

DEVELOPMENT APPLICATION PDPLANPMTD-2024/043611

PROPOSAL: Dwelling

LOCATION: 15 Danes Avenue, Rokeby

RELEVANT PLANNING SCHEME: Tasmanian Planning Scheme - Clarence

ADVERTISING EXPIRY DATE: 08 July 2024

The relevant plans and documents can be inspected at the Council offices, 38 Bligh Street, Rosny Park, during normal office hours until 08 July 2024. In addition to legislative requirements, plans and documents can also be viewed at www.ccc.tas.gov.au during these times.

Any person may make representations about the application to the Chief Executive Officer, by writing to PO Box 96, Rosny Park, 7018 or by electronic mail to clarence@ccc.tas.gov.au. Representations must be received by Council on or before 08 July 2024.

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

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

Clarence City Council



APPLICATION FOR DEVELOPMENT / USE OR SUBDIVISION

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

Proposal:	New Residential Dwelling
Location:	Address (Lot 47) 15 Danes Avenue Suburb/Town Rokeby Postcode 7019
Current Owners/s: Applicant:	Personal Information Removed
Tax Invoice for application fees to be in the name of: (if different from applicant)	
	Estimated cost of development \$402,405.00
	Is the property on the Tasmanian Heritage Register? Yes No X
	(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 Officer, please give their	on discussions with a Council r name			
	Current Use of Site: V	acant Land			
	Does the proposal involute by the Crown or Council	ve land administered or owned l?	Yes	No	X
Declaration:	satisfied that the covenants. I authorise the pany person for arrange for the pe obtained. I had to assess the I declare that, Approvals Act I application. Whe Crown, their sig Section 43A, the	Certificate of Title and Schedule of is application is not prevented by provision of a copy of any docume the purposes of assessment or permission of the copyright owner ave arranged permission for Couris application in accordance with Section 52 (1993, that I have notified the owner the subject property is owned consent is attached. Where the owner's consent is attached.	ents relating to this public consultation or of any part of this uncil's representative of the Land Use oner of the intention of controlled by the application is sufficient.	easement application. I agress application wes to ente Planning to make Council of	fon to eee to fon to eer the e and e this or the
Acknowledgement	become a public both electronic of for display pur obligations. I fu	hat the documentation submitted crecord held by Council and mand hard copy format in order to proses during public consultations acknowledge that following the documentation relating to my	hay be reproduced facilitate the asses ion; and to fulfi g determination of r	by Counsment pro l its stat ny applica	cil in ocess; autory ation,
Applicant's Signature:	SignatureMan	k Page	_{Date} 15/04/202	4	

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

Clarence City Council



DEVELOPMENT/USE OR SUBDIVISION CHECKLIST

Documentation required:

1. MANDATORY DOCUMENTATION

This information is required for the application to be valid. An application lodged without these items is unable to proceed.
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 Council.
Application fees (please phone 03 6217 9550 to determine what fees apply). An invoice will be emailed
upon lodgement.

2. ADDITIONAL DOCUMENTATION

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.

□ Site analysis plan 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.

Clarence City Council DEVELOPMENT/USE OR SUBDIVISION CHECKLIST



Where it is proposed to erect buildings, **detailed plan**s with dimensions at a scale of 1:100 or 1:200 showing:

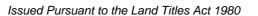
- Internal layout of each building on the site.
- Private open space for each dwelling.
- External storage spaces.
- Car parking space location and layout.
- Major elevations of every building to be erected.
- Shadow diagrams of the proposed buildings and adjacent structures demonstrating the extent 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.

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 Council's Planning Officers on (03) 6217 9550 who will be pleased to assist.



RESULT OF SEARCH

RECORDER OF TITLES





SEARCH OF TORRENS TITLE

VOLUME	FOLIO
181271	47
EDITION	DATE OF ISSUE
3	11-Dec-2021

SEARCH DATE : 15-Apr-2024 SEARCH TIME : 11.45 AM

DESCRIPTION OF LAND

City of CLARENCE

Lot 47 on Sealed Plan 181271

Derivation: Part of 50 Acres Loc. to William Nicholls Snr.

Prior CT 180218/501

SCHEDULE 1

M925985 TRANSFER to HEATHER KATHLEEN MURPHY Registered 11-Dec-2021 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any SP181271 FENCING PROVISION in Schedule of Easements SP156979 FENCING COVENANT in Schedule of Easements SP180218 FENCING PROVISION in Schedule of Easements E288026 MORTGAGE to Commonwealth Bank of Australia Registered 11-Dec-2021 at 12.02 PM

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations



FOLIO PLAN

RECORDER OF TITLES



Issued Pursuant to the Land Titles Act 1980



Page 1 of 3 Search Date: 15 Apr 2024 Search Time: 11:45 AM Volume Number: 181271 Revision Number: 01



FOLIO PLAN

RECORDER OF TITLES



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Search Date: 15 Apr 2024 Search Time: 11:45 AM Volume Number: 181271 Revision Number: 01 Page 2 of 3

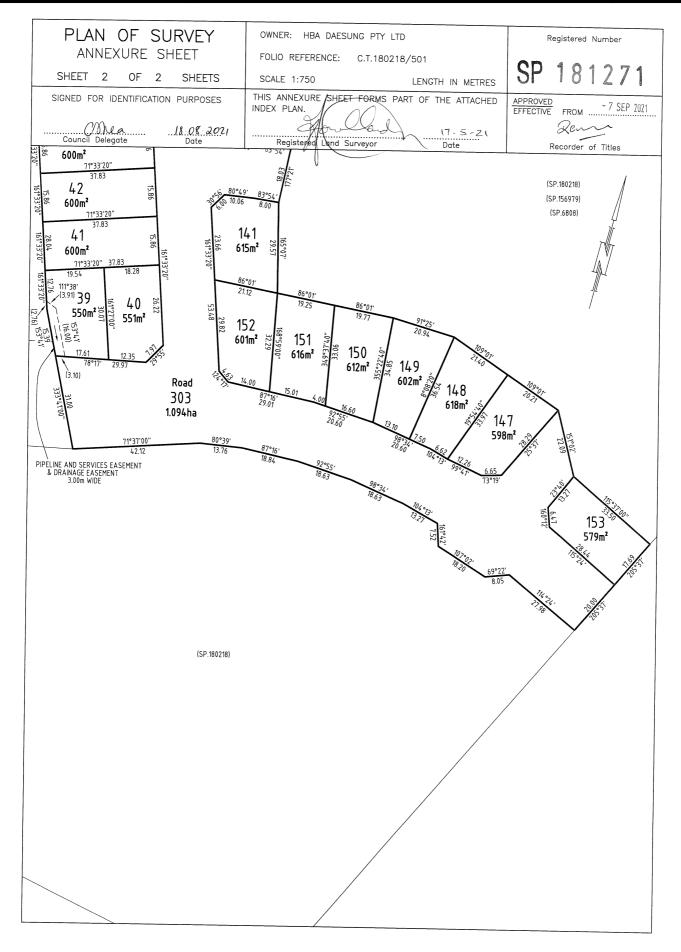


FOLIO PLAN

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RECORDER OF TITLES

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SCHEDULE OF EASEMENTS

NOTE: THE SCHEDULE MUST BE SIGNED BY THE OWNERS &

MORTGAGEES OF THE LAND AFFECTED. SIGNATURES MUST BE ATTESTED.

Registered Number

SP 181271

PAGE 1 OF 5 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:

- such rights of drainage over the drainage easements shown on the plan (if any) as passing through such lot as may be necessary to drain the stormwater and other surplus water from any other lot on the plan; and
- (2) any easements or profits a prendre described hereunder.

The direction of the flow of water through the drainage easements shown on the plan is indicated by arrows.

EASEMENTS

Lots 39, 52, 53 and 86 ("the Lot") are each subject to a PIPELINE AND SERVICES EASEMENT (as defined) in gross in favour of Tasmanian Water & Sewerage Corporation Pty Ltd, its successors and assigns ("TasWater") over the land marked **PIPELINE & SERVICES EASEMENT AND DRAINAGE EASEMENT 3.00m WIDE** on the Plan ("the Easement Land").

Lots 39, 52, 53 and 86 on the Plan are each subject to a Drainage Easement (as defined) in gross in favour of the Clarence City Council over the land marked **PIPELINE & SERVICES EASEMENT AND DRAINAGE EASEMENT 3.00m WIDE** on the Plan.

FENCING PROVISION

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

DEFINITIONS

"Drainage Easement" means a right of drainage (including the right of construction of drains) for Clarence City Council with which the right shall be capable of enjoyment for the purpose of carrying away stormwater and other surplus water from any land over or under the land herein indicated as the land over which the right is to subsist and through all sewers and drains which may hereafter be made or passing

Director

(USE ANNEXURE PAGES FOR CONTINUATION)

SUBDIVIDER: HBA DAESUNG PTY LTD

FOLIO REF: 180218/501

SOLICITOR

& REFERENCE: Page Seager (DAS 182259 - Stage 3)

PLAN SEALED BY: Clarence City Council

DATE: 18-08-202(

SD-2018/3

REF NO.

Classe Council Delegate

NOTE: The Council Delegate must sign the Certificate for the purposes of identification.

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RECORDER OF TITLES

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ANNEXURE TO SCHEDULE OF EASEMENTS

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Registered Number

SP 181271

SUBDIVIDER: HBA DAESUNG PTY LTD

FOLIO REFERENCE: 180218/501

under, through, and along the last-mentioned land and the right for Clarence City Council and its employees, agents and contractors from time to time and at all times hereafter if it or they should think fit to enter into and upon the last-mentioned land and to inspect, repair, cleanse, and amend any such sewer or drain without doing unnecessary damage to the said land.

The Pipeline and Services Easement is defined as follows:

THE FULL RIGHT AND LIBERTY for TasWater at all times to:

- (1) enter and remain upon the Easement Land with or without employees, contractors, agents and all other persons duly authorised by it and 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 and repair the Infrastructure;
- (4) remove and replace the Infrastructure;
- (5) run and pass sewage, water and electricity through and along the Infrastructure;
- (6) do all works reasonably required in connection with such activities or as may be authorised or required by any law:
 - (1) without doing unnecessary damage to the Easement Land; and
 - (2) leaving the Easement Land in a clean and tidy condition; and
- (7) 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 all other persons authorised by it, and with or without machinery, vehicles, plant and equipment enter the Lot from the highway at any then existing vehicle entry and cross the Lot to the Easement Land; and
- (8) 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/Secretary

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.

Page 2 of 5



RECORDER OF TITLES

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ANNEXURE TO SCHEDULE OF EASEMENTS

PAGE 3 OF 5 PAGES

Registered Number

SUBDIVIDER: HBA DAESUNG PTY LTD

FOLIO REFERENCE: 180218/501

PROVIDED ALWAYS THAT:

- The registered proprietors of the Lot in the folio of the Register ("the Owner") must not without the (1) written consent of TasWater first had and obtained (which cannot be unreasonably refused) and only in compliance with any conditions which form the consent:
 - (a) alter, excavate, plough, drill or otherwise penetrate the ground level of the Easement Land;
 - (b) install, erect or plant any building, structure, fence, pit, well, footing, pipeline, paving, tree, shrub or other object on or in the Easement Land;
 - (c) remove any thing that supports, protects or covers any Infrastructure on or in the Easement
 - (d) do anything which will or might damage or contribute to damage to any of the Infrastructure on or in the Easement Land;
 - (e) in any way prevent or interfere with the proper exercise and benefit of the Easement Land by TasWater or its employees, contractors, agents and all other persons duly authorised by it; or
 - permit or allow any action which the Owner must not do or acquiesce in that action.
- (2)TasWater is not required to fence any part of the Easement Land.
- The Owner may erect a fence across the Easement Land at the boundaries of the Lot. (3)
- (4)The Owner may erect a gate across any part of the Easement Land subject to these conditions:
 - (a) the Owner must provide TasWater with a key to any lock which would prevent the opening of the gate; and
 - (b) if the Owner does not provide TasWater with that key or the key provided does not fit the lock, TasWater may cut the lock from the gate.
- If the Owner causes damage to any of the Infrastructure, the Owner is liable for the actual cost to (5) TasWater of the repair of the Infrastructure damaged.
- If the Owner fails to comply with any of the preceding conditions, without forfeiting any right of (6) action, damages or otherwise against the Owner, TasWater may:
 - (a) reinstate the ground level of the Easement Land; or

Director

Director/Secretary

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ANNEXURE TO SCHEDULE OF EASEMENTS

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SUBDIVIDER: HBA DAESUNG PTY LTD

FOLIO REFERENCE: 180218/501

- (b) remove from the Easement Land any building, structure, pit, well, footing, pipeline, paving, tree, shrub or other object; or
- (c) replace anything that supported, protected or covered the Infrastructure.

