Clarence... a brighter place

DEVELOPMENT APPLICATION

PDPLANPMTD-2024/041775

PROPOSAL: Dwelling

LOCATION: 31 Kotona Street, Rokeby

RELEVANT PLANNING SCHEME: Tasmanian Planning Scheme - Clarence

ADVERTISING EXPIRY DATE: 21 March 2024

The relevant plans and documents can be inspected at the Council offices, 38 Bligh Street, Rosny Park, during normal office hours until 21 March 2024. In addition to legislative requirements, plans and documents can also be viewed at www.ccc.tas.gov.au during these times.

Any person may make representations about the application to the Chief Executive Officer, by writing to PO Box 96, Rosny Park, 7018 or by electronic mail to clarence@ccc.tas.gov.au. Representations must be received by Council on or before 21 March 2024.

To enable Council to contact you if necessary, would you please also include a day time contact number in any correspondence you may forward.

Any personal information submitted is covered by Council's privacy policy, available at www.ccc.tas.gov.au or at the Council offices.

E-MAILED
Date 24·1 By RCC

Clarence City Council

Clarence... a brighter place

APPLICATION FOR DEVELOPMENT / USE OR SUBDIVISION

*The personal information on this form is required by Council for the development of land under the Land Use Planning and Approvals Act 1993. We will only use your personal information for this and other related purposes. If this information is not provided, we may not be able to deal with this matter. You may access and/or amend your personal information at any time. How we use this information is explained in our **Privacy Policy**, which is available at www.ccc.tas.gov.au or at Council offices.*

Proposal: Construction of a single dwelling

Location:

Personal Information Removed

Current Owners/s:

Applicant:

Tax Invoice for application fees to be in the name of: (if different from applicant)

Estimated cost of development $ 330,000 –

Is the property on the Tasmanian Heritage Register? Yes ☐ No ☑

(if yes, we recommend you discuss your proposal with Heritage Tasmania prior to lodgement as exemptions may apply which may save you time on your proposal)

If you had pre-application discussions with a Council Officer, please give their name

Current Use of Site: Vacant Land

Does the proposal involve land administered or owned by the Crown or Council? Yes ☐ No ☑

Declaration:

- *I have read the Certificate of Title and Schedule of Easements for the land and am satisfied that this application is not prevented by any restrictions, easements or covenants.*
- *I authorise the provision of a copy of any documents relating to this application to any person for the purposes of assessment or public consultation. I agree to arrange for the permission of the copyright owner of any part of this application to be obtained. I have arranged permission for Council's representatives to enter the land to assess this application*
- *I declare that, in accordance with Section 52 of the Land Use Planning and Approvals Act 1993, that I have notified the owner of the intention to make this application. Where the subject property is owned or controlled by Council or the Crown, their signed consent is attached. Where the application is submitted under Section 43A, the owner's consent is attached.*
- *I declare that the information in this declaration is true and correct.*

Acknowledgement:

- *I acknowledge that the documentation submitted in support of my application will become a public record held by Council and may be reproduced by Council in both electronic and hard copy format in order to facilitate the assessment process; for display purposes during public consultation; and to fulfil its statutory obligations. I further acknowledge that following determination of my application, Council will store documentation relating to my application in electronic format only.*

Applicant's Signature:

Signature ..... *Date* 24-1-2024

PLEASE REFER TO THE DEVELOPMENT/USE AND SUBDIVISION CHECKLIST ON THE FOLLOWING PAGES TO DETERMINE WHAT DOCUMENTATION MUST BE SUBMITTED WITH YOUR APPLICATION.

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
184319	59
EDITION	DATE OF ISSUE
2	31-Jul-2023

SEARCH DATE : 24-Jan-2024
SEARCH TIME : 02.22 PM

DESCRIPTION OF LAND

City of CLARENCE
Lot 59 on Sealed Plan 184319
Derivation : Part of Lot 37617 (56.81ha) Gtd. to The Director-General of Housing & Construction
Prior CT 142549/1

SCHEDULE 1

N131999 TRANSFER to CONSTRUCT CREATIVE PTY LTD Registered 31-Jul-2023 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
SP184319 EASEMENTS in Schedule of Easements
SP184319 COVENANTS in Schedule of Easements
SP184319 FENCING PROVISION in Schedule of Easements
SP142549 COVENANTS in Schedule of Easements
SP142549 FENCING COVENANT in Schedule of Easements
SP142549 WATER SUPPLY RESTRICTION
SP142549 SEWERAGE AND/OR DRAINAGE RESTRICTION

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

OWNER DAESUNG TAS PTY LTD

FOLIO REFERENCE C.T.142549–1 & C.T.156980–1

GRANTEE PART OF LOT 37617 (56.81ha) GTD TO THE DIRECTOR–GENERAL OF HOUSING & CONSTRUCTION, PART OF 410 ACRES GTD TO ROBERT WHITE & JOHN ROBERTSON

PLAN OF SURVEY

BY SURVEYOR TIMOTHY LEIGH GOWLLAND
ROGERSON AND BIRCH SURVEYORS
UNIT 1 – 2 KENNEDY DRIVE, CAMBRIDGE PARK
PH 6248–5898

CITY OF CLARENCE

SCALE 1:2500 LENGTHS IN METRES

REGISTERED NUMBER

SP184319

~~APPROVED~~
EFFECTIVE FROM 6 APR 2023

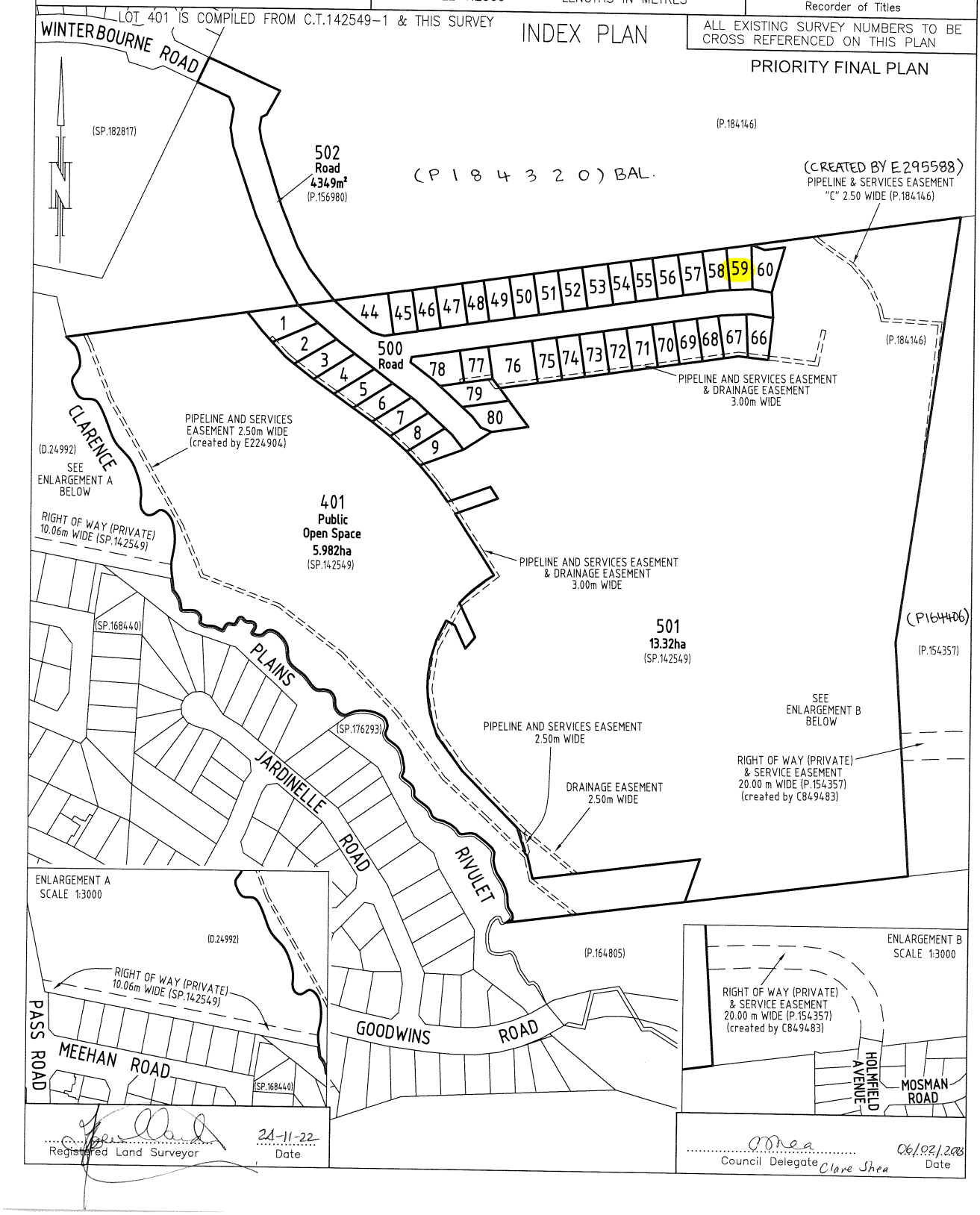
Recorder of Titles

LOT 401 IS COMPILED FROM C.T.142549–1 & THIS SURVEY

INDEX PLAN

ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN

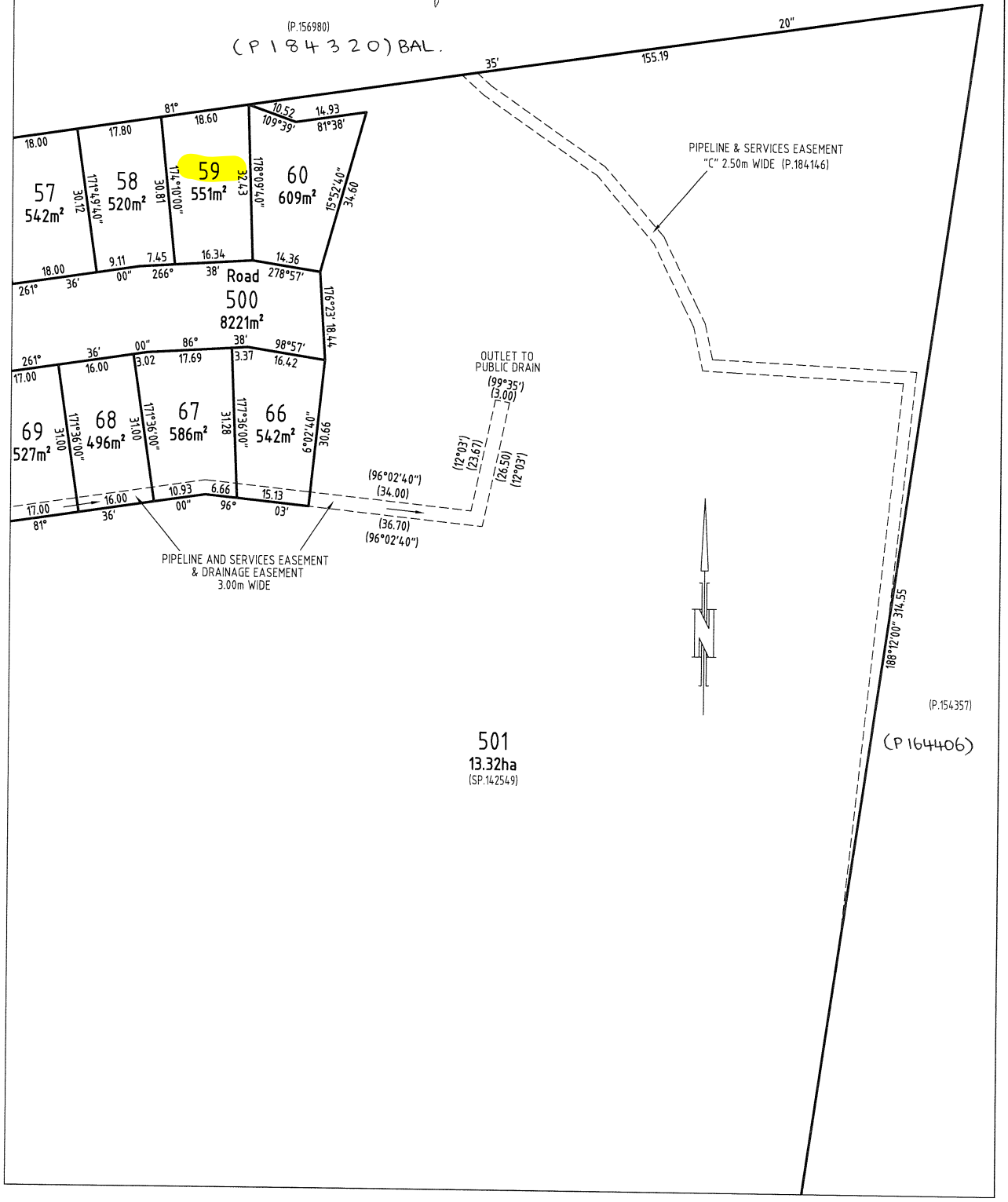
PRIORITY FINAL PLAN



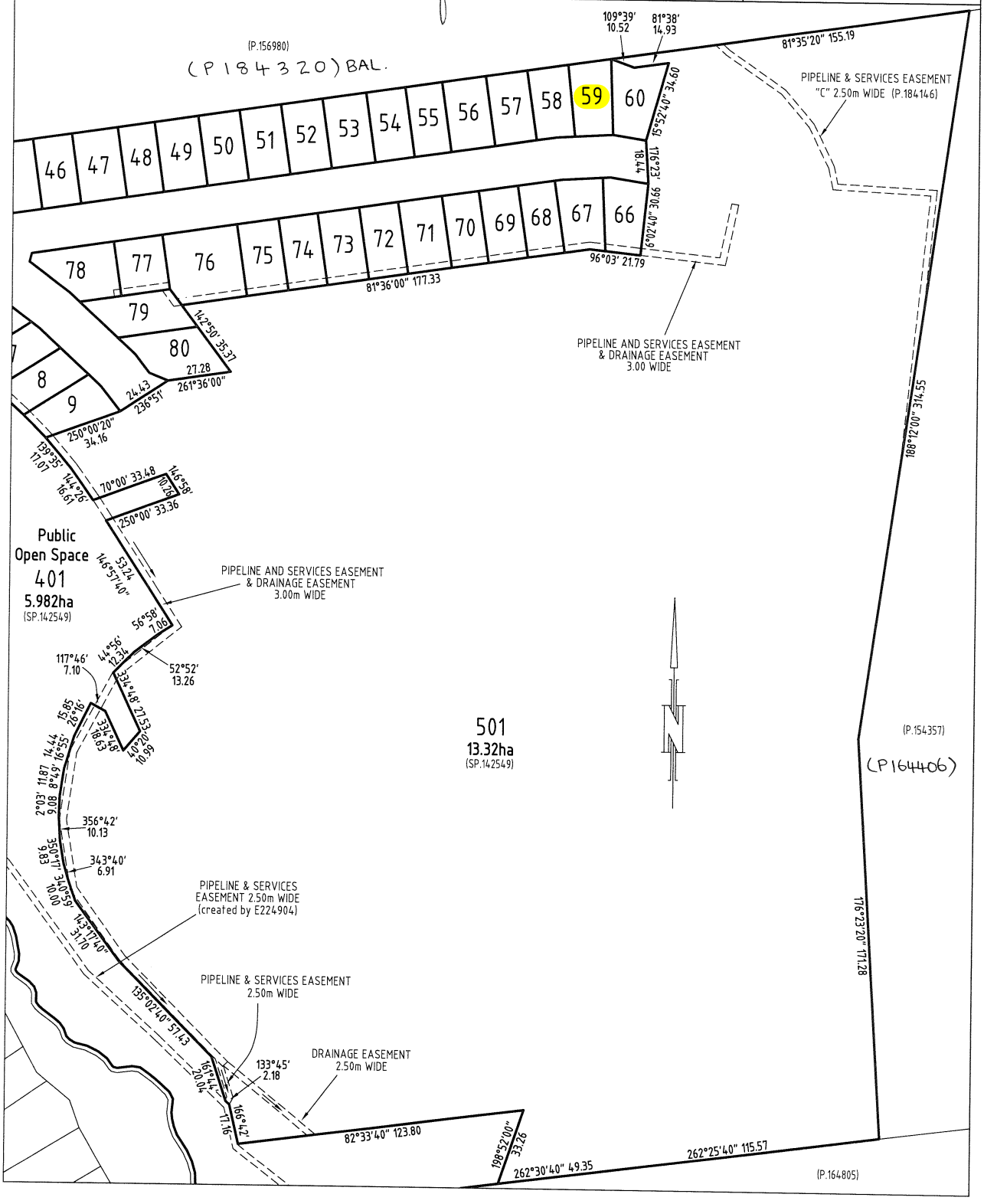
Registered Land Surveyor — 24-11-22 Date

Council Delegate Clare Shea — 06/02/2023 Date

PLAN OF SURVEY ANNEXURE SHEET SHEET 3 OF 6 SHEETS	OWNER: DAESUNG TAS PTY LTD FOLIO REFERENCE: C.T.142549–1 & C.T.156980–1 SCALE 1: 750 LENGTH IN METRES	Registered Number SP 184319
SIGNED FOR IDENTIFICATION PURPOSES Council Delegate 06/02/2023 Date	THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED INDEX PLAN. Registered Land Surveyor 24-11-22 Date	~~APPROVED~~ EFFECTIVE FROM 6 APR 2023 Recorder of Titles



PLAN OF SURVEY ANNEXURE SHEET SHEET 4 OF 6 SHEETS	OWNER: DAESUNG TAS PTY LTD FOLIO REFERENCE: C.T.142549–1 & C.T.156980–1 SCALE 1:1500 LENGTH IN METRES	Registered Number SP 184319
SIGNED FOR IDENTIFICATION PURPOSES Council Delegate ..... Date 06/02/2023	THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED INDEX PLAN. Registered Land Surveyor ..... Date 24-11-22	~~APPROVED~~ EFFECTIVE FROM 6 APR 2023 Recorder of Titles



PLAN OF SURVEY ANNEXURE SHEET SHEET 5 OF 6 SHEETS	OWNER: DAESUNG TAS PTY LTD FOLIO REFERENCE: C.T.142549–1 & C.T.156980–1 SCALE 1:1500 LENGTH IN METRES	Registered Number SP 184319
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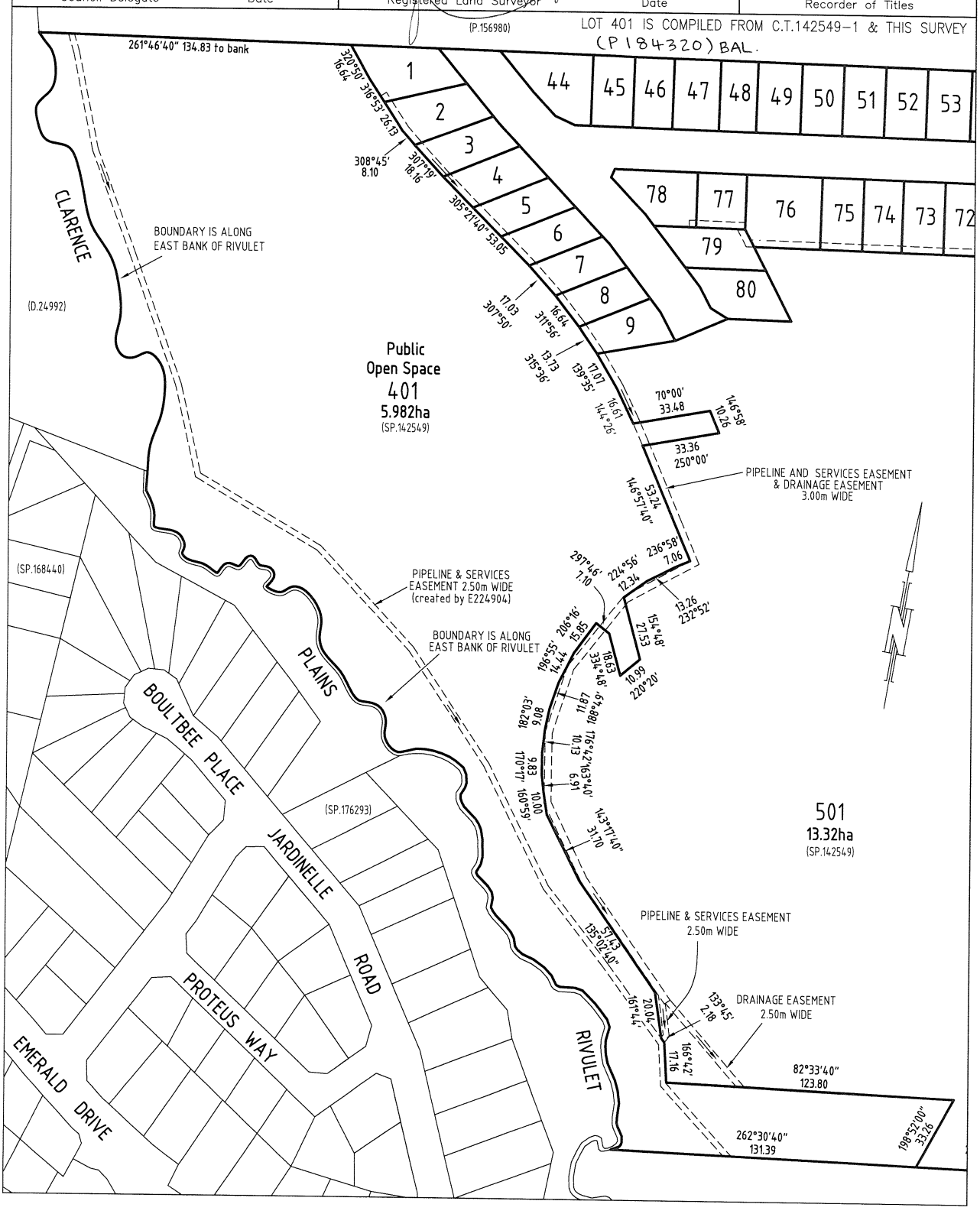


PLAN OF SURVEY
ANNEXURE SHEET

SHEET 6 OF 6 SHEETS

OWNER: DAESUNG TAS PTY LTD

FOLIO REFERENCE: C.T.142549/1 & C.T.156980/1

SCALE 1: 750 LENGTH IN METRES

Registered Number

SP 184319

SIGNED FOR IDENTIFICATION PURPOSES

Council Delegate 06/02/2023 Date

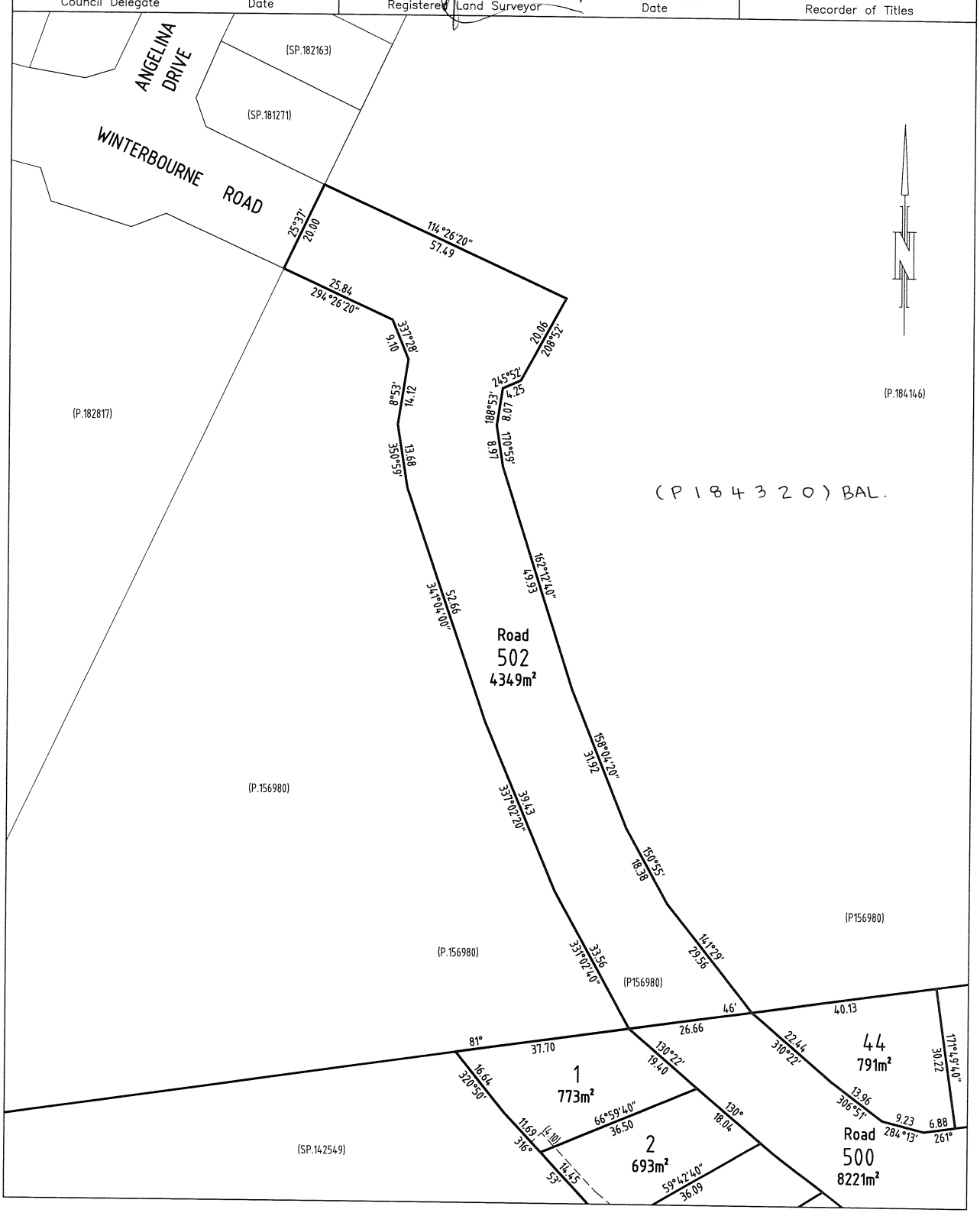
THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED INDEX PLAN.

