DEVELOPMENT APPLICATION

PDPLANPMTD-2025/054399

PROPOSAL: Dwelling

LOCATION: 3 Dontay Drive, Rokeby

RELEVANT PLANNING SCHEME: Tasmanian Planning Scheme - Clarence

ADVERTISING EXPIRY DATE: 20 August 2025

The relevant plans and documents can be inspected at the Council offices, 38 Bligh Street, Rosny Park, during normal office hours until 20 August 2025. 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 20 August 2025.

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

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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 3 Dontay Drive

Suburb/Town Rokeby, Tas *Postcode* 7019

Current Owners/s:

Applicant:

Personal Information Removed

Estimated cost of development $ 305,000

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 discussions with a Council Officer, please give their name

Current Use of Site: Vacant Land

Does the proposal involve land administered or owned by the Crown or Council? Yes [ ] No [x]

Clarence City Council

DEVELOPMENT/USE OR SUBDIVISION DECLARATION

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Declaration:

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

Acknowledgement:

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

Applicant's Signature:

Signature **Personal Information Removed** *Date* 29/07/2025

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

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.

  (please refer to http://www.ccc.tas.gov.au/fees or phone (03) 6217 9550 to determine applicable fees).

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.*

- ❑ 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

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
185621	4
EDITION	DATE OF ISSUE
1	14-Nov-2023

SEARCH DATE : 27-May-2025
SEARCH TIME : 01.25 PM

DESCRIPTION OF LAND

City of CLARENCE
Lot 4 on Sealed Plan 185621
Derivation : Part of 730 Acres Gtd. to F. Butler & Anor
Prior CT 131197/2

SCHEDULE 1

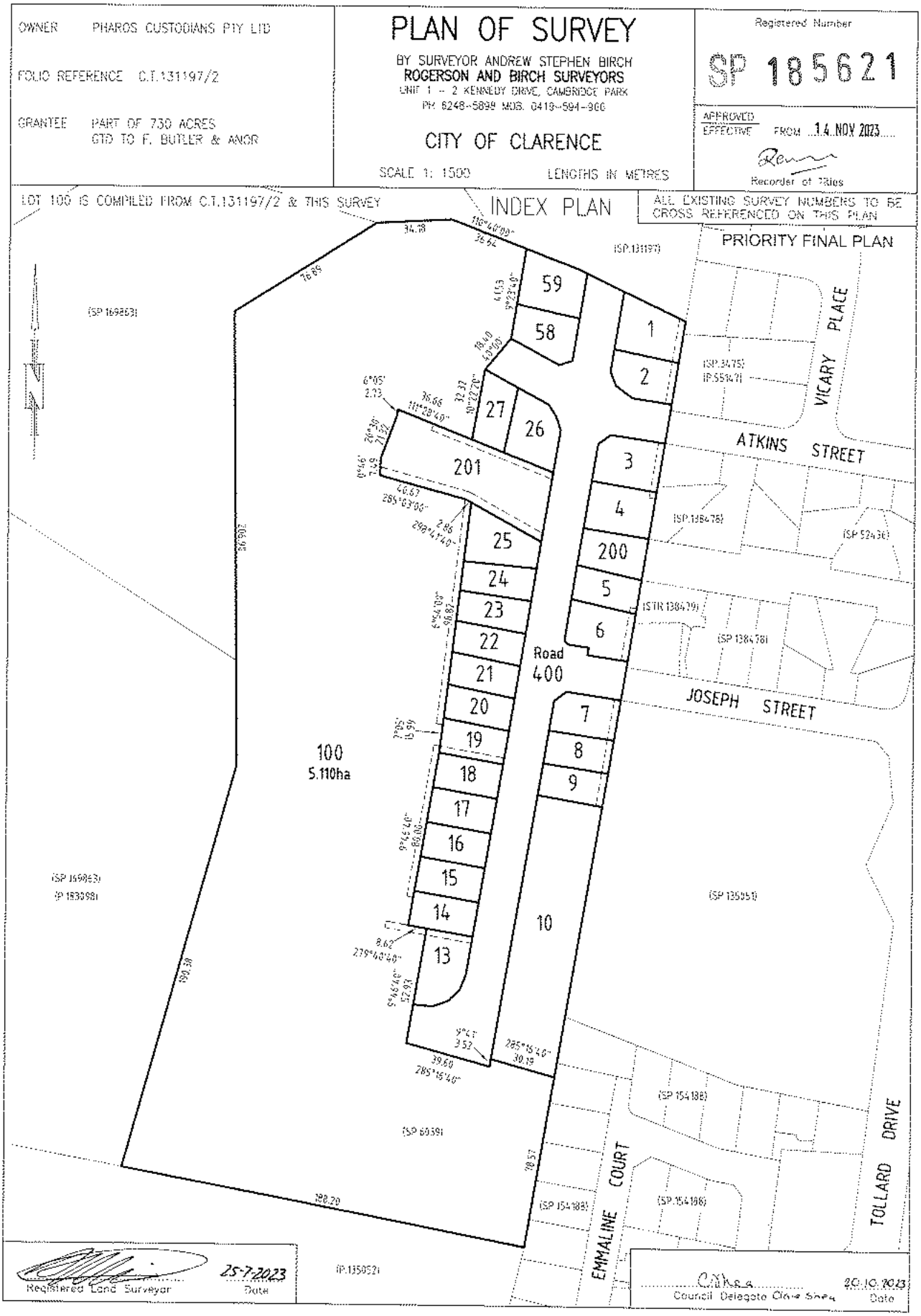
M830023 TRANSFER to PHAROS CUSTODIANS PTY LTD Registered 24-Jul-2020 at noon

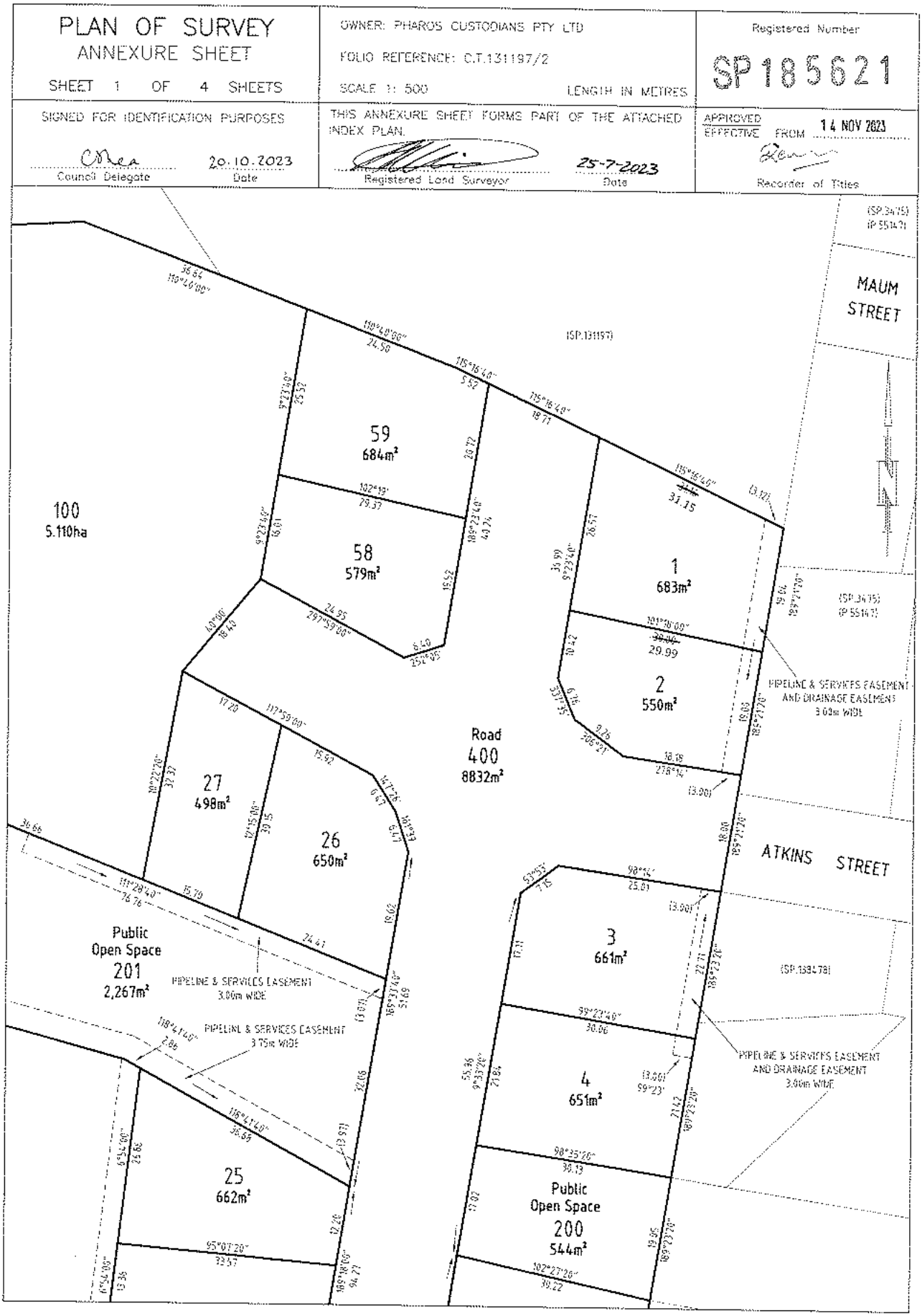
SCHEDULE 2

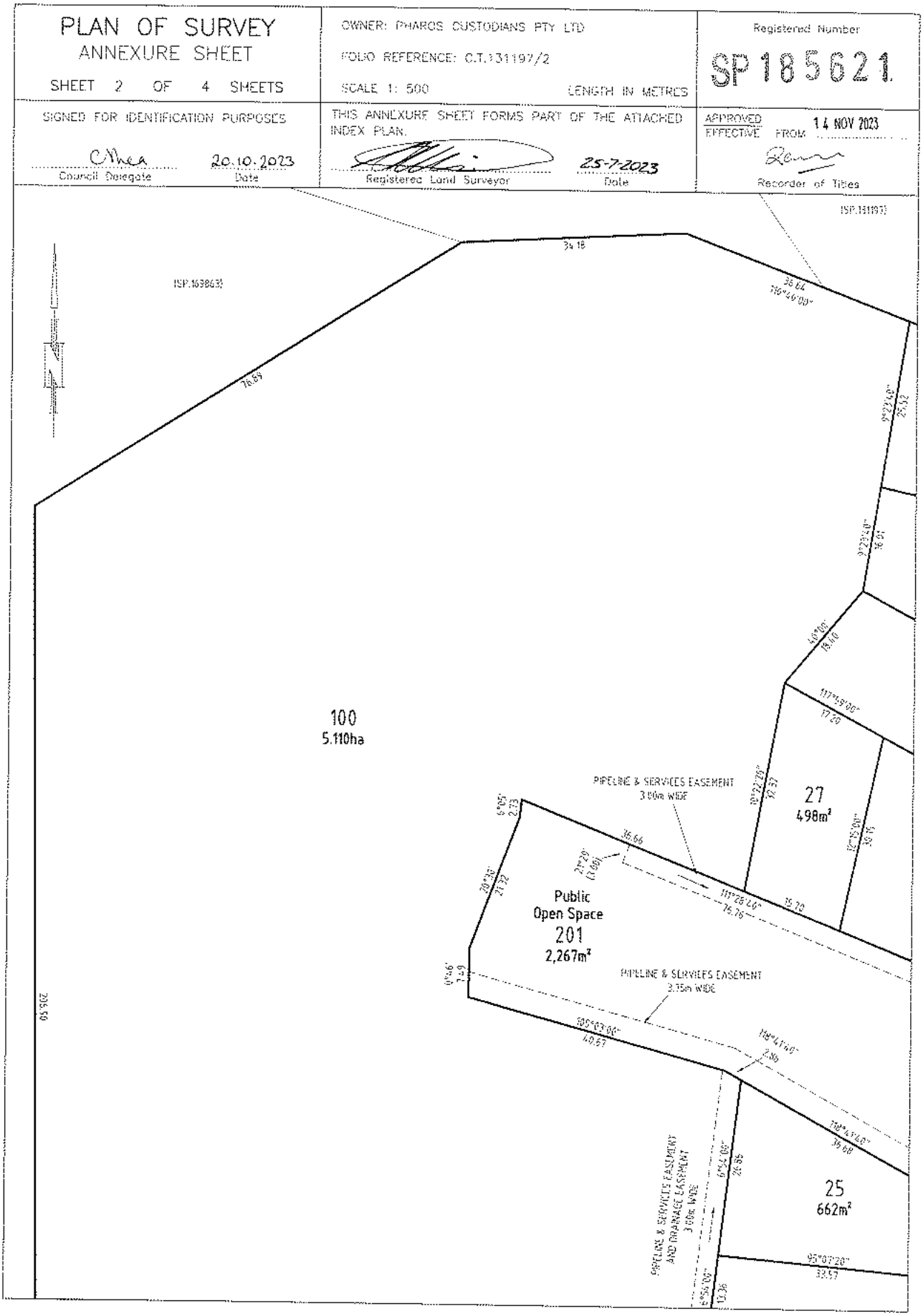
Reservations and conditions in the Crown Grant if any
SP185621 EASEMENTS in Schedule of Easements
SP185621 COVENANTS in Schedule of Easements
SP185621 FENCING COVENANT in Schedule of Easements
SP131197 FENCING PROVISION in Schedule of Easements
E331971 AGREEMENT pursuant to Section 78 of the Land Use Planning and Approvals Act 1993 Registered 14-Nov-2023 at 12.01 PM
E371973 AMENDMENT of the above Agreement No. E331971 pursuant to Section 78 of the Land Use Planning and Approvals Act 1993 Registered 16-May-2024 at noon

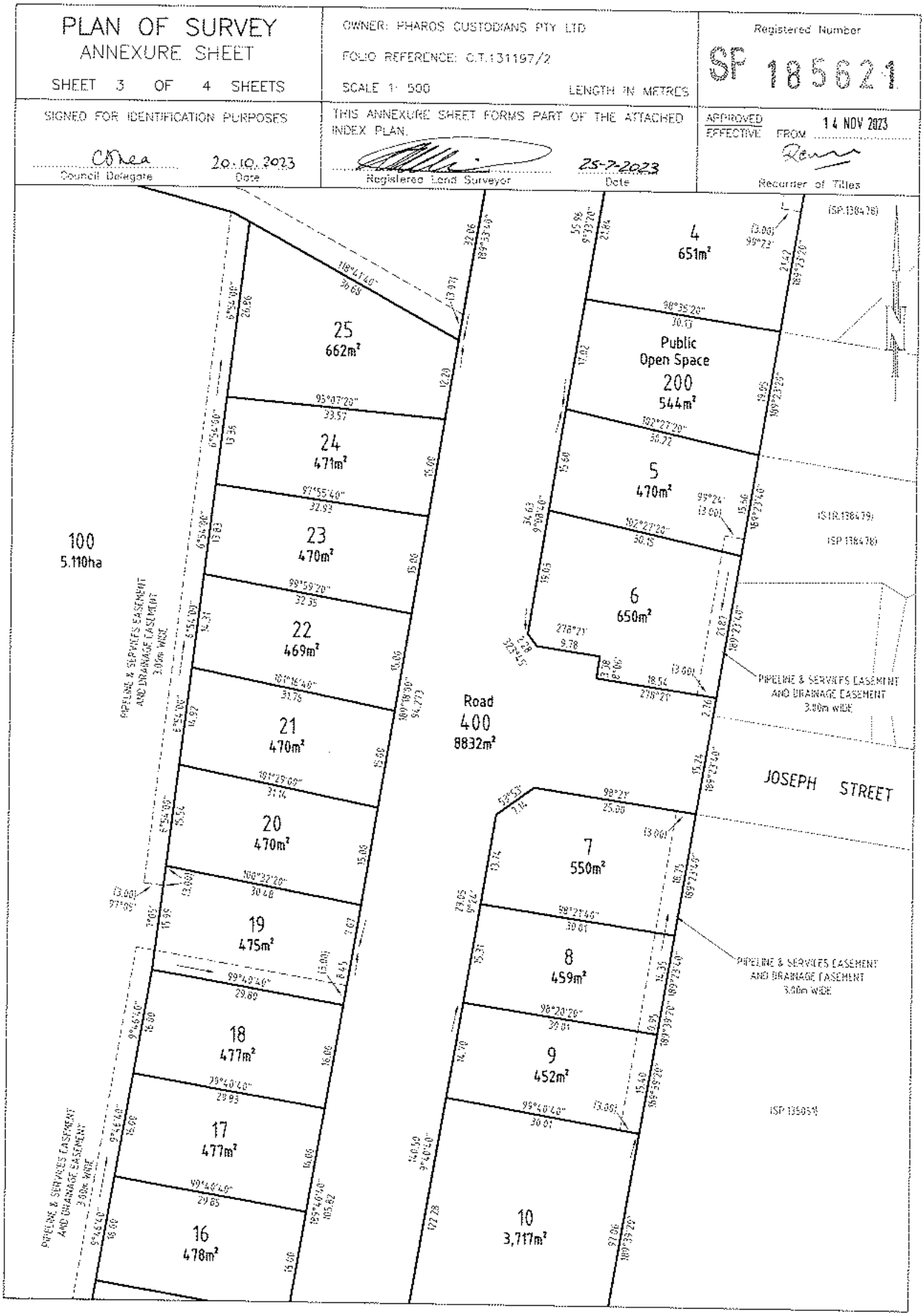
UNREGISTERED DEALINGS AND NOTATIONS

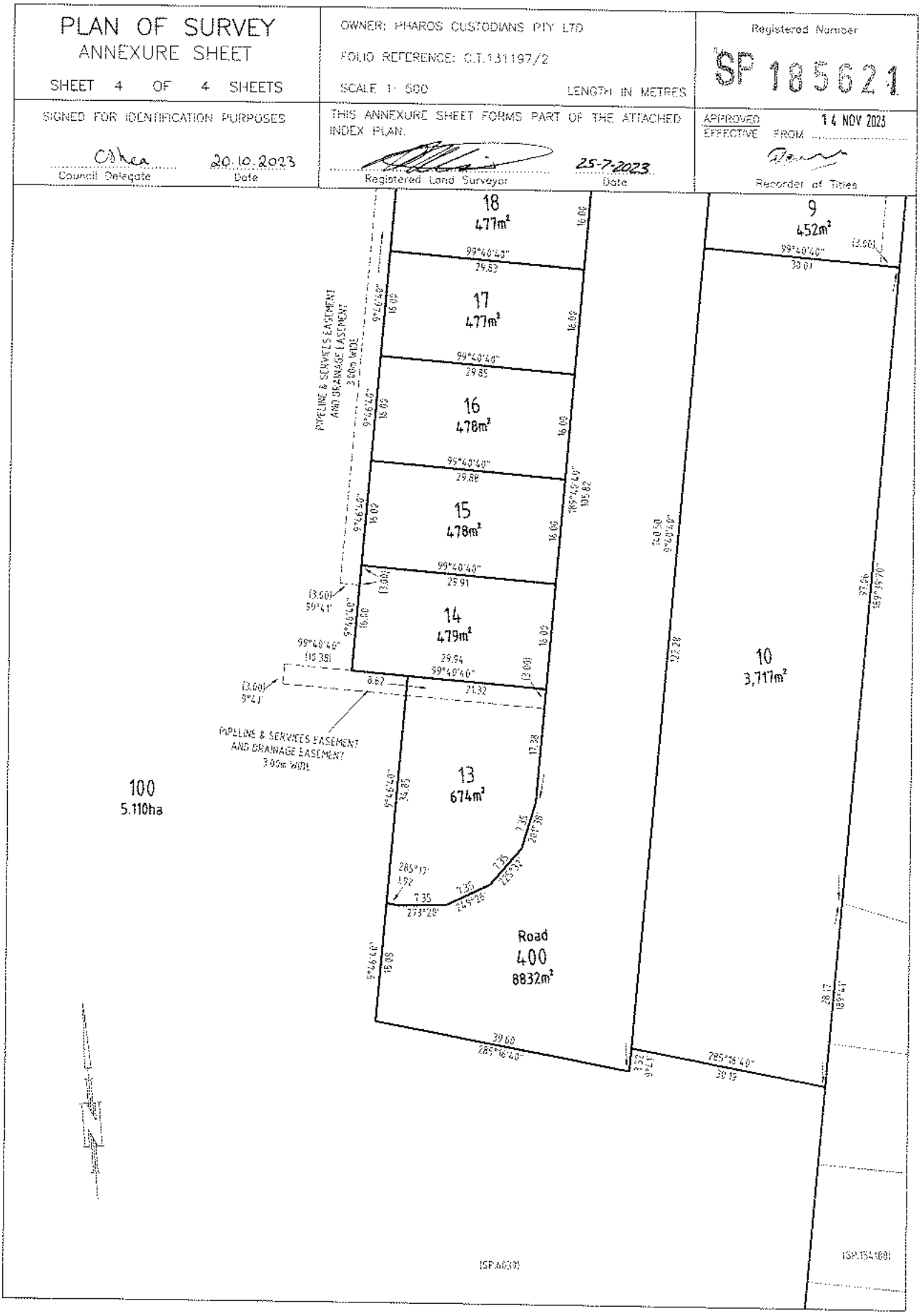
No unregistered dealings or other notations










PLAN OF SURVEY
ANNEXURE SHEET
SHEET 4 OF 4 SHEETS
OWNER: PHAROS CUSTODIANS PTY LTD
FOLIO REFERENCE: C.T.131197/2
SCALE 1: 500
LENGTH IN METRES
Registered Number
SP 185621
SIGNED FOR IDENTIFICATION PURPOSES
Council Delegate
20.10.2023
Date
THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED INDEX PLAN.
Registered Land Surveyor
25-7-2023
Date
APPROVED
EFFECTIVE FROM 14 NOV 2023
Recorder of Titles
18
477m²
17
477m²
16
478m²
15
478m²
14
479m²
13
674m²
9
452m²
10
3,717m²
100
5.110ha
Road
400
8832m²
PIPELINE & SERVICES EASEMENT AND DRAINAGE EASEMENT 3.00m WIDE
PIPELINE & SERVICES EASEMENT AND DRAINAGE EASEMENT 3.00m WIDE

FLOOD HAZARD REPORT

BAYVIEW ESTATE, ROKEBY

CLARENCE CITY COUNCIL
JUNE 2024

TABLE OF CONTENTS

Issuing Office: 117 Harrington Street, Hobart 7000 **JMG Project No. 240281CS**								
Document Issue Status								
Ver.	**Issue Date**	**Description**	**Originator**		**Checked**		**Approved**	
1	21.06.2024	Issue for Building Approval	RWH		CAG		BBG	

1. Introduction

JMG Engineers (JMG) have been engaged by PHAROS Properties to provide a Flood Hazard Report for the recently constructed 60-lot subdivision located at 22 Atkins Street, Rokeby. The subdivision is herein referred to as Bayview Estate and is accessed off the existing municipal roads of Atkins Street and Joseph Street.

At the time of the subdivision development application (DA) (DA Number: PDPLANPMTD-2021/019000) the Clarence City Council (CCC) were operating under the 2015 Clarence Interim Planning Scheme. During the construction stage CCC shifted to the Tasmanian Planning Scheme (TPS), and as part of this transition new flood mapping of the entire municipality was carried out and published. The updated flood mapping indicates the subdivision site is in a flood prone area, and several of the new lots are shown to be at risk from flood water impacts. Specifically, Lots 2-9, 10 (Lot 10 is a unit development that has received occupation), 26, and 56-58 as per the subdivision building approval drawings. Note these lot numbers do not align with the street numbers shown in Figure 2.

Figure 1 - Locality Plan. Bayview Estate shown 'blue'.

As the TPS and the updated flood mapping were not in place at the time of the subdivision DA, assessment against the flood prone areas code was not triggered or addressed at this stage. As a result, any new application to develop one of the impacted lots will trigger the code in relation to 'building and works in a flood hazard area' and require each individual applicant to undertake a flood assessment of their lot. To avoid this, the following report addresses the code for all impacted lots within the Bayview Estate.

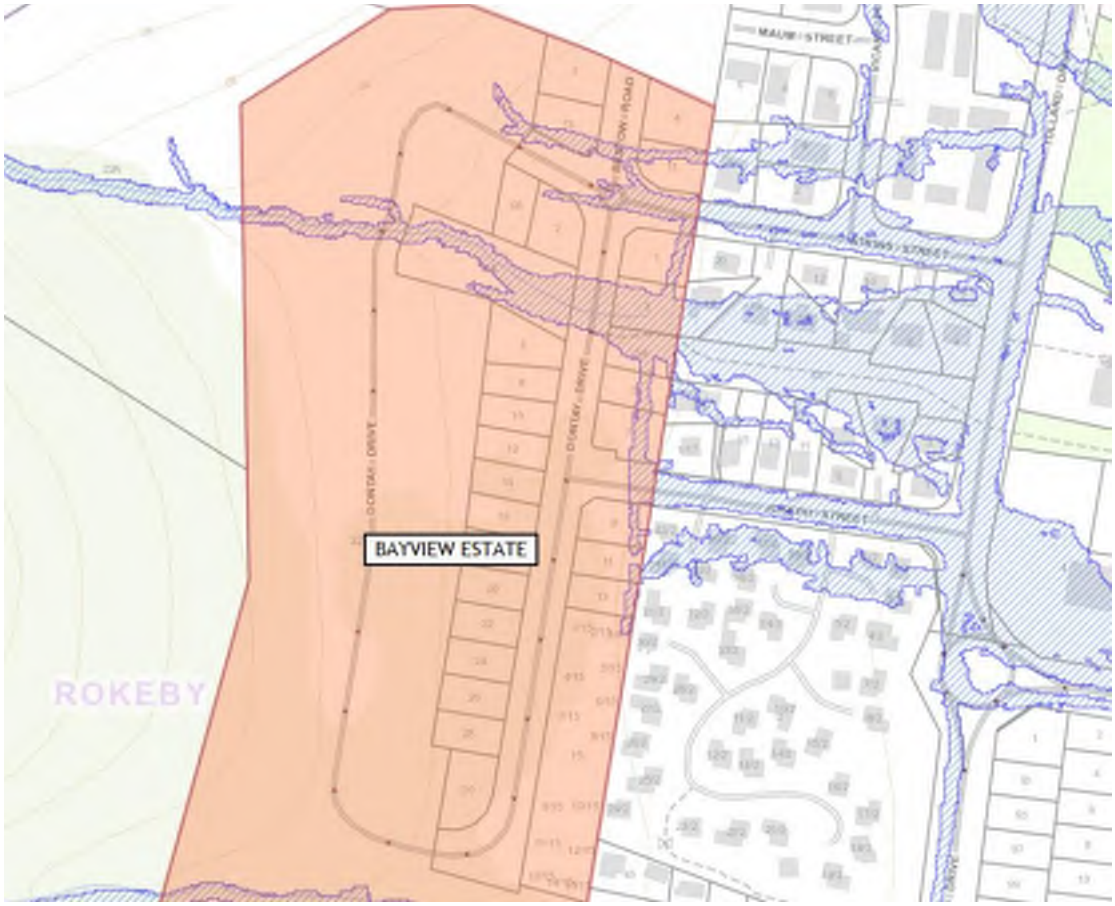


Figure 2 - Site location and flood prone area code overlay.

2. Tasmanian Planning Scheme – Clarence

2.1 Flood Prone Areas Hazard Code - Purpose

A Flood Hazard Report is required as several of the new lots fall within a Flood Prone Area, as defined by the Tasmanian Planning Scheme – Clarence. 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 adaption, 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

In addition to the broader 'purpose' of the code, the technicalities of specific developments also need to be addressed. As this report intends to support the development of existing residential lots, the relevant condition is C12.6.1 – Building and works.

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

That:

a) building and works within a flood-prone hazard area can achieve and maintain a tolerable risk from flood; and
b) buildings and works do not increase the risk from flood to adjacent land and public infrastructure.

