Our Ref: 26001 Newell Beach OPW Submission
Tuesday, 2 June 2026

The Chief Executive Officer
Douglas Shire Council
PO Box 723
MOSSMAN QLD 4873

ATTENTION: NEIL BECK

Dear Neil,

2 ANDREWS STREET, NEWELL

OPW SUBMISSION - L51 SP168537 - ROL 2021_4160/1

We refer to Douglas Shire Council's (Council) Decision Notice ROL 2021_4160/1 (DN) dated 27 September 2022. Applin Consulting has been engaged to document the civil Operational Works (OW) plans associated with the development and to submit and compile a response to Council's conditions which are relevant to the OW application.

Attached for your information and action are the following:

- Receipt for payment of Compliance Assessment fee of $ 15,101.00, calculated on 20 lots as follows:
  - $ 4,427.00 Base Fee (includes first 2 lots)
  - $ 10,674.00 $593.00 per lot x 18 lots
- Civil Construction Drawings: 1 x A3 PDF set: 26001–C001 (0) to C018 (0)
- Landscape Plans by Suzan Quigg
- Newell Beach Design Report
- DA Form 1 and OPW Checklist
- Certified Statement of Compliances for all disciplines

We trust the above and attached is sufficient for Council's purposes and allows Council grant Operational Works Approval.

Please do not hesitate to contact the undersigned should you have any further questions in relation to this matter.

Yours faithfully
APPLIN CONSULTING

GREG APPLIN
B Eng (Civil) RPEQ 06073

APPLIN CONSULTING
(KPAG P/L atf The Applin Family Trust)
ABN : 83 104 356 849

19 Mullins St, WHITFIELD, QLD. 4870
greg@applinconsulting.com.au
0414 768 109

ENGINEERING ASSESSMENT REPORT

OW SUBMISSION

PALM BEACH - NEWELL

LOT 51 SP168537
2 ANDREWS STREET, NEWELL Q 4873

Project No. 26001 Newell Beach
Reference No. OPW Submission Newell Beach
Date: 1 June 2026

APPLIN CONSULTING
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1.0 INTRODUCTION AND BACKGROUND

Applin Consulting has been commissioned by Far North Development Group P/L to undertake the detailed design and documentation of the civil works for the reconfiguration of 1 into 21 lots from the land described as Lot 51 on SP168537 at 2 Andrews Street, Newell.

A Reconfiguration of Lot Application for this subdivision was approved subject to conditions by Douglas Shire Council on the 27th September 2022 (DSC ref: ROL 2021_4160/1). The proposed operational works is for this development and is submitted as part of this application and is in accordance with the lot layout, provided in Plan No. 34678/004 C by Brazier Motti and amended by Condition 3a of ROL 2021_4160/1.

For Council's reference, a copy of the ROL Decision Notice is attached in **Appendix A.**

The development hereby submitted has been prepared in compliance with the conditions of the original Decision Notice where relevant. This report reviews the works in terms of civil engineering requirements of the development approval ROL 2021_4160/1.

2.0 ENGINEERING DOCUMENTATION

Attached in accordance with Council's requirements are the following:

Project Civil Construction Drawings

- 26001-C001 COVER SHEET, LOCALITY PLAN AND DRAWING LIST
- 26001-C002 PROJECT NOTES
- 26001-C003 ROADWORKS AND DRAINAGE PLAN
- 26001-C004 TYPE CROSS SECTIONS AND CONTROL LINE SETOUT
- 26001-C005 ROAD LONGITUDINAL SECTIONS
- 26001-C006 ROAD CROSS SECTIONS
- 26001-C007 DRAINAGE SWALE LONGSECTIONS - SHEET 1 OF 2
- 26001-C008 DRAINAGE SWALE LONGSECTIONS - SHEET 2 OF 2
- 26001-C009 BULK EARTHWORKS PLAN - SHEET 1 OF 2
- 26001-C010 BULK EARTHWORKS PLAN - SHEET 2 OF 2
- 26001-C011 BULK EARTHWORKS SECTIONS
- 26001-C012 CUL-DE-SAC SETOUT PLAN
- 26001-C013 DRAINAGE CULVERT DETAILS - SHEET 1 OF 2
- 26001-C014 DRAINAGE CULVERT DETAILS - SHEET 2 OF 2
- 26001-C015 WATER RETICULATION PLAN
- 26001-C016 EROSION & SEDIMENT CONTROL STRATEGY PLAN
- 26001-C017 EROSION & SEDIMENT CONTROL DETAILS - SHEET 1 OF 2
- 26001-C018 EROSION & SEDIMENT CONTROL DETAILS - SHEET 2 OF 2

3.0 COMPLIANCE WITH RELEVANT CONDITIONS

As noted previously, this Operational Works application is being lodged in association with the Reconfiguration of Lot Application and current development conditions prepared by Council.

To demonstrate compliance, responses have been prepared to address the conditions of the Reconfiguration of Lot Decision Notice ROL 2021_4160/1.

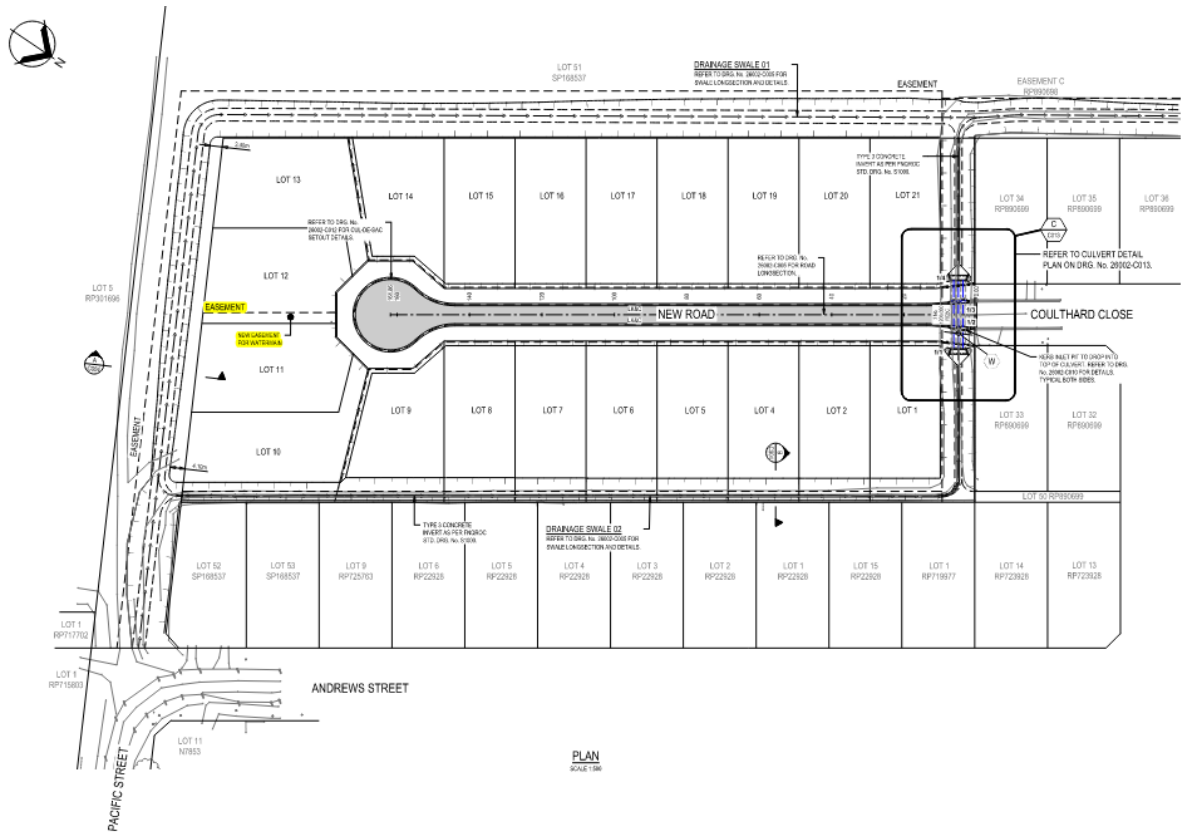
3.1 Condition 3: Lot Layout

The lot layout plan must be revised and provided to the satisfaction of the Chief Executive Officer prior to the lodgement of the application for operational work, generally in accordance with the Brazier Motti Plan No. 34678/004 Issue C dated 19 August 2022 and amended to detail:

a. *Allotments 8 – 13 to be reconfigured to provide less than 6 allotments to be endorsed by the Chief Executive Officer; and*
b. *Provide a corridor to accommodate the water main to connect from Coulthard Close to Pacific Street as required by conditions of this Development Permit. The water main must be contained within an easement.*

Layout has been amended and resulted in 20 lots in lieu of 21 lots and an easement corridor provided between lots 11 and 12 for the water main loop back to Pacific Street.

Refer snip below (Note: Lot number 3 has been removed).



3.2 Condition 4: Water Supply Infrastructure

A detailed Water Supply infrastructure plan and supporting information including hydraulic network analysis must be submitted demonstrating how the development will be serviced from Council's Infrastructure.

The detailed Water Supply plan is to demonstrate the capacity of the existing network to service the development in accordance with the standards of service specified within the FNQROC Development Manual. In particular, the Masterplan must:

a. *identify the water supply network catchment or catchments that the development relies upon;*
b. *provide a detailed hydraulic network analysis and supporting calculations which demonstrate any augmentations or upgrades required to existing water supply infrastructure to ensure the required standard of service is achieved for the development;*
c. *identify the connection points and land tenure arrangements for new and existing infrastructure required to ensure an adequate standard of service is achieved for the development;*
d. *Provide a loop main connecting Pacific Street to Coulthard Close to ensure adequate pressure and reliability of supply.*

The water supply infrastructure plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

An EPANet model was created to represent the new main with pressures and flows based on field testing which has been compared to the model supplied Council.

Results confirm adequate pressures are available at all lots for Peak Hour and fire-fighting demands, and a copy of the digital file has been included for Council's own review.

Refer Tech memo in **Appendix B.**

3.3 Condition 5: Water Supply Works

A Development Approval for Operational Work must be obtained for the design and construction of all internal and external water supply infrastructure that is required to ensure an adequate standard of service is achieved for the development.
As part of any such Development Application, evidence must be provided that the development does not adversely affect the water supply to external properties adjacent to the development.
Water supply works required to ensure an adequate standard of service is achieved for the development must be designed and constructed at no cost to Council.
All works must be carried out in accordance with the approved plans, to the requirements and satisfaction of the Chief Executive Officer prior to the issue of a Compliance Certificate for the Plan of Survey.

Noted and complied with, refer comments to Condition 4 above.

Water reticulation design and plans, compliant with FNQROC, is included in the engineering set of civil OPW plans submitted herein.

3.4 Condition 6: On-Site Effluent Disposal

The method of on-site effluent disposal must be in accordance with the Queensland Plumbing & Wastewater Code. Details of the wastewater treatment system to be installed must be approved by the Chief Executive Officer prior to the construction of dwellings on each of the proposed allotments..

Noted.

In addition to the above condition, a preliminary site assessment (9 bore holes) has been undertaken to determine site suitability for wastewater treatment. The conclusion of this site testing is the soils are consistent across the site and soils are of a well drained material and should be categorised as Category 2 in accordance with AS/NZS 1547:2012.

Refer Dirt Professionals Site Assessment in **Appendix C**.

3.5 Condition 7: Acid Sulfate Soil Investigation

Undertake an Acid Sulfate Soil investigation in the area to be affected by this development. Soil sampling and analysis must be undertaken in accordance with procedures specified in 'Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland' (1998) or updated version of document produced by Department of Environment and Resource Management, (Previously DNRW – QASSIT), and State Planning Policy 2/02 – 'Planning and Managing Development involving Acid Sulfate Soils'. The results of this investigation must be submitted to Council for approval prior to any earthworks or clearing being commenced on the site.
Identification of soils with a pyrite content in excess of the action levels nominated in the latest version of DNRM – QASSIT: 'Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland' (1998) will trigger the requirement for preparation of an Acid Sulfate Soil Environmental Management Plan in accordance with the most recent requirements of the DNRW: 'Queensland Acid Sulfate Soil Technical Manual' (2002), including Soil Management Guidelines (updated Feb 2003), which must be prepared to the satisfaction of the Chief Executive Officer

Douglas Partners have undertaken a site assessment comprising 6 test pits for Acid Sulphate Soils. Refer **Appendix D** for a copy of the report.

The conclusion of this assessment confirms there is naturally occurring acidic soil present on site in the top black silty sand layer, however this material is NOT ASS and an ASSMP is not required.

Despite no ASS being present this black silty sand should be ameliorated with ag lime if used for landscaping purposes and site runoff monitored to ensure very low pH readings (below the naturally occurring soil pH of around 4.7 – 5.0 which the receiving environment currently experiences) are not present.

3.6 Condition 8: Drainage Study of Site

The development is to be undertaken in accordance with the findings and recommendations of the Bligh Tanner Report on Newell Beach Flood Study Dated 2 August 2022, except where modified by the conditions.
The applicant is to undertake additional local drainage calculations and reporting for the design of the internal road and stormwater drainage system and for the rear allotment drains. The supporting calculations are to confirm that the peak flows from the shorter duration rainfall events are contained within the drains and drainage easements.
In relation to the local drainage elements, the additional calculations are to determine the drainage impacts on upstream and downstream properties and the mitigation measures required to minimise such impacts. In particular, the further advice must address the following:

a. *The contributing catchment boundaries to the local drains;*
b. *The depth, velocity and extent of the 100-year ARI peak runoff flows in the allotment catch drain post-development. Based on the drain operation, confirm the extent of the drainage easements;*
c. *Information on the proposed works and any impacts proposed at the drainage outlet from the proposed development.*
d. *Confirmation of the severe impact assessment for the scenario where the crossroad culverts are blocked.*

The report on the local drainage elements must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

Noted.

Calculations have been undertaken for the proposed Drainage Swale 02 which runs through the site to ensure adequate capacity and freeboard is available during 1% AEP (Q100) events.

A copy of the calculations and catchment areas are included in **Appendix E**.

It should be noted that during a severe event situation where the road culvert could possibly be blocked, an alternate flow path would exist to the south towards Drainage Swale 01. Despite this alternate flow path existing, the levels to the lot 1, 2, 20 and 21 have been raised to a minimum level of RL 3.5 kerb side with RL 3.7 minimum at the rear.

3.7 Condition 9: Earthworks

The development is to be undertaken generally in accordance with Civil Walker drawings 214-001-SK03 and SK04 (Revision 1) except as follows:

a. *Unless otherwise approved following the severe impact assessment findings and detailed flood calculations for local drains, the levels on lots 1, 2, 20 and 21 are to be amended as follows:*
   i. *Within 1m of the lot frontage the lot level must achieve a minimum earthworks level of 3.5m AHD. A small batter along the frontage of lots is to be provided to transition from the verge level to this minimum level.*
   ii. *The rear allotment level is to be a minimum of 3.7m AHD;.*

Earthworks plans have been detailed generally as per Civil Walkers drawings with some minor changes to levels to reduce the amount of fill required. Levels as per Condition 3.7 have been adopted.

3.8 Condition 10: Demolish Structures

All structures not associated with the approved development (including disused services and utilities) must be demolished and/or removed from the subject land prior to the issue of a Compliance Certificate for the Plan of Survey.

Noted and complied with.

There were no structures or disused services present.

3.9 Condition 11 & 12: Stockpiling and Transportation of Fill Material

Soil used for filling or spoil from the excavation is not to be stockpiled in locations that can be viewed from adjoining premises or a road frontage for any longer than one (1) month from the commencement of works.
Transportation of fill or spoil to and from the site must not occur within:

a. *peak traffic times; or*
b. *before 7:00 am or after 6:00 pm Monday to Friday; or*
c. *before 7:00 am or after 1:00 pm Saturdays; or*
d. *on Sundays or Public Holidays.*

Noted.

Dust emissions or other air pollutants must not extend beyond the boundary of the site and cause a nuisance to surrounding properties.

Noted.

3.10 Condition 13: Storage of Machinery and Plant

The storage of any machinery, material and vehicles must not cause a nuisance to surrounding properties, to the satisfaction of the Chief Executive Officer.

Noted

3.11 Condition 14: Drainage Construction

The applicant / owner must undertake the development of the land in accordance with the findings of the Drainage Study dated 2 August 2022 prepared by Bligh Tanner and generally in accordance with Civil Walker drawings 214-001-SK03 and SK04 (Revision 1) except where modified by the conditions.

Noted and complied with.

3.12 Condition 15: Drainage Easements

Drainage Easements as nominated in the Bligh Tanner Drainage Study, dated 2 August 2022, must be granted in favour of Council. A copy of the easement documents must be submitted to Council for the approval of Council's solicitors at no cost to Council. The approved easement documents must be submitted at the same time as seeking approval and dating of the Plan of Survey and must be lodged and registered with the Department of Resources. The easement document must nominate that the maintenance obligations for the easement reside with the respective property owners.

Noted.

3.13 Condition 16: Lawful Point of Discharge

All stormwater from the property must be directed to a lawful point of discharge such that it does not adversely affect surrounding properties or properties downstream from the development to the requirements and satisfaction of the Chief Executive Officer.

Note and complied with.

Stormwater flows to drainage easements.

3.14 Condition 17: Plan of Drainage Works

The subject land must be drained to the satisfaction of the Chief Executive Officer. In particular,

a. *Drainage infrastructure in accordance with the FNQROC Development Manual*
b. *The drainage system from the development must incorporate a gross pollutant trap(s) or equivalent measure(s), meeting the following Council specifications for stormwater quality improvement devices (SQID), namely:*
   i. *End-of-line stormwater quality improvement devices (SQID) shall be of a proprietary design and construction and shall carry manufacturer's performance guarantees as to removal of foreign matter from stormwater and structural adequacy of the unit.*
   ii. *SQIDs shall remove at least ninety-five per cent of all foreign matter with a minimum dimension of three (3) mm and shall be configured to prevent re- injection of captured contaminants. The SQID treat all first flush runoff, which shall be defined as that volume of water equivalent to the runoff from the three (3) month ARI storm event. The location of SQIDs within the drainage system shall be planned to ensure that the first flush waters from all parts of the (developed) catchment are treated.*
   iii. *The design of the SQID shall not compromise the hydraulic performance of the overall drainage system.*
   iv. *SQIDs shall be positioned so as to provide appropriate access for maintenance equipment.*
c. *All new allotments shall have immunity from flooding associated with an ARI 100 year rainfall event; and*
d. *Where practical, all new allotments must be drained to the road frontages, drainage easements or drainage reserves and discharged to the existing drainage system*

via storm water quality device(s).

e. *The current earthworks concept on Civil Walker Drawing 214-001-SK03 drawings indicate the open drain at the rear of lots 1 to 9 to have a very flat grade in the order of 0.25%. This drain must be provided with a concrete invert for its full length. Detailed flow calculations must confirm that the drain profile can contain the 1%AEP runoff from the local catchment.*
The concrete invert must extend along the northern side of Lot 1 to the cross culvert apron and must extend west from the culvert outlet to the western boundary of the easement in Lot 21.

Noted. SPA will submit these plans under separate cover soon.

3.15 Condition 18: Landscape Plan

Undertake landscaping of the site and street frontages of new roads in accordance with FNQROC Development Manual and in accordance with a landscape plan. The landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Work. In particular, the plan must show:

a. *Planting of the footpath with trees, using appropriate species with consideration to be given to creating an individual sense of place and character to the estate;*
b. *The provision of suitable shade trees;*
c. *Species to have regard to the Planning Scheme Policy No.SC6.7 Landscaping; and*
d. *Road verges to be seeded and grassed with turf adjacent back of kerb and placed in strip at right angles to kerb;*

Permanent irrigation or any other embellishments are not permitted.
Inclusion of all requirements as detailed in other relevant conditions included in this Approval, with a copy of this Development Approval to be given to the applicant's Landscape Architect / Designer.
One (1) A3 copy of the landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works. Areas to be landscaped must be established prior to the lodgement of the Survey Plan with Council for endorsement and must be maintained for the duration of the on-maintenance period to the satisfaction of the Chief Executive Officer.

Noted and complied with.

Landscape plans prepared by Suzan Quigg.

3.16 Condition 19: Sediment and Erosion Control

A sediment and erosion control plan must be submitted prior the issue of a Development Permit for Operational Works. Such plans must be installed / implemented prior to discharge of water from the site, such that no external stormwater flow from the site adversely affects surrounding or downstream properties (in accordance with the requirements of the Environmental Protection Act 1994, and the FNQROC Development Manual).

Noted and complied with.

ESC strategy plans are included in the submitted OPW plans.

3.17 Condition 20: Existing Services

Written confirmation of the location of existing services for the land must be provided. In any instance where existing services are contained within another lot, the following applies, either:

a. *Relocate the services to comply with this requirement; or*
b. *Arrange registration of necessary easements over services located within another lot prior to, or in conjunction with, the lodgement of a Compliance Certificate for the Plan of Survey creating the lot.*

Noted.

No existing services have been located, therefore no easements are required.

3.18 Condition 21: Electrical Supply

Written evidence from Ergon Energy advising if distribution substation/s are required within the development must be provided. If required, details regarding the location of these facilities must be submitted to the Chief Executive Officer accompanied by written confirmation from Ergon Energy. Details regarding electricity supply must be provided prior to the issue of a Development Permit for Operational Works.

Noted.

Electrical design plans are currently being prepared by SPA and will be submitted under separate cover for electrical OPW approval. If a substation is required a location will be chosen on either Lot 1 or Lot 20.

3.19 Condition 22: Electricity and Telecommunications

Written evidence of negotiations with Ergon Energy and the telecommunication authority must be submitted to Council stating that both an underground electricity supply and telecommunications service will be provided to the development prior to the issue of a Compliance Certificate for the Plan of Survey.

Noted.

3.20 Condition 23: Street Lighting

The following arrangements for the installation of street lighting within the proposed subdivision must be provided prior to the issue of a Compliance Certificate for the Plan of Survey:

a. *Prior to the issue of a development permit for Operational Works a Rate 2 lighting scheme is to be prepared by an Ergon Energy approved consultant and submitted to the Chief Executive Officer for approval. The Rate 2 lighting scheme is to be designed in accordance with the relevant Road Lighting Standard AS/NZS 1158 and the FNQROC Development Manual. The applicable lighting category is to be determined from the Road Hierarchy Table D1.1 and the*

corresponding applicable Lighting Categories Table D8.1 as identified in the FNQROC Development Manual.

The lighting scheme must show light pole locations that align with property boundaries that represent the permitted design spacing and demonstrates no conflicts with stormwater, kerb inlet pits and other services.

The design must provide the applicable illumination level specified in the Road Lighting Standard AS/NZS 1158 at the following road elements:

- *Intersections*
- *Pedestrian Refuges*
- *Cul-de-sacs*
- *LATM Devices (Including Roundabouts)*

LATM Devices are to be shown on the civil layout design, the electrical services and street lighting design must be submitted in accordance with Ergon Energy's latest Distribution Design Drafting Standard.

b. *Prior to the issue of a Compliance Certificate for the Plan of Survey written confirmation that the relevant capital contribution required by Ergon Energy has been paid must be submitted, to ensure that the street lighting will be constructed.*

Noted.

Electrical design plans are currently being prepared by SPA and will be submitted under separate cover for electrical OPW approval.

4.0 CONCLUSION

The development complies with the Council conditions herein and the attached Operational Works plans attached have been designed in accordance with good engineering practice to FNQROC and current Australian Standards to ensure surety to Council in terms of the future servicing of the proposed reconfiguration.

The proposed development is straight forward in its nature, and we see no engineering concerns associated with the development.

APPENDIX A

DOUGLAS SHIRE COUNCIL

PO Box 723 Mossman Qld 4873
www.douglas.qld.gov.au
enquiries@douglas.qld.gov.au
ABN 71 241 237 800

Administration Office
64 - 66 Front St Mossman
P 07 4099 9444
F 07 4098 2902

27 September 2022

Enquiries: Neil Beck
Our Ref: ROL 2021_4160/1 (Doc ID 1110764)
Your Ref: 34678-001-01

F R Coulthard & C B Coulthard
C/- Brazier Motti Pty Ltd
PO Box 1185
CAIRNS QLD 4870

Email: cns.planning@braziermotti.com.au

Attention Mr Michael Tessaro

Dear Sir

Development Application for Reconfiguring a Lot (1 lot into 22 lots)
At 2 Andrews Street Newell
On Land Described as Lot 51 on SP168537

Please find attached the Decision Notice for the above-mentioned development application.

Please quote Council's application number: ROL 2021_4160/1 in all subsequent correspondence relating to this development application.

Should you require any clarification regarding this, please contact Neil Beck on telephone 07 4099 9444.

Yours faithfully

Paul Hoye
Manager Environment & Planning

encl.

- Decision Notice
  - Approved Drawing(s) and/or Document(s)
  - Reasons for Decision
- Advice For Making Representations and Appeals (Decision Notice)
- Adopted Infrastructure Charges Notice
- Advice For Making Representations and Appeals (Infrastructure Charges)

Decision Notice

Approval (with conditions)

Given under s 63 of the Planning Act 2016

Applicant Details

Name:	F R Coulthard & C B Coulthard
Postal Address:	C/- Brazier Motti Pty Ltd PO Box 1185 Cairns Qld 4870
Email:	cairns@braziermotti.com.au

Property Details

Street Address:	2 Andrews Street Newell
Real Property Description:	Lot 51 on SP168537
Local Government Area:	Douglas Shire Council

Details of Proposed Development

Development Permit for Reconfiguring a Lot (1 lot into 22 lots)

Decision

Date of Decision:	27 September 2022
Decision Details:	Approved (subject to conditions)

Approved Drawing(s) and/or Document(s) (Subject to the conditions of the approval.)

Copies of the following plans, specifications and/or drawings are enclosed.

The term 'approved drawing(s) and/or document(s) or other similar expressions means:

Drawing or Document	Reference	Date
Proposed Reconfiguration (Stage 1)	Plan No. 34678/003 Issue A	23/12/2020
Proposed Reconfiguration (Stage 1)	Plan No. 34678/004 Issue C	19/08/2022
Technical Report		
Newell Beach Flood Study prepared by Bligh Tanner.	Job No. 2021.0566	2/08/2022

Note – The plans referenced above will require amending in order to comply with conditions of this Decision Notice.

Assessment Manager Conditions & Advices

Assessment Manager Conditions

1. Carry out the approved development generally in accordance with the approved drawing(s) and/or document(s), and in accordance with:

   a. The specifications, facts and circumstances as set out in the application submitted to Council; and

   b. The following conditions of approval and the requirements of Council's Planning Scheme and the FNQROC Development Manual.

   Except where modified by these conditions of approval

Timing of Effect

2. The conditions of the Development Permit must be effected prior to the approval of the Plan of Survey, except where specified otherwise in these conditions of **approval.**

Lot Layout

3. The lot layout plan must be revised and provided to the satisfaction of the Chief Executive Officer prior to the lodgement of the application for operational work, generally in accordance with the Brazier Motti Plan No. 34678/004 Issue C dated 19 August 2022 and amended to detail:

   a. Allotments 8 – 13 to be reconfigured to provide less than 6 allotments to be endorsed by the Chief Executive Officer; and

   b. Provide a corridor to accommodate the water main to connect from Coulthard Close to Pacific Street as required by conditions of this Development Permit. The water main must be contained within an easement;

Water Supply Infrastructure Plan

4. A detailed Water Supply infrastructure plan and supporting information including hydraulic network analysis must be submitted demonstrating how the development will be serviced from Council's Infrastructure.

   The detailed Water Supply plan is to demonstrate the capacity of the existing network to service the development in accordance with the standards of service specified within the FNQROC Development Manual. In particular, the Masterplan must:

   a. identify the water supply network catchment or catchments that the development relies upon;

   b. provide a detailed hydraulic network analysis and supporting calculations which demonstrate any augmentations or upgrades required to existing water supply infrastructure to ensure the required standard of service is achieved for the development;

   c. identify the connection points and land tenure arrangements for new and existing infrastructure required to ensure an adequate standard of service is achieved for the development;

   d. Provide a loop main connecting Pacific Street to Coulthard Close to ensure adequate pressure and reliability of supply.

   The water supply infrastructure plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

Water Supply Works

5. A Development Approval for Operational Work must be obtained for the design and construction of all internal and external water supply infrastructure that is required to ensure an adequate standard of service is achieved for the development.

   As part of any such Development Application, evidence must be provided that the development does not adversely affect the water supply to external properties adjacent to the development.

   Water supply works required to ensure an adequate standard of service is achieved for the development must be designed and constructed at no cost to Council.

   All works must be carried out in accordance with the approved plans, to the requirements and satisfaction of the Chief Executive Officer prior to the issue of a Compliance Certificate for the Plan of Survey.

On-Site Effluent Disposal

6. The method of on-site effluent disposal must be in accordance with the Queensland Plumbing & Wastewater Code. Details of the wastewater treatment system to be installed must be approved by the Chief Executive Officer prior to the construction of dwellings on each of the proposed allotments.

Acid Sulfate Soil Investigation

7. Undertake an Acid Sulfate Soil investigation in the area to be affected by this development. Soil sampling and analysis must be undertaken in accordance with procedures specified in '*Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland' (1998)* or updated version of document produced by Department of Environment and Resource Management, (Previously DNRW – QASSIT), and State Planning Policy 2/02 – '*Planning and Managing Development involving Acid Sulfate Soils'*. The results of this investigation must be submitted to Council for approval prior to any earthworks or clearing being commenced on the site.

   Identification of soils with a pyrite content in excess of the action levels nominated in the latest version of DNRM – QASSIT: '*Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland' (1998)* will trigger the requirement for preparation of an Acid Sulfate Soil Environmental Management Plan in accordance with the most recent requirements of the DNRW: *'Queensland Acid Sulfate Soil Technical Manual'* (2002), including Soil Management Guidelines (updated Feb 2003), which must be prepared to the satisfaction of the Chief Executive Officer.

Drainage Study of Site

8. The development is to be undertaken in accordance with the findings and recommendations of the Bligh Tanner Report on Newell Beach Flood Study Dated 2 August 2022, except where modified by the conditions.

   The applicant is to undertake additional local drainage calculations and reporting for the design of the internal road and stormwater drainage system and for the rear allotment drains. The supporting calculations are to confirm that the peak flows from the shorter duration rainfall events are contained within the drains and drainage easements.

   In relation to the local drainage elements, the additional calculations are to determine the drainage impacts on upstream and downstream properties and the mitigation measures required to minimise such impacts. In particular, the further advice must address the following:

   a. The contributing catchment boundaries to the local drains;

   b. The depth, velocity and extent of the 100-year ARI peak runoff flows in the allotment catch drain post-development. Based on the drain operation, confirm the extent of the drainage easements;

c. Information on the proposed works and any impacts proposed at the drainage outlet from the proposed development.

d. Confirmation of the severe impact assessment for the scenario where the crossroad culverts are blocked.

The report on the local drainage elements must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

Earthworks

9. The development is to be undertaken generally in accordance with Civil Walker drawings 214-001-SK03 and SK04 (Revision 1) except as follows:

   a. Unless otherwise approved following the severe impact assessment findings and detailed flood calculations for local drains, the levels on lots 1, 2, 20 and 21 are to be amended as follows:

      i. Within 1m of the lot frontage the lot level must achieve a minimum earthworks level of 3.5m AHD. A small batter along the frontage of lots is to be provided to transition from the verge level to this minimum level.

      ii. The rear allotment level is to be a minimum of 3.7m AHD;

Demolish Structures

10. All structures not associated with the approved development (including disused services and utilities) must be demolished and/or removed from the subject land prior to the issue of a Compliance Certificate for the Plan of Survey.

Stockpiling and Transportation of Fill Material

11. Soil used for filling or spoil from the excavation is not to be stockpiled in locations that can be viewed from adjoining premises or a road frontage for any longer than one (1) month from the commencement of works.

    Transportation of fill or spoil to and from the site must not occur within:

    a. peak traffic times; or

    b. before 7:00 am or after 6:00 pm Monday to Friday; or

    c. before 7:00 am or after 1:00 pm Saturdays; or

    d. on Sundays or Public Holidays.

12. Dust emissions or other air pollutants must not extend beyond the boundary of the site and cause a nuisance to surrounding properties.

Storage of Machinery and Plant

13. The storage of any machinery, material and vehicles must not cause a nuisance to surrounding properties, to the satisfaction of the Chief Executive Officer.

Drainage Construction

14. The applicant / owner must undertake the development of the land in accordance with the findings of the Drainage Study dated 2 August 2022 prepared by Bligh Tanner and generally in accordance with Civil Walker drawings 214-001-SK03 and SK04 (Revision 1) except where modified by the conditions.

Drainage Easements

15. Drainage Easements as nominated in the Bligh Tanner Drainage Study, dated 2 August 2022, must be granted in favour of Council. A copy of the easement documents must be submitted to Council for the approval of Council's solicitors at no cost to Council. The approved easement documents must be submitted at the same time as seeking approval and dating of the Plan of Survey and must be lodged and registered with the Department of Resources. The easement document must nominate that the maintenance obligations for the easement resides with he respective property owners.

Lawful Point of Discharge

16. All stormwater from the property must be directed to a lawful point of discharge such that it does not adversely affect surrounding properties or properties downstream from the development to the requirements and satisfaction of the Chief Executive Officer.

Plan of Drainage Works

17. The subject land must be drained to the satisfaction of the Chief Executive Officer. In particular,

    a. Drainage infrastructure in accordance with the FNQROC Development Manual

    b. The drainage system from the development must incorporate a gross pollutant trap(s) or equivalent measure(s), meeting the following Council specifications for stormwater quality improvement devices (SQID), namely:

        i. End-of-line stormwater quality improvement devices (SQID) shall be of a proprietary design and construction and shall carry manufacturer's performance guarantees as to removal of foreign matter from stormwater and structural adequacy of the unit.

        ii. SQIDs shall remove at least ninety-five per cent of all foreign matter with a minimum dimension of three (3) mm and shall be configured to prevent re-injection of captured contaminants. The SQID treat all first flush runoff, which shall be defined as that volume of water equivalent to the runoff from the three (3) month ARI storm event. The location of SQIDs within the drainage system shall be planned to ensure that the first flush waters from all parts of the (developed) catchment are treated.

        iii. The design of the SQID shall not compromise the hydraulic performance of the overall drainage system.

        iv. SQIDs shall be positioned so as to provide appropriate access for maintenance equipment.

    c. All new allotments shall have immunity from flooding associated with an ARI 100 year rainfall event; and

    d. Where practical, all new allotments must be drained to the road frontages, drainage easements or drainage reserves and discharged to the existing drainage system via storm water quality device(s).

    e. The current earthworks concept on Civil Walker Drawing 214-001-SK03 drawings indicate the open drain at the rear of lots 1 to 9 to have a very flat grade in the order of 0.25%. This drain must be provided with a concrete invert for its full length. Detailed flow calculations must confirm that the drain profile can contain the 1%AEP runoff from the local catchment.

    The concrete invert must extend along the northern side of Lot 1 to the cross culvert apron, and must extend west from the culvert outlet to the western boundary of the easement in Lot 21.

Landscape Plan

18. Undertake landscaping of the site and street frontages of new roads in accordance with FNQROC Development Manual and in accordance with a landscape plan. The landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Work. In particular, the plan must show:

    a. Planting of the footpath with trees, using appropriate species with consideration to be given to creating an individual sense of place and character to the estate;

    b. The provision of suitable shade trees;

    c. Species to have regard to the Planning Scheme Policy No.SC6.7 Landscaping; and

    d. Road verges to be seeded and grassed with turf adjacent back of kerb and placed in strip at right angles to kerb;

    Permanent irrigation or any other embellishments are not permitted.

    Inclusion of all requirements as detailed in other relevant conditions included in this Approval, with a copy of this Development Approval to be given to the applicant's Landscape Architect / Designer.

    One (1) A3 copy of the landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works. Areas to be landscaped must be established prior to the lodgement of the Survey Plan with Council for endorsement and must be maintained for the duration of the on-maintenance period to the satisfaction of the Chief Executive Officer.

Sediment and Erosion Control

19. A sediment and erosion control plan must be submitted prior the issue of a Development Permit for Operational Works. Such plans must be installed / implemented prior to discharge of water from the site, such that no external stormwater flow from the site adversely affects surrounding or downstream properties (in accordance with the requirements of the *Environmental Protection Act 1994,* and the FNQROC Development Manual).

Existing Services

20. Written confirmation of the location of existing services for the land must be provided. In any instance where existing services are contained within another lot, the following applies, either:

    a. Relocate the services to comply with this requirement; or

    b. Arrange registration of necessary easements over services located within another lot prior to, or in conjunction with, the lodgement of a Compliance Certificate for the Plan of Survey creating the lot.

Electricity Supply

21. Written evidence from Ergon Energy advising if distribution substation/s are required within the development must be provided. If required, details regarding the location of these facilities must be submitted to the Chief Executive Officer accompanied by written confirmation from Ergon Energy. Details regarding electricity supply must be provided prior to the issue of a Development Permit for Operational Works.

Electricity and Telecommunications

22. Written evidence of negotiations with Ergon Energy and the telecommunication authority must be submitted to Council stating that both an underground electricity supply and telecommunications service will be provided to the development prior to the issue of a Compliance Certificate for the Plan of Survey.

Street Lighting

23. The following arrangements for the installation of street lighting within the proposed subdivision must be provided prior to the issue of a Compliance Certificate for the Plan of Survey:

    a. Prior to the issue of a development permit for Operational Works a Rate 2 lighting scheme is to be prepared by an Ergon Energy approved consultant and submitted to the Chief Executive Officer for approval. The Rate 2 lighting scheme is to be designed in accordance with the relevant Road Lighting Standard AS/NZS 1158 and the FNQROC Development Manual. The applicable lighting category is to be determined from the Road Hierarchy Table D1.1 and the corresponding applicable Lighting Categories Table D8.1 as identified in the FNQROC Development Manual.

    The lighting scheme must show light pole locations that align with property boundaries that represent the permitted design spacing and demonstrates no conflicts with stormwater, kerb inlet pits and other services.

    The design must provide the applicable illumination level specified in the Road Lighting Standard AS/NZS 1158 at the following road elements:

    - Intersections
    - Pedestrian Refuges
    - Cul-de-sacs
    - LATM Devices (Including Roundabouts)

    LATM Devices are to be shown on the civil layout design, the electrical services and street lighting design must be submitted in accordance with Ergon Energy's latest Distribution Design Drafting Standard.

    b. Prior to the issue of a Compliance Certificate for the Plan of Survey written confirmation that the relevant capital contribution required by Ergon Energy has been paid must be submitted, to ensure that the street lighting will be constructed.

Advices

1. This approval, granted under the provisions of the *Planning Act 2016*, shall lapse four (4) years from the day the approval takes effect in accordance with sections 85(1)(b) and 71 of the *Planning Act 2016*.

2. This approval does not negate the requirement for compliance with all relevant Local Laws and statutory requirements.

3. For information relating to the *Planning Act 2016*, log on to www.dsd.qld.gov.au . To access the FNQROC Development Manual, Local Laws and other applicable Policies log on to *www.douglas.qld.gov.au*.

Infrastructure Charges Notice

4. A charge levied for the supply of trunk infrastructure is payable to Council towards the provision of trunk infrastructure in accordance with the Infrastructure Charges Notice, refer to Attachment 3. The original Infrastructure Charges Notice will be provided under cover of a separate letter.

    The amount in the Infrastructure Charges Notice has been calculated according to Council's Infrastructure Charges Resolution. Please note that this Decision Notice and the Infrastructure Charges Notice are stand-alone documents. The *Planning Act 2016* confers rights to make representations and appeal in relation to a Decision Notice and an Infrastructure Charges Notice separately.

Further Development Permits

Please be advised that the following development permits are required to be obtained before the development can be carried out:

- All Operational Work

All Plumbing and Drainage Work must only be carried in compliance with the Queensland *Plumbing and Drainage Act 2018*.

Currency Period for the Approval

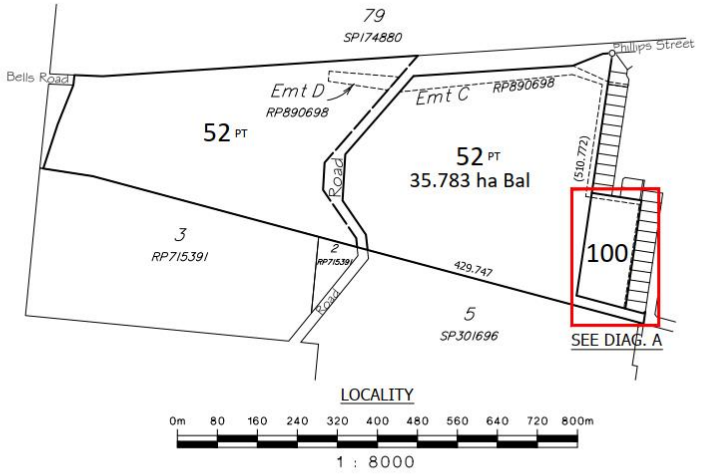
This approval, granted under the provisions of the *Planning Act 2016*, shall lapse four (4) years from the day the approval takes effect in accordance with the provisions of Section 85 of the *Planning Act 2016*.

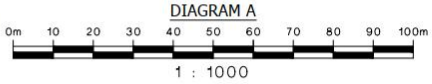
Rights to make Representations & Rights of Appeal

The rights of applicants to make representations and rights to appeal to a Tribunal or the Planning and Environment Court against decisions about a development application are set out in Chapter 6, Part 1 of the *Planning Act 2016.*

A copy of the relevant appeal provisions is attached.

Approved Drawing(s) and/or Document(s) (Subject to the conditions of the approval.)





PROPOSED
RECONFIGURATION (STAGE 1)

Lots 52 & 100
Cancelling Lot 51 on SP168537

Locality of Newell
Douglas Shire Council

Date: 23/12/2020	
Scale: 1:8000	A3
Drawn: WCHO	
Job No: 34678/1-1	
Plan No: 34678/003 A	

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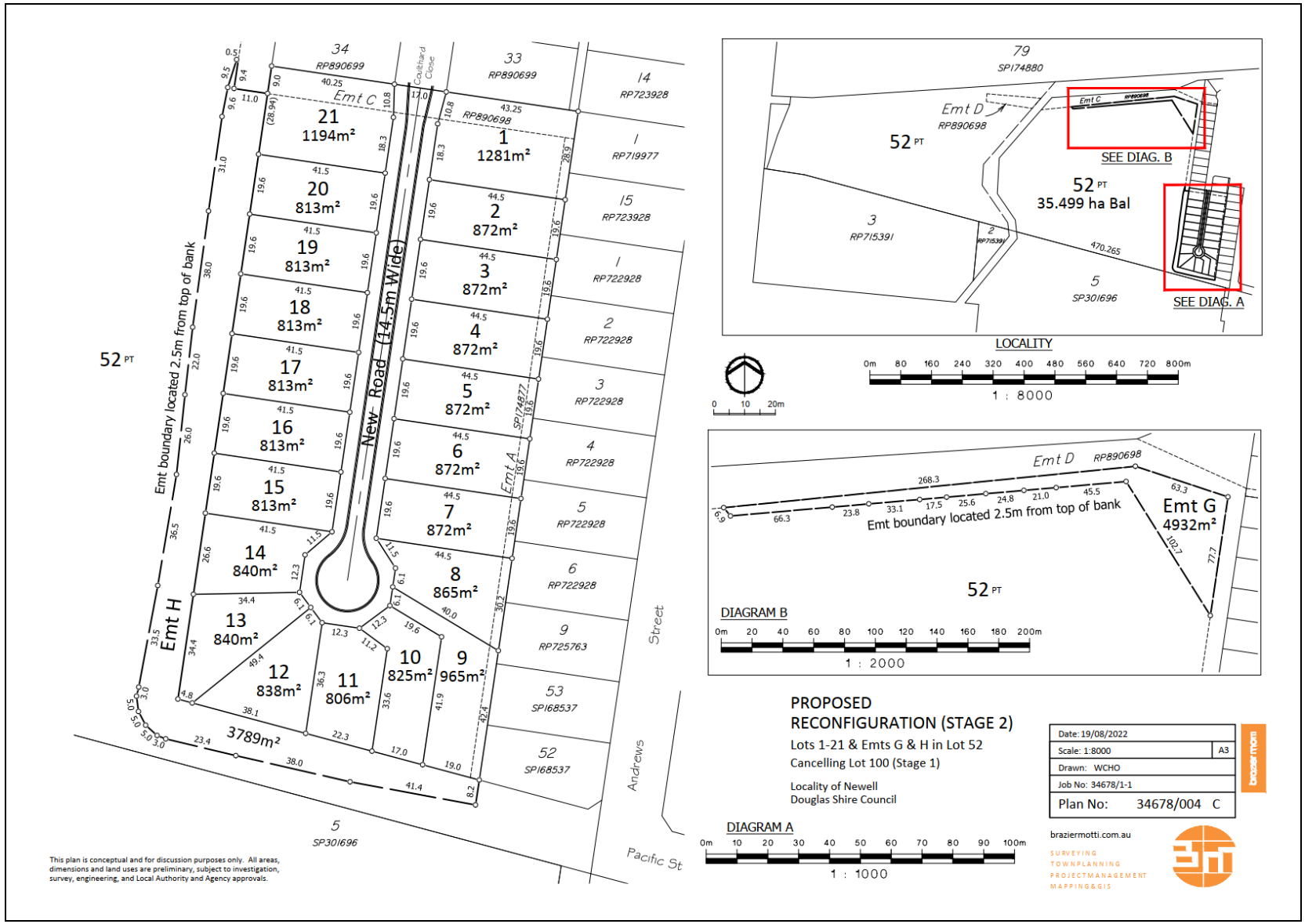
SURVEYING
TOWNPLANNING
PROJECTMANAGEMENT
MAPPING&GIS


PROPOSED
RECONFIGURATION (STAGE 2)
Lots 1-21 & Emts G & H in Lot 52
Cancelling Lot 100 (Stage 1)
Locality of Newell
Douglas Shire Council
Date: 19/08/2022
Scale: 1:8000
A3
Drawn: WCHO
Job No: 34678/1-1
Plan No: 34678/004 C
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SURVEYING
TOWNPLANNING
PROJECTMANAGEMENT
MAPPING&GIS
LOCALITY
1 : 8000
DIAGRAM A
1 : 1000
DIAGRAM B
1 : 2000
SEE DIAG. B
SEE DIAG. A
New Road (14.5m Wide)
Emt boundary located 2.5m from top of bank
Emt C
Emt D
Emt A
Emt G
4932m²
Emt H
3789m²
Coulthard Close
Andrews Street
Pacific St
This plan is conceptual and for discussion purposes only. All areas, dimensions and land uses are preliminary, subject to investigation, survey, engineering, and Local Authority and Agency approvals.

BLIGH TANNER

NEWELL BEACH FLOOD STUDY

TECHNICAL MEMORANDUM

Company. GLF Development Pty Ltd C/- CivilWalker Consulting Engineers
Contact. Daryl Walker
Date. 2 August 2022
Job Number # 2021.0566

DOCUMENT CONTROL SHEET

DOCUMENT

Newell Beach Flood Study

JOB NUMBER

2021.0566

PROJECT ENGINEER

Carlos Gambirazio

CLIENT

GLF Development Pty Ltd C/- CivilWalker Consulting Engineers

CLIENT CONTACT

Daryl Walker

VERSION	AUTHOR	REVIEWED	APPROVED	DATE
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FIGURES

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APPENDICES

EXECUTIVE SUMMARY

This report documents the findings of an overland flow flood study for a site adjacent to Coulthard Close, Newell Beach QLD 4873 (Lot 51 on SP168537), in response to a Douglas Shire Council Development Application Information Request dated 6 July 2021 (Council Reference ROL_2021_4160/1 (101890)).

Methodology

A 2D hydrodynamic flood model was developed using WBNM (hydrology) and TUFLOW (hydraulics) in accordance with Australian Rainfall and Runoff 2019. The flood model incorporates proposed cross-drainage infrastructure (culverts).

Three scenarios were assessed:

1. Existing Case Scenario
    a. Topography based on detailed site survey and LiDAR 1 m grid (Geoscience Australia, 2020),
    b. Surface parameters and hydrological model based on 2022 Aerial Imagery.
2. Developed Case Scenario
    a. Topography based proposed earthworks overlayed over the Existing Case Scenario topography (Refer Appendix B for bulk earthworks drawings).,
    b. Surface parameters and hydrological model based on a fully developed site assuming 60% impervious cover and proposed catchment diversions (associated with development grading and open channels surrounding the development footprint).
3. Developed Case Scenario Sensitivity Analysis
    a. Based on the Developed Case Scenario assuming open channels are not maintained, by increasing their Manning's 'n' value from 0.035 to 0.1.

Flood Impacts

Results indicate reductions in flood levels and flood extents south of the site, and at Philips Street towards the north.

Increases in flood levels and flood extents can be seen adjacent to the Coulthard Close culvert cross-over associated with the site's proposed internal road, however these are contained within the road corridor and do not encroach onto private properties. Minor increases in flood levels and extents at the culvert cross-over are due to the site's local catchment discharging at this location.

During the 1% AEP flood, maximum flood depths and flood hazard categories at the Coulthard Close culvert cross-over do not exceed 300 mm nor Category H1 (~0.1 m²/s), indicating flow conditions relatively safe for people and vehicles.

Building Floor Levels

Flood planning levels were informed by the Douglas Shire Planning Scheme Flood and Storm Tide Hazard Overlay Code, the FNQROC Development Manual, and the Queensland Urban Drainage Manual.

Results indicate that the dominant flood planning level at the site is the 1% AEP overland flow flood plus 300 mm freeboard, resulting in the following building floor level requirements:

- Upstream (south) site area – 3.8 m AHD
- Downstream (north) site area – 3.6 m AHD

Intermediate levels should be interpolated from these levels.

Maintenance Easement Requirements

As part of the proposed works, new drainage channels will be established and existing drainage channels widened, which will require corresponding establishment and widening of easements to permit access for works to be performed, secure a right for stormwater flows, and provide access for maintenance vehicles.

Easements for open channels will be established as per recommendations in Section 3.2.4 of QUDM and Section BN9.7 in the QUDM background notes, as follows:

- 4.5 m wide maintenance access track at one side of the top of bank of the channel,
- 1.5 m wide access strip at one side of the top of bank of the channel.

Due to geometric constraints, no maintenance easement will be established at the grassed channel east of the site (strip between the proposed development and adjacent properties). This has been reflected in the Developed Case Scenario flood model with a Manning's 'n' value of 0.1.

1 INTRODUCTION

This report documents the findings of a local drainage study for a site adjacent to Coulthard Close, Newell Beach QLD 4873 (Lot 51 on SP168537), in response to a Douglas Shire Council Development Application Information Request dated 6 July 2021 (Council Reference ROL_2021_4160/1 (101890)).

The proposed development comprises an urban residential low-density subdivision of 21 new lots with a central access road.

This report addresses:

- Site Context,
- Flood Modelling Methodology,
- Flood Results,
- Design Levels,
- Flood Impacts,
- Drainage Easement Recommendations.

2 SITE CONTEXT

2.1 Flooding

The existing site is undeveloped.

The development proposal comprises an urban residential low-density subdivision of 21 new lots with a central access place.

The existing lot is affected by the 1% AEP storm tide flood at the year 2100 (as per the Douglas Shire Council Storm Tide Inundation Property Report, as seen in Appendix N), with a flood level of approximately 2.8 m AHD. The storm tide flood does not encroach onto the proposed subdivision.

The site is protected from higher storm tide flood levels by a coastal embankment towards the east.

Refer Figure 1 below for an image of the site as affected by the 1% AEP storm tide flood at the year 2100.

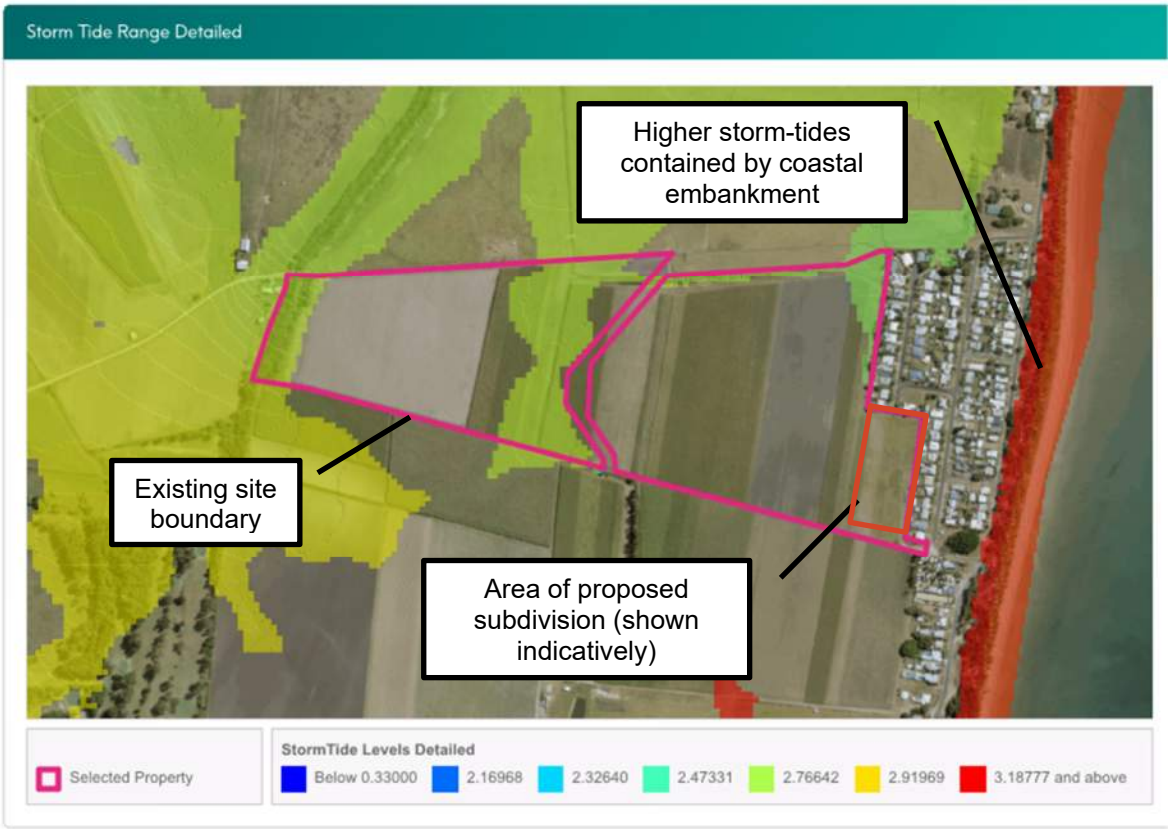


Figure 1 **1% AEP at year 2100 storm tide level – Adopted as flood model tail water level – Douglas Shire Council Storm Tide Inundation Property Report – Produce 14/07/2021**

3 FLOOD MODELLING METHODOLOGY

3.1 Hydrology

Hydrological analysis was undertaken on WBNM to assess storm flows associated with the local overland flow path catchments.

The total catchment was demarcated based on contributing runoff to the Saltwater Creek outlet, resulting in a total catchment area of 624 hectares.

3.1.1 Design Scenarios

Two hydrological models were developed to represent existing and proposed conditions.

Existing Case scenario sub-catchment division and impervious percentages were defined via interpretation of LiDAR topographic information, aerial imagery, defined flow paths and drainage infrastructure.

Developed Case scenario sub-catchment division and impervious percentages were based on the Existing Case scenario, amended to incorporate the development footprint (assuming 60% impervious cover) and proposed catchment modifications.

Refer Appendix A for Existing Case and Developed Case catchments plans.

3.1.2 Storm Selection

Rainfall information and temporal patterns relevant to the site's latitude, longitude and area were extracted from the Bureau of Meteorology IFD website and the Australian Rainfall and Runoff 2019 (ARR 2019) datahub, respectively.

This information was then input into a storm selection process that consisted of analysing 10 temporal patterns for every AEP and duration, including non-standard ones.

Storm durations producing the highest peak flows at the downstream end of the site (Catchment 6 outlet for the Existing Case / Catchment 6A outlet for the Developed Case) were adopted as critical.

Temporal patterns producing peak flows just above the mean were selected for the critical storm durations.

The process of storm and temporal pattern analysis was facilitated by the software application "Storm Injector", designed to help implement and streamline the new requirements of ARR2019.

Critical storm durations are summarised in Table 1 below.

Table 1 Critical Storm Durations

Event	Downstream of Site (adopted for flood model)	Saltwater Creek Outlet (Larger regional catchment)
1% AEP ('1 in 100-year')	1.5 hours	3 hours
10% AEP ('1 in 10-year')	1.5 hours	3 hours
20% AEP ('1 in 5-year')	1.5 hours	3 hours

3.1.3 Rainfall Losses

Rainfall losses were adopted as per recommendations in the Australian Rainfall and Runoff 2019 (ARR 2019) ((Commonwealth of Australia (Geoscience Australia), 2019):

- Global Initial Loss – 61 mm (as per ARR19 DataHub)
- Indirectly Connected Area Initial Loss – 42.7 mm (70% of Global Initial Loss as per Section 3.5.3.2.1 of ARR 2019, Book 5, Chapter 3) – It was assumed all pervious areas act as Indirectly Connected Areas.
- Global Continuous Loss – 4.0 mm/h (ARR 2019 DataHub)
- Impervious Initial Loss – 1.5 mm (Section 3.5.3.1.2 of ARR 2019, Book 5, Chapter 3)
- Impervious Continuous Loss – 0 mm

Local initial losses were applied independently for every rainfall event, subtracting the median pre-burst depth from the Indirectly Connected Area initial loss.

3.1.4 Validation

The suitability of the WBNM hydrological model was validated by comparing Existing Case Scenario peak flow estimates with the Rational Method (Queensland Urban Drainage Manual, 2017) and the Regional Flood Frequency Estimation Model (Engineers Australia, Western Sydney University, 2019) at the Saltwater Creek outlet (Catchment 'OUT'). Refer Table 2 below for comparison.

Table 2 Peak flow estimates at the Saltwater Creek outlet

Method	20% AEP (m^3/s)	10% AEP (m^3/s)	1% AEP (m^3/s)
WBNM	57.3	66.7	102.5
Rational Method	55.5	65.6	108.6
Regional Flood Frequency Estimation (RFFE)	43.4 - 255	57.2 - 364	96.6 - 904

WBNM estimates fall within the RFFE confidence intervals and agree with rational method estimates by -6% to 3%. They are considered fit for purpose.

Refer Appendix L for rational method calculations.

Refer Appendix M for RFFE estimates.

3.2 Hydraulics

A 1D/2D coupled hydrodynamic TUFLOW model was developed to assess the hydraulic behaviour of storm flows associated with the local overland flow path.

Hydrographs for the selected critical storms (calculated via the WBNM hydrologic model as described in 3.1 above) were incorporated into the 2D hydraulic space via 'source area' inflows.

3.2.1 Topography

3.2.1.1 Existing Case Scenario

The base topography is based on Digital Elevation Models of Australia derived from a LiDAR 1 m grid (Geoscience Australia, 2020) and a detailed site survey.

3.2.1.2 Developed Case Scenario

Proposed development earthworks were incorporated into the flood model's topography via overlaying the proposed design surface over the Existing Case Scenario surface.

3.2.2 Surface Roughness

Surface roughness was represented via a combination of fixed and depth-variable Manning's 'n' values.

Parameters for the Existing Case Scenario were determined via inspection of aerial imagery.

These parameters were modified to incorporate the open grassed drain around the perimeter of the site and lot footprint for the Developed Case Scenario.

The adopted surface roughness parameters are presented in Table 3 and Table 4 below.

Refer to Appendix K for the Flood Model Layouts indicating Existing Case Scenario and Developed Case Scenario surfaces.

Table 3 Surface Roughness Parameters

Material Description	Manning's 'n'	
Road & verge, carpark, pavement, driveways	0.02	
Low Density Residential	0.08	
High-Medium Density Residential	0.15	
Maintained grass	0.035	
Mature field crops	0.05	
Medium Density Vegetation	Depth Variable – Refer	Table 4
High Density Vegetation	Depth Variable – Refer	Table 4
Unmaintained grass	0.1	

Table 4 Depth-Variable Manning's 'n' Parameters

Depth (m)	Medium Dense Vegetation	Dense Vegetation
0	0.075	0.090
0.2	0.075	0.090
0.8	0.075	0.090
1.5	0.075	0.090
2	0.094	0.113
3.5	0.150	0.180
99	0.150	0.180

3.2.3 Stormwater Drainage

The culverts under the proposed road extension (three 1.2 m wide x 0.3 m high RCBC's) were incorporated into the TUFLOW 1D solver (ESTRY) and dynamically linked to the 2D hydraulic space via source boundaries (SX), as recommended in the TUFLOW USER Manual (BMT, 2018).

Flow loss coefficients were adopted as per recommendations in the TUFLOW USER Manual (BMT, 2018).

The culvert was represented with 20% blockage as recommended in Table 10.4.1 of the Queensland Urban Drainage Manual (QUDM) (IPWEAQ, 2017), as seen in Figure 2 below.

Table 10.4.1 – Suggested blockage factors for culverts [1]

Culvert conditions	Blockage factor	
	Design value	Severe storm [2]
Inlet height < 3 m, or width < 5 m:		
Inlet	20%	100% [3]
Chamber (barrel)	[3]	
Inlet height > 3 m and width > 5 m:		
Inlet	10%	25%
Chamber (barrel)	[3]	[3]
Culvert inlets with effective debris control features for culverts with inlet height < 3 m and width < 5 m	As above	As above
Screened culvert inlets	50%	100%

Notes:

[1] Developed from Engineers Australia (2012).

[2] Refer to discussion below on severe storm investigations.

[3] Adopt 25% bottom-up sediment blockage unless such blockage is unlikely to occur.

[4] The degree of blockage typically depends on availability of suitable bridging matter, such as large branches and fallen trees, that can 'bridge' across the structure opening.

Figure 2 QUDM Recommended Blockage Factors (IPWEAQ, 2017)

3.2.4 Downstream Tailwater Conditions

3.2.4.1 1% AEP (1 in 100-year flood)

A fixed downstream tailwater level of 2.77 m AHD was adopted for the 1% AEP event scenario, based on the 1% AEP at year 2100 as per the Douglas Shire Council Storm Tide Inundation Property Report (Refer Appendix N)

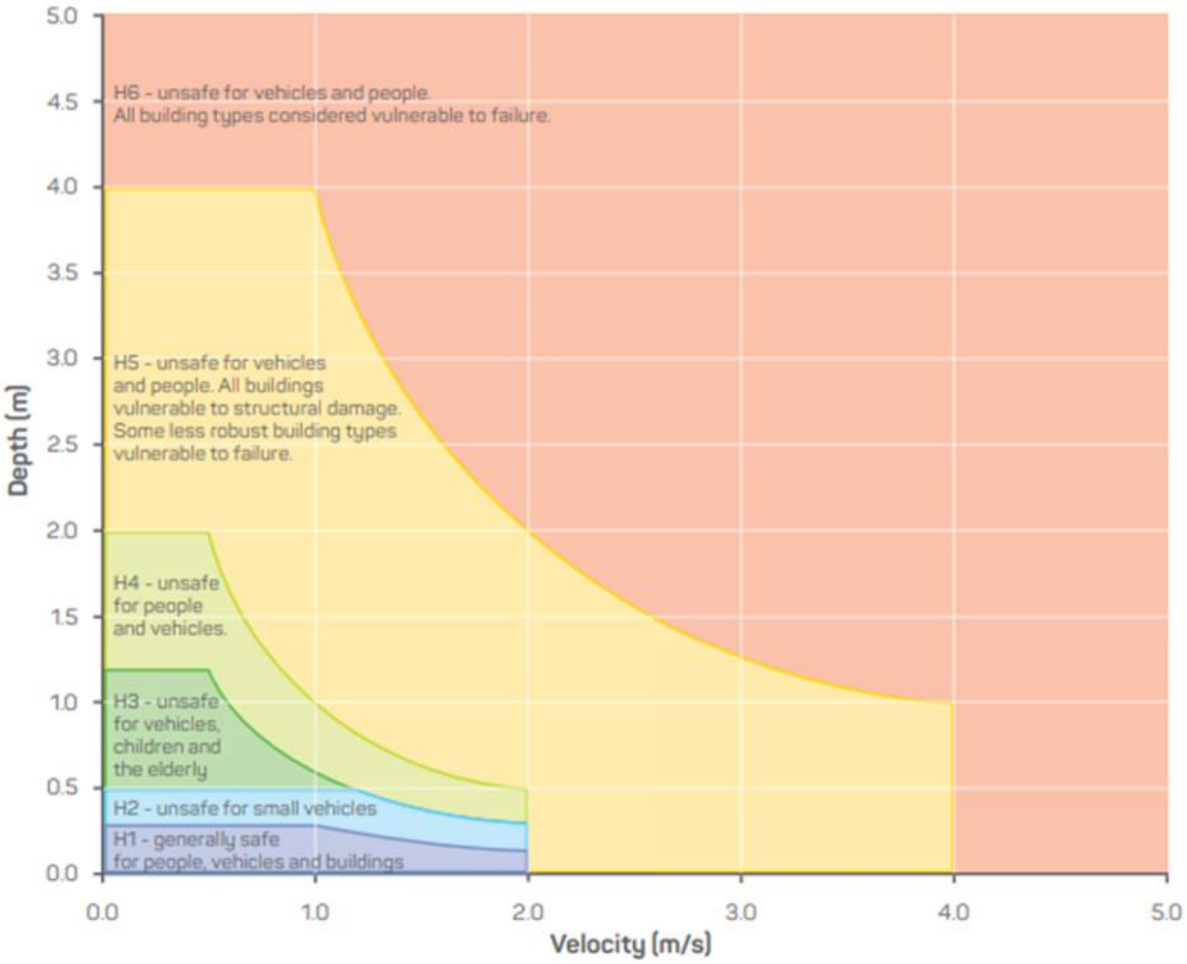
3.2.4.2 10% AEP (1 in 10-year flood) and 20% AEP (1 in 5-year flood)

Tailwater conditions for the 10% AEP and 20% AEP were represented via Stage-Discharge relationships automatically generated by TUFLOW (HQ boundaries), derived from surface slope and flows.

4 RESULTS

Refer to Appendices D to I for the Existing Case and Developed Case flood maps, indicating flood depth, hazard, and level for the 1% AEP, 10% AEP and 20% AEP floods.

Flood Hazard mapping was undertaken as per recommendations in the Australian Disaster Resilience Handbook Collection Guideline 7-3 Flood Hazard (Australian Institute for Disaster Resilience - Commonwealth of Australia, 2017). The adopted 'Flood Hazard Vulnerability Curves' as presented in Figure 3 below.



Hazard Classification	Description
H1	Relatively benign flow conditions. No vulnerability constraints.
H2	Unsafe for small vehicles.
H3	Unsafe for all vehicles, children and the elderly.
H4	Unsafe for all people and all vehicles.
H5	Unsafe for all people and all vehicles. Buildings require special engineering design and construction.
H6	Unconditionally dangerous. Not suitable for any type of development or evacuation access. All building types considered vulnerable to failure.

Figure 3 Flood Hazard Vulnerability Curves – Summary from the TUFLOW USER Manual

5 FLOOD IMMUNITY REQUIREMENTS AND BUILDING FLOOR LEVELS

5.1 Policy Requirements

5.1.1 Douglas Shire Planning Scheme 2018

AO1.2 of the Douglas Shire Planning Scheme Flood and Storm Tide Hazard Overlay Code indicates that "Development within the Flood and Storm Tide hazard overlay maps (…) is designed to provide immunity to the Defined Inundation Event as outlined within Table 8.2.4.3.b plus freeboard of 300 mm", which is the 1% AEP flood level plus 300 mm.

5.1.2 Queensland Urban Drainage Manual (QUDM)

The Douglas Shire Planning Scheme 2018 policy SC6.5 identifies the FNQROC Regional Development Manual as the policy relevant to infrastructure design.

The FNQROC Design Manual D4 (Stormwater Drainage) identifies QUDM (IPWEAQ, 2017) as the basis for design of stormwater drainage, except as amended by the design manual.

The FNQROC Design Manual D4 identifies the 1% AEP ('1 in 100-year flood') as the major design storm for overland flow.

Table 9.3.1 of QUDM recommends 300 mm freeboard for open channels.

As such, the minimum overland flow flood level immunity requirement adopted for the proposed development is the 1% AEP plus 300 mm freeboard.

5.2 Sensitivity Analysis

Open channels surrounding the development will be subject to mowing and maintenance.

A sensitivity analysis was undertaken to assess the 1% AEP flood level assuming the open channels were not maintained, by increasing the Manning's 'n' from 0.035 to 0.1. Refer Appendix J for the corresponding flood level plan.

The overland flow flood level immunity adopted for the proposed development will be the highest of:

- Developed Case 1% AEP with maintained open channels (Manning's 'n' of 0.035) plus 300 mm freeboard, or
- Developed Case 1% AEP with unmaintained open channels (Manning's 'n' of 0.1).

5.3 Building Floor Levels

Refer to Figure 5 and Figure 6 overleaf for site sections at the upstream (Section 1) and downstream (Section 2) ends of the site, respectively, indicating overland flow flood levels, storm-tide flood levels, and respective freeboard requirements. Refer Figure 4 below for the locations of the sections in plan view.

Results indicate that the dominant flood planning level at the site is the 1% AEP overland flow flood plus 300 mm freeboard requirement, resulting in the following building floor level requirements:

- Upstream (south / Section 1) site area – 3.8 m AHD
- Downstream (north / Section 2) site area – 3.6 m AHD

Intermediate levels should be interpolated from these levels.

Figure 4 Site Sections

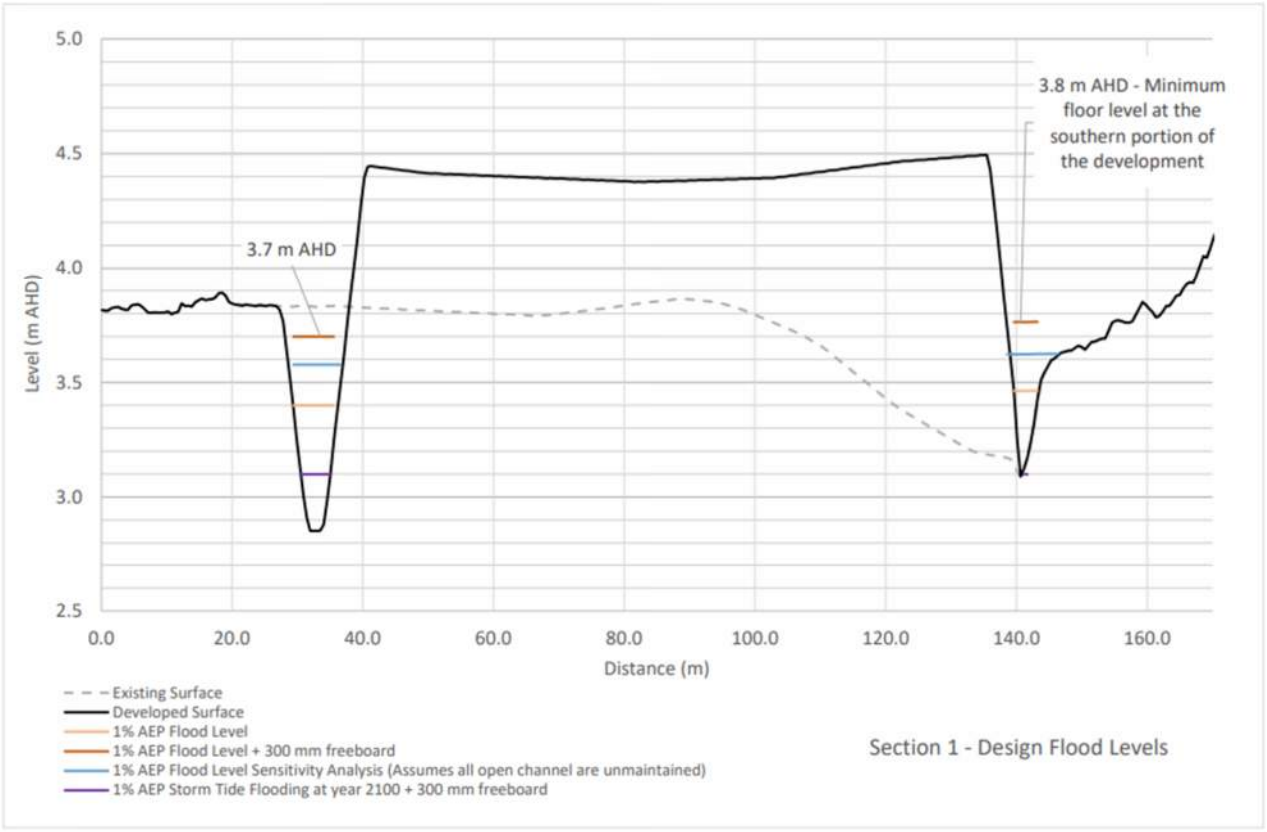


Figure 5 Site Section 1, flood levels & freeboard requirements

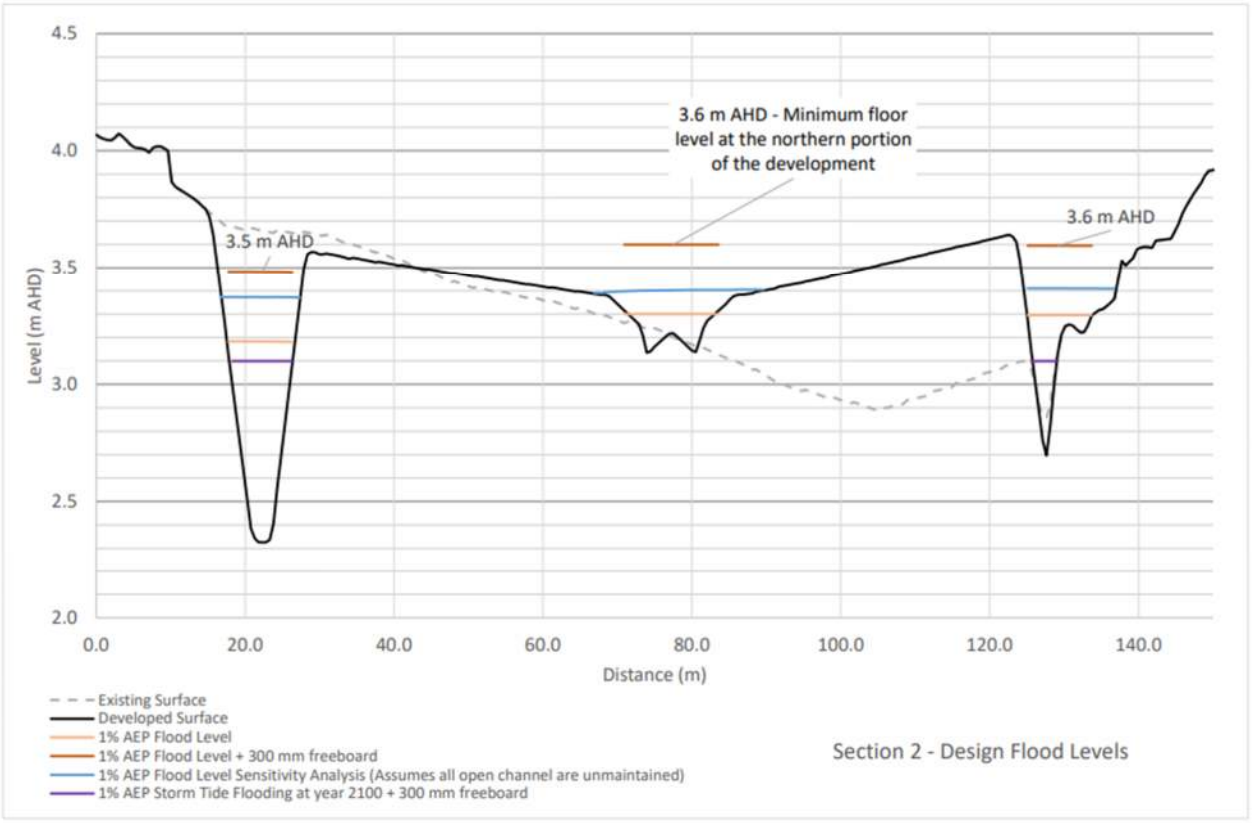


Figure 6 Site Section 2, flood levels & freeboard requirements

6 FLOOD IMPACTS

Proposed development earthworks were incorporated into the flood model's topography via overlaying the proposed design surface over the existing surface.

Refer Appendix B for proposed earthworks drawings.

This scenario assumes the proposed development does not have an on-site stormwater detention system.

Results indicate reductions in flood levels and flood extents south of the site, and at Philips Street towards the north.

Increases in flood levels and flood extents can be seen adjacent to the Coulthard Close culvert cross-over associated with the site's proposed internal road, however these are contained within the road corridor and do not encroach onto private properties.

Minor increases in flood levels and extents at the culvert cross-over are due to the site's local catchment discharging at this location.

During the 1% AEP flood, maximum flood depths and flood hazard categories at the Coulthard Close culvert cross-over do not exceed 300 mm nor Category H1 (~0.1 m²/s), indicating flow conditions relatively safe for people and vehicles.

Refer to Appendix C for flood impact maps.

7 DRAINAGE MAINTENANCE EASEMENT REQUIREMENTS

As part of the proposed works, new drainage channels will be established and existing drainage channels widened, which will require corresponding establishment and widening of easements to permit access for works to be performed, secure a right for stormwater flows, and provide access for maintenance vehicles.

Easements for open channels will be established as per recommendations in Section 3.2.4 of QUDM and Section BN9.7 in the QUDM background notes, as follows:

- 4.5 m wide maintenance access track at one side of the top of bank of the channel,
- 1.5 m wide access strip at one side of the top of bank of the channel.

Due to geometric constraints, no maintenance easement will be established at the grassed channel east of the site as clouded in purple in Figure 7 below. This has been reflected in the Developed Case Scenario flood model with a Manning's 'n' value of 0.1.

