Te Kaunihera o Te Hiku o te Ika
Far North District Council

Office Use Only
Application Number:

Application for resource consent or fast-track resource consent

(Or Associated Consent Pursuant to the Resource Management Act 1991 (RMA)) (If applying for a Resource Consent pursuant to Section 87AAC or 88 of the RMA, this form can be used to satisfy the requirements of Schedule 4). Prior to, and during, completion of this application form, please refer to Resource Consent Guidance Notes and Schedule of Fees and Charges — both available on the Council's web page.

1. Pre-Lodgement Meeting

Have you met with a council Resource Consent representative to discuss this application prior to lodgement? ◯ **Yes** ✓ **No**

2. Type of Consent being applied for

(more than one circle can be ticked):

- ✓ **Land Use**
- ◯ **Fast Track Land Use***
- ✓ **Subdivision**
- ◯ **Consent under National Environmental Standard** (e.g. Assessing and Managing Contaminants in Soil)
- ◯ **Discharge**
- ◯ **Change of Consent Notice (s.221(3))**
- ◯ **Extension of time (s.125)**
- ◯ **Other (please specify)** _____

** The fast track is for simple land use consents and is restricted to consents with a controlled activity status.*

3. Would you like to opt out of the Fast Track Process?

✓ **Yes** ◯ **No**

4. Consultation

Have you consulted with Iwi/Hapū? ◯ **Yes** ✓ **No**

If yes, which groups have you consulted with?	
Who else have you consulted with?	

For any questions or information regarding iwi/hapū consultation, please contact Te Hono at Far North District Council tehonosupport@fndc.govt.nz

5. Applicant Details

Name/s: WM & TA Weber Trust

Email: [redacted]

Phone number:

Postal address:
(or alternative method of service under section 352 of the act)

6. Address for Correspondence

Name and address for service and correspondence (if using an Agent write their details here)

Name/s: Lynley Newport

Email: [redacted]

Phone number:

Postal address:
(or alternative method of service under section 352 of the act)

All correspondence will be sent by email in the first instance. Please advise us if you would prefer an alternative means of communication.

7. Details of Property Owner/s and Occupier/s

Name and Address of the Owner/Occupiers of the land to which this application relates (where there are multiple owners or occupiers please list on a separate sheet if required)

Name/s: WM & TA Weber Family Trust

Property Address/ Location: [redacted]

8. Application Site Details

Location and/or property street address of the proposed activity:

Name/s:	As above
Site Address/ Location:	[redacted]
Legal Description:	[redacted]
Certificate of title:	[redacted]

Please remember to attach a copy of your Certificate of Title to the application, along with relevant consent notices and/or easements and encumbrances (search copy must be less than 6 months old)

Site visit requirements:

Is there a locked gate or security system restricting access by Council staff? ◯ **Yes** ✓ **No**

Is there a dog on the property? ◯ **Yes** ✓ **No**

Please provide details of any other entry restrictions that Council staff should be aware of, e.g. health and safety, caretaker's details. This is important to avoid a wasted trip and having to re-arrange a second visit.

No Restrictions

9. Description of the Proposal:

Please enter a brief description of the proposal here. Please refer to Chapter 4 of the District Plan, and Guidance Notes, for further details of information requirements.

To subdivide land in the Rural Living Zone to create one additional lot; land use consent for breaches of Stormwater Management and Building Coverage rules.

If this is an application for a Change or Cancellation of Consent Notice conditions (s.221(3)), please quote relevant existing Resource Consents and Consent Notice identifiers and provide details of the change(s), with reasons for requesting them.

10. Would you like to request Public Notification?

◯ **Yes** ✓ **No**

11. Other Consent required/being applied for under different legislation

(more than one circle can be ticked):

- (✓) **Building Consent** Enter BC ref # here (if known)
- ( ) **Regional Council Consent (ref # if known)** Ref # here (if known)
- ( ) **National Environmental Standard consent** Consent here (if known)
- ( ) **Other (please specify)** Specify 'other' here

12. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health:

The site and proposal may be subject to the above NES. In order to determine whether regard needs to be had to the NES please answer the following:

Is the piece of land currently being used or has it historically ever been used for an activity or industry on the Hazardous Industries and Activities List (HAIL) ( ) **Yes** (✓) **No** ( ) **Don't know**

Is the proposed activity an activity covered by the NES? Please tick if any of the following apply to your proposal, as the NESCS may apply as a result. (✓) **Yes** ( ) **No** ( ) **Don't know**

- (✓) **Subdividing land**
- ( ) **Changing the use of a piece of land**
- ( ) **Disturbing, removing or sampling soil**
- ( ) **Removing or replacing a fuel storage system**

13. Assessment of Environmental Effects:

Every application for resource consent must be accompanied by an Assessment of Environmental Effects (AEE). This is a requirement of Schedule 4 of the Resource Management Act 1991 and an application can be rejected if an adequate AEE is not provided. The information in an AEE must be specified in sufficient detail to satisfy the purpose for which it is required. Your AEE may include additional information such as Written Approvals from adjoining property owners, or affected parties.

Your AEE is attached to this application (✓) **Yes**

13. Draft Conditions:

Do you wish to see the draft conditions prior to the release of the resource consent decision? (●) **Yes** ( ) **No**

If yes, do you agree to extend the processing timeframe pursuant to Section 37 of the Resource Management Act by 5 working days? (✓) **Yes** ( ) **No**

14. Billing Details:

This identifies the person or entity that will be responsible for paying any invoices or receiving any refunds associated with processing this resource consent. Please also refer to Council's Fees and Charges Schedule.

Name/s: (please write in full) WM & TA Weber Trust

Email: [redacted]

Phone number: [redacted]

Postal address:
(or alternative method of service under section 352 of the act) [redacted]

Fees Information
An instalment fee for processing this application is payable at the time of lodgement and must accompany your application in order for it to be lodged. Please note that if the instalment fee is insufficient to cover the actual and reasonable costs of work undertaken to process the application you will be required to pay any additional costs. Invoiced amounts are payable by the 20th of the month following invoice date. You may also be required to make additional payments if your application requires notification.

Declaration concerning Payment of Fees
I/we understand that the Council may charge me/us for all costs actually and reasonably incurred in processing this application. Subject to my/our rights under Sections 357B and 358 of the RMA, to object to any costs, I/we undertake to pay all and future processing costs incurred by the Council. Without limiting the Far North District Council's legal rights if any steps (including the use of debt collection agencies) are necessary to recover unpaid processing costs I/we agree to pay all costs of recovering those processing costs. If this application is made on behalf of a trust (private or family), a society (incorporated or unincorporated) or a company in signing this application I/we are binding the trust, society or company to pay all the above costs and guaranteeing to pay all the above costs in my/our personal capacity.

Name: (please write in full) Wayne Weber

Signature:
(signature of bill payer [redacted]

15. Important Information:

Note to applicant
You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.
You may apply for 2 or more resource consents that are needed for the same activity on the same form.
You must pay the charge payable to the consent authority for the resource consent application under the Resource Management Act 1991.

Fast-track application
Under the fast-track resource consent process, notice of the decision must be given within 10 working days after the date the application was first lodged with the authority, unless the applicant opts out of that process at the time of lodgement. A fast-track application may cease to be a fast-track application under section 87AAC(2) of the RMA.

Privacy Information:
Once this application is lodged with the Council it becomes public information. Please advise Council if there is sensitive information in the proposal. The information you have provided on this form is required so that your application for consent pursuant to the Resource Management Act 1991 can be processed under that Act. The information will be stored on a public register and held by the Far North District Council. The details of your application may also be made available to the public on the Council's website, www.fndc.govt.nz. These details are collected to inform the general public and community groups about all consents which have been issued through the Far North District Council.

15. Important information continued...

Declaration

The information I have supplied with this application is true and complete to the best of my knowledge.

Name: (please write in full) Wayne Wiber - Trustee

Signature: [redacted]

Checklist (please tick if information is provided)

- ☑ Payment (cheques payable to Far North District Council)
- ☑ A current Certificate of Title (Search Copy not more than 6 months old)
- ○ Details of your consultation with Iwi and hapū
- ☑ Copies of any listed encumbrances, easements and/or consent notices relevant to the application
- ☑ Applicant / Agent / Property Owner / Bill Payer details provided
- ☑ Location of property and description of proposal
- ☑ Assessment of Environmental Effects
- ○ Written Approvals / correspondence from consulted parties
- ☑ Reports from technical experts (if required)
- ☑ Copies of other relevant consents associated with this application
- ○ Location and Site plans (land use) AND/OR
- ☑ Location and Scheme Plan (subdivision)
- ○ Elevations / Floor plans
- ○ Topographical / contour plans

Please refer to Chapter 4 of the District Plan for details of the information that must be provided with an application. Please also refer to the RC Checklist available on the Council's website. This contains more helpful hints as to what information needs to be shown on plans.

WM & TA Weber Trust

PROPOSED SUBDIVISION & LAND USE

17 Waters Lane, Kerikeri

PLANNER'S REPORT & ASSESSMENT OF ENVIRONMENTAL EFFECTS

Thomson Survey Ltd
Kerikeri

1.0 INTRODUCTION

1.1 The Proposal in Summary

The proposal is to carry out the subdivision of Lot 3 DP 170245, where one lot will accommodate the existing built development, and the other is vacant. Both lots are proposed to be in excess of 4,000m^2. The site is in the Rural Living Zone. A copy of the Scheme Plan(s) is/are attached in Appendix 1.

1.2 Related Consents

In conjunction with the subdivision application, there are two building consent proposals, either already underway, or about to be. One is for extensions to the existing residential unit's garaging area and hardstand area within proposed Lot 2; and the other is for a new 12m x 12m utility shed for a new shed (to be on the currently vacant proposed Lot 1). There are also architectural plans for the future dwelling to be on the vacant lot, for which a building consent application will be lodged after subdivision consent is issued.

1.3 Combined Consent approach

It is considered best practice to take into account total future impermeable and building coverage, as might occur on both new lots, when assessing the proposed subdivision for compliance against not only the subdivision rules in the Operative District Plan (ODP), but also zone rules. This enables Council to assess effects of current and future building projects, and will also allow future building projects to proceed in the knowledge that the necessary land use consents have been issued as part of this combined application.

As provided for by Rule 13.6.8 of the ODP, consent for a breach of the ODP's excavation and/or filling volume is also included in this application.

A compliance assessment followed in Section 5 of this report. In summary, the proposed buildings and impermeable surfaces will breach the zone's Stormwater Management (impermeable surface coverage) permitted and controlled activity thresholds. Total excavation and filling will exceed the zone's permitted volume. Consent is also sought for a breach of the zone's permitted activity threshold for Building coverage for proposed Lot 1.

Access is via Waters Lane, public road but seemingly not maintained by Council. The lower (additional) lot will utilise the same access before branching off with its own driveway into the building area within the lot.

1.4 Scope of this Report

This assessment and report accompanies the Resource Consent Application made by the applicant, and is provided in accordance with Section 88 and Schedule 4 of the Resource Management Act 1991. The application seeks consent to subdivide land in one title to create 2 lots, and for land use consent for existing and proposed building and impermeable coverage to be within one of the new lots. Overall the application is assessed as a discretionary activity.

The information provided in this assessment and report is considered commensurate with the scale and intensity of the activity for which consent is being sought. Applicant details are contained within the Application Form 9.

2.0 PROPERTY DETAILS

Location:	17 Waters Lane, Kerikeri. A location map is attached in Appendix 2.
Legal description:	Lot 3 DP 170245
Record of Title:	NA103D/512 with an area of 8763m^2. A copy is attached in Appendix 3, along with relevant legal interests.

3.0 SITE DESCRIPTION

3.1 Physical & Mapped characteristics

The property is at Waters Lane, public road coming off the eastern end of Waipapa Road, Kerikeri, where it intersects with Landing Road, approximately 700m east of the Kerikeri Heritage Bypass intersection. The property is below road level, accessed by right of way off the end of Waters Lane. The access driveway curves around through mature trees to access and existing residence and ancillary buildings, with hardstand parking and manouevring area. The existing dwelling is located at the south end of the site and has connection to the Council reticulated water network. The house has an existing on-site wastewater system, with disposal area down slope of the house.

The site is predominantly covered with grass, with boundary plantings. The site falls gently to the north and north-west, with slope gradients generally being less than 1V:7H.

Looking upslope, south, from northwestern corner of proposed Lot 1, towards existing development to be within Lot 2.

An existing overland flowpath runs downslope following the access, passes under the access and continues down slope on the adjacent property to the west.

The site is zoned Rural Living in the Operative District Plan (ODP) and Rural Residential in the Proposed District Plan. The site has no resource features or overlays in either plan. The site is not within a kiwi present or high density kiwi area.

3.2 Legal Interests on Titles

The property is subject to, and has appurtenant rights to, a number of easements and instruments, summarised below in tabular format.

Subject to		
Identifier	**Date Registered**	**Purpose**
C430273.3		Right of way, and telecommunications rights
C945054.2	1996	Right to drain stormwater and surface water in gross in favour of the FNDC
C945054.7	1996	Right of way, electricity, telecommunications and water rights
C973423.5	1996	Variation to conditions of C945054.7
Appurtenant		
752251.3		Water rights
594061.6		Water rights
B050589.4		Right to take and convey water
C945054.7	1996	Right of way, electricity, telecommunications and water rights
5498810.15	2003	Water supply

The property is also subject to two Fencing Covenants and a privately imposed Land Covenant.

Copies of relevant instruments (primarily the easements to which the site is 'subject') are attached as part of Appendix 3.

3.3 Consent History

Building consent history consists of:
ABA 930278
ABA 970536
BC-1993-278 for a barn (storage/implement shed);
BC-1997-536 for dwelling extensions.

The property was created pursuant to RC 1960005-RMASUB.

4.0 SCHEDULE 4 – INFORMATION REQUIRED IN AN APPLICATION

Clauses 2 & 3: Information required in all applications

(1) An application for a resource consent for an activity must include the following:	
(a) a description of the activity: .	Refer Sections 1 and 5 of this Planning Report.
(b) an assessment of the actual or	Refer to Section 6 of this Planning Report.

potential effect on the environment of the activity:	
(b) a description of the site at which the activity is to occur:	Refer to Section 3 of this Planning Report.
(c) the full name and address of each owner or occupier of the site:	This information is contained in the Form 9 attached to the application.
(d) a description of any other activities that are part of the proposal to which the application relates:	Refer to Sections 3 and 5 of this Planning Report for existing activities within the site. The application is for subdivision & land use under the ODP.
(e) a description of any other resource consents required for the proposal to which the application relates:	No other consents are required other than that being applied for pursuant to the Far North Operative District Plan.
(f) an assessment of the activity against the matters set out in Part 2:	Refer to Section 7 of this Planning Report.
(g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b), including matters in Clause (2): (*a) any relevant objectives, policies, or rules in a document; and* *(b) any relevant requirements, conditions, or permissions in any rules in a document; and* *(c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).*	Refer to Sections 5 & 7 of this Planning Report.
(3) An application must also include any of the following that apply:	
(a) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1)):	Refer sections 3 and 5. The site supports a residential dwelling and ancillary buildings, legally established. The application includes breaches for existing and future impermeable surface coverage within the lots, and for building coverage to be within Lot 1. The consent also includes earthworks.
(b) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)):	There is no existing resource consent. Not applicable.

(c) if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B)).	The site is not within an area subject to a customary marine title group. Not applicable.

Clause 4: Additional information required in application for subdivision consent

(4) An application for a subdivision consent must also include information that adequately defines the following:	
(a) the position of all new boundaries: *(b) the areas of all new allotments, unless the subdivision involves a cross lease, company lease, or unit plan:* *(c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips:* *(d) the locations and areas of any existing esplanade reserves, esplanade strips, and access strips:* *(e) the locations and areas of any part of the bed of a river or lake to be vested in a territorial authority under section 237A:* *(f) the locations and areas of any land within the coastal marine area (which is to become part of the common marine and coastal area under section 237A):* *(g) the locations and areas of land to be set aside as new roads.*	Refer to Scheme Plans in Appendix 1.

Clause 5: Additional information required for application for reclamation – not applicable.

Clause 6: Information required in assessment of environmental effects

(1) An assessment of the activity's effects on the environment must include the following information:	
(a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:	Refer to Section 7 of this planning report. The activity will not result in any significant adverse effect on the environment.
(b) an assessment of the actual or potential effect on the environment of the activity:	Refer to Section 6 of this planning report.
(c) if the activity includes the use of hazardous installations, an assessment	Not applicable as the application does not involve hazardous installations.

of any risks to the environment that are likely to arise from such use:	
(d) if the activity includes the discharge of any contaminant, a description of— *(i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and* *(ii) any possible alternative methods of discharge, including discharge into any other receiving environment:*	The subdivision does not involve any discharge of contaminant.
(e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:	Refer to Section 6 of this planning report.
(f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:	Refer to Section 8 of this planning report. No affected persons are identified.
g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:	No monitoring is required as the scale and significance of effects does not warrant any.
(h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).	No protected customary right is affected.

Clause 7: Matters that must be addressed by assessment of environmental effects (RMA)

(1) An assessment of the activity's effects on the environment must address the following matters:	
(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:	Refer to Sections 6 and 8 of this planning report and also to the assessment of objectives and policies in Section 7.
(b) any physical effect on the locality, including any landscape and visual effects:	Refer to Section 6. The proposed activity will have no more than minor effects on the physical environment and landscape and visual amenity values.
(c) any effect on ecosystems, including effects on plants or animals and any	Refer to Section 6. The proposal will have no more than minor effects on habitat and ecosystems.

physical disturbance of habitats in the vicinity:	
(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:	Refer to Section 6, and above comments
(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:	The subdivision will not result in the discharge of contaminants, nor any unreasonable emission of noise.
(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.	The subdivision site is not subject to natural hazards and does not involve hazardous installations.

5.0 ACTIVITY STATUS

5.1 Operative District Plan

The site is zoned Rural Living.

Subdivision:

Table 13.7.2.1: Minimum Lot Sizes

(i) RURAL LIVING ZONE

Controlled Activity Status (Refer also to 13.7.3)	**Restricted Discretionary Activity Status (Refer also to 13.8)**	**Discretionary Activity Status (Refer also to 13.9)**
The minimum lot size is 4,000m^2		The minimum lot size is 3,000m^2

The lots created are both in excess of 4,000m^2 – controlled activity.

Zone Rules

The proposed impermeable surface coverage to be within Lot 1 (currently vacant land) is estimated as 933m^2, or 21%, of the proposed lot area. This consists of a future swimming pool; gravelled areas and driveways, proposed shed and future dwelling. The coverage breaches both permitted and controlled Stormwater Management rules applying to the zone (**8.7.5.1.5 and 8.7.5.2.2**). The building coverage anticipated for Lot 1 is 12%, exceeding the zone's permitted building coverage threshold of 10% (**8.7.5.1.13**).

In addition, the existing and proposed impermeable surface coverage to be within Lot 2 is estimated to be 928m^2, or 21.4% of proposed lot area (Lot 2 containing the existing driveway impermeable coverage as well). This breaches both permitted and controlled Stormwater

Management rules applying to the zone (**8.7.5.1.5 and 8.7.5.2.2**). Building coverage to be within Lot 2 is estimated to be less than 10% of the proposed lot area (permitted).

In regard to other relevant zone rules, existing and future development on the lots can readily comply with 8.7.5.1.3 Building Height; 8.7.5.1.4 Sunlight; and 8.7.5.1.5 Setback from Boundaries.

District Wide Rules:

12.3.6.1.2 Excavation and/or Filling – Zone provides for up to 300m^3 in any 12 month period. Earthworks will be required for access / driveway formation and building platforms. The total volume is estimated to be 1,610m^3 (780m^3 cut and 830m^3 fill), with no cut/fill face exceeding 1.5m in height. Rule **12.3.6.1.2(a)** is therefore breached.

The site contains nothing to which other rules in Chapter 12 relate to in terms of landscape, natural character, indigenous vegetation or scheduled heritage items, or hazardous facilities or storage.

Rules in Chapter 15.1 Traffic, Parking and Access:

All access is existing. Waters Lane is vested Council road. However it does not appear to be maintained by the Council. It is 20m legal width and generally greater than 5m carriageway width. It serves two existing titles, one on either side, at or near its southern end. Beyond that, travelling north, it serves four titles including the application site (three of which are developed and one vacant). The large property to the west of the application site also has frontage to the legal road portion of Waters Lane, but does not utilise it, having direct road frontage to Landing Road further west. Although a Council vested and legal road, it legally serves seven titles (to become eight) and physically serves six titles (to become seven). Were this private access (and it appears it is regarded by the Council as such), the carriageway width requirement would be 5m. The carriageway width is believed to be 5m, with shallow swale drains on either side. I believe that Waters Lane is to the required standard for private access serving up to 8 titles.

At the culmination of Waters Lane, a driveway (ROW) continues down the slope. This legally serves three existing titles, to become four following the subdivision. The driveway is a minimum of 3m metal carriageway width. The ODP requires 3m plus passing bays. There is a wide bend where the application site intersects with ROW, where there is scope for a metalled passing bay/area to be formed if required. This is already within the application site, and access thereafter will only serve two lots. The first portion is metal surface, likely 3m carriageway width when formed, but now with vegetation cover on the edges. The second portion will serve only the existing house and is concrete surface. A new driveway will be formed off that to service the new lot. This is proposed to be metal surface.

I have not identified any access rule breaches.

Summary

Titles resulting from the proposal will all be in excess of the controlled activity minimum lot size applying to the zone. However, the proposal is a discretionary activity overall in terms of the Operative District Plan due to land use breaches in regard to stormwater management, building coverage and excavation/filling.

5.2 Proposed District Plan

The Proposed District Plan (PDP) was publicly notified on 27th July 2022. Legal effect must be given to a limited number of rules that the Council has identified in the PDP as having immediate legal effect. Such rules may affect activity status of an application.

In this instance I have examined the PDP, where the application site is zoned Rural Residential. There are no zone rules that have legal effect and therefore rules applying to the Rural Residential Zone do not have to be considered in regard this application, or its activity status.

In regard to district wide considerations in the PDP, the only rules in the Subdivision chapter that are marked as having immediate legal effect are those pertaining to Environmental Benefit Subdivisions (not applicable in this instance); Subdivision of a site within a heritage area overlay (not applicable); Subdivision of a site that contains a scheduled heritage resource (again not applicable); Subdivision of a site containing a scheduled site and area of significance to Maori (not applicable); and Subdivision of a site containing a scheduled SNA (not applicable).

There are two earthworks rules and associated standards in the PDP that have legal effect. The requirements of those rules – related to observance of the ADP, and G05 Erosion and Sediment Control standards, can be achieved via conditions of consent.

5.3 Weighting of the Plans

An application made under an ODP, but where there is a notified PDP in place, must be assessed against the objectives and policies of both plans. Where the outcomes sought are different under the Operative and Proposed plan frameworks, it is necessary to consider the weight to be given to each framework and which outcome should prevail. In this instance, the outcomes sought by the PDP's Rural Residential Zone are not, in my opinion, very different to those sought by the ODP's Rural Living Zone. Both are described as having the same purpose, and have a similar suite of objectives and policies.

Notwithstanding this, there remains uncertainty in applying PDP provisions given that the submissions and hearings process is yet to be completed. There is potential for change. As such, less emphasis should be placed on the PDP than the ODP at this point in time.

6.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS

This AEE is supported by a comprehensive Subdivision Site Suitability Report prepared by Trinekel dated 27/6/2025, and attached in Appendix 5. This has advised the following Assessment of Environmental Effects.

6.1 Allotment Sizes and Dimensions

Proposed Lot 2 is already developed. Although built form is being increased, the lot remains of a appropriate size and dimension to accommodate the proposed total building coverage. Proposed Lot 1 is considered to be of a size and dimension able to easily accommodate a 30m x 30m square building envelope complying with setback provisions (3m from boundaries).

6.2 Natural and Other Hazards

Refer to the Subdivision Suitability Report in Appendix 5, specifically Section 5. This assesses the risk of all but one natural hazard as "low". The exception is drought, where the risk is assessed as "moderate". The lot is served by a Council connection. In addition, future lot owners can install on site water storage. In summary there is no reason under s106 of the RMA to withhold consent.

6.3 Water Supply

Refer to the Subdivision Suitability Report's Section 10. The application site has a connection to the Council's reticulated water supply, at Waters Lane. This will remain for Lot 2. The applicant intends that roof runoff from a future dwelling on Lot 1 be collected in rainwater tanks for use as a potable water supply. It is proposed to have on-site fire fighting water supply available, although it is noted that the proposed new dwelling to be within Lot 1 will have swimming pool water as supplementary fire fighting supply.

6.4 Energy Supply & Telecommunications

The property is zoned Rural Living, a non-urban zone where power and telecommunications are not a requirement at time of subdivision. Notwithstanding this, both Top Energy and Chorus have been consulted, with the results of that consultation attached in Appendix 4.

6.5 Stormwater Disposal

Refer to Subdivision Suitability Report, Section 11. This assesses stormwater management per new lot, on the basis of approximately 21% site coverage per lot. The primary objective of the proposed stormwater management was to demonstrate that additional runoff generated by the development could safely and effectively be discharged to the existing receiving environment without causing any negative downstream flooding, erosion, or ponding effects on neighbouring properties.

Based on the findings of the stormwater management assessment, on-site attenuation is not required for the proposed development. There will be "no negative impact on the receiving

environment. The downstream overland flow path has specifically been demonstrated to have ample hydraulic and attenuation capacity to safely collect and convey the existing catchment, and additional runoff generated by the proposed development" (quoted from SS Report, Section 11.6).

The report concludes that "Accordingly, both proposed lots may implement non-attenuative, low-impact stormwater mitigation measures, such as water tanks, level spreaders, or rip-rap lined discharge points, to manage runoff safely and in alignment with performance-based design principles". (quoted from SS Report, Section 11.6). No further stormwater reporting will be required at building consent stage.

6.6 Sanitary Sewage Disposal

Refer to Subdivision Suitability Report, Section 9. Lot 2's existing residential dwelling has an existing system in place. Site inspection showed that the disposal area will be entirely within new lot boundaries.

An assessment of a proposed system for Lot 1 shows compliance with the NRC's Permitted Activity standards for **primary treatment**. Both a disposal and reserve disposal field can be readily accommodated within new lot boundaries. All offsets can be achieved.

6.7 Easements for any purpose

The scheme plan(s) attached in Appendix 1 show existing easement A. This provides for right of way and services to Lot 4 DP 170245 and will continue to do so. It also accommodates an easement in gross in favour of the Council for drainage. This too will remain.

Easement A and new easement B are proposed to provide access and services to new Lot 1, over Lot 2.

6.8 Property Access

All access is existing as far as the new proposed boundary of Lot 1. Effectively one additional residential unit will utilise the existing access. Private driveway will then be formed down the leg-in of Lot 1 to access firstly the shed for which building consent is currently being prepared/lodged, and then the future dwelling.

Waters Lane is of sufficient width to accommodate two way traffic. Once beyond Waters Lane and onto right of way, the carriageway width remains at 3m metal, but likely wider original metal surface, now under grass coverage. Refer to second photo below.

There is extra width within ROW A where the access curves around a right hand bend, that would enable two way vehicle passage (see above photo), but currently no further widening/passing area between there and the existing house. ROW B is less than 60m to the point where Lot 1's driveway will start, with no visibility issues.

Waters Lane / Waipapa Road intersection

Existing appurtenant right of way, leading into the bend

I believe access to the new lot can be provided for in a safe manner without adverse effects on other road and access users.

6.9 Effects of Earthworks

Very little earthworks will be required to give effect to the subdivision, however, account has been taken of earthworks required to construct a new shed on Lot 1, and to facilitate future development (a house). Refer to Subdivision Suitability Report, Section 8.

The works are considered "lot geotechnical complexity, taking place on stable terrain with no identified geohazards or known geotechnical constraints". Erosion and Sediment Control measures are outlined in Table 5, Section 8.2 of the Subdivision Suitability Report.

6.10 Building Locations

There are no constraints as to the location of a building within the vacant lot, in terms of physical attributes such as flood risk, ground conditions or any other natural hazard.

6.11 Preservation and enhancement of heritage resources (including cultural), vegetation, fauna and landscape, and land set aside for conservation purposes

The site is zoned Rural Living under the ODP, and Rural Residential under the PDP. The site is not mapped as containing any heritage / cultural resources. It does not contain indigenous vegetation of any note or quantity, nor habitat for indigenous fauna. The site has no landscape values and there is no land set aside for conservation purposes.

The site is not mapped as supporting kiwi. The site is semi-urban and not zoned for rural use. It is highly unlikely that any properties in the general area, already developed for residential use, are subject to any restrictions on the keeping of cats or dogs. It is not considered necessary to impose any such restriction in the case of this subdivision.

6.12 Soil

The site is zoned for large lot living as opposed to productive use. The PDP reinforces this zoning and the intent of Council to see large lot residential development in the area of the application site. The proposal enables additional large lot residential development, with scope remaining within each site for gardens and amenity planting. The life supporting capacity of soils will not be unduly compromised.

6.13 Access to, and protection of, waterbodies

The site has no boundary with a qualifying waterbody that would require the provision of access. Comprehensive site suitability reporting verifies that the vacant lot can be developed with appropriately designed wastewater and stormwater management such that there will be less than minor off-site effects on any waterbodies.

6.14 Land use compatibility (reverse sensitivity)

The area is predominantly large lot residential in nature, with a vacant pasture next door (albeit with the same Rural Living zoning). The proposal will not create additional or adverse land use compatibility issues.

6.15 Proximity to Airports

The site is outside of any identified buffer area associated with the Bay of Islands Airport.

6.16 Natural Character of the Coastal Environment

The site is not within the coastal environment.

6.17 Energy Efficiency and renewable Energy Development/Use

These aspects were not considered as part of this proposal.

6.18 National Grid Corridor

The National Grid does not run through the application site.

6.19 Effects on Character and Amenity (relevant to Building Coverage rule breach)

The site is one of the bigger sites in the area remaining large enough to support a controlled activity subdivision. The proposal creates lots that meet the controlled activity size, and the density level complies with the zone's permitted standard for residential intensity (1 : 4,000m^2).