Performance Criteria

P1.1

Buildings and works within a flood-prone hazard area must achieve and maintain a tolerable risk from a flood, having regard to:

- *the type, form, scale and intended duration of the development;*
- *whether any increase in the level of risk from flood requires any specific hazard reduction or protection measures;*
- *any advice from a State authority, regulated entity or a council; and*
- *the advice contained in a flood hazard report.*

P1.2

A flood hazard report also demonstrates that the building and works:

- *do not cause or contribute to flood on the site, on adjacent land or public infrastructure; and*
- *can achieve and maintain a tolerable risk from a 1% annual exceedance probability flood event for the intended life of the use without requiring any flood protection measures.*

2.3 Flood Prone Areas Hazard Code – Interpretation

As stated in Section 2.1, the overarching intent of the code implies that a development and the use that would be associated with the development needs to ensure people, property, and infrastructure are protected from a non-tolerable flood risk. Therefore, this report is required to not only address the question of whether the physical works are exposed to a tolerable flood risk but also that users of those works are also protected.

The development of each lot is expected to result in the construction of a dwelling and associated driveway and parking areas. Vehicular and pedestrian movements in and around these dwellings will naturally occur as a result. This flood report assesses the risk in relation to the building structure and to pedestrians and vehicles using the developed land.

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)* (Figure 3), 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 judgement.

Based on the expected use of the development(s) it would be reasonable to state that regular and unpredictable exposure to the H3 flood rating can be considered a non-tolerable risk. This is because a H3 rating is defined as unsafe for vehicles, children, and the elderly. **Any rating lower than H3, or land that receives no rating at all, will be considered tolerable.**

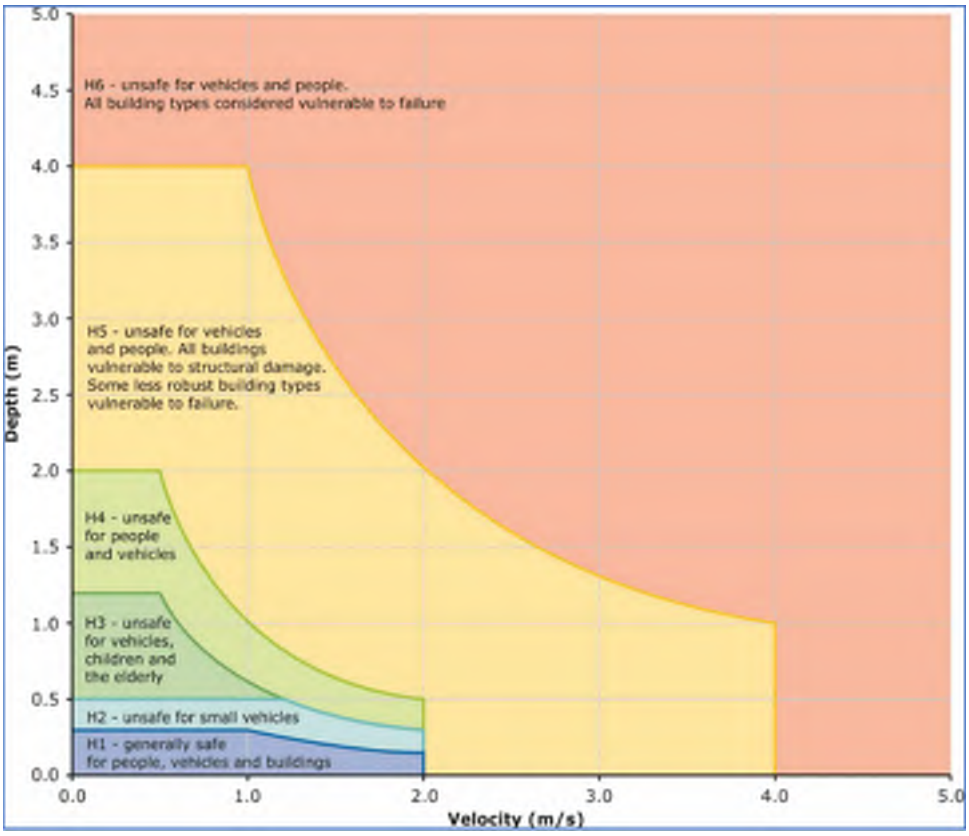


Figure 3 - Flood Hazard Ratings

3. National Construction Code and Building Regulations

In addition to the requirements of the TPS, the National Construction Code (NCC) also specifies the finished floor levels (FFL) of habitable buildings in relation to flood levels. The NCC requires the FFL of a building to be constructed above the 'defined flood level' (DFL) plus additional clearance for freeboard. The NCC does not define the height of the freeboard or what event the DFL should be based on, instead, it refers the designer to the relevant authority.

As such, JMG assume the following:

- The DFL is defined as the inundation level resulting from a 1% Annual Exceedance Probability + 18.3% Climate Change (1% AEP + CC) flood. This is as per the requirements of the TPS.
- The freeboard from the FFL to the DFL is to be 300mm as per the Building Regulations 2016 – Tasmania.

4. Inundation Review

4.1 Council Inundation Mapping

The CCC flood mapping (Figure 2) is assumed to have been undertaken on a surface that utilises Lidar survey. Whilst the exact date of the Lidar survey is unknown, it clearly predates the construction of the subdivision. As such the new roadways and stormwater infrastructure have not been considered in the existing modelling. The inclusion of this infrastructure within the modelled surface is expected to substantially alter the existing flow paths and provide the necessary control of flood water to meet the requirements of the TPS.

4.2 Hydrological Review - Catchment & Flow Calculations

4.2.1 Upstream Catchments

The land upstream of the developed site was split into three catchments in the original stormwater report (Appendix A – Subdivision Stormwater Report).

Catchment A (to the south) bypasses the developed site and does not contribute to any inundation of the lots within this subdivision.

Catchment C forms a minor flow path to the north of the site. This is shown on the CCC flood mapping (Figure 2), and in the original stormwater calculations (Figure 4 & Appendix A – Subdivision Stormwater Report). This is only a very small catchment, and the development of the lots in this area will provide suitable cut-off and dispersion of these flows. Any overland flow that is produced will ultimately end up on the northern side of the internal ring road, where the kerb and channel will provide sufficient capacity to pass flows through the site towards the Atkins St exit. The risk posed by this catchment is negligible and further analysis is not required.

Catchment B is the largest contributor to the inundation mapping. The catchment extends up to Rokeby Hills and contributes to an existing watercourse that flows into the western side of the internal ring road. Although this watercourse has been reshaped as part of the works, it remains a defined flow path through to its intersection with the ring road. From this point the watercourse is piped, but an overland flow path through the neighbouring public open space is in place. The catchment is mainly bushland, although a small area to the north-west has recently been developed as part of the Howrah Gardens subdivision. It has been assumed that the runoff from this development has been appropriately controlled and has not influenced the natural runoff from the broader catchment. Catchment B was previously analysed as part of the subdivision report (Appendix A – Subdivision Stormwater Report), and most of the inputs used for that analysis have been adopted for this work.

- The subdivision stormwater calculations (Appendix A – Subdivision Stormwater Report) utilised the Rational Method. The original calculations adopted a runoff coefficient of only 0.1 for the entire catchment, which is considered very optimistic. For the purposes of this modelling this value has been increased to a more conservative 0.4.
- A pipe blockage factor of 50% has been adopted. A typical blockage factor for a catchment and pipe network of this nature would be in the order of 20%, as such a reasonable factor of safety is provided.
- Rainfall Intensity-Frequency-Duration (IFD) data was extracted from the Bureau of Meteorology (BOM) dataset, and an increase of 18.3% was applied to the intensities to account for the impacts of climate change. This was determined by extrapolation of the factors provided on the Australian Rainfall & Runoff (ARR) Data Hub for the recommended Representative Concentration Pathway (RCP) of 8.5.

Table 1: Climate Change Allowance

Year	2090	2100
Factor	3.090 (16.3%)	18.3% (extrapolated)

Catchment B

Area: 13.71 Ha

Time of Concentration: 15 mins (Bransby-Williams Formula)

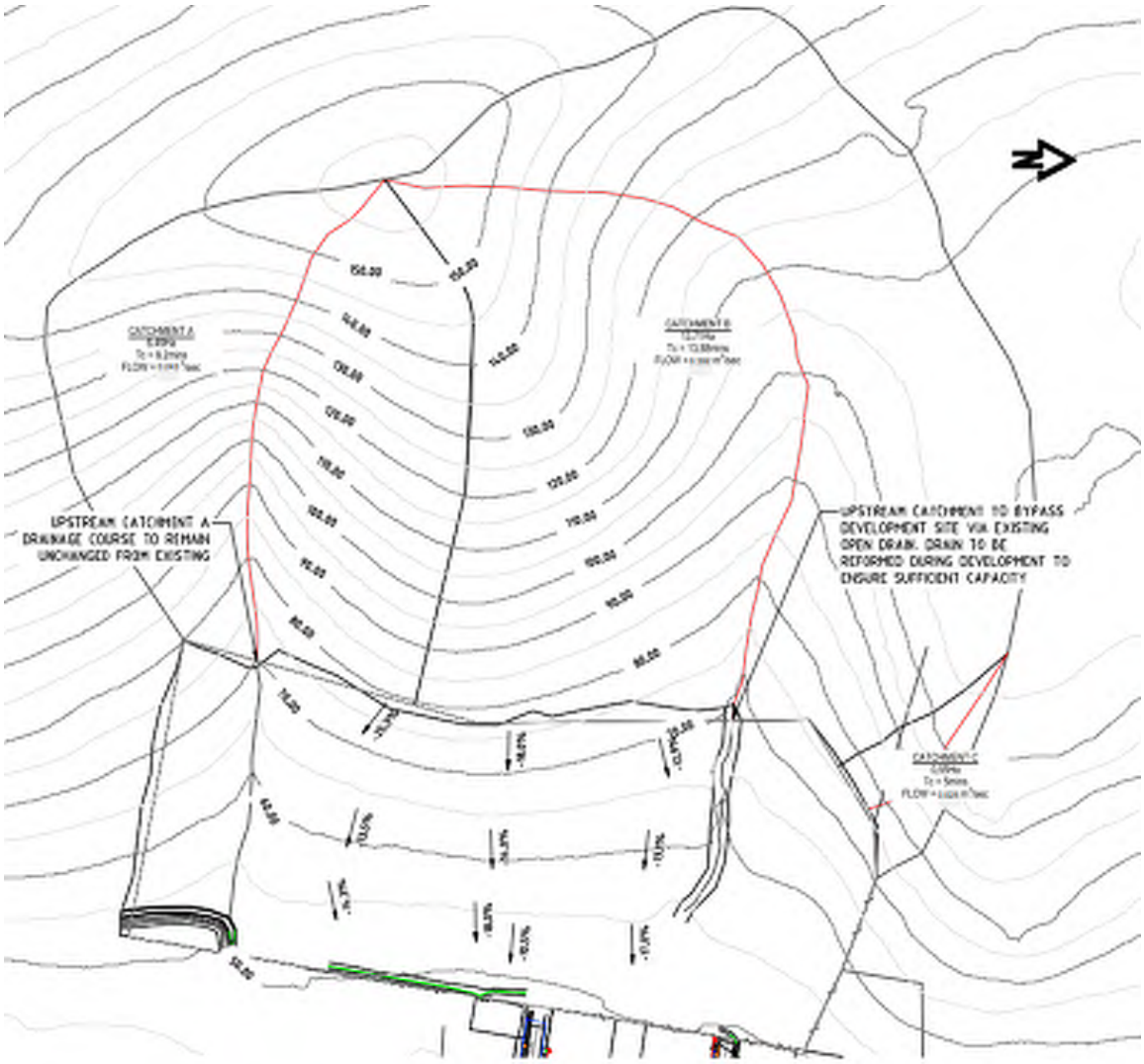


Figure 4 - Original Subdivision Report, Catchment Plan

4.2.2 Subdivision Catchment

Large areas of the subdivision (to the north and south) will discharge onto the new internal ring road and exit the site through either Atkins St or Joseph St without influencing the major overland flow path through the centre of the site. As such, these areas have been neglected from modelling. The remainder of the subdivision is assumed to contribute to the central overland flow path.

Developed Catchment

Area: 2.5 Ha

Time of Concentration: 5 mins

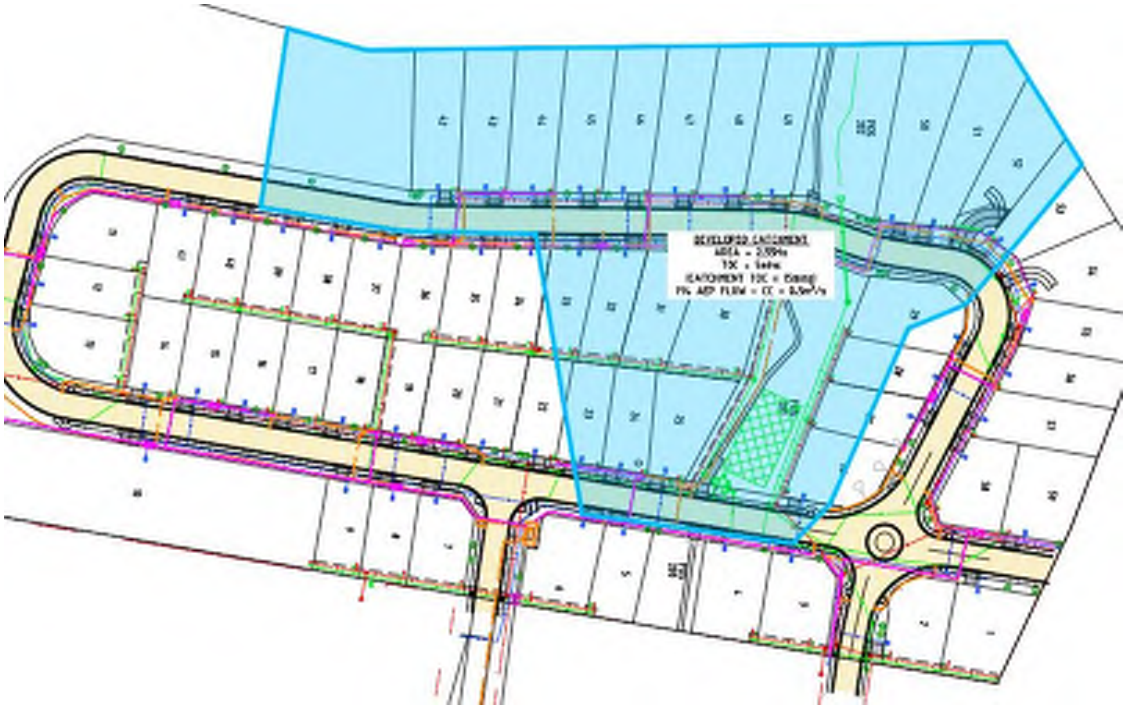


Figure 5 – Developed Catchment (Subdivision)

- The flows from the developed catchment were also calculated using the Rational Method, and the catchment was assumed to be 70% impervious. This is based on estimates of other fully developed lots of this size.
- All other inputs were consistent with those used for the upstream catchment.
- The time of concentration (TOC) for this catchment is only 5-minutes, but the analysis was based on a 15-minute critical catchment TOC.

4.2.3 Total Overland Flow

The 1% AEP + CC overland flow through the main channel was calculated to be 1.5 m^3/s (Appendix B – Stormwater Calculations).

JMG acknowledge that there are reservations associated with the reliability of the Rational Method for catchments of this size and nature. However, as these calculations are being undertaken on an ungauged catchment the results are considered as reliable as those produced by a runoff-routing model. The conservative nature of the analysis further reduces the need for more complex modelling.

4.3 Hydraulic Review - HEC-RAS

The modelled surface is a combination of the JMG subdivision design surface (22 Atkins St Subdivision - J210179CS – Drawing Set), survey data (Rogerson & Birch Surveyors, September 2021) and a small region of Lidar data for the upstream catchment where land survey was not undertaken. Regions of grass and bushland were assigned Mannings n-values between 0.03 and 0.05. The upper limit was used for denser natural bushland, and the lower limit for the maintained areas of public open space. Asphalt roadways and concrete footpaths were assigned a value of 0.012.

No piped stormwater infrastructure was included in the model. Pipe flow capacity was accounted for by reducing the inflow hydrograph. An inflow hydrograph peaking at 1.5m^3/s over a 15-minute time frame was used for the analysis.

5. Results and Discussion

The results from the HEC-RAS model are displayed in Figure 6, Figure 7 and Figure 8. These figures show the flow can be contained within the proposed road network and the public open space areas. As the flow is controlled through the site, and is no longer shown to impact any lots, there is only a negligible risk to any development of the new lots and their associated users. For the same reason, the risk of displacing flood water onto neighbouring properties is also negligible. The development of the new lots is compliant with Condition *C12.6.1 – P1.1 & P1.2* and the general purpose of the flood prone areas code.

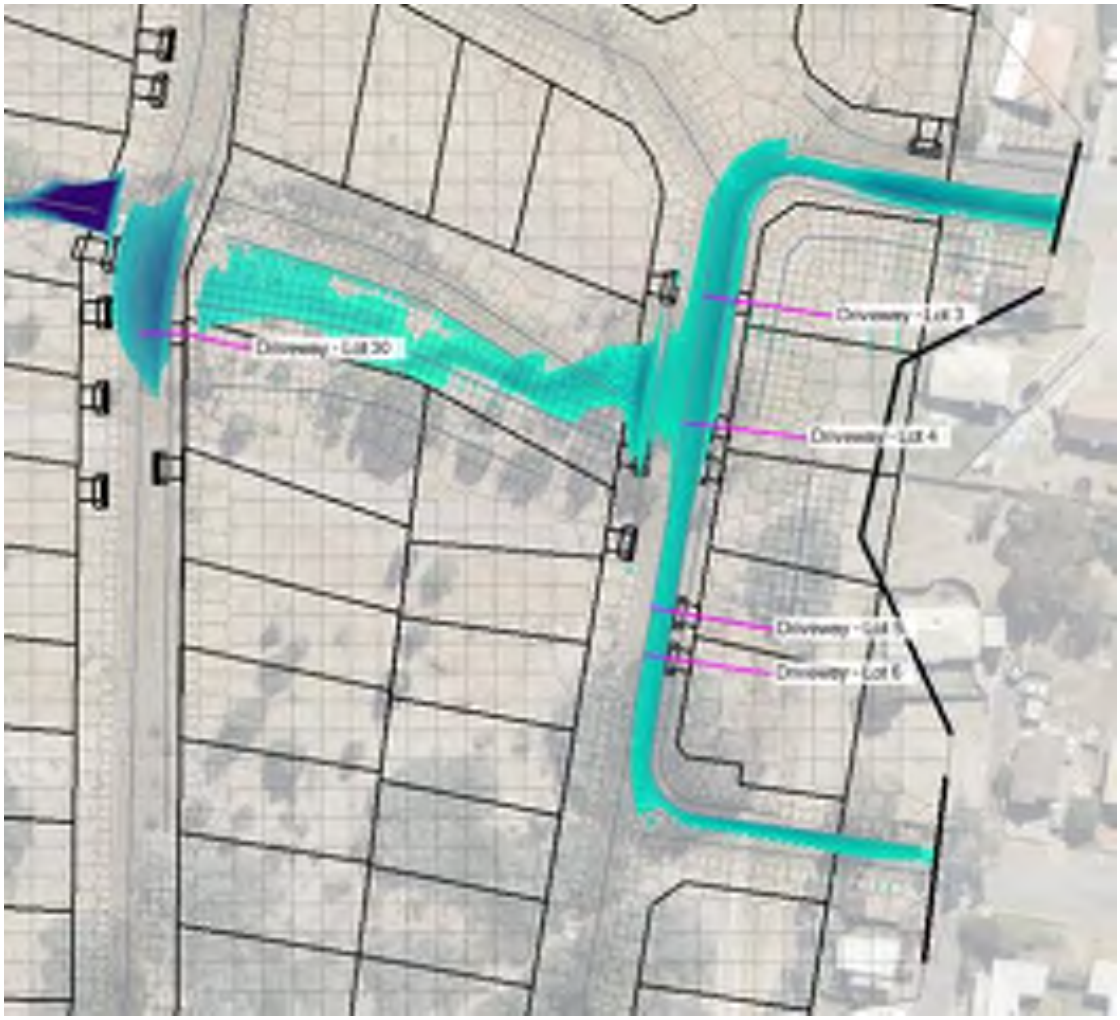


Figure 6 – Alignment Plan of 'At Risk' Driveways

Results indicate that the depth of inundation on the internal ring road will reach the top of the kerb adjacent the driveway crossovers to Lots 3-6 and 30. To ensure compliance with the NCC it is recommended that the FFL's of these dwellings are constructed a minimum of 300mm above a forced low point within the private driveways. Driveways will need to be constructed with a low point, that provides transitions compliant with the off-street parking code - AS2890. This will ensure in the unlikely event flood water does overtop the driveway crossover, 300mm of freeboard will be present between the flood level and the FFL. The driveway and surrounding surface should be graded to divert any flows around the perimeter of the buildings.

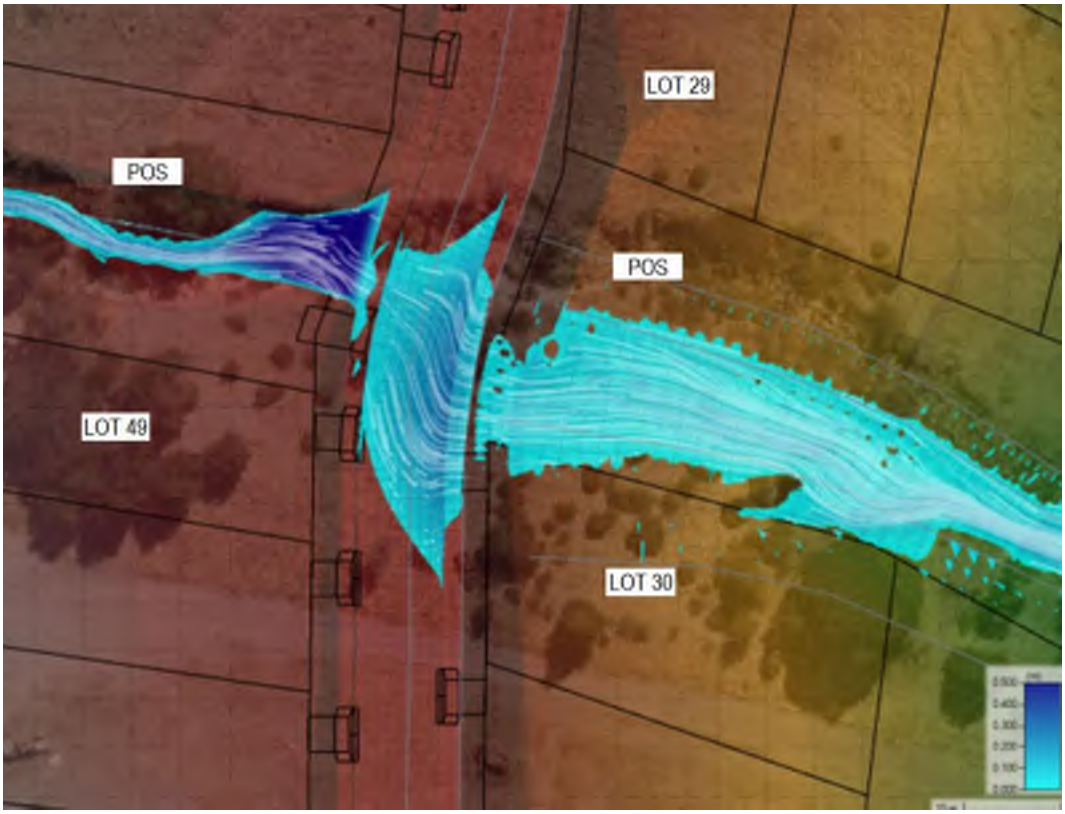


Figure 7 – Flow directional arrows across top roadway.

Figure 8 – Flow directional arrows across bottom roadway.

