: 4
SCALE: 1:5000 @ A3	DATE: 08.09.2021	**60 Wyong Road, Tuggerah**	REVISION: 1