The site is attractively landscaped with mature vegetation and gardens adding to the site's amenity. The proposed vacant lot is currently bare grass, however once developed it too will have landscape plantings and boundary plantings. This will ensure the maintenance of the amenity and character values found in the immediate area.

6.20 Other Matters

Cumulative Effect:

Given that the lot size and residential intensity level proposed both meet the ODP's controlled and permitted activity thresholds, no adverse cumulative effects arise in regard to overall density level. Similarly traffic generation remains comfortably within the ODP's permitted daily traffic movement threshold for the zone. Whilst there are breaches of the zone's impermeable surface coverage rules, the breaches are relatively minor and effects are readily mitigated.

Precedent Effect:

Precedent effects are not amongst those effects to be considered when determining the level of effects on the wider environment for the purposes of assessing whether notification is required. They are instead a matter for consideration when a consent authority is considering whether or not to grant a consent. Consideration of precedent effects is generally restricted to non complying activities, which this application is not. There are numerous lots in the vicinity of same or similar size. No adverse precedent will be set by Council granting this consent.

7.0 STATUTORY ASSESSMENT

7.1 Operative District Plan Objectives and Policies

Objectives and policies relevant to this proposal are considered to be primarily those listed in Chapters 8.7 (Rural Living Zone); and 13 (Subdivision), of the District Plan.

Subdivision Objectives & Policies

Objectives

13.3.1 To provide for the subdivision of land in such a way as will be consistent with the purpose of the various zones in the Plan, and will promote the sustainable management of the natural and physical

resources of the District, including airports and roads and the social, economic and cultural well being of people and communities

This is an enabling objective. The Rural Living Zone is a transition zone designed to provide a transition from rural land use to urban, predominantly located adjacent to existing urban areas. Waters Lane is a large lot area, adjacent to as yet undeveloped pasture at its northern end, albeit that land is zoned for Rural Living, just as the application site is. The creation of an additional lot in this location provides for the social and economic well being of people and communities.

Significant adverse effects on the natural and physical environment can be avoided, remedied or mitigated. The proposed subdivision promotes sustainable management and is an efficient use and development of the land. In providing for residential use in the circumstances outlined above, I do not believe the proposal to be contrary to Objective 13.3.1.

13.3.2 To ensure that subdivision of land is appropriate and is carried out in a manner that does not compromise the life-supporting capacity of air, water, soil or ecosystems, and that any actual or potential adverse effects on the environment which result directly from subdivision, including reverse sensitivity effects and the creation or acceleration of natural hazards, are avoided, remedied or mitigated.

The Assessment of Environmental Effects, and supporting reports, concludes that the proposed subdivision is appropriate for the site and that any actual or potential adverse effects can be avoided, remedied or mitigated.

13.3.3 To ensure that the subdivision of land does not jeopardise the protection of outstanding landscapes or natural features in the coastal environment.

The site is not mapped as containing any outstanding landscape or natural feature and is not in the coastal environment.

13.3.4 To ensure that subdivision does not adversely affect scheduled heritage resources through alienation of the resource from its immediate setting/context.

The site is not within a heritage precinct and contains no scheduled heritage resources.

13.3.5 To ensure that all new subdivisions provide a reticulated water supply and/or on-site water storage and include storm water management sufficient to meet the needs of the activities that will establish all year round.

And

13.4.8 That the provision of water storage be taken into account in the design of any subdivision.

The application site has connection to Council's reticulated water supply. However, it is proposed that the vacant lot utilise on-site water storage. Provision can be made for on-site fire fighting water supply.

13.3.6 To encourage innovative development and integrated management of effects between subdivision and land use which results in superior outcomes to more traditional forms of subdivision, use

and development, for example the protection, enhancement and restoration of areas and features which have particular value or may have been compromised by past land management practices.

This objective is likely intended to encourage Management Plan applications, and does not have a lot of relevance to this proposal.

13.3.7 To ensure the relationship between Maori and their ancestral lands, water, sites, wahi tapu and other taonga is recognised and provided for.

And related Policy

13.4.11 That subdivision recognises and provides for the relationship of Maori and their culture and traditions, with their ancestral lands, water, sites, waahi tapu and other taonga and shall take into account the principles of the Treaty of Waitangi.

The site is not known to contain any sites of cultural significance to Maori, or wahi tapu. The site does not adjoin any waterbody. The vacant lot can accommodate an onsite wastewater treatment and disposal system in compliance with Regional Plan requirements and with no off site adverse effects. Stormwater management can also be provided for. I do not believe that the proposal adversely impacts on the ability of Maori to maintain their relationship with ancestral lands, water, sites, wahi tapu and other taonga.

13.3.8 To ensure that all new subdivision provides an electricity supply sufficient to meet the needs of the activities that will establish on the new lots created.

There is existing reticulated power connection to the site.

13.3.9 To ensure, to the greatest extent possible, that all new subdivision supports energy efficient design through appropriate site layout and orientation in order to maximise the ability to provide light, heating, ventilation and cooling through passive design strategies for any buildings developed on the site(s).

13.3.10 To ensure that the design of all new subdivision promotes efficient provision of infrastructure, including access to alternative transport options, communications and local services.

A future lot owner will have sufficient scope within the site to include energy efficiencies within their individual home designs, via active means such as solar panels, or passive design strategies such as sky lights and orientation.

The subdivision is close to the Kerikeri township, road network and walking and cycling networks.

Objective 13.3.11 is not discussed further as there is no National Grid on or near the subject site.

Policies

13.4.1 That the sizes, dimensions and distribution of allotments created through the subdivision process be determined with regard to the potential effects including cumulative effects, of the use of those allotments on:
(a) natural character, particularly of the coastal environment;
(b) ecological values;

(c) landscape values;
(d) amenity values;
(e) cultural values;
(f) heritage values; and
(g) existing land uses.

The values outlined above, along with existing uses, have been discussed earlier in this report. I believe regard has been had to items (a) through (g) in the design of the subdivision.

13.4.2 That standards be imposed upon the subdivision of land to require safe and effective vehicular and pedestrian access to new properties. And

13.4.5 That access to, and servicing of, the new allotments be provided for in such a way as will avoid, remedy or mitigate any adverse effects on neighbouring property, public roads (including State Highways), and the natural and physical resources of the site caused by silt runoff, traffic, excavation and filling and removal of vegetation.

Access to the site is off an existing public road (sealed). Appropriate sediment and erosion control measures will be put in place for any earthworks during site works.

13.4.3 That natural and other hazards be taken into account in the design and location of any subdivision.

The site is not subject to any hazard that precludes future development.

13.4.4 That in any subdivision where provision is made for connection to utility services, the potential adverse visual impacts of these services are avoided.

Internal to the site, utility services will be / are underground.

13.4.6 That any subdivision proposal provides for the protection, restoration and enhancement of heritage resources, areas of significant indigenous vegetation and significant habitats of indigenous fauna, threatened species, the natural character of the coastal environment and riparian margins, and outstanding landscapes and natural features where appropriate.

The site does not contain any scheduled heritage resource or area of significant indigenous vegetation or habitat. The site is not within the coastal environment.

13.4.13 Subdivision, use and development shall preserve and where possible enhance, restore and rehabilitate the character of the applicable zone in regards to ***s6 matters****. In addition subdivision, use and development shall avoid adverse effects as far as practicable by using techniques including:*
(a) clustering or grouping development within areas where there is the least impact on natural character and its elements such as indigenous vegetation, landforms, rivers, streams and wetlands, and coherent natural patterns;
(b) minimising the visual impact of buildings, development, and associated vegetation clearance and earthworks, particularly as seen from public land and the coastal marine area;
(c) providing for, through siting of buildings and development and design of subdivisions, legal public right of access to and use of the foreshore and any esplanade areas;
(d) through siting of buildings and development, design of subdivisions, and provision of access that recognise and provide for the relationship of Maori with their culture, traditions and taonga including concepts of mauri, tapu, mana, wehi and karakia and the important contribution Maori culture makes

to the character of the District (refer Chapter 2 and in particular Section 2.5 and Council's "Tangata Whenua Values and Perspectives" (2004);
(e) providing planting of indigenous vegetation in a way that links existing habitats of indigenous fauna and provides the opportunity for the extension, enhancement or creation of habitats for indigenous fauna, including mechanisms to exclude pests;
(f) protecting historic heritage through the siting of buildings and development and design of subdivisions.
(g) achieving hydraulic neutrality and ensuring that natural hazards will not be exacerbated or induced through the siting and design of buildings and development.

S6 matters (National Importance) are addressed later in this report.

In addition:

(a) The proposal will create one additional dwelling in an area with an existing large lot residential character, in a manner that has little or no impact on natural character values, indigenous vegetation, landforms, rivers, streams or wetlands;
(b) The site does not directly adjoin any stream or river and no public access is therefore required;
(c) The proposal is not believed to negatively impact on the relationship of Maori with their culture;
(d) There are no existing significant habitat or areas of significant indigenous vegetation;
(e) There are no scheduled heritage resources on the site; and
(f) Stormwater management had been / can be appropriate designed; and
(g) The site is not subject to any hazard that prevents the lots' future development.

I consider the proposal to be consistent with Policy 13.4.13.

13.4.14 That the objectives and policies of the applicable environment and zone and relevant parts of Part 3 of the Plan will be taken into account when considering the intensity, design and layout of any subdivision.

The subdivision has had regard to the underlying zone's objectives and policies.

13.4.15 That conditions be imposed upon the design of subdivision of land to require that the layout and orientation of all new lots and building platforms created include, as appropriate, provisions for achieving the following: (a) development of energy efficient buildings and structures; (b) reduced travel distances and private car usage; (c) encouragement of pedestrian and cycle use; (d) access to alternative transport facilities; (e) domestic or community renewable electricity generation and renewable energy use

The additional lots can readily provide for a house site with good access to sunlight and the ability to utilise energy efficiency measures. The site is close to transport networks.

In summary, I believe the proposal to be consistent with the above Objectives and Policies.

<u>Rural Living Zone Objectives and Policies</u>

Objectives:

8.7.3.1 To achieve a style of development on the urban periphery where the effects of the different types of development are compatible.

8.7.3.2 To provide for low density residential development on the urban periphery, where more intense development would result in adverse effects on the rural and natural environment.

I believe the proposed subdivision to be capable of providing for development that will be in keeping with, and compatible with, the character and amenity of the area.

And policies

8.7.4.1 That a transition between residential and rural zones is achieved where the effects of activities in the different areas are managed to ensure compatibility.

8.7.4.2 That the Rural Living Zone be applied to areas where existing subdivision patterns have led to a semi-urban character but where more intensive subdivision would result in adverse effects on the rural and natural environment.

See above comments under Objectives.

8.7.4.3 That residential activities have sufficient land associated with each household unit to provide for outdoor space, and where a reticulated sewerage system is not provided, sufficient land for onsite effluent disposal.

The proposed vacant lot retains sufficient land associated with a future household to provide outdoor space and sufficient land for onsite effluent disposal.

8.7.4.7 That provision be made for ensuring that sites, and the buildings and activities which may locate on those sites, have adequate access to sunlight and daylight.

A dwelling can be constructed on the vacant lot with adequate access to sunlight and daylight.

8.7.4.10 That provision be made to ensure a reasonable level of privacy for inhabitants of buildings on adjoining sites.

The privacy of inhabitants of buildings on adjoining sites is not adversely affected.

In summary, I believe the proposal to be consistent with the Rural Living Zone objectives and policies.

7.2 Proposed District Plan Objectives and Policies

The following is an assessment of the proposal against relevant objectives and policies in the PDP.

SUB-O1 *Subdivision results in the efficient use of land, which:*
a. achieves the objectives of each relevant zone, overlays and district wide provisions;
b. contributes to the local character and sense of place;
c. avoids reverse sensitivity issues that would prevent or adversely affect activities already established on land from continuing to operate;
d. avoids land use patterns which would prevent land from achieving the objectives and policies of the zone in which it is located;

e. does not increase risk from natural hazards or risks are mitigates and existing risks reduced; and
f. manages adverse effects on the environment.

The proposal achieves all of the above.

SUB-O2 *Subdivision provides for the:*
a. Protection of highly productive land; and
b. Protection, restoration or enhancement of Outstanding Natural Features, Outstanding Natural Landscapes, Natural Character of the Coastal Environment, Areas of High Natural Character, Outstanding Natural Character, wetland, lake and river margins, Significant Natural Areas, Sites and Areas of Significance to Māori, and Historic Heritage.

The site is not zoned production so there is no requirement to protect highly productive land. The site does not contain any Outstanding Natural Features, Outstanding Natural Landscapes, or Natural Character area. The site is not within the coastal environment.

SUB-O3 *Infrastructure is planned to service the proposed subdivision and development where:*
a. there is existing infrastructure connection, infrastructure should provided in an integrated, efficient, coordinated and future-proofed manner at the time of subdivision; and
b.where no existing connection is available infrastructure should be planned and consideration be given to connections with the wider infrastructure network.

The property is connected to Council's reticulated water and road network. Other services will be provided on-site.

SUB-O4
Subdivision is accessible, connected, and integrated with the surrounding environment and provides for:
a. public open spaces;
b. esplanade where land adjoins the coastal marine area; and
c. esplanade where land adjoins other qualifying waterbodies

There is no requirement for esplanade.

SUB-P1 *Enable boundary adjustments that: .....*

Not relevant – application is not a boundary adjustment.

SUB-P2 *Enable subdivision for the purpose of public works, infrastructure, reserves or access.*

Not relevant – application does not involve public works, infrastructure, reserves or access lots.

SUB-P3 *Provide for subdivision where it results in allotments that:*
a. are consistent with the purpose, characteristics and qualities of the zone;
b. comply with the minimum allotment sizes for each zone;
c. have an adequate size and appropriate shape to contain a building platform; and
d. have legal and physical access.

The proposed allotments are consistent with the purpose, characteristics and qualities of the zone. The PDP proposes 4000m^2 sites as a controlled activity minimum lot size and all lots comply with that. Both lots can support a building platform and have legal and physical access.

SUB-P4

Manage subdivision of land as detailed in the district wide, natural environment values, historical and cultural values and hazard and risks sections of the plan

The site has existing access, contains no waterbodies, or areas of biodiversity, or hazards, or heritage resources.

SUB-P5
Manage subdivision design and layout in the General Residential, Mixed Use and Settlement zone to provide for safe, connected and accessible environments by: .....

The site is not zoned any of the zones referenced by this Policy.

SUB-P6 *Require infrastructure to be provided in an integrated and comprehensive manner by:*
a. demonstrating that the subdivision will be appropriately serviced and integrated with existing and planned infrastructure if available; and
b. ensuring that the infrastructure is provided is in accordance the purpose, characteristics and qualities of the zone.

The site is serviced by Council's water supply, but not wastewater or stormwater. These can be provided for on site.

SUB- P7
Require the vesting of esplanade reserves when subdividing land adjoining the coast or other qualifying water bodies.

Not applicable.

SUB-P8 *Avoid rural lifestyle subdivision in the Rural Production zone unless the subdivision: ....*

Not applicable. The site is not zoned Rural Production.

SUB-P9
Avoid subdivision [sic] rural lifestyle subdivision in the Rural Production zone and Rural residential subdivision inthe Rural Lifestyle zone unless the development achieves the environmental outcomes required in the management plan subdivision rule.

The site is not zoned either Rural Production or Rural Lifestyle and the subdivision is not a Management Plan.

SUB-P10
To protect amenity and character by avoiding the subdivision of minor residential units from principalresidential units where resultant allotments do not comply with minimum allotment size and resi dential density.

Not applicable. There are no minor residential units.

SUB-P11
Manage subdivision to address the effects of the activity requiring resource consent including (but not limited to) consideration of the following matters where relevant to the application:
a.consistency with the scale, density, design and character of the environment and purpose of the zone;
b. the location, scale and design of buildings and structures;
c.the adequacy and capacity of available or programmed development infrastructure to accommodate the proposed activity; or the capacity of the site to cater for on-site infrastructure associated with the proposed activity;
d. managing natural hazards;

e. Any adverse effects on areas with historic heritage and cultural values, natural features and landscapes, natural character or indigenous biodiversity values; and
f. any historical, spiritual, or cultural association held by tangata whenua, with regard to the matters set out in Policy TW-P6.

I believe the proposal has adequately taken into account all of the matters listed above.

In summary I believe the proposed subdivision to be consistent with the PDP's objectives and policies in regard to subdivision.

Rural Residential Zone Objectives:

RRZ-O1 *The Rural Residential zone is used predominantly for rural residential activities and small scale farming activities that are compatible with the rural character and amenity of the zone.*

RRZ-O2 *The predominant character and amenity of the Rural Residential Zone is maintained and enhanced, which includes:*
a. peri-urban scale residential activities;
b. small-scale farming activities with limited buildings and structures;
c. smaller lot sizes than anticipated in the Rural Production or Rural Lifestyle Zones; and
d. a diverse range of rural residential environments reflecting the character and amenity of the adjacent urban area.

RRZ-O3 *The Rural Residential zone helps meet the demand for growth around urban centres while ensuring the ability of the land to be rezoned for urban development in the future is not compromised.*

RRZ-O4 *Land use and subdivision in the Rural Residential zone:*
a. maintains rural residential character and amenity values;
b. supports a range of rural residential and small-scale farming activities; and
c. is managed to control any reverse sensitivity issues that may occur within the zone or at the zone interface.

The site is utilised for residential living (RRZ-O1). The predominant character and amenity of the zone and immediate vicinity is not adversely affected (RRZ-O2). The site is already partially developed, supporting residential living (RRZ-O3). There is high demand for residential living in locations such as this, with ready access to road and footpaths and not far from the town centre. I do not believe the proposal significantly adds to reverse sensitivity effects (RRZ-O4).

RRZ-P1 *Enable activities that will not compromise the role, function and predominant character and amenity of the Rural Residential Zone, while ensuring their design, scale and intensity is appropriate, including:*
a. rural residential activities;
b. small-scale farming activities;
c. home business activities;
d. visitor accommodation; and
e. small-scale education facilities.

RRZ-P2 *Avoid activities that are incompatible with the role, function and predominant character and amenity of the Rural Residential Zone including:*
a. activities that are contrary to the density anticipated for the Rural Residential Zone;
b. primary production activities, such as intensive indoor primary production or rural industry, that generate adverse amenity effects that are incompatible with rural residential activities; and

c. commercial or industrial activities that are more appropriately located in an urban zone or a Settlement Zone.

RRZ-P3 *Avoid where possible, or otherwise mitigate, reverse sensitivity effects from sensitive and other non-productive activities on primary production activities in adjacent Rural Production Zones and Horticulture Zones.*

RRZ-P4 *Require all subdivision in the Rural Residential zone to provide the following reticulated services to the boundary:*
a. telecommunications:
i. fibre where it is available;
ii. copper where fibre is not available;
iii. copper where the area is identified for future fibre deployment.
b. local electricity distribution network.

RRZ-P5 *Manage land use and subdivision to address the effects of the activity requiring resource consent, including (but not limited to) consideration of the following matters where relevant to the application:*
a. consistency with the scale and character of the rural residential environment;
b. location, scale and design of buildings or structures;
c. at zone interfaces:
i. any setbacks, fencing, screening or landscaping required to address potential conflicts;
ii. the extent to which adverse effects on adjoining or surrounding sites are mitigated and internalised within the site as far as practicable;
d. the capacity of the site to cater for on-site infrastructure associated with the proposed activity;
e. the adequacy of roading infrastructure to service the proposed activity;
f. managing natural hazards;
g. any adverse effects on historic heritage and cultural values, natural features and landscapes or indigenous biodiversity; and
h. any historical, spiritual, or cultural association held by tangata whenua, with regard to the matters set out in Policy TW-P6.

The land use on the site is residential, with the likely use of the additional lot to also be residential. This is an activity expected in the zone (RRZ-P1). The existing land use is not incompatible with the role, function and predominant character and amenity of the zone (RRZ-P2). Reverse sensitivity effects are not significantly added to given the existing land uses around the site (RRZ-P3). In addition the area is not 'zoned' under the PDP for continued rural production use. Services are available or can be provided on site (RRZ-P4). All of the matters in RRZ-P6, where relevant, have been considered and the proposal is considered consistent with the policy.

I consider the proposal consistent with the above relevant objective and policies.

7.3 Part 2 Matters

5 Purpose

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.

The proposal provides for peoples' social and economic well being, and for their health and safety, while sustaining the potential of natural and physical resources, safeguarding the life-supporting capacity of air, water, soil and the ecosystems; and avoiding, remedying or mitigating adverse effects on the environment.

6 Matters of national importance
In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:
(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:
(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:
(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:
(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:
(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:
(f) the protection of historic heritage from inappropriate subdivision, use, and development:
(g) the protection of protected customary rights:
(h) the management of significant risks from natural hazards.

The proposal is appropriate for the site. The site contains none of the items listed under s6.

7 Other matters
In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—
(a) kaitiakitanga:
(aa) the ethic of stewardship:
(b) the efficient use and development of natural and physical resources:
(ba) the efficiency of the end use of energy:
(c) the maintenance and enhancement of amenity values:
(d) intrinsic values of ecosystems:
(e) [Repealed]
(f) maintenance and enhancement of the quality of the environment:
(g) any finite characteristics of natural and physical resources:
(h) the protection of the habitat of trout and salmon:
(i) the effects of climate change:
(j) the benefits to be derived from the use and development of renewable energy.

Regard has been had to any relevant parts of Section 7 of the RMA, "Other Matters". These include 7(b), (c), (d) and (f). It is considered that the proposal represents efficient use and development of a site. Proposed layout and plantings, along with waste water and stormwater management proposals, will ensure the maintenance of amenity values and the quality of the environment. The proposal has had regard to the values of ecosystems.

8 Treaty of Waitangi

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

The principles of the Treaty of Waitangi have been considered and it is believed that this proposed subdivision does not offend any of those principles.

In summary, it is considered that all matters under s5-8 inclusive have been adequately taken into account.

7.4 National Environmental Standards

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES-CS) is not relevant as I can find no evidence to suggest the site has ever been used for horticulture. There is no natural inland wetland on the site to which the NES Freshwater would apply, and no areas of significant indigenous vegetation.

7.5 National and Regional Policy Statements

I have not identified any national policy statements relevant to this proposal. The site is not zoned General Rural or Rural Production in either the Operative or Proposed District Plan and therefore the NPS Highly Productive Land does not apply. No indigenous vegetation is affected and therefore the NPS Indigenous Biodiversity is not relevant.

The Regional Policy Statement for Northland contains objectives and policies related to infrastructure and regional form and economic development. These are enabling in promoting sustainable management in a way that is attractive for business and investment. The proposal is consistent with these objectives and policies.

The RPS also has policies ensuring that productive land is not subject to fragmentation and/or sterilisation to the point where productive capacity is materially reduced, and that reverse sensitivity effects be avoided, remedied or mitigated, however noting the area within which the site is located is no longer predominantly utilised for any productive use, and is not zoned Rural Production, these policies have limited relevance.

Objective 3.6 Economic activities – reverse sensitivity and sterilisation

The viability of land and activities important for Northland's economy is protected from the negative impacts of new subdivision, use and development, with particular emphasis on either:

(a) Reverse sensitivity for existing:

(i) Primary production activities; .....

In regard to this subdivision, it is considered that no significant additional reverse sensitivity issues arise as a result. The area around the site already supports residential use.

The associated Policy to the above Objective is ***Policy 5.1.1 – Planned and coordinated development***.

Subdivision, use and development should be located, designed and built in a planned and co-ordinated manner which: ....

(c) Recognises and addresses potential cumulative effects of subdivision, use, and development, and is based on sufficient information to allow assessment of the potential long-term effects; ...

(e) Should not result in incompatible land uses in close proximity and avoids the potential for reverse sensitivity;

I believe the creation of additional lots in an area already predominantly large lot residential in character, to be consistent with the above. In fill development such as that proposed has positive effects in that a future lot owner can utilise existing infrastructure already in place to support the area.

8.0 s95A-E ASSESSMENT & CONSULTATION

8.1 S95A Public Notification Assessment

A consent authority must follow the steps set out in s95A to determine whether to publicly notify an application for a resource consent. Step 1 specifies when public notification is mandatory in certain circumstances. None of these circumstances exist and public notification is not mandatory. Step 2 of s95A specifies the circumstances that preclude public notification. None of these exist, and public notification is therefore not precluded. Step 3 of s95A must then be considered. This specifies that public notification is required in certain circumstances, none of which exist. The application is not subject to a rule or national environmental standard that requires public notification. This report and AEE concludes that the activity will not have, nor is it likely to have, adverse effects on the environment that are more than minor. In summary public notification is not required pursuant to Step 3 of s95A.

8.2 S95B Limited Notification Assessment

A consent authority must follow the steps set out in s95B to determine whether to give limited notification of an application for a resource consent, if the application is not publicly notified pursuant to s95A. Step 1 identifies certain affected groups and affected persons that must be notified. No such groups or persons exist in this instance. Step 2 of s95B specifies the circumstances that preclude limited notification. No such circumstances exist and therefore limited notification is not precluded. Step 3 of s95B must be considered. This specifies that certain other affected persons must be notified. No affected persons have been identified.

8.3 S95D Level of Adverse Effects

The AEE in this report assesses effects on the environment and concludes that these will be less than minor. As such public notification is not required.

8.4 S95E Affected Persons & Consultation

A person is an 'affected person' if the consent authority decides that the activity's adverse effects on the person are minor or more than minor (but are not less than minor). A person is not an affected person if they have provided written approval for the proposed activity.

The activity is a discretionary activity solely because of impermeable surface coverage and building coverage. The lot size, additional traffic movements, and level of residential intensity being proposed all comply with the ODP. The effects of impermeable surface breaches can be appropriate managed such that there are no off-site adverse effects. The effects of the minor breach of the building coverage rule can also be adequately mitigated such that no adverse off-site effects are created. The vacant lot, to which the building coverage breach relates, is adjacent to vacant land on all boundaries except the other lot being created by the subdivision. In summary, I have not identified any affected persons in regard to adjacent properties.

No pre lodgement consultation has been considered necessary with tangata whenua, Heritage NZ, Department of Conservation or NZTA Waka Kotahi.

9.0 CONCLUSION

The site is considered suitable for the proposed subdivision. Effects on the wider environment are less than minor. The proposal is considered consistent with the relevant objectives and policies of the Operative and Proposed District Plans, and relevant objectives and policies of the National and Regional Policy Statements, and consistent with Part 2 of the Resource Management.

There is no District Plan rule or national environmental standard that requires the proposal to be publicly notified. No affected persons have been identified.

It is requested that the Council give favourable consideration to this application and grant consent.

Signed Dated 18th July 2025
Lynley Newport,
Senior Planner
Thomson Survey Ltd

WM & TA Weber Trust

PROPOSED SUBDIVISION & LAND USE

17 Waters Lane, Kerikeri

PLANNER'S REPORT & ASSESSMENT OF ENVIRONMENTAL EFFECTS

Thomson Survey Ltd
Kerikeri

1.0 INTRODUCTION

1.1 The Proposal in Summary

The proposal is to carry out the subdivision of Lot 3 DP 170245, where one lot will accommodate the existing built development, and the other is vacant. Both lots are proposed to be in excess of 4,000m^2. The site is in the Rural Living Zone. A copy of the Scheme Plan(s) is/are attached in Appendix 1.

10.0 LIST OF APPENDICES

Appendix 1 Scheme Plan(s)

Appendix 2 Location Plan

Appendix 3 Record of Title & Easement Instruments

Appendix 4 Consultation with Top Energy and Chorus

Appendix 5 Site Suitability Report for proposed Subdivision

Appendix 1

Scheme Plan(s)

EXISTING EASEMENT

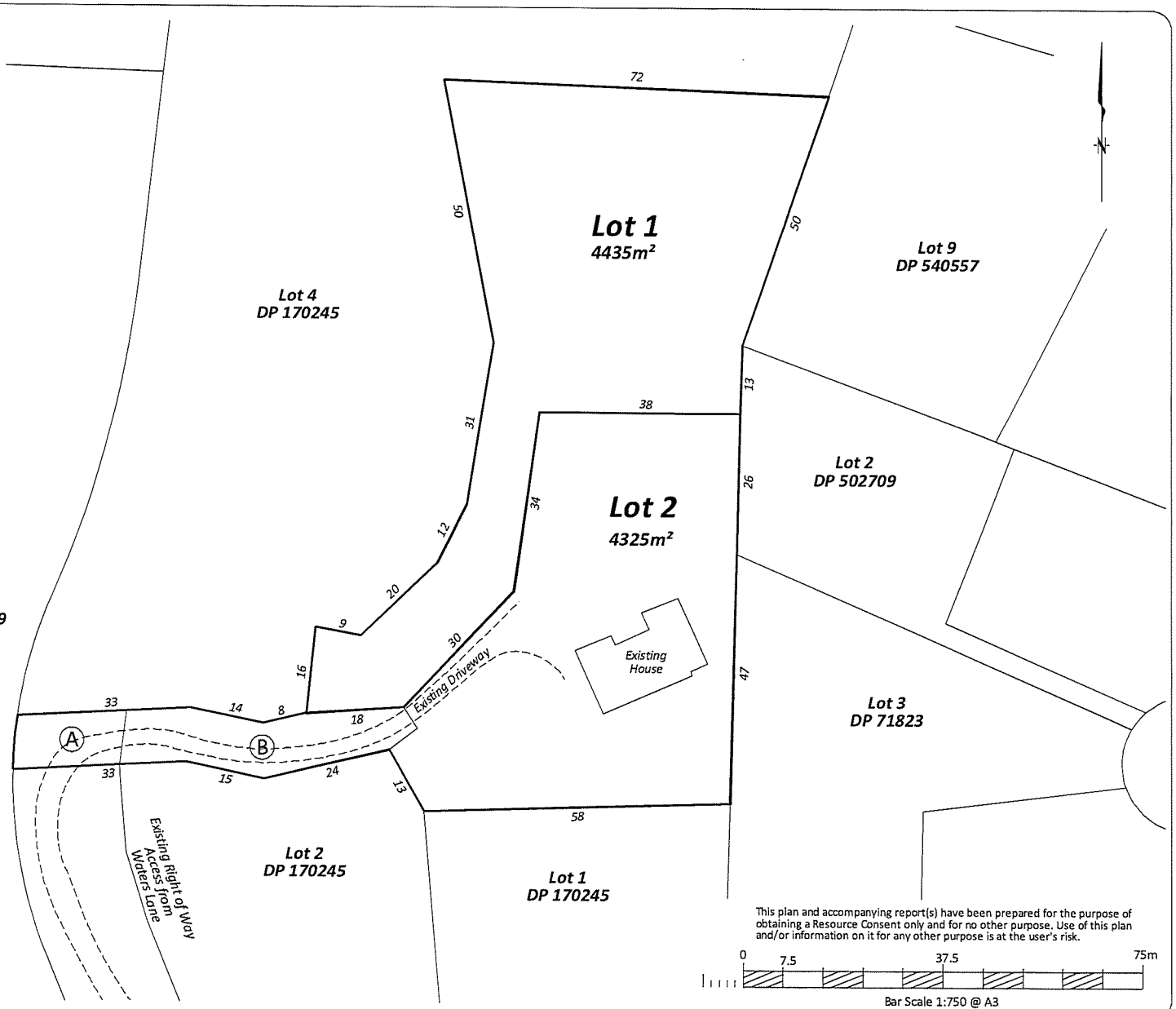
PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
RIGHT OF WAY & TELECOMMUNI-CATIONS	(A)	LOT 2 HEREON	C430273.3
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A)	LOT 2 HEREON	C945054.7

EXISTING EASEMENT IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
DRAIN STORMWATER & SURFACE WATER	(A)	LOT 2 HEREON	C945054.7

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A) (B)	LOT 2 HEREON	LOT 1 HEREON



Local Authority: Far North District Council
Comprised in: NA103D/512
Total Area: 8763m²
Zoning: Rural Living
Resource features: NIL

This plan and accompanying report(s) have been prepared for the purpose of obtaining a Resource Consent only and for no other purpose. Use of this plan and/or information on it for any other purpose is at the user's risk.