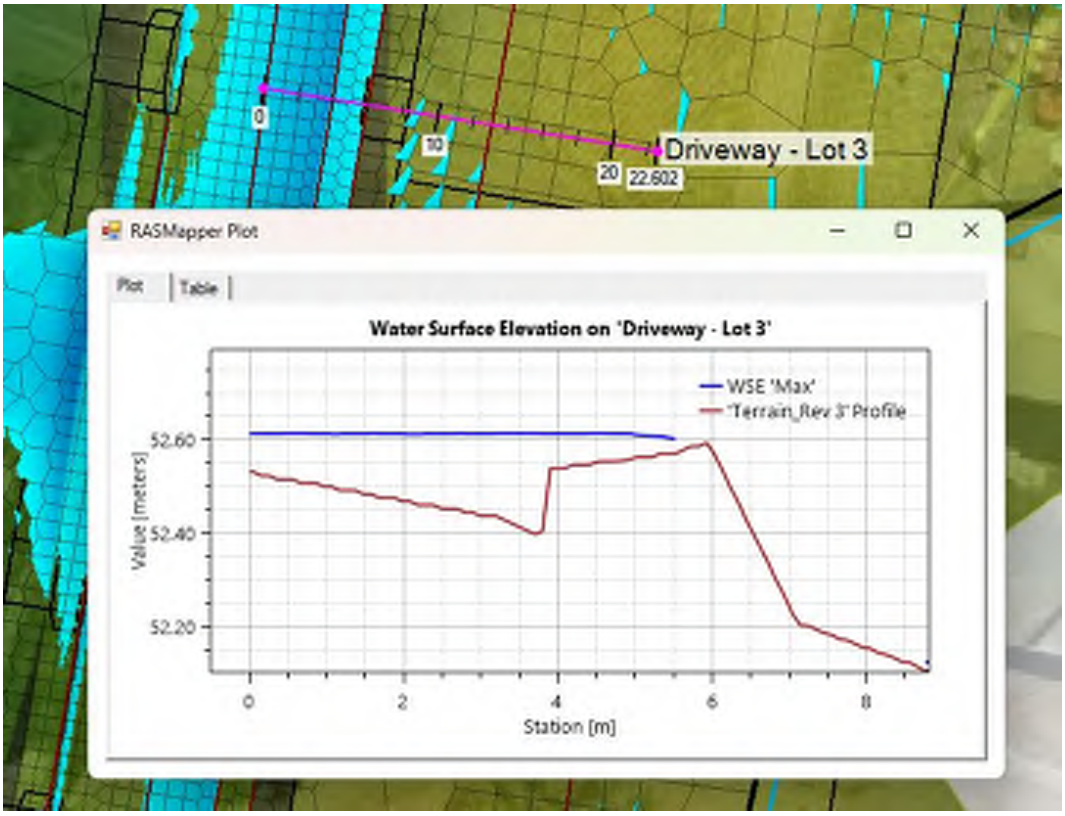


Figure 9 - Lot 3 Driveway, Water Surface Elevation Profile

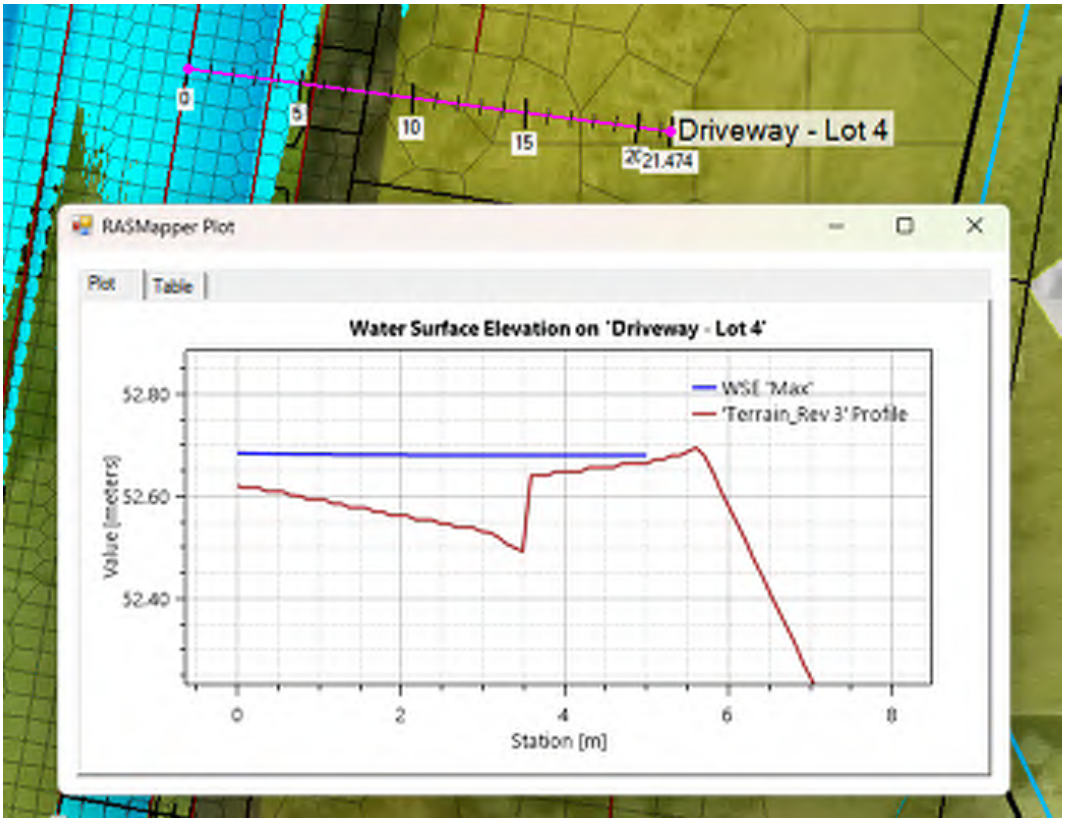


Figure 10 - Lot 4 Driveway, Water Surface Elevation Profile

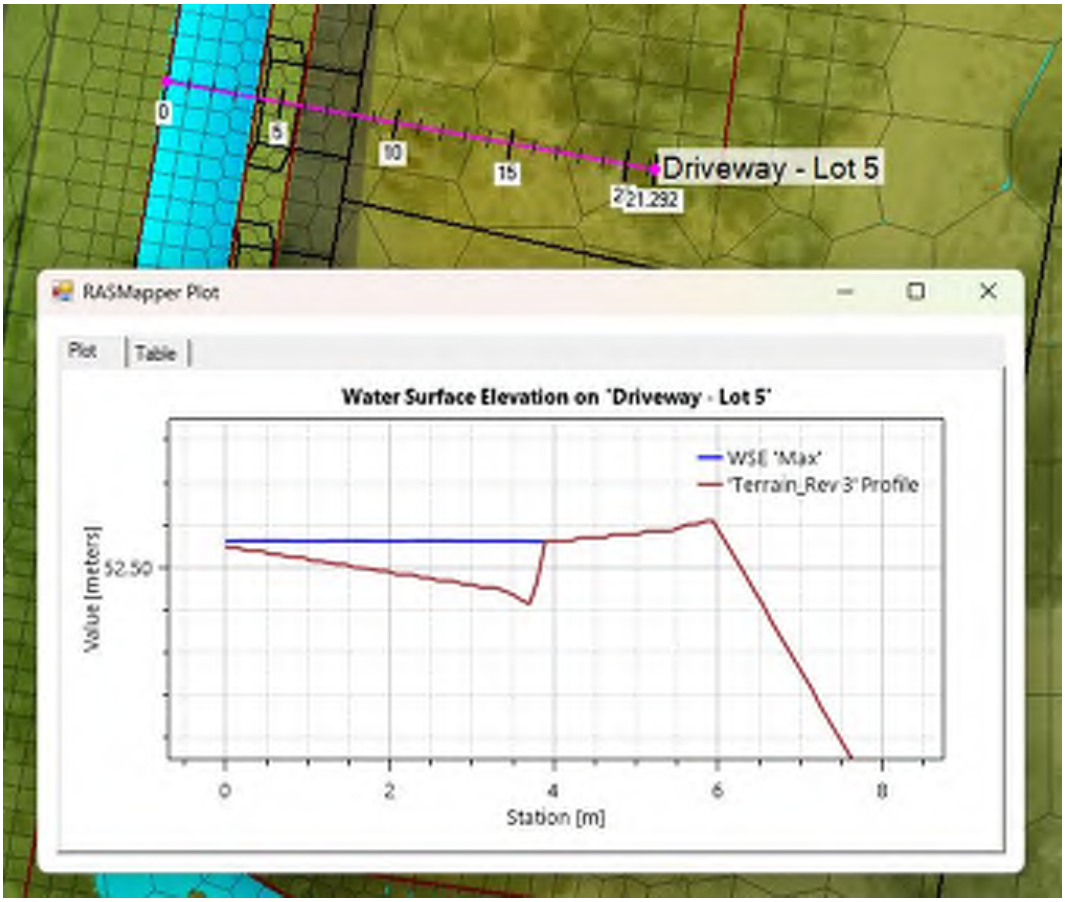


Figure 11 - Lot 5 Driveway, Water Surface Elevation Profile

Figure 12 - Lot 6 Driveway, Water Surface Elevation Profile

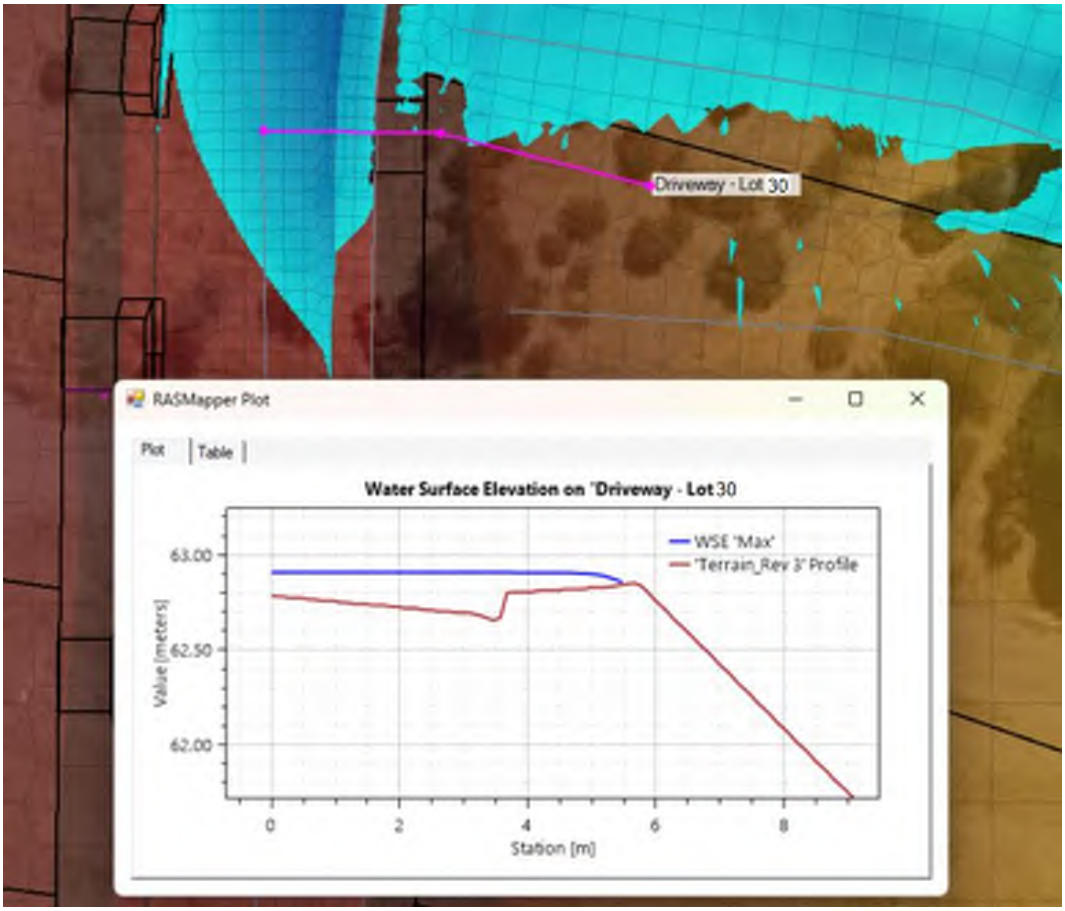


Figure 13 - Lot 30 Driveway, Water Surface Elevation Profile

6. Conclusions and Recommendations

JMG identify the development of all new lots within Bayview Estate as a very low inundation risk with regards to the TPS. Flood water is contained to the public roadways and open space areas, and it is no longer shown to impact any private lots. As such new buildings and works will be constructed on land that is clear of flood water, and as stated in Section 2.4, this is classified as a tolerable risk. The development meets the performance criteria of C12.6.1 of the Tasmanian Planning Scheme – Clarence and the general purpose of the code.

No specific hazard reduction or protection measures, other than those imposed by the NCC, are required. JMG acknowledge the requirement for 300mm of freeboard to the DFL as stated in the NCC and Building Regulations – Tasmania. It is recommended that the FFL's for Lots 3, 4, 5, 6 and 30 are constructed 300mm above a forced low point within the private driveways. These driveways and the surrounding surfaces should be graded to divert any flows around the perimeter of the buildings.

APPENDIX A

22 Atkins Street Subdivision – Stormwater Report

REPORT

22 Atkins Street Subdivision - Stormwater Report

October 2021

Engineers & Planners

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JMG Project No. **J210179CS**

Document Issue Status

Ver.	Issue Date	Description	Originator		Checked		Approved	
1	27/10/2021	Building Approval	JMB		CJM		GLA	

TABLE OF CONTENTS

1. Introduction

A planning permit has been issued for a development at 22 Atkins Street, Rokeby. Refer PDPLANPMTD-2021/019000 and Appendix A for an overall lot layout.
This report provides information on the proposed stormwater system including quantity and quality management.

2. Stormwater Design Details

The proposed development site is approximately 8Ha in size and is made up of a mix of cleared grassland and open eucalypt forest. The site typically falls west to east with a grade of around 15%. There are two significant upstream catchments, approximately 6.49Ha and 14.31Ha, that flow across the site via two clearly defined drainage paths. A third minor catchment enters the site as overland flow, before being directed to the existing Northern drainage path. These two drainage paths direct most of the sites flow to the downstream piped stormwater infrastructure installed through the developed suburb to the east.

2.1 Pre-Developed Flow Conditions

Analysis of stormwater capacity is divided into two parts:

- The upstream catchment, which considers the flows that need to be managed & directed across site.
- The developed area, which considers the detention volume required to limit post-development flow from site to pre-development levels and the internal drainage layout.

All flow analysis was conducted with the rational method, in accordance with AR&R 1987, and utilised 2019 Rainfall IFD data obtained from the Bureau of Meteorology.
The 2019 AR&R IFD's utilise terminology that differs from that in the 1987 edition and as such the following assumptions have been made:

A 1:10 year ARI event was approximated to be equivalent to a 10% AEP (while the 1:20 and 1:100 year events match the 5% & 1% AEP's respectively).

<u>Upstream Catchment</u>
The upstream catchment plan can be seen in Appendix B - C01. It is proposed flows generated within areas A and B be directed through the site to the downstream piped network, effectively bypassing the detention and treatment facility. Catchment C is quite small and is effectively overland flow that will be managed by properties abutting this area. Refer section 2.2 for further detail.

Table 1 summarises the key values for the upstream drainage paths for a 5% AEP event. A value of 10% impermeability was adopted for the surface.

CATCHMENT	Area (Ha)	Tc (mins)	5% AEP Flow (m3/sec)
A	6.49	8	0.243
B	13.70	14	0.392
C	0.55	5	0.025

Table 1 - Upstream Catchment Characteristics

Subdivision Catchment Areas

The undeveloped subdivision catchment areas can be seen in drawing Appendix C - C02. Analysis of flow was determined as above, again adopting 10% impermeability. The key figures for a 5% AEP event are shown in Table 2, including the point at which they discharge.

CATCHMENT	Area (m2)	Tc (mins)	5% AEP Flow (m3/sec)	Discharge Point
1	20,057	6	0.084	Southern Open Drain
2	47,792	5	0.213	DN450 South Joseph Inlet
3	12,673	5	0.057	DN525 Atkins Inlet

Table 2 – Undeveloped Catchment

2.2 Post Developed Flow Conditions

It is proposed that the new residential lots and roadways be serviced with a piped stormwater drainage system with capacity to convey rainfall events up to AEP 5%. These drains will mostly convey water directly to a new underground stormwater detention system, located at the bottom of the proposed open space area 201. The remaining lots located adjacent the existing residential developments, shown catchments 3 & 4, flow directly to the existing downstream piped network.

For the post development flow conditions, the following assumptions have been made:

- The flow condition within the upstream catchment is unchanged between pre & post development – the runoff is constant.
- Balance lot 303, which covers the area of Catchment 1, is zoned as a bio-diversity region – the lot will remain essentially unchanged from its present state (the planning scheme allows the construction of one house) – it is thus considered appropriate to say the flows from Catchment 1 are constant. As catchment A also remains unchanged, this area of the site is not analysed for either treatment or detention.
- The flows from Developed Catchment 2 are captured within the piped network and directed via a GPT to the underground detention system, entering a proprietary treatment device before discharging to the upgraded piped network on Atkins Street.

A developed network catchment plan can be seen in Appendix D-C03. The proposed stormwater network results in a re-distribution of flow, with a greater area flowing to the

north, so as it can be detained in a single stormwater detention facility before connecting to the upgraded network on Atkins Street.

The post-development flow was calculated using the rational method, with undeveloped POS areas set to 10% impervious, roof areas 100% (approximated at 220m2 per lot), the remainder of the lots 40% (with lots averaged at 450m2) and road reserves 75%.
The reduction in area for catchments flowing to the southern open drain and the DN450 south Joseph inlet result in lower flows to these outlets. Therefore, no detention is required for either of these catchments.

To limit the developed discharge rate from site to pre-development levels, and considering the reduction in discharge rate to the Southern Open Drain and South Joseph Inlet discharge points when comparing undeveloped and developed values, a maximum allowable discharge rate to the Atkins Street discharge point of 0.197 m^3/sec was adopted. Refer Table 3 for a break down of 5%AEP flows to various discharge points.

Discharge Point	Undeveloped Discharge rate (m3/sec)	Developed Discharge rate (m3/sec)	Discharge Rate Following Detention (m3/sec)
Southern Open Drain	0.084	0.067	0.067
DN450 South Joseph Inlet	0.213	0.090	0.090
Atkins Inlet	0.057	0.759	0.197
TOTAL	0.354	0.916	0.354

Table 3 – Discharge Location & 5%AEP flows

To achieve the required 197l/s at the Atkins Street discharge point, flows from developed catchment 2 need to be managed with a suitably sized detention tank. The volume required to do so is discussed in Section 2.3. Outflow from the detention tank will be limited to 0.197m^3/s less the uncontrolled outflow from catchment 4 (0.042m^3/s), ie. 0.155m^3/s.

2.3 Detention Storage Requirements

Boyds Formula
Boyds Formula, see equation 1 below, was used to calculate the storage volume required to detain rainfall events of duration less than or equal to the Time of Concentration, and determine an approximation of the total storage volume required.

$$S_{max} = V_1\left(1 - \frac{Q_p}{I_p}\right) \quad (1)$$

Where

S_{max}	Maximum Volume of Temporary Storage	(m^3)
V_1	Volume of Inflow Flood	(m^3)
Q_p	Peak of Outflow Hydrograph	$\left(\frac{m^3}{s}\right)$
I_p	Peak of Inflow Hydrograph	$\left(\frac{m^3}{s}\right)$

This yielded a maximum volume of 355m^3 for a 25 minute duration storm.

Time Step Analysis

A spreadsheet-based time-step analysis, that allowed the hydrograph shape to be varied, was used to calculate the detention volume required for storms of duration greater than the catchments time of concentration. The process and assumptions are detailed as follows;

- A 1-minute time step was selected
- Detention storage surface area was approximated from iterative calculations and proprietary storage information. Surface area was determined to be 400m^2, which correlates to approximately 12 SPEL StormChambers long by 6 wide.
- Maximum discharge flow rate was set to the pre-development level of 0.155m^3/sec
- Inflow to detention storage (Ip) was taken as a fraction of the time step i.e.

$$Ip = Q_{time\ step} = Q_{max}\left(\frac{t_{time\ step}}{t_{t.o.c}}\right) \quad (2)$$

- Detention storage outflow, Qp, was determined as

$$Q_p = C_d . A\sqrt{(2.g.H)} \quad (3)$$

Where

Q_p	Outflow from the storage	$\left(\frac{m^3}{s}\right)$
C_d	Dimensionless Discharge Coefficient	0.6
A	Area of outlet Orifice	(m^2)
H	Depth of water above orifice	(m)
g	Gravitational constant	$(9.81\frac{m}{s^2})$

Volume

$$V_t = V_{t-1} + t_{step}(I_p - Q_p) \quad (4)$$

Where

t_{step}	1 minute	$60s$

Head

$$H_t = \frac{(V_{t-1})}{Detention\ Tank\ Surface\ Area} \quad (5)$$

A summary of all tabulated data can be seen in Appendix E. Results are inclusive of a 30% allowance for climate change.

A 30-minute duration storm required a minimum storage volume for the site of 382m^3. This has been designed using large Spel Storm Chambers, configured 6 chambers wide by 12 units long providing a total of 384m3 of available storage.

The Storm Chambers will be protected from sediment and gross pollutants by way of a GPT (refer section 2.5 for further details on treatment).

Discharge from the detention tank will be via a restricted outlet. A 260mm orifice is required on the outlet pipe from the flow control manhole (SW20/10) to restrict flows to 155l/s at the expected maximum depth of detention (1.34m above pipe invert). The orifice will be on the inlet to a DN375 pipe to take flows downstream of the detention tank to the tertiary treatment system.

2.4 Overland Flow Paths

Drainage channel flows from upstream of the development will be collected and transferred through the developed area to the downstream receiving pipework.
For events greater than 5% AEP, runoff generated within the development and from upstream sheet flows will be intercepted by the new road network. Profiles have been graded such that these flows are conveyed by the road network to discharge via both Atkins and Joseph Streets.

2.5 Quality Analysis

MUSIC (Model for Urban Stormwater Improvement Conceptualisation) software was used to analyse the stormwater quality performance of the proposed subdivision. The software's default parameters were selected alongside the 6min interval rainfall data for Hobart and evapotranspiration rates during the year of 1993. Treatment efficiencies of proprietary devices were supplied by the manufacturers.

It is proposed that the site be treated by a combination of proprietary devices.
Runoff is pre-filtered through an Ocean Protect Cascade CS2250 GPT to screen for any deleterious material prior to entering the stormwater detention system, flow from the detention tanks (limited to 0.155m^3/sec) passes through an Ocean Protect Jellyfish JF 2250-10-2 (1375) before discharging to the Atkins Street Inlet.

A high level bypass of the Jellyfish unit is provided for flows in excess of 55l/s (the units treatable flow limit). This bypass is set 460mm above the Jellyfish's outlet invert level per manufacturers requirements.

Levels downstream of the GPT have been set to ensure that under a 20% AEP event backwater levels do not drown the GPT causing it to have reduced effectiveness. Water levels in the detention storage would expect to be approximately 610mm deep during a 20%AEP event. This equates to the treatment weir level in the GPT, which is 490mm above pipe invert level.

The model is based on the following assumptions:

- The Southern Drainage network remains mostly unchanged and is therefore not considered as part of the MUSIC analysis.
- Upstream Catchment B & C is managed in such a way that it bypasses the site and is therefore not considered as part of the analysis.
- The remaining developed sections are defined as "residential" urban area, with impermeability as per section 2.2.
- Flows from catchment 2 are piped to a GPT prior to entering the detention pond & then treatment device.
- Catchments 3 & 4 flow to the existing piped network without treatment.
- The default overflow value of the detention storage has been set to 0.717 m^3/sec, the 5% AEP flow rate.

The MUSIC model for the site can be seen in Figure 1.

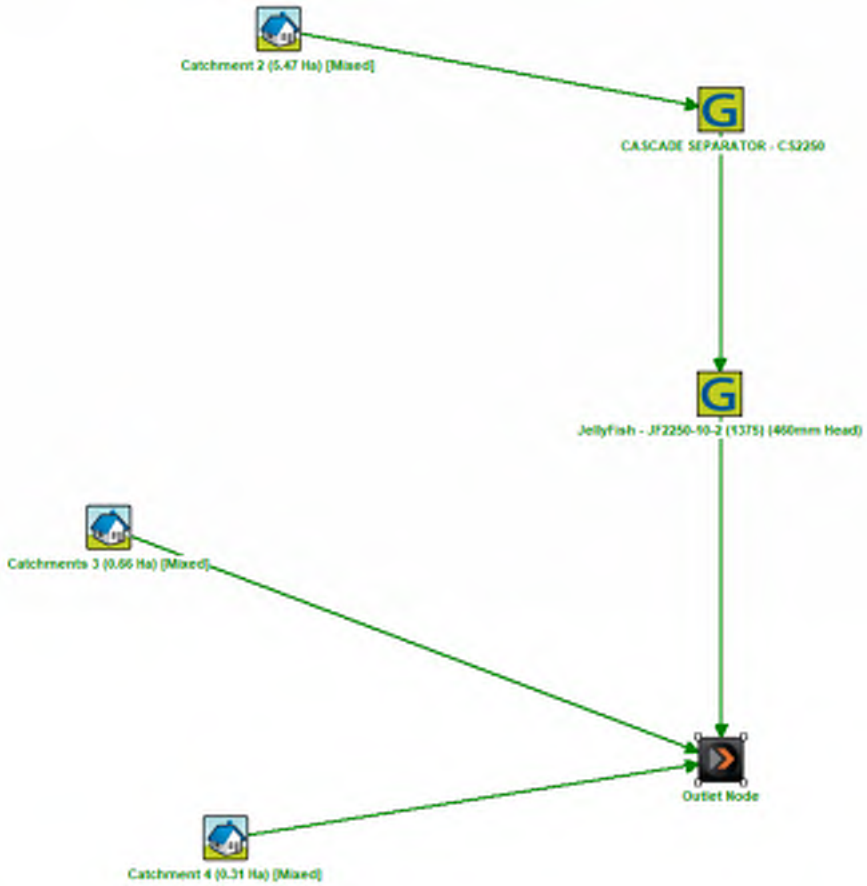


Figure 1: Stormwater treatment MUSIC Model

The results from the MUSIC modelling are seen in Table 4.

Treatment Train Effectiveness - Outlet Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	18.5	18.5	0
Total Suspended Solids (kg/yr)	3950	781	80.2
Total Phosphorus (kg/yr)	7.67	3.51	54.3
Total Nitrogen (kg/yr)	53.2	26.5	50.2
Gross Pollutants (kg/yr)	707	111	84.2

Table 4 – Treatment Train Effectiveness

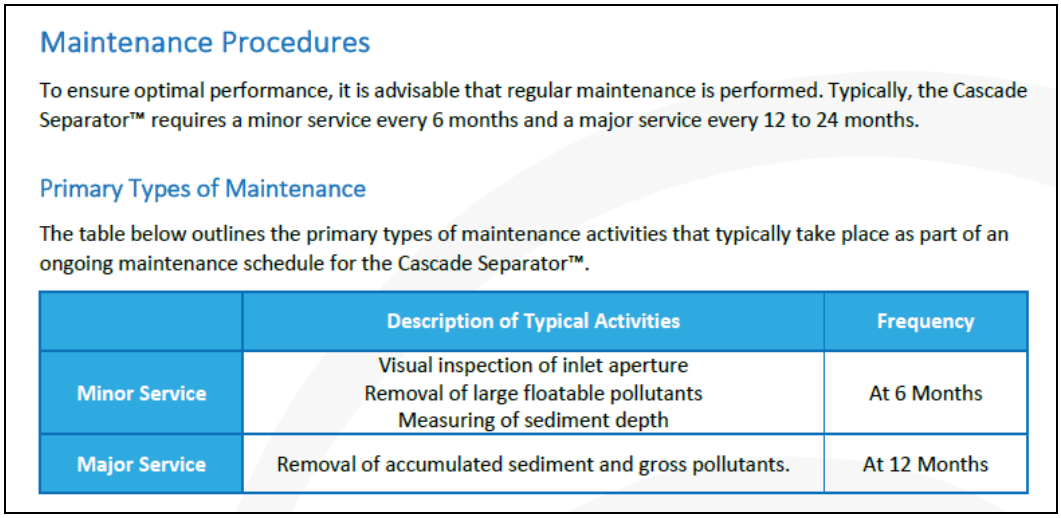
The planning scheme implies that a stormwater system for a new development must meet water quality targets as detailed in the State Stormwater Strategy, 2010 and as follows (unless it is not feasible to do so):

- *80% reduction in the annual average load of total suspended solids*
- *45% reduction in the annual average load of total phosphorus*
- *45% reduction in the annual average load of total nitrogen*

As can be seen the proposed system meets best practice for the removal of all three key pollutant indicators.

Maintenance and replacement

Operations and Maintenance manuals for the two treatment devices are included in Appendix F, with a summary of required maintenance activities and frequency below.



Maintenance Procedures

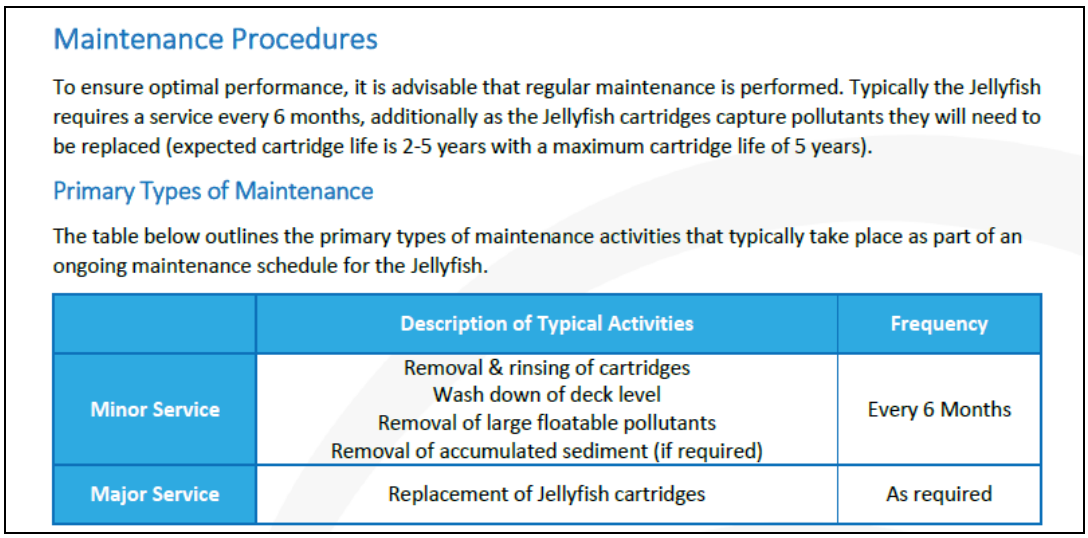
To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the Cascade Separator™ requires a minor service every 6 months and a major service every 12 to 24 months.

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the Cascade Separator™.

	Description of Typical Activities	Frequency
Minor Service	Visual inspection of inlet aperture Removal of large floatable pollutants Measuring of sediment depth	At 6 Months
Major Service	Removal of accumulated sediment and gross pollutants.	At 12 Months

Figure 2 – Cascade GPT maintenance requirements



Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically the Jellyfish requires a service every 6 months, additionally as the Jellyfish cartridges capture pollutants they will need to be replaced (expected cartridge life is 2-5 years with a maximum cartridge life of 5 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the Jellyfish.