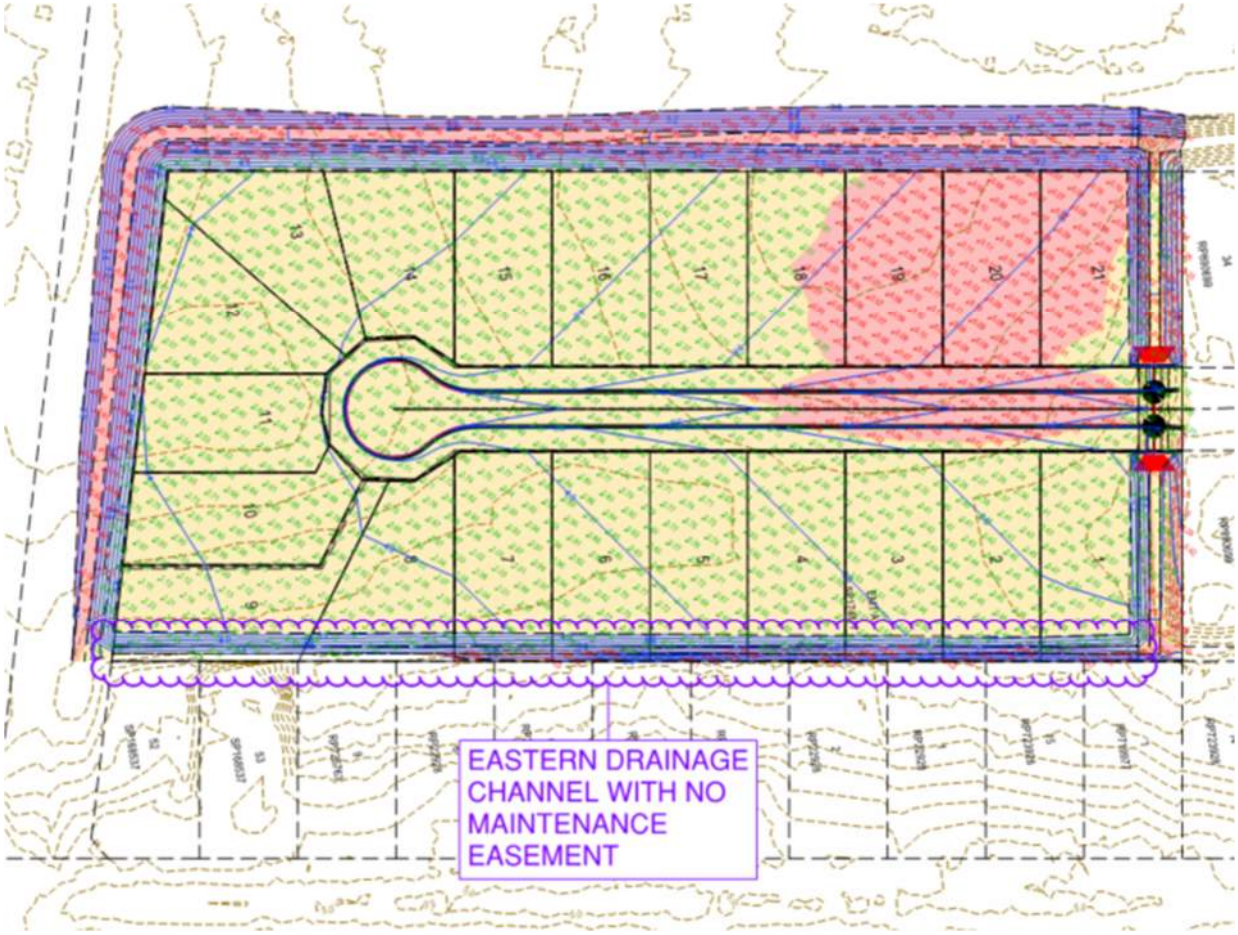


Figure 7 Proposed earthworks drawing indicating eastern drainage channel with no easement clouded in purple

8 REFERENCES

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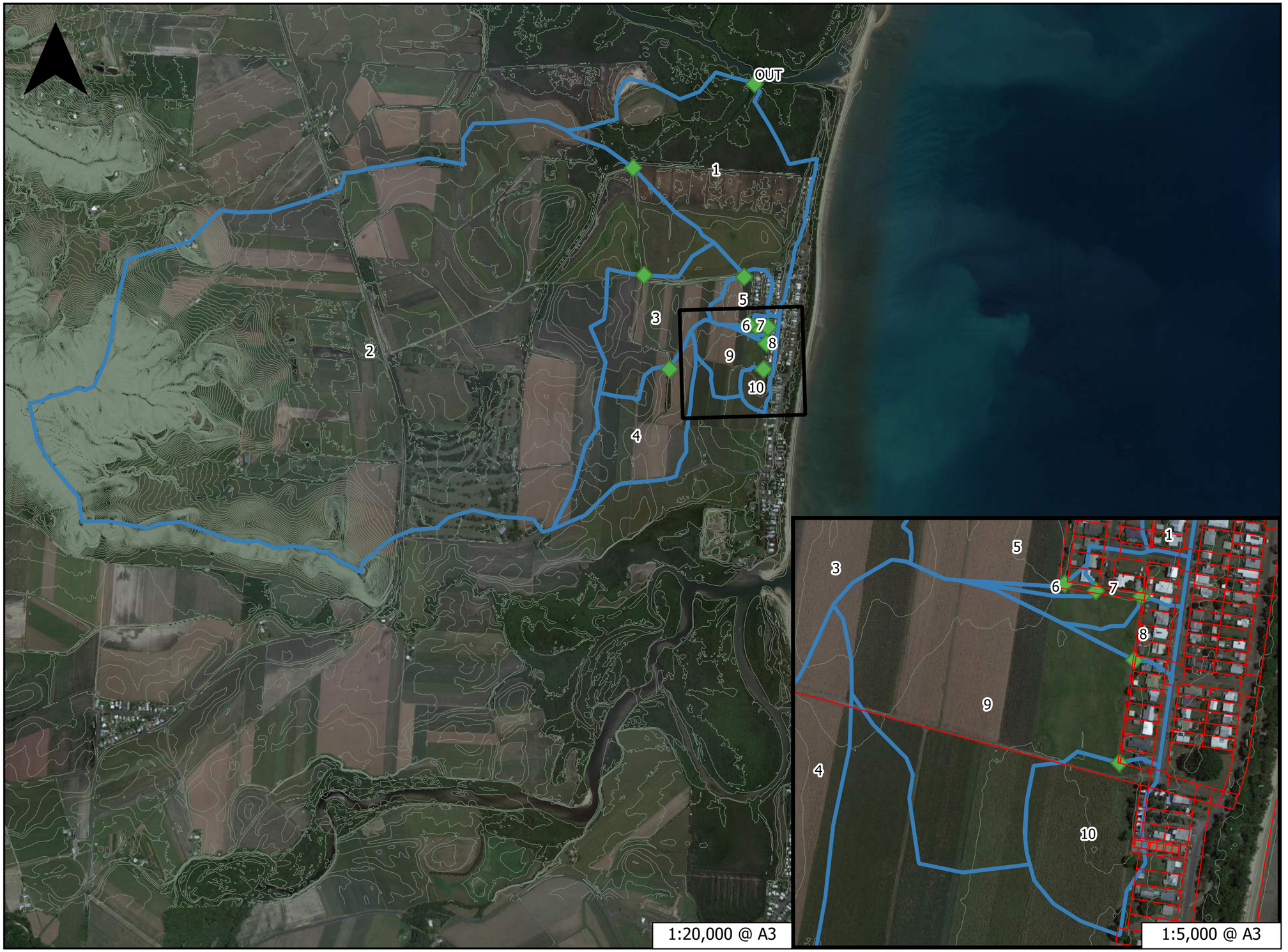
APPENDIX A
CATCHMENT PLANS



Legend
- Catchments
- Catchment Outlets
- 1 m Contours - LiDAR - 2015
- © Google Maps

Existing Catchment Table

Catchment ID	Area (ha)	Impervious %
1	68.0	1.7%
2	475.5	0.7%
3	29.9	0.0%
4	29.2	0.8%
5	6.4	14.4%
6	0.2	29.1%
7	1.3	18.0%
8	0.6	22.8%
9	9.8	2.0%
10	2.8	1.9%
OUT	0.0	0.0%
Total	**623.7**	**1.0%**

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Catchment Plan - Existing Conditions
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 1/2/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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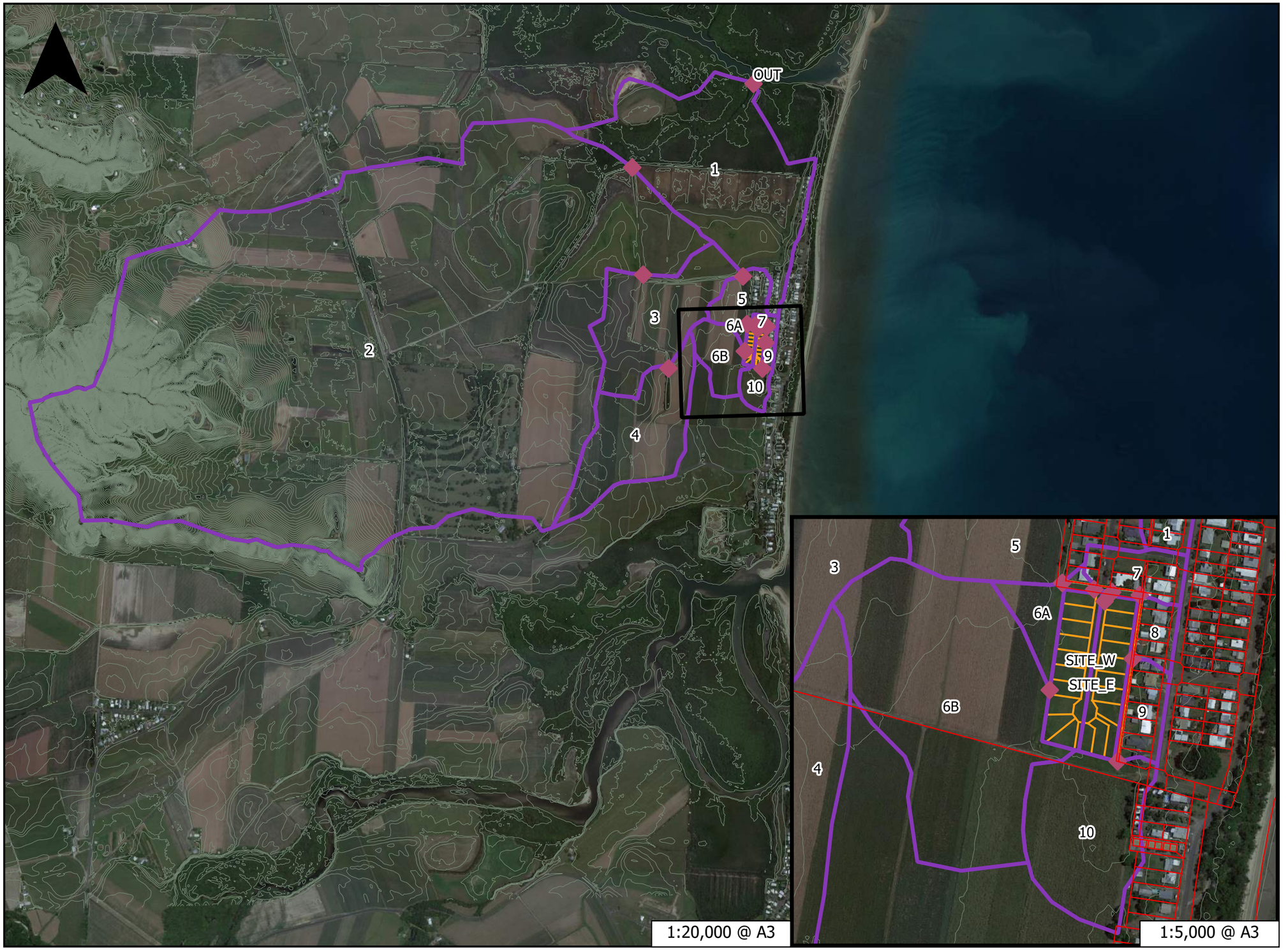
Scale 1:5,000 0 125 250 375 500 m



Legend

- Catchments
- Catchment Outlets
- 1 m Contours - LiDAR - 2015
- Proposed subdivision

Developed Catchment Table

Catchment ID	Area (ha)	Impervious %
1	68.0	2.0%
2	475.5	1.0%
3	29.9	0.0%
4	29.2	1.0%
5	6.4	14.0%
6A	0.7	2.0%
6B	7.4	0.0%
7	0.8	40.0%
8	0.4	50.0%
9	0.7	50.0%
10	2.8	2.0%
SITE_E	1.0	60.0%
SITE_W	1.0	60.0%
OUT	0.0	0.0%
Total	**623.7**	**1.5%**

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Catchment Plan - Developed Conditions
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 25/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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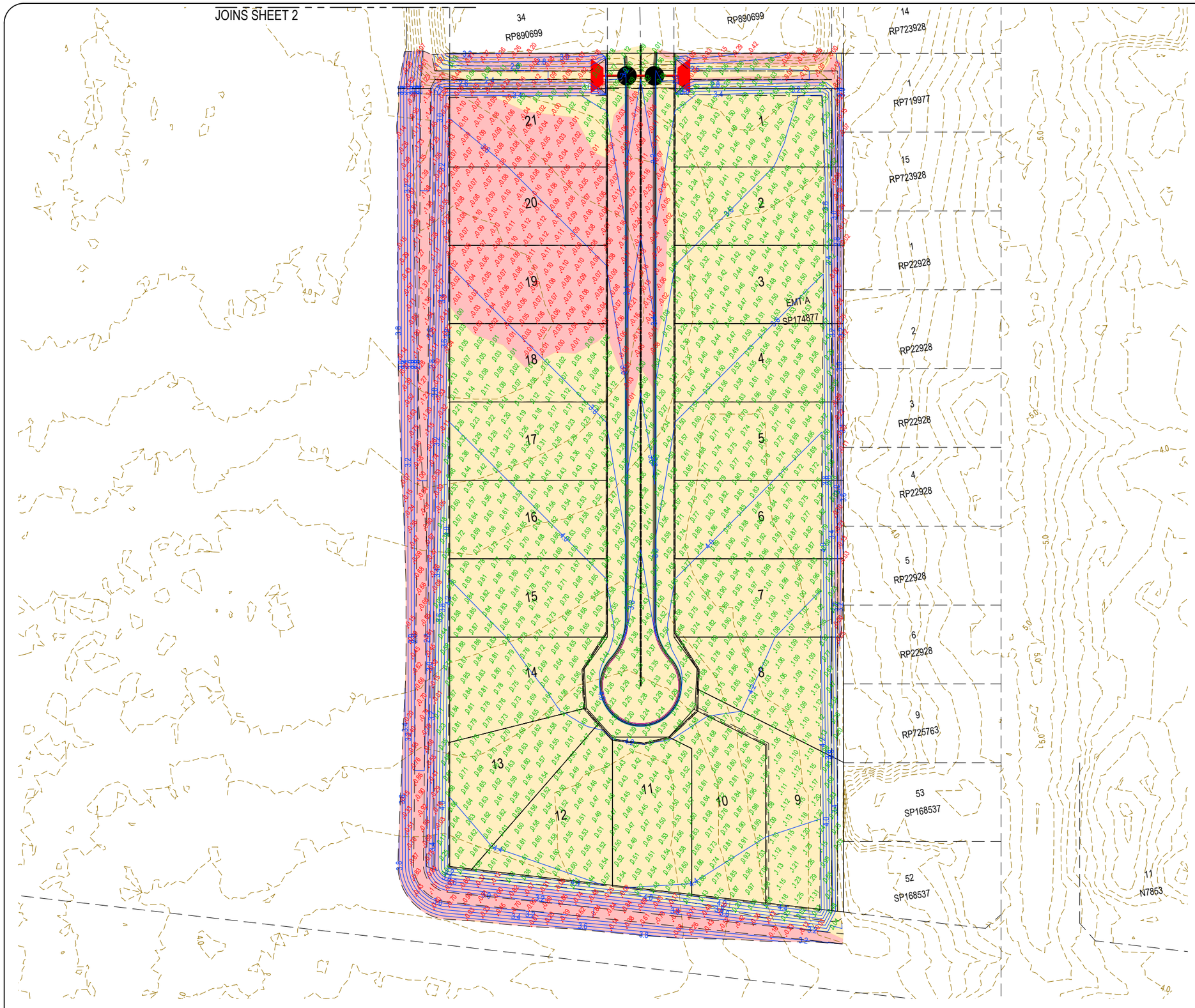
Scale 1:5,000 0 125 250 375 500 m

APPENDIX B
BULK EARTHWORKS

JOINS SHEET 2



LEGEND

- AREAS OF CUT
- AREAS OF FILL
- 57.0 — DESIGN SURFACE CONTOURS (0.2m INTERVAL)
- 57.0 — EXISTING SURFACE CONTOURS (0.2m INTERVAL)
- -0.13 — CUT DEPTH
- -0.17 — FILL DEPTH

REVISIONS				
1	26.07.22	INITIAL ISSUE		
NO.	DATE	DESCRIPTION	DESIGN	APPROVED

CLIENT: CB & FR COULTHARD

SCALE: 1:500 / 1:1000 — 0 5 10 20 30 — A1 / A3

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

CivilWalker CONSULTING ENGINEERS

DRAWN	CW	CHECKED	DJW
DESIGNED	CW	CHECKED	DJW
APPROVED			
DATE:		RPEQ:	

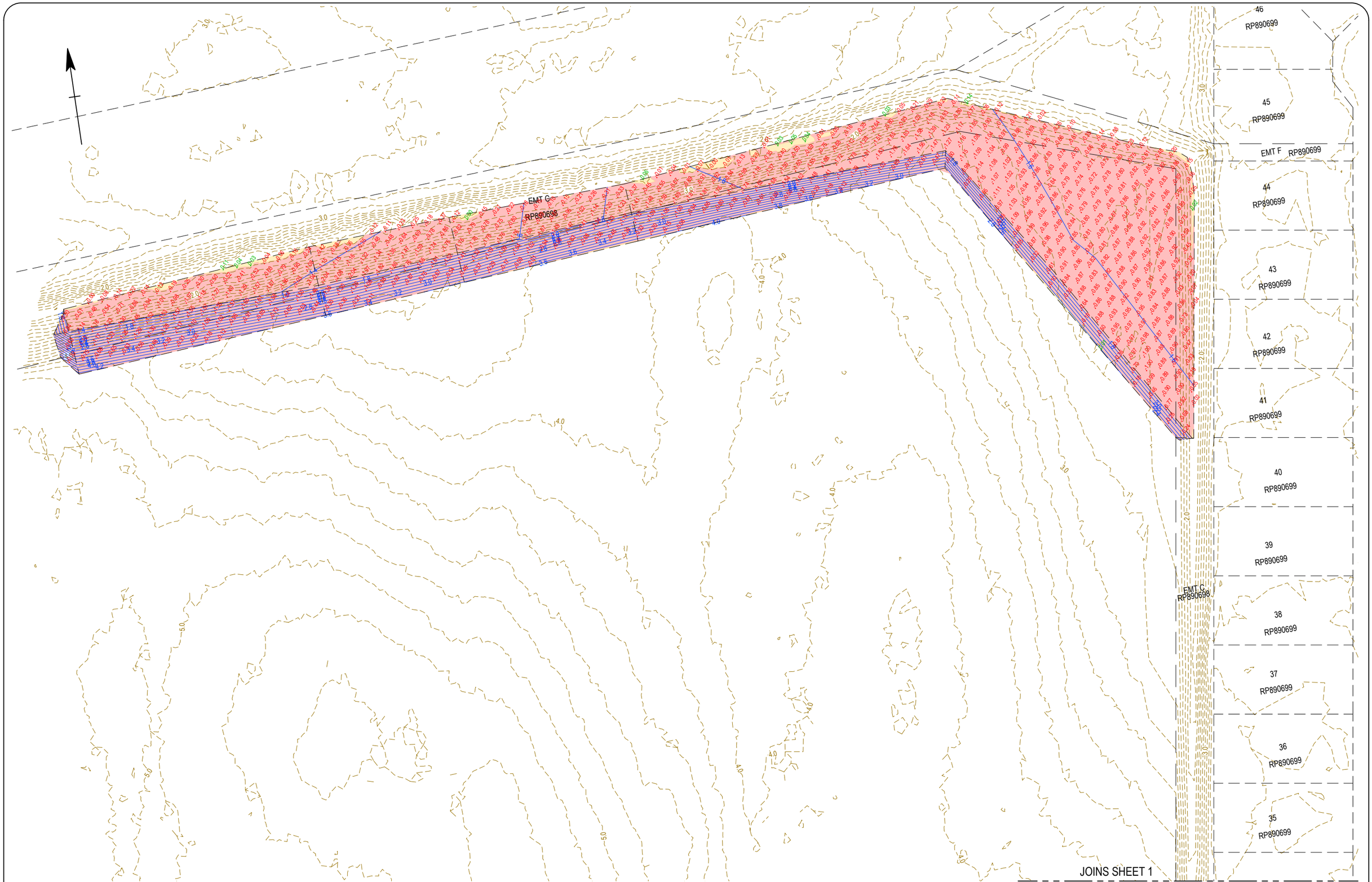
LOT 51 COULTHARD CLOSE, NEWELL BEACH

EARTHWORKS CONCEPT

SHEET 1 OF 2

DRAWING NO. 214-001-SK03

REVISION



REVISIONS					
NO.	1	DATE	26.07.22	DESIGN	APPROVED
		DESCRIPTION	INITIAL ISSUE		

CLIENT

CB & FR COULTHARD

SCALE

1:500 0 5 10 20 30 A1
1:1000 A3

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

CivilWalker
CONSULTING ENGINEERS

DRAWN	CW	CHECKED	DJW
DESIGNED	CW	CHECKED	DJW
APPROVED			
DATE:		RPEQ:	

LOT 51 COULTHARD CLOSE, NEWELL BEACH

EARTHWORKS CONCEPT

SHEET 2 OF 2

DRAWING NO. 214-001-SK04

REVISION

APPENDIX C
FLOOD IMPACT ASSESSMENT

Legend

Change in Flood Level (m)
- <= -0.18
- -0.18 - -0.16
- -0.16 - -0.14
- -0.14 - -0.12
- -0.12 - -0.1
- -0.1 - -0.08
- -0.08 - -0.06
- -0.06 - -0.04
- -0.04 - -0.02
- -0.02 - 0
- 0 - 0.02
- 0.02 - 0.04
- 0.04 - 0.06
- 0.06 - 0.08
- 0.08 - 0.1
- 0.1 - 0.12
- 0.12 - 0.14
- 0.14 - 0.16
- 0.16 - 0.18
- > 0.18
- Was wet now dry
- Was dry now wet

COULTHARD CLOSE

LEMATY STREET

PHILLIPS STREET

ANDREWS STREET

0 50 100 150 200 m

Scale 1:2,000 @ A3

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Afflux - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Afflux - 10% AEP ('1 in 10-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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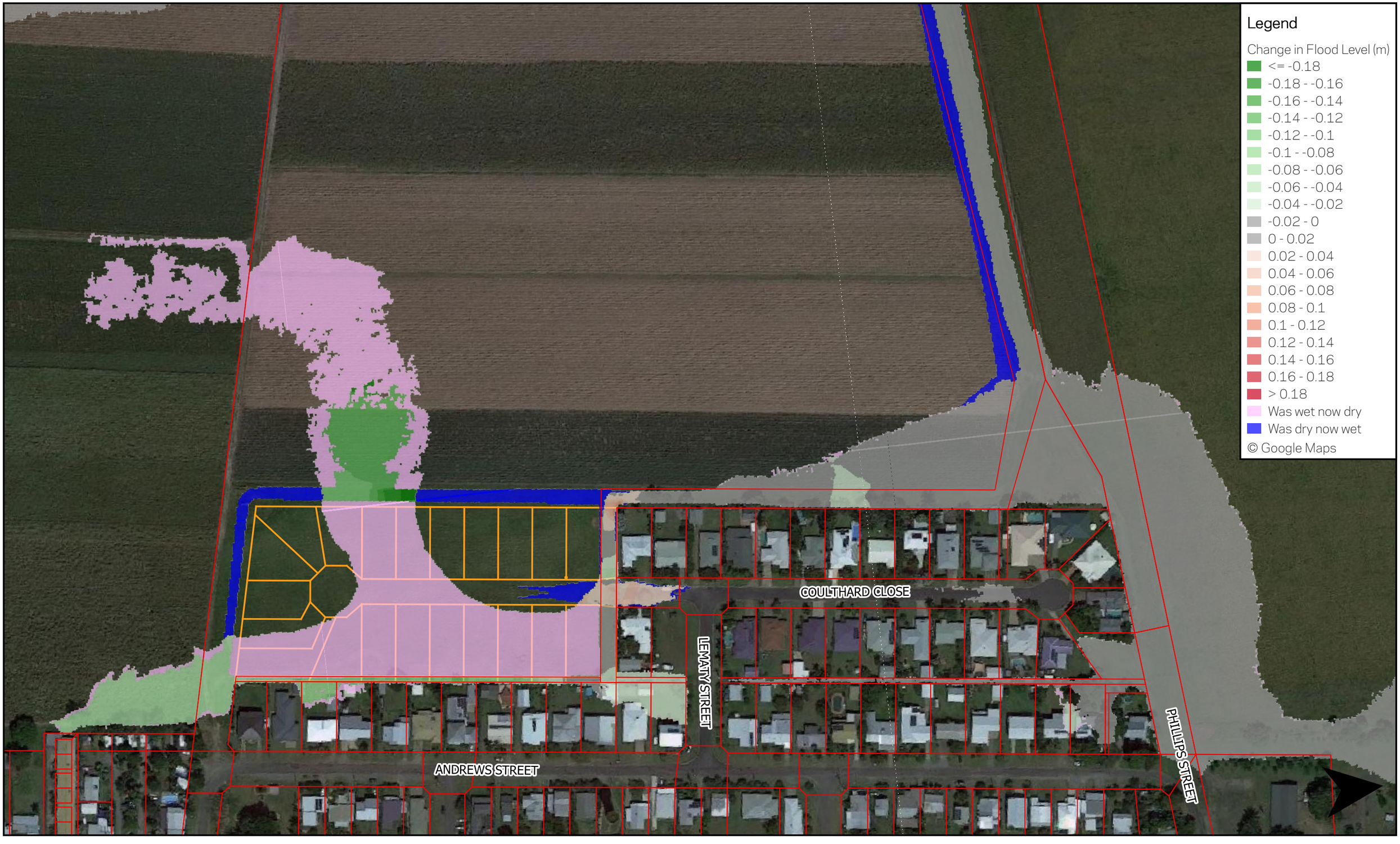
Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
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T +61 7 3251 8555

Title:
Afflux - 1% AEP ('1 in 100-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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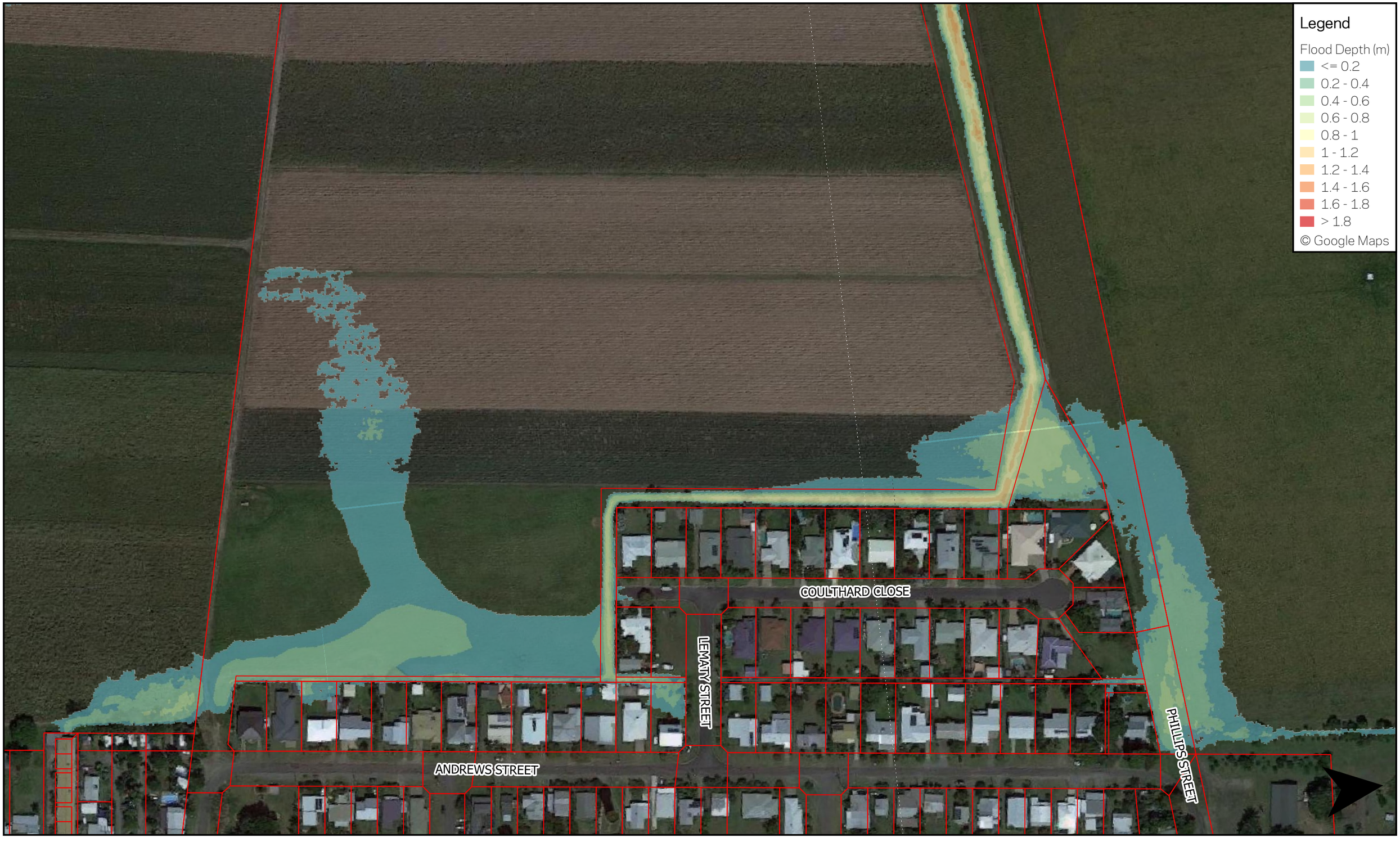
Scale 1:2,000 @ A3

APPENDIX D
EXISTING FLOOD DEPTH



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
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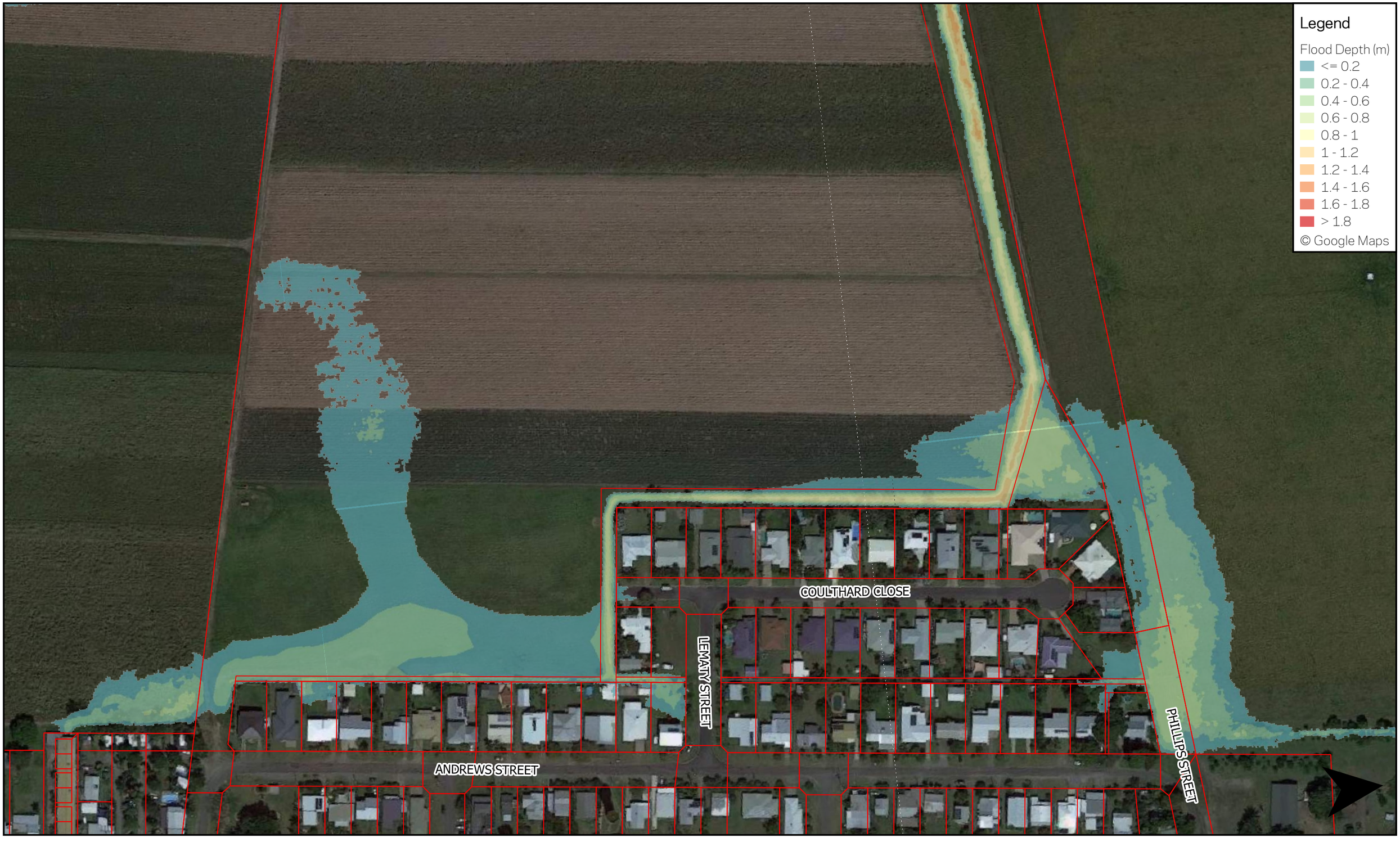
Title:
Depth - Existing - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Existing - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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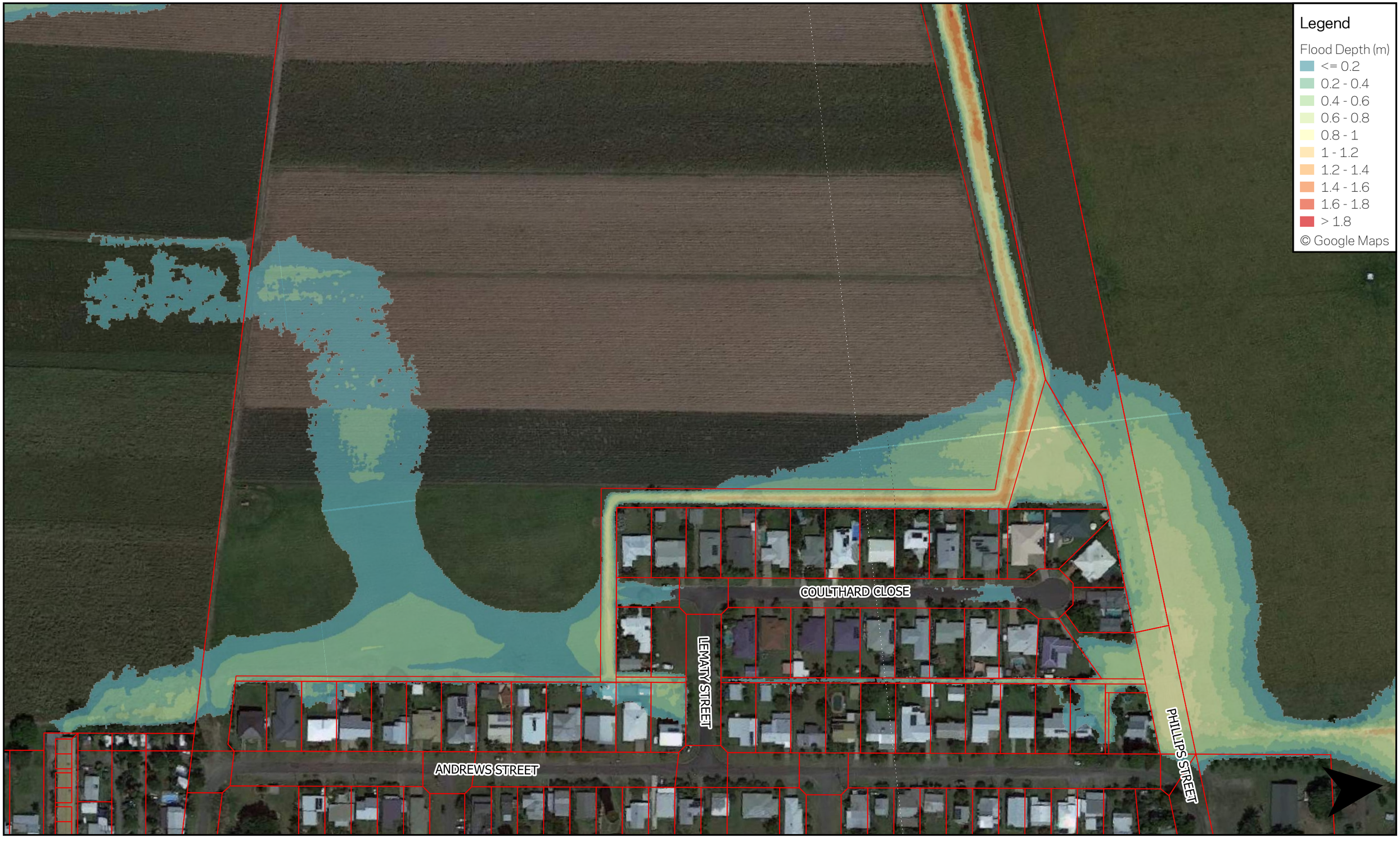
Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Existing - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX E
EXISTING FLOOD HAZARD

Legend

Hazard Categories
- H0 - No Hazard
- H1 - No restrictions
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for all people and all vehicles. Buildings require special engineering and construction.
- H6 - Not suitable for people, vehicles or buildings

COULTHARD CLOSE

LEMATY STREET

ANDREWS STREET

PHILLIPS STREET

0 50 100 150 200 m

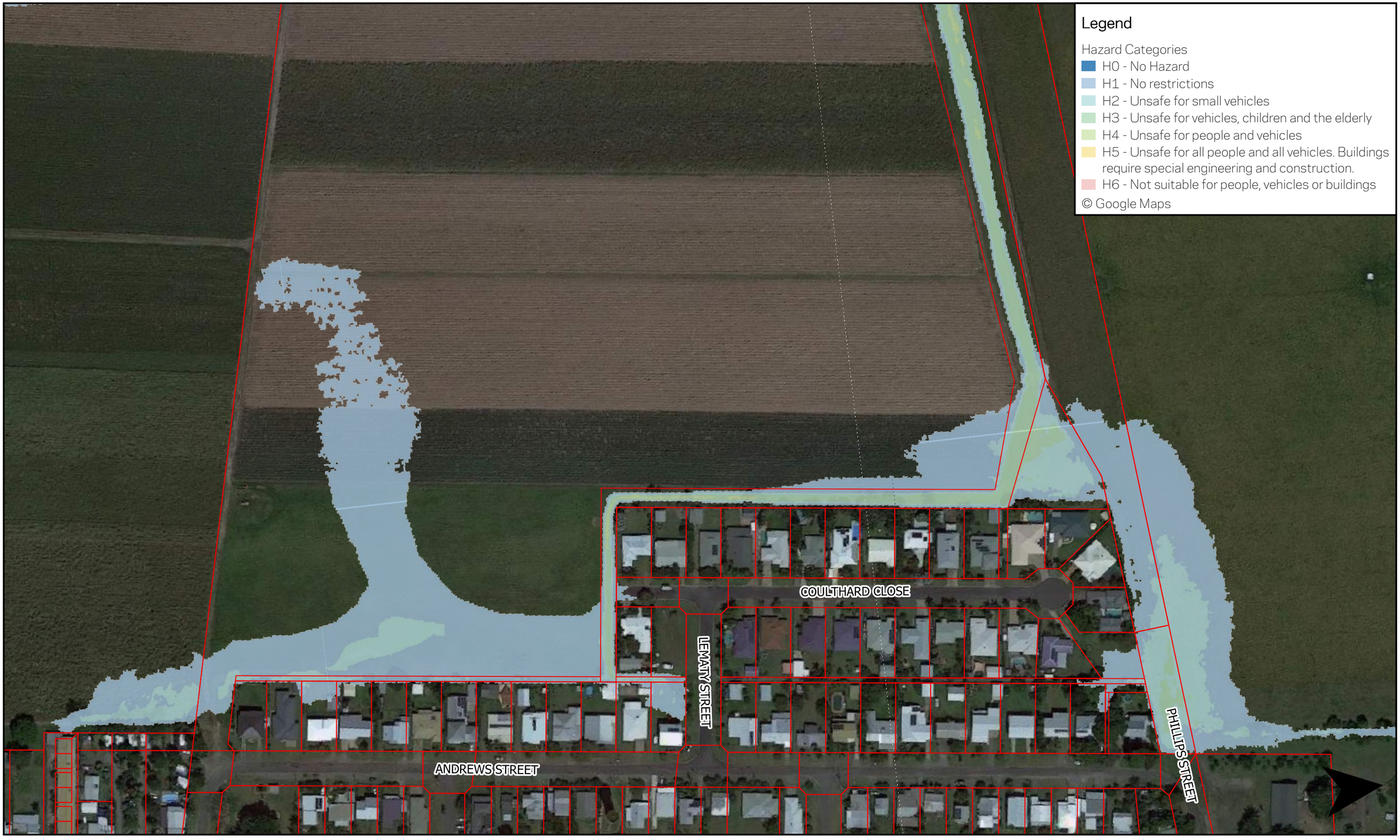
Scale 1:2,000 @ A3

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Existing - 20% AEP ('1 in 5-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Existing - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

BLIGH TANNER

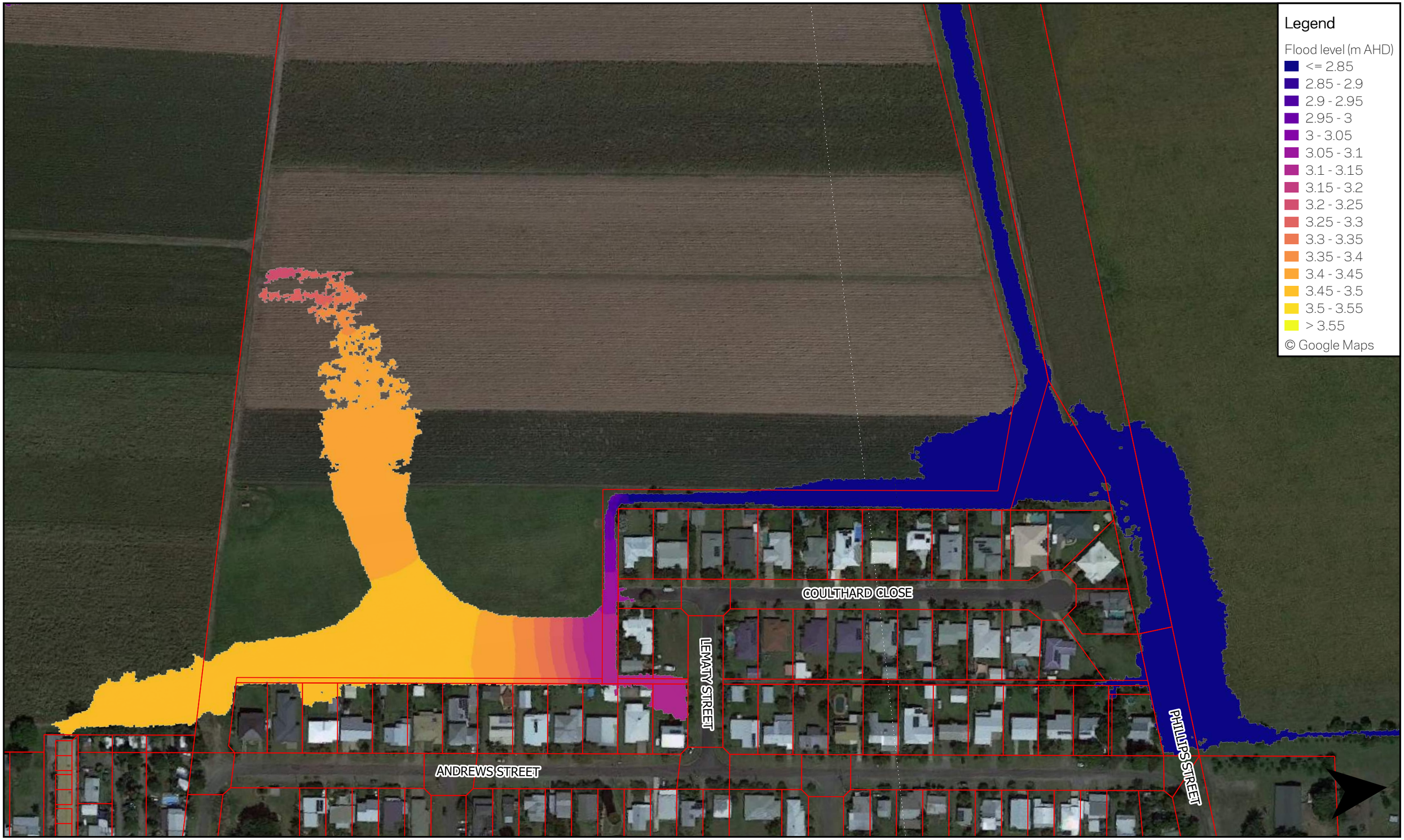
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Existing - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX F
EXISTING FLOOD LEVEL



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Existing - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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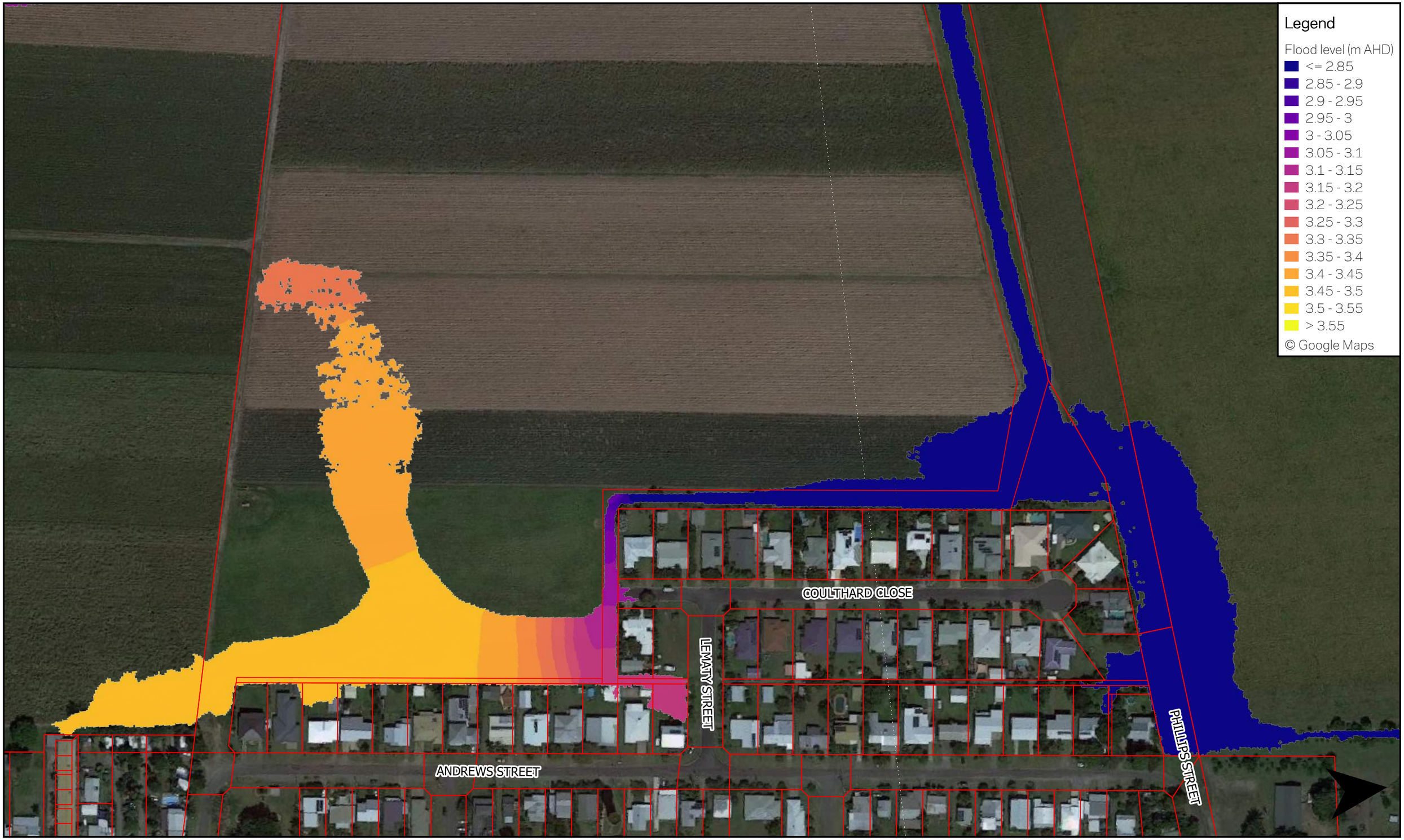
Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Existing - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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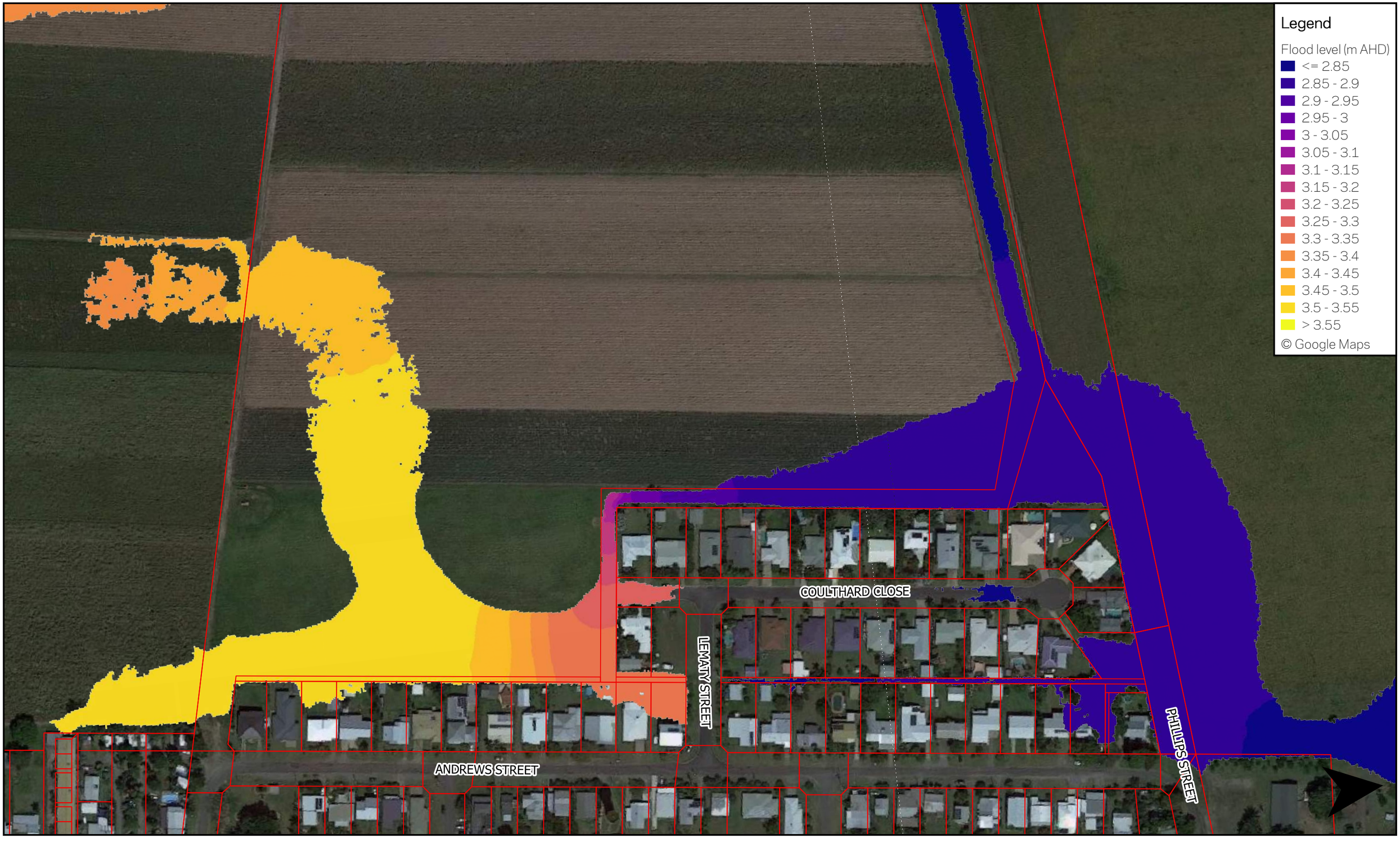
Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Existing - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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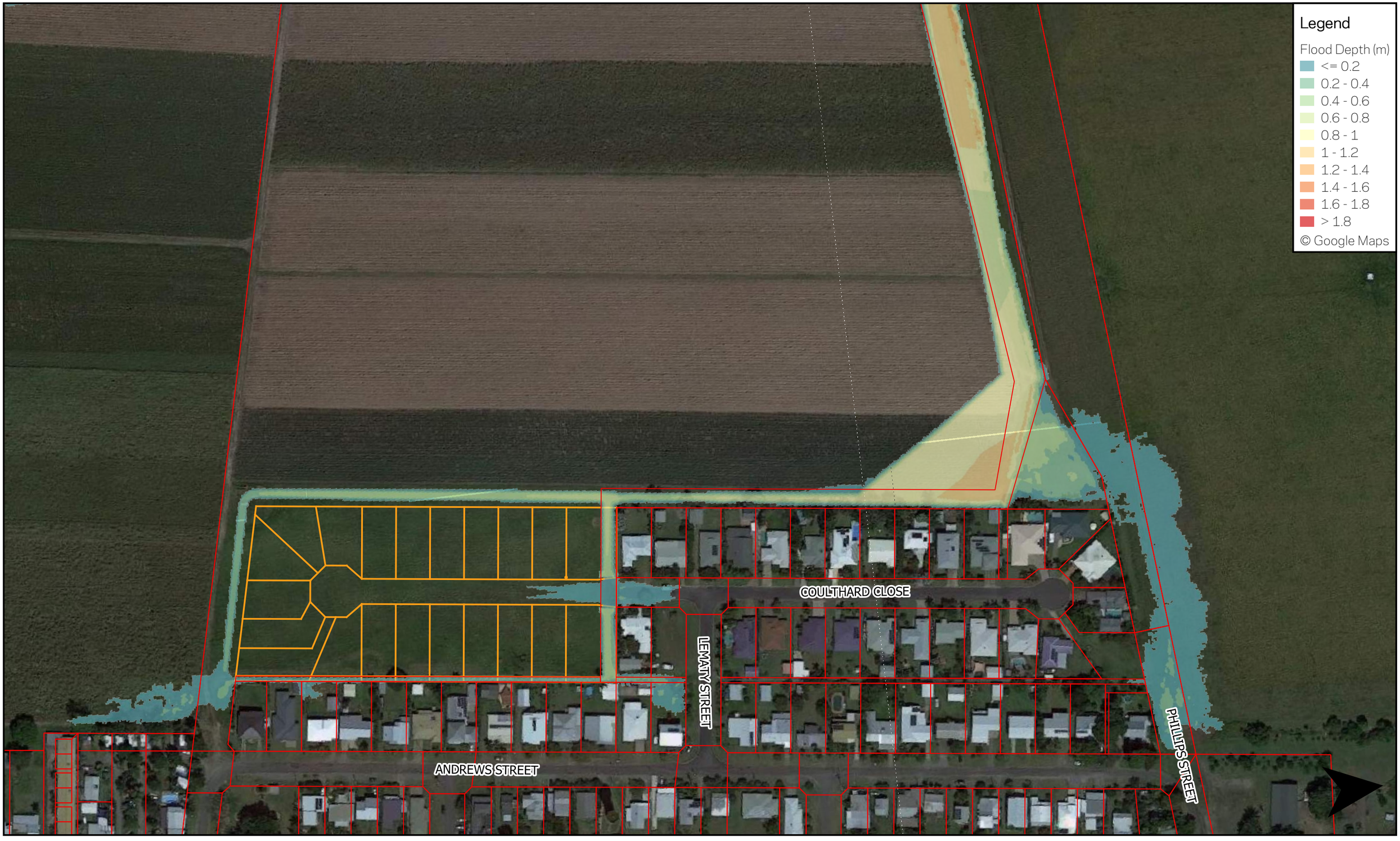
Scale 1:2,000 @ A3

APPENDIX G
DEVELOPED FLOOD DEPTH



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Developed - 20% AEP ('1 in 5-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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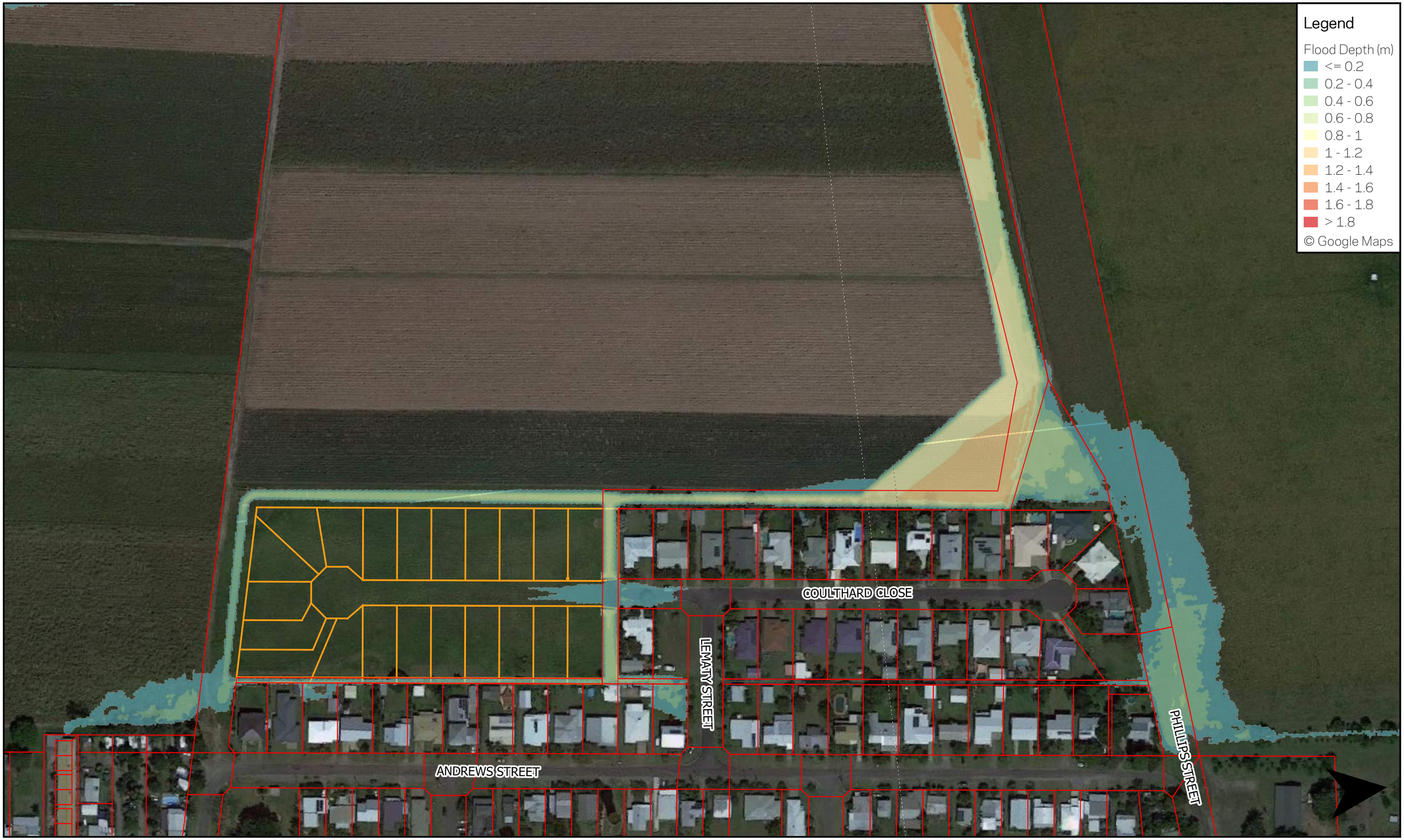
Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Developed - 10% AEP ('1 in 10-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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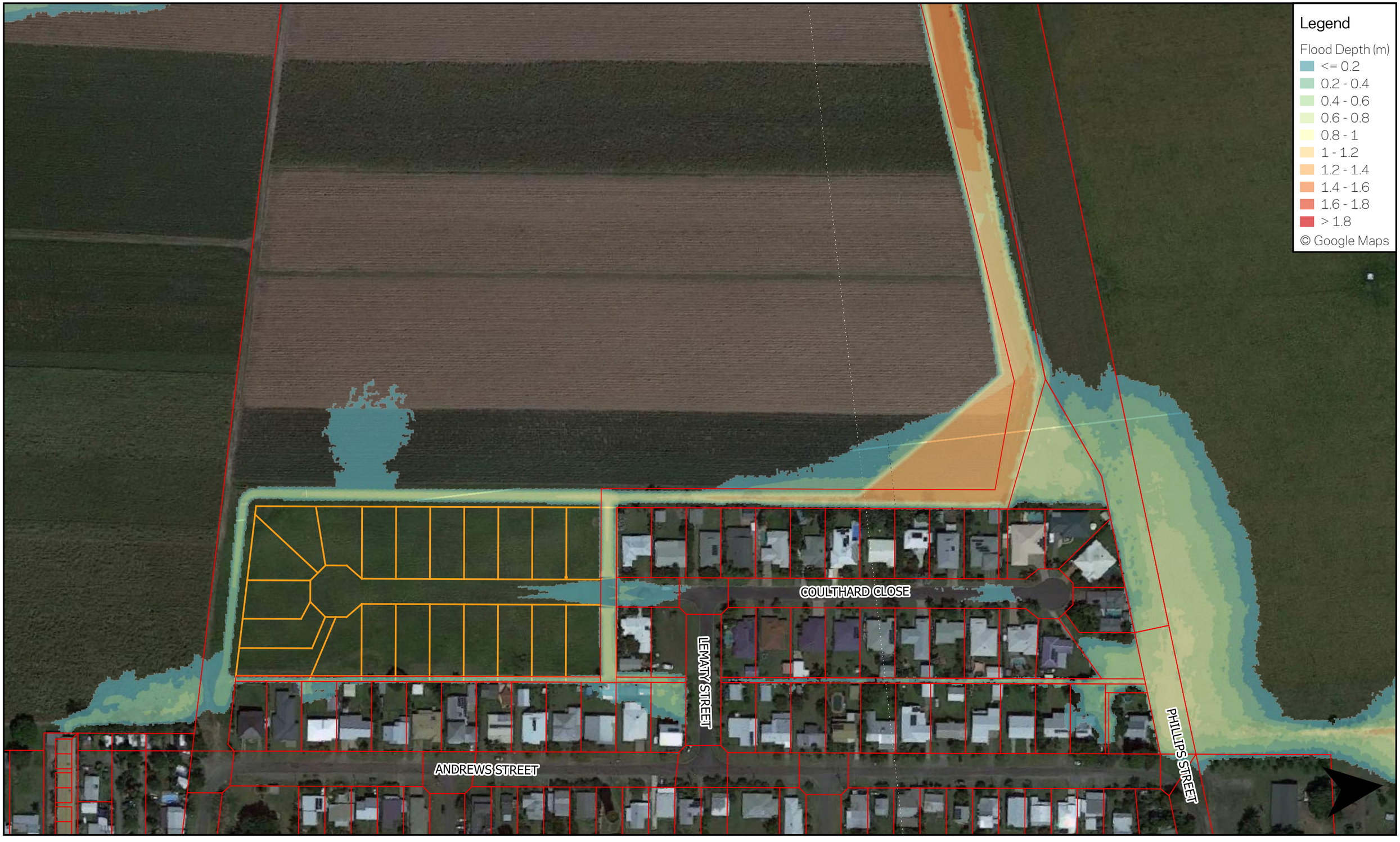
Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Developed - 1% AEP ('1 in 100-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX H
DEVELOPED FLOOD HAZARD

Legend

Hazard Categories
- H0 - No Hazard
- H1 - No restrictions
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for all people and all vehicles. Buildings require special engineering and construction.
- H6 - Not suitable for people, vehicles or buildings

COULTHARD CLOSE

LEMATY STREET

ANDREWS STREET

PHILLIPS STREET

0 50 100 150 200 m

Scale 1:2,000 @ A3

Title:
Hazard - Developed - 20% AEP ('1 in 5-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Legend

Hazard Categories

- H0 - No Hazard
- H1 - No restrictions
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for all people and all vehicles. Buildings require special engineering and construction.
- H6 - Not suitable for people, vehicles or buildings

COULTHARD CLOSE

LEMATY STREET

ANDREWS STREET

PHILLIPS STREET

0 50 100 150 200 m

Scale 1:2,000 @ A3

Title:

Hazard - Developed - 10% AEP ('1 in 10-year flood')

Project. Newell Beach Drainage Study

Job # 2021.0566

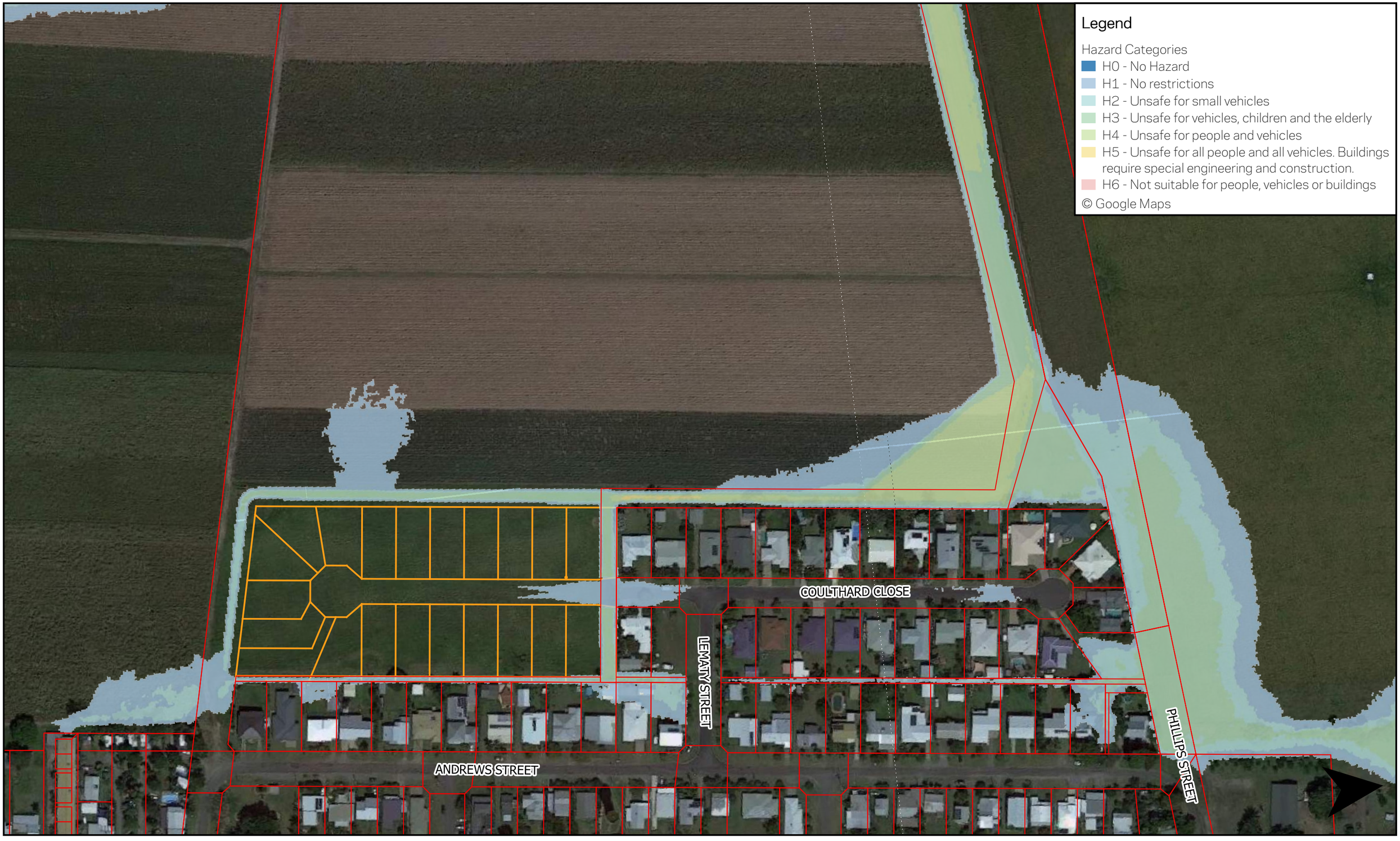
Engineer. Carlos Gambirazio

Date. 27/7/2022

Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Developed - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX I
DEVELOPED FLOOD LEVEL

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Developed - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

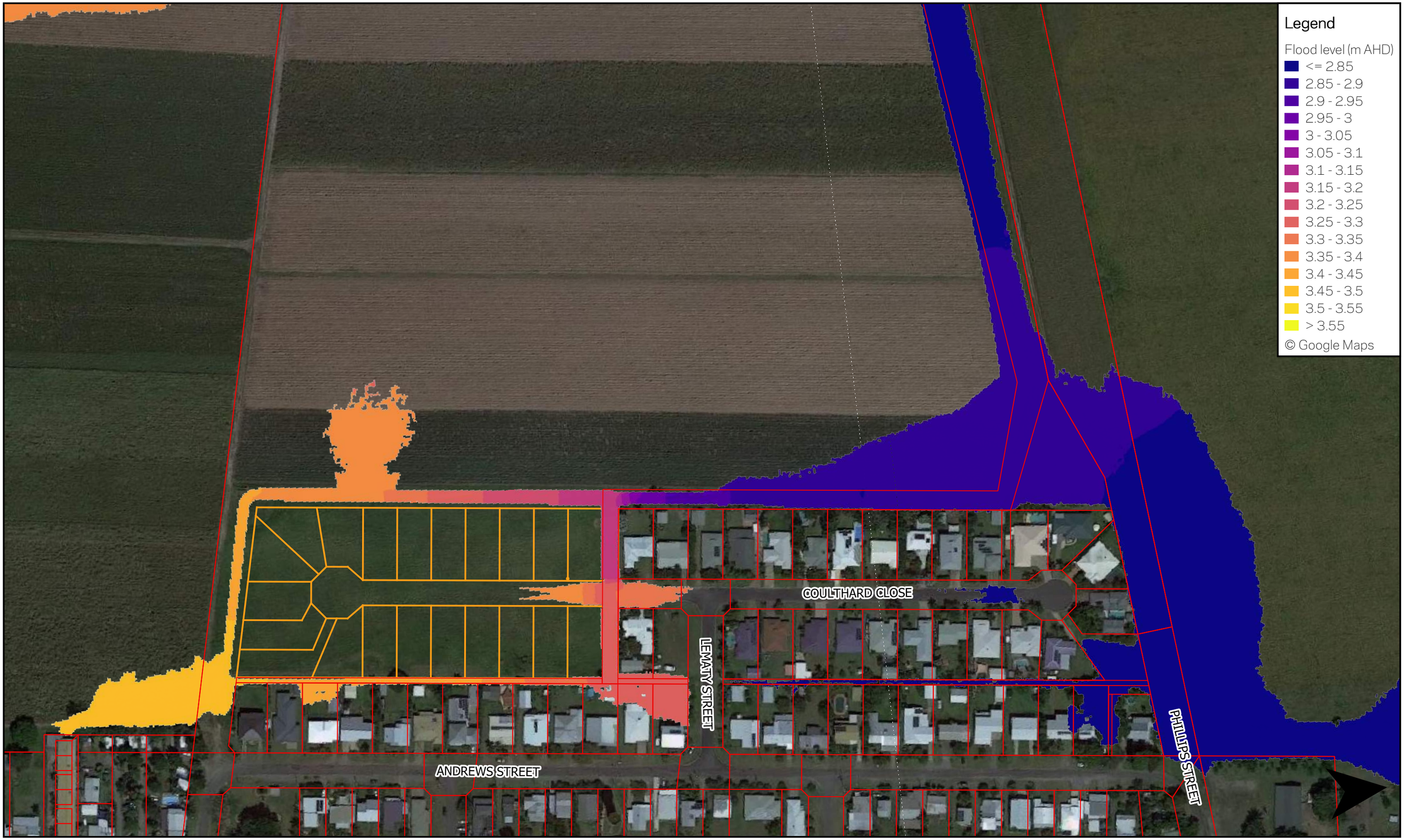
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Developed - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

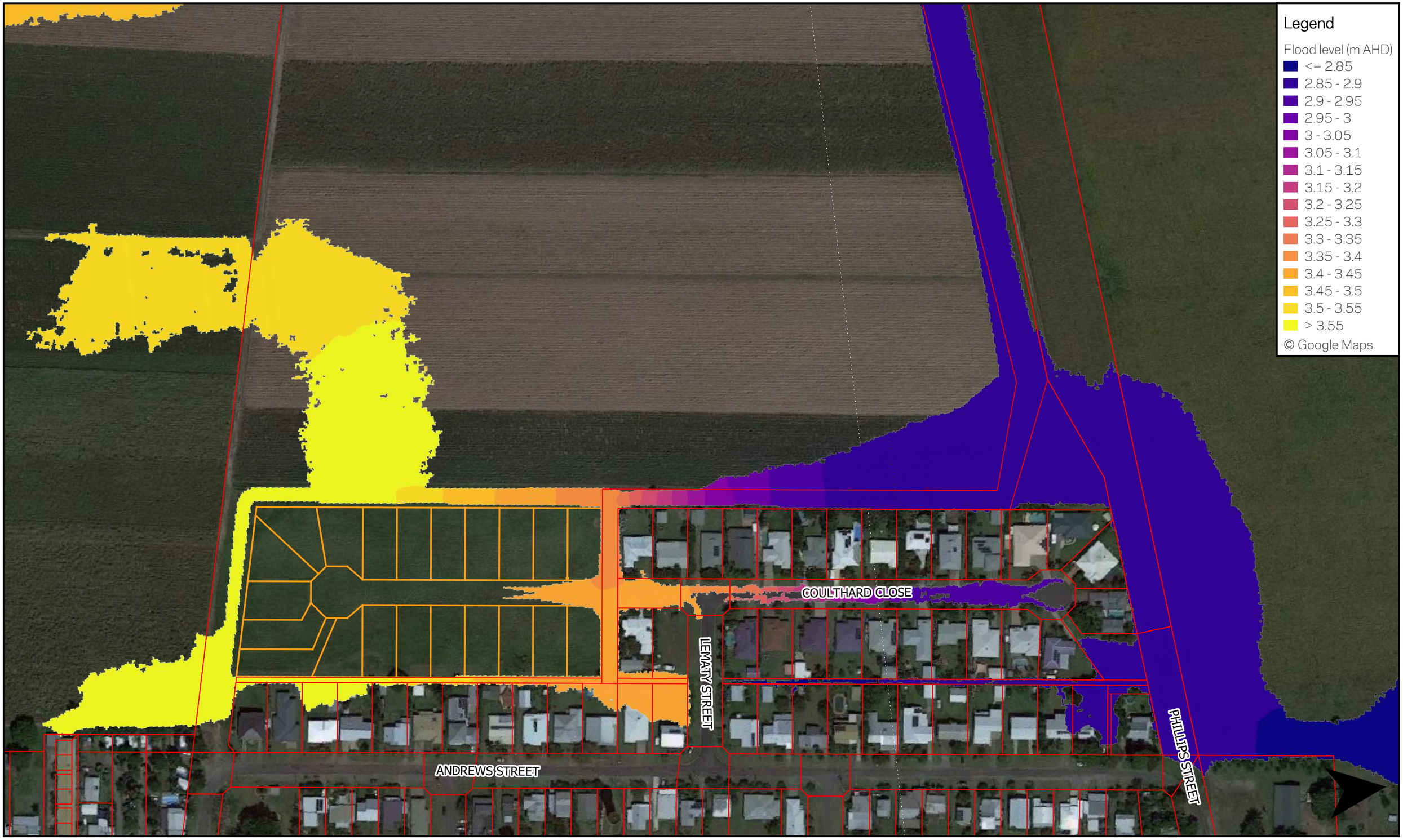
Title:
Level - Developed - 1% AEP ('1 in 100-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX J
DEVELOPED SENSITIVITY ANALYSIS FLOOD LEVEL