Interpretation:

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

- (a) sewer pipes and water pipes and associated valves;
- (b) telemetry and monitoring devices;
- (c) inspection and access pits;
- (d) power poles and lines, electrical wires, electrical cables and other conducting media (excluding telemetry and monitoring devices);
- (e) markers or signs indicating the location of the Easement Land, the Infrastructure or any warnings or restrictions with respect to the Easement Land or the Infrastructure;
- (f) anything reasonably required to support, protect or cover any of the 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.

Director

Director/Secretary

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Volume Number: 181271

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ANNEXURE TO SCHEDULE OF EASEMENTS

PAGE 5 OF 5 PAGES

Registered Number

181271

SUBDIVIDER: HBA DAESUNG PTY LTD

FOLIO REFERENCE: 180218/501

EXECUTED by HBA DAESUNG PTY LTD (ACN 133	,
810 714), as registered proprietor of the land comprised in	١
Folio of the Register Volume 180218 Folio 501 pursuant	`
to section 127 of the Corporations Act 2001 by:)
Director Signature	
Dong Kein Yoon Director Full Name (print)	
Director/Secretary Signature	
JUN Ho Lee Director/Secretary Full Name (print)	

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TOTAL FLOOR AREAS

MAIN DWELLING, GROUND FLOOR

LIVING	144.13
PORCH	2.31
	146.44 m²

HIGHLY REACTIVE / PROBLEMATIC SOIL TYPE. **REFER TO HYDRAULICS PLANS** AND DETAILS PREPARED BY **GANDY AND ROBERTS**

AS & NCC COMPLIANCE

ALL CONSTRUCTION TO BE IN ACCORDANCE WITH NCC 2022 AND APPLICABLE AUSTRALIAN STANDARDS AT TIME OF APPROVAL

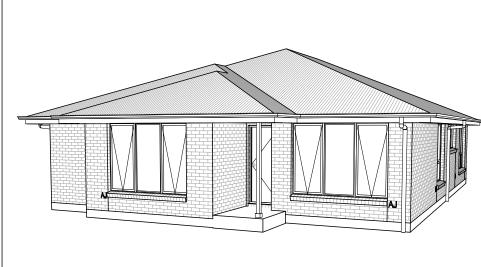
- SLAB IN ACCORDANCE WITH AS 2870. REFER TO ENGINEERS DETAILS FOR ALL SLAB DETAILS.
- BRICK CONTROL JOINTS PROVIDED IN ACCORDANCE WITH NCC 2022. ALL STEEL FRAMING TO BE DESIGNED TO AS 4100-2020 OR AS/NZS
- INSULATION TO BE INSTALLED IN ACCORDANCE WITH NCC 2022 AND ALL APPLICABLE AUSTRALIAN STANDARDS.
- 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
- 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 2019.
- 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

EXHAUST FANS DUCTED TO OUTSIDE AIR (IF APPLICABLE).

CONTROL	DETAILS
ACID SULPHATE SOIL	NO
BIODIVERSITY	NO
BUILDING ENVELOPE	NO
BUSHFIRE	YES - BAL TBC
CLIMATE ZONE (NCC)	TBC
DESIGN WIND CLASSIFICATION	N2 (NOT EXPOSED)
ESTATE/DEVELOPER GUIDELINES	NO
FLOOD OVERLAY	YES
HERITAGE	NO
LANDSLIP HAZARD	NO
MINIMUM FLOOR LEVEL	NO
NATURAL ASSET CODE	NO
NOISE ATTENUATION	NO
SALINE SOIL	NO
SHIELDING FACTOR	PS - PARTIAL SHIELDING
SITE CLASSIFICATION	H1
SPECIFIC AREA PLAN OVERLAY	YES
PARANVILLE	
TERRAIN CATEGORY	TC2.5
TOPOGRAPHIC CLASSIFICATION	T1
WATERWAY & COASTAL OVERLAY	YES
WIND REGION	A - NORMAL
WITHIN 1km CALM SALT WATER	NO
WITHIN 50km BREAKING SURF	2.30km
ZONING	GENERAL RESIDENTIAL

BUILDING CONTROLS	& COMPLIA	NCE
CONTROL	REQUIRED	PROPOSED
SETBACKS		
FRONT	MIN. 4,500mm	18,498mm
SIDE A	MIN. 1,500mm	1,500mm
SIDE B	MIN. 1,500mm	4,161mm
REAR	MIN. 1,500mm	4,410mm
BULK & SCALE		
SITE AREA	600.05m ²	
SITE COVERAGE	MAX. 50%	24.4%
LANDSCAPE		
NO APPLICABLE CONTROLS		
EARTHWORKS		
CUT DEPTH	MAX. 2,000mm	495mm
FILL DEPTH	MAX. 1,000mm	356mm
ACCESS & AMENITY		
PARKING SPACES	MIN. 2 SPACES	2 SPACES
	_	

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.



Certificate of Title including crossover locations and service

BUILDING INFORMATION GROUND FLOOR TOP OF WALL HEIGHT(S) 2445mm NOTE: CEILING HEIGHT 45mm LOWER THAN TOP OF WALL ROOF PITCH (UNO) SINGLE PHASE ELECTRICITY SUPPLY GAS SUPPLY NONE ROOF MATERIAL SHEET METAL ROOF COLOUR N/A BRICK VENEER WALL MATERIAL SLAB CLASSIFICATION TBC

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

THE OWNERS ACKNOWLEDGE THAT THESE CONTRACT PLANS MAY NOT REFLECT ALL THE SELECTIONS THAT HAVE BEEN MADE OR CHANGES REQUESTED. THE OWNERS AGREE THAT FOLLOWING THE COLOUR SELECTIONS VARIATION OR UPDATING OF PLANS, THEY WILL BE PROVIDED WITH CONSTRUCTION PLANS FOR SIGNATURE PRIOR TO COMMENCEMENT OF CONSTRUCTION.

SIGNATURE: DATE:

> **SUBJECT TO NCC 2022** (1 MAY 2023)

> > SIGNATURE:

WATERPROOFING & PLUMBING

PLAN ACCEPTANCE BY OWNER SIGNATURE: DATE:

DATE:

PLEASE NOTE THAT VARIATIONS WILL NOT BE ACCEPTED AFTER THIS PLAN ACCEPTANCE HAS BEEN SIGNED

PRELIMINARY PLAN SET

No.	AMENDMENT	SHEET	DATE	DRAWN	CHECK
2	PRELIMINARY PLAN SET - INITIAL ISSUE	ALL	2024.04.11	DKZ	-
2	PRELIMINARY PLAN SET - PLANNING RFI UPDATE	2	2024.06.18	НМІ	-

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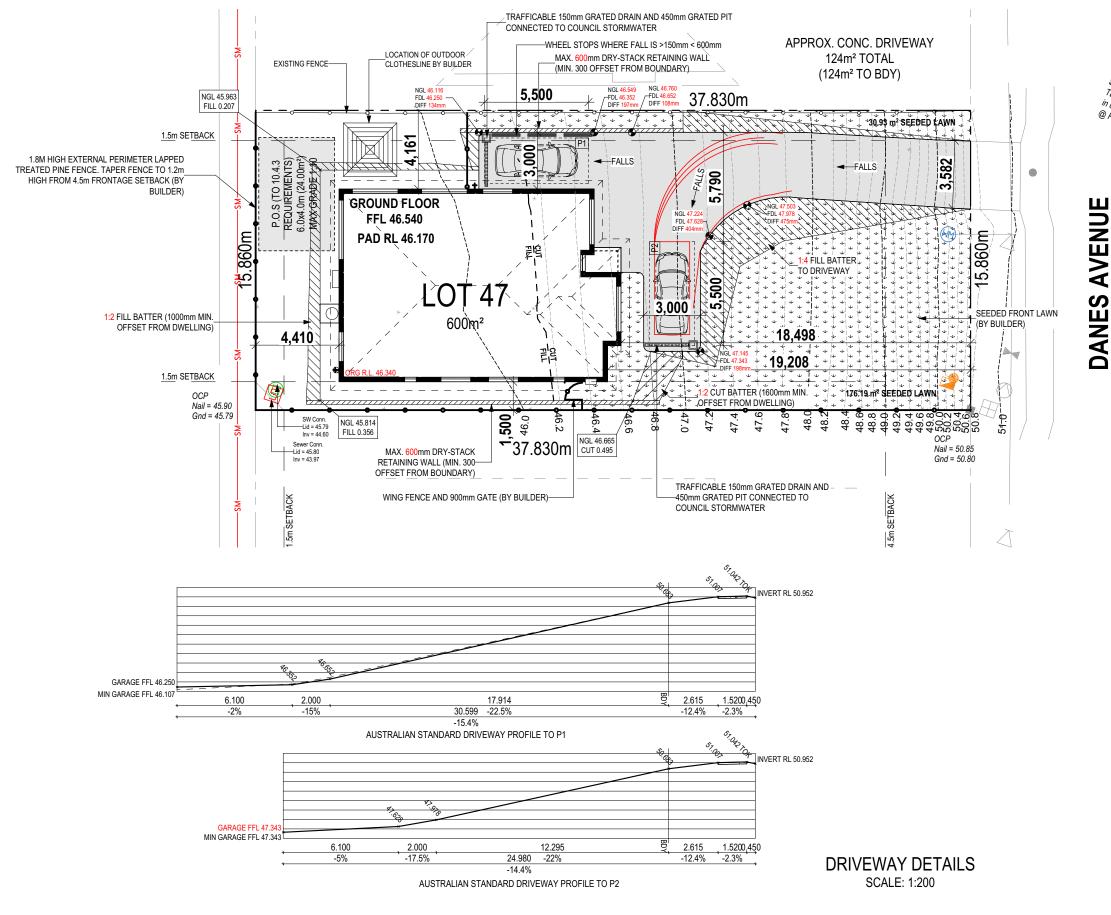
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© 2024	3 PRELIM PLANS - RFI UPDATE HN	I 18/06/202	15 DANES AVE, ROKE	BY TAS 7019	CLASSIC		F-WDCOLN10CLASA	DISCREPANCIES TO BE REPORTED TO THE DRAFTING OFFICE.	/ersic
			LOT / SECTION / CT:	COUNCIL:	SHEET TITLE:	SHEET No.:	SCALES:	744000	ate
			47 / - / 18127	CLARENCE COUNCIL	COVER SHEET	1 / 13	1:100	714003	emp

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

APPROX. CUT/FILL

EVEN CUT & FILL						
DIFFERENCE	0.06m³	0.14t				
FILL	28.07m³	63.16t				
CUT	28.13m³	63.29t				
CLIT	28 13m³	63 20t				

LOT SIZE: 600m² HOUSE (COVERED AREA) 146.44m² SITE COVERAGE: 24.40%



SUBJECT TO NCC 2022 (1 MAY 2023) WATERPROOFING & PLUMBING

PLAN ACCEPTANCE BY OWNER SIGNATURE: DATE: SIGNATURE: DATE:

PLEASE NOTE THAT VARIATIONS WILL NOT BE ACCEPTED

AFTER THIS PLAN ACCEPTANCE HAS BEEN SIGNED

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	SPECIFICATION:	REVISION	DF	RAWN	CLIENT:		HOUSE DESIGN:	HOUSE CODE:	DO NOT SCALE DRAWINGS, USE	
nn	DISCOVERY	1 DRAFT SALES PLAN - CT1	JOL	08/04/2024	HEATHER KATHLEEN N	MURPHY	OLINDA 15	H-WDCOLN10SA	FIGURED DIMENSIONS ONLY. CHECK AND VERIFY DIMENSIONS AND LEVELS PRIOR TO THE	.U.3o
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\overline{C}	© 2024	3 PRELIM PLANS - RFI UPDATE	НМІ	18/06/2024	15 DANES AVE, ROKEB	Y TAS 7019	CLASSIC	F-WDCOLN10CLASA	DISCREPANCIES TO BE REPORTED TO THE DRAFTING OFFICE.	/ersı.
2					LOT / SECTION / CT:	COUNCIL:	SHEET TITLE:	SHEET No.: SCALES:	744000	ate
					47 / - / 18127	CLARENCE COUNCIL	SITE PLAN	2 / 13 1:200	714003	em d

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

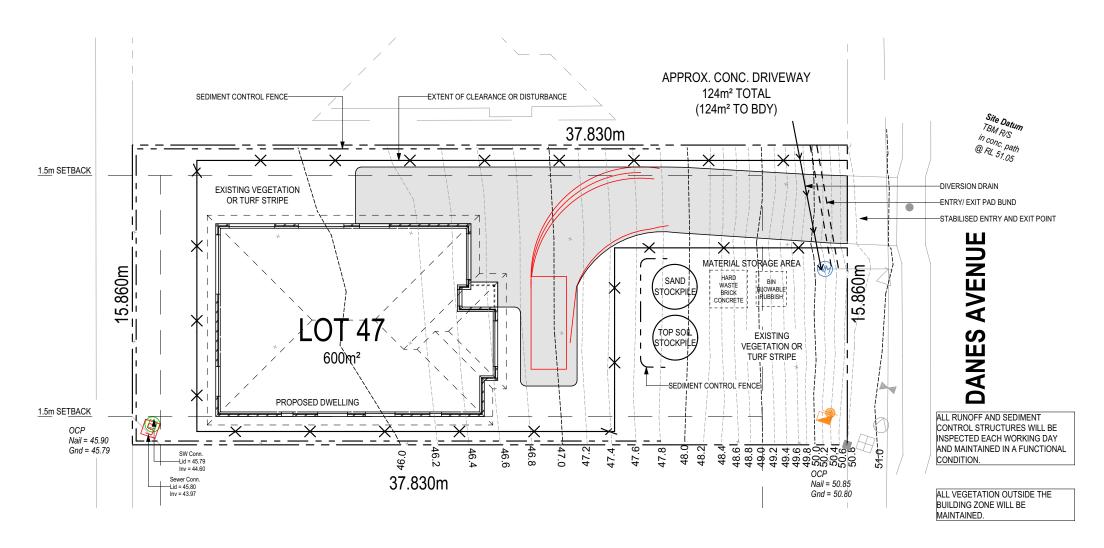
1. ALL EROSION AND SEDIMENT CONTROL STRUCTURES TO BE INSPECTED EACH WORKING DAY AND MAINTAINED IN GOOD WORKING ORDER.

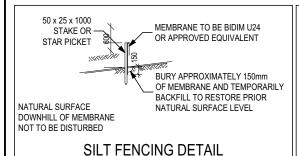
- 2. ALL GROUND COVER VEGETATION
 OUTSIDE THE IMMEDIATE BUILDING AREA
 TO BE PRESERVED DURING THE BUILDING
- 3. ALL EROSION AND SEDIMENT CONROL MEASURES TO BE INSTALLED PRIOR TO COMMENCEMENT OF MAJOR EARTHWORKS.
- 4. STOCKPILES OF CLAYEY MATERIAL TO BE COVERED WITH AN IMPERVIOUS SHEET. 5. ROOF WATER DOWNPIPES TO BE CONNECTED TO THE PERMAMENT UNDERGROUND STORMWATER DRAINAGE SYSTEM AS SOON AS PRACTICAL AFTER

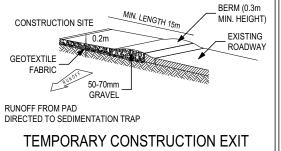
THE ROOF IS LAID.

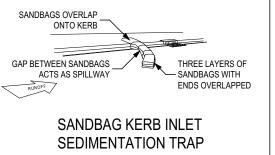
6. DIVERSION DRAINS ARE TO BE CONNECTED TO A LEAGAL DISCHARGE POINT (COUNCIL STORMWATER SYSTEM, WATERCOURSE OR ROAD DRAIN).
7. SEDIMENT RETENTION TRAPS INSTALLED AROUND THE INLETS TO THE STORMWATER SYSTEM TO PREVENT SEDIMENT & OTHER DEBRIS BLOCKING THE DRAINS.











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SUBJECT TO NCC 2022 (1 MAY 2023)

WATERPROOFING & PLUMBING

PLAN ACCEPTANCE BY OWNER SIGNATURE: DATE: SIGNATURE: DATE: PLEASE NOTE THAT VARIATIONS WILL NOT BE ACCEPTED AFTER THIS PLAN ACCEPTANCE HAS BEEN SIGNED



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	COPYRIGHT:			ADDRESS:		FACADE DESIGN:			COMMENCEMENT OF ANY WORK. ALL	
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ALL EXTERIOR SLABS TO BE GRADED BY CONCRETER TO ACHIEVE APPROX. 1:100 FALL TO OUTSIDE EDGE WITH MAXIMUM CROSSFALL OF 30mm OVER ENTIRE SLAB.

MAIN DWELLING, GROUND FLOOR 144.13 PORCH 2.31 146.44 m²

SUSTAINABILITY REQUIREMENTS SITE CLASSIFICATION GENERAL BUILDING INFORMATION ALL MECHANICAL VENTILATION TO BE

REFER TO SHEET 1 (COVER SHEET) FOR

ALL BUILDING INFORMATION REGARDING

DISCHARGED TO OUTDOOR AIR AS PER NCC 2022 REQUIREMENTS FIRE RESISTANT PLASTERBOARD TO BE INSTALLED BEHIND COOKTOP

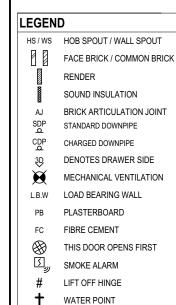
ALL GROUND FLOOR BULKHEAD AND SQUARE SET OPENING FRAMES TO BE 2155 ABOVE FFL UNLESS NOTED OTHERWISE

REFER TO WINDOW AND DOOR SCHEDULES FOR FULL DETAILS OF ALL WINDOWS AND DOORS. PLEASE NOTE WINDOW AND DOOR SIZES ARE BASED ON DEPOSIT STAGE AND MAY DIFFER SLIGHTLY TO THE SIZES NOMINATED IN THE SCOPE OF WORKS DUE TO MANUFACTURING CHANGES AT THE TIME OF CONSTRUCTION.

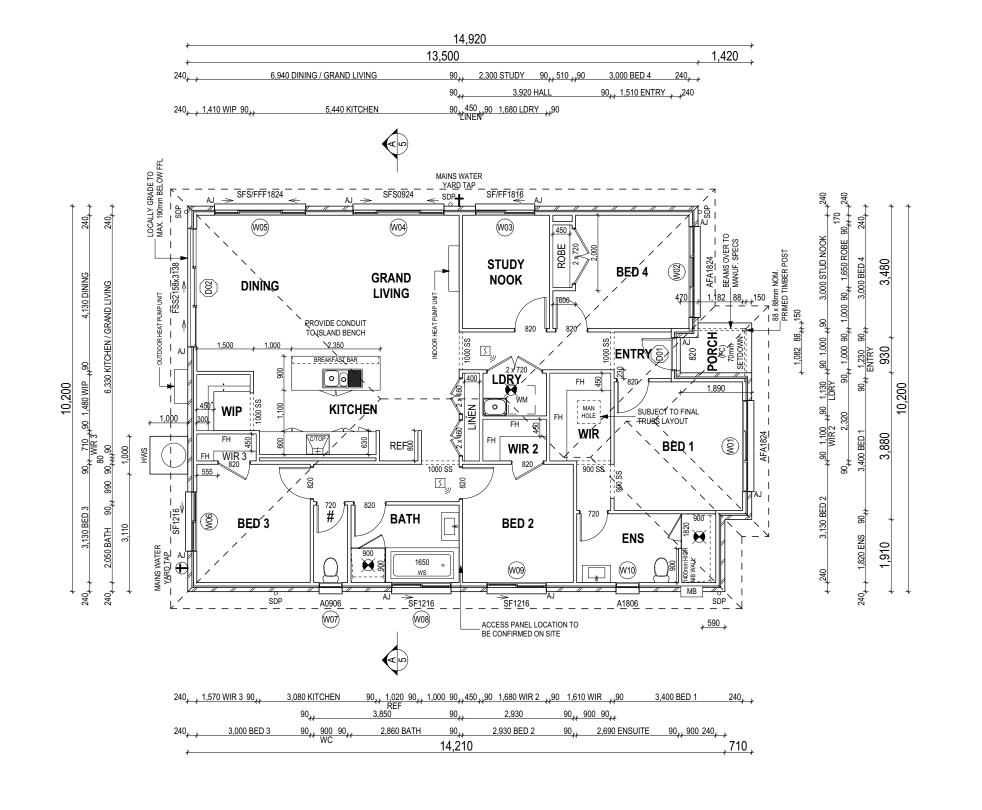
FINAL WINDOW AND EXTERIOR DOOR LOCATIONS MAY BE ADJUSTED ON SITE TO SUIT BRICKWORK GAUGE

UNLESS NOTED OTHERWISE ALL ROOMS ARE REFERENCED AS FOLLOWS:





GAS BAYONET



ALL DIMENSIONS ARE FRAME DIMENSIONS

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SUBJECT TO NCC 2022

(1 MAY 2023) WATERPROOFING & PLUMBING

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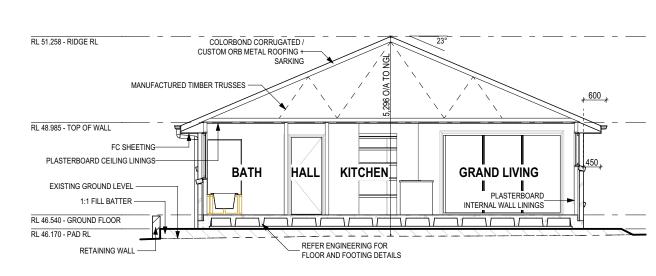
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				47 / - / 18127	CLARENCE COUNCIL	GROUND FLOOR PLAN 4	/ 13	1:100	114003	Lemp

ARE SUBJECT TO CHANGE. SH = SNAP HEADER SILL

BEDROOM WINDOW OPENINGS ABOVE 2m OFF THE SURFACE BENEATH TO BE RESTRICTED AS REQUIRED BY NCC 11.3.7 (VOLUME

ROOMS OTHER THAN BEDROOM WINDOW OPENINGS ABOVE 4m OFF THE SURFACE BENEATH TO BE RESTRICTED AS REQUIRED BY NCC 11.3.7 (VOLUME TWO)

REFER TO THE FOLLOWING DETAILS: BRICK COURSING W-BRIC-001



SECTION A-A SCALE: 1:100

> **SUBJECT TO NCC 2022** (1 MAY 2023)

WATERPROOFING & PLUMBING

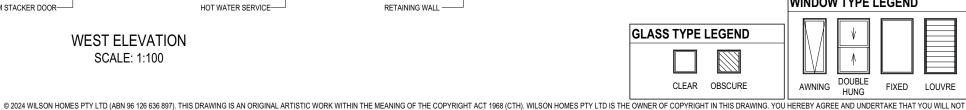
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AND VERIFY DIMENSIONS AND LEVELS PRIOR TO THE

COMMENCEMENT OF ANY WORK. AL DISCREPANCIES TO BE REPORTED TO THE DRAFTING OFFICE.