	Description of Typical Activities	Frequency
Minor Service	Removal & rinsing of cartridges Wash down of deck level Removal of large floatable pollutants Removal of accumulated sediment (if required)	Every 6 Months
Major Service	Replacement of Jellyfish cartridges	As required

Figure 3 – Jellyfish filter unit maintenance requirements

APPENDIX A

Lot Layout

SAFETY IN DESIGN REPORT

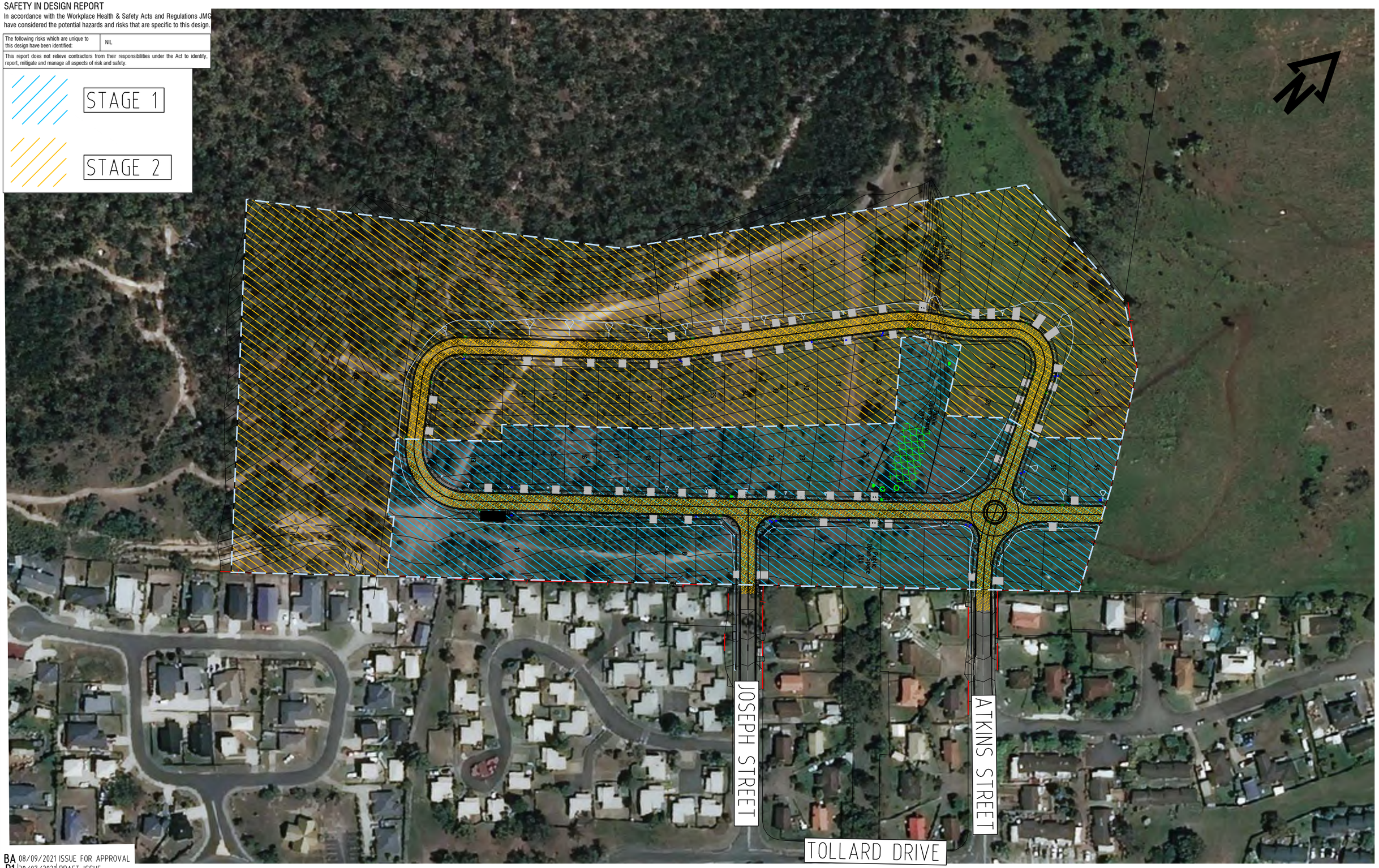
In accordance with the Workplace Health & Safety Acts and Regulations JMG have considered the potential hazards and risks that are specific to this design.

The following risks which are unique to this design have been identified:	NIL

This report does not relieve contractors from their responsibilities under the Act to identify, report, mitigate and manage all aspects of risk and safety.

STAGE 1

STAGE 2



REV	DATE	REMARK
BA	08/09/2021	ISSUE FOR APPROVAL
P1	30/07/2021	DRAFT ISSUE

Accepted CJM (Discipline Head)	Date
Accepted JMB (Team Leader)	Date
Approved GLA (Principal)	Date

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PROJECT
22 ATKINS STREET
ROKEBY
RESIDENTIAL SUBDIVISION

TITLE
STAGING AND LAYOUT PLAN

PROJECT NO. J210179CS

DWG NO. C05

REVISION BA

PLOT DETAILS C-J210179CS - STAGING PLAN.DWG

APPENDIX B

Upstream Catchments Drawing

REV	DATE	REMARK
P4	19.05.2021	REVISED LOT LAYOUT

Engineers & Planners

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PROJECT
22 ATKINS STREET, ROKEBY SUBDIVISION

TITLE
UPSTREAM CATCHMENT PLAN

Accepted Chris Males (Discipline Head)	Date
Accepted Matt Clark (Team Leader)	Date
Approved Matt Clark (Group Manager)	Date

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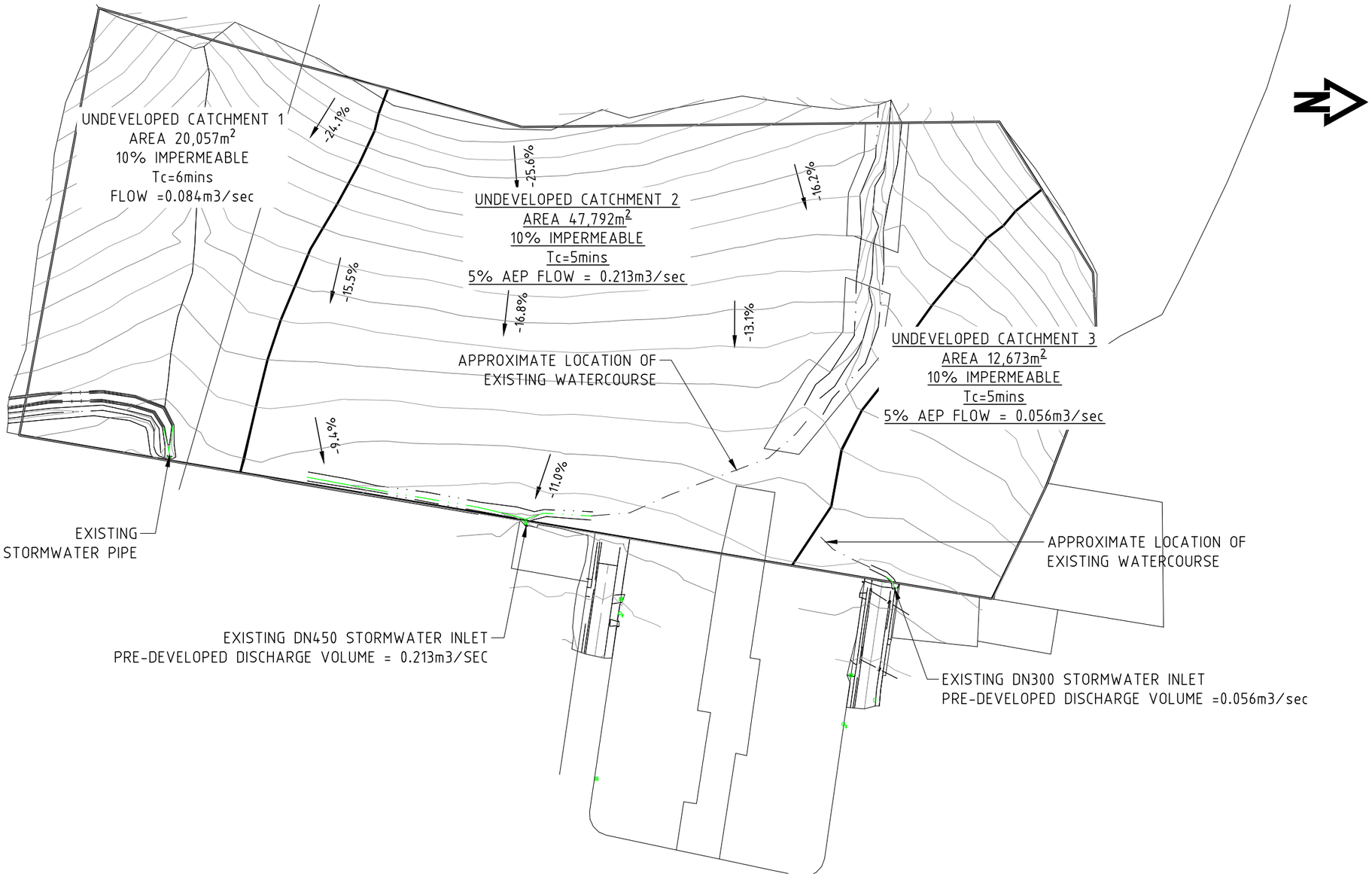
PLOT DETAILS 213029PH - GENERAL ARRANGEMENT.DWG

PROJECT NO. **J213029PH**

DWG NO.	REVISION
C01	P4

APPENDIX C

Pre-Development Catchments Drawing



REV	DATE	REMARK
P4	19.05.2021	REVISED LOT LAYOUT

Engineers & Planners

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PROJECT
22 ATKINS STREET, ROKEBY SUBDIVISION

TITLE
UNDEVELOPED SITE CATCHMENT

Accepted Chris Males (Discipline Head)	Date
Accepted Matt Clark (Team Leader)	Date
Approved Matt Clark (Group Manager)	Date

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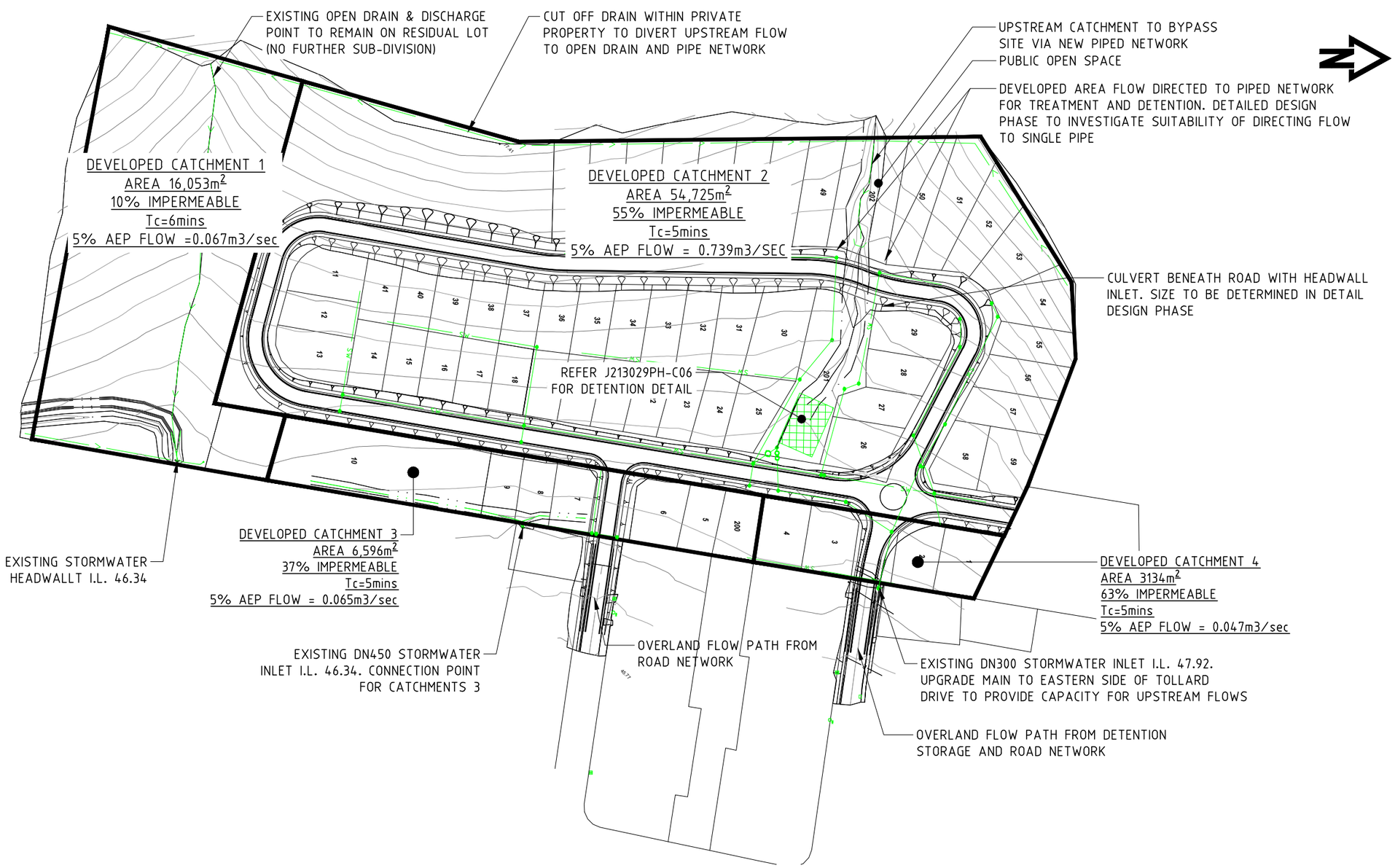
PLOT DETAILS 213029PH - GENERAL ARRANGEMENT.DWG

PROJECT NO. J213029PH

DWG NO. C02 | REVISION P4

APPENDIX D

Post Development Catchments Drawing



CATCHMENT	AREA (m2)											
	ROAD (75%)	P.O.S (10%)	BIODIVERSITY (10%)	RESIDENTIAL LOT (220m2 @ 100% & 40%)	No. Residential Lots	Roof Area (m2)	Remaining Area (m2)	Remaining Area Impermeable	UNDEVELOPED LOT (10%)	AREA IMPERMEABLE	SUM	% IMPERMEABLE
DEVELOPED CATCHMENT 1			15,202						851	1,605	16,053	10
DEVELOPED CATCHMENT 2	14,921	3553		30,330	47	10,340	19,990	7,996	5,921	30,474	54,725	55
DEVELOPED CATCHMENT 3	565	545		2,610	5	1,100	1,510	604	2,876	2,470	6,596	37
DEVELOPED CATCHMENT 4	571			2,563	4	880	1683	673		1,981	3,134	63

REV	DATE	REMARK
P4	19.05.2021	REVISED LOT LAYOUT

Engineers & Planners

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PROJECT
22 ATKINS STREET, ROKEBY
SUBDIVISION
APRIL 2021 REVISION

TITLE
DEVELOPED CATCHMENT
& STORMWATER SERVICES

Accepted Chris Males (Discipline Head)	Date
Accepted Matt Clark (Team Leader)	Date
Approved Matt Clark (Group Manager)	Date

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PLOT DETAILS 213029PH - GENERAL ARRANGEMENT.DWG

PROJECT NO. J213029PH

DWG NO. C03

REVISION P4

APPENDIX E

Stormwater Calculations

J210179CS - 22 ATKINS STREET SUBDIVISION

UPSTREAM - CATCHMENT A - RATIONAL METHOD

Time of Concentration Calculation			
A=	0.06488	Km^2	Insert Catchment Area
S_e=	262	m/Km	Insert Catchment Grade
L=	0.326	Km	Insert Flow Length
t_c=	8.16	mins	Tc Calculated
t_c=	**8.00**	**mins**	

Impervious Area Calculation			
Existing Hardstand Area (approx) =		0	m2
	Total Area =	64881	m2
	Fraction Impervious =	10%	

FOR C1,10 < 25mm use 25mm 25

Runoff Coefficient Calculation - Refer AR&R 1987		
Fraction impervious =	10%	
C1,10 =	0.100	*Formula - Refer ARR Book VIII*
C10 =	**0.18**	**Runoff Coefficient**

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 For Catchment For Given ARI		
AEP	**$I_{tc,Y}$ (mm/h)**	**Flow (m^3/s)**
63.20%	31.35	0.081
50.00%	35.55	0.098
20%	49.65	0.153
10%	60.15	0.195
5%	71.18	0.243
2%	87.00	0.325
1%	100.50	0.392

J210179CS - 22 ATKINS STREET SUBDIVISION

UPSTREAM - CATCHMENT B - RATIONAL METHOD

TC Calculation

A=	0.13707	Km^2
S_e=	167	m/Km
L=	0.546	Km
t_c=	13.88	mins
	14.00	**mins**

Existing Hardstand Area (approx) = 0 m2

Total Area = 137069

Fraction Impervious = 10%

Runoff Coefficient

Fraction impervious =	10%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.18**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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 For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	23.66	0.130
50.00%	26.83	0.156
20.00%	37.63	0.245
10.00%	45.86	0.315
5.00%	54.43	0.392
2.00%	66.86	0.527
1.00%	77.57	0.638

J210179CS - 22 ATKINS STREET SUBDIVISION

UPSTREAM - CATCHMENT C - RATIONAL METHOD

TC Calculation

A=	0.00554	Km^2
S_e=	237	m/Km
L=	0.135	Km
t_c=	4.41	mins
	5.00	**mins**

Existing Hardstand Area (approx) = 0 m2

Total Area = 5539

Fraction Impervious = 10%

Runoff Coefficient

Fraction impervious =	10%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.18**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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

0.189

Peak Flows For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	38.76	0.009
50.00%	43.68	0.010
20.00%	60.36	0.016
10.00%	72.48	0.020
5.00%	84.96	0.025
2.00%	102.24	0.033
1.00%	116.16	0.039

J210179CS - 22 ATKINS STREET SUBDIVISION

UNDEVELOPED - CATCHMENT 1

TC Calculation

A=	0.02006	Km^2
S_e=	117	m/Km
L=	0.179	Km
t_c=	5.92	mins
	6.00	**mins**

Existing Hardstand Area (approx) = 0 m2

Total Area = 20057

Fraction Impervious = 0

Runoff Coefficient

Fraction impervious =	10%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.18**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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 For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	35.80	0.029
50.00%	40.50	0.035
20%	56.20	0.054
10%	67.80	0.068
5%	79.80	0.084
2%	96.70	0.112
1%	111.00	0.134

J210179CS - 22 ATKINS STREET SUBDIVISION

UNDEVELOPED - CATCHMENT 2

TC Calculation

A=	0.04779	Km^2
S_e=	185	m/Km
L=	0.168	Km
t_c=	4.65	mins
	5.00	**mins**

Existing Hardstand Area (approx) = 0 m2

Total Area = 47792

Fraction Impervious = 0

Runoff Coefficient

Fraction impervious =	10%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.18**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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 For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	38.76	0.074
50.00%	43.68	0.089
20%	60.36	0.137
10%	72.48	0.173
5%	84.96	0.213
2%	102.24	0.281
1%	116.16	0.333

J210179CS - 22 ATKINS STREET SUBDIVISION

UNDEVELOPED - CATCHMENT 3

TC Calculation

A=	0.01267	Km^2
S_e=	159	m/Km
L=	0.163	Km
t_c=	5.31	mins
	5.00	**mins**

Existing Hardstand Area (approx) = 0 m2

Total Area = 12673

Fraction Impervious = 0

Runoff Coefficient

Fraction impervious =	10%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.18**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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 For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	38.76	0.020
50.00%	43.68	0.024
20%	60.36	0.036
10%	72.48	0.046
5%	84.96	0.057
2%	102.24	0.075
1%	116.16	0.088

J210179CS - 22 ATKINS STREET SUBDIVISION

DEVELOPED - CATCHMENT 1

TC Calculation

A=	0.01605	Km^2
S_e=	117	m/Km
L=	0.179	Km
t_c=	6.05	mins
	6.00	**mins**

Existing Hardstand Area (approx) = 0 m2

Total Area = 16053

Fraction Impervious = 0

Runoff Coefficient

Fraction impervious =	10%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.18**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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 For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	35.80	0.023
50.00%	40.50	0.028
20%	56.20	0.043
10%	67.80	0.054
5%	79.80	0.067
2%	96.70	0.089
1%	111.00	0.107

J210179CS - 22 ATKINS STREET SUBDIVISION

DEVELOPED CATCHMENT - 2

TC Calculation

A=	0.05473	Km^2
S_e=	159	m/Km
L=	0.163	Km
t_c=	7.00	mins
	7.00	**mins**

Existing Hardstand Area (approx) = 34000 m2

Total Area = 54725

Fraction Impervious = 0.621288

Runoff Coefficient

Fraction impervious =	62%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.60**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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 For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	33.43	0.243
50.00%	37.80	0.292
20%	52.71	0.455
10%	63.69	0.578
5%	75.17	0.717
2%	91.71	0.958
1%	105.43	1.149

J210179CS - 22 ATKINS STREET SUBDIVISION

DEVELOPED CATCHMENT - 3

TC Calculation

A=	0.00660	Km^2
S_e=	159	m/Km
L=	0.163	Km
t_c=	5.67	mins
	6.00	**mins**

Existing Hardstand Area (approx) = 4000 m2

Total Area = 6596

Fraction Impervious = 0.606428

Runoff Coefficient

Fraction impervious =	61%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.59**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

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 For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	35.80	0.031
50.00%	40.50	0.037
20%	56.20	0.057
10%	67.80	0.073
5%	79.80	0.090
2%	96.70	0.119
1%	111.00	0.143

J210179CS - 22 ATKINS STREET SUBDIVISION

DEVELOPED CATCHMENT - 4

TC Calculation

A=	0.00313	Km^2
S_e=	159	m/Km
L=	0.163	Km
t_c=	6.11	mins
	7.00	**mins**

Same as PD2

Existing Hardstand Area (approx) = 2000 m2

Total Area = 3134

Fraction Impervious = 0.6381621

Runoff Coefficient

Fraction impervious =	64%	
C1,10 =	0.100	*Refer ARR Book VIII*
C10 =	**0.61**	

FOR C1,10 < 25mm use 25mm 25

Frequency Conversion Factors

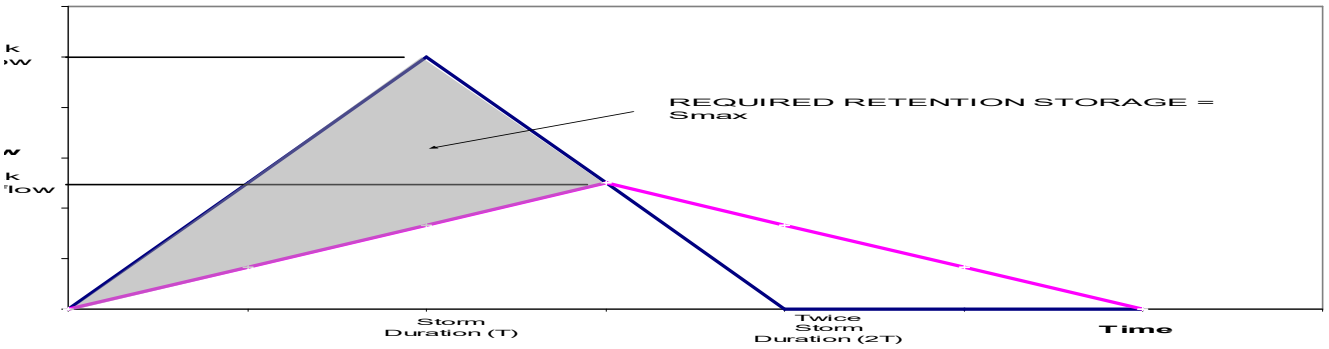
ARI (years)	1	2	5	10	20	40	60	80	100	50
Factor, F_y	0.8	0.85	0.95	1	1.05	1.2	1.17	1.19	1.2	1.15

Peak Flows For Catchment For Given ARI

AEP	$I_{tc,Y}$ (mm/h)	Flow (m^3/s)
63.20%	33.43	0.014
50.00%	37.80	0.017
20%	52.71	0.027
10%	63.69	0.034
5%	75.17	0.042
2%	91.71	0.056
1%	105.43	0.067

J210179CS - 22 ATKINS STREET SUBDIVISION

Boyds Formula Storage Calculation - 5% AEP CALCULATION



$$S_{max} = V_1 (1 - Q_p/I_p)$$

$S_{max}= V_1(1-Q_p/I_p)$

S_{max} = Maximum Volume of temporary Storage (m^3)

V_1 = Volume of inflow flood (m^3)

I_p = Peak discharge of inflow hydrograph (m^3/s)

Q_p = Peak discharge of outflow hydrograph (m^3/s)

Catchment Area (A) =	5.47	ha
Runoff Coefficient (20 Year) =	0.63	
20 Year Effective Catchment Area = ∑CA =	3.60	ha
Restricted outflow requirement =	0.155	m^3/s

Storage requirement is highest value of S_{max} calculated in the table below

Critical storm duration is the storm duration when S_{max} occurs

Continue table until a clear Smax is calculated			*No allowance CC*			
Storm Duration	**5% AEP**	**5% AEP + 30% CC**	**I_p**	**Q_p**	**V_1**	**S_{max}**
(min)	**Intensity (mm/hr)**	**Intensity (mm/hr)**	**(m^3/s)**	**(m^3/s)**	**(m^3)**	**(m^3)**
1	139.20	181.0	1.393	0.155	83.57	74.29
2	108.90	141.6	1.090	0.155	130.76	112.19
3	98.40	127.9	0.985	0.155	177.23	149.38
4	91.05	118.4	0.911	0.155	218.65	181.52
5	84.96	110.4	0.850	0.155	255.03	208.62
6	79.80	103.7	0.798	0.155	287.45	231.75
7	75.17	97.7	0.752	0.155	315.91	250.93
8	71.18	92.5	0.712	0.155	341.84	267.58
9	67.33	87.5	0.674	0.155	363.82	280.27
10	64.20	83.5	0.642	0.155	385.43	292.60
14	54.43	70.8	0.545	0.155	457.47	327.51
15	52.40	68.1	0.524	0.155	471.88	332.64
19	45.79	59.5	0.458	0.155	522.31	345.93
25	39.12	50.9	0.391	0.155	587.15	355.07
30	35.00	45.5	0.350	0.155	630.38	351.88
60	22.70	29.5	0.227	0.155	817.69	260.70

22 Atkins Street - Extended Storm Duration Hydrograph

Confirm approximate detention storage surface area **Assume 400m2**

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m^3/s

Qp is discharge rate where $I_d = C_d A_s \sqrt{(2.g.H)}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d A_s \sqrt{(2.g.H)}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d A_s \sqrt{(2.g.H)}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

STORM DURATION = 5mins

Time of Concentration **7** **min**
Max. Flow Rate for Storm Duration **0.810** **m3/sec**
STORM DURATION **5** **min**
Inflow rate is factor of time step on Tc (time at which max flow occurs)

			No allowance CC		
Time Step (min)	**5% AEP FLOW Ip At STEP (m3/sec)**	**5% AEP FLOW + CC At STEP (m3/sec)**	**V_1 (m^3)**	**Head m**	**Ip (m^3/s)**
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.12	0.15	6.95	0.00	0.00
2.00	0.23	0.30	19.58	0.02	0.02
3.00	0.35	0.45	38.30	0.05	0.04
4.00	0.46	0.60	63.13	0.10	0.05
5.00	0.58	0.75	94.07	0.16	0.06
6.00	0.69	0.90	131.12	0.24	0.08
7.00	0.81	1.05	174.28	0.33	0.09
8.00	0.46	0.60	195.76	0.44	0.10
9.00	0.35	0.45	209.93	0.49	0.11
10.00	0.23	0.30	216.91	0.52	0.12
11.00	0.12	0.15	216.83	0.54	0.12
12.00	0.00	0.00	209.81	0.54	0.12
13.00	0.00	0.00	202.91	0.52	0.12
14.00	0.00	0.00	196.11	0.51	0.11
15.00	0.00	0.00	189.44	0.49	0.11
16.00	0.00	0.00	182.87	0.47	0.11

