



## **DEVELOPMENT APPLICATION**

### **PDPLANPMTD-2026/061945**

**PROPOSAL:** Dwelling

**LOCATION:** 24 Creese Drive, Richmond

**RELEVANT PLANNING SCHEME:** Tasmanian Planning Scheme - Clarence

**ADVERTISING EXPIRY DATE:** 06/07/2026

The relevant plans and documents can be inspected at the Council offices, 38 Bligh Street, Rosny Park, during normal office hours until 06/07/2026. In addition to legislative requirements, plans and documents can also be viewed at [www.ccc.tas.gov.au](http://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](mailto:clarence@ccc.tas.gov.au). Representations must be received by Council on or before 06/07/2026.

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](http://www.ccc.tas.gov.au) or at the Council offices.

## Planning Application

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Use this form to obtain planning approval for the use and development of land, including change of use, subdividing land into smaller lots, lot consolidation, or signage.

Please refer to the Planning Application checklist on the following pages to determine what documentation must be submitted with your application.

Proposal: **New Residential Dwelling**

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Location: **Lot 35, 24 Creese Drive Richmond**

**Personal Information Removed**

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 City of Clarence, please provide planner's name:

Current use of site: **Vacant Residential 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.
- 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.

**Personal Information Removed**



## Planning Application checklist

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### Mandatory Documents

This information is required for the application to be valid. We are unable to proceed with an application without these documents.

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- Details of the location of the proposed use or development.
- A copy of the current Certificate of Title, Sealed Plan, Plan or Diagram and Schedule of Easements and other restrictions for each parcel of land on which the use or development is proposed.
- Full description of the proposed use or development.
- Description of the proposed operation. May include where appropriate: staff/student/customer numbers; operating hours; truck movements; and loading/unloading requirements; waste generation and disposal; equipment used; pollution, including noise, fumes, smoke or vibration and mitigation/management measures.
- Declaration the owner has been notified if the applicant is not the owner.
- Crown or Council consent (if publically-owned land).
- Any reports, plans or other information required by the relevant zone or code.
- Fees prescribed by the City of Clarence.

Application fees (please phone 03 6217 9550 to determine what fees apply). An invoice will be emailed upon lodgement.

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### Additional Documents

In addition to the mandatory information required above, Council may, to enable it to consider an application, request further information it considers necessary to ensure that the proposed use or development will comply with any relevant standards and purpose statements in the zone, codes or specific area plan, applicable to the use or development.

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- Site analysis and site plan, including where relevant:
    - Existing and proposed use(s) on site.
    - Boundaries and dimensions of the site.
    - Topography, including contours showing AHD levels and major site features.
    - Natural drainage lines, watercourses and wetlands on or adjacent to the site.
    - Soil type.
    - Vegetation types and distribution, and trees and vegetation to be removed.
    - Location and capacity of any existing services or easements on/to the site.
    - Existing pedestrian and vehicle access to the site.
    - Location of existing and proposed buildings on the site.
    - Location of existing adjoining properties, adjacent buildings and their uses.
    - Any natural hazards that may affect use or development on the site.
    - Proposed roads, driveways, car parking areas and footpaths within the site.
    - Any proposed open space, communal space, or facilities on the site.
- 



- Main utility service connection points and easements.
  - Proposed subdivision lot boundaries.
- Where it is proposed to erect buildings, detailed plans with dimensions at a scale of 1:100 or 1:200 showing:
- Internal layout of each building on the site.
  - Private open space for each dwelling.
  - External storage spaces.
  - Car parking space location and layout.
  - Major elevations of every building to be erected.
  - Shadow diagrams of the proposed buildings and adjacent structures demonstrating the extent of shading of adjacent private open spaces and external windows of buildings on adjacent sites.
  - Relationship of the elevations to natural ground level, showing any proposed cut or fill.
  - Materials and colours to be used on rooves and external walls.
- Where it is proposed to erect buildings, a plan of the proposed landscaping showing:
- Planting concepts.
  - Paving materials and drainage treatments and lighting for vehicle areas and footpaths.
  - Plantings proposed for screening from adjacent sites or public places.
- Any additional reports, plans or other information required by the relevant zone or code.
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This list is not comprehensive for all possible situations. If you require further information about what may be required as part of your application documentation, please contact City of Clarence Planning team on (03) 6217 9550.



SEARCH OF TORRENS TITLE

VOLUME 189888	FOLIO 35
EDITION 1	DATE OF ISSUE 02-Jan-2026

SEARCH DATE : 10-Apr-2026

SEARCH TIME : 08.44 am

DESCRIPTION OF LAND

City of CLARENCE

Lot 35 on Sealed Plan 189888

Derivation : Part of 569A-2R-0P Gtd. to Thomas Daniel Cosgrove

Prior CT 189511/103

SCHEDULE 1

M932992 & M933512 TRANSFER to JAC MULTI ASSET PTY LTD

Registered 27-May-2022 at 12.02 pm

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

SP189888 EASEMENTS in Schedule of Easements

SP189888 COVENANTS in Schedule of Easements

SP189888 FENCING PROVISION in Schedule of Easements

SP184978, SP186408, SP186867, SP187236 & SP189511 COVENANTS in  
Schedule of Easements

SP186408, SP186867, SP187236 & SP189511 FENCING PROVISION in  
Schedule of Easements

SP11304 & SP184978 FENCING COVENANT in Schedule of Easements

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

OWNER: JAC MULTI ASSET PTY LTD

FOLIO REFERENCE: CT.189511/103

GRANTEE: PART OF 569A-2R-0P GRANTED TO THOMAS DANIEL COSGROVE & PART OF 5A-1R-22P GRANTED TO CATHERINE SHELVERTON & BRIDGET WARTON

**PLAN OF SURVEY**

BY SURVEYOR SAMUEL FRANKLIN HARVEY  
**ROGERSON AND BIRCH SURVEYORS**  
 UNIT 1 - 2 KENNEDY DRIVE, CAMBRIDGE PARK  
 PH 6248-5898 MOB. 0402-476-360

**CITY OF CLARENCE**

SCALE 1:1500 LENGTHS IN METRES

REGISTERED NUMBER  
**SP189888**

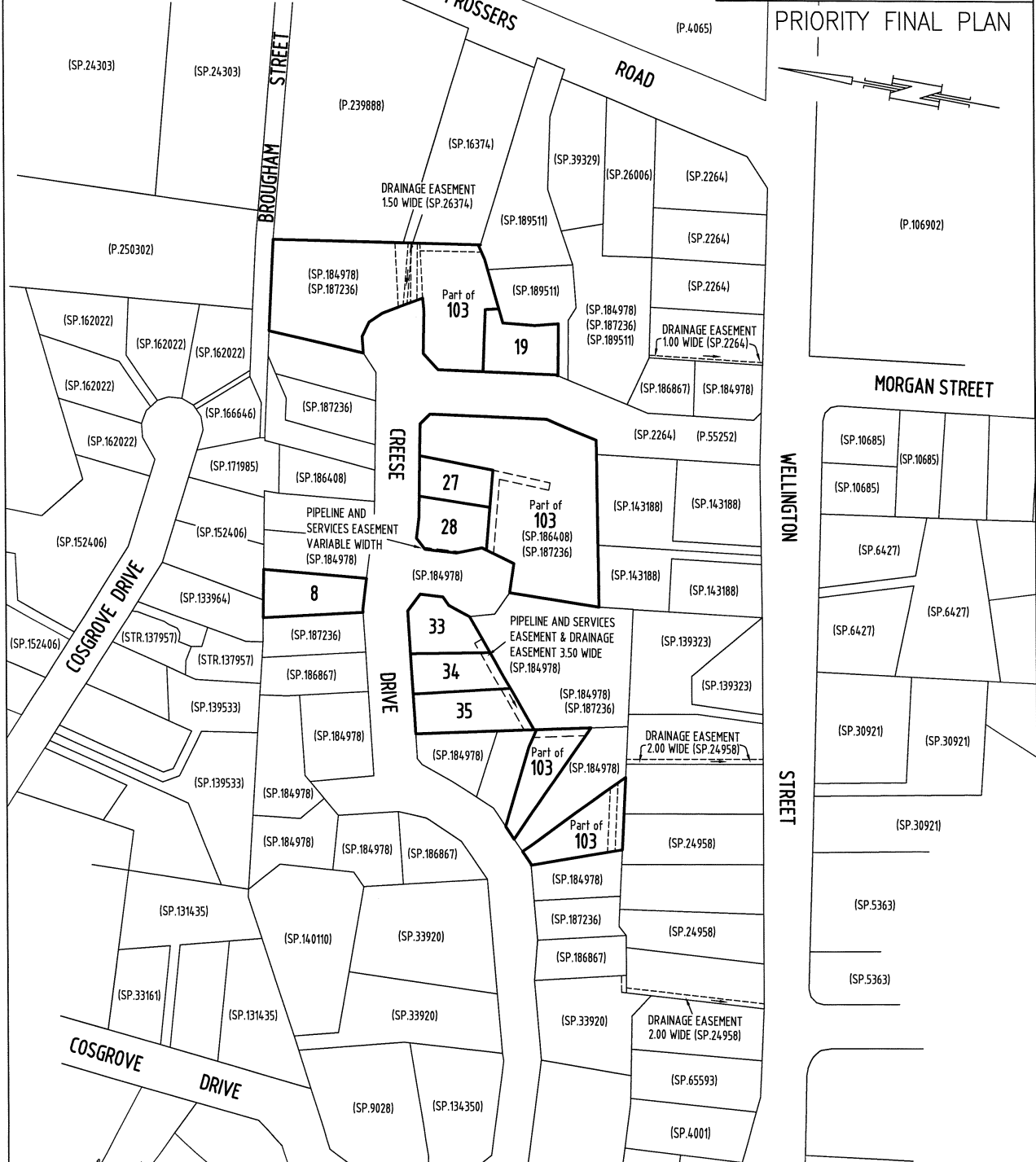
APPROVED EFFECTIVE FROM -2 JAN 2026

*Samuel Franklin Harvey*  
 Recorder of Titles

LOT 103 IS COMPILED FROM CT.189511/103 & THIS SURVEY

INDEX PLAN

ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN



*Samuel Franklin Harvey*  
 Registered Land Surveyor

04/12/2025  
 Date

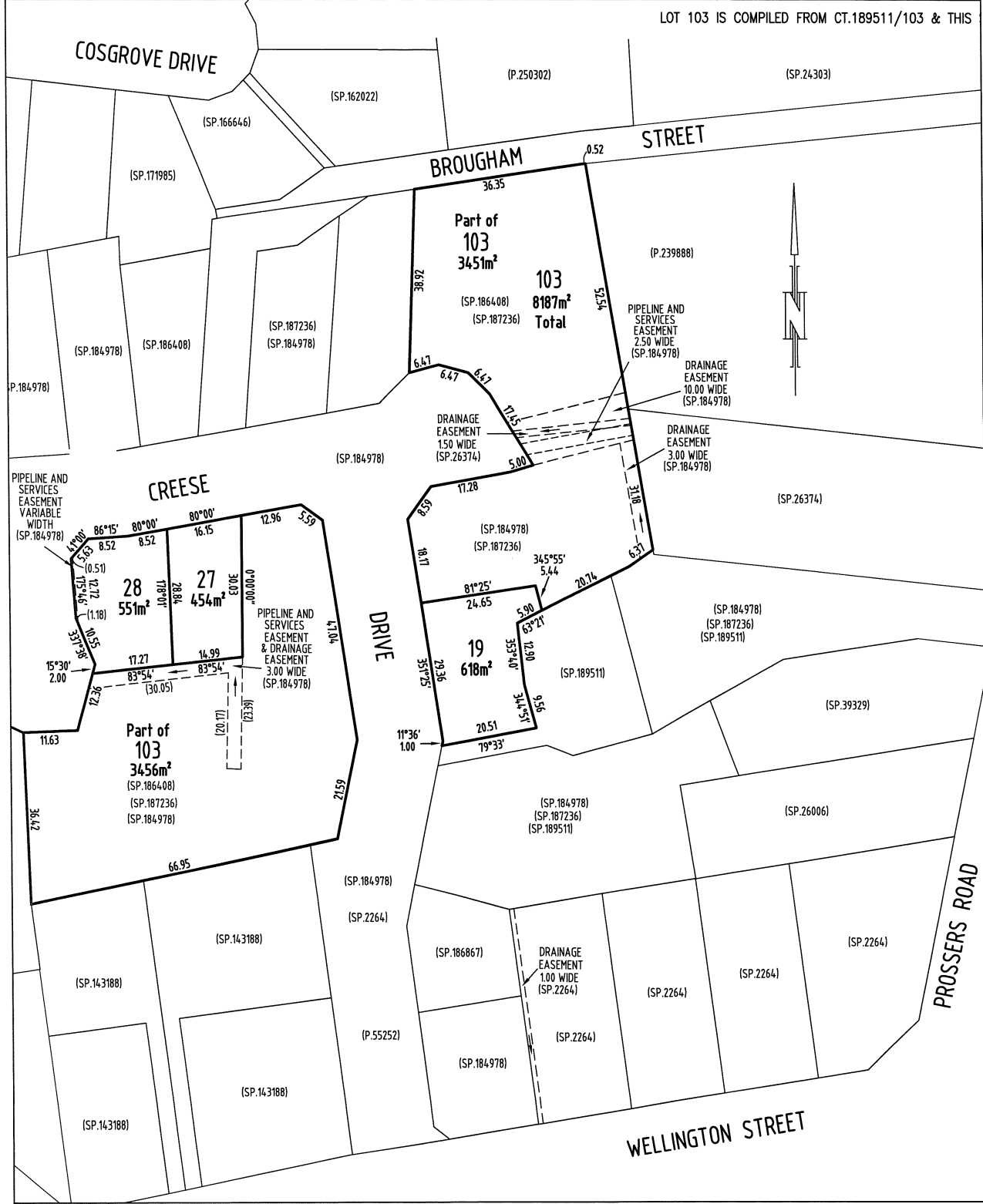
ST JOHN'S CIRCLE

*Clare Shea*  
 Council Delegate

22.12.2025  
 Date



<p>PLAN OF SURVEY ANNEXURE SHEET SHEET 2 OF 2 SHEETS</p>	<p>OWNER: JAC MULTI ASSET PTY LTD FOLIO REFERENCE: CT.189511/103 SCALE 1:750                      LENGTH IN METRES</p>	<p>Registered Number <b>SP 189888</b></p>
<p>SIGNED FOR IDENTIFICATION PURPOSES  ..... <i>C. Mea</i> ..... <u>22.12.2025</u> Council Delegate                      Date</p>	<p>THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED INDEX PLAN.  ..... <i>[Signature]</i> ..... <u>04/12/2025</u> Registered Land Surveyor                      Date</p>	<p>APPROVED EFFECTIVE FROM <b>- 2 JAN 2026</b>  ..... <i>[Signature]</i> ..... Recorder of Titles</p>



<b>SCHEDULE OF EASEMENTS 1</b>	Registered Number
<b>NOTE:</b> THE SCHEDULE MUST BE SIGNED BY THE OWNERS & MORTGAGEES OF THE LAND AFFECTED. SIGNATURES MUST BE ATTESTED.	<b>SP 189888</b>

PAGE 1 OF 4 PAGES

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.

**Drainage**

Lots 33, 34, 35 are SUBJECT TO a right of drainage in gross (in favour of Clarence City Council) over the land marked "PIPELINE AND SERVICES EASEMENT & DRAINAGE EASEMENT 3.50 WIDE (SP.184978)" passing through such lot on the plan.

Lot 103 is SUBJECT TO a right of drainage in gross (in favour of Clarence City Council) over the land marked "PIPELINE AND SERVICES EASEMENT & DRAINAGE EASEMENT 3.00 WIDE (SP.184978)" passing through such lot on the plan.

That part of Lot 103 formerly comprised in Lot 1 on P174538 is TOGETHER WITH a right of drainage over the land marked "DRAINAGE EASEMENT 2.00 WIDE (SP.24958)" on the plan.

That part of Lot 103 formerly comprised in Lot 1 on D40183 is TOGETHER WITH a right of drainage over the land marked "DRAINAGE EASEMENT 1.00 WIDE (SP.2264)" on the plan.

Lot 103 is SUBJECT TO a right of drainage in gross (in favour of Clarence City Council) over the land marked "DRAINAGE EASEMENT 1.50 WIDE (SP.26374)" passing through that lot on the plan.

Lot 103 is SUBJECT TO a right of drainage in gross (in favour of Clarence City Council) over the land marked "DRAINAGE EASEMENT 10.00 WIDE (SP.184978)" passing through that lot on the plan.

Lot 103 is SUBJECT TO a right of drainage in gross (in favour of Clarence City Council) over the land marked "DRAINAGE EASEMENT 3.00 WIDE (SP.184978)" passing through that lot on the plan.


**Taswater**

Lots 33, 34, 35 are SUBJECT TO a pipeline and services easement in gross (in favour of TasWater) over the land marked "PIPELINE AND SERVICES EASEMENT & DRAINAGE EASEMENT 3.50 WIDE (SP.184978)" ("the Easement Land") passing through that lot on the plan.

(USE ANNEXURE PAGES FOR CONTINUATION)

SUBDIVIDER: JAC MULTI ASSET P/L FOLIO REF: 189511/103 SOLICITOR: BUTLER McINTYRE & BUTLER (JS:252694)	PLAN SEALED BY: CLARENCE CITY COUNCIL DATE: 22 <sup>nd</sup> December 2025 2019-003190 & 2024/046803 ..... <i>C. Shea</i> ..... REF NO. <i>Clare Shea</i> Council Delegate
<b>NOTE:</b> The Council Delegate must sign the Certificate for the purposes of identification.	

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<p><b>ANNEXURE TO SCHEDULE OF EASEMENTS</b></p> <p>PAGE 2 OF 4 PAGES</p>	<p>Registered Number</p> <p><b>SP 189888</b></p>
<p>SUBDIVIDER: JAC MULTI ASSET P/L FOLIO REFERENCE: 189511/103</p>	

Lot 103 is SUBJECT TO a pipeline and services easement in gross (in favour of TasWater) over the land marked "PIPELINE AND SERVICES EASEMENT & DRAINAGE EASEMENT 3.00 WIDE (SP.184978)" ("the Easement Land") passing through that lot on the plan.

Lot 28 & 103 are <sup>is</sup> SUBJECT TO a pipeline and services easement in gross (in favour of TasWater) over the land marked "PIPELINE AND SERVICES EASEMENT VARIABLE WIDTH (SP.184978)" ("the Easement Land") passing through that lot on the plan.

Lot 103 is SUBJECT TO a pipeline and services easement in gross (in favour of TasWater) over the land marked "PIPELINE AND SERVICES EASEMENT 2.50 WIDE (SP.184978)" ("the Easement Land") passing through that lot on the plan.

**FENCING PROVISION**

In respect to the lots on the plan the vendor (JAC Multi Asset Pty Ltd) shall not be required to fence

**INTERPRETATION**

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

"Pipeline and Services Easement" means-

**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.

Director: 

Director: 

**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.

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<p><b>ANNEXURE TO SCHEDULE OF EASEMENTS</b></p> <p>PAGE 3 OF 4 PAGES</p>	<p>Registered Number</p> <p><b>SP 189888</b></p>
<p>SUBDIVIDER: JAC MULTI ASSET P/L FOLIO REFERENCE: 189511/103</p>	

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

**"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.

**RESTRICTIVE COVENANTS**

Lots 8, ~~18~~, 19, 27, 28, 33, 34 & 35<sup>#103</sup> are subject to the covenants in SP186867, SP187236 and SP 189511 as follows;

1. Not to make any or permit or suffer the making of any alterations to the finished surface levels of the overland flowpath, swale drain or catch drain constructed within the area marked DRAINAGE EASEMENT 10.00 WIDE on the plan without prior consent in writing of Clarence City Council.
2. Not to make or permit or suffer the placement of any fencing within the drainage easement area with the exception of open style fencing that does not obstruct surface flows to or within the area marked DRAINAGE EASEMENT' 10.00 WIDE on the plan.
3. Not to make or permit or suffer the placement of any wall, structure, landscaping, or vegetation, with the exception of grass or turf within the area marked DRAINAGE EASEMENT 10.00 WIDE on the plan.

Director: 

Director: 

**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.

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<b>ANNEXURE TO SCHEDULE OF EASEMENTS</b> PAGE 4 OF 4 PAGES	Registered Number <b>SP 189888</b>
SUBDIVIDER: JAC MULTI ASSET P/L FOLIO REFERENCE: 189511/103	

Executed by **JAC MULTI ASSET PTY LTD (ACN 636 512 082)**  
pursuant to section 127(1) Corporations Act (Cth) 2001 by-

PETER KRIZ  
Name of Director

[Signature]  
Signature of Director

DEAN MURRAY COCKER  
Name of Director

[Signature]  
Signature of Director

**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.

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# DA TASMANIAN PLANNING SCHEME

## SHEET INDEX

1	COVER SHEET
2	SITE PLAN
3	SOIL & WATER MANAGEMENT PLAN
4	GROUND FLOOR PLAN
5	ELEVATIONS / SECTION
6	ELEVATIONS
7	WINDOW & DOOR SCHEDULES
8	ROOF DRAINAGE PLAN
9	FLOOR COVERINGS
10	KITCHEN DETAILS
11	BATHROOM DETAILS
12	ENSUITE DETAILS
13	LAUNDRY DETAILS
14	POWDER DETAILS

## TOTAL FLOOR AREAS

### MAIN DWELLING, GROUND FLOOR

ALFRESCO	14.93
B&J LIVING	100.19
GARAGE	39.60
LIVING	69.18
PATIO	9.65
PORCH	3.34
VERANDAH	11.49
<b>TOTAL</b>	<b>248.38 m<sup>2</sup></b>

## AS & NCC COMPLIANCE

- ALL CONSTRUCTION TO BE IN ACCORDANCE WITH NCC 2022 AND APPLICABLE AUSTRALIAN STANDARDS AT TIME OF APPROVAL.**
- SLAB IN ACCORDANCE WITH AS 2870. REFER TO ENGINEERS DETAILS FOR ALL SLAB DETAILS.
  - BRICK CONTROL JOINTS PROVIDED IN ACCORDANCE WITH NCC 2022.
  - ALL STEEL FRAMING TO BE DESIGNED TO AS 4100-2020 OR AS/NZS 4600-2018.
  - INSULATION TO BE INSTALLED IN ACCORDANCE WITH NCC 2022 AND ALL APPLICABLE AUSTRALIAN STANDARDS.
  - TERMITE PROTECTION IN ACCORDANCE WITH AS 3660 AND NCC 2022.
  - GLAZING IN ACCORDANCE WITH AS 1288 AND NCC 2022.
  - SMOKE ALARMS IN ACCORDANCE WITH AS 3786 AND NCC 2022.
  - INTERNAL WATERPROOFING IN ACCORDANCE WITH NCC 2022 HOUSING PROVISIONS PART 10.2.
  - EXTERNAL WATERPROOFING IN ACCORDANCE WITH AS 3740 AND AS 4654.
  - WET AREA FLOORS TO FALL TO FLOOR WASTES AT MIN. 1:80 AND MAX. 1:50 GRADE (IF APPLICABLE).
  - CONDENSATION MANAGEMENT IN ACCORDANCE WITH NCC 2022 HOUSING PROVISIONS PART 10.8.
  - BUILDING SEALING IN ACCORDANCE WITH NCC 2022.
  - SERVICES IN ACCORDANCE WITH NCC 2022.
  - EARTHWORKS IN ACCORDANCE WITH AS 3798-2007.
  - EXTERNAL WALL WRAP (SARKING) IN ACCORDANCE WITH NCC 2022 (IF APPLICABLE).
  - EXHAUST FANS DUCTED TO OUTSIDE AIR (IF APPLICABLE).