Registered Land Surveyor 24-11-22 Date

~~APPROVED~~

EFFECTIVE FROM 6 APR 2023

Recorder of Titles



SCHEDULE OF EASEMENTS	Registered Number
NOTE: THE SCHEDULE MUST BE SIGNED BY THE OWNERS & MORTGAGEES OF THE LAND AFFECTED. SIGNATURES MUST BE ATTESTED.	SP 184319

EASEMENTS AND PROFITS

Each lot on the plan is together with:
(1) such rights of drainage over the drainage easements shown on the plan (if any) as may be necessary to drain the stormwater and other surplus water from such lot; and
(2) any easements or profits a prendre described hereunder.
Each lot on the plan is subject to:
(1) such rights of drainage over the drainage easements shown on the plan (if any) as passing through such lot as may be necessary to drain the stormwater and other surplus water from any other lot on the plan; and
(2) any easements or profits a prendre described hereunder.
The direction of the flow of water through the drainage easements shown on the plan is indicated by arrows.

EASEMENTS

Lots 1 to 9 (inclusive), 66 to 79 (inclusive), 401 and 501 ("the Lots") are subject to a PIPELINE AND SERVICES EASEMENT (as defined herein) in gross in favour of TasWater over the land marked **PIPELINE AND SERVICES EASEMENT & DRAINAGE EASEMENT 3.00m WIDE** shown on the Plan ("the Easement Land").

Lots 1 to 9 (inclusive), 66 to 79 (inclusive), 401 and 501 on the Plan are subject to a Drainage Easement (as defined) in gross in favour of the Clarence City Council over the land marked **PIPELINE AND SERVICES EASEMENT & DRAINAGE EASEMENT 3.00m WIDE** on the Plan.

Lot 501 ("the Lot") is subject to a PIPELINE AND SERVICES EASEMENT (as defined herein) in gross in favour of TasWater over the land marked **PIPELINE AND SERVICES EASEMENT 2.50m WIDE** shown on the Plan ("the Easement Land").

Lot 501 on the Plan is subject to a Drainage Easement (as defined) in gross in favour of the Clarence City Council over the land marked **DRAINAGE EASEMENT 2.50m WIDE** on the Plan.

Attorney

(USE ANNEXURE PAGES FOR CONTINUATION)

SUBDIVIDER: DAESUNGTAS PTY LTD FOLIO REF: 142549/1 & 156980/1 SOLICITOR & REFERENCE: Page Seager (DAS 221111)	PLAN SEALED BY: Clarence City Council DATE: 6th February 2023 ..... REF NO. SD-2016/31
NOTE: The Council Delegate must sign the Certificate for the purposes of identification.	

Clare Shea Council Delegate

ANNEXURE TO SCHEDULE OF EASEMENTS PAGE 2 OF 6 PAGES	Registered Number SP 184319
SUBDIVIDER: DAESUNGTAS PTY LTD FOLIO REFERENCE: 142549/1 & 156980/1	

Lot 501 ("the Lot") is subject to a PIPELINE AND SERVICES EASEMENT in gross in favour of TasWater created by and described in E295588 over the land marked **PIPELINE AND SERVICES EASEMENT "C" 2.50m WIDE (P.184146)** shown on the Plan ("the Easement Land").

Lot 401 on the Plan is subject to ~~the easement~~ a Pipeline and Services Easement in favour of Tasmanian Water and Sewerage Corporation Pty Ltd created by and fully described in E224904 over the land marked **PIPELINE AND SERVICES EASEMENT 2.50m WIDE (created by E224904)** on the Plan.

Each lot on the Plan, excepting Lot 502, is together with a right of way created by and fully described in the Schedule of Easements to SP 142549 over the land marked **RIGHT OF WAY (PRIVATE) 10.06m WIDE (SP.142549)** on the Plan.

Each lot on the Plan, excepting Lot 502, is together with a right of carriageway and service easement created by and fully described in C849483 over the land marked **RIGHT OF WAY (PRIVATE) & SERVICE EASEMENT 20.00m WIDE (P.154357) (created by C849483)** on the Plan.

COVENANTS

The owner of each Lot on the Plan, excepting Lot 502, covenants with the Vendor (Daesungtas Pty Ltd) and the Owner or Owners for the time being of every other Lot shown on the Plan to the intent that the burden of these covenants may run with and bind the covenantor's Lot and every part thereof and that the benefit thereof shall be annexed to and devolve with each and every part of every other Lot shown on the plan to observe the following stipulations:

1. Not to subdivide that Lot at any time without the prior consent in writing of the Corporation.
2. Not to erect on that Lot more than a single residence, which may include an ancillary apartment together with usual outbuildings as may be permitted by the Corporation, without the consent of the Corporation.
3. Not to use the land for any purpose except as a residence or the for the purpose of house occupation without the prior consent of the Corporation in writing.

Attorney

NOTE: Every annexed page must be signed by the parties to the dealing or where the party is a corporate body be signed by the persons who have attested the affixing of the seal of that body to the dealing.

ANNEXURE TO SCHEDULE OF EASEMENTS PAGE 3 OF 6 PAGES	Registered Number SP 184319
SUBDIVIDER: DAESUNGTAS PTY LTD FOLIO REFERENCE: 142549/1 & 156980/1	

4. Not to use any engine or machinery in any trade of business, nor erect or use or permit to be used on any part of any lot shown on the Plan nor to conduct or permit to be conducted any trade or business on or from any part of the same, including but not limited to mining, quarrying, or market gardening. The leasing of the property for private residential purposes is not deemed to be a breach of this covenant.
5. Not to keep any animals other than domestic pets on any lot shown on the Plan and not to make any application for a kennel licence in respect of any lot shown on the Plan nor to keep or establish or permit to be kept or established any licensed kennel upon any lot or any part of any lot shown on the Plan nor to keep at one time more than two adult canines on any lot shown on the Plan.
6. The Vendor may, at the Vendor's absolute discretion, waive the burden of any covenant contained in this Schedule of Easements in favour of any lot by notice in writing to the registered proprietor of that lot.

FENCING PROVISION

In respect of the Lots shown on the Plan, the Vendor (Daesungtas Pty Ltd) shall not be required to fence.

DEFINITIONS

"**Corporation**" means the Warden Councillors and Electors of the City of Clarence.

"**Drainage Easement**" means a right of drainage (including the right of construction of drains) for Clarence City Council with which the right shall be capable of enjoyment for the purpose of carrying away stormwater and other surplus water from any land over or under the land herein indicated as the land over which the right is to subsist, and through all sewers and drains which may hereafter be made or passing under, through, and along the last-mentioned land and the right for Clarence City Council and its employees, agents and contractors from time to time and at all times hereafter if it or they should think fit to enter into and upon the last-mentioned land and to inspect, repair, cleanse, and amend any such sewer or drain without doing unnecessary damage to the said land.

Attorney

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ANNEXURE TO SCHEDULE OF EASEMENTS PAGE 4 OF 6 PAGES	Registered Number SP 184319
SUBDIVIDER: DAESUNGTAS PTY LTD FOLIO REFERENCE: 142549/1 & 156980/1	

"**Pipeline and Services Easement**" is defined as follows:-

FIRSTLY, THE FULL AND FREE RIGHT AND LIBERTY for TasWater and its employees, contractors, agents and all other persons duly authorised by it, at all times to:

(1) enter and remain upon the Easement Land with or without machinery, vehicles, plant and equipment;

(2) investigate, take soil, rock and other samples, survey, open and break up and excavate the Easement Land for any purpose or activity that TasWater is authorised to do or undertake;

(3) install, retain, operate, modify, relocate, maintain, inspect, cleanse, repair, remove and replace the Infrastructure;

(4) run and pass sewage, water and electricity through and along the Infrastructure;

(5) do all works reasonably required in connection with such activities or as may be authorised or required by any law:

(a) without doing unnecessary damage to the Easement Land; and

(b) leaving the Easement Land in a clean and tidy condition;

(6) if the Easement Land is not directly accessible from a highway, then for the purpose of undertaking any of the preceding activities TasWater may with or without employees, contractors, agents and any other persons authorised by it, and with or without machinery, vehicles, plant and equipment enter the Lot from the highway at any vehicle entry and cross the Lot to the Easement Land; and

(7) use the Easement Land as a right of carriageway for the purpose of undertaking any of the preceding purposes on other land, TasWater reinstating any damage that it causes in doing so to any boundary fence of the Lot.

SECONDLY, the benefit of a covenant in gross for TasWater with the registered proprietor/s of the Easement Land and their successors and assigns not to erect any building, or place any structures, objects, vegetation, or remove any thing that supports, protects or covers any Infrastructure on or in the Easement Land, without the prior written consent of TasWater to the intent that the burden of the covenant may run

Attorney

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ANNEXURE TO SCHEDULE OF EASEMENTS PAGE 5 OF 6 PAGES	Registered Number SP 184319
SUBDIVIDER: DAESUNGTAS PTY LTD FOLIO REFERENCE: 142549/1 & 156980/1	

with and bind the servient land and every part thereof and that the benefit thereof may be annexed to the easement herein described.

Interpretation:

"**Infrastructure**" means infrastructure owned or for which TasWater is responsible and includes but is not limited to:

(a) sewer pipes and water pipes and associated valves;

(b) telemetry and monitoring devices;

(c) inspection and access pits;

(d) electricity assets and other conducting media (excluding telemetry and monitoring devices);

(e) markers or signs indicating the location of the Easement Land or any other Infrastructure or any warnings or restrictions with respect to the Easement Land or any other Infrastructure;

(f) anything reasonably required to support, protect or cover any other Infrastructure;

(g) any other infrastructure whether of a similar nature or not to the preceding which is reasonably required for the piping of sewage or water, or the running of electricity, through the Easement Land or monitoring or managing that activity; and

(h) where the context permits, any part of the Infrastructure.

"**TasWater**" means Tasmanian Water & Sewerage Corporation Pty Ltd (ACN 162 220 653), its successors and assigns.

Attorney

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ANNEXURE TO SCHEDULE OF EASEMENTS PAGE 6 OF 6 PAGES	Registered Number SP 184319
SUBDIVIDER: DAESUNGTAS PTY LTD FOLIO REFERENCE: 142549/1 & 156980/1	

EXECUTED by **DAESUNGTAS PTY LTD (ACN 607 472 131)** as registered proprietor of the land comprised in Folio of the Register Volume 142549 Folio 1 and Folio of the Register Volume 156980 Folio 1 by their attorney David Alexander Shelley under Power of Attorney dated 11 February 2022 / No PA136148 who hereby declares that no notice of alteration or revocation of the said Power of Attorney has been received in the presence of:

.....
Attorney Signature

.....
Witness Signature

.....
Witness Full Name (print)

.....
Witness address and occupation

.....
Attorney

NOTE: Every annexed page must be signed by the parties to the dealing or where the party is a corporate body be signed by the persons who have attested the affixing of the seal of that body to the dealing.

CREATIVE HOMES HOBART

CREATIVE HOMES HOBART, CNR OF ELWICK ROAD & BROOKER HIGHWAY, GLENORCHY 7010 PH: 03 6272 3000

PROJECT ADDRESS: LOT 59 KOTONA STREET, ROKEBY

TITLE REFERENCE: VOLUME: FOLIO:

CLIENTS: CONSTRUCT CREATIVE PTY LTD

DESIGNER: Inge Brown, CC 6652

DRAWINGS:

01 COVER PAGE
02 PROPOSED SITE PLAN
03 PROPOSED FLOOR PLAN
04 PROPOSED ROOF PLAN
05 PROPOSED ELEVATIONS
06 PROPOSED ELEVATIONS
07 SECTION A-A
08 TYPICAL SECTION DETAILS
09 WINDOW SCHEDULE

FLOOR AREAS:

FLOOR AREA:	124.1 m²
PORCH:	0.9 m²
GARAGE:	25.5 m²
DECK:	21.0 m²
TOTAL AREA:	171.6 m²

SOIL CLASSIFICATION: --

WIND CLASSIFICATION: --

CLIMATE ZONE: 7

BUSHFIRE ATTACK LEVEL: TBC

ALPINE AREA: N/A

CORROSION ENVIRONMENT: N/A

DOCUMENTATION INDEX

The documentation listed below should be read in conjunction with these drawings and form the basis of construction documentation for the project

Document	*Revision*	*By*
Working drawings planning issue (these drawings)	SK1	Creative Homes Hobart
Survey plan SP22437-01	A	Survey Plus
Soil assessment		Doyle Soil Consulting

FFL increased by 350mm as per Flood Report . Current FFL 50.8

GLAZING - ALL EXTERNAL WILL BE LOW REFLECTIVE TO COUNCIL COMPLIANCE AS TO MINIMISE BIRDSTRIKE

GENERAL NOTES:

1. THIS PLAN HAS BEEN PREPARED BY SURVEY PLUS FROM A COMBINATION OF EXISTING RECORDS AND FIELD SURVEY FOR THE PURPOSES OF SHOWING THE PHYSICAL FEATURES OF THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

2. TITLE BOUNDARIES SHOWN WERE NOT VERIFIED OR MARKED AT THE TIME OF THIS SURVEY.

3. SERVICES SHOWN ON THIS PLAN WERE LOCATED WHERE POSSIBLE BY FIELD SURVEY. THEY ARE NOT A COMPLETE PICTURE OF SERVICES ON SITE. ALL SERVICE LOCATIONS ARE TO BE VERIFIED BEFORE COMMENCEMENT OF ANY WORK ON SITE, IN PARTICULAR THOSE SERVICES NOT PREVIOUSLY LOCATED THROUGH FIELD SURVEY.

4. SURVEY PLUS CAN NOT ACCEPT LIABILITY WHATSOEVER FOR LOSS OR DAMAGE CAUSED TO ANY UNDERGROUND SERVICE WHETHER SHOWN BY OUR SURVEY OR NOT.

5. THIS NOTE IS AN INTEGRAL PART OF THIS PLAN/DATA. REPRODUCTION OF THIS PLAN OR ANY PART OF IT WITHOUT THIS NOTE BEING INCLUDED IN FULL WILL RENDER THE INFORMATION SHOWN ON SUCH A REPRODUCTION INVALID AND NOT SUITABLE FOR USE WITHOUT PRIOR AUTHORITY OF SURVEY PLUS.

6. HORIZONTAL DATUM IS MGA (GDA94).

7. VERTICAL DATUM IS AHD.

8. CONTOUR INTERVAL IS 0.2 METRES, INDEX IS 1.0 METRES.

9. SURVEY BY ROBOTIC TOTAL STATION AND GPS.

11. BOUNDARIES ARE COMPILED ONLY FROM PRELIMINARY SURVEY PLAN BY ROGERSON AND BIRCH SURVEYORS AND ARE APPROXIMATE AND SUBJECT TO FINAL SURVEY.

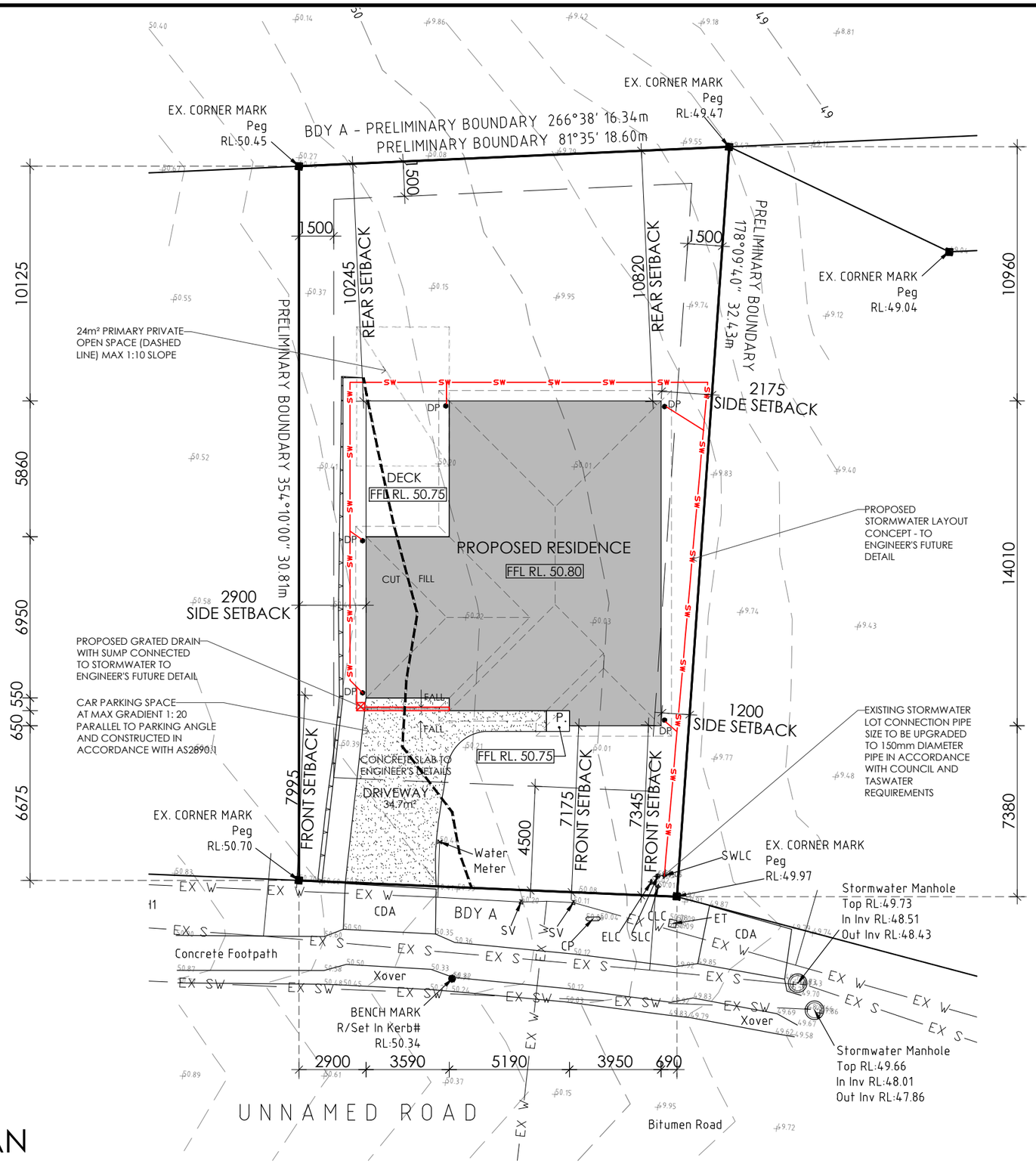
11. 3D DATA TURNED OFF IN LAYER CONTROL.
- 3D TIN
- MAJOR CONTOUR 3D
- MINOR CONTOUR 3D

GPS DATA SCALE LOCATION
JOB CONTROL POINT
POINT NO: 1
DESCRIPTION: R/S IN KERB#
GPS SCALE FACTOR = 1.000392427
E: 535651.199
N: 5252203.714
RL: 50.3447
EPU = 0.04±

•DP 90mm DOWNPIPE

NOTE: ALL PROPOSED STORMWATER TO BE DISCHARGED TO EXISTING INFRASTRUCTURE

EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE IMPLEMENTED ON THE SITE IN ACCORDANCE WITH COUNCIL REQUIREMENTS



PROPOSED SITE PLAN

LEGEND

CP = Comms Pit
ET = Elec. Turret
SV = Stop Valve
CLC = Comms Lot Connection
ELC = Elec. Lot Connection
CDA = Concrete Driveway Apron

SWLC = Stormwater Lot Connection
Top RL:50.05
Inv. RL:49.01

SLC = Sewer Lot Connection
Top RL:50.05
Inv. RL:49.13

MH1 = Sewer Manhole
Top RL:51.05
In Inv RL:47.99
Out Inv RL:47.96

NOTES

SITE PREPARATION
THE SITE IS TO BE DISTURBED AS MINIMALLY AS POSSIBLE TO THE EXTENT REQUIRED TO CARRY OUT THE BUILDING WORKS.
EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH NCC PART 3.2.
UN-RETAINED EMBANKMENT GRADIENTS SHALL BE IN ACCORDANCE WITH NCC TABLE 3.2.1.
DRAINAGE SHALL BE IN ACCORDANCE WITH NCC PART 3.3.2.
THE BUILDER AND SUBCONTRACTOR SHALL ENSURE THAT ALL STORMWATER DRAINS, SEWER PIPES AND THE LIKE ARE LOCATED AT A SUFFICIENT DISTANCE FROM ANY BUILDINGS FOOTING AND/OR SLAB EDGE BEAMS SO AS TO PREVENT GENERAL MOISTURE PENETRATION, DAMPNESS, WEAKENING & UNDERMINING OF ANY BUILDING AND IT'S FOOTING SYSTEM.
LOCATION OF ALL EXISTING SERVICES TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
ATTENTION OF OWNER
THE OWNERS ATTENTION IS DRAWN TO THE FACT THAT FOUNDATIONS AND ASSOCIATED DRAINAGE FOR ALL SITES REQUIRES CONTINUING MAINTENANCE TO ASSIST FOOTING PERFORMANCE. ADVICE FOR FOUNDATION MAINTENANCE IS CONTAINED IN THE CSIRO BUILDING TECHNOLOGY FILE 18 AND IT IS THE OWNERS RESPONSIBILITY TO MAINTAIN THE SITE IN ACCORDANCE WITH THIS DOCUMENT.
SOIL AND WATER MANAGEMENT NOTES:
DRAINAGE LINES ARE TO BE INSTALLED PRIOR TO THE PLACEMENT OF ROOF AND GUTTERING. ONCE DWELLING IS ROOFED, CONNECT IMMEDIATELY.
APPLY TEMPORARY COVERING TO DISTURBED AREAS THAT WILL REMAIN EXPOSED FOR 14 DAYS OR MORE DURING CONSTRUCTION (EG. WATERPROOF BLANKET, VEGETATION OR MULCH)

PROTECT ANY NEARBY OR ON-SITE DRAINAGE PITS FROM SEDIMENT BY INSTALLING SEDIMENT TRAPS AROUND THEM.
LIMIT ENTRY/EXIT TO ONE POINT AND STABILISE.
INSTALL FACILITIES TO REMOVE DIRT/ MUD FROM VEHICLE WHEELS BEFORE THEY LEAVE THE SITE.