STORM DURATION = 6mins

Time of Concentration **7** **min**
Max. Flow Rate for Storm Duration **0.761** **m3/sec**
STORM DURATION **6.000** **min**
Inflow rate is factor of time step on Tc (time at which max flow occurs)

			No allowance CC		
Time Step (min)	**5% AEP FLOW Ip At STEP (m3/sec)**	**5% AEP FLOW + CC At STEP (m3/sec)**	**V_1 (m^3)**	**Head m**	**Qp (m^3/s)**
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.11	0.14	6.52	0.00	0.00
2.00	0.22	0.28	18.35	0.02	0.02
3.00	0.33	0.42	35.88	0.05	0.03
4.00	0.43	0.57	59.12	0.09	0.05
5.00	0.54	0.71	88.07	0.15	0.06
6.00	0.65	0.85	122.73	0.22	0.07
7.00	0.76	0.99	163.12	0.31	0.09
8.00	0.54	0.71	189.64	0.41	0.10
9.00	0.43	0.57	209.17	0.47	0.11
10.00	0.33	0.42	221.85	0.52	0.11
11.00	0.22	0.28	227.79	0.55	0.12
12.00	0.11	0.14	227.12	0.57	0.12
13.00	0.00	0.00	219.93	0.57	0.12
14.00	0.00	0.00	212.86	0.55	0.12
15.00	0.00	0.00	205.91	0.53	0.12
16.00	0.00	0.00	199.06	0.51	0.11
17.00	0.00	0.00	192.34	0.50	0.11

STORM DURATION = 7mins

Time of Concentration **7** **min**
Max. Flow Rate for Storm Duration **0.717** **m3/sec**
STORM DURATION **7.000** **min**
Inflow rate is factor of time step on Tc (time at which max flow occurs)

			No allowance CC		
Time Step (min)	**5% AEP FLOW Ip At STEP (m3/sec)**	**5% AEP FLOW + CC At STEP (m3/sec)**	**V_1 (m^3)**	**Head m**	**Qp (m^3/s)**
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.10	0.13	6.15	0.00	0.00
2.00	0.20	0.27	17.25	0.02	0.02
3.00	0.31	0.40	33.71	0.04	0.03
4.00	0.41	0.53	55.52	0.08	0.05
5.00	0.51	0.67	82.69	0.14	0.06
6.00	0.61	0.80	115.23	0.21	0.07
7.00	0.72	0.93	153.12	0.29	0.09
8.00	0.61	0.80	184.09	0.38	0.10
9.00	0.51	0.67	208.35	0.46	0.11
10.00	0.41	0.53	226.05	0.52	0.11
11.00	0.31	0.40	237.31	0.57	0.12
12.00	0.20	0.27	242.26	0.59	0.12
13.00	0.10	0.13	240.98	0.61	0.12
14.00	0.00	0.00	233.58	0.60	0.12
15.00	0.00	0.00	226.29	0.58	0.12
16.00	0.00	0.00	219.12	0.57	0.12
17.00	0.00	0.00	212.06	0.55	0.12
18.00	0.00	0.00	205.12	0.53	0.12
19.00	0.00	0.00	198.29	0.51	0.11

22 Atkins Street - Extended Storm Duration Hydrograph

Confirm approximate detention storage surface area **Assume 400m2**

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d A \sqrt{(2 \cdot g \cdot h)}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d A \sqrt{(2 \cdot g \cdot h)}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d A \sqrt{(2 \cdot g \cdot h)}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

STORM DURATION = 8mins

Time of Concentration	**7**	**min**
Max. Flow Rate for Storm Duration	**0.679**	**m3/sec**
STORM DURATION	**8.000**	**min**

Inflow rate is factor of time step on Tc (time at which max flow occurs)

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	*No allowance CC* V_1 (m^3)	Head m	Qp (m^3/s)
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.10	0.13	5.82	0.00	0.00
2.00	0.19	0.25	16.30	0.01	0.02
3.00	0.29	0.38	31.83	0.04	0.03
4.00	0.39	0.50	52.42	0.08	0.04
5.00	0.48	0.63	78.06	0.13	0.06
6.00	0.58	0.76	108.75	0.20	0.07
7.00	0.68	0.88	144.51	0.27	0.08
8.00	0.68	0.88	179.51	0.36	0.10
9.00	0.58	0.76	208.03	0.45	0.11
10.00	0.48	0.63	230.24	0.52	0.11
11.00	0.39	0.50	246.28	0.58	0.12
12.00	0.29	0.38	256.26	0.62	0.12
13.00	0.19	0.25	260.26	0.64	0.13
14.00	0.10	0.13	258.39	0.65	0.13
15.00	0.00	0.00	250.72	0.65	0.13
16.00	0.00	0.00	243.17	0.63	0.13
17.00	0.00	0.00	235.74	0.61	0.12
18.00	0.00	0.00	228.42	0.59	0.12
19.00	0.00	0.00	221.21	0.57	0.12
20.00	0.00	0.00	214.12	0.55	0.12

STORM DURATION = 9mins

Time of Concentration	**7**	**min**
Max. Flow Rate for Storm Duration	**0.642**	**m3/sec**
STORM DURATION	**9.000**	**min**

Inflow rate is factor of time step on Tc (time at which max flow occurs)

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	*No allowance CC* V_1 (m^3)	Head m	Qp (m^3/s)
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.09	0.12	5.50	0.00	0.00
2.00	0.18	0.24	15.39	0.01	0.02
3.00	0.28	0.36	30.04	0.04	0.03
4.00	0.37	0.48	49.44	0.08	0.04
5.00	0.46	0.60	73.61	0.12	0.06
6.00	0.55	0.72	102.54	0.18	0.07
7.00	0.64	0.83	136.25	0.26	0.08
8.00	0.64	0.83	169.21	0.34	0.09
9.00	0.64	0.83	201.54	0.42	0.10
10.00	0.55	0.72	227.80	0.50	0.11
11.00	0.46	0.60	248.12	0.57	0.12
12.00	0.37	0.48	262.63	0.62	0.13
13.00	0.28	0.36	271.41	0.66	0.13
14.00	0.18	0.24	274.57	0.68	0.13
15.00	0.09	0.12	272.17	0.69	0.13
16.00	0.00	0.00	264.31	0.68	0.13
17.00	0.00	0.00	256.55	0.66	0.13
18.00	0.00	0.00	248.92	0.64	0.13
19.00	0.00	0.00	241.39	0.62	0.13
20.00	0.00	0.00	233.99	0.60	0.12
21.00	0.00	0.00	226.69	0.58	0.12

STORM DURATION = 10mins

Time of Concentration	**7**	**min**
Max. Flow Rate for Storm Duration	**0.612**	**m3/sec**
STORM DURATION	**10.000**	**min**

Inflow rate is factor of time step on Tc (time at which max flow occurs)

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	*No allowance CC* V_1 (m^3)	Head m	Qp (m^3/s)
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.09	0.11	5.25	0.00	0.00
2.00	0.17	0.23	14.65	0.01	0.02
3.00	0.26	0.34	28.57	0.04	0.03
4.00	0.35	0.45	47.02	0.07	0.04
5.00	0.44	0.57	69.99	0.12	0.05
6.00	0.52	0.68	97.49	0.17	0.07
7.00	0.61	0.80	129.52	0.24	0.08
8.00	0.61	0.80	160.83	0.32	0.09
9.00	0.61	0.80	191.52	0.40	0.10
10.00	0.61	0.80	221.66	0.48	0.11
11.00	0.52	0.68	246.05	0.55	0.12
12.00	0.44	0.57	264.81	0.62	0.12
13.00	0.35	0.45	278.04	0.66	0.13
14.00	0.26	0.34	285.84	0.70	0.13
15.00	0.17	0.23	288.27	0.71	0.13
16.00	0.09	0.11	285.42	0.72	0.13
17.00	0.00	0.00	277.37	0.71	0.13
18.00	0.00	0.00	269.43	0.69	0.13
19.00	0.00	0.00	261.60	0.67	0.13
20.00	0.00	0.00	253.89	0.65	0.13
21.00	0.00	0.00	246.29	0.63	0.13
22.00	0.00	0.00	238.81	0.62	0.12
23.00	0.00	0.00	231.44	0.60	0.12

22 Atkins Street - Extended Storm Duration Hydrograph

Confirm approximate detention storage surface area **Assume 400m2**

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d \cdot A_s \sqrt{[2 \cdot g \cdot H]}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d \cdot A_s \sqrt{[2 \cdot g \cdot H]}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $I_d = C_d \cdot A_s \sqrt{[2 \cdot g \cdot H]}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

STORM DURATION = 13mins

Time of Concentration **7** **min**
Max. Flow Rate for Storm Duration **0.519** **m3/sec**
STORM DURATION **14.000** **min**
Inflow rate is factor of time step on Tc (time at which max flow occurs)

No allowance CC

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	V_1 (m^3)	Head m	Qp (m^3/s)
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.07	0.10	4.45	0.00	0.00
2.00	0.15	0.19	12.34	0.01	0.02
3.00	0.22	0.29	24.02	0.03	0.03
4.00	0.30	0.39	39.48	0.06	0.04
5.00	0.37	0.48	58.73	0.10	0.05
6.00	0.44	0.58	81.77	0.15	0.06
7.00	0.52	0.67	108.60	0.20	0.07
8.00	0.52	0.67	134.78	0.27	0.08
9.00	0.52	0.67	160.39	0.34	0.09
10.00	0.52	0.67	185.50	0.40	0.10
11.00	0.52	0.67	210.15	0.46	0.11
12.00	0.52	0.67	234.38	0.53	0.12
13.00	0.52	0.67	258.23	0.59	0.12
14.00	0.52	0.67	281.71	0.65	0.13
15.00	0.44	0.58	300.41	0.70	0.13
16.00	0.37	0.48	314.39	0.75	0.14
17.00	0.30	0.39	323.73	0.79	0.14
18.00	0.22	0.29	328.50	0.81	0.14
19.00	0.15	0.19	328.76	0.82	0.14
20.00	0.07	0.10	324.56	0.82	0.14
21.00	0.00	0.00	315.97	0.81	0.14
22.00	0.00	0.00	307.50	0.79	0.14
23.00	0.00	0.00	299.14	0.77	0.14
24.00	0.00	0.00	290.89	0.75	0.14
25.00	0.00	0.00	282.76	0.73	0.14
26.00	0.00	0.00	274.74	0.71	0.13
27.00	0.00	0.00	266.84	0.69	0.13

STORM DURATION = 15mins

Time of Concentration **7** **min**
Max. Flow Rate for Storm Duration **0.500** **m3/sec**
STORM DURATION **15.000** **min**
Inflow rate is factor of time step on Tc (time at which max flow occurs)

No allowance CC

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	V_1 (m^3)	Head m	Qp (m^3/s)
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.07	0.09	4.28	0.00	0.00
2.00	0.14	0.19	11.86	0.01	0.02
3.00	0.21	0.28	23.07	0.03	0.03
4.00	0.29	0.37	37.92	0.06	0.04
5.00	0.36	0.46	56.40	0.09	0.05
6.00	0.43	0.56	78.52	0.14	0.06
7.00	0.50	0.65	104.28	0.20	0.07
8.00	0.50	0.65	129.39	0.26	0.08
9.00	0.50	0.65	153.96	0.32	0.09
10.00	0.50	0.65	178.02	0.38	0.10
11.00	0.50	0.65	201.65	0.45	0.11
12.00	0.50	0.65	224.86	0.50	0.11
13.00	0.50	0.65	247.70	0.56	0.12
14.00	0.50	0.65	270.18	0.62	0.13
15.00	0.50	0.65	292.32	0.68	0.13
16.00	0.43	0.56	309.87	0.73	0.14
17.00	0.36	0.46	322.90	0.77	0.14
18.00	0.29	0.37	331.47	0.81	0.14
19.00	0.21	0.28	335.64	0.83	0.14
20.00	0.14	0.19	335.47	0.84	0.15
21.00	0.07	0.09	331.02	0.84	0.15
22.00	0.00	0.00	322.34	0.83	0.14
23.00	0.00	0.00	313.78	0.81	0.14
24.00	0.00	0.00	305.34	0.78	0.14
25.00	0.00	0.00	297.01	0.76	0.14
26.00	0.00	0.00	288.79	0.74	0.14
27.00	0.00	0.00	280.69	0.72	0.14
28.00	0.00	0.00	272.70	0.70	0.13
29.00	0.00	0.00	264.83	0.68	0.13

STORM DURATION = 19mins

Time of Concentration **7** **min**
Max. Flow Rate for Storm Duration **0.437** **m3/sec**
STORM DURATION **19.000** **min**
Inflow rate is factor of time step on Tc (time at which max flow occurs)

No allowance CC

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	V_1 (m^3)	Head m	Qp (m^3/s)
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.06	0.08	3.74	0.00	0.00
2.00	0.12	0.16	10.31	0.01	0.02
3.00	0.19	0.24	20.01	0.03	0.03
4.00	0.25	0.32	32.85	0.05	0.04
5.00	0.31	0.41	48.83	0.08	0.05
6.00	0.37	0.49	67.96	0.12	0.06
7.00	0.44	0.57	90.23	0.17	0.07
8.00	0.44	0.57	111.90	0.23	0.08
9.00	0.44	0.57	133.06	0.28	0.08
10.00	0.44	0.57	153.76	0.33	0.09
11.00	0.44	0.57	174.05	0.38	0.10
12.00	0.44	0.57	193.96	0.44	0.10
13.00	0.44	0.57	213.52	0.48	0.11
14.00	0.44	0.57	232.76	0.53	0.12
15.00	0.44	0.57	251.69	0.58	0.12
16.00	0.44	0.57	270.32	0.63	0.13
17.00	0.44	0.57	288.69	0.68	0.13
18.00	0.44	0.57	306.79	0.72	0.14
19.00	0.44	0.57	324.64	0.77	0.14
20.00	0.37	0.49	338.51	0.81	0.14
21.00	0.31	0.41	348.45	0.85	0.15
22.00	0.25	0.32	354.52	0.87	0.15
23.00	0.19	0.24	356.78	0.89	0.15
24.00	0.12	0.16	355.26	0.89	0.15
25.00	0.06	0.08	350.01	0.89	0.15
26.00	0.00	0.00	341.09	0.88	0.15
27.00	0.00	0.00	332.29	0.85	0.15
28.00	0.00	0.00	323.60	0.83	0.14
29.00	0.00	0.00	315.02	0.81	0.14
30.00	0.00	0.00	306.56	0.79	0.14
31.00	0.00	0.00	298.21	0.77	0.14
32.00	0.00	0.00	289.98	0.75	0.14
33.00	0.00	0.00	281.86	0.72	0.14
34.00	0.00	0.00	273.85	0.70	0.13

22 Atkins Street - Extended Storm Duration Hydrograph

Confirm approximate detention storage surface area **Assume 400m2**

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $Q_p = C_d A \sqrt{2gH}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $Q_p = C_d A \sqrt{2gH}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

Detention Storage Surface Area	400	m2
Max. Discharge Flow	0.155	m3/s

Qp is discharge rate where $Q_p = C_d A \sqrt{2gH}$

Cd	discharge coefficient	0.6	Fixed
A	Area of Orifice m2	0.060	Solve iteratively
H	Head above Outlet	Dependent	
g	gravity	9.81	Fixed

ENSURE ALL Qp LESS THAN MAX. DISCHARGE FLOW - VARY ORIFICE SIZE

STORM DURATION = 25mins

Time of Concentration	**7**	**min**
Max. Flow Rate for Storm Duration	**0.373**	**m3/sec**
STORM DURATION	**25.000**	**min**

Inflow rate is factor of time step on Tc (time at which max flow occurs)

No allowance CC

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	V_1 (m^3)	Head m	Qp (m^3/s)
1.00	0.05	0.07	0.00	0.00	0.00
2.00	0.11	0.14	6.40	0.00	0.00
3.00	0.16	0.21	14.78	0.02	0.02
4.00	0.21	0.28	25.74	0.04	0.03
5.00	0.27	0.35	39.31	0.06	0.04
6.00	0.32	0.42	55.51	0.10	0.05
7.00	0.37	0.49	74.34	0.14	0.06
8.00	0.37	0.49	92.62	0.19	0.07
9.00	0.37	0.49	110.42	0.23	0.08
10.00	0.37	0.49	127.79	0.28	0.08
11.00	0.37	0.49	144.79	0.32	0.09
12.00	0.37	0.49	161.44	0.36	0.10
13.00	0.37	0.49	177.76	0.40	0.10
14.00	0.37	0.49	193.79	0.44	0.11
15.00	0.37	0.49	209.54	0.48	0.11
16.00	0.37	0.49	225.02	0.52	0.12
17.00	0.37	0.49	240.26	0.56	0.12
18.00	0.37	0.49	255.25	0.60	0.12
19.00	0.37	0.49	270.02	0.64	0.13
20.00	0.37	0.49	284.57	0.68	0.13
21.00	0.37	0.49	298.91	0.71	0.13
22.00	0.37	0.49	313.06	0.75	0.14
23.00	0.37	0.49	327.01	0.78	0.14
24.00	0.37	0.49	340.77	0.82	0.14
25.00	0.37	0.49	354.35	0.85	0.15
26.00	0.32	0.42	364.57	0.89	0.15
27.00	0.27	0.35	371.45	0.91	0.15
28.00	0.21	0.28	375.05	0.93	0.15
29.00	0.16	0.21	375.41	0.94	0.15
30.00	0.11	0.14	372.57	0.94	0.15
31.00	0.05	0.07	366.57	0.93	0.15
32.00	0.00	0.00	357.44	0.92	0.15
33.00	-0.05	-0.07	345.23	0.89	0.15
34.00	-0.11	-0.14	329.97	0.86	0.15
35.00	-0.16	-0.21	311.72	0.82	0.14
36.00	-0.21	-0.28	290.51	0.78	0.14
37.00	-0.27	-0.35	266.39	0.73	0.14
38.00	-0.32	-0.42	239.42	0.67	0.13
39.00	-0.37	-0.49	209.66	0.60	0.12
40.00	-0.43	-0.55	177.17	0.52	0.12

STORM DURATION = 30mins

Time of Concentration	**7**	**min**
Max. Flow Rate for Storm Duration	**0.334**	**m3/sec**
STORM DURATION	**30.000**	**min**

Inflow rate is factor of time step on Tc (time at which max flow occurs)

No allowance CC

Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	V_1 (m^3)	Head m	Qp (m^3/s)
1.00	0.05	0.06	0.00	0.00	0.000
2.00	0.10	0.12	5.72	0.00	0.000
3.00	0.14	0.19	13.17	0.01	0.019
4.00	0.19	0.25	22.88	0.03	0.029
5.00	0.24	0.31	34.90	0.06	0.038
6.00	0.29	0.37	49.25	0.09	0.047
7.00	0.33	0.43	65.94	0.12	0.056
8.00	0.33	0.43	82.09	0.16	0.065
9.00	0.33	0.43	97.80	0.21	0.072
10.00	0.33	0.43	113.11	0.24	0.079
11.00	0.33	0.43	128.07	0.28	0.085
12.00	0.33	0.43	142.70	0.32	0.090
13.00	0.33	0.43	157.04	0.36	0.095
14.00	0.33	0.43	171.09	0.39	0.100
15.00	0.33	0.43	184.88	0.43	0.104
16.00	0.33	0.43	198.42	0.46	0.108
17.00	0.33	0.43	211.74	0.50	0.112
18.00	0.33	0.43	224.83	0.53	0.116
19.00	0.33	0.43	237.71	0.56	0.119
20.00	0.33	0.43	250.38	0.59	0.123
21.00	0.33	0.43	262.87	0.63	0.126
22.00	0.33	0.43	275.16	0.66	0.129
23.00	0.33	0.43	287.28	0.69	0.132
24.00	0.33	0.43	299.23	0.72	0.135
25.00	0.33	0.43	311.01	0.75	0.137
26.00	0.33	0.43	322.63	0.78	0.140
27.00	0.33	0.43	334.09	0.81	0.143
28.00	0.33	0.43	345.41	0.84	0.145
29.00	0.33	0.43	356.57	0.86	0.148
30.00	0.33	0.43	367.60	0.89	0.150
31.00	0.29	0.37	375.62	0.92	0.152
32.00	0.24	0.31	380.69	0.94	0.154
33.00	0.19	0.25	382.83	0.95	0.155
34.00	0.14	0.19	382.08	0.96	0.155
35.00	0.10	0.12	378.49	0.96	0.155
36.00	0.05	0.06	372.07	0.95	0.155
37.00	0.00	0.00	362.88	0.93	0.153
38.00	-0.05	-0.06	350.93	0.91	0.151
39.00	-0.10	-0.12	336.28	0.88	0.149
40.00	-0.14	-0.19	318.95	0.84	0.146
41.00	-0.19	-0.25	298.99	0.80	0.142
42.00	-0.24	-0.31	276.44	0.75	0.137
43.00	-0.29	-0.37	251.35	0.69	0.132
44.00	-0.33	-0.43	223.76	0.63	0.126
45.00	-0.38	-0.50	193.74	0.56	0.119

ORM DURATION = 60mins

Time of Concentration	**7**	**min**
Max. Flow Rate for Storm Duration	**0.216**	**m3/sec**
STORM DURATION	**60.000**	**min**

Inflow rate is factor of time step on Tc (time at which max flow occurs)

No allowance CC

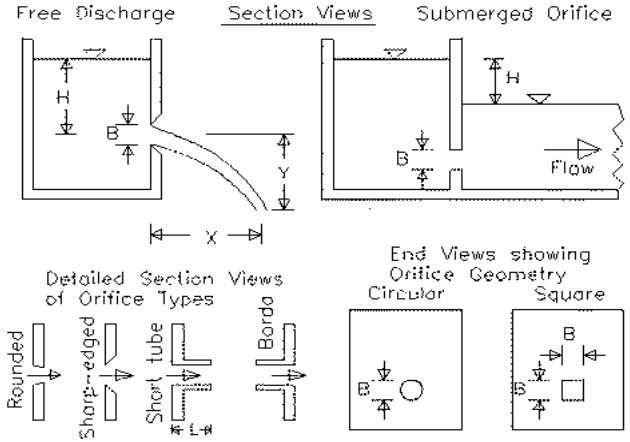
Time Step (min)	5% AEP FLOW Ip At STEP (m3/sec)	5% AEP FLOW + CC At STEP (m3/sec)	V_1 (m^3)	Head m	Qp (m^3/s)
1.00	0.03	0.04	0.00	0.00	0.00
2.00	0.06	0.08	3.71	0.00	0.00
3.00	0.09	0.12	8.36	0.01	0.02
4.00	0.12	0.16	14.40	0.02	0.02
5.00	0.15	0.20	21.87	0.04	0.03
6.00	0.19	0.24	30.78	0.05	0.04
7.00	0.22	0.28	41.12	0.08	0.04
8.00	0.22	0.28	51.05	0.10	0.05
9.00	0.22	0.28	60.64	0.13	0.06
10.00	0.22	0.28	69.91	0.15	0.06
11.00	0.22	0.28	78.92	0.17	0.07
12.00	0.22	0.28	87.67	0.20	0.07
13.00	0.22	0.28	96.20	0.22	0.07
14.00	0.22	0.28	104.51	0.24	0.08
15.00	0.22	0.28	112.62	0.26	0.08
16.00	0.22	0.28	120.55	0.28	0.08
17.00	0.22	0.28	128.31	0.30	0.09
18.00	0.22	0.28	135.90	0.32	0.09
19.00	0.22	0.28	143.33	0.34	0.09
20.00	0.22	0.28	150.61	0.36	0.10
21.00	0.22	0.28	157.75	0.38	0.10
22.00	0.22	0.28	164.75	0.39	0.10
23.00	0.22	0.28	171.62	0.41	0.10
24.00	0.22	0.28	178.36	0.43	0.10
25.00	0.22	0.28	184.98	0.45	0.11
26.00	0.22	0.28	191.49	0.46	0.11
27.00	0.22	0.28	197.88	0.48	0.11
28.00	0.22	0.28	204.16	0.49	0.11
29.00	0.22	0.28	210.34	0.51	0.11
30.00	0.22	0.28	216.42	0.53	0.12
31.00	0.22	0.28	222.39	0.54	0.12
32.00	0.22	0.28	228.27	0.56	0.12
33.00	0.22	0.28	234.06	0.57	0.12
34.00	0.22	0.28	239.75	0.59	0.12
35.00	0.22	0.28	245.36	0.60	0.12
36.00	0.22	0.28	250.88	0.61	0.12
37.00	0.22	0.28	256.32	0.63	0.13
38.00	0.22	0.28	261.67	0.64	0.13
39.00	0.22	0.28	266.95	0.65	0.13
40.00	0.22	0.28	272.15	0.67	0.13
41.00	0.22	0.28	277.27	0.68	0.13
42.00	0.22	0.28	282.32	0.69	0.13
43.00	0.22	0.28	287.30	0.71	0.13
44.00	0.22	0.28	292.21	0.72	0.13
45.00	0.22	0.28	297.05	0.73	0.14
46.00	0.22	0.28	301.82	0.74	0.14
47.00	0.22	0.28	306.53	0.75	0.14
48.00	0.22	0.28	311.17	0.77	0.14
49.00	0.22	0.28	315.75	0.78	0.14
50.00	0.22	0.28	320.27	0.79	0.14
51.00	0.22	0.28	324.72	0.80	0.14
52.00	0.22	0.28	329.12	0.81	0.14
53.00	0.22	0.28	333.46	0.82	0.14
54.00	0.22	0.28	337.74	0.83	0.15
55.00	0.22	0.28	341.97	0.84	0.15
56.00	0.22	0.28	346.14	0.85	0.15
57.00	0.22	0.28	350.26	0.87	0.15
58.00	0.22	0.28	354.33	0.88	0.15
59.00	0.22	0.28	358.34	0.89	0.15
60.00	0.22	0.28	362.31	0.90	0.15
61.00	0.19	0.24	364.37	0.91	0.15
62.00	0.15	0.20	364.54	0.91	0.15
63.00	0.12	0.16	362.86	0.91	0.15
64.00	0.09	0.12	359.35	0.91	0.15
65.00	0.06	0.08	354.02	0.90	0.15
66.00	0.03	0.04	346.91	0.89	0.15
67.00	0.00	0.00	338.03	0.87	0.15
68.00	-0.03	-0.04	327.40	0.85	0.15
69.00	-0.06	-0.08	315.07	0.82	0.14
70.00	-0.09	-0.12	301.04	0.79	0.14
71.00	-0.12	-0.16	285.34	0.75	0.14

ORIFACE ANALYSIS

22 Atkins Street

Max flow required 0.155m3/s

$$Q = C_o \, A \sqrt{2gH}$$



Assume free discharge

No. orifices	1	
Orifice diameter (m)	0.26	*Should be >2.54cm*
Head above oriface invert (m)	1.34	Detention tank depth
Head, H (m)	1.21	*Should be >1.25m*
Co	0.6	
Area (m2)	0.053	
Flow, Q (m3/s) per orifice	0.155	
Total flow, Q (m3/s)	**0.155**	

APPENDIX F

Operations and Maintenance Manuals

Cascade Separator™

Operations & Maintenance Manual

Document Set ID: 5647636
Version: 1, Version Date: 30/07/2025

Table of Contents

***Rev:** 1 **Last Updated:** Aug 2020*

Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes as recommended by the manufacturer.