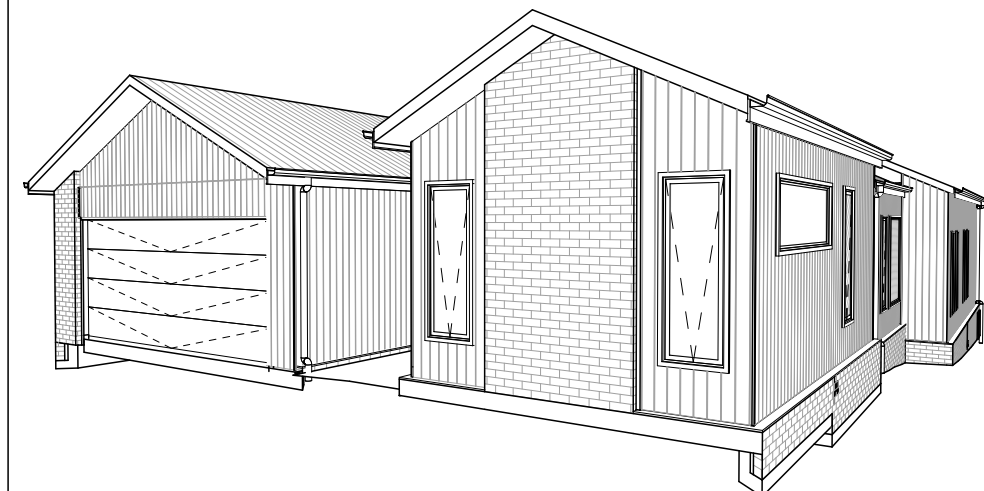
## SITE SPECIFIC CONTROLS

CONTROL	DETAILS
ACID SULPHATE SOIL	NO
BIODIVERSITY	NO
BUILDING ENVELOPE	YES
BUSHFIRE	NO
CLIMATE ZONE (NCC)	ZONE 7 - COOL TEMPERATE
DESIGN WIND CLASSIFICATION	N2 (NOT EXPOSED)
DESIGN WIND SPEED	40.00 m/s (NOT EXPOSED)
ESTATE/DEVELOPER GUIDELINES	RICHMOND GREEN COVENANTS
FLOOD OVERLAY	YES
HERITAGE	TBC
LANDSLIP HAZARD	NO
MINIMUM FLOOR LEVEL	NO
NATURAL ASSET CODE	NO
NOISE ATTENUATION	NO
SALINE SOIL	NO
SHIELDING FACTOR	PS - PARTIAL SHIELDING
SITE CLASSIFICATION	P
SPECIFIC AREA PLAN OVERLAY	NO
TERRAIN CATEGORY	TC2
TOPOGRAPHIC CLASSIFICATION	T0
WATERWAY & COASTAL OVERLAY	YES
WIND REGION	A - NORMAL
WITHIN 1km CALM SALT WATER	NO
WITHIN 50km BREAKING SURF	NO
ZONING	GENERAL RESIDENTIAL

## BUILDING CONTROLS & COMPLIANCE

CONTROL	REQUIRED	PROPOSED
<b>SETBACKS</b>		
FRONT	MIN. 4,500mm	5,538mm
GARAGE TO BOUNDARY	MIN. 5,500mm	5,850mm
SIDE A	MIN. 1,500mm	1,517mm
SIDE B	MIN. 1,500mm	1,406mm
REAR	MIN. 1,500mm	12,365mm
<b>BULK &amp; SCALE</b>		
SITE AREA	716m <sup>2</sup>	
SITE COVERAGE	MAX. 50%	30.12%
<b>LANDSCAPE</b>		
NO APPLICABLE CONTROLS		
<b>EARTHWORKS</b>		
CUT DEPTH	MAX. 2,000mm	168mm
FILL DEPTH	MAX. 1,500mm	0mm
<b>ACCESS &amp; AMENITY</b>		
PRIVATE OPEN SPACE	MIN. 24m <sup>2</sup>	24m <sup>2</sup>

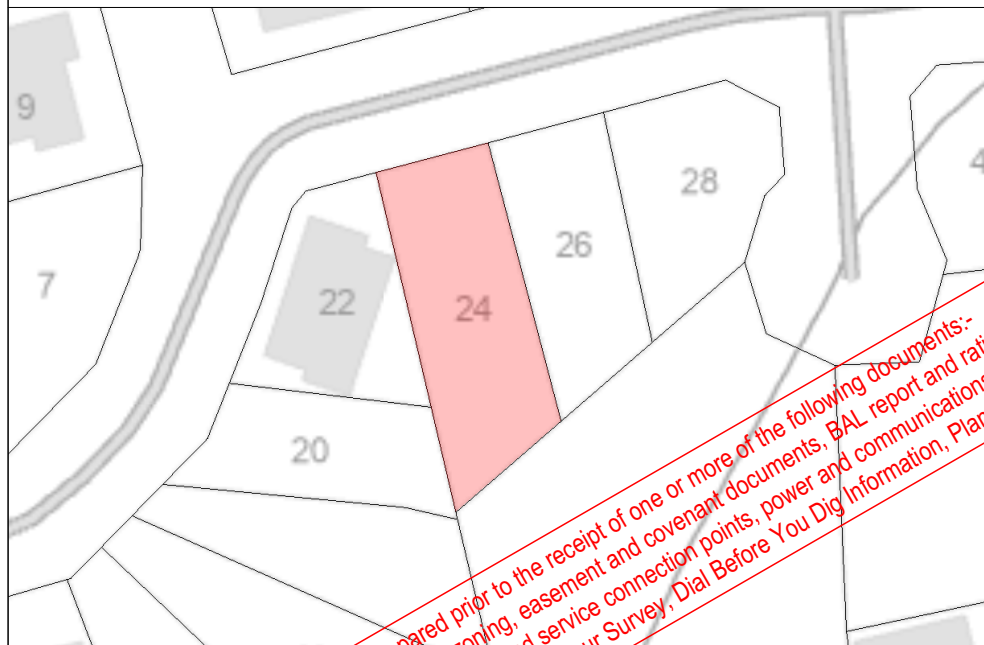
## 3D PERSPECTIVE



## NOTE TO OWNER

THESE PLANS MAY FEATURE WORKS THAT ARE EXCLUDED FROM THE SCOPE OF WORKS WITH THE BUILDER, BUT THEY HAVE BEEN INCLUDED IN THESE DRAWINGS TO ASSIST IN THE OVERALL PLANNING AND ASSESSMENT OF THE BUILDING PROJECT. EXAMPLES OF SOME REGULARLY EXCLUDED WORKS INCLUDE DRIVEWAYS, RETAINING WALLS, SOLAR PANEL SPACING AND SITE DRAINAGE. PLEASE REFER TO YOUR SCOPE OF WORKS AND COLOUR SELECTIONS DOCUMENTATION FOR DETAILS OF INCLUDED WORKS. SOME DETAILS ARE INDICATIVE ONLY FOR EXAMPLE FLOORING, TILING, BRICKWORK AND CLADDING (EXPANSION JOINTS, ORIENTATION AND LAYOUT) AND ARE SUBJECT TO CHANGE.

## LOCATION MAP



This Plan has been prepared prior to the receipt of one or more of the following documents:-  
 Certificate of Title inclusive of lot specific zoning, easement and covenant documents, BAL report and rating, approved  
 subdivision plans providing crossover locations and service connection points, power and communications connection point  
 information, Geotechnical Site Investigation, Contour Survey, Dial Before You Dig Information, Planning Approval.

## BUILDING INFORMATION

GROUND FLOOR TOP OF WALL HEIGHT(S)	2605mm
NOTE: CEILING HEIGHT 45mm LOWER THAN TOP OF WALL	
ROOF PITCH (U.N.O.)	26.0°
ELECTRICITY SUPPLY	SINGLE PHASE
GAS SUPPLY	NONE
ROOF MATERIAL	SHEET METAL
ROOF COLOUR	N/A
WALL MATERIAL	BRICK VENEER CLADDING
SLAB CLASSIFICATION	TBC

## INSULATION

ROOF	SARKING UNDER ROOFING
CEILING	R4.1 BATTS (EXCL. GARAGE, ALFRESCO & PATIO)
EXT. WALLS	R2.0 BATTS (EXCL. GARAGE)
WALL WRAP	WALL WRAP TO ENTIRE HOUSE
INT. WALLS	R2.0 BATTS ADJACENT TO GARAGE AND AS PER PLAN
FLOOR	BIAX SLAB R0.60

## NCC 2022 LIVABLE HOUSING COMPLIANCE

STEP FREE ENTRANCE LOCATION: TBA  
 ACCESSIBLE SANITARY COMPARTMENT LOCATION: ENS (GROUND FLOOR)  
 ACCESSIBLE SHOWER LOCATION: ENS (GROUND FLOOR)

### GENERAL NOTES:

- THRESHOLD OF ACCESSIBLE SHOWER ENTRY TO BE MAX. 5mm.
- THRESHOLD OF STEP FREE ENTRANCE DOOR TO BE MAX. 5mm.
- THRESHOLD OF INTERIOR DOORS SERVICING HABITABLE ROOMS, LAUNDRY, ACCESSIBLE SANITARY COMPARTMENT AND ROOM CONTAINING ACCESSIBLE SHOWER TO BE MAX. 5mm.
- INTERIOR DOORS NOMINATED AS 870 TO ACHIEVE MIN. 820mm CLEAR OPENING.
- CORRIDORS CONNECTING HABITABLE ROOMS, ACCESSIBLE SANITARY COMPARTMENT AND ROOM CONTAINING ACCESSIBLE SHOWER TO ACHIEVE MIN. 1000mm CLEARANCE BETWEEN FINISHED SURFACE OF OPPOSING WALLS (EXCL. SKIRTINGS).
- REFER TO APPLICABLE WET AREA PLANS AND INTERIOR ELEVATIONS FOR LOCATIONS OF REQUIRED WALL REINFORCEMENT FOR FUTURE GRAB RAIL INSTALLATION.

## PRELIMINARY PLAN SET

1	PRELIMINARY DA PLAN SET - INITIAL ISSUE	ALL	2026.05.07	HAB	MSP
2	DA PLAN SET - ISSUE	ALL	2026.06.05	HAB	-
No.	AMENDMENT	SHEET	DATE	DRAWN	CHECK

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SPECIFICATION: <b>BARN HOUSE</b>	REVISION	DRAWN	CLIENT: <b>WILSON COMPLETE</b>	HOUSE DESIGN: <b>BARN 14</b>	HOUSE CODE: <b>H-WBH01410SA</b>	DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY. CHECK AND VERIFY DIMENSIONS AND LEVELS PRIOR TO THE COMMENCEMENT OF ANY WORK. ALL DISCREPANCIES TO BE REPORTED TO THE DRAFTING OFFICE. <b>714766</b>
COPYRIGHT: © 2026	1 PRELIMINARY DA 2 DA PLAN SET - ISSUE	HAB 13/04/2026 HAB 05/06/2026	ADDRESS: <b>24 CREESE DRIVE, RICHMOND TAS 7025</b>	FACADE DESIGN: <b>BARN</b>	FACADE CODE: <b>F-WBH01410BARN</b>	
			LOT / SECTION / CT: <b>35 / - / 189888</b>	COUNCIL: <b>CLARENCE</b>	SHEET TITLE: <b>COVER SHEET</b>	
					SHEET No.: <b>1 / 14</b>	

REFER TO SHEET 1 (COVER SHEET) FOR ALL BUILDING INFORMATION REGARDING:  
 - SUSTAINABILITY REQUIREMENTS  
 - SITE CLASSIFICATION  
 - GENERAL BUILDING INFORMATION

APPROX. CUT/FILL		
CUT	0.43m³	0.97t
FILL	17.61m³	39.62t
DIFFERENCE	17.18m³	38.66t

**39 TONNES OF IMPORT FILL**  
**EXCLUDES DRIVEWAY CUT/FILL**

**LOT SIZE:** 716m²  
**HOUSE (COVERED AREA):** 215.68m²  
**SITE COVERAGE:** 30.12%

**CONCRETE DRIVEWAY BY BUILDER**

WATERWAY AND COASTAL PROTECTION AREA

FLOOD-PRONE AREAS

AIRPORT OBSTACLE LIMITATION AREA (TO WHOLE SITE)

**DEB AREA**

DROPPED EDGE BEAMS	
SURFACE AREA (m²)	
	10.65
	10.65 m²

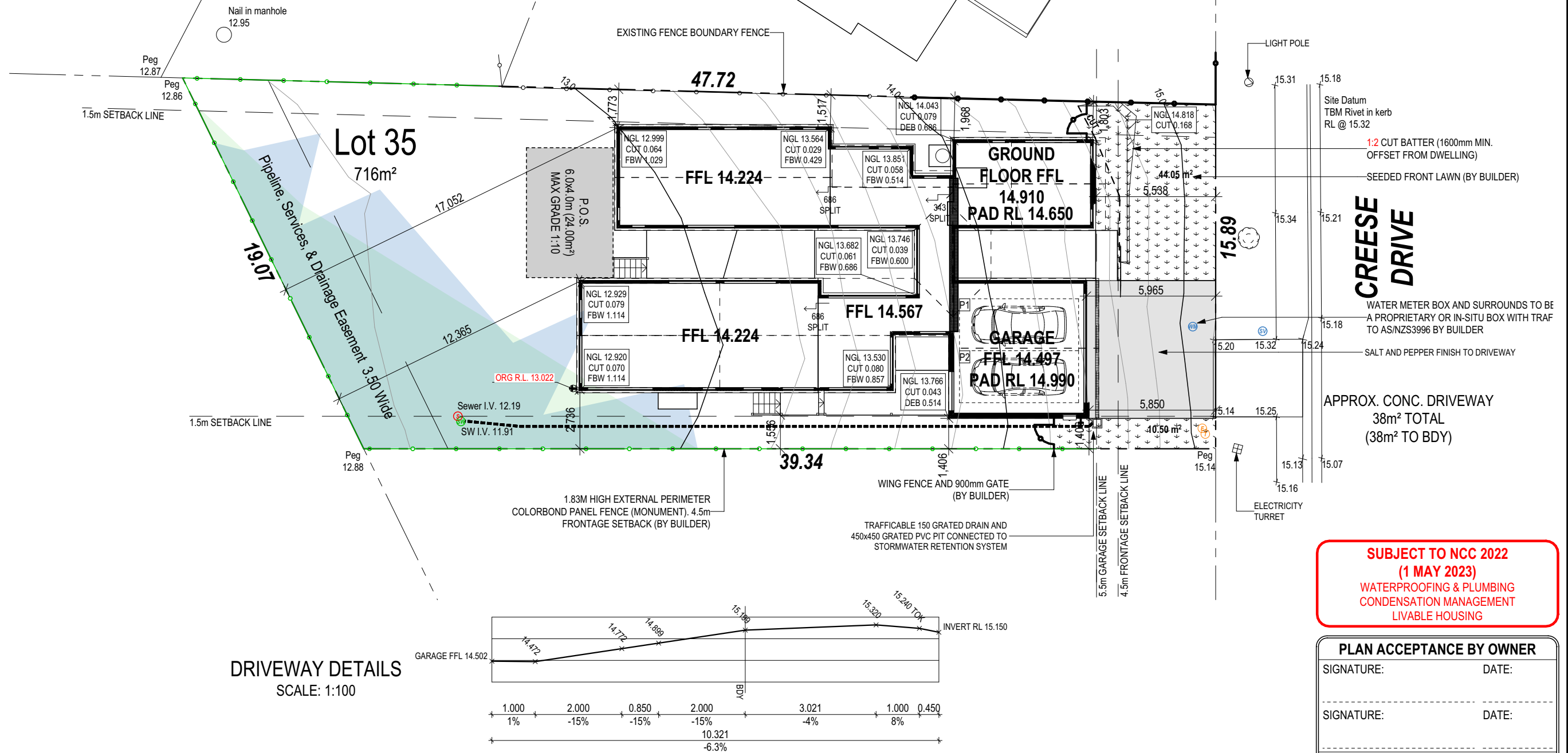
\*THIS PLAN AND ASSOCIATED DIGITAL MODEL IS PREPARED FOR WILSON HOMES FROM A COMBINATION OF FIELD SURVEY AND EXISTING RECORDS FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS ON THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

THE TITLE BOUNDARIES AS SHOWN ON THIS PLAN WERE NOT MARKED AT THE TIME OF THE SURVEY AND HAVE BEEN DETERMINED BY PLAN DIMENSIONS ONLY AND NOT BY FIELD SURVEY. NO MEASUREMENTS OR OFFSETS ARE TO BE DERIVED BETWEEN THE FEATURES ON THIS PLAN AND THE BOUNDARY LAYER. THE RELATIONSHIP BETWEEN THE FEATURES IN THIS MODEL AND THE BOUNDARY LAYERS CANNOT BE USED FOR ANY SET OUT PURPOSES OR TO CONFIRM THE POSITION OF THE TITLE BOUNDARIES ON SITE.

SERVICES SHOWN HAVE BEEN LOCATED WHERE VISIBLE BY FIELD SURVEY. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATIONS OF ALL SERVICES.

IF SUBSEQUENT DESIGN IS INTENDED FOR CONSTRUCTION SETOUT, FUTURE SURVEYING SETOUT COSTS ARE INCREASED IF THE DIGITAL DATA PROVIDED IS ROTATED, SCALED OR MOVED.

THIS NOTE FORMS AN INTEGRAL PART OF THE PLAN/DATA. ANY REPRODUCTION OF THIS PLAN/MODEL WITHOUT THIS NOTE ATTACHED WILL RENDER THE INFORMATION SHOWN INVALID.



**CREESE DRIVE**

1:2 CUT BATTER (1600mm MIN. OFFSET FROM DWELLING)

SEEDED FRONT LAWN (BY BUILDER)

WATER METER BOX AND SURROUNDS TO BE A PROPRIETARY OR IN-SITU BOX WITH TRAF TO AS/NZS3996 BY BUILDER

SALT AND PEPPER FINISH TO DRIVEWAY

APPROX. CONC. DRIVEWAY 38m² TOTAL (38m² TO BDY)

**SUBJECT TO NCC 2022 (1 MAY 2023)**  
**WATERPROOFING & PLUMBING CONDENSATION MANAGEMENT LIVABLE HOUSING**

**PLAN ACCEPTANCE BY OWNER**

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

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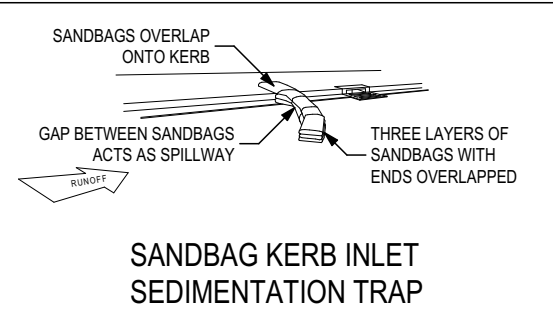
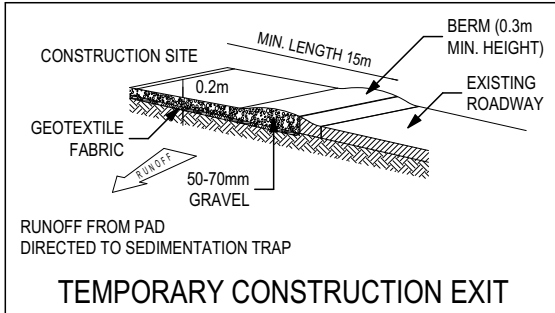
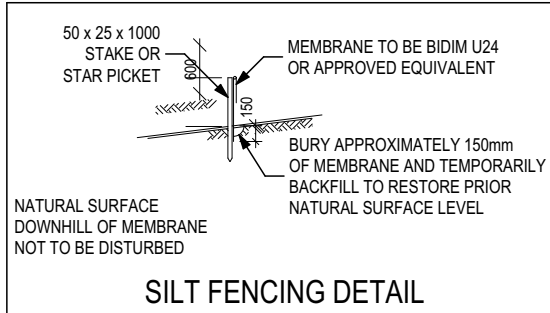
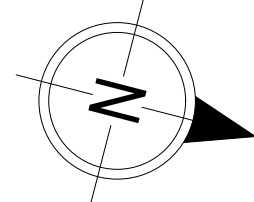
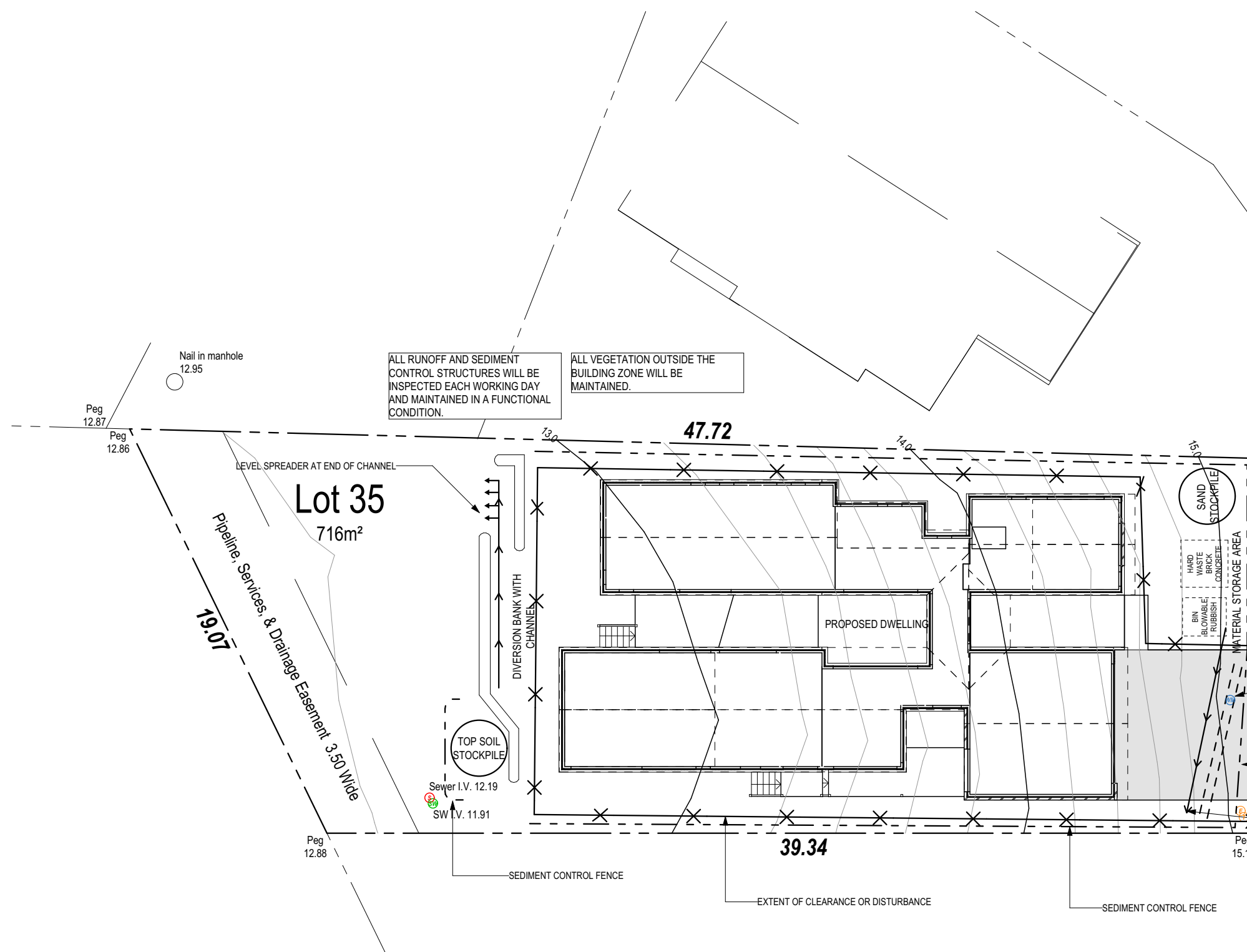
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BARN HOUSE	1 PRELIMINARY DA	HAB 13/04/2026	WILSON COMPLETE	BARN 14	H-WBH01410SA	
COPYRIGHT: © 2026	2 DA PLAN SET - ISSUE	HAB 05/06/2026	ADDRESS: 24 CREESE DRIVE, RICHMOND TAS 7025	FACADE DESIGN: BARN	FACADE CODE: F-WBH01410BARN	
			LOT / SECTION / CT: 35 / - / 189888	SHEET TITLE: SITE PLAN	SHEET No.: 2 / 14	714766
			COUNCIL: CLARENCE		SCALES: 1:200	

ALL VEGETATION OUTSIDE THE BUILDING ZONE WILL BE MAINTAINED.

OWNER TO STABILISE THE SITE ON COMPLETION OF THE BUILD WITH TURF LAWNS, GRASS SEEDS, NATIVE GROUND COVERS AND/ OR MULCH SPREAD TO A DEPTH OF 75-100mm

THE FOLLOWING IS A STANDARD APPROACH. SEDIMENT AND EROSION CONTROL MEASURES WILL BE REVIEWED PRIOR TO COMMENCING WORK AND INSTALLED BASED ON THE OUTCOME OF THAT REVIEW.

- NOTES:
1. ALL EROSION AND SEDIMENT CONTROL STRUCTURES TO BE INSPECTED EACH WORKING DAY AND MAINTAINED IN GOOD WORKING ORDER.
  2. ALL GROUND COVER VEGETATION OUTSIDE THE IMMEDIATE BUILDING AREA TO BE PRESERVED DURING THE BUILDING PHASE.
  3. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSTALLED PRIOR TO COMMENCEMENT OF MAJOR EARTHWORKS.
  4. STOCKPILES OF CLAYEY MATERIAL TO BE COVERED WITH AN IMPERVIOUS SHEET.
  5. ROOF WATER DOWNPIPES TO BE CONNECTED TO THE PERMANENT UNDERGROUND STORMWATER DRAINAGE SYSTEM AS SOON AS PRACTICAL AFTER THE ROOF IS LAID.
  6. DIVERSION DRAINS ARE TO BE CONNECTED TO A LEGAL DISCHARGE POINT (COUNCIL STORMWATER SYSTEM, WATERCOURSE OR ROAD DRAIN).
  7. SEDIMENT RETENTION TRAPS INSTALLED AROUND THE INLETS TO THE STORMWATER SYSTEM TO PREVENT SEDIMENT & OTHER DEBRIS BLOCKING THE DRAINS.