0 7.5 37.5 75m

Bar Scale 1:750 @ A3

THOMSON SURVEY LIMITED
315 Kerikeri Rd
P.O. Box 372 Kerikeri
Email: kerikeri@tsurvey.co.nz
Ph: (09) 4077360
www.tsurvey.co.nz
Registered Land Surveyors, Planners & Land Development Consultants

PROPOSED SUBDIVISION OF LOT 3 DP 170245

17 WATERS LANE, KERIKERI

PREPARED FOR: W. WEBER

	Name	Date
Survey		
Design		
Drawn	KY	06.03.25
Approved		
Rev		

ORIGINAL
SCALE 1:750
SHEET SIZE A3
10742 Scheme 20250306

Surveyors Ref. No: 10742

Sheet 1 of 1

EXISTING EASEMENT

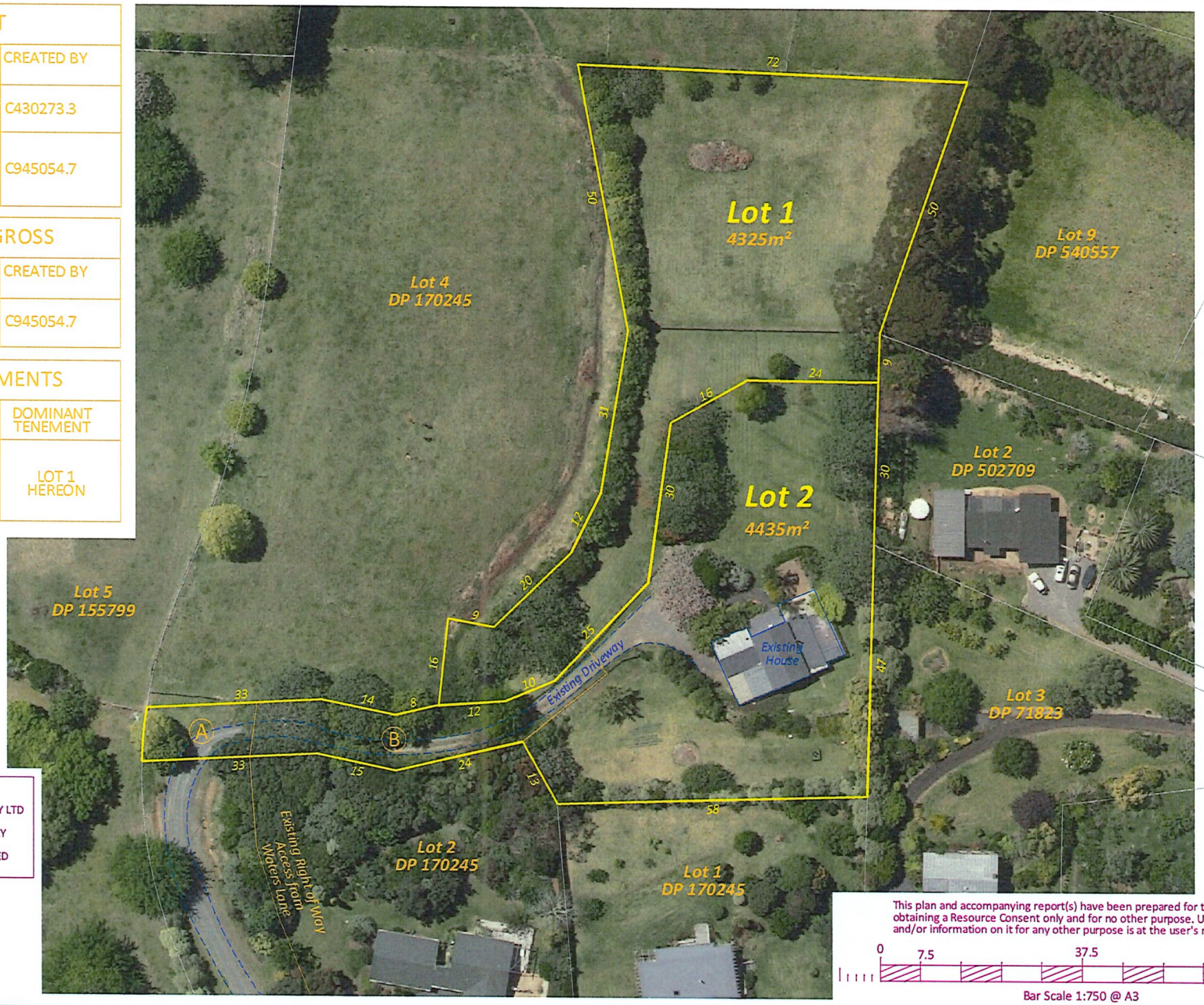
PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
RIGHT OF WAY & TELECOMMUNI-CATIONS	(A)	LOT 2 HEREON	C430273.3
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A)	LOT 2 HEREON	C945054.7

EXISTING EASEMENT IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
DRAIN STORMWATER & SURFACE WATER	(A)	LOT 2 HEREON	C945054.7

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A) (B)	LOT 2 HEREON	LOT 1 HEREON



Local Authority: Far North District Council
Comprised in: NA103D/512
Total Area: 8763m²
Zoning: Rural Living
Resource features: NIL

0 7.5 37.5 75m

Bar Scale 1:750 @ A3

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PROPOSED SUBDIVISION OF LOT 3 DP 170245

17 WATERS LANE, KERIKERI

PREPARED FOR: W. WEBER

	Name	Date
Survey		
Design		
Drawn	KY	06.03.25
Approved		
Rev	KY	10.03.25

10742 Scheme 20250310

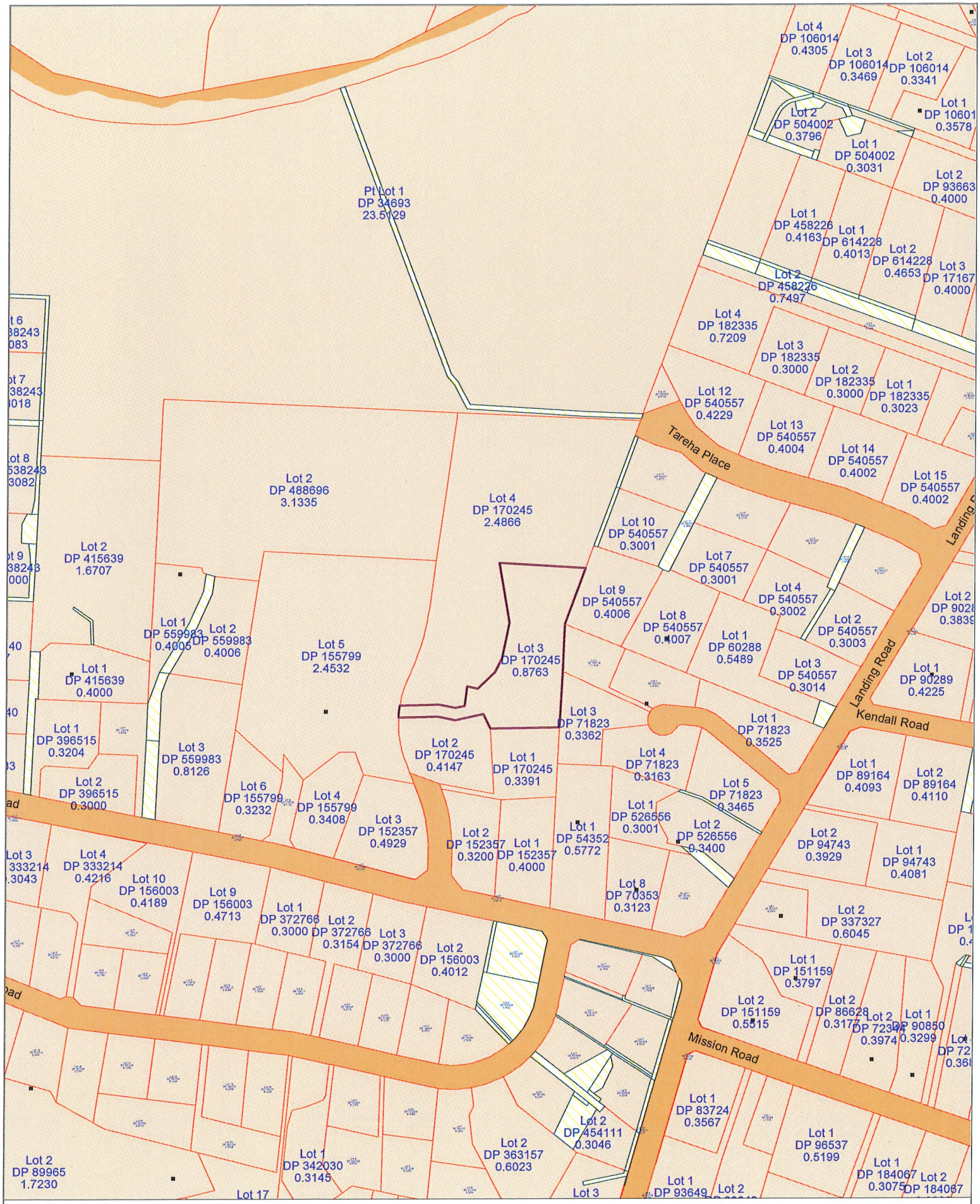
ORIGINAL
SCALE 1:750
SHEET SIZE A3

Surveyors Ref. No: 10742

Sheet 1 of 1

Appendix 2

Location Plan



QuickMap
Custom Software Ltd

0 50 100 150 200 250 300 350 400 450 500m

Any person wishing to rely on the information shown on this map must independently verify the information

Scale 1:4000 Topographical and Cadastral map derived from LINZ data. Printed: 17-Jul-2025 09:36.

Appendix 3

Record of Title & Easement Instruments

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**NA103D/512**
Land Registration District	**North Auckland**
Date Issued	22 January 1996

Prior References
NA91A/44

Estate	Fee Simple
Area	8763 square metres more or less
Legal Description	Lot 3 Deposited Plan 170245

Registered Owners
Wayne Michael Weber, Thyrl Ann Weber and Richard George Ashwell Palmer

Interests

Fencing Agreement in Transfer 290550

Land Covenant in Transfer C442154.1

Subject to a right of way and a telecommunication right over part marked B on DP 170245 specified in Easement Certificate C430273.3

The easements specified in Easement Certificate C430273.3 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto are water rights created by Transfer 752251.3

Appurtenant hereto is a water right created by Transfer 594061.6

Appurtenant hereto is a right to take and convey water created by Transfer B050589.4

C945054.2 Resolution pursuant to Section 321(3)(c) Local Government Act 1974 - 22.1.1996 at 3.10 pm

Subject to a right (in gross) to drain stormwater and surface water over part marked B on DP 170245 in favour of The Far North District Council created by Transfer C945054.6 - 22.1.1996 at 3.10 pm

The easements created by Transfer C945054.6 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right of way and electricity, telecommunications and water rights specified in Easement Certificate C945054.7 - 22.1.1996 at 3.10 pm

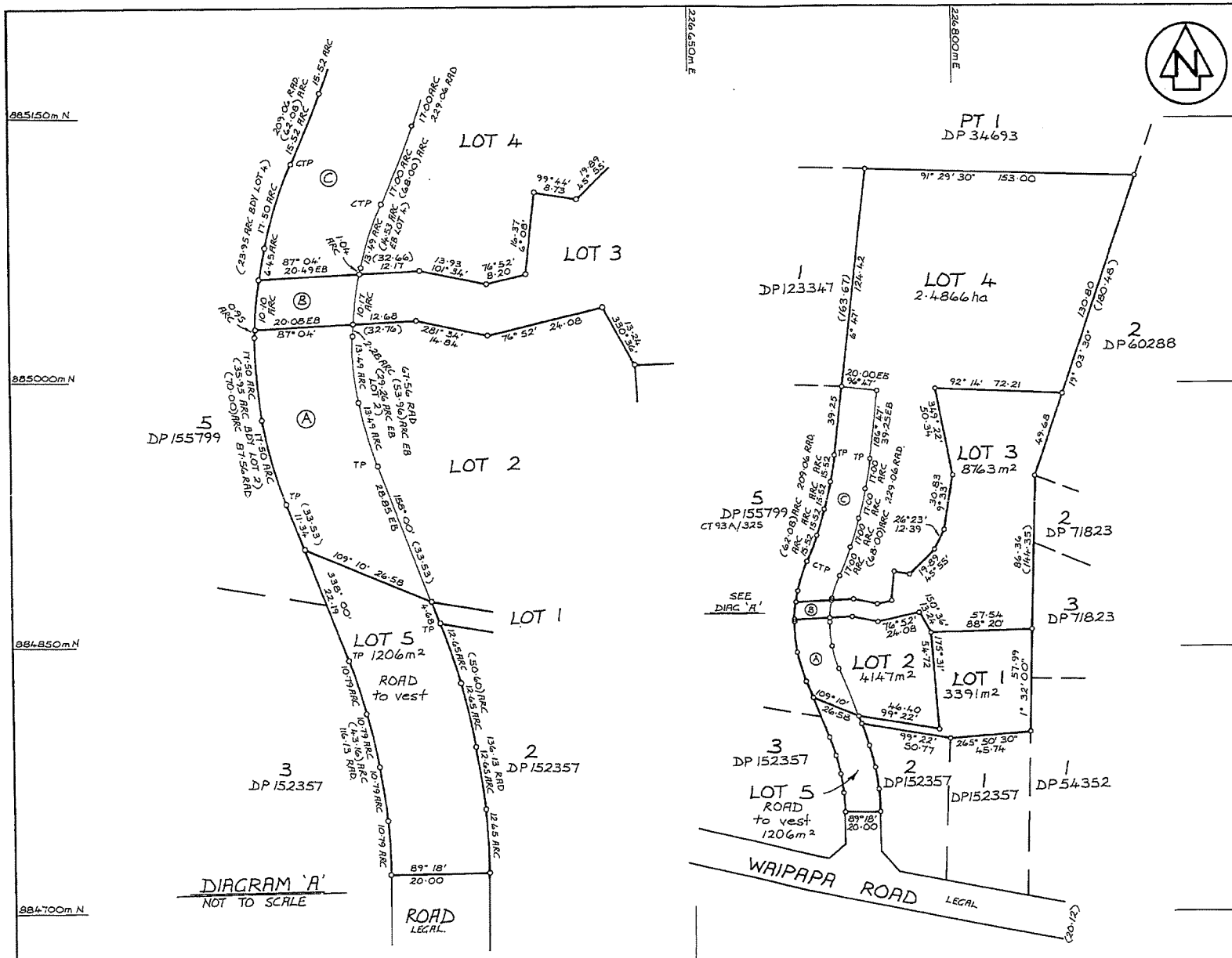
Subject to a right of way and to electricity, telecommunications and water rights over part marked B on DP 170245 specified in Easement Certificate C945054.7 - 22.1.1996 at 3.10 pm

The easements specified in Easement Certificate C945054.7 are subject to Section 243 (a) Resource Management Act 1991

C973423.5 Variation of the conditions of the easement specified in Easement Certificate C945054.7 - 27.3.1996 at 11.36 am

Fencing Covenant in Transfer 6472574.1 - 27.6.2005 at 9:00 am

13234106.2 Mortgage to ANZ Bank New Zealand Limited - 19.3.2025 at 3:35 pm



Approvals

REGISTERED OWNERS · M.W. SIMM & D.J.W. NICOLL

APPROVED PURSUANT TO SECTION 223 OF THE RESOURCE MANAGEMENT ACT 1991 ON THE 1st DAY OF September 1995 SUBJECT TO THE AMALGAMATION CONDITION SET OUT HEREON AND SUBJECT TO THE GRANTING OR RESERVING OF THE EASEMENTS SET OUT IN THE MEMORANDUM HEREON

THE COMMON SEAL OF THE FAR NORTH DISTRICT COUNCIL IS AFFIXED HERETO IN THE PRESENCE OF :-

AUTHORISED OFFICER (UNDER DELEGATED AUTHORITY)

AMALGAMATION CONDITION

THAT LOT 4 HEREON BE TRANSFERRED TO THE OWNER OF LOT 5 DP 155799 (CT 93A/325) AND THAT ONE CERTIFICATE OF TITLE BE ISSUED TO INCLUDE BOTH PARCELS

SEE :- A 631054

MEMORANDUM OF EASEMENTS.

PURPOSE	SERVIENT TENEMENT	SHOWN	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO TRANSMIT ELECTRICITY & TELECOMMUNICATIONS & RIGHT TO CONVEY WATER	LOT 2 HEREON	A	LOTS 3 & 4 HEREON
	LOT 3 HEREON	B	LOT 4 HEREON

MEMORANDUM OF EASEMENTS IN GROSS

PURPOSE	SERVIENT TENEMENT	SHOWN	GRANTEE
RIGHT TO DRAIN WATER	LOT 3 HEREON	B	FAR NORTH DISTRICT COUNCIL

EXISTING EASEMENTS

PURPOSE	SHOWN	CREATED BY
RIGHT OF WAY TELECOMMUNICATIONS	A B C	C 442154.1

LAND COVENANT IN C.442154.1

NEW C's T ALLOCATED.
LOT 1 :- 103D/510 LOT 2 :- 103D/511
LOT 3 :- 103D/512 LOT 4 :- 103D/513

Total Area 4·2373 ha

Comprised in CT 91A/44 (All)

I, Robert John Donaldson

Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986) hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof.

Dated at Kerikeri this 31st day of August 1995 Signature R.J. Donaldson

Field Book ... p. Traverse Book ... p.

Reference Plans ...

Examined A.R. Callano Correct

Approved as to Survey

31/11/95

Chief Surveyor

Deposited this 2nd day of August 1995

District Land Registrar

File 2814

Received Instructions 19 SEP 1995

DP170245

LAND DISTRICT NORTH AUCKLAND

SURVEY BLK. & DIST. XI KERIKERI

NZMS 261 SHT ... RECORD MAP No ... KERIKERI 465

PLAN OF LOTS 1-5 BEING A SUBDIVISION OF LOT 5 DP 152357.

TERRITORIAL AUTHORITY FAR NORTH DISTRICT

Surveyed by R.J. DONALDSON & ASSOC.

Scale 1:1500 Date AUGUST 1995

W.A. ROBERTSON, SURVEYOR GENERAL, DEPARTMENT OF SURVEY AND LAND INFORMATION, NEW ZEALAND

BOSLI FORM D15 "APPROVED M 80/93"

AARQUE

CENTIMETRES

25 JAN 1996

C430273·3EC

Approved by the District Land Registrar, South Auckland No. 351560
Approved by the District Land Registrar, North Auckland, No. 4380/81
Approved by the Registrar-General of Land, Wellington, No. 436748.1/81

EASEMENT CERTIFICATE

(IMPORTANT: Registration of this certificate does not of itself create any of the easements specified herein).

I/We **BRIAN WILLIAM SAUNDERS** Landscaper and **KATHRYN JEAN SAUNDERS** Teacher both of Kerikeri

being the registered proprietor(s) of the land described in the Schedule hereto hereby certify that the easements specified in that Schedule, the servient tenements in relation to which are shown on a plan of survey deposited in the Land Registry Office at Auckland on the day of 19 under No. 152357 are the easements which it is intended shall be created by the operation of section 90A of the Land Transfer Act 1952.

SCHEDULE

DEPOSITED PLAN NO. 152357

Nature of Easement (e.g., Right of Way, etc.)	Servient Tenement		Dominant Tenement Lot No.(s) or other Legal Description	Title Reference
	Lot No.(s) or other Legal Description	Colour, or Other Means of Identification, of Part Subject to Easement		
Right-of-Way and right to convey telephonic communications	Lot 5 Deposited Plan 152357	(A)	Lot 4 Deposited Plan 152357	91A/43

State whether any rights or powers set out here are in addition to or in substitution for those set out in the Seventh Schedule to the Land Transfer Act 1952.

1. Rights and powers:

The rights and powers of the grantee under the right to convey telephonic communications specified in Schedule A hereof are the same rights and powers as those set out in Clauses 2 and 5 of the Seventh Schedule to the Land Transfer Act 1952 as if the words "telephonic communications" were inserted in lieu of the word "water" wherever the same appears in the said Clause 2 and as if the words "wires cables conduits and poles" were inserted in lieu of the words "line of pipes", "pipe or pipes" and "pipe line" wherever the same appear in the said Clause 5.

2. Terms, conditions, covenants, or restrictions in respect of any of the above easements: NIL

Dated this 22nd day of October 1992

Signed by the above-named

BRIAN WILLIAM SAUNDERS and

KATHRYN JEAN SAUNDERS

in the presence of

Witness .....

Occupation .....

Address .....

EASEMENT CERTIFICATE

(IMPORTANT): Registration of this certificate does not of itself create any of the easements specified herein.

Correct for the purposes of the Land Transfer Act

Solicitor for the registered proprietor

The within easements when created will be subject to Section 243(a) Resource Management Act 1991

McLEOD & PARTNERS
SOLICITORS
KERIKERI

PARTICULARS ENTERED IN REGISTER
LAND REGISTRY AUCKLAND
ASST. LAND REGISTRAR

9.10 12 NOV 92 C 430278

9A/43-44

5 E.C. 946

C945054.6 TE

TRANSFER

Land Transfer Act 1952

This page does not form part of the Transfer.

TRANSFER CREATING AN EASEMENT IN GROSS

Land Transfer Act 1952

If there is not enough space in any of the panels below, cross-reference to and use the approved Annexure Schedule: no other format will be received.

Land Registration District

NORTH AUCKLAND

Certificate of Title No.		All or Part?	Area and legal description — *Insert only when part or Stratum, CT*
103D	512	Part	8763 square metres being LOT 3 Deposited Plan 170245 (Part marked "B") (hereinafter called "the servient land")

Grantor
~~Transferor~~ *Surnames must be underlined*

MICHAEL WALLACE SIMM of Kerikeri, Manager and
LYNN MARIE SIMM his wife

Grantee
~~Transferee~~ *Surnames must be underlined*

THE FAR NORTH DISTRICT COUNCIL

Estate or Interest or Easement to be created: *Insert e.g. Fee simple; Leasehold in Lease No. .....; Right of way etc.*

Easement granting right to drain water

Consideration

$1.00 (ONE DOLLAR)

Operative Clause See page 2 of 2 herein

~~For the above consideration (receipt of which is acknowledged) the TRANSFEROR TRANSFERS to the TRANSFEREE all the~~ transferor's estate and interest in the land in the above Certificate(s) of Title and if an easement is described above such is ~~granted or created.~~

Dated this 9th day of January 1996

Attestation

Grantor
Signed in my presence by the ~~Transferor~~
Signature of Witness

Witness to complete in BLOCK letters
(unless typewritten or legibly stamped)

Witness name JANDOROTHY JONSON
Occupation Legal Executive to
Address LAW NORTH PARTNERS
Barristers & Solicitors,
KERIKERI.

Grantor
Signature, or common seal of ~~Transferor~~

Certified correct for the purposes of the Land Transfer Act 1952

Certified that Part IIA of the Land Settlement Promotion and Land Acquisition Act 1952 does not apply.
~~Certified that no conveyance duty is payable by virtue of Section 24(1) of the Stamp and Cheque Duties Act 197~~
(DELETE INAPPLICABLE CERTIFICATE)

Solicitor for the Transferee

OPERATIVE CLAUSE

For the above consideration (receipt of which sum is hereby acknowledged) the Grantor TRANSFERS AND GRANTS to the Grantee as an Easement in gross forever the right to convey storm water and surface water throughout that part of the above described land shown on the plan marked "B" on Plan No. 170245 (called "the servient land") by means of piped ad open drains: together with the licences from time to time:

(a) To dig construct and lay piped and open drains though the servient land;
(b) To inspect repair cleanse dig up alter enlarge renew or replace those piped and open drains;
(c) For the purposes of this grant by the Grantee's agents servants workmen and employees with or without vehicles to enter upon the servient land and generally to do anything necessary or convenient for the full exercise of the rights so granted.

And the Grantee COVENANTS with the Grantor that, upon the exercise of any rights granted, the Grantee shall restore the servient land as nearly as reasonably possible to its previous condition and make good any damage thereby done to fences of the Grantor.

And the Grantor COVENANTS with the Grantee that he shall not at any time do anything which will prevent or interfere with the free passage of water through the piped or open drains or prevent or interfere with the full use and enjoyment by the Grantee of the rights granted by this Instrument.

If this Annexure Schedule is used as an expansion of an instrument, all signing parties and either their witnesses or their solicitors must put their signatures or initials here.

Approved by Registrar-General
of Land under No. 1995/1004

TRANSFER CREATING AN EASEMENT IN GROSS

Land Transfer Act 1952

The ~~above~~/within easements ~~when created will be~~/are subject to Section 243(a) Resource Management Act 1991

A.L.R.

3.10 22.JAN96 C 945054.6
PARTICULARS ENTERED IN REGISTER
LAND REGISTRY NORTH AUCKLAND
ASST LAND REGISTRAR

60

6 TE $115

Law Firm Acting

LAW NORTH PARTNERS
SOLICITORS
PRIVATE BAG
KERIKERI

Auckland District Law Society
REF 4135

This page is for Land Registry Office use on
(except for "Law Firm Acting")

C945054.7 EC

Approved by the District Land Registrar, South Auckland No. 351560
Approved by the District Land Registrar, North Auckland, No. 4380/81
Approved by the Registrar-General of Land, Wellington, No. 436748.1/81

EASEMENT CERTIFICATE

(IMPORTANT: Registration of this certificate does not of itself create any of the easements specified herein).

I/We MICHAEL WALLACE SIMM of Kerikeri, Manager and LYNN MARIE SIMM his wife

being the registered proprietor(s) of the land described in the Schedule hereto hereby certify that the easements specified in that Schedule, the servient tenements in relation to which are shown on a plan of survey deposited in the Land Registry Office at Auckland on the day of 19 95 under No. 170245 are the easements which it is intended shall be created by the operation of section 90A of the Land Transfer Act 1952.

SCHEDULE

DEPOSITED PLAN NO. 170245

Nature of Easement (e.g., Right of Way, etc.)	Servient Tenement		Dominant Tenement Lot No.(s) or other Legal Description	Title Reference
	Lot No.(s) or other Legal Description	Colour, or Other Means of Identification, of Part Subject to Easement		
Right of Way Right to Transmit Electricity and Telecommunications and right to convey water	LOT 2 hereon	A	LOTS 3 and 4 hereon	103D/511 103D/512 103D/513
	LOT 3 hereon	B	LOT 4 hereon	103D/512 103D/513

State whether any rights or powers set out here are in addition to or in substitution for those set out in the Seventh Schedule to the Land Transfer Act 1952.

1. Rights and powers: See attached

RIGHTS AND POWERS

That in respect of the Telecommunications and Electricity Easements referred to in the Schedule hereto, the rights and powers applicable thereto are:

(a) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electrical current or any other mode of transmitting telecommunications in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) for the purposes of telecommunications ~~across~~ under the land over which the Easement is created and to lay and maintain cables for such purpose.

(b) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electricity in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) ~~across~~ under the land over which the Easement is created and to lay and maintain cables for such purpose.

EASEMENTS:
TERMS CONDITIONS COVENANTS OR RESTRICTIONS IN RESPECT OF ABOVE

That in respect of the Electricity and Telecommunications Easements (hereinafter called "the Easements") referred to in the Schedule hereto the terms conditions covenants or restrictions applicable thereto are as follows:-

(a) All cables placed under ~~within or such poles and cable erected upon~~ the servient tenements shall be maintained and as required repaired to a good and serviceable condition by the registered proprietors for the time being of the dominant tenements.

(b) All the costs and expenses of and incidental to the repairing and maintaining of the Easements herein specified shall be borne by the registered proprietor for the time being of the dominant tenements.

(c) Any person wishing to carry out any work whatsoever on the Easements herein specified shall first give to the registered proprietor of the servient tenement thereof notice of such intention and of the nature and expense of the said work at least fourteen (14) days prior to any such work being commenced and shall obtain the prior consent in writing of the registered proprietor of the servient tenement provided that such consent shall not be unreasonably nor arbitrarily withheld.