The Cascade Separator™ is a vortex type engineered stormwater management device designed to remove hydrocarbons and sediment with associated pollutants from stormwater runoff. It removes all particles 5 mm and greater from stormwater flows, including neutrally buoyant material such as rubbish and debris.

Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it works properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up).

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Health and Safety

Access to a Cascade Separator™ unit requires removing heavy access covers/grates, additionally it might become necessary to enter into a confined space. Pollutants collected by the Cascade Separator™ will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your OceanSave require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the Cascade Separator™, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst the minor maintenance for the Cascade Separator™ can be performed from surface level, there will be a need to enter the pit (confined space) during major services. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification in confined space entry requirements.

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How does it Work?

The internal flow controls of the Cascade Separator™ are illustrated in Figure 1. Low, frequently occurring storm flows enter the device via one or more inlet pipes, or a surface grate. Once inside the device, water is directed to two separate inlet flumes. As a result of the directional flow into the centre tube via the flumes, vortices are created operating in opposite directions. This innovative design unlike any other device on the market facilitates enhanced particle separation. The downward swirling vertical water column allows for sediment to settle into the sump and water to exit through an outlet window. Flow that eventually exceeds the capacity of the flumes can also exit over the flume without re-suspending previously captured pollutants. The system incorporates a partially perforated slanted skirt that equalizes the pressure between the storage and treatment zone while reducing the potential for scour. The skirt also allows transport of sediment and debris into the sump zone which improves ease of maintenance since all captured material can be removed through the centre tube.

The outlet deck incorporates two drain down pipes that extend downward and allow the system to drain to the outlet pipe invert elevation after the storm event has subsided, while preventing captured hydrocarbons from leaving the system.

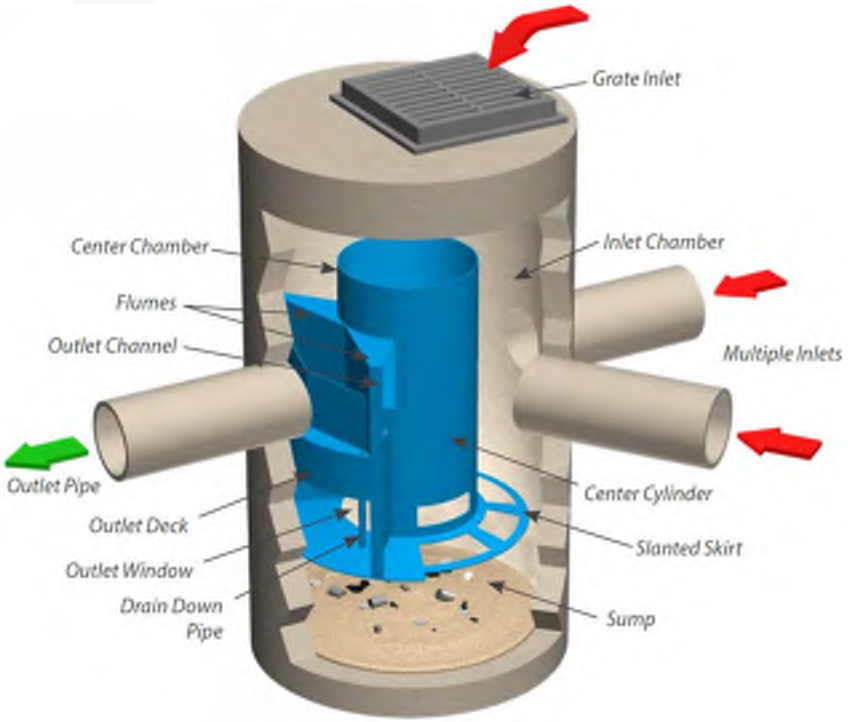

Figure 1: Cascade Separator™ *Components*

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the Cascade Separator™ requires a minor service every 6 months and a major service every 12 to 24 months.

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the Cascade Separator™.

	Description of Typical Activities	Frequency
Minor Service	Visual inspection of inlet aperture Removal of large floatable pollutants Measuring of sediment depth	At 6 Months
Major Service	Removal of accumulated sediment and gross pollutants.	At 12 Months

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to assess the condition of the device and record necessary information that will inform the activities to be undertaken during a major service.

1. Establish a safe working area around the access point
2. Remove access cover
3. Visually inspect the inlet aperture
4. Remove large floatable pollutants with a net
5. Measure and record sediment depth
6. Replace access cover

Major Service

This service is designed to return the Cascade Separator™ device back to optimal operating performance.

1. Establish a safe working area around the access point
2. Remove access cover
3. Using a vacuum unit remove any floatable pollutants
4. Decant water until water level reaches accumulated sediment
5. Remove accumulated sediment and gross pollutants with vacuum unit (if required)
6. Use high pressure water to clean flumes, centre tube and sump area (if required)
7. Replace access cover

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When determining the need to remove accumulated sediment from the Cascade Separator™ unit, the specific sediment storage capacity for the size of unit should be considered (see table below).

Model	Diameter (m)	Sediment Storage Capacity (m^3)	Oil Storage Capacity (litre)
CS1200	1.2	0.5	530
CS1500	1.5	0.8	1040
CS2250	2.25	2.4	4270
CS3250	3.25	4.4	8340

Additional Types of Maintenance

The standard maintenance approach is designed to work towards keeping the Cascade Separator™ system operational during normal conditions. From time to time events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the Cascade Separator™ unit that potentially received flow should be inspected and cleaned. Specifically all captured pollutants from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event.

Blockages

The Cascade Separator™ internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. In the unlikely event that flooding occurs around or upstream of the device location the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the inlet aperture, ensuring that it is free of debris and pollutants
2. Decant water from Cascade Separator™ unit in preparation for confined space entry
3. Inspect the screen and flume as well as both inlet and outlet pipes for obstructions, if present remove any built up pollutants or blockages.

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Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the Cascade Separator™ after a significant major storm event. The focus is to inspect for higher than normal sediment accumulation that may result from localised erosion, where necessary accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the Cascade Separator™ must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the system has been exposed to any hazardous or unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanSave system we offer long term pay-as-you-go contracts and pre-paid once off servicing.

For more information please visit www.OceanProtect.com.au

Jellyfish Filter

Operations & Maintenance Manual

Document Set ID: 5647636
Version: 1, Version Date: 30/07/2025

Table of Contents

Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the Jellyfish Filter as recommended by the manufacturer.

The Jellyfish Filter is a stormwater quality treatment technology featuring high surface area and high flow rate membrane filtration at low driving head. By incorporating pre-treatment with light-weight membrane filtration, the Jellyfish Filter removes floatables, trash, oil, debris, TSS and a high percentage of particulate-bound pollutants; including phosphorus and nitrogen, metals and hydrocarbons.

Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that suitably qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the Jellyfish.

Health and Safety

Access to a Jellyfish unit requires removing heavy access covers/grates, and entry into a confined space. Pollutants collected by the Jellyfish will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your Jellyfish require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the Jellyfish, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of Jellyfish maintenance can be performed from surface level, there will be a need to enter the Jellyfish pit (confined space) for both minor and major services. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

Document Set ID: 5647636
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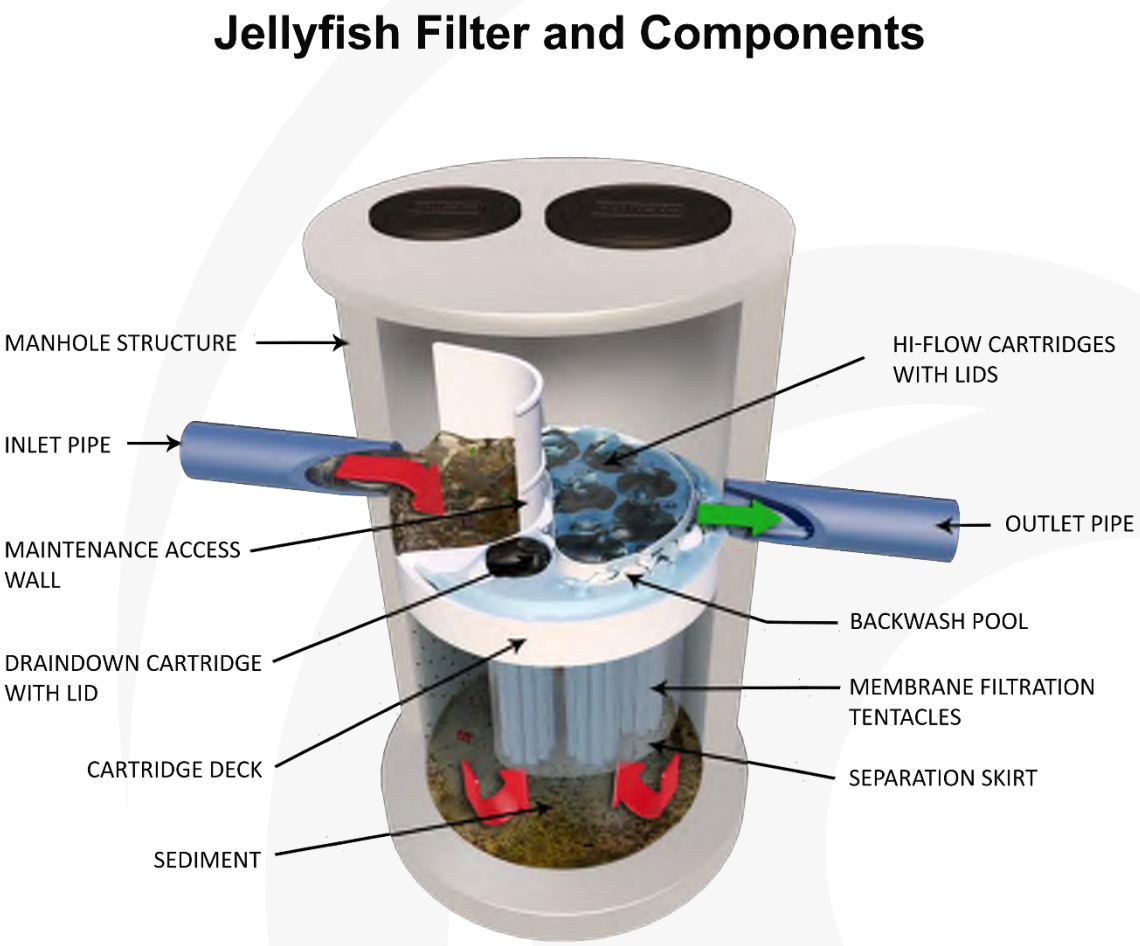
How does it Work?

Stormwater enters the Jellyfish system through the inlet pipe where floatable pollutants are captured behind the maintenance access wall. As stormwater enters the treatment chamber a separation skirt ensures the retention of oils whilst simultaneously protecting the filtration cartridges and allowing coarse particles to settle below on the chamber floor. Stormwater then passes through the Jellyfish cartridges and onto the Jellyfish deck, at this point the backwash pool will fill and overflow allowing treated stormwater to exit via the outlet pipe.



As the storm event subsides, the treated water held in the backwash pool passes back through the high flow cartridges into the treatment chamber. This passive backwash helps to clear the cartridge surface by dislodging sediment onto the chamber floor. The drain down cartridge(s) located outside the backwash pool enables water levels to balance, leaving the cartridge deck level free of standing water.

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically the Jellyfish requires a service every 6 months, additionally as the Jellyfish cartridges capture pollutants they will need to be replaced (expected cartridge life is 2-5 years with a maximum cartridge life of 5 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the Jellyfish.

	Description of Typical Activities	Frequency
Minor Service	Removal & rinsing of cartridges Wash down of deck level Removal of large floatable pollutants Removal of accumulated sediment (if required)	Every 6 Months
Major Service	Replacement of Jellyfish cartridges	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to assess the condition of the Jellyfish cartridges and record necessary information that will establish whether a major service is required.

1. Establish a safe working area around the access point
2. Remove access covers
3. Using a vacuum unit or net remove any floatable gross pollutants contained behind the maintenance access wall
4. Using a vacuum unit decant the water until the level drops below the base of the cartridges
5. Remove Jellyfish cartridges*
    a. Remove cartridge lid
    b. Remove cartridges vertically from chamber, lifting from eye nut lifting points only
    c. Replace and secure cartridge lid back into deck to reduce trip hazards during maintenance
6. Unscrew all 11 tentacles from the cartridge head plate, keep all components for reassembly*
7. Rinse each tentacle individually NOTE: excessive water pressure may damage the tentacles
    a. Position tentacle in a container (to capture runoff) with the open end facing down
    b. Rinse entire length of cartridge using only low pressure water source (e.g. garden hose).
    c. Evaluate and note the condition of the tentacles
    d. Ensure runoff is disposed appropriately
    e. Re-assemble cartridges ready for reinstallation*
8. Wash down deck level to remove any built up sediment (if required)
9. Measure the level of accumulated sediment in the chamber if depth is greater than 300mm use vacuum unit to remove sediment.
10. Re-install Jellyfish cartridges
    a. Remove cartridge lid
    b. Lower cartridge into chamber, lifting from eye nut lifting points only
    c. Insert cartridge vertically into cartridge receptacle, and secure cartridge lid back in place
11. Replace access covers

**Refer appendix 1 for Jellyfish Cartridge Schematic*

Major Service (Filter Cartridge Replacement)

For the Jellyfish system a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event	Maintenance Action
Rinsing does not remove accumulated sediment from the tentacles	Replace Jellyfish tentacles[1]
Jellyfish tentacles are damaged	Replace Jellyfish tentacles[1]
Jellyfish cartridges have been in operation for 5 years	Replace Jellyfish tentacles[1]

[1] Replacement filter tentacles and components are available for purchase from Ocean Protect.

This service is designed to return the Jellyfish device back to optimal operating performance

1. Establish a safe working area around the access point
2. Remove access covers
3. Using a vacuum unit or net remove any floatable gross pollutants contained behind the maintenance access wall
4. Using a vacuum unit decant the water until the level drops below the base of the cartridges
5. Remove Jellyfish cartridges*
    a. Remove cartridge lid
    b. Remove cartridges vertically from chamber, lifting from eye nut lifting points only
    c. Replace and secure cartridge lid back into deck to reduce trip hazards during maintenance
6. Unscrew all 11 tentacles from the cartridge head plate for disposal, keep all components for fixing of new tentacles to existing head plate*
7. Wash down deck level to remove any built up sediment (if required)
8. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
9. Install replacement tentacles into each head plate*
10. Install Jellyfish cartridges
    a. Remove cartridge lid
    b. Lower cartridge into chamber, lifting from eye nut lifting points only
    c. Insert cartridge vertically into cartridge receptacle, and secure cartridge lid back in place
11. Replace access covers

**Refer appendix 1 for Jellyfish Cartridge Schematic*

Additional Types of Maintenance

Occasionally events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the Jellyfish unit should be inspected and serviced accordingly. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess their contamination, depending on the type of spill event it may be necessary to replace the filtration cartridges.

Blockages

The Jellyfish treatment system is designed to operate in an offline arrangement, where an upstream high flow bypass structure is in used. In the unlikely event that flooding occurs upstream of the Jellyfish system, the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure to ensure that it is free of debris and pollutants
2. Inspect the Jellyfish unit checking both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the Jellyfish after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary, damaged components should be replaced and accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the Jellyfish must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter cartridges have been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

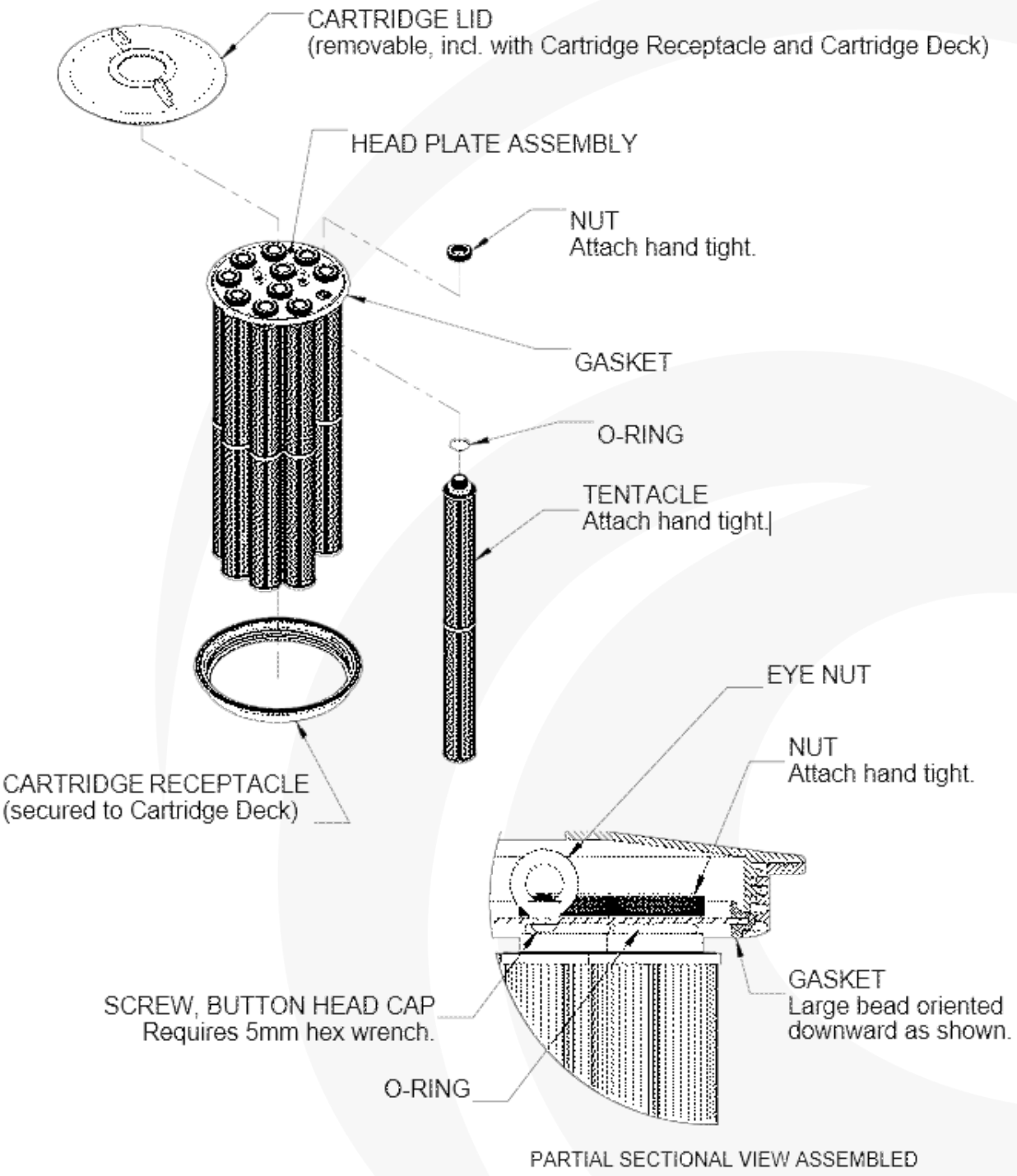
Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our Jellyfish system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement cartridges.

For more information please visit www.OceanProtect.com.au

Appendix 1 – Jellyfish Cartridge Schematic



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Johnstone McGee and Gandy Pty Ltd

incorporating Dale P Luck & Associates
(trading as JMG Engineers and Planners)

ABN 76 473 834 852 ACN 009 547 139

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Engineers & Planners

Your Vision is Our Mission

APPENDIX B

Stormwater Calculations

STORMWATER CALCULATIONS

PROJECT DESCRIPTION:	1% AEP + CC - OVERLAND FLOWS
PROJECT ADDRESS:	BAYVIEW ESTATE, ROKEBY
PROJECT NUMBER:	240281CS
REVISION:	BA

DATE:	14/06/2024
DESIGNED:	*RWH*
REVIEWED:	*CJM*

SITE PARAMETERS

	Upstream Catchment (Undeveloped)		Site Catchment (Developed)	
Site Area	137100	m^2	25900	m^2
Effective Impervious Area	54840	m^2	5160	m^2
Percentage Impervious	40	%	70	%
Runoff Coefficient	0.42	(-)	0.66	(-)
Time of Concentration	15	mins	15	mins

PEAK CATCHMENT FLOWS FOR GIVEN AEP AT T.O.C.

	Upstream Catchment (Undeveloped)			Site Catchment (Developed)		
AEP	**$I_{tc,Y}$ (mm/h)**	**Flow (L/s)**	**Flow + 18% CC (L/s)**	**$I_{tc,Y}$ (mm/h)**	**Flow (L/s)**	**Flow + 18% CC (L/s)**
10%	44.0	704.3	831.1	44.0	209.4	247.1
5%	52.4	880.7	1039.3	52.4	261.8	309.0
2%	64.8	1192.9	1407.6	64.8	354.6	418.5
1%	74.8	1436.9	1695.5	74.8	427.2	504.0
	1% Flow - 5% Flow (incl. 50% blockage)		1176	1% Flow - 5% Flow (incl. 50% blockage)		350

Total Overland Flow (1% AEP + CC)	1525	l/s
	1.5	m^3/s

ACN 009 547 139 | ABN 76 473 834 852

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GROUND FLOOR, 73 PATERSON STREET, LAUNCESTON (03) 6334 5548
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H872

PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY
D.D.
PD25171

PLANNING

BUILDING DRAWINGS

No	DRAWING
01	SITE PLAN
02	SITE DRAINAGE PLAN
03	CUT & FILL PLAN
04	LOCALITY PLAN
05	FLOOR PLAN
06	DOOR AND WINDOW SCHEDULES
07	ELEVATIONS
08	ELEVATIONS
09	ROOF PLAN
10	FLOOR FINISHES PLAN
11	ELECTRICAL/REFLECTED CEILING PLAN
12	PERSPECTIVES

CUNIC homes
Built for you

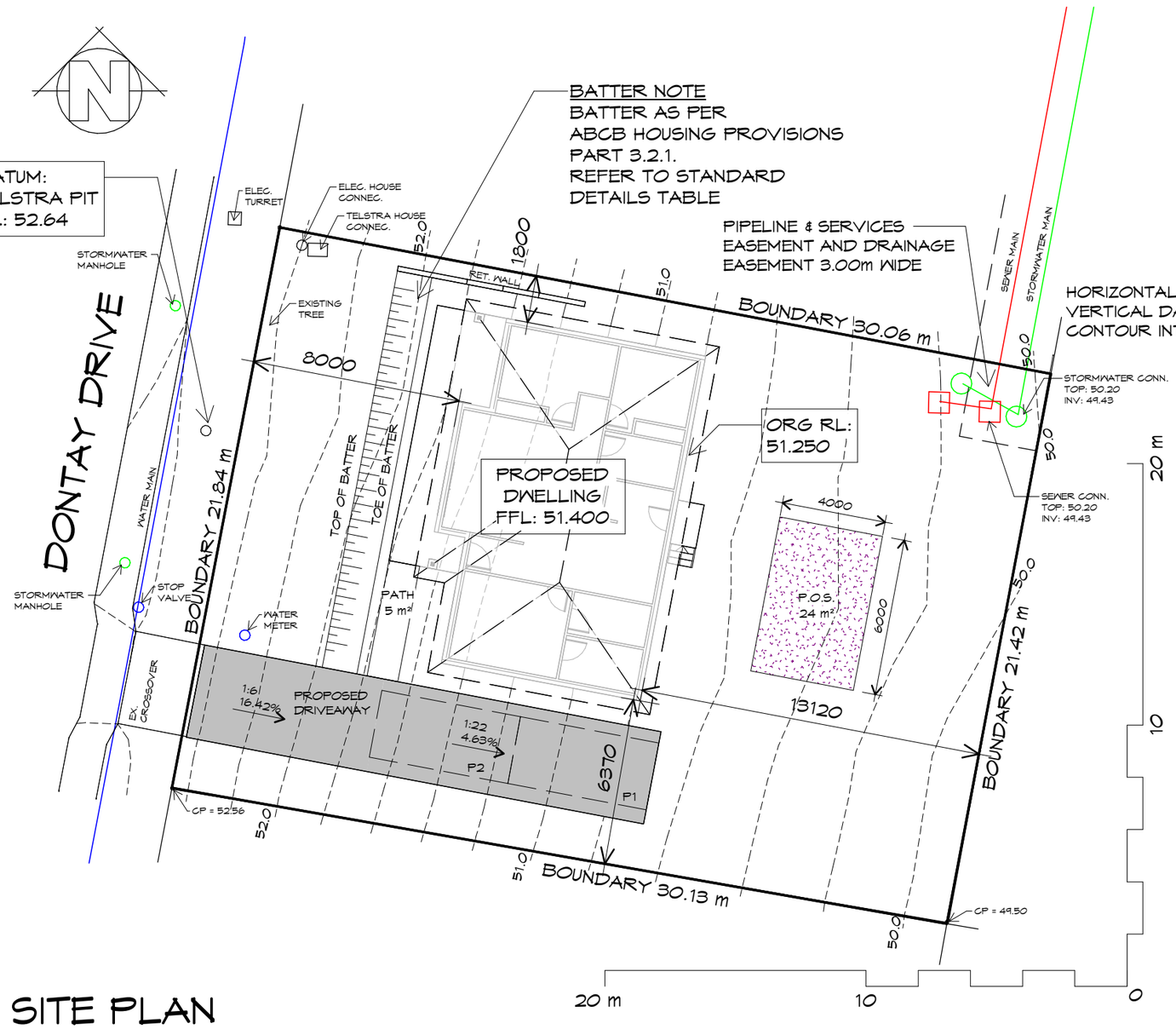
GENERAL PROJECT INFORMATION
TITLE REFERENCE: 4/185621
SITE AREA: 651 m2
DESIGN WIND SPEED: N2
SOIL CLASSIFICATION: H-2
CLIMATE ZONE: 7
ALPINE AREA: NO
CORROSIVE ENVIRONMENT: N/A
BAL RATING: TBC
OTHER KNOWN HAZARDS: FLOOD PRONE AREA

FLOOR AREA	110.28	m2	(11.87	SQUARES)
TOTAL AREA	110.28		11.87	

Prime Design
your build, your way

10 Goodman Court , Invermay Launceston 7248
p(l) +03 6332 3790
Shop 9, 105-111 Main Road, Moonah Hobart 7009
p(h)+03 6228 4575
info@ primedesigntas.com.au primedesigntas.com.au
Accredited Building Practitioner: Frank Geskus -No CC246A

JULY 2025



SEWER AND WATER SERVICES

- ALL WORKS IN ACCORDANCE WITH WATER SUPPLY CODE OF AUSTRALIA AND TASWATER SUPPLEMENTS
- WORKS TO BE DONE BY TASWATER AT DEVELOPERS COST

GENERAL NOTES

- CHECK & VERIFY ALL DIMENSIONS & LEVELS ON SITE
- WRITTEN DIMENSIONS TO TAKE PREFERENCE OVER SCALED
- ALL WORK TO BE STRICTLY IN ACCORDANCE WITH NCC 2022, ALL S.A.A.. CODES & LOCAL AUTHORITY BY-LAWS
- ALL DIMENSIONS INDICATED ARE FRAME TO FRAME AND DO NOT ALLOW FOR WALL LININGS
- CONFIRM ALL FLOOR AREAS
- ALL PLUMBING WORKS TO BE STRICTLY IN ACCORDANCE WITH A.S. 3500, NCC 2022 & APPROVED BY COUNCIL INSPECTOR
- BUILDER/PLUMBER TO ENSURE ADEQUATE FALL TO SITE CONNECTION POINTS IN ACCORDANCE WITH A.S. 3500 FOR STORMWATER AND SEWER BEFORE CONSTRUCTION COMMENCES
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ENGINEER'S STRUCTURAL DRAWINGS
- ALL WINDOWS AND GLAZING TO COMPLY WITH A.S. 1288 & A.S. 2047
- ALL SET OUT OF BUILDINGS & STRUCTURES TO BE CARRIED OUT BY A REGISTERED LAND SURVEYOR AND CHECKED PRIOR TO CONSTRUCTION
- IF CONSTRUCTION OF THE DESIGN IN THIS SET OF DRAWINGS DIFFER FROM THE DESIGN AND DETAIL IN THESE AND ANY ASSOCIATED DOCUMENTS BUILDER AND OWNER ARE TO NOTIFY DESIGNER
- BUILDER'S RESPONSIBILITY TO COMPLY WITH ALL PLANNING CONDITIONS
- BUILDER TO HAVE STAMPED BUILDING APPROVAL DRAWINGS AND PERMITS PRIOR TO COMMENCEMENT OF CONSTRUCTION
- CONSTRUCTION TO COMPLY WITH AS 3959, READ IN CONJUNCTION WITH BUSHFIRE ATTACK LEVEL (BAL) ASSESSMENT REPORT.
- DRAWINGS ARE REQUIRED TO BE VIEWED OR PRINTED IN COLOUR.