SITE TO BE VEGETATED AND PLANTED ACCORDING TO THE HOBART REGIONAL SOIL AND WATER MANAGEMENT CODE OF PRACTICE.

BUILDER AND SUBCONTRACTORS TO VERIFY ALL DIMENSIONS AND LEVELS PRIOR TO THE COMMENCEMENT OF ANY WORK. GIVE 24 HOURS MINIMUM NOTICE WHERE AMENDMENTS ARE REQUIRED TO DRAWINGS. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH DOCUMENTATION LISTED ON THE COVER PAGE. DO NOT SCALE DRAWINGS.
DIMENSIONS ARE TO TAKE PREFERENCE OVER SCALE.
BUILDING SPECIFICATION AND ENGINEERS DRAWINGS SHALL OVERRIDE ARCHITECTURAL DRAWINGS.

-THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWING SHEETS, CONSULTANTS DRAWINGS, DOCUMENTS, SCHEDULES AND SPECIFICATIONS (AS APPLICABLE).
-THE BUILDER AND SUBCONTRACTOR SHALL ENSURE THAT ALL STORMWATER DRAINS, SEWER PIPES AND THE LIKE ARE LOCATED AT A SUFFICIENT DISTANCE FROM ANY BUILDINGS FOOTING AND/OR SLAB EDGE BEAMS SO AS TO PREVENT GENERAL MOISTURE PENETRATION, DAMPNESS, WEAKENING & UNDERMINING OF ANY BUILDING AND ITS FOOTING SYSTEM.
- LOCATION OF ALL EXISTING ONSITE SERVICES TO BE CONFIRMED ONSITE PRIOR TO CONSTRUCTION

IMPORTANT!
SITE INFORMATION AS DRAWN IS APPROXIMATE ONLY. FINAL SITE INFORMATION IS SUBJECT TO A DETAILED CONTOUR SURVEY BY LICENSED SURVEYOR.

SOIL CLASSIFICATION:	--
WIND CLASSIFICATION:	--

SITE COVERAGE		
SITE AREA	550.94	m²
PROPOSED BUILDING FOOTPRINT	171.6	m²
PROPOSED SITE COVERAGE	31.14	%

02

PROJECT NORTH

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND LEVELS AT THE JOB PRIOR TO COMMENCING ANY WORK OR MAKING ANY SHOP DRAWINGS.
DO NOT SCALE DRAWINGS.
ALWAYS USE WRITTEN DIMENSIONS.

REV:	DESCRIPTION:	BY:	DATE:
SK	ISSUED FOR CLIENT REVIEW	QT	01/11/23
SK1	CHANGE THE ROOF, BED & GARAGE; ADD A LINEN	QT	28/11/23

CREATIVE HOMES HOBART
CREATIVE HOMES HOBART, CNR OF ELWICK ROAD & BROOKER HIGHWAY, GLENORCHY 7010 PH: 03 6272 3000

JOB ADDRESS: Lot 59 Kotona Street Rokeby		CLIENT: Construct Creative Pty Ltd	
DESIGNER: I. Brown	ACCRED. NO.: CC6652	SHEET:	2 of 9
DRAWN: Q. Tra	DATE: Nov 2023	DESIGN TYPE:	Custom
CHECKED:	DATE:	DRAWING NO:	---
SCALE: 1:200	REV: SK1		

AREAS:	
FLOOR AREA:	124.1 m²
PORCH:	0.9 m²
GARAGE:	25.5 m²
DECK:	21.0 m²
TOTAL AREA:	171.6 m²

LEGEND:

DP	DOWNPIPE LOCATION
SHR	SHOWER
BTH	BATH
VB	VANITY BASIN
WC	TOILET
OHC	OVERHEAD CUPBOARDS
REF	REFRIGERATOR
P	PANTRY
RH	RANGE HOOD
UBO	UNDER BENCH OVEN
CT	COOK TOP
S	SINK
DW	DISH WASHER
T	TROUGH
WM	WASHING MACHINE
MH	MANHOLE
CSD	CAVITY SLIDING DOOR
AAW	ALUM. AWNING WINDOW
ASD	ALUM. SLIDING DOOR
B/O	BEAM OVER
BAL	BALUSTRADE

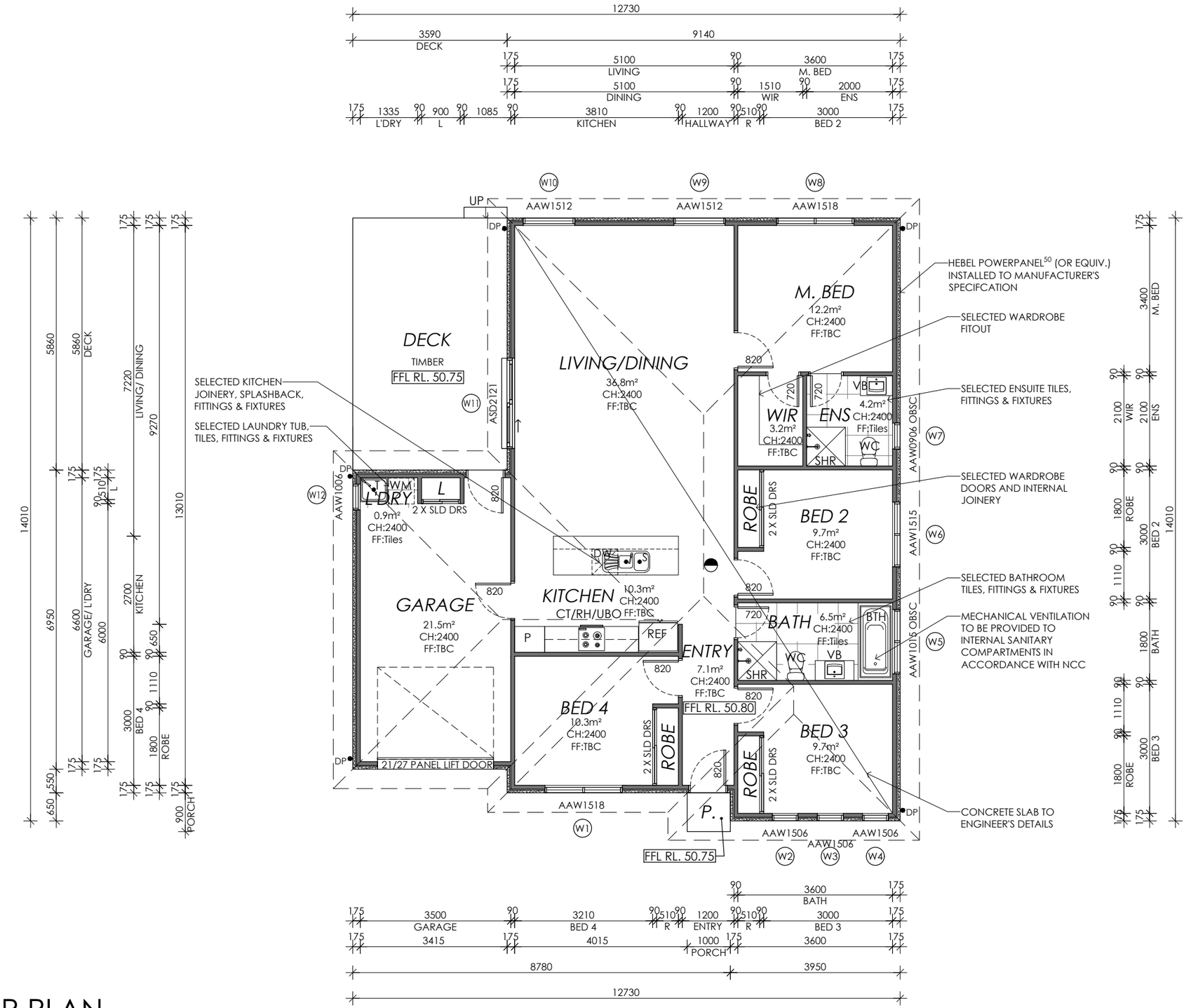
BAL SELECTED BALUSTRADE TO BUILDER'S STANDARD DETAIL INSTALLED IN ACCORDANCE WITH NCC

MASONRY ARTICULATION JOINT - LOCATION TO ENGINEER'S DETAILS

CEILING MOUNTED INTERCONNECTED SMOKE DETECTORS, MAINS WIRED WITH BATTERY BACKUP, ALL IN ACCORDANCE WITH AS 3786.

DP 90mm DOWNPIPE

NOTE: LIFT OFF HINGES TO WC TO BE INSTALLED AS REQUIRED IN ACCORDANCE WITH NCC.



PROPOSED FLOOR PLAN

FLOOR AREA: 171.6m²

Framing part 3.4 NCC
All timber framing, fixing and bracing shall comply with AS 1684 and the requirements of NCC part 3.4.3 manufactured sizes must not be undersized to those specified, for all timber sizes, stress grades, spacing and wall bracing refer to Engineer's details. Tie-down details shall comply with the requirements of tables 3.4.3.8 and 3.4.3.9. Structural steel members shall comply with the requirements of clauses in part 3.4.4. Refer to Engineer's details where provided.

Glazing part 3.6 NCC All windows to be aluminium awning style, double glazed (obscured safety glass to bathrooms as shown on drawings) all glazing shall comply with the requirements of AS 2047-AS 1288 and NCC clauses in part 3.6.

Human impact safety requirements shall comply with NCC clauses 3.6.4 pane within 500mm from finished floor level & glazed full height

Note:
Builder and subcontractors to verify all dimension and levels prior to the commencement of any work. Give 24hrs minimum notice where amendments are required to design of working drawings. These drawings are to be read in conjunction with Engineer's and Surveyor's drawings and notes. Do not scale drawings. Dimensions are to take preference over scale. Building specification and Engineer's drawings shall override architectural drawings. All construction work shall be carried out in accordance with the state building regulations, local council by-laws and relevant NCC and AS codes.

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External walls are to be clad with perforated reflective foil over the outside of the timber frame. Ceiling to be insulated with R4.0 and reflective foil. Floor to be insulated with R2.0 batts. Seal exhaust fans to Ensuite, Bathroom, Laundry and Kitchen. Building to be sealed in accordance with NCC part 3.12.3
Construction of the external walls, floor and roof compliance of air leakage to comply with NCC part 3.12.3.5

General:
All flashings to be in accordance with part 3.3 of the NCC. Weep holes and damp proof coursing in accordance with 3.3.4.4 and 3.3.4.5 of the NCC. Fibre cement sheet in accordance with 3.5.3.4 of the NCC. Block construction in accordance with NCC requirements. Plasterboard to internal wall linings and ceilings with selected cornice. (see below for wet areas)

Health & amenity part 3.8 NCC: showers, baths and wall fixtures to all wet areas shall comply with the requirements of clauses, 3.8.1.1, 3.8.1.2, 3.8.1.3, 3.8.1.4, 3.8.1.5 and 3.8.1.6. In all wet areas provide selected ceramic tiles to concrete floors or over 15mm cement sheeting where timber framed floors are proposed.

Provide waterproof plasterboard sheeting to all walls and ceilings. Provide ceramic tiles, lamipanel or other approved water resistant lining to a minimum height of 1800mm to shower walls and to a height of min 150mm behind baths, basins, sinks, troughs, washing machines and wall fixtures, for the required extent of area to be protected refer to figures 3.8.1.1, 3.8.1.2 and 3.8.1.1.

For typical installation requirements of shower recesses, tap flanges, shower troughs, floors & waterproof membranes refer to figures 3.8.1.5, 3.8.1.6, 3.8.1.7, 3.8.1.8 and 3.8.1.9. For typical installation requirements & sealing of wall junctions with benchtops, laundry sinks & baths refer to figures 3.8.1.10 and 3.8.1.11. Materials shall comply with the requirements of clauses 3.8.1.3, 3.8.1.4 and 3.8.1.5. Refer to AS 3740-2010 for waterproofing of domestic wet areas, as well as appropriate wall & floor treatment when not using a prefabricated shower unit (eg. Min 1:100 fall to waste).

03

PROJECT NORTH

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND LEVELS AT THE JOB PRIOR TO COMMENCING ANY WORK OR MAKING ANY SHOP DRAWINGS.

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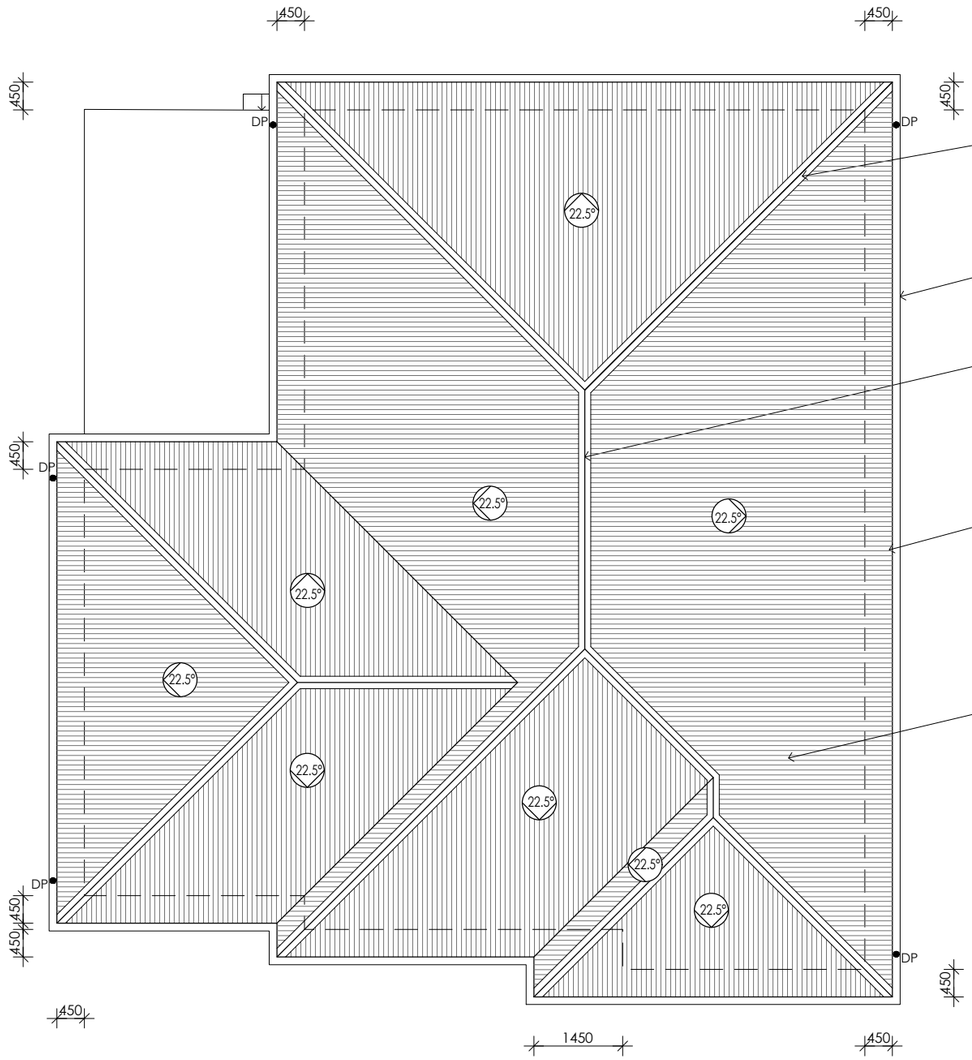
SK	ISSUED FOR CLIENT REVIEW	QT	01/11/23
SK1	CHANGE THE ROOF, BED & GARAGE; ADD A LINEN	QT	28/11/23

CREATIVE HOMES HOBART
CREATIVE HOMES HOBART, CNR OF ELWICK ROAD & BROOKER HIGHWAY, GLENORCHY 7010 PH: 03 6272 3000

JOB ADDRESS:			CLIENT:
Lot 59 Kotona Street Rokeby			Construct Creative Pty Ltd
DESIGNER: I. Brown	ACCRED. NO.: CC6652		SHEET: 3 of 9
DRAWN: Q. Tra	DATE: Nov 2023		DESIGN TYPE: Custom
CHECKED:	DATE:		DRAWING NO: ---
SCALE: 1:100	REV: SK1		



PROPOSED ROOF PLAN

● DP 90mm DOWNPIPE

Framing part 3.4 NCC
All timber framing, fixing and bracing shall comply with AS 1684 and the requirements of NCC part 3.4.3 manufactured sizes must not be undersized to those specified, for all timber sizes, stress grades, spacing and wall bracing refer to Engineer's details. Tie-down details shall comply with the requirements of tables 3.4.3.8 and 3.4.3.9. Structural steel members shall comply with the requirements of clauses in part 3.4.4. Refer to Engineer's details where provided.

Glazing part 3.6 NCC All windows to be aluminium awning style, double glazed (obscured safety glass to bathrooms as shown on drawings) all glazing shall comply with the requirements of AS 2047-AS 1288 and NCC clauses in part 3.6.

Human impact safety requirements shall comply with NCC clauses 3.6.4 pane within 500mm from finished floor level & glazed full height

Note:
Builder and subcontractors to verify all dimension and levels prior to the commencement of any work. Give 24hrs minimum notice where amendments are required to design of working drawings. These drawings are to be read in conjunction with Engineer's and Surveyor's drawings and notes. Do not scale drawings. Dimensions are to take preference over scale. Building specification and Engineer's drawings shall override architectural drawings. All construction work shall be carried out in accordance with the state building regulations, local council by-laws and relevant NCC and AS codes.

Important notice for attention of Owners:
the Owners attention is drawn to the fact that foundations and associated drainage in all sites requires continuing maintenance to assist footing performance. Advice for foundation maintenance is contained in the CSIRO building technology file 18 and it is the Owners responsibility to maintain the site in accordance with this document. Energy efficiency bulk insulation between external studs to be insulated with min R2.0. (Ensure batts fit within cavity without compression, making sure that there is at least 25mm gap from the reflective surface).

External walls are to be clad with perforated reflective foil over the outside of the timber frame. Ceiling to be insulated with R4.0 and reflective foil. Floor to be insulated with R2.0 batts. Seal exhaust fans to Ensuite, Bathroom, Laundry and Kitchen. Building to be sealed in accordance with NCC part 3.12.3
Construction of the external walls, floor and roof compliance of air leakage to comply with NCC part 3.12.3.5

General:
All flashings to be in accordance with part 3.3 of the NCC. Weep holes and damp proof coursing in accordance with 3.3.4.4 and 3.3.4.5 of the NCC. Fibre cement sheet in accordance with 3.5.3.4 of the NCC. Block construction in accordance with NCC requirements. Plasterboard to internal wall linings and ceilings with selected cornice. (see below for wet areas)

Health & amenity part 3.8 NCC: showers, baths and wall fixtures to all wet areas shall comply with the requirements of clauses, 3.8.1.1, 3.8.1.2, 3.8.1.3, 3.8.1.4, 3.8.1.5 and 3.8.1.6. In all wet areas provide selected ceramic tiles to concrete floors or over 15mm cement sheeting where timber framed floors are proposed.

Provide waterproof plasterboard sheeting to all walls and ceilings. Provide ceramic tiles, lamipanel or other approved water resistant lining to a minimum height of 1800mm to shower walls and to a height of min 150mm behind baths, basins, sinks, troughs, washing machines and wall fixtures, for the required extent of area to be protected refer to figures 3.8.1.1, 3.8.1.2 and 3.8.1.1.

For typical installation requirements of shower recesses, tap flanges, shower troughs, floors & waterproof membranes refer to figures 3.8.1.5, 3.8.1.6, 3.8.1.7, 3.8.1.8 and 3.8.1.9. For typical installation requirements & sealing of wall junctions with benchtops, laundry sinks & baths refer to figures 3.8.1.10 and 3.8.1.11. Materials shall comply with the requirements of clauses 3.8.1.3, 3.8.1.4 and 3.8.1.5. Refer to AS 3740-2010 for waterproofing of domestic wet areas, as well as appropriate wall & floor treatment when not using a prefabricated shower unit (eg. Min 1:100 fall to waste).