(d) Any person carrying out any work whatsoever on the Easements herein specified shall take all reasonable and proper action and care to interfere as little as possible with the comfort and convenience of the occupier or occupiers for the time being of the dominant and servient tenements and shall carry out such work or cause the same to be carried out with the utmost expedition and in a prudent manner and in particular shall during the course of such work:

(i) Shore up or cause to be shored up in a proper safe and workmanlike manner any part of the dominant or servient tenement affected thereby.

(ii) Take all reasonable and proper steps to preserve the said tenements and all parts thereof and all property and goods thereon from damage.

(e) Subject to the other terms and conditions covenants and restrictions contained in these presents any person carrying out any work as aforesaid shall have the right to enter and to bring machinery and workmen on to any part of the dominant or servient tenement as shall be necessary for the purposes of carrying out maintenance on the Easements referred to herein and shall have the right to remove all soil roading paving metalling fencing and all other things as shall be reasonably necessary to give unimpeded access to the said Easement PROVIDED HOWEVER that such soil roading paving metalling and fencing which is so removed shall be restored as nearly as possible to its original condition and that any other damage done by reason of the said maintenance is repaired and that as little disturbance as possible is caused

to the surface of the land and to the enjoyment of the said tenements by the registered proprietors or occupiers.

(f) Where the maintenance work which is required to be carried out in terms of these presents involves the total or partial replacement of any cables this work shall be deemed to be maintenance work which may be carried out in accordance with these presents.

2. Terms, conditions, covenants, or restrictions in respect of any of the above easements:
See attached

Dated this 9th day of January 1996

Signed by the above-named
MICHAEL WALLACE SIMM and
LYNN MARIE SIMM

in the presence of

Witness .....

Occupation ... Legal Executive to
LAW NORTH PARTNERS
Barristers & Solicitors,

Address .....
KERIKERI.

EASEMENT CERTIFICATE

(IMPORTANT): Registration of this certificate does not of itself create any of the easements specified herein.

Correct for the purposes of the Land Transfer Act

The ~~above~~/within easements when created will be/~~are~~ subject to Section 243(a) Resource Management Act 1991

Solicitor for the registered proprietor

A.L.R.

PARTICULARS ENTERED IN REGISTER
LAND REGISTRY NORTH AUCKLAND
ASST. LAND REGISTRAR

3.10 22.JAN96 C 945054.7c

LAW NORTH PARTNERS
SOLICITORS
KERIKERI

Approved by the District Land Registrar, South Auckland No. 351560
Approved by the District Land Registrar, North Auckland, No. 4380/81
Approved by the Registrar-General of Land, Wellington, No. 436748.1/81

VE

C973423.5

MEMORANDUM VARIATION OF
EASEMENT ~~CERTIFICATE~~ C.945054.7

(IMPORTANT: Registration of this certificate does not of itself create any of the easements specified herein).

I/We MICHAEL WALLACE SIMM of Kerikeri, Manager and LYNN MARIE SIMM his wife and ROBYN LOWE CARR-SMITH of Kerikeri, Retired

being the registered proprietor(s) of the land described in ~~the Schedule hereto~~ Easement Certificate C.945054.7 hereby certify that the easements specified in ~~that~~ the Schedule/to Easement Certificate C.945054.7, the servient tenements in relation to which are shown on a plan of survey deposited in the Land Registry Office at Auckland on the 22nd day of January 19 96 under No. 170245 are the easements which it is intended shall be ~~created~~ varied by the operation of section 90~~A~~E of the Land Transfer Act 1952. as follows

SCHEDULE

DEPOSITED PLAN NO.

Nature of Easement (e.g., Right of Way, etc.)	Servient Tenement		Dominant Tenement Lot No.(s) or other Legal Description	Title Reference
	Lot No.(s) or other Legal Description	Colour, or Other Means of Identification, of Part Subject to Easement		

State whether any rights or powers set out here are in addition to or in substitution for those set out in the Seventh Schedule to the Land Transfer Act 1952.

1. Rights and powers: N/A

2. Terms, conditions, covenants, or restrictions in respect of any of the above easements:
The terms covenants and conditions contained and implied in Easement Certificate C.945054.7 are hereby varied as follows:
Delete existing clause C and replace with

(c) Any person wishing to carry out any work whatsoever on the Easements herein specified, other than work which is required to be carried out to re-establish supply in an emergency, shall first give to the registered proprietor of the servient tenement thereof notice of such intention and of the nature and expense of the said work at least fourteen (14) days prior to any such work being commenced and shall obtain the prior consent in writing of the registered proprietor of the servient tenement provided that such consent shall not be unreasonably nor arbitrarily withheld.

Dated this 27th day of February 1996

Signed by the above-named
MICHAEL WALLACE SIMM and
LYNN MARIE SIMM
as the registered proprietor of the
dominant tenement being LOT 4 D.P 170245
and LOT 3 D.P 170245

in the presence of:

Witness: .....

Occupation: .....
MICHAEL ANTHONY RAY
Address: .....SOLICITOR.....
KERIKERI

Dated this 27th day of February 19 96

Signed by the above-named
ROBYN LOWE CARR-SMITH
as the registered proprietor of the
servient tenement being LOT 2 D.P 170245

in the presence of .

Witness ..... Jenifer Louise NATHAN
Occupation ..... Legal Executive to
M°Leod & Partners
Solicitors, Kerikeri
Address .....

The Far North District Council pursuant to Section 243 (a) (iv) Resource Management Act 1991 hereby consents to the within Memorandum of Variation

SIGNED pursuant to delegated authority .....

MANAGER ENVIRONMENTAL SERVICES

VARIATION OF
EASEMENT ~~CERTIFICATE~~
C.945054.7

(IMPORTANT): Registration of this certificate does not of itself create any of the easements specified herein.

Correct for the purposes of the Land Transfer Act

Solicitor for the registered proprietor

11.36 27.MAR96 C 973423.5

PARTICULARS ENTERED IN REGISTER
LAND REGISTRY NORTH AUCKLAND

1038/511-513

LAW NORTH PARTNERS
SOLICITORS
KERIKERI

Appendix 4

Consultation with Top Energy and Chorus

TOP ENERGY
TePuna Hihiko
www.topenergy.co.nz

Top Energy Limited
Level 2, John Butler Centre
60 Kerikeri Road
P O Box 43
Kerikeri 0245
New Zealand
PH +64 (0)9 401 5440
FAX +64 (0)9 407 0611

21 May 2025

Lynley Newport
Thomson Survey
PO Box 372
KERIKERI 0245

Email: lynley@tsurvey.co.nz

To Whom It May Concern:

RE: PROPOSED SUBDIVISION
Wayne Weber – 17 Waters Lane, Kerikeri. Lot 3 DP 170245.

Thank you for your recent correspondence with attached subdivision scheme plans.

Top Energy's requirement for this subdivision is that power be made available for the additional lot. Top Energy advises that there is an existing power supply at proposed lot 2. Design and costs to provide a power supply to lot 1 would be provided after application and an on-site survey have been completed.
Link to application: Top Energy | Top Energy

In order to get a letter from Top Energy upon completion of your subdivision, a copy of the resource consent decision must be provided.

If you have any further queries, please do not hesitate to contact the writer.

Yours sincerely

Aaron Birt
Planning and Design
T: 09 407 0685
E: aaron.birt@topenergy.co.nz

Chorus New Zealand Limited

19 May 2025

Chorus reference: 11238426

Attention: Lynley Newport

Quote: New Property Development

1 connections at 17 Waters Lane , Kerikeri, Far North District, 0230

Your project reference: N/A

Thank you for your enquiry about having Chorus network provided for the above development.

Chorus is pleased to advise that, as at the date of this letter, we are able to provide reticulation for this property development based upon the information that has been provided:

Fibre network	$0.00
Pre-built fibre	$0.00

The total contribution we would require from you is **$0.00 (including GST)**. This fee is a contribution towards the overall cost that Chorus incurs to link your development to our network. This quote is valid for 90 days from 19 May 2025. This quote is conditional on you accepting a New Property Development Contract with us for the above development.

If you choose to have Chorus provide reticulation for your property development, please log back into your account and finalise your details. If there are any changes to the information you have supplied, please amend them online and a new quote will be generated. This quote is based on information given by you and any errors or omissions are your responsibility. We reserve the right to withdraw this quote and requote should we become aware of additional information that would impact the scope of this letter.

Once you would like to proceed with this quote and have confirmed all your details, we will provide you with the full New Property Development Contract, and upon confirmation you have accepted the terms and paid the required contribution, we will start on the design and then build.

For more information on what's involved in getting your development connected, visit our website www.chorus.co.nz/develop-with-chorus

Kind Regards

Chorus New Property Development Team

Appendix 5

Site Suitability Report for proposed Subdivision

TRINEKEL
CIVIL ENGINEERING SOLUTIONS

88 Kerikeri Road
Kerikeri
0230

WM & TA WEBER TRUST
SITE SUITABILITY REPORT FOR PROPOSED RESIDENTIAL SUBDIVISION
17 Waters Lane, Kerikeri

DOCUMENT NO:

063-SSR-GNG-01-Rev00

SITE SUITABILITY REPORT

REV	DATE	DISCRIPTION	ORIG	CHK'D	APP'D	CLIENT
P1	29/04/2025	DRAFT SITE SUITABILITY REPORT	KM	KK	KK	WWT
P2	13/05/2025	DRAFT SITE SUITABILITY REPORT	KM	KK	KK	WWT
Rev00	27/06/2025	FINAL SITE SUITABILITY REPORT	KM	KK	KK	WWT

DOCUMENT CONTROL

TITLE:	SITE SUITABILITY REPORT FOR PROPOSED RESIDENTIAL SUBDIVISION AT 17 WATERS LANE, KERIKERI, FOR WM & TA WEBER TRUST
SUB-TILE:	SITE SUITABILITY REPORT
REPORT STATUS:	FINAL
REPORT NUMBER:	063-SSR-GNG-01
REVISION NUMBER:	Rev00
CLIENT:	WM & TA WEBER TRUST
	TRINE KEL LIMITED
PREPARED BY:	88 KERIKERI ROAD
	KERIKERI 0230
DATE:	27th June 2025
COPIES ISSUED:	PDF, INTERNAL COPY & CLIENT COPY

This Report caters specifically for the requirements of this project and this Client. No warranty is intended or implied for use by any third party and no responsibility is undertaken to any third party for any of the content of this Report.

Authored:

Keavy Mitchell BSc (Geol) | PGDipSci (Env Mgt) | MEngGeol | MEngNZ

Senior Engineering Geologist | Trine Kel Limited

Review & Approved:

Kelvin Kapp CPEng | CMEngNZ | IntPE(NZ)

Principal Civil Engineer & Director | Trine Kel Limited

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1 EXECUTIVE SUMMARY

This report addresses various aspects, including land suitability, effluent disposal, water supply for firefighting, stormwater management, and access. The proposed development entails a proposed two-lot residential subdivision at 17 Waters Lane, Kerikeri, alongside necessary infrastructure, vegetation clearance and bulk earthworks for the new allotment.

Element	Summary
General – Section 1 to 4	
Site Address	17 Waters Lane, Kerikeri (Lot 3 DP 170245)
Client	WM & TA Weber Trust
Development Type	Two-lot residential subdivision, retaining existing dwelling and constructing a new dwelling with shed and infrastructure on Lot 1
District Plan Zone	Operative Plan: Rural Living / Proposed Plan: Rural Residential
Site Area (Gross)	8,754 m² (approximate, per FNDC maps)
Lots Proposed	2 (Lot 2 existing, Lot 1 proposed)
Geology	Kerikeri Volcanic Residual Soils
Natural Hazard Risk – Section 5	
Natural Hazard Risk	Low – No identified flooding, liquefaction, or slope instability risk
Geotechnical Suitability – Section 6	
Geotechnical Suitability	Confirmed – Residual volcanic soils with high strength and moderate structure; no groundwater encountered
Foundation Classification	Class M (Dwelling), Class S (Shed) – NZBC B1 basis, with recommendations herein implemented.
On-Site Wastewater Treatment and Disposal - Section 7	
On-site Wastewater	Permitted activity – system complies with PRPN C.6.1.3 and setback requirements; designed for 900L/day
Water Supply – Section 8	
Water Supply	Rainwater harvesting from roof surfaces ~45,000L of potable water supply available
Firefighting	Supply from either rainwater tanks or proposed pool
Stormwater - Section 9	
Stormwater Design	A full hydrological and hydraulic stormwater assessment was undertaken for the proposed two-lot subdivision at 17 Waters Lane, Kerikeri, which exceeds the 20% impermeable surface Controlled Activity threshold given under the District Plan. Rather than adopting a conventional tank-based attenuation strategy, a performance-based approach was applied in accordance with Clause 4.3.3 of the FNDC Engineering Standards. Catchment-scale modelling using TR-55 methods confirmed that the downstream overland flow path has ample capacity to accommodate additional runoff without triggering any additional flooding, erosion, or ponding effects on downstream neighbours—even under a conservative 25% total catchment imperviousness scenario. As a result, on-site attenuation is not considered necessary to mitigate adverse effects [in reference to Section 106 of the RMA] so the development may proceed with the simple implementation of low-impact discharge measures.
Conclusion - Section 10	
Overall Recommendation	The site is suitable for subdivision and future development subject to final BC-stage design review and mitigation implementation

2 INTRODUCTION

Trine Kel Limited has been engaged by WM and TA Weber Trust to prepare a Site Suitability Report in support of a proposed two-lot residential subdivision at 17 Waters Lane, Kerikeri (Lot 3 DP 170245).

This report presents a summary of the technical assessments undertaken to support the proposed subdivision and associated residential development. The scope of this assessment includes the following components:

- **Natural Hazard Risk Evaluation**
  Identification and evaluation of natural hazards present across the site, with recommendations for mitigation where applicable.
- **Confirmation of Ground Conditions**
  Evaluation of the geotechnical suitability of proposed Lot 1 for the establishment of a new residential dwelling (approx. 300 m², single-storey) and a 12 m × 12 m implement shed. The assessment includes foundation recommendations and identification of any areas unsuitable for development.
- **Erosion and Sedimentation Control**
  Erosion and sedimentation control measures will be implemented in accordance with the Far North District Council Engineering Standards (2023). Controls will be designed to minimise sediment discharge during earthworks and construction activities, including silt fencing and diversion bunds where appropriate. Site-specific controls will be confirmed following inspection and monitored throughout construction.
- **Effluent Disposal Assessment**
  Assessment of on-site wastewater treatment and disposal capacity for both proposed lots, including land suitability and system design recommendations based on expected occupancy levels.
- **Water Supply**
  Water supply will be provided via on-site rainwater harvesting systems in accordance with the Far North District Council Engineering Standards (2023). Each lot will be serviced by individual or shared water storage tanks, sized to meet potable demand and firefighting requirements in accordance with SNZ PAS 4509:2008. Roof catchment areas and first flush diversion systems will be integrated into the design to ensure water quality and system efficiency. Compliance with the Drinking Water Standards for New Zealand (2022) will be required where potable supply is intended.
- **Stormwater Management**
  Assessment of stormwater runoff from both the existing development on Lot 2 and the proposed development of Lot 1.
- **Vehicle Access and Driveway Compliance**
  Review of the proposed access and driveway layouts for both lots, assessing compliance with the Far North District Plan and Engineering Standards. Recommendations will be provided for any necessary design improvements.

3 PROPOSED DEVELOPMENTS

The development of the subject site (Lot 3 DP 170245, 17 Waters Lane, Kerikeri) involves several proposals, which will be staged under separate consents. Each consent will be submitted to the Far North District Council (FNDC) by independent consultants.

The consent proposals are summarised below:

Consent 1: Building Consent for a New Implement Shed

- The Building Consent Application (BCA) will be submitted under the Parent Allotment (Lot 3 DP 170245) and is expected to precede the subdivision application.
- The BCA will detail construction proposals for a 12 m x 12 m implement shed.
- The shed will be centrally located along the eastern boundary of the parent allotment, which—post-subdivision—will be contained within proposed Lot 1 and is intended to service the future residential dwelling.
- Stormwater runoff from the roof of the shed will be collected and conveyed to a potable water tank system, to be installed during the development of the new dwelling on Lot 1. In the interim, stormwater runoff will be discharged via a temporary above ground spreader bar to a large well-established, gently sloping lawn area.
- Earthworks will be required to form the shed platform, including construction of a low height retaining wall. The wall is anticipated to be exempt from requiring specific building consent (i.e., height <1.5 m, no surcharge).

Consent 2: Building Consent for Existing Dwelling on Proposed Lot 2

- The existing residential dwelling and associated on-site infrastructure will remain on proposed Lot 2.
- A new garage extension, retaining wall, and driveway extension are planned and will be the subject of a separate building consent application

Consent 3: Subdivision of the Parent Allotment

- The parent allotment will be subdivided into two residential lots:
    - **Proposed Lot 1** – intended for the construction of a new residential dwelling (detailed under Consent 4) and will contain the new shed (detailed under Consent 1);
    - **Proposed Lot 2** – will retain the existing dwelling and upgrades detailed under Consent 2.
- The subdivision application will also incorporate a **land use consent** to:
    - Authorise the anticipated breach of the 300 m^3 earthworks volume limit for the Rural Living Zone for the earthworks Proposed for Consent 1, 2 and 4.
    - Address anticipated stormwater rule breaches associated with the new, smaller, sub-allotment sizes.

Consent 4: Future Residential Dwelling on Lot 1 (Post-Subdivision)

- A new single-storey residential dwelling (~300 m^2) is proposed for Lot 1 following subdivision.
- The dwelling will be serviced by a new on-site wastewater system and water tank system
- The building platform has been assessed for geotechnical suitability as part of this report (see Section 6), and foundation recommendations have been provided.

- All required services, including vehicular access and firefighting water supply, have been assessed to ensure compliance with FNDC Engineering Standards and SNZ PAS 4509:2008.

Planned development works for proposed Lot 1 (referred to as Lot 1 herein), include:

i. Minor vegetation clearance (mostly grass);
ii. Establishment of a driveway, parking areas and a level building platform via bulk earthworks;
iii. Potable & firefighting water supply tanks;
iv. An on-site wastewater treatment tank and soakage bed land disposal system;
v. A small pool (24m²);
vi. A large outdoor decking area (outdoor living);
vii. Power and telecommunication services (trenched and extended to Lot 1)

Please refer to Figure 1-3 below, for visual reference.

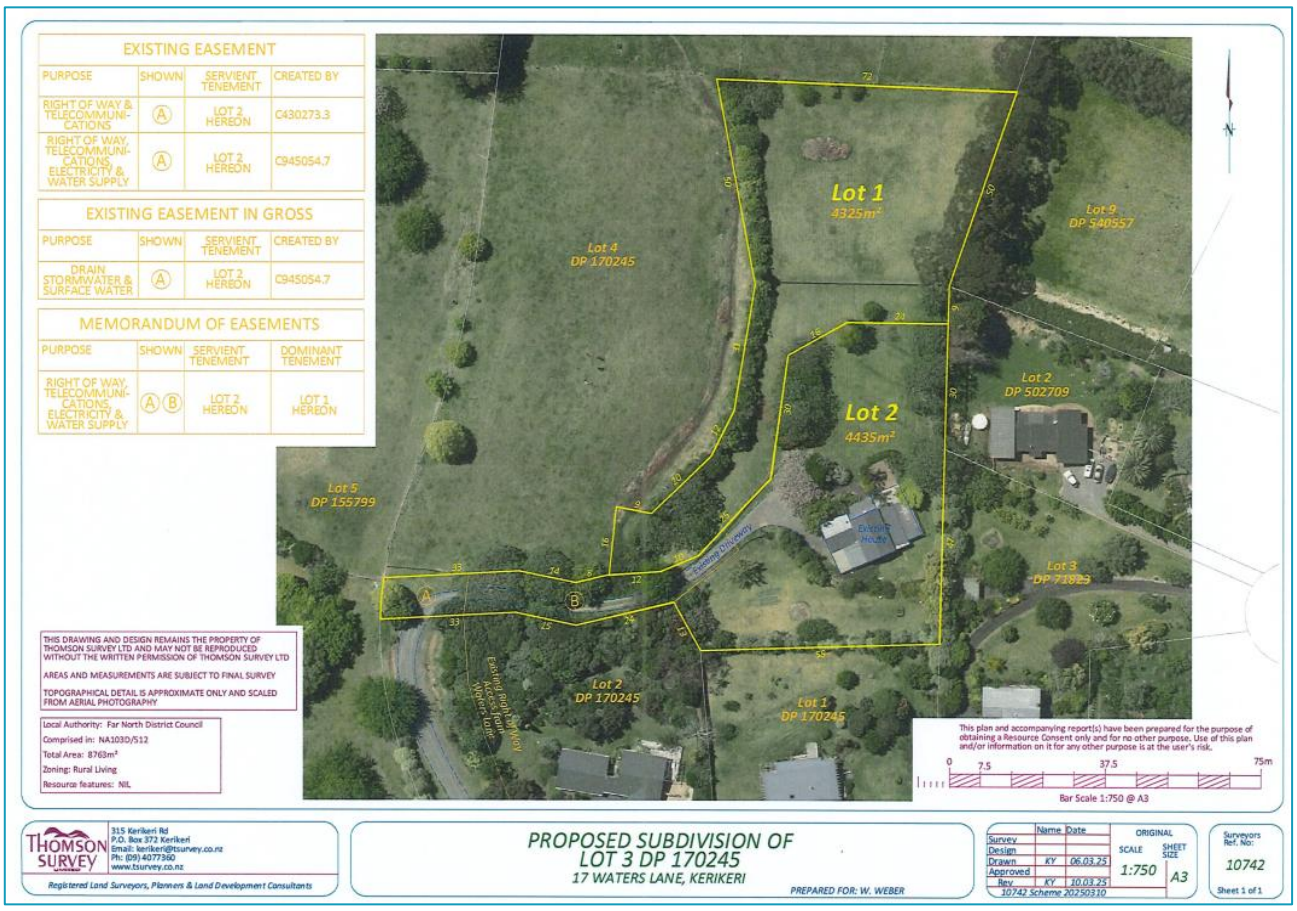


Figure 1: Proposed Scheme Plan for the Subdivision from Thomson Survey, TS Project ID: 10742

Figure 2: Proposed Concept Layout For Lot 1 (Source: Lindholm Design)

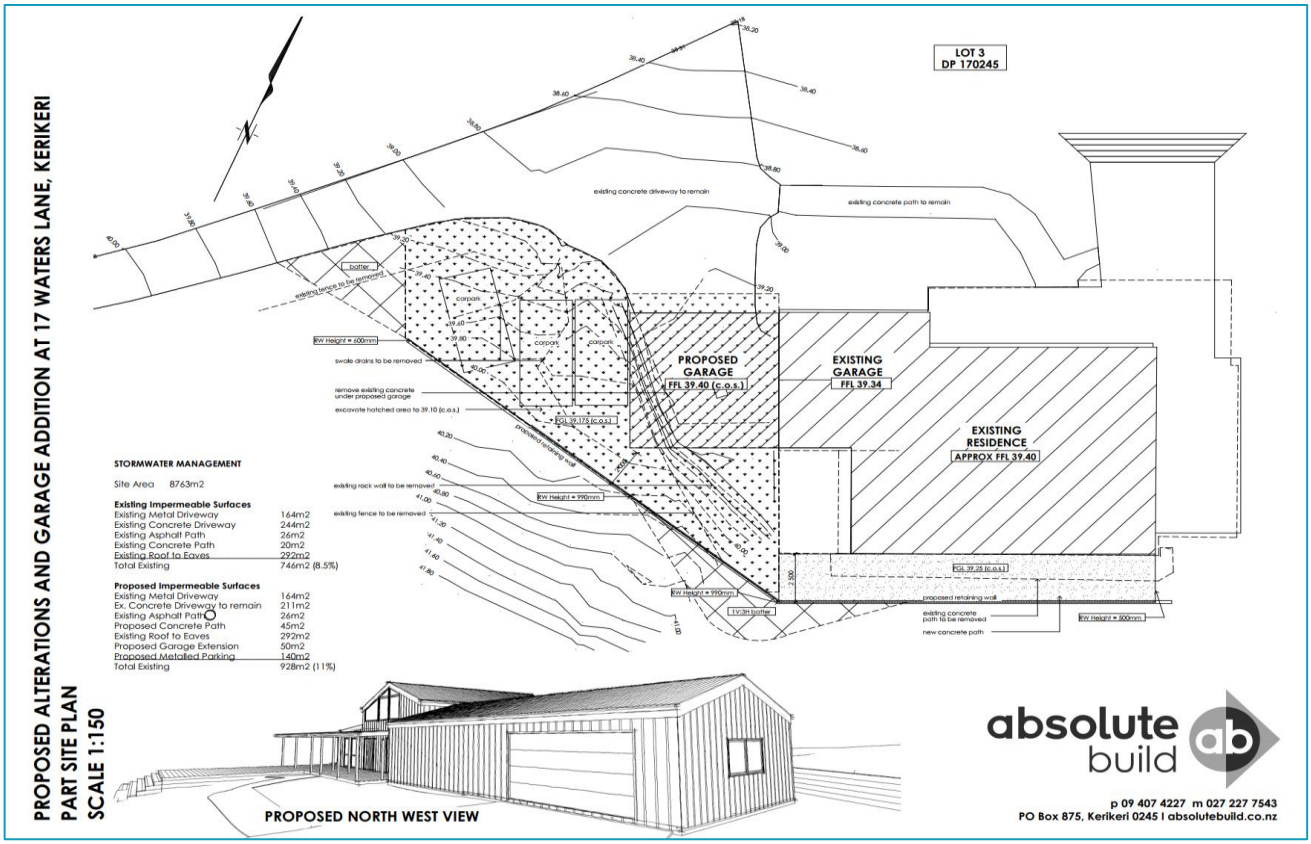


Figure 3: Proposed Development Upgrades for Lot 2 (Source: Absolute Build)

4 SITE DISCRIPTION

4.1 GENERAL

The subject site is located approximately 700 metres east of the Kerikeri Heritage Bypass–Waipapa Road intersection and is legally described as Lot 3 DP 170245, with a physical address of 17 Waters Lane, Kerikeri. The property is irregular in shape and encompasses a gross plan area of approximately 8,754 m² (source: FNDC Maps).

The site is predominantly covered with grass, interspersed with mature trees and shrubs, particularly along the western, eastern, and southern boundaries. The existing dwelling, which is to remain on Lot 2 following subdivision, is positioned in the southern portion of the site. It is surrounded by landscaped gardens, mature vegetation, a concrete driveway, and an outdoor patio area.

The existing on-site septic system is situated in the lawn area directly north of the dwelling and is shown on the attached site plan in ***Annexure B,*** based on our review of the historical as-built drainage layout sketches. Due to the age of the system, the accuracy of this location is not guaranteed and should be confirmed during construction. The proposed lot boundaries have been positioned to provide a minimum 1.5 metre setback from the existing septic field, in accordance with the required separation distances for subsurface disposal systems under the Operative Proposed Regional Plan for Northland. Access to the site is currently via a gravel driveway originating at the northernmost end of Waters Lane. This driveway meanders in a north-easterly direction before joining the existing concrete driveway near existing dwelling.

The proposed vehicle access to Lot 1 will commence at the southern end of the parent allotment running parallel to the western boundary for approximately 100 metres, terminating at the building platform in Lot 1. To minimise impermeable area coverage and the associated effects of increased stormwater run-off, the driveway neck will comprise of 2 x 1.0m wide wheel strips, spaced 1.0m apart. The internal strip will remain grassed. Refer to ***Figure 4*** below, for the site location. North is up the page.

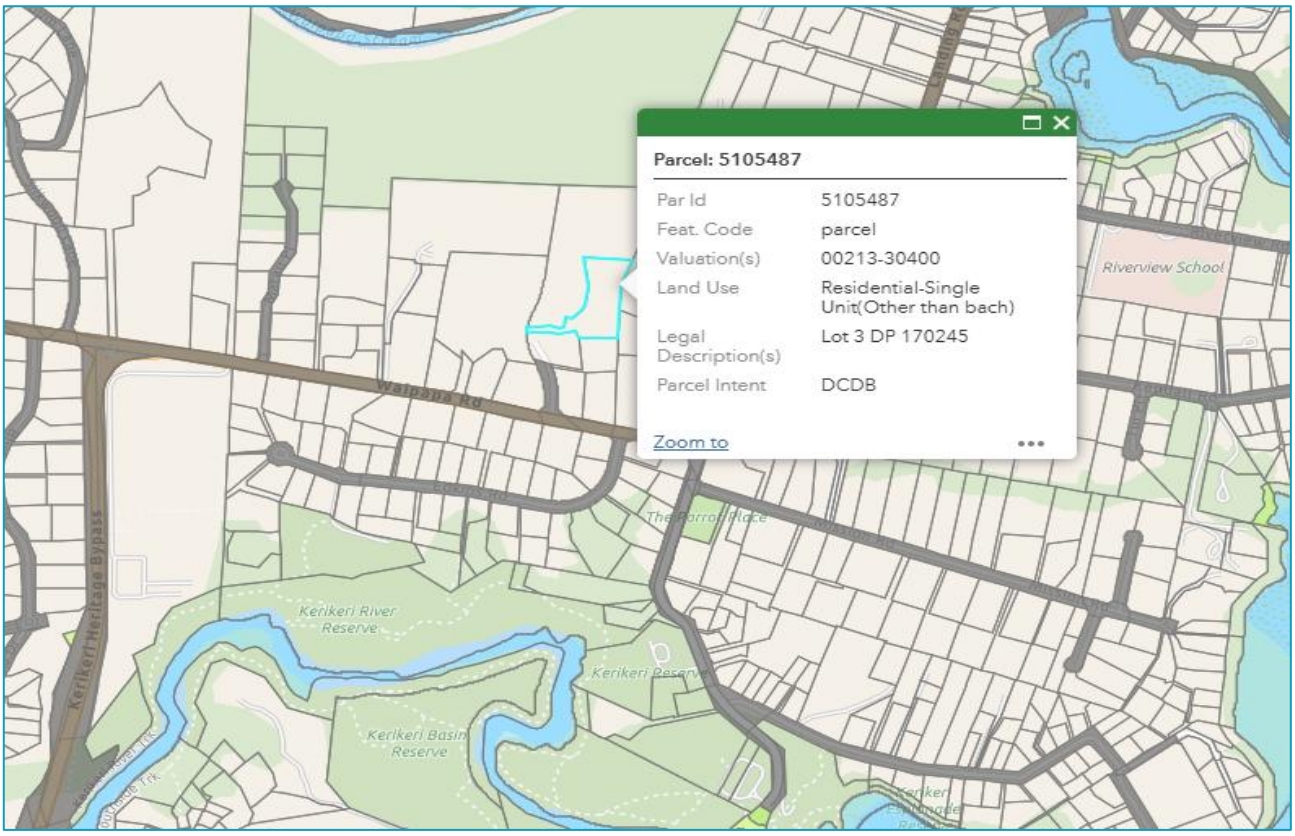


Figure 4: Site Location (FNDC Property Maps)

4.2 TOPOGRAPHY

LINZ LiDAR contour data was utilized to assess the topographical features of the site, including observations from our site walk over. The site falls gently to the north and north-west, with slope gradients generally being less than 1V:7H (approximately 8°). Beyond the western boundary, the terrain steepens locally and forms the eastern margin of an ephemeral overland flow path. This natural feature is located more than 20 metres from the proposed development area in Lot 1 and was dry during our site walkover. Refer to ***Figure 5*** & ***Figure 6,*** below.