DRIVEWAY GRADIENT

MAXIMUM GRADIENT 1:4 (25%)
TO AS 2890

CAR PARKING GRADIENT

PARALLEL TO PARKING ANGLE 1:20 (5%)
CROSSFALL 1:16 (6.25%)

SETBACKS

REFER TO DIMENSIONS AND ELEVATIONS FOR FURTHER DETAILS.

SITE COVERAGE

BUILDING FOOTPRINT 110.28 /SITE AREA 651m2 = 0.169
TOTAL SITE COVERAGE 16.9%

PRIVATE OPEN SPACE

24m² MINIMUM,
WITH A MINIMUM DIMENSION OF 4m
GRADIENT NO STEEPER THAN 1:10

SITE PLAN

1 : 200

SURVEY NOTES

- THIS PLAN AND ASSOCIATED DIGITAL MODEL IS PREPARED FOR CUNIC 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. SERVICES DENOTED AS BEING "PER DBYD ONLY" ARE APPROXIMATE AND FOR ILLUSTRATIVE PURPOSES ONLY. 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.

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PLANNING

NOTE: DO NOT SCALE OFF DRAWINGS

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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

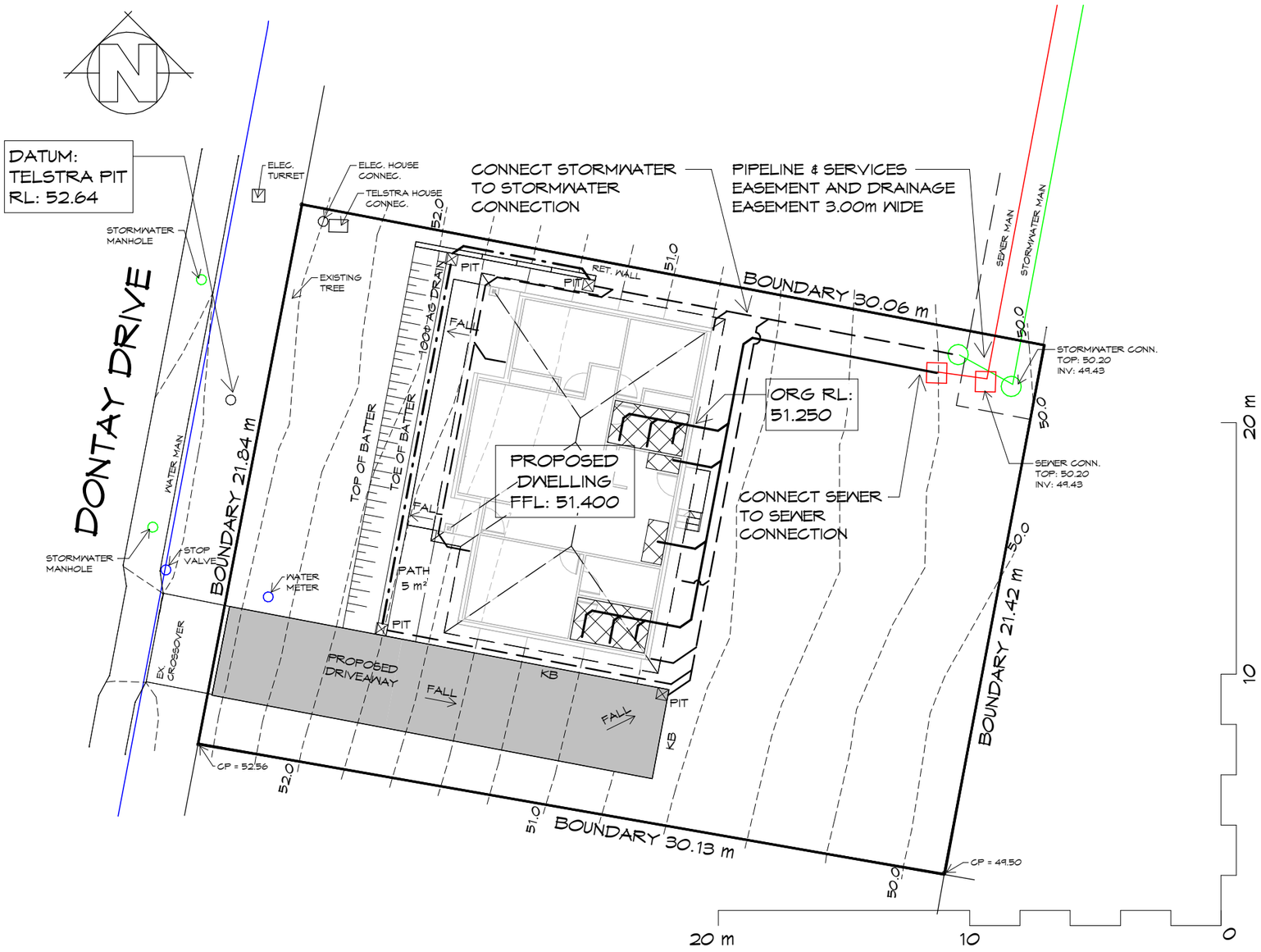
Client name:
D.D.

Drawing:
SITE PLAN

Drafted by:	Approved by:
L.L.	D.D.H.
Date:	Scale:
28.07.2025	1 : 200
Project/Drawing no:	Revision:
PD25171 -01	03

BUILDING DESIGNERS ASSOCIATION OF AUSTRALIA

Accredited building practitioner: Frank Geskus -No CC246A



SITE DRAINAGE

1 : 200

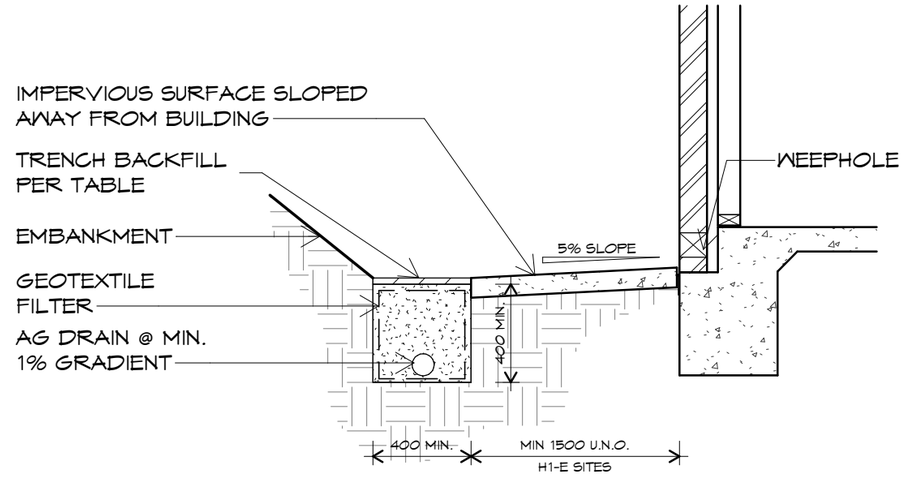
LEGEND

- PIT — 450X 450 SURFACE DRAINAGE PIT
- WET AREAS
- SEWER LINE
- STORMWATER LINE
- 100ϕ AG DRAIN
- KB — 100 HIGH KERB

PLUMBING NOTES:
ALL DRAINAGE WORK SHOWN IS PROVISIONAL ONLY AND IS SUBJECT TO AMENDMENT TO COMPLY WITH THE REQUIREMENTS OF THE LOCAL AUTHORITIES.
ALL WORK IS TO COMPLY WITH THE REQUIREMENTS OF AS 3500.2021 & THE TASMANIAN PLUMBING CODE. AND MUST BE CARRIED OUT BY A LICENCED TRADESMAN ONLY.

TRENCH BACKFILL PER SITE CLASS
TO COMPLY WITH AS2870 PART 5.6.3

SOIL CLASS	BACKFILL MATERIAL
A-S	CRUSHED DRAINAGE ROCK
M-E	COMPACTED CLAY



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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Drawing:
SITE DRAINAGE PLAN

Client name:
D.D.

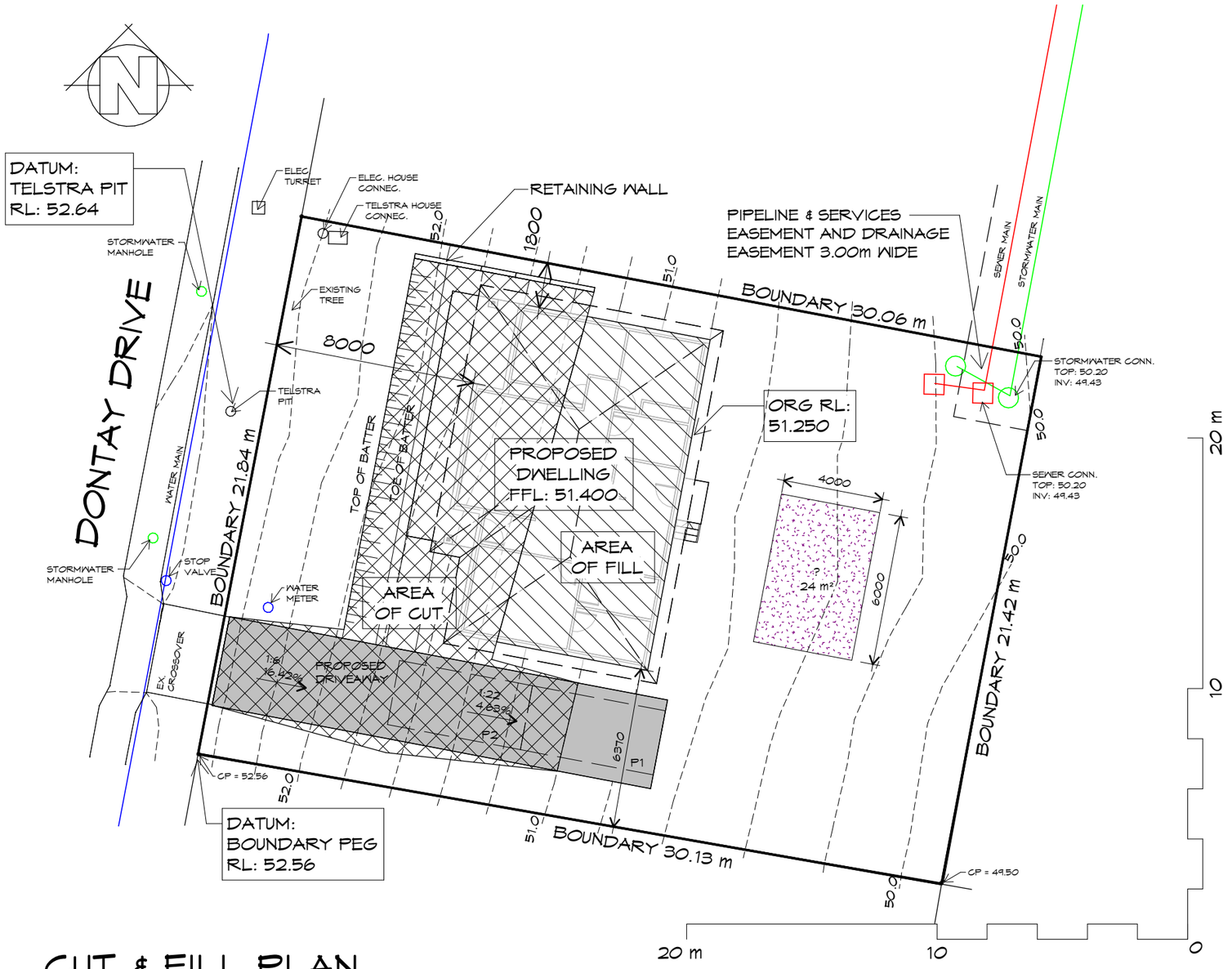
Date: 28.07.2025
Scale: As indicated

Drafted by: L.L.
Approved by: D.D.H.

BUILDING DESIGNERS ASSOCIATION OF AUSTRALIA

Project/Drawing no: PD25171 -02
Revision: 03

Accredited building practitioner: Frank Geskus -No CC246A



CUT & FILL PLAN

1 : 200

CUT/FILL VOLUME			
CUT	m3	FILL	m3
43.52	m3	18.88	m3

NOTE:
THE CUT & FILL VOLUMES CALCULATED BY REVIT ARE APPROXIMATE, GENERALLY PROVIDING RESULTS WITH +/- 1% TO 2% ACCURACY

PLANNING

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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Drawing:
CUT & FILL PLAN

Client name:
D.D.

Date: 28.07.2025
Scale: 1 : 200

Drafted by: L.L.
Approved by: D.D.H.

BUILDING DESIGNERS ASSOCIATION OF AUSTRALIA

Project/Drawing no: PD25171 -03
Revision: 03

Accredited building practitioner: Frank Geskus -No CC246A

LOCALITY PLAN

1 : 2000

PLANNING

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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Client name:
D.D.

Drafted by: L.L.

Approved by: D.D.H.

BUILDING DESIGNERS ASSOCIATION OF AUSTRALIA

Drawing:
LOCALITY PLAN

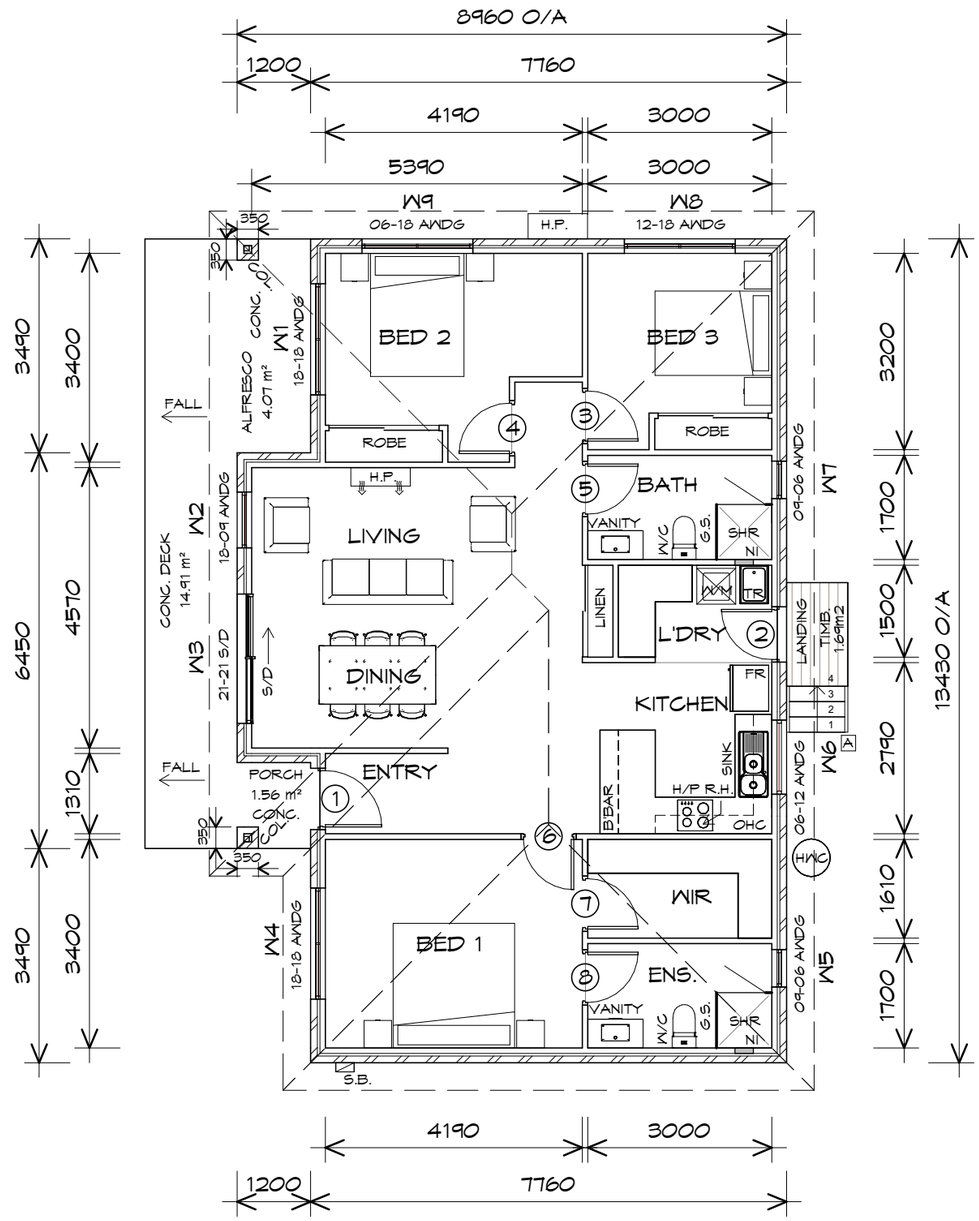
Date: 28.07.2025

Scale: 1 : 2000

Project/Drawing no: PD25171 -04

Revision: 03

Accredited building practitioner: Frank Geskus -No CC246A



LEGEND

S/D	SLIDING DOOR
COL	COLUMN
HWC	HOT WATER CYLINDER
G.S.	GLASS SCREEN
S.B.	SWITCH BOX
OHC	OVERHEAD CUPBOARDS
NI	SHOWER NICHE 300X300 LOCATION TO BE CONFIRMED ON-SITE

PLANNING

NOTE: DO NOT SCALE OFF DRAWINGS

STAIRS

STAIR	NO RISERS	RISER H'T	TREAD DEPTH
A	4	175	250

FLOOR PLAN

1 : 100

FLOOR AREA	110.28	m2	(11.87 SQUARES)
TOTAL AREA	110.28		11.87

NOTE:
FLOOR AREAS INCLUDE TO EXTERNAL FACE OF BUILDING AND GARAGE, UNLESS OTHERWISE STATED. DECKS AND OUTDOOR AREAS ARE CALCULATED SEPARATELY.

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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Client name:
D.D.

Drawing:
FLOOR PLAN

Drafted by: L.L.
Approved by: D.D.H.
Date: 28.07.2025
Scale: 1 : 100
Project/Drawing no: PD25171 -05
Revision: 03

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Accredited building practitioner: Frank Geskus -No CC246A

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DOOR SCHEDULE			
MARK	WIDTH	TYPE	REMARKS
1	920	EXTERNAL SOLID DOOR	
2	820	EXTERNAL SOLID DOOR	
3	820	INTERNAL TIMBER DOOR	
4	820	INTERNAL TIMBER DOOR	
5	820	INTERNAL TIMBER DOOR	
6	820	INTERNAL TIMBER DOOR	
7	820	INTERNAL TIMBER DOOR	
8	820	INTERNAL TIMBER DOOR	

WINDOW SCHEDULE				
MARK	HEIGHT	WIDTH	TYPE	REMARKS
W1	1800	1810	AWNING WINDOW	
W2	1800	910	AWNING WINDOW	
W3	2100	2110	SLIDING DOOR	
W4	1800	1810	AWNING WINDOW	
W5	900	610	AWNING WINDOW	OPAQUE
W6	600	1210	FIXED WINDOW	900 SILL
W7	900	610	AWNING WINDOW	OPAQUE
W8	1200	1810	AWNING WINDOW	
W9	600	1810	AWNING WINDOW	

ALUMINIUM WINDOWS **DOUBLE GLAZING** COMPLETE
WITH FLY SCREENS TO SUIT **???** **BAL** RATING.
ALL WINDOW MEASUREMENTS TO BE VERIFIED ON SITE
PRIOR TO ORDERING

PLANNING

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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Client name:
D.D.

Drafted by: L.L.
Approved by: D.D.H.

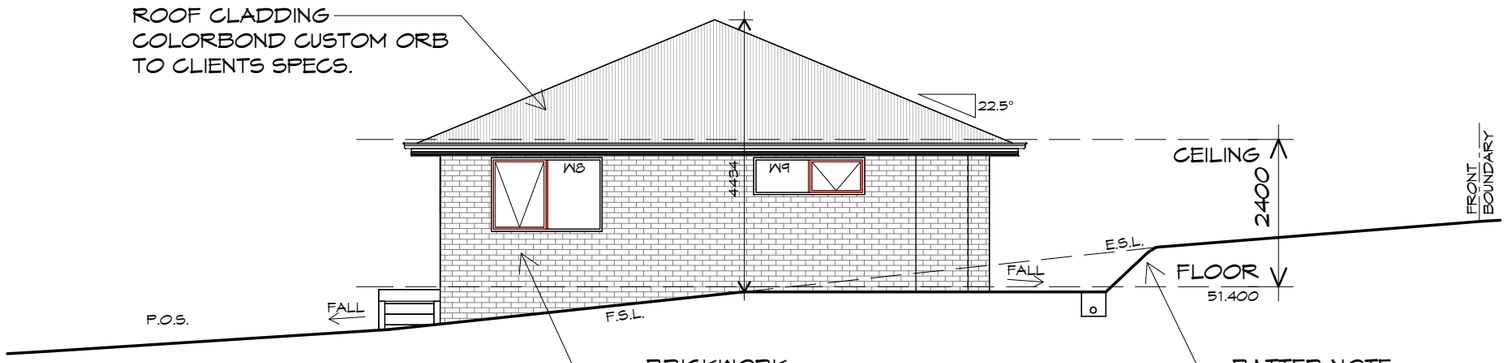
BUILDING DESIGNERS ASSOCIATION OF AUSTRALIA

Drawing:
DOOR AND WINDOW SCHEDULES

Date: 28.07.2025
Scale:

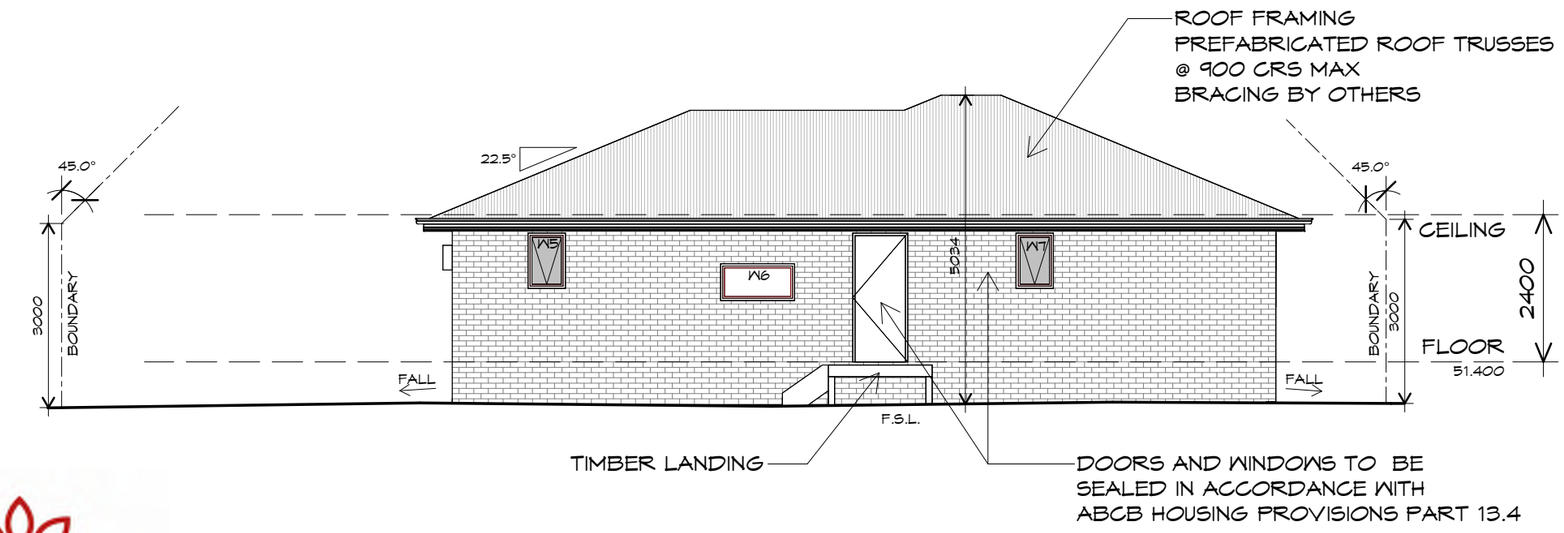
Project/Drawing no: PD25171 -06
Revision: 03

Accredited building practitioner: Frank Geskus -No CC246A



NORTHERN ELEVATION

1 : 100



:ASTERN ELEVATION

: 100

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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Client name:
D.D.

Drawing:
ELEVATIONS

Drafted by:	Approved by:
L.L.	D.D.H.
Date:	Scale:
28.07.2025	1 : 100
Project/Drawing no:	Revision:
PD25171 -07	03

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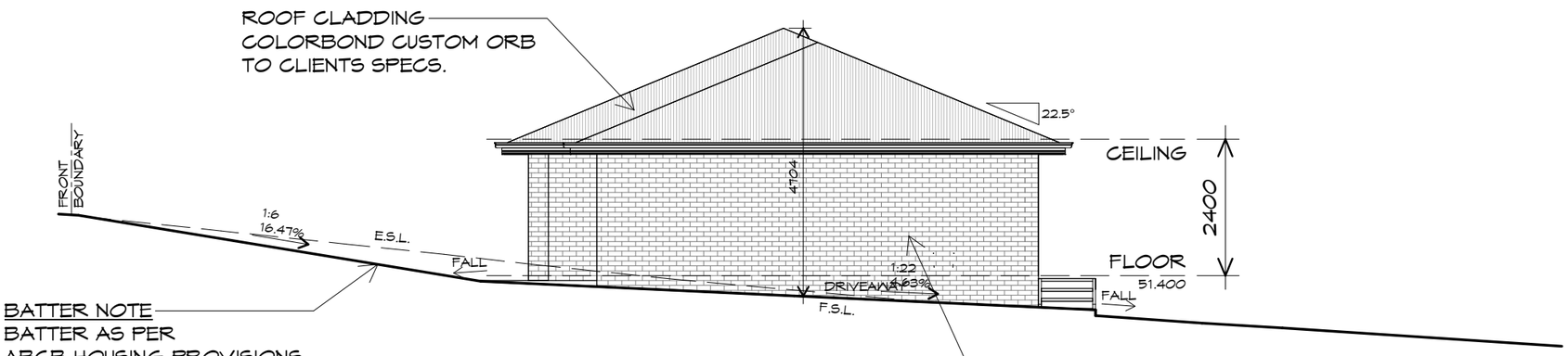
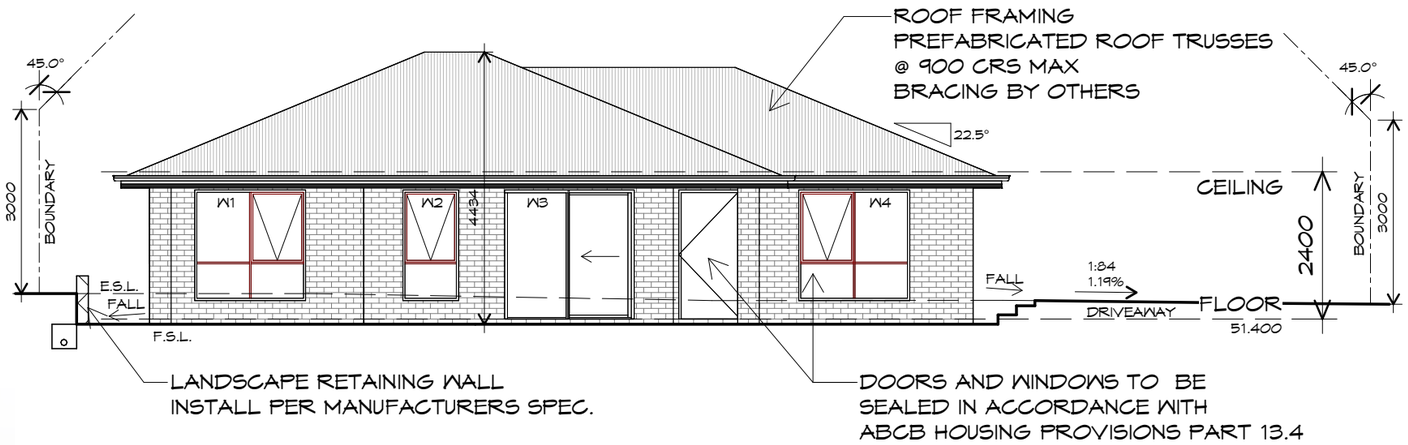


SOUTHERN ELEVATION

1 : 100



WESTERN ELEVATION

1 : 100

PLANNING

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PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Client name:
D.D.