**SUBJECT TO NCC 2022  
(1 MAY 2023)  
WATERPROOFING & PLUMBING  
CONDENSATION MANAGEMENT  
LIVABLE HOUSING**

**PLAN ACCEPTANCE BY OWNER**

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

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	1 PRELIMINARY DA	HAB 13/04/2026	WILSON COMPLETE	BARN 14	H-WBH01410SA	
COPYRIGHT: © 2026	2 DA PLAN SET - ISSUE	HAB 05/06/2026	ADDRESS: 24 CREESE DRIVE, RICHMOND TAS 7025	FACADE DESIGN: BARN	FACADE CODE: F-WBH01410BARN	714766
			LOT / SECTION / CT: 35 / - / 189888	COUNCIL: CLARENCE	SHEET TITLE: SOIL & WATER MANAGEMENT PLAN	
				SHEET No.: 3 / 14	SCALES: 1:200	



REFER TO SHEET 1 (COVER SHEET) FOR ALL BUILDING INFORMATION REGARDING:  
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 - SITE CLASSIFICATION  
 - GENERAL BUILDING INFORMATION

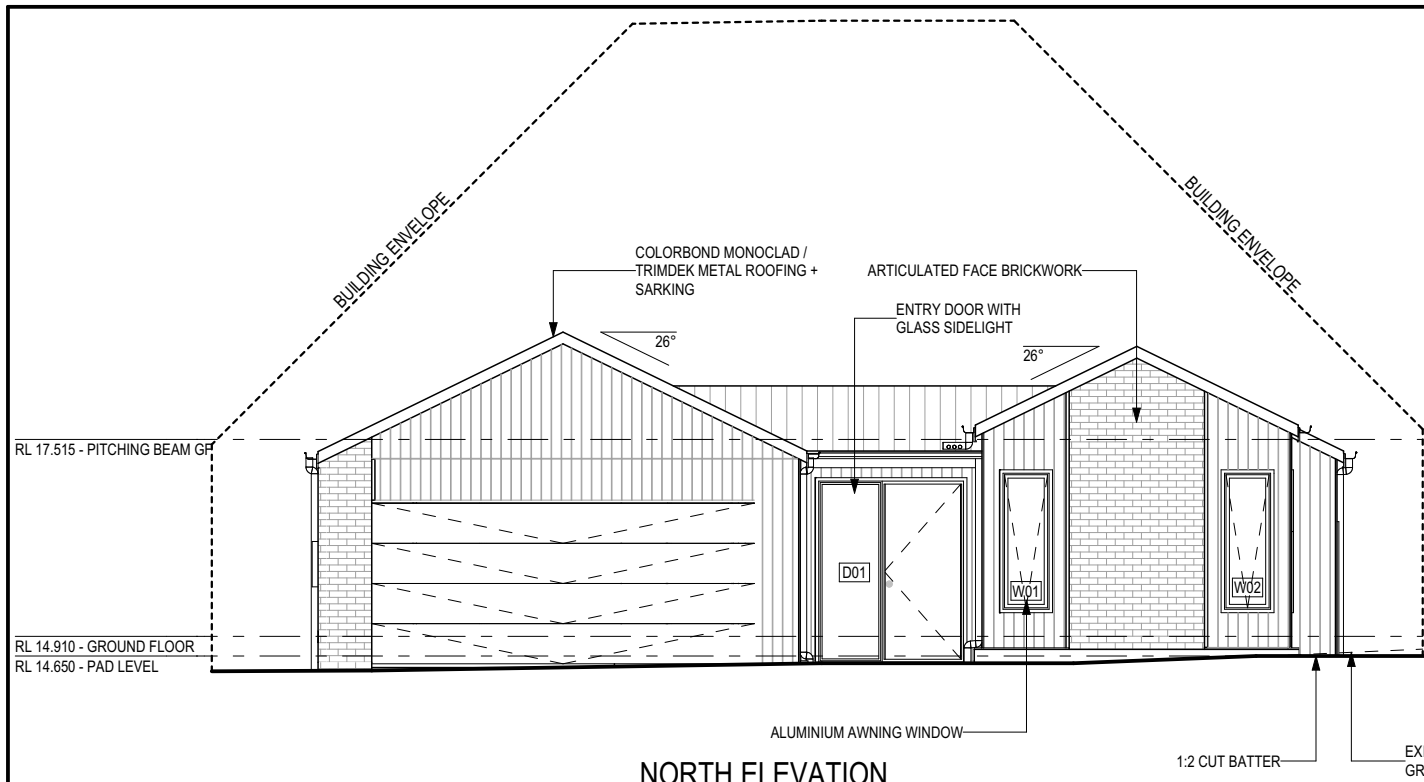
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SH = SNAP HEADER SILL

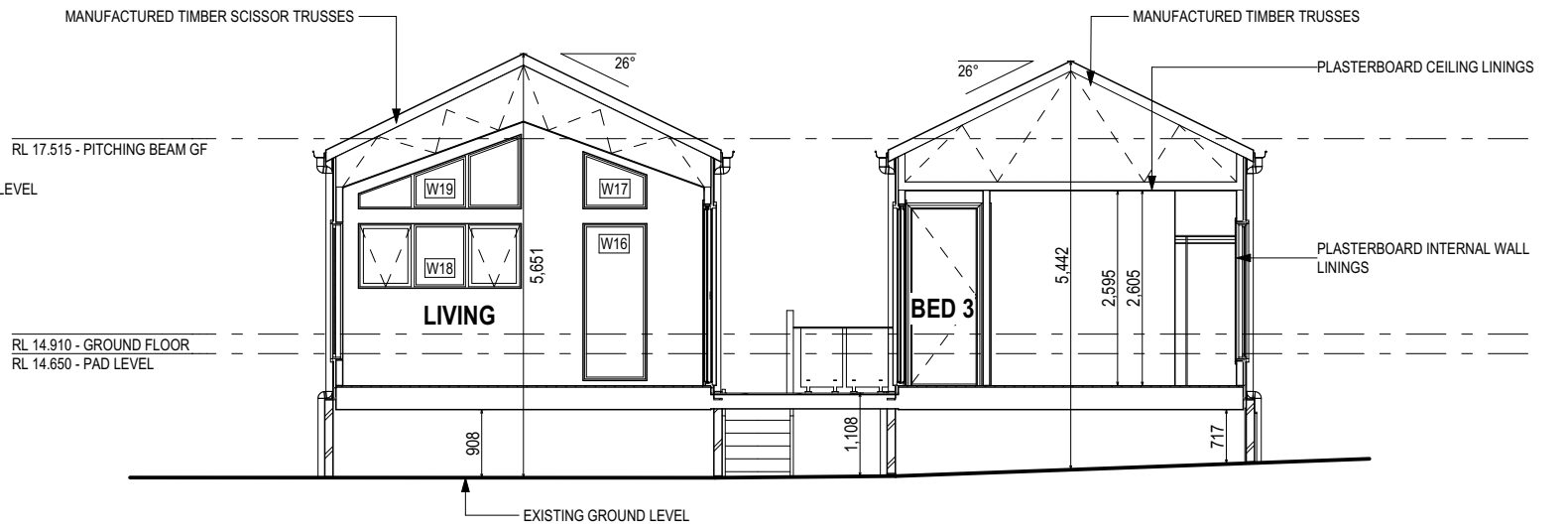
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 SHEET CLADDING DETAIL W-CLAD-001

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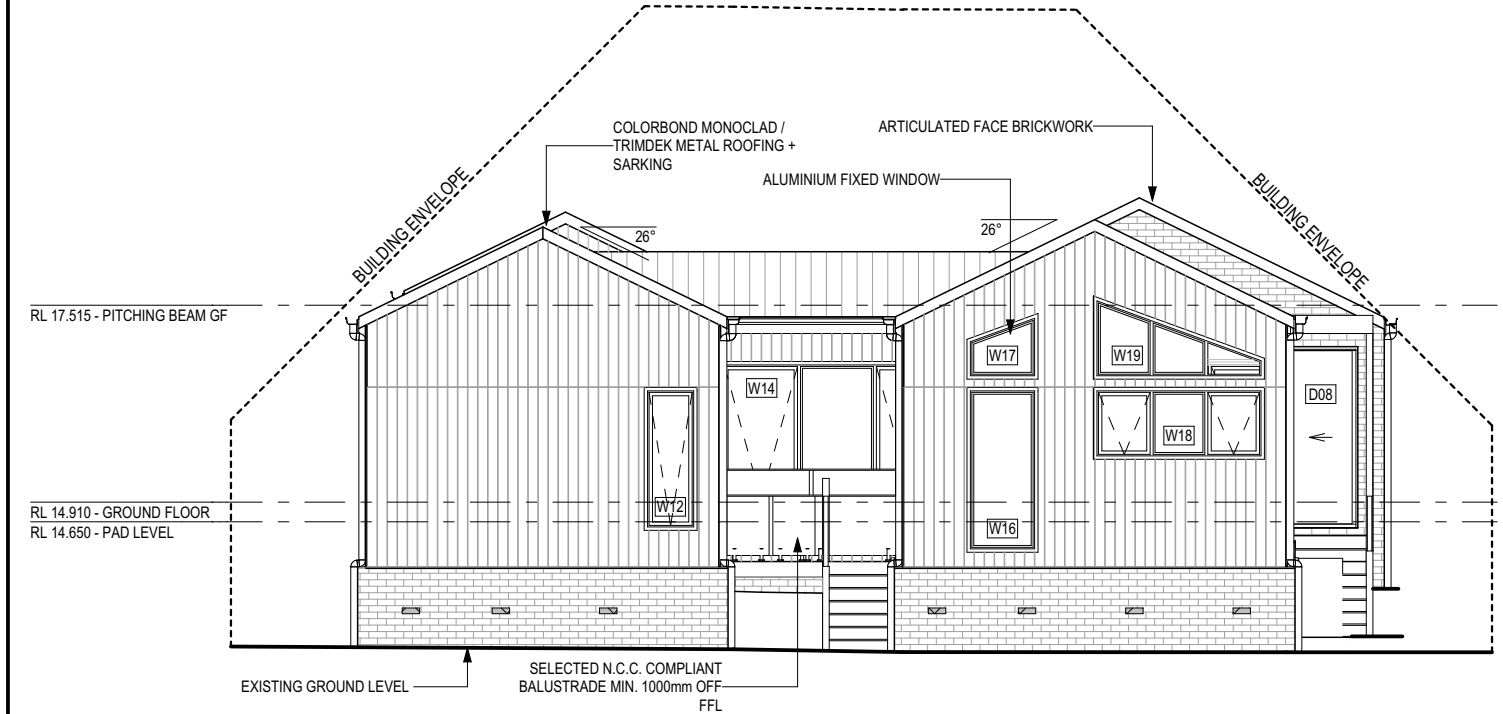


**NORTH ELEVATION**  
SCALE: 1:100



**SECTION A-A**  
SCALE: 1:100

GROUND CLEARANCE IN ACCORDANCE WITH NCC HOUSING PROVISIONS FOR CLIMATIC ZONE C TO BE 150mm FOR THE FIRST 2m THEN 400mm CLEARANCE FOR ACCESS TO SERVICES.



**SOUTH ELEVATION**  
SCALE: 1:100

**SUBJECT TO NCC 2022 (1 MAY 2023)**  
 WATERPROOFING & PLUMBING  
 CONDENSATION MANAGEMENT  
 LIVABLE HOUSING

**GLASS TYPE LEGEND**

CLEAR	OBSCURE

**WINDOW TYPE LEGEND**

AWNING	DOUBLE HUNG	FIXED	LOUVRE	SLIDING

**PLAN ACCEPTANCE BY OWNER**

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

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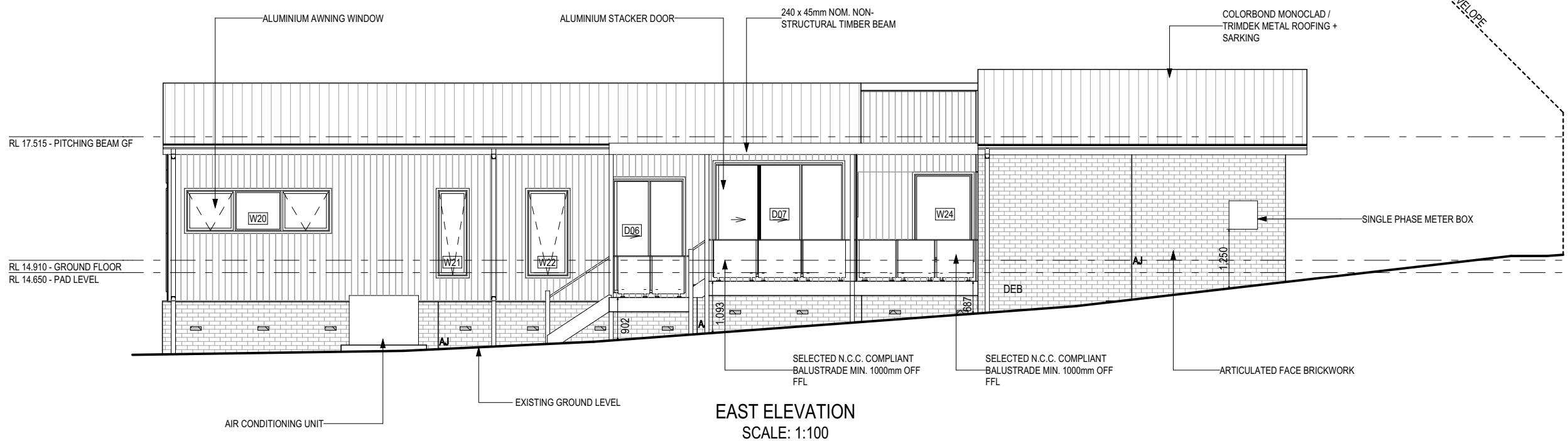
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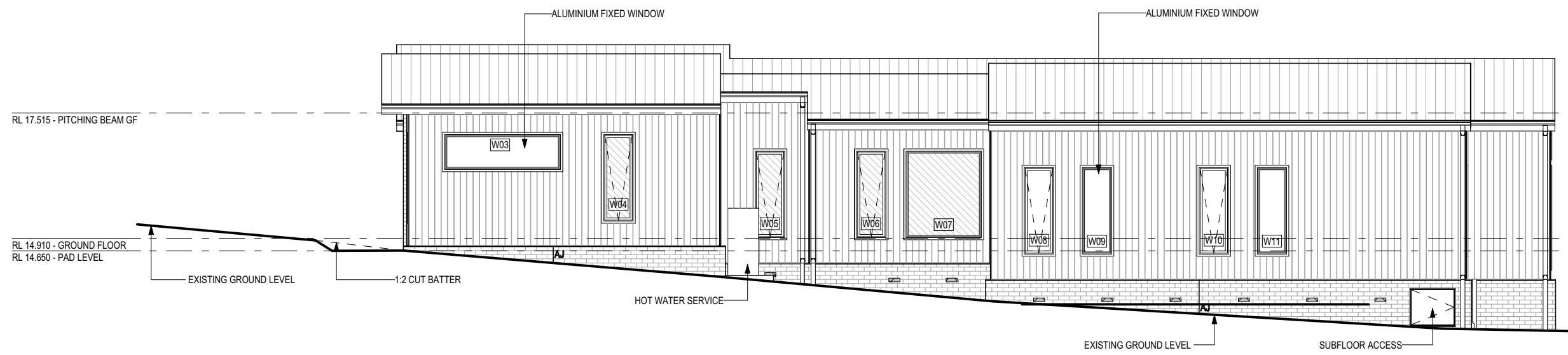
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**EAST ELEVATION**  
SCALE: 1:100



**WEST ELEVATION**  
SCALE: 1:100

**SUBJECT TO NCC 2022 (1 MAY 2023)**  
 WATERPROOFING & PLUMBING  
 CONDENSATION MANAGEMENT  
 LIVABLE HOUSING

**GLASS TYPE LEGEND**

CLEAR	OBSCURE

**WINDOW TYPE LEGEND**

AWNING	DOUBLE HUNG	FIXED	LOUVRE	SLIDING

**PLAN ACCEPTANCE BY OWNER**

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

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				LOT / SECTION / CT: <b>35 / - / 189888</b>	COUNCIL: <b>CLARENCE</b>	SHEET TITLE: <b>ELEVATIONS</b>	SHEET No.: <b>6 / 14</b>
						SCALES: <b>1:100</b>	

**EXTERIOR WINDOW & DOOR SCHEDULE** 1:2 ASSUME LOOKING FROM OUTSIDE

STOREY	ID	CODE <sup>1</sup>	TYPE	ROOM	HEIGHT	WIDTH	PERIMETER	AREA (m <sup>2</sup> )	FRAME TYPE	BAL RATING	SILL TYPE	ORIENT.	GLAZING AREA (m <sup>2</sup> )	GLAZING TYPE (SINGLE GLAZING U.N.O.)	ADDITIONAL INFORMATION <sup>2</sup>
<b>WINDOW</b>															
GROUND FLOOR	W01	A1806	AWNING	BED 1	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	N	0.81	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W02	A1806	AWNING	BED 1	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	N	0.81	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W03	F727x2410	FIXED	BED 1	727	2,410	6,274	1.75	ALUMINIUM	N/A	NONE	W	1.53	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W04	A1806	AWNING	ENS	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	W	0.81	OBSCURE, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W05	A1806	AWNING	PWD	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	W	0.81	OBSCURE, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W06	A1806	AWNING	BATH	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	W	0.81	OBSCURE, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W07	F1816	FIXED	BATH	1,800	1,570	6,740	2.83	ALUMINIUM	N/A	NONE	W	2.59	OBSCURE, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W08	A1806	AWNING	BED 2	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	W	0.81	CLEAR, DOUBLE GLAZED	
GROUND FLOOR	W09	F1806	FIXED	BED 2	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	W	0.93	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W10	A1806	AWNING	BED 3	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	W	0.81	CLEAR, DOUBLE GLAZED	
GROUND FLOOR	W11	F1806	FIXED	BED 3	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	W	0.93	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W12	A1806	AWNING	BED 4	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	S	0.81	CLEAR, DOUBLE GLAZED	
GROUND FLOOR	W13	A1806	AWNING	BED 4	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	E	0.81	CLEAR, DOUBLE GLAZED	
GROUND FLOOR	W14	AFA1830	AWNING	ENTRY	1,800	3,010	9,620	5.42	ALUMINIUM	N/A	NONE	S	4.54	CLEAR, DOUBLE GLAZED, TOUGHENED	MP 1003-1003
GROUND FLOOR	W15	F737x2410	SPECIAL	KITCHEN	737	2,410	6,294	1.78	ALUMINIUM	N/A	NONE	W	1.55	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W16	F2090x850	FIXED	LIVING	2,090	850	5,880	1.78	ALUMINIUM	N/A	NONE	S	1.57	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	W17	F450x760x850 RAKED	FIXED	LIVING	760	850	2,965	0.51	ALUMINIUM	N/A	NONE	S	0.39	CLEAR, DOUBLE GLAZED	RAKED TOP, LOW END HEIGHT 450mm, HIGH END HEIGHT 760mm
GROUND FLOOR	W18	AFA0922	AWNING	LIVING	860	2,170	6,060	1.87	ALUMINIUM	N/A	NONE	S	1.39	CLEAR, DOUBLE GLAZED, TOUGHENED	MP 723-723
GROUND FLOOR	W19	FFA990x200x2170 RAKED	FIXED	LIVING	990	2,170	5,669	1.29	ALUMINIUM	N/A	NONE	S	0.80	CLEAR, DOUBLE GLAZED	RAKED TOP, LOW END HEIGHT 200mm, HIGH END HEIGHT 990mm, MP 723-723
GROUND FLOOR	W20	AFA0930	AWNING	LIVING	860	3,010	7,740	2.59	ALUMINIUM	N/A	NONE	E	2.02	CLEAR, DOUBLE GLAZED	MP 1003-1003
GROUND FLOOR	W21	A1806	AWNING	DINING	1,800	610	4,820	1.10	ALUMINIUM	N/A	NONE	E	0.81	CLEAR, DOUBLE GLAZED	
GROUND FLOOR	W22	A1809	AWNING	KITCHEN	1,800	850	5,300	1.53	ALUMINIUM	N/A	NONE	E	1.21	CLEAR, DOUBLE GLAZED	
GROUND FLOOR	W23	AFA0922	AWNING	LEISURE	860	2,170	6,060	1.87	ALUMINIUM	N/A	NONE	N	1.39	CLEAR, DOUBLE GLAZED, TOUGHENED	MP 723-723
GROUND FLOOR	W24	F1812	FIXED	COATS	1,800	1,210	6,020	2.18	ALUMINIUM	N/A	NONE	E	1.97	CLEAR, DOUBLE GLAZED	
								<b>38.60</b>					<b>30.91</b>		
<b>DOOR</b>															
GROUND FLOOR	D01	1020	SWINGING	ENTRY	2,397	1,916	8,626	4.59	ALUMINIUM	N/A	SNAP HEADER	N	3.59	CLEAR, DOUBLE GLAZED	1 x FIXED SIDELIGHT
GROUND FLOOR	D02	SSF2400x2178	STACKER	HALL 4	2,400	2,178	9,156	5.23	ALUMINIUM	N/A	NONE	E	4.53	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	D03	FSS2400x3138	STACKER	HALL 3	2,400	3,138	11,076	7.53	ALUMINIUM	N/A	NONE	E	6.73	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	D04	FSS2400x3588	STACKER	HALL 1	2,400	3,588	11,976	8.61	ALUMINIUM	N/A	NONE	W	7.77	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	D05	SSF2400x2178	STACKER	DINING	2,400	2,178	9,156	5.23	ALUMINIUM	N/A	NONE	W	4.53	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	D06	SF2400x1470	SLIDING	LDRY	2,400	1,470	7,740	3.53	ALUMINIUM	N/A	NONE	E	3.03	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	D07	SSF2400x2688	STACKER	LEISURE	2,400	2,688	10,176	6.45	ALUMINIUM	N/A	NONE	E	5.70	CLEAR, DOUBLE GLAZED, TOUGHENED	
GROUND FLOOR	D08	FS2400x1810	SLIDING	GARAGE	2,400	1,810	8,420	4.34	ALUMINIUM	N/A	NONE	S	3.81	CLEAR, DOUBLE GLAZED, TOUGHENED	
								<b>45.51</b>					<b>39.69</b>		
								<b>84.11</b>					<b>70.60</b>		

INTERIOR WINDOW & DOOR SCHEDULE							
STOREY	QTY	CODE	TYPE	HEIGHT	WIDTH	GLAZING TYPE	ADDITIONAL INFORMATION
<b>DOOR</b>							
GROUND FLOOR	1	1040 SS	SQUARE SET OPENING	2,400	1,040	N/A	
GROUND FLOOR	1	2 x SLIDING	SLIDING	2,400	1,270	N/A	
GROUND FLOOR	1	2 x SLIDING	SLIDING	2,445	2,160	N/A	
GROUND FLOOR	1	2 x SLIDING	SLIDING	2,445	1,870	N/A	
GROUND FLOOR	1	620	SWINGING	2,340	620	N/A	
GROUND FLOOR	1	720	SWINGING	2,340	720	N/A	
GROUND FLOOR	6	870	SWINGING	2,340	870	N/A	
GROUND FLOOR	1	870 CSD	CAVITY SLIDING	2,340	870	N/A	
GROUND FLOOR	1	870 UC	SWINGING	2,340	870	N/A	20mm UNDERCUT, LIFT-OFF HINGES
GROUND FLOOR	1	870 UC CSD	CAVITY SLIDING	2,340	870	N/A	20mm UNDERCUT

REFER TO SHEET 1 (COVER SHEET) FOR ALL BUILDING INFORMATION REGARDING:  
 - SUSTAINABILITY REQUIREMENTS  
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NOTE: INTERNAL DOORS TO WET AREAS WITH MECHANICAL VENTILATION TO BE UNDERCUT 20mm