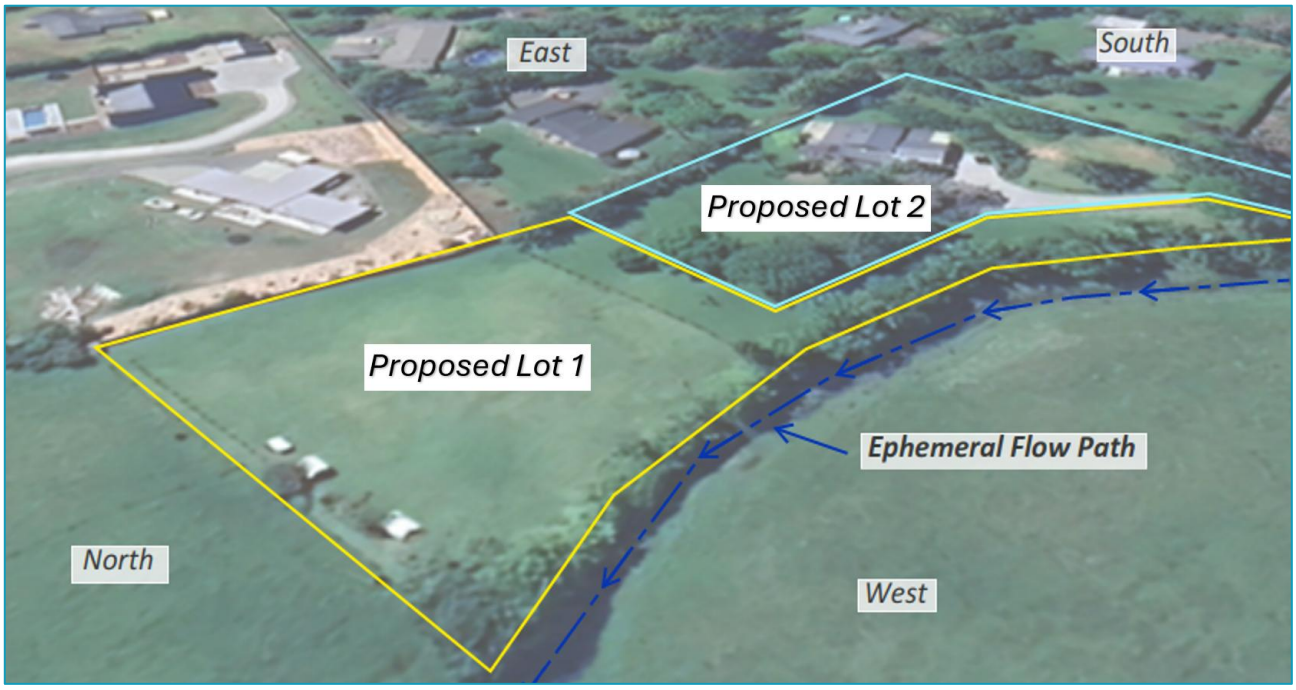


Figure 5: 3D view of the site from Google Earth Pro, with annotations

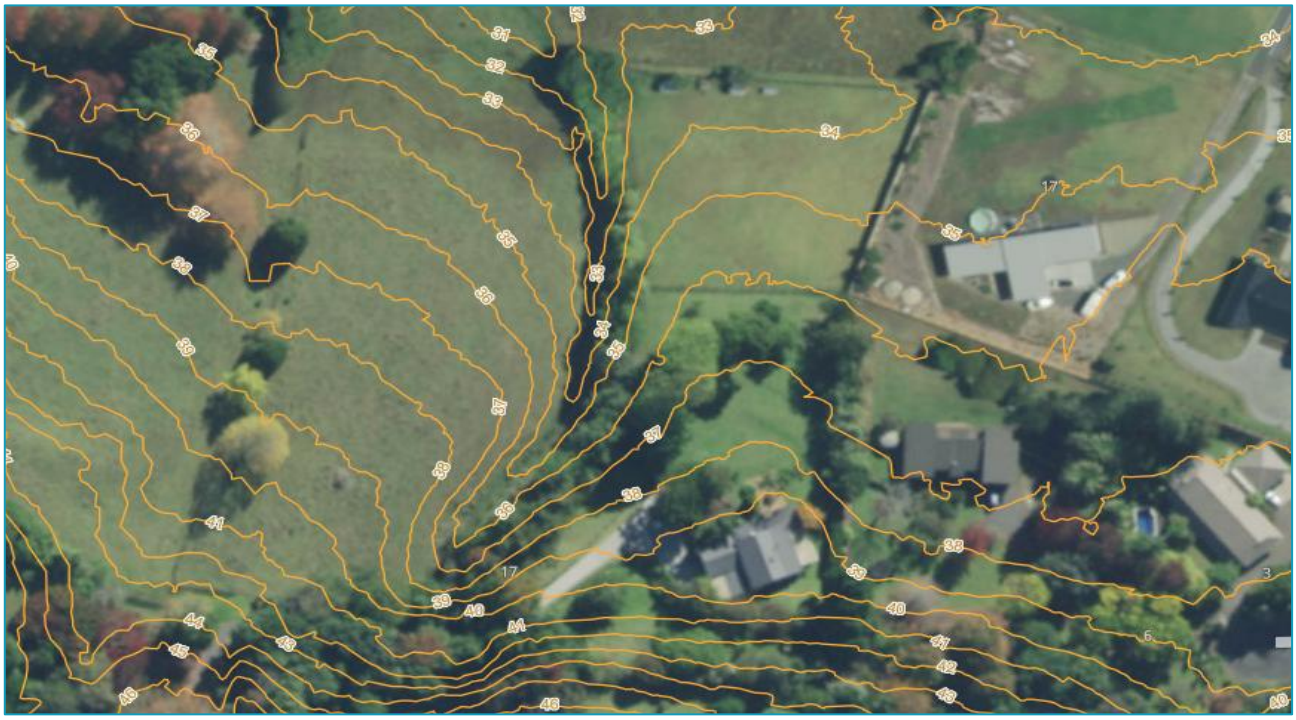


Figure 6: Slope morphology at the site depicted by 1m contours from NRC Maps. North is up the page.

1.1 GEOLOGY

The site is within the bounds of the GNS Geological Map 2 “Geology of the Whangarei area” 1:250,000 scale (Edbrooke & Brook, 2009), and is shown to be underlain by Kerikeri Volcanic Group geology. The geological group is described as “Late Miocene basalt of Kaikohe - Bay of Islands Volcanic Field, comprising: Basalt lava, volcanic plugs and minor tuff”. See ***Figure 7*** below.

Figure 7: Underlying Geology at the subject site (Source: GNS Maps (Edbrooke & Brook, 2009))

4.3 DISTRICT PLAN ZONE

Per ***Figure 8***, the site is zoned Rural Living with respect to the Far North District Councils (FNDC) **Operative** District Plan, and Rural Residential with respect to the FNDC ***Proposed*** District Plan.

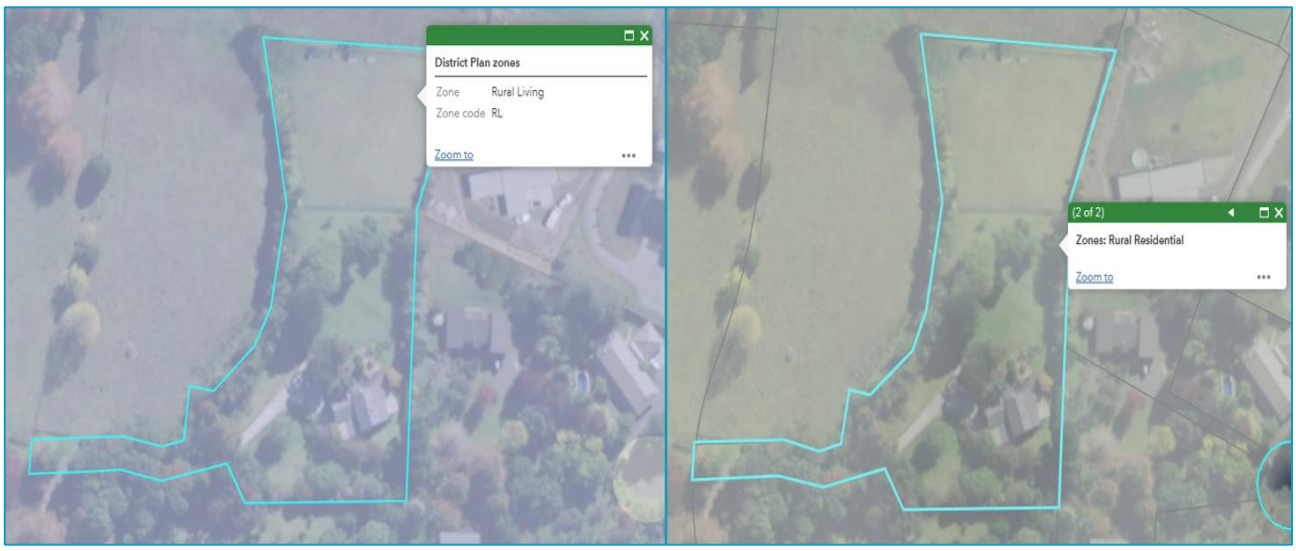


Figure 8: FNDC Operative and Proposed District Plan Zones

5 NATURAL HAZARD RISK

5.1 ASSESSMENT

Under Section 106 of the Resource Management Act 1991 (RMA), a consent authority may refuse a subdivision consent application, or grant it subject to conditions, if the land is considered to be at significant risk from natural hazards. In accordance with these provisions, an assessment of potential natural hazards relevant to the subject site has been undertaken to help inform FNDCs decision-making process. This assessment is presented in **Table 1**, below.

Table 1: Natural Hazard Assessment Table

No.	Natural Hazard	Risk	Explanation
1	Earthquake & Liquefaction	Low	Northland has no mapped active fault lines. The site soils underlying the site are cohesive in nature and likely would not be subject to liquefaction in a ULS earthquake event.
2	Tsunami	Low	The site is inland
3	Erosion and Sedimentation	Low	The site soils are over consolidated, fused, Miocene aged volcanic residual soils. Wind and water erosion is easily mitigated via standard erosion and sediment control practices which are provided for in Section 7.
4	Volcanic & geothermal activity	Low	The site is underlain my Miocene aged volcanics, initially formed through intraplate volcanism (mantle hotspots). The activity underlying the subject site, is now extinct.
5	Landslip & Subsidence	Low	The site has a gentle gradient, site soil shear strengths all exceed 300kPa (UGBC) and elevated groundwater was not encountered during the site intrusive geotechnical testing. Given these reasons, landslip and subsidence risk is considered low.
6	Drought	Moderate	Northland can be subject to drought during summer months. Drought induced risk applicable to the proposed future development at the site will be mitigated through an adequate supply of potable water, held on-site in rainwater tanks. See Section 9 for more details.
7	Fire	Low	The proposed development will have an adequate firefighting water supply provided on-site, by way of an accessible swimming pool.
8	Flooding	low	The site is gently elevated and is not within any mapped flood prone areas on NRC Hazard Maps. During our site walk over, the parent allotment was deemed to have good water shedding slope characteristics and is well offset from the adjacent ephemeral flow path located just outside of the site's western boundary.

6 GEOTECHNICAL ASSESSMENT

6.1 INTRODUCTION

The assessment evaluates the suitability of Lot 1 for future residential development, based on shallow intrusive geotechnical investigations, site walkovers, and review of geological and topographical information.

The assessment aligns with the requirements of Section 106 of the Resource Management Act (RMA) and the Rural Living Zone provisions under the Far North District Plan. The information presented herein is sufficient to demonstrate that the land is suitable for residential use and is not subject to material instability or geotechnical hazard(s). Detailed foundation and platform certification will be addressed through Building Consent-stage reporting.

6.2 SUMMARY OF PROPOSED DEVELOPMENT (LOT 1)

Lot 1 is proposed to accommodate a new residential dwelling, an associated driveway, water tanks, on-site wastewater system, a 12m x12m utility shed, outdoor decking, a small pool (~24 m²), and landscaped/decked outdoor living areas. Bulk earthworks are proposed to establish a level building platform and access, including a retaining wall (under 1.0 m) to support cut batters behind the shed.

6.3 SITE INVESTIGATIONS AND GROUND CONDITIONS

In March 2025, a geotechnical investigation was undertaken to assess the suitability of Lot 1 for future residential development. The investigation comprised:

- 6 × Hand auger boreholes (50 mm Ø), advanced to depths ranging from 0.7 m to 2.2 m below ground level (mbgl);
- 4 × Scala Penetrometer tests, carried out to depths of approximately 1.9 m;
- Handheld shear vane testing at 0.3m intervals, within the auger holes.

The underlying soils were generally consistent with residually weathered volcanic material derived from the Kerikeri Volcanic Group (KVG), including:

- Slightly gravelly SILT with minor to trace clay;
- Weakly to moderately cemented gravels and sesquioxide-rich (fused) aggregates;
- Blocky and lensoidal soil structure, indicating mature residual development and good drainage capabilities;
- Dark brown to orangish & reddish-brown colouration with manganese mottling in places.

All soils were noted to be of low plasticity or non-plastic (friable), and no groundwater was encountered in any of the boreholes.

Topsoil was observed to be dark, dry, and of moderate thickness, indicating good organic content.

Handheld shear vane tests consistently returned corrected undrained shear strengths exceeding 140 kPa, with most locations producing UTP (Unable to Penetrate) results. These results indicate that the near-surface materials are of good strength and stiffness, consistent with the requirements for shallow residential footings under NZS 3604:2011.

7 SLOPE STABILITY AND NATURAL HAZARDS

No signs of slope instability or active land movement were observed during the site walkover, and the property lies outside any mapped instability zones or flood overlays. The terrain falls gently to the northwest with slope gradients generally less than 1V:7H (≈8°). An ephemeral overland flow path located beyond the western boundary is offset by more than 20 metres from the proposed development platform and presents no geotechnical constraint.

In terms of seismic hazards, the site is underlain by dense, residual volcanic soils associated with the Kerikeri Volcanic Group. No groundwater was encountered during intrusive investigations, and based on MBIE liquefaction screening guidance, these conditions are not susceptible to liquefaction under design-level earthquake shaking.

In accordance with Section 106 of the Resource Management Act (RMA), the site is not considered to be at significant risk from natural hazards.

7.1 SOIL MOISTURE REACTIVITY (*SOIL EXPANSIVITY*) AND FOUNDATION SUITABILITY

The residual soils encountered at the site are characteristic of the Kerikeri Volcanic Group (KVG) and exhibit traits typical of weathered volcanic materials, including weakly to moderately cemented fine-grained soil (sesquioxide-rich structures) with minor clay content and variably-size gravel inclusions.

Based on field observations, investigation data, and regional precedent, the following soil reactivity classifications are recommended:

- Class M (Moderately Expansive), in accordance with the NZBC, Clause B1
    - Within the **proposed dwelling platform area,** where cut material will be reworked and reused as engineered fill;
- Class S (Slightly Expansive) in accordance with the NZBC, Clause B1
    - Within the **proposed shed**, which will be entirely founded on natural, undisturbed cut ground.

Atterberg Limits and Shrink–Swell tests were not relied upon for determining soil expansivity in this case. While these tests are widely used and remain valuable for assessing other geotechnical properties (e.g. fill suitability, classification, and compaction control), recent research and field experience in Northland suggest that they may not reliably reflect the true shrink–swell potential of residual volcanic soils, particularly where in-situ structure and clay type plays a dominant role in soil behaviour[1].

Instead, soil reactivity for this site has been assessed based on:

- Visual-tactile field logging [structure, texture, and moisture condition];
- Observed soil strength and friability;
- Regional experience with similar materials across KVG terrains;
- Performance of comparable foundation systems on neighbouring properties.

This approach aligns with performance-based assessment principles and is considered appropriate for Resource Consent-level decision making.

Notwithstanding the above, Atterberg Limits testing remains useful for characterising other relevant properties such as soil sensitivity, generalised moisture response to reworking and compaction behaviour. These parameters particularly

[1]Mitchell, K.E., 2023. *Soil Expansivity Characteristics in Residual Soils of the Kerikeri Volcanic Group* (*Master Thesis*, University of Auckland).

support the assessment of fill suitability and workability. Such testing is therefore recommended at Building Consent stage if bulk earthworks or cut/fill operation proposals are proposed.

7.2 FOUNDATION RECOMMENDATIONS

To support conservative preliminary design, the following items in ***Table 2*** must be adopted in specific design at building *cons*ent stage:

Table 2: Preliminary Geotechnical Design Parameters for Lot 1 (to be confirmed at Building Consent stage)

Design Element	Parameter	Value/Requirement
Dwelling Platform	Platform Preparation	Engineered Cut/Fill
	Compaction Standard	≥ 95% MDD (±2% OMC)
	Air Voids	< 10%
	Capping Layer	≥ 100 mm compacted GAP40
	Characteristic Surface Movement (ys)	Min. 44 mm (Class M soils [NZBC])
	Ultimate Geotechnical Bearing Capacity	300 kPa
Shed Platform	Platform Preparation	Cut - Natural Ground
	Capping Layer	≥ 200 mm compacted GAP40
	Characteristic Surface Movement (ys)	Min. 22mm (Class S soils [NZBC])
	Ultimate Geotechnical Bearing Capacity	225 kPa

These recommendations provide a robust basis for confirming Lot 1 is geotechnically suitable for future residential development. Final design validation, compaction testing, and platform certification will be addressed through future detailed reporting.

7.3 GEOTECHNICAL SUITABILITY CONCLUSION

Based on the findings of this investigation, it is our professional opinion that Lot 1 is geotechnically suitable for residential subdivision and future development, provided that:

- Earthworks and fill construction follow best practice as outlined generally herein;
- The site is contoured to direct stormwater runoff away from development platforms, preventing ponding or saturation of fill, and ensuring safe conveyance to a stable discharge area downslope;
- Erosion and sediment control measures are implemented during construction in accordance with best practice, where in doubt, utilise GD05 "*Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region*", June 2016, Guideline Document 2016/005 Incorporating Amendment 1;
- The recommendations above are accepted as conceptual at this stage. Final development proposals must be relayed to FNDC in a detailed Geotechnical Investigation Report (GIR) to form a part of the future building consent application. The building consent-stage design must incorporate the foundation classifications and reactivity allowances outlined above.

- Specific soil limits testing is required at Building consent stage to help form a basis of the cut/fill specifications. Geotechnical Completion Reporting will be required at the conclusion of earthworks to confirm fill platform suitability and bearing capacity.

8 EARTHWORKS AND EROSION AND SEDIMENT CONTROL

8.1 EARTHWORKS OVERVIEW AND VOLUMES

Earthworks are proposed to facilitate the development of residential infrastructure across Lot 1 (currently vacant) and Lot 2 (which contains an existing dwelling and is subject to a proposed extension). These works are necessary to form level building platforms, vehicle accessways, driveways, parking areas, landscaped surrounds, and the installation of stormwater, wastewater, and other services. The proposed cut and fill operations will also provide suitable ground conditions for the installation of tanks, footpaths, and pool excavation (on Lot 2).

The works are considered to be of low geotechnical complexity, taking place on stable terrain with no identified geohazards or known geotechnical constraints. Preliminary assessments confirm that conventional earthworks practices are appropriate, provided they follow recognised best practice for erosion control, cut/fill management, and engineered fill placement.

Given the site conditions and scale of development, the risk of instability, settlement, or ground failure is considered low. All earthworks will occur within individual lot boundaries, with all excavated material to be retained on-site for reuse as engineered fill or general landscaping. No off-site disposal is proposed, reducing construction traffic and sedimentation risk. A summary of the proposed earthworks volumes for each lot is provided in the following table:

Table 3: Earthworks Summary by Lot

Lot	Description	Cut (m^3)	Fill (m^3)	Total (m^3)
Lot 1	Excavation Areas 1–3	140	140	280
Lot 2	House, Shed, Driveway, Landscaping	640	690	1,330
Total	—	780	830	1,610

Under Rule 12.5.6.1 of the Far North District Council (FNDC) Operative District Plan, the following thresholds apply to determine whether earthworks are permitted or require resource consent:

- Earthworks exceeding 200 m^3 per lot within any 12-month period;
- Cut depths greater than 1.5 metres or fill depths greater than 1.0 metre.

Based on these thresholds, both proposed lots of trigger Restricted Discretionary Activity status, as outlined in *Table 4* below.

Table 4: Activity Status by Lot

Lot	Total (m^3)	Cut/Fill Depths	Activity Status
Lot 1	280	≤1.5 m	**Restricted Discretionary** (Rule 12.5.6.1(b))
Lot 2	1,330	Up to ~1.8 m cut and fill	**Restricted Discretionary** (Rules 12.5.6.1(b), (c))

8.2 EROSION AND SEDIMENT CONTROL MEASURES

We strongly recommend that all earthworks are undertaken during dry weather periods and that exposed cuts are not left open for extended periods of time. Undertaking the earthworks phase of this development in the summer months/dry periods will help to minimise adverse effects of sedimentation to the receiving environment.

To minimise any adverse effects from bulk earthworks, the following items are required:

Table 5: Erosion and sediment control measures

Element	Recommendations
Silt Fence Installation	· Installed prior to works · Trenched at least 200 mm into the ground · Supported at ≤2.0 m intervals with metal waratahs · Positioned downslope of all disturbed soil and stockpiles
Stormwater Management During Earthworks	· Overland flow will be diverted above earthworks zones using temporary swales or cut-off drains · No ponding will be allowed on engineered fill · Temporary soakage will be used to manage runoff from exposed surfaces · Final site levels will be shaped to direct flow away from fill areas and structural elements · All drainage features will be offset ≥3.0 m from any foundation or fill batter
Freshwater Diversion	· Cut-off drains to intercept surface water above earthworks zones · Directed into 'C-shaped' sediment traps, with silt fencing or hay bale lining
Dust Management	· Water will be available for dust suppression · Due to naturally cohesive soils, dust nuisance is expected to be minor
Stabilisation	· All exposed batters and disturbed soil will be reseeded, mulched, or hydroseeded as soon as practicable · Temporary stabilisation (e.g., damp-proof membrane) will be used if wet weather is encountered
Monitoring	· Controls will be checked weekly and after any significant rainfall event · Damaged or ineffective controls will be replaced promptly
Work Hours and Construction Noise	· Monday to Friday: 7:00 am to 5:00 pm · Saturday (if needed): 8:00 am to 4:00 pm · Construction noise will comply with NZS 6803P:1984 and district plan limits · No excessive vibration or disturbance is expected
Health and Safety	· Works to comply with the Health and Safety at Work Act 2015 · All excavations must be fenced or restricted · Contractors must identify and protect all services before starting works · The contractor is responsible for site safety at all times

8.3 CONCEPT EARTHWORKS METHODOLOGY

The earthworks sequence is anticipated to follow this staged approach:

1) Establish site access and move earthmoving plant onto site
2) Strip topsoil and excavate cut areas to design levels
3) Redistribute cut material as fill within landscaped or platform areas
4) Compact engineered fill in thin lifts (~150 mm)
5) Reinstate cut/fill surfaces with either compacted hardfill, gravel topping, or vegetation
6) Remove erosion controls post-construction

Machinery to be used includes, a Mechanical excavator, Loader/dump truck, Plate compactor and/or drum roller and a Sheepsfoot roller (if cohesive fill is used).

8.4 CUT AND FILL CONTROLS

The proposed earthworks to establish the building platform, driveway, and shed site are considered to be of low complexity and are geotechnically appropriate, provided that recognised best practice is followed throughout construction.

To ensure long-term stability and performance, all cut and fill activities must comply with the requirements outlined in NZS 4431:1989 – Code of Practice for Earth Fill for Residential Development and must be carried out under the supervision of a suitably qualified and experienced geotechnical professional.

Where cut slopes exceed 1.0 metre in vertical height, they must be graded to no steeper than 1 vertical to 2 horizontal (1V:3H, or 18°) unless specifically retained by an engineered retaining structure. Similarly, fill batters greater than 0.6 metres in height must not exceed a gradient of 1V:3H (18°) unless they are compacted under geotechnical supervision, and/or appropriately buttressed or retained.

All engineered fill must be:

- Placed in thin layers not exceeding 150 mm loose thickness;
- Moisture-conditioned to achieve optimal compaction;
- Compacted using appropriate plant to meet specified dry density ratios;
- Verified through geotechnical testing at vertical intervals not exceeding 0.6 metres, or as required by the supervising engineer.

Fill used to support any future structures must meet applicable standards for bearing capacity, density, and settlement control. While retaining walls under 1.5 metres in height may be exempt from building consent under Schedule 1 of the Building Act 2004, they must still be designed and constructed to achieve appropriate Factors of Safety and comply with geotechnical engineering principles.

9 ON-SITE WASTEWATER TREATMENT AND DISPOSAL (LOT 1)

9.1 TERRITORIAL AUTHORITY REQUIREMENTS

In accordance with the FNDC Engineering Standards 2023, all private wastewater systems shall comply with the NRC Regional Plans (or any amendments as applicable) either as permitted activity or by resource consent. An assessment of the proposed Lot 1 system against the PRPN rules has been provided below in ***Table 3***. A detailed design report will be required at Building Consent Stage, once final development proposals are confirmed.

Table 6: Section C.6.1.3 'Other on-site treated domestic wastewater discharge' Permitted activity requirements and explanations

Item	Rule	Complies? Yes/No	Comments
1	The on-site system is designed and constructed in accordance with the Australian/New Zealand Standard. On-site Domestic Wastewater Management (AS/NZS 1547:2012), and	Yes	The on-site system has been designed in accordance (AS/NZS 1547:2012)
2	The volume of wastewater discharged does not exceed two cubic metres per day, and	Yes	900l per day proposed
3	The discharge is not via a spray irrigation system or deep soakage system, and	Yes	sub-surface soakage beds proposed
4	The slope of the disposal area is not greater than 25 degrees, and	Yes	Slope of the disposal area = ≤ 8°
5	For wastewater that has received secondary treatment or tertiary treatment, it is discharged via: a) a trench or bed system in soil categories 3 to 5 that is designed in accordance with Appendix L of Australian/New Zealand Standard On-Site Domestic Wastewater Management (AS/NZS 1547:2012); or b) an irrigation line system that is dose loaded and covered by a minimum of 50 millimetres of topsoil, mulch, or bark, and	N/A	Primary Treatment System is Proposed
6	for the discharge of wastewater onto the surface of slopes greater than 10 degrees: c) the wastewater, excluding greywater, has received at least secondary treatment, and d) the irrigation lines are firmly attached to the disposal area, and e) where there is an up-slope catchment that generates stormwater runoff, a diversion system is installed and maintained to divert surface water runoff from the up-slope catchment away from the disposal area, and	N/A	Primary Treatment System reticulated to **sub-surface** soakage beds proposed

	f) a minimum 10 metre buffer area down-slope of the lowest irrigation line is included as part of the disposal area, and g) the disposal area is located within existing established vegetation that has at least 80 percent canopy cover, or h) the irrigation lines are covered by a minimum of 100 millimetres of topsoil, mulch, or bark, and		
7	The disposal area and reserve disposal area are situated outside the relevant exclusion areas and setbacks in Table 9: Exclusion areas and setback distances for on-site domestic wastewater systems, and	Yes	See Table 4 for details
8	for septic tank treatment systems, a filter that retains solids greater than 3.5 millimetres in size is fitted on the outlet, and	Yes	3.5mm filter proposed
9	the following reserve disposal areas are available at all times: a) one hundred percent of the existing effluent disposal area where the wastewater has received primary treatment or is only comprised of greywater, or b) thirty percent of the existing effluent disposal area where the wastewater has received secondary treatment or tertiary treatment, and	Yes	100% Reserve Area Proposed
10	The on-site system is maintained so that it operates effectively at all times and maintenance is undertaken in accordance with the manufacturer's specifications, and	Yes	Will comply given provided Maintenance recommendations
11	the discharge does not contaminate any groundwater water supply or surface water, and	Yes	Will comply given provided design parameters
12	there is no surface runoff or ponding of wastewater, and	Yes	Will comply given provided design parameters
13	there is no offensive or objectionable odour beyond the property boundary.	Yes	Will comply given provided design parameters

Further to the above, the disposal area and reserve disposal area must be situated outside of the relevant exclusion areas and setbacks in the PRPNs ***Table 9***: Exclusion areas and setback distances for on-site domestic wastewater systems, provided for below in ***Table 7***.