04

PROJECT NORTH

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DO NOT SCALE DRAWINGS.
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REV:	DESCRIPTION:	BY:	DATE:
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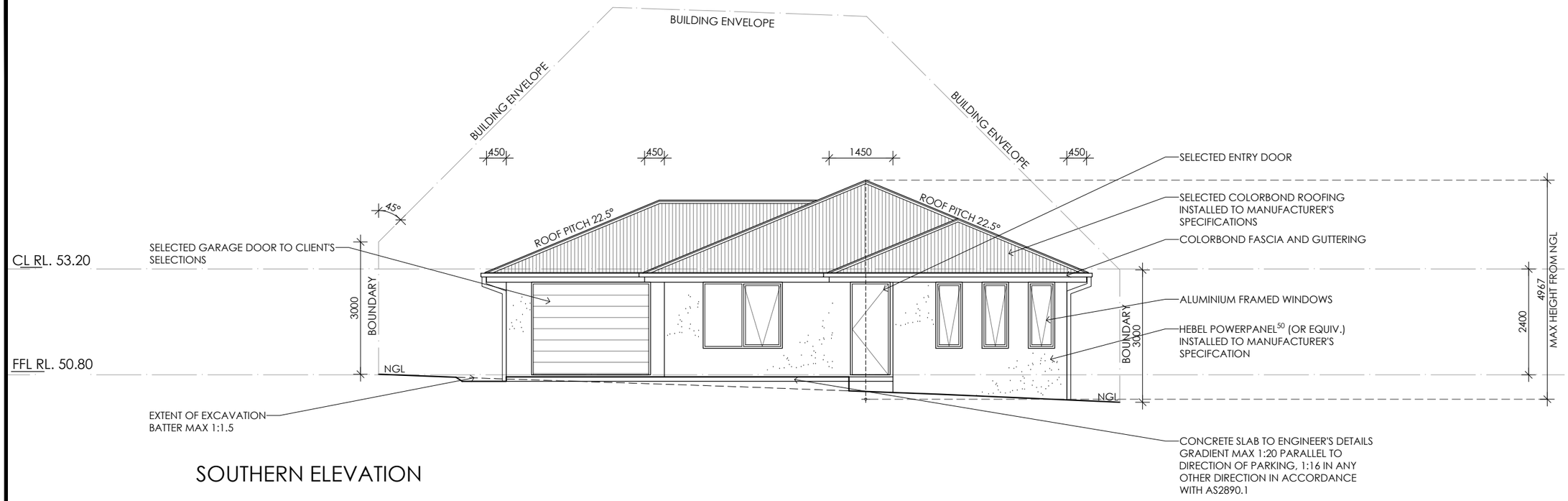
SK1	CHANGE THE ROOF, BED & GARAGE; ADD A LINEN	QT	28/11/23

CREATIVE HOMES HOBART
CREATIVE HOMES HOBART, CNR OF ELWICK ROAD & BROOKER HIGHWAY, GLENORCHY 7010 PH: 03 6272 3000

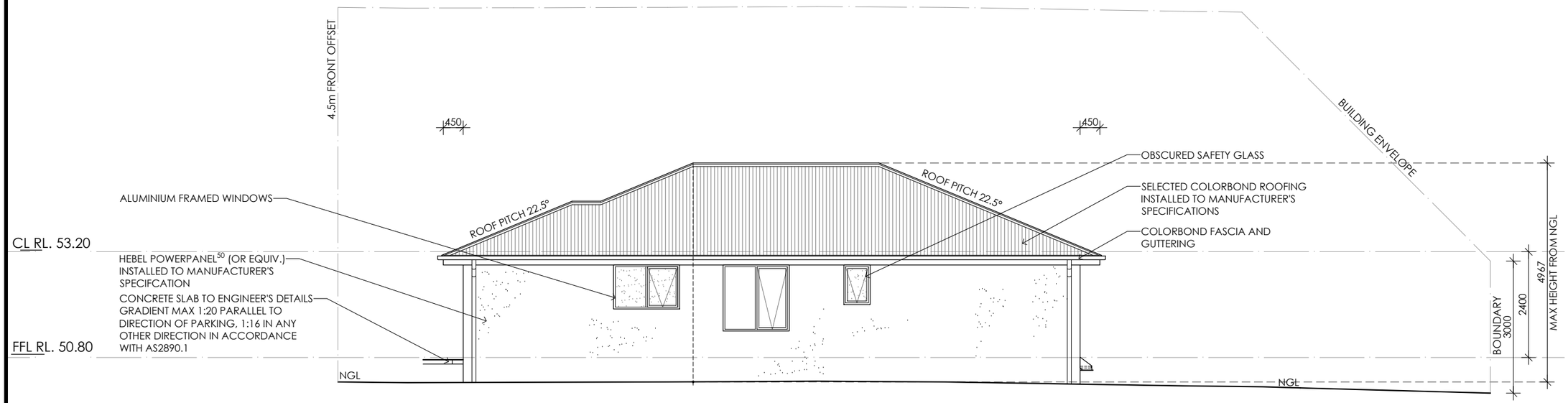
JOB ADDRESS:
Lot 59 Kotona Street
Rokeby

CLIENT:
Construct Creative Pty Ltd

DESIGNER:	I. Brown	ACCRED. NO.:	CC6652	SHEET:	4 of 9
DRAWN:	Q. Tra	DATE:	Nov 2023	DESIGN TYPE:	Custom
CHECKED:		DATE:		DRAWING NO:	---
SCALE:	1:100	REV:	SK1		



SOUTHERN ELEVATION



EASTERN ELEVATION

Framing part 3.4 NCC
All timber framing, fixing and bracing shall comply with AS 1684 and the requirements of NCC part 3.4.3 manufactured sizes must not be undersized to those specified, for all timber sizes, stress grades, spacing and wall bracing refer to Engineer's details. Tie-down details shall comply with the requirements of tables 3.4.3.8 and 3.4.3.9. Structural steel members shall comply with the requirements of clauses in part 3.4.4. Refer to Engineer's details where provided.

Glazing part 3.6 NCC All windows to be aluminium awning style, double glazed (obscured safety glass to bathrooms as shown on drawings) all glazing shall comply with the requirements of AS 2047-AS 1288 and NCC clauses in part 3.6.

Human impact safety requirements shall comply with NCC clauses 3.6.4 pane within 500mm from finished floor level & glazed full height

Note:
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External walls are to be clad with perforated reflective foil over the outside of the timber frame. Ceiling to be insulated with R4.0 and reflective foil. Floor to be insulated with R2.0 batts. Seal exhaust fans to Ensuite, Bathroom, Laundry and Kitchen. Building to be sealed in accordance with NCC part 3.12.3
Construction of the external walls, floor and roof compliance of air leakage to comply with NCC part 3.12.3.5

General:
All flashings to be in accordance with part 3.3 of the NCC. Weep holes and damp proof coursing in accordance with 3.3.4.4 and 3.3.4.5 of the NCC. Fibre cement sheet in accordance with 3.5.3.4 of the NCC. Block construction in accordance with NCC requirements. Plasterboard to internal wall linings and ceilings with selected cornice. (see below for wet areas)

Health & amenity part 3.8 NCC: showers, baths and wall fixtures to all wet areas shall comply with the requirements of clauses, 3.8.1.1, 3.8.1.2, 3.8.1.3, 3.8.1.4, 3.8.1.5 and 3.8.1.6. In all wet areas provide selected ceramic tiles to concrete floors or over 15mm cement sheeting where timber framed floors are proposed.

Provide waterproof plasterboard sheeting to all walls and ceilings. Provide ceramic tiles, lamipanel or other approved water resistant lining to a minimum height of 1800mm to shower walls and to a height of min 150mm behind baths, basins, sinks, troughs, washing machines and wall fixtures, for the required extent of area to be protected refer to figures 3.8.1.1, 3.8.1.2 and 3.8.1.1.

For typical installation requirements of shower recesses, tap flanges, shower troughs, floors & waterproof membranes refer to figures 3.8.1.5, 3.8.1.6, 3.8.1.7, 3.8.1.8 and 3.8.1.9. For typical installation requirements & sealing of wall junctions with benchtops, laundry sinks & baths refer to figures 3.8.1.10 and 3.8.1.11. Materials shall comply with the requirements of clauses 3.8.1.3, 3.8.1.4 and 3.8.1.5. Refer to AS 3740-2010 for waterproofing of domestic wet areas, as well as appropriate wall & floor treatment when not using a prefabricated shower unit (eg. Min 1:100 fall to waste).

05

PROJECT NORTH

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND LEVELS AT THE JOB PRIOR TO COMMENCING ANY WORK OR MAKING ANY SHOP DRAWINGS.

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SK	ISSUED FOR CLIENT REVIEW	QT	01/11/23
SK1	CHANGE THE ROOF, BED & GARAGE; ADD A LINEN	QT	28/11/23

CREATIVE HOMES HOBART
CREATIVE HOMES HOBART, CNR OF ELWICK ROAD & BROOKER HIGHWAY, GLENORCHY 7010 PH: 03 6272 3000

JOB ADDRESS:
Lot 59 Kotona Street
Rokeby

CLIENT:
Construct Creative Pty Ltd

DESIGNER: I. Brown	ACCRED. NO.: CC6652	SHEET:	5 of 9
DRAWN: Q. Tra	DATE: Nov 2023	DESIGN TYPE:	Custom
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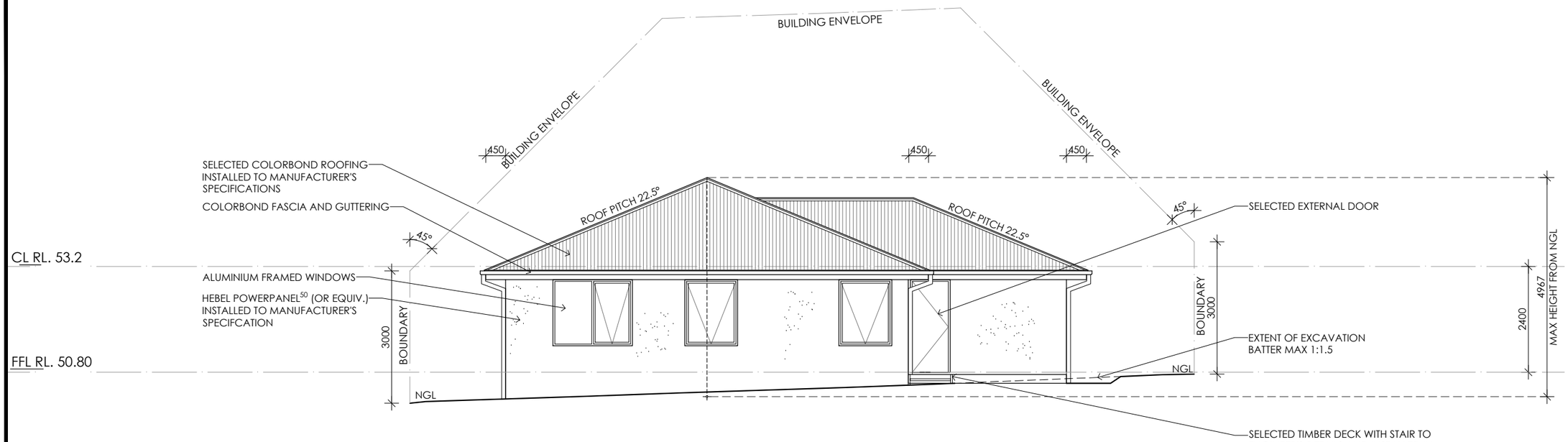
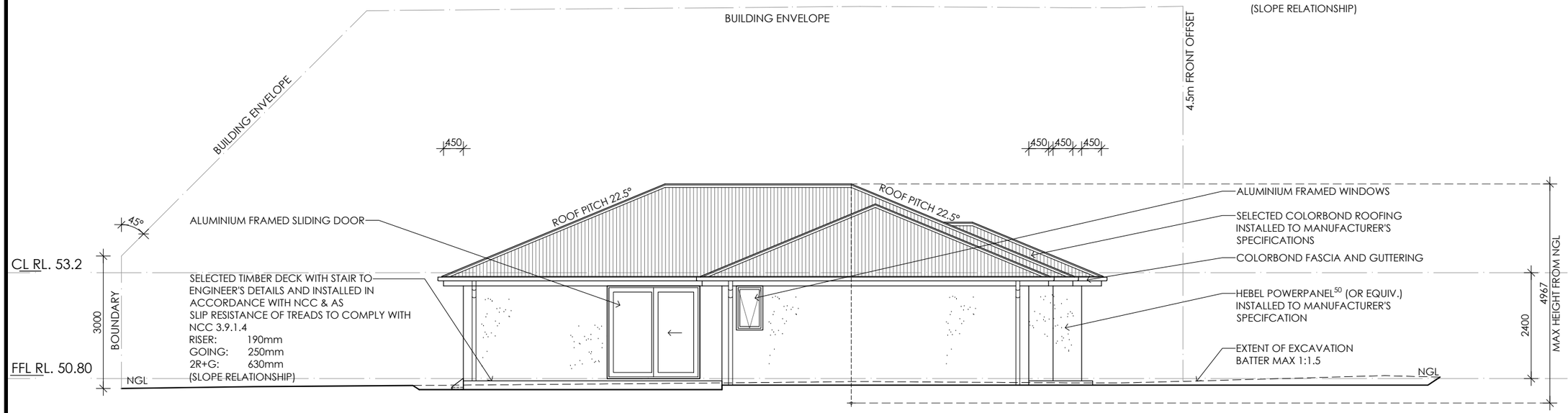
SCALE: 1:100	REV: SK1		



NORTHERN ELEVATION



WESTERN ELEVATION

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Glazing part 3.6 NCC All windows to be aluminium awning style, double glazed (obscured safety glass to bathrooms as shown on drawings) all glazing shall comply with the requirements of AS 2047-AS 1288 and NCC clauses in part 3.6.

Human impact safety requirements shall comply with NCC clauses 3.6.4 pane within 500mm from finished floor level & glazed full height

Note:
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External walls are to be clad with perforated reflective foil over the outside of the timber frame. Ceiling to be insulated with R4.0 and reflective foil. Floor to be insulated with R2.0 batts. Seal exhaust fans to Ensuite, Bathroom, Laundry and Kitchen. Building to be sealed in accordance with NCC part 3.12.3
Construction of the external walls, floor and roof compliance of air leakage to comply with NCC part 3.12.3.5

General:
All flashings to be in accordance with part 3.3 of the NCC. Weep holes and damp proof coursing in accordance with 3.3.4.4 and 3.3.4.5 of the NCC. Fibre cement sheet in accordance with 3.5.3.4 of the NCC. Block construction in accordance with NCC requirements. Plasterboard to internal wall linings and ceilings with selected cornice. (see below for wet areas)

Health & amenity part 3.8 NCC: showers, baths and wall fixtures to all wet areas shall comply with the requirements of clauses, 3.8.1.1, 3.8.1.2, 3.8.1.3, 3.8.1.4, 3.8.1.5 and 3.8.1.6. In all wet areas provide selected ceramic tiles to concrete floors or over 15mm cement sheeting where timber framed floors are proposed.

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06

PROJECT NORTH

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REV:	DESCRIPTION:	BY:	DATE:
SK	ISSUED FOR CLIENT REVIEW	QT	01/11/23
SK1	CHANGE THE ROOF, BED & GARAGE; ADD A LINEN	QT	28/11/23

CREATIVE HOMES HOBART
CREATIVE HOMES HOBART, CNR OF ELWICK ROAD & BROOKER HIGHWAY, GLENORCHY 7010 PH: 03 6272 3000

JOB ADDRESS:
Lot 59 Kotona Street
Rokeby

CLIENT:
Construct Creative Pty Ltd

DESIGNER: I. Brown	ACCRED. NO.: CC6652	SHEET:	6 of 9
DRAWN: Q. Tra	DATE: Nov 2023	DESIGN TYPE:	Custom
CHECKED:	DATE:	DRAWING NO:	---
SCALE: 1:100	REV: SK1		

Framing part 3.4 NCC
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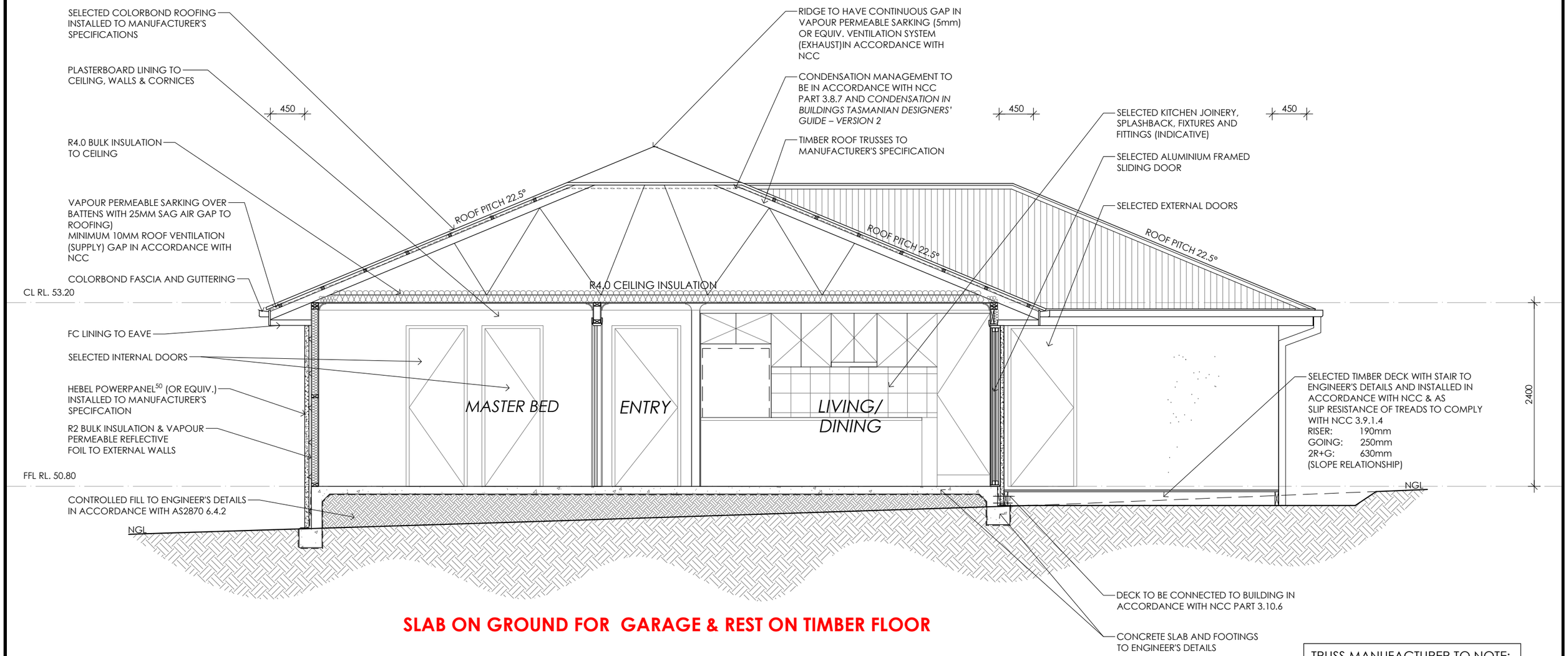
Construction of the external walls, floor and roof compliance of air leakage to comply with NCC part 3.12.3.5

General:
All flashings to be in accordance with part 3.3 of the NCC. Weep holes and damp proof coursing in accordance with 3.3.4.4 and 3.3.4.5 of the NCC. Fibre cement sheet in accordance with 3.5.3.4 of the NCC. Block construction in accordance with NCC requirements. Plasterboard to internal wall linings and ceilings with selected cornice. (see below for wet areas)

Health & amenity part 3.8 NCC: showers, baths and wall fixtures to all wet areas shall comply with the requirements of clauses, 3.8.1.1, 3.8.1.2, 3.8.1.3, 3.8.1.4, 3.8.1.5 and 3.8.1.6. In all wet areas provide selected ceramic tiles to concrete floors or over 15mm cement sheeting where timber framed floors are proposed.

Provide waterproof plasterboard sheeting to all walls and ceilings. Provide ceramic tiles, lamipanel or other approved water resistant lining to a minimum height of 1800mm to shower walls and to a height of min 150mm behind baths, basins, sinks, troughs, washing machines and wall fixtures, for the required extent of area to be protected refer to figures 3.8.1.1, 3.8.1.2 and 3.8.1.1.

For typical installation requirements of shower recesses, tap flanges, shower troughs, floors & waterproof membranes refer to figures 3.8.1.5, 3.8.1.6, 3.8.1.7, 3.8.1.8 and 3.8.1.9. For typical installation requirements & sealing of wall junctions with benchtops, laundry sinks & baths refer to figures 3.8.1.10 and 3.8.1.11. Materials shall comply with the requirements of clauses 3.8.1.3, 3.8.1.4 and 3.8.1.5. Refer to AS 3740-2010 for waterproofing of domestic wet areas, as well as appropriate wall & floor treatment when not using a prefabricated shower unit (eg. Min 1:100 fall to waste).



SLAB ON GROUND FOR GARAGE & REST ON TIMBER FLOOR

TRUSS MANUFACTURER TO NOTE:

ALL TRUSSES TO BE DESIGNED TO BE SUPPORTED BY ALL EXTERNAL WALLS FOR BOTH DEAD AND WIND LOADS.