714003



WINDOW TYPE LEGEND

PLAN ACCEPTANCE BY OWNER SIGNATURE:

HOUSE CODE

FACADE CODE:

1:100

H-WDCOLN10SA

F-WDCOLN10CLASA

SIGNATURE: DATE:

PLEASE NOTE THAT VARIATIONS WILL NOT BE ACCEPTED AFTER THIS PLAN ACCEPTANCE HAS BEEN SIGNED

RL 51.258 - RIDGE RL

RL 48.985 - TOP OF WALL

RL 46.540 - GROUND FLOOR

- EXISTING GROUND LEVEL

- RETAINING WALL

ARTICULATED FACE BRICKWORK

EXISTING GROUND LEVEL

-ARTICULATED FACE BRICKWORK

COLORBOND CORRUGATED / CUSTOM ORB METAL ROOFING +-

ALUMINIUM STACKER DOOR-

EAST ELEVATION SCALE: 1:100

WEST ELEVATION SCALE: 1:100

RL 46.170 - PAD RL

RL 51.258 - RIDGE RL

RL 48.985 - TOP OF WALL

RL 46.540 - GROUND FLOOR

RL 46.170 - PAD RL

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RETAINING WALL

COLORBOND CORRUGATED /

_88 x 88mm NOM. PRIMED

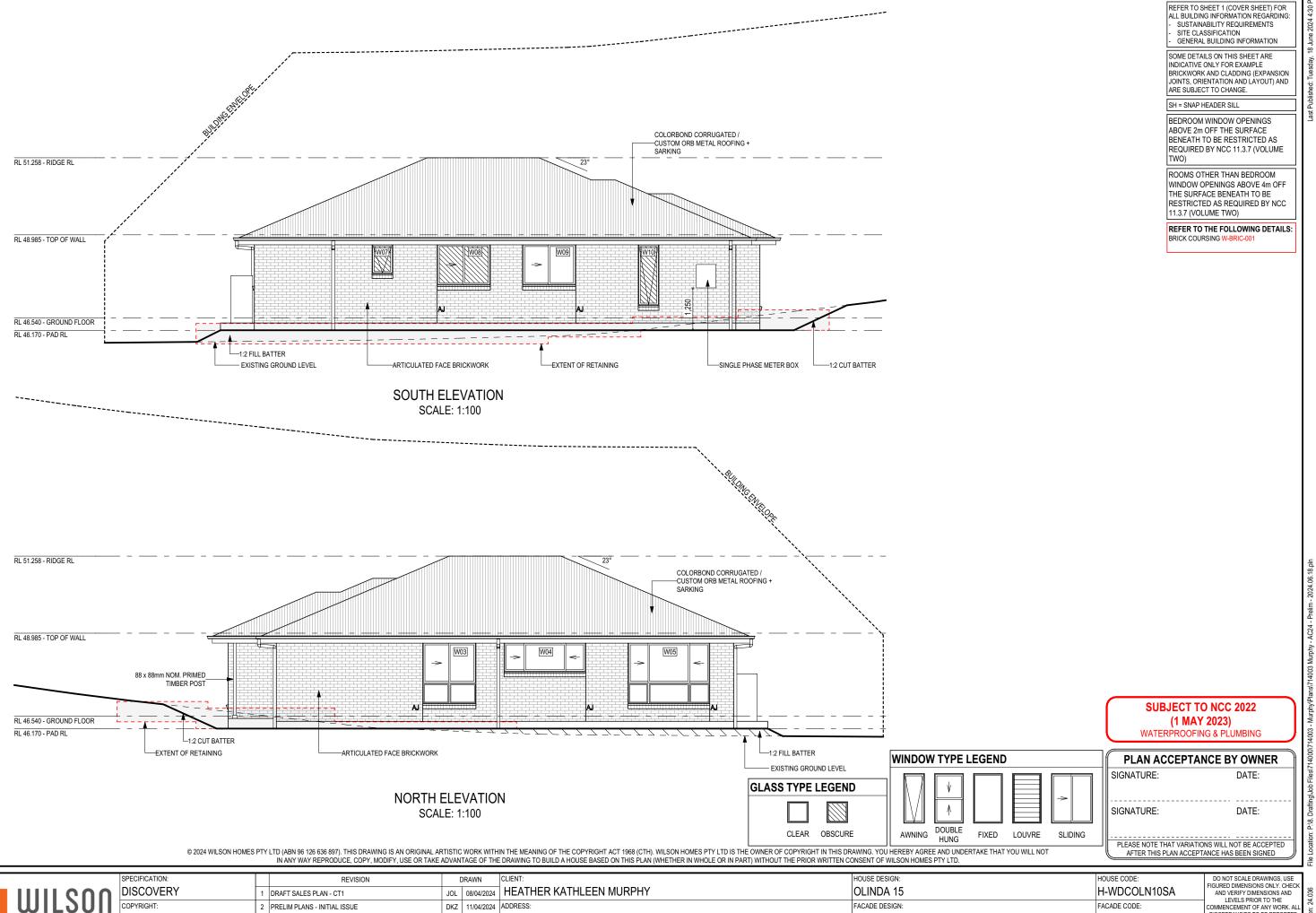
TIMBER POST

HOT WATER SERVICE-

ENTRY DOOR

-CUSTOM ORB METAL ROOFING + SARKING

-1:2 CUT BATTER



CLARENCE COUNCIL

CLASSIC

SHEET TITLE:

ELEVATIONS

HMI 18/06/2024 15 DANES AVE, ROKEBY TAS 7019

LOT / SECTION / CT:

47 / - / 18127

2 PRELIM PLANS - INITIAL ISSUE

3 PRELIM PLANS - RFI UPDATE

COMMENCEMENT OF ANY WORK. AL DISCREPANCIES TO BE REPORTED TO THE DRAFTING OFFICE. 714003

F-WDCOLN10CLASA

SHEET No.: SCALES:

1:100

6 / 13

rovide BAL-12.5 rated aluminium windows and external glass sliding doors in lieu

Provide flyscreens with corrosion resistant mesh to all opening window sashes only.

LOW REFLECTANCE GLAZING TO BE USED ON WINDOWS AND GLAZED DOORS AS

INTE	ERIOR WIND	OW 8	& DOOR SCHEDU	JLE				
	TOREY		CODE	TYPE	HEIGHT	WIDTH	GLAZING TYPE	ADDITIONAL INFORMATION
DOOR	₹				_		1	
GR	ROUND FLOOR	4	1000 SS	SQUARE SET OPENING	2,155	1,000	N/A	
GR	ROUND FLOOR	2	2 x 460	SWINGING	2,040	920	N/A	
GR	ROUND FLOOR	2	2 x 720	SWINGING	2,040	1,440	N/A	
GR	ROUND FLOOR	1	720	SWINGING	2,040	720	N/A	
GR	ROUND FLOOR	1	720	SWINGING	2,040	720	N/A	LIFT-OFF HINGES
GR	ROUND FLOOR	8	820	SWINGING	2,040	820	N/A	
GR	ROUND FLOOR	2	900 SS	SQUARE SET OPENING	2,155	900	N/A	

2 PRELIM PLANS - INITIAL ISSUE

3 PRELIM PLANS - RFI UPDATE

DKZ 11/04/2024 ADDRESS:

NOTE: INTERNAL DOORS TO WET AREAS WITH MECHANICAL VENTILATION TO BE UNDERCUT 20mm

PICTURE, TV RECESS AND SS WINDOW OPENINGS QTY TYPE HEIGHT | WIDTH | AREA (m²)

FACADE DESIGN:

WINDOW & DOOR SCHEDULES

CLASSIC

SHEET TITLE:

Double 4.4 Windows supplied MUST HAVE Uw better and or equal to stated figures and SHGC within +/- 5% of stated figures. Restricted windows to have their openability restricted as per N.C.C 11.3.6. **SUBJECT TO NCC 2022** (1 MAY 2023)

Manufacturer - Clark Windows

Fixed Glass Panel Hinged Door

135 deg. Awning Bay Window

135 deg. Sliding Bay Window

90 deg. Awning Bay Window

90 deg. Sliding Bay Window

Window Type **Awning**

Fixed

Sliding

Fixed Pane

Sliding Door

Stacking Door

Bifold Doors

PLAN ACCEPTANCE BY OWNER								
SIGNATURE:	DATE:							
SIGNATURE:	DATE:							
	IONS WILL NOT BE ACCEPTED							

WATERPROOFING & PLUMBING

Glazing U-Value SHGC

6.5

4.1

5.9

3.2

6.4

4.2

5.9

3.2

6.0

4.3

6.1

3.6

6.3

3.8

6.5

4.1

6.5

4.2

6.5

4.1

6.5

4.2

6.1

0.67

0.57

0.75

0.67

0.76

0.59

0.75

0.67

0.62

0.55

0.74

0.66

0.74

0.66

0.67 0.57

0.76

0.59

0.67

0.57

0.76

0.59

0.61

0.53

Single

Double

Single

Single

Double

Double

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Double

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Single

Double

Single Double

Single

Double

Single

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Single

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Single

Double

Single

Double

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SPECIFICATION:	REVISION	DRAWN	CLIENT:	HOUSE DESIGN:						
DISCOVERY	1 DRAFT SALES PLAN - CT1	JOL 08/04/2024	HEATHER KATHLEEN MURPHY	OLINDA 15						

HMI 18/06/2024 15 DANES AVE, ROKEBY TAS 7019

LOT / SECTION / CT:

47 / - / 18127

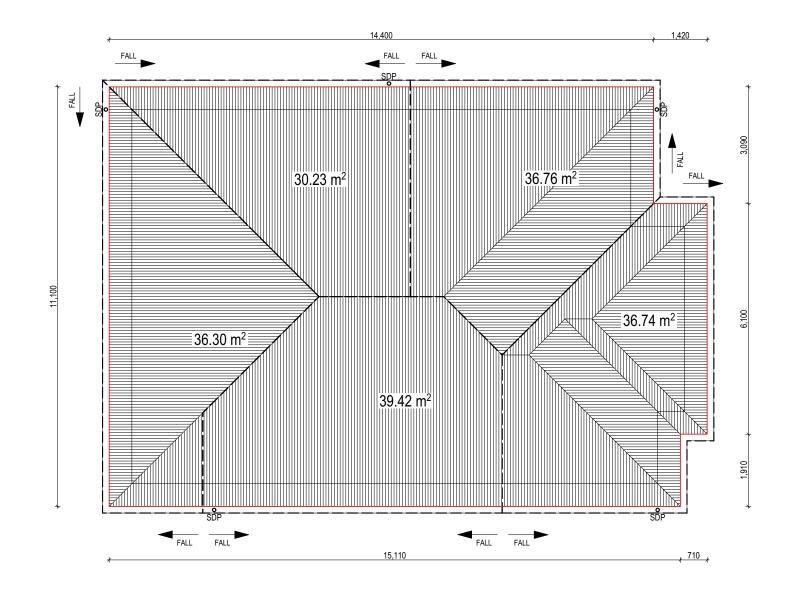
SHEET No.: 7 / 13	SCALES:	714003	mplate \
	FACADE CODE: F-WDCOLN10CLASA	COMMENCEMENT OF ANY WORK. ALL DISCREPANCIES TO BE REPORTED TO THE DRAFTING OFFICE.	Version: 24.
	H-WDCOLN10SA	DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS ONLY. CHECK AND VERIFY DIMENSIONS AND LEVELS PRIOR TO THE	980