Table 7: Exclusion areas and setback distances for on-site domestic wastewater systems based on Table 9 of the PRPN

Feature	Offset Requirements (metres)			Subject Site
	Primary	Secondary	Greywater	
Exclusion Areas				
Floodplain	5% annual exceedance probability	5% annual exceedance probability	5% annual exceedance probability	**5% annual exceedance probability**
Horizontal Set Back Distances				
Identified **stormwater** flow path (including a formed road with kerb and channel, and water-table drain) that is down-slope of the disposal area	5	5	5	**>20m**
River, lake, stream, pond, dam or natural wetland	20	15	15	**>20m**
Coastal marine area	20	15	15	**Not applicable**
Existing water supply bore	20	20	20	**>20m**
Property boundary	1.5	1.5	1.5	**>1.5m**
Retaining Walls	3	3	3	**>3m**
Residential Dwelling	3	3	3	**3m**
Vertical setback distances				
Winter groundwater table	1.2	0.6	0.6	**>1.2m**

Given the above, the system to be installed on-site is a Permitted Activity under the PRPN and the FNDC District Plan.

9.2 SITE SPECIFIC ASSESSMENT FOR RESOURCE CONSENT

A site-specific Assessment (SSA) to determine the suitability of wastewater disposal to land has also been carried out by this office using Appendix B ES-SEW1, in accordance with the Site-and-Soil Evaluation Procedures of AS/NZS 1547:2012 (or any amendments as applicable) as stipulated in the FNDCES 2023.

Please refer to ***Table 5*** below. The SSA provided demonstrates compliance with the permitted activity rules of the NRC Regional Plans for Lot 1, and demonstrates that:

1. The site is suitable for the disposal system proposed
2. Adequate disposal and reserve area is available

Table 8: FNDC Appendix ES-SEW1

Appendix B ES-SEW1 **On-site Wastewater Disposal Investigation** **This form is to be read in conjunction with AS/NZS 1547:2012 (or any amendments as applicable), and, in particular with Part 4: Means of Compliance**
Part A – Contact Details
1- Applicant **Name:** WM & TA WEBER TRUST **Property Address:** 17 Walters Lane, Kerikeri Lot & DP Number: Lot 3 DP 170245
2 – Consultant & Site Evaluator(s) **Name:** Keavy Mitchell **Company:** Trine Kel Ltd. **Address:** Suite 1, 88 Kerikeri Road, Kerikeri **Business Phone:** +64 27 275 3457 Mobile of Evaluator: +64 27 275 3457 **Email:** keavy@trinekel.co.nz **Qualifications:** BSc | PGDip | MEngGeol | MEngNZ SQEP Registered: ☑ Yes ❑ No **Name:** Kelvin Kapp **Company:** Trine Kel Ltd. **Address:** Suit 1, 88 Kerikeri Road, Kerikeri Business Phone: +64 21 107 0619 Mobile of Evaluator: +64 21 107 0619 **Email:** kelvin@trinekel.co.nz **Qualifications:** CPEng | CMEngNZ | IntPE(NZ)

	FNDC Requirement	Applies to	Comments
1	**Hazard maps/GIS Hazard Layer – Stability**		
☑	Low Instability	1 & 2	Assessed as low in Geotechnical Assessment. See **Section 6**.
	Medium Instability		
	High Instability		

2	**GIS hazard layer – effluent on slope stability**		
	Low disposal potential		
	Moderate disposal potential		
☑	High disposal potential	1 & 2	Category 3 Soils, gentle fall across disposal areas, deep static ground water level, well-preforming systems on neighbouring properties including the existing on-site primary treatment system which is reticulated to soakage beds (circa ~20 years old) on Lot 2

3	**GIS hazard layer – effluent suitability**		
	Medium unsuitability	n.a	n.a
	High unsuitability	n.a	n.a

4	**GIS hazard layer – flood susceptibility**		
n.a	Is flood susceptible	n.a	n.a
n.a	Is partially flood susceptible	n.a	n.a

5	**GIS land resources layer - stream**				
Are there streams on or adjacent to land under investigation?			Yes		
		Lot s 1 & 2	No	☑	
6	**GIS land resources layer – aquifers at risk**				
Is land situated over or adjacent to aquifer?			Yes		
		Lots 1 & 2	No	☑	
7	**Annual Rainfall**	Average:		1501mm	

Soil category		Structure	Applies to Site(s)	Comments
[1] Gravels and Sands		Structureless (massive)		
[2] Sandy Loams		Weakly Structured		
		Massive		
[3] Loams	☑	High/Moderate structured	Lot 1 & 2	Fine gravelly silt loam with visible fine gravels and weak to strong cemented clasts. The soil mass is well structured, friable and dry to moist.
		Weakly structured or massive		
[4] Clay Loams		High/moderate structured		
		Weakly structured		
		Massive		
[5] Light Clays		Strongly structured		
		Moderately structured		
		Weakly structured or massive		
[6] Medium to Heavy Clays		Strongly structured		
		Moderately structured		
		Weakly structured or massive		

On-Site Evaluation Continued:

	Details:	Applies to site(s)
1	**Flooding potential to proposed field and reserve field**	
☑	Fields will not flood, or	Lot 1 & 2
	Fields will flood in	
	20% AEP event	
	5% AEP event	
	1% AEP even	
2	**Surface water separation to proposed field and reserve field**	
☑	Main/reserve disposal field comply with NRC rules	Lot 1 & 2
	Main/reserve disposal field do not comply with NRC rules	
3	**Surface water separation to proposed field and reserve field**	
☑	Main/reserve disposal field comply with NRC rules	Lot 1 & 2
	Main/reserve disposal field do not comply with NRC rules	
4	**Winter ground water separation to proposed field and reserve field**	
☑	Main and reserve disposal field comply with NRC rules	Lot 1 & 2
	Main and reserve disposal field do NOT comply with NRC rules	
5	**Slope of ground of proposed field and reserve field**	

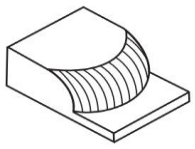
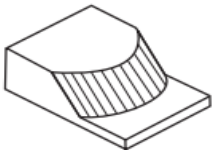
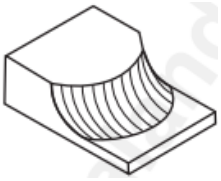
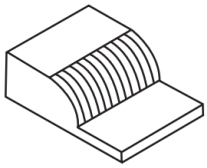
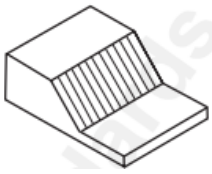
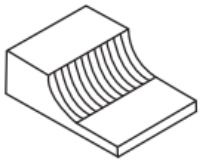
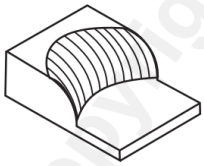
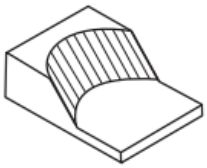
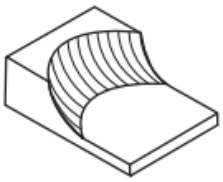
Description:

The assessment of topographical features at the site, was undertaken by a physical site walk over. NRC LIDAR contour data was also utilized to confirm nuanced topographical features where vegetation cover was thick.

The sites landform slopes gently to the north and north-west, with the majority of the site exhibiting gradients generally less than 1V:7H (approximately 8°). Beyond the western boundary, the terrain steepens locally and forms the eastern margin of an ephemeral overland flow path. This natural feature is located more than 20 metres from the proposed development area in Lot 1 and was dry during our site walkover. ***Figure 10*** & ***Figure 11*** depict the existing disposal area on Lot 2 & the proposed disposal area on Lot 1.

Figure 9: Existing Disposal Field in Lot 2

Figure 10: Proposed Disposal Area in Lot 1

6	**Shape of ground of proposed field and reserve field: Linear Divergent, Linear Planar, Linear Convergent**	
		
Waxing Divergent	**Linear Divergent**	**Waning Divergent**
Best water shedding surface, accelerates and spread run-off	Good water shedding surface, spreads run-off, but no acceleration	Waning slope slows run-off but divergence aids in spreading run-off out
		
Waxing Planar	**Linear Planar**	**Waning Planar**
Increasing slope angle aids run-off, but no spreading; good drainage	Natural drainage less effective with distance from crest; no spreading or acceleration; access site	Becomes progressively less well drained down slope, slows run-off; poor
		
Waxing Convergent	**Linear Convergent**	**Waning Convergent**
Good drainage, but may concentrate run-on; run-off is accelerated; use bunds	Relatively poor drainable expected; improve by cut-off drains and bunds	Most prone to waterlogging; avoid if possible; otherwise improve drainage

Comments	The site exhibits varying geomorphological character. The existing septic field location on Lot 2 has a linear divergent slope morphology, as depicted previously in **Figure 5 & 6, Section 4.2.** Within the proposed disposal area in Lot 1, slope morphology is generally linear planar, but transitions to a linear convergent shape near the northern boundary. Observations on-site confirm that the morphology is very shallow and will not pose any drainage/soakage issues for the proposed soakage field.

7	Details	Applies to site(s)
	Intended water supply source:	
	Public Supply	
☑	Rainwater	Lot 1 & 2
	Bore	

8	**Proposed method of disposal and recommended Daily Loading rate (DLR)**

Description:

Standard soakage beds will be utilised on site to dispose of primary treated effluent on-site.

The disposal field will comprise of 60m of 1.0m wide soakage beds, 0.6m deep. Multiple configurations are available at the site, but it is envisioned that the disposal area on Lot 1 will be located either north or northeast of the dwelling and outdoor areas, with all required offsets kept, per ***Table 7***. The unutilised space will provide for the required 100% reserve area.

Peak loading factored in: 5 Persons

Comments	The dwelling comprises 3 bedrooms but will be inhabited by only 2 people. Basing the design of 5 persons was considered conservative.

9	**Site exposure (refer note 7 below)**	Description	Applies to Site(s)
Site(s) aspect		North	Lot 1 & 2
Pre-dominant wind direction		North	Lot 1 & 2
Presence of shelter belts		East & West	Lot 1 & 2
Presence of topographical features or structures		South	Lot 1 & 2

10	**Proximity of water bores (include adjacent to properties)**

Not within 20m

11	**Visible evidence of slips / instability**

None

12	**Total suitable area available for type of effluent disposal proposed (including reserve area)**

100%

13	**Setback areas proposed (if any)**

All Setbacks are met on both allotments per PRPN Requirements

Notes:

1. If the FNDC hazard maps/GIS indicate a flooding susceptibility on the site being evaluated, an on -site evaluation is to be carried out to determine the effects from 20%, 5% and 1% AEP storm events. This evaluation is to include all calculations to substantiate conclusions drawn. If necessary, include a detailed contour plan and photos.
2. NRC Water & Soil plan defines surface water as 'All water, flowing or not, above the ground. It includes water in continually or intermittently flowing rivers, artificial watercourses, lakes and wetlands, and water impounded by structures such as dams or weirs but does not include water while in pipes, tanks, cisterns, nor water within the Coastal Marine Area'. By this definition, separation (complying with NRC rules) is to be maintained by both the proposed disposal and reserve areas from any overland flow paths and/or swale drains etc. or R/C will be required from NRC. Surface water is to be clearly marked on each site plan, showing the extent of a 1% AEP storm event, and detailing separation distances to main/reserve disposal areas.
3. Positions of test borehole/s to be shown and bore logs to be provided. Separation (complying with NRC rules) is to be maintained by both the proposed disposal and reserve areas from winter ground water level or R/C will be required from NRC. If the investigation is done outside of the winter period, allowance is to be made in determining the likely winter level.
4. Slopes of ground are to be compared with those recommended maximums for type of system proposed (refer Appendix 4.2B AS/NZS 1547:2012). Designs exceeding those maximums will require specific design to justify the proposal and may also need Resource Consent from NRC.
5. Shape of ground is important as it will determine whether there is potential for concentrated overland flows from the upper slopes and also if effluent might be concentrated at base of slope if leeching occurs. Refer Figure 4.1B2 AS/NZS 1547:2012.
6. The proposed system (for residential developments) should be sized to accommodate an average 3-bedroom house with 5 people. Sites in holiday areas need to take peak loading into effect in determining daily volumes. The design must state what DLR was used to determine area necessary (including reserve area). If ground conditions are marginal for type of disposal proposed, then a soil permeability test utilising the constant head method is to be carried out across the proposed disposal area. Refer Appendix 4.1F AS/NZS 1547:2012.
7. The site aspect is important as a north-facing site that is not sheltered from wind and sun by shelterbelts or other topographical features or structures will perform far better than a south-facing site on the lee of a hill that is shaded from wind and sun etc.
8. If any effluent disposal area (including any reserve area) proposed has or is adjacent to areas that show signs of instability, then a full report from a CPEng (Geotech) will be required to justify the viability of the area for effluent disposal.
9. If there are any water bores on the subject property or adjacent properties, then a site plan will be required showing bore positions in relation to any proposed effluent field(s).
10. If setback areas are proposed to mitigate effects, the extent and position/s need to be shown on a site plan

10 WATER SUPPLY

10.1 POTABLE WATER

The client has requested that roof runoff be collected in rainwater tanks for use as a potable water supply for the proposed dwelling on Lot 1.

Rainwater harvesting is considered the most appropriate option for Lot 1, given the significant proposed roof area, which will provide ample on-site potable water supply while avoiding additional demand on the Kerikeri Town Water Supply system, which is currently at capacity.

Based on ***Figure 12***, a standard household comprising two adults and three children is estimated to require approximately 27,000 litres of potable water per month. Using average Northland rainfall data, the collected runoff is expected to consistently exceed the household's monthly demand throughout the year.

With an allowable storage capacity of ~44,000 litres, the proposed rainwater collection system will ensure a reliable potable water supply year-round, while also providing a substantial buffer during summer months to reduce drought risk at the site.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Harvest	43050	49350	52500	51450	64050	73500	87675	70350	62475	48300	43050	51450
Monthly Consumption	27375	27375	27375	27375	27375	27375	27375	27375	27375	27375	27375	27375
Monthly Surplus/Shortage	15675	21975	25125	24075	36675	46125	60300	42975	35100	20925	15675	24075

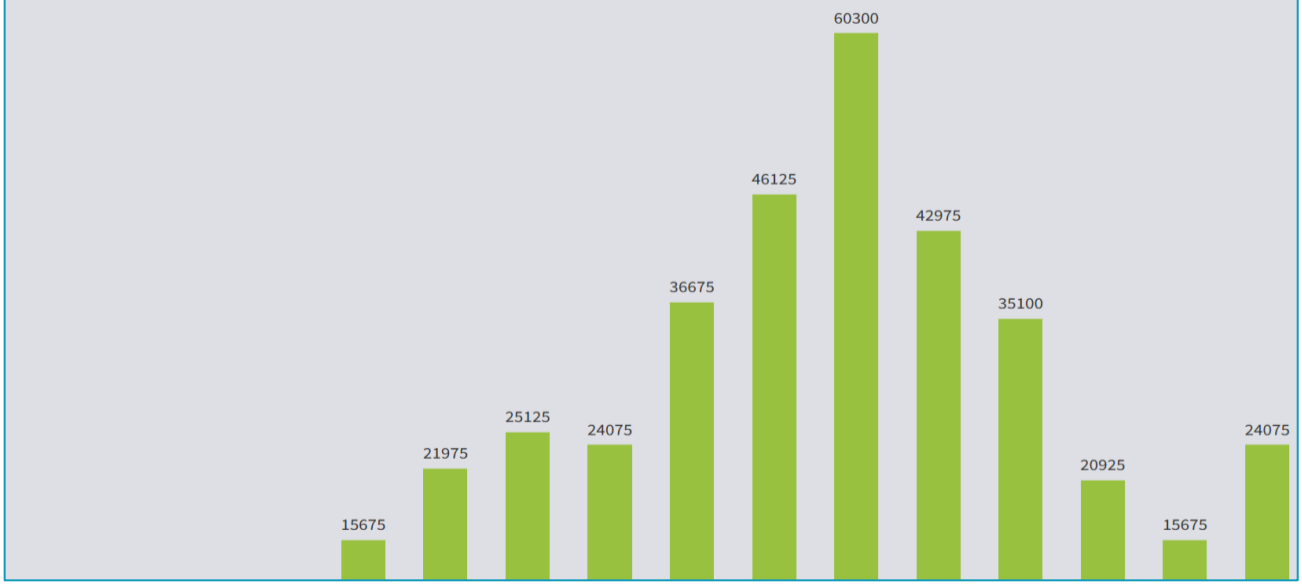


Figure 11: Estimated Potable Rainwater Harvesting Volume from 525m² of roof area [Shed and Dwelling] (Source: Devan Tanks)

10.2 FIRE FIGHTING

Adequate supply for firefighting purposes must be provided via tanks or other water sources (i.e pools) positioned for safe accessibility. These arrangements will align with the New Zealand Fire Fighting Water Supply Code of Practice SNZ PAS 4509:2008. Any alternative firefighting water supplies must receive specific approval from an authorized representative of Fire and Emergency NZ.

11 STORMWATER MANAGEMENT

11.1 INTRODUCTION

This stormwater assessment was undertaken to determine the effects of increased impervious surfaces associated with a proposed two-lot subdivision at 17 Waters Lane, Kerikeri. Both proposed allotments will exceed the 12.5% permitted activity threshold for impermeable surface coverage under Rule 8.7.5.1.5, as well as the 20% Controlled Activity threshold under Rule 8.7.5.2.2 of the Far North District Plan (Operative) for the Rural Living Zone.

Initial design concepts considered a conventional attenuation approach using on-site stormwater tanks. However, calculations showed that detaining runoff back to a 12.5% pre-development baseline would require three to four 25,000 L tanks, dedicated solely to stormwater detention. This approach was considered cost-prohibitive and disproportionate in benefit to the scale and effects of the proposed development.

Alternatively, a full hydrological and hydraulic assessment was undertaken for the receiving Overland Flow Path (Channel) on the western boundary of the parent allotment, which currently collects all stormwater runoff from the allotment. The assessment presented here in represents a performance-based discharge strategy for stormwater management at the site, that avoids the need for conventional tank attenuation, in line with Clause 4.3.3 of the FNDC Engineering Standards (2023).

The primary objective was to demonstrate that additional runoff generated by the development could be safely and effectively discharged to the existing receiving environment, without causing any negative downstream flooding, erosion, or ponding effects on neighbouring properties, in-line with the objectives of the RMA.

11.2 SITE COVER

Table 9 below, outlines the plan view area measurements taken from the proposed concept development plans. These values form the basis of the stormwater management assessment presented.

Table 9: Impermeable Cover Summary

Lot 1 – 4,435m²	
Future pool	24m²
Proposed gravelled area	10 m²
Proposed gravelled driveway to shed	220 m²
Proposed shed	144 m²
future driveway	150 m²
future dwelling	385 m²
Total:	**933m² (21.03%)**
Lot 2 - 4,328 m²	
Existing metal driveway	164 m²
Existing concrete driveway	211 m²
Existing asphalt Path	26 m²
Proposed concrete path	45 m²
Existing roof to eaves	292 m²
Proposed garage extension	50 m²
Proposed metalled parking	140 m²
Total:	**928m² (21.4%)**

11.3 METHODOLOGY

A comprehensive catchment-scale analysis was conducted using:

- **2025 1 m LiDAR-derived DEM** processed in QGIS for progressive catchment delineation;
- **Land cover analysis** using weighted runoff coefficients

- **HydroCAD v10.20** for TR-55 rainfall-runoff channel flow simulations under four scenarios:
    - **Scenario 1:** Existing Conditions (12.0% Catchment cover, CN_W = 71)
    - **Scenario 2:** Post 17 Waters Lane development (12.7% Catchment cover, CN_W = 72)
    - **Scenario 3:** 20% MPD, CN_W = 75
    - **Scenario 4:** 25% MPD, CN_W = 78

A 1% AEP 24-hr rainfall event of 303 mm, inclusive of RCP8.5 climate change factors for the 2081–2100 horizon, was utilised. ***Figures 12-14*** below illustrate the *user-defined* delineated sub-catchment areas where progressive capacity analyses were carried out. At the downstream extent of each sub-catchment, channel cross-sectional profiles (No. 7 total) were extracted from DEM data to capture overland flow path geometry ***(refer Figure 14).*** These profiles were used to complete hydraulic analyses under each of the four catchment cover **scenarios**, as described above.

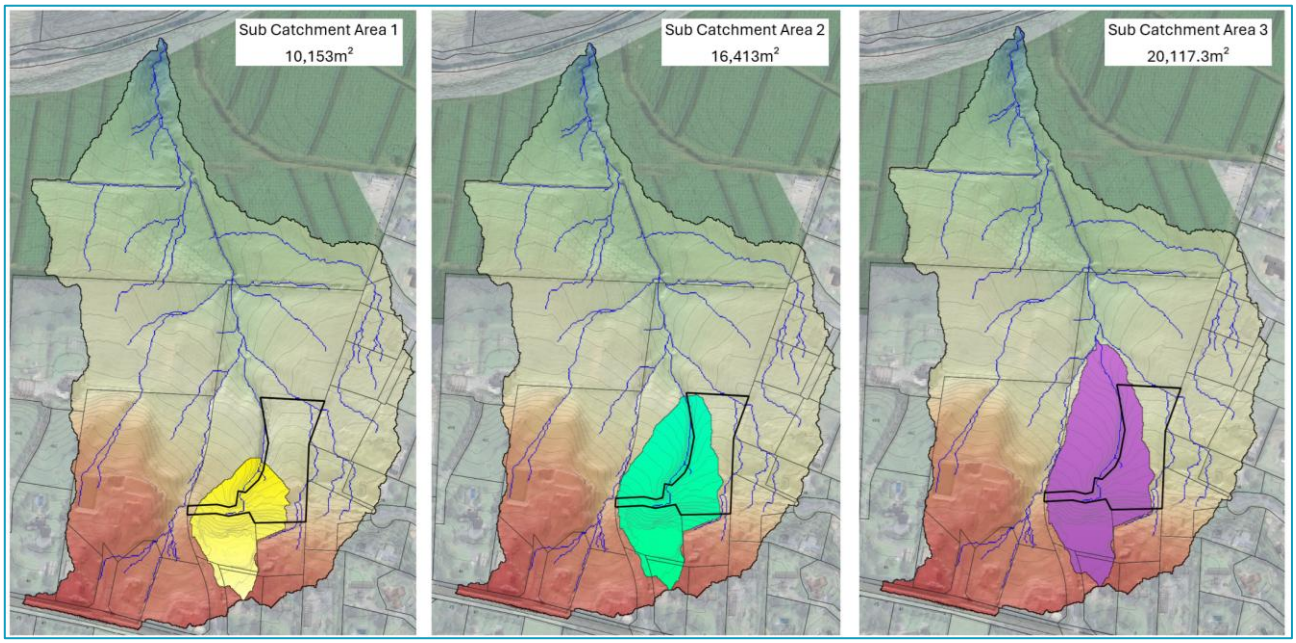


Figure 12: User-Defined Delineated Sub Catchment Areas 1-3

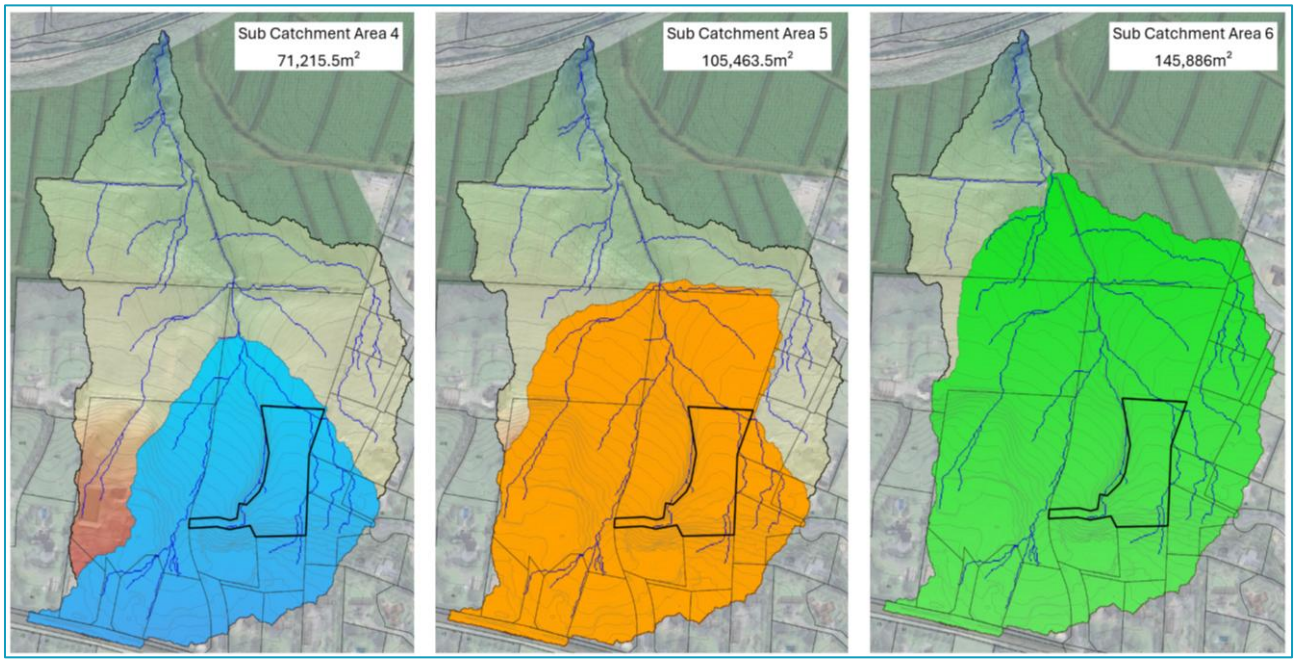


Figure 13: User-Defined Delineated Sub Catchment Areas 4-6

Channel flow assessments were completed for 7 downstream reaches (HydroCAD Reaches 8R–14R, See ***Annexure D***), with full capacity and flow metrics analysed and verified against custom cross-sections extracted from DEM data.

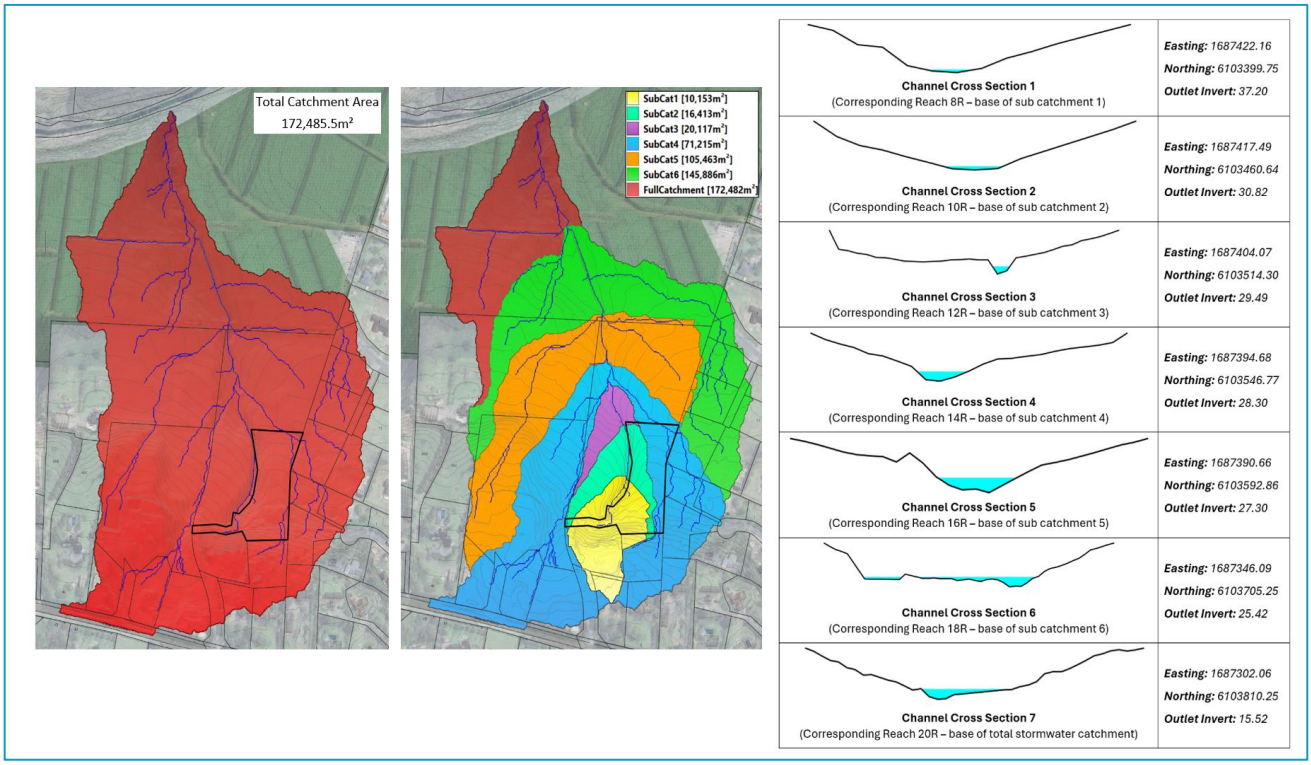


Figure 14: Total Actual Stormwater Catchment Area (left) Stacked Catchments (centre) & Channel Section Geometry (right)

11.4 OUTCOMES

The models showed that even under the most conservative scenario (25% Maximum Probable Catchment Development), peak discharges remain significantly below the capacity of the receiving channel. As shown above, the maximum increase in channel flow depth during the 1% AEP rainfall event (including climate change adjustment) between the existing catchment condition and the unattenuated 17 Waters Lane subdivision (Scenario 2) is less than 10mm. This change results in a negligible horizontal variation in inundation extent, as demonstrated in the stacked inundation output maps (refer to ***Figure 15***).