BLIGH TANNER

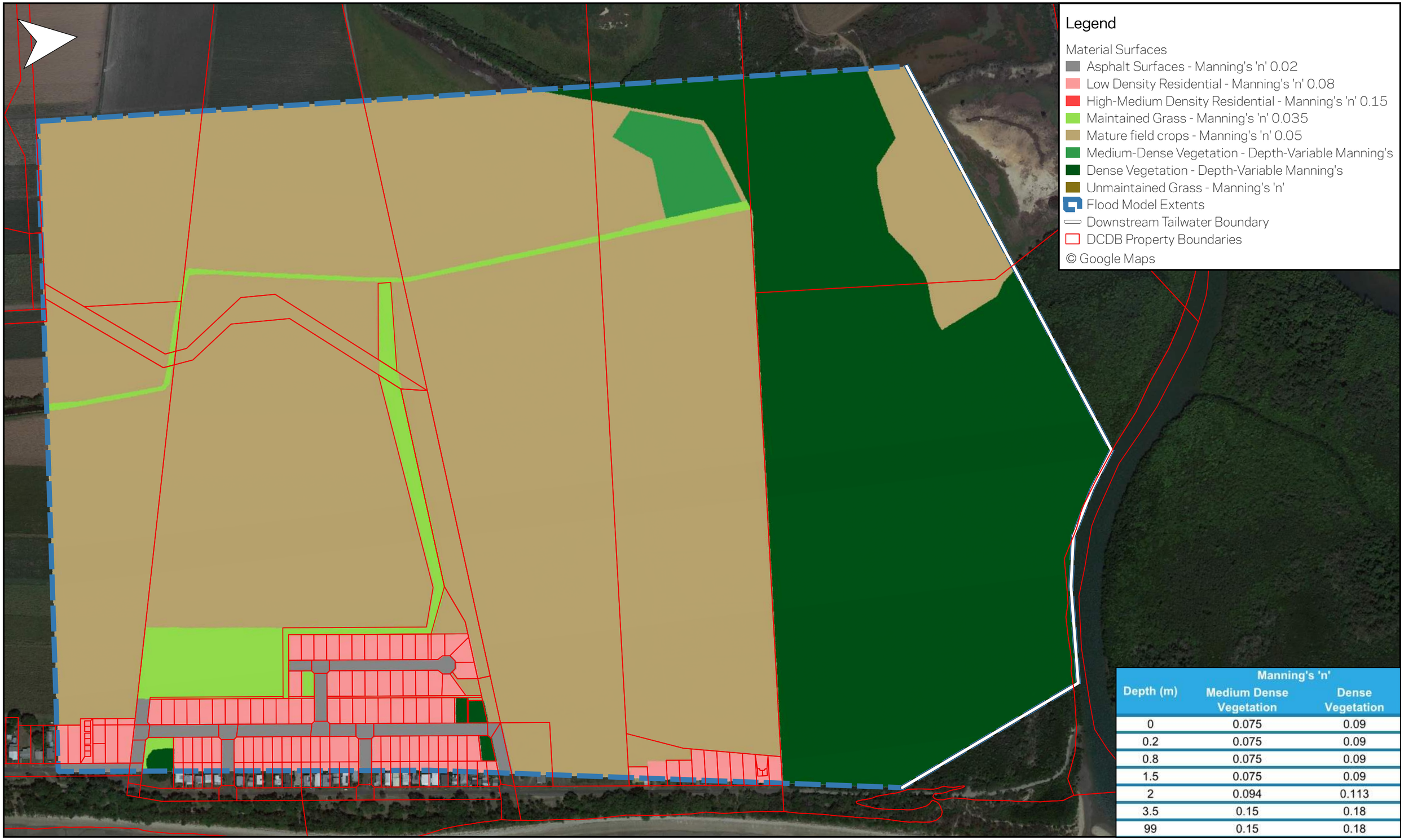
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Developed - Sensitivity Analysis - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX K
FLOOD MODELLING LAYOUTS



Depth (m)	Manning's 'n'	
	Medium Dense Vegetation	Dense Vegetation
0	0.075	0.09
0.2	0.075	0.09
0.8	0.075	0.09
1.5	0.075	0.09
2	0.094	0.113
3.5	0.15	0.18
99	0.15	0.18

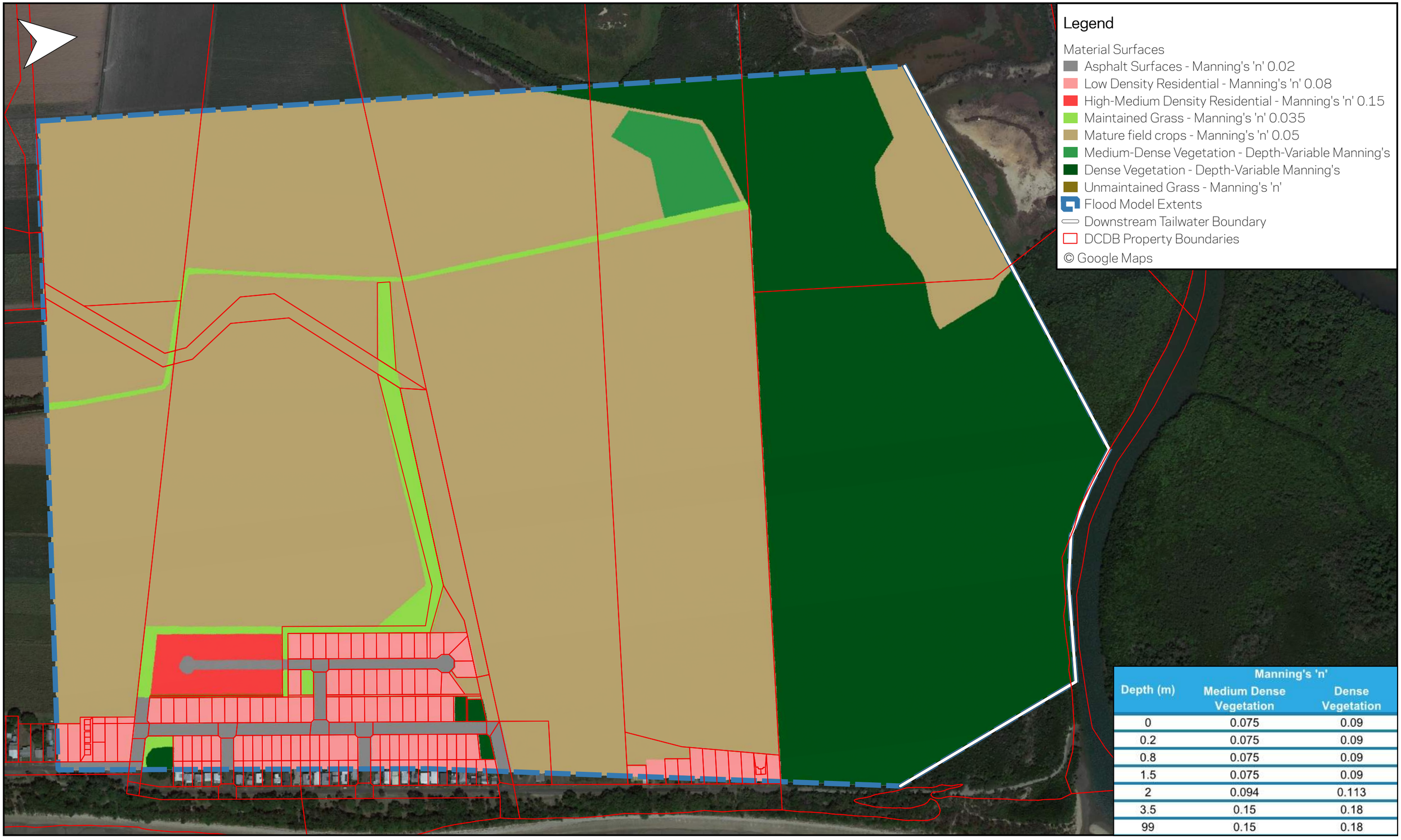
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Flood Modelling Layout - Existing Case Scenario
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 28/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 100 200 300 400 m

Scale 1:5,500 @ A3



Depth (m)	Manning's 'n'	
	Medium Dense Vegetation	Dense Vegetation
0	0.075	0.09
0.2	0.075	0.09
0.8	0.075	0.09
1.5	0.075	0.09
2	0.094	0.113
3.5	0.15	0.18
99	0.15	0.18

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Flood Modelling Layout - Developed Case Scenario

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 28/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 100 200 300 400 m

Scale 1:5,500 @ A3

APPENDIX L
RATIONAL METHOD

RATIONAL METHOD CALCULATOR

Project Name:	Newell Beach Drainage Study
Project Number	2021.0566
Date	1/02/2022

Instructions

INPUT	Manually Insert Information
CALCULATIONS/REFERENCE INFORMATION	sources or calculations for transparency of the worksheet operations. **DO NOT CHANGE.**
RESULTS	These cells contain results from relevant processes

Rainfall Information - Download and manually input mm/hr IFD information from BoM

		Average Rainfall Intensity (mm/hr)						
		Average Recurrence Interval (ARI) (years)						
Duration (min)	Duration (hr)	1	2	5	10	20	50	100
1	0.02	180	219	254	283	314	353	382
2	0.03	169	206	239	265	293	328	353
3	0.05	156	191	221	245	272	304	328
4	0.07	146	178	206	229	254	285	308
5	0.08	138	168	195	216	240	269	291
10	0.17	111	135	157	174	194	218	236
15	0.25	96.6	117	136	151	168	189	204
20	0.33	86.5	105	122	135	150	169	183
25	0.42	79	95.9	111	123	137	154	167
30	0.50	73	88.8	103	114	127	143	155
45	0.75	60.7	73.9	85.9	95.6	106	120	129
60	1.00	52.7	64.3	75.1	83.6	93.1	105	113
90	1.50	42.6	52.2	61.4	68.7	76.7	86.6	93.9
120	2.00	36.4	44.7	53	59.5	66.5	75.4	81.9
180	3.00	28.7	35.5	42.7	48.2	54.2	61.9	67.5
270	4.50	22.5	28	34.1	38.9	44	50.7	55.6
360	6.00	18.8	23.5	29	33.3	37.9	44	48.5
540	9.00	14.6	18.4	23.1	26.7	30.7	36	40.1
720	12.00	12.2	15.4	19.6	22.8	26.4	31.3	35.1
1080	18.00	9.52	12.1	15.6	18.3	21.3	25.6	29
1440	24.00	8	10.2	13.2	15.6	18.3	22.2	25.3
1800	30.00	7.01	8.94	11.7	13.8	16.2	19.8	22.7
2160	36.00	6.29	8.04	10.5	12.5	14.7	18	20.7
2880	48.00	5.33	6.81	8.93	10.6	12.5	15.4	17.9
4320	72.00	4.21	5.38	7.04	8.35	9.82	12.2	14.2
5760	96.00	3.55	4.53	5.89	6.96	8.15	10.1	11.8
7200	120.00	3.1	3.94	5.09	5.98	6.96	8.67	10.1
8640	144.00	2.76	3.5	4.48	5.24	6.06	7.54	8.8
10080	168.00	2.49	3.15	4	4.65	5.35	6.64	7.74

Catchment Information

Catchment Type:	Rural creek catchments	
Catchment Area	6.237	km2
Catchment Area	623.7	hectares

Time of Concentration

Standard Inlet Time	Urban residential areas, slope at top of catchment is up to 3%	
Standard Inlet Time	0	minutes
Overland Sheet Flow Time	Flat (0-1%) bushland or grassland	
Recommended maximum length	200	
Selected length (m)	28	
Surface Type	Concrete	
Surface Roughness	0.01	Horton's Roughness Coefficient (n)
Slope of surface	2.8	%
Overland Sheet Flow Time	0	minutes
Kerb and Channel Flow Time		
Length of Gutter Flow	45	metres
Slope of Gutter	0.5	%
Kerb and Channel Flow Time	0	minutes
Open Channel Flow Time		
Length of Reach	28.7	metres
Velocity from Flood Model	1.1	m/s
Open Channel Flow Time	0	minutes

Pipe Flow Time (assuming full)		
Material Type	Concrete	
Manning's Roughness 'n'	0.013	do not touch
Diameter	300	millimetres
Hydraulic Radius	0.075	metres
Slope	0.05	m/m
Velocity	3.059021238	m/s
Length of Reach	0	metres
Pipe Capacity (full)	0.21622947	m3/s
Pipe Flow Time	0	minutes
Creek Flow Time		
Length of flow path	5.424	kilometres
Catchment Area	623.7	hectares
Slope	3.15	%
Creek Flow Time	131.3977683	minutes
TOTAL TIME OF CONCENTRATION (MINUTES)	131.3977683	

Coefficient of Discharge (C10)

Intensity (10% AEP, 1 Hour)	Impervious Options	Associated C10
83.6	0	0.66
	0.2	0.74
	0.4	0.78
	0.6	0.82
	0.8	0.86
	0.9	0.88
	1	0.9

Stage	Impervious	C10
Existing	0	0.66
Proposed	0.5	0.8

Table 4.5.3 – Table of C_{10} values

Intensity (mm/hr) I_{1hr}	Fraction Impervious f_i						
	0.00	0.20	0.40	0.60	0.80	0.90	1.00
39-44	Refer to Table 4.5.4	0.44	0.55	0.67	0.78	0.84	0.90
45-49		0.49	0.60	0.70	0.80	0.85	0.90
50-54		0.55	0.64	0.72	0.81	0.86	0.90
55-59		0.60	0.68	0.75	0.83	0.86	0.90
60-64		0.65	0.72	0.78	0.84	0.87	0.90
65-69		0.71	0.76	0.80	0.85	0.88	0.90
70-90		0.74	0.78	0.82	0.86	0.88	0.90

Refer to notes on previous page.

Table 4.5.4 – C_{10} values for zero fraction impervious [1]

Land description	Below bushland			Medium density bush, or Good grass cover, or High density pasture, or Zone village cropping			Light cover bushland, or Poor grass cover, or Low density pasture, or Low cover from fallows		
Intensity (mm/hr) I_{1hr}	Soil permeability			Soil permeability			Soil permeability		
	High	Med	Low	High	Med	Low	High	Med	Low
39–44	0.08	0.24	0.32	0.16	0.32	0.40	0.24	0.40	0.48
45–49	0.10	0.29	0.39	0.20	0.39	0.49	0.29	0.49	0.59
50–54	0.12	0.35	0.46	0.23	0.46	0.58	0.35	0.58	0.69
55–59	0.13	0.40	0.53	0.27	0.53	0.68	0.40	0.66	0.79
60–64	0.15	0.44	0.59	0.30	0.59	0.70	0.44	0.70	0.70
65–69	0.17	0.50	0.66	0.33	0.66	0.70	0.50	0.70	0.70
70–90	0.18	0.53	0.70	0.35	0.70	0.70	0.53	0.70	0.70

[1] Developed from Department of Natural Resources and Mines (2004); see Background Notes for further discussion. These coefficients are not suitable for soils compacted by construction activities.

RATIONAL METHOD CALCULATION

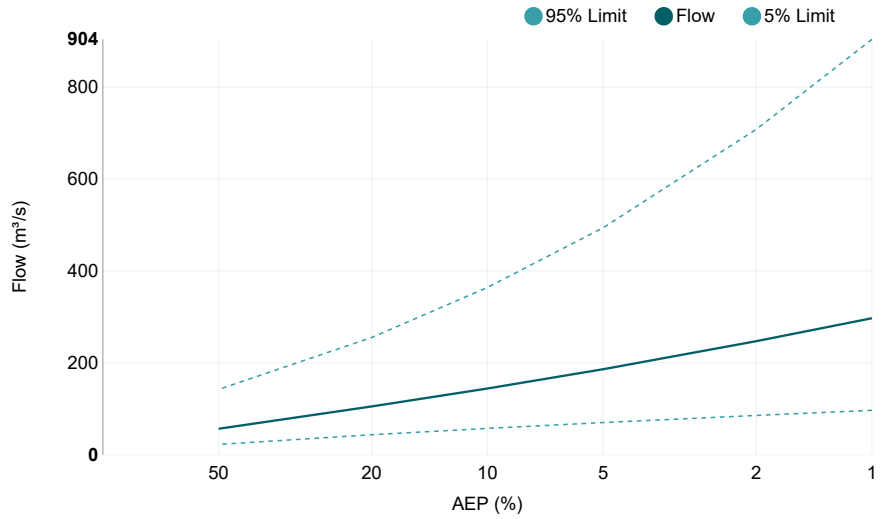
Catchment Area	623.7
Fraction Impervious	0
Coefficient of Discharge (C10)	0.66
Q1 - C1 - 63.2% AEP	0.528
Q2 - C2 - 39.3% AEP	0.561
Q5 - C5 - 20% AEP	0.627
Q10 - C10 - 10% AEP	0.66
Q20 - C20 - 5% AEP	0.693
Q50 - C50 - 2% AEP	0.759
Q100 - C100 - 1% AEP	0.792

Peak Flow (Qy) (m^3/s)	
1 EY (1-year ARI)	31.9592321
0.5 EY (2-year ARI)	41.74677732
0.2 EY (5-year ARI)	55.44727859
10% AEP (10-year ARI)	65.58076844
5% AEP (20-year ARI)	77.03609074
2% AEP (50-year ARI)	95.77631814
1% AEP (100-year ARI)	108.6248259

Average Rainfall Intensity (I)	Duration (min) - Change duration values so that the range covers the time of concentration. E.g. Tc = 20, durations = 15 and 30.		Tc (min)
	120	180	131.40
1	36.4	28.7	34.9372864
2	44.7	35.5	42.95234219
5	53	42.7	51.0433831
10	59.5	48.2	57.35342029
20	66.5	54.2	64.16345749
50	75.4	61.9	72.83550212
100	81.9	67.5	79.1645356

APPENDIX M
RFFE ESTIMATION MODEL

Results | Regional Flood Frequency Estimation Model



AEP (%)	Discharge (m^3/s)	Lower Confidence Limit (5%) (m^3/s)	Upper Confidence Limit (95%) (m^3/s)
50	56.4	22.3	142
20	105	43.4	255
10	144	57.2	364
5	186	69.9	494
2	247	85.4	708
1	297	96.6	904

Statistics

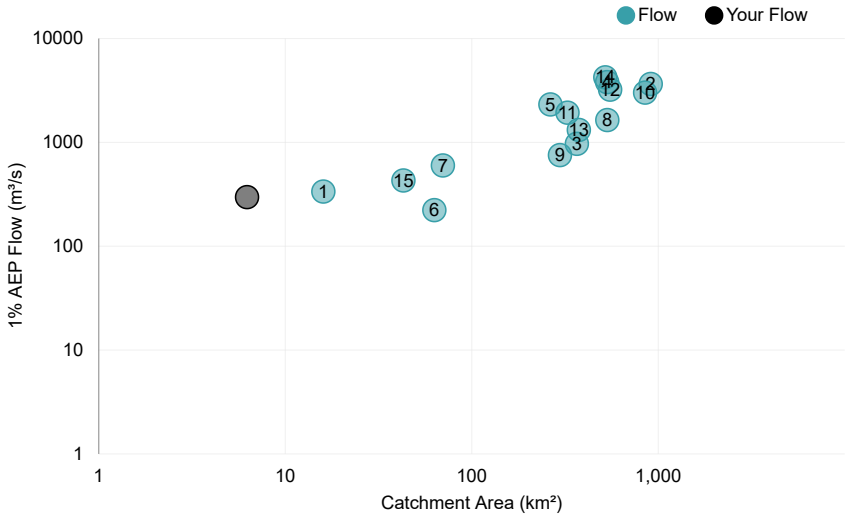
Variable	Value	Standard Dev
Mean	3.707	0.544
Standard Dev	0.743	0.293
Skew	-0.126	0.084

Note: These statistics come from the nearest gauged catchment. Details.

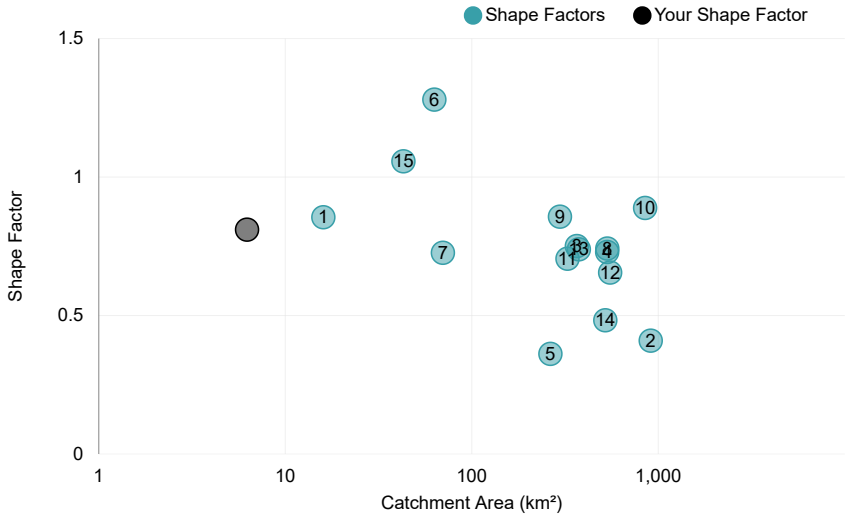
Correlation		
1.000		
-0.330	1.000	
0.170	-0.280	1.000

Note: These statistics are common to each region. Details.

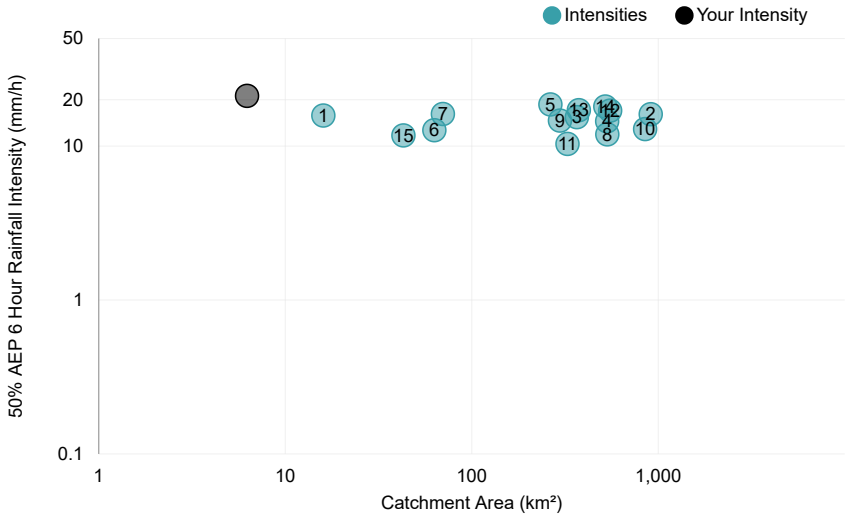
1% AEP Flow vs Catchment Area



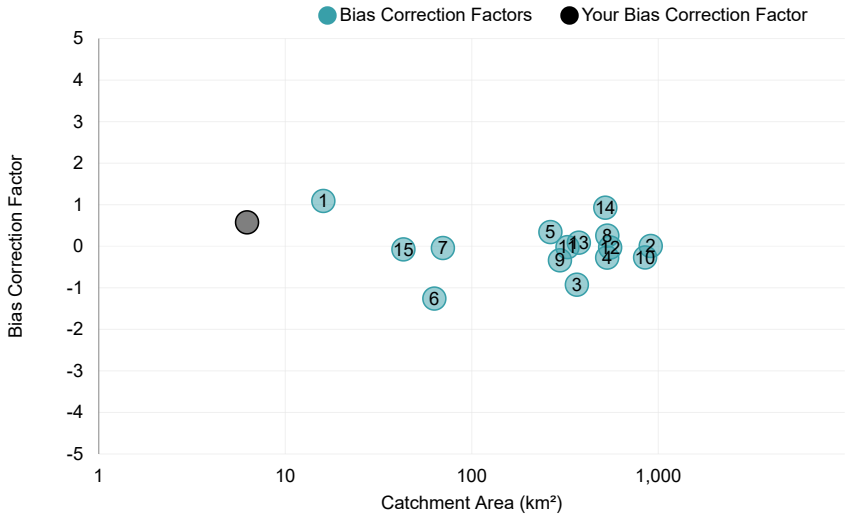
Shape Factor vs Catchment Area



Intensity vs Catchment Area



Bias Correction Factor vs Catchment Area



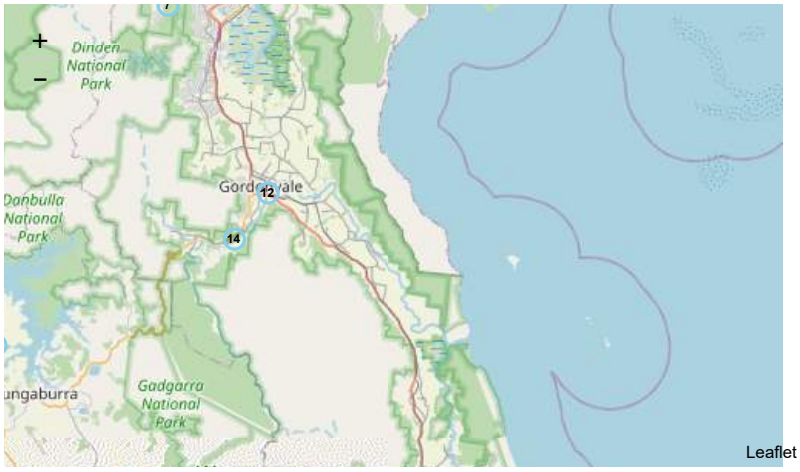
Download

TXT Nearby JSON

Input Data

Input Data

Date/Time	2022-02-01 16:41
Catchment Name	Catchment1
Latitude (Outlet)	-16.41165
Longitude (Outlet)	145.40545
Latitude (Centroid)	-16.42258
Longitude (Centroid)	145.39041
Catchment Area (km^2)	6.237
Distance to Nearest Gauged Catchment (km)	7.66
50% AEP 6 Hour Rainfall Intensity (mm/h)	21.203716
2% AEP 6 Hour Rainfall Intensity (mm/h)	43.872875
Rainfall Intensity Source (User/Auto)	Auto
Region	East Coast
Region Version	RFFE Model 2016 v1
Region Source (User/Auto)	Auto
Shape Factor	0.81
Interpolation Method	Natural Neighbour
Bias Correction Value	0.576



Method by Dr Ataur Rahman and Dr Khaled Haddad from Western Sydney University for the Australian Rainfall and Runoff Project. Full description of the project can be found at the project page (http://arr.ga.gov.au/revision-projects/project-list/projects/project-5) on the ARR website. Send any questions regarding the method or project here (mailto:admin@arr-software.org).

ENGINEERS AUSTRALIA (http://www.engineersaustralia.org.au)

APPENDIX N
STORM TIDE INUNDATION REPORT

Storm Tide Inundation Property Report

The following report has been automatically generated to provide a general indication of development related information applying to the nominated land parcel.

For more information refer to the JB Pacific Storm Tide Inundation Methodology Study This report is not intended to replace the need for carrying out a detailed assessment of Council and State controls or the need to seek your own professional advice on any town planning instrument, local law or other controls that may impact on the existing or intended use of the premise mentioned in this report. For further information please contact Council by phone: 07 4099 9444 or 1800 026 318 or email enquiries@douglas.qld.gov.au.

A separate Council Planning Scheme Property Report tool is available for information relating to Council's 2018 Planning Scheme.

Visit Council's website to apply for an official property search or certificate, or contact the Department of Natural Resources, Mines and Energy to undertake a title search to ascertain how easements may affect land.

JB Pacific Storm Tide Inundation Methodology Study

The purpose of the Douglas Shire Storm Tide Inundation Methodologies Study was to review and analyse different methodologies, identify a best practise model for the Shire's coastal urban areas, run this preferred best practise model and calculate the minimum heights for the 1% AEP (Annual Exceedance Probability) storm tide inundation for the year 2100 having regard to a 0.8m sea level rise for urban coastal properties.

Excerpt from the JB Pacific Storm Tide Inundation Methodology Report -

Storm Tide Inundation

The Douglas Shire coastline experiences a range of hydrodynamic, waves, and morphologic processes that are linked through dependant and independent variables. This includes the underlying astronomical tide, the passage of local storms and cyclones, the interaction of storm surges along the open coastline, the local wave climate, any sheltering provided by nearshore reefs, and the role of nearshore and dune vegetation. A range of these coastal processes are shown in Figure 2-1.

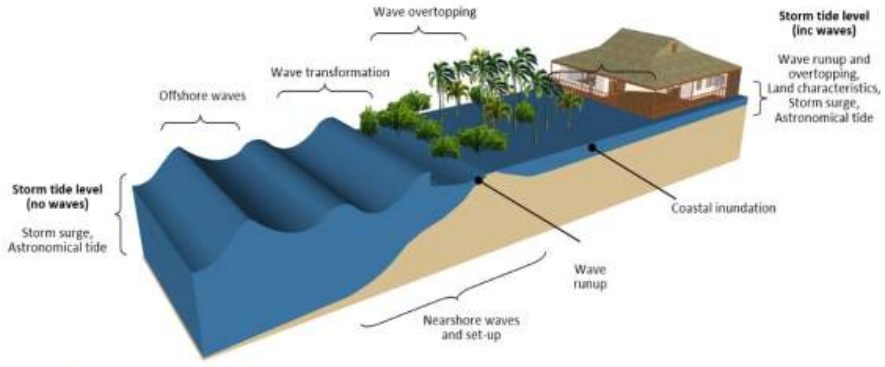


Figure 2-1: Drivers of coastal risk

Importantly storm tide inundation can be from the overtopping at the foreshore as well as wave runup through estuaries and inundate from "behind" a locality. Check out the animation of this activity through the local estuaries in the animation on Council's website.

Future Year 2100 Projected Levels

On 2 July 2017 the Planning Act 2016 came into effect as part of the Queensland Government's commitment to delivering planning reform across the State and the State Planning Policies reinstating the need to consider the 1% AEP (Average Exceedance Probability) Storm Tide Inundation level for the year 2100 with a 0.8m sea level rise. The 1% AEP is referred to as the one in one hundred year event. The 1%AEP is the minimum we need to consider and plan for.

Freeboard

There are numerous variants that can affect the modelled levels. To account for the differences in these variants a "freeboard" is applied. For the JB Pacific Storm Tide Inundation Methodology Study these differences have been considered within a nominal 0.5m freeboard level. Minimum levels for habitable rooms need to consider the Finished Floor Level (FFL) being the 1%AEP level plus the 0.5m freeboard. This value is a measurement at AHD (Australian Height Datum).

AHD Levels

A Licensed Surveyor should be engaged to determine the accurate AHD for a property. Contours and levels identified through Queensland Globe are estimated from LIDAR calculations and may not be 100% accurate.

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

Property Information

Property Address	2 Andrews Street NEWELL
Lot Plan	51SP168537 (Freehold - 379270m^2)

Selected Property | Easements | Land Parcels

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

Storm Tide Inundation Property Information

The information below provides details of the projected Future Year 2100 Storm Tide Inundation Level that considers a Sea Level Rise of 0.8m AHD

Selected Property

Affected by the 1 % AEP Event for the year 2100

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

JBPacific summary Information

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

Storm Tide Range Detailed

Selected Property

StormTide Levels Detailed

Below 0.33000 | 2.16968 | 2.32640 | 2.47331 | 2.76642 | 2.91969 | 3.18777 and above

The Level for Construction – for Storm Tide Inundation Considerations

The lot is affected by storm tide inundation for the Year 2100, 1 in 100 (1% AEP) event. The 1% AEP for the year 2100 (including a Sea Level Rise of 0.8m) is at **2.809** (without freeboard).The Freeboard for the Study is 0.5m and is applied to determine Finished Floor Level for habitable rooms.

Finished Floor Level

The total required Finished Floor Level for habitable rooms is 3.309 m AHD

Note - Finished floor level is usually 225mm above the pad level.

Disclaimer

The maps show the estimated areas of inundation for the 1% AEP projected for the year 2100 having regard to a sea level rise of 0.8m. The report nominates required minimum habitable room minimum finished floor level. This minimum level is determined from the best data to date held by Council. This storm tide inundation flood level, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating flood levels. Storm tide Inundation analysis is based on comprehensive computer modelling calibrated against actual storm tides. The website provides locations, street names, aerial photography and available storm tide inundation data for the Shire areas that were included in the JB Pacific Storm Tide Inundation Methodologies Study. This property reporting tool is not a substitute for a detailed Coastal Engineering analysis of a property and should not be relied upon where the reliance may result in loss, damage or injury. While every effort is taken to ensure the information in this report is accurate and up to date, Douglas Shire Council makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs that may occur as a result of the report being inaccurate or incomplete in any way or for any reason.

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BLIGH TANNER

Reasons for Decision

1. Sections 60, 62 and 63 of the *Planning Act 2016*:

    a. to ensure the development satisfies the benchmarks of the 2018 Douglas Shire Planning Scheme Version 1.0; and

    b. to ensure compliance with the *Planning Act 2016*.

2. Findings on material questions of fact:

    a. the development application was properly lodged to the Douglas Shire Council on 3 June 2021 under section 51 of the *Planning Act 2016* and Part 1 of the *Development Assessment Rules*;

    b. the development application contained information from the applicant which Council reviewed together with Council's own assessment against the 2017 State Planning Policy and the 2018 Douglas Shire Planning Scheme Version 1.0 in making its assessment manager decision.

3. Evidence or other material on which findings were based:

    a. the development triggered assessable development under the Assessment Table associated with the Low density residential zone code;

    b. Council undertook an assessment in accordance with the provisions of sections 60, 62 and 63 of the *Planning Act 2016*; and

    c. the applicant's reasons have been considered and the following findings are made:

        i. The proposed development is consistent with the established pattern of development in Coulthard Close despite not complying with the minimum lot size for unsewered land in the Low density residential zone;

        ii. Conditions of approval require Lots 8-13 to be reconfigured into 4 allotments to increase the utility of the residential allotments and to meet the assessment benchmarks of the Low density residential zone with respect to minimum road frontage requirements and the ROL code with respect to number of allotments accessed via a cul-de-sac.

4. Compliance with Assessment Benchmarks.

    The development complies with the benchmarks as per the summary provided in Reasons For Decision in particular Item 3c.

Extracts from the Planning Act 2016 - Making Representations During Applicant's Appeal Period

Division 2 Changing development approvals

Subdivision 1 Changes during appeal period

74 What this subdivision is about

(1) This subdivision is about changing a development approval before the applicant's appeal period for the approval ends.

(2) This subdivision also applies to an approval of a change application, other than a change application for a minor change to a development approval.

(3) For subsection (2), sections 75 and 76 apply—

(a) as if a reference in section 75 to a development approval were a reference to an approval of a change application; and

(b) as if a reference in the sections to the assessment manager were a reference to the responsible entity; and

(c) as if a reference in section 76 to a development application were a reference to a change application; and

(d) as if the reference in section 76(3)(b) to section 63(2) and (3) were a reference to section 83(4); and

(e) with any other necessary changes.

75 Making change representations

(1) The applicant may make representations (***change representations***) to the assessment manager, during the applicant's appeal period for the development approval, about changing—

(a) a matter in the development approval, other than—

(i) a matter stated because of a referral agency's response; or

(ii) a development condition imposed under a direction made by the Minister under chapter 3, part 6, division 2; or

(b) if the development approval is a deemed approval—the standard conditions taken to be included in the deemed approval under section 64(8)(c).

(2) If the applicant needs more time to make the change representations, the applicant may, during the applicant's appeal period for the approval, suspend the appeal period by a notice given to the assessment manager.

(3) Only 1 notice may be given.

(4) If a notice is given, the appeal period is suspended—

(a) if the change representations are not made within a period of 20 business days after the notice is given to the assessment manager—until the end of that period; or

(b) if the change representations are made within 20 business days after the notice is given to the assessment manager, until—

(i) the applicant withdraws the notice, by giving another notice to the assessment manager; or

(ii) the applicant receives notice that the assessment manager does not agree with the change representations; or

(iii) the end of 20 business days after the change representations are made, or a longer period agreed in writing between the applicant and the assessment manager.

(5) However, if the assessment manager gives the applicant a negotiated decision notice, the appeal period starts again on the day after the negotiated decision notice is given.

76 Deciding change representations

(1) The assessment manager must assess the change representations against and having regard to the matters that

must be considered when assessing a development application, to the extent those matters are relevant.

(2) The assessment manager must, within 5 business days after deciding the change representations, give a decision notice to—

(a) the applicant; and

(b) if the assessment manager agrees with any of the change representations—

(i) each principal submitter; and

(ii) each referral agency; and

(iii) if the assessment manager is not a local government and the development is in a local government area—the relevant local government; and

(iv) if the assessment manager is a chosen assessment manager—the prescribed assessment manager; and

(v) another person prescribed by regulation.

(3) A decision notice (a ***negotiated decision notice***) that states the assessment manager agrees with a change representation must—

(a) state the nature of the change agreed to; and

(b) comply with section 63(2) and (3).

(4) A negotiated decision notice replaces the decision notice for the development application.

(5) Only 1 negotiated decision notice may be given.

(6) If a negotiated decision notice is given to an applicant, a local government may give a replacement infrastructure charges notice to the applicant.

Extracts from the Planning Act 2016 – Appeal Rights

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

(1) Schedule 1 states—

(a) matters that may be appealed to—

(i) either a tribunal or the P&E Court; or

(ii) only a tribunal; or

(iii) only the P&E Court; and

(b) the person—

(i) who may appeal a matter (the ***appellant***); and

(ii) who is a respondent in an appeal of the matter; and

(iii) who is a co-respondent in an appeal of the matter; and

(iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

(3) The ***appeal period*** is—

(a) for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or

(b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or

(c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or

(d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or

(e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or

(f) for an appeal relating to the *Plumbing and Drainage Act 2018*—

(i) for an appeal against an enforcement notice given because of a belief mentioned in the *Plumbing and Drainage Act 2018*, section 143(2)(a)(i), (b) or (c)—5 business days after the day the notice is given; or

(ii) for an appeal against a decision of a local government or an inspector to give an action notice under the *Plumbing and Drainage Act 2018*—5 business days after the notice is given; or

(iii) for an appeal against a failure to make a decision about an application or other matter under the *Plumbing and Drainage Act 2018*—at anytime after the period within which the application or matter was required to be decided ends; or

(iv) otherwise—20 business days after the day the notice is given; or

(g) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note—

See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

(5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.

(6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—

(a) the adopted charge itself; or

(b) for a decision about an offset or refund—

(i) the establishment cost of trunk infrastructure identified in a LGIP; or

(ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

(1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—

(a) is in the approved form; and

(b) succinctly states the grounds of the appeal.

(2) The notice of appeal must be accompanied by the required fee.

(3) The appellant or, for an appeal to a tribunal, the registrar, must, within the service period, give a copy of the notice of appeal to—

(a) the respondent for the appeal; and

(b) each co-respondent for the appeal; and

(c) for an appeal about a development application under schedule 1, section 1, table 1, item 1—each principal submitter for the application whose submission has not been withdrawn; and

(d) for an appeal about a change application under schedule 1, section 1, table 1, item 2—each principal submitter for the application whose submission has not been withdrawn; and

(e) each person who may elect to be a co-respondent for the appeal other than an eligible submitter for a development application or change application the subject of the appeal; and

(f) for an appeal to the P&E Court—the chief executive; and

(g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.

(4) The ***service period*** is—

(a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or

(b) otherwise—10 business days after the appeal is started.

(5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).

(6) A person elects to be a co-respondent to an appeal by filing a notice of election in the approved form—

(a) if a copy of the notice of appeal is given to the person—within 10 business days after the copy is given to the person; or

(b) otherwise—within 15 business days after the notice of appeal is lodged with the registrar of the tribunal or the P&E Court.

(7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Non-appealable decisions and matters

(1) Subject to this chapter, section 316(2), schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

(2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.

(3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

(4) In this section—

decision includes—

(a) conduct engaged in for the purpose of making a decision; and

(b) other conduct that relates to the making of a decision; and

(c) the making of a decision or the failure to make a decision; and

(d) a purported decision; and

(e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—

(a) is final and conclusive; and

(b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the *Judicial Review Act 1991* or otherwise, whether by the Supreme Court, another court, any tribunal or another entity; and

(c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, any tribunal or another entity on any ground.

232 Rules of the P&E Court

(1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.

(2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

DOUGLAS SHIRE COUNCIL

2018 Douglas Shire Planning Scheme version 1.0 Applications

ADOPTED INFRASTRUCTURE CHARGES NOTICE

F.R. Coulthard & C.B. Coulthard.		**0**	**0**
DEVELOPERS NAME		ESTATE NAME	STAGE
2 Andrews Street	**Newell Beach**	**Lot 51 on SP168537**	**11485**
STREET No. & NAME	**SUBURB**	LOT & RP No.s	PARCEL No.
ROL (1 lot into 22 lots)		**2021-4160**	**4**
DEVELOPMENT TYPE		COUNCIL FILE NO.	VALIDITY PERIOD (year)
1108522	**1**	**Payment before commencement of use for MCU; and Prior to signing and sealing of survey form for ROL**	
DSC Reference Doc . No.	VERSION No.		

Infrastructure Charges as resolved by Council at the Ordinary Meeting held on 23 February 2021 (Came into effect on 1 March 2021)

		Charge per Use	$ Rate	Floor area/No.	Amount	Amount Paid	Receipt Code & GL Code
Proposed Demand							
Residential	Dwelling_house	$_per_3_or_more_bedroom_dwelling	15,959.97	22	$351,119.34		
	Total Demand				**$351,119.34**		
Credit							
Existing land use							
3 or more bedroom dwelling	1 lot	$_per_3_or_more_bedroom_dwelling	15,959.97	1	$15,959.97		
	Total Credit				**$15,959.97**		**Code 895 GL GL7500.135.825**
	Required Payment or Credit		**TOTAL**		**$335,159.37**		

Prepared by	**Rebecca Taranto**	**9 Spetember 2022**	**Amount Paid**		
Checked by	**Neil Beck**	**9-Sep-22**	**Date Paid**		
Date Payable	**ROL - Before the Local Government approves the plan of subdivision**		**Receipt No.**		
Amendments		**Date**	**Cashier**		

Note:

The Infrastructure Charges in this Notice are payable in accordance with Sections 119 and 120 of the *Planning Act 2016* *as from Council's resolution from the Ordinary Meeting held on 23 February 2021.*

Charge rates under the Policy are subject to indexing.
Any Infrastructure Agreement for trunk works must be determined and agreed to prior to issue of Development Permit for Operational Work.

Charges are payable to: Douglas Shire Council. You can make payment at any of Council's Business Offices or by mail with your cheque or money order to Douglas Shire Council, PO Box 723, Mossman QLD 4873. Cheques must be made payable to Douglas Shire Council and marked 'Not Negotiable.' Acceptance of a cheque is subject to collection of the proceeds. Post dated cheques will not be accepted

Any enquiries regarding Infrastructure Charges can be directed to the Development & Environment, Douglas Shire Council on 07 4099 9444 or by email on enquiries@douglas.qld.gov.au

DOUGLAS SHIRE COUNCIL

PO Box 723 Mossman Qld 4873
www.douglas.qld.gov.au
enquiries@douglas.qld.gov.au
ABN 71 241 237 800

Administration Office
64 - 66 Front St Mossman
P 07 4099 9444
F 07 4098 2902

27 September 2022

Enquiries: Neil Beck
Our Ref: ROL 2021_4160 (Doc ID 1110764)
Your Ref: 34678-001-01

F R Coulthard & C B Coulthard
C/- Brazier Motti Pty Ltd
PO Box 1185
CAIRNS QLD 4870

Email: cns.planning@braziermotti.com.au

Attention Mr Michael Tessaro

Dear Sir

Adopted Infrastructure Charge Notice
For Development Application Reconfiguring a Lot (1 lot into 22 lots)
At 2 Andrews Street Newell
On Land Described as Lot 51 on SP168537

Please find attached the Adopted Infrastructure Charges Notice issued in accordance with section 119 of the *Planning Act 2016.*

The amount in the Adopted Infrastructure Charges Notice has been calculated according to Council's Adopted Infrastructure Charges Resolution.

Please also find attached extracts from the Act regarding the following:

- your right to make representations to Council about the Adopted Infrastructure Charges Notice; and
- your Appeal rights with respect to the Adopted Infrastructure Charges Notice.

Please quote Council's application number: MCUC 2021_4160 in all subsequent correspondence relating to this matter.

Should you require any clarification regarding this, please contact Neil Beck on telephone 07 4099 9444.

Yours faithfully

Paul Hoye
Manager Environment & Planning

encl.

- Adopted Infrastructure Charges Notice
- Rights to Make Representations and Appeals Regarding Infrastructure Charges

Adopted Infrastructure Charges Notice

DOUGLAS SHIRE COUNCIL

2018 Douglas Shire Planning Scheme version 1.0 Applications

ADOPTED INFRASTRUCTURE CHARGES NOTICE

F.R. Coulthard & C.B. Coulthard.		0	0
DEVELOPERS NAME		ESTATE NAME	STAGE
2 Andrews Street	Newell Beach	Lot 51 on SP168537	11485
STREET No. & NAME	SUBURB	LOT & RP No.s	PARCEL No.
ROL (1 lot into 22 lots)		2021-4160	4
DEVELOPMENT TYPE		COUNCIL FILE NO.	VALIDITY PERIOD (year)
1108522	1	Payment before commencement of use for MCU; and Prior to signing and sealing of survey form for ROL	
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Infrastructure Charges as resolved by Council at the Ordinary Meeting held on 23 February 2021 (Came into effect on 1 March 2021)

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Proposed Demand							
Residential	Dwelling_house	$_per_3_or_more_bedroom_dwelling	15,959.97	22	$351,119.34		
	Total Demand				**$351,119.34**		
Credit							
Existing land use							
3 or more bedroom dwelling	1 lot	$_per_3_or_more_bedroom_dwelling	15,959.97	1	$15,959.97		
	Total Credit				**$15,959.97**		**Code 895 GL GL7500.135.825**
	Required Payment or Credit		**TOTAL**		**$335,159.37**		

Prepared by	Rebecca Taranto	9 Spetember 2022	**Amount Paid**	
Checked by	Neil Beck	9-Sep-22	**Date Paid**	
Date Payable	**ROL - Before the Local Government approves the plan of subdivision**		**Receipt No.**	
Amendments		**Date**	**Cashier**	

Note:

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Any enquiries regarding Infrastructure Charges can be directed to the Development & Environment, Douglas Shire Council on 07 4099 9444 or by email on enquiries@douglas.qld.gov.au

Extracts from the Planning Act 2016 – Making Representations during Applicant's Appeal Period

Subdivision 5 Changing charges during relevant appeal period

124 Application of this subdivision

This subdivision applies to the recipient of an infrastructure charges notice given by a local government.

125 Representations about infrastructure charges notice

(1) During the appeal period for the infrastructure charges notice, the recipient may make representations to the local government about the infrastructure charges notice.

(2) The local government must consider the representations.

(3) If the local government—

(a) agrees with a representation; and

(b) decides to change the infrastructure charges notice;

the local government must, within 10 business days after making the decision, give a new infrastructure charges notice (a ***negotiated notice***) to the recipient.

(4) The local government may give only 1 negotiated notice.

(5) A negotiated notice—

(a) must be in the same form as the infrastructure charges notice; and

(b) must state the nature of the changes; and

(c) replaces the infrastructure charges notice.

(6) If the local government does not agree with any of the representations, the local government must, within 10 business days after making the decision, give a decision notice about the decision to the recipient.

(7) The appeal period for the infrastructure charges notice starts again when the local government gives the decision notice to the recipient.

126 Suspending relevant appeal period

(1) If the recipient needs more time to make representations, the recipient may give a notice suspending the relevant appeal period to the local government.

(2) The recipient may give only 1 notice.

(3) If the representations are not made within 20 business days after the notice is given, the balance of the relevant appeal period restarts.

(4) If representations are made within the 20 business days and the recipient gives the local government a notice withdrawing the notice of suspension, the balance of the relevant appeal period restarts the day after the local government receives the notice of withdrawal.

Division 3 Development approval conditions about trunk infrastructure

Subdivision 1 Conditions for necessary trunk infrastructure

127 Application and operation of subdivision

(1) This subdivision applies if—

(a) trunk infrastructure—

(i) has not been provided; or

(ii) has been provided but is not adequate; and

(b) the trunk infrastructure is or will be located on—

(i) premises (the ***subject premises***) that are the subject of a development application, whether or not the infrastructure is necessary to service the subject premises; or

(ii) other premises, but is necessary to service the subject premises.

Extracts from the Planning Act 2016 –Appeal Rights

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

(1) Schedule 1 states—

(a) matters that may be appealed to—

(i) either a tribunal or the P&E Court; or

(ii) only a tribunal; or

(iii) only the P&E Court; and

(b) the person—

(i) who may appeal a matter (the ***appellant***); and

(ii) who is a respondent in an appeal of the matter; and

(iii) who is a co-respondent in an appeal of the matter; and

(iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

(3) The ***appeal period*** is—

(a) for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or

(b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or

(c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or

(d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or

(e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or

(f) for an appeal relating to the *Plumbing and Drainage Act 2018*—

(i) for an appeal against an enforcement notice given because of a belief mentioned in the *Plumbing and Drainage Act 2018*, section 143(2)(a)(i), (b) or (c)—5 business days after the day the notice is given; or

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(iii) for an appeal against a failure to make a decision about an application or other matter under the *Plumbing and Drainage Act 2018*—at anytime after the period within which the application or matter was required to be decided ends; or

(iv) otherwise—20 business days after the day the notice is given; or

(g) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note—

See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

(5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.

(6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—

(a) the adopted charge itself; or

(b) for a decision about an offset or refund—

(i) the establishment cost of trunk infrastructure identified in a LGIP; or

(ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

(1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—

(a) is in the approved form; and

(b) succinctly states the grounds of the appeal.

(2) The notice of appeal must be accompanied by the required fee.

(3) The appellant or, for an appeal to a tribunal, the registrar, must, within the service period, give a copy of the notice of appeal to—

(a) the respondent for the appeal; and

(b) each co-respondent for the appeal; and

(c) for an appeal about a development application under schedule 1, section 1, table 1, item 1—each principal submitter for the application whose submission has not been withdrawn; and

(d) for an appeal about a change application under schedule 1, section 1, table 1, item 2—each principal submitter for the application whose submission has not been withdrawn; and

(e) each person who may elect to be a co-respondent for the appeal other than an eligible submitter for a development application or change application the subject of the appeal; and

(f) for an appeal to the P&E Court—the chief executive; and

(g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.

(4) The ***service period*** is—

(a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or

(b) otherwise—10 business days after the appeal is started.

(5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).

(6) A person elects to be a co-respondent to an appeal by filing a notice of election in the approved form—

(a) if a copy of the notice of appeal is given to the person—within 10 business days after the copy is given to the person; or

(b) otherwise—within 15 business days after the notice of appeal is lodged with the registrar of the tribunal or the P&E Court.

(7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Non-appealable decisions and matters

(1) Subject to this chapter, section 316(2), schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

(2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.

(3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

(4) In this section—

decision includes—

(a) conduct engaged in for the purpose of making a decision; and

(b) other conduct that relates to the making of a decision; and

(c) the making of a decision or the failure to make a decision; and

(d) a purported decision; and

(e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—

(a) is final and conclusive; and

(b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the *Judicial Review Act 1991* or otherwise, whether by the Supreme Court, another court, any tribunal or another entity; and

(c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, any tribunal or another entity on any ground.

232 Rules of the P&E Court

(1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.

(2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

APPENDIX B

TECHNICAL MEMORANDUM

Date	Monday, 1 June 2026	To	Douglas Shire Council
From	Greg Applin	Company	Applin Consulting
Email	greg@applinconsulting.com.au	Contact	0414 768 109
Project	Newell Beach Subdivision	Subject	Water Analysis

1.0 WATER RETICULATION NETWORK

Preliminary plans have been prepared for an urban water distribution network within the proposed 20 lot subdivision of Lot 51 Coulthard Close, Newell Beach. The network is to be supplied via two connections to Council's existing water reticulation network, and the internal network consists of DN100 branch mains and DN50 rider mains.

Refer to Drawing 26001-C015 Water Reticulation in **Appendix A**.

1.1 Model

A hydraulic network model has been built using EPANet 2.2 software to represent the pipe network and simulate user demand. The EPANet program analysed the head losses within the network using Darcy-Weisbach headloss formula in accordance with the FNQROC Development Manual D6 – Water Reticulation. An absolute roughness K of 0.15 has been adopted PVC and Polypropylene pipes.

Hydrant flow test was carried out by Gilboy Hydraulic Solutions, and a copy of the test results are included in **Appendix B.**

The nearest hydrant test to both connection points is FH 3, for the purposes of the analysis a static Head of 60m was adopted for both the connection points.

1.2 Residential Demands

The development demand loading was calculated in accordance with the FNQROC Development Manual D6 – Water Reticulation. The demand given as (EPs)and Equivalent Domestic Connections (EDCs) is provided in **Table 2.2.**

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Table 2.2 Residential Demands

Lot Size	No. of Lots	EP/EDC	EP	EDC
1500m^2 > Lot > 1100m^2	3	3.4	10.2	3.64
1100m^2 > Lot > 900m^2	4	3.1	12.4	4.43
900m^2 > Lot > 400m^2	13	2.8	36.4	13.00
Total	20		59	21.07

1.3 Flow Parameters

The water supply flow parameters for the model were in accordance with the FNQROC "Design Manual D6: Water Reticulation"

The Average daily (AD) usage of 500 L/person/day and an occupancy ration of 2.8 EP/EDC were used in the model.

- Mean Day Maximum Month (MDMM) = 1.5 x AD
- Peak Day (PD) = 2.25 x AD
- Peak Hour (PH) = 1/12 x PD

Table 2.3 shows the calculated flow parameters applied to the model.

Table 2.3 Flow Parameters

Flow Parameters	Flow (L/s)
Average Daily Consumption (AD)	0.34
Mean Day Maximum Month (MDMM)	0.51
Peak Day (PD)	0.77
Peak Hour (PH)	1.54
Fire + 2/3 Peak Hour	16.03
Fire + Peak Hours	16.54

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1.4 Modelling Results

Analysis of the proposed water reticulation network has been undertaken using the water distribution system software package EPANET 2.2. Modelling was undertaken for the following scenarios:

- Peak Hour Flow Analysis - to confirm a minimum allowable pressure of 22m was maintained during peak hour conditions; and
- Fire Flow Analysis - to confirm a minimum allowable pressure of 12m was maintained during 2/3 peak hour background condition.

Nodes have been produced in the network model to represent demands from groups of properties that are serviced by a common section of water main. A Node Plan has been included in **Appendix C** showing the combinations of properties represented by a single node, and the accumulative EP.

1.4.1 Peak Hour Flow Analysis

Network analysis results for the peak hour flow are included in **Appendix D**. Residual pressures during this scenario range between 55.20m and 56.79m within the modelled network, thereby meeting the minimum requirement of 22m.

1.4.2 Fire Fighting Flow Analysis

Network analysis results for fire flow with a background 2/3 peak hour flow are included within **Appendix E**. The fire flow demand has been allocated to Node N6. Residual pressures during this scenario range between 53.55m and 56.75m within the modelled network, thereby meeting the minimum requirement of 12m.

After running the model with all build parameters and demand patterns in place, we can analyse hydraulic performance across the network during the most critical Peak Hour demand period.

1.5 Conclusion

An EPANet analysis has confirmed that in the Peak Hour, and Fire Flow requirements of the FNQROC Development Manual D6 – Water Reticulation can be satisfactorily achieved.

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APPENDIX A

DRAWING 26001-C015 WATER RETICULATION

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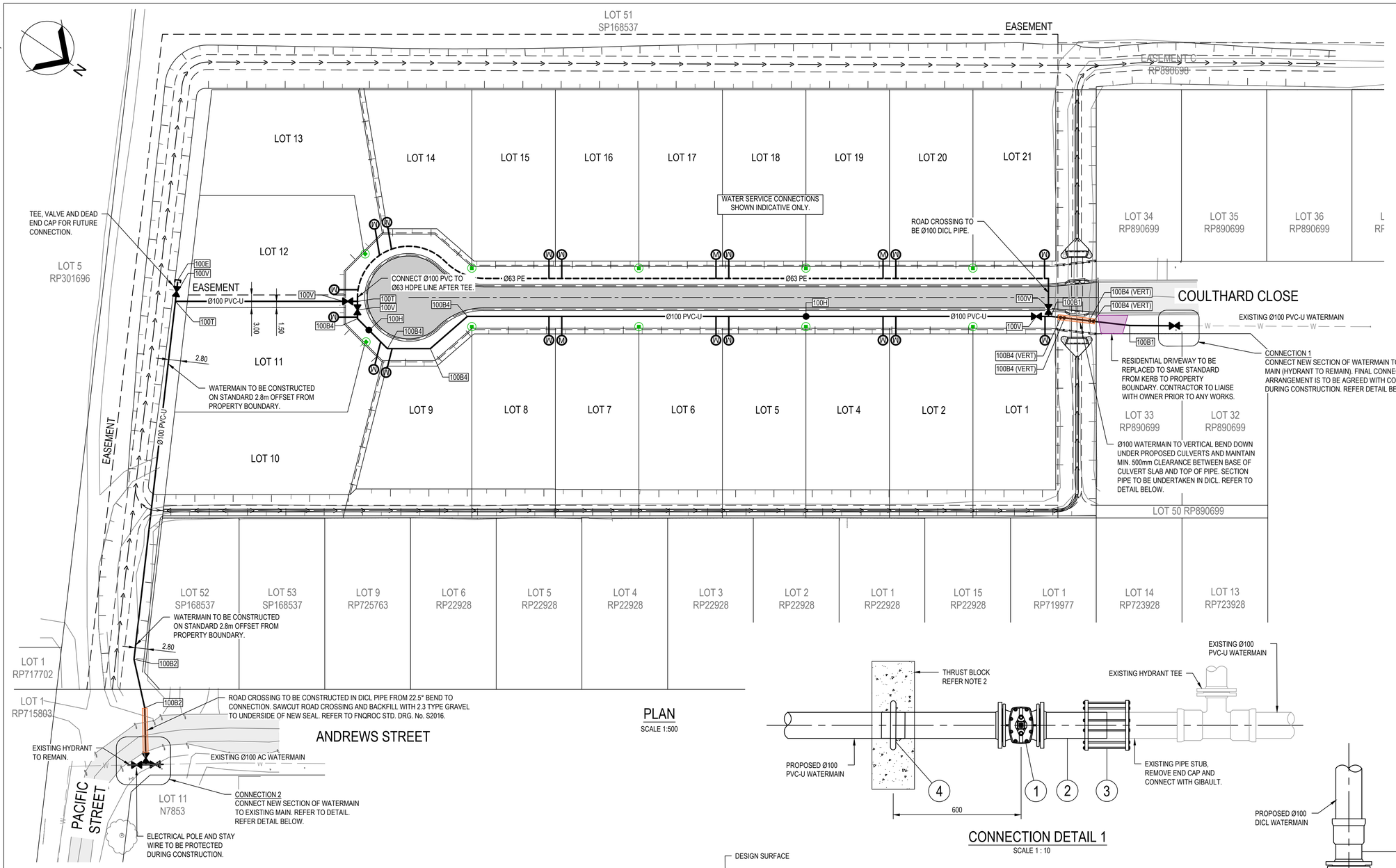
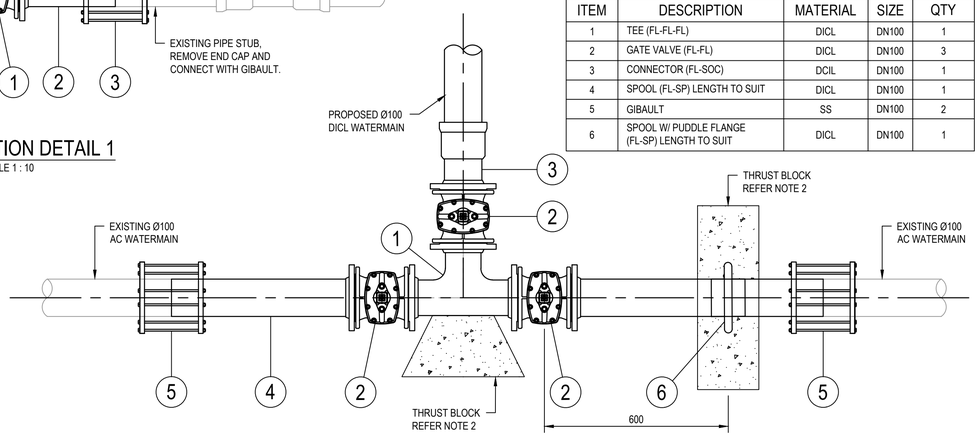
DATE PLOTTED: 30 May 2026 10:55 AM

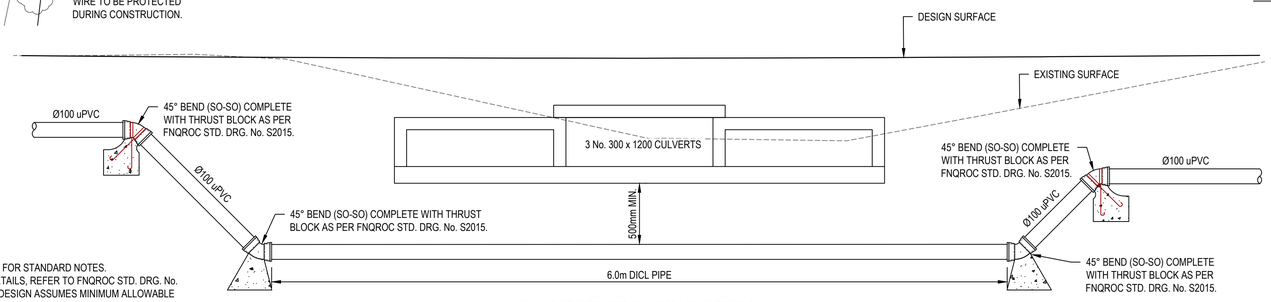


PLAN
SCALE 1:500

CONNECTION DETAIL 1
SCALE 1 : 10



CONNECTION DETAIL 2
SCALE 1 : 10



CULVERT CROSSING DETAIL
SCALE 1 : 10

NOTES

1. REFER DRG 26001-C002 FOR STANDARD NOTES.
2. FOR THRUST BLOCK DETAILS, REFER TO FNQROC STD. DRG. No. S2015. THRUST BLOCK DESIGN ASSUMES MINIMUM ALLOWABLE BEARING PRESSURE OF FOUNDATION MATERIAL = 50 kPa.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.

LEGEND

EXISTING

- EXISTING LOT BOUNDARY
- EXISTING EASEMENT BOUNDARY
- W — EXISTING WATER MAIN

PROPOSED

- 63 — NEW WATER MAIN DN63 PE100 PN20
- 100 — NEW WATER MAIN DN100 PVC PN16 (DICL PN35 WHERE NOTED)
- SECTION OF PIPE TO BE DICL
- M — NEW WATER SERVICE CONNECTION
- WATER SERVICE CONDUIT UNDER PATH
- FIRE HYDRANT
- VALVE
- REDCUCER
- 1DOMC — WATER FITTING CODE
  - FITTING TYPE
  - V - VALVE
  - H - HYDRANT
  - T - TEE
  - E - ENDCAP
  - B1 - BEND 11 ¼ DEG
  - B2 - BEND 22 ½ DEG
  - B4 - BEND 45 DEG
  - B9 - BEND 90 DEG
  - MC - SERVICE MAIN CONNECTION WITH VALVE
  - xRx - REDUCER (x=PIPE SIZE)
- NEW SEALED ROADWAY
- LOCATION OF ELECTRICAL PILLAR
- AREA OF DRIVEWAY REPLACEMENT

CONNECTION DETAIL 1 - FITTING SCHEDULE

ITEM	DESCRIPTION	MATERIAL	SIZE	QTY
1	GATE VALVE (FL-FL)	DICL	DN100	1
2	SPOOL (FL-SP) LENGTH TO SUIT	DICL	DN100	1
3	GIBAULT	SS	DN100	1
4	SPOOL W/ PUDDLE FLANGE (FL-SP) LENGTH TO SUIT	DICL	DN100	1

CONNECTION DETAIL 2 - FITTING SCHEDULE

ITEM	DESCRIPTION	MATERIAL	SIZE	QTY
1	TEE (FL-FL-FL)	DICL	DN100	1
2	GATE VALVE (FL-FL)	DICL	DN100	3
3	CONNECTOR (FL-SOC)	DCIL	DN100	1
4	SPOOL (FL-SP) LENGTH TO SUIT	DICL	DN100	1
5	GIBAULT	SS	DN100	2
6	SPOOL W/ PUDDLE FLANGE (FL-SP) LENGTH TO SUIT	DICL	DN100	1

REV	DESCRIPTION	DRN	APP	DATE
0	FOR APPROVAL	MT	GA	30.06.2026

CERTIFICATION RPEQ
G. APPLIN 06073

APPLIN CONSULTING
M 0414 768 109 | E greg@applinconsulting.com.au

SCALES
1:500 0 5 10 15 20 25m
1:10 0 0.1 0.2 0.3 0.4 0.5m

CLIENT
FAR NORTH DEVELOPMENT GROUP P/L
NEWELL BEACH DEVELOPMENT

DESIGNED M. TICKNER
DRAWN M. TICKNER
CHECKED G. APPLIN

PROJECT
LOT 51 COULTHARD CLOSE, NEWELL BEACH
DEVELOPMENT WORKS

TITLE
WATER RETICULATION PLAN

STATUS
FOR APPROVAL

SCALE (AT FULL SIZE) REFER PLAN
SIZE A1

DRAWING NUMBER 26001-C015
REVISION 0

CAD File: 26002-C015 [WATER].dwg

APPENDIX B

HYDRANT FLOW TEST RESULTS

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Fire Hydrant Test - FH#1 Only - Flow & Pressure	
Location: 25 Coulthard Close	
Date: 06.02.26	Time: 8:15am
Static	550 kPa
2.5 L/S	525 kPa
5 L/S	475 kPa
7.5 L/S	350 kPa
10 L/S	200 kPa
12.5 L/S	0 kPa

Fire Hydrant Test - FH#2 Only - Flow & Pressure	
Location: 11 Coulthard Close	
Date: 06.02.26	Time: 8:18am
Static	700 kPa
2.5 L/S	600 kPa
5 L/S	520 kPa
7.5 L/S	380 kPa
10 L/S	280 kPa
11 L/S	0 kPa

Fire Hydrant Test - FH#3 Only - Flow & Pressure	
Location: 33 Andrews Street	
Date: 06.02.26	Time: 8:22am
Static	600 kPa
2.5 L/S	500 kPa
5 L/S	425 kPa
7.5 L/S	325 kPa
10 L/S	225 kPa
12.5 L/S	100 kPa

Fire Hydrant Test - FH#4 Only - Flow & Pressure	
Location: 28 Andrews Street	
Date: 06/02/26	Time: 8:52am
Static	640 kPa
2.5 L/S	625 kPa
5 L/S	475 kPa
7.5 L/S	325 kPa
10 L/S	250 kPa
12.5 L/S	190 kPa
14 L/S	60 kPa