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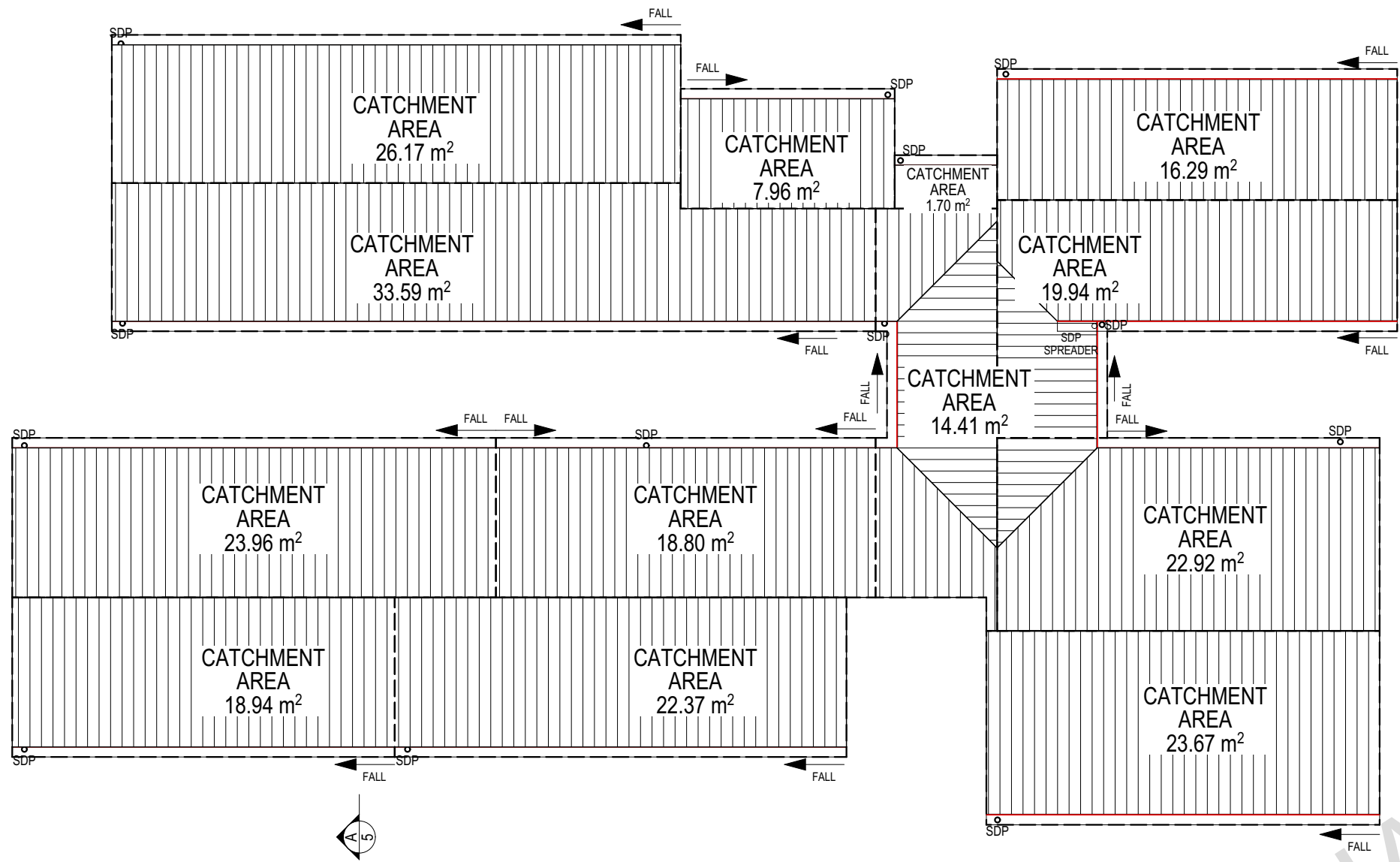
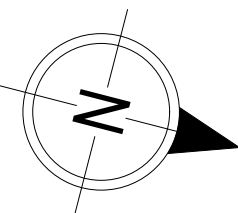
PICTURE, TV RECESS AND SS WINDOW OPENINGS				
QTY	TYPE	HEIGHT	WIDTH	AREA (m <sup>2</sup> )

**SUBJECT TO NCC 2022  
(1 MAY 2023)**  
 WATERPROOFING & PLUMBING  
 CONDENSATION MANAGEMENT  
 LIVABLE HOUSING

PLAN ACCEPTANCE BY OWNER	
SIGNATURE: _____	DATE: _____
SIGNATURE: _____	DATE: _____
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	SPECIFICATION: <b>BARN HOUSE</b>	REVISION: 1 PRELIMINARY DA 2 DA PLAN SET - ISSUE	DRAWN: HAB 13/04/2026 HAB 05/06/2026	CLIENT: <b>WILSON COMPLETE</b>	HOUSE DESIGN: <b>BARN 14</b>	HOUSE CODE: <b>H-WBH01410SA</b>	DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY. CHECK AND VERIFY DIMENSIONS AND LEVELS PRIOR TO THE COMMENCEMENT OF ANY WORK. ALL DISCREPANCIES TO BE REPORTED TO THE DRAFTING OFFICE.
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SHEET TITLE: <b>WINDOW &amp; DOOR SCHEDULES</b>				SHEET No.: <b>7 / 14</b>	SCALES:	<b>714766</b>	

File Location: P:\24. Projects\Client Files\Wilson Complete\714766 - Lot 35 - 24 Creese Drive, Richmond\01 Onsite Reports\Draft-Engineering\01c - Drafting\05. Archicat\714766 - Lot 35 - 24 Creese Drive Richmond.pln  
 Last Published: Friday, 5 June 2026 1:57 PM  
 Template Version: 24.038



WHERE DOWNPIPES ARE FURTHER THAN 1.2m AWAY FROM VALLEY REFER TO N.C.C. 7.3.5(2)

POSITION AND QUALITY OF DOWNPIPES ARE NOT TO BE ALTERED WITHOUT CONSULTATION WITH DESIGNER.

AREA'S SHOWN ARE SURFACE AREAS/ CATCHMENT AREAS, NOT PLAN AREAS

Roofing Data		
	235.28	Flat Roof Area (excluding gutter and slope factor) (m <sup>2</sup> )
	261.94	Roof Surface Area (includes slope factor, excludes gutter) (m <sup>2</sup> )
Downpipe roof calculations (as per AS/NZA3500.3:2021)		
Ah	250.72	Area of roof catchment (including 115mm Slotted Quad Gutter) (m <sup>2</sup> )
Ac	310.89	Ah x Catchment Area Multiplier for slope (Table 3.4.3.2 from AS/NZS 3500.3:2021) (1.24 for 26° pitch) (m <sup>2</sup> )
Ae	6300	Cross sectional area of 57 x 115 Slotted Quad Gutter (mm <sup>2</sup> )
DRI	86	Design Rainfall Intensity (determined from Table E1 from AS/NZS 3500.3:2021)
Acdp	64	Catchment area per Downpipe (determined from Figure 3.5(A) from AS/NZS 3500.3:2021) (m <sup>2</sup> )
Required Downpipes	5	Ac / Acdp
Downpipes Provided	13	

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**WATERPROOFING & PLUMBING CONDENSATION MANAGEMENT LIVABLE HOUSING**

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	1 PRELIMINARY DA	HAB 13/04/2026	WILSON COMPLETE	BARN 14	H-WBH01410SA	
COPYRIGHT: © 2026	2 DA PLAN SET - ISSUE	HAB 05/06/2026	ADDRESS: 24 CREESE DRIVE, RICHMOND TAS 7025	FACADE DESIGN: BARN	FACADE CODE: F-WBH01410BARN	714766
			LOT / SECTION / CT: 35 / - / 189888	COUNCIL: CLARENCE	SHEET TITLE: ROOF DRAINAGE PLAN	

REFER TO SHEET 1 (COVER SHEET) FOR ALL BUILDING INFORMATION REGARDING:  
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FLOOR TILES SHOWN ON PLAN DO NOT INDICATE THE SIZE OR JOINT LOCATIONS OF THE ACTUAL FLOOR TILES.  
 TIMBER FLOORING SHOWN ON PLAN DOES NOT INDICATE THE BOARD SIZE OR DIRECTION OF THE ACTUAL FLOORING.

**COVERINGS LEGEND**

	NO COVERING
	COVER GRADE CONCRETE
	CARPET
	LAMINATE
	TILE (STANDARD WET AREAS)
	TILE (UPGRADED AREAS)
	DECKING



FLOOR COVERINGS  
 SCALE: 1:100

**SUBJECT TO NCC 2022  
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 CONDENSATION MANAGEMENT  
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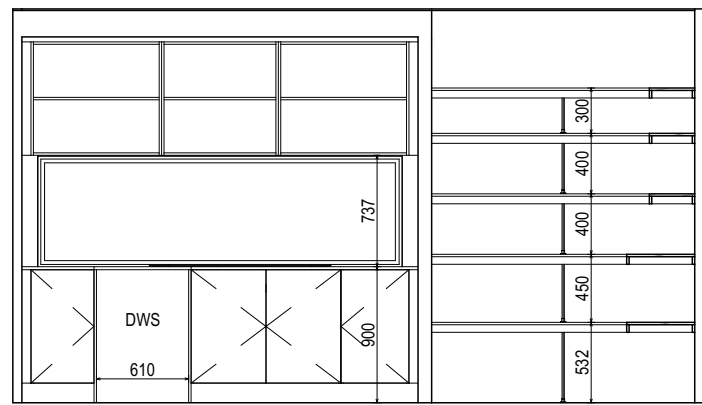
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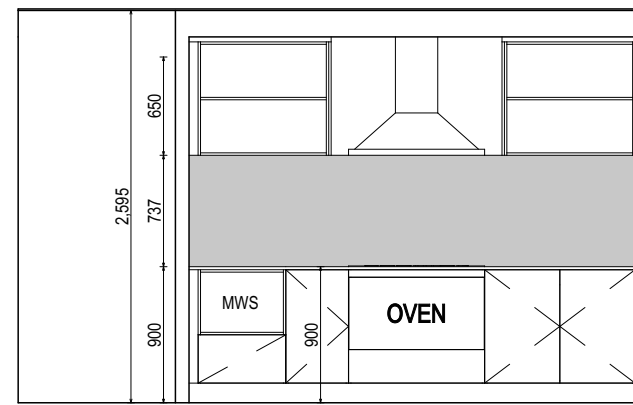
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			LOT / SECTION / CT: 35 / - / 189888	SHEET TITLE: FLOOR COVERINGS	SCALES: 1:100	
			COUNCIL: CLARENCE	SHEET No.:	9 / 14	

REFER TO SHEET 1 (COVER SHEET) FOR ALL BUILDING INFORMATION REGARDING:  
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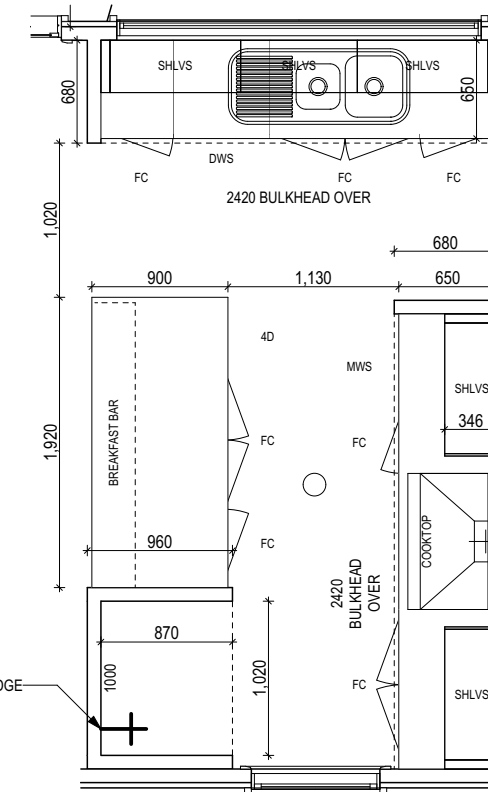
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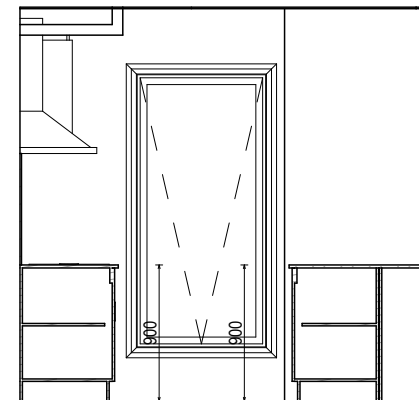
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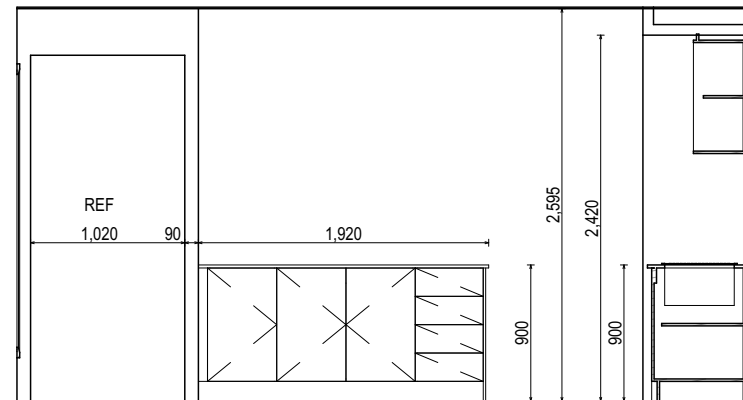
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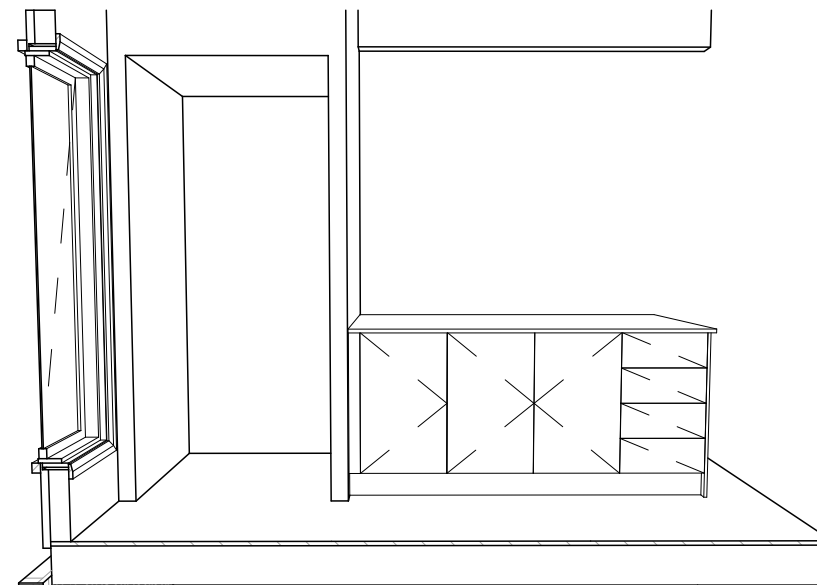
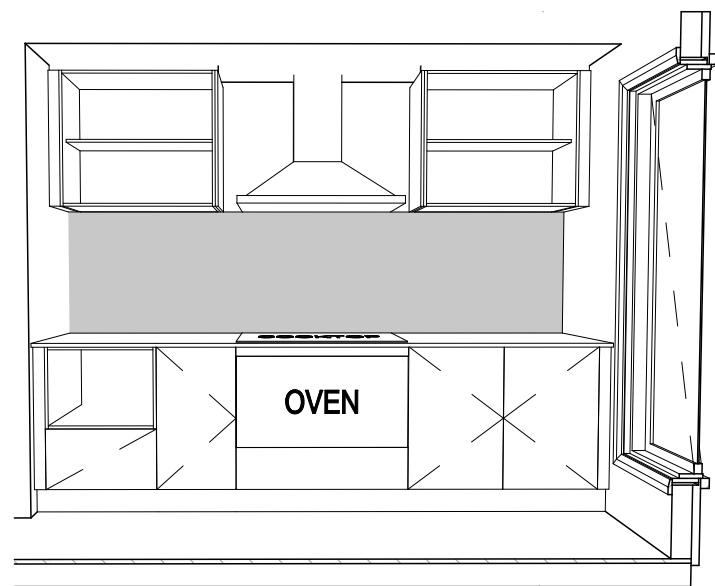
KITCHEN PLAN  
SCALE: 1:50



ELEVATION C  
SCALE: 1:50



ELEVATION D  
SCALE: 1:50



**SUBJECT TO NCC 2022  
(1 MAY 2023)**  
 WATERPROOFING & PLUMBING  
 CONDENSATION MANAGEMENT  
 LIVABLE HOUSING

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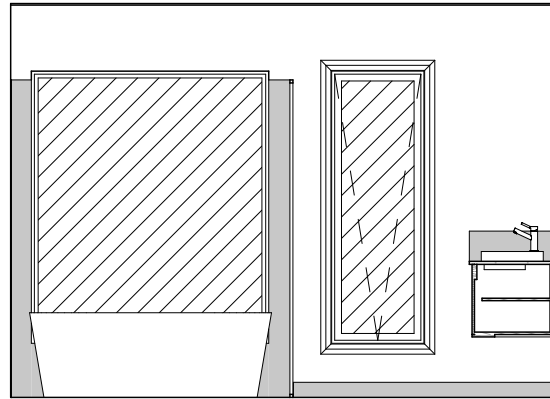
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				LOT / SECTION / CT: 35 / - / 189888	COUNCIL: CLARENCE	SHEET TITLE: KITCHEN DETAILS	SHEET No.: 10 / 14
						SCALES: 1:50	714766

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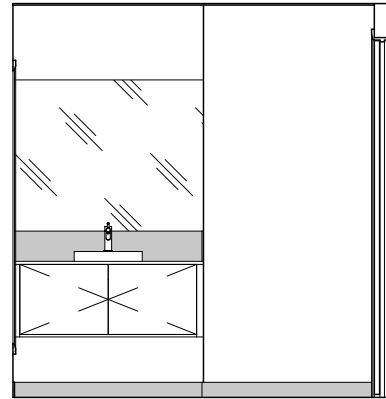
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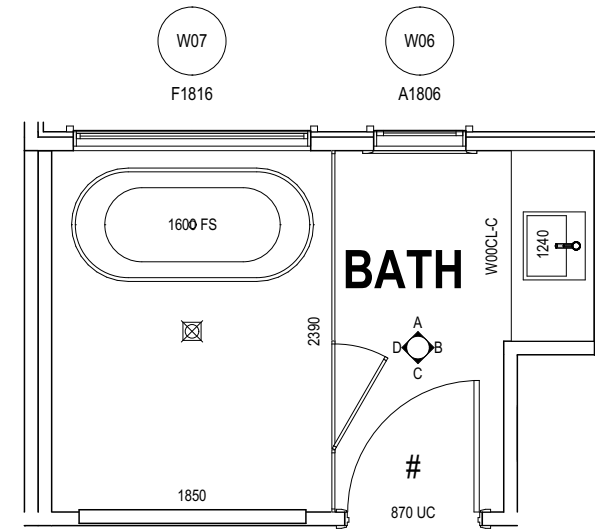
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- ROSE SHOWER ROSE
- ELBW SHOWER ELBOW CONNECTION
- MIX MIXER TAP
- HT HOT TAP
- CT COLD TAP
- HS HOB SPOUT
- WS WALL SPOUT
- SC STOP COCK
- TRH TOILET ROLL HOLDER
- TR-S TOWEL RAIL - SINGLE
- TR-D TOWEL RAIL - DOUBLE
- TL TOWEL LADDER
- TH TOWEL HOLDER
- TR TOWEL RACK
- TMB TUMBLER HOLDER
- RNG TOWEL RING
- RH ROBE HOOK
- SHLF SHELF
- SR SHAMPOO RECESS
- SOAP SOAP HOLDER



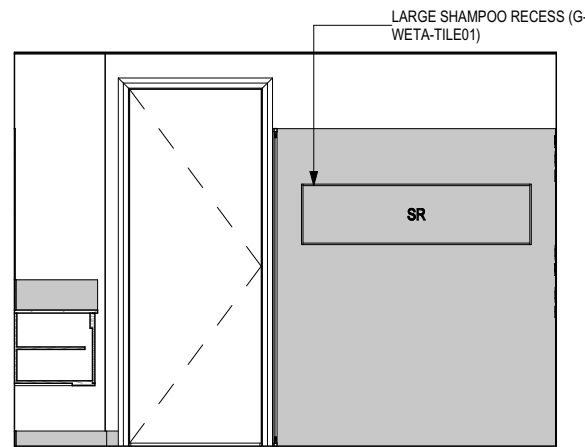
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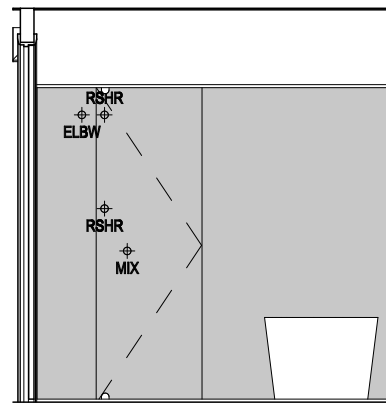
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SCALE: 1:50



BATHROOM PLAN  
SCALE: 1:50



ELEVATION C  
SCALE: 1:50



ELEVATION D  
SCALE: 1:50

**SUBJECT TO NCC 2022  
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 WATERPROOFING & PLUMBING  
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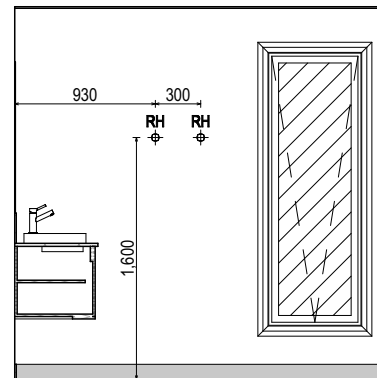
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				LOT / SECTION / CT: <b>35 / - / 189888</b>	COUNCIL: <b>CLARENCE</b>	SHEET No.: <b>11 / 14</b>	SCALES: <b>1:50</b>
							<b>714766</b>

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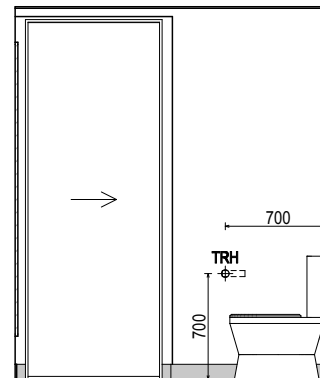
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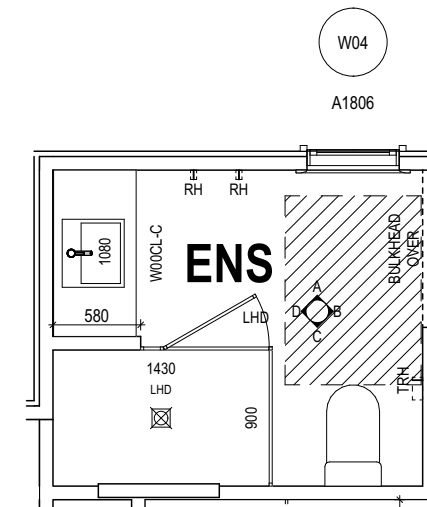
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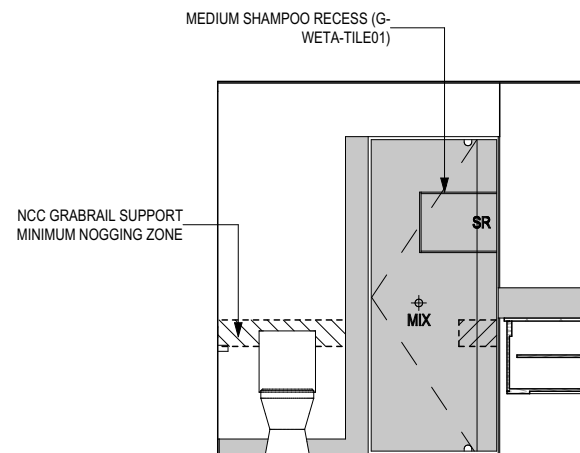
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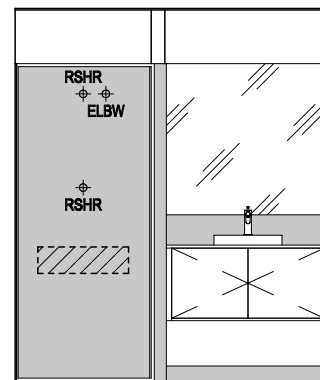
ELEVATION B  
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ENSUITE PLAN  
SCALE: 1:50



ELEVATION C  
SCALE: 1:50



ELEVATION D  
SCALE: 1:50

**SUBJECT TO NCC 2022  
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		2 DA PLAN SET - ISSUE	HAB 05/06/2026	LOT / SECTION / CT: <b>35 / - / 189888</b>	COUNCIL: <b>CLARENCE</b>	SHEET No.: <b>12 / 14</b>	SCALES: <b>1:50</b>
					SHEET TITLE: <b>ENSUITE DETAILS</b>		<b>714766</b>