Table 10: Model Outputs

	Scenario 1 ***Existing Catchment Cover***			***Scenario 2*** ***Intro of 17 Waters Lane Imp.***			***Scenario 3*** ***20% Imp. Catchment Cover***			***Scenario 4*** ***25% Imp. Catchment Cover***		
Channel Section	**Max. Flow Depth (m)**	**WSE (m)**	**Max. Velocity (m/s**	**Max. Flow Depth (m)**	**WSE (m)**	**Max. Velocity (m/s**	**Max. Flow Depth (m)**	**WSE (m)**	**Max. Velocity (m/s**	**Max. Flow Depth (m)**	**WSE (m)**	**Max. Velocity (m/s**
Section 1	0.14	32.85	0.91	0.14	32.86	0.91	0.14	32.87	0.93	0.15	33.04	0.94
Section 2	0.13	30.90	0.99	0.13	30.91	0.99	0.13	30.92	1.01	0.14	31.07	1.03
Section 3	0.22	29.44	1.15	0.22	29.46	1.16	0.22	29.49	1.18	0.23	29.78	1.19
Section 4	0.30	28.12	1.46	0.31	28.14	1.47	0.31	28.16	1.50	0.32	28.51	1.52
Section 5	0.31	27.16	1.35	0.31	27.20	1.36	0.32	27.23	1.38	0.32	27.68	1.40
Section 6	0.27	25.68	0.78	0.27	25.71	0.78	0.28	25.75	0.79	0.28	26.31	0.80
Section 7	0.38	20.08	1.12	0.38	20.11	1.13	0.39	20.15	1.15	0.40	20.78	1.17

Under the most conservative condition—Scenario 4, which models 25% impervious cover across the catchment—the maximum increase in flow depth compared to existing condition is negligible at approximately 20 mm. Even at this upper

bound, the resulting change in inundation extent remains spatially minor and visually negligible as shown on the output maps.

The left-hand output in ***Figure 15*** below provides a visual comparison of Scenario 1 (existing conditions) and Scenario 2 (post-development with unattenuated discharge), confirming that the introduction of additional impervious surfaces from the proposed development does not meaningfully alter the channel's spatial inundation pattern. Similarly, the right-hand output in Figure 15 provides a stacked visual comparison of all four scenarios, which highlights slight spatial variation in inundation extent, primarily in the lower catchment near the kiwifruit orchard. Given that this area is earmarked for Horticultural Zoning in the Proposed District Plan, and that the inundation differences remain minor even under the most conservative land cover scenario (Scenario 4), we are confident in concluding that the proposed development will not result in any adverse stormwater effects.

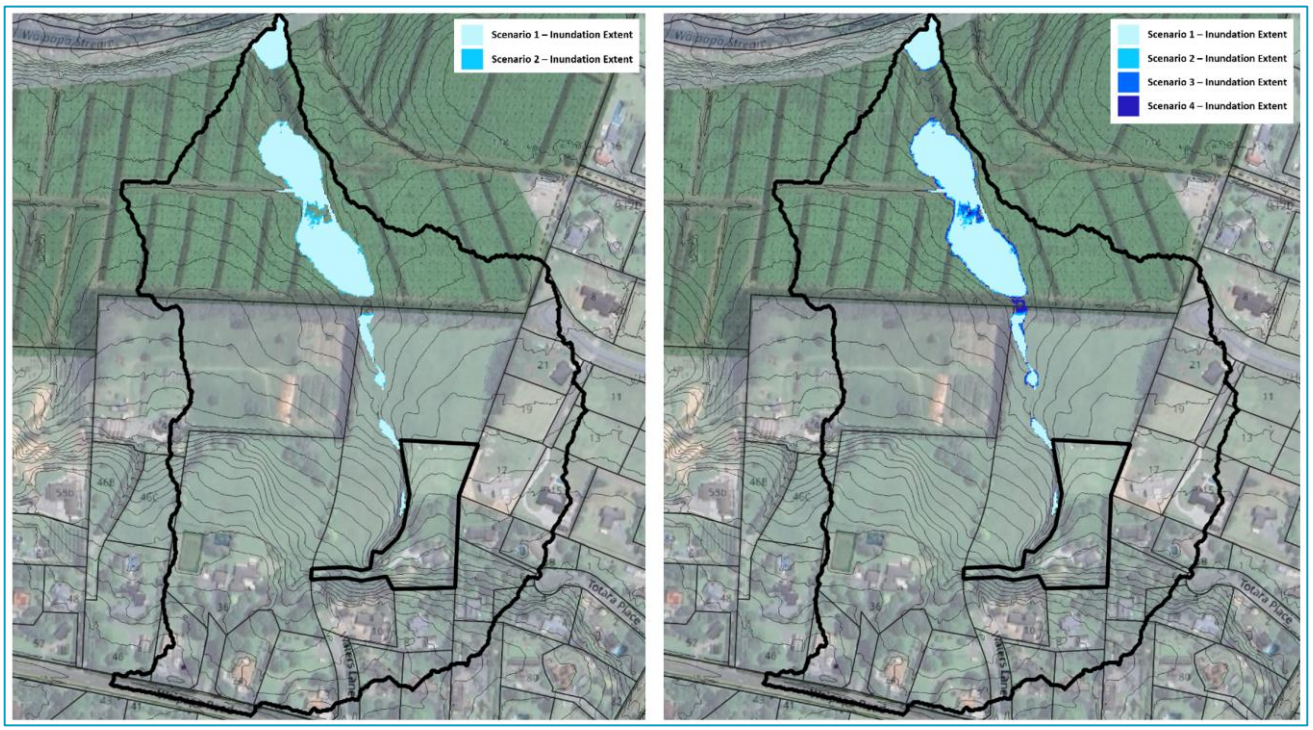


Figure 15: Inundation Extent in the Overland Flow Path for Each of the 4 Modelled Catchment Cover Scenarios

In addition to the above, all modelled open channel flow velocities remain beneath the threshold criteria provide in the FNDC ES 2023, for a fully vegetated channel (i.e ≤ 1.5m/s per Table 4-7: Maximum Velocities in Channels (in all discharge conditions).

Full summaries and calculation outputs are provided in Annexure D.

11.5 DISCUSSION AND JUSTIFICATION

Initial consideration was given to conventional on-site detention via stormwater tanks. However, the analysis revealed:

- The majority of runoff originates from hardstand areas (concrete and gravel accessways);
- Retaining and detaining runoff from these surfaces would require dedicated detention tanks—separate from potable/fire tanks—adding considerable cost, excavation, plumbing complexity, and long-term maintenance burdens;
- The downstream environment already receives flow from a wider contributing catchment and has robust hydraulic capacity, demonstrated to absorb flow increases even under a 25% catchment imperviousness scenario.

Critically, the modelling demonstrates that runoff increase is negligible at a catchment scale, and no adverse effects (flooding, erosion, or ponding) are triggered on- or off-site. This satisfies both:

- Section 106 RMA thresholds for adverse effects, and
- Clause 4.3.3 of FNDC Engineering Standards, which allows unattenuated discharge where downstream capacity is sufficient.

Importantly, no allowance was made for infiltration losses or exfiltration through the natural soil profile in our model which would drastically decrease the populated data. This adds to the conservatism of our modelling approach, thereby strengthening confidence in the validity and reliability of the resulting outputs.

11.6 STORMWATER ASSESSMENT CONCLUSIONS

Based on the findings of this assessment and the supporting catchment-specific evidence, on-site attenuation is not required for the proposed development. In this particular instance, the increase in impermeable surface coverage beyond the 12.5% permitted threshold does not result in any negative impact on the receiving environment.

The downstream overland flow path has specifically been demonstrated to have ample hydraulic and attenuation capacity to safely collect and convey the existing catchment, and additional runoff generated by the proposed development—including under a conservative 25% catchment imperviousness Maximum Probable Development (MPD) scenario, where the actual outcome from the proposed development is 12.7%.

Modelled flow conditions confirm that runoff remains well within the capacity of the downstream channel network, with no risk of adverse flooding, surface ponding, or additional inundation effects on downstream properties.

In accordance with Section 106 of the Resource Management Act 1991, the overland flow path capacity analysis presented herein provides robust, site-specific evidence that any potential effects from exceeding the 12.5% impermeable surface limit are less than minor.

Accordingly, both proposed allotments may implement non-attenuative, low-impact stormwater mitigation measures, such as water tanks, level spreaders, or rip-rap lined discharge points, to manage runoff safely and in alignment with performance-based design principles, and therefore no further stormwater reporting will be required at Building Consent Stage

12 CONCLUSIONS

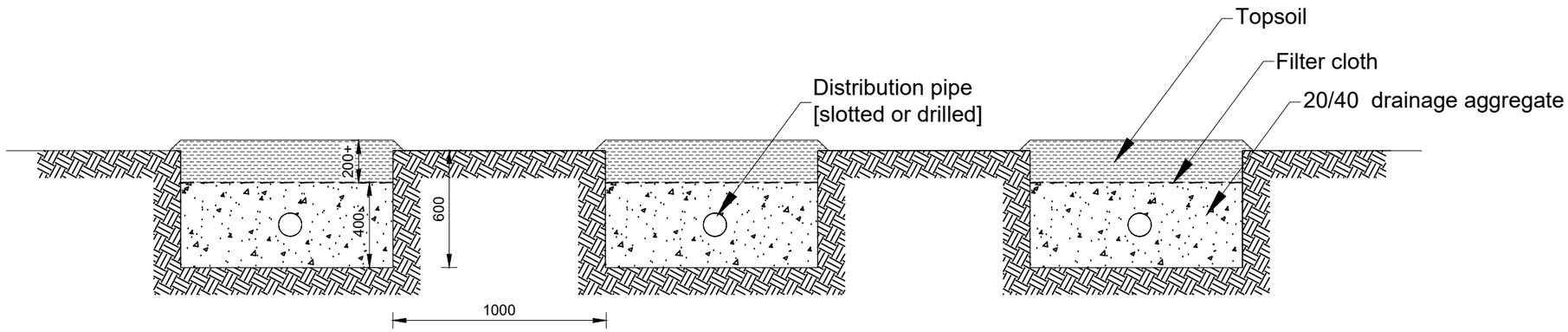
This Site Suitability Report has assessed the key development elements for the proposed subdivision at 17 Waters Lane, Kerikeri, including land stability, wastewater treatment and disposal, potable water supply, firefighting water supply, and stormwater management. Based on the assessments undertaken, it is concluded that the site is suitable for the intended two-lot residential subdivision and associated development, subject to:

- Implementation of earthworks, drainage, and wastewater system designs in accordance with the recommendations herein.
- Adherence to Building Consent-stage validation of final earthworks, foundations, wastewater disposal, and water supply.
- Registration of consent notices where necessary

For ease of reference, a summary of the overall site suitability findings is presented in the Executive Summary in **Section 1** of this report.

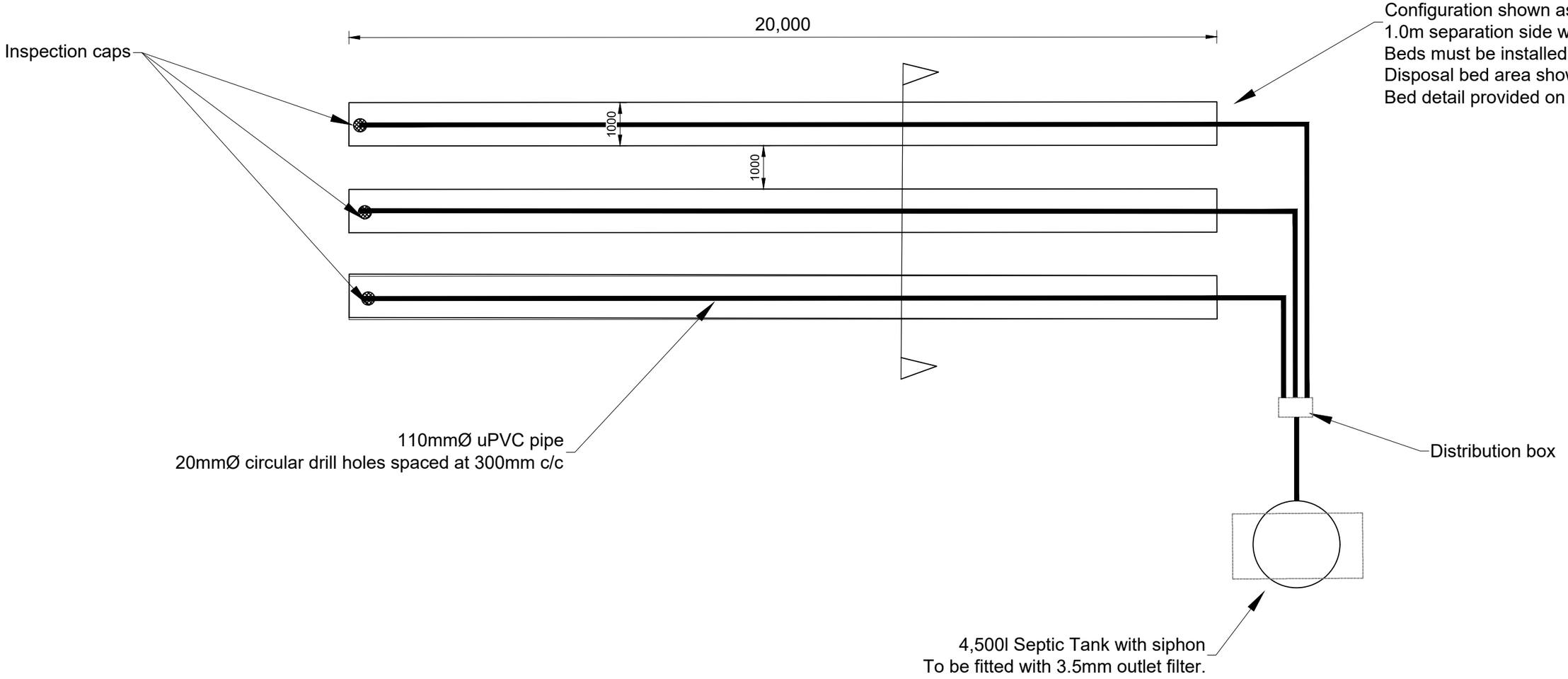
13 ANNEXURES

ANNEXURE A – TKL ANNOTATED CONCEPT SCHEME PLAN



Concept Deisgn [TBC]

60m of 1.0m wide conventional soakage beds.
Configuration shown as 3 x 20m beds,
1.0m separation side wall to side wall.
Beds must be installed level along the contour.
Disposal bed area shown is roughly 5°.
Bed detail provided on sheet D02.



ISSUE FOR INFORMATION ONLY

REVISIONS

NO	DATE	DESCRIPTION	BY	CHK
00	27/06/25	FOR SUBDIVSION	KM	KK
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.		.	.	.
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DRAWN: KM
DESIGNED: KM
CPENG: KK
DATE ISSUED: 27/06/2025
LOCATION: KERIKERI
REFERENCE: 063-300

TRINEKEL
CIVIL ENGINEERING SOLUTIONS

CLIENT: WM & TA WEBER TRUST
PROJECT: SUBDIVISION
TITLE: CONCEPT SEPTIC LAYOUT

SCALE: NOT TO SCALE
A3

PROJECT #			AREADISC			SEQUENCE			REVISION	
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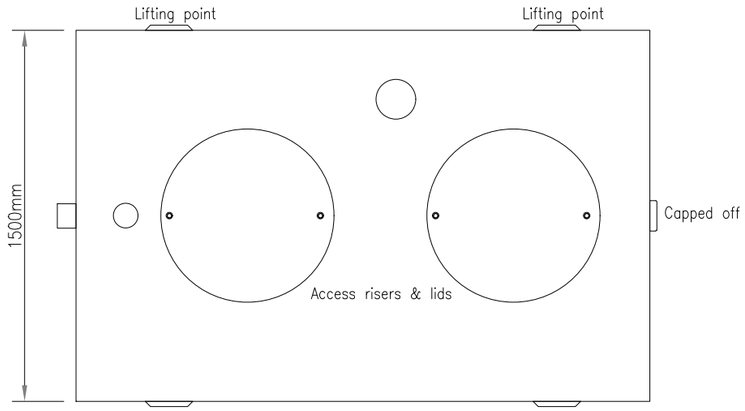
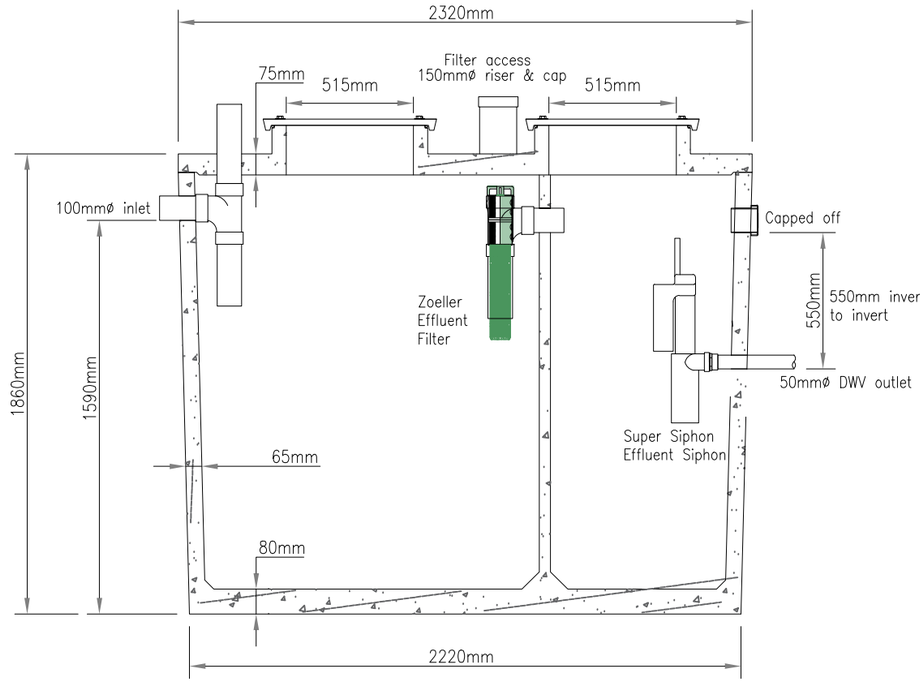
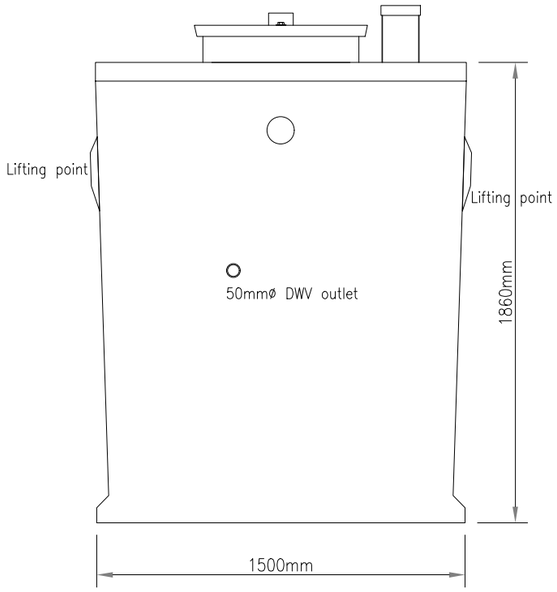


DURACRETE
PRECAST TO LAST

4,500L Dual Chamber Syphon Septic Tank





ISSUE FOR INFORMATION ONLY

REVISIONS	NO	DATE	DESCRIPTION	BY	CHK
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DRAWN: KM
DESIGNED: KM
CPENG: KK
DATE ISSUED: 27/06/2025
LOCATION: KERIKERI
REFERENCE: 063-300

TRINEKEL
CIVIL ENGINEERING SOLUTIONS

CLIENT: WM & TA WEBER TRUST
PROJECT: SUBDIVISION
TITLE: SEPTIC TANK DETAIL

SCALE: NOT TO SCALE
A3

PROJECT #			AREADISC			SEQUENCE			REVISION	
0	6	3	G	N	C	3	0	1	0	0

ANNEXURE B – CONCEPT DEVELOPMENT PLANS FOR LOT 2

EXISTING EASEMENT

PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
RIGHT OF WAY & TELECOMMUNI-CATIONS	(A)	LOT 2 HEREON	C430273.3
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A)	LOT 2 HEREON	C945054.7

EXISTING EASEMENT IN GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
DRAIN STORMWATER & SURFACE WATER	(A)	LOT 2 HEREON	C945054.7

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A) (B)	LOT 2 HEREON	LOT 1 HEREON

Local Authority: Far North District Council
Comprised in: NA103D/512
Total Area: 8763m²
Zoning: Rural Living
Resource features: NIL

0 7.5 37.5 75m

Bar Scale 1:750 @ A3

THOMSON SURVEY LIMITED
315 Kerikeri Rd
P.O. Box 372 Kerikeri
Email: kerikeri@tsurvey.co.nz
Ph: (09) 4077360
www.tsurvey.co.nz
Registered Land Surveyors, Planners & Land Development Consultants

PROPOSED SUBDIVISION OF LOT 3 DP 170245

17 WATERS LANE, KERIKERI

PREPARED FOR: W. WEBER

	Name	Date
Survey		
Design		
Drawn	KY	06.03.25
Approved		
Rev	KY	10.03.25

10742 Scheme 20250310

ORIGINAL
SCALE 1:750
SHEET SIZE A3

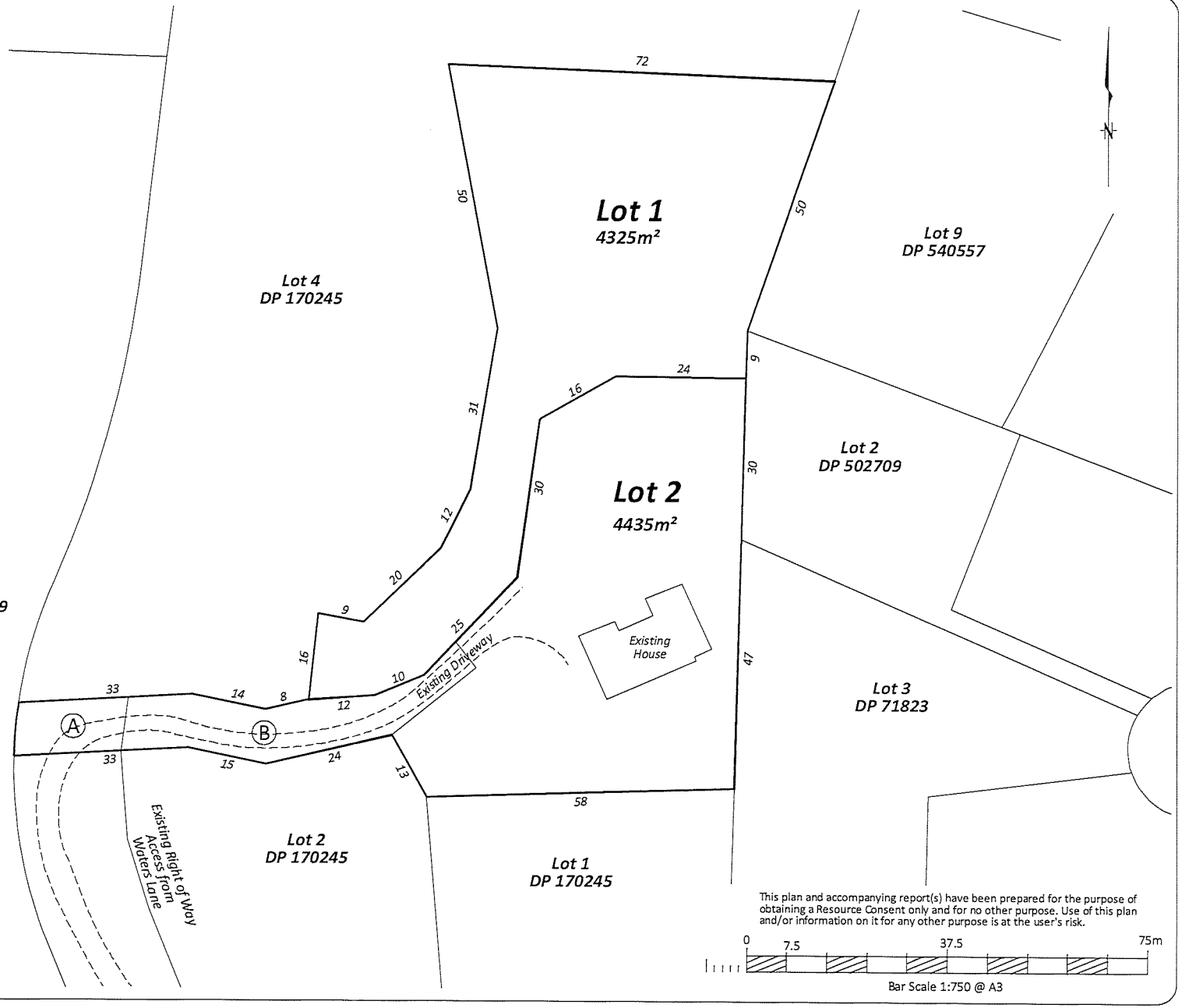
Surveyors Ref. No: 10742

Sheet 1 of 1

EXISTING EASEMENT			
PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
RIGHT OF WAY & TELECOMMUNI-CATIONS	(A)	LOT 2 HEREON	C430273.3
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A)	LOT 2 HEREON	C945054.7

EXISTING EASEMENT IN GROSS			
PURPOSE	SHOWN	SERVIENT TENEMENT	CREATED BY
DRAIN STORMWATER & SURFACE WATER	(A)	LOT 2 HEREON	C945054.7

MEMORANDUM OF EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY, TELECOMMUNI-CATIONS, ELECTRICITY & WATER SUPPLY	(A) (B)	LOT 2 HEREON	LOT 1 HEREON



AREAS AND MEASUREMENTS ARE SUBJECT TO FINAL SURVEY

TOPOGRAPHICAL DETAIL IS APPROXIMATE ONLY AND SCALED FROM AERIAL PHOTOGRAPHY

Local Authority: Far North District Council
Comprised in: NA103D/512
Total Area: 8763m²
Zoning: Rural Living
Resource features: NIL

This plan and accompanying report(s) have been prepared for the purpose of obtaining a Resource Consent only and for no other purpose. Use of this plan and/or information on it for any other purpose is at the user's risk.

0 7.5 37.5 75m

Bar Scale 1:750 @ A3

THOMSON SURVEY LIMITED
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P.O. Box 372 Kerikeri
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www.tsurvey.co.nz
Registered Land Surveyors, Planners & Land Development Consultants

PROPOSED SUBDIVISION OF LOT 3 DP 170245

17 WATERS LANE, KERIKERI

PREPARED FOR: W. WEBER

	Name	Date
Survey		
Design		
Drawn	KY	06.03.25
Approved		
Rev	KY	10.03.25

10742 Scheme 20250310

ORIGINAL
SCALE 1:750
SHEET SIZE A3

Surveyors Ref. No: 10742

Sheet 1 of 1

N

NORTHPOINT

SITE DESCRIPTION:

LOT 3 DP 170245
SITE AREA: 8763m2

PLAN AREAS:
HOUSE ROOF AREA: 385m2 approx
HOUSE FLOOR AREA: 288.73m2 approx

GENERAL NOTES:
PLANNING ZONE: RURAL LIVING
WIND ZONE: HIGH - to NZS3604 5.2.3 (to NZS3604:2011)
EXPOSURE ZONE: Zone C
SUBSOIL CLASSIFICATION:
SOIL CLASS:
ROOF PITCH:

WIND ZONE CALCULATION:
WIND REGION: A
GROUND ROUGHNESS: URBAN (>10 obstructions/ha)
SITE EXPOSURE: EXPOSED
TOPOGRAPHICAL CLASS:
Smooth gradient = >0.1 (1:10) = MILD
Zone =Crest zone
Topo Class = T3

DISTRICT PLAN COMPLIANCE:
RESIDENTIAL INTENSITY:
Permitted: 1 unit per 4,000m² of land. In all cases the land shall be developed in such a way that each unit shall have at least 3,000m² for its exclusive use surrounding the unit plus a minimum of 1,000m² elsewhere on the property.
Proposed: 2 Dwellings = 3000m2min exclusive area/dwelling = COMPLIES

BUILDING HEIGHT:
Permitted: = 9m max
Proposed House: = <6 m approx
=COMPLIES

SUNLIGHT: = COMPLIES

STORMWATER MANAGEMENT: (Impermeable surfaces)
Total Permitted = ≤12.5% of gross site area
Extg. driveway to remain gravelled: = 164m2
Extg Concrete driveway = 211m2
Existing Asphalt path = 26m2
Extg. roof area to remain: =192m2

Total Proposed:
Proposed driveway to shed & turning gravelled = 220m2
Proposed Shed roof: = 144m2 approx
Additional gravelled access to new driveway off extg = 10m2

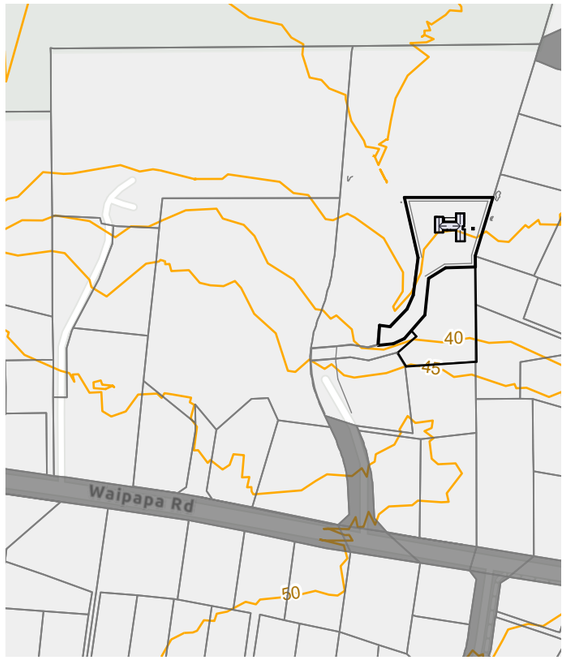
Proposed Extension Roof area = 50m2
Proposed Extension to gravelled parking = 140m2
Proposed concrete Paving = 45m2

Future House Roof Plan Area: = <autotext-BUILDING-B05472B6-4046-4A26-8B1C-918ED561E423>
Future Proposed Driveway & gravelled areas outside roofline: =150m2 approx
Future Pool: 24m2
2 additional water tanks 20m2
Proposed & Existing = 1781m2 approx =20%= RESOURCE CONSENT REQUIRED

SETBACKS to BOUNDARIES: =3m min permitted =COMPLIES

CUT/FILL FACE: = ≤1.5m max permitted = COMPLIES

HAIL: NOT A HAIL SITE - no change in use
FIRE RISK TO RESIDENTIAL UNITS: >20m setback to scrub/bush lot = COMPLIES



2 Location Plan 1:5000

1 Overall Site Plan 1:750

NOTES:

1) All construction to comply with NZBC & NZ Standards and LA requirements.