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

TOTIMENT PILEPO, NOTE ENVIRENCE							
Roofi	Roofing Data						
	169.86	Flat Roof Area (excluding gutter and slope factor) (m²)					
	184.53	Roof Surface Area (includes slope factor, excludes gutter) (m²)					
Dowr	pipe roof	calculations (as per AS/NZA3500.3:2018)					
Ah	179.45	Area of roof catchment (including 115mm Slotted Quad Gutter) (m²)					
Ac	217.13	Ah x Catchment Area Multiplier for slope (Table 3.4.3.2 from AS/NZS 3500.3:2018) (1.21 for 23° pitch) (m²)					
Ae	6300	Cross sectional area of 57 x 115 Slotted Quad Gutter (mm²)					
DRI	86	Design Rainfall Intensity (determined from Table E1 from AS/NZS 3500.3:2018)					
Acdp	64	Catchment area per Downpipe (determined from Figure 3.5(A) from AS/NZS 3500.3:2018) (m²)					
Required Downpipes	3.4	Ac / Acdp					
Downpipes Provided	5						



SOFFIT EAVE VENT PROPOSED LOCATION TO BE MIN. 1M FROM CORNER JOINT

SUBJECT TO NCC 2022 (1 MAY 2023) WATERPROOFING & PLUMBING

PLAN ACCEPTANCE BY OWNER						
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OLONATURE	DATE:					
SIGNATURE:	DATE:					
	ONS WILL NOT BE ACCEPTED					
AFTER THIS PLAN ACCEP	TANCE HAS BEEN SIGNED					

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	© 2024	3 PRELIM PLANS - RFI UPDATE HM	18/06/2024	15 DANES AVE, ROKEBY TAS 7019	CLASSIC		F-WDCOLN10CLASA	TO THE DRAFTING OFFICE.	Versi
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				47 / - / 18127 CLARENCE COUNCIL	ROOF DRAINAGE PLAN	8 / 13	1:100	, <i>1</i> 14000	Lem Lem

GENERAL BUILDING INFORMATION

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

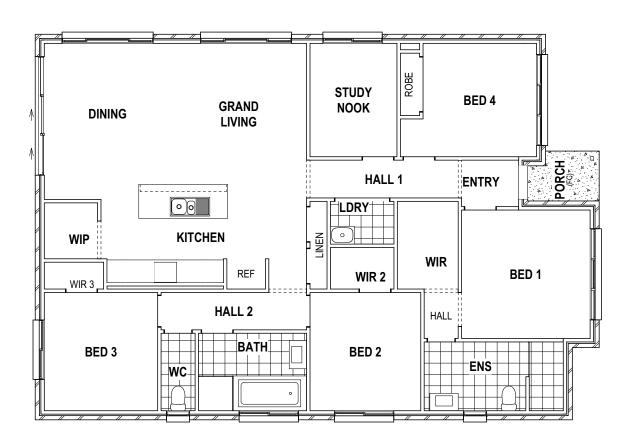
COVER GRADE CONCRETE

CARPET

LAMINATE

TILE (STANDARD WET AREAS)

TILE (UPGRADED AREAS)



PLAN ACCEPTA	NCE BY OWNER
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SIGNATURE:	DATE:
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DISCOVERY	1 DRAFT SALES PLAN - CT1	JOL 08/04/2024	HEATHER KATHLEEN MURPHY	OLINDA 15		FIGURED DIMENSIONS ONLY. CHECK AND VERIFY DIMENSIONS AND	.036
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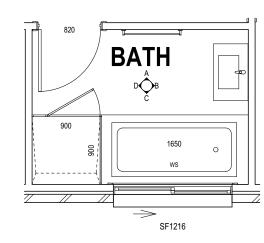
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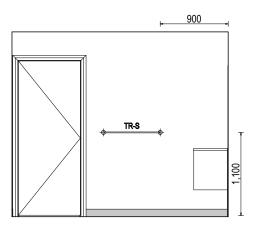
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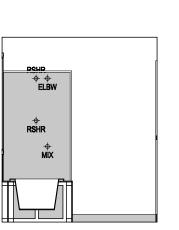
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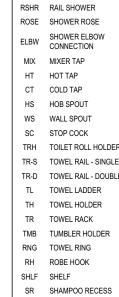


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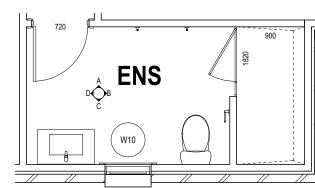




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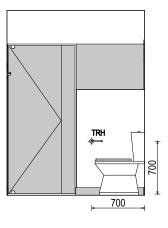
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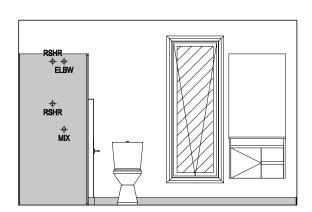
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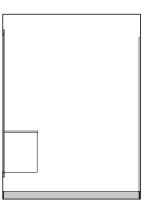
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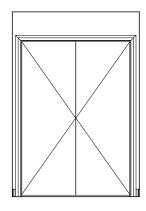
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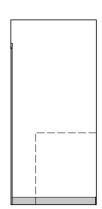
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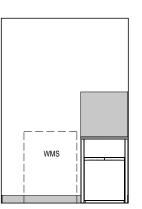
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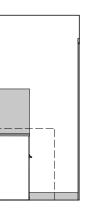
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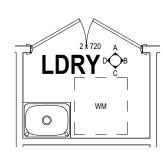
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Appendix A - GHD flood modelling flow data

Appendix B - JMG Flood modelling drawings

Appendix C - Calculations

1. Introduction

A 175 Lot subdivision is planned for 163 Pass Road, Rokeby. Hutchings Spurr (HS) consulting engineers are undertaking detailed design for the development and have engaged JMG Engineers and Planners to assist with Stormwater design.

Hutchings Spurr have previously provided a Stormwater Design Report (HS Report) to Council (ref 17285/1, dated 18 March 2019). This report should be read in conjunction with the Hutchings Spurr report and specifically addresses the following issues raised by Councils Asset Planning Engineer Glen Popowski:

Clarence Plains Rivulet:

- Ensure no increase in 1% AEP flood level upstream of development
- Show 1%AEP flood levels/extents through the development and ensure controls in place to mitigate risks
- Identify flood hazards and risk mitigation strategies
- Determine bed shear stresses and select appropriate swale surface treatment

Detention Basin:

 Provide detention storage calculations to prove that the proposed storage volume and configuration reduces post development runoff rates to pre-development levels using an inflow/outflow model.

Wetland

Verify wetland treatment efficiency using MUSIC model

2. Clarence Plains Rivulet

To address the issues outlined in Section 1, a HEC-RAS model capable of analyzing the pre and post development scenarios was developed. The design philosophy for the Rivulet is to take upstream flows through the development via an open swale capable of taking the 1% AEP flood flow. A small pipe is also proposed under the swale to take small nuisance flows providing a mostly dry swale corridor for multipurpose recreational use.

5% AEP runoff from the development area will be captured and directed to detention and treatment facilities before being discharged into the Rivulet downstream of the development site. Overland flows exceeding the 5% AEP event will discharge into the swale via roadways.

2.1. HEC-RAS Model

Terrain

To address the questions of council both pre and post development terrain were required for modelling. The predevelopment surface used a combination of land survey and Lidar data (Geoscience Australia, 2013). The post development surface was a combination of the natural (predevelopment) surface, the Hutchings Spurr subdivision design and the JMG swale design.

JMG Swale Design -

The swale is a trapezoidal shape for much of its length, with the only variations occurring under the proposed bridge locations where it tapers into and out of a rectangular section. At a minimum, the base of the trapezoidal swale needs to be 2m in width and 1m deep, with side slopes approximately 1:8. The rectangular section under roads has a base width of approximately 16m.



It is proposed to install a DN450 pipe under the swale to take low rainfall events. The pipes capacity at 1% grade is approximately 300l/s, which equates to runoff from the upstream 278-hectare catchment with a rainfall intensity of approximately 2mm/hr. It could therefore be expected that the swale will be dry most of the time with culvert capacity exceeding a once per month rainfall recurrence interval. Pits will be spaced regularly along the swale invert to capture runoff.

For the purposes of assessing swale capacity, the DN450 pipe has been ignored.

Geometry

The 2D area was defined as a large region around the rivulet, with an upstream boundary condition (Inlet 1) set just north of the dam on the 187 Pass Rd property. A further two inlets enter the site, one approximately halfway down the western boundary (Inlet 2) and another (Inlet 3, also entering from the west) at the bottom of the site just to the north of the only outlet. Outlet 1 is located just upstream of the dam on the 101 Pass Rd property.

The inlet locations align with the overall catchment HEC-RAS model created by GHD. JMG were instructed by the Clarence City Council to adopt the findings of GHD for any further hydraulic modelling.

A Manning's coefficient of 0.027 was assigned to the whole mesh. This is the value defined (by Chow, 1959) for straight and uniform channels with short grass. This assumption is considered appropriate as most of the flow is contained within the grass lined swale.

Flows

The GHD hydraulic analysis of the Clarence Plains Rivulet determined 1% AEP flows at various cross sections (Appendix A - GHD flood modelling flow data).

Immediately to the north of the site (through cross section QA1) the 1% AEP flow is $19.4\text{m}^3/\text{s}$. The inflow approximately halfway down the site was determined by subtracting QA1 from QB $(21.2\text{m}^3/\text{s})$ - $1.8\text{m}^3/\text{s}$, and the final inflow (QB1) is $1.5\text{m}^3/\text{s}$. The inlet flows increase linearly from zero to their respective peaks over the critical storm duration (360 minutes, as outlined by GHD), before decreasing back to zero over approximately 12 hours. The DN450 pipe is assumed to not take any of this flow.

2.2. Addressing Council Requirements

• Ensure no increase in 1% AEP flood level upstream of development

Drawing J191133CH-C01 (Appendix B - JMG flood modelling drawings) displays the extent of flooding from the pre and post development modelling and indicates the extent of inundation to the north remains the same.

 Show 1% AEP flood levels/extents through the development and ensure controls in place to mitigate risks

The HEC-RAS model was used to confirm the proposed swale has capacity to wholly contain the 1% AEP flow. The flooding extents/depths can be seen on drawings J191133CH-C01 & C02 (Appendix B - JMG flood modelling drawings).

· Identify flood hazards and risk mitigation strategies

1% AEP flows are wholly contained within the swale, which is a defined floodway bounded by property fences and accessed from each end via roadways and paths. It is understood that the swale corridor is also to be used as a multiuse path/trail. It is highly unlikely that the swale corridor will be used as a pathway during significant rainfall events as conditions would be less than favourable for recreation. Furthermore, water levels would expect to rise slowly giving opportunity for users to evacuate the swale area via shallow batter slopes.



Determine bed shear stresses and select appropriate swale surface treatment

The velocity through the swale varies from 2-5.3m/s. Appropriate erosion control measures (such as the 'Grassroots' product from Geotas) will be installed to mitigate any possible issues.

3. Detention Basin

As requested by Council, the proposed detention storage basin has been checked to ensure that post development flows will be reduced to pre-development levels for rainfall events less than 5%AEP.

Pre-development 5%AEP flows from the site were estimated by HS to be 816l/s for a 20-minute storm duration. These were checked by JMG and a flow of 818l/s estimated, which was adopted for detention storage calculations. Refer Appendix C for calculations.

Post development flows for various storm durations were modelled in Excel to flow into a detention basin with area of 1030m2 and a time step of one minute. The outlet orifice size from the basin was then selected to ensure outflows remained less than the predevelopment level of 818l/s. It was found that the critical storm duration of 15 minutes and time of concentration of 26 minutes results in a detention storage depth of 730mm and resulting volume of 750m3.

The proposed detention basin has a depth of 1.3m from outflow level (40.60m) to spillway overflow level (41.90m) and a corresponding storage volume of 1340m3. It is proposed to use the bottom 200mm of this basin to provide a sedimentation basin for the wetlands. The outflow pipe to the wetlands will therefore have an invert at 40.60m and will be sized to limit flows to the 100% AEP flow of 135l/s (refer HS Report). Once water levels reach 40.80m in the basin flows will then begin to discharge directly to the adjacent Rivulet via a pipe sized to limit flows to pre-development levels for a 5% AEP event (818l/s). There is 1.1m (41.90 - 40.80) of effective detention storage height in the basin above discharge level, providing approximately 1130m3 of storage. This is well in excess of the required 750m3. Refer Figure 1.