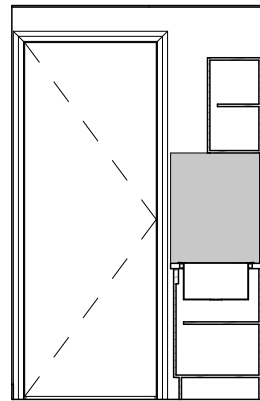
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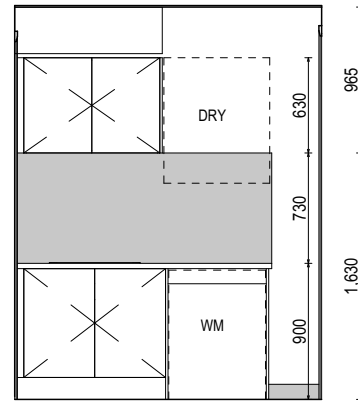
PROVIDE ADDITIONAL NOGGING TO LAUNDRY FOR FIXING OF WALL MOUNTED CLOTHES DRYER AS PER D-FRAM-ELEC006

**LEGEND**

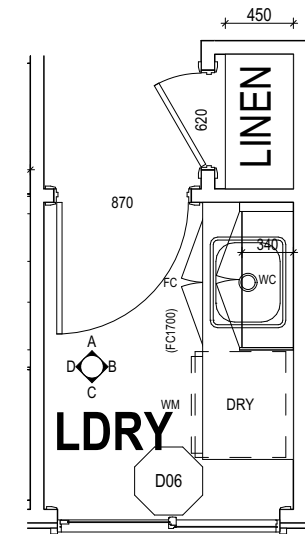
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- TR-D TOWEL RAIL - DOUBLE
- TL TOWEL LADDER
- TH TOWEL HOLDER
- TR TOWEL RACK
- TMB TUMBLER HOLDER
- RNG TOWEL RING
- RH ROBE HOOK
- SHLF SHELF
- SR SHAMPOO RECESS
- SOAP SOAP HOLDER



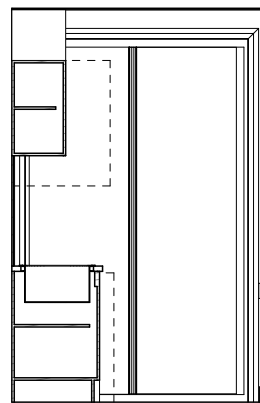
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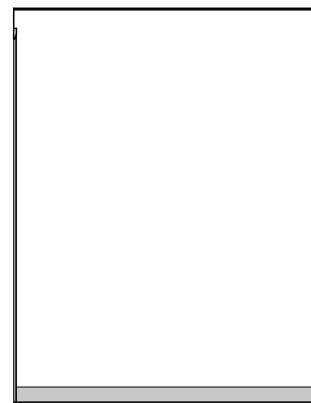
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LAUNDRY PLAN  
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**SUBJECT TO NCC 2022  
(1 MAY 2023)  
WATERPROOFING & PLUMBING  
CONDENSATION MANAGEMENT  
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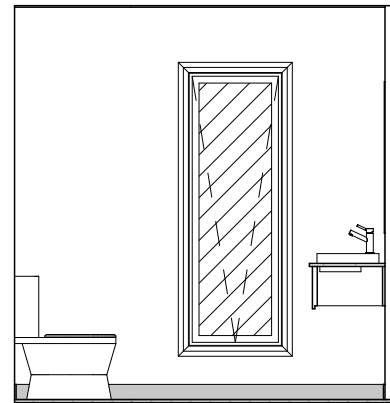
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 - SUSTAINABILITY REQUIREMENTS  
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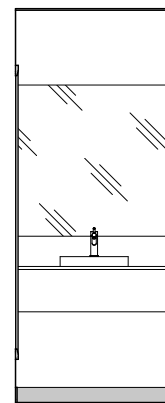
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**LEGEND**

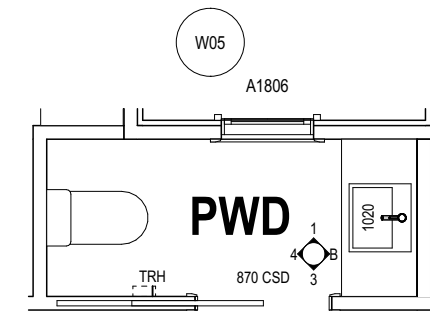
- RSHR RAIL SHOWER
- ROSE SHOWER ROSE
- ELBW SHOWER ELBOW CONNECTION
- MIX MIXER TAP
- HT HOT TAP
- CT COLD TAP
- HS HOB SPOUT
- WS WALL SPOUT
- SC STOP COCK
- TRH TOILET ROLL HOLDER
- TR-S TOWEL RAIL - SINGLE
- TR-D TOWEL RAIL - DOUBLE
- TL TOWEL LADDER
- TH TOWEL HOLDER
- TR TOWEL RACK
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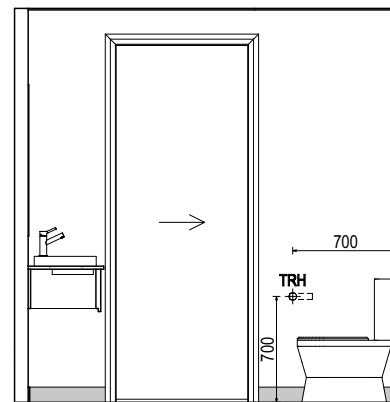
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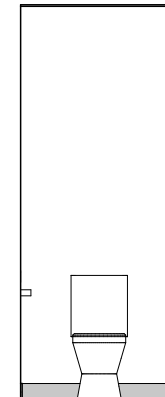
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**POWDER ROOM PLAN**  
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**ELEVATION C**  
SCALE: 1:50



**ELEVATION D**  
SCALE: 1:50

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# FLOOD HAZARD REPORT

LOT 32 – CREESE DRIVE, RICHMOND

CLARENCE CITY COUNCIL  
12 AUGUST 2024





JMG

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### Appendix A - Concept Services Report - Drainage Addendum (JMG Document)

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# 1. Introduction

JMG Engineers & Planners have been engaged by the JAC Group to conduct a Flood Hazard Report for Lot 32, Creese Drive, Richmond. This report forms the basis for a two-lot subdivision (Lot 32A and Lot 32B) development application to be submitted to Clarence City Council.

The flood hazard report has been prepared in accordance with clause C12.3.1 of Code 12.0 (Flood-Prone Areas Hazard) and incorporates the latest survey information. The study follows the guidelines of the Tasmanian Planning Scheme and references an existing Concept Services Report, which has been issued by JMG (30.07.2019) and has been accepted by Clarence City Council under the planning permit PDPLANPMTD-2019/003190. This report includes a comprehensive hydrological analysis of the site (see Appendix A). Additionally, a 2D analysis of unsteady flow has been performed using HEC-RAS to assess the range of potential flood risks at the site.

## 2. Tasmanian Planning Scheme (TPS) - Sorell

### 2.1 Flood Prone Areas Hazard Code - Purpose

The overarching objective of this report is to ensure the purpose of the code is met.

#### **C12.1 Code Purpose**

*The purpose of the Flood-Prone Areas Hazard Code is:*

*C12.1.1 - To ensure that use or development subject to risk from flood is appropriately located and managed, so that:*

- a) People, property, and infrastructure are not exposed to an unacceptable level of risk.*
- b) Future costs associated with options for adaptation, protection, retreat or abandonment of property and infrastructure are minimised.*
- c) it does not increase the risk from flood to other land or public infrastructure.*

*C12.1.2 - To preclude development on land that will unreasonably affect flood flow or be affected by permanent or periodic flood.*

### 2.2 Flood Prone Areas Hazard Code - Technical Detail

As this report intends to support the development of Standard Subdivision Lots, the relevant condition is C12.7 - Development Standards for Subdivision.

#### **C12.7.1 Subdivision within a flood-prone hazard area.**

*Objective: That subdivision within a flood-prone hazard area does not create an opportunity for use or development that cannot achieve a tolerable risk from flood*

### 2.3 Flood Prone Areas Hazard Code - Interpretation

In summary, to comply with regulations, any lot proposed in a flood-prone area must not enable development that cannot tolerate flood risks. This entails considering various factors such as the potential increase in flood risk for adjacent lands, the impact on public

infrastructure, the necessity to minimise future remediation efforts, potential access loss due to flooding, the importance of siting buildings outside flood-prone zones, and guidance from relevant authorities and flood hazard reports. Adhering to these criteria ensures that development within flood-prone areas is conducted in a manner that mitigates risks and promotes safety and resilience.

## 2.4 “Tolerable Risk”

*A tolerable risk is defined as the lowest level of likely risk from the relevant hazard:*

- a) to secure the benefits of a use or development in a relevant hazard area; and*
- b) which can be managed through:*
  - i. routine regulatory measures; or*
  - ii. by specific hazard management measures for the intended life of each use or development.*

When considering the ‘lowest level of likely risk’ it is useful to review the proposed development and its intended use against the Hazard Rating curves. Flood Hazard Rating is typically based on inundation depth and flow velocity as per ‘*Updating National Guidance on Best Practice Flood Risk Management (D. McLuckie et al., 2014)*’, but it is important to note that these charts alone cannot exclusively define the level of risk associated with a development. Decisions regarding tolerable risk are more nuanced and often come down to engineering judgment.

## 3. Existing Parameters

The site is located on Creese Drive, Richmond, and covers a total area of 2,655 m<sup>2</sup>. The natural surface grades at approximately 5% from both the western and eastern boundaries towards a central drainage path, which directs overland flow south through 35/37/37A Wellington Street to an existing creek. The flow path is approximately 3 meters wide and 65 meters long, with a 1% longitudinal fall. It is proposed that a 10m wide easement will be located centrally over this flow path, which will be on the western boundary of proposed lot 32B.

The present study will specifically examine the extent of possible flooding through Lot 32 during a 1% Annual Exceedance Probability (AEP) stormwater event, accounting for an 18.3% climate change factor (1% AEP + CC).

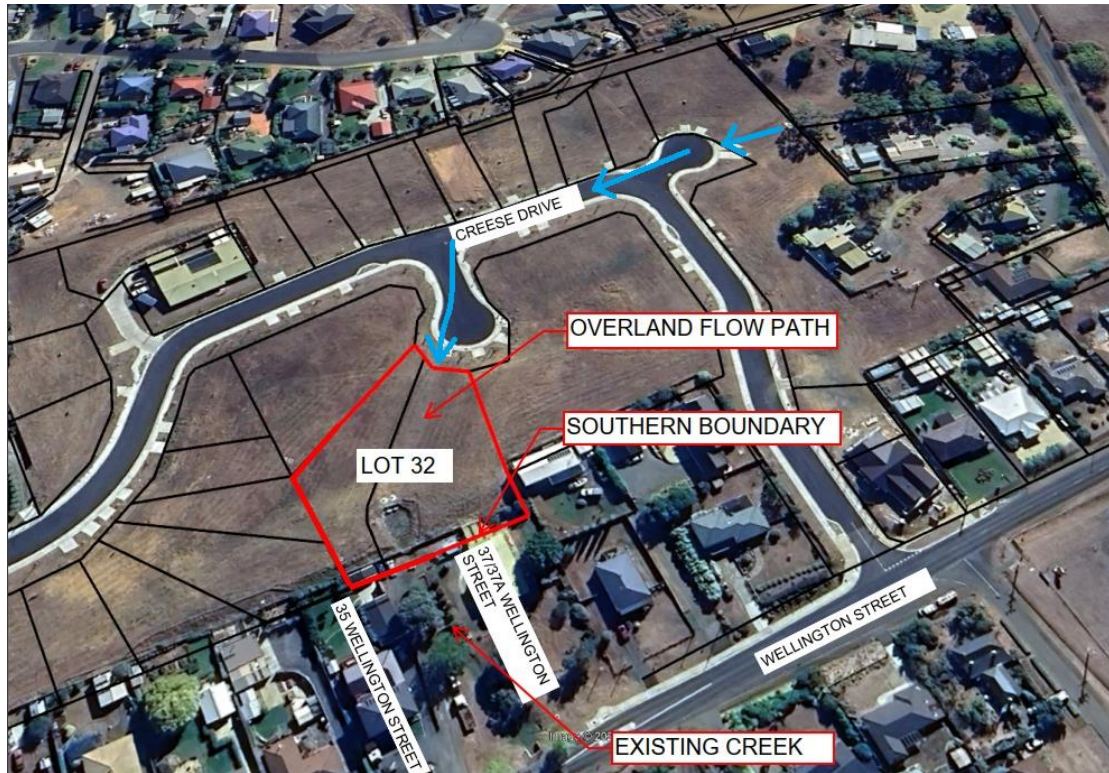


Figure 1: Site Locality Plan and Overland Flow Scheme

## 4. Hydrological and Runoff Peak Analysis

The hydrological study and hydrographs utilized in this report are based on the approved JMG report under application PDPLANPMTD-2019/003190 (Appendix A), specifically Section 11 (Drainage Results).

- 1% AEP + Climate Change = 4.65 m<sup>3</sup>/s
- 5% AEP = 2.05 m<sup>3</sup>/s

Given that the existing stormwater system is designed to accommodate the 5% AEP event, this study has considered the runoff as the difference between the 1% AEP + Climate Change scenario and the 5% AEP scenario. Consequently, the adopted peak runoff over a 6-hour period is approximately 2.60 m<sup>3</sup>/s.

### 4.1 HEC-RAS (Overland Flow - 2D Analysis)

A HEC-RAS model has been used to undertake a 2D unsteady flow analysis using the overland peak flow from Section 4 of this report. The software is an ARR-recognised 2D modelling program, ideal for overland flows, depths, velocities and overland flood extents.

### 4.2 Surface, Geometry and Flow Boundaries

The analysed surface has been built considering the surface condition described in section 3. In addition, the geometry mesh has been defined as an appropriate region surrounding the watercourse.

The inflow and outflow set a suitable distance upstream and downstream from the target modelling area to ensure that the model has time to stabilise at the upstream end and is not influenced by backwater at the downstream end. The inflow boundary has been designated at the upstream end of Creese Drive, directing runoff towards the road and going through the site.

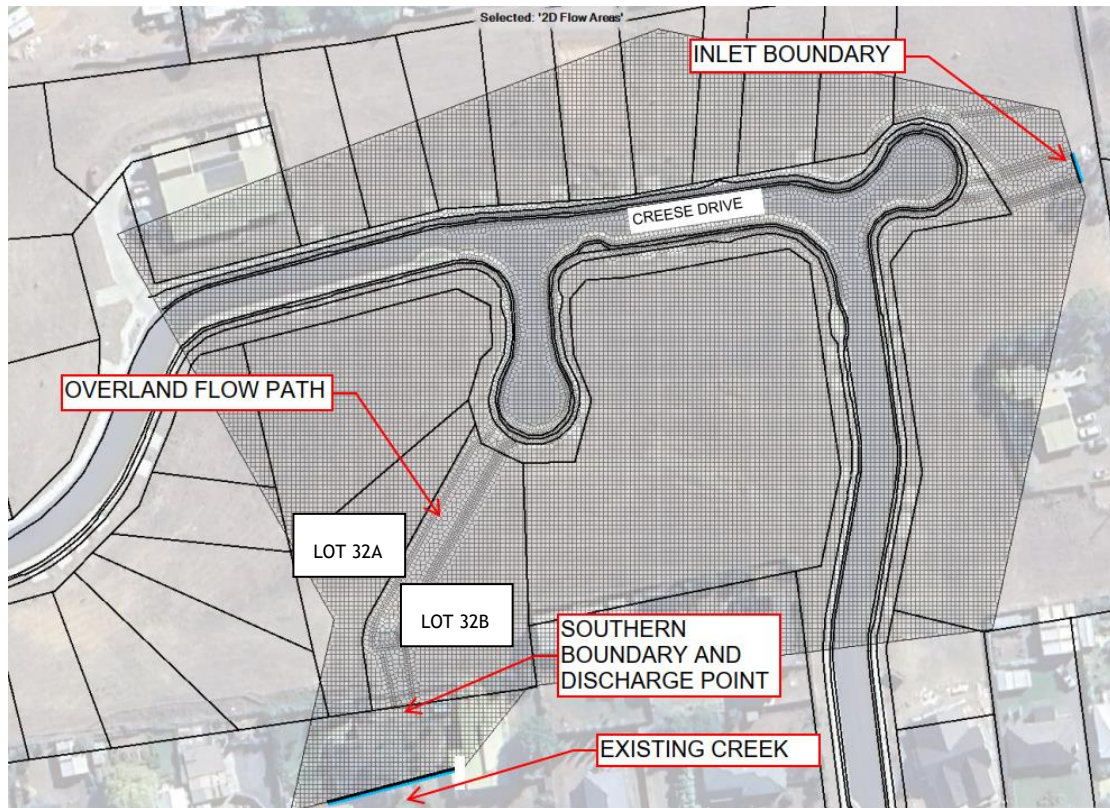


Figure 2: Inflow/Outflow Boundaries Scheme

Lastly, the model considers the following Mannings values:

- Roads, Driveway and Impervious Surfaces = 0.018
- Short Vegetation = 0.035

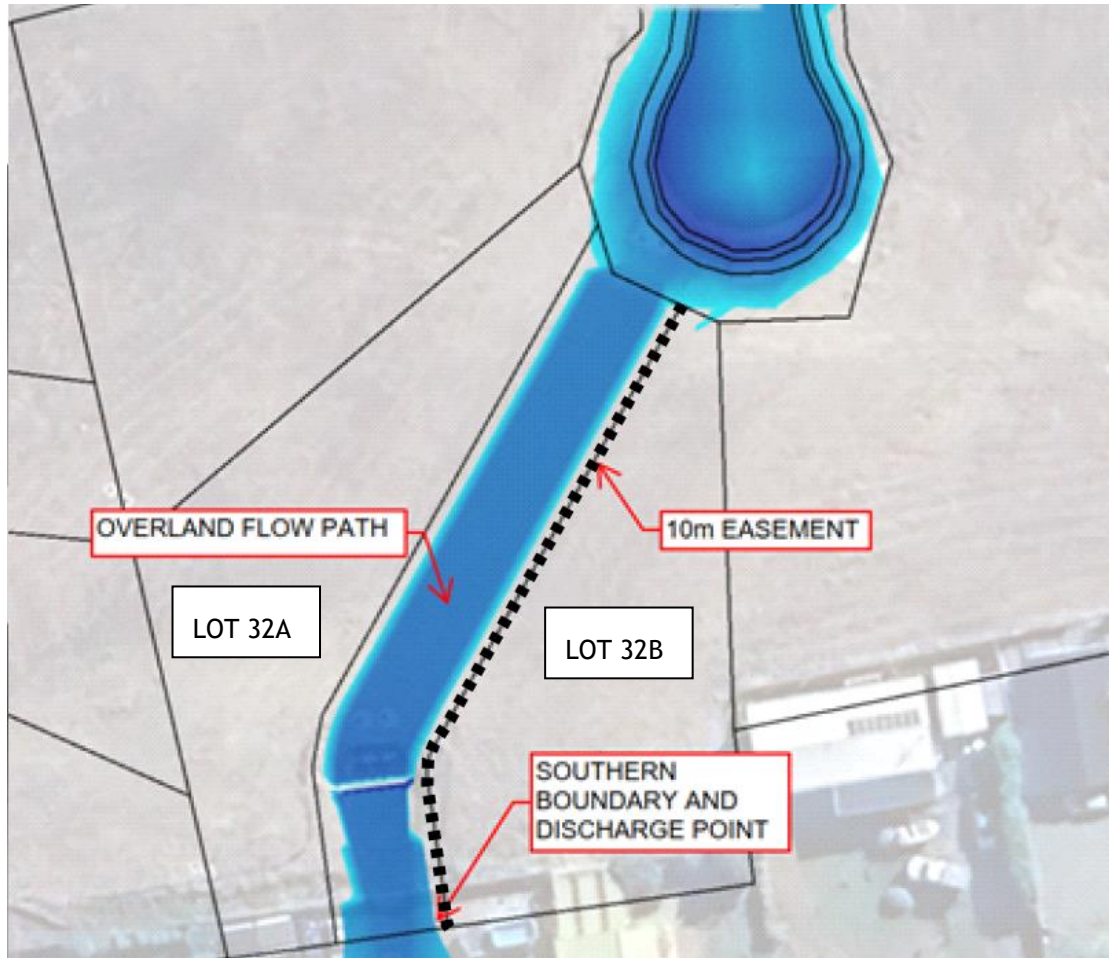


Figure 3: JMG - Flood Extents (1% AEP + CC)

It is evident that lot 32B, east of the 10m easement zone and 32A is outside the 1% AEP + CC (Annual Exceedance Probability with Climate Change) flood-prone area and demonstrates the proposed easement can adequately accommodate this condition. This proposed boundary arrangement is favourable to the subdivision development.

## 5. Flood Hazard Analysis

Flood Risk Hazard Levels are typically based on inundation depth and flow velocity per the following graphic and table from 'Updating National Guidance on Best Practice Flood Risk Management (D. McLuckie et al., 2014).

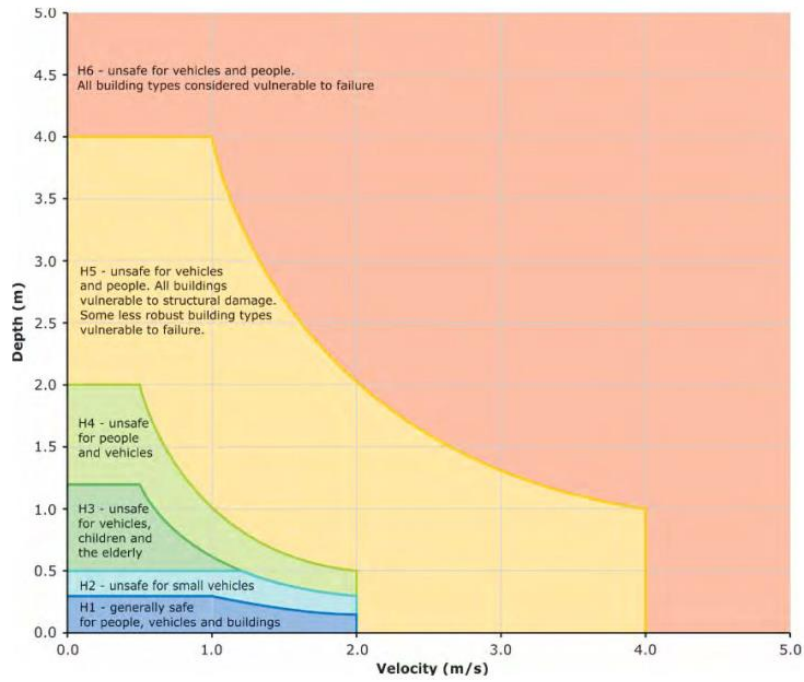


Figure 4: Combined Flood Hazard Curve Classification

Despite both envelopes being situated outside the 1% AEP + CC boundary extents, the lots are still susceptible to runoff from the calculated event along the 10m central easement. Figures 5 to 7 show the inundation depth, velocity and subsequent hazard rating.