SECTION A-A

07

PROJECT NORTH

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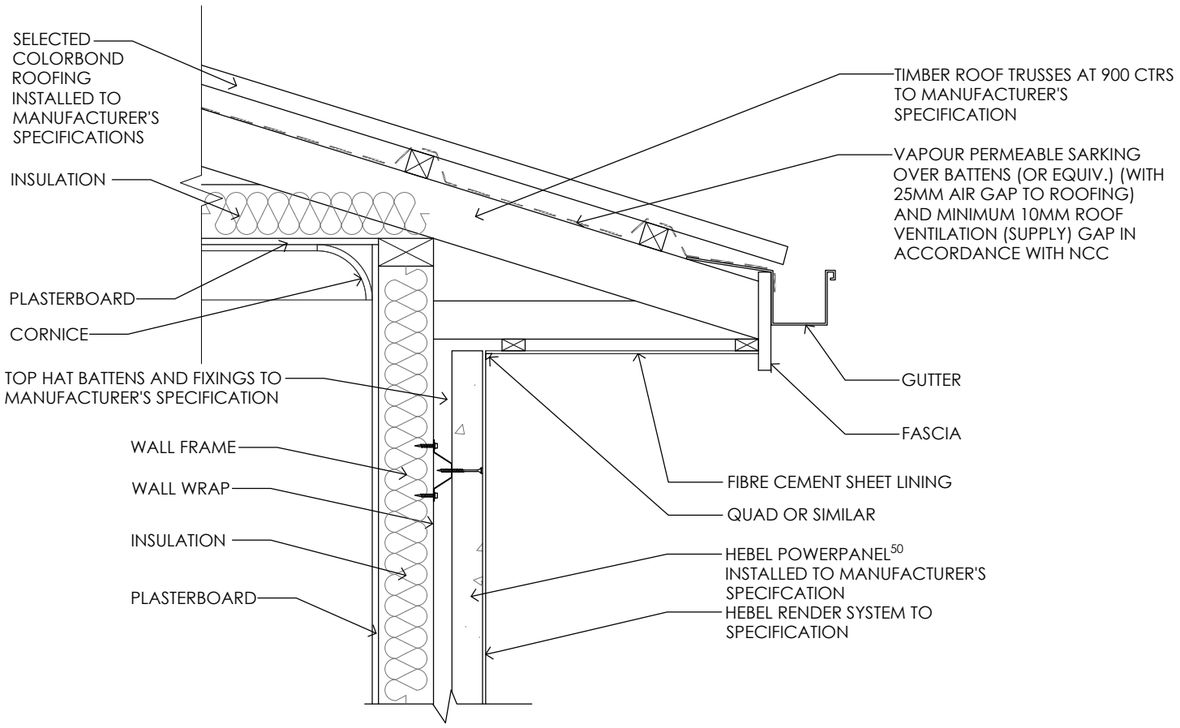
SK1	CHANGE THE ROOF, BED & GARAGE; ADD A LINEN	QT	28/11/23

CREATIVE HOMES HOBART
CREATIVE HOMES HOBART, CNR OF ELWICK ROAD & BROOKER HIGHWAY, GLENORCHY 7010 PH: 03 6272 3000

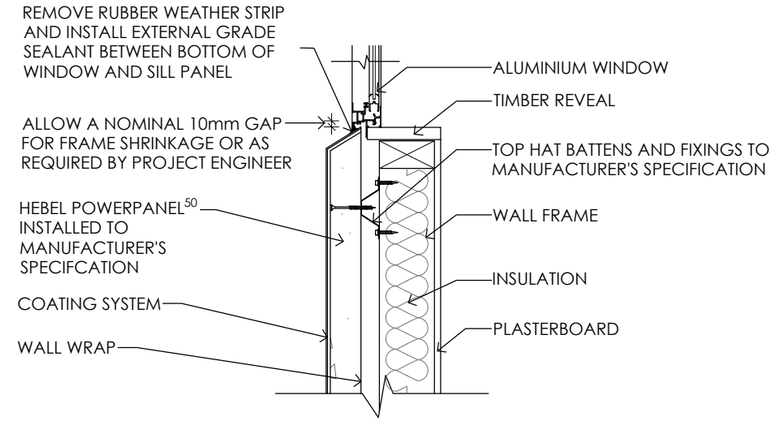
JOB ADDRESS:
Lot 59 Kotona Street
Rokeby

CLIENT:
Construct Creative Pty Ltd

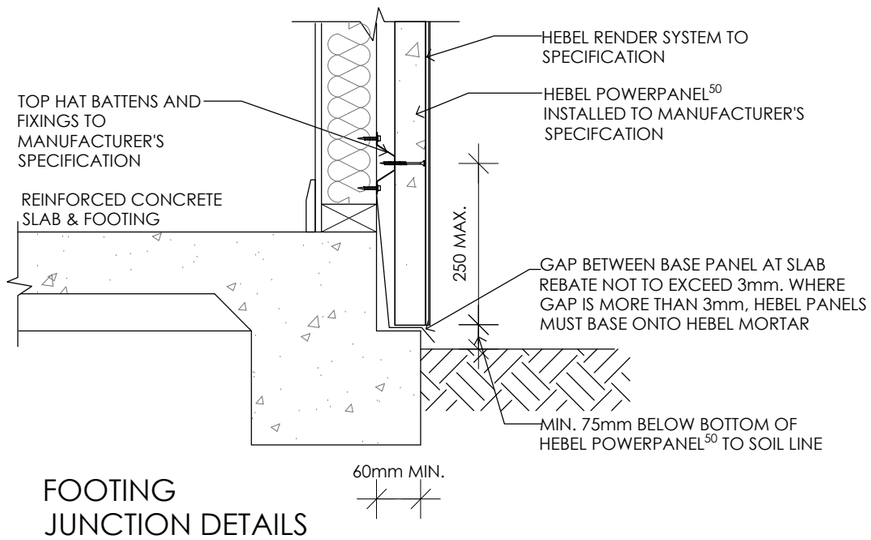
DESIGNER: I. Brown	ACCRED. NO.: CC6652	SHEET:	7 of 9
DRAWN: Q. Tra	DATE: Nov 2023	DESIGN TYPE:	Custom
CHECKED:	DATE:	DRAWING NO:	---
SCALE: 1:50	REV: SK1		



TYPICAL ROOF
EAVES DETAILS



TYPICAL WINDOW SILL DETAIL
ALUMINIUM WINDOW FRAME



FOOTING
JUNCTION DETAILS

08

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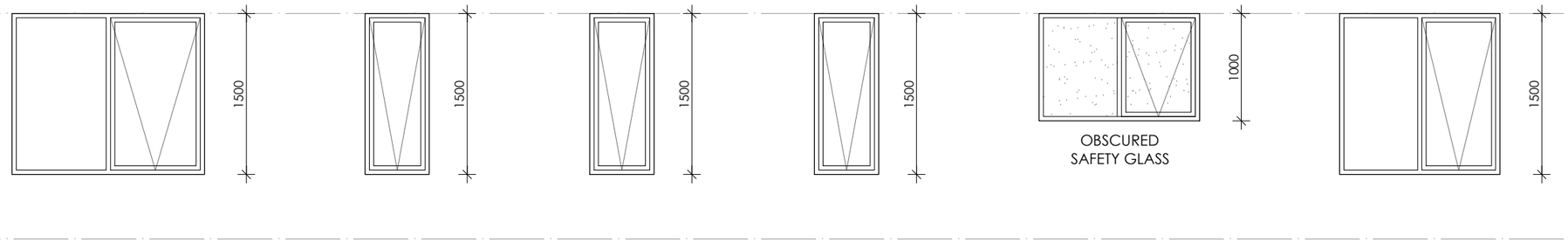

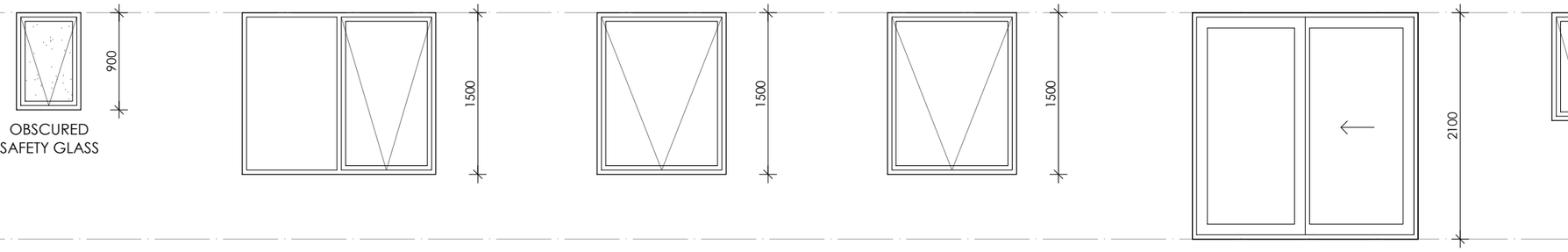

WINDOW SCHEDULE

fg FIXED GLAZING

Framing part 3.4 NCC
All timber framing, fixing and bracing shall comply with AS 1684 and the requirements of NCC part 3.4.3 manufactured sizes must not be undersized to those specified, for all timber sizes, stress grades, spacing and wall bracing refer to Engineer's details. Tie-down details shall comply with the requirements o tables 3.4.3.8 and 3.4.3.9. Structural steel members shall comply with the requirement of clauses in part 3.4.4. Refer to Engineer's details where provided.

Glazing part 3.6 NCC All windows to be aluminium awning style, double glazed (obscured safety glass to bathrooms as shown on drawings) all glazing shall comply with the requirements of AS 2047-AS 1288 and NCC clauses in part 3.6.

Human impact safety requirements shall comply with NCC clauses 3.6.4 pane within 500mm from finished floor level & glazed full height

Note:
Builder and subcontractors to verify all dimension and levels prior to the commencement of any work. Give 24hrs minimum notice where amendments are required to design of working drawings. These drawings are to be read in conjunction with Engineer's and Surveyor's drawings and notes. Do not scale drawings. Dimensions are to take preference over scale. Building specification and Engineer's drawings shall override architectural drawings. All construction work shall be carried out in accordance with the state building regulations, local council by-laws and relevant NCC and AS codes.

Important notice for attention of Owners:
the Owners attention is drawn to the fact that foundations and associated drainage in all sites requires continuing maintenance to assist footing performance. Advice for foundation maintenance is contained in the CSIRO building technology file 18 and it is the Owners responsibility to maintain the site in accordance with this document. Energy efficiency bulk insulation between external studs to be insulated with min R2.0. (Ensure batts fit within cavity without compression, making sure that there is at least 25mm gap from the reflective surface).

External walls are to be clad with perforated reflective foil over the outside of the timber frame. Ceiling to be insulated with R4.0 and reflective foil. Floor to be insulated with R2.0 batts. Seal exhaust fans to Ensuite, Bathroom, Laundry and Kitchen. Building to be sealed in accordance with NCC part 3.12.3
Construction of the external walls, floor and roof compliance of air leakage to comply with NCC part 3.12.3.5

General:
All flashings to be in accordance with part 3.3 of the NCC. Weep holes and damp proof coursing in accordance with 3.3.4.4 and 3.3.4.5 of the NCC. Fibre cement sheet in accordance with 3.5.3.4 of the NCC. Block construction in accordance with NCC requirements. Plasterboard to internal wall linings and ceilings with selected cornice. (see below for wet areas)

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09

PROJECT NORTH

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FLOOD HAZARD REPORT

31 Kotona Street, Rokeby
Client: Rachael Cunningham (Creative Homes Hobart)
Date: February 2024

RMS SPATIAL

RMS SPATIAL
BLACKMANS BAY, TAS 7052
PH: 0409 181 349
ABN: 56 138 727 432

Document Control Information

Document Information

Project:	Flood Hazard Report
Title:	31 Kotona Street Flood Hazard Report
Client:	Rachael Cunningham (Creative Homes Hobart)
Site:	31 Kotona Street, Rokeby TAS
Job Number:	RMS-24101
Date:	28 February 2024
Prepared By:	Mark Smith

Document Control

Revision	Description	Approved by	Signature	Date
00	Report for submission	Mark Smith		28/02/2024

Contact Information

RMS Spatial
0409 181 349
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Contents

Figures

Tables

1. Introduction

RMS Spatial has been engaged by the Client – Creative Homes Hobart (Rachael Cunningham), for the purpose of a site-specific flood prone area hazard assessment for the proposed development at 31 Kotona Street, Rokeby (CT 184319/59). The proposed development includes a single storey, four-bedroom residential development, including a deck to the north west corner of the proposed residence on an approximately 550m^2 lot (Figure 2).

The lot lies within a defined flood hazard area and triggers section C12.0 Flood Prone Areas Hazard Code of the Tasmanian Planning Scheme (TPS) (Clarence City Council). The purpose of this report is to assess the risk of the proposed development against flood hazards in line with the planning scheme and Building Act 2016 requirements.

1.1. Report Objectives

The objectives of this report are to ascertain the following:

- Assess the proposed development against Flood Prone Areas Hazard Code and Building Code of Australia 2016 (BCA).
- Assess the developments risk to flood hazards for the life of any proposed buildings from a 1% AEP storm event (includes the effects of climate change).
- Undertake a risk assessment to determine the developments tolerable risk to flood hazard.
- Where applicable, provide recommendations and options to reduce risk to the development and surrounds.

1.2. Report Objective Limitations

The following limitations apply to the report and its findings:

- The report aims to provide details to assist in the structural analysis including erosion but does not provide certification that the design structures are fit for purpose.
- This report is commissioned as a flood hazard report for the purpose of a development application under the Tasmanian Planning Scheme C12.0 Flood Prone Areas Hazard Code at 31 Kotona Street, Rokeby. RMS Spatial does not warrant the information outside of the purpose of this commission.

1.3. Planning

1.3.1. Tasmanian Planning Scheme

Development at 31 Kotona Street, Rokeby is subject to the flood prone hazards layer and triggers C12.6.1 Buildings and works within a flood-prone hazard area, shown in Table 1 below. The development must demonstrate that buildings and works can achieve and maintain a tolerable risk from inundation hazard, and that buildings and works do not increase the risk of inundation to adjacent land and public infrastructure. As there is no acceptable solution for this code, performance criteria are required to be addressed.

Table 1. C12.6.1 Buildings and works within a flood-prone hazard area.

Objectives:	
To ensure that risk from riverine, watercourse or inland flooding is appropriately managed and takes into account the use of the buildings.	
Acceptable Solution	**Performance Criteria**
A1 No Acceptable Solution.	**P1.1**

	Buildings and works within a flood-prone hazard area must achieve and maintain a tolerable risk from a flood, having regard to: (a) the type, form, scale and intended duration of the development; (b) whether any increase in the level of risk from flood requires any specific hazard reduction or protection measures; (c) any advice from a State authority, regulated entity or a council; and (d) the advice contained in a flood hazard report. **P1.2** A flood hazard report also demonstrates that the building and works: (a) do not cause or contribute to flood on the site, on adjacent land or public infrastructure; and (b) (b) can achieve and maintain a tolerable risk from a 1% annual exceedance probability flood event for the intended life of the use without requiring any flood protection measures.

1.3.2. Building Code

Additional to the TPS, the development is subject to the Tasmanian Building Act 2016 and the directors' determinations apply to hazardous land (includes riverine inundation) which requires any building to be constructed to have a tolerable risk from inundation for the period of the design life. Under the Building Code of Australia (2016) Table 3-1 "Design life of building and plumbing installations and their components" places the design life of 50 years for any normal building. As such, giving an approximate 2-year construction period places the expected life span for the assessment of tolerable risk to the year 2076.

2. Site Location and Development

2.1. Location

The development is located at 31 Kotona Street, Rokeby (lot 59) in Southern Tasmania, northeast of the Hobart CBD (Figure 1). The site lies along a tributary overland flow path within the greater Stokell Creek catchment. The site is predominately surrounded by general residential and open space zoning, with rural zoning in the upper reaches of the Stokell Creek catchment. The site is located within a small sub catchment of the main catchment and drains to Stokell Creek.

Figure 1, Site Location – 31 Kotona Street, Rokeby

2.2. Proposed Development

The proposed development at 31 Kotona Street, Rokeby (lot 59), is a single storey four-bedroom residential dwelling, proposing approximately 171m^2 residence on approximately 550m^2 lot. The development is located within a newly developed subdivision lot with a slightly sloping eastly aspect. The proposed development is shown in Figure 2, with the finished floor level shown in Table 2.

Table 2, finished floor level

31 Kotona Street	FFL (mAHD)
Proposed floor level	50.45

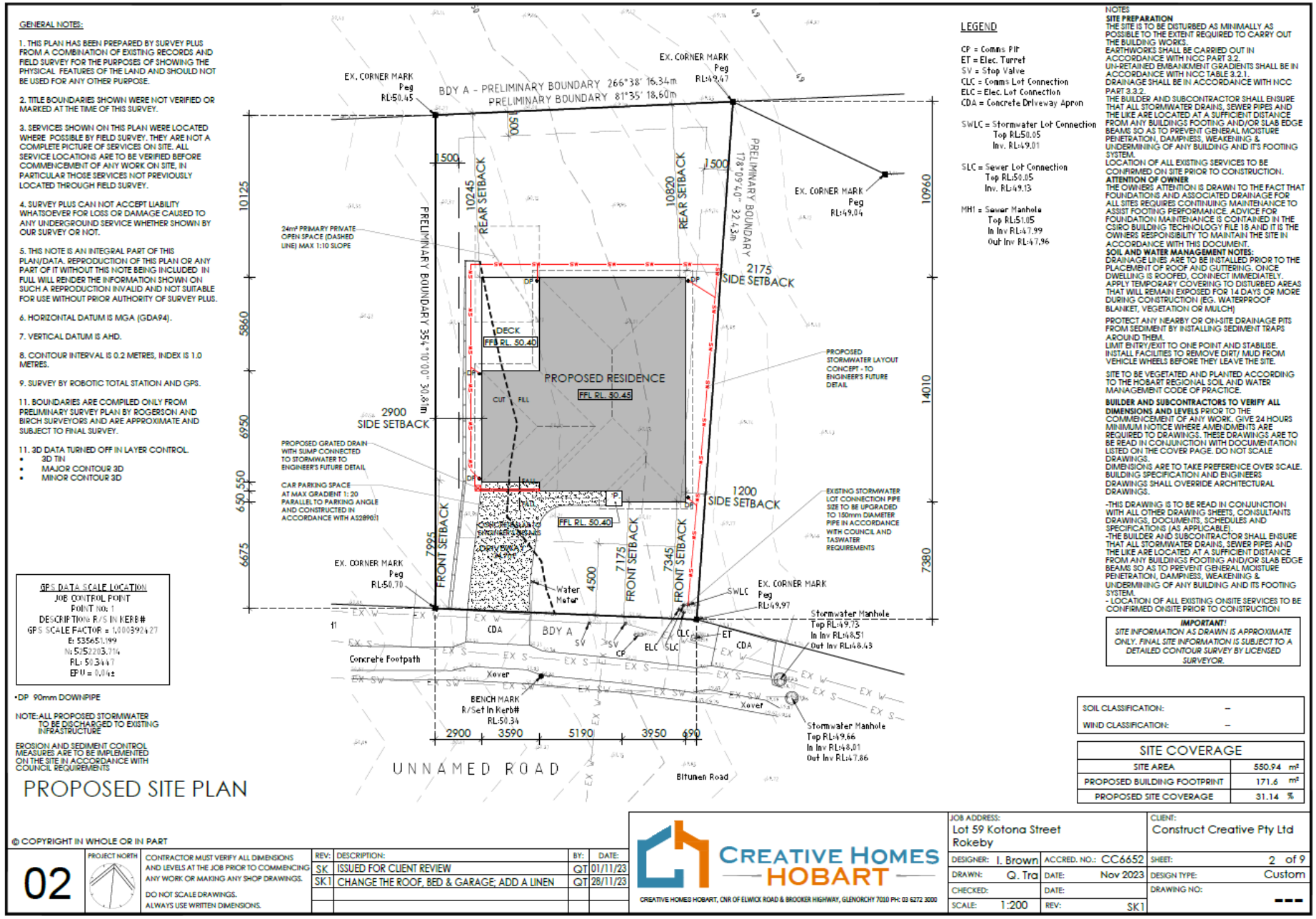

Figure 2, Proposed development at 31 Kotona Street, Rokeby.

3. Hydrology

3.1. Catchment Area

The proposed development site is located within a small sub-catchment of an approximate area of 0.73ha sloping to the east with an average gradient ranging from 8% to 9%. The flood flows are mostly defined by natural depression (overland flow paths), gutters, drainage infrastructure and open channels through a newly developed residential subdivision. Sub catchments have been derived from Digital Elevation Models (DEM), drainage structures and property boundaries deriving main contributing sub-catchments to each major drainage outlet. The majority of the catchment is predominantly residential, with a small section of open space surrounding. The upper portion of the greater catchment is predominately rural zone areas. The contributing catchment is a small sub catchment of the greater Stokell Creek catchment which has approximately 1.9km^2 catchment to the Dollina Drive, Rokeby exit. This additional catchment was model as the receiving boundary for the tributary sub catchment within the model.

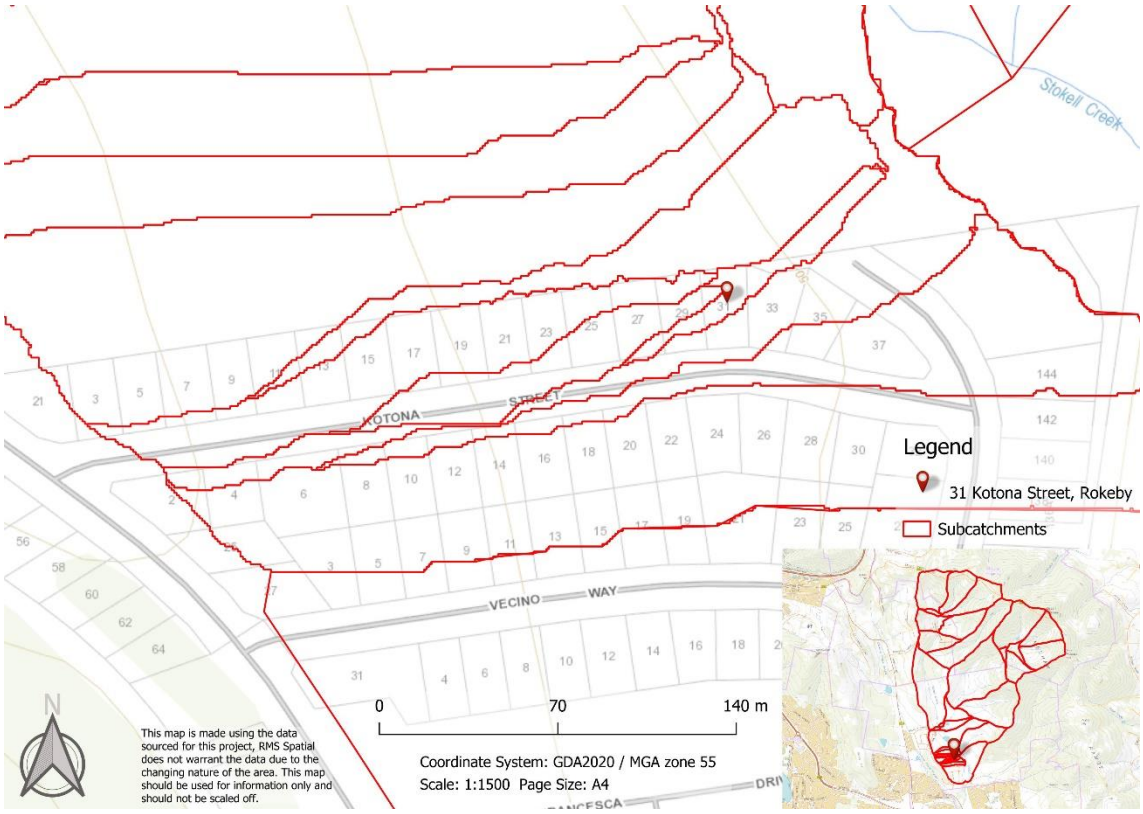

Figure 3, Sub Catchment Delineation

3.2. Design Rainfall and Temporal Pattern

Design rainfall temporal patterns were sourced from the ARR data hub 2016. Combined with the BOM IFD curves (BOM 2016) for their respective 1% AEP frequency durations spanned between 10 min – 24 hours. Given the size of the catchment, durations over 24 hours were removed as unlikely to produce rainfall peaks. This allows a faster processing and post processing of the data. ARR 2016 describes the process for defining the design storm event as being the worst case duration using the median temporal pattern. Figure 4 below shows the 2 hour storm was the worst case duration with storm 3 being the median temporal pattern with 0.113m^3/s total discharge, for the contributing catchment to 31 Kotona Street.