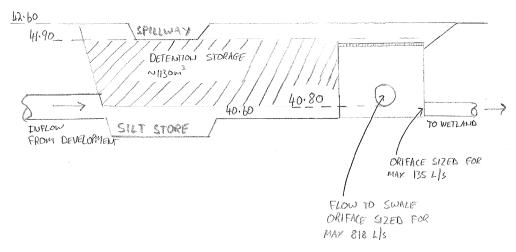


Figure 1 - Detention storage detail

2.3. Pipe and orifice sizing

Wetland inflow

Inflow to the wetland is required to be limited to the 100% AEP flow level of 135l/s. The worst case scenario for sizing the outflow would be when the detention basin is full and the wetland is empty. However, this is an unlikely scenario as the wetland will fill up as the detention basin fills. Therefore, the orifice is designed assuming both basins are full:

- Upstream water level 41.90m
- Downstream water level 41.55m
- Driving head 0.35m

With this assumption, a 330mm orifice is required. Given a short pipe run, a DN375 pipe could be used with a 330mm orifice on the upstream end or alternatively a DN300 pipe with no orifice would limit flows to about the right level. For simplicity, the latter is recommended.

Detention outflow to swale

Outflow from the detention basin needs to be less than the pre-development 5% AEP flow rate of 818l/s. During a high rainfall event it is likely that the swale is running full with an estimated water surface level of 41.2m. Maximum water level in the detention basin is 41.90m providing approximately 0.7m of head on the outlet orifice. The subsequent outlet orifice size therefore is required to be approximately 680mm, which should be fitted to a DN750 outlet pipe with invert level of 40.80m in the detention basin outlet structure.

As a design check, if the swale is empty and the detention basin is full (unlikely) there would be 1.1m of head from the pipe invert to the basin overflow level, which equates to 0.725m design head on the orifice and a similar discharge rate. Therefore, a 680mm orifice is still required. Refer Appendix C for calculations.

Wetland

The proposed wetland has an average area of 332m2 and a working height of 0.6m between permanent pool level (40.5m) and overflow level (41.1m) with a detention storage capacity of 200m3.

Wetlands are often designed to provide 1-3 days of detention time to allow macrophytes to cleanse the water. In order to achieve this, very small orifices would be required on the outlet riser. Small orifices are prone to blocking and are deemed to be a maintenance burden. It is therefore recommended to have a minimum orifice size of 50mm.

With 50mm orifices spaced at 125mm vertical intervals on the outlet riser between RL 40.5 and RL 41.1 (total of 4 \times 50mm orifices) the detention time varies between 4 and 6 hours depending on water surface level. These times assume that there is no inflow so actual detention times will be greater. Refer Appendix C for calculations and sketch.

The proposed treatment train has been modelled using MUSIC (Model for Urban Stormwater Improvement Conceptualisation) with the following inputs and results:

- Catchment Area 19.2ha with 43% impervious (as per HS Report)
- Detention basin with 1030m2 surface area and 1.30m extended detention depth
- Wetland with:
 - o an effective inlet pond of 200m3 and a high flow bypass of 135l/s
 - Storage surface area 332m2, extended detention depth of 0.6m and permanent pool volume of 157m3. Outlet restrained to provide 4 hours detention.



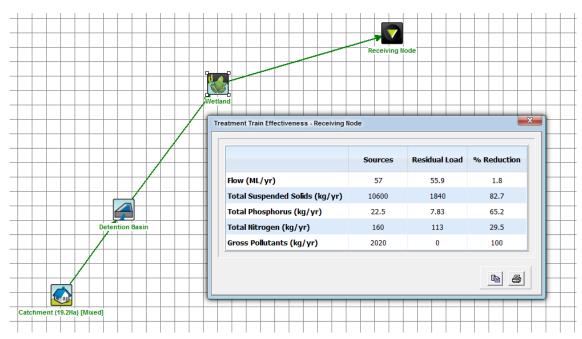


Figure 2 - MUSIC model results

As can be seen from the MUSIC model results, stormwater treatment complies with best practice pollutant reductions in all parameters other than Total Nitrogen, where the target of 45% is not met. In order to achieve the 45% reduction level a wetland of around 6000m2 would be required, which is not considered viable given the site constraints. Therefore, the achieved level of 30% is considered acceptable.

5. Conclusions and Recommendations

The proposed swale, detention storage and wetland comply with best practices and Council requirements in all aspects other than the reduction of Total Nitrogen (TN). The achieved reduction in TN of 30% is considered acceptable given site constraints.

The following is a summary of design requirements to achieve the required outcomes:

- Swale design as per JMG model with minimum 2m wide base, side slopes of 1:8 and minimum depth of 1.0m. Bridges to be clear of the 1% AEP water level with minimum 300mm freeboard. If a 500mm wide central bridge support is used, an additional 300mm of freeboard is required. Furthermore, the upstream edge of the support should be shaped to minimise turbulence and the support should be parallel with flow direction.
- 2. Provide erosion control geofabric (such as "Grassrotts") throughout the entire swale.
- 3. Detention storage with minimum average area of 1030m2 and depth of 1.1m. Outlet orifice sized for maximum flow of 818l/s, approximately 680mm diameter.
- 4. Flow to wetland from detention storage limited to 135l/s use a DN300 pipe.
- 5. Wetland sized with minimum average area of 332m2, 0.6m extended detention depth and 4 hours detention time.

6. References

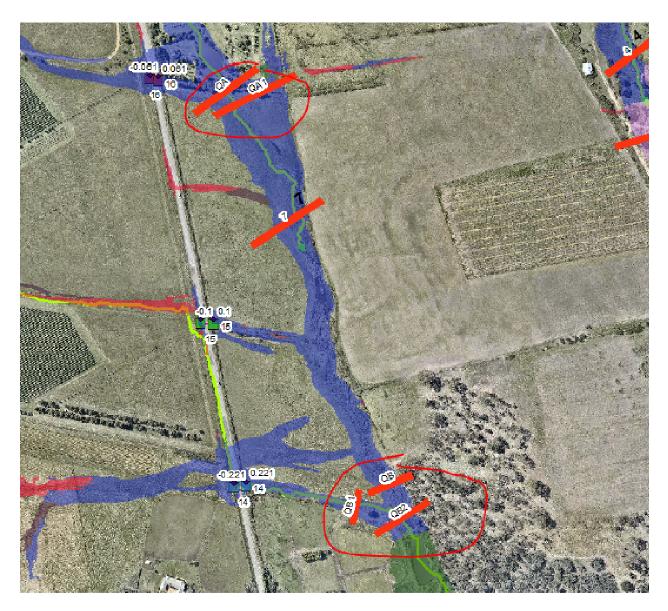
Chow, V. T. (1959). Open-Channel Hydraulics. Science, 680.





APPENDIX A

GHD flood modelling flow data



Regards

Fiona Haynes

Senior Civil Engineer

GHD

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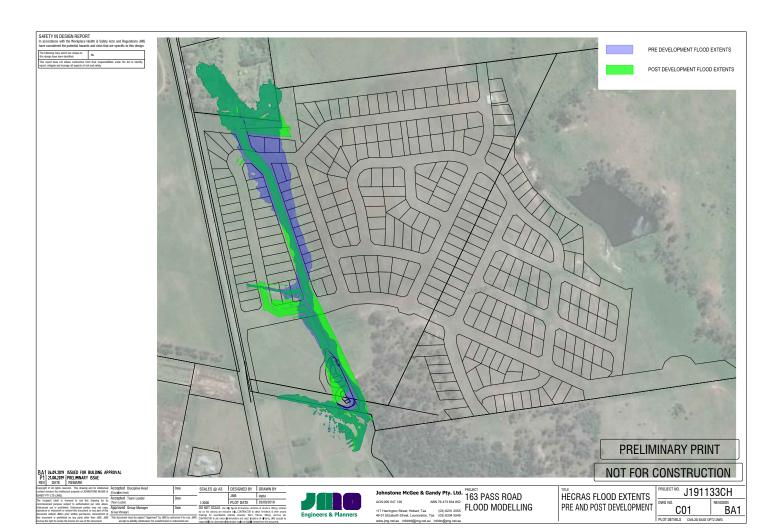
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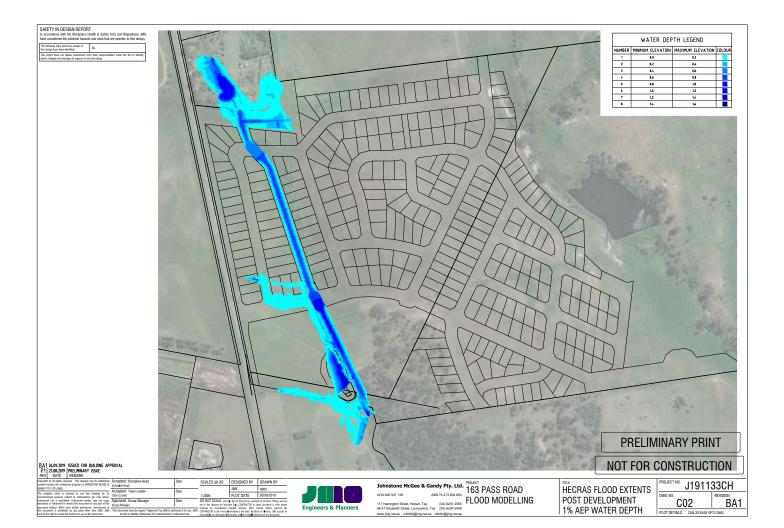
ID	Type	Source	Peak Q (0020yr) m3/s	Peak Q (0100yr) m3/s	Q0020_003i	Q0020_0015	Q0020_0045	Q0020_0090	Q0020_0060	Q0020_0120	Q0020_0180	Q0020_0360	Q0020_0540	Q0020_0720	Q0020_1080	Q0020_1440	Q0100_0015	Q0100_0120	Q0050_0720	Q0100_0060	Q0100_0030	Q0100_1080	Q0100_0540	Q0100_0180	Q0100_0090	Q0100_0045	Q0100_1440	Q0100_0720	Q0100_0360
QA	20	Q_	11.8	19.0	1.5	0.0	3.3	5.9	4.8	6.9	0.0	9.8	11.8	0.0	7.4	8.4	6.4	19.0	0.0	17.9	12.1	13.0	17.4	16.1	17.6	15.2	12.6	17.1	18.4
QA1	20	0_	12.0	19.4	1.5	0.0	3.3	6.0	4.8	7.0	0.0	10.0	12.0	0.0	7.5	8.6				18.2								17.5	18.8
QB	20	٥_	13.7	21.2	1.5	0.0	3.4	6.6	5.0	7.6	0.0	11.0	13.7	0.0	8.3	9.7	6.8	21.1	9	19.3	12.6	15.0	20.1	18.7	20.0	16.3	14.7	19.5	21.2
Q81	20	٥_	0.6	1.5	0.4	0.0	0.5	0.6	0.6	0.6	0.1	0.6	0.6	0.0	0.5	0.5		1.5	9	1.4	1.3		6		1.4	1.2	0.6	60	1.0
QB2	20	0_	14.2	22.1	1.5	0.0	3.5	6.9	5.1	7.8	0.1	11.5	14.2	0.0	8.7	10.1				20.0								20.3	22.1

Critical duration 540min

APPENDIX B

JMG flood modelling drawings





APPENDIX C

Calculations

INSERT JOB NUMBER AND NAME

J191133CH - 163 Pass Road Pre-development

_				•									
L	Calculate T.O.C FIRST												
	T	ime of Concentration	Calculation -	Check Cells Match									
Г	C ₁ ,10	25	mm	10% AEP, 60min Rainfall									
Г	A=	192100	m2	Insert Catchment Area									
Г	A=	0.19210	Km ²	Calculated in Km2									
Г	S _e =	40	m/Km	Insert Catchment Grade									
Г	L=	0.8	Km	Insert Flow Length									
Г	t _c =	26.17	mins	Tc Calculated									
	t.=	26.00	mins	Whole Number To									