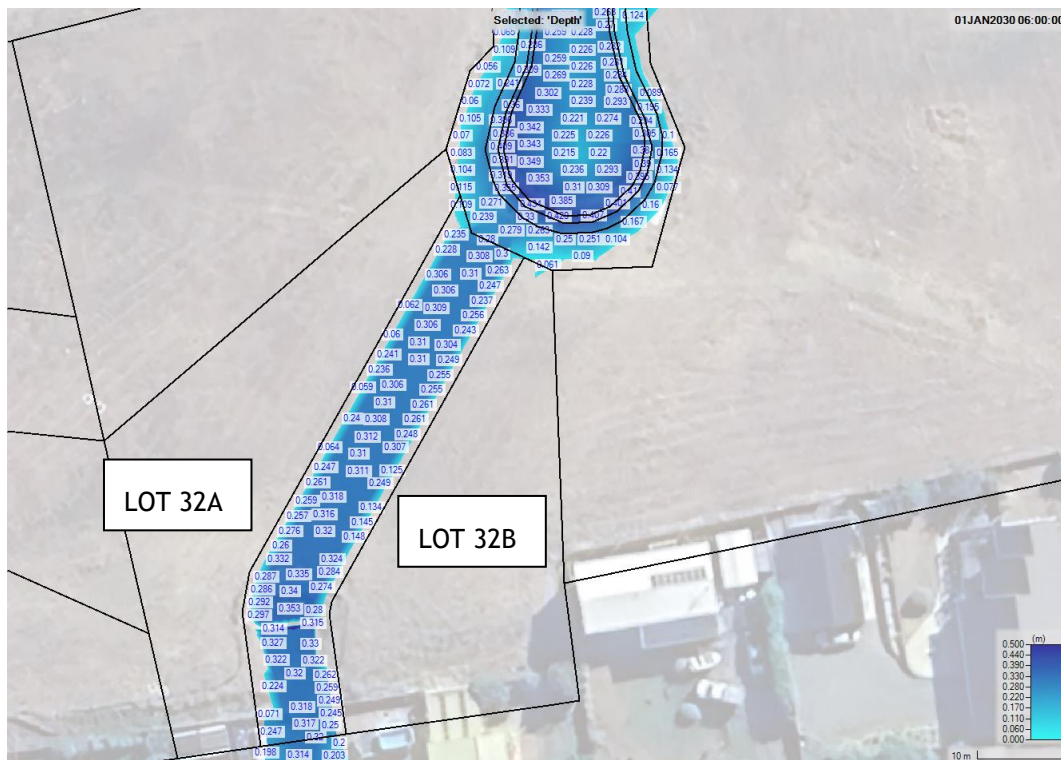


Figure 5: Screenshot from HEC-RAS (Maximum Depth 1%AEP + CC)

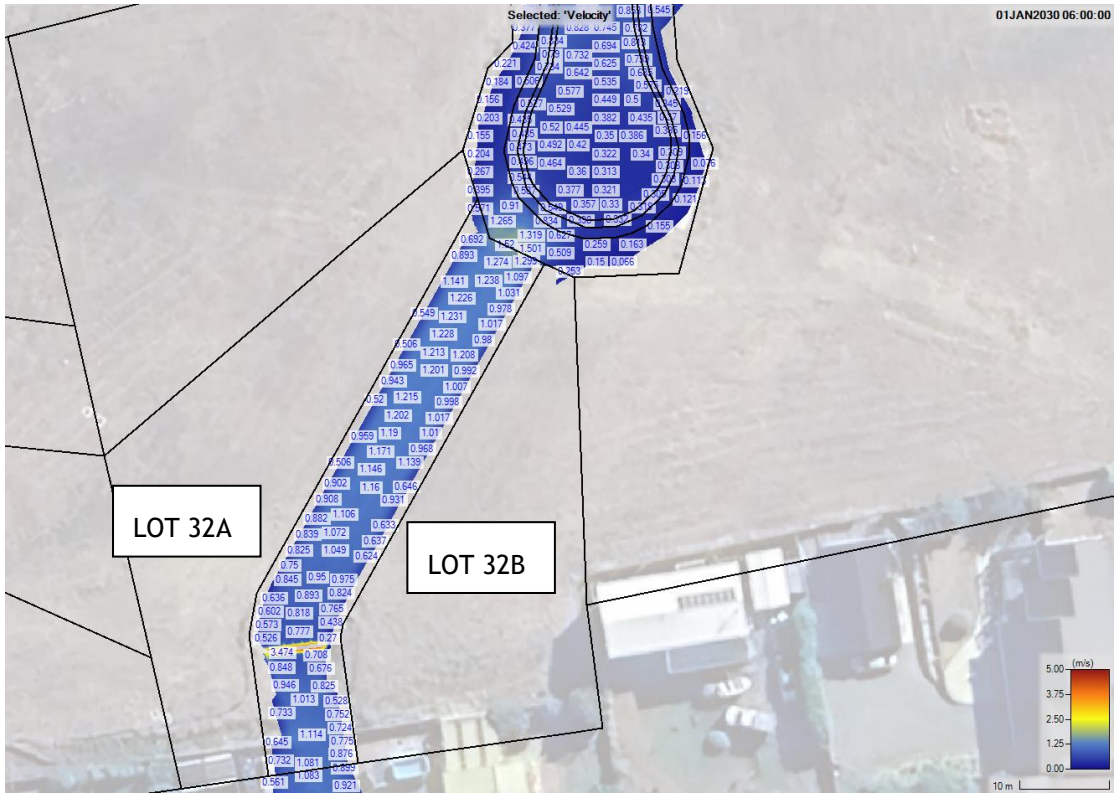


Figure 6: Screenshot from HEC-RAS (Maximum Velocity 1%AEP + CC)

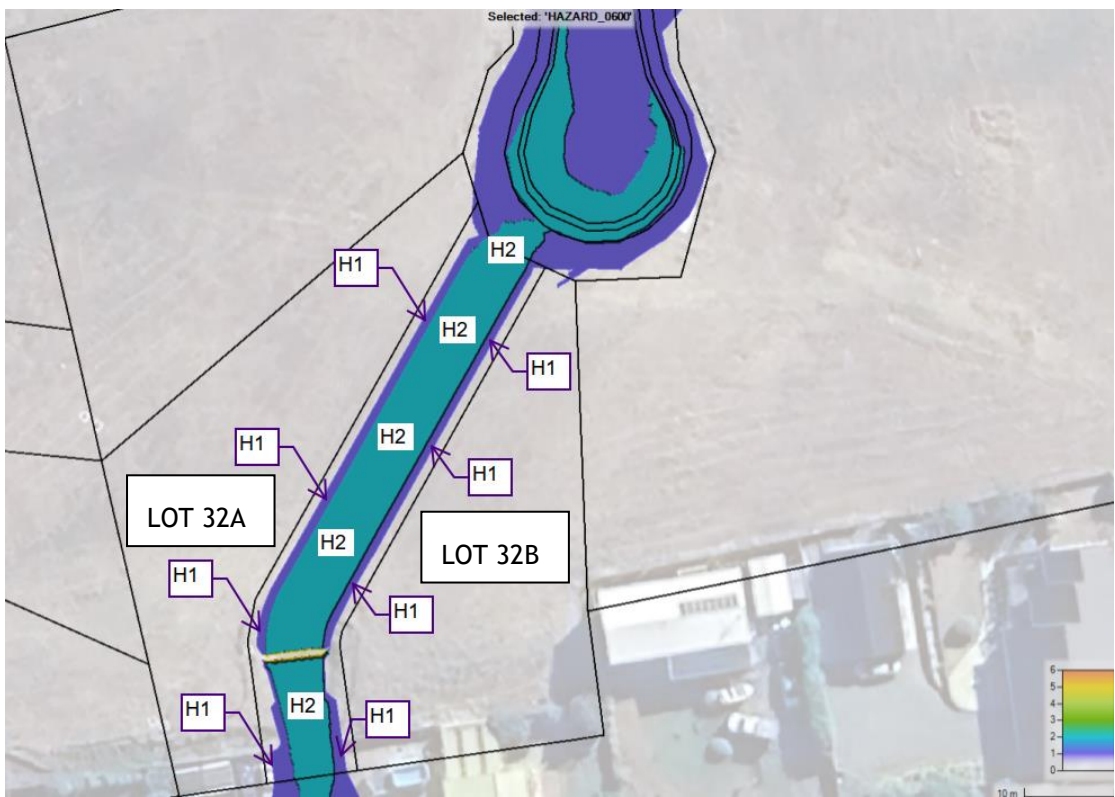


Figure 7: Screenshot from HEC-RAS (Hazard Map Results)

## 6. Conclusion and Recommendations

It can be concluded that Lot 32A is only exposed to a tolerable risk, as it lies wholly outside the designed flood extent. For Lot 32B, the constructed overland flow path through the 10.0m wide easement successfully accommodates the designed flood event (1% AEP + CC), and as such there is no risk to the remaining area of the lot.

Overall, both lots are able to contain a building area, vehicle access and services, complying with the Tasmanian Planning Scheme C12.7.1.

## 7. References

“Updating National Guidance on Best Practice Flood Risk Management” D. McLuckie et al 2014

**Appendix A**

Concept Services Report - Drainage Addendum (JMG Document)



# CONCEPT SERVICES REPORT - DRAINAGE ADDENDUM

To Clarence City Council

PROPOSED SUBDIVISION

12 ST JOHN CIRCLE, RICHMOND  
TASMANIA 7025

July 2019



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*Your Vision is Our Mission*



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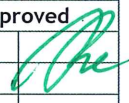
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- As project scope becomes better defined it is strongly recommended that estimates are updated.

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## 1. INTRODUCTION

JMG Engineers and Planners prepared a Concept Services report for a proposed subdivision in Richmond Tasmania. Clarence City Council sought to clarify the report with respect to drainage aspects. In particular there is concern that the rationale formula may not be an appropriate analysis tool. Council is seeking to understand the results from an alternate analysis method and has suggested a runoff routing computerised catchment model, and to also review the drainage for compliance with Australian Rainfall and Runoff (AR&R 2016).

A Runoff Routing (ROR) model will be set up to simulate the catchment. Comparisons and compare results with the rationale formulae calculations. Other regional flood estimating tools will also be examined.

The report will also discuss a number of other issues raised by Council about storm attenuation and lot fill and consider a number of improvements that can be made to the subdivision layout. General comments on the major/minor stormwater parameters adopted by Council will also be made.

## 2. EXECUTIVE SUMMARY

This report arrived at a number conclusions

- JMG's previous application of the rationale formulae was not in accordance with established and/or recognised procedures and severely underestimated the peak flow rate from the subdivision.
- Council's general concerns about the suitability of the rationale formulae are not founded. A comparison between the use of the rationale formulae and runoff routing and other methods suggested in AR&R 2016, indicate that they are no more precise given the absence of good and reliable calibration parameters.

These other methods include regional flood estimations and Runoff Routing involving hydrographs, temporal patterns and estimated of initial and continuing loss rates.

More concerning is that parameters suggested for use in uncalibrated catchments produce a wide range of possible results, making these alternate methods much less able to be reasonably interpreted than the rationale formulae.

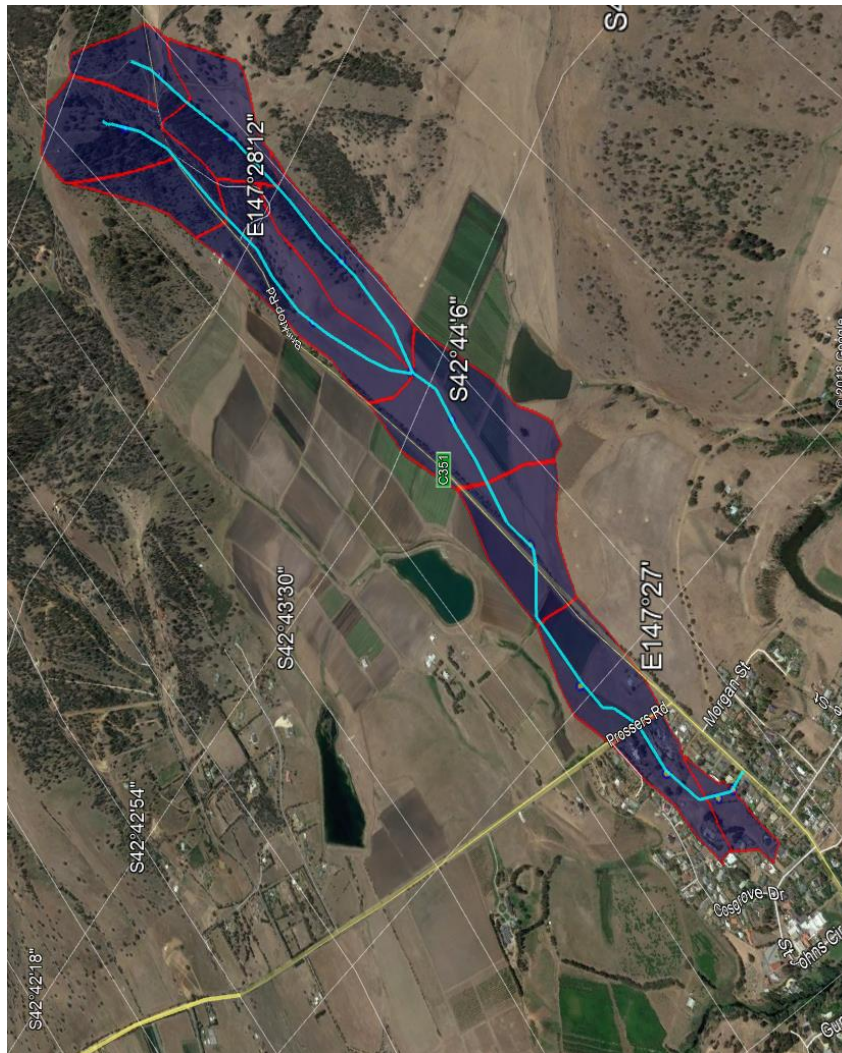
- The rational formulae therefore remains the surest way and the most more realistic way to estimate peak flow for a catchment of this type and size.
- The rationale formulae is also considered to be an appropriate methods to calibrate a hydrograph model requiring urbanization and/or analysis of detention storage.

### 3. SITE LOCATION AND CATCHMENT DESCRIPTION



The site is located in Richmond, North of Hobart

Figure 1 - Location within Tasmania



The terrain consists of two minor streams which merge half way down the catchment.

Figure 2 Catchment and terrain diagram - 3D

The area is some 1.01 km<sup>2</sup>, with a stream length of nearly 3 km and an average catchment slope of some 4.2%.

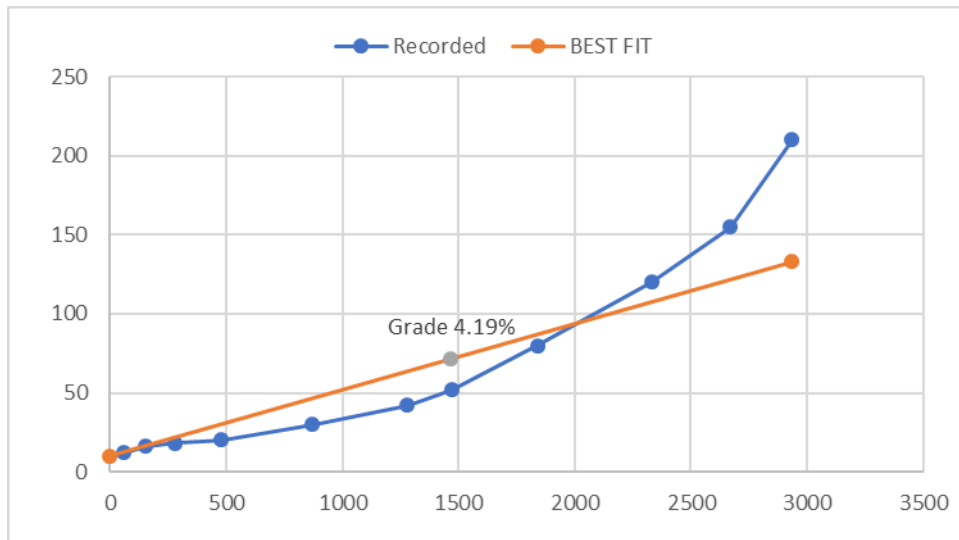
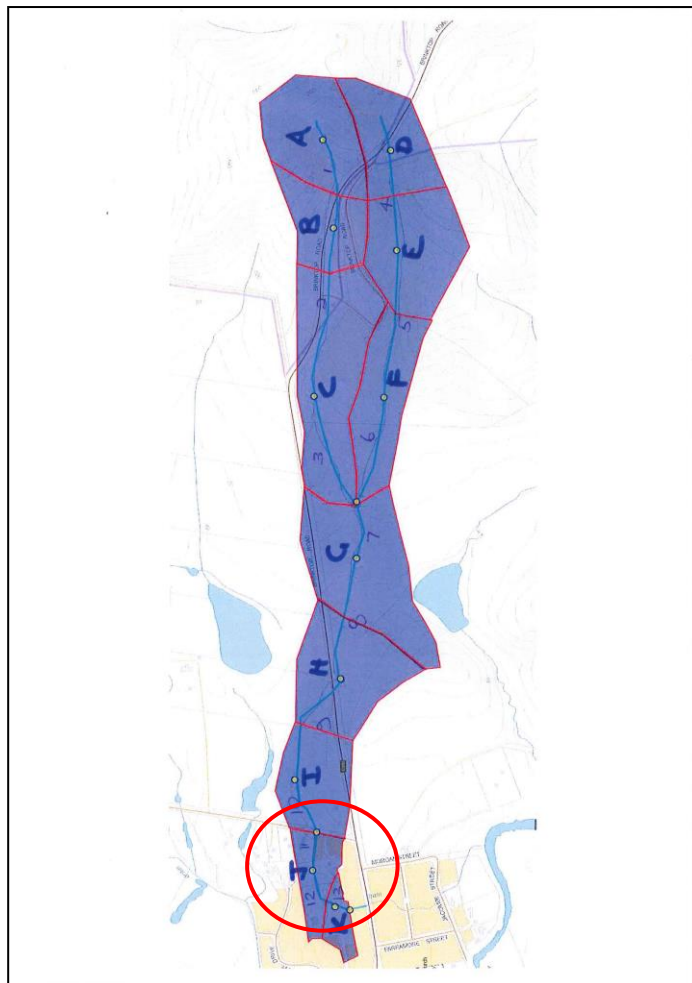


Figure 3 - Average Stream slope - Catchment D-K



The catchment was subdivided into 11 sub catchments and 13 stream lengths to form input into a Runoff Routing model.

The potential subdivision consists of catchment J & K, located at the catchment outlet

Figure 4 - Runoff Routing model Sub Catchment and stream length data sets

## 4. RATIONALE FORMULAE ANALYSIS - RURAL

The rationale formulae require the interpretation of two parameters:

- the time of concentration, representing the time for runoff to arrive from the and the furthest point of the catchment to the catchment outlet
- the coefficient of runoff - reresenting the proportion of rainfall to runoff, indicative of the permeability of the soil and vegetation cover.

Unusually shaped catchments may require the review of a partial area storm, where a shorter storm duration and a lesser area may produce greater runoff. The catchment in this example has a regular shape and is quite linear and would not require this review.

Length of main stream = 2.934 km Outlet to top of Catchment  
 Average mainstream Grade = 4.19% Figure 3  
 Area = 101.24 Ha

Time of Concentration = 80.5 mins Bransby -Williams Formulae  
 $T = 58 * L / S^{0.2} / A^{0.1}$

Rainfall Intensity 1% AEP = 25.7 mm/ hr. BOM 2019

Co-efficient of Runoff - Horton's N = 0.035

Poorly grassed Interpreted curves - 1977, 1987 AR&R et al.

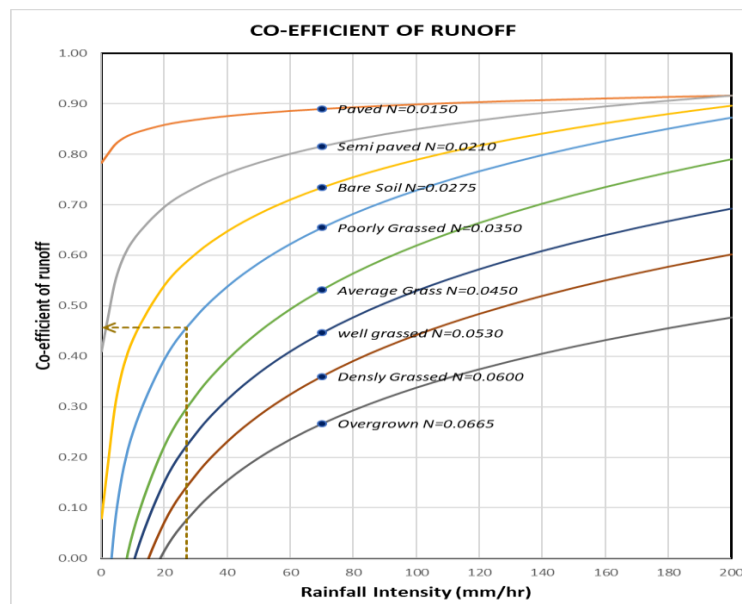


Figure 5 - Coefficient of runoff

CofR = 0.45

Q Peak = 3.23 m<sup>3</sup>/s 1% AEP

These results are different to the original services report which calculated a 1% AEP of 0.72 m<sup>3</sup>/s. The difference stems from the assessment of the coefficient of Runoff. This was understated in the original analysis at a value of C=0.11, due to the application of an urban %impervious formulae intended for Urban catchments.

This was not an appropriate application of the rational formulae and those results are to be abandoned in favour of these new calculations.

## 5. REGIONAL FLOOD FREQUENCY MODEL- Rural

The AR&R 2016 web site has a link to a regional flood frequency estimating model. It requires the entry of catchment outlet, centroid location and the catchment area.

Using this tool the following regional estimations were obtained.

AEP%	Discharge m <sup>3</sup> /s (*)	5% Confid m <sup>3</sup> /a	95% Confid m <sup>3</sup> /s
50	0.27	0.12	0.63
20	0.48	0.21	1.11
10	0.66	0.26	1.70
5	0.86	0.28	2.53
2	1.17	0.30	4.13
1	1.44	0.32	5.83

This represents a large variation in possible results, and it has a peak flow much less than the rationale formulae, for the average (50%) confidence level (\*).

The regional model consisted of 14 catchments ranging from 12 km<sup>2</sup> to 1200 km<sup>2</sup>, with only one additional catchment at approximately 2 km<sup>2</sup>. The trial catchment is therefore an outlier to the surrounding examples and may not be wholly representative.

## 6. RUNOFF ROUTING INPUT - Rural

A runoff routing model was set up with the following sub areas:-

	AREA	%	HYET	CATCH	DISTANCE
	km <sup>2</sup>	IMP	#	DESC	km
	<b>1.0124</b>				<b>1.699</b>
A	0.103	0	7	0	2.710
B	0.0654	0	7	0	2.410
C	0.161	0	7	0	1.850
D	0.0831	0	7	0	2.670
E	0.1103	0	7	0	2.330
F	0.0934	0	7	0	1.840
G	0.15	0	7	0	1.280
H	0.1145	0	7	0	0.870
I	0.0757	0	7	0	0.480
J	0.0375	0	7	0	0.150
K	0.0185	0	7	0	0.060

The following stream lengths:-

	<b>LENGTH</b>	<b>TYPE</b>	<b>SLOPE</b>	<b>F</b>	<b>Rel Delay Time</b>
	<b>Km</b>	<b>1,2,3,4</b>	<b>%</b>		<b>Av km</b>
1	0.30	Natural		1.00	0.18
2	0.56	Natural		1.00	0.33
3	0.38	Natural		1.00	0.22
4	0.34	Natural		1.00	0.20
5	0.49	Natural		1.00	0.29
6	0.37	Natural		1.00	0.22
7	0.19	Natural		1.00	0.11
8	0.41	Natural		1.00	0.24
9	0.39	Natural		1.00	0.23
10	0.20	Natural		1.00	0.12
11	0.13	Natural		1.00	0.08
12	0.09	Natural		1.00	0.05
13	0.06	Natural		1.00	0.04

The following vectors:-

	<b>VECTOR</b>	<b>Desc</b>
1	1	SUB AREA A, Route through STREAM 1
2	2	+SUB AREA B, Route through STREAM 2
3	2	+SUB AREA C, Route through STREAM 3
4	3	Store HYD. And Zero
5	1	SUB AREA D, Route through STREAM 4
6	2	+SUB AREA E, Route through STREAM 5
7	2	+SUB AREA F, Route through STREAM 6
8	4	Add Stored HYD.
9	5	Route through STREAM 7
10	2	+SUB AREA G, Route through STREAM 8
11	2	+SUB AREA H, Route through STREAM 9
12	2	+SUB AREA I, Route through STREAM 10
13	7	PRINT HYDROGRAPH
14	5	Route through STREAM 11
15	2	+SUB AREA J, Route through STREAM 12
16	2	+SUB AREA K, Route through STREAM 13
17	7	PRINT HYDROGRAPH

## 7. RUNOFF ROUTING CONTROL PARAMETERS

Runoff routing is controlled by 2 main parameters: Kc and M in the Storage /Discharge equation

$$\text{Storage} = K_c * K_r * \text{Discharge}^m \qquad S = K * Q^m$$

Kr is Catchment stream input dependent

Kc is the Storage Coefficient                      manually entered

M is Storage exponent                              manually entered

There are also two rainfall loss parameters: Initial Loss and continuing losses

Use of this model therefore requires the selection of 4 parameters.

Runoff routing models are best used when they can be calibrated to known rainfall and measured streamflow events. The rainfall losses and the storage parameters are adjusted to replicate the observed runoff. Once calibrated the model can then be modified to simulate a change in catchment values and/or rainfall events to satisfy the design need.

Rarely is data available to enable this process to be completed and use must be made of either formulae estimates of the model inputs, or by adjusting the model inputs to replicate flow rates devised and adopted by other methods.

Over the last 30 years it has been reasonably common to adopt rainfall loss parameters and to calibrate Kc to replicate an adopted rural flow, often developed by Rural Rationale Formulae.

In more recent times regional flood frequency analysis has also been used to select the adopted runoff value for larger rural areas.

Over the last few years there has been a reluctance in some quarters to continue to use the rational formulae.

AR&R 2016 states in Book 9 Section 5.4

### Design of Conveyance Networks with Computer Models

1. *Design of urban stormwater conveyance networks has a long history in Australia. Hand calculations using the urban Rational Method was discussed in the 1958, 1977 and 1987 editions of ARR as the most utilised method for estimation of stormwater inflows to conveyance or drainage networks. There is significant ongoing concern about the reliable characterisation of the parameters (such as runoff co-efficient and time of concentration) underpinning the Rational Method due to insufficient rainfall runoff observations in urban areas ([Coombes et al., 2015](#)).*

Council has expressed similar views in its email to JMG. This is further discussed in section 10.0

## 7.1 ROR Parameters      AR&R 2016

Concerns with the Rational formulae may well be justified but the ability to select reasonable values for Kc for runoff routing analysis, with confidence, is not particularly rewarding within the available literature for Tasmania.