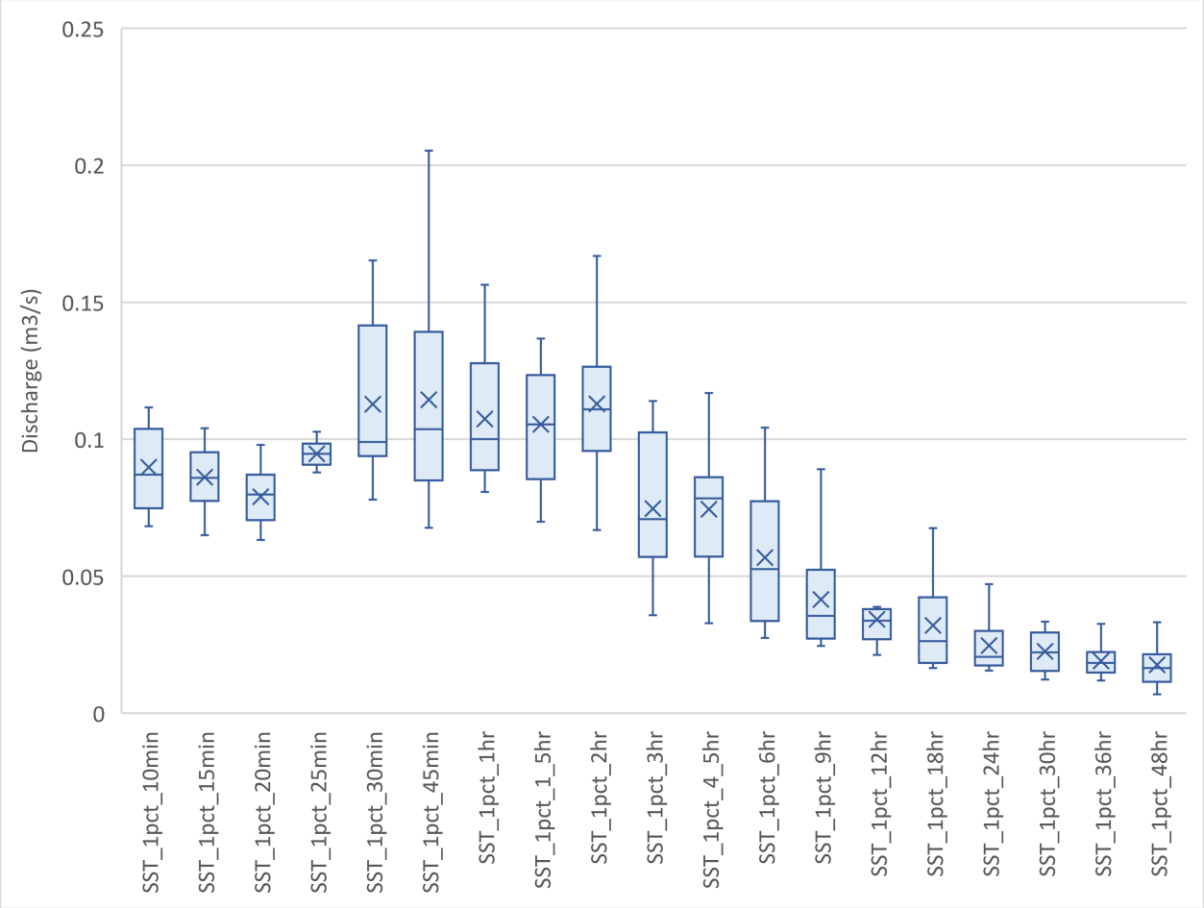

Figure 4, Rainfall Box and Whisker plot

3.3. Climate Change

To accurately represent inundation risk over the life of the development, increases in rainfall due to climate change have been included to year 2100. ARR guidelines provides the predicted increase due to climate change for 2100 for Representative Concentration Pathways (RCP). As per ARR guidelines, the RCP 8.5 increase was adopted and applied to the peak rainfall depth and applied to the worst-case duration and temporal storm event. Table 3 shows the derived rainfall increase derived from ARR datahub for the region of interest.

Table 3, Climate change factor RCP 8.5 for 2100

Location	**ARR Climate Change Adaptation factor**
Tasmania	16.3%

3.4. Pre-Burst Depths

Pre-burst depths considers rainfall depths leading up to the main storm, but not included in the event, falling onto the catchment and filling some storage areas and losses prior to the main storm (ARR 2019). Median pre-burst depths for this report were derived from the ARR data hub. Depths were applied to the front of each storm event and ensures this is accurately captured within the model.

3.5. Losses

Losses have been derived from ARR Data Hub for the catchment. As per ARR guidelines, losses have been derived for rural catchments. As a portion of the catchment is classified as urban, ARR recommends applying an effective impervious factor of 60-70% of the rural previous loss and a flat 2.5mm/hr for continuing losses. Table 4 below shows the adopted losses used for this report.

Table 4, Applied Loss Factors for Risdon Catchment

	Initial Loss (mm)	**Continuing Loss (mm/hr)**
Pervious	28	3.7
Effective Impervious	0.7*IL=19.6	2.5 (ARR recommended)
Impervious	1	0

3.6. Routing Factors

The hydrologic model uses the RAFTS runoff and routing method to determine peak flows at the development location for the contributing catchment. RAFTS utilises the slope, roughness and non-linearity or RAFTS R to route the rainfall through the catchment to produce total outflows from each catchment. Table 5 shows the three main surface types identified and applied in each catchment providing the following factors.

Table 5, Runoff Routing Factors

Runoff Surfaces	**Open Space/Bush**	**Residential**	**Impervious (Roads etc.)**
Roughness "n"	0.1	0.04	0.02
Slope	Derived from individual catchment		
Non-Linearity	-0.285	-0.285	-0.285

4. Hydrodynamic Model

4.1. Digital Elevation Model

Digital Elevation Model (DEM) was derived from a subset of LiDAR datasets of Clarence Aerial LiDAR Survey in 2019 (source. Geoscience Australia). This provides a 1m cell resolution of ground levels with a quoted vertical accuracy of approximately +/- 300mm. The datasets were merged for the purpose of hydrodynamic modelling of the Rokeby area (Figure 5).

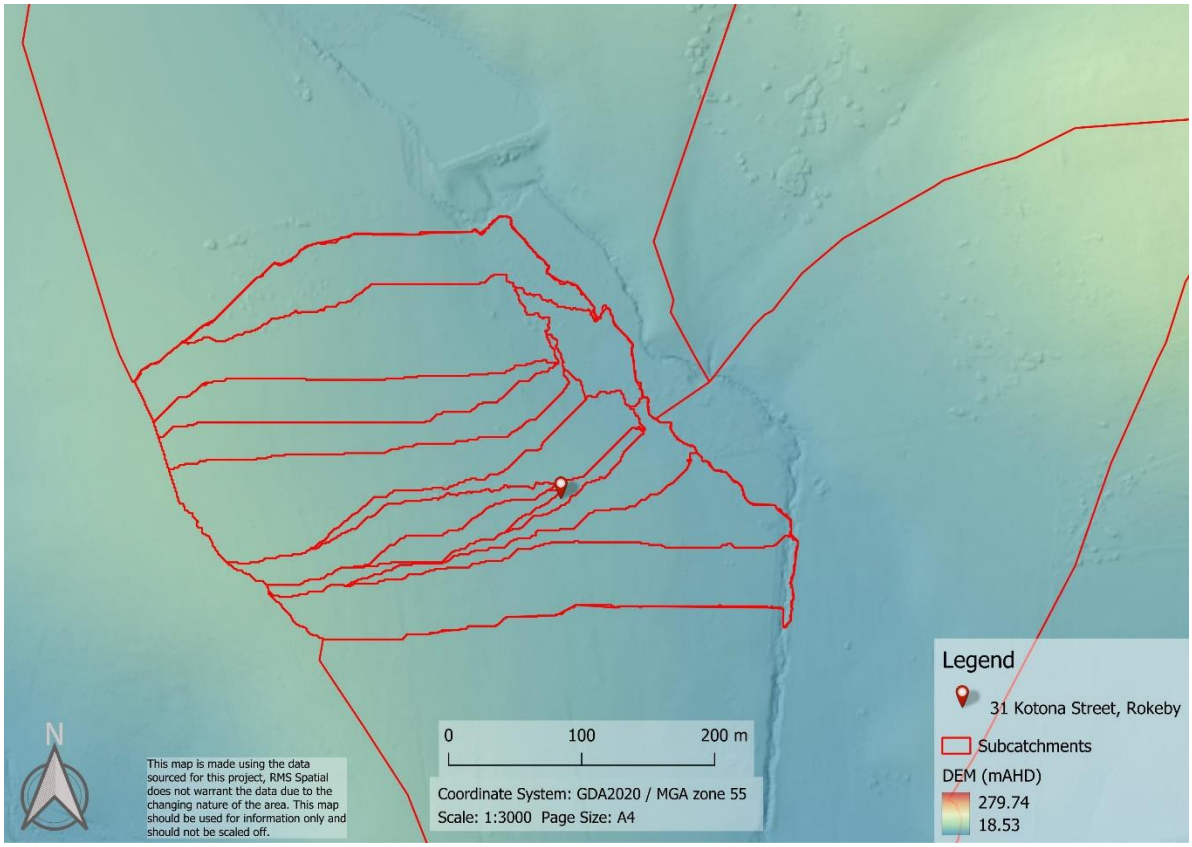

Figure 5, Digital Elevation Model, Rokeby

4.2. Roughness Mannings n

Hydraulic roughness values for this model were derived from the ARR 2019 guidelines. The Manning's values are listed in Table 6 below. These values are placed in the model as land use polygons and sampled by the computational grid, applying a roughness factor to each 2D cell.

Table 6, Mannings n values per land use type

Land Use	Manning's n
Roads	0.018
Commercial/ Industrial	0.035
Inner Residential	0.04
Residential	0.045
Parks	0.05
Buildings	0.3
Piped Infrastructure	0.014

4.3. 1D Structures

4.3.1. Pipes and Pits

1D structures such as pipes and pits were not included in the model as pipe sizes were not considered to have an effect to overall overland flood quantity.

4.4. 2D Structures

4.4.1. Walls

Walls located in critical flow paths are included in the model as 2D base linear structures. These structures have a general failure threshold of 300mm in flood depth to account for failure points in these structures and partially allow flow through the structure after failure. No walls were deemed to be located within critical flow paths.

4.4.2. Buildings

All existing buildings surrounding the development are applied as defined mesh zones and are raised 300mm to allow for typical design raised threshold, in lieu of known surveyed floor levels. A 0.3 Manning's n factor is also applied to the building. This allows flood water to more accurately mimic flow around and through a building.

The proposed development at 31 Kotona Street, Rokeby was elevated to a finished floor level of 50.45mAHD, within the post development model scenario.

4.4.3. Roads

Roads are applied as a defined mesh zone and lowered by 0.1m to allow for flow against a road gutter to be more accurately represented.

4.4.4. Inflow Boundary

Each catchment is linked to a 2D node or 2D inflow point, which in turn is coupled to the 2D mesh. This method of linking runoff to the 2D model provides greater control on losses and routing parameters through a hydrological routing equation, prior to entry into the 2D mesh which provides superior hydrodynamic routing of overland flow paths.

4.4.5. Downstream Boundary

The site location is higher up in the overall Stokell Creek catchment. Therefore, the 2D mesh was extended down past the development and concluded on the western side of Stokell Creek. This allows any downstream hydraulic controls to be included without adversely impacting the quality of the run with excessive mesh areas.

Adjacent sub-catchments to the north and west of the contributing catchment were included into the model. This provided confluence of flooding downstream that may affect flood flows within the proposed development lot.

4.5. 2D Mesh Zone

A 2D mesh zone was applied to the study area and extends approximately from north of Kotona Street to south of Dollina Drive, and east of Dollina Drive to west of Stokell Creek. The mesh is a variable triangular mesh with terrain sensitivity with cell sizes can range from $15m^2$ in flat topography like areas to $0.5m^2$ in areas of higher resolution requirements, roads and buildings. Mesh zones are applied to critical structures, as outlined above, to ensure mesh resolution is $1m^2$ or lower. Elevation to each cell is applied from the DEM and roughness is taken from the land use type, with the values shown in Table 6.

5. Inundation Assessment

5.1. Model Results

Pre and post development scenarios were run through the developed model to understand the effects of flood hazard on the proposed development and assess the development against the planning and building requirements.

5.1.1. Pre-development

Figure 6 below shows the predevelopment model results from a 1% AEP, including climate change event at year 2100. This shows the main overland flood path occurring to the north of the property, predominately within 10m of the northern boundary of 31 Kotona Street, the tributary is characterised with extremely shallow flows of less than 30mm and velocities of less than 0.11m/s (Figure 7). Figure 6 shows main overland flow path is likely to intersect the proposed building envelope, with the minor tributary intersecting the rear corner of the building envelope.

Figure 6, Pre-development 1% AEP @ 2100 depth map

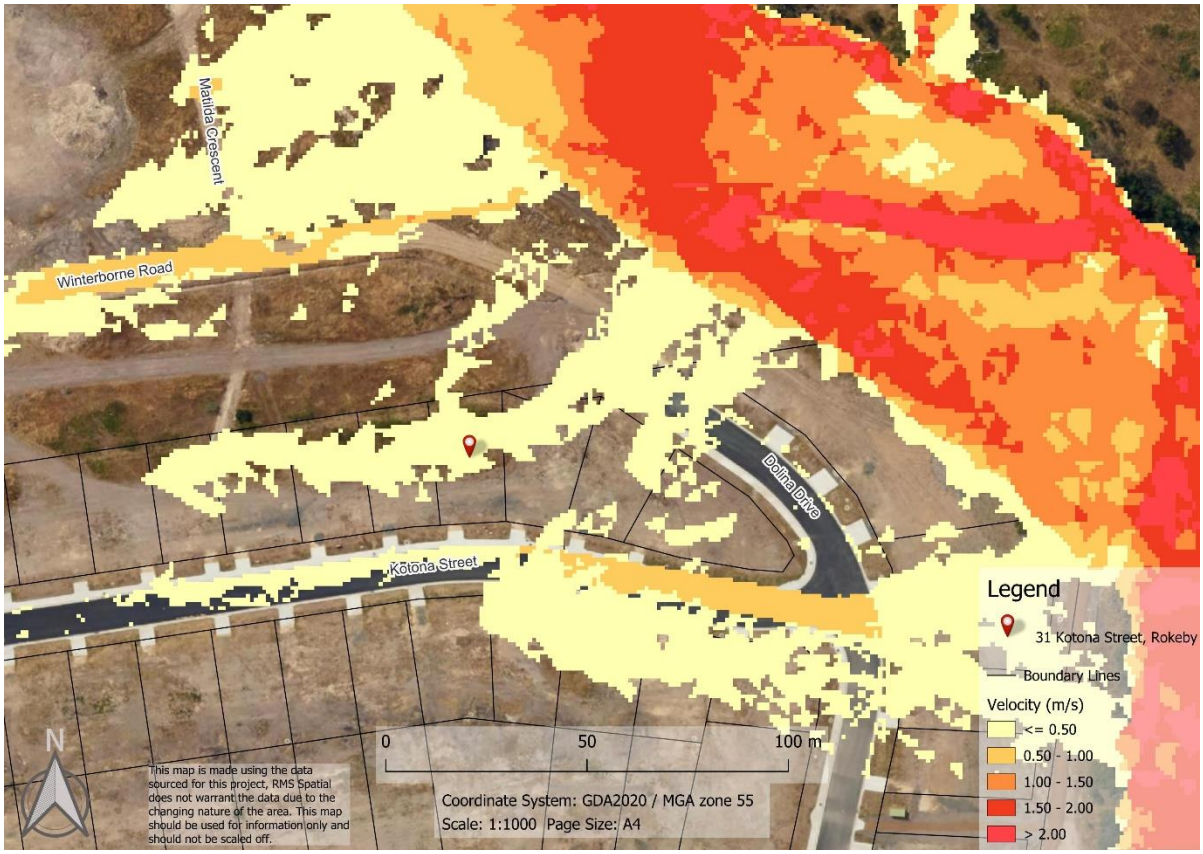

Figure 7, Pre development 1% AEP @2100 Velocity Map

5.1.2. Post Development Results

Figure 8 shows the post development scenario. In this scenario, the proposed building footprint and driveway has been included and the floor level has been raised to 300mm above the 1% flood levels of 50.3mAHD. The proposed development shows interaction with the flood extents, with the western side of the building being influenced by a maximum depth of 75mm at the rear of the building along the deck. Figure 9 shows slightly elevated, however still slow, velocities around the building with maximum velocities of less than 0.4 m/s. Figure 9 shows an increase from the predevelopment velocities mainly around the building corner which quickly dissipates to predevelopment level after the structure. Whilst this shows a slight increase in velocity, the increase does not result in any increase in flood hazard risk or in erosion potential with the maximum velocity well below Austroads guidelines for channel design erosion potential of non-vegetated sands and loams of 0.8m/s (Austroads,2013).

Figure 8, Post Development 1% AEP @ 2100 depth map

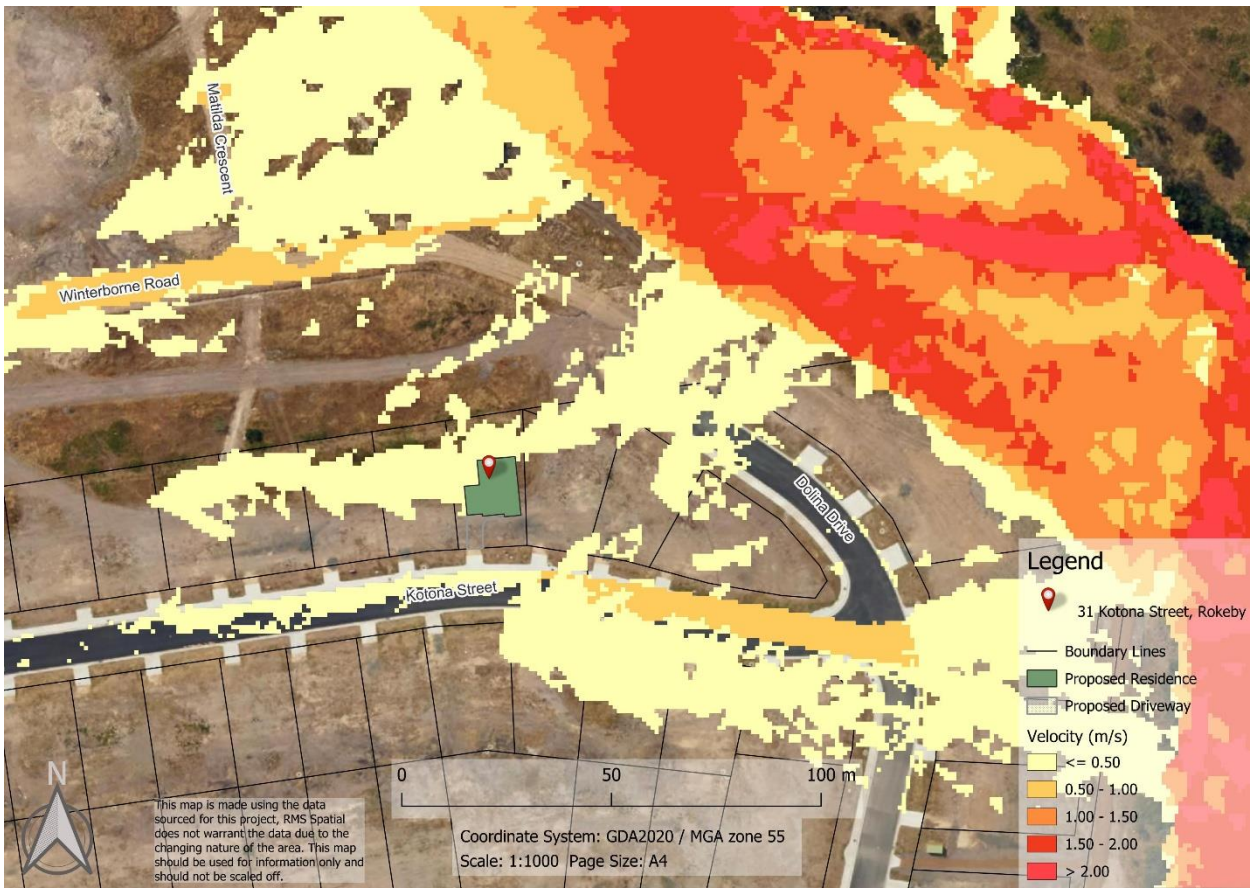

Figure 9, Post Development 1% AEP @2100 Velocity Map

5.2. Building Inundation Levels

Figure 8 shows flood inundation intersecting the proposed building to a maximum elevation of 50.5mAHD. To meet the Building Regulations S.53, the construction of a new dwelling is required to have a habitable floor level no less than 300mm above the 1% AEP + CC flood level. Therefore, the minimum floor level required for the proposed development to comply with these sections is 50.8mAHD, as can be seen in Table 7.

Table 7, Minimum Floor level required for each unit.

Building	Proposed FFL (mAHD)	1% + CC Flood Level (mAHD)	Minimum Floor Level Required (mAHD)
Proposed Building	50.45	50.5	50.8

5.3. Overland Flood Behaviour

Pre and post overland flow levels are recorded in Table 8 below. They show little to no differences in depth (7mm), with a negligible difference in velocity of 0.01m/s and discharge of 0.002m^3/s at cross section XS1 (Figure 8). Extent of flooding or the risk on rating on surrounding properties or infrastructure does not change from pre and post model runs.

Table 8, Overland flow differences pre and post development

Sample	Parameter	Pre-Development	Post Development	Difference
XS1	Flow	0.017m^3/s	0.019 m^3/s	0.002m^3/s
	Depth	0.021m	0.028m	0.007 m (7mm)
	Velocity	0.11m/s	0.12m/s	0.01 m/s
	Hazard	H1	H1	-

6. Inundation Risk Analysis

6.1. Flood Hazard Assessment

As per the Australian Disaster and Resilience Handbook 7, flood hazards are classified into categories of severity dependent upon depth and velocity of the flooding. Figure 10 below describes the risk and levels associated with each category.

Figure 11 shows the flood hazard layer at 31 Kotona Street. As the post development maximum depth onsite is <80mm and velocities <0.4m/s, this places the maximum hazard category to H1 – generally safe for people, vehicles, and buildings, for both pre and post development, showing no increased risk from flooding on site and neighbouring properties in a 1% AEP at 2100 flood scenario. Therefore, the building can demonstrate a tolerable risk to flooding onsite Additionally, the development can maintain a safe access to and from the development via Kotona Street.