Existing Hardstand Area (approx) = 68000 m2 Total Area = 192100 m2	Impervious Area Calcu	lation	
Total Area = 192100 m2	Existing Hardstand Area (approx) =	68000	m2
	Total Area =	192100	m2
Fraction Impervious = 35%	Fraction Impervious =	35%	

Runoff Coefficient Calculation - Refer ARBR 1987
Fraction impervious = 35%
C.1,10 = 0.100 Formula - Refer ARB Book VIII
C.10 = 0.38 Runoff Coefficient

Adjusted to achieve a more realistic C10 value of 0.35. Refer Figure 2.9

	Frequency Conversion Factors -Refer AR&R 1987										
ARI (years)	1	2	5	10	20	40	60	80	100	50	
Factor, F _y	0.8	0.85	0.95	1	1.05	1.2	1.17	1.19	1.2	1.15	

Peak Flows I	For Catchment For Given AEP - At T.O.C									
AEP	I _{tc,Y} (mm/h)	Flow (m ³ /s)								
63.20%	16.9	0.276								
50.00%	19.1	0.332								
20%	26.5	0.516								
10%	32.3	0.661								
5%	38.1	0.818								
2%	46.6	1.097								
1%	53.8	1.320								

Peak Flows for Catchment for 5% AEP for given Storm Duration										
AEP	Duration (min)	Flow (m ³ /s)								
5.00%	5.0	1.826								
5.00%	10.0	1.379								
5.00%	15.0	1.126								
5.00%	20.0	0.960								
5.00%	25.0	0.841								
5.00%	26.0	0.818								
5.00%	30.0	0.752								
5.00%	45.0	0.584								
5.00%	60.0	0.488								
5.00%	90.0	0.382								
5.00%	120.0	0.324								
5.00%	180.0	0.259								

INICO	OT CURRENT	DECIONAL IED	DATA ODTAINIED	FDOM ADOD 20	1C INCLEOC	COFCIFIC DUDATE	CAL				
IIVSE	INSERT CURRENT REGIONAL IFD DATA OBTAINED FROM AR&R 2016 - INCL. T.O.C SPECIFIC DURATION Annual Exceedance Probability (AEP) mm										
Duration (min)	63.20%	50%	20%	10%	5%	2%	1%				
1	1.03	1.17	1.63	1.96	2.32	2.83	3.24				
2	1.76	1.98	2.67	3.16	3.63	4.22	4.68				
3	2.34	2.63	3.58	4.25	4.92	5.78	6.46				
4	2.82	3.18	4 36	5.21	6.07	7.22	8 15				
5	3.23	3.64	5.03	6.04	7.08	8.52	9.68				
10	4.69	5.32	7.45	9.04	10.7	13.2	15.3				
15	5.7	6.46	9.06	11	13.1	16.2	18.7				
20	6.5	7.37	10.3	12.5	14.9	18.3	21.1				
25	7.18	8.13	11.3	13.7	16.3	19.9	22.9				
26	7.31 8.27		11.5	14	16.5	20.2	23.3				
30	7.79	8.81	12.20	14.80	17.50	21.30	24.40				
45	9.32	10.5	14.5	17.4	20.4	24.5	27.9				
60	10.6	12	16.4	19.5	22.7	27.1	30.5				
90	12.8	14.4	19.5	23.1	26.7	31.4	35.1				
120	14.6	16.4	22.3	26.3	30.2	35.2	39.1				
180	17.7	19.9	27	31.7	36.2	42.1	46.5				
270	21.4	24.2	32.9	38.6	44.1	51.2	56.5				
360	24.5	27.8	38	44.6	51	59.4	65.6				
540	29.4	33.6	46.3	54.7	62.7	73.6	81.8				
720	33.3	38.1	53.1	62.9	72.5	85.7	95.6				
1080	38.9	44.9	63.3	75.7	87.8	105	118				

	CALCULATED FROM ABOVE - Rainfall mm/hr											
	Annual Exceedance Probability (AEP) mm/hr											
Duration (min)	63.20%	50%	20%	10%	5%	2%	1%					
1	61.8	70.2	97.8	117.6	139.2	169.8	194.4					
2	52.8	59.4	80.1	94.8	108.9	126.6	140.4					
3	46.8	52.6	71.6	85.0	98.4	115.6	129.2					
4	42.3	47.7	65.4	78.2	91.1	108.3	122.3					
5	38.8	43.7	60.4	72.5	85.0	102.2	116.2					
10	28.1	31.9	44.7	54.2	64.2	79.2	91.8					
15	22.8	25.8	36.2	44.0	52.4	64.8	74.8					
20	19.5	22.1	30.9	37.5	44.7	54.9	63.3					
25	17.2	19.5	27.1	32.9	39.1	47.8	55.0					
26	16.9	19.1	26.5	32.3	38.1	46.6	53.8					
30	15.6	17.6	24.4	29.6	35.0	42.6	48.8					
45	12.4	14.0	19.3	23.2	27.2	32.7	37.2					
60	10.6	12.0	16.4	19.5	22.7	27.1	30.5					
90	8.5	9.6	13.0	15.4	17.8	20.9	23.4					
120	7.3	8.2	11.2	13.2	15.1	17.6	19.6					
180	5.9	6.6	9.0	10.6	12.1	14.0	15.5					
270	4.8	5.4	7.3	8.6	9.8	11.4	12.6					
360	4.1	4.6	6.3	7.4	8.5	9.9	10.9					
540	3.3	3.7	5.1	6.1	7.0	8.2	9.1					
720	2.8	3.2	4.4	5.2	6.0	7.1	8.0					
1080	2.2	2.5	3.5	4.2	4.9	5.8	6.6					

INSERT IOR NUMBER AND NAME
(ATOMNENT CESCRIPTION)
Time Resp Analysis - Edended Storm Duration
Certines instration until transpare volume reaches Mademum

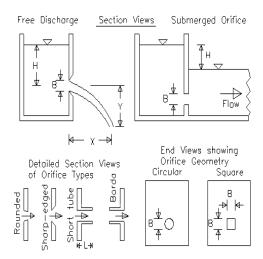
PEAK FLO	NS FOR GIVEN DURATI	ON & AEP
AEP	DURATION (min)	Flow (m ³ /s)
5%	5	2.12
5%	10	1.60
5%	15	1.30
5%	20	1.11
5%	25	0.97
5%	26	0.95
5%	30	0.87
5%	45	0.68
5%	60	0.57
5%	90	0.44
5%	120	0.38
	180	0.30

tion																
Detention Storage Surface Area	1030	m2	Detention	Storage Surface Area	1030	m2		Detention	Storage Surface Area	1030	m2		Detention '	Storage Surface Area	1030	m2
Max. Allowable Discharge Flow	0.818	m ² /s	Max. Allo	wable Discharge Flow	0.818	m ² /s		Max. Allo	wable Discharge Flow	0.818	m³/s		Max Allow	vable Discharge Flow	0.818	m ³ /s
Op is discharge rate where I,	$y = C_d A \sqrt{(2 \cdot g \cdot H)}$		Op is discharge rat	te where	$t_g = C_d, A\sqrt{(2,g)}$	7)		Qp is discharge	rate where	$I_g = C_d A \sqrt{(2\cdot g \cdot H)}$	5		Op is discharge	rate where	$I_g = C_d.A\sqrt{(2\cdot g\cdot 1)}$	<u> </u>
Cd discharge coefficient A Area of Onflice m2 D Critice diameter (m) H Head above Outlet B gravity ENSURE ALL Op LESS THAN MAX. DISCHARGE RI	0.385 0.700 Dependent 9.81	Fixed Solve Iteratively Fixed	Cd A D H B ENSURE ALL Op LE	discharge coefficient Area of Crifice m2 Orlface diameter (m) Head above orlface center gravity SS THAN MAX. DISCHARGE FU	0.6 0.36 0.677 Dependent 9.81 W - VARY ORIFICE S	Fixed Solve iteratively Fixed		Cd A D H E ENSURE ALL Q	discharge coefficient Area of Orifice m2 Oriface diameter (m) fead above critice cente gravity	9.81	Fixed Solve Iteratively Fixed FICE SZE		Cd A D H E ENSURE ALL Qp	discharge coefficient Area of Orifice m2 Oriface diameter (m) lead above oriface cente gravity LESS THAN MAX. DISCHAI	9.81	Flood Solve Iteratively Flood IFICE SIZE
STORM D	URATION = 10mins			STORM DURATION = 15mins			STORM DURATION = 20mins				STORM DURATION = 25mins					
Time of Concentration	26	min	Time of Concentra	ition	26	min		Time of Conces	ntration	26	min		Time of Concen	tration	26	min