AR&R 2016 in Book 7 -Application of Catchment Modelling systems states:

### 6.2.1.8. Tasmania

Morris (1982) developed the following relation for 17 catchments (63 to 1780 km<sup>2</sup>) using  $m = 0.75$ :

$$K_c = 4.86A^{0.32} \quad \text{EQUATION (7.6.28)}$$

Australian Rainfall and Runoff (Pilgrim, 1987) presents a relation developed by the Tasmanian Hydro Electric Commission for western Tasmania, with  $m = 0.75$ :

$$K_c = 0.86A^{0.57} \quad \text{EQUATION (7.6.29)}$$

Equation (7.6.28) and Equation (7.6.29) are in good agreement for catchments near to 1000 km<sup>2</sup> but Equation (7.6.28) predicts larger  $K_c$  values for smaller catchments.

In the absence of further data, equation Equation (7.6.29) is recommended for Tasmania.

For the catchment at Richmond this will produce a  $K_c$  between 0.86 and 4.87, a 500% difference. The smaller catchment of 1 km<sup>2</sup> is also well outside the range of the catchments used to derive these formulae, which are likely to be well above 1 km<sup>2</sup>. The Morris formulae used catchments greater than 63 km<sup>2</sup>.

$K_c$  is a measure of interstream storage “S”, where  $S = K * Q^m$ . The larger  $K$  is the more storage is available in the flow profile. The value of  $K_c$  for steep rugged country where runoff will flow fast, and shallow can be expected to be much less than a value for  $K_c$  in rural plains where the runoff is slow and deep. This is the case for the two formulae above where the Tasmanian west coast  $K_c$  is much lower.

None the less AR&R 2016 makes the representation that the West Coast formulae should be adopted in the absence of other information. Whether a  $K_c$  developed for steep rugged country on the west coast of Tasmania is appropriate for use on the East Coast, or in Richmond, is a moot point, worthy of much more discussion and analysis than the simple statement made in AR&R 2016 to adopt the west coast values.

These two formulae were also both developed over 35-years ago, and it appears that no new research has been undertaken since 1987. Given the deskilling of many government departments that likely participated in the derivation of these formulae it may be many years before any new formulae are developed.

As a comparison Askew developed a generalised formulae published in AR&R 1977.

$$K_c = 2.12 * A^{.57}$$

This yields a  $K_c$  of 2.14, which happens to be almost the average of 0.86 and 4.87.

Therefore any concern about “...the reliable characterisation of the parameters (such as runoff coefficient and time of concentration) underpinning the rational formulae...” are an equally apt description of the characterisation parameters for other computer based models including runoff routing models.

## 8. RAINFALL LOSSES & TEMPORAL PATTERNS

AR&R 2016 provides a data hub by which it is possible to develop storm losses for any location, although these are intended for rural use.

Using this resource, the initial and continuing losses for Richmond are:

Rainfall Initial Loss                    27.0    mm  
 Rainfall continuing loss                4.2    mm/hr.

These are both high losses, and their use will assume that the catchment is dry rather than saturated prior to the rainfall event. It is not uncommon to assume a much lower initial and continuing loss, but these values recommended by AR&R will be adopted for the initial analysis.

Temporal pattern will be adopted from 1977 AR&R. Given the scale of the catchment this is not considered an unreasonable simplification.

## 9. ROR RURAL ANALYSIS

The following parameters were used for the initial ROR run, in accordance with the AR&R 2016 guidelines.

IL = 27 mm                                    CL = 4.2 mm/hr.  
 Kc= 0.87                                      m = 0.75

### 9.1 RURAL RESULTS 1% AEP

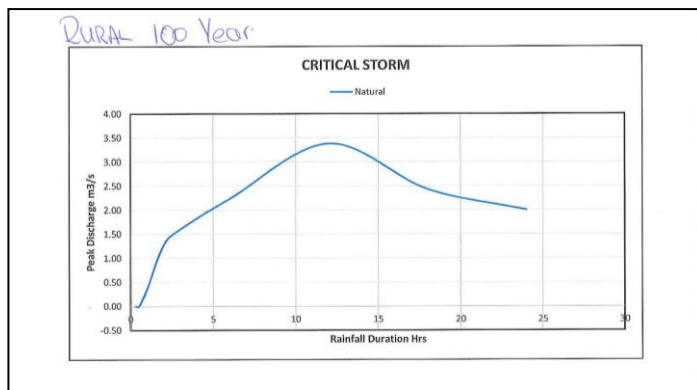


Figure 6 ROR Rural 1% AEP - Critical Storm

The Runoff Routing model was assessed for a range of storm durations from 20 minutes to 24 hours.

The critical storm was the 12 hour storm.

#### RUNOFF

Peak Q	<b>3.35</b>	m <sup>3</sup> /s
Peak @	<b>6.00</b>	hrs
VOLUME	<b>29,051</b>	m <sup>3</sup>
CENTROID T	<b>6.34</b>	hrs
CENTROID Q	<b>0.64</b>	m <sup>3</sup> /s

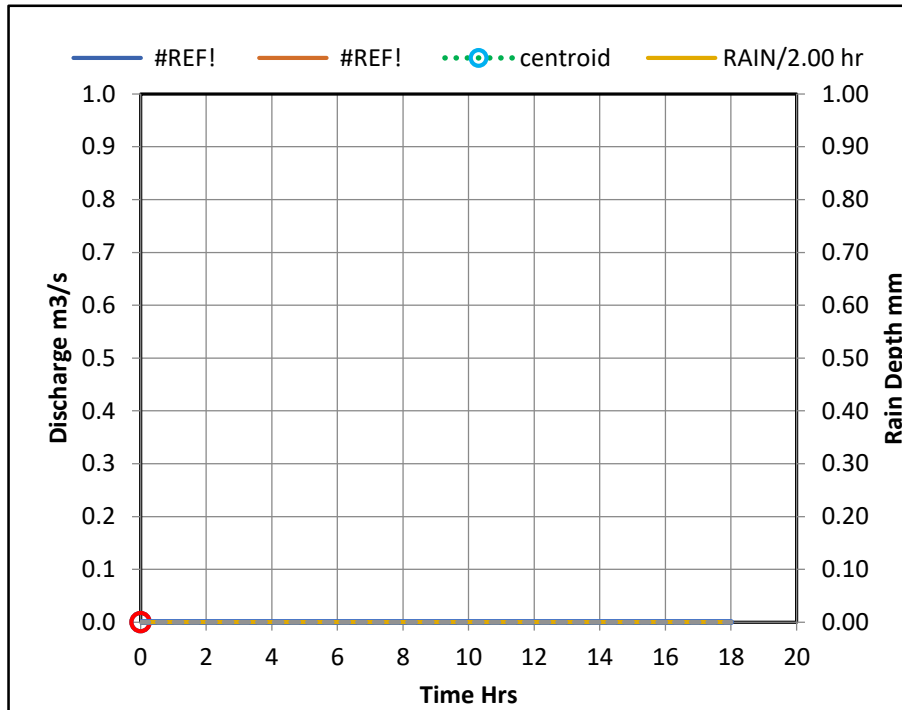


Figure 7 ROR RURAL 1% AEP 12 hour Hydrograph KC=0.87 M=0.75 IL=27mm CL=4.2mm/hr

The high losses show that no runoff occurs until 4 hours after the start of the 12 hour rainfall event. This is considered unlikely to be a reasonable result.

## 9.2 SENSITIVITY ANALYSIS RURAL 1% AEP

Given the range of possible Kc and rainfall loss values a sensitivity analysis was performed. The rational formula and the Regional flood frequency analysis results are also reported for comparison purposes.

ROR							Rational Formulae	Regional Flood Freq Analysis
IL mm	27	27	27	0	0	0		
CL mm/hr	4.2	4.2	4.2	4.2	4.2	4.2		
Kc	0.87	2.14	4.89	0.87	2.14	4.89		
M	0.75	0.75	0.75	0.75	0.75	0.75		
Q m <sup>3</sup> /s	<b>3.35</b>	<b>2.11</b>	<b>1.24</b>	<b>4.61</b>	<b>3.00</b>	<b>1.30</b>	<b>3.23</b>	<b>1.44</b>
Tcrit hrs	12	12	18	6	6	12		

The peak flow ROR results vary from 1.24 to 4.61 m<sup>3</sup>/s. a range of 350%.

Even within the same rainfall losses the range of discharges for different Kc is still significant, being from 1.24 to 3.35 with a 27mm initial loss and 1.3 to 4.61 with a 0 initial loss.

Clearly runoff routing, without the benefit of a rainfall and runoff data to calibration against does not yield any greater precision than the rationale formulae, despite any shortcomings that process may be perceived as having.

In much larger rural catchments regional flood frequency is likely to be more useful as a calibrating tool, however, in small catchment including this one, ROR has been shown not to be particularly illuminating using available model set up formulae.

The fact that the rationale formulae has meaningful parameters for time of concentration and proportion of runoff to rainfall, means that it is often more “rational” and simpler to interpret a reasonable value for these parameters.

It is much less intuitive to interpret meaningful parameters for  $m$ ,  $K_c$ ,  $IL$  and  $CL$  for ROR.

### 9.3 RURAL PEAK FLOW

In this example it is considered reasonable to adopt a 1% AEP Rural flow rate of approximately  $3.25 \text{ m}^3/\text{s}$ . This agrees reasonably with the Rational Formulae result of  $3.23 \text{ m}^3/\text{s}$  and compares well with the ROR results for

$IL= 27$  and  $K_c = 0.87 \rightarrow 3.35 \text{ m}^3/\text{s}$  as recommended by ARR 2016, or  
 $IL=0$  and  $K_c = 2.14 \rightarrow 3.00 \text{ m}^3/\text{s}$  as recommended by AR&R 1977

If detention storage was being considered for an extreme event in an urban environment the more reasonable ROR parameters are considered to be 0 initial loss and a  $K_c$  of 2.14.

The hydrograph for  $IL=0$  and  $K_c= 2.14$  is shown following.

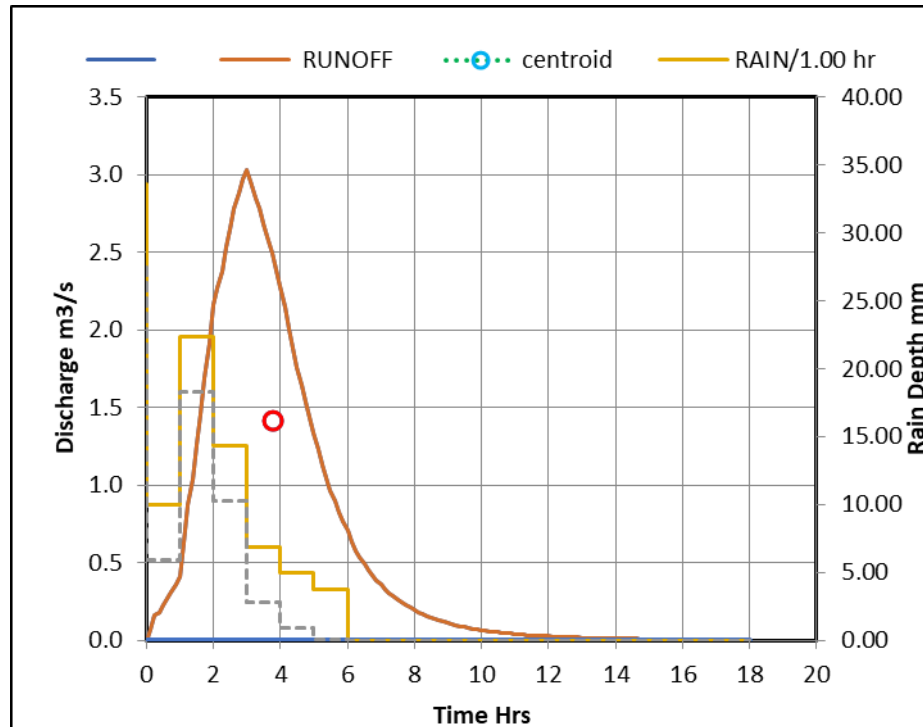


Figure 8 ROR RURAL 1% AEP 6-hour Hydrograph  $KC=2.14$   $M=0.75$   $IL=0$  mm  $CL=4.2\text{mm/hr}$

The 0 initial loss is considered to better represent reality where during a 6-hour critical storm, runoff occurs almost immediately after the beginning of rainfall, instead of many hours later.

It is not considered reasonable to have a 0 initial loss together with the lowest possible recommendation of Kc (0.87). The calculated peak discharge would be 4.7 m<sup>3</sup>/s which is considered excessive.

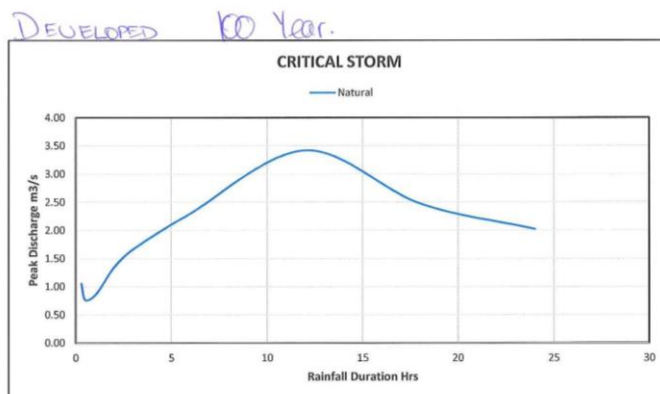
If peak flows are only to be considered, then the rational formulae still provide a reasonable result. This is considered likely to be true in many similar circumstances, and for larger but not excessive catchment sizes.

Decisions to abandon the Rational formulae in favour of more precise modelling techniques are premature unless better data sets are available.

## 10. DEVELOPED FLOWS

Changing the ROR Model to account for development is achieved by identifying a percent impervious (50% is used) for Catchments I & K, and altering the stream of reaches 11,12, & 13 to lined reaches at say 0.5%, instead of natural reaches.

Losses are diminished by the impervious percentage and stream storage is reduced by the streamlined reach lengths.



Using parameters of

IL = 27            CL = 4.2

Kc = 0.87        M = 0.75

1% AEP

The develop Critical Storm is still the 12-hour event, but the shorter duration storms show the effect of urbanization

Figure 9            1% AEP Developed Critical storm

### RUNOFF

Peak Q	<b>3.39</b>	m <sup>3</sup> /s
Peak @	<b>6.00</b>	hrs
VOLUME	<b>30,415</b>	m <sup>3</sup>
CENTROID T	<b>6.17</b>	hrs
CENTROID Q	<b>0.68</b>	m <sup>3</sup> /s

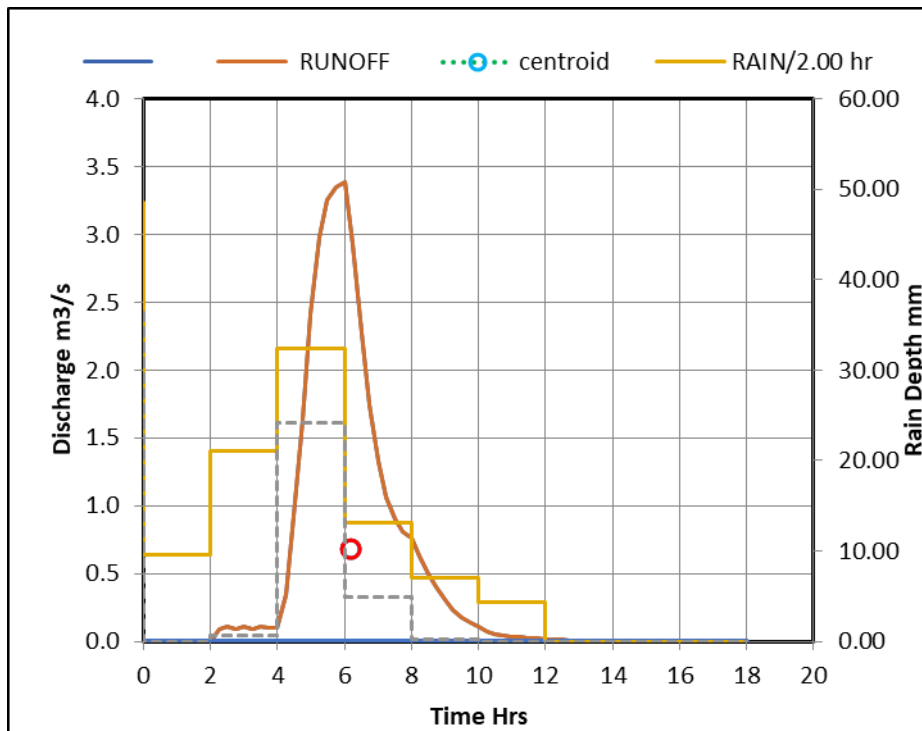


Figure 10 ROR DEVELOPED 1% AEP 12-hour Hydrograph KC=0.87 M=0.75 IL=27 CL=4.2

Urbanization has a minor effect on the total site peak runoff since the runoff from the lower area will be delivered early and before the peak arrives from the upstream rural catchment. This is especially so where the overall critical storm is between 6 and 12 hours.

Overall urbanization has increased ROR runoff from 3.35 to 3.39, an increase of 1.2%.

## 10.1 DEVELOPED FLOWS - alternate AEPs

The rainfall depths were modified to assess the runoff from more frequent events, and from Climate change. The 12-hour event remained the critical storm whilst still using the initial Rainfall loss values of IL= 27 and CL = 4.2.

5% AEP            Q = 1.82 m<sup>3</sup>/s

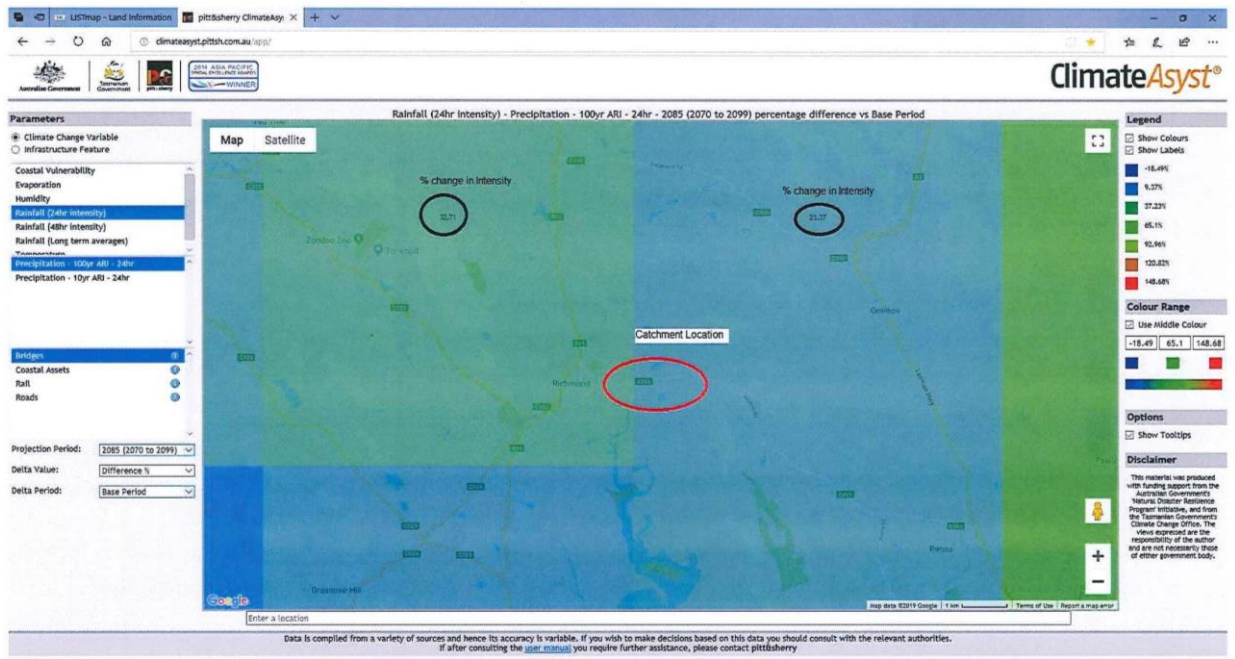
20 % AEP        Q = 0.13 m<sup>3</sup>/s

This is not a credible result

The more frequent events are heavily influenced by the large Initial losses. Often most, if not all, of the rainfall is consumed by the high losses. This reason alone is good justification for having zero initial losses, together with a higher Kc, as discussed in section 9.3.

Climate change was also assessed by accessing the Climate Assist Tool developed by Pitt & Sherry with funds provided by the Australian Government.

This tool shows that at the turn of the century - (2070 to 2099) the 100-year ARI 24 hour intensity at Richmond will likely increase by an average 28%.



Adopting this figure for all storm durations the 1% AEP will increase to

1% AEP - with Climate Change  $Q = 4.72 \text{ m}^3/\text{s}$  12-hour storm

In comparison the developed results with the more realistic input parameters, which are not recommended by AR&R.

IL = 0, Kc = 2.14, M=0.75 are:

20 % AEP	$Q = 1.17 \text{ m}^3/\text{s}$	3-hour storm
5% AEP	$Q = 2.06 \text{ m}^3/\text{s}$	6-hour storm
1% AEP	$Q = 3.11 \text{ m}^3/\text{s}$	6-hour storm
Climate Change 1% AEP	$Q = 4.45 \text{ m}^3/\text{s}$	6-hour storm

## 11. DRAINAGE RESULTS

We suggest that the appropriate values of developed runoff can be given with ROR with IL=0, CL= 4.2 Kc= 2.14 M= 0.75.

These results are shown below together with Rational formulae values, for comparison.

### ADOPTED FLOWS

	UNDEVELOPED		DEVELOPED	
	ROR	Rational	ROR	Rational
20% AEP		1.31	<b>1.17</b>	
5% AEP		2.05	<b>2.06</b>	
1% AEP	<b>3.00</b>	3.23	<b>3.11</b>	
1% AEP + CC*		4.65	<b>4.45</b>	

CC\* = Climate Change

The rational Formula provides an equally good interpretation of appropriate results as any runoff routing procedure. In fact, without rational formulae guidance as to an appropriate answer it would not be known which result ought to be adopted.

Accordingly, we do not share the concern with regard to the use of the rational method as runoff routing has been shown to be no more precise given the uncertainty of appropriate calibration parameters. The values for IL and Kc recommended in AR&R 2016, as required, are not conducive to producing realistic or practical results.

Adopting AR&R 2016 recommended parameters yields results that are most unrealistic with regard to the critical duration storm and the zero runoff levels for more frequent events.

We suggest that the Rational Formulae will remain a valuable and suitable analysis tool for some time yet, and decisions to abandon it are well premature.

JMG will adopt the Rational formulae results.

## 12. OTHER COUNCIL CONCERNS

- Hydraulic Inlets

We have not reviewed a solution at this stage, and in-depth analysis ought not be required for a subdivision application services plan. Further discussion will be required in detailed design. The inclusion of an overland flow path avoids the need for detailed understanding of any drainage inlets.

Climate change has been assessed as shown, but the planning scheme does not require its use.

- Hydraulic Outlet

The Council has a concern with the proximity of adjoining property to the south. This is reasonable but it also relates to Councils stormwater strategy and planning scheme requirements.

Council appears to have partly dealt with this outlet at Wellington Street, where it has acquired land to effectively control the headwaters of the culvert inlet. It is not possible however to join the public overland flow paths from the proposal with the existing public lands at the culvert. It is also not possible to direct the flow elsewhere as this is a natural creek and natural outlet.

To limit high speed jet stream from the low flow drainage structures the headwall will be partially set back from the boundary.

The 1% developed peak flows are only 4% higher after development compared to undeveloped flows, although there will be an increase in flow (but not above the peak) in shorter duration storms.

- Impacts from filling

Council has a concern for the loss of attenuation and the resulting higher peak flows and quicker delivery of peaks to downstream areas. We do not agree with this concern.

Filling of private land to protect and enhance lots cannot be regarded as decreasing attenuation or enhancing delivery of flows, unless the subdivision is specifically required for natural attenuation. That is not the case here.

Faster delivery of peak flows downstream can more realistically be attributed to the Council requirement to pipe the 5% AEP flows as the minor event. This requirement will result in more rapid response and shorten delivery times to increase the reaction form rainfall.

The use of major/minor storm strategies have been around for many decades. The major event is more often the 1% AEP for overland flows. Previously the conventional approach to the minor event was the 20% AEP. In earlier editions of AR&R this was defined as the 5-year ARI and was interpreted by placing gully pits and pipes to limit the flow width in gutters. This was to avoid aquaplaning of cars and splashing of pedestrians on footpaths. It was considered reasonable in an urban environment for pedestrians to expect some impediment from a passing car whilst walking on the footpath once every 5 years. As urban events are reasonably intense storm lasting only some 20 minutes this was a minor inconvenience.