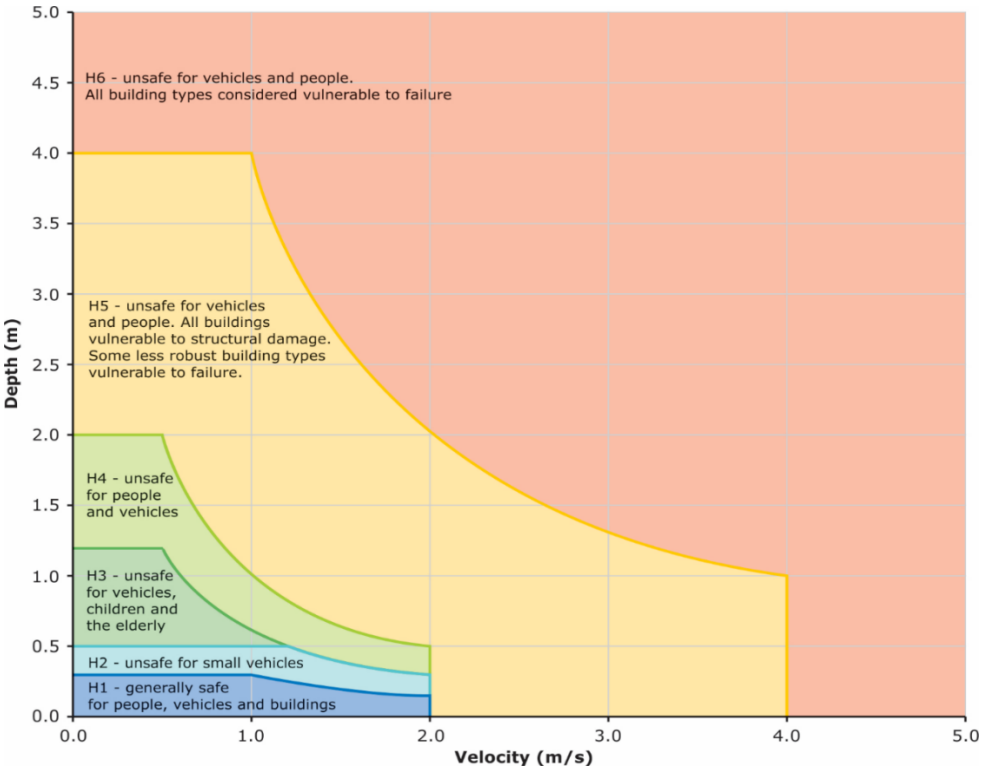

Figure 10, Australian Disaster and Resilience Handbook - Hazard Categories

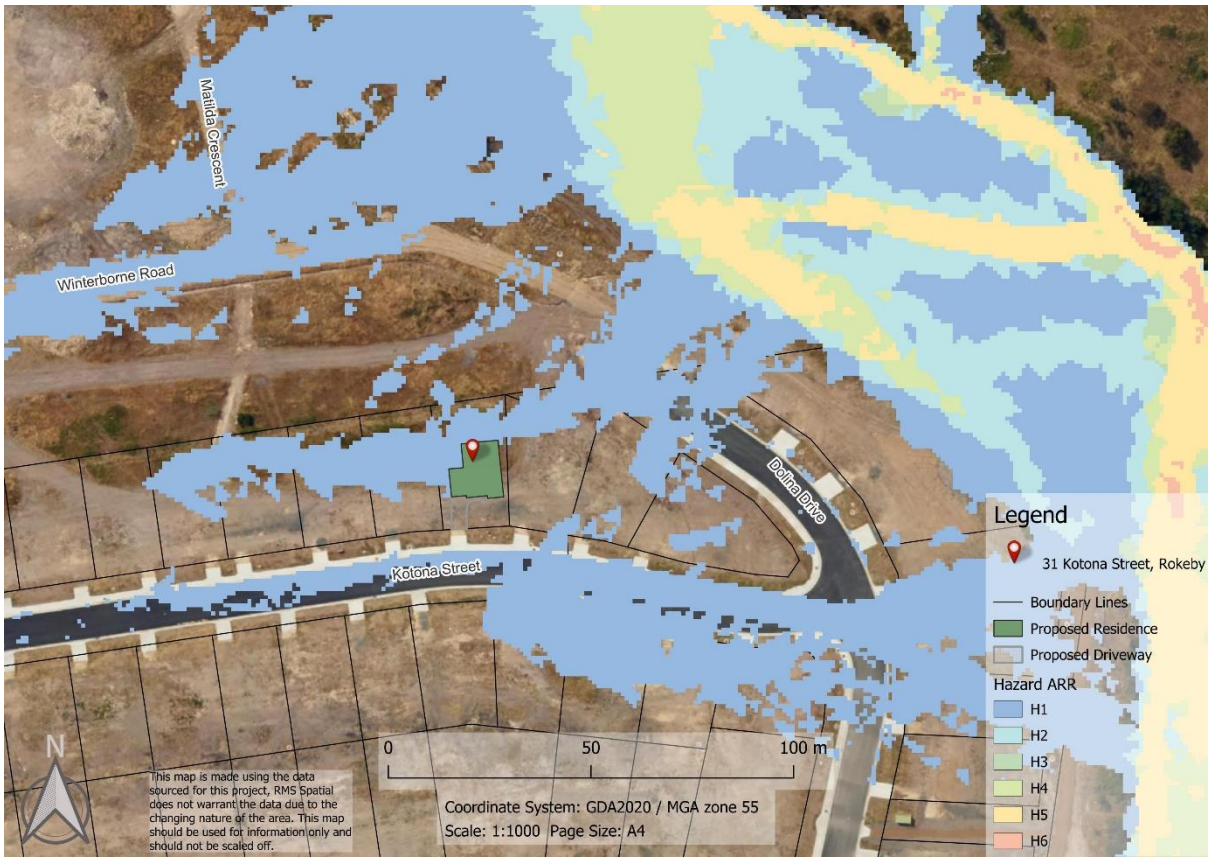

Figure 11, Post Development 1% AEP @2100 Hazard Map

6.2. Risk Assessment

A qualitative risk assessment has been undertaken to outline risks that may arise from building works in areas that are vulnerable to inundation. The risk assessment is based on the development as described in this report and a fifty-year projected life of the structure to 2076.
The qualitative assessment of risk severity and likelihood, in accordance with AS/NZ 4360 Risk Assessment, were used to help provide a qualitative risk assessment based upon the inundation assessment completed for the site. A detailed risk assessment addressing the performance criteria is presented in Appendix 2.

The risk assessment undertaken provides a level of risk demonstrating that the proposed structure can achieve and maintain a tolerable risk for the entire life of the structure.

7. Recommendations

RMS Spatial, through the findings of this report, recommends that the proposed development with the following recommendations will meet the requirements of Tasmanian Planning Scheme - Flood Prone Areas Hazard C12.6.1 P1 and the Building Act 2016. The following recommendations apply:

1) The finished floor levels of the extension must not be lower than a floor level of 50.8mAHD, 300mm higher than the 1% AEP+CC flood event (50.5mAHD).
2) Hydrodynamic and hydrostatic forces should be considered in the structural assessment of the development where applicable.

Development as per the current design and recommendations of the report displays a tolerable risk to inundation for the life of the development (2076).

8. Limitations

This study is limited to the objectives of the engagement by the clients, the availability and reliability of data, and including the following:

- All parameters have been derived from best practice manuals and available relevant studies (if applicable) in the area. This information is subject to change as new information becomes available and as further studies are carried out.
- All provided data by the client or government bodies for the purpose of this study are deemed fit for purpose and have not been checked for accuracy.
- The study is to determine the effects of the new development on inundation behaviour and should not be used as a full riverine inundation study outside the specified area without further assessment.
- The information provided represents the best estimates based on currently available information described and is subject to change.
- No warranty is made as to the accuracy or liability of any studies, estimates, calculations, opinions, conclusions, recommendations (which may change without notice), or other information contained in this report, and to the maximum extent permitted by law.
- RMS Spatial disclaims all liability and responsibility for any direct or indirect loss or damage which may be suffered by any recipient other than the client, relying on anything contained in or omitted from this report.

9. References

1. *Australian Disaster Resilience Guideline 7-3: Technical flood risk management guideline: Flood hazard, 2014, Australian Institute for Disaster Resilience CC BY-NC*
2. *Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors), 2019, Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia*
3. *Board, A. B. C. (2016). NCC Volume one: Construction of Buildings in Flood Hazard Areas*
4. *Grose, M. R., Barnes-Keoghan, I., Corney, S. P., White, C. J., Holz, G. K., Bennett, J. & Bindoff, N. L. (2010). Climate Futures for Tasmania: General Climate Impacts Technical Report.*
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6. *Standards Australia & Standards New Zealand (2009) AS/NZS ISO 31000:2009 Risk Management - Principles and Guidelines, Standards Australia and Standards New Zealand, Sydney, Australia and Wellington, New Zealand.*
7. *T.A. Remenyi, N. Earl, P.T. Love, D.A. Rollins, R.M.B. Harris, 2020, Climate Change Information for Decision Making –Climate Futures Programme, Discipline of Geography & Spatial Sciences, University of Tasmania.*

10. Appendices

Appendix 1 Flood Hazard Maps

1% AEP at 2100
Inundation Depth
31 Kotona Street, Rokeby

LEGEND

31 Kotona Street, Rokeby

Boundary Lines

Depth (m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.60
- 0.60 - 1.20
- 1.20 - 2.00
- > 2.00

N

0 20 40 m

CRS: GDA2020 / MGA zone 55
EPSG:7855
Scale: 1:800
Page size: A3

RMS SPATIAL

This map is made using the data sourced for this project, RMS Spatial does not warrant the data due to the changing nature of the area. This map should be used for information only and should not be scaled off.

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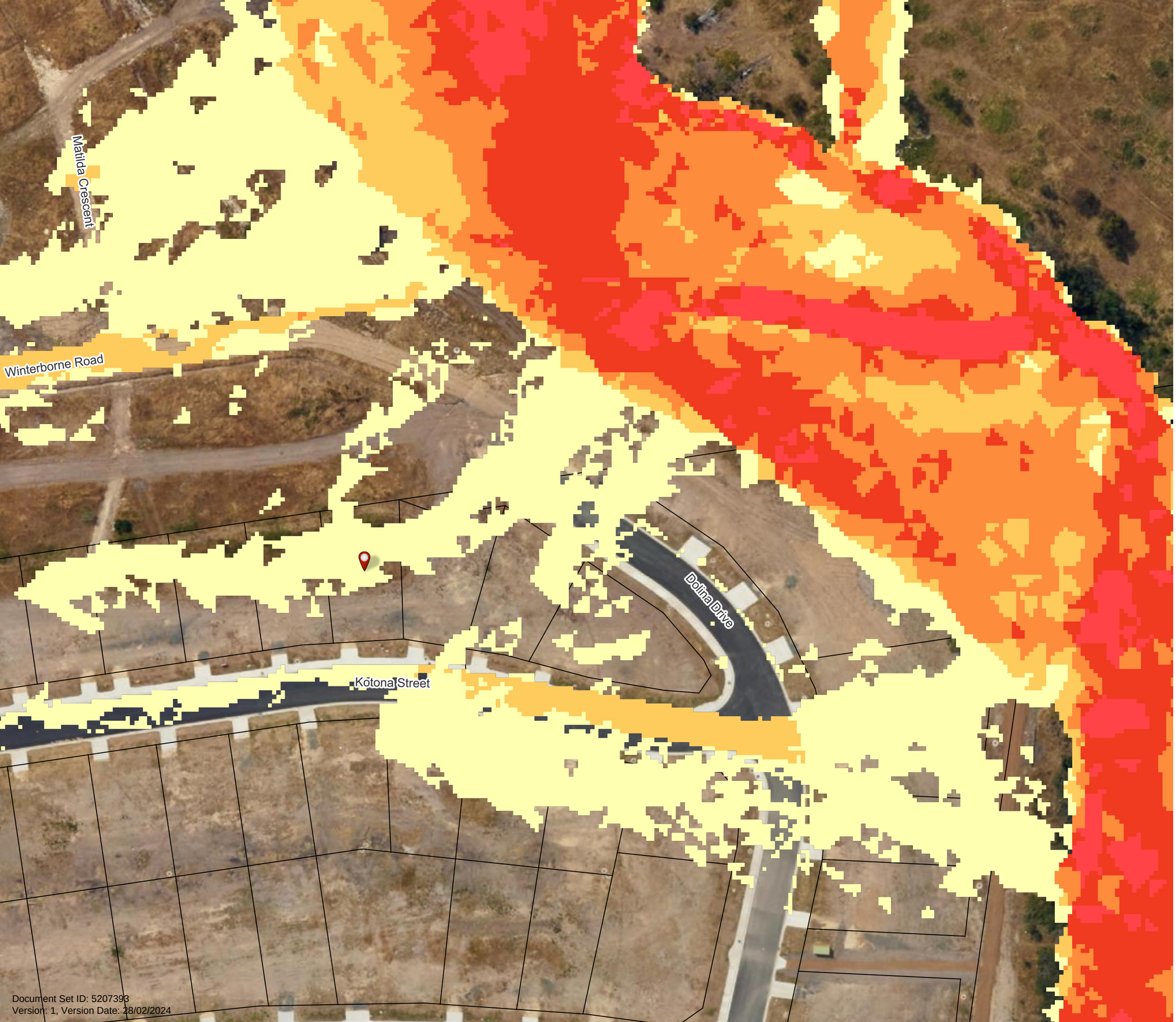
Version: 1, Version Date: 28/02/2024



1% AEP at 2100
Inundation Velocity
31 Kotona Street, Rokeby

LEGEND

31 Kotona Street, Rokeby

Boundary Lines

Velocity (m/s)

- <= 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00

N

0 20 40 m

CRS: GDA2020 / MGA zone 55
EPSG:7855
Scale: 1:800
Page size: A3

RMS SPATIAL

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1% AEP at 2100
Inundation Hazard
31 Kotona Street, Rokeby

LEGEND

31 Kotona Street, Rokeby

Boundary Lines

Hazard ARR

- H1
- H2
- H3
- H4
- H5
- H6

Matilda Crescent

Winterborne Road

Kotona Street

Dolina Drive

N

0 20 40 m

CRS: GDA2020 / MGA zone 55
EPSG:7855
Scale: 1:800
Page size: A3

RMS SPATIAL

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Document Set ID: 5207393
Version: 1, Version Date: 28/02/2024

1% AEP at 2100
Post Inundation Depth
31 Kotona Street, Rokeby

LEGEND

31 Kotona Street, Rokeby

Boundary Lines

Proposed Residence

Proposed Driveway

Depth (m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.60
- 0.60 - 1.20
- 1.20 - 2.00
- > 2.00

N

0 20 40 m

CRS: GDA2020 / MGA zone 55
EPSG:7855
Scale: 1:800
Page size: A3

RMS SPATIAL

This map is made using the data sourced for this project, RMS Spatial does not warrant the data due to the changing nature of the area. This map should be used for information only and should not be scaled off.

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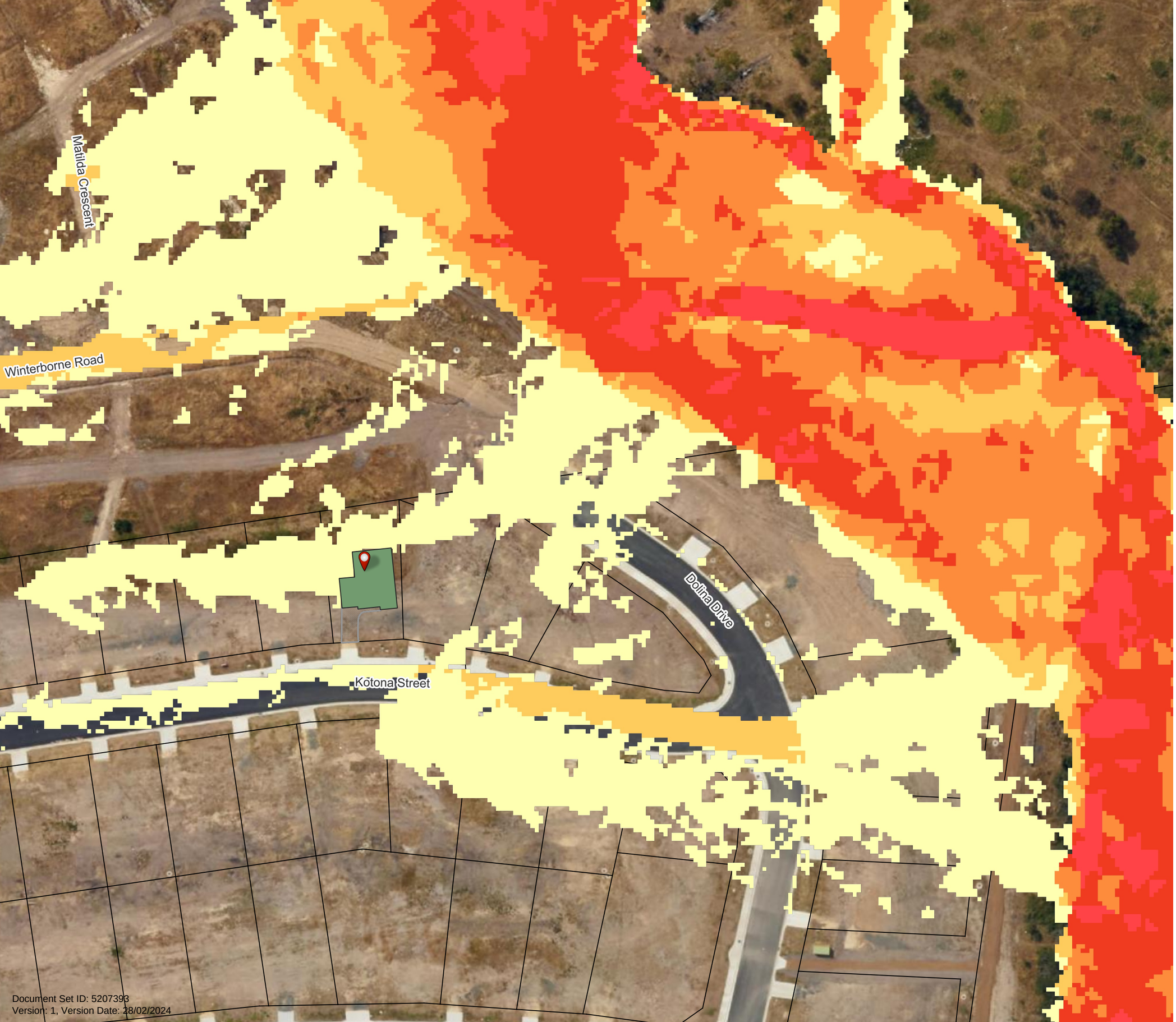

1% AEP at 2100
Post Inundation Velocity
31 Kotona Street, Rokeby

LEGEND

- 31 Kotona Street, Rokeby
- Boundary Lines
- Proposed Residence
- Proposed Driveway

Velocity (m/s)

- <= 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00

N

0 20 40 m

CRS: GDA2020 / MGA zone 55
EPSG:7855
Scale: 1:800
Page size: A3

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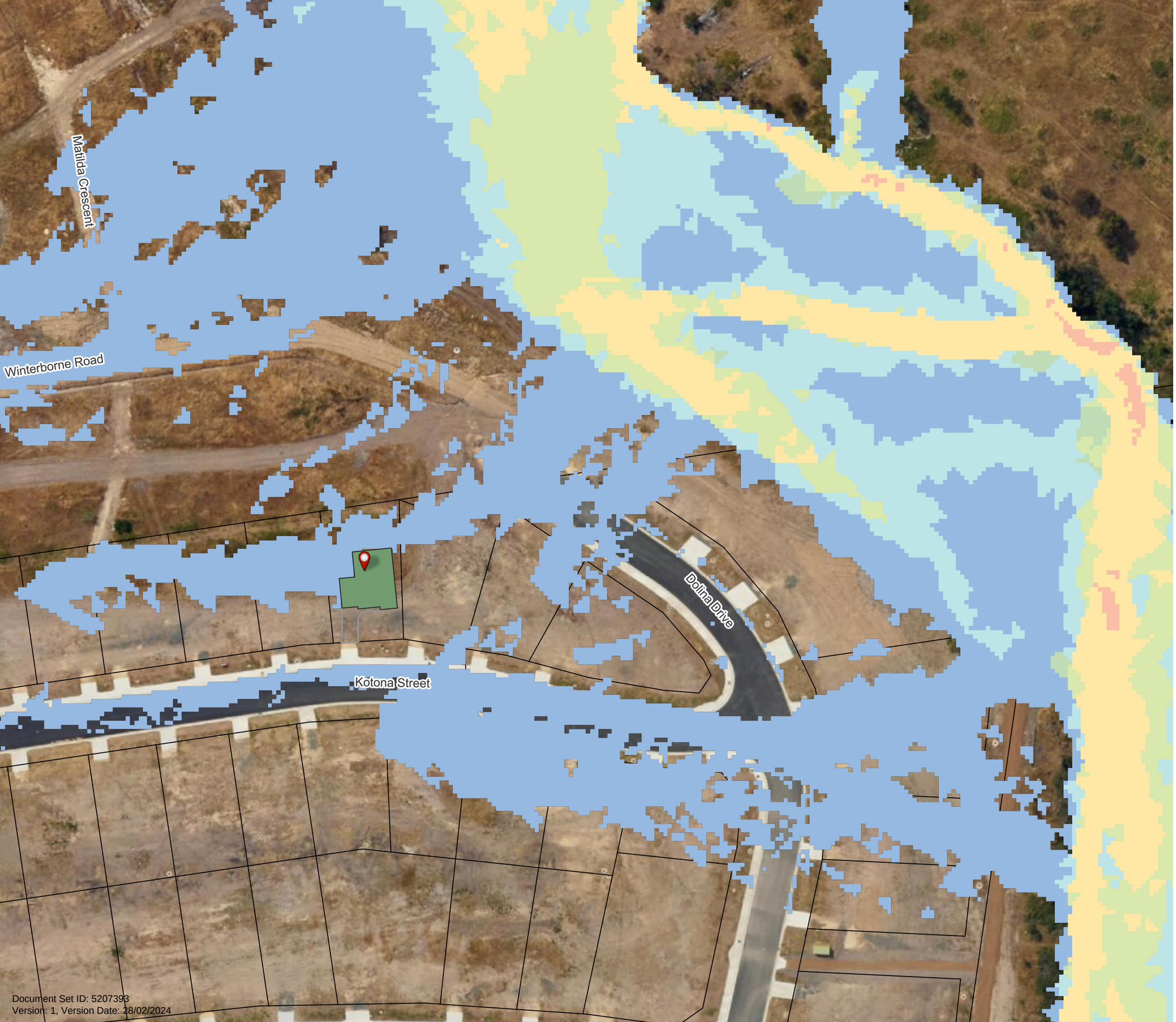

1% AEP at 2100
Post Inundation Hazard
31 Kotona Street, Rokeby

LEGEND

- 31 Kotona Street, Rokeby
- Boundary Lines
- Proposed Residence
- Proposed Driveway

Hazard ARR

- H1
- H2
- H3
- H4
- H5
- H6

N

0 20 40 m

CRS: GDA2020 / MGA zone 55
EPSG:7855
Scale: 1:800
Page size: A3

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Document Set ID: 5207393
Version: 1, Version Date: 28/02/2024

Appendix 2 Risk Assessment

Consequence	Risk from Inundation
Catastrophic	Loss of life. Loss of significant environmental values due to a pollution event where there is not likely to be recovery in the foreseeable future.
Major	Extensive injuries. Complete structural failure of development, destruction of significant property and infrastructure, significant environmental damage requiring remediation with a long-term recovery time.
Moderate	Treatment required, significant building or infrastructure damage i.e. loss of minor outbuildings such as car ports, garages and the like. Replacement of significant property components. linings, hard paved surfaces, cladding, flooring. Moderate environmental damage with a short-term natural or remedial recovery time.
Minor	Medium loss – repair of outbuildings and repair and minor replacement of building components of buildings. Replacement of floor/window coverings, some furniture through seepage (where applicable). Minor environmental damage easily remediated.
Insignificant	No injury, low loss – no replacement of habitable building components, some remediation of garden beds, gravel driveways etc. Environment can naturally withstand and recover without remediation. Inundation of the site, but ground based access is still readily available and habitable buildings are not inundated, including incorporated garages.