	STORM DURATION = 10mins					STORM DURATION = 15mins						STORM DURATION = 20mins						STORM DURATION = 25mins					-
Time of Concentration	1	26	min		\neg	Time of Concentr	ation	26	min			Time of Concents	ation	26	min			Time of Concent	ration	26	min		-
Max. Flow Rate for St	orm Duration	1.598	m3/sec				or Storm Duration	1.305	m3/sec			Max. Flow Rate f		1.113	m3/sec				for Storm Duration	0.974	m3/sec		
STORM DURATION		10.000	min			STORM DURATIO	IN .	15	min			STORM DURATIO	en .	20	min			STORM DURATH	ON	25.000	min		
Inflow rate is factor of t	ime step on Tc (time at	which max flow occurs	0			Inflow rate is facto	or of time step on Tc (time at w	high max flow occurs)				Inflow rate is facto	or of time step on Tc (tim	e at which max flow oc	curs)			Inflow rate is fact	or of time step on Tc (tin	ne at which max flow occ	um)		
			Allowance for CC						Allowance for I	CC C					Allowance for C	0					Allowance for C	JC .	-
Time Step	5% AEP FLOW IP	5% AEP FLOW + CO	V ₁	Mead	Qр	Time Step	5% AEP FLOW to	5% AEP FLOW + CC	ν,	Mead	Qp	Time Step	5% AEP FLOW IP	5% AEP FLOW + CO	V ₁	Mead	Qp	Time Step	5% AEP FLOW to	5% AEP FLOW + CC	V ₁	Mead	Qp
(min)	At STEP (m3/sec)	At STEP (m3/sec)	(m*)	m	(m /x)	(min)	At STEP (m3/sec)	At STEP (m3/sec)	(m*)	m	(m7a)	(min)	At STEP (m3/sec)	At STEP (m3/sec)	(m)	m	(m7s)	(min)	At STEP (m3/sec)	At STEP (m3/sec)	(m)	m	(m7x)
	0.00	0.00	0.00	0.000	0.00	0	0.00	0.00	0.00	0.000	0.00		0.00	0.00	0.00	0.000	0.00	0	0.00	0.00	0.00	0.000	0.00
1	0.06	0.06	3.69	0.000	0.00	- 1	0.05	0.07	3.91	0.000	0.00	1	0.04	0.06	2.57	0.000	0.00	1	0.04	0.05	2.25	0.000	0.00
2	0.12	0.16	7.39	0.004	0.06	2	0.10	0.13	8.20	0.004	0.06	2	0.09	0.11	2.93	0.002	0.08	2	0.07	0.10	1.16	0.002	0.09
- 1	0.18	0.24	13.26	0.007	0.09	- 1	0.15	0.20	14.82	0.008	0.09	- 1	0.13	0.17	5.53	0.003	0.09	1	0.11	0.15	3.89	0.001	0.07
- 4	0.25	0.32	21.05	0.013	0.12	- 4	0.20	0.26	23.59	0.014	0.11	- 4	0.17	0.22	1.79	0.005	0.12	4	0.15	0.19	5.53	0.004	0.12
5	0.31	0.40	30.71	0.020	0.15	5	0.25	0.33	34.47	0.023	0.14	5	0.21	0.28	12.79	0.000	0.15	5	0.19	0.24	8.01	0.005	0.15
6	0.37	0.48	42.24	0.030	0.15	6	0.90	0.39	47.45	0.003	0.18	6	0.26	0.33	17.54	0.012	0.18	6	0.22	0.29	10.95	0.006	0.15
7	0.43	0.56	55.63	0.041	0.21	7	0.35	0.46	62.53	0.046	0.21	7	0.30	0.29	23.03	0.017	0.21	7	0.26	0.34	14.35	0.011	0.21
	0.49	0.64	70.87	0.054	0.24		0.40	0.52	79.69	0.061	0.24		0.34	0.45	29.27	0.022	0.24		0.30	0.29	18.22	0.014	0.24
9	0.55	0.72	87.96	0.000	0.27	9	0.45	0.59	91.95	0.077	0.27	9	0.39	0.50	35.26	0.025	0.27	9	0.34	0.44	22.54	0.018	0.27
10	13.0	0.80	106.91	99	0.30	10	0.50	0.65	120.29	0.096	0.30	10	0.43	0.56	41.99	0.035	0.30	10	0.37	0.49	27.32	0.022	0.29
- 11	0.68	0.88	127.70	0.104	0.33	- 11	0.55	0.72	143.73	0.117	0.33	- 11	0.47	0.61	52.47	0.043	0.33	- 11	0.41	0.54	32.57	0.027	0.32
12	0.74	0.96	150.35	0.124	0.36	12	0.60	0.78	169.25	0.140	0.36	12	0.51	0.67	61.69	0.051	0.36	12	0.45	0.58	38.27	0.032	0.35
13	0.80	1.04	174.85	0.146	0.39	13	0.65	0.85	196.86	0.164	0.39	13	0.56	0.72	71.66	0.060	0.39	13	0.49	0.63	44.44	0.037	0.36
14	0.86	1.12	201.19	0.170	0.42	14	0.70	0.91	226.56	0.191	0.42	14	0.60	0.78	82.38	0.070	0.42	14	0.52	0.68	51.06	0.043	0.41
15	0.92	1.20	229.39	0.125	0.45	15	0.75	0.98	258.34	0.220	0.45	15	0.64	0.83	93.85	0.000	0.45	15	0.56	0.73	58.15	0.050	0.44
16	0.98	1.28	259.43	0.223	0.48	16	0.90	1.04	292.21	0.251	0.48	16	0.68	0.89	106.06	0.091	0.48	16	0.60	0.78	65.69	0.056	0.47
17	1.05	1.36	291.33	0.252	0.51	17	0.85	1.11	328.17	0.284	0.51	17	0.72	0.95	119.02	0.103	0.51	17	0.64	0.83	73.70	0.064	0.50
18	1.11	1.44	325.07	0.283	0.54	18	0.90	1.17	166.21	0.319	0.54	18	0.77	1.00	132.72	0.116	0.54	18	0.67	0.88	82.17	0.072	0.53
19	1.17	1.52	360.66	0.316	0.57	19	0.95	1.24	406.35	0.356	0.57	19	0.81	1.06	147.17	0.129	0.57	19	0.71	0.93	91.09	0.080	0.56
20	1.23	1.60	398.11	0.350	0.61	20	1.00	1.30	448.56	0.395	0.60	20	38.0	1.11	162.37	0.143	0.60	20	0.75	0.97	100.48	0.088	0.59
21	1.29	1.68	437.40		0.64	21	1.05	1.37	492.87	0.435	0.63	21	0.90	1.17	178.32	0.158	0.63	21	0.79	1.02	110.32	0.096	0.62
22	1.35	1.76	478.54	0.425	0.67	22	1.10	1.44	539.26 587.74	0.479	0.66	22	0.94	122	195.01	0.173	0.66	22	0.82	1.07	120.63	0.107	0.65
				0.465																			
24	148	192	566.37 513.05	0.506	0.73	24	1.20	1.57	638.31 690.96	0.571	0.72	24	1.03	1.34	230.63	0.206	0.72	24	0.90	1.17	142.62	0.126	0.71
25	1.54	2.00	613.06	0.550	0.76	25 26	1.25 1.30	1.63	745.70	0.620	0.75	25	1.07	1.39	269.56	0.224	0.75	25 26	0.94	122 127	154.31	0.138	0.74
27	0.55	0.72	645.59	0.542	0.52	27	0.70	0.91	751.65	0.671	0.78	27	0.81	1.05	209.24	0.242	0.78	27	0.90	1.17	172.32	0.152	0.50
20	0.55	0.72	626.50	0.642	0.82	28	0.65	0.85	751.69	0.724	0.82	20	0.81	1.00	269.12	0.261	0.82	28	0.90	1.12	172.12	0.167	0.80
29	0.49	0.56	626.50	0.627	0.80	28	0.60	0.85	751.36	0.732	0.82	29	0.77	0.95	261.44	0.259	0.62	28	0.86	1.02	175.24	0.170	0.82
30	0.43	0.56	529.54	0.505	0.80	30	0.55	0.78	765.38	0.732	0.82	30	0.74	0.99	251.44	0.259	0.81	30	0.82	1.07	173.24	0.170	0.82
31	0.31	0.48	551.93	0.563	0.75	31	0.50	0.72	735.68	0.729	0.82	31	0.64	0.89	245.31	0.254	0.60	31	0.79	0.97	199.03	0.170	0.82
32	0.25	0.32	521.75	0.536	0.75	32	0.45	0.59	722.39	0.714	0.81	32	030	0.78	234.57	0.238	0.78	32	0.71	0.93	161.29	0.164	0.81
33	0.15	0.34	499.12	0.507	0.73	22	0.40	0.59	705.63	0.701	0.80	33	0.56	0.72	222.30	0.236	0.76	32	0.72	0.99	156.13	0.159	0.29
34 34	0.12	0.16	454 10	0.475	0.71	34	0.95	0.46	685.51	0.585	0.79	34	0.51	0.62	200.62	0.216	0.74	34	0.64	0.83	147.77	0.152	0.78
- 20	0.06	0.06	417.11	0.441	0.55	15	0.30	0.40	662.16	0.666	0.75	× ×	0.47	0.61	193.85	0.203	0.72	35	0.60	0.28	138.66	0.143	0.75
36	0.00	0.00	378.04	0.405	0.65	16	0.25	0.33	635.70	0.643	0.77	36	0.43	0.56	178.03	0.188	0.69	35	0.56	0.73	128.31	0.134	0.73
37	-0.06	-0.06	337.16	0.367	0.62	37	0.20	0.26	606.26	0.617	0.75	37	0.39	0.50	161.37	0.173	0.66	37	0.52	0.68	117.56	0.125	0.70
28	-0.12	-0.16	234.66	0.327	0.59	38	0.15	0.20	573.96	0.589	0.73	28	0.34	0.45	144.04	0.157	0.63	38	0.49	0.63	106.38	0.114	0.67
39	-0.18	-0.24	250.76	0.286		29	0.10	0.13	518.91	0.557	0.71	39	0.30	0.29	126.24	0.140	0.60	29	0.45	0.58	94.91	0.103	0.64
40	-0.25	-0.32	205.71	0.243	0.50	40	0.05	0.07	501.32	0.523	0.69	40	0.26	0.22	108.16	0.123	0.56	40	0.41	0.54	83.33	0.092	0.61
41	-0.31	-0.40	159.83	0.200	0.46							41	0.21	0.28	23.99	0.105	0.52	41	0.37	0.49	71.79	0.061	0.57
42	-0.27	-0.48	113.52	0.155	0.40							42	0.17	0.22	71.99	0.087	0.47	42	0.34	0.44	60.45	0.070	0.53
43	-0.43	-0.56	67.32	0.110	0.34							43	0.13	0.17	54.40	0.070	0.42	43	0.30	0.29	49.45	0.059	0.45

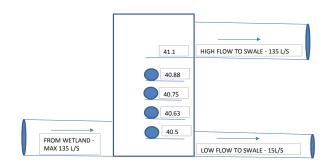
ORIFICE ANALYSIS

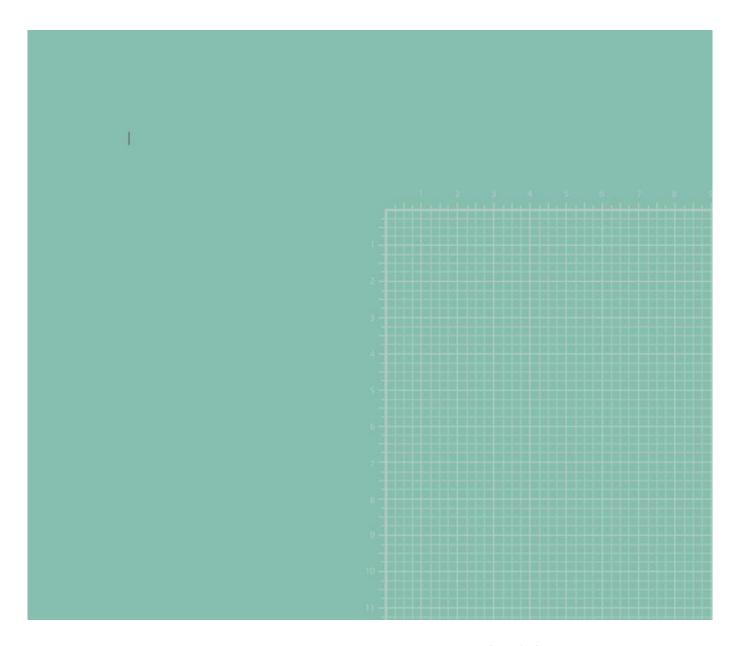
Detention	Pond			
Max flow re	quired	0.818	m3/s	
			,	
$-Q = C_0$	$4\sqrt{2gH} =$			
Submerged	orifico			
No. orifices	1			
Orifice				
diameter				
(m)	0.68	Should be	>2 54cm	
Head	0.00	Oriodia bo	72.040III	
above				
orifice (m)	0.7			
Head, H	3.,			
(m)	0.7	Should be	>1.25m	
Co	0.6			
Orifice Area	0.0			
(m2)	0.363			
Flow, Q				
(m3/s) per				
orriface	0.808			
Total flow,				
Q (m3/s)	0.808			
Free discha	rge orifice			
No. orifices	1			
Orifice				
diameter				
(m)	0.67	Should be	>2.54cm	
Head				
above				
orifice (m)	1.1			
Head, H	0 = 5	01	4.05	
(m)		Should be	>1.25m	
Co	0.6			
Orifice Area	a ===			
(m2)	0.353			
Flow, Q				
(m3/s) per	0.000			
orriface	0.820			
Total flow,				
Q (m3/s)	0.820			
₩ (1110/3)	0.020			



Wetland orifice sizing

Average wetland area 332 m2					Orifice flows						
TWL permanent pool 40.5 m RL	IL .					Q1	Q2	Q3	Q4		
					Orifice invert location above						
Overflow level 41.1 m RL	IL.				permanent pool level	0	0.125	0.25	0.375		
					a.6						
					Orifice diameter (m)	0.05	0.05	0.05	0.05		
			Detention time								
			•	Required							
Wate	ter depth water level RL	Volume	inflow	outflow rate	Number	1	1	1	1		
											Notational
										Total	detention time
(m)	(m)	m3	(hrs)	(I/s)		Flows (I/s)				Flow (I/s)	(hrs)
	0 40.5	0	4	0.000		0				0	
	0.125 40.625	41.5	4	2.882		1.84	0.00			1.84	6.2
	0.25 40.75	83	4	5.764		2.61	1.84	0.00		4.45	5.2
	0.375 40.875	124.5	4	8.646		3.20	2.61	1.84	0.00	7.65	4.5
	0.5 41	166	4	11.528		3.69	3.20	2.61	1.84	11.34	4.1
	0.6 41.1	199.2	4	13.833		4.04	3.60	3.09	2.48	13.20	4.2





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