More recently many councils have gradually increased the minor storm ARI from 5 year to 10 year and in the Glenorchy Area to 20-year years in residential and 50 years in Commercial. These latter two are extreme events. If indeed the major 1% AEP has been provided for then these extreme minor events are most likely unnecessary, will cost much more to develop and maintain, but the larger conveyance pipe area will have increased transmission speeds.

We would not support Council' s concern about attenuation loss due to lot filling.  
We would also support Council's review of its minor storm standards

- Storm Water Quality is not addressed in this addendum. This will be an item for review once the key concerns about appropriate drainage tools, discharge levels and stormwater strategy are further considered.

Signed  
**JOHNSTONE McGEE & GANDY**

**Geoff BRAYFORD**  
**SENIOR CIVIL ENGINEER**  
Dip. Tech (Civil Eng), BE (hons), LGE (NSW), MBA,

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## APPENDIX A

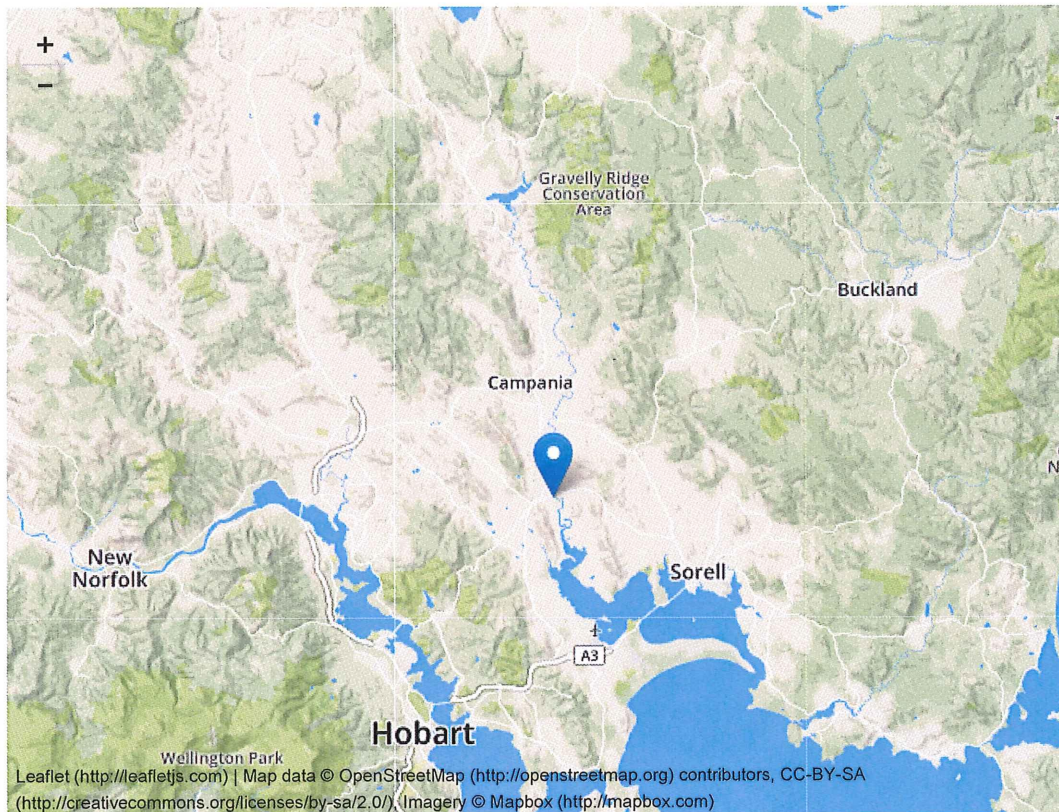
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### AR&R -Data HUB - Results

# Australian Rainfall & Runoff Data Hub - Results

## Input Data

Longitude	147.439
Latitude	-42.737
<b>Selected Regions (clear)</b>	
Storm Losses	show



## Region Information

Data Category	Region
River Region	Coal River
ARF Parameters	Tasmania
Temporal Patterns	Southern Slopes (Tas)

## Data



### Storm Losses

Note: Burst Loss = Storm Loss - Preburst

Note: These losses are only for rural use and are **NOT FOR USE** in urban areas

<b>id</b>	25205.0
<b>Storm Initial Losses (mm)</b>	27.0
<b>Storm Continuing Losses (mm/h)</b>	4.2

### Layer Info

<b>Time Accessed</b>	12 April 2019 08:19AM
<b>Version</b>	2016_v1

### BOM IFD Depths

Click here ([http://www.bom.gov.au/water/designRainfalls/revise-ifd/?year=2016&coordinate\\_type=dd&latitude=-42.737&longitude=147.439&sdmin=true&sdhr=true&sdday=true&user\\_labe](http://www.bom.gov.au/water/designRainfalls/revise-ifd/?year=2016&coordinate_type=dd&latitude=-42.737&longitude=147.439&sdmin=true&sdhr=true&sdday=true&user_labe)) to obtain the IFD depths for catchment centroid from the BoM website

**No data** No data found at this location!

### Layer Info

<b>Time Accessed</b>	12 April 2019 08:19AM
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[Download TXT \(downloads/1555021190.txt\)](#)

[Download PDF \(downloads/1555021190.pdf\)](#)

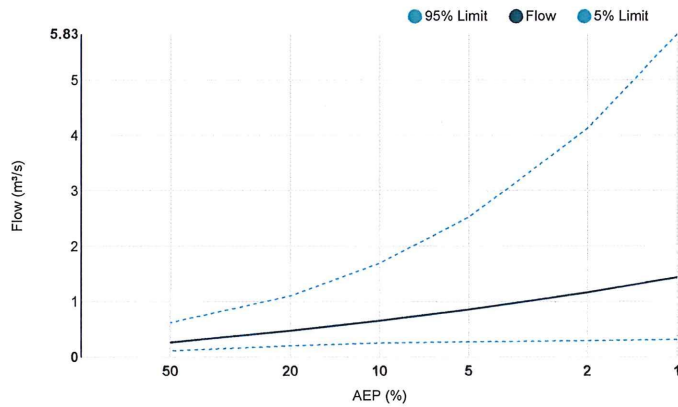
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## APPENDIX B

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# AR&R - Regional Flood Frequency Estimation Model

# Results | Regional Flood Frequency Estimation Model



\*The catchment has unusual shape. Results have lower accuracy and may not be directly applicable in practice.

AEP (%)	Discharge (m³/s)	Lower Confidence Limit (5%) (m³/s)	Upper Confidence Limit (95%) (m³/s)
50	0.270	0.120	0.630
20	0.480	0.210	1.11
10	0.660	0.260	1.70
5	0.860	0.280	2.53
2	1.17	0.300	4.13
1	1.44	0.320	5.83

## Input Data

Date/Time	2019-04-09 16:23
Catchment Name	RICHMOND
Latitude (Outlet)	-42.735
Longitude (Outlet)	147.44
Latitude (Centroid)	-42.733
Longitude (Centroid)	147.455
Catchment Area (km²)	1.022
Distance to Nearest Gauged Catchment (km)	8.63
50% AEP 6 Hour Rainfall Intensity (mm/h)	4.661356
2% AEP 6 Hour Rainfall Intensity (mm/h)	9.691403
Rainfall Intensity Source (User/Auto)	Auto
Region	Tasmania
Region Version	RFFE Model 2016 v1
Region Source (User/Auto)	Auto
Shape Factor	1.23*
Interpolation Method	Natural Neighbour
Bias Correction Value	0.361

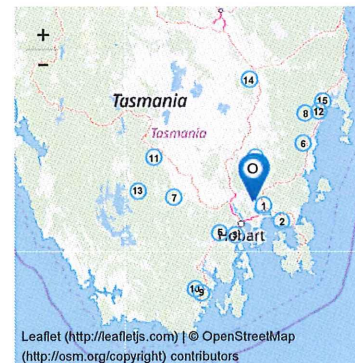
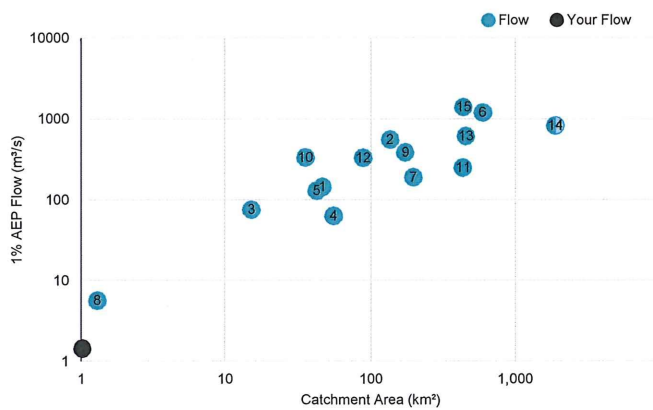
## Statistics

Variable	Value	Standard Dev	Correlation		
Mean	-1.373	0.552	1.000		
Standard Dev	0.610	0.371	-0.330	1.000	
Skew	0.148	0.163	0.150	-0.440	1.000

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

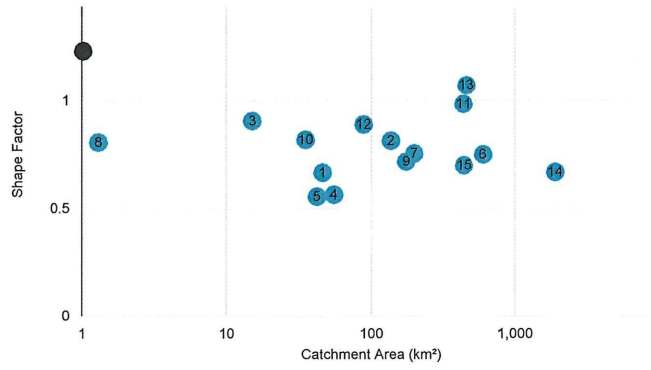
Note: These statistics are common to each region. Details.

## 1% AEP Flow vs Catchment Area

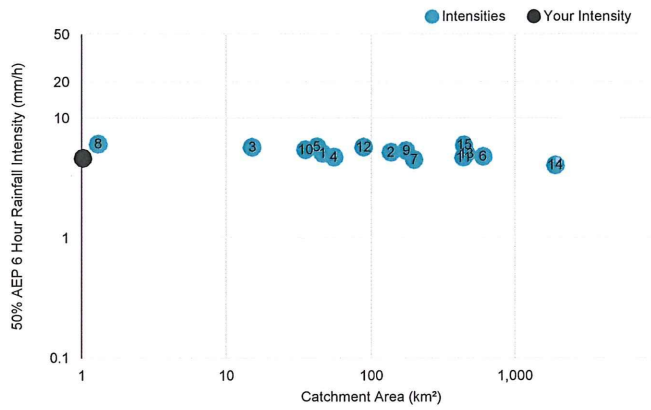


## Shape Factor vs Catchment Area

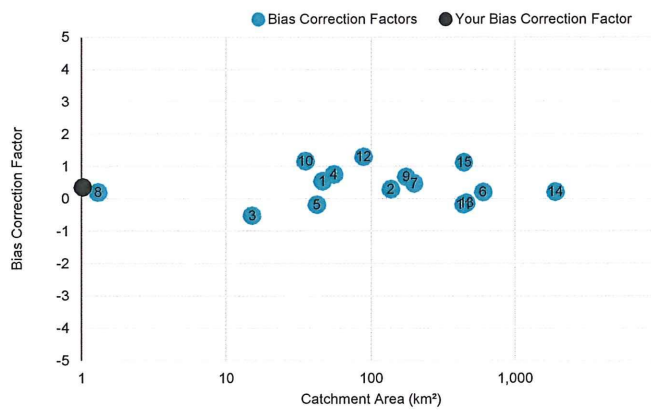




### Intensity vs Catchment Area



### Bias Correction Factor vs Catchment Area



### Download

- [TXT](#)
- [Nearby](#)
- [JSON](#)

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



<http://www.engineersaustralia.org.au>



<http://www.uws.edu.au>

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## APPENDIX C

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# AR&R IFD Design Rainfall Depths



## Location

**Label:** Not provided

**Latitude:** -42.737 [Nearest grid cell: 42.7375 (S)]

**Longitude:** 147.439 [Nearest grid cell: 147.4375 (E)]

## IFD Design Rainfall Depth (mm)

Issued: 12 April 2019

Rainfall depth for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).  
[FAQ for New ARR probability terminology](#)

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	1.04	1.18	1.65	2.00	2.36	2.88	3.32
2 min	1.79	2.01	2.74	3.26	3.75	4.37	4.83
3 min	2.37	2.67	3.66	4.37	5.06	5.95	6.64
4 min	2.85	3.22	4.44	5.33	6.21	7.41	8.35
5 min	3.26	3.69	5.12	6.16	7.23	8.71	9.90
10 min	4.74	5.39	7.57	9.20	10.9	13.5	15.6
15 min	5.77	6.56	9.23	11.2	13.4	16.5	19.2
18 min	6.28	7.13	10.0	12.2	14.5	17.9	20.8
20 min	6.59	7.48	10.5	12.8	15.2	18.7	21.7
25 min	7.29	8.27	11.6	14.1	16.7	20.4	23.6
30 min	7.91	8.96	12.5	15.1	17.9	21.9	25.1
45 min	9.45	10.7	14.8	17.8	20.9	25.2	28.6
1 hour	10.7	12.1	16.7	19.9	23.2	27.7	31.3
1.5 hour	12.8	14.5	19.7	23.4	27.1	31.8	35.6
2 hour	14.6	16.4	22.3	26.3	30.3	35.4	39.2
3 hour	17.5	19.7	26.7	31.3	35.7	41.5	45.8
4.5 hour	20.9	23.7	32.0	37.4	42.6	49.4	54.4
6 hour	23.8	26.9	36.5	42.6	48.5	56.3	62.2
9 hour	28.2	32.1	43.7	51.3	58.5	68.4	75.8
12 hour	31.7	36.1	49.6	58.3	66.8	78.5	87.5
18 hour	36.9	42.2	58.5	69.3	79.9	94.9	107
24 hour	40.6	46.6	65.1	77.6	89.9	107	121
30 hour	43.5	49.9	70.2	84.1	97.7	117	133
36 hour	45.7	52.5	74.2	89.2	104	125	142
48 hour	49.1	56.4	80.0	96.7	113	137	155

<b>72 hour</b>	53.1	61.0	86.8	105	124	149	169
<b>96 hour</b>	55.5	63.7	90.3	109	129	155	176
<b>120 hour</b>	57.1	65.4	92.3	111	131	157	178
<b>144 hour</b>	58.3	66.8	93.5	112	132	158	179
<b>168 hour</b>	59.3	67.8	94.3	112	132	158	180

Note:

# The 50% AEP IFD **does not** correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.44 ARI.

\* The 20% AEP IFD **does not** correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.48 ARI.

This page was created at **08:23 on Friday 12 April 2019 (AEST)**

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## APPENDIX D

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### Council Concerns - Email 8 March 2019 8:47 am

Part of Email only

*Firstly, the report states that the hydrologic analysis has been conducted using the Rational Method in accordance with Australian Rainfall and Runoff. I assume that they have used the outdated 1987 version since the Rational Method is no longer recommended for anything other than small developments. Rainfall IFDs have been sourced from the BoM, however they have not stated whether they are 1987 or 2016 IFD values, nor have they shown the IFD values in any of their “calculations”.*

#### Hydrology

*The report only provides an estimate of the 5% AEP peak flow from the upstream catchment, however plan C05 indicates that the twin DN750 pipes are sized to convey a 1%AEP peak flow. I assume that the pipes are sized to convey their estimated 5% AEP peak flow of 0.7m<sup>3</sup>/s.*

*The use of the Rational Method is not applicable to the hydrologic analysis of this catchment. However by way of comparison I found my calculations from 2011 in which I estimated a 1% AEP peak flow rate of approximately 2.6m<sup>3</sup>/s. This would roughly correspond to a 5% AEP peak flow of 1.8m<sup>3</sup>/s. More recently I have undertaken 2D modelling of the catchment and my 1% peak flow from that work would correspond with a 5% AEP peak flow in the order of 3 m<sup>3</sup>/s.*

*The report is also silent on climate change, hence I assume that no allowance has been made.*

**Recommendation:** *That the upstream catchment and the proposed development be re-analysed using appropriate runoff routing software in accordance with ARR2016, including making allowance for the effects of climate change on rainfall intensity.*

#### Hydraulics - inlet

*JMG have proposed to pipe the runoff from the upstream catchment through the subdivision. I would like to see a concept design for the inlet structure, and subject to reassessment of the upstream hydrology, preliminary calculations to demonstrate adequate hydraulic capacity (inlet) is required. And as this structure would be critical to the function of the stormwater system a risk assessment of a fully blocked scenario is desirable.*

**Recommendation:** *Provide concept design and preliminary calculations demonstrating that the inlet structure to the piped watercourse has adequate hydraulic inlet capacity. Provide a risk assessment of a fully blocked scenario.*

#### Hydraulics - outlet

*The proposal shows the piped watercourse stopping just short of the boundary with 37 Wellington Street. A box culvert providing vehicular access to the carport at the rear of 37 Wellington Street is situated within 1-2m of the boundary and would have a significant effect on the outlet capacity of the piped watercourse, and conversely the discharge from the piped watercourse would likely cause damage to the culvert.*

**Recommendation:** *That the piping of the watercourse extend through 37 Wellington Street, or stop well short of the boundary.*

### Hydraulics - impacts of proposed filling

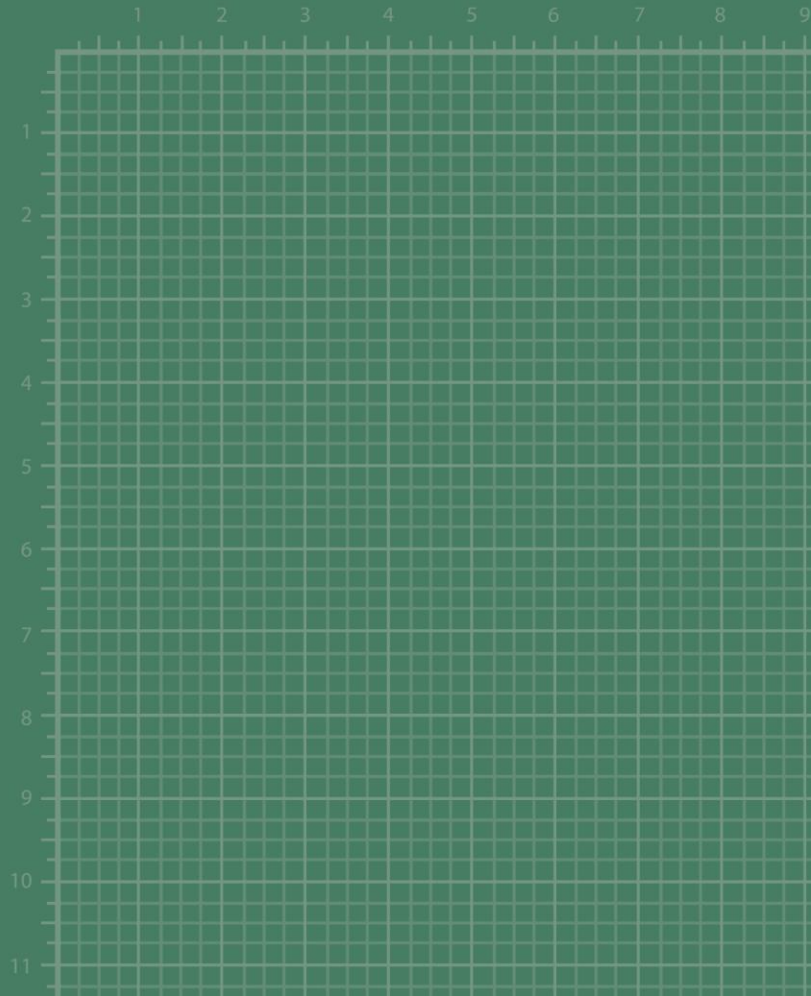
*The proposed fill may have an effect on the hydraulics of the Wellington Street culvert by reducing the available natural attenuation of flows. Possible effects are: higher peak flood levels upstream of the development, and quicker time to peak and potentially higher peak flows downstream of the development.*

**Recommendation: Demonstrate that the proposed filling does not have any adverse impacts upstream or downstream of the development site.**

### SW Quality

*What can I say? The screenshots are too small to be legible. What time period did they use? What is the actual proposal - detention or no detention? There seem to be two proposals. Detention would have negligible effect on the total annual flow from the catchment unless it is so big and takes so long to empty that water is lost through evaporation - something must be wrong. They need to provide more detail regarding the MUSIC model setup: What time period rainfall data are they using? Many years are incomplete and need to be excluded from analysis to prevent underestimating the pollutant loading, and hence overestimating the pollutant removal effectiveness.*

*More generally, I would think that some street scale WSUD features would be more appropriate than proprietary treatment devices (GPTs and Humeceptor - which isn't effective at removing nutrients by the way when you consider the "teabag effect"). I would happier with some street trees planted in proprietary structural cells.*



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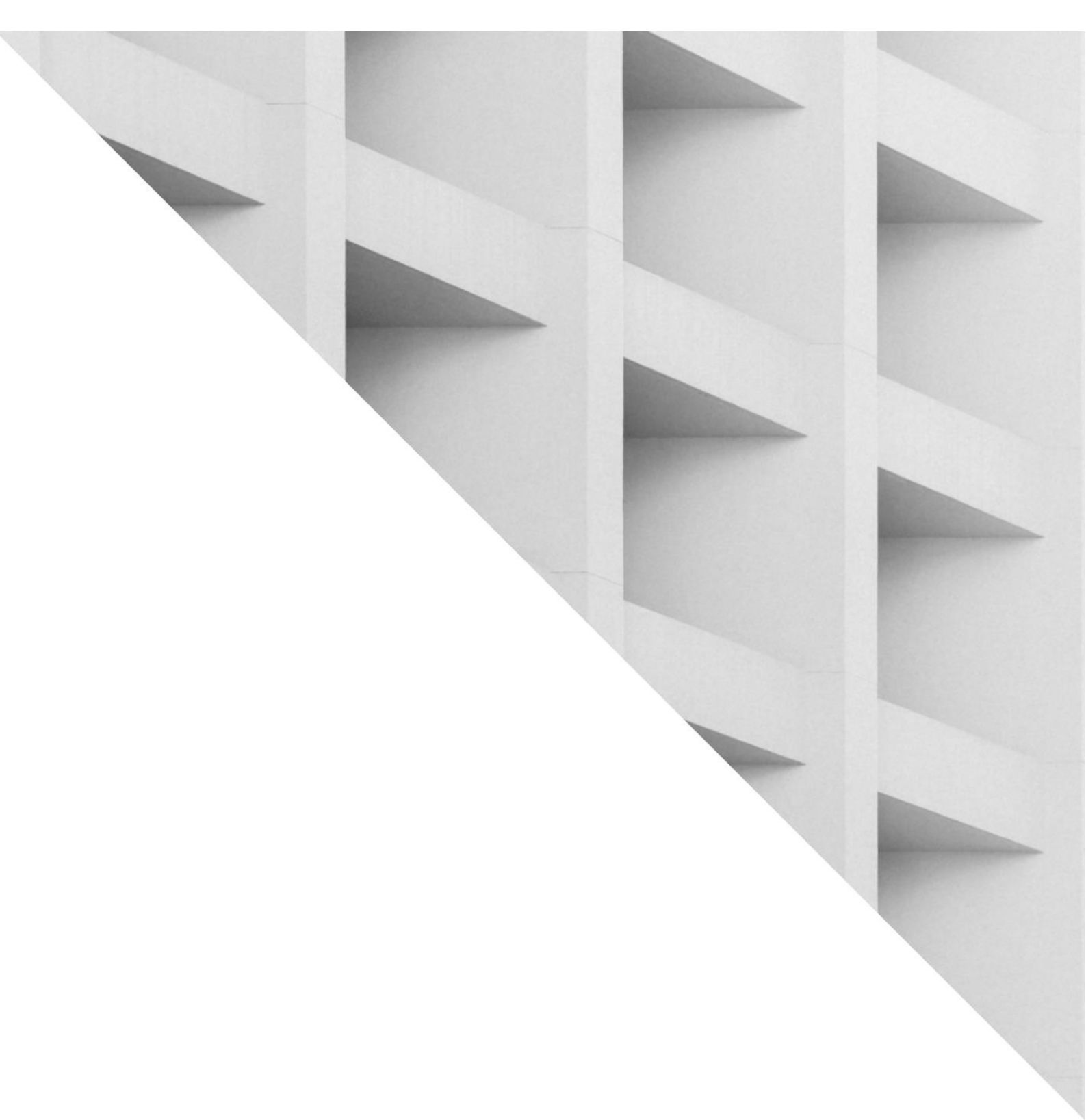
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