Descriptor	Description	Guide
Almost Certain	Consequence is expected to occur in most circumstances	Occurs more than once a month
Likely	Consequence will probably occur in most circumstances	Occurs once every 1 month – 1 year
Occasionally	Consequence should occur at some time	Occurs once every 1 year – 10 years
Unlikely	Consequence could occur at some time	Occurs once every 10 year – 100 years
Rare	Consequence may only occur in exceptional circumstances	Occurs less than once every 100 years

Likelihood of Consequence	Maximum Reasonable Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	High	High	Extreme	Extreme	Extreme
Likely	Moderate	High	High	Extreme	Extreme
Occasionally	Low	Moderate	High	Extreme	Extreme
Unlikely	Low	Low	Moderate	High	Extreme
Rare	Low	Low	Moderate	High	High

C12.6.1 Performance Criteria P1 **Buildings and works within a flood-prone hazard area must achieve and maintain a tolerable risk from a flood, having regard to:**	**Relevance**	**Management**	**Preliminary Risk Assessment**			**Action Required**
			Consequence	**Likelihood**	**Risk**	
the type, form, scale and intended duration of the development.	The proposed development is single storey class 1a residential development, with a suggested life of 50 years.	The report does not assess or recommend the development for a vulnerable use as defined under section C10.3 Definition of Terms of the TPS.	Insignificant	Unlikely	Low	N/A
whether any increase in the level of risk from flood requires any specific hazard reduction or protection measures.	No increase in risk to users onsite, adjoining or nearby land from the development is present.	N/A	Insignificant	Unlikely	Low	N/A
any advice from a State authority, regulated entity or a council.	N/A	N/A				
the advice contained in a flood hazard report.	See Section 8 Recommendations.	1. Floor level to be no lower the 1%AEP+CC flood level against the extension +300mm, 2. Structural assessments for flood forces are undertaken.	Insignificant	Unlikely	Low	N/A
C12.6.1 Performance criteria P2 **A flood hazard report also demonstrates that the building and works:**						
do not cause or contribute to flood on the site, on adjacent land or public infrastructure.	Development does not contribute to inundation onsite, on adjacent land or infrastructure.	N/A	Insignificant	Unlikely	Low	N/A
can achieve and maintain a tolerable risk from a 1% annual exceedance probability flood event for the intended life of the use without requiring any flood protection measures.	The report demonstrates that the building can achieve a tolerable risk to the 1% AEP plus climate change flood event, for the intended life.	The development applies the recommendations of the Report.	Insignificant	Unlikely	Low	N/A

DOYLE SOIL CONSULTING

SITE AND SOIL EVALUATION REPORT

FOUNDATION AND WINDLOADING ASSESSMENT

LOT 59 Greenville Estate

Rokeby

October 2022

Doyle Soil Consulting: 150 Nelson Rd Mt Nelson 7007 – 0488 080 455 – robyn@doylesoilconsulting.com.au

SITE INFORMATION

Client: Creative Homes Hobart

Address: LOT 59 Greenville Estate, Rokeby (CT Part of 142549/1)

Site Area: Approximately 539 m^2

Date of inspection: 30/09/2022

Building type: New House

Services: Mains water and sewer

Planning Overlays: Priority vegetation, airport obstacle limitation, bushfire prone

Mapped Geology - Mineral Resources Tasmania 1:25 000 Hobart sheet:
Pua = Permian siltstone and silty sandstone

Soil Depth: 1.6 – 1.9 m

Subsoil Drainage: Moderately-well drained

Drainage lines / water courses: Stokell Creek to the east

Vegetation: Disturbed

Rainfall in previous 7 days: Approximately 11 mm

Site Assessment and Sample Testing

Site investigation and soil classification in accordance with AS 2870-2011 *Residential slabs and footings* and in accordance with AS 4055-2021 *Wind load for Housing.*

Two test hole (TH) cores: TH1 with refusal at 1.95 m, and TH2 with refusal at 1.85 m.

Dynamic Cone Penetrometer (DCP) test(s): DCP1 at TH2 with refusal at 1.6 m.

Emerson Dispersion test on subsoils and linear shrinkage tests on all likely founding layers.

Test holes were dug using a Christie Post Driver Soil Sampling Kit, comprising CHPD78 Christie Post Driver with Soil Sampling Tube (50 mm OD x 1600/2100 mm).

SOIL PROFILES – Test Hole 1

TH1 Depth (m)	Horizon	Description and field texture grade	Soil Classifn.
0.0 – 0.6	AB	Very dark greyish brown (10YR 3/2) grading to dark greyish brown (2.5Y 4/2), **Medium Clay**, massive, slightly moist firm to stiff consistency.	**CL**
0.6 – 1.8	B2	Olive brown (2.5Y 4/4), **Sandy Light Clay**, weak coarse angular blocky structure, slightly moist soft.	**CL**
1.8 – 1.9	Cw	Light olive brown (2.5Y 5/3), **Sandy Light Clay**, moderate medium platy structure, slightly moist soft consistency, refusal on weathered alluvial dolerite boulder/gravels.	**CL**

SOIL PROFILES – Test Hole 2

TH1 Depth (m)	Horizon	Description and field texture grade	Soil Classifn.
0.0 – 0.25	A1	Black (10YR 2/1), **Silty Clay Loam**, weak fine polyhedral structure, moist soft consistency.	**ML**
0.25 – 1.0	$B2_1$	Very dark greyish brown (2.5Y 3/2) grading to dark olive brown (2.5Y 3/3) **Medium Clay**, massive, moist soft consistency.	**CL**
1.0 – 1.55	$B2_2$	Olive brown (2.5Y 4/4), **Sandy Light Clay**, weak coarse angular blocky structure, slightly moist stiff consistency.	**CL**
1.55 – 1.85	BC	Light olive brown (2.5Y 5/3), **Sandy Light Clay**, moderate medium platy structure, slightly moist soft, refusal on weathered alluvial dolerite boulder/gravels.	**CL**

SITE AND SOIL COMMENTS

The natural soil profiles are formed from clayey colluvium derived from mudstone over alluvial gravels of dolerite. The profiles are moderately deep with refusal occurring at approximately 1.6 to 1.9 m. The field textures of the soil profile are dominated by clay, which is moderately reactive, weakly to moderately structured with low bearing capacity to at least 0.7 m. We recommend founding on the underlying competent alluvial gravels at approximately 1.6 to 1.9 m.

LINEAR SHRINKAGE AND SOIL REACTIVITY

Samples of the clayey subsoils were tested for reactivity using the linear shrinkage test. Linear shrinkage provides an approximate guide to aid soil classification of reactivity of clays for foundations. The tests suggest the clays are moderately reactive.

Sample	Depth (m)	Length of mould (L)	Longitudinal Shrinkage (LS) in mm	LS (%)	Soil Class
TH 1	0.6 - 1.8	125	11.0	8.8	M
TH 2	0.25 - 1.0	125	16.0	12.8	M
TH 2	1.55 - 1.85	125	13.0	10.4	M

DCP TESTS AND ESTIMATED BEARING CAPACITY

Dynamic Cone Penetrometer (DCP) testing is a method of estimating likely soil bearing capacity. However, surface layers (approx. upper 0.7 m) are subject to significant soil moisture variations with the season, affecting DCP values, especially in clays, e.g. in summer or drought. Dry clays may be very stiff – hard but only soft – firm in winter. Thus, DCP values below approximately 0.7 m are likely to be more typical of year–to–year soil bearing conditions in clayey and silty soils. We provide estimated soil bearing strengths along with a variance range (+/-) based on a review of published literature relating field DCP readings to triaxial soil strength tests.

A minimum bearing capacity of 100 kPa is required for strip and pad footings and under the edge footings and associated slab foundations. The Dynamic Cone Penetrometer (DCP) test DCP1 was carried out near TH2. The subsoils were dry to slightly moist when tested and so the

field DCP values are likely to be higher than in very moist to saturated soil conditions (winter/spring).

The field DCP1 data indicates that the bearing capacity of the soil is at a suitable strength below 0.8 m. However, the competent likely alluvial gravels at approximately 1.6 m would be the recommended foundation material.

Based on the DCP data and core depths, the recommended foundation depth can range from approximately 1.6 – 1.9 m.

The clay horizons are moderately reactive/plastic and thus require foundation design suitable for moderate shrinking and swelling induced movement (refer to tables below and AS2870-2011 clause 2.4.5).

DCP 1				
Depth (mm)	DCP n-number (Blows/100 mm)	DCP Penetration Index (mm/Blow)	Estimated bearing capabity (kPa = n x 30)	Likely Variance (+/-)
0 - 100	1	100.0	30	10
100 - 200	1	100.0	30	10
200 - 300	2	50.0	60	20
300 - 400	2	50.0	60	20
400 - 500	2	50.0	60	20
500 - 600	3	33.3	90	30
600 - 700	6	16.7	180	60
700 - 800	6	16.7	180	60
800 - 900	9	11.1	270	90
900 - 1000	12	8.3	360	120
1000 - 1100	14	7.1	420	140
1100 - 1200	14	7.1	420	140
1200 - 1300	16	6.3	480	160
1300 - 1400	17	5.9	510	170
1400 - 1500	20	5.0	600	200
1500 - 1600	35	2.9	1050	350

EMERSON AGGREGATE DISPERSION TEST

Soils with an excess of exchangeable sodium ions on the cation exchange complex (clays), can cause clay dispersion. Under some circumstances the presence of dispersive soils can also lead to significant erosion, and in particular tunnels leading to eventual gully erosion. Based upon field survey of the property and the surrounding area, no erosion was identified at the site.

The subsoil was tested for dispersion using the Emerson Aggregate Test (EAT). Photos are available on request. The class 2(1) indicates a slight dispersion characteristic. The subsoils are therefore slightly spontaneously dispersive and so exposure to rainfall may lead to minor clay dispersion and potentially rill and tunnel erosion, although this is more common in sandy lighter clays, sandy clay loams and silt loams. Dispersive clay subsoil materials can also cause sealing of the soil surface – if left out in wet weather, they then dry and set very hard in dry weather. To minimise this, we recommend coverage of exposed subsoil with topsoil or regular treatment with gypsum at 0.5 Kg/m^2 along with minimising subsoil disturbance whenever possible. Photo available on request.

Sample	Depth (m)	Visual sign	Class
TH 1	0.6 - 1.8	Some dispersion (Slight milkiness immediately adjacent to aggregate)	2(1)
TH 2	0.25 - 1.0	Some dispersion (Slight milkiness immediately adjacent to aggregate)	2(1)
TH 2	1.55 - 1.85	Some dispersion (Slight milkiness immediately adjacent to aggregate)	2(1)

WIND CLASSIFICATION

The AS 4055-2021 *Wind load for Housing* classification of the site is:

Region:	**A**
Terrain Category:	**TC3**
Shielding Classification:	**NS**
Topographic Classification:	**T2**
Wind Classification:	**N2**
Design Wind Gust Speed ($V_{h,u}$):	**40 m/sec**

SITE CLASSIFICATION AND RECOMMENDATIONS

According to AS2870-2011 (construction) the site is classified as **Class P** due to the low bearing capacity in the upper 0.8 m. We recommend founding below 1.6 m in the firmer gravelly materials.

Note 1 – The soils are also **Class M** or moderately reactive, with 20 – 40 mm the dominant reactivity of expected surface movement under normal soil moisture ranges for the location.

Note 2 – If founded entirely on underlying competent likely alluvial gravels below approximately 1.6 to 1.9 m, which is recommended, and no part of the foundations, be it a slab, pier or footing, is in contact with/or is supported by the clayey subsoils, then **Class S** would become an appropriate site classification.

Note 3 – All foundations require ongoing adequate drainage and vegetation management – please refer to CSIRO foundation management BTF 18 sheet attached.

Note 3 – If any foundations are placed on FILL that is > 0.5 m in depth then **Class P** is applicable.

General Notes – Important points pertinent to maintenance of foundation soil conditions

This report relates to the soil and site conditions on the property at the time of the site assessment. The satisfactory long-term performance of footings is dependent upon the on-going site maintenance by the owner.

Examples of abnormal moisture conditions developing after construction include the following:

A) The effect of trees too close to the footings
B) Excessive or irregular watering of gardens adjacent to the footings
C) Failure to maintain site drainage affecting footings
D) Failure to repair plumbing leaks affecting footings

E) Loss of vegetation from near the building.

All earthworks on site must comply with AS3798-2007 Guidelines on Earthworks for commercial and residential developments.

REPORT LIMITATIONS

Whilst every attempt is made to describe sub-surface conditions, natural variation will occur that cannot be determined by limited investigative soil testing. Therefore, discrepancies are possible between test results and observations during construction. It is our intention to accurately indicate the most probable soil type(s) and conditions for the area assessed. However due to the nature of sampling an area, variations in soil type, soil depth and site conditions may occur.

We accept no responsibility for any differences between what we have reported and actual site and soil conditions for the particular regions we could not directly assess at the time of inspection.

It is recommended that during construction, Doyle Soil Consulting and/or the design engineer be notified of any major variation to the foundation conditions as predicted in this report. Any changes to the site through excavations may alter the site classification.

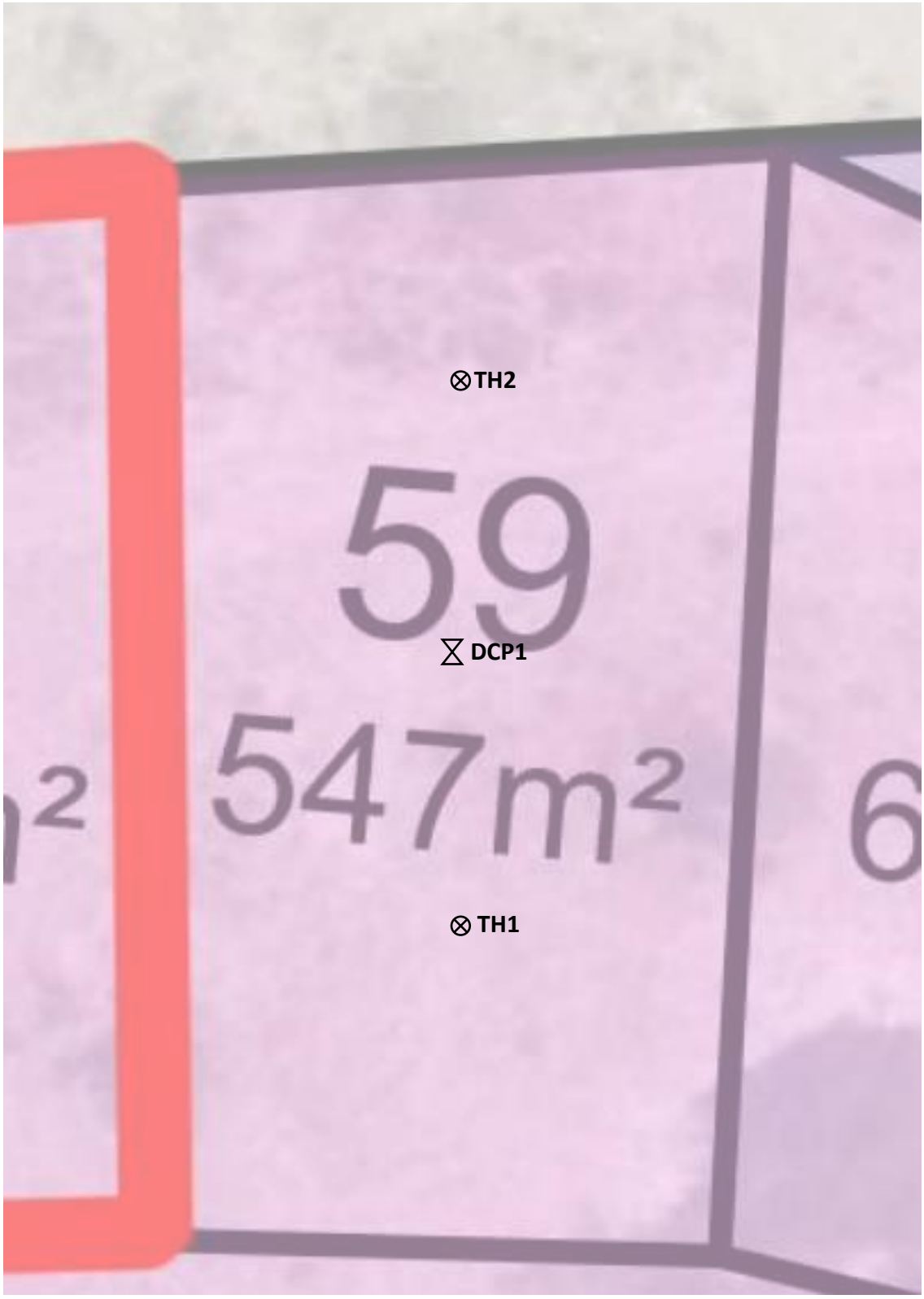
In these cases, it is expected the owner consult the author for a reclassification. This report requires certification via a form 55 certificate from Doyle Soil Consulting to validate its contents.

Because site discrepancies may occur between this report and actual site conditions, it is a condition of certification of this report that the builder be provided with a copy of this report.

Evan Langridge
B.Agr.Sc.(Hons).
Soil Scientist

Dr Richard Doyle
B.Sc.(Hons), M.Sc.(Geol), Ph.D. (Soil Sci.), CPSS (Certified Prof Soil Scientist)
Geologist and Soil Scientist

APPENDIX 1 – Approximate test hole locations



APPENDIX 2 – Definitions of Soil Horizons

Horizon name	Meaning
A1	Dark topsoils, zone of maximum organic activity
A2 or E	Leached, light/pale washed-out sandy layer
A3 or AB	Transition from A to B, more like A
B1 or BA	Transition from A to B, more like B
B2	Main subsoils layer with brown coluration, accumulations of clay, humus, iorn oxide, etc
B3	Transitional from B2 to C
C	Weakly weathered soil parent materials

Subscript	Meaning
r	Reducing conditions (anaerobic)
t	Enriched in translocated clay
s	Iron/aluminium oxide accumulations
g	Mottled, suggesting periodic/seasonal wetness
m	Cemmented layer (oxides, cabonates, humus, silica etc)
k	Calcium carbonate (lime) accumulation
h	Humus accumulation a subsoil

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Creative Homes Hobart *Owner /Agent*

PO Box 4 *Address*

New Town 7008 *Suburb/postcode*

Qualified person details:

Qualified person: Richard Doyle

Address: 150 Nelson Road

Mount Nelson 7173

Phone No: 0488 080 455

Fax No:

Licence No: N/A

Email address: robyn@doylesoilconsulting.com.au

Qualifications and Insurance details: Geologist and Soil Scientist PhD
Certified Professional Soil Scientist (CPSS)
Professional Indemnity cover –

Lloyd's of London
ENG 19 000305

(description from Column 3 of the Director's Determination - Certificates by Qualified Persons for Assessable Items

Speciality area of expertise: AS2870-2011 Foundation Classification

(description from Column 4 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)

Details of work:

Address: LOT 49 Greenville Estate

Rokeby 7019

Lot No: 59

Certificate of title No: Part of 142549/1

The assessable item related to this certificate: Classification of foundation conditions according to AS2870-2011

(description of the assessable item being certified)
Assessable item includes –
- *a material;*
- *a design*
- *a form of construction*
- *a document*
- *testing of a component, building system or plumbing system*
- *an inspection, or assessment, performed*

Certificate details:

Certificate type: Foundation Classification

(description from Column 1 of Schedule 1 of the Director's Determination - Certificates by Qualified Persons for Assessable Items n)

This certificate is in relation to the above assessable item, at any stage, as part of - *(tick one)*

building work, plumbing work or plumbing installation or demolition work: X

or

a building, temporary structure or plumbing installation: ☐

In issuing this certificate the following matters are relevant –

Documents:	The attached Geotechnical Assessment Report for the address detailed above in, 'Details of Work'.
Relevant calculations:	Refer to above report.
References:	AS2870-2011 Residential slabs and footings AS1726-2017 Geotechnical site investigations CSIRO Building Technology File -18

Substance of Certificate: *(what it is that is being certified)*

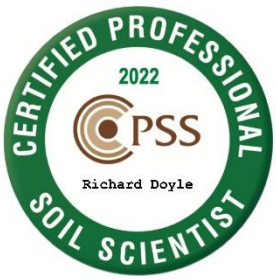
Site classification consistent with AS2870-2011.

Scope and/or Limitations

The classification applies to the site as inspected and does not account for future alteration to foundation conditions as a result of earthworks, drainage condition changes or variations in site maintenance.

I certify the matters described in this certificate.

	Signed:	*Certificate No:*	*Date:*
Qualified person:		1179	03/10/2022



Foundation Maintenance and Footing Performance:
A Homeowner's Guide

PUBLISHING

BTF 18-2011
replaces
Information
Sheet 10/91

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870-2011, the Residential Slab and Footing Code.

Causes of Movement

Settlement due to construction

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

Erosion

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

Saturation

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

Seasonal swelling and shrinkage of soil

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

Shear failure

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

GENERAL DEFINITIONS OF SITE CLASSES

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
E	Extremely reactive sites, which may experience extreme ground movement from moisture changes

Notes

1. Where controlled fill has been used, the site may be classified A to E according to the type of fill used.
2. Filled sites. Class P is used for sites which include soft fills, such as clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soil subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise.
3. Where deep-seated moisture changes exist on sites at depths of 3 m or greater, further classification is needed for Classes M to E (M-D, H1-D, H2-D and E-D).

Tree root growth
Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

Effects of Uneven Soil Movement on Structures

Erosion and saturation
Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

Seasonal swelling/shrinkage in clay
Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

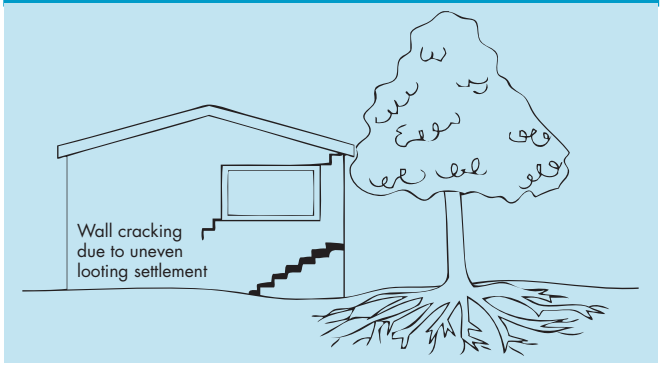
The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

Trees can cause shrinkage and damage



Movement caused by tree roots
In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

Complications caused by the structure itself
Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

Effects on full masonry structures
Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

Effects on framed structures
Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

Effects on brick veneer structures
Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

Prevention/Cure

Plumbing
Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage
In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

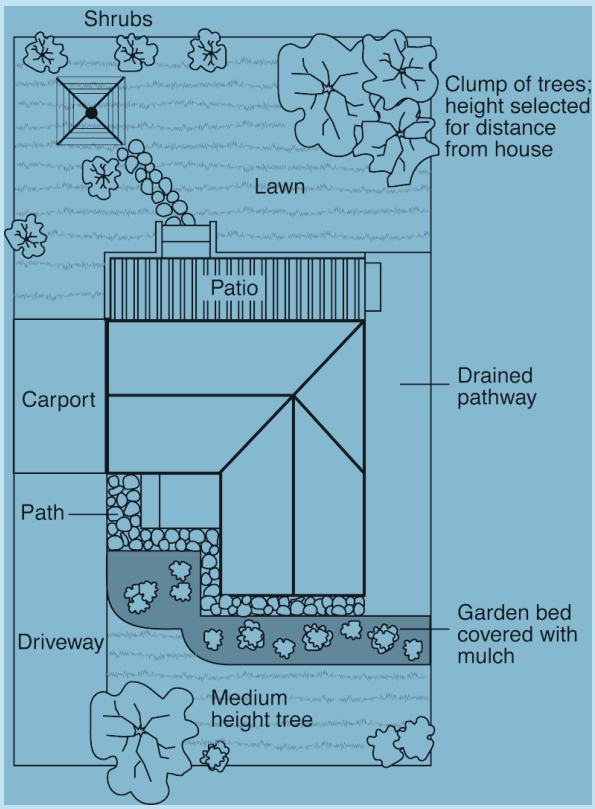
Protection of the building perimeter
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should

CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4

Gardens for a reactive site



extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

Warning: Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.

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