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APPENDIX C

WATER NODE PLAN

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ABN: 83 104 356 849

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LOT 13
998m²

LOT 14
840m²

LOT 15
813m²

LOT 16
813m²

LOT 17
813m²

LOT 18
813m²

LOT 19
813m²

LOT 20
813m²

LOT 21
1194m²

LOT 34
RP890699

LOT 35
RP890699

LOT 36
RP890699

NODE N16
LOTS 12-17 - 17.4 EP
DEMAND - 0.381 l/s

NODE N15
LOTS 18-21 - 11.8 EP
PH DEMAND - 0.381 l/s

LOT 5
RP301696

LOT 12
994m²

N19

N04

N18

N05

N17

N16

N15

DN50

DN100

N14

COULTHARD CLOSE

EX DN100

W

CONNECT TO
EXISTING

N13

N12

N11

N10

N09

N08

N07

N06

LOT 11
999m²

LOT 9
978m²

LOT 8
872m²

LOT 7
872m²

LOT 6
872m²

LOT 5
872m²

LOT 4
872m²

LOT 2
872m²

LOT 1
1281m²

LOT 33
RP890699

LOT 32
RP890699

LOT 10
1168m²

NODE N8
LOTS 7-11 - 15.2 EP
DEMAND - 0.381 l/s

NODE N11
LOTS 1-6 - 14.6 EP
DEMAND - 0.381 l/s

LOT 50 RP890699

LEMATY STREET

LOT 52
SP168537

LOT 53
SP168537

LOT 9
RP725763

LOT 6
RP22928

LOT 5
RP22928

LOT 4
RP22928

LOT 3
RP22928

LOT 2
RP22928

LOT 1
RP22928

LOT 15
RP22928

LOT 1
RP719977

LOT 14
RP723928

LOT 13
RP723928

DN100

N03

N02

CONNECT TO
EXISTING

ANDREWS STREET

N01

EX DN100

W

LOT 11
N7853

APPENDIX D

PEAK HOUR FLOWS

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Peak Flows


```
 ******************************************************************
 *                          E P A N E T                           *
 *                  Hydraulic and Water Quality                   *
 *                  Analysis for Pipe Networks                    *
 *                        Version 2.2                             *
 ******************************************************************

 Input File: Lot 151 Coulthard.inp
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	N1	N2	13.33	100
P2	N2	N3	11.7	100
P3	N3	N4	84.54	100
P4	N4	N5	42.73	100
P6	N6	N7	6.17	100
P7	N7	N8	10.07	100
P8	N8	N9	11.52	100
P9	N9	N10	20.59	100
P10	N10	N11	72.33	100
P11	N11	N12	43.46	100
P12	N12	N13	19.21	100
P13	N13	N14	12.43	100
P15	N15	N16	132.2	50
P19	N4	N19	4.53	100
P18	N5	N18	0.91	100
P14	N15	N12	8.9	100
P20	N5	N6	7.85	100
P21	N18	N17	28.49	50
P22	N17	N16	10.11	50
P23	RES1	N14	0.01	100
P24	RES2	N1	0.01	100

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
N1	0.00	60.00	55.50	0.00
N2	0.00	60.00	55.20	0.00
N3	0.00	60.00	55.60	0.00
N4	0.00	59.99	56.19	0.00
N5	0.00	59.99	55.89	0.00
N6	0.00	59.99	55.89	0.00
N7	0.00	59.99	55.94	0.00
N8	0.40	59.99	55.99	0.00

N9	0.00	59.99	56.14	0.00
N10	0.00	59.99	56.20	0.00

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality	
N11	0.38	59.99	56.59	0.00	
N12	0.00	59.99	56.79	0.00	
N13	0.00	60.00	56.77	0.00	
N14	0.00	60.00	56.75	0.00	
N15	0.31	59.99	56.79	0.00	
N16	0.45	59.95	55.13	0.00	
N17	0.00	59.96	55.98	0.00	
N18	0.00	59.99	55.89	0.00	
N19	0.00	59.99	56.19	0.00	
RES1	-1.01	60.00	0.00	0.00	Reservoir
RES2	-0.53	60.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
P1	0.53	0.07	0.08	Open
P2	0.53	0.07	0.08	Open
P3	0.53	0.07	0.08	Open
P4	0.53	0.07	0.08	Open
P6	0.23	0.03	0.01	Open
P7	0.23	0.03	0.01	Open
P8	-0.17	0.02	0.01	Open
P9	-0.17	0.02	0.01	Open
P10	-0.17	0.02	0.01	Open
P11	-0.55	0.07	0.09	Open
P12	-1.01	0.13	0.27	Open
P13	-1.01	0.13	0.27	Open
P15	0.16	0.08	0.28	Open
P19	0.00	0.00	0.00	Open
P18	0.29	0.04	0.52	Open
P14	-0.47	0.06	0.07	Open
P20	0.23	0.03	0.01	Open
P21	0.29	0.15	0.87	Open
P22	0.29	0.15	0.87	Open
P23	1.01	0.13	0.00	Open
P24	0.53	0.07	0.00	Open

APPENDIX E

FIRE FIGHTING FLOWS

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0414 768 109

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                           Version 2.2                          *
  ******************************************************************

  Input File: Lot 151 Coulthard.inp
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	N1	N2	13.33	100
P2	N2	N3	11.7	100
P3	N3	N4	84.54	100
P4	N4	N5	42.73	100
P6	N6	N7	6.17	100
P7	N7	N8	10.07	100
P8	N8	N9	11.52	100
P9	N9	N10	20.59	100
P10	N10	N11	72.33	100
P11	N11	N12	43.46	100
P12	N12	N13	19.21	100
P13	N13	N14	12.43	100
P15	N15	N16	132.2	50
P19	N4	N19	4.53	100
P18	N5	N18	0.91	100
P14	N15	N12	8.9	100
P20	N5	N6	7.85	100
P21	N18	N17	28.49	50
P22	N17	N16	10.11	50
P23	RES1	N14	0.01	100
P24	RES2	N1	0.01	100

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
N1	0.00	60.00	55.50	0.00
N2	0.00	59.84	55.04	0.00
N3	0.00	59.70	55.30	0.00
N4	0.00	58.69	54.89	0.00
N5	0.00	58.18	54.08	0.00
N6	15.00	58.06	53.96	0.00
N7	0.00	58.12	54.07	0.00
N8	0.27	58.20	54.20	0.00

N9	0.00	58.31	54.46	0.00
N10	0.00	58.49	54.70	0.00

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality	
N11	0.25	59.15	55.75	0.00	
N12	0.00	59.57	56.37	0.00	
N13	0.00	59.83	56.60	0.00	
N14	0.00	60.00	56.75	0.00	
N15	0.21	59.57	56.37	0.00	
N16	0.30	58.37	53.55	0.00	
N17	0.00	58.32	54.34	0.00	
N18	0.00	58.18	54.08	0.00	
N19	0.00	58.69	54.89	0.00	
RES1	-8.25	60.00	0.00	0.00	Reservoir
RES2	-7.77	60.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
P1	7.77	0.99	11.98	Open
P2	7.77	0.99	11.98	Open
P3	7.77	0.99	11.98	Open
P4	7.77	0.99	11.98	Open
P6	-6.47	0.82	8.42	Open
P7	-6.47	0.82	8.42	Open
P8	-6.74	0.86	9.10	Open
P9	-6.74	0.86	9.10	Open
P10	-6.74	0.86	9.10	Open
P11	-6.99	0.89	9.76	Open
P12	-8.25	1.05	13.44	Open
P13	-8.25	1.05	13.44	Open
P15	1.06	0.54	9.10	Open
P19	0.00	0.00	0.00	Open
P18	-0.76	0.10	3.70	Open
P14	-1.26	0.16	0.40	Open
P20	8.53	1.09	14.33	Open
P21	-0.76	0.39	4.88	Open
P22	-0.76	0.39	4.88	Open
P23	8.25	1.05	13.02	Open
P24	7.77	0.99	11.63	Open

APPENDIX C

DIRT PROFESSIONALS

Email: dirtprofessionals@bigpond.com
MOBILE 0417 647 477

Brazier Motti Pty Ltd
michael.tessaro@braziremotti.com.au

Site Assessment
Part of Lot 51 SP 168537
Newell Beach QLD

16 December 2020

Job No 22242

INTRODUCTION

This report presents the results of a preliminary site assessment performed at Lot 51 SP 168537 Newell Beach. The purpose of the assessment is to determine an acceptable solution for the treatment of wastewater as per the guidelines of the Code of Practise for On-Site Sewerage and the AS/AZS 1547 2012.

The Scope of the works comprised of a series of test bores, followed by laboratory testing.

EXISTING CONDITIONS

At the time of the assessment the site consisted of a portion of land to the Southeast corner of the above address. The land was rectangular in shape, with an approximate total area of approximately 2.33 ha. The allotment is to be subdivided into 18-20 allotments.

At the time of the assessment the proposed allotment was grassed with a slope descending to the South/Southeast. The site had a drain located to the North and East boundary.

Adjacent properties consist of residential land which are serviced with secondary treatment plants and standard septic systems (primary treatment).

FIELD WORK

The field work was undertaken on the 16 December 2020 and comprised of mechanical boring of 9 bore holes. The bores were located at various locations over the proposed allotment (see map).

FIELD WORK RESULTS

Details of the subsurface conditions encountered at the test locations are attached on the bore log forms attached.

The subsurface conditions encountered at the location of the bores were uniform. The materials comprised of mainly sandy loams to the depth of holes.

Water was encountered at a depth of 1200 mm the time of the assessment. Test holes carried out on previous jobs during seasonal rains found water at 600 mm below ground level, during seasonal rains.

LABORATORY TESTING

Laboratory Testing Comprised of dispersion testing.

The testing indicated that the materials tested in the area are of a non- dispersion nature.

EFFLUENT DISPOSAL

Based on the results of the assessment, and on visual assessment of samples from the site, it is concluded that the soils are of a well drained material with a weak structure and should be categorised as and a Category 2, in accordance with the AS/NZS 1547:2012.

It is considered that the indicative permeability of the site soils are likely to be 1.4 - 3.0 m/day, with no special measures to be taken for dispersive soils.

Effluent must be treated as **Advanced Secondary Treatment, due to the watertable.** The wastewater will require a separation distances maintained from drains of 10m.

It is estimated that the water table will rise to 600 mm below ground level during seasonal rains.

For subsurface irrigation a design irrigation rate (DIR) of 35 mm/week be adopted, as indicated by the AS/NZS 1547:2012. The irrigation area which is based on a 4 bedroom dwelling at 6 persons at 200 litres per day. This will require a minimum of 240 square metres of irrigation area with the same for a reserve area.

If a trenches are to be used a design loading rate (DLR) of 50 mm/d be adopted, as indicated by the AS/NZS 1547:2012. The trenches required based on a 4 bedroom dwelling at 6 persons at 200 litres per day. This will require approximately 24 square metres which can be utilized as 1 x 2m wide x 12m long Bed with the same for a reserve area. **Theses trenches will need to consist of a mound allowing for a minimum of 300 mm vertical separation from watertable.**

It should be noted that the DLR and DIR values provided are based on soil infiltration rates only. These may require to be altered following a water balance analysis with consideration given to the published rainfall and evaporation data from the nearest meteorological station.

It should be noted that application and maintenance of appropriate vegetation cover is essential for effective disposal relying upon evapo - transpiration. It would be advantageous to duplicate disposal areas and alternate areas.

For the calculation of disposal area, it is suggested that a daily effluent flow of 150 litres per/person/day be used for households with a reticulated town water supply.

RECOMMENDATIONS

Further testing will be required prior to construction as this is only a preliminary report and allotments have not been determined.

This can be determined when the location of the building is located on the allotment.

BUFFER DISTANCES

Minimum horizontal buffer distances are to be maintained. A table is attached.

VALIDITY

The excavation of a limited number of holes does not preclude the possibility of some conditions on the site being different from those encountered in the holes. Should conditions be found which differ from those described in this report, then the recommendations are not valid and this organisation should be contacted.

Yours faithfully

Tandel Investments Pty Ltd T/as **DIRT PROFESSIONALS**

Angelo Tudini
Director

Attached
-Site plan of proposed subdivision
-Guides for effluent quality
-Guidelines for vertical and horizontal separation distances

BORE HOLE LOG

HOLE 1

0.0 - 1.2m	Sandy Loams - Brown
1.2m	Water at this depth

HOLE 2

0.0 - 0.8m	Sandy Loams - Brown

HOLE 3

0.0 - 1.2m	Sandy Loams - Brown
1.2m	Water at this depth

HOLE 4

0.0 - 1.8m	Sandy Loams - Brown

HOLE 5

0.0 - 1.5m	Sandy Loams - Brown

HOLE 6

0.0 - 1.2m	Sandy Loams - Brown

HOLE 7

0.0 - 2.0m	Sandy Loam - Brown

HOLE 8

0.0 - 1.2m	Sandy Loams - Brown

HOLE 9

0.0 - 1.5m	Sandy Loams - Brown

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APPENDIX D

Douglas PARTNERS

GROUNDED EXPERTISE

Report on Acid Sulfate Soil Investigation

Proposed Subdivision

Lot 51 Coulthard Close, Newell Beach

Prepared for 3D Civil Pty Ltd

Project 242245.00

22 May 2026

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Document History

Details

Project No.	242245.00
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Status and Review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Shermal Fernando and Dan Martin	Bruce Stewart	22 May 2026

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Revision 0	Wayne Davis, 3D Civil Pty Ltd

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	pp Shermal	22 May 2026
Reviewer	Bruce Stewart	22 May 2026

Douglas PARTNERS | GROUNDED EXPERTISE

Table of Contents

Report on Acid Sulfate Soil Investigation
Proposed Subdivision
Lot 51 Coulthard Close, Newell Beach

1. Introduction

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of an acid sulfate soil investigation for a proposed subdivision at Lot 51 Coulthard Close, Newell Beach (the site). The investigation was commissioned by 3D Civil Pty Ltd and was undertaken in accordance with Douglas' proposal 242245.00.P.001.Rev0 dated 22 April 2026.

The investigation aim was to assess subsurface and groundwater conditions at selected tested locations with reference to acid sulfate soils (ASS), and to provide comments on:

- ASS laboratory test results,
- the presence or absence of actual or potential ASS at the tested locations; and
- the need for any additional investigation, if required.

The investigation included six test pits and laboratory testing of selected samples. Details of the field and laboratory work are presented in this report, along with comments and recommendations addressing the items outlined above.

This report must be read in conjunction with the notes 'About This Report' presented in Appendix A, along with any other attached explanatory notes, and should be kept in entirety without separation of individual pages or sections.

2. Site description

The approximately 2 ha site is a relatively flat, level, rectangular parcel occupying most of Lot 51 Coulthard Close, Newell Beach, as shown on Drawing 1 in Appendix B.

The site is bounded by residential dwellings to the east, beyond which lies Andrews Street; Coulthard Close to the north (which will be extended into the middle of the site); and cane fields along the western and southern boundaries. At the time of field work, the site was vacant and covered with short grasses.

A site photograph is provided in Figure 1.

Figure 1: Looking north across site from the southern boundary; excavator at Pit 1.

3. Published data

3.1 Geology

Geology mapping on Queensland Globe indicates that the site is underlain by late Tertiary to Quaternary aged deposits, described as typically comprising "... sand, silt, mud and gravel; older, unconsolidated to semi-consolidated residual to colluvial deposits".

The ground conditions encountered in the test pits comprised silty sand over sand and gravel, which are probably Tertiary to Quaternary aged. However, the flat, level topography, low elevation (~4 m AHD), and no nearby elevated terrain suggests the encountered soils are probably alluvial.

3.2 Acid sulfate soils

The National Digital Acid Sulfate Soil (ASS) Risk Mapping indicates that this site is mapped as having a 'low probability' of ASS occurrence.

4. Field work

4.1 Methods

Field work was undertaken on 1 May 2025 and comprised six test pits (designated Pits 1 to 6). Approximate test locations are shown on Drawing 1 in Appendix B.

The test pits were excavated using a 6t excavator fitted with a 600 mm wide toothed bucket to 1.5 m and 1.8 m depth in Pits 1 to 3, and to 2.9 m and 3.0 m depth in Pits 4 to 6. A dynamic cone penetrometer test (DCP) was undertaken adjacent to each test pit. On completion, the pits were checked for groundwater ingress, and the side walls and spoil piles were photographed. The pits were then backfilled in layers using excavated spoil, which was compacted using the back of the excavator bucket. Excess spoil was mounded over the pits, and the surface was track rolled.

A geotechnical engineer set out the test locations, completed the DCPs, logged the test pits based on visual and tactile sample assessment, and collected samples for laboratory testing. UTM coordinates and surface levels at the test locations were recorded with reference to MGA2020 and AHD respectively, using a sub-decimetre accurate dGPS.

4.2 **Results**

The subsurface conditions encountered in test pits are presented in the test pit logs in Appendix C. These should be read in conjunction with the general notes which explain the sampling, testing and excavation methodology; terminology, symbols and abbreviations; and soil descriptions used in their preparation given in Appendix A.

In summary, the subsurface conditions encountered in the pits comprised black silty sand to between 0.3 m and 0.55 m depth overlying yellow brown, variably mottled brown and grey sand and gravel. Groundwater observations are summarised in Table 1. It should be noted that groundwater levels are affected by climatic conditions, surface and subsurface drainage, soil permeability, and human influences, and will therefore vary with time. It is also noted that the test holes were only left open for a short period, and it is likely that groundwater levels may not have stabilised.

Table 1: Summary of groundwater observations

Test Location	Date	Ground Surface Elevation (m AHD)	Observed Groundwater	Groundwater Elevation (m AHD)
Pit 1	1 May 2026	3.5	None observed	-
Pit 2	1 May 2026	3.6	None observed	-
Pit 3	1 May 2026	3.2	None observed	-
Pit 4	1 May 2026	3.9	2.7	1.2
Pit 5	1 May 2026	3.6	2.0	1.6
Pit 6	1 May 2026	4.0	2.5	1.5

5. Laboratory testing

Laboratory testing comprised 51 ASS screening tests and 20 chromium suite tests.

Douglas completed the screening tests by measuring pH after adding distilled water (pH_F) and peroxide (pH_{FOX}) to the samples. The pH_F test indicates past oxidation and hence actual ASS (AASS), while the pH_{FOX} test indicates unoxidized sulfides and therefore potential ASS (PASS).

Chromium suite analysis samples were selected based on the more adverse screening test results. This analysis was by SGS Australia Pty Ltd (SGS), a NATA accredited analytical laboratory.

The screening and chromium suite test results are summarised in Table 2, and the laboratory test reports for the chromium suite tests are provided in Appendix D.

Table 2: ASS field screening and chemical laboratory testing results

Pit	Depth (m)	Sample Description	Screening Test Results				Chromium Suite Test Results (%S)			
			pH_F	pH_{FOX}	ΔpH	Reaction (1,2,3,4) *	Potential Sulfidic Acidity (S_{CR})	Total Actual Acidity (TAA)	Acid Neutralising Capacity (ANC)	Net Acidity ***
Pit 1	0.25	Silty SAND	4.6	3.3	1.3	1	<0.005	0.070	NT	0.068
	0.50	SAND	4.7	4.5	0.2	1	NT	NT	NT	NT
	0.75	SAND	4.6	4.3	0.3	1	<0.005	0.020	NT	0.016
	1.00	SAND	4.6	4.4	0.2	1	NT	NT	NT	NT
	1.25	SAND	4.6	4.4	0.2	1	NT	NT	NT	NT
	1.50	SAND	4.6	4.3	0.3	1	<0.005	<0.01	NT	0.006
Pit 2	0.25	Silty SAND	4.3	3.5	0.8	1	<0.005	0.110	NT	0.110
	0.50	Silty SAND	4.7	4.1	0.6	1	<0.005	0.040	NT	0.036
	0.75	Gravelly SAND	5.0	4.7	0.3	1	NT	NT	NT	NT
	1.00	Gravelly SAND	5.0	4.7	0.3	1	<0.005	<0.01	NT	<0.005
	1.25	Sandy GRAVEL	4.8	4.6	0.2	1	NT	NT	NT	NT
	1.50	Sandy GRAVEL	4.7	4.5	0.2	1	NT	NT	NT	NT
Pit 3	0.25	Silty SAND	4.8	3.8	1.0	1	NT	NT	NT	NT
	0.50	Silty SAND	4.6	3.9	0.7	1	<0.005	0.020	NT	0.024
	0.75	SAND	4.6	4.3	0.3	1	NT	NT	NT	NT
	1.00	SAND	4.8	4.5	0.3	1	NT	NT	NT	NT
	1.25	SAND	5.0	4.6	0.4	1	NT	NT	NT	NT
	1.50	Gravelly SAND	4.7	4.3	0.4	1	<0.005	0.010	NT	0.014
Pit 4	0.25	Silty SAND	4.5	3.6	0.9	1	<0.005	0.080	NT	0.076
	0.50	SAND	4.6	4.1	0.5	1	NT	NT	NT	NT
	0.75	SAND	4.8	4.6	0.2	1	NT	NT	NT	NT
	1.00	SAND	4.8	4.8	0.0	1	NT	NT	NT	NT
	1.25	SAND	4.8	4.4	0.4	1	<0.005	<0.01	NT	<0.005
	1.50	Sandy GRAVEL	5.1	4.4	0.7	1	NT	NT	NT	NT
	1.75	Sandy GRAVEL	4.9	4.3	0.6	1	<0.005	0.010	NT	0.014
	2.00	Sandy GRAVEL	5.0	4.5	0.5	1	NT	NT	NT	NT
	2.25	Sandy GRAVEL	5.3	4.4	0.9	1	<0.005	0.010	NT	0.012
	2.50	Sandy GRAVEL	5.1	4.7	0.4	1	NT	NT	NT	NT
	2.75	Sandy GRAVEL	5.0	4.7	0.3	1	NT	NT	NT	NT
Pit 5	0.25	Silty SAND	4.4	2.7	1.7	1	<0.005	0.090	NT	0.088
	0.50	Gravelly SAND	5.0	4.7	0.3	1	NT	NT	NT	NT
	0.75	Gravelly SAND	5.0	4.1	0.9	1	<0.005	<0.01	NT	0.010
	1.00	Gravelly SAND	4.8	4.2	0.6	1	NT	NT	NT	NT
	1.25	Gravelly SAND	4.7	4.1	0.6	1	<0.005	<0.01	NT	0.008
	1.50	Sandy GRAVEL	4.7	4.2	0.5	1	NT	NT	NT	NT
	1.75	Sandy GRAVEL	4.8	4.3	0.5	1	<0.005	<0.01	NT	0.010
	2.00	Sandy GRAVEL	4.8	4.6	0.2	1	NT	NT	NT	NT
	2.25	Sandy GRAVEL	4.6	4.3	0.3	1	NT	NT	NT	NT
	2.50	Sandy GRAVEL	4.5	4.2	0.3	1	<0.005	<0.01	NT	0.006
	2.75	Sandy GRAVEL	4.4	4.3	0.1	1	NT	NT	NT	NT

Table 2 (cont'd): ASS field screening and chemical laboratory testing results

Pit	Depth (m)	Sample Description	Screening Test Results				Chromium Suite Test Results (%S)			
			pH_F	pH_{FOX}	ΔpH	Reaction (1,2,3,4) *	Potential Sulfidic Acidity (S_{CR})	Total Actual Acidity (TAA)	Acid Neutralising Capacity (ANC)	Net Acidity ***
Pit 6	0.25	Silty SAND	4.7	3.3	1.4	1	NT	NT	NT	NT
	0.50	Silty SAND	5.2	4.5	0.7	1	<0.005	0.020	NT	0.022
	0.75	Silty SAND	5.4	5.1	0.3	1	NT	NT	NT	NT
	1.00	Silty SAND	5.4	5.4	0.0	1	NT	NT	NT	NT
	1.25	Clayey Gravelly SAND	5.4	5.0	0.4	1	NT	NT	NT	NT
	1.50	Clayey Gravelly SAND	5.4	5.0	0.4	1	NT	NT	NT	NT
	1.75	Clayey Gravelly SAND	5.2	4.2	1.0	1	NT	NT	NT	NT
	2.00	Sandy GRAVEL	5.3	4.1	1.2	1	<0.005	0.010	NT	0.014
	2.25	Sandy GRAVEL	5.5	4.3	1.2	1	NT	NT	NT	NT
	2.50	Sandy GRAVEL	5.0	4.6	0.4	1	NT	NT	NT	NT
	2.75	Sandy GRAVEL	5.1	4.4	0.7	1	<0.005	0.010	NT	0.012

Notes to Table 2:
* 1 – denotes slight effervescence: 2 – denotes moderate reaction; 3 – denotes vigorous reaction; 4 – denotes very strong effervescence accompanied by escape of gas/heat
*** as reported by the analytical laboratory
NT – not tested

6. Proposed development

The proposed subdivision comprises 21 residential lots across the approximately 2 ha site. Works include excavation for a central roadway (to about 0.5 m maximum depth) and drains along the western and southern boundaries (to about 1.8 m maximum depth), along with minor fill placed in selected allotment areas.

7. Comments

The ASS testing results summarised in Table 1 are interpreted below based on the National Acid Sulfate Soils Guidance WQA (2018a) and the Queensland Soil Management Guidelines (Dear, et al., 2014):

- Where $pH_F \leq 4$, and jarosite is observed, this indicates AASS are present. Where $pH_F \leq 4$ without jarosite, this may indicate AASS are present or that the soil is naturally acidic but non-ASS. No samples returned $pH_F \leq 4$, and no jarosite was observed.
- Where $pH_{FOX} < 3$, along with a strong reaction to peroxide, and pH_{FOX} reading at least one pH unit below pH_F, this strongly indicates potential acid sulfate soils (PASS) conditions, and additional testing is recommended. One sample returned 2.7 pH_{FOX} (highlighted green in Table 1), however it only had a slight reaction. This sample was subject to additional laboratory testing (refer below). No other samples met these criteria

- Where 3 ≤ pH_{FOX} < 4, along with a slight, medium or strong reaction, the indication is inconclusive. Reduced inorganic sulfur (RIS) may be present, however organic matter may also be responsible for the pH decrease, and additional testing is recommended. Six samples satisfied these criteria (highlighted yellow in Table 1), and four were subject to additional laboratory testing (refer below).
- Where 4 ≤ pH_{FOX} < 5 the indication is also inconclusive, and additional testing is recommended. RIS may be present in small quantities or poorly reactive under rapid oxidation, or the sample may contain shell/carbonate. Equally, the low pH may be due to organic acids with no RIS present. 40 samples returned values in this range, with no shells observed, and 12 of these were subject to additional laboratory testing (refer below).

The calculated net acidity for the 20 samples submitted for chromium suite testing is summarised in Table 2. In general, the methods for determining net acidity have been derived from WQA (2018a), and for this project are:

Net Acidity = Potential Acidity (S_{cr}) + Actual Acidity (s-TAA)

The action criterion triggering specific ASS management is 0.03% sulfur or greater.

Five samples (highlighted blue in the attached table) exceeded the 0.03% sulfur action criterion, with net acidities ranging from 0.036% to 0.110% sulfur. These were all from the uppermost black silty sand layer encountered in each test pit to between 0.3 m and 0.55 m depth. No tests from the underlying 'yellow-ish' sand/gravel mixtures exceeded the action criterion.

Regarding the elevated results for the black silty sand, for soils to be identified as sulfuric materials they need to show evidence either of the following (WQA, 2018b): ·

- mottles and coatings with accumulations of jarosite or other iron and aluminium sulfate or hydroxy sulfate minerals; or
- underlying sulfidic material.

Neither criterion was satisfied for the black silty sand.

Based on the above, the black silty sand is considered a naturally acidic soil, and not actual ASS. In this case, an ASSMP is not required.

National ASS guidance suggests that naturally acidic soils are not treated as a typical ASS acidity hazard. However, given the site proximity to the coast, it would be prudent to adopt a site management plan during subdivision construction which sets out some nominal measures to minimise acidity risks. These should include:

- construction outside of the wet season, to minimise the potential for stormwater (and particularly stormwater flow across disturbed acidic ground);
- pH amelioration consistent with standard agricultural practices where the black silty sand is used in landscaping;
- collect (if any), test, and treat (if required) any leachate from temporary excavation stockpiles; and
- any stormwater from disturbed areas discharging into waterways should be tested for pH, and treated (if required).

The leachate or stormwater treatment, as suggested above, should accord with any council requirements as typically associated with construction sites. Given the site is located within an area historically utilised for cane farming, where shallow soils have been regularly disturbed (e.g. ploughed), collected stormwater or leachate treatment can be assessed in the context of typical stormwater discharge parameters from the general area.

8. References

Dear, S., Ahern, C., O'Brien, L., Dobos, S., McElnea, A., Moore, N., & Watling, K. (2014). *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*. (QASSIT). Brisbane: Department of Science: Department of Science, Information, Technology, Innovation and the Arts, Queensland Government.

WQA. (2018a). *National acid sulfate soils sampling and identification methods manual*. Water Quality Australia.

WQA. (2018b). *National acid sulfate soils identification and laboratory methods manual*. Water Quality Australia

9. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at Lot 51 Coulthard Close, Newell Beach in line with Douglas' proposal dated 22 April 2026 and acceptance received from Wayne Davis of 3D Civil Pty Ltd dated 23 April 2026. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of 3D Civil Pty Ltd 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 Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

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. Douglas 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 Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

About this Report

Terminology, Symbols and Abbreviations

Soil Descriptions

Sampling, Testing and Excavation Methodology

About this Report

October 2024

Introduction

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

Douglas' 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, Douglas 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, Douglas 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, Douglas 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, Douglas 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. Douglas 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.

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Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style XW. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	KL
Unknown	Information was not available to allow classification of the property. For example, when augering in loose, saturated sand auger cuttings may not be returned.	UK
No data	Information required to allow classification of the property was not available. For example if drilling is commenced from the base of a hole predrilled by others	ND
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example providing a description of the strength of a concrete pavement	NA

Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Soil Descriptions

Terminology
Symbols
Abbreviations

March 2024

Introduction

All materials which are not considered to be "in-situ rock" are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:

The "classification" comprises a two character "group symbol" providing a general summary of dominant soil characteristics. The "name" summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either "fine grained" (also known as "cohesive" behaviour) or "coarse grained" ("non cohesive" behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as "oversize"	
Cobble	63 - 200		
Gravel[1]	2.36 - 63	Coarse	>65%
Sand[1]	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

[1] – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer "component proportions" below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a "Sandy CLAY", this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a "primary", "secondary", or "minor" component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition[1]	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor[2]	Present in the soil, but not significant to its engineering properties	All other components	All other components

[1] As defined in AS1726-2017 6.1.4.4

[2] In the detailed material description, minor components are split into two further sub-categories. Refer "identification of minor components" below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, "INTERBEDDED Silty CLAY AND SAND".

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component [1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code NDF, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example (VS).

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as "extremely weathered material" in reports and by the abbreviation code XWM on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than 'very low' as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Fluvial	Deposited by channel fill and overbank (natural levee, crevasse splay or flood basin)	FLV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

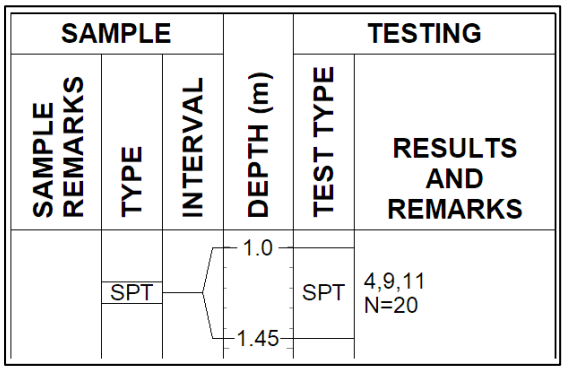
The presence of particles considered to be "oversize" may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with "MIXTURE OF".

intentionally blank

Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Acid Sulfate sample	ASS
Bulk sample	B
Core sample	C
Disturbed sample	D
Environmental sample	ES
Driven Tube sample	DT
Gas sample	G
Piston sample	P
Sample from SPT test	SPT
Undisturbed tube sample	U[1]
Water sample	W
Material Sample	MT
Core sample for unconfined compressive strength testing	UCS

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y =*x* blows for *y* mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(_)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP9/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150
Dynamic probe super heavy, followed by blow count penetration increment in mm	DPSH/100

Groundwater Observations

	water seepage/inflow
	water seepage/outflow
	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Direct Push	DP
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD[1]
Air Track	AT
Diatube	DT[1]
Hand auger	HA[1]
Hand tools (unspecified)	HAND
Existing exposure	X
Hollow flight auger	HSA[1]
HQ coring	HQ3
HMLC series coring	HMLC
NMLC series coring	NMLC
NQ coring	NQ3
PQ coring	PQ3
Predrilled	PD
Push tube	PT[1]
Ripping tyne/ripper	R
Rock roller	RR[1]
Rock breaker/hydraulic hammer	EH
Sonic drilling	SON[1]
Mud/blade bucket	MB[1]
Toothed bucket	TB[1]
Vibrocore	VC[1]
Vacuum excavation	VE
Wash bore (unspecified bit type)	WB[1]

[1] – numeric suffixes indicate tool diameter/width in mm

Appendix B

Drawing 1- Site and Test Location Plan

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0		May.2026	SF

COORDINATE REFERENCE SYSTEM:
GDA2020, MGA ZONE XX

Douglas PARTNERS
OFFICE: CAIRNS
13 Industrial Avenue, Stratford QLD 4870
(07)4055 1550

CLIENT:
3D Civil Pty Ltd

NOTE:
1: Basemap from QImagery.com.au
2: Locality Plan from Street-directory.com.au
3: Test locations are approximate only and were located using differential GPS typically accurate to ± 0.1 m depending on satellite coverage

SCALE: 0 20 40 60 80 m

PROJECT NAME:
Proposed Subdivision

PROJECT ADRESS:
Lot 51 Coulthard Close, Newell Beach

DRAWING TITLE:
Site and Test Location Plan

PROJECT NO: **242245.00**
DRAWING NO: **1**
REVISION: **0**

Appendix C

Field Work Results

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.5 AHD
COORDINATE: E:329709.3, N:8183463.1
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 1
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
01/05/26 No free groundwater encountered to 1.5 m depth	0.30	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25	DCP9/100	
		SAND (SM) with clay trace gravel: yellow brown; fine to coarse; fine gravel.			MD			ASS		0.50		
								ASS		0.75		
				ALV		M		ASS		1.00		
		1.10m: yellow brown mottled brown			D			ASS		1.25		
		Test Pit discontinued at 1.50m depth. Limit of Investigation.						ASS		1.50		

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.6 AHD
COORDINATE: E:329698.7, N:8183541.3
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 2
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)
01/05/26 No free groundwater encountered to 1.5 m depth	3	0.55	Silty SAND (SM) trace gravel: black; fine to coarse; fine gravel.		ALV	MD	M		ASS		0.25
									ASS		0.50
			Gravelly SAND (SW) with clay: yellow brown mottled grey and brown; fine to coarse; fine gravel.		ALV	MD	M		ASS		0.75
	1	1.10				D			ASS		1.00
			Sandy GRAVEL (GP) trace clay: brown grey mottled yellow brown; fine; fine to coarse sand.		ALV	D	M		ASS		1.25
						MD			ASS		1.50
	2		Test Pit discontinued at 1.50m depth. Limit of Investigation.								
	2										
	1										
	3										

TESTING AND REMARKS

TEST TYPE: DCP9/100

RESULTS AND REMARKS: 5 | 10 | 15

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.2 AHD
COORDINATE: E:329735.5, N:8183600.2
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 3
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
01/05/26 No free groundwater encountered to 1.5 m depth	3 / 0.00	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25	DCP9/100	5 10 15
	0.55	SAND (SW) with clay with gravel: yellow mottled grey; fine to coarse; fine, sub-angular to angular gravel.		ALV	MD	M		ASS		0.50		
	1							ASS		0.75		
	2 / 1.30	Gravelly SAND (SW) with clay: grey mottled brown; fine to coarse; fine, sub-angular to angular gravel.		ALV	MD / D	M		ASS		1.00		
								ASS		1.25		
								ASS		1.50		
	2 / 1.80	Test Pit discontinued at 1.80m depth. Limit of Investigation.										
	1 / 3											

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.9 AHD
COORDINATE: E:329684.6, N:8183418.1
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 4
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)
		0.40	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25
		1.40	SAND (SW) with clay with gravel: yellow brown mottled grey; fine to coarse; fine, sub-angular to angular gravel.		ALV	L	M		ASS		0.50
									ASS		0.75
									ASS		1.00
									ASS		1.25
			Sandy GRAVEL (GP) with clay: yellow brown mottled grey; fine, sub-angular to angular; fine to coarse sand.			L			ASS		1.50
									ASS		1.75
					ALV		M		ASS		2.00
			2.40m: pale grey			MD			ASS		2.25
									ASS		2.50
									ASS		2.75
			Test Pit discontinued at 3.00m depth. Limit of Investigation.				W				

Free groundwater encountered at 2.7 m depth
01/05/26

TESTING AND REMARKS

TEST TYPE: DCP9/100

RESULTS AND REMARKS

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.6 AHD
COORDINATE: E:329640.6, N:8183482.8
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 5
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
Free groundwater encountered at 2 m depth 01/05/26	0.40	Silty SAND (SM): black; fine to coarse.		ALV	L / MD	M		ASS		0.25	DCP9/100	
	1.40	Gravelly SAND (SP): yellow brown mottled grey; fine to coarse; fine, sub-angular possibly angular gravel.		ALV	MD / L	M		ASS		0.50		
	2.50	Sandy GRAVEL (GP) with clay: pale grey; fine, sub-angular to angular; fine to coarse sand.		ALV	MD	M / W		ASS		0.75		
		Sandy GRAVEL (GP) trace clay; fine, rounded; fine to coarse sand; poorly graded. 2.80m: fine to medium gravel		ALV	MD to D	W		ASS		1.00		
	3	Test Pit discontinued at 2.90m depth. Limit of Investigation.						ASS		1.25		
								ASS		1.50		
								ASS		1.75		
								ASS		2.00		
								ASS		2.25		
								ASS		2.50		
								ASS		2.75		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 4.0 AHD
COORDINATE: E:329654.3, N:8183578.8
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 6
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)
		0.00	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25
		0.40	Silty SAND (SM) trace gravel: yellow brown mottled grey; fine to coarse; fine to coarse gravel.		ALV	MD	M		ASS		0.50
									ASS		0.75
	3	1				D			ASS		1.00
		1.20	Clayey Gravelly SAND (SP-SC): grey mottled yellow brown; fine to coarse; fine, sub-angular to angular gravel.		ALV	D to VD	M		ASS		1.25
									ASS		1.50
									ASS		1.75
	2	1.90	Sandy GRAVEL (GP): grey mottled brown; fine, sub-angular to angular; fine to coarse sand.		ALV	D	M		ASS		2.00
▼ Free groundwater encountered at 2.5 m depth 01/05/26		2	2.40m: pale grey						ASS		2.25
							W		ASS		2.50
	1	3	Test Pit discontinued at 2.90m depth. Limit of Investigation.						ASS		2.75

TESTING AND REMARKS — TEST TYPE: DCP9/100; RESULTS AND REMARKS: 5, 10, 15

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Appendix D

Laboratory Report Sheets

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Dan Martin
Client	DOUGLAS PARTNERS PTY LTD
Address	NATIONAL ACCOUNTS PAYABLE PO BOX 472 WEST RYDE NSW 2114
Telephone	07 4055 1550
Facsimile	07 4055 1774
Email	dan.martin@douglaspartners.com.au
Project	**242245 Proposed Subdivision**
Order Number	(Not specified)
Samples	20

LABORATORY DETAILS

Manager	Jon Dicker
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
SGS Reference	**CE189139 R0**
Date Received	06 May 2026
Date Reported	12 May 2026

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146)

SIGNATORIES

Jon Dicker
Manager Northern QLD

Maristela GANZAN
Quality Manager

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE189139.001 Soil 01 May 2026 Pit 1 0.25m	CE189139.002 Soil 01 May 2026 Pit 1 0.75m	CE189139.003 Soil 01 May 2026 Pit 1 1.5m	CE189139.004 Soil 01 May 2026 Pit 2 0.25m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**14**	**7.6**	**6.7**	**14**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**4.8**	**5.6**	**6.2**	**4.8**
Titratable Actual Acidity	kg H2SO4/T	0.25	**2.1**	**0.49**	<0.25	**3.3**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**42**	**10**	<5	**67**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.07**	**0.02**	<0.01	**0.11**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.068**	**0.016**	<0.005	**0.11**
s-Net Acidity without ANC	%w/w S	0.005	**0.068**	**0.016**	**0.006**	**0.11**
a-Net Acidity	moles H+/T	5	**42**	**10**	<5	**69**
Liming Rate	kg CaCO3/T	0.1	**3.2**	**0.7**	<0.1	**5.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**42**	**10**	<5	**69**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**3.2**	**0.7**	<0.1	**5.2**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE189139.005 Soil 01 May 2026 Pit 2 0.5m	CE189139.006 Soil 01 May 2026 Pit 2 1.0m	CE189139.007 Soil 01 May 2026 Pit 3 0.5m	CE189139.008 Soil 01 May 2026 Pit 3 1.5m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**12**	**7.4**	**11**	**9.0**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**5.3**	**6.0**	**5.4**	**5.7**
Titratable Actual Acidity	kg H2SO4/T	0.25	**1.1**	<0.25	**0.67**	**0.31**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**22**	<5	**14**	**6**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.04**	<0.01	**0.02**	**0.01**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.036**	<0.005	**0.024**	**0.014**
s-Net Acidity without ANC	%w/w S	0.005	**0.036**	<0.005	**0.024**	**0.014**
a-Net Acidity	moles H+/T	5	**22**	<5	**15**	**9**
Liming Rate	kg CaCO3/T	0.1	**1.7**	<0.1	**1.1**	**0.7**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**22**	<5	**15**	**9**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**1.7**	<0.1	**1.1**	**0.7**

Parameter	Units	LOR	Sample Number: CE189139.009 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 0.25m	Sample Number: CE189139.010 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 1.25m	Sample Number: CE189139.011 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 1.75m	Sample Number: CE189139.012 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 2.25m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**14**	**7.7**	**7.8**	**11**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**4.7**	**6.0**	**5.5**	**5.4**
Titratable Actual Acidity	kg H2SO4/T	0.25	**2.3**	<0.25	**0.37**	**0.37**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**47**	<5	**7**	**7**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.08**	<0.01	**0.01**	**0.01**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.076**	<0.005	**0.014**	**0.012**
s-Net Acidity without ANC	%w/w S	0.005	**0.076**	<0.005	**0.014**	**0.012**
a-Net Acidity	moles H+/T	5	**47**	<5	**9**	**7**
Liming Rate	kg CaCO3/T	0.1	**3.6**	<0.1	**0.7**	**0.6**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**47**	<5	**9**	**7**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**3.6**	<0.1	**0.7**	**0.6**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE189139.013 Soil 01 May 2026 Pit 5 0.25m	CE189139.014 Soil 01 May 2026 Pit 5 0.75m	CE189139.015 Soil 01 May 2026 Pit 5 1.25m	CE189139.016 Soil 01 May 2026 Pit 5 1.75m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**14**	**8.5**	**8.0**	**8.6**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**4.7**	**5.9**	**5.7**	**5.8**
Titratable Actual Acidity	kg H2SO4/T	0.25	**2.6**	<0.25	<0.25	<0.25
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**54**	<5	<5	<5
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.09**	<0.01	<0.01	<0.01
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.088**	**0.010**	<0.005	**0.010**
s-Net Acidity without ANC	%w/w S	0.005	**0.088**	**0.010**	**0.008**	**0.010**
a-Net Acidity	moles H+/T	5	**55**	**6**	<5	**6**
Liming Rate	kg CaCO3/T	0.1	**4.1**	**0.5**	<0.1	**0.5**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**55**	**6**	<5	**6**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**4.1**	**0.5**	<0.1	**0.5**

Parameter	Units	LOR	Sample Number: CE189139.017 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 5 2.5m	Sample Number: CE189139.018 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 6 0.5m	Sample Number: CE189139.019 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 6 2.0m	Sample Number: CE189139.020 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 6 2.75m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**13**	**11**	**8.2**	**15**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**5.5**	**5.5**	**5.4**	**5.5**
Titratable Actual Acidity	kg H2SO4/T	0.25	<0.25	**0.67**	**0.43**	**0.37**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	<5	**14**	**9**	**7**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	<0.01	**0.02**	**0.01**	**0.01**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	<0.005	**0.022**	**0.014**	**0.012**
s-Net Acidity without ANC	%w/w S	0.005	**0.006**	**0.022**	**0.014**	**0.012**
a-Net Acidity	moles H+/T	5	<5	**14**	**9**	**7**
Liming Rate	kg CaCO3/T	0.1	<0.1	**1.0**	**0.7**	**0.6**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	<5	**14**	**9**	**7**
Liming Rate without ANCBT	kg CaCO3/T	0.1	<0.1	**1.0**	**0.7**	**0.6**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Chromium Reducible Sulfur (CRS) **Method: ME-(AU)-[ENV]AN217**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chromium Reducible Sulfur (Scr)	LB154355	%	0.005	<0.005	0%	97%
Chromium Reducible Sulfur (Scr)	LB154355	moles H+/T	5	<5		

TAA (Titratable Actual Acidity) **Method: ME-(AU)-[ENV]AN219**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB154360	pH Units	-	6.2	0 - 1%	103%
Titratable Actual Acidity	LB154360	kg H2SO4/T	0.25	<0.25	12 - 22%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB154360	moles H+/T	5	<5	12 - 22%	108%
Titratable Actual Acidity (TAA) S%w/w	LB154360	%w/w S	0.01	<0.01	0 - 12%	108%

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN217	Dried pulped sample is mixed with acid and chromium metal in a rapid distillation unit to produce hydrogen sulfide (H2S) which is collected and titrated with iodine (I2(aq)) to measure SCR.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	Chromium Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated
NAD	No Asbestos Detected.	NA	Not Applicable

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

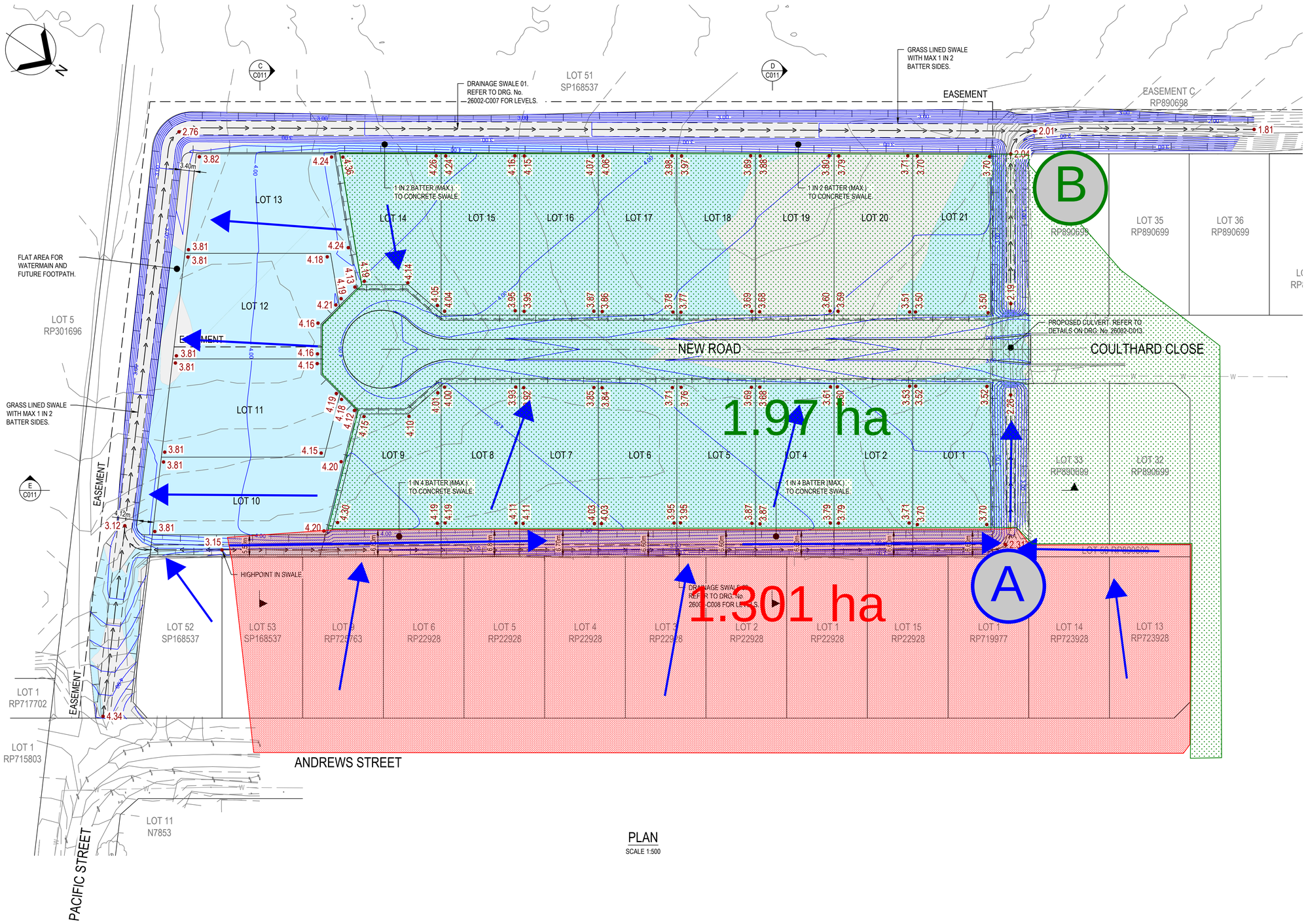
a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: https://www.sgs.com/en-au/industry/environmental-health-and-safety.

APPENDIX E

DATE PLOTTED: 22 May 2026 3:49 PM



PLAN
SCALE 1:500

LEGEND

EXISTING

- EXISTING LOT BOUNDARY
- EXISTING EASEMENT BOUNDARY
- 24.0 EXISTING SURFACE CONTOUR (0.5m INTERVALS)
- D EXISTING DRAINAGE PIPE
- S EXISTING SEWER LINE
- W EXISTING WATER LINE
- E EXISTING ELECTRICAL SERVICE
- C EXISTING COMMUNICATIONS SERVICE

PROPOSED

- NEW LOT BOUNDARY
- NEW EASEMENT BOUNDARY
- 24.0 DESIGN SURFACE CONTOUR (0.2m INTERVALS)
- 24.60 DESIGN FINISHED SURFACE LEVEL (FSL)
- 24.60 EXISTING SURFACE LEVEL (ESL)
- AREA OF CUT
- AREA OF FILL
- TOP OF BANK
- BOTTOM OF BANK

NOTES

1. REFER DRG 26002-C002 FOR STANDARD NOTES.

BEFORE YOU DIG www.byda.com.au

REV	DESCRIPTION	DRN	APP	DATE
0	FOR APPROVAL	MT	GA	22.05.2026

CERTIFICATION RPEQ
G. APPLIN 6073

APPLIN —— CONSULTING
M 0414 768 109 | E greg@applinconsulting.com.au

SCALES
1:500 0 5 10 15 20 25m

CLIENT
FAR NORTH DEVELOPMENT GROUP P/L
NEWELL BEACH DEVELOPMENT

DESIGNED M. TICKNER
DRAWN M. TICKNER
CHECKED G. APPLIN

PROJECT
LOT 51 COULTHARD CLOSE, NEWELL BEACH
DEVELOPMENT WORKS

TITLE
CATCHMENT INTERNAL

STATUS
FOR APPROVAL

SCALE (AT FULL SIZE) REFER PLAN
SIZE A1

DRAWING NUMBER
CATCHMENT

REVISION
0

CAD File: 26002-C009-C010 [EWKS].dwg

APPLIN —— CONSULTING

Hydrology Calculations

Project No.	26001
Calc's By	GA
Checked By	GB

Location

Newell Beach

Catchment Details:

Catchment Number: **A**

Catchment Area	=	A	=	1.301	ha
Length of Stream	=	L	=		km
Stream Slope	=	Se	=		%

Time of Concentration:

Friends Equation tc	=	14.7	min		min		min		min		min		min		min
Overland sheet flow path Length	=	40.0	m		m		m		m						
Horton's Roughness Factor	=	0.035													
Surface Slope	=	0.50	%		%		%		%						
Additional Roadside Channel flow	=	2.7	min		min		min		min		min		min		min
Channel Length	=	210	m		m		m		m		m		m		m
Channel Slope	=	0.40	%		%		%		%		%		%		%
Channel Vel. (assumed)	=	1.30	m/s		m/s		m/s		m/s		m/s		m/s		m/s

Calculated Time of Concentration	=	tc	=	17.4	mins
Adopted Time of Concentration	=	tc	=	18.0	mins

Runoff Coefficient:

Fraction Impervious	=	f_i	=	0.65	Table 4.5.1 QUDM - Fraction Impervious (Urban Residential Low Density exc roads)
1 hr rainfall Intensity for 10yr ARI	=	$^1I_{10}$	=	84.5	
10 yr Discharge Coefficient	=	C_{10}	=	0.83	Table 4.5.3 QUDM

				63% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Coefficient of Runoff	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00

Rainfall Intensity:

				63% (1yr)	39% (2yr)	18% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Intensity for Catchment tc (mm/hr)	=	^tI_y		91.1	99.7	125.5	142.2	158.0	178.0	192.6

Runoff Calculation:

The Rational Method formula is: $Q_y = (C_y \,.\, {}^tI_y \,.\, A)/360$

				63.2% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Runoff Coefficient	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00
Intesity for tc hours and y years	=	^tI_y	=	91.11	99.69	125.54	142.25	157.97	177.96	192.64
Catchment Area	=	A	=	1.301 ha						

				63.2% (1yr)	**50% (2yr)**	**20% (5 yr)**	**10% (10 yr)**	**5% (20 yr)**	**2% (50 yr)**	**1% (100 yr)**
Calculated Peak Flow Rate	=	Qy	=	0.217 m^3/s	0.256 m^3/s	0.358 m^3/s	0.427 m^3/s	0.497 m^3/s	0.611 m^3/s	0.696 m^3/s

APPLIN —— CONSULTING

Hydrology Calculations

Project No.	26001
Calc's By	GA
Checked By	GB

Location

Newell Beach - Point B

Catchment Details:

Catchment Number: **A and B**

Catchment Area	=	A	=	3.271	ha
Length of Stream	=	L	=		km
Stream Slope	=	Se	=		%

Time of Concentration:

Friends Equation tc	=	14.7	min		min		min		min						
Overland sheet flow path Length	=	40.0	m		m		m		m						
Horton's Roughness Factor	=	0.035													
Surface Slope	=	0.50	%		%		%		%						
Additional Roadside Channel flow	=	4.0	min		min		min		min		min		min		min
Channel Length	=	310	m		m		m		m		m		m		m
Channel Slope	=	0.40	%		%		%		%		%		%		%
Channel Vel. (assumed)	=	1.30	m/s		m/s		m/s		m/s		m/s		m/s		m/s

Calculated Time of Concentration	=	tc	=	18.7	mins
Adopted Time of Concentration	=	tc	=	19.0	mins

Runoff Coefficient:

Fraction Impervious	=	f_i	=	0.65	Table 4.5.1 QUDM - Fraction Impervious (Urban Residential Low Density exc roads)
1 hr rainfall Intensity for 10yr ARI	=	$^1I_{10}$	=	84.5	
10 yr Discharge Coefficient	=	C_{10}	=	0.83	Table 4.5.3 QUDM

				63% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Coefficient of Runoff	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00

Rainfall Intensity:

				63% (1yr)	39% (2yr)	18% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Intensity for Catchment tc (mm/hr)	=	^tI_y		89.2	97.6	122.9	139.3	154.7	174.2	188.6

Runoff Calculation:

The Rational Method formula is: $Q_y = (C_y \,.\, {}^tI_y \,.\, A)/360$

				63.2% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Runoff Coefficient	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00
Intesity for tc hours and y years	=	^tI_y	=	89.22	97.61	122.93	139.29	154.68	174.24	188.60
Catchment Area	=	A	=	3.271 ha						

				63.2% (1yr)	**50% (2yr)**	**20% (5 yr)**	**10% (10 yr)**	**5% (20 yr)**	**2% (50 yr)**	**1% (100 yr)**
Calculated Peak Flow Rate	=	Qy	=	0.535 m^3/s	0.630 m^3/s	0.882 m^3/s	1.050 m^3/s	1.223 m^3/s	1.504 m^3/s	1.714 m^3/s

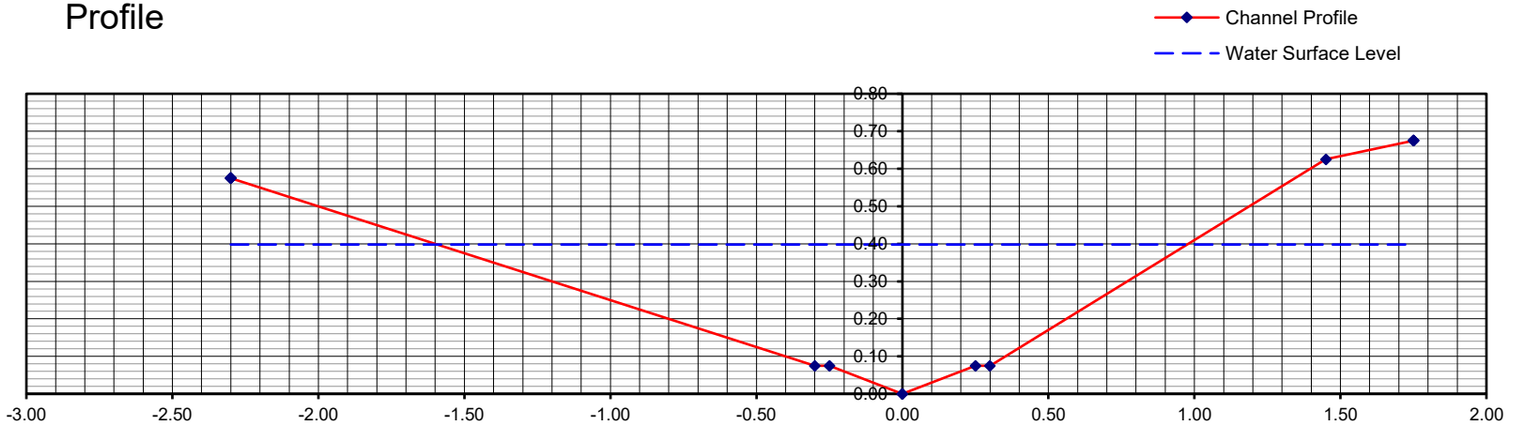
APPLIN —— CONSULTING

Channel Flow (Irregular shape)

Project No.	26001
Calc's By	GA
Checked By	GA

Location Newell Beach Swale Drain 02 - Point A

Profile



Depth of flow (m)	0.398
Slope (%)	0.400
I.L.	0.000
A	0.530
P	3.348
R	0.158
WSE	0.398

SECTION	Width	Height	n	A	H_1	H_2	W	P	A/P	Q	$n^{1.5}xP$	$A^{1.66}/P^{0.66}$	$A^{1.66}/P^{0.66}/n$
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.323	0.000	0.323	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.323	0.000	0.323	0.000	0.000	0.000	0.000	0.000
	2.000	0.500	0.030	0.209	0.000	0.323	1.292	1.332	0.157	0.128	0.007	0.061	2.021
	0.050	0.000	0.013	0.016	0.323	0.323	0.050	0.050	0.323	0.037	0.000	0.008	0.585
	0.250	0.075	0.013	0.090	0.323	0.398	0.250	0.261	0.345	0.216	0.000	0.044	3.412
Centre	0.000	0.000	0.013	0.000	0.398	0.398	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.013	0.000	0.398	0.398	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.250	0.075	0.013	0.090	0.323	0.398	0.250	0.261	0.345	0.216	0.000	0.044	3.412
	0.050	0.000	0.013	0.016	0.323	0.323	0.050	0.050	0.323	0.037	0.000	0.008	0.585
	1.150	0.550	0.030	0.109	0.000	0.323	0.675	0.749	0.146	0.064	0.004	0.030	1.007
	0.300	0.050	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.53						**0.697**	0.012	0.195	11.022

Calculated Design Flows		
Q100	0.697	m^3/s
		m^3/s
		m^3/s
		m^3/s

Recommended Freeboard Calc's		
Calc'd channel velocity	1.31	m/s
Minimum	0.30	m
20% channel depth	0.08	m
$V^2/2g$	0.09	m

Comments

Q100 flow is 696 l/s
Swale flows 398mm deep in a Q100 event
Drain is more than 1.2m deep - Freeboard is okay

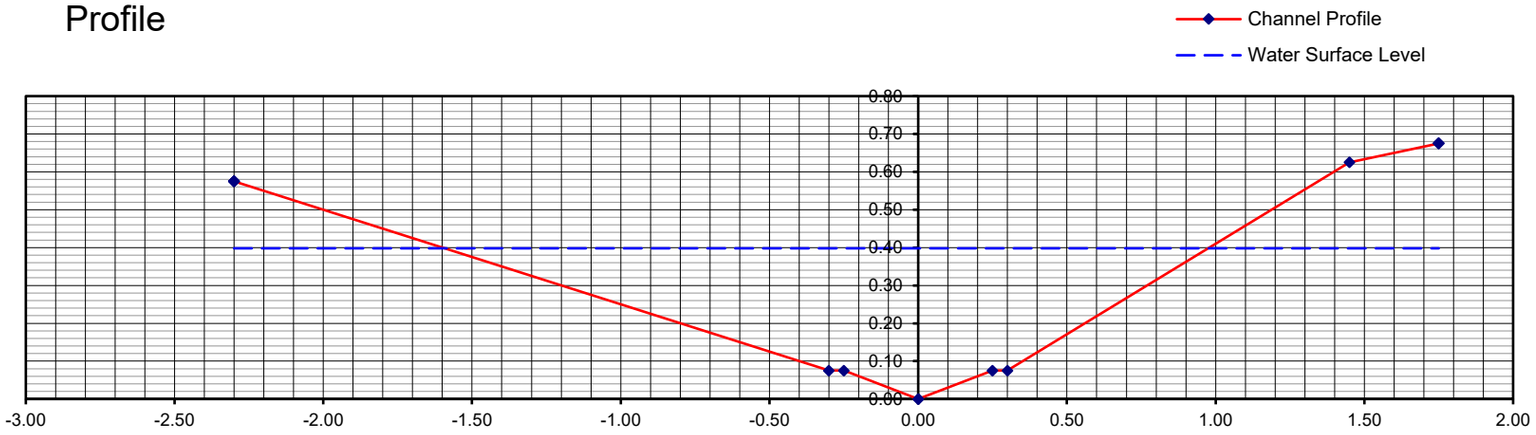
APPLIN —— CONSULTING

Channel Flow (Irregular shape)

Project No.	26001
Calc's By	GA
Checked By	GA

Location Newell Beach Swale Drain 02 - Point B

Profile



Depth of flow (m)	0.590
Slope (%)	0.400
I.L.	0.000
A	1.135
P	4.877
R	0.233
WSE	0.590

SECTION	Width	Height	n	A	H_1	H_2	W	P	A/P	Q	$n^{1.5}xP$	$A^{1.66}/P^{0.66}$	$A^{1.66}/P^{0.66}/n$
				0.000	0.015	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.015	0.515	0.000	0.500	0.000	0.000	0.000	0.000	0.000
				0.000	0.015	0.515	0.000	0.500	0.000	0.000	0.000	0.000	0.000
	2.000	0.500	0.030	0.530	0.015	0.515	2.000	2.062	0.257	0.452	0.011	0.214	7.143
	0.050	0.000	0.013	0.026	0.515	0.515	0.050	0.050	0.515	0.080	0.000	0.017	1.273
	0.250	0.075	0.013	0.138	0.515	0.590	0.250	0.261	0.529	0.440	0.000	0.090	6.951
Centre	0.000	0.000	0.013	0.000	0.590	0.590	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.013	0.000	0.590	0.590	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.250	0.075	0.013	0.138	0.515	0.590	0.250	0.261	0.529	0.440	0.000	0.090	6.951
	0.050	0.000	0.013	0.026	0.515	0.515	0.050	0.050	0.515	0.080	0.000	0.017	1.273
	1.150	0.550	0.030	0.277	0.000	0.515	1.077	1.194	0.232	0.221	0.006	0.105	3.493
	0.300	0.050	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				1.14						**1.713**	0.018	0.533	27.084

Calculated Design Flows		
Q100	1.713	m^3/s
		m^3/s
		m^3/s
		m^3/s

Recommended Freeboard Calc's		
Calc'd channel velocity	1.51	m/s
Minimum	0.30	m
20% channel depth	0.12	m
$V^2/2g$	0.12	m

Comments

Q100 flow is 1.714 m3/s
Swale flows 590mm deep in a Q100 event
Drain is more than 1.5m deep Freeboard is okay

DA Form 1 – Development application details

Approved form (version 1.6 effective 2 August 2024) made under section 282 of the Planning Act 2016.

This form **must** be used to make a development application **involving code assessment or impact assessment**, except when applying for development involving only building work.

For a development application involving **building work only**, use *DA Form 2 – Building work details*.

For a development application involving **building work associated with any other type of assessable development (i.e. material change of use, operational work or reconfiguring a lot)**, use this form (*DA Form 1*) **and** parts 4 to 6 of *DA Form 2 – Building work details*.

Unless stated otherwise, all parts of this form **must** be completed in full and all required supporting information **must** accompany the development application.

One or more additional pages may be attached as a schedule to this development application if there is insufficient space on the form to include all the necessary information.

This form and any other form relevant to the development application must be used to make a development application relating to strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994*, and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008.* For the purpose of assessing a development application relating to strategic port land and Brisbane core port land, any reference to a planning scheme is taken to mean a land use plan for the strategic port land, Brisbane port land use plan for Brisbane core port land, or a land use plan for airport land.

Note: *All terms used in this form have the meaning given under the Planning Act 2016, the Planning Regulation 2017, or the Development Assessment Rules (DA Rules).*

PART 1 – APPLICANT DETAILS

1) Applicant details	
Applicant name(s) (*individual or company full name*)	Far North Development Group P/L
Contact name *(only applicable for companies)*	C/- Greg Applin – Applin Consulting
Postal address *(P.O. Box or street address)*	19 Mullins Street
Suburb	Whitfield
State	QLD
Postcode	4870
Country	Australia
Contact number	0414 768 109
Email address *(non-mandatory)*	greg@applinconsulting.com.au
Mobile number *(non-mandatory)*	0414 768 109
Fax number *(non-mandatory)*	n/a
Applicant's reference number(s) *(if applicable)*	22014

1.1) Home-based business

☐ Personal details to remain private in accordance with section 264(6) of *Planning Act 2016*

2) Owner's consent

2.1) Is written consent of the owner required for this development application?

☐ Yes – the written consent of the owner(s) is attached to this development application
☒ No – proceed to 3)

PART 2 – LOCATION DETAILS

3) Location of the premises *(complete 3.1) or 3.2), and 3.3) as applicable)*

***Note**: Provide details below and attach a site plan for any or all premises part of the development application. For further information, see DA Forms Guide: Relevant plans.*

3.1) Street address and lot on plan

☐ Street address **AND** lot on plan (*all lots must be listed*), ***or***

☐ Street address **AND** lot on plan for an adjoining or adjacent property of the premises *(appropriate for development in water but adjoining or adjacent to land e.g. jetty, pontoon. All lots must be listed).*

a)	Unit No.	Street No.	Street Name and Type	Suburb
		2	Andrews Street	Newell Beach
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)
	4873	51	SP168537	Douglas Shire Council
b)	Unit No.	Street No.	Street Name and Type	Suburb
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)

3.2) Coordinates of premises *(appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land e.g. channel dredging in Moreton Bay)*

***Note**: Place each set of coordinates in a separate row.*

☐ Coordinates of premises by longitude and latitude

Longitude(s)	Latitude(s)	Datum	Local Government Area(s) *(if applicable)*
		☐ WGS84 ☐ GDA94 ☐ Other:	

☐ Coordinates of premises by easting and northing

Easting(s)	Northing(s)	Zone Ref.	Datum	Local Government Area(s) *(if applicable)*
		☐ 54 ☐ 55 ☐ 56	☐ WGS84 ☐ GDA94 ☐ Other:	

3.3) Additional premises

☐ Additional premises are relevant to this development application and the details of these premises have been attached in a schedule to this development application

☒ Not required

4) Identify any of the following that apply to the premises and provide any relevant details

☐ In or adjacent to a water body or watercourse or in or above an aquifer

Name of water body, watercourse or aquifer:

☐ On strategic port land under the *Transport Infrastructure Act 1994*

Lot on plan description of strategic port land:

Name of port authority for the lot:

☐ In a tidal area

Name of local government for the tidal area *(if applicable)*:

Name of port authority for tidal area *(if applicable)*

☐ On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*	
Name of airport:	
☐ Listed on the Environmental Management Register (EMR) under the *Environmental Protection Act 1994*	
EMR site identification:	
☐ Listed on the Contaminated Land Register (CLR) under the *Environmental Protection Act 1994*	
CLR site identification:	

5) Are there any existing easements over the premises?

Note: Easement uses vary throughout Queensland and are to be identified correctly and accurately. For further information on easements and how they may affect the proposed development, see DA Forms Guide.

☐ Yes – All easement locations, types and dimensions are included in plans submitted with this development application

☒ No

PART 3 – DEVELOPMENT DETAILS

Section 1 – Aspects of development

6.1) Provide details about the first development aspect

a) What is the type of development? *(tick only one box)*

☐ Material change of use ☐ Reconfiguring a lot ☒ Operational work ☐ Building work

b) What is the approval type? *(tick only one box)*

☒ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approval

c) What is the level of assessment?

☒ Code assessment ☐ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*:

20 Lot RoL (1 lot into 20 lots)

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms guide: Relevant plans.*

☒ Relevant plans of the proposed development are attached to the development application

6.2) Provide details about the second development aspect

a) What is the type of development? *(tick only one box)*

☐ Material change of use ☐ Reconfiguring a lot ☐ Operational work ☐ Building work

b) What is the approval type? *(tick only one box)*

☐ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approval

c) What is the level of assessment?

☐ Code assessment ☐ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*:

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*

☐ Relevant plans of the proposed development are attached to the development application

6.3) Additional aspects of development
☐ Additional aspects of development are relevant to this development application and the details for these aspects that would be required under Part 3 Section 1 of this form have been attached to this development application
☒ Not required
6.4) Is the application for State facilitated development?
☐ Yes - Has a notice of declaration been given by the Minister?
☐ No

Section 2 – Further development details

7) Does the proposed development application involve any of the following?	
Material change of use	☐ Yes – complete division 1 if assessable against a local planning instrument
Reconfiguring a lot	☐ Yes – complete division 2
Operational work	☒ Yes – complete division 3
Building work	☐ Yes – complete *DA Form 2 – Building work details*

Division 1 – Material change of use

***Note**: This division is only required to be completed if any part of the development application involves a material change of use assessable against a local planning instrument.*

8.1) Describe the proposed material change of use			
Provide a general description of the proposed use	Provide the planning scheme definition *(include each definition in a new row)*	Number of dwelling units *(if applicable)*	Gross floor area (m^2) *(if applicable)*

8.2) Does the proposed use involve the use of existing buildings on the premises?
☐ Yes
☐ No

8.3) Does the proposed development relate to temporary accepted development under the Planning Regulation?	
☐ Yes – provide details below or include details in a schedule to this development application	
☐ No	
Provide a general description of the temporary accepted development	Specify the stated period dates under the Planning Regulation

Division 2 – Reconfiguring a lot

***Note**: This division is only required to be completed if any part of the development application involves reconfiguring a lot.*

9.1) What is the total number of existing lots making up the premises?

9.2) What is the nature of the lot reconfiguration? *(tick all applicable boxes)*	
☐ Subdivision *(complete 10)*	☐ Dividing land into parts by agreement *(complete 11)*
☐ Boundary realignment *(complete 12)*	☐ Creating or changing an easement giving access to a lot from a constructed road *(complete 13)*

10) Subdivision				
10.1) For this development, how many lots are being created and what is the intended use of those lots:				
Intended use of lots created	Residential	Commercial	Industrial	Other, please specify:
Number of lots created				

10.2) Will the subdivision be staged?	
☐ Yes – provide additional details below ☐ No	
How many stages will the works include?	
What stage(s) will this development application apply to?	

11) Dividing land into parts by agreement – how many parts are being created and what is the intended use of the parts?				
Intended use of parts created	Residential	Commercial	Industrial	Other, please specify:
Number of parts created				

12) Boundary realignment			
12.1) What are the current and proposed areas for each lot comprising the premises?			
Current lot		Proposed lot	
Lot on plan description	Area (m^2)	Lot on plan description	Area (m^2)
12.2) What is the reason for the boundary realignment?			

13) What are the dimensions and nature of any existing easements being changed and/or any proposed easement? *(attach schedule if there are more than two easements)*				
Existing or proposed?	Width (m)	Length (m)	Purpose of the easement? *(e.g. pedestrian access)*	Identify the land/lot(s) benefitted by the easement

Division 3 – Operational work

***Note**: This division is only required to be completed if any part of the development application involves operational work.*

14.1) What is the nature of the operational work?		
☒ Road work	☒ Stormwater	☒ Water infrastructure
☒ Drainage work	☒ Earthworks	☐ Sewage infrastructure
☒ Landscaping	☐ Signage	☐ Clearing vegetation
☒ Other – please specify:	Electrical Reticulation and Lighting, Telecommunications	

14.2) Is the operational work necessary to facilitate the creation of new lots? *(e.g. subdivision)*	
☒ Yes – specify number of new lots:	21
☐ No	

14.3) What is the monetary value of the proposed operational work? *(include GST, materials and labour)*

$ 900,000

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application

Tablelands Regional Council

16) Has the local government agreed to apply a superseded planning scheme for this development application?

☐ Yes – a copy of the decision notice is attached to this development application
☐ The local government is taken to have agreed to the superseded planning scheme request – relevant documents attached
☒ No

PART 5 – REFERRAL DETAILS

17) Does this development application include any aspects that have any referral requirements?
***Note**: A development application will require referral if prescribed by the* Planning Regulation 2017.

☒ No, there are no referral requirements relevant to any development aspects identified in this development application – proceed to Part 6

Matters requiring referral to the **Chief Executive of the *Planning Act 2016***:

☐ Clearing native vegetation
☐ Contaminated land *(unexploded ordnance)*
☐ Environmentally relevant activities (ERA) *(only if the ERA has not been devolved to a local government)*
☐ Fisheries – aquaculture
☐ Fisheries – declared fish habitat area
☐ Fisheries – marine plants
☐ Fisheries – waterway barrier works
☐ Hazardous chemical facilities
☐ Heritage places – Queensland heritage place *(on or near a Queensland heritage place)*
☐ Infrastructure-related referrals – designated premises
☐ Infrastructure-related referrals – state transport infrastructure
☐ Infrastructure-related referrals – State transport corridor and future State transport corridor
☐ Infrastructure-related referrals – State-controlled transport tunnels and future state-controlled transport tunnels
☐ Infrastructure-related referrals – near a state-controlled road intersection
☐ Koala habitat in SEQ region – interfering with koala habitat in koala habitat areas outside koala priority areas
☐ Koala habitat in SEQ region – key resource areas
☐ Ports – Brisbane core port land – near a State transport corridor or future State transport corridor
☐ Ports – Brisbane core port land – environmentally relevant activity (ERA)
☐ Ports – Brisbane core port land – tidal works or work in a coastal management district
☐ Ports – Brisbane core port land – hazardous chemical facility
☐ Ports – Brisbane core port land – taking or interfering with water
☐ Ports – Brisbane core port land – referable dams
☐ Ports – Brisbane core port land – fisheries
☐ Ports – Land within Port of Brisbane's port limits *(below high-water mark)*
☐ SEQ development area
☐ SEQ regional landscape and rural production area or SEQ rural living area – tourist activity or sport and recreation activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – community activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – indoor recreation
☐ SEQ regional landscape and rural production area or SEQ rural living area – urban activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – combined use
☐ SEQ northern inter-urban break – tourist activity or sport and recreation activity

☐ SEQ northern inter-urban break – community activity
☐ SEQ northern inter-urban break – indoor recreation
☐ SEQ northern inter-urban break – urban activity
☐ SEQ northern inter-urban break – combined use
☐ Tidal works or works in a coastal management district
☐ Reconfiguring a lot in a coastal management district or for a canal
☐ Erosion prone area in a coastal management district
☐ Urban design
☐ Water-related development – taking or interfering with water
☐ Water-related development – removing quarry material *(from a watercourse or lake)*
☐ Water-related development – referable dams
☐ Water-related development –levees *(category 3 levees only)*
☐ Wetland protection area

Matters requiring referral to the **local government:**

☐ Airport land
☐ Environmentally relevant activities (ERA) (*only if the ERA has been devolved to local government)*
☐ Heritage places – Local heritage places

Matters requiring referral to the **Chief Executive of the distribution entity or transmission entity:**

☐ Infrastructure-related referrals – Electricity infrastructure

Matters requiring referral to:

- The **Chief Executive of the holder of the licence**, if not an individual
- The **holder of the licence**, if the holder of the licence is an individual

☐ Infrastructure-related referrals – Oil and gas infrastructure

Matters requiring referral to the **Brisbane City Council:**

☐ Ports – Brisbane core port land

Matters requiring referral to the **Minister responsible for administering the *Transport Infrastructure Act 1994*:**

☐ Ports – Brisbane core port land *(where inconsistent with the Brisbane port LUP for transport reasons)*
☐ Ports – Strategic port land

Matters requiring referral to the **relevant port operator**, if applicant is not port operator**:**

☐ Ports – Land within Port of Brisbane's port limits *(below high-water mark)*

Matters requiring referral to the **Chief Executive of the relevant port authority:**

☐ Ports – Land within limits of another port *(below high-water mark)*

Matters requiring referral to the **Gold Coast Waterways Authority:**

☐ Tidal works or work in a coastal management district *(in Gold Coast waters)*

Matters requiring referral to the **Queensland Fire and Emergency Service:**

☐ Tidal works or work in a coastal management district *(involving a marina (more than six vessel berths))*

18) Has any referral agency provided a referral response for this development application?

☐ Yes – referral response(s) received and listed below are attached to this development application
☒ No

Referral requirement	Referral agency	Date of referral response

Identify and describe any changes made to the proposed development application that was the subject of the referral response and this development application, or include details in a schedule to this development application *(if applicable).*

PART 6 – INFORMATION REQUEST

19) Information request under the DA Rules

☒ I agree to receive an information request if determined necessary for this development application

☐ I do not agree to accept an information request for this development application

***Note**: By not agreeing to accept an information request I, the applicant, acknowledge:*

- *that this development application will be assessed and decided based on the information provided when making this development application and the assessment manager and any referral agencies relevant to the development application are not obligated under the DA Rules to accept any additional information provided by the applicant for the development application unless agreed to by the relevant parties*
- *Part 3 under Chapter 1 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules or*
- *Part 2under Chapter 2 of the DA Rules will still apply if the application is for state facilitated development*

Further advice about information requests is contained in the DA Forms Guide.

PART 7 – FURTHER DETAILS

20) Are there any associated development applications or current approvals? *(e.g. a preliminary approval)*

☒ Yes – provide details below or include details in a schedule to this development application

☐ No

List of approval/development application references	Reference number	Date	Assessment manager
☒ Approval ☐ Development application	ROL 2021_4160/1	27.09.2022	Douglas Shire Council
☐ Approval ☐ Development application			

21) Has the portable long service leave levy been paid? *(only applicable to development applications involving building work or operational work)*

☐ Yes – a copy of the receipted QLeave form is attached to this development application

☒ No – I, the applicant will provide evidence that the portable long service leave levy has been paid before the assessment manager decides the development application. I acknowledge that the assessment manager may give a development approval only if I provide evidence that the portable long service leave levy has been paid

☐ Not applicable *(e.g. building and construction work is less than $150,000 excluding GST)*

Amount paid	Date paid (dd/mm/yy)	QLeave levy number (A, B or E)
$		

22) Is this development application in response to a show cause notice or required as a result of an enforcement notice?

☐ Yes – show cause or enforcement notice is attached

☒ No

23) Further legislative requirements

Environmentally relevant activities

23.1) Is this development application also taken to be an application for an environmental authority for an **Environmentally Relevant Activity (ERA)** under section 115 of the *Environmental Protection Act 1994*?

☐ Yes – the required attachment (form ESR/2015/1791) for an application for an environmental authority accompanies this development application, and details are provided in the table below

☒ No

***Note**: Application for an environmental authority can be found by searching "ESR/2015/1791" as a search term at www.qld.gov.au. An ERA requires an environmental authority to operate. See www.business.qld.gov.au for further information.*

Proposed ERA number:		Proposed ERA threshold:	
Proposed ERA name:			

☐ Multiple ERAs are applicable to this development application and the details have been attached in a schedule to this development application.

Hazardous chemical facilities

23.2) Is this development application for a **hazardous chemical facility**?

☐ Yes – *Form 536: Notification of a facility exceeding 10% of schedule 15 threshold* is attached to this development application

☒ No

***Note**: See www.business.qld.gov.au for further information about hazardous chemical notifications.*

Clearing native vegetation

23.3) Does this development application involve **clearing native vegetation** that requires written confirmation that the chief executive of the *Vegetation Management Act 1999* is satisfied the clearing is for a relevant purpose under section 22A of the *Vegetation Management Act 1999*?

☐ Yes – this development application includes written confirmation from the chief executive of the *Vegetation Management Act 1999* (s22A determination)

☒ No

***Note**: 1. Where a development application for operational work or material change of use requires a s22A determination and this is not included, the development application is prohibited development.*

2. See https://www.qld.gov.au/environment/land/vegetation/applying for further information on how to obtain a s22A determination.

Environmental offsets

23.4) Is this development application taken to be a prescribed activity that may have a significant residual impact on a **prescribed environmental matter** under the *Environmental Offsets Act 2014*?

☐ Yes – I acknowledge that an environmental offset must be provided for any prescribed activity assessed as having a significant residual impact on a prescribed environmental matter

☒ No

***Note**: The environmental offset section of the Queensland Government's website can be accessed at www.qld.gov.au for further information on environmental offsets.*

Koala habitat in SEQ Region

23.5) Does this development application involve a material change of use, reconfiguring a lot or operational work which is assessable development under Schedule 10, Part 10 of the Planning Regulation 2017?

☐ Yes – the development application involves premises in the koala habitat area in the koala priority area

☐ Yes – the development application involves premises in the koala habitat area outside the koala priority area

☒ No

***Note**: If a koala habitat area determination has been obtained for this premises and is current over the land, it should be provided as part of this development application. See koala habitat area guidance materials at www.desi.qld.gov.au for further information.*

Water resources

23.6) Does this development application involve **taking or interfering with underground water through an artesian or subartesian bore, taking or interfering with water in a watercourse, lake or spring, or taking overland flow water under the *Water Act 2000***?

☐ Yes – the relevant template is completed and attached to this development application and I acknowledge that a relevant authorisation or licence under the *Water Act 2000* may be required prior to commencing development

☒ No

***Note**: Contact the Department of Resources at www.resources.qld.gov.au for further information.*

DA templates are available from planning.statedevelopment.qld.gov.au. If the development application involves:

- *Taking or interfering with underground water through an artesian or subartesian bore: complete DA Form 1 Template 1*
- *Taking or interfering with water in a watercourse, lake or spring: complete DA Form1 Template 2*
- *Taking overland flow water: complete DA Form 1 Template 3.*

Waterway barrier works

23.7) Does this application involve **waterway barrier works?**

☐ Yes – the relevant template is completed and attached to this development application

☒ No

DA templates are available from planning.statedevelopment.qld.gov.au. For a development application involving waterway barrier works, complete DA Form 1 Template 4.

Marine activities

23.8) Does this development application involve **aquaculture, works within a declared fish habitat area or removal, disturbance or destruction of marine plants?**

☐ Yes – an associated *resource* allocation authority is attached to this development application, if required under the *Fisheries Act 1994*

☒ No

***Note**: See guidance materials at www.daf.qld.gov.au for further information.*

Quarry materials from a watercourse or lake

23.9) Does this development application involve the **removal of quarry materials from a watercourse or lake** under the *Water Act 2000?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development

☒ No

***Note**: Contact the Department of Resources at www.resources.qld.gov.au and www.business.qld.gov.au for further information.*

Quarry materials from land under tidal waters

23.10) Does this development application involve the **removal of quarry materials from land under tidal water** under the *Coastal Protection and Management Act 1995?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development

☒ No

***Note**: Contact the Department of Environment, Science and Innovation at www.desi.qld.gov.au for further information.*

Referable dams

23.11) Does this development application involve a **referable dam** required to be failure impact assessed under section 343 of the *Water Supply (Safety and Reliability) Act 2008* (the Water Supply Act)?

☐ Yes – the 'Notice Accepting a Failure Impact Assessment' from the chief executive administering the Water Supply Act is attached to this development application

☒ No

***Note**: See guidance materials at www.resources.qld.gov.au for further information.*

Tidal work or development within a coastal management district

23.12) Does this development application involve **tidal work or development in a coastal management district**?

☐ Yes – the following is included with this development application:
- ☐ Evidence the proposal meets the code for assessable development that is prescribed tidal work *(only required if application involves prescribed tidal work)*
- ☐ A certificate of title

☒ No

***Note**: See guidance materials at www.desi.qld.gov.au for further information.*

Queensland and local heritage places

23.13) Does this development application propose development on or adjoining a place entered in the **Queensland heritage register** or on a place entered in a local government's **Local Heritage Register**?

☐ Yes – details of the heritage place are provided in the table below

☒ No

***Note**: See guidance materials at www.desi.qld.gov.au for information requirements regarding development of Queensland heritage places.*

For a heritage place that has cultural heritage significance as a local heritage place and a Queensland heritage place, provisions are in place under the Planning Act 2016 that limit a local categorising instrument from including an assessment benchmark about the effect or impact of, development on the stated cultural heritage significance of that place. See guidance materials at www.planning.statedevelopment.qldgov.au for information regarding assessment of Queensland heritage places.

Name of the heritage place:		Place ID:	

Decision under section 62 of the *Transport Infrastructure Act 1994*

23.14) Does this development application involve new or changed access to a state-controlled road?

☐ Yes – this application will be taken to be an application for a decision under section 62 of the *Transport Infrastructure Act 1994* (subject to the conditions in section 75 of the *Transport Infrastructure Act 1994* being satisfied)

☒ No

Walkable neighbourhoods assessment benchmarks under Schedule 12A of the Planning Regulation

23.15) Does this development application involve reconfiguring a lot into 2 or more lots in certain residential zones (except rural residential zones), where at least one road is created or extended?

☒ Yes – Schedule 12A is applicable to the development application and the assessment benchmarks contained in schedule 12A have been considered

☐ No

***Note**: See guidance materials at www.planning.statedevelopment.qld.gov.au for further information.*

PART 8 – CHECKLIST AND APPLICANT DECLARATION

24) Development application checklist

I have identified the assessment manager in question 15 and all relevant referral requirement(s) in question 17 ***Note**: See the Planning Regulation 2017 for referral requirements*	☒ Yes
If building work is associated with the proposed development, Parts 4 to 6 of *DA Form 2 – Building work details* have been completed and attached to this development application	☐ Yes ☒ Not applicable
Supporting information addressing any applicable assessment benchmarks is with the development application ***Note**: This is a mandatory requirement and includes any relevant templates under question 23, a planning report and any technical reports required by the relevant categorising instruments (e.g. local government planning schemes, State Planning Policy, State Development Assessment Provisions). For further information, see DA Forms Guide: Planning Report Template.*	☒ Yes
Relevant plans of the development are attached to this development application ***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*	☒ Yes
The portable long service leave levy for QLeave has been paid, or will be paid before a development permit is issued *(see 21)*	☒ Yes ☐ Not applicable

25) Applicant declaration
☒ By making this development application, I declare that all information in this development application is true and correct ☒ Where an email address is provided in Part 1 of this form, I consent to receive future electronic communications from the assessment manager and any referral agency for the development application where written information is required or permitted pursuant to sections 11 and 12 of the *Electronic Transactions Act 2001* ***Note**: It is unlawful to intentionally provide false or misleading information.*
Privacy – Personal information collected in this form will be used by the assessment manager and/or chosen assessment manager, any relevant referral agency and/or building certifier (including any professional advisers which may be engaged by those entities) while processing, assessing and deciding the development application. All information relating to this development application may be available for inspection and purchase, and/or published on the assessment manager's and/or referral agency's website. Personal information will not be disclosed for a purpose unrelated to the *Planning Act 2016*, Planning Regulation 2017 and the DA Rules except where: • such disclosure is in accordance with the provisions about public access to documents contained in the *Planning Act 2016* and the Planning Regulation 2017, and the access rules made under the *Planning Act 2016* and Planning Regulation 2017; or • required by other legislation (including the *Right to Information Act 2009*); or • otherwise required by law. This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002.*

PART 9 – FOR COMPLETION OF THE ASSESSMENT MANAGER – FOR OFFICE USE ONLY

Date received: | Reference number(s):

Notification of engagement of alternative assessment manager	
Prescribed assessment manager	
Name of chosen assessment manager	
Date chosen assessment manager engaged	
Contact number of chosen assessment manager	
Relevant licence number(s) of chosen assessment manager	

QLeave notification and payment *Note: For completion by assessment manager if applicable*			
Description of the work			
QLeave project number			
Amount paid ($)		Date paid (dd/mm/yy)	
Date receipted form sighted by assessment manager			
Name of officer who sighted the form			

Operational Works Receipting Checklist

(To be completed by Consulting engineer making the application)

Name of Council: Douglas SHire Council

Development Name and Location: 2 Andrews Street, Newell

Planning Permit No/Council File No: ..... ROL 2021_4160/1 .....

DESIGN SUBMISSION	CHECK	COMMENT
1. Completed 'Statement of Compliance' form. (FNQROC - AP1 – Appendix A)	Y	
2. IDAS Forms A ,E & IDAS Assessment Checklist (Available from www.ipa.qld.gov.au)	N	IDAS Form 1 attached
3. Payment of Engineering Application Fees (Copy of receipt to be attached)	N	These will be paid upon receipt of Council's Tax Invoice for $ 15,694 as detailed in the covering letter
4. Copy of Decision Notice for Development Application Conditions, inc. explanation of how each condition is to be addressed (Statement of Compliance)	Y	
5. Engineering Design drawings - Complete sets (1 x A1 set, 2 x A3 sets and 1 x electronic copy on compact disc in 'PDF' format)	N	A set of drawing in PDF format are attached
6. One copy of Design and Standard Specifications (Unbound Copy Preferable)	N	As per FNQROC Development Manual as shown on the drawings
7. Written consent from adjoining property owners authorising any works on their property	N.A.	
8. Water reticulation network in electronic format (Engineer to confirm system requirements and compatibility with Cairns Water)	Y	
9. Landscape drawings - Complete set (1 x A1 set, 2 x A3 sets and 1 x electronic copy on compact disc in 'PDF' format). These must be accompanied by elements of the stormwater & street ltg. layout design, to avoid conflicts.	Y	Included with submission By Suzan Quigg

DESIGN SUBMISSION	CHECK	COMMENT
10. Overall network drawings (for staged development) for:	N/A	
• Water	Y	
• Stormwater	Y	
• Sewer	N/A	
• Pathways and roads	Y	
• Street Lighting	Y	
• Electrical	Y	
• Gas	N/A	
• Public Transport	N/A	
• Park Reserves	N/A	
• Drainage Reserves	Y	
11. Pavement design criteria	Y	
12. Geotechnical reports for proposed earthworks	Y	ASS REPORT
13. Structural and geotechnical certificates for retaining walls etc.	N/A	
14. Water supply/sewerage pump station design parameters	N.A.	
15. Stormwater drainage calculations	Y	
16. Erosion and Sediment Control Strategy (ESCS)	Y	
17. Declared Pest Management Plan (if applicable)	N.A.	
18. The approval of any other Authorities & concurrence agencies likely to be affected by the works.	N.A.	

19. Contact details of the Consulting Engineer who is submitting the Application:

Name of Engineer	Gregory M Applin	
Name of Company	Applin Consulting Pty. Ltd.	
Telephone Number (s)	Office:	Mobile: 0414 768 109
Email address	greg@applinconsulting.com.au	
RPEQ No.	06073	

20. Date of submission of application …30 / 05 / 2026 ….

(For further information on all of the above refer to the FNQROC Development Manual Section AP1)

FNQROC DEVELOPMENT MANUAL

Council Douglas Shire Council
(INSERT COUNCIL NAME)

STATEMENT OF COMPLIANCE
OPERATIONAL WORKS DESIGN

This form duly completed and signed by an authorised agent of the Designer shall be submitted with the Operational Works Application for Council Approval.

Name of Development Newell Beach

Location of Development 2 Andrews Street Newell

Applicant Far North Development Group

Designer Applin Consulting

It is hereby certified that the Calculations, Drawings, Specifications and related documents submitted herewith have been prepared, checked and amended in accordance with the requirements of the FNQROC Development Manual and that the completed works comply with the requirements therein, **except** as noted below.

Compliance with the requirements of the Operational Works Design Guidelines	Non-Compliance refer to non-compliance report / drawing number
Plan Presentation	Yes
Geotechnical requirements	Yes
Geometric Road Design	Yes
Pavements	Yes
Structures / Bridges	N/A
Subsurface Drainage	N/A
Stormwater Drainage	Yes
Site Re-grading	Yes
Erosion Control and Stormwater Management	Yes
Pest Plant Management	N/A
Cycleway / Pathways	N/A

Landscaping	Yes
Water Source and Disinfection/Treatment Infrastructure (if applicable)	N/A
Water Reticulation, Pump Stations and water storages	Yes
Sewer Reticulation and Pump Stations	N/A
Electrical Reticulation and Street Lighting	By Others
Public Transport	N/A
Associated Documentation/ Specification	As per FNQROC
Priced Schedule of Quantities	Yes
Referral Agency Conditions	N/A
Supporting Information (AP1.08)	Yes
Other	N/A

Conscientiously believing the above statements to be true and correct, signed on behalf of:

Designer Applin Consulting ..... **RPEQ No** 06073.....

Name in Full Gregory M Applin .....

Signature ..... **Date** 02/06/2026.....

DOUGLAS SHIRE COUNCIL

PO Box 723 Mossman Qld 4873
www.douglas.qld.gov.au
enquiries@douglas.qld.gov.au
ABN 71 241 237 800

Administration Office
64 - 66 Front St Mossman
P 07 4099 9444
F 07 4098 2902

27 September 2022

Enquiries: Neil Beck
Our Ref: ROL 2021_4160/1 (Doc ID 1110764)
Your Ref: 34678-001-01

F R Coulthard & C B Coulthard
C/- Brazier Motti Pty Ltd
PO Box 1185
CAIRNS QLD 4870

Email: cns.planning@braziermotti.com.au

Attention Mr Michael Tessaro

Dear Sir

Development Application for Reconfiguring a Lot (1 lot into 22 lots)
At 2 Andrews Street Newell
On Land Described as Lot 51 on SP168537

Please find attached the Decision Notice for the above-mentioned development application.

Please quote Council's application number: ROL 2021_4160/1 in all subsequent correspondence relating to this development application.

Should you require any clarification regarding this, please contact Neil Beck on telephone 07 4099 9444.

Yours faithfully

Paul Hoye
Manager Environment & Planning

encl.

- Decision Notice
  - Approved Drawing(s) and/or Document(s)
  - Reasons for Decision
- Advice For Making Representations and Appeals (Decision Notice)
- Adopted Infrastructure Charges Notice
- Advice For Making Representations and Appeals (Infrastructure Charges)

Decision Notice

Approval (with conditions)

Given under s 63 of the Planning Act 2016

Applicant Details

Name:	F R Coulthard & C B Coulthard
Postal Address:	C/- Brazier Motti Pty Ltd PO Box 1185 Cairns Qld 4870
Email:	cairns@braziermotti.com.au

Property Details

Street Address:	2 Andrews Street Newell
Real Property Description:	Lot 51 on SP168537
Local Government Area:	Douglas Shire Council

Details of Proposed Development

Development Permit for Reconfiguring a Lot (1 lot into 22 lots)

Decision

Date of Decision:	27 September 2022
Decision Details:	Approved (subject to conditions)

Approved Drawing(s) and/or Document(s) (Subject to the conditions of the approval.)

Copies of the following plans, specifications and/or drawings are enclosed.

The term 'approved drawing(s) and/or document(s) or other similar expressions means:

Drawing or Document	Reference	Date
Proposed Reconfiguration (Stage 1)	Plan No. 34678/003 Issue A	23/12/2020
Proposed Reconfiguration (Stage 1)	Plan No. 34678/004 Issue C	19/08/2022
Technical Report		
Newell Beach Flood Study prepared by Bligh Tanner.	Job No. 2021.0566	2/08/2022

Note – The plans referenced above will require amending in order to comply with conditions of this Decision Notice.

Assessment Manager Conditions & Advices

Assessment Manager Conditions

1. Carry out the approved development generally in accordance with the approved drawing(s) and/or document(s), and in accordance with:

   a. The specifications, facts and circumstances as set out in the application submitted to Council; and

   b. The following conditions of approval and the requirements of Council's Planning Scheme and the FNQROC Development Manual.

   Except where modified by these conditions of approval

Timing of Effect

2. The conditions of the Development Permit must be effected prior to the approval of the Plan of Survey, except where specified otherwise in these conditions of **approval.**

Lot Layout

3. The lot layout plan must be revised and provided to the satisfaction of the Chief Executive Officer prior to the lodgement of the application for operational work, generally in accordance with the Brazier Motti Plan No. 34678/004 Issue C dated 19 August 2022 and amended to detail:

   a. Allotments 8 – 13 to be reconfigured to provide less than 6 allotments to be endorsed by the Chief Executive Officer; and

   b. Provide a corridor to accommodate the water main to connect from Coulthard Close to Pacific Street as required by conditions of this Development Permit. The water main must be contained within an easement;

Water Supply Infrastructure Plan

4. A detailed Water Supply infrastructure plan and supporting information including hydraulic network analysis must be submitted demonstrating how the development will be serviced from Council's Infrastructure.

   The detailed Water Supply plan is to demonstrate the capacity of the existing network to service the development in accordance with the standards of service specified within the FNQROC Development Manual. In particular, the Masterplan must:

   a. identify the water supply network catchment or catchments that the development relies upon;

   b. provide a detailed hydraulic network analysis and supporting calculations which demonstrate any augmentations or upgrades required to existing water supply infrastructure to ensure the required standard of service is achieved for the development;

   c. identify the connection points and land tenure arrangements for new and existing infrastructure required to ensure an adequate standard of service is achieved for the development;

   d. Provide a loop main connecting Pacific Street to Coulthard Close to ensure adequate pressure and reliability of supply.

   The water supply infrastructure plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

Water Supply Works

5. A Development Approval for Operational Work must be obtained for the design and construction of all internal and external water supply infrastructure that is required to ensure an adequate standard of service is achieved for the development.

   As part of any such Development Application, evidence must be provided that the development does not adversely affect the water supply to external properties adjacent to the development.

   Water supply works required to ensure an adequate standard of service is achieved for the development must be designed and constructed at no cost to Council.

   All works must be carried out in accordance with the approved plans, to the requirements and satisfaction of the Chief Executive Officer prior to the issue of a Compliance Certificate for the Plan of Survey.

On-Site Effluent Disposal

6. The method of on-site effluent disposal must be in accordance with the Queensland Plumbing & Wastewater Code. Details of the wastewater treatment system to be installed must be approved by the Chief Executive Officer prior to the construction of dwellings on each of the proposed allotments.

Acid Sulfate Soil Investigation

7. Undertake an Acid Sulfate Soil investigation in the area to be affected by this development. Soil sampling and analysis must be undertaken in accordance with procedures specified in '*Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland' (1998)* or updated version of document produced by Department of Environment and Resource Management, (Previously DNRW – QASSIT), and State Planning Policy 2/02 – '*Planning and Managing Development involving Acid Sulfate Soils'*. The results of this investigation must be submitted to Council for approval prior to any earthworks or clearing being commenced on the site.

   Identification of soils with a pyrite content in excess of the action levels nominated in the latest version of DNRM – QASSIT: '*Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland' (1998)* will trigger the requirement for preparation of an Acid Sulfate Soil Environmental Management Plan in accordance with the most recent requirements of the DNRW: *'Queensland Acid Sulfate Soil Technical Manual'* (2002), including Soil Management Guidelines (updated Feb 2003), which must be prepared to the satisfaction of the Chief Executive Officer.

Drainage Study of Site

8. The development is to be undertaken in accordance with the findings and recommendations of the Bligh Tanner Report on Newell Beach Flood Study Dated 2 August 2022, except where modified by the conditions.

   The applicant is to undertake additional local drainage calculations and reporting for the design of the internal road and stormwater drainage system and for the rear allotment drains. The supporting calculations are to confirm that the peak flows from the shorter duration rainfall events are contained within the drains and drainage easements.

   In relation to the local drainage elements, the additional calculations are to determine the drainage impacts on upstream and downstream properties and the mitigation measures required to minimise such impacts. In particular, the further advice must address the following:

   a. The contributing catchment boundaries to the local drains;

   b. The depth, velocity and extent of the 100-year ARI peak runoff flows in the allotment catch drain post-development. Based on the drain operation, confirm the extent of the drainage easements;

c. Information on the proposed works and any impacts proposed at the drainage outlet from the proposed development.

d. Confirmation of the severe impact assessment for the scenario where the crossroad culverts are blocked.

The report on the local drainage elements must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

Earthworks

9. The development is to be undertaken generally in accordance with Civil Walker drawings 214-001-SK03 and SK04 (Revision 1) except as follows:

   a. Unless otherwise approved following the severe impact assessment findings and detailed flood calculations for local drains, the levels on lots 1, 2, 20 and 21 are to be amended as follows:

      i. Within 1m of the lot frontage the lot level must achieve a minimum earthworks level of 3.5m AHD. A small batter along the frontage of lots is to be provided to transition from the verge level to this minimum level.

      ii. The rear allotment level is to be a minimum of 3.7m AHD;

Demolish Structures

10. All structures not associated with the approved development (including disused services and utilities) must be demolished and/or removed from the subject land prior to the issue of a Compliance Certificate for the Plan of Survey.

Stockpiling and Transportation of Fill Material

11. Soil used for filling or spoil from the excavation is not to be stockpiled in locations that can be viewed from adjoining premises or a road frontage for any longer than one (1) month from the commencement of works.

    Transportation of fill or spoil to and from the site must not occur within:

    a. peak traffic times; or

    b. before 7:00 am or after 6:00 pm Monday to Friday; or

    c. before 7:00 am or after 1:00 pm Saturdays; or

    d. on Sundays or Public Holidays.

12. Dust emissions or other air pollutants must not extend beyond the boundary of the site and cause a nuisance to surrounding properties.

Storage of Machinery and Plant

13. The storage of any machinery, material and vehicles must not cause a nuisance to surrounding properties, to the satisfaction of the Chief Executive Officer.

Drainage Construction

14. The applicant / owner must undertake the development of the land in accordance with the findings of the Drainage Study dated 2 August 2022 prepared by Bligh Tanner and generally in accordance with Civil Walker drawings 214-001-SK03 and SK04 (Revision 1) except where modified by the conditions.

Drainage Easements

15. Drainage Easements as nominated in the Bligh Tanner Drainage Study, dated 2 August 2022, must be granted in favour of Council. A copy of the easement documents must be submitted to Council for the approval of Council's solicitors at no cost to Council. The approved easement documents must be submitted at the same time as seeking approval and dating of the Plan of Survey and must be lodged and registered with the Department of Resources. The easement document must nominate that the maintenance obligations for the easement resides with he respective property owners.

Lawful Point of Discharge

16. All stormwater from the property must be directed to a lawful point of discharge such that it does not adversely affect surrounding properties or properties downstream from the development to the requirements and satisfaction of the Chief Executive Officer.

Plan of Drainage Works

17. The subject land must be drained to the satisfaction of the Chief Executive Officer. In particular,

    a. Drainage infrastructure in accordance with the FNQROC Development Manual

    b. The drainage system from the development must incorporate a gross pollutant trap(s) or equivalent measure(s), meeting the following Council specifications for stormwater quality improvement devices (SQID), namely:

        i. End-of-line stormwater quality improvement devices (SQID) shall be of a proprietary design and construction and shall carry manufacturer's performance guarantees as to removal of foreign matter from stormwater and structural adequacy of the unit.

        ii. SQIDs shall remove at least ninety-five per cent of all foreign matter with a minimum dimension of three (3) mm and shall be configured to prevent re-injection of captured contaminants. The SQID treat all first flush runoff, which shall be defined as that volume of water equivalent to the runoff from the three (3) month ARI storm event. The location of SQIDs within the drainage system shall be planned to ensure that the first flush waters from all parts of the (developed) catchment are treated.

        iii. The design of the SQID shall not compromise the hydraulic performance of the overall drainage system.

        iv. SQIDs shall be positioned so as to provide appropriate access for maintenance equipment.

    c. All new allotments shall have immunity from flooding associated with an ARI 100 year rainfall event; and

    d. Where practical, all new allotments must be drained to the road frontages, drainage easements or drainage reserves and discharged to the existing drainage system via storm water quality device(s).

    e. The current earthworks concept on Civil Walker Drawing 214-001-SK03 drawings indicate the open drain at the rear of lots 1 to 9 to have a very flat grade in the order of 0.25%. This drain must be provided with a concrete invert for its full length. Detailed flow calculations must confirm that the drain profile can contain the 1%AEP runoff from the local catchment.

    The concrete invert must extend along the northern side of Lot 1 to the cross culvert apron, and must extend west from the culvert outlet to the western boundary of the easement in Lot 21.

Landscape Plan

18. Undertake landscaping of the site and street frontages of new roads in accordance with FNQROC Development Manual and in accordance with a landscape plan. The landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Work. In particular, the plan must show:

    a. Planting of the footpath with trees, using appropriate species with consideration to be given to creating an individual sense of place and character to the estate;

    b. The provision of suitable shade trees;

    c. Species to have regard to the Planning Scheme Policy No.SC6.7 Landscaping; and

    d. Road verges to be seeded and grassed with turf adjacent back of kerb and placed in strip at right angles to kerb;

    Permanent irrigation or any other embellishments are not permitted.

    Inclusion of all requirements as detailed in other relevant conditions included in this Approval, with a copy of this Development Approval to be given to the applicant's Landscape Architect / Designer.

    One (1) A3 copy of the landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works. Areas to be landscaped must be established prior to the lodgement of the Survey Plan with Council for endorsement and must be maintained for the duration of the on-maintenance period to the satisfaction of the Chief Executive Officer.

Sediment and Erosion Control

19. A sediment and erosion control plan must be submitted prior the issue of a Development Permit for Operational Works. Such plans must be installed / implemented prior to discharge of water from the site, such that no external stormwater flow from the site adversely affects surrounding or downstream properties (in accordance with the requirements of the *Environmental Protection Act 1994,* and the FNQROC Development Manual).

Existing Services

20. Written confirmation of the location of existing services for the land must be provided. In any instance where existing services are contained within another lot, the following applies, either:

    a. Relocate the services to comply with this requirement; or

    b. Arrange registration of necessary easements over services located within another lot prior to, or in conjunction with, the lodgement of a Compliance Certificate for the Plan of Survey creating the lot.

Electricity Supply

21. Written evidence from Ergon Energy advising if distribution substation/s are required within the development must be provided. If required, details regarding the location of these facilities must be submitted to the Chief Executive Officer accompanied by written confirmation from Ergon Energy. Details regarding electricity supply must be provided prior to the issue of a Development Permit for Operational Works.

Electricity and Telecommunications

22. Written evidence of negotiations with Ergon Energy and the telecommunication authority must be submitted to Council stating that both an underground electricity supply and telecommunications service will be provided to the development prior to the issue of a Compliance Certificate for the Plan of Survey.

Street Lighting

23. The following arrangements for the installation of street lighting within the proposed subdivision must be provided prior to the issue of a Compliance Certificate for the Plan of Survey:

    a. Prior to the issue of a development permit for Operational Works a Rate 2 lighting scheme is to be prepared by an Ergon Energy approved consultant and submitted to the Chief Executive Officer for approval. The Rate 2 lighting scheme is to be designed in accordance with the relevant Road Lighting Standard AS/NZS 1158 and the FNQROC Development Manual. The applicable lighting category is to be determined from the Road Hierarchy Table D1.1 and the corresponding applicable Lighting Categories Table D8.1 as identified in the FNQROC Development Manual.

    The lighting scheme must show light pole locations that align with property boundaries that represent the permitted design spacing and demonstrates no conflicts with stormwater, kerb inlet pits and other services.

    The design must provide the applicable illumination level specified in the Road Lighting Standard AS/NZS 1158 at the following road elements:

    - Intersections
    - Pedestrian Refuges
    - Cul-de-sacs
    - LATM Devices (Including Roundabouts)

    LATM Devices are to be shown on the civil layout design, the electrical services and street lighting design must be submitted in accordance with Ergon Energy's latest Distribution Design Drafting Standard.

    b. Prior to the issue of a Compliance Certificate for the Plan of Survey written confirmation that the relevant capital contribution required by Ergon Energy has been paid must be submitted, to ensure that the street lighting will be constructed.

Advices

1. This approval, granted under the provisions of the *Planning Act 2016*, shall lapse four (4) years from the day the approval takes effect in accordance with sections 85(1)(b) and 71 of the *Planning Act 2016*.

2. This approval does not negate the requirement for compliance with all relevant Local Laws and statutory requirements.

3. For information relating to the *Planning Act 2016*, log on to www.dsd.qld.gov.au . To access the FNQROC Development Manual, Local Laws and other applicable Policies log on to *www.douglas.qld.gov.au*.

Infrastructure Charges Notice

4. A charge levied for the supply of trunk infrastructure is payable to Council towards the provision of trunk infrastructure in accordance with the Infrastructure Charges Notice, refer to Attachment 3. The original Infrastructure Charges Notice will be provided under cover of a separate letter.

    The amount in the Infrastructure Charges Notice has been calculated according to Council's Infrastructure Charges Resolution. Please note that this Decision Notice and the Infrastructure Charges Notice are stand-alone documents. The *Planning Act 2016* confers rights to make representations and appeal in relation to a Decision Notice and an Infrastructure Charges Notice separately.

Further Development Permits

Please be advised that the following development permits are required to be obtained before the development can be carried out:

- All Operational Work

All Plumbing and Drainage Work must only be carried in compliance with the Queensland *Plumbing and Drainage Act 2018*.

Currency Period for the Approval

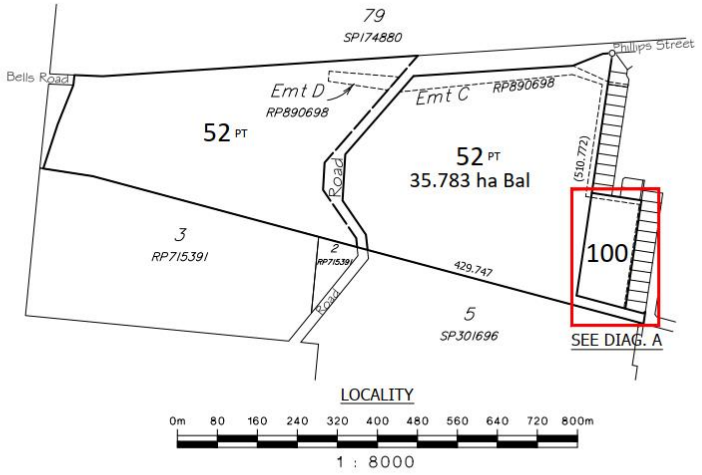
This approval, granted under the provisions of the *Planning Act 2016*, shall lapse four (4) years from the day the approval takes effect in accordance with the provisions of Section 85 of the *Planning Act 2016*.

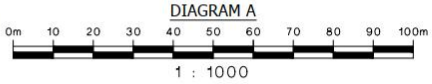
Rights to make Representations & Rights of Appeal

The rights of applicants to make representations and rights to appeal to a Tribunal or the Planning and Environment Court against decisions about a development application are set out in Chapter 6, Part 1 of the *Planning Act 2016.*

A copy of the relevant appeal provisions is attached.

Approved Drawing(s) and/or Document(s) (Subject to the conditions of the approval.)





PROPOSED
RECONFIGURATION (STAGE 1)

Lots 52 & 100
Cancelling Lot 51 on SP168537

Locality of Newell
Douglas Shire Council

Date: 23/12/2020	
Scale: 1:8000	A3
Drawn: WCHO	
Job No: 34678/1-1	
Plan No: 34678/003 A	

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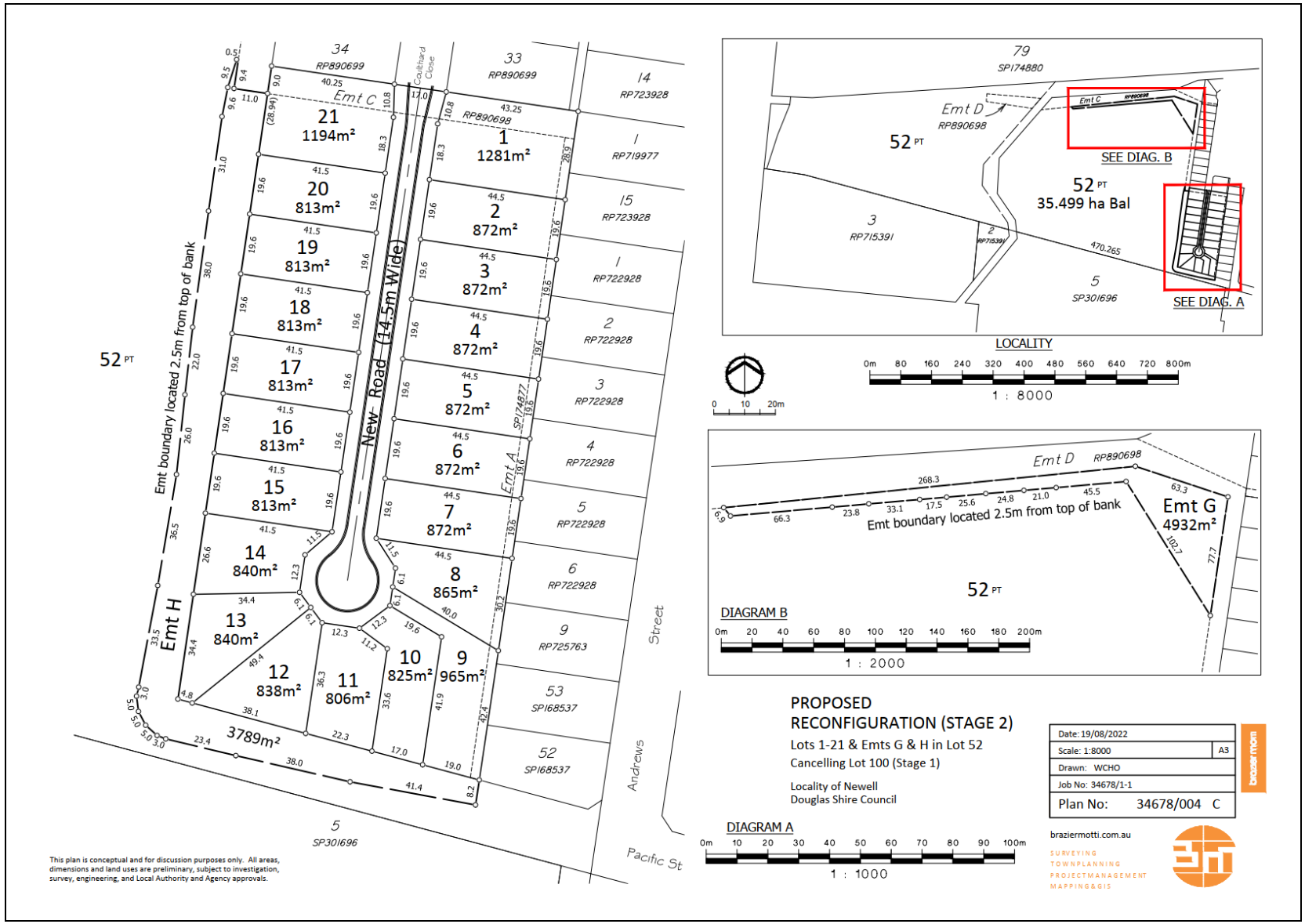
SURVEYING
TOWNPLANNING
PROJECTMANAGEMENT
MAPPING&GIS


PROPOSED
RECONFIGURATION (STAGE 2)
Lots 1-21 & Emts G & H in Lot 52
Cancelling Lot 100 (Stage 1)
Locality of Newell
Douglas Shire Council
Date: 19/08/2022
Scale: 1:8000
A3
Drawn: WCHO
Job No: 34678/1-1
Plan No: 34678/004 C
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SURVEYING
TOWNPLANNING
PROJECTMANAGEMENT
MAPPING&GIS
LOCALITY
1 : 8000
DIAGRAM A
1 : 1000
DIAGRAM B
1 : 2000
SEE DIAG. B
SEE DIAG. A
New Road (14.5m Wide)
Emt boundary located 2.5m from top of bank
Emt C
Emt D
Emt A
Emt G
4932m²
Emt H
3789m²
Coulthard Close
Andrews Street
Pacific St
This plan is conceptual and for discussion purposes only. All areas, dimensions and land uses are preliminary, subject to investigation, survey, engineering, and Local Authority and Agency approvals.

BLIGH TANNER

NEWELL BEACH FLOOD STUDY

TECHNICAL MEMORANDUM

Company. GLF Development Pty Ltd C/- CivilWalker Consulting Engineers
Contact. Daryl Walker
Date. 2 August 2022
Job Number # 2021.0566

DOCUMENT CONTROL SHEET

DOCUMENT

Newell Beach Flood Study

JOB NUMBER

2021.0566

PROJECT ENGINEER

Carlos Gambirazio

CLIENT

GLF Development Pty Ltd C/- CivilWalker Consulting Engineers

CLIENT CONTACT

Daryl Walker

VERSION	AUTHOR	REVIEWED	APPROVED	DATE
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FIGURES

TABLES

APPENDICES

EXECUTIVE SUMMARY

This report documents the findings of an overland flow flood study for a site adjacent to Coulthard Close, Newell Beach QLD 4873 (Lot 51 on SP168537), in response to a Douglas Shire Council Development Application Information Request dated 6 July 2021 (Council Reference ROL_2021_4160/1 (101890)).

Methodology

A 2D hydrodynamic flood model was developed using WBNM (hydrology) and TUFLOW (hydraulics) in accordance with Australian Rainfall and Runoff 2019. The flood model incorporates proposed cross-drainage infrastructure (culverts).

Three scenarios were assessed:

1. Existing Case Scenario
    a. Topography based on detailed site survey and LiDAR 1 m grid (Geoscience Australia, 2020),
    b. Surface parameters and hydrological model based on 2022 Aerial Imagery.
2. Developed Case Scenario
    a. Topography based proposed earthworks overlayed over the Existing Case Scenario topography (Refer Appendix B for bulk earthworks drawings).,
    b. Surface parameters and hydrological model based on a fully developed site assuming 60% impervious cover and proposed catchment diversions (associated with development grading and open channels surrounding the development footprint).
3. Developed Case Scenario Sensitivity Analysis
    a. Based on the Developed Case Scenario assuming open channels are not maintained, by increasing their Manning's 'n' value from 0.035 to 0.1.

Flood Impacts

Results indicate reductions in flood levels and flood extents south of the site, and at Philips Street towards the north.

Increases in flood levels and flood extents can be seen adjacent to the Coulthard Close culvert cross-over associated with the site's proposed internal road, however these are contained within the road corridor and do not encroach onto private properties. Minor increases in flood levels and extents at the culvert cross-over are due to the site's local catchment discharging at this location.

During the 1% AEP flood, maximum flood depths and flood hazard categories at the Coulthard Close culvert cross-over do not exceed 300 mm nor Category H1 (~0.1 m²/s), indicating flow conditions relatively safe for people and vehicles.

Building Floor Levels

Flood planning levels were informed by the Douglas Shire Planning Scheme Flood and Storm Tide Hazard Overlay Code, the FNQROC Development Manual, and the Queensland Urban Drainage Manual.

Results indicate that the dominant flood planning level at the site is the 1% AEP overland flow flood plus 300 mm freeboard, resulting in the following building floor level requirements:

- Upstream (south) site area – 3.8 m AHD
- Downstream (north) site area – 3.6 m AHD

Intermediate levels should be interpolated from these levels.

Maintenance Easement Requirements

As part of the proposed works, new drainage channels will be established and existing drainage channels widened, which will require corresponding establishment and widening of easements to permit access for works to be performed, secure a right for stormwater flows, and provide access for maintenance vehicles.

Easements for open channels will be established as per recommendations in Section 3.2.4 of QUDM and Section BN9.7 in the QUDM background notes, as follows:

- 4.5 m wide maintenance access track at one side of the top of bank of the channel,
- 1.5 m wide access strip at one side of the top of bank of the channel.

Due to geometric constraints, no maintenance easement will be established at the grassed channel east of the site (strip between the proposed development and adjacent properties). This has been reflected in the Developed Case Scenario flood model with a Manning's 'n' value of 0.1.

1 INTRODUCTION

This report documents the findings of a local drainage study for a site adjacent to Coulthard Close, Newell Beach QLD 4873 (Lot 51 on SP168537), in response to a Douglas Shire Council Development Application Information Request dated 6 July 2021 (Council Reference ROL_2021_4160/1 (101890)).

The proposed development comprises an urban residential low-density subdivision of 21 new lots with a central access road.

This report addresses:

- Site Context,
- Flood Modelling Methodology,
- Flood Results,
- Design Levels,
- Flood Impacts,
- Drainage Easement Recommendations.

2 SITE CONTEXT

2.1 Flooding

The existing site is undeveloped.

The development proposal comprises an urban residential low-density subdivision of 21 new lots with a central access place.

The existing lot is affected by the 1% AEP storm tide flood at the year 2100 (as per the Douglas Shire Council Storm Tide Inundation Property Report, as seen in Appendix N), with a flood level of approximately 2.8 m AHD. The storm tide flood does not encroach onto the proposed subdivision.

The site is protected from higher storm tide flood levels by a coastal embankment towards the east.

Refer Figure 1 below for an image of the site as affected by the 1% AEP storm tide flood at the year 2100.

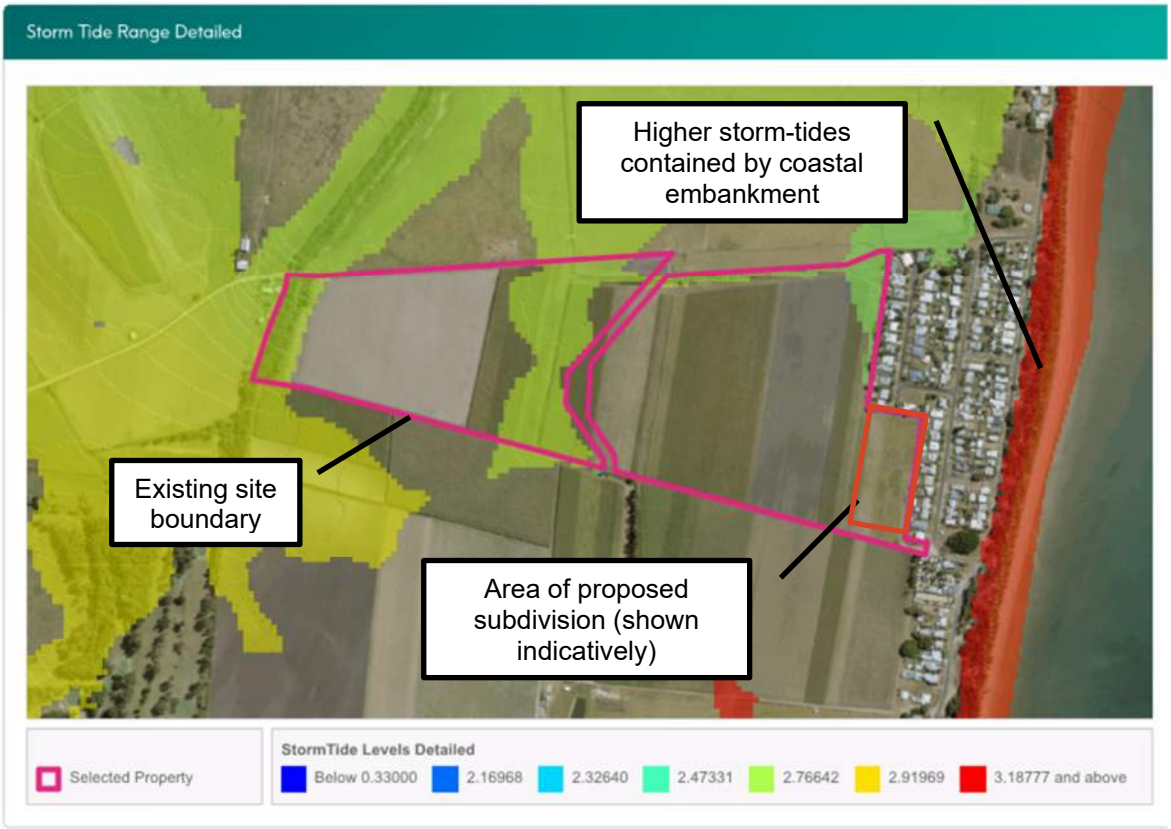


Figure 1 **1% AEP at year 2100 storm tide level – Adopted as flood model tail water level – Douglas Shire Council Storm Tide Inundation Property Report – Produce 14/07/2021**

3 FLOOD MODELLING METHODOLOGY

3.1 Hydrology

Hydrological analysis was undertaken on WBNM to assess storm flows associated with the local overland flow path catchments.

The total catchment was demarcated based on contributing runoff to the Saltwater Creek outlet, resulting in a total catchment area of 624 hectares.

3.1.1 Design Scenarios

Two hydrological models were developed to represent existing and proposed conditions.

Existing Case scenario sub-catchment division and impervious percentages were defined via interpretation of LiDAR topographic information, aerial imagery, defined flow paths and drainage infrastructure.

Developed Case scenario sub-catchment division and impervious percentages were based on the Existing Case scenario, amended to incorporate the development footprint (assuming 60% impervious cover) and proposed catchment modifications.

Refer Appendix A for Existing Case and Developed Case catchments plans.

3.1.2 Storm Selection

Rainfall information and temporal patterns relevant to the site's latitude, longitude and area were extracted from the Bureau of Meteorology IFD website and the Australian Rainfall and Runoff 2019 (ARR 2019) datahub, respectively.

This information was then input into a storm selection process that consisted of analysing 10 temporal patterns for every AEP and duration, including non-standard ones.

Storm durations producing the highest peak flows at the downstream end of the site (Catchment 6 outlet for the Existing Case / Catchment 6A outlet for the Developed Case) were adopted as critical.

Temporal patterns producing peak flows just above the mean were selected for the critical storm durations.

The process of storm and temporal pattern analysis was facilitated by the software application "Storm Injector", designed to help implement and streamline the new requirements of ARR2019.

Critical storm durations are summarised in Table 1 below.

Table 1 Critical Storm Durations

Event	Downstream of Site (adopted for flood model)	Saltwater Creek Outlet (Larger regional catchment)
1% AEP ('1 in 100-year')	1.5 hours	3 hours
10% AEP ('1 in 10-year')	1.5 hours	3 hours
20% AEP ('1 in 5-year')	1.5 hours	3 hours

3.1.3 Rainfall Losses

Rainfall losses were adopted as per recommendations in the Australian Rainfall and Runoff 2019 (ARR 2019) ((Commonwealth of Australia (Geoscience Australia), 2019):

- Global Initial Loss – 61 mm (as per ARR19 DataHub)
- Indirectly Connected Area Initial Loss – 42.7 mm (70% of Global Initial Loss as per Section 3.5.3.2.1 of ARR 2019, Book 5, Chapter 3) – It was assumed all pervious areas act as Indirectly Connected Areas.
- Global Continuous Loss – 4.0 mm/h (ARR 2019 DataHub)
- Impervious Initial Loss – 1.5 mm (Section 3.5.3.1.2 of ARR 2019, Book 5, Chapter 3)
- Impervious Continuous Loss – 0 mm

Local initial losses were applied independently for every rainfall event, subtracting the median pre-burst depth from the Indirectly Connected Area initial loss.

3.1.4 Validation

The suitability of the WBNM hydrological model was validated by comparing Existing Case Scenario peak flow estimates with the Rational Method (Queensland Urban Drainage Manual, 2017) and the Regional Flood Frequency Estimation Model (Engineers Australia, Western Sydney University, 2019) at the Saltwater Creek outlet (Catchment 'OUT'). Refer Table 2 below for comparison.

Table 2 Peak flow estimates at the Saltwater Creek outlet

Method	20% AEP (m^3/s)	10% AEP (m^3/s)	1% AEP (m^3/s)
WBNM	57.3	66.7	102.5
Rational Method	55.5	65.6	108.6
Regional Flood Frequency Estimation (RFFE)	43.4 - 255	57.2 - 364	96.6 - 904

WBNM estimates fall within the RFFE confidence intervals and agree with rational method estimates by -6% to 3%. They are considered fit for purpose.

Refer Appendix L for rational method calculations.

Refer Appendix M for RFFE estimates.

3.2 Hydraulics

A 1D/2D coupled hydrodynamic TUFLOW model was developed to assess the hydraulic behaviour of storm flows associated with the local overland flow path.

Hydrographs for the selected critical storms (calculated via the WBNM hydrologic model as described in 3.1 above) were incorporated into the 2D hydraulic space via 'source area' inflows.

3.2.1 Topography

3.2.1.1 Existing Case Scenario

The base topography is based on Digital Elevation Models of Australia derived from a LiDAR 1 m grid (Geoscience Australia, 2020) and a detailed site survey.

3.2.1.2 Developed Case Scenario

Proposed development earthworks were incorporated into the flood model's topography via overlaying the proposed design surface over the Existing Case Scenario surface.

3.2.2 Surface Roughness

Surface roughness was represented via a combination of fixed and depth-variable Manning's 'n' values.

Parameters for the Existing Case Scenario were determined via inspection of aerial imagery.

These parameters were modified to incorporate the open grassed drain around the perimeter of the site and lot footprint for the Developed Case Scenario.

The adopted surface roughness parameters are presented in Table 3 and Table 4 below.

Refer to Appendix K for the Flood Model Layouts indicating Existing Case Scenario and Developed Case Scenario surfaces.

Table 3 Surface Roughness Parameters

Material Description	Manning's 'n'	
Road & verge, carpark, pavement, driveways	0.02	
Low Density Residential	0.08	
High-Medium Density Residential	0.15	
Maintained grass	0.035	
Mature field crops	0.05	
Medium Density Vegetation	Depth Variable – Refer	Table 4
High Density Vegetation	Depth Variable – Refer	Table 4
Unmaintained grass	0.1	

Table 4 Depth-Variable Manning's 'n' Parameters

Depth (m)	Medium Dense Vegetation	Dense Vegetation
0	0.075	0.090
0.2	0.075	0.090
0.8	0.075	0.090
1.5	0.075	0.090
2	0.094	0.113
3.5	0.150	0.180
99	0.150	0.180

3.2.3 Stormwater Drainage

The culverts under the proposed road extension (three 1.2 m wide x 0.3 m high RCBC's) were incorporated into the TUFLOW 1D solver (ESTRY) and dynamically linked to the 2D hydraulic space via source boundaries (SX), as recommended in the TUFLOW USER Manual (BMT, 2018).

Flow loss coefficients were adopted as per recommendations in the TUFLOW USER Manual (BMT, 2018).

The culvert was represented with 20% blockage as recommended in Table 10.4.1 of the Queensland Urban Drainage Manual (QUDM) (IPWEAQ, 2017), as seen in Figure 2 below.

Table 10.4.1 – Suggested blockage factors for culverts [1]

Culvert conditions	Blockage factor	
	Design value	Severe storm [2]
Inlet height < 3 m, or width < 5 m:		
Inlet	20%	100% [3]
Chamber (barrel)	[3]	
Inlet height > 3 m and width > 5 m:		
Inlet	10%	25%
Chamber (barrel)	[3]	[3]
Culvert inlets with effective debris control features for culverts with inlet height < 3 m and width < 5 m	As above	As above
Screened culvert inlets	50%	100%

Notes:

[1] Developed from Engineers Australia (2012).

[2] Refer to discussion below on severe storm investigations.

[3] Adopt 25% bottom-up sediment blockage unless such blockage is unlikely to occur.

[4] The degree of blockage typically depends on availability of suitable bridging matter, such as large branches and fallen trees, that can 'bridge' across the structure opening.

Figure 2 QUDM Recommended Blockage Factors (IPWEAQ, 2017)

3.2.4 Downstream Tailwater Conditions

3.2.4.1 1% AEP (1 in 100-year flood)

A fixed downstream tailwater level of 2.77 m AHD was adopted for the 1% AEP event scenario, based on the 1% AEP at year 2100 as per the Douglas Shire Council Storm Tide Inundation Property Report (Refer Appendix N)