Drawing:
ELEVATIONS

Drafted by:	Approved by:
L.L.	D.D.H.
Date:	Scale:
28.07.2025	1 : 100
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PD25171 -08	03

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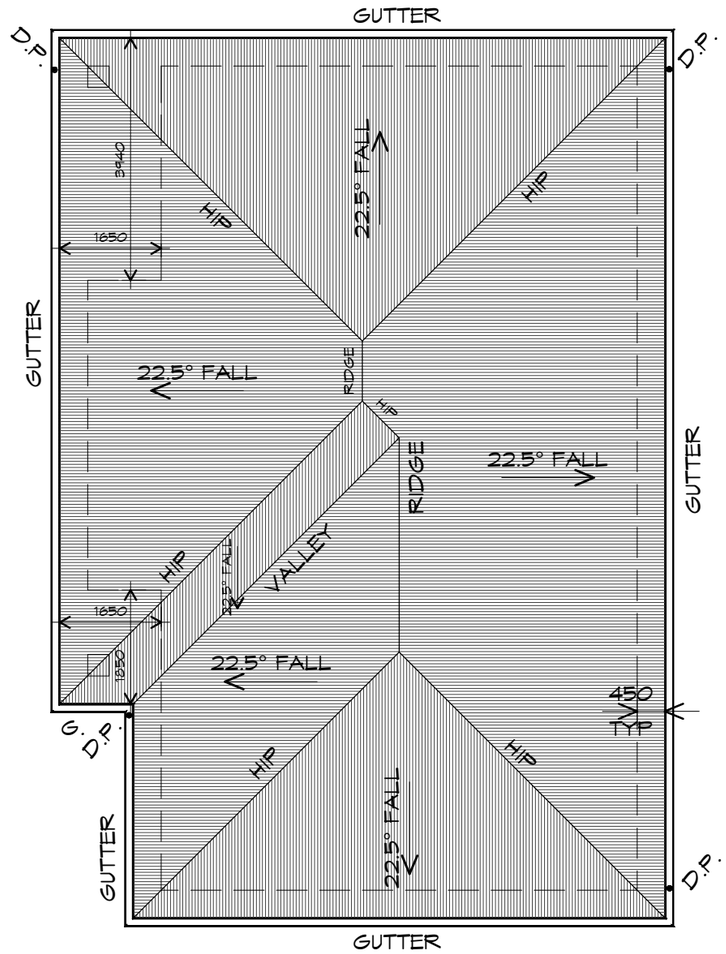

ROOF PLAN

1 : 100

OVERFLOW MEASURES
INSTALL **FRONT FACE SLOTTED GUTTER *OR***
10mm CONTROLLED BACK GAP, STAND OFF BRACKET WITH SPACER.
BACK OF GUTTER INSTALLED A MINIMUM OF 10mm BELOW THE TOP OF FASCIA
INSTALL IN ACCORDANCE WITH ABCB HOUSING PROVISIONS PART 7.4.6

ROOF PLUMBING NOTES:

GUTTER INSTALLATION
TO BE IN ACCORDANCE WITH ABCB HOUSING PROVISIONS PART 7.4.4 WITH FALL NO LESS THAN 1:500 FOR EAVES GUTTER
BOX GUTTERS IN ACCORDANCE WITH AS33500.3:2021

UNLESS FIXED TO METAL FASCIA EAVES GUTTER TO BE FIXED @ 1200 CRS MAX.

VALLEY GUTTERS ON A ROOF WITH A PITCH:
A) MORE THAN 12.5° DEGREES - MUST HAVE A WIDTH OF NOT LESS THAN 400mm AND ROOF OVERHANG OF NOT LESS THAN 150mm EACH SIDE OFVALLEY GUTTER.
B) LESS THAN 12.5° DEGREES, MUST BE DESIGNED AS A BOX GUTTER.

LAP GUTTERS 75mm IN THE DIRECTION OF FLOW, RIVET & SEAL WITH AN APPROVED SILICONE SEALANT.

DOWNPIPE POSITIONS SHOWN ON THIS PLAN ARE NOMINAL ONLY.
EXACT LOCATION & NUMBER OF D.P'S REQUIRED ARE TO BE IN ACCORDANCE WITH ABCB HOUSING PROVISIONS PART 7.4.5 REQUIREMENTS.
SPACING BETWEEN DOWNPIPES MUST NOT BE MORE THAN 12m & LOCATED AS CLOSE AS POSSIBLE TO VALLEY GUTTERS

METAL ROOF
METAL SHEETING ROOF TO BE INSTALLED IN ACCORDANCE WITH ABCB HOUSING PROVISIONS PART 7.2. REFER TO TABLE 7.2.2a FOR ACCEPTABLE CORROSION PROTECTION FOR SHEET ROOFING, REFER TO TABLE 7.2.2b-7.2.2e FOR ACCEPTABILITY OF CONTACT BETWEEN DIFFERENT ROOFING MATERIALS. FOR FIXING, SHEET LAYING SEQUENCE, FASTENER FREQUENCY FOR TRANVERSE FLASHINGS AND CAPPINGS, ANTI CAPILLARY BREAKS, FLASHING DETAILS REFER TO ABCB HOUSING PROVISIONS PART 7.2.5- 7.2.7. ROOF PENETRATION FLASHING DETAILS. REFER TO TO ABCB HOUSING PROVISIONS PART 7.2.5- 7.2.7. ROOF SHEETING MUST OVERHANG MIN 35mm AS PER ABCB HOUSING PROVISIONS PART 7.2.8

PLANNING
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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Client name:
D.D.

Drawing:
ROOF PLAN

Drafted by:	Approved by:
L.L.	D.D.H.
Date:	Scale:
28.07.2025	1 : 100

Project/Drawing no: PD25171 -09
Revision: 03

Accredited building practitioner: Frank Geskus -No CC246A

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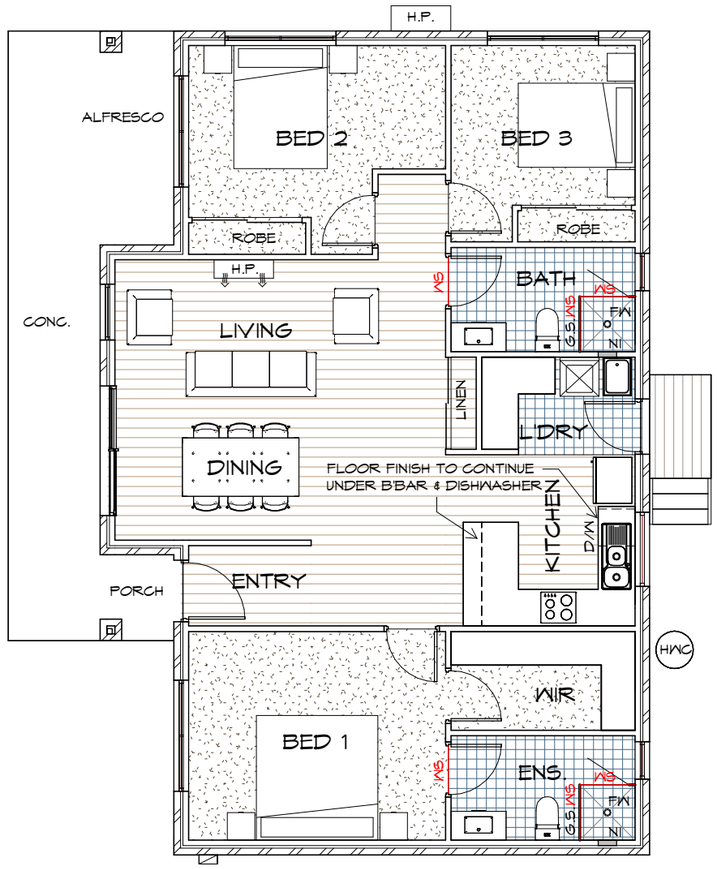

FLOOR FINISHES PLAN

1 : 100

LEGEND

- CARPET
- TILES
- TIMBER OVERLAY
- TIMBER DECK
- WS — WATERSTOP
- FW — FLOOR WASTE
- NI — SHOWER NICHE 300x300 LOCATION TO BE CONFIRMED ON-SITE

IMPORTANT:
PLEASE REFER TO ENERGY ASSESSMENT REPORT FOR FULL DETAILS.
ENERGY ASSESSMENT IS BASED ON FLOOR TYPES AS NOTED IN THE REPORT.

IF AN ALTERNATIVE FLOORING IS CHOSEN OR ANY OTHER ASPECT OF THE BUILDING IS MODIFIED, A NEW ENERGY ASSESSMENT WILL BE REQUIRED.

REFER TO ELECTRICAL PLAN AND REFLECTED CEILING PLAN FOR CEILING PENETRATIONS.

PLANNING

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Project:
PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

Client name:
D.D.

Drawing:
FLOOR FINISHES PLAN

Drafted by:	Approved by:
L.L.	D.D.H.
Date:	Scale:
28.07.2025	1 : 100
Project/Drawing no:	Revision:
PD25171 -10	03

Accredited building practitioner: Frank Geskus -No CC246A

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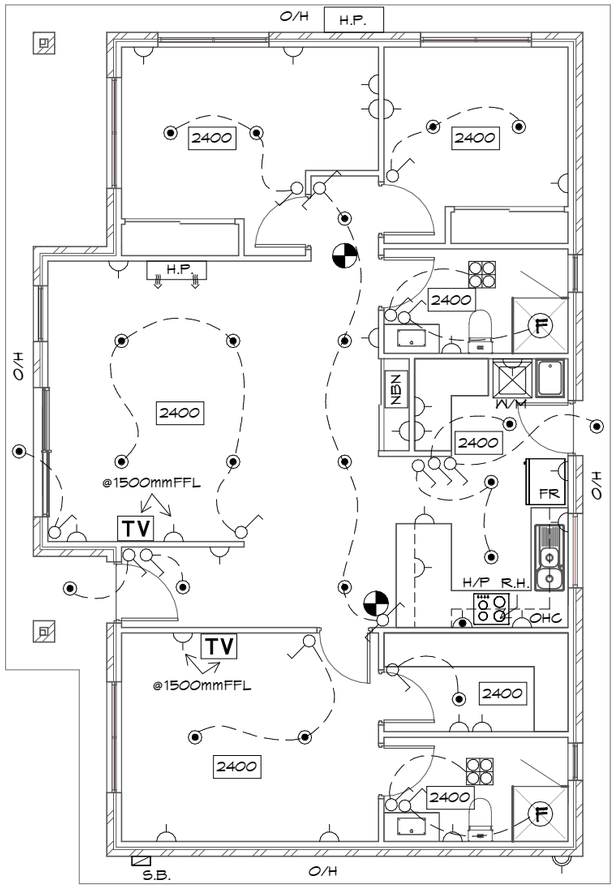

ELECTRICAL/REFLECTED CEILING PLAN

1 : 100

IMPORTANT:
PLEASE REFER TO ENERGY ASSESSMENT REPORT FOR FULL DETAILS.
ENERGY ASSESSMENT IS BASED ON THE ABOVE ELECTRICAL LAYOUT AND TYPES AS NOTED IN THE REPORT.
IF MORE PENETRATIONS ARE INCLUDED OR ANY OTHER ASPECT OF THE BUILDING IS MODIFIED, A NEW ENERGY ASSESSMENT WILL BE REQUIRED.

SMOKE ALARMS
- ALL ALARMS TO BE INTERCONNECTED WHERE MORE THAN ONE ALARM IS INSTALLED.
- SMOKE ALARMS TO BE LOCATED ON ALL FLOORS IN ACCORDANCE WITH THE ABCB HOUSING PROVISIONS 9.5.1, 9.5.2 AND 9.5.4.

ELECTRICAL
ALL ELECTRICAL WORKS TO BE CARRIED OUT BY A GRADE ELECTRICAL CONTRACTOR. ALL WORKS TO COMPLY WITH LOCAL AUTHORITIES AND AS3000

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ELECTRICAL INDEX

LIGHTING

- FOUR LIGHT, 3 IN 1 BATHROOM LIGHT C/W DAMPER, EXHAUST TO OUTSIDE*
- L.E.D. - SEALED DOWN LIGHT *
- *INSTALL AS PER MANUFACTURERS SPECIFICATION

OTHER

- 240v SMOKE ALARM
- SWITCH BOX
- (F) EXHAUST FAN, VENT TO OUTSIDE AIR, PROVIDE POWER
- R/H RANGE HOOD, VENT TO OUTSIDE AIR, PROVIDE POWER

SWITCH TYPE

- ONE-WAY SWITCH
- TWO-WAY SWITCH

WALL OUTLETS

- GENERAL PURPOSE OUTLET (DOUBLE)
- WEATHER PROOF OUTLET
- HOTPLATE SAFETY CUT-OFF
- TV T.V. OUTLET

NOTE:
POWER POINT TO BE 300mm AWAY FROM EDGE OF WATER SOURCE

CEILING

- XXXX DENOTES CEILING HEIGHT
- O/H ROOF OVERHANG/EAVES

HEATING

- H.P. HEAT PUMP
- H.P. HEAT PUMP, OUTDOOR UNIT

PLANNING
NOTE: DO NOT SCALE OFF DRAWINGS

ARTIFICIAL LIGHTING
RESIDENCES TO BE IN COMPLIANCE WITH NCC 2019 PART 3.12.5.5.

ARTIFICIAL LIGHTING MUST NOT EXCEED:
- 5W/m2 FOR CLASS 1 BUILDING
- 4W/m2 FOR VERANDAHS & BALCONIES
- 3W/m2 FOR CLASS 10A ASSOCIATED WITH CLASS 1 BUILDING

REFER TO LIGHTING CALCULATOR FOR FURTHER DETAILS.

EXHAUST FANS
EXHAUST FANS TO ACHIEVE FLOW RATE TO COMPLY WITH HOUSING PROVISIONS 10.8.2

BATHROOMS WITHOUT NATURAL VENTILATION
EXHAUST FAN WITH 10 MINUTE TIMED FAN CONNECTED TO LIGHT SWITCH. UNDERCUT DOOR 20mm TO PROVIDE MAKE UP AIR, TO COMPLY WITH HOUSING PROVISIONS 10.8.2

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PROPOSED NEW RESIDENCE
3 DONTAY DRIVE,
ROKEBY

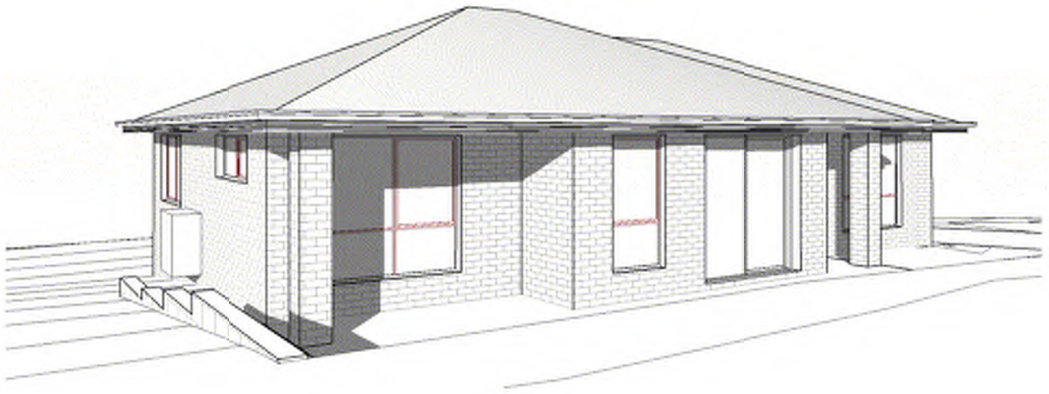
Client name:
D.D.

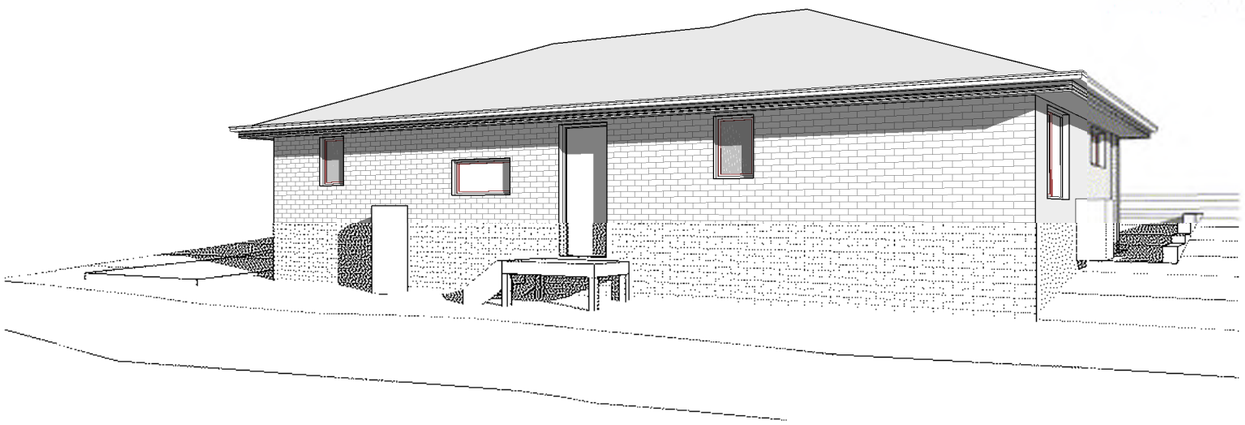
Drawing:
ELECTRICAL/REFLECTED CEILING PLAN

Drafted by:	Approved by:
L.L.	D.D.H.
Date:	Scale:
28.07.2025	1 : 100

Project/Drawing no:	Revision:
PD25171 -11	03

Accredited building practitioner: Frank Geskus -No CC246A





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Client name:
D.D.

Drawing:
PERSPECTIVES

Drafted by:	Approved by:
L.L.	D.D.H.
Date:	Scale:
28.07.2025	
Project/Drawing no:	Revision:
PD25171 -12	03

BUILDING DESIGNERS ASSOCIATION OF AUSTRALIA

Accredited building practitioner: Frank Geskus -No CC246A

CUNIC homes
Built for you

27 July 2025

Att: Planning Department
Clarence City Council

Dear Sir/Madam,

3 Dontay Drive, Rokeby
New residential dwelling development

Please find enclosed application for development for a single residential dwelling development at 3 Dontay Drive, Rokeby. In support of this application the following documents are provided:

- Title documents
- DA plans
- Flood hazard report

8.0 General Residential Zone

8.1 Zone Purpose

8.1.1 The proposal is for the construction of a single residential dwelling located on a lot with full infrastructure and services available.

8.1.2 The proposed development is located in close proximity to public transport and other services and complies.

8.2 Use Table

A single residential dwelling is a no permit required, permitted or discretionary use. Our assessment of the development, as below, assess this proposed development as a "discretionary" application.

8.4 Development Standards for Dwellings

8.4.1 Residential density for multiple dwellings

A1 NA

8.4.2 Setbacks and building envelope for all dwellings

A1 The proposed dwelling is set back 8000mm from the front frontage and complies with A1(a).

A2 The proposed dwelling does not include garage. Therefore, A2 does not apply.

A3(a) The proposed dwelling is contained within the building envelope, as demonstrated on elevations and complies with A3(a).

A3(b) The proposed dwelling is located >1500mm from the side and rear boundaries, however, the landscaping retaining is located within 1500mm side setback and does not comply with A3(b) and so has been assessed against P3.

P3 The retaining wall along the northern boundary facilitates necessary site level adjustments due to slope, and its height is under 1000mm, and location have been designed to avoid overshadowing any habitable room of the adjoining property and complies with P3.

8.4.3 Site coverage and private open space for all dwellings

A1(a) The proposed dwelling has a site coverage of 16.9% and complies.

A1(b) NA

A2(a) The proposed dwelling has a POS of 24m2 and complies.

A2(b) The proposed dwelling has a POS with minimum width of 4000mm and complies with A2(b).

A2(c) The POS is located to the rear side of the property and complies with A2 (c).

A2(d) The POS for the proposed dwelling has a gradient of not more than 1 in 10 and complies with A2(d).

8.4.4 Sunlight to private open space of multiple dwellings

A1(a) NA

8.4.5 Width of openings for garages and carports for all dwellings

A1 NA.

8.4.6 Privacy for all dwellings

A1 The proposed dwelling has a landing with an FFL <1000mm and located >4000mm from the rear boundary and complies A1.

A2 (a) The proposed dwelling has windows within 3000mm on the northern side and has setback with an FFL <1000mm and complies with A2(a).

8.4.7 Frontage fences for all dwellings

A1 NA

8.4.8 Waste storage for multiple dwellings

A1(a) NA

C2.0 Parking and Access Code

C2.5 Use Standards

C2.5.1 Car parking numbers

A1 The proposed development is for a 3-bedroom dwelling with single garage and in accordance with Table C2.1, 2 car parking spaces are required. The proposed development provides for two car parking spaces and complies with A1.

C2.5.2 Bicycle parking numbers

A1 NA

C2.5.3 Motorcycle parking numbers

A1 NA

C2.5.4 Loading Bays

A1 NA

C2.5.5 Number of car parking spaces within the General Residential Zone and Inner Residential Zone

A1 NA

C2.6 Development Standards for Buildings and Works

C2.6.1 Construction of parking areas

A1(a) & (c) The parking and driveway for the proposed dwelling will be constructed from concrete and complies with A1(a) & (c).

A1(b) The driveway is designed to be drained to the Council stormwater system and complies with A1(b).

C2.6.2 Design and layout of parking areas

A1.1 The driveway and parking areas have been designed to comply with *AS2890- Parking facilities Parts 1-6* and complies.

A1.2 NA

C2.6.3 Number of accesses for vehicles

A1 One access has been designed for this proposal and complies with A1.

A2 NA

C2.6.4 Lighting of parking areas within the General Business Zone and Central Business Zone

A1 NA

C2.6.5 Pedestrian access

A1.1 NA

C2.6.6 Loading bays

A1 NA

A2 NA

C2.6.7 Bicycle parking and storage facilities within the General Business Zone and Central Business Zone

A1 NA

A2 NA

C2.6.8 Siting of parking and turning areas

A1 NA

C12.0 Flood-Prone Areas Hazard Code

The proposed dwelling is located within flood prone hazard code. As per the Bayview flood report, the findings indicates that it is not impacted by overland flow. The floodwaters are effectively managed within the proposed road network and public open space areas. As a result, the risk is considered negligible and there is no displacement of water onto neighbouring properties.

C13.0 Bushfire-Prone Areas Code

The proposed dwelling is located within the Bushfire-Prone Areas Code and will be constructed to the assessed BAL.

C16.0 Safeguarding of Airports Code

The proposed dwelling is located within safeguarding of airports (obstacle limitation area). The proposal complies with the height restriction requirements of this code.

Please contact me via email should you require any additional information to assist Council's assessment of the application

Yours faithfully

SCHEDULE OF EASEMENTS	Registered Number
NOTE: THE SCHEDULE MUST BE SIGNED BY THE OWNERS & MORTGAGEES OF THE LAND AFFECTED. SIGNATURES MUST BE ATTESTED.	SF 185621

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.

Lots 1-9 (inclusive), 13 and 19, 100 ~~and 201~~ are each subject to a Right of Drainage in gross in favour of the Clarence City Council over the land marked "Pipeline and Services Easement and Drainage Easement 3.00m wide". (as defined herein)

Lots 1-9 (inclusive), 13 and 19, 100 ~~and 201~~ (the Lots) are each subject to a Pipeline and Services Easement in gross in favour of the Tasmanian Water and Sewerage Corporation Pty Ltd, it's successors and assigns (TasWater) over the land marked "Pipeline and Services Easement and Drainage Easement 3.00m wide on the Plan (the "Easement Land"). (as defined herein)

Lot 201 (the Lot) is subject to a Pipetine and Services Easement in gross in favour of the Tasmanian Water and Sewerage Corporation Pty Ltd, it's successors and assigns (TasWater) over the land marked "Pipeline and Services Easement ~~and Drainage Easement 3.75m wide~~ on the Plan (the "Easement Land").
3.75m wide and "Pipeline & Services Easement 3.00m wide"

Restrictive Covenants

The Owner of each Lots covenants to the Vendor, Pharos Custodians Pty Ltd and the Owner of each other Lot to the intent that the burden of these covenants may run with and bind the Covenantor's Lot and every part thereof and that the benefit shall be annexed with and devolve with each and every part of every Lot shown on the Plan to observe the following stipulations that: -

(1) they will not construct or allow to be constructed any relocatable dwelling on any such Lot,

(2) they will not permit any caravans to be located on such Lot (save and except is a residence has already been erected on the said Lot);

(3) they will not construct any dwelling on the Lot which exterior exceeds more than 25% colourbond (roof excluded);

(4) The Vendor reserves the right in relation to any of the Restrictive Covenants herein to make any Lots on the Plan free and exempt from one or more of the covenants or conditions or waive or alter any covenant as to any Lot on the Plan.

(USE ANNEXURE PAGES FOR CONTINUATION)

SUBDIVIDER: Pharos Custodians Pty Ltd FOLIO REF: 131197/2 SOLICITOR & REFERENCE: WCJ 069222	PLAN SEALED BY: Clarence City Council DATE: 20th October 2023 REF NO. ..... Council Delegate Clare Shea

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

pharocpi_069222_006.dot

William Jose Solicitor for Subdivider 14-11-23

William Jose Solicitor for Subdivider 29-8-23

ANNEXURE TO SCHEDULE OF EASEMENTS PAGE 2 OF 3 PAGES	Registered Number SP 185621
SUBDIVIDER: Pharos Custodians Pty Ltd FOLIO REFERENCE: 131197/2	

Fencing Covenant

The Owners of each Lot on the Plan covenant with the ~~Subdivider~~ Vendor, Pharos Custodians Pty Ltd, that the ~~Subdivider~~ Vendor shall not be required to fence.

Definitions:

Pipeline and Services Easement is defined as follows:-

FIRSTLY, THE FULL 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:

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

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

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

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

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

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

ANNEXURE TO SCHEDULE OF EASEMENTS PAGE 3 OF 3 PAGES	Registered Number SP 185621
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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.

Interpretation:

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

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

(b) telemetry and monitoring devices;

(c) inspection and access pits;

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

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

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

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

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

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

EXECUTED by Pharos Custodians Pty Ltd (ACN 131 759 807) in accordance with section 127 of the *Corporations Act 2001*:

Signature: .....

Name: Antonios Papastamatis
PLEASE PRINT

Director

Signature: .....

Name: Eugenia Papastamatis
PLEASE PRINT

~~**Director/**~~**Secretary** *

* Delete as appropriate

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.