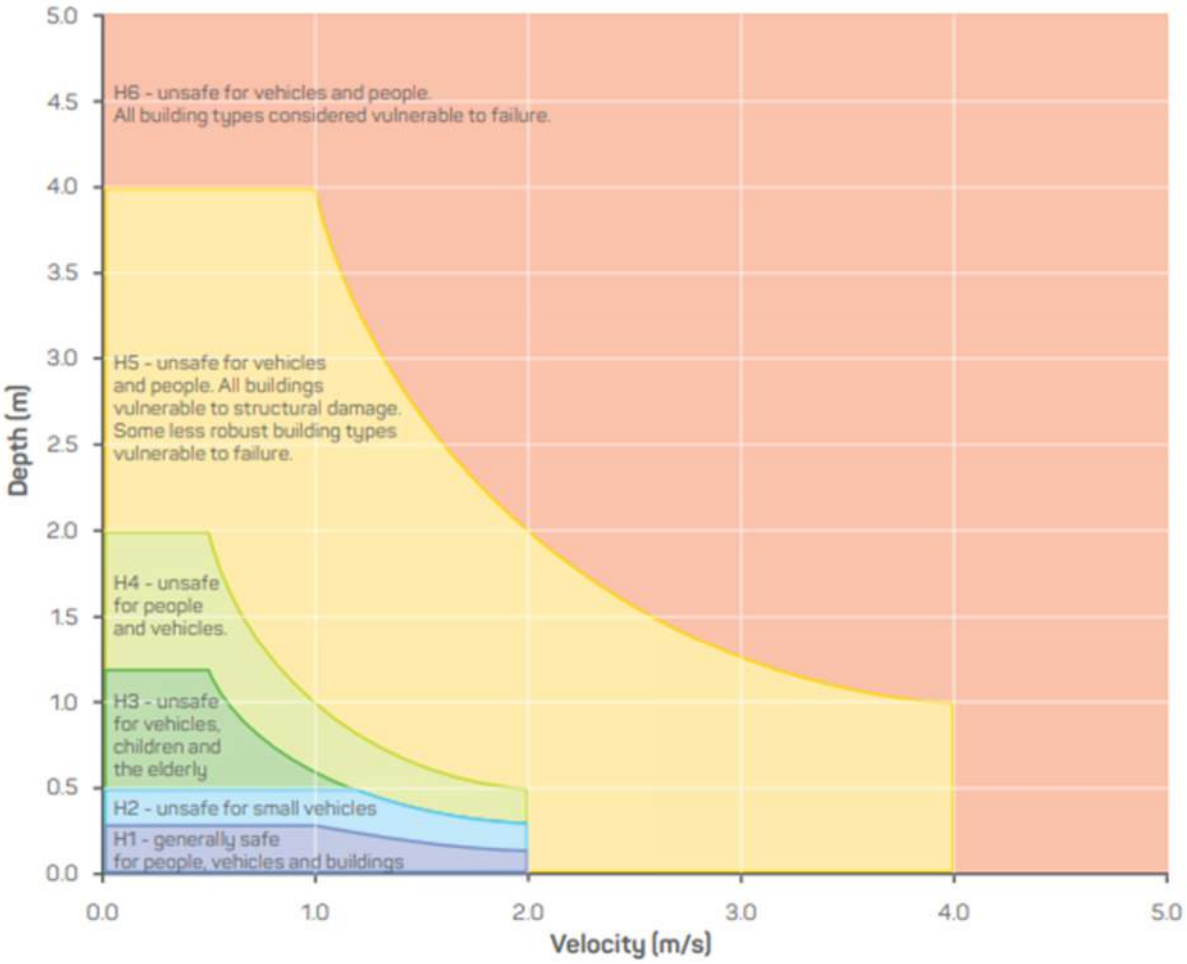
3.2.4.2 10% AEP (1 in 10-year flood) and 20% AEP (1 in 5-year flood)

Tailwater conditions for the 10% AEP and 20% AEP were represented via Stage-Discharge relationships automatically generated by TUFLOW (HQ boundaries), derived from surface slope and flows.

4 RESULTS

Refer to Appendices D to I for the Existing Case and Developed Case flood maps, indicating flood depth, hazard, and level for the 1% AEP, 10% AEP and 20% AEP floods.

Flood Hazard mapping was undertaken as per recommendations in the Australian Disaster Resilience Handbook Collection Guideline 7-3 Flood Hazard (Australian Institute for Disaster Resilience - Commonwealth of Australia, 2017). The adopted 'Flood Hazard Vulnerability Curves' as presented in Figure 3 below.



Hazard Classification	Description
H1	Relatively benign flow conditions. No vulnerability constraints.
H2	Unsafe for small vehicles.
H3	Unsafe for all vehicles, children and the elderly.
H4	Unsafe for all people and all vehicles.
H5	Unsafe for all people and all vehicles. Buildings require special engineering design and construction.
H6	Unconditionally dangerous. Not suitable for any type of development or evacuation access. All building types considered vulnerable to failure.

Figure 3 Flood Hazard Vulnerability Curves – Summary from the TUFLOW USER Manual

5 FLOOD IMMUNITY REQUIREMENTS AND BUILDING FLOOR LEVELS

5.1 Policy Requirements

5.1.1 Douglas Shire Planning Scheme 2018

AO1.2 of the Douglas Shire Planning Scheme Flood and Storm Tide Hazard Overlay Code indicates that "Development within the Flood and Storm Tide hazard overlay maps (…) is designed to provide immunity to the Defined Inundation Event as outlined within Table 8.2.4.3.b plus freeboard of 300 mm", which is the 1% AEP flood level plus 300 mm.

5.1.2 Queensland Urban Drainage Manual (QUDM)

The Douglas Shire Planning Scheme 2018 policy SC6.5 identifies the FNQROC Regional Development Manual as the policy relevant to infrastructure design.

The FNQROC Design Manual D4 (Stormwater Drainage) identifies QUDM (IPWEAQ, 2017) as the basis for design of stormwater drainage, except as amended by the design manual.

The FNQROC Design Manual D4 identifies the 1% AEP ('1 in 100-year flood') as the major design storm for overland flow.

Table 9.3.1 of QUDM recommends 300 mm freeboard for open channels.

As such, the minimum overland flow flood level immunity requirement adopted for the proposed development is the 1% AEP plus 300 mm freeboard.

5.2 Sensitivity Analysis

Open channels surrounding the development will be subject to mowing and maintenance.

A sensitivity analysis was undertaken to assess the 1% AEP flood level assuming the open channels were not maintained, by increasing the Manning's 'n' from 0.035 to 0.1. Refer Appendix J for the corresponding flood level plan.

The overland flow flood level immunity adopted for the proposed development will be the highest of:

- Developed Case 1% AEP with maintained open channels (Manning's 'n' of 0.035) plus 300 mm freeboard, or
- Developed Case 1% AEP with unmaintained open channels (Manning's 'n' of 0.1).

5.3 Building Floor Levels

Refer to Figure 5 and Figure 6 overleaf for site sections at the upstream (Section 1) and downstream (Section 2) ends of the site, respectively, indicating overland flow flood levels, storm-tide flood levels, and respective freeboard requirements. Refer Figure 4 below for the locations of the sections in plan view.

Results indicate that the dominant flood planning level at the site is the 1% AEP overland flow flood plus 300 mm freeboard requirement, resulting in the following building floor level requirements:

- Upstream (south / Section 1) site area – 3.8 m AHD
- Downstream (north / Section 2) site area – 3.6 m AHD

Intermediate levels should be interpolated from these levels.

Figure 4 Site Sections

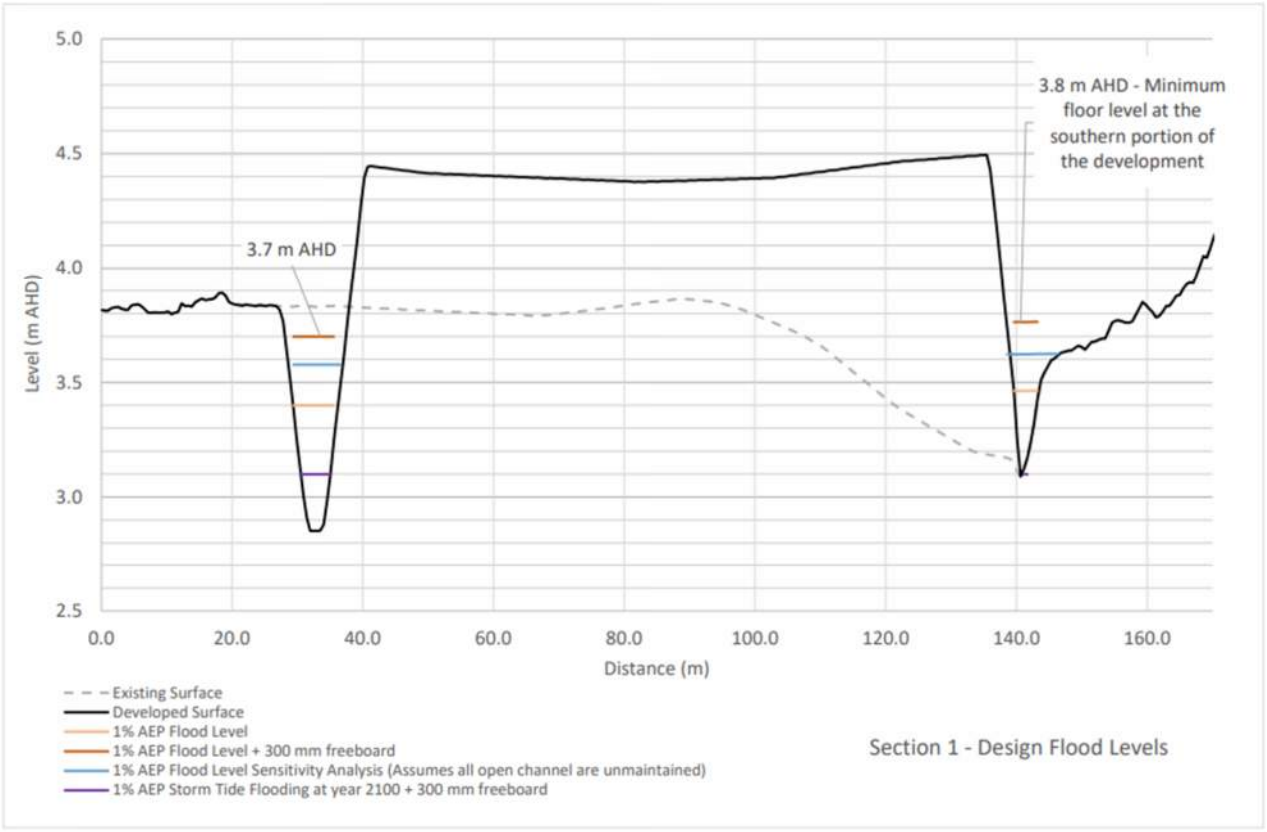


Figure 5 Site Section 1, flood levels & freeboard requirements

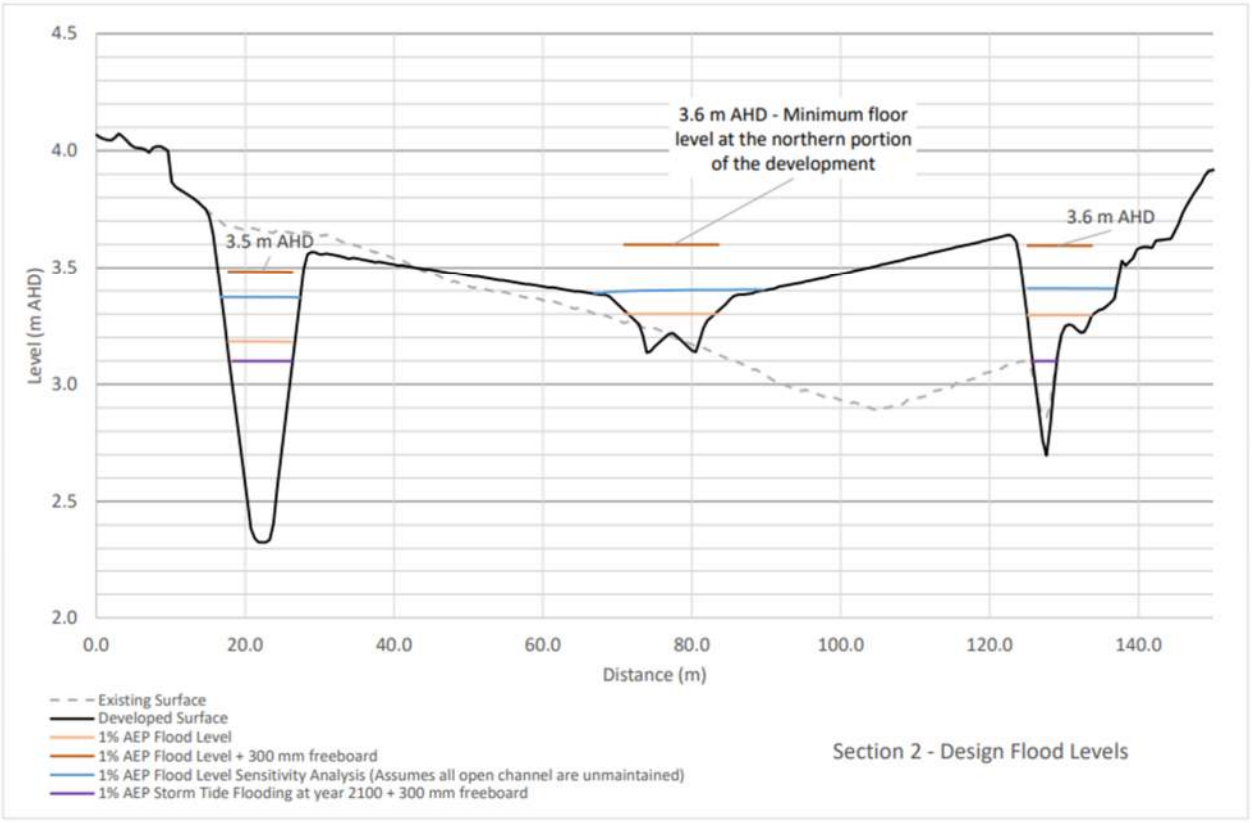


Figure 6 Site Section 2, flood levels & freeboard requirements

6 FLOOD IMPACTS

Proposed development earthworks were incorporated into the flood model's topography via overlaying the proposed design surface over the existing surface.

Refer Appendix B for proposed earthworks drawings.

This scenario assumes the proposed development does not have an on-site stormwater detention system.

Results indicate reductions in flood levels and flood extents south of the site, and at Philips Street towards the north.

Increases in flood levels and flood extents can be seen adjacent to the Coulthard Close culvert cross-over associated with the site's proposed internal road, however these are contained within the road corridor and do not encroach onto private properties.

Minor increases in flood levels and extents at the culvert cross-over are due to the site's local catchment discharging at this location.

During the 1% AEP flood, maximum flood depths and flood hazard categories at the Coulthard Close culvert cross-over do not exceed 300 mm nor Category H1 (~0.1 m²/s), indicating flow conditions relatively safe for people and vehicles.

Refer to Appendix C for flood impact maps.

7 DRAINAGE MAINTENANCE EASEMENT REQUIREMENTS

As part of the proposed works, new drainage channels will be established and existing drainage channels widened, which will require corresponding establishment and widening of easements to permit access for works to be performed, secure a right for stormwater flows, and provide access for maintenance vehicles.

Easements for open channels will be established as per recommendations in Section 3.2.4 of QUDM and Section BN9.7 in the QUDM background notes, as follows:

- 4.5 m wide maintenance access track at one side of the top of bank of the channel,
- 1.5 m wide access strip at one side of the top of bank of the channel.

Due to geometric constraints, no maintenance easement will be established at the grassed channel east of the site as clouded in purple in Figure 7 below. This has been reflected in the Developed Case Scenario flood model with a Manning's 'n' value of 0.1.

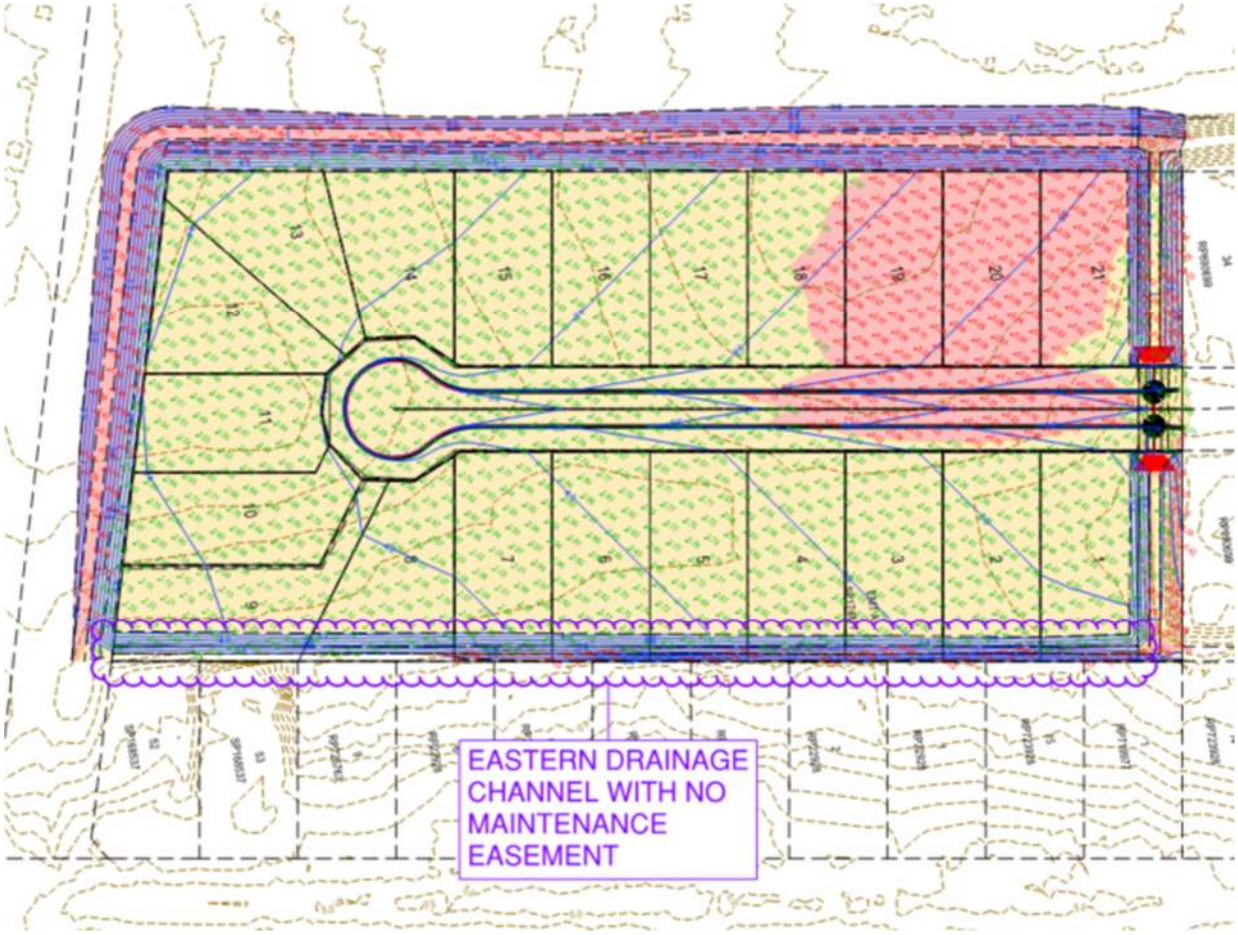


Figure 7 Proposed earthworks drawing indicating eastern drainage channel with no easement clouded in purple

8 REFERENCES

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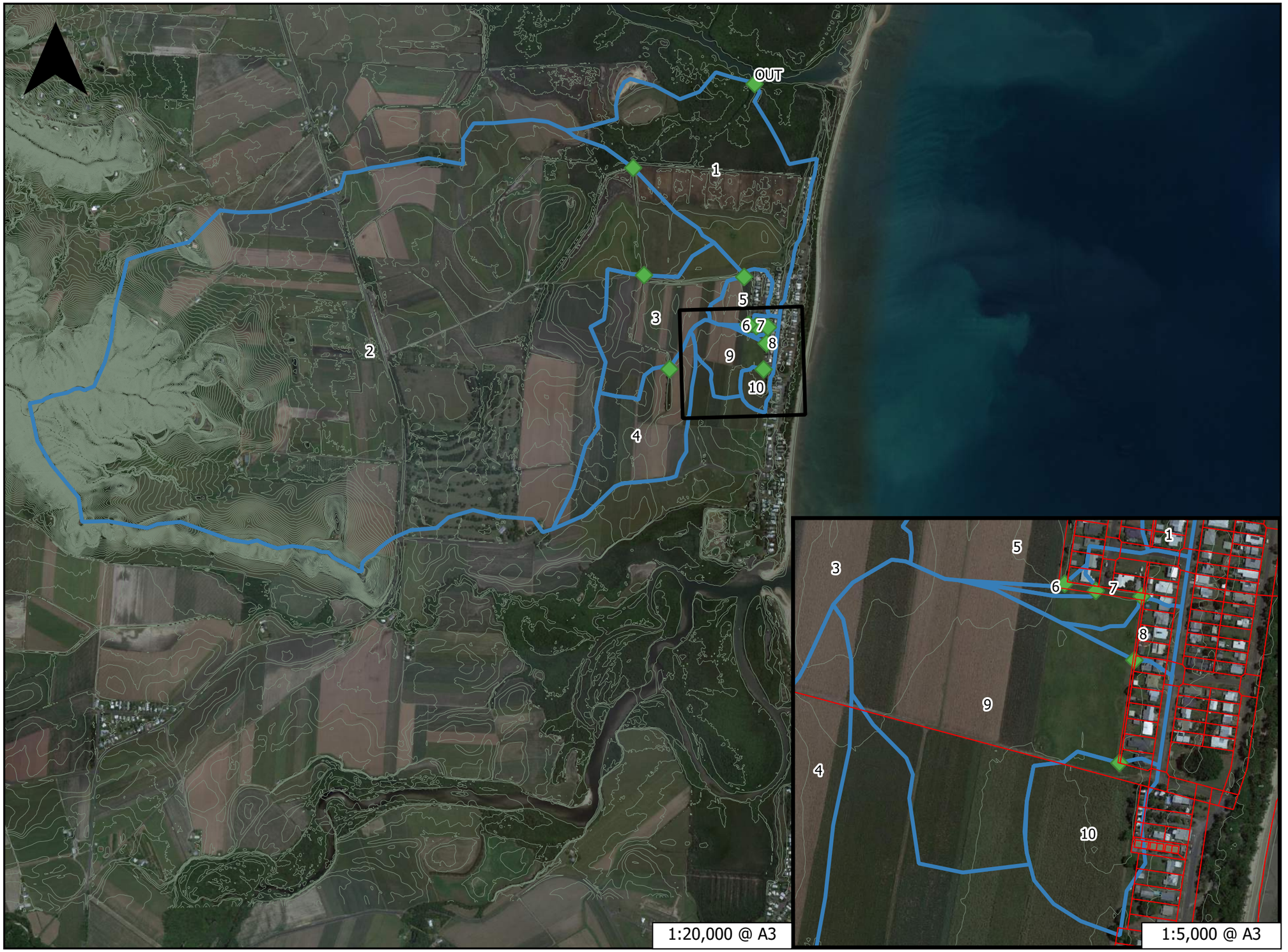
APPENDIX A
CATCHMENT PLANS



Legend
- Catchments
- Catchment Outlets
- 1 m Contours - LiDAR - 2015
- © Google Maps

Existing Catchment Table

Catchment ID	Area (ha)	Impervious %
1	68.0	1.7%
2	475.5	0.7%
3	29.9	0.0%
4	29.2	0.8%
5	6.4	14.4%
6	0.2	29.1%
7	1.3	18.0%
8	0.6	22.8%
9	9.8	2.0%
10	2.8	1.9%
OUT	0.0	0.0%
Total	**623.7**	**1.0%**

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Title:
Catchment Plan - Existing Conditions
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 1/2/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

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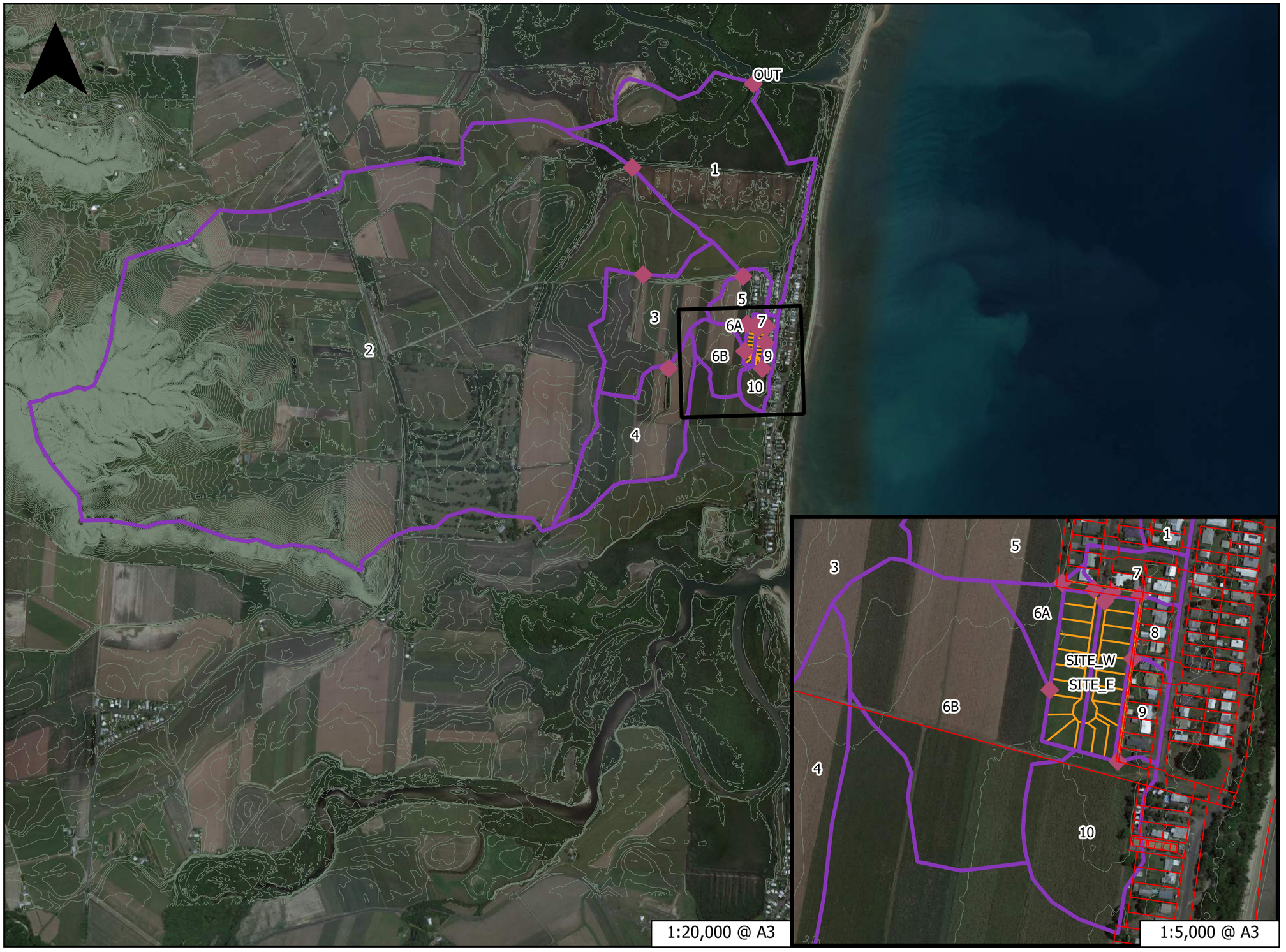
Scale 1:5,000 0 125 250 375 500 m



Legend

- Catchments
- Catchment Outlets
- 1 m Contours - LiDAR - 2015
- Proposed subdivision

Developed Catchment Table

Catchment ID	Area (ha)	Impervious %
1	68.0	2.0%
2	475.5	1.0%
3	29.9	0.0%
4	29.2	1.0%
5	6.4	14.0%
6A	0.7	2.0%
6B	7.4	0.0%
7	0.8	40.0%
8	0.4	50.0%
9	0.7	50.0%
10	2.8	2.0%
SITE_E	1.0	60.0%
SITE_W	1.0	60.0%
OUT	0.0	0.0%
Total	**623.7**	**1.5%**

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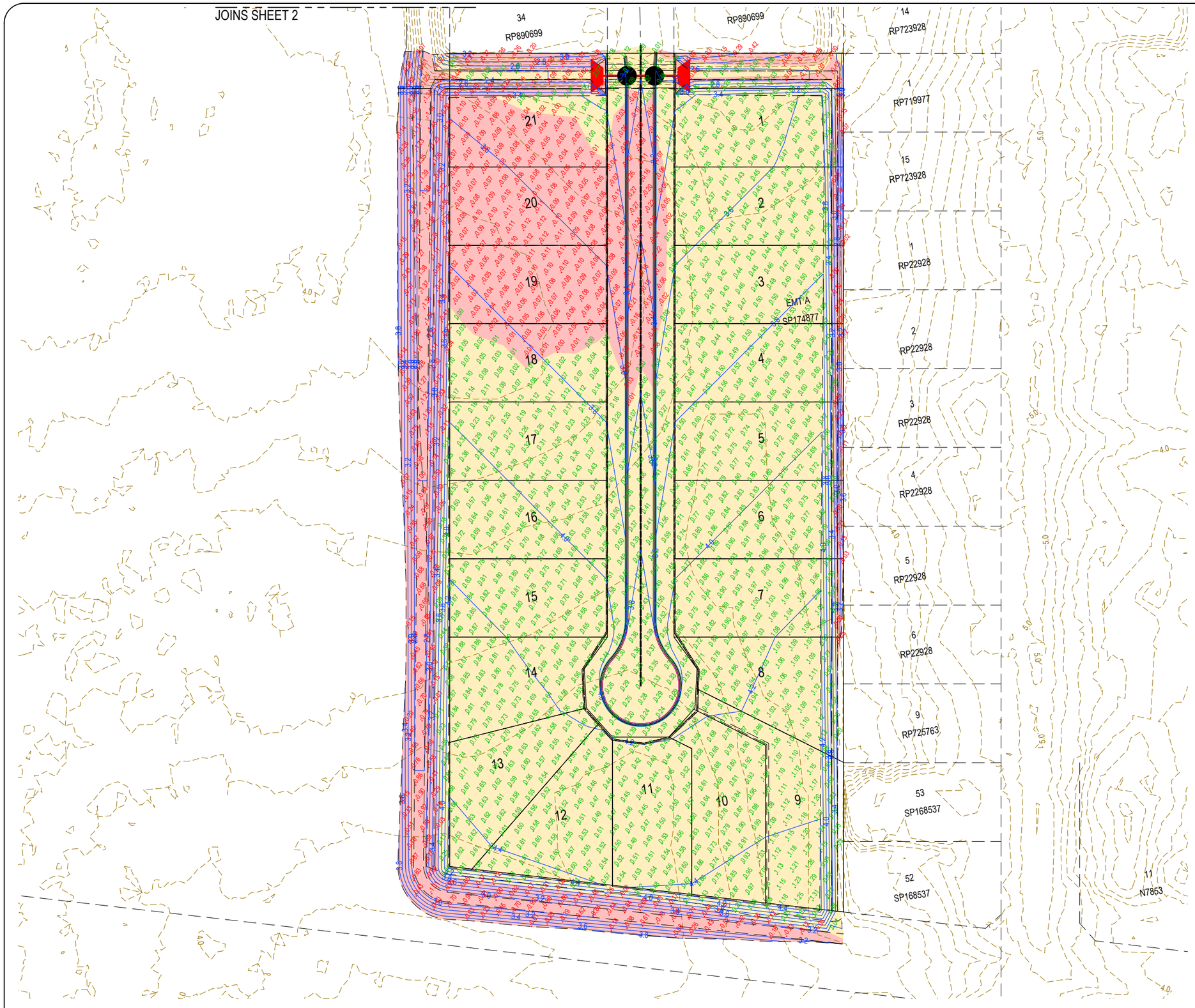
Title:
Catchment Plan - Developed Conditions
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 25/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

Scale 1:20,000 0 500 1000 1500 2000 m

Scale 1:5,000 0 125 250 375 500 m

APPENDIX B
BULK EARTHWORKS

JOINS SHEET 2



LEGEND

- AREAS OF CUT
- AREAS OF FILL
- 57.0 — DESIGN SURFACE CONTOURS (0.2m INTERVAL)
- 57.0 — EXISTING SURFACE CONTOURS (0.2m INTERVAL)
- -0.13 — CUT DEPTH
- -0.17 — FILL DEPTH

REVISIONS				
1	26.07.22	INITIAL ISSUE		
NO.	DATE	DESCRIPTION	DESIGN	APPROVED

CLIENT: CB & FR COULTHARD

SCALE: 1:500 / 1:1000 — 0 5 10 20 30 — A1 / A3

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

CivilWalker CONSULTING ENGINEERS

DRAWN	CW	CHECKED	DJW
DESIGNED	CW	CHECKED	DJW
APPROVED			
DATE:		RPEQ:	

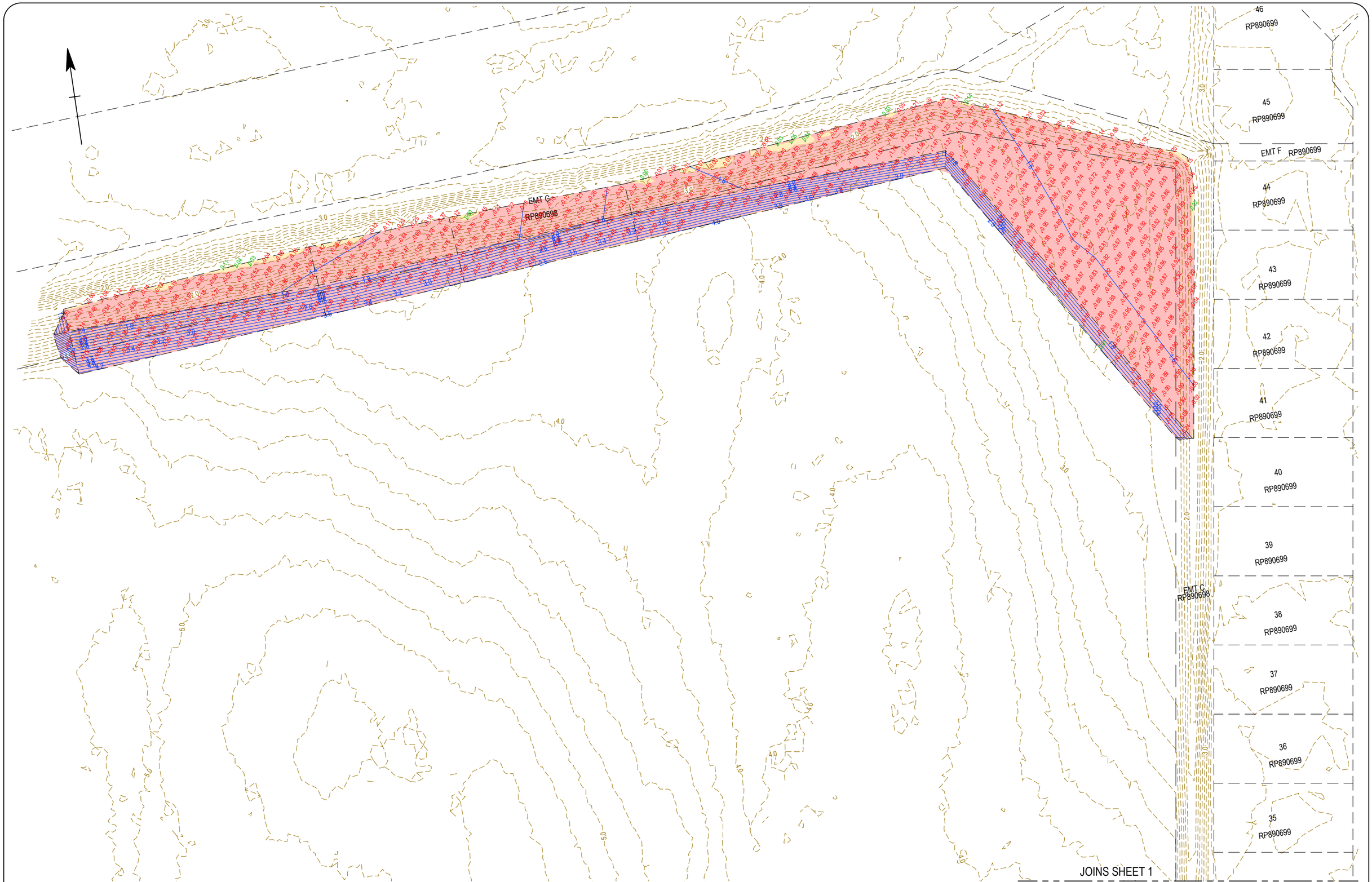
LOT 51 COULTHARD CLOSE, NEWELL BEACH

EARTHWORKS CONCEPT

SHEET 1 OF 2

DRAWING NO. 214-001-SK03

REVISION



REVISIONS					
NO.	1	DATE	26.07.22	DESIGN	APPROVED
		DESCRIPTION	INITIAL ISSUE		

CLIENT

CB & FR COULTHARD

SCALE

1:500 0 5 10 20 30 A1
1:1000 A3

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

CivilWalker
CONSULTING ENGINEERS

DRAWN	CW	CHECKED	DJW
DESIGNED	CW	CHECKED	DJW
APPROVED			
DATE:		RPEQ:	

LOT 51 COULTHARD CLOSE, NEWELL BEACH

EARTHWORKS CONCEPT

SHEET 2 OF 2

DRAWING NO. 214-001-SK04

REVISION

APPENDIX C
FLOOD IMPACT ASSESSMENT

Legend

Change in Flood Level (m)
- <= -0.18
- -0.18 - -0.16
- -0.16 - -0.14
- -0.14 - -0.12
- -0.12 - -0.1
- -0.1 - -0.08
- -0.08 - -0.06
- -0.06 - -0.04
- -0.04 - -0.02
- -0.02 - 0
- 0 - 0.02
- 0.02 - 0.04
- 0.04 - 0.06
- 0.06 - 0.08
- 0.08 - 0.1
- 0.1 - 0.12
- 0.12 - 0.14
- 0.14 - 0.16
- 0.16 - 0.18
- > 0.18
- Was wet now dry
- Was dry now wet

COULTHARD CLOSE

LEMATY STREET

PHILLIPS STREET

ANDREWS STREET

0 50 100 150 200 m

Scale 1:2,000 @ A3

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Afflux - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

BLIGH TANNER

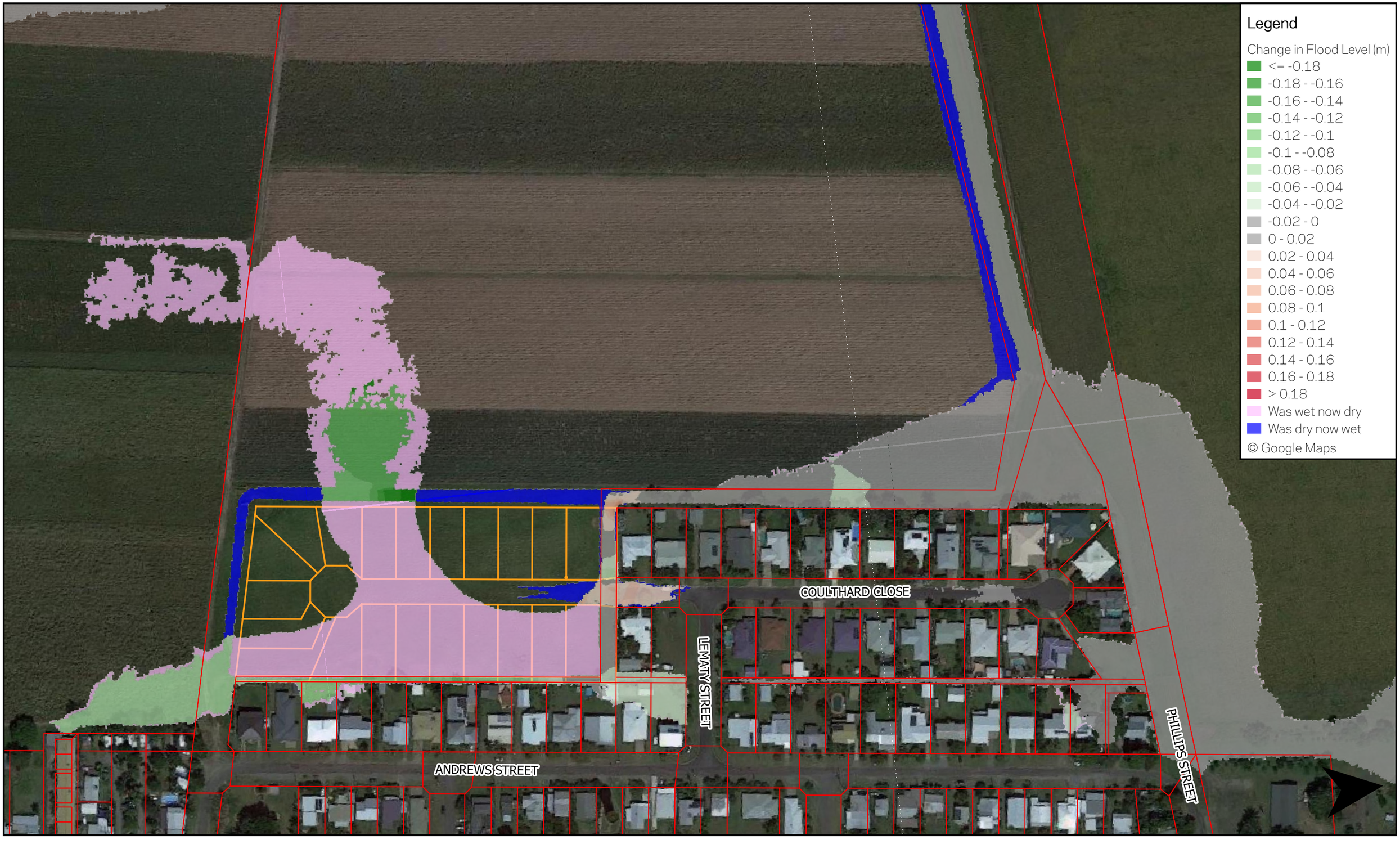
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Afflux - 10% AEP ('1 in 10-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

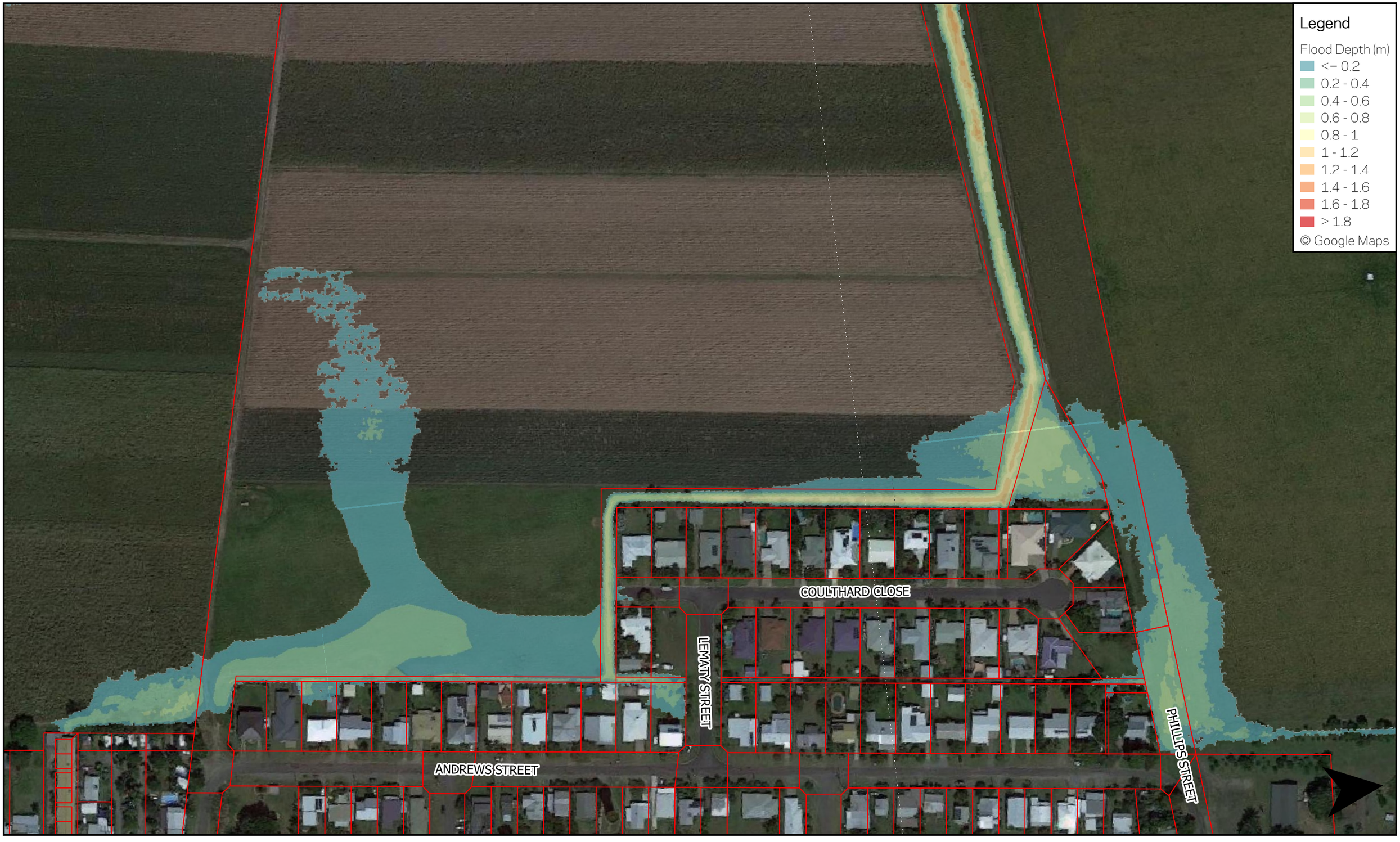
Title:
Afflux - 1% AEP ('1 in 100-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX D
EXISTING FLOOD DEPTH



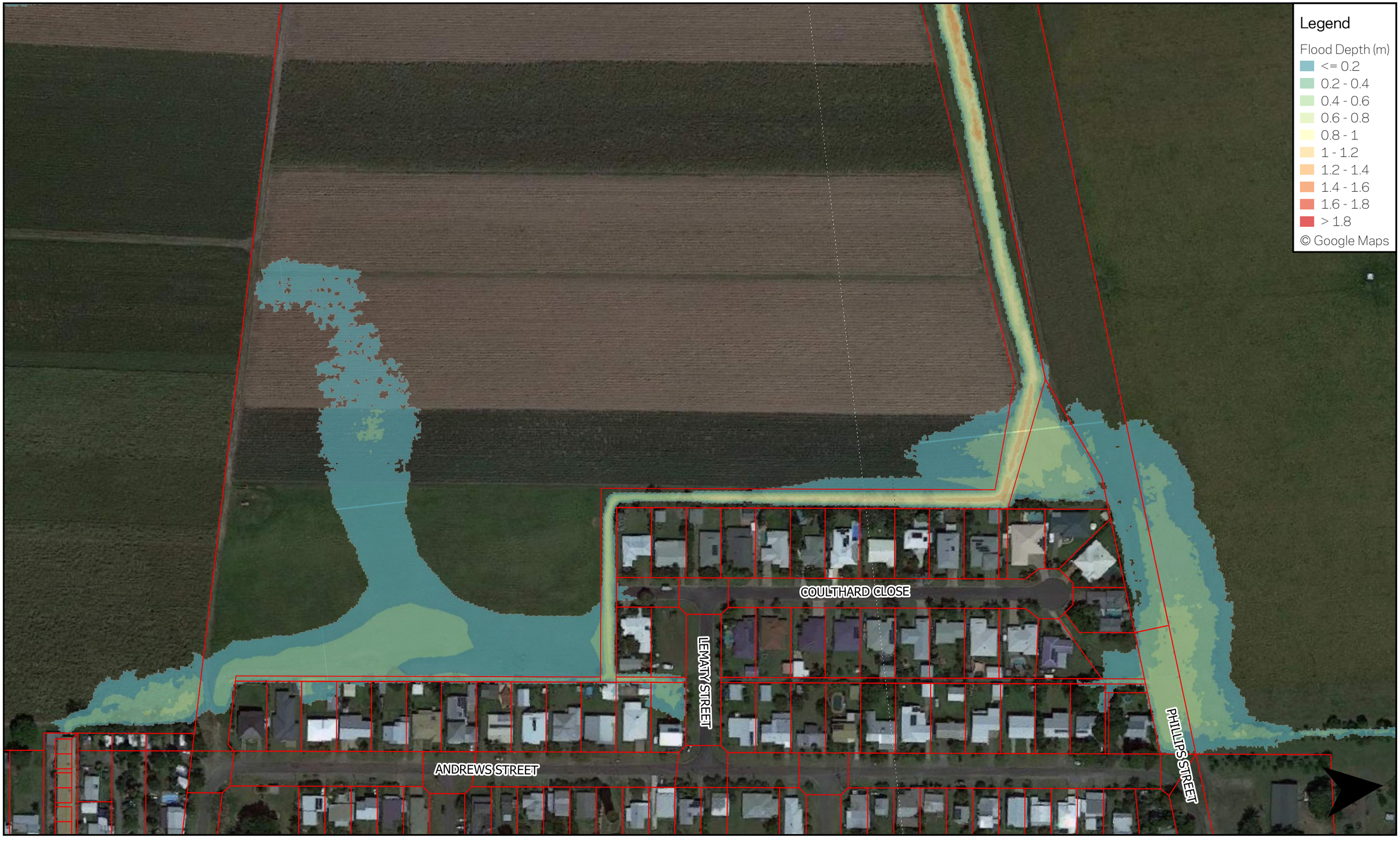
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Existing - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



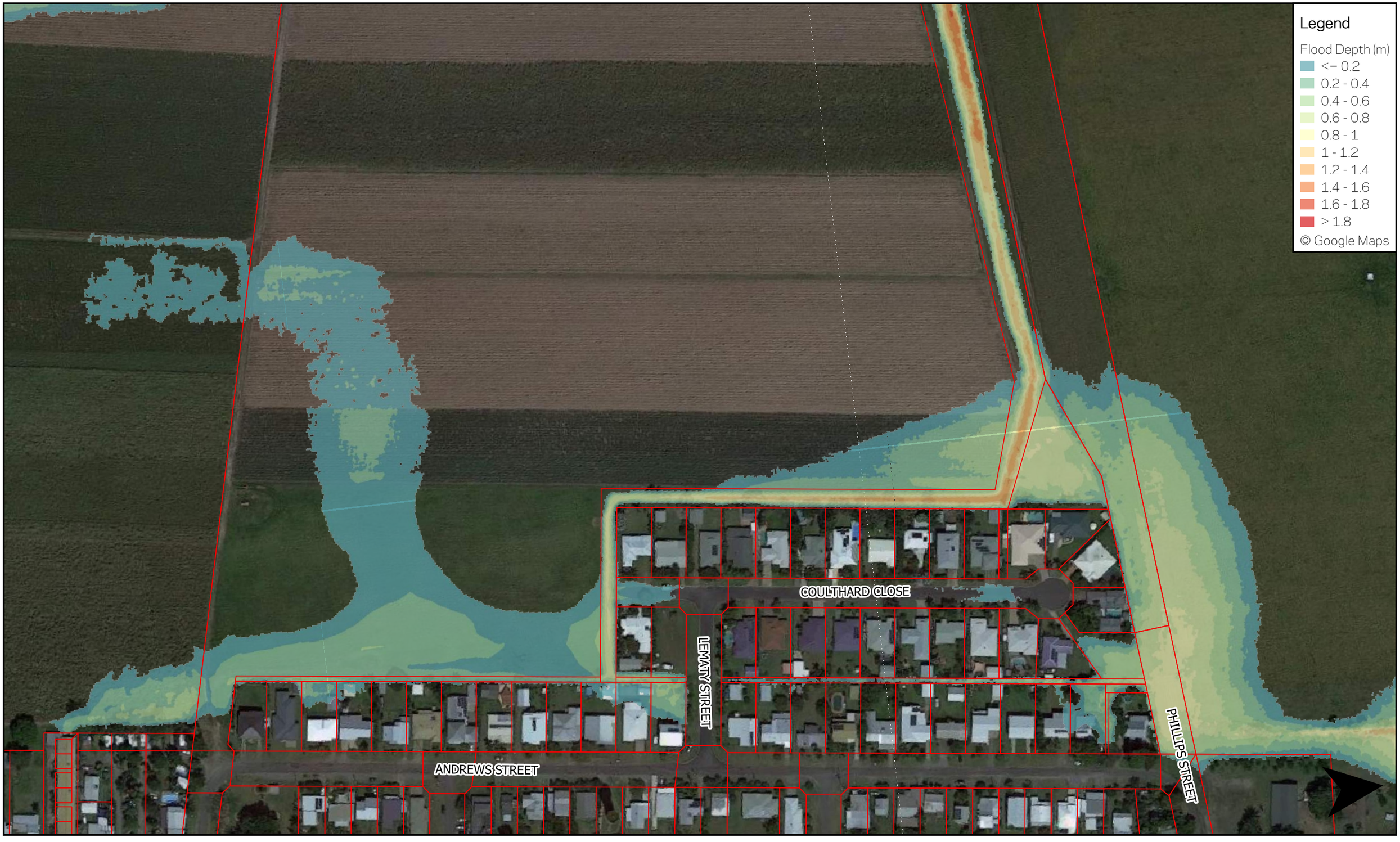
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Existing - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Existing - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX E
EXISTING FLOOD HAZARD

Legend

Hazard Categories
- H0 - No Hazard
- H1 - No restrictions
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for all people and all vehicles. Buildings require special engineering and construction.
- H6 - Not suitable for people, vehicles or buildings

COULTHARD CLOSE

LEMATY STREET

ANDREWS STREET

PHILLIPS STREET

0 50 100 150 200 m

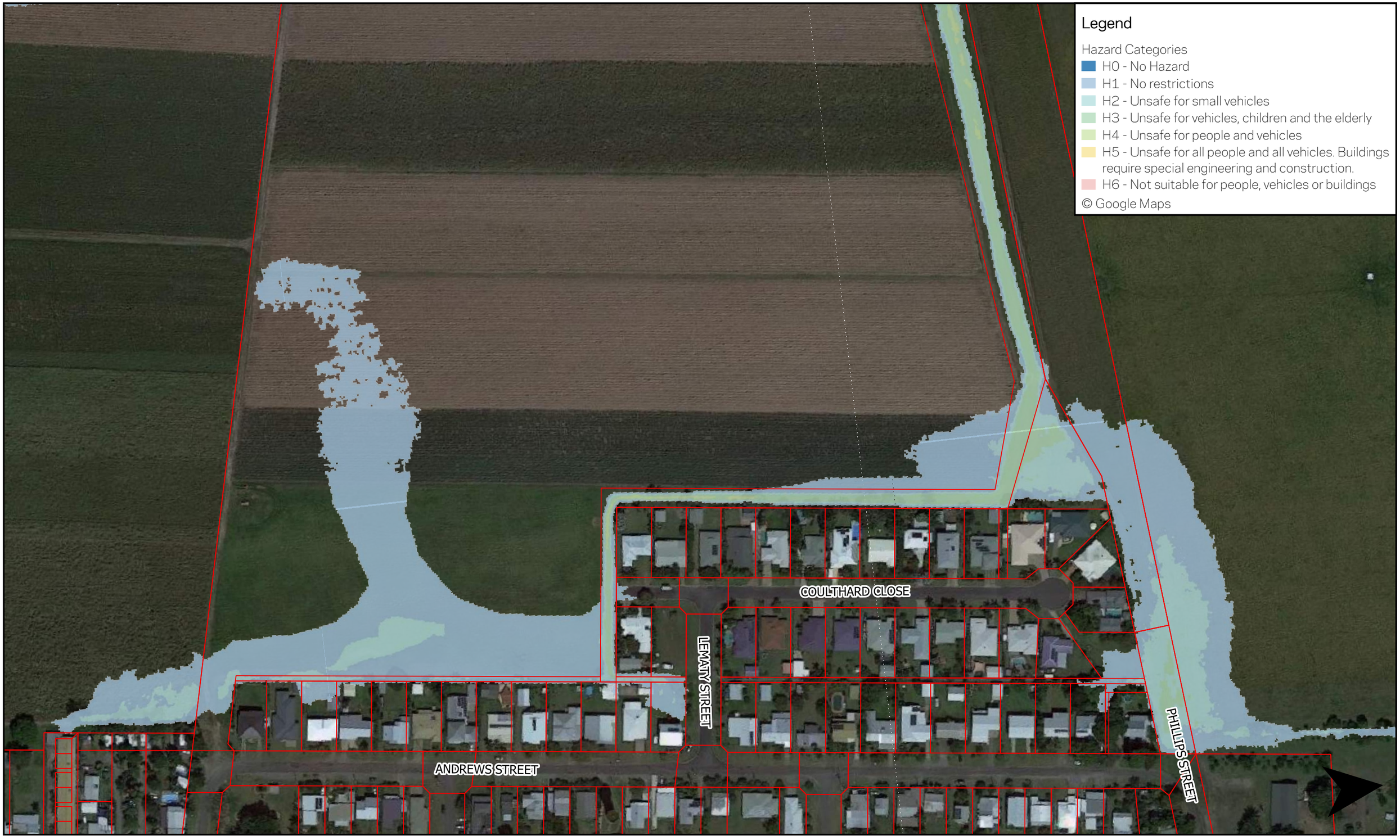
Scale 1:2,000 @ A3

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Existing - 20% AEP ('1 in 5-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Existing - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

BLIGH TANNER

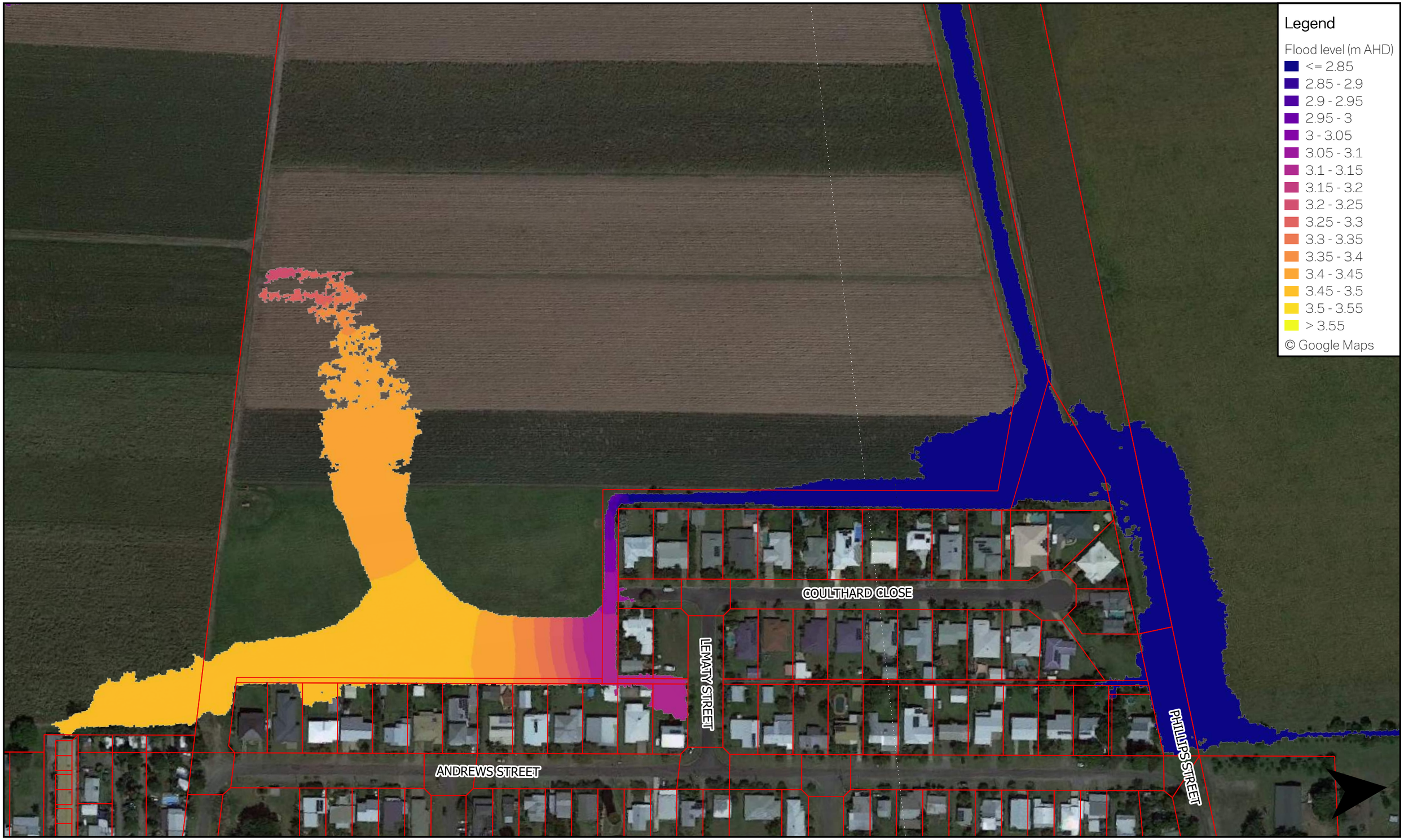
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Existing - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX F
EXISTING FLOOD LEVEL



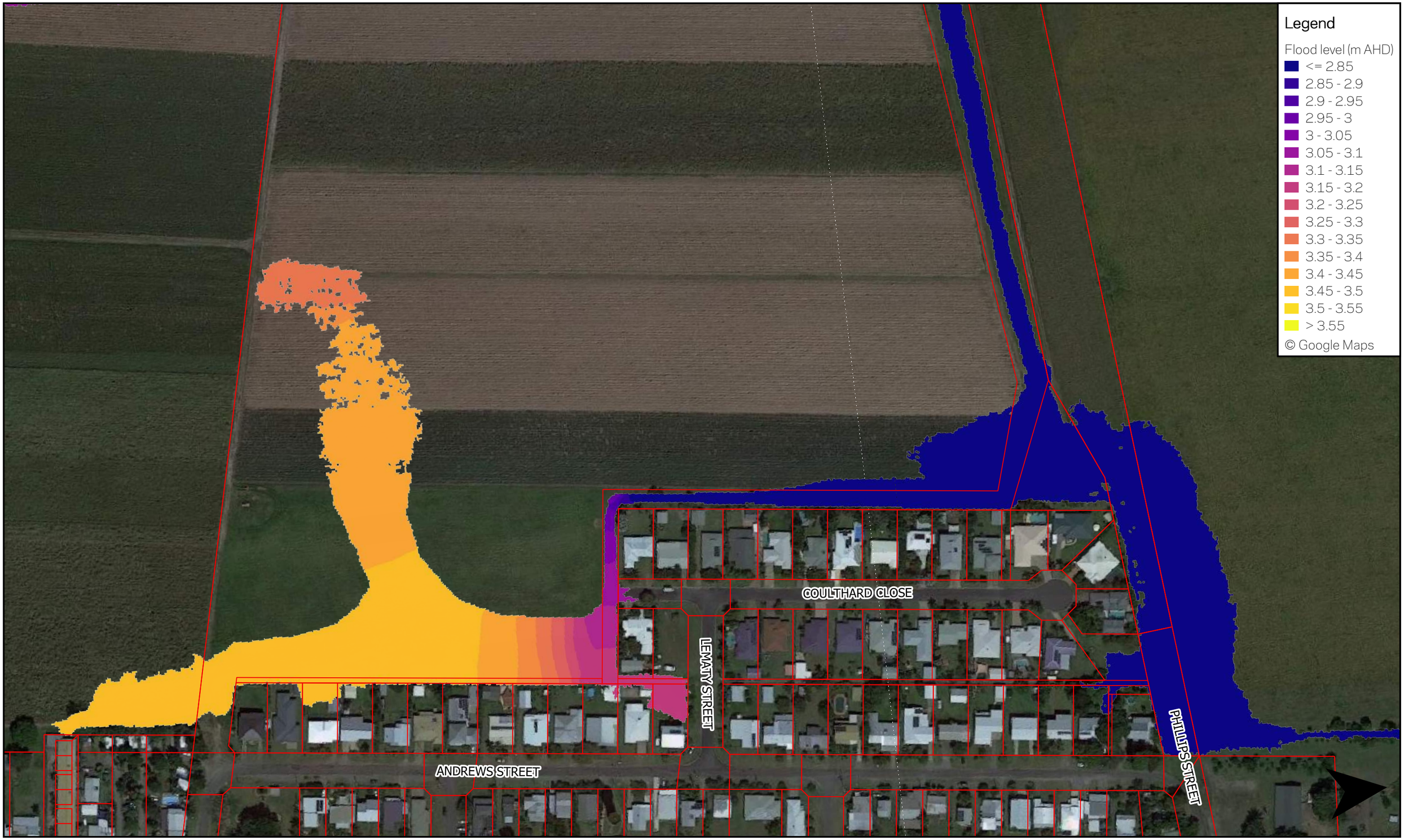
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Existing - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



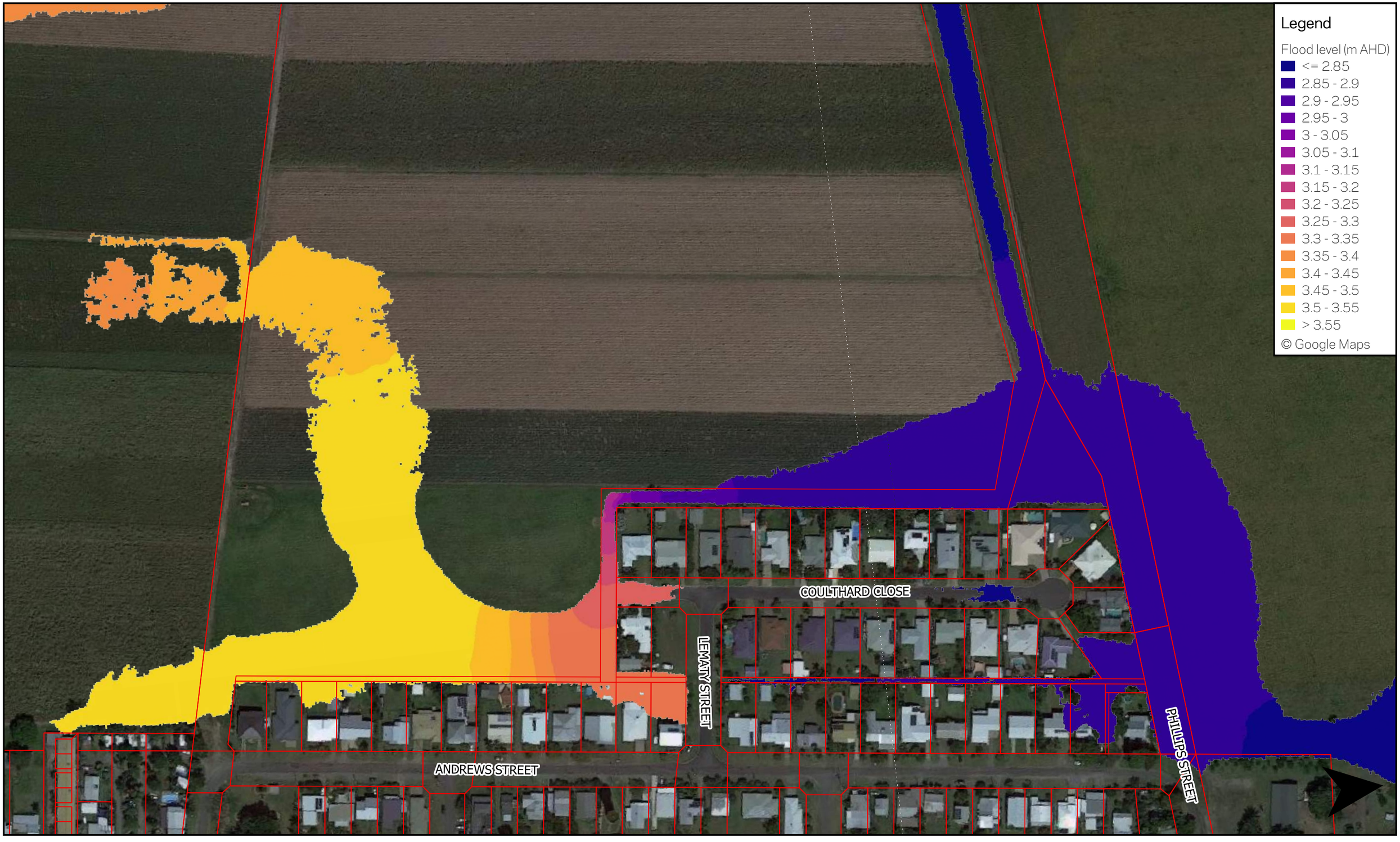
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Existing - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

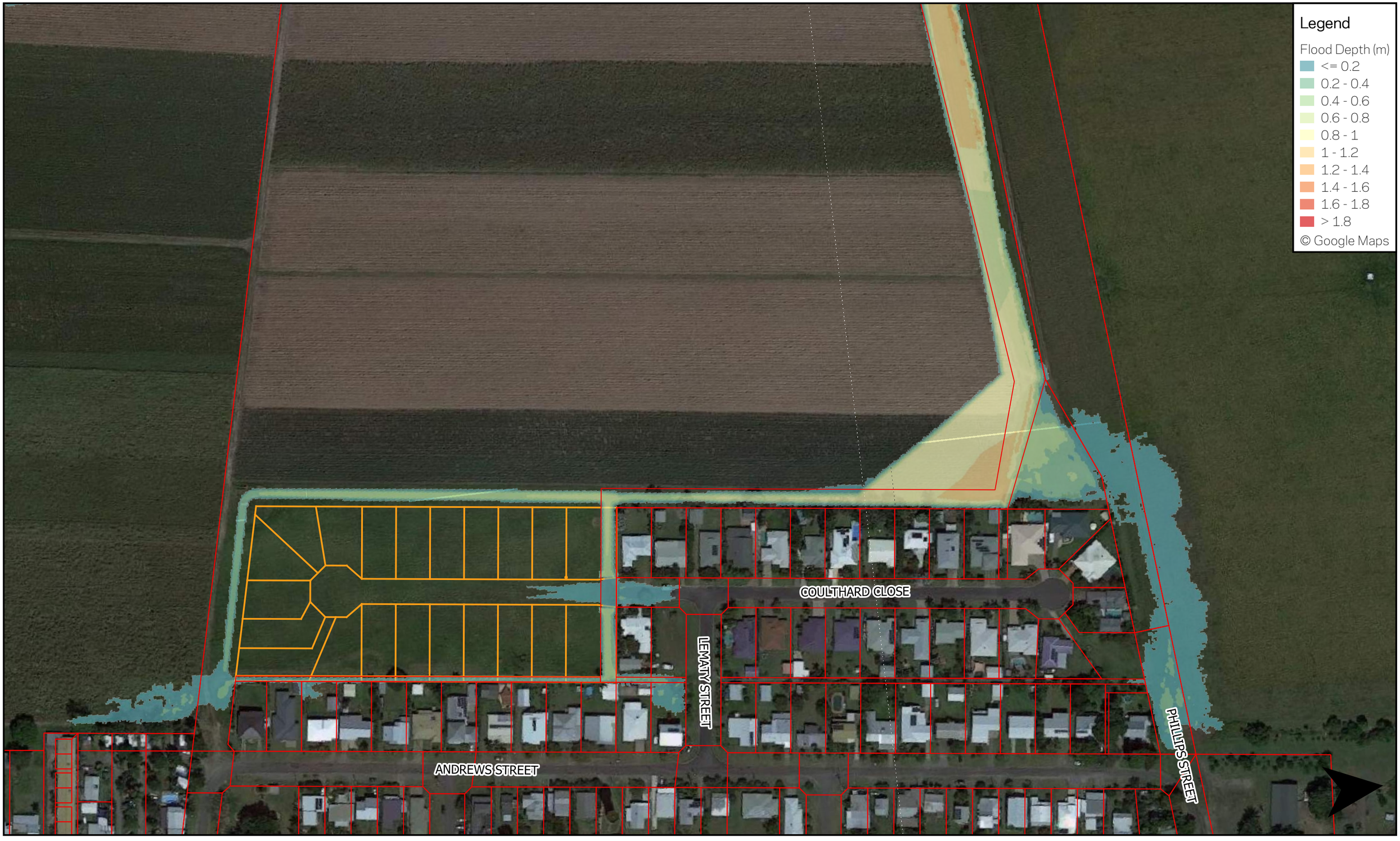
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Existing - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX G
DEVELOPED FLOOD DEPTH



BLIGH TANNER

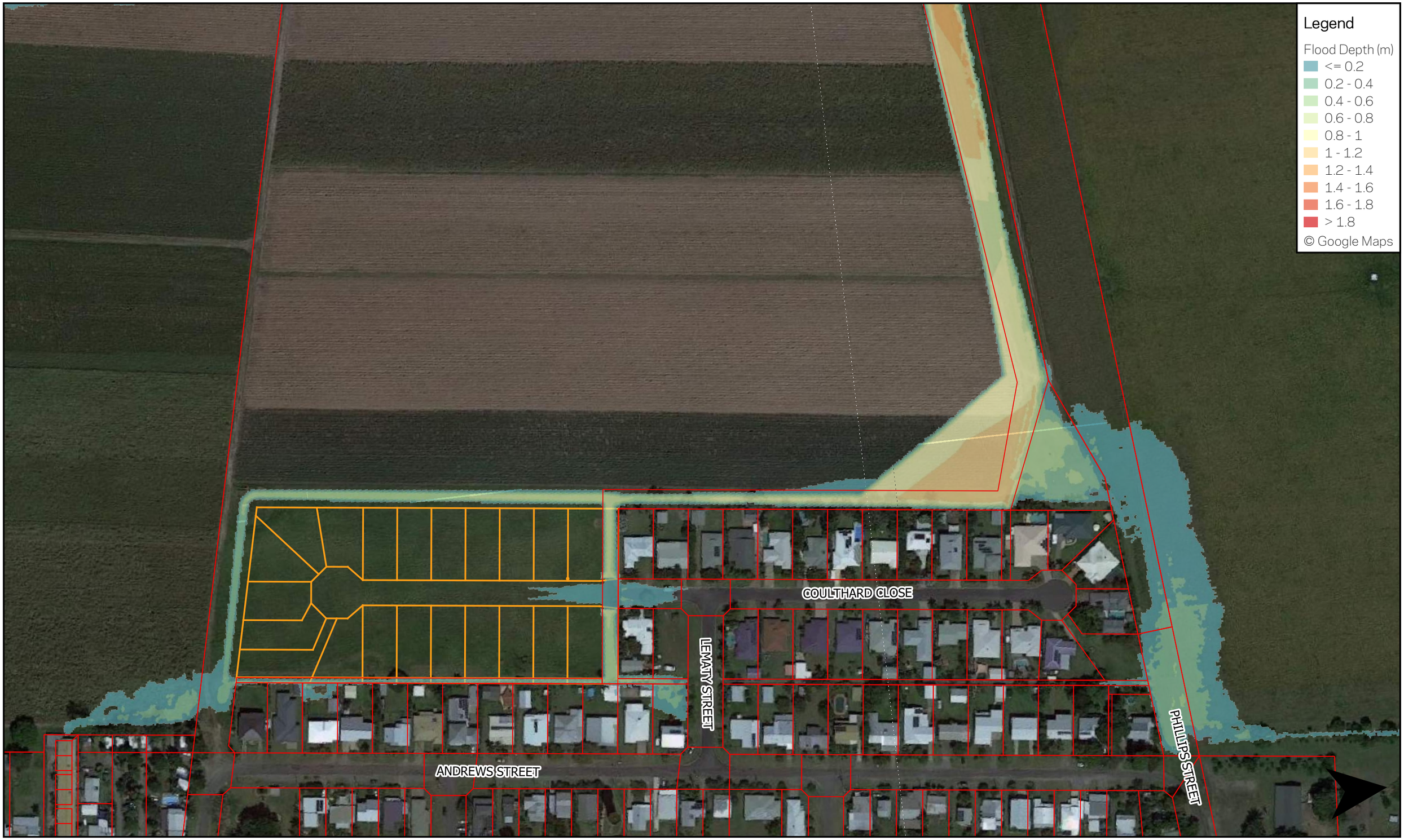
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Developed - 20% AEP ('1 in 5-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

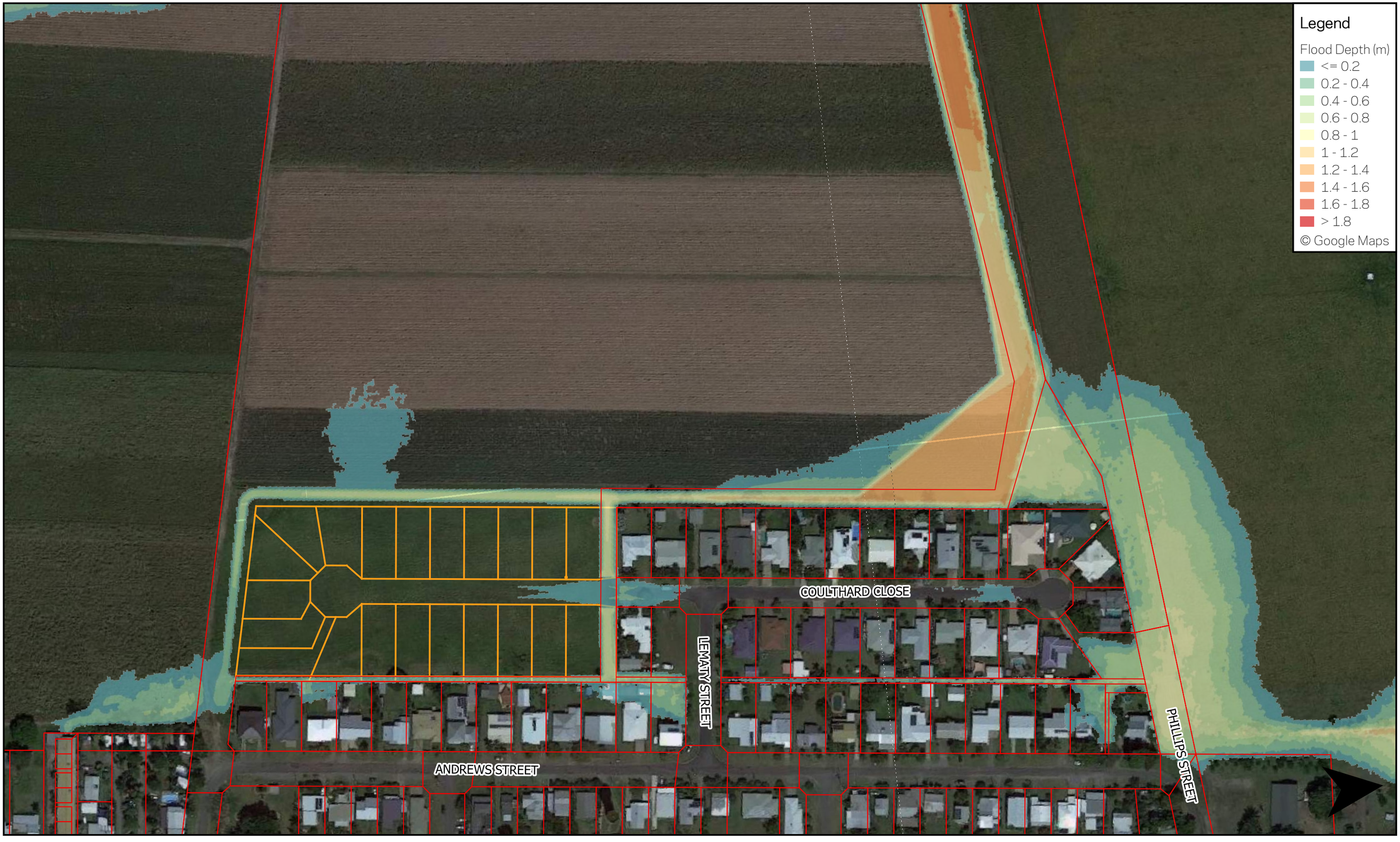
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Developed - 10% AEP ('1 in 10-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Depth - Developed - 1% AEP ('1 in 100-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX H
DEVELOPED FLOOD HAZARD

Legend

Hazard Categories
- H0 - No Hazard
- H1 - No restrictions
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for all people and all vehicles. Buildings require special engineering and construction.
- H6 - Not suitable for people, vehicles or buildings

COULTHARD CLOSE

LEMATY STREET

ANDREWS STREET

PHILLIPS STREET

0 50 100 150 200 m

Scale 1:2,000 @ A3

Title:
Hazard - Developed - 20% AEP ('1 in 5-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Legend

Hazard Categories

- H0 - No Hazard
- H1 - No restrictions
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for all people and all vehicles. Buildings require special engineering and construction.
- H6 - Not suitable for people, vehicles or buildings

COULTHARD CLOSE

LEMATY STREET

ANDREWS STREET

PHILLIPS STREET

0 50 100 150 200 m

Scale 1:2,000 @ A3

Title:

Hazard - Developed - 10% AEP ('1 in 10-year flood')

Project. Newell Beach Drainage Study

Job # 2021.0566

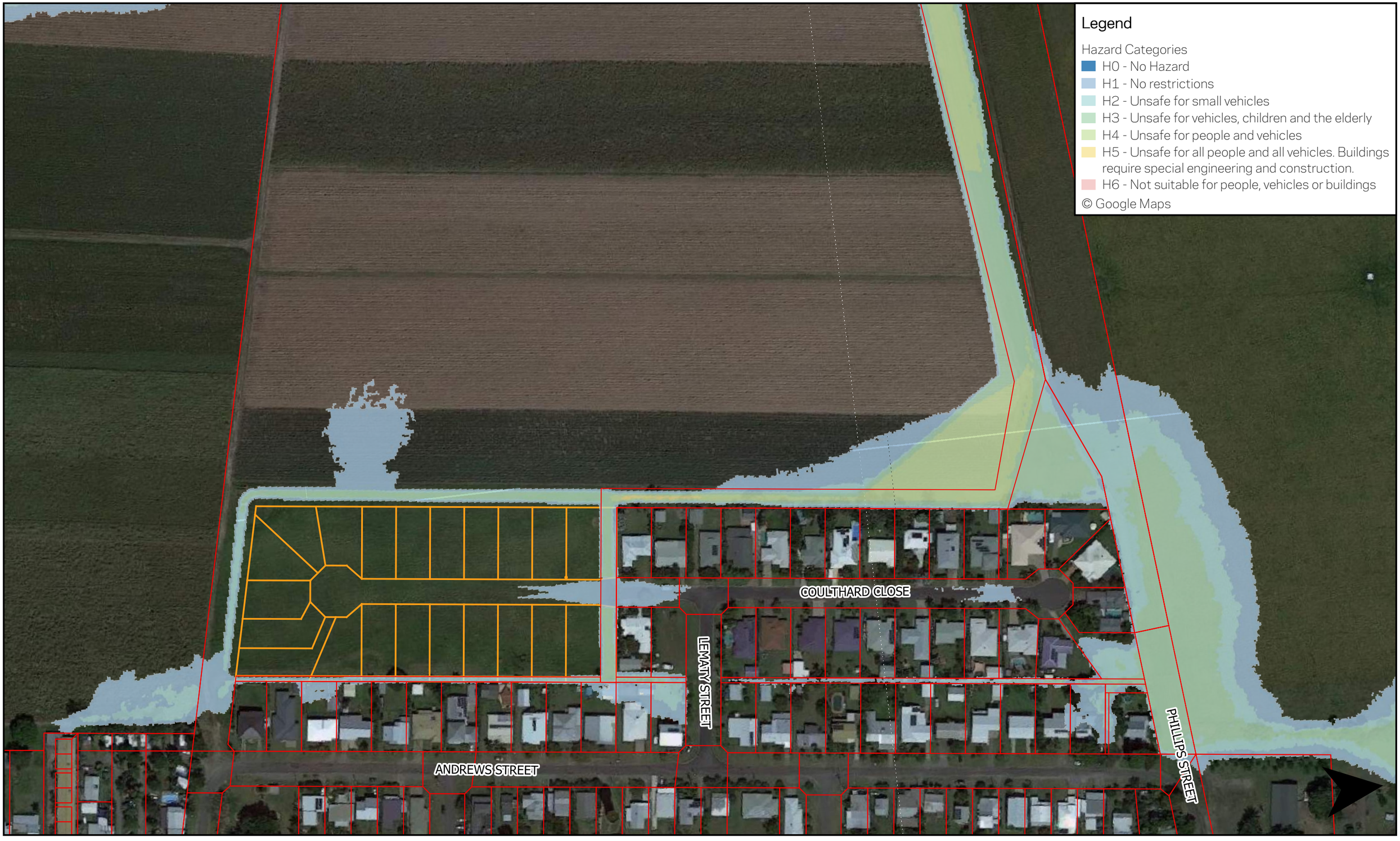
Engineer. Carlos Gambirazio

Date. 27/7/2022

Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Hazard - Developed - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX I
DEVELOPED FLOOD LEVEL

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Developed - 20% AEP ('1 in 5-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

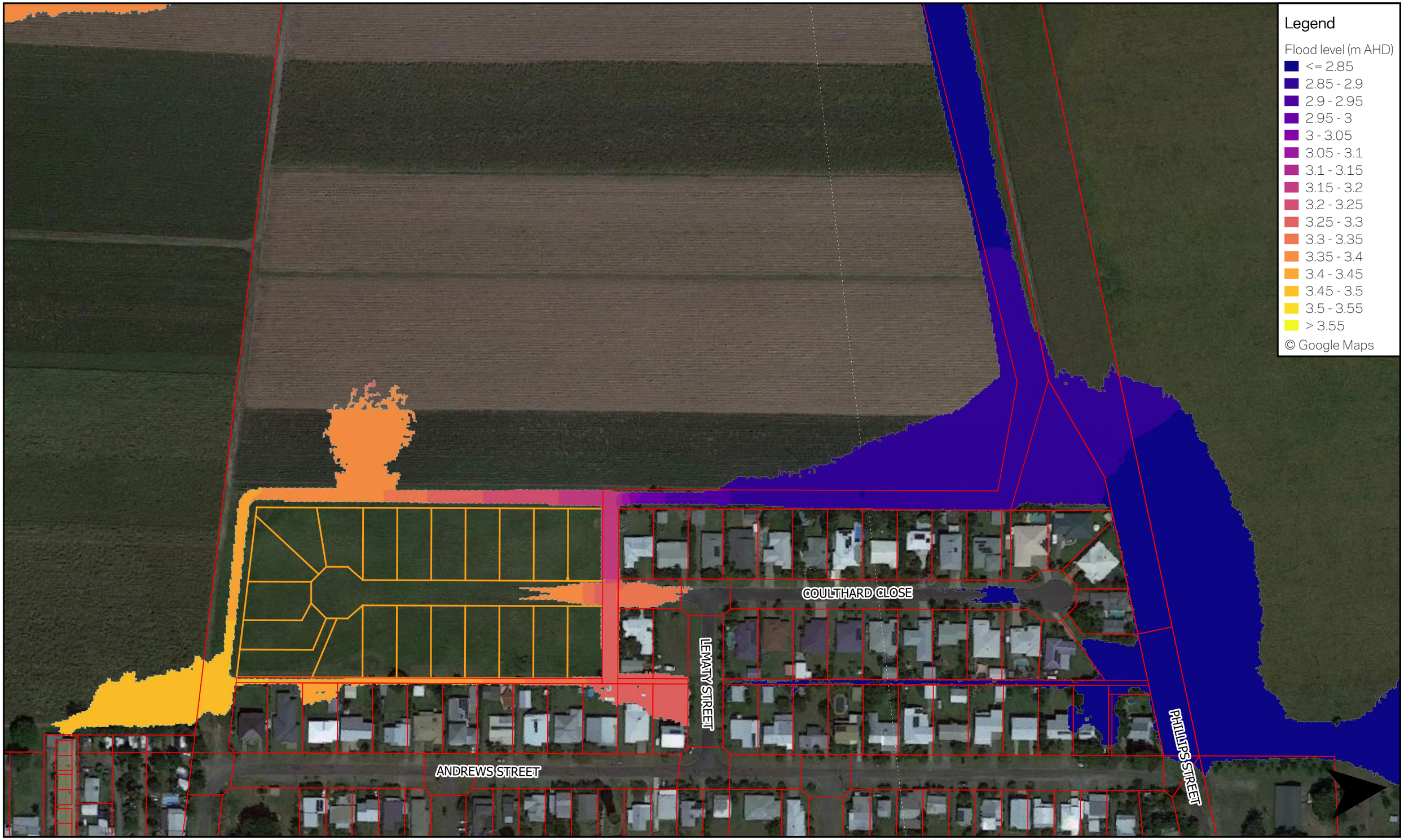
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Developed - 10% AEP ('1 in 10-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3



BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

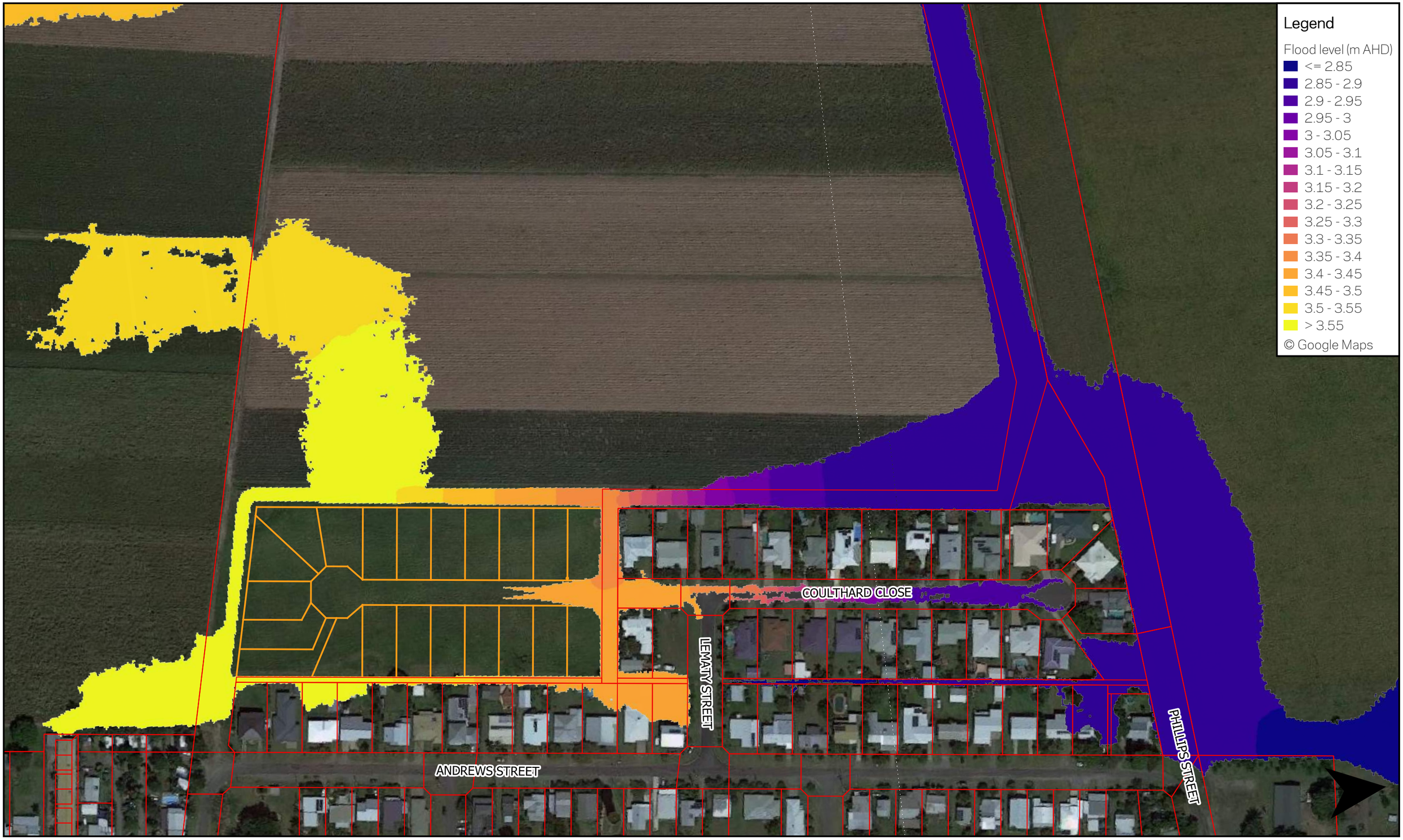
Title:
Level - Developed - 1% AEP ('1 in 100-year flood')

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX J
DEVELOPED SENSITIVITY ANALYSIS FLOOD LEVEL



BLIGH TANNER

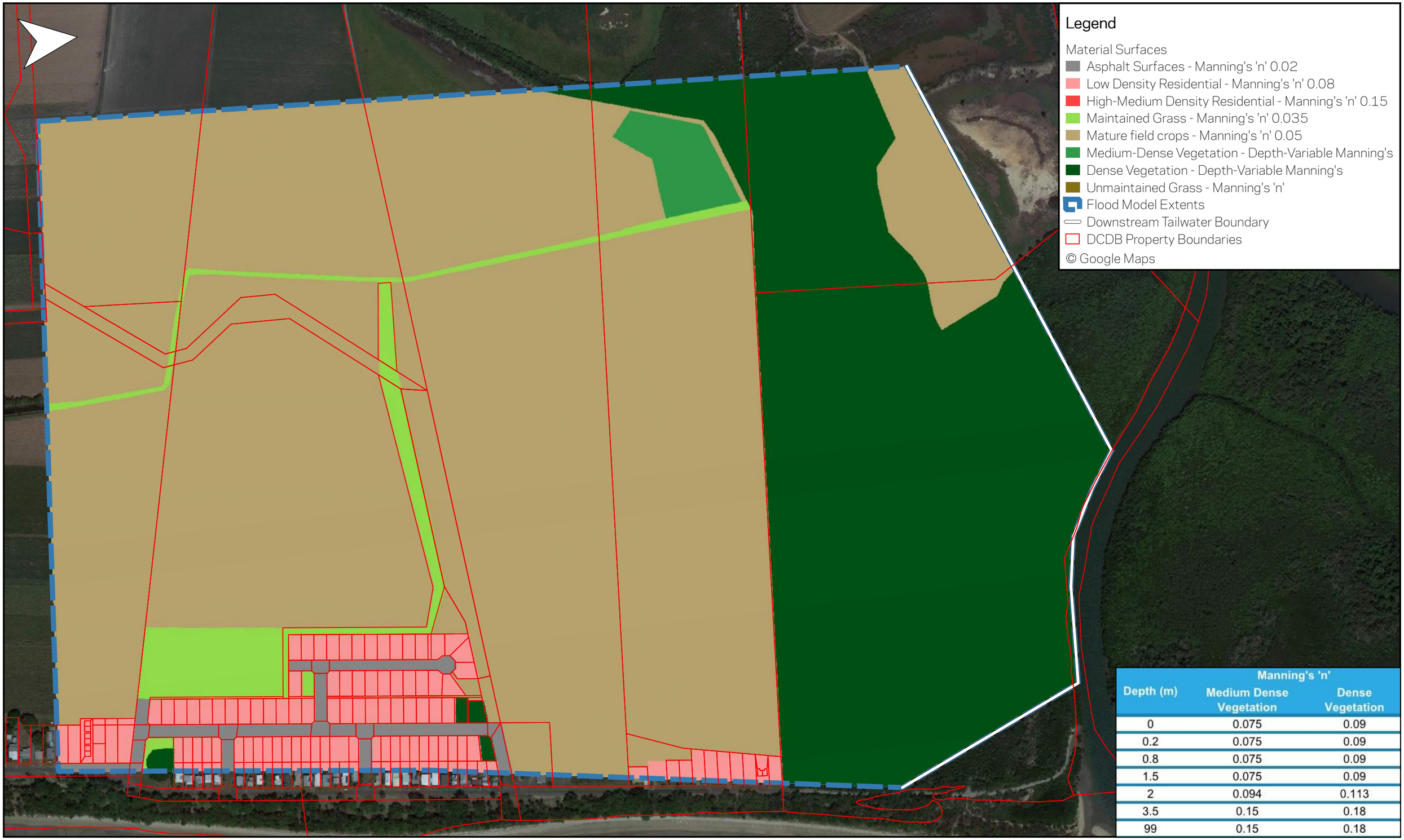
Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Level - Developed - Sensitivity Analysis - 1% AEP ('1 in 100-year flood')
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 27/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 50 100 150 200 m

Scale 1:2,000 @ A3

APPENDIX K
FLOOD MODELLING LAYOUTS



Depth (m)	Manning's 'n'	
	Medium Dense Vegetation	Dense Vegetation
0	0.075	0.09
0.2	0.075	0.09
0.8	0.075	0.09
1.5	0.075	0.09
2	0.094	0.113
3.5	0.15	0.18
99	0.15	0.18

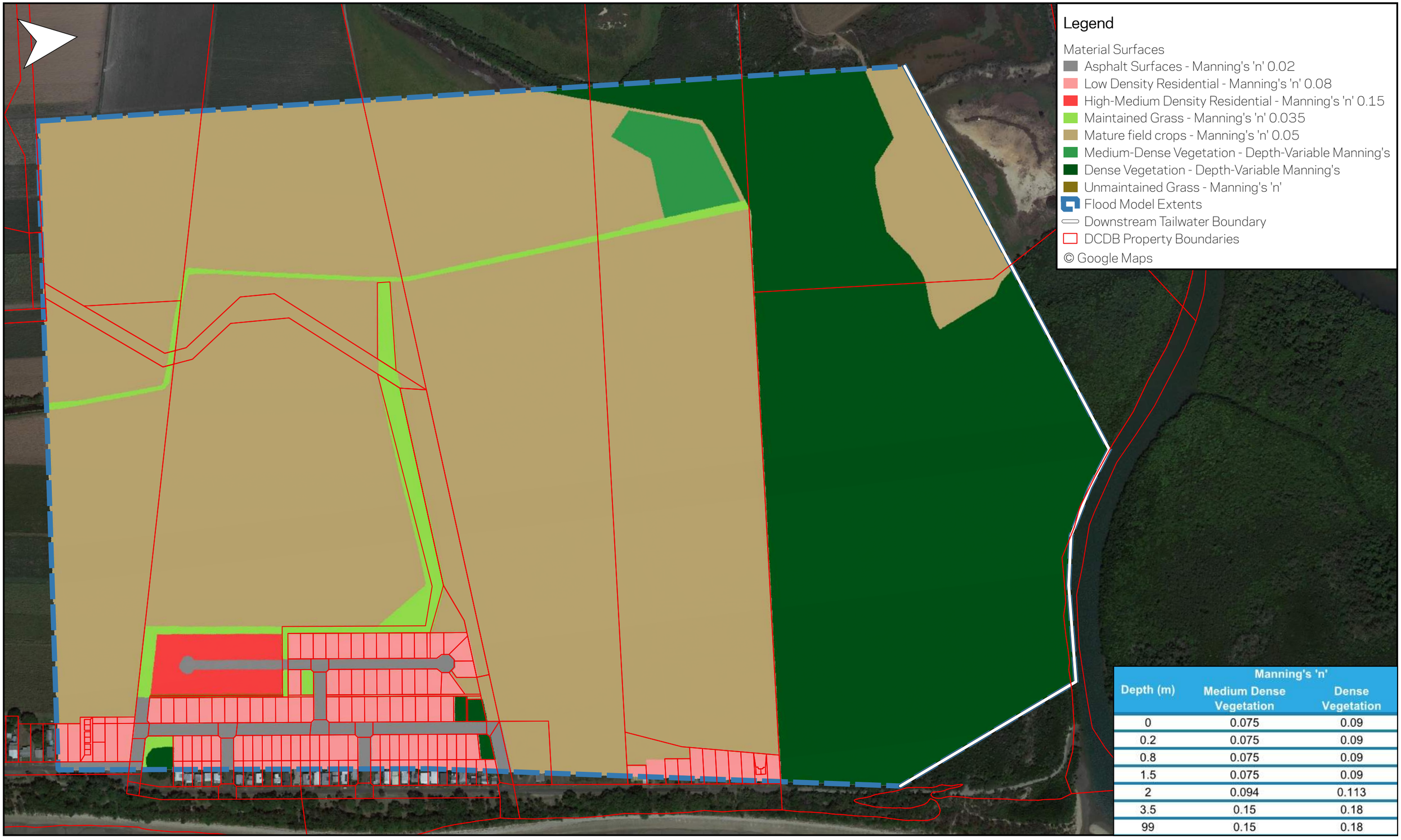
BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Flood Modelling Layout - Existing Case Scenario
Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 28/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 100 200 300 400 m

Scale 1:5,500 @ A3



Depth (m)	Manning's 'n'	
	Medium Dense Vegetation	Dense Vegetation
0	0.075	0.09
0.2	0.075	0.09
0.8	0.075	0.09
1.5	0.075	0.09
2	0.094	0.113
3.5	0.15	0.18
99	0.15	0.18

BLIGH TANNER

Level 9, 269 Wickham St
PO Box 612 Fortitude Valley Qld
4006 Australia
T +61 7 3251 8555

Title:
Flood Modelling Layout - Developed Case Scenario

Project. Newell Beach Drainage Study
Job # 2021.0566
Engineer. Carlos Gambirazio
Date. 28/7/2022
Filepath: \\bt-data\Company Data\Projects\2021\2021.0566-Newell Beach Drainage Study\2 Engineering\1 Civil\6 GIS\2021.0566_NewellBeachDrainageStudy_GIS.qgz

0 100 200 300 400 m

Scale 1:5,500 @ A3

APPENDIX L
RATIONAL METHOD

RATIONAL METHOD CALCULATOR

Project Name:	Newell Beach Drainage Study
Project Number	2021.0566
Date	1/02/2022

Instructions

INPUT	Manually Insert Information
CALCULATIONS/REFERENCE INFORMATION	sources or calculations for transparency of the worksheet operations. **DO NOT CHANGE.**
RESULTS	These cells contain results from relevant processes

Rainfall Information - Download and manually input mm/hr IFD information from BoM

		Average Rainfall Intensity (mm/hr)						
		Average Recurrence Interval (ARI) (years)						
Duration (min)	Duration (hr)	1	2	5	10	20	50	100
1	0.02	180	219	254	283	314	353	382
2	0.03	169	206	239	265	293	328	353
3	0.05	156	191	221	245	272	304	328
4	0.07	146	178	206	229	254	285	308
5	0.08	138	168	195	216	240	269	291
10	0.17	111	135	157	174	194	218	236
15	0.25	96.6	117	136	151	168	189	204
20	0.33	86.5	105	122	135	150	169	183
25	0.42	79	95.9	111	123	137	154	167
30	0.50	73	88.8	103	114	127	143	155
45	0.75	60.7	73.9	85.9	95.6	106	120	129
60	1.00	52.7	64.3	75.1	83.6	93.1	105	113
90	1.50	42.6	52.2	61.4	68.7	76.7	86.6	93.9
120	2.00	36.4	44.7	53	59.5	66.5	75.4	81.9
180	3.00	28.7	35.5	42.7	48.2	54.2	61.9	67.5
270	4.50	22.5	28	34.1	38.9	44	50.7	55.6
360	6.00	18.8	23.5	29	33.3	37.9	44	48.5
540	9.00	14.6	18.4	23.1	26.7	30.7	36	40.1
720	12.00	12.2	15.4	19.6	22.8	26.4	31.3	35.1
1080	18.00	9.52	12.1	15.6	18.3	21.3	25.6	29
1440	24.00	8	10.2	13.2	15.6	18.3	22.2	25.3
1800	30.00	7.01	8.94	11.7	13.8	16.2	19.8	22.7
2160	36.00	6.29	8.04	10.5	12.5	14.7	18	20.7
2880	48.00	5.33	6.81	8.93	10.6	12.5	15.4	17.9
4320	72.00	4.21	5.38	7.04	8.35	9.82	12.2	14.2
5760	96.00	3.55	4.53	5.89	6.96	8.15	10.1	11.8
7200	120.00	3.1	3.94	5.09	5.98	6.96	8.67	10.1
8640	144.00	2.76	3.5	4.48	5.24	6.06	7.54	8.8
10080	168.00	2.49	3.15	4	4.65	5.35	6.64	7.74

Catchment Information

Catchment Type:	Rural creek catchments	
Catchment Area	6.237	km2
Catchment Area	623.7	hectares

Time of Concentration

Standard Inlet Time	Urban residential areas, slope at top of catchment is up to 3%	
Standard Inlet Time	0	minutes
Overland Sheet Flow Time	Flat (0-1%) bushland or grassland	
Recommended maximum length	200	
Selected length (m)	28	
Surface Type	Concrete	
Surface Roughness	0.01	Horton's Roughness Coefficient (n)
Slope of surface	2.8	%
Overland Sheet Flow Time	0	minutes
Kerb and Channel Flow Time		
Length of Gutter Flow	45	metres
Slope of Gutter	0.5	%
Kerb and Channel Flow Time	0	minutes
Open Channel Flow Time		
Length of Reach	28.7	metres
Velocity from Flood Model	1.1	m/s
Open Channel Flow Time	0	minutes

Pipe Flow Time (assuming full)		
Material Type	Concrete	
Manning's Roughness 'n'	0.013	do not touch
Diameter	300	millimetres
Hydraulic Radius	0.075	metres
Slope	0.05	m/m
Velocity	3.059021238	m/s
Length of Reach	0	metres
Pipe Capacity (full)	0.21622947	m3/s
Pipe Flow Time	0	minutes
Creek Flow Time		
Length of flow path	5.424	kilometres
Catchment Area	623.7	hectares
Slope	3.15	%
Creek Flow Time	131.3977683	minutes
TOTAL TIME OF CONCENTRATION (MINUTES)	131.3977683	

Coefficient of Discharge (C10)

Intensity (10% AEP, 1 Hour)	Impervious Options	Associated C10
83.6	0	0.66
	0.2	0.74
	0.4	0.78
	0.6	0.82
	0.8	0.86
	0.9	0.88
	1	0.9

Stage	Impervious	C10
Existing	0	0.66
Proposed	0.5	0.8

Table 4.5.3 – Table of C_{10} values

Intensity (mm/hr) I_{1hr}	Fraction Impervious f_i						
	0.00	0.20	0.40	0.60	0.80	0.90	1.00
39-44	Refer to Table 4.5.4	0.44	0.55	0.67	0.78	0.84	0.90
45-49		0.49	0.60	0.70	0.80	0.85	0.90
50-54		0.55	0.64	0.72	0.81	0.86	0.90
55-59		0.60	0.68	0.75	0.83	0.86	0.90
60-64		0.65	0.72	0.78	0.84	0.87	0.90
65-69		0.71	0.76	0.80	0.85	0.88	0.90
70-90		0.74	0.78	0.82	0.86	0.88	0.90

Refer to notes on previous page.

Table 4.5.4 – C_{10} values for zero fraction impervious [1]

Land description	Below bushland			Medium density bush, or Good grass cover, or High density pasture, or Zone village cropping			Light cover bushland, or Poor grass cover, or Low density pasture, or Low cover from fallows		
Intensity (mm/hr) I_{1hr}	Soil permeability			Soil permeability			Soil permeability		
	High	Med	Low	High	Med	Low	High	Med	Low
39–44	0.08	0.24	0.32	0.16	0.32	0.40	0.24	0.40	0.48
45–49	0.10	0.29	0.39	0.20	0.39	0.49	0.29	0.49	0.59
50–54	0.12	0.35	0.46	0.23	0.46	0.58	0.35	0.58	0.69
55–59	0.13	0.40	0.53	0.27	0.53	0.68	0.40	0.66	0.79
60–64	0.15	0.44	0.59	0.30	0.59	0.70	0.44	0.70	0.70
65–69	0.17	0.50	0.66	0.33	0.66	0.70	0.50	0.70	0.70
70–90	0.18	0.53	0.70	0.35	0.70	0.70	0.53	0.70	0.70

[1] Developed from Department of Natural Resources and Mines (2004); see Background Notes for further discussion. These coefficients are not suitable for soils compacted by construction activities.

RATIONAL METHOD CALCULATION

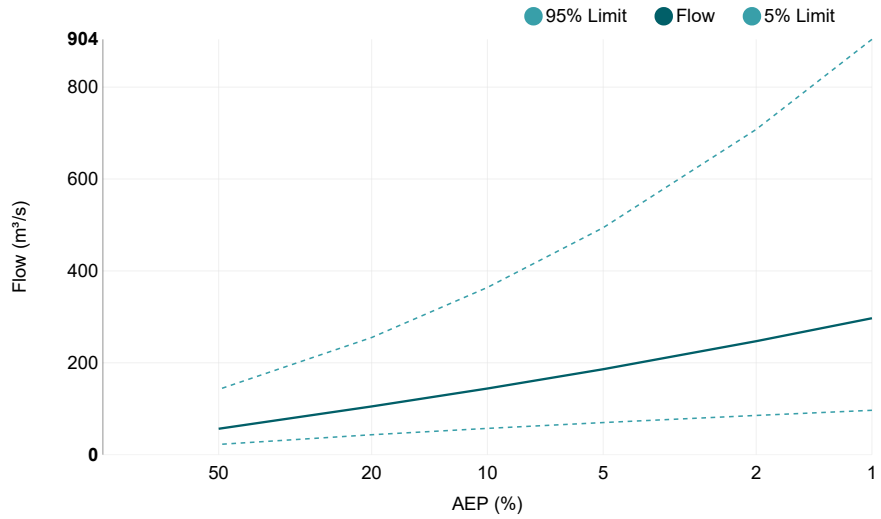
Catchment Area	623.7
Fraction Impervious	0
Coefficient of Discharge (C10)	0.66
Q1 - C1 - 63.2% AEP	0.528
Q2 - C2 - 39.3% AEP	0.561
Q5 - C5 - 20% AEP	0.627
Q10 - C10 - 10% AEP	0.66
Q20 - C20 - 5% AEP	0.693
Q50 - C50 - 2% AEP	0.759
Q100 - C100 - 1% AEP	0.792

Peak Flow (Qy) (m^3/s)	
1 EY (1-year ARI)	31.9592321
0.5 EY (2-year ARI)	41.74677732
0.2 EY (5-year ARI)	55.44727859
10% AEP (10-year ARI)	65.58076844
5% AEP (20-year ARI)	77.03609074
2% AEP (50-year ARI)	95.77631814
1% AEP (100-year ARI)	108.6248259

Average Rainfall Intensity (I)	Duration (min) - Change duration values so that the range covers the time of concentration. E.g. Tc = 20, durations = 15 and 30.		Tc (min)
	120	180	131.40
1	36.4	28.7	34.9372864
2	44.7	35.5	42.95234219
5	53	42.7	51.0433831
10	59.5	48.2	57.35342029
20	66.5	54.2	64.16345749
50	75.4	61.9	72.83550212
100	81.9	67.5	79.1645356

APPENDIX M
RFFE ESTIMATION MODEL

Results | Regional Flood Frequency Estimation Model



AEP (%)	Discharge (m^3/s)	Lower Confidence Limit (5%) (m^3/s)	Upper Confidence Limit (95%) (m^3/s)
50	56.4	22.3	142
20	105	43.4	255
10	144	57.2	364
5	186	69.9	494
2	247	85.4	708
1	297	96.6	904

Statistics

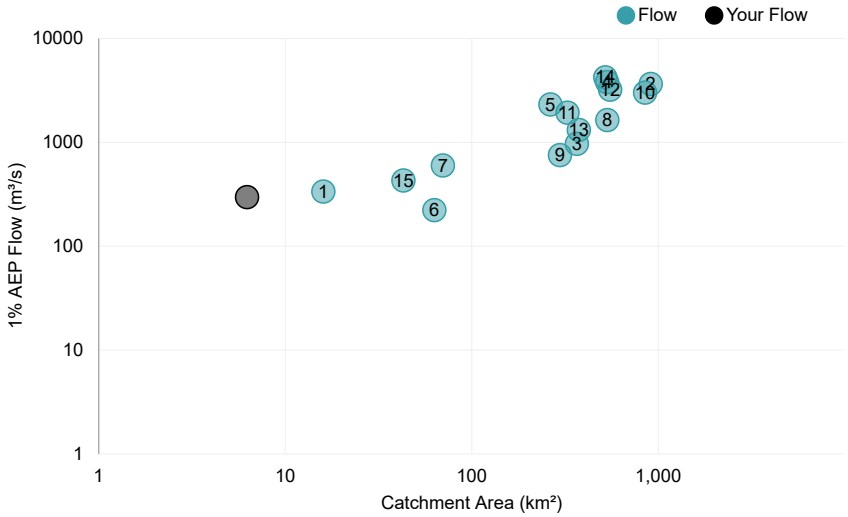
Variable	Value	Standard Dev
Mean	3.707	0.544
Standard Dev	0.743	0.293
Skew	-0.126	0.084

Note: These statistics come from the nearest gauged catchment. Details.

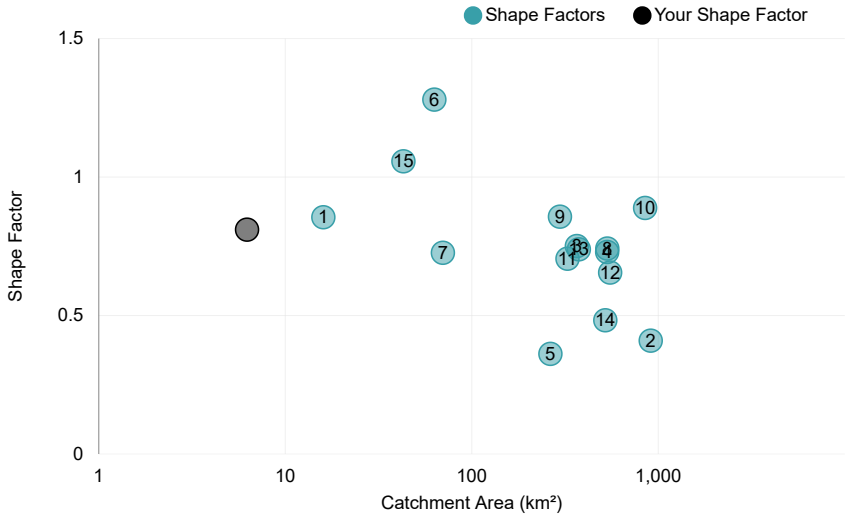
Correlation		
1.000		
-0.330	1.000	
0.170	-0.280	1.000

Note: These statistics are common to each region. Details.

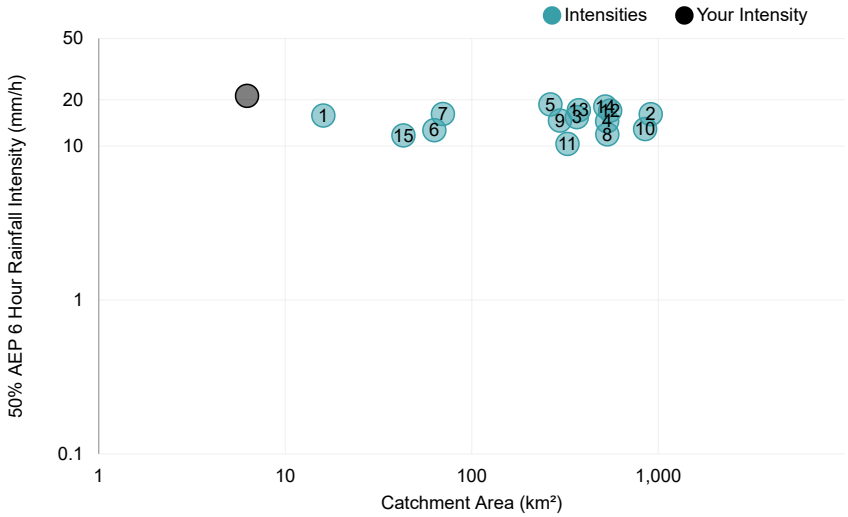
1% AEP Flow vs Catchment Area



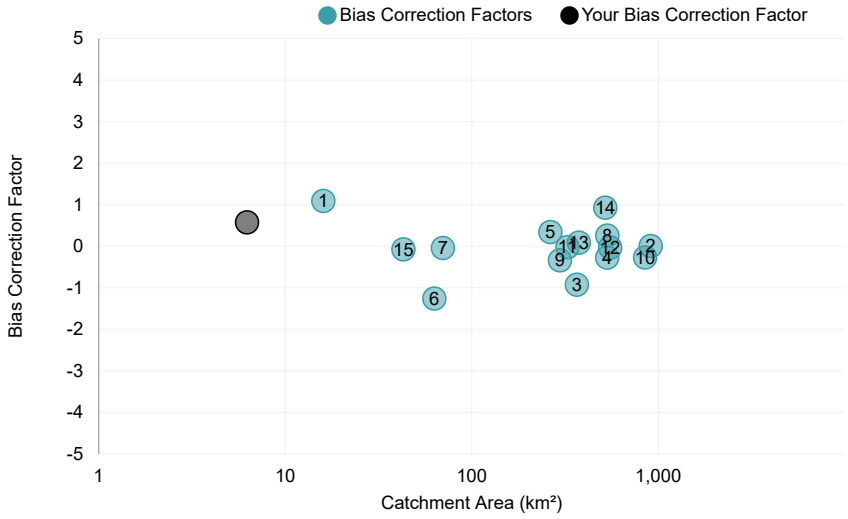
Shape Factor vs Catchment Area



Intensity vs Catchment Area



Bias Correction Factor vs Catchment Area



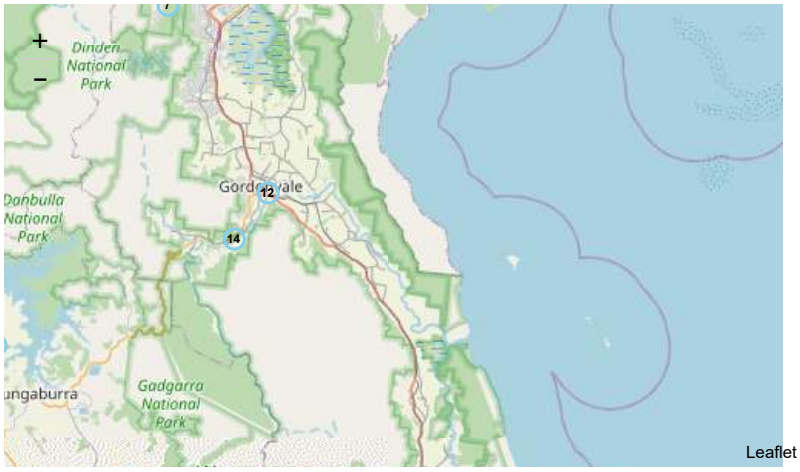
Download

TXT Nearby JSON

Input Data

Input Data

Date/Time	2022-02-01 16:41
Catchment Name	Catchment1
Latitude (Outlet)	-16.41165
Longitude (Outlet)	145.40545
Latitude (Centroid)	-16.42258
Longitude (Centroid)	145.39041
Catchment Area (km^2)	6.237
Distance to Nearest Gauged Catchment (km)	7.66
50% AEP 6 Hour Rainfall Intensity (mm/h)	21.203716
2% AEP 6 Hour Rainfall Intensity (mm/h)	43.872875
Rainfall Intensity Source (User/Auto)	Auto
Region	East Coast
Region Version	RFFE Model 2016 v1
Region Source (User/Auto)	Auto
Shape Factor	0.81
Interpolation Method	Natural Neighbour
Bias Correction Value	0.576



Method by Dr Ataur Rahman and Dr Khaled Haddad from Western Sydney University for the Australian Rainfall and Runoff Project. Full description of the project can be found at the project page (http://arr.ga.gov.au/revision-projects/project-list/projects/project-5) on the ARR website. Send any questions regarding the method or project here (mailto:admin@arr-software.org).

ENGINEERS AUSTRALIA (http://www.engineersaustralia.org.au)

APPENDIX N
STORM TIDE INUNDATION REPORT

Storm Tide Inundation Property Report

The following report has been automatically generated to provide a general indication of development related information applying to the nominated land parcel.

For more information refer to the JB Pacific Storm Tide Inundation Methodology Study This report is not intended to replace the need for carrying out a detailed assessment of Council and State controls or the need to seek your own professional advice on any town planning instrument, local law or other controls that may impact on the existing or intended use of the premise mentioned in this report. For further information please contact Council by phone: 07 4099 9444 or 1800 026 318 or email enquiries@douglas.qld.gov.au.

A separate Council Planning Scheme Property Report tool is available for information relating to Council's 2018 Planning Scheme.

Visit Council's website to apply for an official property search or certificate, or contact the Department of Natural Resources, Mines and Energy to undertake a title search to ascertain how easements may affect land.

JB Pacific Storm Tide Inundation Methodology Study

The purpose of the Douglas Shire Storm Tide Inundation Methodologies Study was to review and analyse different methodologies, identify a best practise model for the Shire's coastal urban areas, run this preferred best practise model and calculate the minimum heights for the 1% AEP (Annual Exceedance Probability) storm tide inundation for the year 2100 having regard to a 0.8m sea level rise for urban coastal properties.

Excerpt from the JB Pacific Storm Tide Inundation Methodology Report -

Storm Tide Inundation

The Douglas Shire coastline experiences a range of hydrodynamic, waves, and morphologic processes that are linked through dependant and independent variables. This includes the underlying astronomical tide, the passage of local storms and cyclones, the interaction of storm surges along the open coastline, the local wave climate, any sheltering provided by nearshore reefs, and the role of nearshore and dune vegetation. A range of these coastal processes are shown in Figure 2-1.

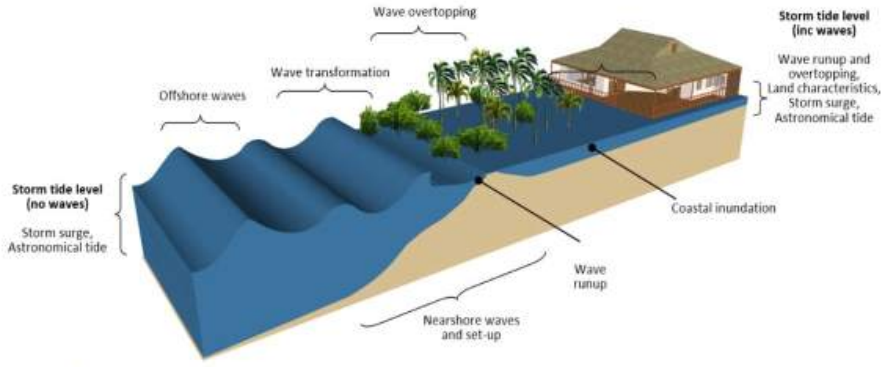


Figure 2-1: Drivers of coastal risk

Importantly storm tide inundation can be from the overtopping at the foreshore as well as wave runup through estuaries and inundate from "behind" a locality. Check out the animation of this activity through the local estuaries in the animation on Council's website.

Future Year 2100 Projected Levels

On 2 July 2017 the Planning Act 2016 came into effect as part of the Queensland Government's commitment to delivering planning reform across the State and the State Planning Policies reinstating the need to consider the 1% AEP (Average Exceedance Probability) Storm Tide Inundation level for the year 2100 with a 0.8m sea level rise. The 1% AEP is referred to as the one in one hundred year event. The 1%AEP is the minimum we need to consider and plan for.

Freeboard

There are numerous variants that can affect the modelled levels. To account for the differences in these variants a "freeboard" is applied. For the JB Pacific Storm Tide Inundation Methodology Study these differences have been considered within a nominal 0.5m freeboard level. Minimum levels for habitable rooms need to consider the Finished Floor Level (FFL) being the 1%AEP level plus the 0.5m freeboard. This value is a measurement at AHD (Australian Height Datum).

AHD Levels

A Licensed Surveyor should be engaged to determine the accurate AHD for a property. Contours and levels identified through Queensland Globe are estimated from LIDAR calculations and may not be 100% accurate.

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

Property Information

Property Address	2 Andrews Street NEWELL
Lot Plan	51SP168537 (Freehold - 379270m^2)

Selected Property | Easements | Land Parcels

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

Storm Tide Inundation Property Information

The information below provides details of the projected Future Year 2100 Storm Tide Inundation Level that considers a Sea Level Rise of 0.8m AHD

Selected Property

Affected by the 1 % AEP Event for the year 2100

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

JBPacific summary Information

Storm Tide Inundation Property Report

2 Andrews Street NEWELL

Produced: 14/07/2021

Storm Tide Range Detailed

Selected Property

StormTide Levels Detailed

Below 0.33000 | 2.16968 | 2.32640 | 2.47331 | 2.76642 | 2.91969 | 3.18777 and above

The Level for Construction – for Storm Tide Inundation Considerations

The lot is affected by storm tide inundation for the Year 2100, 1 in 100 (1% AEP) event. The 1% AEP for the year 2100 (including a Sea Level Rise of 0.8m) is at **2.809** (without freeboard).The Freeboard for the Study is 0.5m and is applied to determine Finished Floor Level for habitable rooms.

Finished Floor Level

The total required Finished Floor Level for habitable rooms is 3.309 m AHD

Note - Finished floor level is usually 225mm above the pad level.

Disclaimer

The maps show the estimated areas of inundation for the 1% AEP projected for the year 2100 having regard to a sea level rise of 0.8m. The report nominates required minimum habitable room minimum finished floor level. This minimum level is determined from the best data to date held by Council. This storm tide inundation flood level, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating flood levels. Storm tide Inundation analysis is based on comprehensive computer modelling calibrated against actual storm tides. The website provides locations, street names, aerial photography and available storm tide inundation data for the Shire areas that were included in the JB Pacific Storm Tide Inundation Methodologies Study. This property reporting tool is not a substitute for a detailed Coastal Engineering analysis of a property and should not be relied upon where the reliance may result in loss, damage or injury. While every effort is taken to ensure the information in this report is accurate and up to date, Douglas Shire Council makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs that may occur as a result of the report being inaccurate or incomplete in any way or for any reason.

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BLIGH TANNER

Reasons for Decision

1. Sections 60, 62 and 63 of the *Planning Act 2016*:

    a. to ensure the development satisfies the benchmarks of the 2018 Douglas Shire Planning Scheme Version 1.0; and

    b. to ensure compliance with the *Planning Act 2016*.

2. Findings on material questions of fact:

    a. the development application was properly lodged to the Douglas Shire Council on 3 June 2021 under section 51 of the *Planning Act 2016* and Part 1 of the *Development Assessment Rules*;

    b. the development application contained information from the applicant which Council reviewed together with Council's own assessment against the 2017 State Planning Policy and the 2018 Douglas Shire Planning Scheme Version 1.0 in making its assessment manager decision.

3. Evidence or other material on which findings were based:

    a. the development triggered assessable development under the Assessment Table associated with the Low density residential zone code;

    b. Council undertook an assessment in accordance with the provisions of sections 60, 62 and 63 of the *Planning Act 2016*; and

    c. the applicant's reasons have been considered and the following findings are made:

        i. The proposed development is consistent with the established pattern of development in Coulthard Close despite not complying with the minimum lot size for unsewered land in the Low density residential zone;

        ii. Conditions of approval require Lots 8-13 to be reconfigured into 4 allotments to increase the utility of the residential allotments and to meet the assessment benchmarks of the Low density residential zone with respect to minimum road frontage requirements and the ROL code with respect to number of allotments accessed via a cul-de-sac.

4. Compliance with Assessment Benchmarks.

    The development complies with the benchmarks as per the summary provided in Reasons For Decision in particular Item 3c.

Extracts from the Planning Act 2016 - Making Representations During Applicant's Appeal Period

Division 2 Changing development approvals

Subdivision 1 Changes during appeal period

74 What this subdivision is about

(1) This subdivision is about changing a development approval before the applicant's appeal period for the approval ends.

(2) This subdivision also applies to an approval of a change application, other than a change application for a minor change to a development approval.

(3) For subsection (2), sections 75 and 76 apply—

(a) as if a reference in section 75 to a development approval were a reference to an approval of a change application; and

(b) as if a reference in the sections to the assessment manager were a reference to the responsible entity; and

(c) as if a reference in section 76 to a development application were a reference to a change application; and

(d) as if the reference in section 76(3)(b) to section 63(2) and (3) were a reference to section 83(4); and

(e) with any other necessary changes.

75 Making change representations

(1) The applicant may make representations (***change representations***) to the assessment manager, during the applicant's appeal period for the development approval, about changing—

(a) a matter in the development approval, other than—

(i) a matter stated because of a referral agency's response; or

(ii) a development condition imposed under a direction made by the Minister under chapter 3, part 6, division 2; or

(b) if the development approval is a deemed approval—the standard conditions taken to be included in the deemed approval under section 64(8)(c).

(2) If the applicant needs more time to make the change representations, the applicant may, during the applicant's appeal period for the approval, suspend the appeal period by a notice given to the assessment manager.

(3) Only 1 notice may be given.

(4) If a notice is given, the appeal period is suspended—

(a) if the change representations are not made within a period of 20 business days after the notice is given to the assessment manager—until the end of that period; or

(b) if the change representations are made within 20 business days after the notice is given to the assessment manager, until—

(i) the applicant withdraws the notice, by giving another notice to the assessment manager; or

(ii) the applicant receives notice that the assessment manager does not agree with the change representations; or

(iii) the end of 20 business days after the change representations are made, or a longer period agreed in writing between the applicant and the assessment manager.

(5) However, if the assessment manager gives the applicant a negotiated decision notice, the appeal period starts again on the day after the negotiated decision notice is given.

76 Deciding change representations

(1) The assessment manager must assess the change representations against and having regard to the matters that

must be considered when assessing a development application, to the extent those matters are relevant.

(2) The assessment manager must, within 5 business days after deciding the change representations, give a decision notice to—

(a) the applicant; and

(b) if the assessment manager agrees with any of the change representations—

(i) each principal submitter; and

(ii) each referral agency; and

(iii) if the assessment manager is not a local government and the development is in a local government area—the relevant local government; and

(iv) if the assessment manager is a chosen assessment manager—the prescribed assessment manager; and

(v) another person prescribed by regulation.

(3) A decision notice (a ***negotiated decision notice***) that states the assessment manager agrees with a change representation must—

(a) state the nature of the change agreed to; and

(b) comply with section 63(2) and (3).

(4) A negotiated decision notice replaces the decision notice for the development application.

(5) Only 1 negotiated decision notice may be given.

(6) If a negotiated decision notice is given to an applicant, a local government may give a replacement infrastructure charges notice to the applicant.

Extracts from the Planning Act 2016 – Appeal Rights

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

(1) Schedule 1 states—

(a) matters that may be appealed to—

(i) either a tribunal or the P&E Court; or

(ii) only a tribunal; or

(iii) only the P&E Court; and

(b) the person—

(i) who may appeal a matter (the ***appellant***); and

(ii) who is a respondent in an appeal of the matter; and

(iii) who is a co-respondent in an appeal of the matter; and

(iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

(3) The ***appeal period*** is—

(a) for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or

(b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or

(c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or

(d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or

(e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or

(f) for an appeal relating to the *Plumbing and Drainage Act 2018*—

(i) for an appeal against an enforcement notice given because of a belief mentioned in the *Plumbing and Drainage Act 2018*, section 143(2)(a)(i), (b) or (c)—5 business days after the day the notice is given; or

(ii) for an appeal against a decision of a local government or an inspector to give an action notice under the *Plumbing and Drainage Act 2018*—5 business days after the notice is given; or

(iii) for an appeal against a failure to make a decision about an application or other matter under the *Plumbing and Drainage Act 2018*—at anytime after the period within which the application or matter was required to be decided ends; or

(iv) otherwise—20 business days after the day the notice is given; or

(g) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note—

See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

(5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.

(6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—

(a) the adopted charge itself; or

(b) for a decision about an offset or refund—

(i) the establishment cost of trunk infrastructure identified in a LGIP; or

(ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

(1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—

(a) is in the approved form; and

(b) succinctly states the grounds of the appeal.

(2) The notice of appeal must be accompanied by the required fee.

(3) The appellant or, for an appeal to a tribunal, the registrar, must, within the service period, give a copy of the notice of appeal to—

(a) the respondent for the appeal; and

(b) each co-respondent for the appeal; and

(c) for an appeal about a development application under schedule 1, section 1, table 1, item 1—each principal submitter for the application whose submission has not been withdrawn; and

(d) for an appeal about a change application under schedule 1, section 1, table 1, item 2—each principal submitter for the application whose submission has not been withdrawn; and

(e) each person who may elect to be a co-respondent for the appeal other than an eligible submitter for a development application or change application the subject of the appeal; and

(f) for an appeal to the P&E Court—the chief executive; and

(g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.

(4) The ***service period*** is—

(a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or

(b) otherwise—10 business days after the appeal is started.

(5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).

(6) A person elects to be a co-respondent to an appeal by filing a notice of election in the approved form—

(a) if a copy of the notice of appeal is given to the person—within 10 business days after the copy is given to the person; or

(b) otherwise—within 15 business days after the notice of appeal is lodged with the registrar of the tribunal or the P&E Court.

(7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Non-appealable decisions and matters

(1) Subject to this chapter, section 316(2), schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

(2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.

(3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

(4) In this section—

decision includes—

(a) conduct engaged in for the purpose of making a decision; and

(b) other conduct that relates to the making of a decision; and

(c) the making of a decision or the failure to make a decision; and

(d) a purported decision; and

(e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—

(a) is final and conclusive; and

(b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the *Judicial Review Act 1991* or otherwise, whether by the Supreme Court, another court, any tribunal or another entity; and

(c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, any tribunal or another entity on any ground.

232 Rules of the P&E Court

(1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.

(2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

DOUGLAS SHIRE COUNCIL

2018 Douglas Shire Planning Scheme version 1.0 Applications

ADOPTED INFRASTRUCTURE CHARGES NOTICE

F.R. Coulthard & C.B. Coulthard.		**0**	**0**
DEVELOPERS NAME		ESTATE NAME	STAGE
2 Andrews Street	**Newell Beach**	**Lot 51 on SP168537**	**11485**
STREET No. & NAME	**SUBURB**	LOT & RP No.s	PARCEL No.
ROL (1 lot into 22 lots)		**2021-4160**	**4**
DEVELOPMENT TYPE		COUNCIL FILE NO.	VALIDITY PERIOD (year)
1108522	**1**	**Payment before commencement of use for MCU; and Prior to signing and sealing of survey form for ROL**	
DSC Reference Doc . No.	VERSION No.		

Infrastructure Charges as resolved by Council at the Ordinary Meeting held on 23 February 2021 (Came into effect on 1 March 2021)

		Charge per Use	$ Rate	Floor area/No.	Amount	Amount Paid	Receipt Code & GL Code
Proposed Demand							
Residential	Dwelling_house	$_per_3_or_more_bedroom_dwelling	15,959.97	22	$351,119.34		
	Total Demand				**$351,119.34**		
Credit							
Existing land use							
3 or more bedroom dwelling	1 lot	$_per_3_or_more_bedroom_dwelling	15,959.97	1	$15,959.97		
	Total Credit				**$15,959.97**		**Code 895 GL GL7500.135.825**
	Required Payment or Credit		**TOTAL**		**$335,159.37**		

Prepared by	**Rebecca Taranto**	**9 Spetember 2022**	**Amount Paid**		
Checked by	**Neil Beck**	**9-Sep-22**	**Date Paid**		
Date Payable	**ROL - Before the Local Government approves the plan of subdivision**		**Receipt No.**		
Amendments		**Date**	**Cashier**		

Note:

The Infrastructure Charges in this Notice are payable in accordance with Sections 119 and 120 of the *Planning Act 2016* *as from Council's resolution from the Ordinary Meeting held on 23 February 2021.*

Charge rates under the Policy are subject to indexing.
Any Infrastructure Agreement for trunk works must be determined and agreed to prior to issue of Development Permit for Operational Work.

Charges are payable to: Douglas Shire Council. You can make payment at any of Council's Business Offices or by mail with your cheque or money order to Douglas Shire Council, PO Box 723, Mossman QLD 4873. Cheques must be made payable to Douglas Shire Council and marked 'Not Negotiable.' Acceptance of a cheque is subject to collection of the proceeds. Post dated cheques will not be accepted

Any enquiries regarding Infrastructure Charges can be directed to the Development & Environment, Douglas Shire Council on 07 4099 9444 or by email on enquiries@douglas.qld.gov.au

DOUGLAS SHIRE COUNCIL

PO Box 723 Mossman Qld 4873
www.douglas.qld.gov.au
enquiries@douglas.qld.gov.au
ABN 71 241 237 800

Administration Office
64 - 66 Front St Mossman
P 07 4099 9444
F 07 4098 2902

27 September 2022

Enquiries: Neil Beck
Our Ref: ROL 2021_4160 (Doc ID 1110764)
Your Ref: 34678-001-01

F R Coulthard & C B Coulthard
C/- Brazier Motti Pty Ltd
PO Box 1185
CAIRNS QLD 4870

Email: cns.planning@braziermotti.com.au

Attention Mr Michael Tessaro

Dear Sir

Adopted Infrastructure Charge Notice
For Development Application Reconfiguring a Lot (1 lot into 22 lots)
At 2 Andrews Street Newell
On Land Described as Lot 51 on SP168537

Please find attached the Adopted Infrastructure Charges Notice issued in accordance with section 119 of the *Planning Act 2016.*

The amount in the Adopted Infrastructure Charges Notice has been calculated according to Council's Adopted Infrastructure Charges Resolution.

Please also find attached extracts from the Act regarding the following:

- your right to make representations to Council about the Adopted Infrastructure Charges Notice; and
- your Appeal rights with respect to the Adopted Infrastructure Charges Notice.

Please quote Council's application number: MCUC 2021_4160 in all subsequent correspondence relating to this matter.

Should you require any clarification regarding this, please contact Neil Beck on telephone 07 4099 9444.

Yours faithfully

Paul Hoye
Manager Environment & Planning

encl.

- Adopted Infrastructure Charges Notice
- Rights to Make Representations and Appeals Regarding Infrastructure Charges

Adopted Infrastructure Charges Notice

DOUGLAS SHIRE COUNCIL

2018 Douglas Shire Planning Scheme version 1.0 Applications

ADOPTED INFRASTRUCTURE CHARGES NOTICE

F.R. Coulthard & C.B. Coulthard.		0	0
DEVELOPERS NAME		ESTATE NAME	STAGE
2 Andrews Street	Newell Beach	Lot 51 on SP168537	11485
STREET No. & NAME	SUBURB	LOT & RP No.s	PARCEL No.
ROL (1 lot into 22 lots)		2021-4160	4
DEVELOPMENT TYPE		COUNCIL FILE NO.	VALIDITY PERIOD (year)
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DSC Reference Doc . No.	VERSION No.		

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	Total Credit				**$15,959.97**		**Code 895 GL GL7500.135.825**
	Required Payment or Credit		**TOTAL**		**$335,159.37**		

Prepared by	Rebecca Taranto	9 Spetember 2022	**Amount Paid**	
Checked by	Neil Beck	9-Sep-22	**Date Paid**	
Date Payable	**ROL - Before the Local Government approves the plan of subdivision**		**Receipt No.**	
Amendments		**Date**	**Cashier**	

Note:

The Infrastructure Charges in this Notice are payable in accordance with Sections 119 and 120 of the *Planning Act 2016* *as from Council's resolution from the Ordinary Meeting held on 23 February 2021.*

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Any Infrastructure Agreement for trunk works must be determined and agreed to prior to issue of Development Permit for Operational Work.

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Any enquiries regarding Infrastructure Charges can be directed to the Development & Environment, Douglas Shire Council on 07 4099 9444 or by email on enquiries@douglas.qld.gov.au

Extracts from the Planning Act 2016 – Making Representations during Applicant's Appeal Period

Subdivision 5 Changing charges during relevant appeal period

124 Application of this subdivision

This subdivision applies to the recipient of an infrastructure charges notice given by a local government.

125 Representations about infrastructure charges notice

(1) During the appeal period for the infrastructure charges notice, the recipient may make representations to the local government about the infrastructure charges notice.

(2) The local government must consider the representations.

(3) If the local government—

(a) agrees with a representation; and

(b) decides to change the infrastructure charges notice;

the local government must, within 10 business days after making the decision, give a new infrastructure charges notice (a ***negotiated notice***) to the recipient.

(4) The local government may give only 1 negotiated notice.

(5) A negotiated notice—

(a) must be in the same form as the infrastructure charges notice; and

(b) must state the nature of the changes; and

(c) replaces the infrastructure charges notice.

(6) If the local government does not agree with any of the representations, the local government must, within 10 business days after making the decision, give a decision notice about the decision to the recipient.

(7) The appeal period for the infrastructure charges notice starts again when the local government gives the decision notice to the recipient.

126 Suspending relevant appeal period

(1) If the recipient needs more time to make representations, the recipient may give a notice suspending the relevant appeal period to the local government.

(2) The recipient may give only 1 notice.

(3) If the representations are not made within 20 business days after the notice is given, the balance of the relevant appeal period restarts.

(4) If representations are made within the 20 business days and the recipient gives the local government a notice withdrawing the notice of suspension, the balance of the relevant appeal period restarts the day after the local government receives the notice of withdrawal.

Division 3 Development approval conditions about trunk infrastructure

Subdivision 1 Conditions for necessary trunk infrastructure

127 Application and operation of subdivision

(1) This subdivision applies if—

(a) trunk infrastructure—

(i) has not been provided; or

(ii) has been provided but is not adequate; and

(b) the trunk infrastructure is or will be located on—

(i) premises (the ***subject premises***) that are the subject of a development application, whether or not the infrastructure is necessary to service the subject premises; or

(ii) other premises, but is necessary to service the subject premises.

Extracts from the Planning Act 2016 –Appeal Rights

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

(1) Schedule 1 states—

(a) matters that may be appealed to—

(i) either a tribunal or the P&E Court; or

(ii) only a tribunal; or

(iii) only the P&E Court; and

(b) the person—

(i) who may appeal a matter (the ***appellant***); and

(ii) who is a respondent in an appeal of the matter; and

(iii) who is a co-respondent in an appeal of the matter; and

(iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

(3) The ***appeal period*** is—

(a) for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or

(b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or

(c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or

(d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or

(e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or

(f) for an appeal relating to the *Plumbing and Drainage Act 2018*—

(i) for an appeal against an enforcement notice given because of a belief mentioned in the *Plumbing and Drainage Act 2018*, section 143(2)(a)(i), (b) or (c)—5 business days after the day the notice is given; or

(ii) for an appeal against a decision of a local government or an inspector to give an action notice under the *Plumbing and Drainage Act 2018*—5 business days after the notice is given; or

(iii) for an appeal against a failure to make a decision about an application or other matter under the *Plumbing and Drainage Act 2018*—at anytime after the period within which the application or matter was required to be decided ends; or

(iv) otherwise—20 business days after the day the notice is given; or

(g) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note—

See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

(5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.

(6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—

(a) the adopted charge itself; or

(b) for a decision about an offset or refund—

(i) the establishment cost of trunk infrastructure identified in a LGIP; or

(ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

(1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—

(a) is in the approved form; and

(b) succinctly states the grounds of the appeal.

(2) The notice of appeal must be accompanied by the required fee.

(3) The appellant or, for an appeal to a tribunal, the registrar, must, within the service period, give a copy of the notice of appeal to—

(a) the respondent for the appeal; and

(b) each co-respondent for the appeal; and

(c) for an appeal about a development application under schedule 1, section 1, table 1, item 1—each principal submitter for the application whose submission has not been withdrawn; and

(d) for an appeal about a change application under schedule 1, section 1, table 1, item 2—each principal submitter for the application whose submission has not been withdrawn; and

(e) each person who may elect to be a co-respondent for the appeal other than an eligible submitter for a development application or change application the subject of the appeal; and

(f) for an appeal to the P&E Court—the chief executive; and

(g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.

(4) The ***service period*** is—

(a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or

(b) otherwise—10 business days after the appeal is started.

(5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).

(6) A person elects to be a co-respondent to an appeal by filing a notice of election in the approved form—

(a) if a copy of the notice of appeal is given to the person—within 10 business days after the copy is given to the person; or

(b) otherwise—within 15 business days after the notice of appeal is lodged with the registrar of the tribunal or the P&E Court.

(7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Non-appealable decisions and matters

(1) Subject to this chapter, section 316(2), schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

(2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.

(3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

(4) In this section—

decision includes—

(a) conduct engaged in for the purpose of making a decision; and

(b) other conduct that relates to the making of a decision; and

(c) the making of a decision or the failure to make a decision; and

(d) a purported decision; and

(e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—

(a) is final and conclusive; and

(b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the *Judicial Review Act 1991* or otherwise, whether by the Supreme Court, another court, any tribunal or another entity; and

(c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, any tribunal or another entity on any ground.

232 Rules of the P&E Court

(1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.

(2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

TECHNICAL MEMORANDUM

Date	Monday, 1 June 2026	To	Douglas Shire Council
From	Greg Applin	Company	Applin Consulting
Email	greg@applinconsulting.com.au	Contact	0414 768 109
Project	Newell Beach Subdivision	Subject	Water Analysis

1.0 WATER RETICULATION NETWORK

Preliminary plans have been prepared for an urban water distribution network within the proposed 20 lot subdivision of Lot 51 Coulthard Close, Newell Beach. The network is to be supplied via two connections to Council's existing water reticulation network, and the internal network consists of DN100 branch mains and DN50 rider mains.

Refer to Drawing 26001-C015 Water Reticulation in **Appendix A**.

1.1 Model

A hydraulic network model has been built using EPANet 2.2 software to represent the pipe network and simulate user demand. The EPANet program analysed the head losses within the network using Darcy-Weisbach headloss formula in accordance with the FNQROC Development Manual D6 – Water Reticulation. An absolute roughness K of 0.15 has been adopted PVC and Polypropylene pipes.

Hydrant flow test was carried out by Gilboy Hydraulic Solutions, and a copy of the test results are included in **Appendix B.**

The nearest hydrant test to both connection points is FH 3, for the purposes of the analysis a static Head of 60m was adopted for both the connection points.

1.2 Residential Demands

The development demand loading was calculated in accordance with the FNQROC Development Manual D6 – Water Reticulation. The demand given as (EPs)and Equivalent Domestic Connections (EDCs) is provided in **Table 2.2.**

APPLIN CONSULTING
(KPAG P/L atf The Applin Family Trust)
ABN : 83 104 356 849

19 Mullins St, WHITFIELD, QLD. 4870
greg@applinconsulting.com.au
0414 768 109

Table 2.2 Residential Demands

Lot Size	No. of Lots	EP/EDC	EP	EDC
1500m^2 > Lot > 1100m^2	3	3.4	10.2	3.64
1100m^2 > Lot > 900m^2	4	3.1	12.4	4.43
900m^2 > Lot > 400m^2	13	2.8	36.4	13.00
Total	20		59	21.07

1.3 Flow Parameters

The water supply flow parameters for the model were in accordance with the FNQROC "Design Manual D6: Water Reticulation"

The Average daily (AD) usage of 500 L/person/day and an occupancy ration of 2.8 EP/EDC were used in the model.

- Mean Day Maximum Month (MDMM) = 1.5 x AD
- Peak Day (PD) = 2.25 x AD
- Peak Hour (PH) = 1/12 x PD

Table 2.3 shows the calculated flow parameters applied to the model.

Table 2.3 Flow Parameters

Flow Parameters	Flow (L/s)
Average Daily Consumption (AD)	0.34
Mean Day Maximum Month (MDMM)	0.51
Peak Day (PD)	0.77
Peak Hour (PH)	1.54
Fire + 2/3 Peak Hour	16.03
Fire + Peak Hours	16.54

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1.4 Modelling Results

Analysis of the proposed water reticulation network has been undertaken using the water distribution system software package EPANET 2.2. Modelling was undertaken for the following scenarios:

- Peak Hour Flow Analysis - to confirm a minimum allowable pressure of 22m was maintained during peak hour conditions; and
- Fire Flow Analysis - to confirm a minimum allowable pressure of 12m was maintained during 2/3 peak hour background condition.

Nodes have been produced in the network model to represent demands from groups of properties that are serviced by a common section of water main. A Node Plan has been included in **Appendix C** showing the combinations of properties represented by a single node, and the accumulative EP.

1.4.1 Peak Hour Flow Analysis

Network analysis results for the peak hour flow are included in **Appendix D**. Residual pressures during this scenario range between 55.20m and 56.79m within the modelled network, thereby meeting the minimum requirement of 22m.

1.4.2 Fire Fighting Flow Analysis

Network analysis results for fire flow with a background 2/3 peak hour flow are included within **Appendix E**. The fire flow demand has been allocated to Node N6. Residual pressures during this scenario range between 53.55m and 56.75m within the modelled network, thereby meeting the minimum requirement of 12m.

After running the model with all build parameters and demand patterns in place, we can analyse hydraulic performance across the network during the most critical Peak Hour demand period.

1.5 Conclusion

An EPANet analysis has confirmed that in the Peak Hour, and Fire Flow requirements of the FNQROC Development Manual D6 – Water Reticulation can be satisfactorily achieved.

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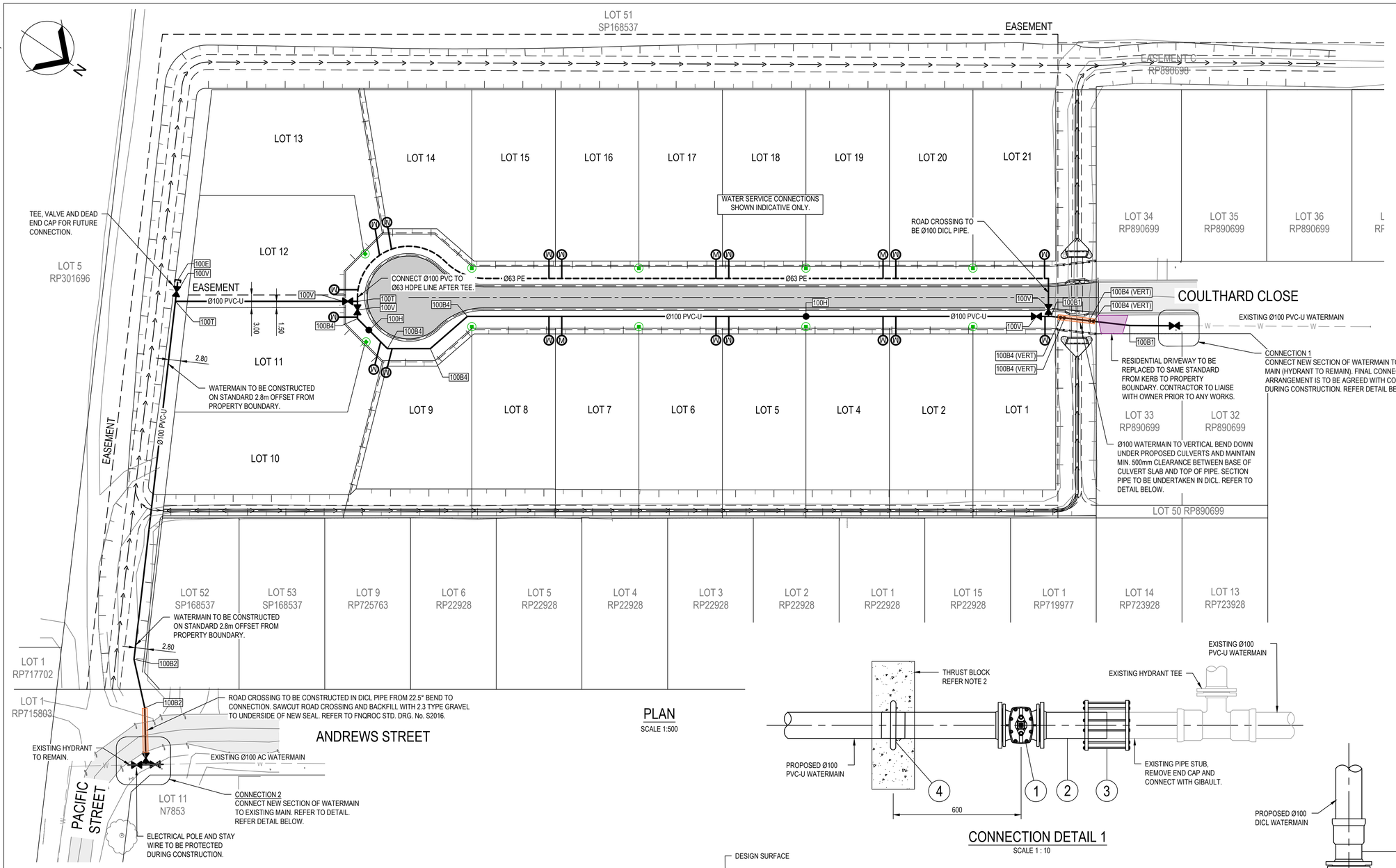
APPENDIX A

DRAWING 26001-C015 WATER RETICULATION

APPLIN CONSULTING
(KPAG P/L atf The Applin Family Trust)
ABN: 83 104 356 849

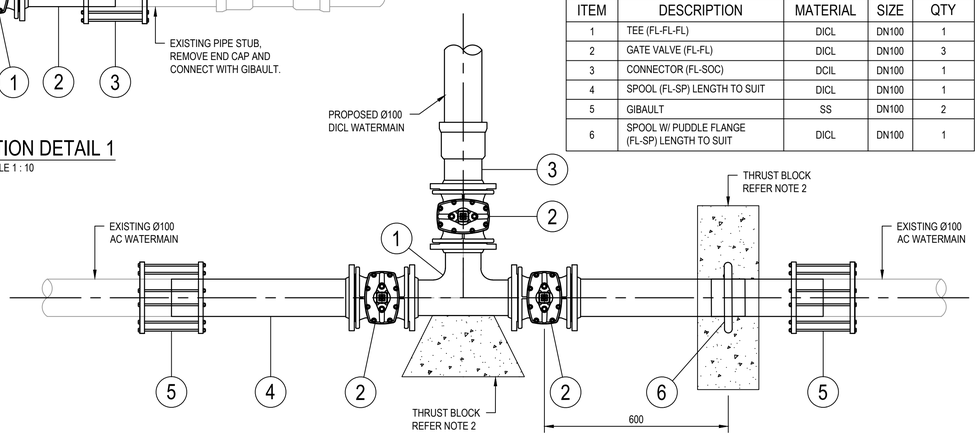
19 Mullins St, WHITFIELD, QLD. 4870
greg@applinconsulting.com.au
0414 768 109

DATE PLOTTED: 30 May 2026 10:55 AM

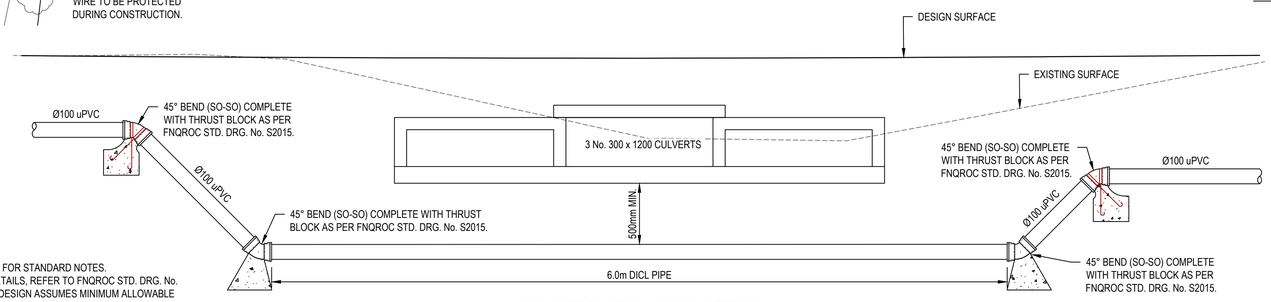


PLAN
SCALE 1:500

CONNECTION DETAIL 1
SCALE 1 : 10



CONNECTION DETAIL 2
SCALE 1 : 10



CULVERT CROSSING DETAIL
SCALE 1 : 10

NOTES

1. REFER DRG 26001-C002 FOR STANDARD NOTES.
2. FOR THRUST BLOCK DETAILS, REFER TO FNQROC STD. DRG. No. S2015. THRUST BLOCK DESIGN ASSUMES MINIMUM ALLOWABLE BEARING PRESSURE OF FOUNDATION MATERIAL = 50 kPa.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.

LEGEND

EXISTING

- EXISTING LOT BOUNDARY
- EXISTING EASEMENT BOUNDARY
- W — EXISTING WATER MAIN

PROPOSED

- 63 — NEW WATER MAIN DN63 PE100 PN20
- 100 — NEW WATER MAIN DN100 PVC PN16 (DICL PN35 WHERE NOTED)
- SECTION OF PIPE TO BE DICL
- M — NEW WATER SERVICE CONNECTION
- WATER SERVICE CONDUIT UNDER PATH
- FIRE HYDRANT
- VALVE
- REDCUCER
- 1DOMC — WATER FITTING CODE
  - FITTING TYPE
  - V - VALVE
  - H - HYDRANT
  - T - TEE
  - E - ENDCAP
  - B1 - BEND 11 ¼ DEG
  - B2 - BEND 22 ½ DEG
  - B4 - BEND 45 DEG
  - B9 - BEND 90 DEG
  - MC - SERVICE MAIN CONNECTION WITH VALVE
  - xRx - REDUCER (x=PIPE SIZE)
- NEW SEALED ROADWAY
- LOCATION OF ELECTRICAL PILLAR
- AREA OF DRIVEWAY REPLACEMENT

CONNECTION DETAIL 1 - FITTING SCHEDULE

ITEM	DESCRIPTION	MATERIAL	SIZE	QTY
1	GATE VALVE (FL-FL)	DICL	DN100	1
2	SPOOL (FL-SP) LENGTH TO SUIT	DICL	DN100	1
3	GIBAULT	SS	DN100	1
4	SPOOL W/ PUDDLE FLANGE (FL-SP) LENGTH TO SUIT	DICL	DN100	1

CONNECTION DETAIL 2 - FITTING SCHEDULE

ITEM	DESCRIPTION	MATERIAL	SIZE	QTY
1	TEE (FL-FL-FL)	DICL	DN100	1
2	GATE VALVE (FL-FL)	DICL	DN100	3
3	CONNECTOR (FL-SOC)	DCIL	DN100	1
4	SPOOL (FL-SP) LENGTH TO SUIT	DICL	DN100	1
5	GIBAULT	SS	DN100	2
6	SPOOL W/ PUDDLE FLANGE (FL-SP) LENGTH TO SUIT	DICL	DN100	1

REV	DESCRIPTION	DRN	APP	DATE
0	FOR APPROVAL	MT	GA	30.06.2026

CERTIFICATION RPEQ
G. APPLIN 06073

APPLIN CONSULTING
M 0414 768 109 | E greg@applinconsulting.com.au

SCALES
1:500 0 5 10 15 20 25m
1:10 0 0.1 0.2 0.3 0.4 0.5m

CLIENT
FAR NORTH DEVELOPMENT GROUP P/L
NEWELL BEACH DEVELOPMENT

DESIGNED M. TICKNER
DRAWN M. TICKNER
CHECKED G. APPLIN

PROJECT
LOT 51 COULTHARD CLOSE, NEWELL BEACH
DEVELOPMENT WORKS

TITLE
WATER RETICULATION PLAN

STATUS
FOR APPROVAL

SCALE (AT FULL SIZE) REFER PLAN
SIZE A1

DRAWING NUMBER 26001-C015
REVISION 0

CAD File: 26002-C015 [WATER].dwg

APPENDIX B

HYDRANT FLOW TEST RESULTS

APPLIN CONSULTING
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ABN: 83 104 356 849

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Fire Hydrant Test - FH#1 Only - Flow & Pressure	
Location: 25 Coulthard Close	
Date: 06.02.26	Time: 8:15am
Static	550 kPa
2.5 L/S	525 kPa
5 L/S	475 kPa
7.5 L/S	350 kPa
10 L/S	200 kPa
12.5 L/S	0 kPa

Fire Hydrant Test - FH#2 Only - Flow & Pressure	
Location: 11 Coulthard Close	
Date: 06.02.26	Time: 8:18am
Static	700 kPa
2.5 L/S	600 kPa
5 L/S	520 kPa
7.5 L/S	380 kPa
10 L/S	280 kPa
11 L/S	0 kPa

Fire Hydrant Test - FH#3 Only - Flow & Pressure	
Location: 33 Andrews Street	
Date: 06.02.26	Time: 8:22am
Static	600 kPa
2.5 L/S	500 kPa
5 L/S	425 kPa
7.5 L/S	325 kPa
10 L/S	225 kPa
12.5 L/S	100 kPa

Fire Hydrant Test - FH#4 Only - Flow & Pressure	
Location: 28 Andrews Street	
Date: 06/02/26	Time: 8:52am
Static	640 kPa
2.5 L/S	625 kPa
5 L/S	475 kPa
7.5 L/S	325 kPa
10 L/S	250 kPa
12.5 L/S	190 kPa
14 L/S	60 kPa

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APPENDIX C

WATER NODE PLAN

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LOT 13
998m²

LOT 14
840m²

LOT 15
813m²

LOT 16
813m²

LOT 17
813m²

LOT 18
813m²

LOT 19
813m²

LOT 20
813m²

LOT 21
1194m²

LOT 34
RP890699

LOT 35
RP890699

LOT 36
RP890699

NODE N16
LOTS 12-17 - 17.4 EP
DEMAND - 0.381 l/s

NODE N15
LOTS 18-21 - 11.8 EP
PH DEMAND - 0.381 l/s

LOT 5
RP301696

LOT 12
994m²

N19

N04

N18

N05

N17

N16

N15

DN50

DN100

N14

COULTHARD CLOSE

EX DN100

W

CONNECT TO
EXISTING

N13

N12

N11

N10

N09

N08

N07

N06

LOT 11
999m²

LOT 9
978m²

LOT 8
872m²

LOT 7
872m²

LOT 6
872m²

LOT 5
872m²

LOT 4
872m²

LOT 2
872m²

LOT 1
1281m²

LOT 33
RP890699

LOT 32
RP890699

LOT 10
1168m²

NODE N8
LOTS 7-11 - 15.2 EP
DEMAND - 0.381 l/s

NODE N11
LOTS 1-6 - 14.6 EP
DEMAND - 0.381 l/s

LOT 50 RP890699

LEMATY STREET

LOT 52
SP168537

LOT 53
SP168537

LOT 9
RP725763

LOT 6
RP22928

LOT 5
RP22928

LOT 4
RP22928

LOT 3
RP22928

LOT 2
RP22928

LOT 1
RP22928

LOT 15
RP22928

LOT 1
RP719977

LOT 14
RP723928

LOT 13
RP723928

DN100

N03

N02

CONNECT TO
EXISTING

ANDREWS STREET

N01

EX DN100

W

LOT 11
N7853

APPENDIX D

PEAK HOUR FLOWS

APPLIN CONSULTING
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Peak Flows


```
 ******************************************************************
 *                          E P A N E T                           *
 *                  Hydraulic and Water Quality                   *
 *                  Analysis for Pipe Networks                    *
 *                        Version 2.2                             *
 ******************************************************************

 Input File: Lot 151 Coulthard.inp
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	N1	N2	13.33	100
P2	N2	N3	11.7	100
P3	N3	N4	84.54	100
P4	N4	N5	42.73	100
P6	N6	N7	6.17	100
P7	N7	N8	10.07	100
P8	N8	N9	11.52	100
P9	N9	N10	20.59	100
P10	N10	N11	72.33	100
P11	N11	N12	43.46	100
P12	N12	N13	19.21	100
P13	N13	N14	12.43	100
P15	N15	N16	132.2	50
P19	N4	N19	4.53	100
P18	N5	N18	0.91	100
P14	N15	N12	8.9	100
P20	N5	N6	7.85	100
P21	N18	N17	28.49	50
P22	N17	N16	10.11	50
P23	RES1	N14	0.01	100
P24	RES2	N1	0.01	100

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
N1	0.00	60.00	55.50	0.00
N2	0.00	60.00	55.20	0.00
N3	0.00	60.00	55.60	0.00
N4	0.00	59.99	56.19	0.00
N5	0.00	59.99	55.89	0.00
N6	0.00	59.99	55.89	0.00
N7	0.00	59.99	55.94	0.00
N8	0.40	59.99	55.99	0.00

N9	0.00	59.99	56.14	0.00
N10	0.00	59.99	56.20	0.00

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality	
N11	0.38	59.99	56.59	0.00	
N12	0.00	59.99	56.79	0.00	
N13	0.00	60.00	56.77	0.00	
N14	0.00	60.00	56.75	0.00	
N15	0.31	59.99	56.79	0.00	
N16	0.45	59.95	55.13	0.00	
N17	0.00	59.96	55.98	0.00	
N18	0.00	59.99	55.89	0.00	
N19	0.00	59.99	56.19	0.00	
RES1	-1.01	60.00	0.00	0.00	Reservoir
RES2	-0.53	60.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
P1	0.53	0.07	0.08	Open
P2	0.53	0.07	0.08	Open
P3	0.53	0.07	0.08	Open
P4	0.53	0.07	0.08	Open
P6	0.23	0.03	0.01	Open
P7	0.23	0.03	0.01	Open
P8	-0.17	0.02	0.01	Open
P9	-0.17	0.02	0.01	Open
P10	-0.17	0.02	0.01	Open
P11	-0.55	0.07	0.09	Open
P12	-1.01	0.13	0.27	Open
P13	-1.01	0.13	0.27	Open
P15	0.16	0.08	0.28	Open
P19	0.00	0.00	0.00	Open
P18	0.29	0.04	0.52	Open
P14	-0.47	0.06	0.07	Open
P20	0.23	0.03	0.01	Open
P21	0.29	0.15	0.87	Open
P22	0.29	0.15	0.87	Open
P23	1.01	0.13	0.00	Open
P24	0.53	0.07	0.00	Open

APPENDIX E

FIRE FIGHTING FLOWS

APPLIN CONSULTING
(KPAG P/L atf The Applin Family Trust)
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```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                           Version 2.2                          *
  ******************************************************************

  Input File: Lot 151 Coulthard.inp
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	N1	N2	13.33	100
P2	N2	N3	11.7	100
P3	N3	N4	84.54	100
P4	N4	N5	42.73	100
P6	N6	N7	6.17	100
P7	N7	N8	10.07	100
P8	N8	N9	11.52	100
P9	N9	N10	20.59	100
P10	N10	N11	72.33	100
P11	N11	N12	43.46	100
P12	N12	N13	19.21	100
P13	N13	N14	12.43	100
P15	N15	N16	132.2	50
P19	N4	N19	4.53	100
P18	N5	N18	0.91	100
P14	N15	N12	8.9	100
P20	N5	N6	7.85	100
P21	N18	N17	28.49	50
P22	N17	N16	10.11	50
P23	RES1	N14	0.01	100
P24	RES2	N1	0.01	100

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
N1	0.00	60.00	55.50	0.00
N2	0.00	59.84	55.04	0.00
N3	0.00	59.70	55.30	0.00
N4	0.00	58.69	54.89	0.00
N5	0.00	58.18	54.08	0.00
N6	15.00	58.06	53.96	0.00
N7	0.00	58.12	54.07	0.00
N8	0.27	58.20	54.20	0.00

N9	0.00	58.31	54.46	0.00
N10	0.00	58.49	54.70	0.00

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality	
N11	0.25	59.15	55.75	0.00	
N12	0.00	59.57	56.37	0.00	
N13	0.00	59.83	56.60	0.00	
N14	0.00	60.00	56.75	0.00	
N15	0.21	59.57	56.37	0.00	
N16	0.30	58.37	53.55	0.00	
N17	0.00	58.32	54.34	0.00	
N18	0.00	58.18	54.08	0.00	
N19	0.00	58.69	54.89	0.00	
RES1	-8.25	60.00	0.00	0.00	Reservoir
RES2	-7.77	60.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
P1	7.77	0.99	11.98	Open
P2	7.77	0.99	11.98	Open
P3	7.77	0.99	11.98	Open
P4	7.77	0.99	11.98	Open
P6	-6.47	0.82	8.42	Open
P7	-6.47	0.82	8.42	Open
P8	-6.74	0.86	9.10	Open
P9	-6.74	0.86	9.10	Open
P10	-6.74	0.86	9.10	Open
P11	-6.99	0.89	9.76	Open
P12	-8.25	1.05	13.44	Open
P13	-8.25	1.05	13.44	Open
P15	1.06	0.54	9.10	Open
P19	0.00	0.00	0.00	Open
P18	-0.76	0.10	3.70	Open
P14	-1.26	0.16	0.40	Open
P20	8.53	1.09	14.33	Open
P21	-0.76	0.39	4.88	Open
P22	-0.76	0.39	4.88	Open
P23	8.25	1.05	13.02	Open
P24	7.77	0.99	11.63	Open

DIRT PROFESSIONALS

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Site Assessment
Part of Lot 51 SP 168537
Newell Beach QLD

16 December 2020

Job No 22242

INTRODUCTION

This report presents the results of a preliminary site assessment performed at Lot 51 SP 168537 Newell Beach. The purpose of the assessment is to determine an acceptable solution for the treatment of wastewater as per the guidelines of the Code of Practise for On-Site Sewerage and the AS/AZS 1547 2012.

The Scope of the works comprised of a series of test bores, followed by laboratory testing.

EXISTING CONDITIONS

At the time of the assessment the site consisted of a portion of land to the Southeast corner of the above address. The land was rectangular in shape, with an approximate total area of approximately 2.33 ha. The allotment is to be subdivided into 18-20 allotments.

At the time of the assessment the proposed allotment was grassed with a slope descending to the South/Southeast. The site had a drain located to the North and East boundary.

Adjacent properties consist of residential land which are serviced with secondary treatment plants and standard septic systems (primary treatment).

FIELD WORK

The field work was undertaken on the 16 December 2020 and comprised of mechanical boring of 9 bore holes. The bores were located at various locations over the proposed allotment (see map).

FIELD WORK RESULTS

Details of the subsurface conditions encountered at the test locations are attached on the bore log forms attached.

The subsurface conditions encountered at the location of the bores were uniform. The materials comprised of mainly sandy loams to the depth of holes.

Water was encountered at a depth of 1200 mm the time of the assessment. Test holes carried out on previous jobs during seasonal rains found water at 600 mm below ground level, during seasonal rains.

LABORATORY TESTING

Laboratory Testing Comprised of dispersion testing.

The testing indicated that the materials tested in the area are of a non- dispersion nature.

EFFLUENT DISPOSAL

Based on the results of the assessment, and on visual assessment of samples from the site, it is concluded that the soils are of a well drained material with a weak structure and should be categorised as and a Category 2, in accordance with the AS/NZS 1547:2012.

It is considered that the indicative permeability of the site soils are likely to be 1.4 - 3.0 m/day, with no special measures to be taken for dispersive soils.

Effluent must be treated as **Advanced Secondary Treatment, due to the watertable.** The wastewater will require a separation distances maintained from drains of 10m.

It is estimated that the water table will rise to 600 mm below ground level during seasonal rains.

For subsurface irrigation a design irrigation rate (DIR) of 35 mm/week be adopted, as indicated by the AS/NZS 1547:2012. The irrigation area which is based on a 4 bedroom dwelling at 6 persons at 200 litres per day. This will require a minimum of 240 square metres of irrigation area with the same for a reserve area.

If a trenches are to be used a design loading rate (DLR) of 50 mm/d be adopted, as indicated by the AS/NZS 1547:2012. The trenches required based on a 4 bedroom dwelling at 6 persons at 200 litres per day. This will require approximately 24 square metres which can be utilized as 1 x 2m wide x 12m long Bed with the same for a reserve area. **Theses trenches will need to consist of a mound allowing for a minimum of 300 mm vertical separation from watertable.**

It should be noted that the DLR and DIR values provided are based on soil infiltration rates only. These may require to be altered following a water balance analysis with consideration given to the published rainfall and evaporation data from the nearest meteorological station.

It should be noted that application and maintenance of appropriate vegetation cover is essential for effective disposal relying upon evapo - transpiration. It would be advantageous to duplicate disposal areas and alternate areas.

For the calculation of disposal area, it is suggested that a daily effluent flow of 150 litres per/person/day be used for households with a reticulated town water supply.

RECOMMENDATIONS

Further testing will be required prior to construction as this is only a preliminary report and allotments have not been determined.

This can be determined when the location of the building is located on the allotment.

BUFFER DISTANCES

Minimum horizontal buffer distances are to be maintained. A table is attached.

VALIDITY

The excavation of a limited number of holes does not preclude the possibility of some conditions on the site being different from those encountered in the holes. Should conditions be found which differ from those described in this report, then the recommendations are not valid and this organisation should be contacted.

Yours faithfully

Tandel Investments Pty Ltd T/as **DIRT PROFESSIONALS**

Angelo Tudini
Director

Attached
-Site plan of proposed subdivision
-Guides for effluent quality
-Guidelines for vertical and horizontal separation distances

BORE HOLE LOG

HOLE 1

0.0 - 1.2m	Sandy Loams - Brown
1.2m	Water at this depth

HOLE 2

0.0 - 0.8m	Sandy Loams - Brown

HOLE 3

0.0 - 1.2m	Sandy Loams - Brown
1.2m	Water at this depth

HOLE 4

0.0 - 1.8m	Sandy Loams - Brown

HOLE 5

0.0 - 1.5m	Sandy Loams - Brown

HOLE 6

0.0 - 1.2m	Sandy Loams - Brown

HOLE 7

0.0 - 2.0m	Sandy Loam - Brown

HOLE 8

0.0 - 1.2m	Sandy Loams - Brown

HOLE 9

0.0 - 1.5m	Sandy Loams - Brown

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16 12 2020


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16 12 2020

Douglas PARTNERS

GROUNDED EXPERTISE

Report on Acid Sulfate Soil Investigation

Proposed Subdivision

Lot 51 Coulthard Close, Newell Beach

Prepared for 3D Civil Pty Ltd

Project 242245.00

22 May 2026

Douglas Partners Pty Ltd
ABN 75 053 980 117
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13 Industrial Avenue, Stratford, QLD 4870
(07) 4055 1550

Document History

Details

Project No.	242245.00
Document Title	Report on Acid Sulfate Soil Investigation
Site Address	Lot 51 Coulthard Close, Newell Beach
Report Prepared For	3D Civil Pty Ltd
Filename	242245.00.R.001.Rev0

Status and Review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Shermal Fernando and Dan Martin	Bruce Stewart	22 May 2026

Distribution of Copies

Status	Issued to
Revision 0	Wayne Davis, 3D Civil Pty Ltd

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	pp Shermal	22 May 2026
Reviewer	Bruce Stewart	22 May 2026

Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.

Douglas PARTNERS | GROUNDED EXPERTISE

Table of Contents

Report on Acid Sulfate Soil Investigation
Proposed Subdivision
Lot 51 Coulthard Close, Newell Beach

1. Introduction

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of an acid sulfate soil investigation for a proposed subdivision at Lot 51 Coulthard Close, Newell Beach (the site). The investigation was commissioned by 3D Civil Pty Ltd and was undertaken in accordance with Douglas' proposal 242245.00.P.001.Rev0 dated 22 April 2026.

The investigation aim was to assess subsurface and groundwater conditions at selected tested locations with reference to acid sulfate soils (ASS), and to provide comments on:

- ASS laboratory test results,
- the presence or absence of actual or potential ASS at the tested locations; and
- the need for any additional investigation, if required.

The investigation included six test pits and laboratory testing of selected samples. Details of the field and laboratory work are presented in this report, along with comments and recommendations addressing the items outlined above.

This report must be read in conjunction with the notes 'About This Report' presented in Appendix A, along with any other attached explanatory notes, and should be kept in entirety without separation of individual pages or sections.

2. Site description

The approximately 2 ha site is a relatively flat, level, rectangular parcel occupying most of Lot 51 Coulthard Close, Newell Beach, as shown on Drawing 1 in Appendix B.

The site is bounded by residential dwellings to the east, beyond which lies Andrews Street; Coulthard Close to the north (which will be extended into the middle of the site); and cane fields along the western and southern boundaries. At the time of field work, the site was vacant and covered with short grasses.

A site photograph is provided in Figure 1.

Figure 1: Looking north across site from the southern boundary; excavator at Pit 1.

3. Published data

3.1 Geology

Geology mapping on Queensland Globe indicates that the site is underlain by late Tertiary to Quaternary aged deposits, described as typically comprising "... sand, silt, mud and gravel; older, unconsolidated to semi-consolidated residual to colluvial deposits".

The ground conditions encountered in the test pits comprised silty sand over sand and gravel, which are probably Tertiary to Quaternary aged. However, the flat, level topography, low elevation (~4 m AHD), and no nearby elevated terrain suggests the encountered soils are probably alluvial.

3.2 Acid sulfate soils

The National Digital Acid Sulfate Soil (ASS) Risk Mapping indicates that this site is mapped as having a 'low probability' of ASS occurrence.

4. Field work

4.1 Methods

Field work was undertaken on 1 May 2025 and comprised six test pits (designated Pits 1 to 6). Approximate test locations are shown on Drawing 1 in Appendix B.

The test pits were excavated using a 6t excavator fitted with a 600 mm wide toothed bucket to 1.5 m and 1.8 m depth in Pits 1 to 3, and to 2.9 m and 3.0 m depth in Pits 4 to 6. A dynamic cone penetrometer test (DCP) was undertaken adjacent to each test pit. On completion, the pits were checked for groundwater ingress, and the side walls and spoil piles were photographed. The pits were then backfilled in layers using excavated spoil, which was compacted using the back of the excavator bucket. Excess spoil was mounded over the pits, and the surface was track rolled.

A geotechnical engineer set out the test locations, completed the DCPs, logged the test pits based on visual and tactile sample assessment, and collected samples for laboratory testing. UTM coordinates and surface levels at the test locations were recorded with reference to MGA2020 and AHD respectively, using a sub-decimetre accurate dGPS.

4.2 **Results**

The subsurface conditions encountered in test pits are presented in the test pit logs in Appendix C. These should be read in conjunction with the general notes which explain the sampling, testing and excavation methodology; terminology, symbols and abbreviations; and soil descriptions used in their preparation given in Appendix A.

In summary, the subsurface conditions encountered in the pits comprised black silty sand to between 0.3 m and 0.55 m depth overlying yellow brown, variably mottled brown and grey sand and gravel. Groundwater observations are summarised in Table 1. It should be noted that groundwater levels are affected by climatic conditions, surface and subsurface drainage, soil permeability, and human influences, and will therefore vary with time. It is also noted that the test holes were only left open for a short period, and it is likely that groundwater levels may not have stabilised.

Table 1: Summary of groundwater observations

Test Location	Date	Ground Surface Elevation (m AHD)	Observed Groundwater	Groundwater Elevation (m AHD)
Pit 1	1 May 2026	3.5	None observed	-
Pit 2	1 May 2026	3.6	None observed	-
Pit 3	1 May 2026	3.2	None observed	-
Pit 4	1 May 2026	3.9	2.7	1.2
Pit 5	1 May 2026	3.6	2.0	1.6
Pit 6	1 May 2026	4.0	2.5	1.5

5. Laboratory testing

Laboratory testing comprised 51 ASS screening tests and 20 chromium suite tests.

Douglas completed the screening tests by measuring pH after adding distilled water (pH_F) and peroxide (pH_{FOX}) to the samples. The pH_F test indicates past oxidation and hence actual ASS (AASS), while the pH_{FOX} test indicates unoxidized sulfides and therefore potential ASS (PASS).

Chromium suite analysis samples were selected based on the more adverse screening test results. This analysis was by SGS Australia Pty Ltd (SGS), a NATA accredited analytical laboratory.

The screening and chromium suite test results are summarised in Table 2, and the laboratory test reports for the chromium suite tests are provided in Appendix D.

Table 2: ASS field screening and chemical laboratory testing results

Pit	Depth (m)	Sample Description	Screening Test Results				Chromium Suite Test Results (%S)			
			pH_F	pH_{FOX}	ΔpH	Reaction (1,2,3,4) *	Potential Sulfidic Acidity (S_{CR})	Total Actual Acidity (TAA)	Acid Neutralising Capacity (ANC)	Net Acidity ***
Pit 1	0.25	Silty SAND	4.6	3.3	1.3	1	<0.005	0.070	NT	0.068
	0.50	SAND	4.7	4.5	0.2	1	NT	NT	NT	NT
	0.75	SAND	4.6	4.3	0.3	1	<0.005	0.020	NT	0.016
	1.00	SAND	4.6	4.4	0.2	1	NT	NT	NT	NT
	1.25	SAND	4.6	4.4	0.2	1	NT	NT	NT	NT
	1.50	SAND	4.6	4.3	0.3	1	<0.005	<0.01	NT	0.006
Pit 2	0.25	Silty SAND	4.3	3.5	0.8	1	<0.005	0.110	NT	0.110
	0.50	Silty SAND	4.7	4.1	0.6	1	<0.005	0.040	NT	0.036
	0.75	Gravelly SAND	5.0	4.7	0.3	1	NT	NT	NT	NT
	1.00	Gravelly SAND	5.0	4.7	0.3	1	<0.005	<0.01	NT	<0.005
	1.25	Sandy GRAVEL	4.8	4.6	0.2	1	NT	NT	NT	NT
	1.50	Sandy GRAVEL	4.7	4.5	0.2	1	NT	NT	NT	NT
Pit 3	0.25	Silty SAND	4.8	3.8	1.0	1	NT	NT	NT	NT
	0.50	Silty SAND	4.6	3.9	0.7	1	<0.005	0.020	NT	0.024
	0.75	SAND	4.6	4.3	0.3	1	NT	NT	NT	NT
	1.00	SAND	4.8	4.5	0.3	1	NT	NT	NT	NT
	1.25	SAND	5.0	4.6	0.4	1	NT	NT	NT	NT
	1.50	Gravelly SAND	4.7	4.3	0.4	1	<0.005	0.010	NT	0.014
Pit 4	0.25	Silty SAND	4.5	3.6	0.9	1	<0.005	0.080	NT	0.076
	0.50	SAND	4.6	4.1	0.5	1	NT	NT	NT	NT
	0.75	SAND	4.8	4.6	0.2	1	NT	NT	NT	NT
	1.00	SAND	4.8	4.8	0.0	1	NT	NT	NT	NT
	1.25	SAND	4.8	4.4	0.4	1	<0.005	<0.01	NT	<0.005
	1.50	Sandy GRAVEL	5.1	4.4	0.7	1	NT	NT	NT	NT
	1.75	Sandy GRAVEL	4.9	4.3	0.6	1	<0.005	0.010	NT	0.014
	2.00	Sandy GRAVEL	5.0	4.5	0.5	1	NT	NT	NT	NT
	2.25	Sandy GRAVEL	5.3	4.4	0.9	1	<0.005	0.010	NT	0.012
	2.50	Sandy GRAVEL	5.1	4.7	0.4	1	NT	NT	NT	NT
	2.75	Sandy GRAVEL	5.0	4.7	0.3	1	NT	NT	NT	NT
Pit 5	0.25	Silty SAND	4.4	2.7	1.7	1	<0.005	0.090	NT	0.088
	0.50	Gravelly SAND	5.0	4.7	0.3	1	NT	NT	NT	NT
	0.75	Gravelly SAND	5.0	4.1	0.9	1	<0.005	<0.01	NT	0.010
	1.00	Gravelly SAND	4.8	4.2	0.6	1	NT	NT	NT	NT
	1.25	Gravelly SAND	4.7	4.1	0.6	1	<0.005	<0.01	NT	0.008
	1.50	Sandy GRAVEL	4.7	4.2	0.5	1	NT	NT	NT	NT
	1.75	Sandy GRAVEL	4.8	4.3	0.5	1	<0.005	<0.01	NT	0.010
	2.00	Sandy GRAVEL	4.8	4.6	0.2	1	NT	NT	NT	NT
	2.25	Sandy GRAVEL	4.6	4.3	0.3	1	NT	NT	NT	NT
	2.50	Sandy GRAVEL	4.5	4.2	0.3	1	<0.005	<0.01	NT	0.006
	2.75	Sandy GRAVEL	4.4	4.3	0.1	1	NT	NT	NT	NT

Table 2 (cont'd): ASS field screening and chemical laboratory testing results

Pit	Depth (m)	Sample Description	Screening Test Results				Chromium Suite Test Results (%S)			
			pH_F	pH_{FOX}	ΔpH	Reaction (1,2,3,4) *	Potential Sulfidic Acidity (S_{CR})	Total Actual Acidity (TAA)	Acid Neutralising Capacity (ANC)	Net Acidity ***
Pit 6	0.25	Silty SAND	4.7	3.3	1.4	1	NT	NT	NT	NT
	0.50	Silty SAND	5.2	4.5	0.7	1	<0.005	0.020	NT	0.022
	0.75	Silty SAND	5.4	5.1	0.3	1	NT	NT	NT	NT
	1.00	Silty SAND	5.4	5.4	0.0	1	NT	NT	NT	NT
	1.25	Clayey Gravelly SAND	5.4	5.0	0.4	1	NT	NT	NT	NT
	1.50	Clayey Gravelly SAND	5.4	5.0	0.4	1	NT	NT	NT	NT
	1.75	Clayey Gravelly SAND	5.2	4.2	1.0	1	NT	NT	NT	NT
	2.00	Sandy GRAVEL	5.3	4.1	1.2	1	<0.005	0.010	NT	0.014
	2.25	Sandy GRAVEL	5.5	4.3	1.2	1	NT	NT	NT	NT
	2.50	Sandy GRAVEL	5.0	4.6	0.4	1	NT	NT	NT	NT
	2.75	Sandy GRAVEL	5.1	4.4	0.7	1	<0.005	0.010	NT	0.012

Notes to Table 2:
* 1 – denotes slight effervescence: 2 – denotes moderate reaction; 3 – denotes vigorous reaction; 4 – denotes very strong effervescence accompanied by escape of gas/heat
*** as reported by the analytical laboratory
NT – not tested

6. Proposed development

The proposed subdivision comprises 21 residential lots across the approximately 2 ha site. Works include excavation for a central roadway (to about 0.5 m maximum depth) and drains along the western and southern boundaries (to about 1.8 m maximum depth), along with minor fill placed in selected allotment areas.

7. Comments

The ASS testing results summarised in Table 1 are interpreted below based on the National Acid Sulfate Soils Guidance WQA (2018a) and the Queensland Soil Management Guidelines (Dear, et al., 2014):

- Where $pH_F \leq 4$, and jarosite is observed, this indicates AASS are present. Where $pH_F \leq 4$ without jarosite, this may indicate AASS are present or that the soil is naturally acidic but non-ASS. No samples returned $pH_F \leq 4$, and no jarosite was observed.
- Where $pH_{FOX} < 3$, along with a strong reaction to peroxide, and pH_{FOX} reading at least one pH unit below pH_F, this strongly indicates potential acid sulfate soils (PASS) conditions, and additional testing is recommended. One sample returned 2.7 pH_{FOX} (highlighted green in Table 1), however it only had a slight reaction. This sample was subject to additional laboratory testing (refer below). No other samples met these criteria

- Where 3 ≤ pH_{FOX} < 4, along with a slight, medium or strong reaction, the indication is inconclusive. Reduced inorganic sulfur (RIS) may be present, however organic matter may also be responsible for the pH decrease, and additional testing is recommended. Six samples satisfied these criteria (highlighted yellow in Table 1), and four were subject to additional laboratory testing (refer below).
- Where 4 ≤ pH_{FOX} < 5 the indication is also inconclusive, and additional testing is recommended. RIS may be present in small quantities or poorly reactive under rapid oxidation, or the sample may contain shell/carbonate. Equally, the low pH may be due to organic acids with no RIS present. 40 samples returned values in this range, with no shells observed, and 12 of these were subject to additional laboratory testing (refer below).

The calculated net acidity for the 20 samples submitted for chromium suite testing is summarised in Table 2. In general, the methods for determining net acidity have been derived from WQA (2018a), and for this project are:

Net Acidity = Potential Acidity (S_{cr}) + Actual Acidity (s-TAA)

The action criterion triggering specific ASS management is 0.03% sulfur or greater.

Five samples (highlighted blue in the attached table) exceeded the 0.03% sulfur action criterion, with net acidities ranging from 0.036% to 0.110% sulfur. These were all from the uppermost black silty sand layer encountered in each test pit to between 0.3 m and 0.55 m depth. No tests from the underlying 'yellow-ish' sand/gravel mixtures exceeded the action criterion.

Regarding the elevated results for the black silty sand, for soils to be identified as sulfuric materials they need to show evidence either of the following (WQA, 2018b): ·

- mottles and coatings with accumulations of jarosite or other iron and aluminium sulfate or hydroxy sulfate minerals; or
- underlying sulfidic material.

Neither criterion was satisfied for the black silty sand.

Based on the above, the black silty sand is considered a naturally acidic soil, and not actual ASS. In this case, an ASSMP is not required.

National ASS guidance suggests that naturally acidic soils are not treated as a typical ASS acidity hazard. However, given the site proximity to the coast, it would be prudent to adopt a site management plan during subdivision construction which sets out some nominal measures to minimise acidity risks. These should include:

- construction outside of the wet season, to minimise the potential for stormwater (and particularly stormwater flow across disturbed acidic ground);
- pH amelioration consistent with standard agricultural practices where the black silty sand is used in landscaping;
- collect (if any), test, and treat (if required) any leachate from temporary excavation stockpiles; and
- any stormwater from disturbed areas discharging into waterways should be tested for pH, and treated (if required).

The leachate or stormwater treatment, as suggested above, should accord with any council requirements as typically associated with construction sites. Given the site is located within an area historically utilised for cane farming, where shallow soils have been regularly disturbed (e.g. ploughed), collected stormwater or leachate treatment can be assessed in the context of typical stormwater discharge parameters from the general area.

8. References

Dear, S., Ahern, C., O'Brien, L., Dobos, S., McElnea, A., Moore, N., & Watling, K. (2014). *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*. (QASSIT). Brisbane: Department of Science: Department of Science, Information, Technology, Innovation and the Arts, Queensland Government.

WQA. (2018a). *National acid sulfate soils sampling and identification methods manual*. Water Quality Australia.

WQA. (2018b). *National acid sulfate soils identification and laboratory methods manual*. Water Quality Australia

9. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at Lot 51 Coulthard Close, Newell Beach in line with Douglas' proposal dated 22 April 2026 and acceptance received from Wayne Davis of 3D Civil Pty Ltd dated 23 April 2026. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of 3D Civil Pty Ltd 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 Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

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. Douglas 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 Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

About this Report

Terminology, Symbols and Abbreviations

Soil Descriptions

Sampling, Testing and Excavation Methodology

About this Report

October 2024

Introduction

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

Douglas' 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, Douglas 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, Douglas 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, Douglas 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, Douglas 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. Douglas 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.

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Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style XW. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	KL
Unknown	Information was not available to allow classification of the property. For example, when augering in loose, saturated sand auger cuttings may not be returned.	UK
No data	Information required to allow classification of the property was not available. For example if drilling is commenced from the base of a hole predrilled by others	ND
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example providing a description of the strength of a concrete pavement	NA

Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Soil Descriptions

Terminology
Symbols
Abbreviations

March 2024

Introduction

All materials which are not considered to be "in-situ rock" are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:

The "classification" comprises a two character "group symbol" providing a general summary of dominant soil characteristics. The "name" summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either "fine grained" (also known as "cohesive" behaviour) or "coarse grained" ("non cohesive" behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as "oversize"	
Cobble	63 - 200		
Gravel[1]	2.36 - 63	Coarse	>65%
Sand[1]	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

[1] – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer "component proportions" below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a "Sandy CLAY", this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a "primary", "secondary", or "minor" component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition[1]	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor[2]	Present in the soil, but not significant to its engineering properties	All other components	All other components

[1] As defined in AS1726-2017 6.1.4.4

[2] In the detailed material description, minor components are split into two further sub-categories. Refer "identification of minor components" below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, "INTERBEDDED Silty CLAY AND SAND".

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component [1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code NDF, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example (VS).

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as "extremely weathered material" in reports and by the abbreviation code XWM on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than 'very low' as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Fluvial	Deposited by channel fill and overbank (natural levee, crevasse splay or flood basin)	FLV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

The presence of particles considered to be "oversize" may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with "MIXTURE OF".

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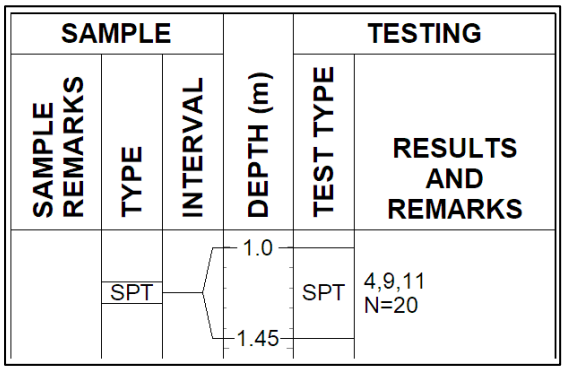
Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Acid Sulfate sample	ASS
Bulk sample	B
Core sample	C
Disturbed sample	D
Environmental sample	ES
Driven Tube sample	DT
Gas sample	G
Piston sample	P
Sample from SPT test	SPT
Undisturbed tube sample	U[1]
Water sample	W
Material Sample	MT
Core sample for unconfined compressive strength testing	UCS

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y =*x* blows for *y* mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(_)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP9/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150
Dynamic probe super heavy, followed by blow count penetration increment in mm	DPSH/100

Groundwater Observations

	water seepage/inflow
	water seepage/outflow
	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Direct Push	DP
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD[1]
Air Track	AT
Diatube	DT[1]
Hand auger	HA[1]
Hand tools (unspecified)	HAND
Existing exposure	X
Hollow flight auger	HSA[1]
HQ coring	HQ3
HMLC series coring	HMLC
NMLC series coring	NMLC
NQ coring	NQ3
PQ coring	PQ3
Predrilled	PD
Push tube	PT[1]
Ripping tyne/ripper	R
Rock roller	RR[1]
Rock breaker/hydraulic hammer	EH
Sonic drilling	SON[1]
Mud/blade bucket	MB[1]
Toothed bucket	TB[1]
Vibrocore	VC[1]
Vacuum excavation	VE
Wash bore (unspecified bit type)	WB[1]

[1] – numeric suffixes indicate tool diameter/width in mm

Appendix B

Drawing 1- Site and Test Location Plan

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0		May.2026	SF

COORDINATE REFERENCE SYSTEM:
GDA2020, MGA ZONE XX

Douglas PARTNERS
OFFICE: CAIRNS
13 Industrial Avenue, Stratford QLD 4870
(07)4055 1550

CLIENT:
3D Civil Pty Ltd

NOTE:
1: Basemap from QImagery.com.au
2: Locality Plan from Street-directory.com.au
3: Test locations are approximate only and were located using differential GPS typically accurate to ± 0.1 m depending on satellite coverage

SCALE: 0 20 40 60 80 m

PROJECT NAME:
Proposed Subdivision

PROJECT ADRESS:
Lot 51 Coulthard Close, Newell Beach

DRAWING TITLE:
Site and Test Location Plan

PROJECT NO: **242245.00**
DRAWING NO: **1**
REVISION: **0**

Appendix C

Field Work Results

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.5 AHD
COORDINATE: E:329709.3, N:8183463.1
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 1
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
01/05/26 No free groundwater encountered to 1.5 m depth	0.30	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25	DCP9/100	
		SAND (SM) with clay trace gravel: yellow brown; fine to coarse; fine gravel.			MD			ASS		0.50		
								ASS		0.75		
				ALV		M		ASS		1.00		
		1.10m: yellow brown mottled brown			D			ASS		1.25		
		Test Pit discontinued at 1.50m depth. Limit of Investigation.						ASS		1.50		

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.6 AHD
COORDINATE: E:329698.7, N:8183541.3
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 2
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)
01/05/26 No free groundwater encountered to 1.5 m depth	3	0.55	Silty SAND (SM) trace gravel: black; fine to coarse; fine gravel.		ALV	MD	M		ASS		0.25
									ASS		0.50
			Gravelly SAND (SW) with clay: yellow brown mottled grey and brown; fine to coarse; fine gravel.		ALV	MD	M		ASS		0.75
	1	1.10				D			ASS		1.00
			Sandy GRAVEL (GP) trace clay: brown grey mottled yellow brown; fine; fine to coarse sand.		ALV	D	M		ASS		1.25
						MD			ASS		1.50
	2		Test Pit discontinued at 1.50m depth. Limit of Investigation.								
	2										
	1										
	3										

TESTING AND REMARKS

TEST TYPE: DCP9/100

RESULTS AND REMARKS: 5 | 10 | 15

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.2 AHD
COORDINATE: E:329735.5, N:8183600.2
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 3
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
01/05/26 No free groundwater encountered to 1.5 m depth	3 / 0.00	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25	DCP9/100	5 10 15
	0.55	SAND (SW) with clay with gravel: yellow mottled grey; fine to coarse; fine, sub-angular to angular gravel.		ALV	MD	M		ASS		0.50		
	1							ASS		0.75		
	2 / 1.30	Gravelly SAND (SW) with clay: grey mottled brown; fine to coarse; fine, sub-angular to angular gravel.		ALV	MD / D	M		ASS		1.00		
								ASS		1.25		
								ASS		1.50		
	2 / 1.80	Test Pit discontinued at 1.80m depth. Limit of Investigation.										
	1 / 3											

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.9 AHD
COORDINATE: E:329684.6, N:8183418.1
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 4
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)
		0.40	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25
		1.40	SAND (SW) with clay with gravel: yellow brown mottled grey; fine to coarse; fine, sub-angular to angular gravel.		ALV	L	M		ASS		0.50
									ASS		0.75
									ASS		1.00
									ASS		1.25
			Sandy GRAVEL (GP) with clay: yellow brown mottled grey; fine, sub-angular to angular; fine to coarse sand.			L			ASS		1.50
									ASS		1.75
					ALV		M		ASS		2.00
			2.40m: pale grey			MD			ASS		2.25
									ASS		2.50
									ASS		2.75
			Test Pit discontinued at 3.00m depth. Limit of Investigation.				W				

Free groundwater encountered at 2.7 m depth
01/05/26

TESTING AND REMARKS

TEST TYPE: DCP9/100

RESULTS AND REMARKS

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 3.6 AHD
COORDINATE: E:329640.6, N:8183482.8
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 5
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
Free groundwater encountered at 2 m depth 01/05/26	0.40	Silty SAND (SM): black; fine to coarse.		ALV	L / MD	M		ASS		0.25	DCP9/100	
	1.40	Gravelly SAND (SP): yellow brown mottled grey; fine to coarse; fine, sub-angular possibly angular gravel.		ALV	MD / L	M		ASS		0.50		
	2.50	Sandy GRAVEL (GP) with clay: pale grey; fine, sub-angular to angular; fine to coarse sand.		ALV	MD	M / W		ASS		0.75		
		Sandy GRAVEL (GP) trace clay; fine, rounded; fine to coarse sand; poorly graded. 2.80m: fine to medium gravel		ALV	MD to D	W		ASS		1.00		
	3	Test Pit discontinued at 2.90m depth. Limit of Investigation.						ASS		1.25		
								ASS		1.50		
								ASS		1.75		
								ASS		2.00		
								ASS		2.25		
								ASS		2.50		
								ASS		2.75		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: 3D Civil Pty Ltd
PROJECT: Proposed Subdivision
LOCATION: Lot 51 Coulthard Close, Newell Beach

SURFACE LEVEL: 4.0 AHD
COORDINATE: E:329654.3, N:8183578.8
DATUM/GRID: MGA2020 Zone 55
DIP/AZIMUTH: 90°/---°

LOCATION ID: Pit 6
PROJECT No: 242245.00
DATE: 01/05/26
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)
		0.00	Silty SAND (SM): black; fine to coarse.		ALV	MD	M		ASS		0.25
		0.40	Silty SAND (SM) trace gravel: yellow brown mottled grey; fine to coarse; fine to coarse gravel.		ALV	MD	M		ASS		0.50
									ASS		0.75
	3	1				D			ASS		1.00
		1.20	Clayey Gravelly SAND (SP-SC): grey mottled yellow brown; fine to coarse; fine, sub-angular to angular gravel.		ALV	D to VD	M		ASS		1.25
									ASS		1.50
									ASS		1.75
	2	1.90	Sandy GRAVEL (GP): grey mottled brown; fine, sub-angular to angular; fine to coarse sand.		ALV	D	M		ASS		2.00
▼ Free groundwater encountered at 2.5 m depth 01/05/26		2	2.40m: pale grey						ASS		2.25
							W		ASS		2.50
	1	3	Test Pit discontinued at 2.90m depth. Limit of Investigation.						ASS		2.75

TESTING AND REMARKS — TEST TYPE: DCP9/100; RESULTS AND REMARKS: 5, 10, 15

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Case 6 Tonne Excavator
METHOD: 600 mm Wide Toothed Bucket
REMARKS:

OPERATOR: MPDT

LOGGED: P Wilkins

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Appendix D

Laboratory Report Sheets

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Dan Martin
Client	DOUGLAS PARTNERS PTY LTD
Address	NATIONAL ACCOUNTS PAYABLE PO BOX 472 WEST RYDE NSW 2114
Telephone	07 4055 1550
Facsimile	07 4055 1774
Email	dan.martin@douglaspartners.com.au
Project	**242245 Proposed Subdivision**
Order Number	(Not specified)
Samples	20

LABORATORY DETAILS

Manager	Jon Dicker
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
SGS Reference	**CE189139 R0**
Date Received	06 May 2026
Date Reported	12 May 2026

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146)

SIGNATORIES

Jon Dicker
Manager Northern QLD

Maristela GANZAN
Quality Manager

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE189139.001 Soil 01 May 2026 Pit 1 0.25m	CE189139.002 Soil 01 May 2026 Pit 1 0.75m	CE189139.003 Soil 01 May 2026 Pit 1 1.5m	CE189139.004 Soil 01 May 2026 Pit 2 0.25m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**14**	**7.6**	**6.7**	**14**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**4.8**	**5.6**	**6.2**	**4.8**
Titratable Actual Acidity	kg H2SO4/T	0.25	**2.1**	**0.49**	<0.25	**3.3**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**42**	**10**	<5	**67**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.07**	**0.02**	<0.01	**0.11**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.068**	**0.016**	<0.005	**0.11**
s-Net Acidity without ANC	%w/w S	0.005	**0.068**	**0.016**	**0.006**	**0.11**
a-Net Acidity	moles H+/T	5	**42**	**10**	<5	**69**
Liming Rate	kg CaCO3/T	0.1	**3.2**	**0.7**	<0.1	**5.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**42**	**10**	<5	**69**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**3.2**	**0.7**	<0.1	**5.2**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE189139.005 Soil 01 May 2026 Pit 2 0.5m	CE189139.006 Soil 01 May 2026 Pit 2 1.0m	CE189139.007 Soil 01 May 2026 Pit 3 0.5m	CE189139.008 Soil 01 May 2026 Pit 3 1.5m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**12**	**7.4**	**11**	**9.0**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**5.3**	**6.0**	**5.4**	**5.7**
Titratable Actual Acidity	kg H2SO4/T	0.25	**1.1**	<0.25	**0.67**	**0.31**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**22**	<5	**14**	**6**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.04**	<0.01	**0.02**	**0.01**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.036**	<0.005	**0.024**	**0.014**
s-Net Acidity without ANC	%w/w S	0.005	**0.036**	<0.005	**0.024**	**0.014**
a-Net Acidity	moles H+/T	5	**22**	<5	**15**	**9**
Liming Rate	kg CaCO3/T	0.1	**1.7**	<0.1	**1.1**	**0.7**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**22**	<5	**15**	**9**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**1.7**	<0.1	**1.1**	**0.7**

Parameter	Units	LOR	Sample Number: CE189139.009 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 0.25m	Sample Number: CE189139.010 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 1.25m	Sample Number: CE189139.011 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 1.75m	Sample Number: CE189139.012 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 4 2.25m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**14**	**7.7**	**7.8**	**11**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**4.7**	**6.0**	**5.5**	**5.4**
Titratable Actual Acidity	kg H2SO4/T	0.25	**2.3**	<0.25	**0.37**	**0.37**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**47**	<5	**7**	**7**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.08**	<0.01	**0.01**	**0.01**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.076**	<0.005	**0.014**	**0.012**
s-Net Acidity without ANC	%w/w S	0.005	**0.076**	<0.005	**0.014**	**0.012**
a-Net Acidity	moles H+/T	5	**47**	<5	**9**	**7**
Liming Rate	kg CaCO3/T	0.1	**3.6**	<0.1	**0.7**	**0.6**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**47**	<5	**9**	**7**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**3.6**	<0.1	**0.7**	**0.6**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE189139.013 Soil 01 May 2026 Pit 5 0.25m	CE189139.014 Soil 01 May 2026 Pit 5 0.75m	CE189139.015 Soil 01 May 2026 Pit 5 1.25m	CE189139.016 Soil 01 May 2026 Pit 5 1.75m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**14**	**8.5**	**8.0**	**8.6**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**4.7**	**5.9**	**5.7**	**5.8**
Titratable Actual Acidity	kg H2SO4/T	0.25	**2.6**	<0.25	<0.25	<0.25
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**54**	<5	<5	<5
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.09**	<0.01	<0.01	<0.01
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	**0.088**	**0.010**	<0.005	**0.010**
s-Net Acidity without ANC	%w/w S	0.005	**0.088**	**0.010**	**0.008**	**0.010**
a-Net Acidity	moles H+/T	5	**55**	**6**	<5	**6**
Liming Rate	kg CaCO3/T	0.1	**4.1**	**0.5**	<0.1	**0.5**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**55**	**6**	<5	**6**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**4.1**	**0.5**	<0.1	**0.5**

Parameter	Units	LOR	Sample Number: CE189139.017 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 5 2.5m	Sample Number: CE189139.018 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 6 0.5m	Sample Number: CE189139.019 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 6 2.0m	Sample Number: CE189139.020 Sample Matrix: Soil Sample Date: 01 May 2026 Sample Name: Pit 6 2.75m
Moisture Content Method: AN002 Tested: 7/5/2026						
% Moisture	%w/w	0.5	**13**	**11**	**8.2**	**15**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 11/5/2026						
pH KCl	pH Units	-	**5.5**	**5.5**	**5.4**	**5.5**
Titratable Actual Acidity	kg H2SO4/T	0.25	<0.25	**0.67**	**0.43**	**0.37**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	<5	**14**	**9**	**7**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	<0.01	**0.02**	**0.01**	**0.01**
Sulphur (SKCl)	%w/w	0.005	-	-	-	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 11/5/2026						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 12/5/2026						
s-Net Acidity	%w/w S	0.005	<0.005	**0.022**	**0.014**	**0.012**
s-Net Acidity without ANC	%w/w S	0.005	**0.006**	**0.022**	**0.014**	**0.012**
a-Net Acidity	moles H+/T	5	<5	**14**	**9**	**7**
Liming Rate	kg CaCO3/T	0.1	<0.1	**1.0**	**0.7**	**0.6**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	<5	**14**	**9**	**7**
Liming Rate without ANCBT	kg CaCO3/T	0.1	<0.1	**1.0**	**0.7**	**0.6**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Chromium Reducible Sulfur (CRS) **Method: ME-(AU)-[ENV]AN217**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chromium Reducible Sulfur (Scr)	LB154355	%	0.005	<0.005	0%	97%
Chromium Reducible Sulfur (Scr)	LB154355	moles H+/T	5	<5		

TAA (Titratable Actual Acidity) **Method: ME-(AU)-[ENV]AN219**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB154360	pH Units	-	6.2	0 - 1%	103%
Titratable Actual Acidity	LB154360	kg H2SO4/T	0.25	<0.25	12 - 22%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB154360	moles H+/T	5	<5	12 - 22%	108%
Titratable Actual Acidity (TAA) S%w/w	LB154360	%w/w S	0.01	<0.01	0 - 12%	108%

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN217	Dried pulped sample is mixed with acid and chromium metal in a rapid distillation unit to produce hydrogen sulfide (H2S) which is collected and titrated with iodine (I2(aq)) to measure SCR.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	Chromium Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated
NAD	No Asbestos Detected.	NA	Not Applicable

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: https://www.sgs.com/en-au/industry/environmental-health-and-safety.

APPLIN —— CONSULTING

Hydrology Calculations

Project No.	26001
Calc's By	GA
Checked By	GB

Location

Newell Beach

Catchment Details:

Catchment Number: **A**

Catchment Area	=	A	=	1.301	ha
Length of Stream	=	L	=		km
Stream Slope	=	Se	=		%

Time of Concentration:

Friends Equation tc	=	14.7	min		min		min		min		min		min		min
Overland sheet flow path Length	=	40.0	m		m		m		m						
Horton's Roughness Factor	=	0.035													
Surface Slope	=	0.50	%		%		%		%						
Additional Roadside Channel flow	=	2.7	min		min		min		min		min		min		min
Channel Length	=	210	m		m		m		m		m		m		m
Channel Slope	=	0.40	%		%		%		%		%		%		%
Channel Vel. (assumed)	=	1.30	m/s		m/s		m/s		m/s		m/s		m/s		m/s

Calculated Time of Concentration	=	tc	=	17.4	mins
Adopted Time of Concentration	=	tc	=	18.0	mins

Runoff Coefficient:

Fraction Impervious	=	f_i	=	0.65	Table 4.5.1 QUDM - Fraction Impervious (Urban Residential Low Density exc roads)
1 hr rainfall Intensity for 10yr ARI	=	$^1I_{10}$	=	84.5	
10 yr Discharge Coefficient	=	C_{10}	=	0.83	Table 4.5.3 QUDM

				63% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Coefficient of Runoff	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00

Rainfall Intensity:

				63% (1yr)	39% (2yr)	18% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Intensity for Catchment tc (mm/hr)	=	^tI_y		91.1	99.7	125.5	142.2	158.0	178.0	192.6

Runoff Calculation:

The Rational Method formula is: $Q_y = (C_y \,.\, {}^tI_y \,.\, A)/360$

				63.2% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Runoff Coefficient	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00
Intesity for tc hours and y years	=	^tI_y	=	91.11	99.69	125.54	142.25	157.97	177.96	192.64
Catchment Area	=	A	=	1.301 ha						

				63.2% (1yr)	**50% (2yr)**	**20% (5 yr)**	**10% (10 yr)**	**5% (20 yr)**	**2% (50 yr)**	**1% (100 yr)**
Calculated Peak Flow Rate	=	Qy	=	0.217 m^3/s	0.256 m^3/s	0.358 m^3/s	0.427 m^3/s	0.497 m^3/s	0.611 m^3/s	0.696 m^3/s

APPLIN —— CONSULTING

Hydrology Calculations

Project No.	26001
Calc's By	GA
Checked By	GB

Location

Newell Beach - Point B

Catchment Details:

Catchment Number: **A and B**

Catchment Area	=	A	=	3.271	ha
Length of Stream	=	L	=		km
Stream Slope	=	Se	=		%

Time of Concentration:

Friends Equation tc	=	14.7	min		min		min		min						
Overland sheet flow path Length	=	40.0	m		m		m		m						
Horton's Roughness Factor	=	0.035													
Surface Slope	=	0.50	%		%		%		%						
Additional Roadside Channel flow	=	4.0	min		min		min		min		min		min		min
Channel Length	=	310	m		m		m		m		m		m		m
Channel Slope	=	0.40	%		%		%		%		%		%		%
Channel Vel. (assumed)	=	1.30	m/s		m/s		m/s		m/s		m/s		m/s		m/s

Calculated Time of Concentration	=	tc	=	18.7	mins
Adopted Time of Concentration	=	tc	=	19.0	mins

Runoff Coefficient:

Fraction Impervious	=	f_i	=	0.65	Table 4.5.1 QUDM - Fraction Impervious (Urban Residential Low Density exc roads)
1 hr rainfall Intensity for 10yr ARI	=	$^1I_{10}$	=	84.5	
10 yr Discharge Coefficient	=	C_{10}	=	0.83	Table 4.5.3 QUDM

				63% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Coefficient of Runoff	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00

Rainfall Intensity:

				63% (1yr)	39% (2yr)	18% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Intensity for Catchment tc (mm/hr)	=	^tI_y		89.2	97.6	122.9	139.3	154.7	174.2	188.6

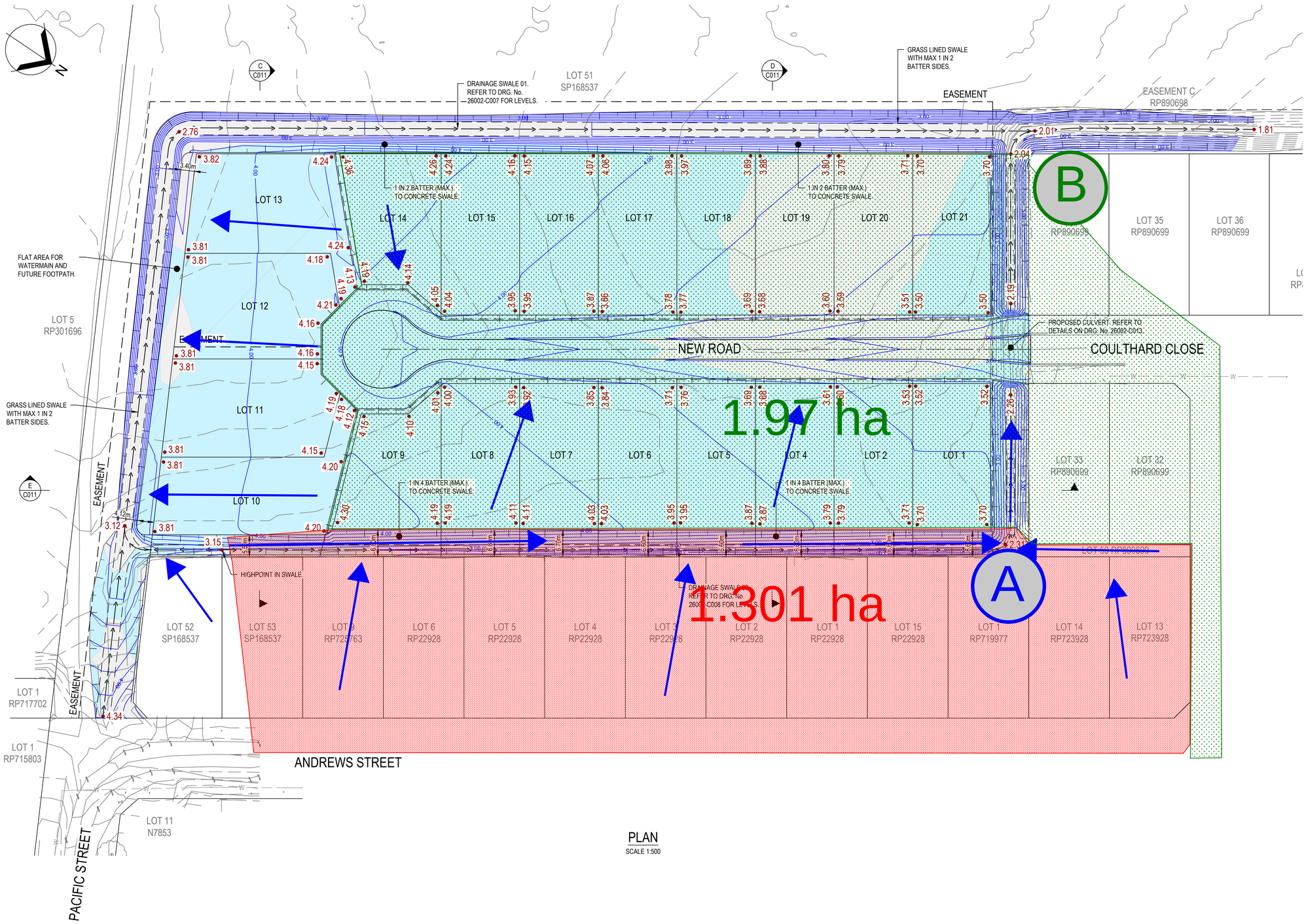
Runoff Calculation:

The Rational Method formula is: $Q_y = (C_y \,.\, {}^tI_y \,.\, A)/360$

				63.2% (1yr)	50% (2yr)	20% (5 yr)	10% (10 yr)	5% (20 yr)	2% (50 yr)	1% (100 yr)
Runoff Coefficient	=	C_y	=	0.66	0.71	0.79	0.83	0.87	0.95	1.00
Intesity for tc hours and y years	=	^tI_y	=	89.22	97.61	122.93	139.29	154.68	174.24	188.60
Catchment Area	=	A	=	3.271 ha						

				63.2% (1yr)	**50% (2yr)**	**20% (5 yr)**	**10% (10 yr)**	**5% (20 yr)**	**2% (50 yr)**	**1% (100 yr)**
Calculated Peak Flow Rate	=	Qy	=	0.535 m^3/s	0.630 m^3/s	0.882 m^3/s	1.050 m^3/s	1.223 m^3/s	1.504 m^3/s	1.714 m^3/s

DATE PLOTTED: 22 May 2026 3:49 PM



PLAN
SCALE 1:500

LEGEND

EXISTING

- EXISTING LOT BOUNDARY
- EXISTING EASEMENT BOUNDARY
- 24.0 EXISTING SURFACE CONTOUR (0.5m INTERVALS)
- D EXISTING DRAINAGE PIPE
- S EXISTING SEWER LINE
- W EXISTING WATER LINE
- E EXISTING ELECTRICAL SERVICE
- C EXISTING COMMUNICATIONS SERVICE

PROPOSED

- NEW LOT BOUNDARY
- NEW EASEMENT BOUNDARY
- 24.0 DESIGN SURFACE CONTOUR (0.2m INTERVALS)
- 24.60 DESIGN FINISHED SURFACE LEVEL (FSL)
- 24.60 EXISTING SURFACE LEVEL (ESL)
- AREA OF CUT
- AREA OF FILL
- TOP OF BANK
- BOTTOM OF BANK

NOTES

1. REFER DRG 26002-C002 FOR STANDARD NOTES.

BEFORE YOU DIG www.byda.com.au

REV	DESCRIPTION	DRN	APP	DATE
0	FOR APPROVAL	MT	GA	22.05.2026

CERTIFICATION RPEQ
G. APPLIN 6073

APPLIN —— CONSULTING
M 0414 768 109 | E greg@applinconsulting.com.au

SCALES
1:500 0 5 10 15 20 25m

CLIENT
FAR NORTH DEVELOPMENT GROUP P/L
NEWELL BEACH DEVELOPMENT

DESIGNED M. TICKNER
DRAWN M. TICKNER
CHECKED G. APPLIN

PROJECT
LOT 51 COULTHARD CLOSE, NEWELL BEACH
DEVELOPMENT WORKS

TITLE
CATCHMENT INTERNAL

STATUS
FOR APPROVAL

SCALE (AT FULL SIZE) REFER PLAN
SIZE A1

DRAWING NUMBER
CATCHMENT

REVISION
0

CAD File: 26002-C009-C010 [EWKS].dwg

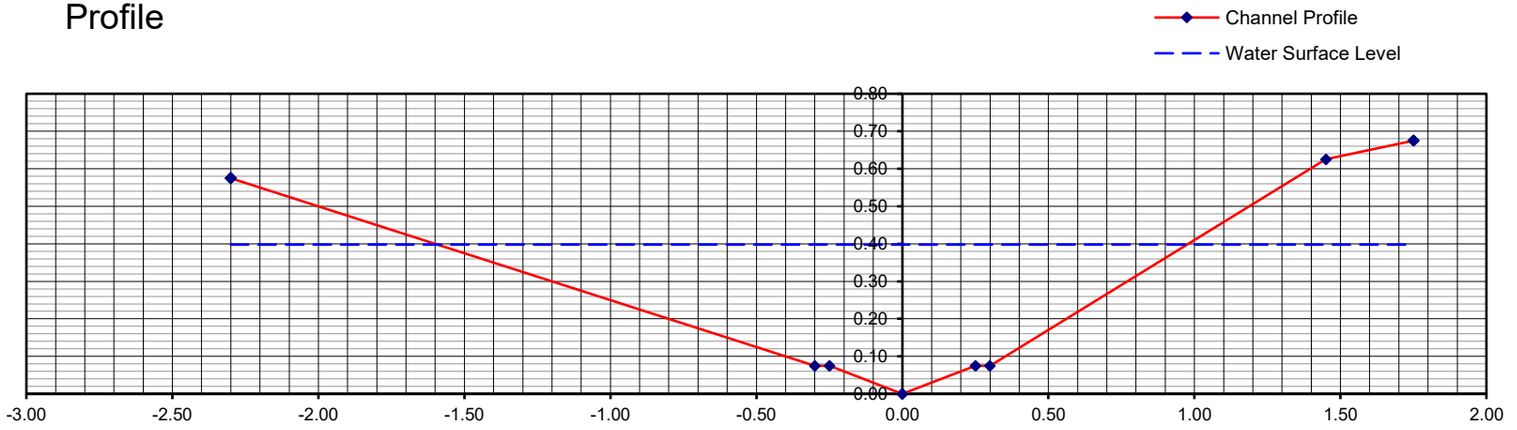
APPLIN —— CONSULTING

Channel Flow (Irregular shape)

Project No.	26001
Calc's By	GA
Checked By	GA

Location Newell Beach Swale Drain 02 - Point A

Profile



Depth of flow (m)	0.398
Slope (%)	0.400
I.L.	0.000
A	0.530
P	3.348
R	0.158
WSE	0.398

SECTION	Width	Height	n	A	H_1	H_2	W	P	A/P	Q	$n^{1.5}xP$	$A^{1.66}/P^{0.66}$	$A^{1.66}/P^{0.66}/n$
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.323	0.000	0.323	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.323	0.000	0.323	0.000	0.000	0.000	0.000	0.000
	2.000	0.500	0.030	0.209	0.000	0.323	1.292	1.332	0.157	0.128	0.007	0.061	2.021
	0.050	0.000	0.013	0.016	0.323	0.323	0.050	0.050	0.323	0.037	0.000	0.008	0.585
	0.250	0.075	0.013	0.090	0.323	0.398	0.250	0.261	0.345	0.216	0.000	0.044	3.412
Centre	0.000	0.000	0.013	0.000	0.398	0.398	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.013	0.000	0.398	0.398	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.250	0.075	0.013	0.090	0.323	0.398	0.250	0.261	0.345	0.216	0.000	0.044	3.412
	0.050	0.000	0.013	0.016	0.323	0.323	0.050	0.050	0.323	0.037	0.000	0.008	0.585
	1.150	0.550	0.030	0.109	0.000	0.323	0.675	0.749	0.146	0.064	0.004	0.030	1.007
	0.300	0.050	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.53						**0.697**	0.012	0.195	11.022

Calculated Design Flows		
Q100	0.697	m^3/s
		m^3/s
		m^3/s
		m^3/s

Recommended Freeboard Calc's		
Calc'd channel velocity	1.31	m/s
Minimum	0.30	m
20% channel depth	0.08	m
$V^2/2g$	0.09	m

Comments

Q100 flow is 696 l/s
Swale flows 398mm deep in a Q100 event
Drain is more than 1.2m deep - Freeboard is okay

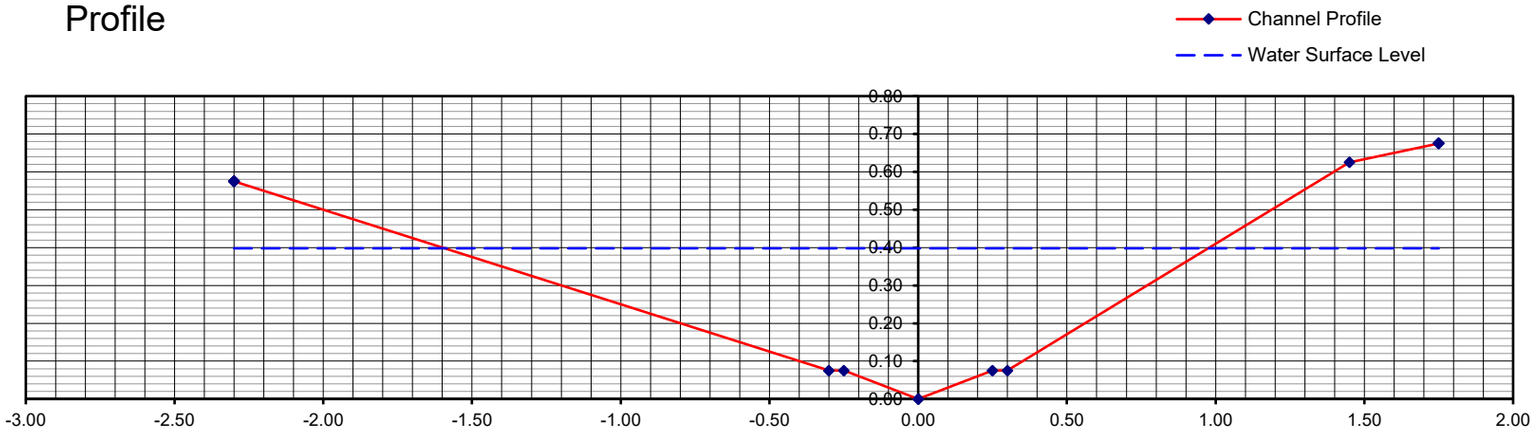
APPLIN —— CONSULTING

Channel Flow (Irregular shape)

Project No.	26001
Calc's By	GA
Checked By	GA

Location Newell Beach Swale Drain 02 - Point B

Profile



Depth of flow (m)	0.590
Slope (%)	0.400
I.L.	0.000
A	1.135
P	4.877
R	0.233
WSE	0.590

SECTION	Width	Height	n	A	H_1	H_2	W	P	A/P	Q	$n^{1.5}xP$	$A^{1.66}/P^{0.66}$	$A^{1.66}/P^{0.66}/n$
				0.000	0.015	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.015	0.515	0.000	0.500	0.000	0.000	0.000	0.000	0.000
				0.000	0.015	0.515	0.000	0.500	0.000	0.000	0.000	0.000	0.000
	2.000	0.500	0.030	0.530	0.015	0.515	2.000	2.062	0.257	0.452	0.011	0.214	7.143
	0.050	0.000	0.013	0.026	0.515	0.515	0.050	0.050	0.515	0.080	0.000	0.017	1.273
	0.250	0.075	0.013	0.138	0.515	0.590	0.250	0.261	0.529	0.440	0.000	0.090	6.951
Centre	0.000	0.000	0.013	0.000	0.590	0.590	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.013	0.000	0.590	0.590	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.250	0.075	0.013	0.138	0.515	0.590	0.250	0.261	0.529	0.440	0.000	0.090	6.951
	0.050	0.000	0.013	0.026	0.515	0.515	0.050	0.050	0.515	0.080	0.000	0.017	1.273
	1.150	0.550	0.030	0.277	0.000	0.515	1.077	1.194	0.232	0.221	0.006	0.105	3.493
	0.300	0.050	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				1.14						**1.713**	0.018	0.533	27.084

Calculated Design Flows		
Q100	1.713	m^3/s
		m^3/s
		m^3/s
		m^3/s

Recommended Freeboard Calc's		
Calc'd channel velocity	1.51	m/s
Minimum	0.30	m
20% channel depth	0.12	m
$V^2/2g$	0.12	m

Comments

Q100 flow is 1.714 m3/s
Swale flows 590mm deep in a Q100 event
Drain is more than 1.5m deep Freeboard is okay

FAR NORTH DEVELOPMENT GROUP P/L

51 COULTHARD CLOSE
NEWELL BEACH

LANDSCAPE PLANS TO BE READ IN COLOUR

LANDSCAPE DOCUMENTATION FOR OPERATIONAL WORKS

NOTE LIVE CABLES AND EXISTING SERVICE IN AREA

ISSUE: 1

DATE: 3 JUNE 2026

JOB NO: 2601504

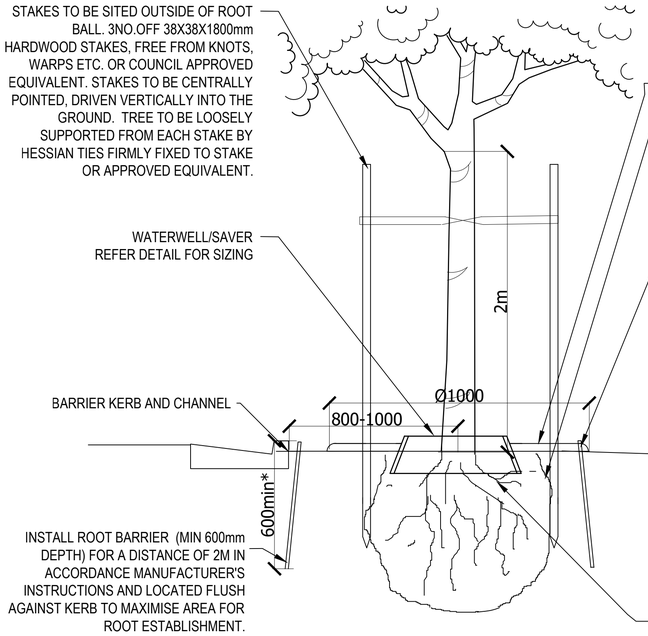
SHEET INDEX

SHEET	DESCRIPTION
L00	COVER SHEET AND GENERAL DETAILS
L01	LANDSCAPE PLAN
L02	SPECIFICATION PART 1
L03	SPECIFICATION PART 2

GENERAL NOTES:

1. REFER TO DRAWINGS AND REPORTS BY OTHERS FOR INFORMATION ON SITE SUCH AS SERVICE LOCATION. NOTE LIVE POWER IN THE AREA. DETERMINE THE POSITION OF ALL UNDERGROUND AND OVERHEAD SERVICES ON SITE PRIOR TO COMMENCING CONSTRUCTION. DO NOT RELY SOLELY UPON LIMITED SERVICES INFORMATION PROVIDED ON LANDSCAPE PLANS.
2. ALL LANDSCAPE WORK WILL BE CARRIED OUT IN ACCORDANCE WITH FNQROC GUIDELINES, CAIRNS REGIONAL COUNCIL LANDSCAPE POLICIES, OTHER RELEVANT CODES AND ANY RELEVANT AUSTRALIAN STANDARDS AND NATSPEC RECOMMENDATIONS. STREET TREES AND SHRUBS SHOULD BE PLANTED IN ACCORDANCE WITH FNQROC GUIDELINES AND ADJUSTED TO SUIT STRUCTURES SUCH AS LIGHTS AND POWER POLES (SUMMARIZED ON THE DETAIL SHEETS OF THESE PLANS).
3. ANY CHANGES TO THE SUGGESTED SPECIES, INCLUDING SIZES, SHOULD BE AGREED WITH SUZAN QUIGG LANDSCAPE DESIGNS AND COUNCIL IN WRITING PRIOR TO MAKING SUBSTITUTIONS.
4. REFER TO PLANS BY OTHERS FOR PATH AND CROSSOVER SETOUT, SERVICE LOCATIONS, JOINTING AND CONDUIT IN PAVEMENTS, ALL STRUCTURAL FIXINGS AND REINFORCEMENTS TO PAVEMENTS AND WALLS ETC., LIGHTING AND HYDRAULIC ELEMENTS.
5. REFER TO PLANS BY OTHERS FOR FINISHED SURFACE LEVELS. ALL NEW FINISHED SURFACES SHOULD ALIGN FLUSH WITH EXISTING SURFACE LEVELS AND RETAIN EXISTING LEVELS TO ADJACENT SURFACES UNLESS OTHERWISE INSTRUCTED BY SUPERINTENDENT.
6. THE FINAL SETOUT FOR ALL LANDSCAPING SHOULD BE CONFIRMED ON SITE BY THE SUPERINTENDENT.
7. IT IS THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR TO CHECK ALL PLANT QUANTITIES FOR THEMSELVES ON THE PLANS. WHERE PLANT NUMBERS OR SPECIES IN THE SCHEDULES DIFFER FROM THOSE ON THE PLANS, THE PLANS HAVE PRECEDENCE OVER THE SCHEDULES. THE CONTRACTOR SHOULD IMMEDIATELY CONTACT THE LANDSCAPE DESIGNER FOR CLARIFICATION IF THEY IDENTIFY ANY DISCREPANCIES AND SHOULD NOT QUOTE ON OR PLACE ORDERS BASED SOLELY ON THE SCHEDULES.
8. THE LANDSCAPE DESIGNER WILL NOT BE RESPONSIBLE FOR ANY DAMAGE OR INJURIES TO PERSONS OR PROPERTY SUSTAINED AS A RESULT OF USING THE PLANTS NOMINATED IN THIS PLAN. IT IS UNDERSTOOD THAT MOST PLANTS CAN BE TOXIC OR INJURIOUS TO VARYING DEGREES IF INGESTED OR HANDLED IN INAPPROPRIATE WAYS.
9. DO NOT RELY UPON THE ACCURACY OF THESE PLANS AS THEY MAY HAVE BEEN REPRODUCED AT A SCALE DIFFERENT TO THAT NOMINATED ON THE PLANS. VERIFY THE SCALE BY CHECKING AGAINST THE SCALE BAR SHOWN ON THE PLANS AND DO NOT USE THESE PLANS FOR ACCURATE MEASUREMENTS WITHOUT FIRST CHECKING AGAINST OTHER PLANS SUCH AS ENGINEERING AND BUILDING PLANS.
10. IF THE LANDSCAPE CONTRACTOR IS SUBCONTRACTING TO A MAIN CONTRACTOR, THEN THE SUB-CONTRACT FOR THE LANDSCAPING MUST BE AWARDED EARLY ENOUGH FOR THE LANDSCAPER TO BE ABLE TO PROVIDE ALL THE SPECIES NOMINATED IN THE SIZES ADVISED.
11. THE CONTRACTOR MAY NEED TO SOURCE THESE PLANTS FROM SEVERAL NURSERIES WELL IN ADVANCE OF THE PLANTING TIMES TO ENSURE THAT THE NOMINATED SPECIES ARE AVAILABLE IN THE SIZES REQUIRED.
12. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT HE IS AT ALL TIMES IN POSSESSION OF THE LATEST REVISIONS TO THE PLANS.
13. DO NOT COPY OR DISTRIBUTE THESE PLANS WITHOUT PERMISSION FROM SUZAN QUIGG LANDSCAPE DESIGNS

Site Location Map (Courtesy Google)



NOTES

1. FOR LOCATION AND SPECIES OF TREES REFER PROJECT DRAWINGS.
2. PRIOR TO PLANTING ALL WEEDS SHALL BE KILLED BY SPRAYING A SUITABLE GLYPHOSATE BASED HERBICIDE. SPRAYED AREA SHALL REMAIN UNDISTURBED FOR TWO WEEKS.
3. EXCAVATED PLANTING HOLE SHALL ALLOW FOR A MINIMUM 100mm CLEARANCE AROUND THE ROOTBALL. BASE OF HOLE TO BE RIPPED TO 150mm DEPTH TO PROMOTE DRAINAGE.
4. TOP OF ROOTBALL TO BE FINISHED FLUSH WITH EXISTING GROUND LEVEL.
5. MULCH TO BE 75mm THICK IN PAVED FOOTPATHS. 100mm THICKNESS ELSEWHERE SUCH AS ADJACENT TO TREE GUARDS, TRAFFIC ISLANDS AND MASS PLANTED, MULCHED AREAS.
6. REFER STANDARD SPECIFICATION FOR MAINTENANCE AND WATERING REQUIREMENTS.
7. ALL DIMENSIONS ARE IN MILLIMETRES.
8. ALL TREES MUST COMPLY WITH AS2303:2015 - TREE STOCK FOR LANDSCAPE USE.
9. ROOT BARRIERS - INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. *DEPTH OF SERVICES WILL DETERMINE BARRIER TYPE. IF PATH OR SERVICES ARE PRESENT THEN USE ROOT BARRIER ON BOTH SIDES OF TREE FOR A DISTANCE OF 2m ALONG KERB AND FOOTPATH 300mm FROM BOTH.
10. TREES ARE TO BE LOCATED CLEAR OF STORMWATER INFRASTRUCTURE.

FNQROC - ALIGNMENT AND PLACEMENT OF STREET TREES (MEASURED FROM THE TREE AT THE ESTIMATED ULTIMATE SIZE):

- MINIMUM OF 800mm AND MAXIMUM OF 1000m FROM BACK OF KERB
- AT INTERSECTION A MINIMUM OF 10m BACK FROM FACE OF KERB OF ADJOINING STREET
- LOCATE SO AS NOT TO OBSTRUCT ANY SERVICES OR SIGNAGE
- LOCATE SO AS NOT TO OBSTRUCT PEDESTRIAN OR VEHICULAR TRAFFIC, NOR CREATE TRAFFIC HAZARD OR CAUSE DAMAGE TO EXISTING TREES
- GREATER THAN 4.0m FROM ELECTRICITY OR TELECOMMUNICATION POLES OR PILLARS
- GREATER THAN 7.5m FROM STREETLIGHTS
- GREATER THAN 4.0m RADIUS FROM HIGH VOLTAGE TRANSMISSION LINES
- GREATER THAN 2.0m FROM STORMWATER DRAINAGE PITS.
- MINIMUM OF 3m FROM DRIVEWAY
- MAXIMUM SPACING 20m OR ONE PER LOT WHERE ACHIEVABLE

1 STREET TREEPLANTING S4210 COMPLIANT DSC

NTS

Issue	Date	Item
1	03/06/2026	Plans to Client

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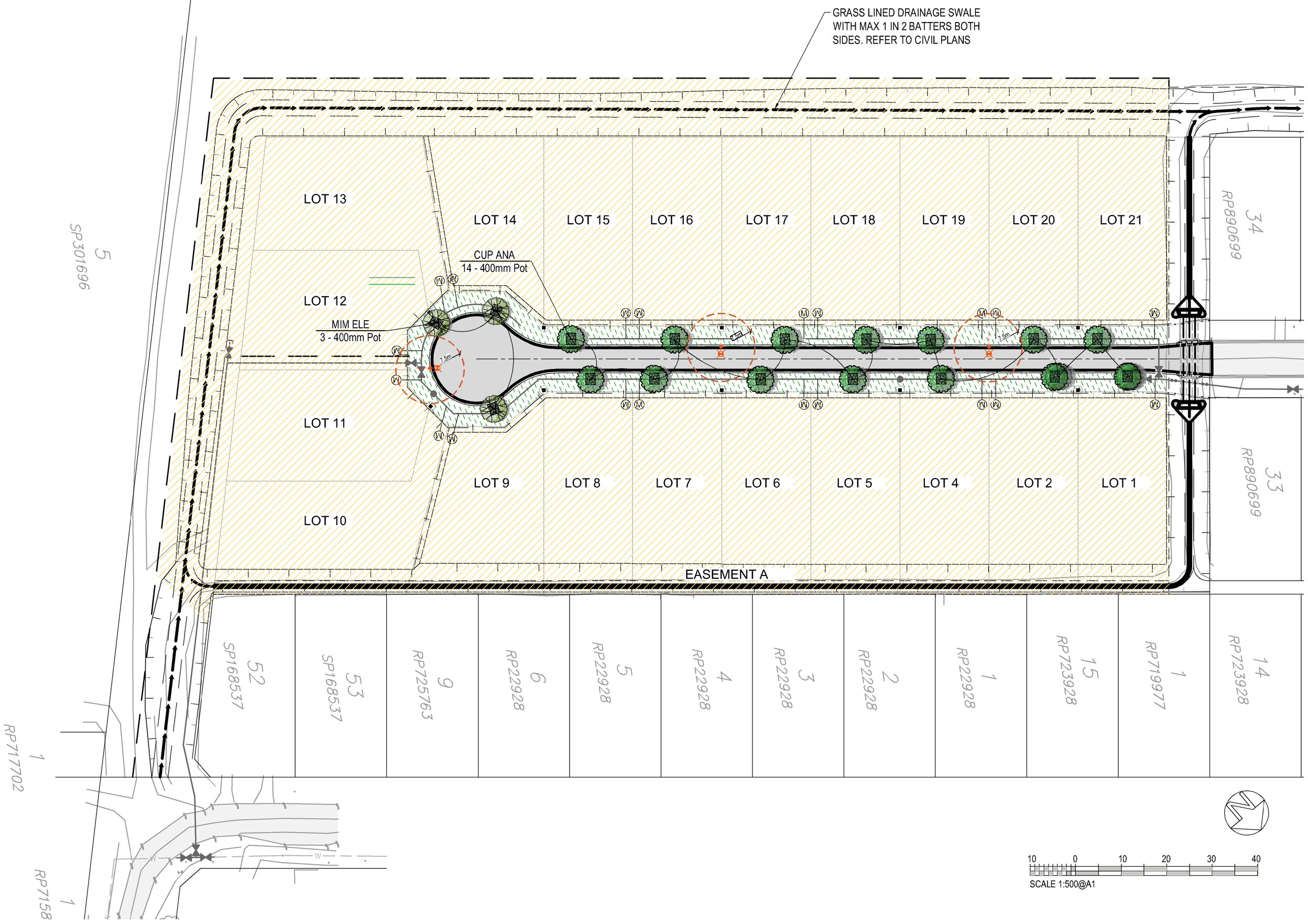
L00 COVER SHEET AND GENERAL NOTES

LANDSCAPE PLANS TO BE READ IN COLOUR

PLANT SCHEDULE

SYMBOL	CODE	BOTANICAL / COMMON NAME	SIZE	QTY
TREES				
	CUP ANA	CUPANIOPSIS ANACARDIOIDES / CARROT WOOD	400MM POT	16
	MIM ELE	MIMUSOPS ELENGI / SPANISH CHERRY	400MM POT	3

NOTE: REFER TO PLANTING DETAIL. STREET TREES ARE TO BE PLANTED IN ACCORDANCE WITH FNQROC REQUIREMENTS AS A MINIMUM STANDARD - REFER TO NOTES AND DETAILS,ADJUST LOCATION OF TREES TO SUIT SERVICES AND OTHER RESTRICTIONS LISTED IN FNQROC ON SITE.



LEGEND

PROPOSED VERGE TREATMENT GENERALLY IN ACCORDANCE WITH FNQROC SPECIFICATIONS - REFER ALSO TO NOTES AND DETAIL PAGES

EXTENT OF NEW LOTS AND DRAINS TO BE GRASSED AS PART OF CIVIL WORKS

PROPOSED STREETLIGHT WITH 7.5m CLEARANCE ROOM FOR VEGETATION- REFER TO FNQROC AND NOTES ON THESE PLANS FOR DETAILS OF TREE EXCLUSION ZONES

THE CONTRACTOR IS TO IDENTIFY ALL LOCATE ALL SERVICES PRIOR TO STARTING ON SITE.
DO NOT ATTEMPT ANY WORK ON THIS SITE WITHOUT FIRST ESTABLISHING THE EXACT LOCATION OF ALL SERVICES. REFER TO CIVIL PLANS FOR LIMITED INFORMATION ON WHERE SERVICES ARE EXPECTED TO BE.NOTE ERGON RESTRICTIONS FOR WORKING IN THE VICINITY OF ENERGISED CABLE. CONTACT ERGON ENERGY 131046.

NOTE:

- ALL STOCK IS TO BE SOURCED FROM SEED OR OTHER PROPAGATION MATERIAL COLLECTED AND GROWN LOCALLY.
- DO NOT SCALE OFF THIS PLAN. ANNOTATED MEASUREMENTS TAKE PRECEDENCE OVER ANY MEASURED SCALES.
- CRITICAL MEASUREMENTS ONLY ARE NOTED ON PLAN. CONTRACTOR IS TO ADJUST OTHER MEASUREMENTS TO SUIT SITE CONDITIONS.
- BRING TO THE ATTENTION OF SUZAN QUIGG LANDSCAPE DESIGN ANY DISCREPANCIES FOUND DURING CONSTRUCTION.
- REFER TO GENERAL NOTES ON PAGE L00 (COVER SHEET), DETAILS AND LANDSCAPE NOTES

GRASSED AREAS

- REFER TO CIVIL PLANS AND NOTES FOR EXTENT OF COVER FOR ALL BARE AREAS (LOTS, DRAINS, ROAD RESERVES, VERGES, ETC WHICH SHALL BE GRASSED. AS A MINIMUM AND UNLESS OTHERWISE NOMINATED THESE AREAS WILL BE DRILL SEEDED WITH APPROVED GRASSED SPECIES (SEE SPECIFICATION AND FNQROC MANUAL) FOR SLOPES UP TO AND INCLUDING 1 IN 4. FOR SLOPES GREATER THAN 1 IN 4, AREAS ARE TO BE HYDROMULCHED AS A MINIMUM TREATMENT.
- ALL AREAS ARE TO BE MAINTAINED AND WATERED UNTIL ESTABLISHED AND THEN FOR FOR THE REQUIRED MAINTENANCE PERIOD.
- VERGES (NOT PART OF SCOPE OF WORKS OF LANDSCAPE CONTRACTOR) - REFER TO DETAIL 2. (REFER TO FNQROC MANUAL D9.06) ALL VERGES ARE TO BE COVERED FULL WIDTH WITH TOPSOIL TO A DEPTH OF NOT LESS THAN 40MM AND LIGHTLY COMPACTED AND GRASSED AS SHOWN ON DETAIL WITH EITHER DRILL SEEDING OR HYDROMULCHING AND IN ACCORDANCE WITH COUNCIL'S MINIMUM STANDARDS AND SPECIFICATIONS. ALL VERGES SHALL BE LEFT IN A MOWABLE CONDITION, FREE FROM ROCKS AND LOOSE STONES AND GRADED TO EVEN-RUNNING CONTOURS.
- THE DEVELOPER MAY OPT TO TURF AREAS IN LIEU OF OTHER METHODS OF GRASSING.

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JOB No:	2601504
DWG No:	L01
ISSUE:	1
DRAWN:	SJQ
DATE:	3 JUNE 2026
SCALE:	1:500@A1

DRAWING TITLE: LANDSCAPE PLAN

PROJECT: Lot 51 COULTHARD CLOSE NEWELL BEACH

CLIENT: FAR NORTH DEVELOPMENT GROUP P/L NEWELL BEACH DEVELOPMENT

GENERAL

1. ALL WORK IS TO BE CARRIED OUT BY LICENSED CONTRACTORS IN ACCORDANCE WITH ALL AUSTRALIA, NATSPEC AND LOCAL GOVERNMENT CODES AND STANDARDS.
2. REFER ALSO TO INFORMATION ON L00

EXISTING - VEGETATION PROTECTION

1. ANY TREES IN THIS STAGE WHICH ARE TO BE REMOVED WILL BE DONE AS PART OF THE CIVIL WORKS.
2. ALL TREES ON THE SURROUNDING AREAS WHICH ARE NOT WITHIN THE PROJECT BOUNDARY WILL REMAIN UNDISTURBED DURING CONSTRUCTION. PROTECT ANY TREES WHICH ARE ADJACENT TO THE PROPOSED AREA DURING CONSTRUCTION IN ACCORDANCE WITH AS4970-2009. A MINIMUM OF 2m (OR TO SUIT CALCULATED RPZS) FROM THE TRUNK MUST BE PROTECTED USING BARRIER FENCING.TO PREVENT ANY TRAFFIC (VEHICLE OR OTHERWISE) WITHIN THIS AREA. DO NOT STORE ANY HARMFUL OR BULK CHEMICALS NEAR TREES OR SHRUBS WHICH ARE TO BE RETAINED. DO NOT ALTER GROUND LEVELS OR MOISTURE AROUND TREES. REFER ALSO TO NATSPEC SPECIFICATIONS FOR DETAILS.

WEED CONTROL AND SITE PREPARATION

1. THE PROJECT MUST AIM TO MINIMISE THE AMOUNT OF SEDIMENT LEAVING THE SITE DURING SITE PREPARATION AND PLANT ESTABLISHMENT.THE CONTRACTOR WILL BE RESPONSIBLE FOR ADEQUATE DRAINAGE OF THE SITE DURING THE CONSTRUCTION PERIOD. EROSION AND SEDIMENT CONTROL BARRIERS WILL BE ERECTED AS PART OF THE SITE PREPARATION WORKS.REFER TO CIVIL PLANS
2. DO NOT TRANSPORT SOIL BETWEEN SITES AND CHECK THAT ALL MACHINERY, VEHICLES AND SHOES ARE CLEANED BEFORE LEAVING THE SITE.
3. ERECT ALL FENCES TO KEEP STOCK OUT OF ANY PLANTED AREAS PRIOR TO DOING ANY REVEGETATION WORK. ENSURE WATER IS AVAILABLE PRIOR TO PLANTING.
4. REGULAR WEED MANAGEMENT OF THE SITE IS ESSENTIAL.CONTROL PASTURE GRASSES/WEEDS PRIOR TO PLANTING. THE MASSED PLANTING AREAS SHOULD BE COMPLETELY WEED-FREE PRIOR TO STARTING PLANTING.
5. A REGULAR WEED REMOVAL PROGRAM SHOULD BE IMPLEMENTED TO FURTHER FURTHER SPREAD OF WEEDS.DO NOT ALLOW WEEDS TO FLOWER AND SPREAD SEED.
6. WHERE POSSIBLE REMOVE ANY WOODY AND HERBACEOUS WEEDS, GRASSES AND DECLARED PEST PLANTS BY MECHANICAL MEANS, CAREFULLY DISPOSING OF ALL REMOVED MATERIAL, OBSERVING ALL LOCAL AUTHORITY AND ENVIRONMENTAL AGENCY REQUIREMENTS.
7. IF HERBICIDES ARE USED, ONLY A NON-RESIDUAL HERBICIDE SUCH AS GLYPHOSATE WILL BE ACCEPTABLE IN THESE AREAS (PARTICULARLY WHERE RUN-OFF IS LIKELY TO OCCUR (UNLESS OTHER CHEMICALS ARE RECOMMENDED FOR PARTICULAR SPECIES- REFER WEED MANAGEMENT PLAN AND EXCEPTIONS TO PLAN LISTED BELOW).
8. IF IMPORTING SOIL TREAT ANY NUTGRASS PRIOR TO USE (PRESENT IN MOST IMPORTANT SOILS AT PRESENT) WITH SEMPRA SPRAYED AT REGULAR INTERVALS APPLIED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
9. USE ALL HERBICIDES STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS TAKING EVERY PRECAUTION TO PROTECT THE OPERATOR AND THE ENVIRONMENT.
10. NOTE THAT THERE ARE DRAINAGE CREEKS AND WATERWAYS WITHIN THE AREA - DO NOT ALLOW CHEMICALS TO RUN INTO THESE.
11. DO NOT PLANT ANY SPECIES THAT IS LIKELY TO BECOME INVASIVE.
12. ANY EXOTIC PLANT FOUND ON SITE THAT HAS THE POTENTIAL TO BECOME INVASIVE SHOULD BE REMOVED.
13. EXAMPLES OF COMMON WOODY WEEDS IN THE LOCAL AREA INCLUDE *SOLANUM MAURITANICUM* (TOBACCO WEED), *LANTANA CAMARA*, *PSIDIUM CATTLEIANUM* (GUAVA), *LIGUSTRUM LUCIDUM* AND *L. SINENSE* (PRIVET), *SPATHODEA CAMPANULATA* (AFRICAN TULIP TREE) AND *CINNAMOMUM CAMPHORA* (CAMPHOR LAUREL) AMONGST OTHERS. fOR SMALLER PLANTS SUCH AS LANTANA TRY GLYPHOSATE AS FIRST CHOICE AND FOR LARGER WOODY PLANTS CUT STUMPS AND TREAT WITH TRICLOPYR AND PICLORAM PREPARATION.
14. EXAMPLES OF SOME OTHER WEEDS THAT MIGHT BE FOUND AND SUGGESTED CHEMICALS FOR THEIR TREATMENT ARE:
    - *14.1.* *Allamanda carthatica* (Golden Trumpet) - CUT STUMP AND APPLY TRICLOPYR AND PICLORAM PREPARATION.
    - *14.2.* *Briophyllum pinnatum* (Mother of Millions) - TRICLOPYR AND PICLORAM PREPARATION
    - *14.3.* *Epremnum pinnatum cv*.Aureum (Golden Pothos) -REMOVE MANUALLY AND CUT STUMP WITH GLYPHOSATE
    - *14.4.* *Sanseveria trifasciata* (Mother-in-law's Tongue) - CUT STUMP WITH TRICLOPYR AND PICLORAM PREPARATION
    - *14.5.* *Saritaea magnifica* (Glow Vine) - CUT STUMP WITH TRICLOPYR AND PICLORAM PREPARATION
    - *14.6.* *Sporobolus africanus* (Parramatta Grass) - GLYPHOSATE
    - *14.7.* *Syngonium podophylum* (Arrowhead Vine) - GLYPHOSATE
    - *14.8.* *Calopogonium mucunoides* (Calopo) - GLYPHOSATE
    - *14.9.* *Cyperus aromaticus* (Navua Sedge) - SPRAY WITH SEMPRA
    - *14.10.* *Hyptis capitata* (Knobweed) - GLYPHOSATE
    - *14.11.* *Ipomaea indica* (Blue Morning Glory) - GLYPHOSATE
    - *14.12.* *Leucaena leucocephala ssp.leucocephala* (Leucaena) - REMOVE MANUALLY AND CUT STUMP WITH UNDILUTED GLYPHOSATE PREPARATION
    - *14.13.* *Macroptilium atropurpureum* (Silatro) - GLYPHOSATE
    - 14.14. Mango - CUT STUMP AND PAINT WITH TRICLOPYR AND PICLORAM PREPARATION
    - *14.15.* *Passiflora foetida* (Stinking Passionflower) - GLYPHOSATE
    - *14.16.* *Passiflora suberosa* (Corky Passionflower) - GLYPHOSATE
    - *14.17.* *Solanum seaforthianum* (Brazilian Nightshade) - GLYPHOSATE
    - *14.18.* *Sphagneticola trilobata* (Singapore Daisy) - metsulfuron-methyl
    - *14.19.* *Stachytarpheta* sp. (Snakeweed) - fluroxpyr (in growing season only)

SUBSOIL AND DRAINAGE

1. ENSURE THAT ALL LANDSCAPED AREAS ARE ADEQUATELY DRAINED.
2. RIP SUBSOIL TO A DEPTH OF 150mm. SUBSOIL SHOULD NOT BE COMPACTED OTHERWISE ADEQUATE PLANT GROWTH WILL NOT OCCUR.

TOPSOIL

1. FOR STREET TREES THE QUALITY OF TOPSOIL PILED ON THE SITE SHALL BE CHECKED AND IF ADEQUATE FOR USE WITH THE ADDITION OF SUITABLE ADDITIVES THEN THIS MAY BE USED IN PLACE OF IMPORTED TOPSOIL PROVIDED THAT IT COMPLIES WITH THE RELEVANT AUSTRALIAN STANDARDS. PROVIDE SAMPLES OF A ONE LITRE BAG OF ANY PROPOSED TOPSOIL TO BE USED. ASSUME THAT MOST IMPORTED SOILS WILL CONTAIN NUTGRASS AND TREAT ACCORDINGLY.
2. ALL TOPSOIL SHALL CONFORM TO AS4419(INT) AND SHALL BE A GOOD QUALITY LANDSCAPING SOIL MIX IMPORTED FROM AN APPROVED SOURCE.
3. SOIL FOR NATIVES SHALL BE LOW IN PHOSPHOROUS TO COMPLY WITH PARAGRAPH 5.8 OF AS4419-2003.
4. IT SHALL CONTAIN APPROXIMATELY 70% SANDY LOAM AND 30% COMPOSTED OR MATURE ORGANIC MATTER
5. IT SHALL BE FRIABLE AND NOT CONTAIN ANY CLAY
6. THE PH SHOULD BE BETWEEN 5.5 AND 7.0
7. IT SHALL BE FREE FROM CONTAMINANTS SUCH AS THE SEED OF DECLARED WEEDS, ROCKS AND SALTS
8. IT SHALL NOT CONTAIN ANY CHEMICAL FERTILIZERS.

PLANT SUPPLY

1. PLANTS SHOULD BE ORDERED WELL IN ADVANCE OF THE PROJECTED PLANTING DATE TO ALLOW TIME FOR THEM TO BE AN OPTIMUM SIZE. .
2. DO NOT SUBSTITUTE WITHOUT REFERENCE TO THE SUPERINTENDENT.
3. IF A SPECIMEN PLANT IS AVAILABLE IN A LARGER SIZE THAN SPECIFIED ON THE PLAN, BRING THIS TO THE ATTENTION OF THE SUPERINTENDENT WHO MAY WISH TO ORGANISE USING THE LARGER AVAILABLE SPECIMEN IF IT IS SUITABLE AS A VARIATION TO THE CONTRACT.
4. ALL TREES AND SHRUBS ARE TO BE TRUE TO NAME, WELL-GROWN AND STREET TREES SHOULD BE WELL ESTABLISHED IN THEIR ROOT AND BRANCH FORMATION AND COMPLY WITH THE FNQROC MINIMUM SIZES AND AS2303:2018 TREE STOCK FOR LANDSCAPE USE.
5. STOCK MUST BE FROM SEED FROM AN APPROPRIATE SOURCE.
6. ALL PLANTS SHALL BE DELIVERED TO SITE IN A COVERED VEHICLE AND WATERED IMMEDIATELY FOLLOWING DELIVERY. DO NOT ALLOW PLANTS TO DRY OUT OR OVER-HEAT.
7. ENSURE THAT AT LEAST ONE PLANT FROM EACH SPECIES IN A BATCH IS CLEARLY LABELED.
8. ALL PLANTING MUST BE CARRIED OUT IMMEDIATELY FOLLOWING DELIVERY, REMOVING CONTAINERS, UNLESS FULLY DEGRADABLE, AT THE LATEST POINT BEFORE PLANTING.
9. ALL PLANTS MUST BE FULLY SUN-HARDENED, TRUE TO NAME, WELL-FORMED AND FREE FROM DISEASE.

PLANTING - GENERALLY

1. GENERALLY PLANTS SHOULD BE PLANTED IN ACCORDANCE WITH THE PLAN, HOWEVER WHERE POSITIONS OF SERVICES HAVE BEEN VARIED FROM THOSE SHOWN ON THE PLAN OR CONTOURS AND EARTHWORKS MEAN THAT IT WOULD BE IMPRACTICAL TO LOCATE TREES IN THE POSITIONS INDICATED, REFER TO THE SUPERINTENDENT FOR GUIDANCE.
2. ALL APPROPRIATE WATER PERMITS MUST BE OBTAINED PRIOR TO COMMENCING PLANTING
3. FOR STREET TREES, AS A MINIMUM, EXCAVATE THE PLANTING HOLE TO ALLOW A MINIMUM OF 200mm CLEARANCE AROUND THE ROOT BALL. RIP THE BASE OF THE HOLE TO 150mm DEPTH BELOW THIS AND CULTIVATE SUBGRADE TO PROMOTE GOOD DRAINAGE. REMOVE ALL ROCKS, STONES AND RUBBLE THAT EXCEEDS 75mm DIA.
4. RECOMMENDED FERTILISER IS AGRIFORM (OR SIMILAR SLOW RELEASE) PLANTING PELLET APPLIED AT A RATE OF 1-2 PELLETS PER HOLE DEPENDING UPON PLANT SIZE AND MANUFACTURER'S INSTRUCTIONS.
5. PLACE WATER CRYSTALS AT A RATE OF 250ml EXPANDED CRYSTALS PER PLANTING HOLE.
6. IMMERSE THE PLANT CONTAINER IN WATER PRIOR TO REMOVING THE PLANT FROM THE POT AND WATER THE PLANT HOLE TO PREVENT THE ROOTS COMING INTO CONTACT WITH DRY SOIL. DO NOT DAMAGE THE ROOTS WHEN REMOVING THE PLANT FROM ITS CONTAINER AND GENTLY PLACING IN THE HOLE.
7. PLANTING SHOULD BE CARRIED OUT IN SUCH A WAY THAT THE TOP OF THE SOIL IN THE PLANT CONTAINER FROM THE NURSERY IS AT GROUND LEVEL WHEN PLANTED AND NEITHER TOO DEEP OR TOO SHALLOW.
8. BACKFILL THE HOLE GENTLY FIRMING SUCCESSIVE LAYERS WITHOUT COMPACTING THE SOIL BUT ENSURE THAT THE PLANT IS HELD SECURELY BY THE SOIL.
9. FORM A SMALL INDENTED AREA AROUND THE STEM TO CAPTURE WATER.
10. WATER WITH A MINIMUM 10 LITRES IMMEDIATELY FOLLOWING PLANTING AND PRIOR TO MULCHING

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JOB No: 2601504	DRAWN: SJQ	DRAWING TITLE: SPECIFICATION PART 1	PROJECT: Lot 51 COULTHARD CLOSE NEWELL BEACH	CLIENT: FAR NORTH DEVELOPMENT GROUP P/L NEWELL BEACH DEVELOPMENT
DWG No: L03	DATE: 3 JUNE 2026			
ISSUE: 1	SCALE: N/A			

MULCHING

1. MULCH FOR STREET TREES SHOULD BE FOREST BARK OR SIMILAR (NO FINES) INSTALLED TO A MINIMUM DEPTH OF 75mm. MULCH FOR THE SEEDLINGS CAN BE HAY.
2. MULCH SHOULD BE KEPT CLEAR OF THE PLANT STEM.
3. USE PARTICLE MASKS WHEN SPREADING ORGANIC MULCH TO AVOID BREATHING IN MOULD SPORES.

VERGES

1. REPAIR ANY DAMAGE DONE TO EXISTING VERGES DURING CONSTRUCTION AND REINSTATE TO AN ACCEPTABLE STANDARD.
2. ALL VERGES SHALL BE COVERED FULL WIDTH WITH TOPSOIL TO A DEPTH OF NOT LESS THAN 40mm AND SHALL BE LIGHTLY COMPACTED AND GRASSED IN ACCORDANCE WITH COUNCILS GUIDELINES AND SPECIFICATIONS.
3. IN ORDER TO GUARANTEE A HIGH STANDARD OF MAINTENANCE ALL GRASSED AREAS ARE TO BE IN A MOWABLE CONDITION, FREE FROM ROCKS AND LOOSE STONES AND GRADED TO EVEN-RUNNING CONTOURS.
4. ALL GRASSED AREAS ARE TO BE TURFED.

TURF SPECIES

1. TURF SHOULD BE *AXONOPUS COMPRESSUS* (BROAD LEAF BUFFALO) AND COUCH MIX. IT SHOULD BE FREE FROM ANY TOXIC MATERIAL, NOXIOUS WEEDS, SEEDS OR ROOTS INCLUDING NUT GRASS AND OXALIS. THE SOIL TO THE TURF SHALL BE FREE FROM RUBBISH, STICKS OR OTHER DELETERIOUS MATERIAL, CUT WITH A FULL 25MM REMAINING BELOW THE THATCH OF THE TURF.
2. THE MOISTURE LEVEL IN THE TURF SHOULD BE KEPT RELATIVELY CONSISTENT SO THAT IT IS NOT SATURATED OR SEVERELY DRIED OUT WHEN LAYING.

GROUND PREPARATION

1. CULTIVATE THE AREA TO A DEPTH OF 150MM BELOW FINISHED SURFACE LEVELS AND GRADE TO EVEN-RUNNING CONTOURS.
2. CULTIVATE THE SOIL TO A FINE TILTH, FREE OF CLODS, ROCKS, STICKS AND THE LIKE. ANY STOCK-PILED TOPSOIL SHOULD BE SPREAD TO A MINIMUM DEPTH OF 25MM AND PREPARED AS ABOVE.
3. ANY CONTAMINATED SOIL SHOULD BE EXCAVATED AND REMOVED FROM SITE.
4. BEFORE LAYING TURF A SLOW RELEASE FERTILISER SHALL BE PLACED ON TOP OF THE PREPARED TOPSOIL RATE OF 35G/M2. THIS SHOULD BE AN APPROVED LAWN FERTILISER WITH AN N:P:K RATION OF 12:12:8 AND RAKED INTO THE TOPSOIL.

LAYING

1. SECTIONS TO BE TURFED SHALL BE WATERED WITHIN TWENTY FOUR HOURS PRIOR TO TURFING AT AN APPROXIMATE RATE OF 10MM OF WATER IN NOT LESS THAN ONE HOUR.
2. WATERING IS TO BE CARRIED OUT IN SUCH A WAY AS NOT TO CAUSE ANY SCOURING OR EROSION.

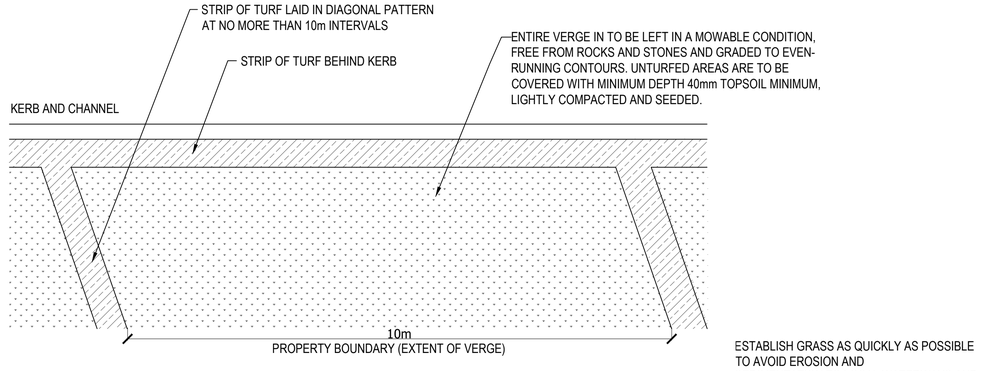
WATERING

1. WATERING IS THE APPLICATION OF 10MM OF WATER TO THE TOTAL AREA IN NOT LESS THAN ONE HOUR AND SHALL INCLUDE ANY NATURAL RAINFALL.
2. ALL PLANTS SHALL BE THOROUGHLY WATERED IMMEDIATELY ON ARRIVAL AT SITE AND AGAIN PRIOR TO PLANTING.
3. WATER DURING AND IMMEDIATELY AFTER PLANTING.
4. ALL LANDSCAPED AREAS ARE TO BE RIGOROUSLY WATERED DURING CONSTRUCTION AND DURING THE MAINTENANCE PERIOD UNTIL THE PLANTS ARE ESTABLISHED.
5. THE FREQUENCY OF WATERING SHALL COMPLY WITH THE FOLLOWING MINIMUM REQUIREMENTS:

PERIODS AFTER GRASSING/PLANTING	WATERING
IMMEDIATELY	ONCE
WEEK 1	TWICE/DAY DURING HOT DRY,WINDY PERIODS
	ONCE/DAY DURING COOL/OVERCAST PERIODS
WEEK 2	ONCE/DAY
WEEKS 3 & 4	ONCE EVERY SECOND DAY
WEEKS 5 UNTIL NECESSARY	TWICE/WEEK OR AS NECESSARY TO ENSURE A MINIMUM STRIKE RATE.

PLANT ESTABLISHMENT AND MAINTENANCE

1. THE STREET TREES DO NOT NEED TO BE PLANTED UNTIL 13 WEEKS BEFORE FINAL INSPECTION AND HANDOVER TO COUNCIL AT WHICH POINT THEY MUST BE ESTABLISHED IN GROWTH AND MEET THE STANDARDS OF FNQROC. A MAINTENANCE AND ESTABLISHMENT PERIOD OF 13 WEEKS IS REQUIRED FOR ON-STREET (TREE-PLANTING) WORKS.
2. THE MAINTENANCE PERIOD SHOULD BE IMPLEMENTED IMMEDIATELY FOLLOWING PLANTING AND IF THIS IS STARTED MORE THAN 13 WEEKS BEFORE THE DATE OF WORKS ACCEPTANCE THEN THE DEVELOPER WILL NEED TO CONTINUE MAINTENANCE UNTIL FINAL HANDOVER.
3. THE REVEGETATION WORKS IN THE AGRICULTURAL BUFFER AND THE VERGE GRASSING NEED TO BE COMPLETED PRIOR TO COUNCIL ENDORSING THE SURVEY PLANS FOR THE LOTS. AT THIS TIME THE REVEGETATION WORKS NEED TO BE ACCEPTED BY COUNCIL AS BEING REASONABLY MATURE.
4. ONCE ENDORSEMENT OF THE REVEGETATION WORKS HAS OCCURRED THEN THE DEVELOPER IS TO MAINTAIN THE BUFFER FOR A PERIOD OF 2 YEARS.
5. DURING THE MAINTENANCE PERIOD, THE CONTRACTOR IS TO ENSURE ALL WORK IS DONE TO ENSURE PLANTS AND GRASS ARE HEALTHY AND GROWING WELL.
6. REMOVE AND REPLACE AS NECESSARY ANY DEAD, DISEASED OR UNHEALTHY GROWTH SO THAT ALL VEGETATION IS THRIVING BY THE TIME THAT THE COUNCIL ACCEPTS RESPONSIBILITY FOR THE LANDSCAPE WORKS.
7. ALL WEEDS SHOULD BE ERADICATED MANUALLY OR WITH THE USE OF AN APPROVED HERBICIDE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS. SPRAYING WILL ONLY TAKE PLACE AT A TIME WHEN THERE WILL BE NO DAMAGE CAUSED TO THE ENVIRONMENT BY APPLYING THE CHEMICAL E.G. NOT IN WINDY CONDITIONS OR WHEN RAIN APPEARS IMMINENT.
8. MOW, MULCH, PRUNE, FERTILISE AND WATER AS REQUIRED.
9. AT THE END OF THE HANDOVER PERIOD, THE CLIENT SHOULD ISSUE AN 'OFF-MAINTENANCE CERTIFICATE'.
10. WITH THE EXCEPTION OF ALMOST DAILY WATERING, MAINTENANCE VISITS SHOULD BE AT APPROXIMATELY 1 WEEKLY INTERVALS.



2 VERGE TREATMENT SUBDIVISIONS
N.T.S.

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DRAWING TITLE: SPECIFICATION PART 2
PROJECT: Lot 51 COULTHARD CLOSE NEWELL BEACH
CLIENT: FAR NORTH DEVELOPMENT GROUP P/L NEWELL BEACH DEVELOPMENT