2) All Services locations and connections shown indicative only. Contractor to confirm all existing services runs on site prior to commencing construction

3) Extg. Contours are indicative only from LIDAR mapping. All levels to be confirmed on site by builder prior to construction.

5) Earthworks and Sediment Control to comply with Geotechnical Report requirements and FNDC Proposed District Plan EW-S5: to comply with "Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region 2016" - refer to accompanying documents for " Building on Small Sites - Doing it Right" for guidance.

6) Earthworks to comply with FNDC Proposed District Plan EW-S3 "Accidental Discovery Protocol"

7) Plans to be read in conjunction with Site suitability Report and TP58

8) Refer to Site & Service Plans for drainage & Services runs and locations

CONCEPT

All Construction to comply with Local Authority requirements, NZ Building Code/ Approved Documents and NZStandards.

DO NOT SCALE. Work only to figured dimensions. All Dimensions and levels are to be checked by contractor before commencement of work. Contractor to report any discrepancy to Designer.

Drawings are to be read in conjunction with the "Specification" and manufacturers literature and other accompanying documentation. Where there are inconsistencies, drawings are to take precedence over the specification typically, confirmation is to be sought from Designer.

These drawings and accompanying documents are not to be used for construction purposes until issued for Building Consent and stamped "approved documents" by the local authority.

Lindholmdesign
ARCHITECTURAL SERVICES
P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526

PROPOSED NEW DWELLING for **WM & TA WEBER FAMILY TRUST**
at 17 WATERS LANE KERIKERI, LOT 3 DP 170245

SHEET TITLE
OVERALL SITE & LOCATION PLAN

PROJECT No: L-264
SHEET SIZE: A3
SCALE: 1:750, 1:5000, 1:250
DRAWN: Karin Lindholm Andreassen
DATE: 28/05/2025

SHEET **A01**
REVISION NO. **G**

ANNEXURE C - GEOTECHNICAL TESTING LOGS

HAND AUGER : HA01

JOB NO.: 1391394 **SHEET:** 1 OF 1

CLIENT: Trine Kel Ltd
PROJECT: Ground Testing as Directed by Trine Kel
SITE LOCATION: 17 Waters Lane, Kerikeri

START DATE: 20/03/2025 **NORTHING:** **GRID:**
DIAMETER: 50mm **EASTING:**
SV DIAL: DR4802 **ELEVATION:** Ground
FACTOR: 1.57 **DATUM:**

STRATIGRAPHY	SOIL DESCRIPTION	LEGEND	DEPTH (m)	WATER	SHEAR VANE: PEAK STRENGTH (kPa)	SHEAR VANE: REMOULD STRENGTH (kPa)	SHEAR VANE: SENSITIVITY	DCP - SCALA (Blows / mm)	COMMENTS, SAMPLES, OTHER TESTS
Topsoil	TOPSOIL, blackish brown, dry.	TS	0.0	Groundwater Not Encountered					
Kerikeri Volcanic Group	NATURAL: Slightly Gravelly (Weakly & Strongly Fused Clast) SILT, minor clay, dark brown with red and orange mottles, very stiff, dry, no to low plasticity.		0.2						
	Slightly Clayey SILT, dark brown, very stiff, dry, no to low plasticity.		0.4		220+	-	-		
	0.6m: Occasional orange and white weakly fused clast mottles, no plasticity (friable).		0.6						
	0.8m: 200mm lense of frequent white weakly fused clast mottles.		0.8		UTP	-	-		
	1.0m: Becoming low plasticity.		1.0						
	1.1m: Becoming brown, dry to moist.		1.2		UTP	-	-		
	1.3m: Frequent small white specks, no to low plasticity.		1.4						
			1.6		220+	-	-		
	Slightly Clayey SILT, purple and brown with orange and white mottles, very stiff, moist, not to low plasticity.		1.8						
	SILT, trace to minor clay, purple and brown with orange and white mottles, very stiff to hard, moist, no plasticity (friable).		2.0		UTP	-	-		
			2.2		UTP	-	-		
	EOH: 2.20m - Too Hard To Auger		2.4						

REMARKS
End of borehole @ 2.20m (Target Depth: 3.00m)

NZGS Definition of Relative Density for Coarse Grain soils: VL - Very Loose; L - Loose; MD - Medium Dense; D - Dense; VD - Very Dense

LOGGED BY: SJP
CHECKED BY:

▼ Standing groundwater level
▽ GW while drilling

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HAND AUGER : HA02

CLIENT: Trine Kel Ltd
PROJECT: Ground Testing as Directed by Trine Kel
SITE LOCATION: 17 Waters Lane, Kerikeri

JOB NO.: 1391394 **SHEET:** 1 OF 1
START DATE: 20/03/2025 **NORTHING:** **GRID:**
DIAMETER: 50mm **EASTING:**
SV DIAL: DR4802 **ELEVATION:** Ground
FACTOR: 1.57 **DATUM:**

SOIL DESCRIPTION

TOPSOIL | CLAY | SAND | PEAT | FILL | SILT | GRAVEL | ROCK

STRATIGRAPHY	SOIL DESCRIPTION	LEGEND	DEPTH (m)	WATER	SHEAR VANE PEAK STRENGTH (kPa)	SHEAR VANE REMOULD STRENGTH (kPa)	SHEAR VANE SENSITIVITY	DCP - SCALA (Blows / mm)	COMMENTS, SAMPLES, OTHER TESTS
Topsoil	TOPSOIL, blackish brown, dry.	TS	0.0	Groundwater Not Encountered					
Kerikeri Volcanic Group	NATURAL: Slightly Clayey SILT, dark brown, very stiff, dry, no to low plasticity.		0.2						
	0.3m: 100mm lesne with red and orange weakly fused clast mottles.		0.4		UTP	-	-		
	0.5m: Becoming brown.		0.6						
			0.8		UTP	-	-		
	SILT, minor clay, brown with occasional white, purple and red weakly fused clast mottles, hard, dry, no plasticity (fraible).		1.0						
			1.2		UTP	-	-		
			1.4						
	EOH: 1.60m - Too Hard To Auger		1.6		UTP	-	-		
			1.8						
			2.0						
			2.2						
			2.4						

REMARKS
End of borehole @ 1.60m (Target Depth: 3.00m)

NZGS Definition of Relative Density for Coarse Grain soils: VL - Very Loose; L - Loose; MD - Medium Dense; D - Dense; VD - Very Dense

LOGGED BY: SJP
CHECKED BY:

▼ Standing groundwater level
▽ GW while drilling

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HAND AUGER : HA03

JOB NO.: 1391394 **SHEET:** 1 OF 1

START DATE: 20/03/2025 **NORTHING:** **GRID:**

CLIENT: Trine Kel Ltd **DIAMETER:** 50mm **EASTING:**

PROJECT: Ground Testing as Directed by Trine Kel **SV DIAL:** DR4802 **ELEVATION:** Ground

SITE LOCATION: 17 Waters Lane, Kerikeri **FACTOR:** 1.57 **DATUM:**

STRATIGRAPHY	SOIL DESCRIPTION	LEGEND	DEPTH (m)	WATER	SHEAR VANE: PEAK STRENGTH (kPa)	SHEAR VANE: REMOULD STRENGTH (kPa)	SHEAR VANE: SENSITIVITY	DCP - SCALA (Blows / mm)	COMMENTS, SAMPLES, OTHER TESTS
Topsoil	TOPSOIL, blackish brown, dry.	TS	0.2	Groundwater Not Encountered					
Kerikeri Volcanic Group	NATURAL: Slightly Gravelly (Weakly & Fused Clast) SILT, minor clay, dark brown with red and orange mottles, very stiff, dry, no to low plasticity.		0.4		UTP	-	-		
	Slightly Clayey SILT, dark brown, very stiff, dry, no to low plasticity. 0.7m: Becoming no plasticity (fraible).		0.6						
			0.8		UTP	-	-		
	SILT, trace to minor clay, brown with occasional white weakly fused clast mottles, dry, no plasticity (friable).		1.0						
			1.2		UTP	-	-		
	EOH: 1.30m - Too Hard To Auger		1.4		UTP	-	-		
			1.6						
			1.8						
			2.0						
			2.2						
			2.4						

REMARKS

End of borehole @ 1.30m (Target Depth: 3.00m)

NZGS Definition of Relative Density for Coarse Grain soils: VL - Very Loose; L - Loose; MD - Medium Dense; D - Dense; VD - Very Dense

LOGGED BY: SJP

CHECKED BY:

▼ Standing groundwater level

▽ GW while drilling

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Website: www.wiltonjoubert.co.nz

HAND AUGER : HA04

JOB NO.: 1391394 **SHEET:** 1 OF 1

CLIENT: Trine Kel Ltd
PROJECT: Ground Testing as Directed by Trine Kel
SITE LOCATION: 17 Waters Lane, Kerikeri

START DATE: 20/03/2025 **NORTHING:** **GRID:**
DIAMETER: 50mm **EASTING:**
SV DIAL: DR4802 **ELEVATION:** Ground
FACTOR: 1.57 **DATUM:**

STRATIGRAPHY	SOIL DESCRIPTION	LEGEND	DEPTH (m)	WATER	SHEAR VANE: PEAK STRENGTH (kPa)	SHEAR VANE: REMOULD STRENGTH (kPa)	SHEAR VANE: SENSITIVITY	DCP - SCALA (Blows / mm)	COMMENTS, SAMPLES, OTHER TESTS
Topsoil	TOPSOIL, blackish brown, dry.	TS	0.2	Groundwater Not Encountered					
Kerikeri Volcanic Group	NATURAL: Slightly Gravelly (weakly & Strongly Fused Clast) SILT, minor clay, dark brown with red and orange mottles, very stiff, dry, no to low plasticity.		0.4						
	Gravelly (Weakly & Strongly Fused Clast) SILT, no to trace clay, dark brown with red and orange mottles, hard, dry, no plasticity (friable).		0.6		UTP	-	-		
	EOH: 0.70m - Too Hard To Auger		0.8		UTP	-	-		
			1.0						
			1.2						
			1.4						
			1.6						
			1.8						
			2.0						
			2.2						
			2.4						

SOIL DESCRIPTION: TOPSOIL, CLAY, SAND, PEAT, FILL, SILT, GRAVEL, ROCK

REMARKS
End of borehole @ 0.70m (Target Depth: 3.00m)

NZGS Definition of Relative Density for Coarse Grain soils: VL - Very Loose; L - Loose; MD - Medium Dense; D - Dense; VD - Very Dense

LOGGED BY: SJP
CHECKED BY:

▼ Standing groundwater level
▽ GW while drilling

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HAND AUGER : WWM01

JOB NO.: 1391394 **SHEET:** 1 OF 1

CLIENT: Trine Kel Ltd
START DATE: 20/03/2025 **NORTHING:** **GRID:**

PROJECT: Ground Testing as Directed by Trine Kel
DIAMETER: 50mm **EASTING:**

SITE LOCATION: 17 Waters Lane, Kerikeri
SV DIAL: **ELEVATION:** Ground
FACTOR: **DATUM:**

STRATIGRAPHY	SOIL DESCRIPTION	LEGEND	DEPTH (m)	WATER	SHEAR VANE: PEAK STRENGTH (kPa)	SHEAR VANE: REMOULD STRENGTH (kPa)	SHEAR VANE: SENSITIVITY	DCP - SCALA (Blows / mm)	COMMENTS, SAMPLES, OTHER TESTS
Topsoil	TOPSOIL, blackish brown, dry.	TS	0.2	Groundwater Not Encountered					
Kerikeri Volcanic Group	NATURAL: Slightly Clayey SILT, dark brown, very stiff, dry, no to low plasticity. 0.4m: Occasional red and orange weakly fused clast mottles. 0.5m: Frequent red and orange weakly fused clast mottles.		0.4						
	Gravelly (Weakly & Strongly Fused Clast) SILT, no to trace clay, dark brown with red and orange mottles, hard, dry, no plasticity (friable).		0.6						
	EOH: 0.80m - Too Hard To Auger		0.8						
			1.0						
			1.2						
			1.4						
			1.6						
			1.8						
			2.0						
			2.2						
			2.4						

SOIL DESCRIPTION: TOPSOIL, CLAY, SAND, PEAT, FILL, SILT, GRAVEL, ROCK

REMARKS
End of borehole @ 0.80m (Target Depth: 1.20m)

NZGS Definition of Relative Density for Coarse Grain soils: VL - Very Loose; L - Loose; MD - Medium Dense; D - Dense; VD - Very Dense

LOGGED BY: SJP
CHECKED BY:

▼ Standing groundwater level
▽ GW while drilling

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HAND AUGER : WWM02

JOB NO.: 1391394 **SHEET:** 1 OF 1

START DATE: 20/03/2025 **NORTHING:** **GRID:**

CLIENT: Trine Kel Ltd **DIAMETER:** 50mm **EASTING:**

PROJECT: Ground Testing as Directed by Trine Kel **SV DIAL:** **ELEVATION:** Ground

SITE LOCATION: 17 Waters Lane, Kerikeri **FACTOR:** **DATUM:**

SOIL DESCRIPTION: TOPSOIL, CLAY, SAND, PEAT, FILL, SILT, GRAVEL, ROCK

STRATIGRAPHY	SOIL DESCRIPTION	LEGEND	DEPTH (m)	WATER	SHEAR VANE: PEAK STRENGTH (kPa)	SHEAR VANE: REMOULD STRENGTH (kPa)	SHEAR VANE: SENSITIVITY	DCP - SCALA (Blows / mm)	COMMENTS, SAMPLES, OTHER TESTS
Topsoil	TOPSOIL, blackish brown, dry.	TS	0.2	Groundwater Not Encountered					
Kerikeri Volcanic Group	NATURAL: Slightly Clayey SILT, dark brown with occasional black streaks, very stiff, dry, no to low plasticity.		0.4						
	0.8m: Becoming brown with occasional orange streaks and white specks.		0.6						
			0.8						
			1.0						
			1.2						
	EOH: 1.20m - Too Hard To Auger		1.4						
			1.6						
			1.8						
			2.0						
			2.2						
			2.4						

REMARKS

End of borehole @ 1.20m (Target Depth: 1.20m)

NZGS Definition of Relative Density for Coarse Grain soils: VL - Very Loose; L - Loose; MD - Medium Dense; D - Dense; VD - Very Dense

LOGGED BY: SJP

CHECKED BY:

▼ Standing groundwater level

▽ GW while drilling

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CLIENT: Trine Kel Ltd
LOCATION: 17 Water Lane, Kerikeri

DYNAMIC CONE PENETROMETER RESULTS SHEET

Logged SJP | Job No. 139194 | Date: 20/03/2025
Checked | Sheet: 1 of 2

Test Location: SP1

Depth	No. Blows	Equiv CBR
100	2	3.5
200	4	7.5
300	4	7.5
400	6	10+
500	7	10+
600	7	10+
700	7	10+
800	5	10
900	6	10+
1000	5	10
1100	6	10+
1200	8	10+
1300	6	10+
1400	7	10+
1500	7	10+
1600	6	10+
1700	7	10+
1800	7	10+
1900	7	10+

Notes:

Test Location: SP 2

Depth	No. Blows	Equiv CBR
100	1	2
200	6	10+
300	8	10+
400	8	10+
500	7	10+
600	7	10+
700	7	10+
800	7	10+
900	6	10+
1000	7	10+
1100	7	10+
1200	7	10+
1300	8	10+
1400	9	10+
1500	8	10+
1600	9	10+
1700	9	10+
1800	8	10+
1900	10	10+

Notes:

Test Location: SP 3

Depth	No. Blows	Equiv CBR
100	2	3.5
200	4	7.5
300	8	10+
400	8	10+
500	9	10+
600	7	10+
700	7	10+
800	7	10+
900	6	10+
1000	6	10+
1100	6	10+
1200	7	10+
1300	7	10+
1400	7	10+
1500	7	10+
1600	7	10+
1700	8	10+
1800	8	10+
1900	10	10+

Notes:

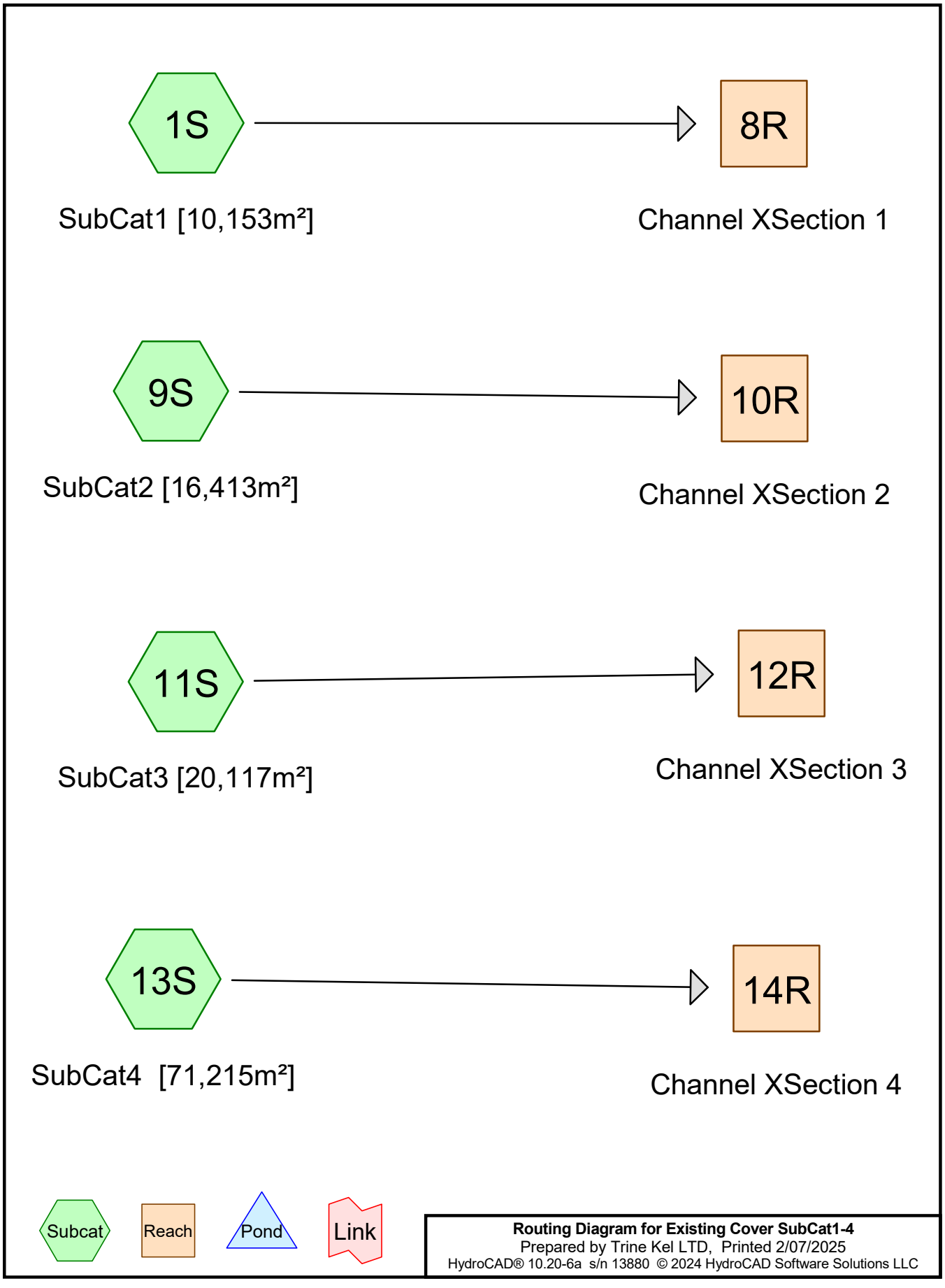
Test Location: SP4

Depth	No. Blows	Equiv CBR
100	2	3.5
200	3	5.5
300	7	10+
400	7	10+
500	7	10+
600	6	10+
700	6	10+
800	6	10+
900	5	10
1000	5	10
1100	6	10+
1200	6	10+
1300	6	10+
1400	5	10
1500	6	10+
1600	6	10+
1700	6	10+
1800	7	10+
1900	8	10+

Notes:

WILTON JOUBERT
Consulting Engineers
Wilton Joubert Limited
PO BOX 11-381, Ellerslie, Auckland 1524
Phone: 09 527 0196
THOROUGH ANALYSIS • DEPENDABLE ADVICE

ANNEXURE D – STORMWATER CALCULATIONS AND MODEL OUTPUTS



Routing Diagram for Existing Cover SubCat1-4
Prepared by Trine Kel LTD, Printed 2/07/2025

Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
11.7898	71	Weighted CN Existing (1S, 9S, 11S, 13S)
11.7898	**71**	**TOTAL AREA**

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SubCat1 [10,153m²] Runoff Area=10,153.0 m² 0.00% Impervious Runoff Depth=206 mm
Flow Length=150.0 m Slope=0.0800 m/m Tc=4.1 min CN=71 Runoff=0.1494 m³/s 2,095.465 m³

Subcatchment 9S: SubCat2 [16,413m²] Runoff Area=16,413.0 m² 0.00% Impervious Runoff Depth=206 mm
Flow Length=230.0 m Slope=0.0900 m/m Tc=6.0 min CN=71 Runoff=0.2409 m³/s 3,387.458 m³

Subcatchment 11S: SubCat3 Runoff Area=20,117.0 m² 0.00% Impervious Runoff Depth=206 mm
Flow Length=291.0 m Slope=0.0790 m/m Tc=8.1 min CN=71 Runoff=0.2941 m³/s 4,151.922 m³

Subcatchment 13S: SubCat4 Runoff Area=71,215.0 m² 0.00% Impervious Runoff Depth=206 mm
Flow Length=319.0 m Slope=0.0700 m/m Tc=9.4 min CN=71 Runoff=1.0378 m³/s 14,697.972 m³

Reach 8R: Channel XSection Avg. Flow Depth=0.14 m Max Vel=0.91 m/s Inflow=0.1494 m³/s 2,095.465 m³
n=0.060 L=160.00 m S=0.0856 m/m Capacity=71.5580 m³/s Outflow=0.1489 m³/s 2,095.438 m³

Reach 10R: Channel Avg. Flow Depth=0.13 m Max Vel=0.99 m/s Inflow=0.2409 m³/s 3,387.458 m³
n=0.060 L=230.00 m S=0.0873 m/m Capacity=61.2091 m³/s Outflow=0.2396 m³/s 3,386.990 m³

Reach 12R: Channel Avg. Flow Depth=0.22 m Max Vel=1.15 m/s Inflow=0.2941 m³/s 4,151.922 m³
n=0.060 L=291.00 m S=0.0736 m/m Capacity=67.0923 m³/s Outflow=0.2921 m³/s 4,151.260 m³

Reach 14R: Channel Avg. Flow Depth=0.30 m Max Vel=1.46 m/s Inflow=1.0378 m³/s 14,697.972 m³
n=0.060 L=319.00 m S=0.0708 m/m Capacity=52.6908 m³/s Outflow=1.0322 m³/s 14,695.847 m³

Total Runoff Area = 11.7898 ha Runoff Volume = 24,332.816 m³ Average Runoff Depth = 206 mm
100.00% Pervious = 11.7898 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 1S: SubCat1 [10,153m²]

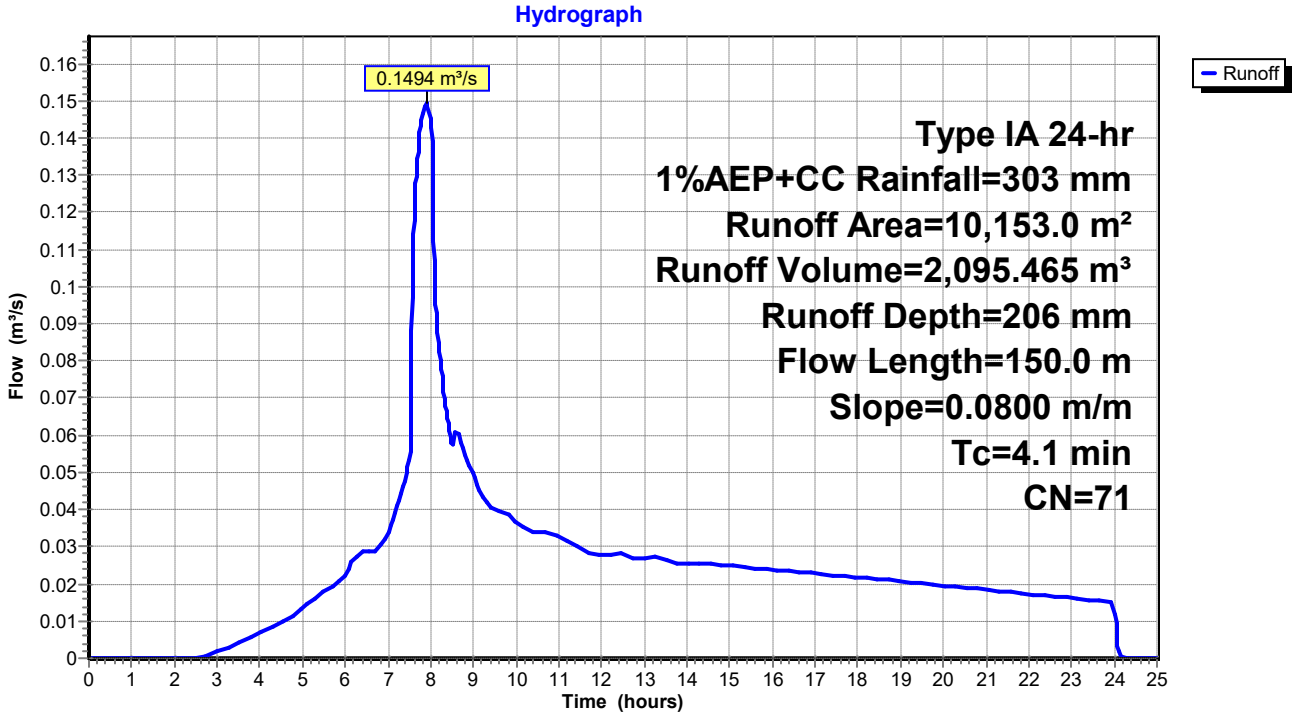
Runoff = 0.1494 m³/s @ 7.90 hrs, Volume= 2,095.465 m³, Depth= 206 mm
Routed to Reach 8R : Channel XSection 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	10,153.0	71	Weighted CN Existing
	10,153.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
4.1	150.0	0.0800	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 1S: SubCat1 [10,153m²]



Summary for Subcatchment 9S: SubCat2 [16,413m²]

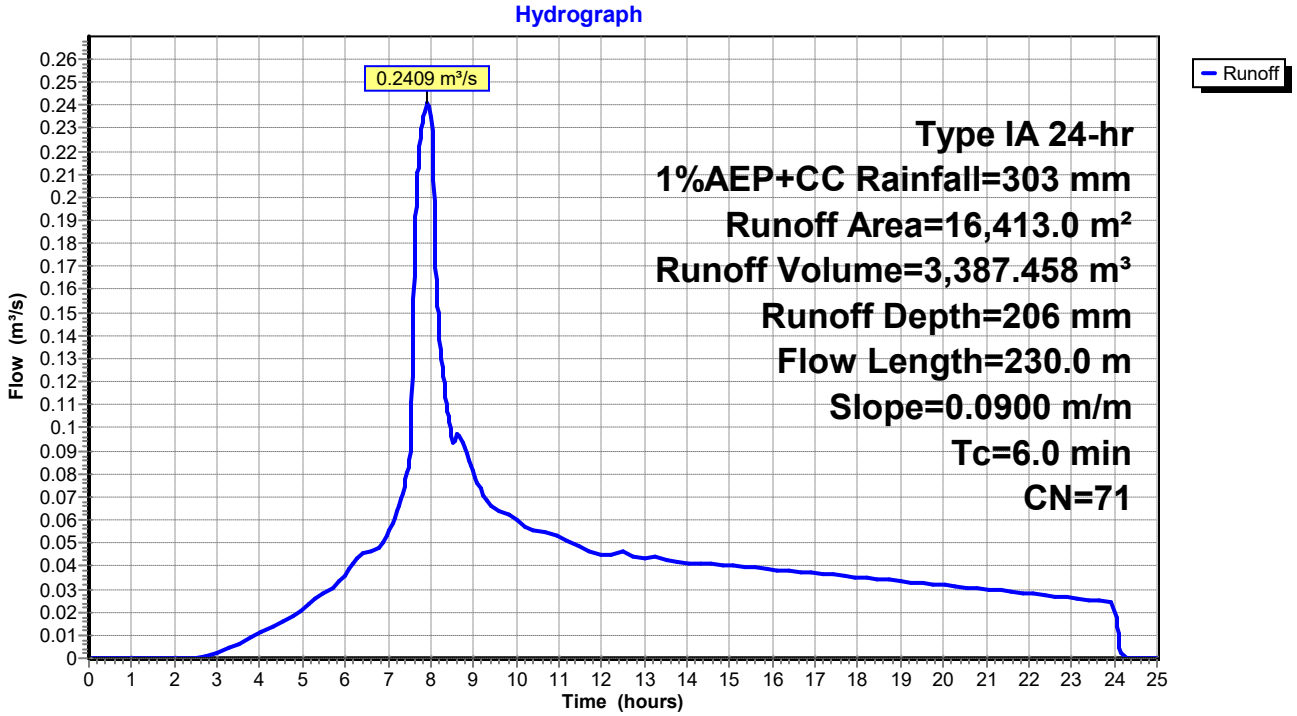
Runoff = 0.2409 m³/s @ 7.93 hrs, Volume= 3,387.458 m³, Depth= 206 mm
Routed to Reach 10R : Channel XSection 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	16,413.0	71	Weighted CN Existing
	16,413.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
6.0	230.0	0.0900	0.64		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 9S: SubCat2 [16,413m²]



Summary for Subcatchment 11S: SubCat3 [20,117m²]

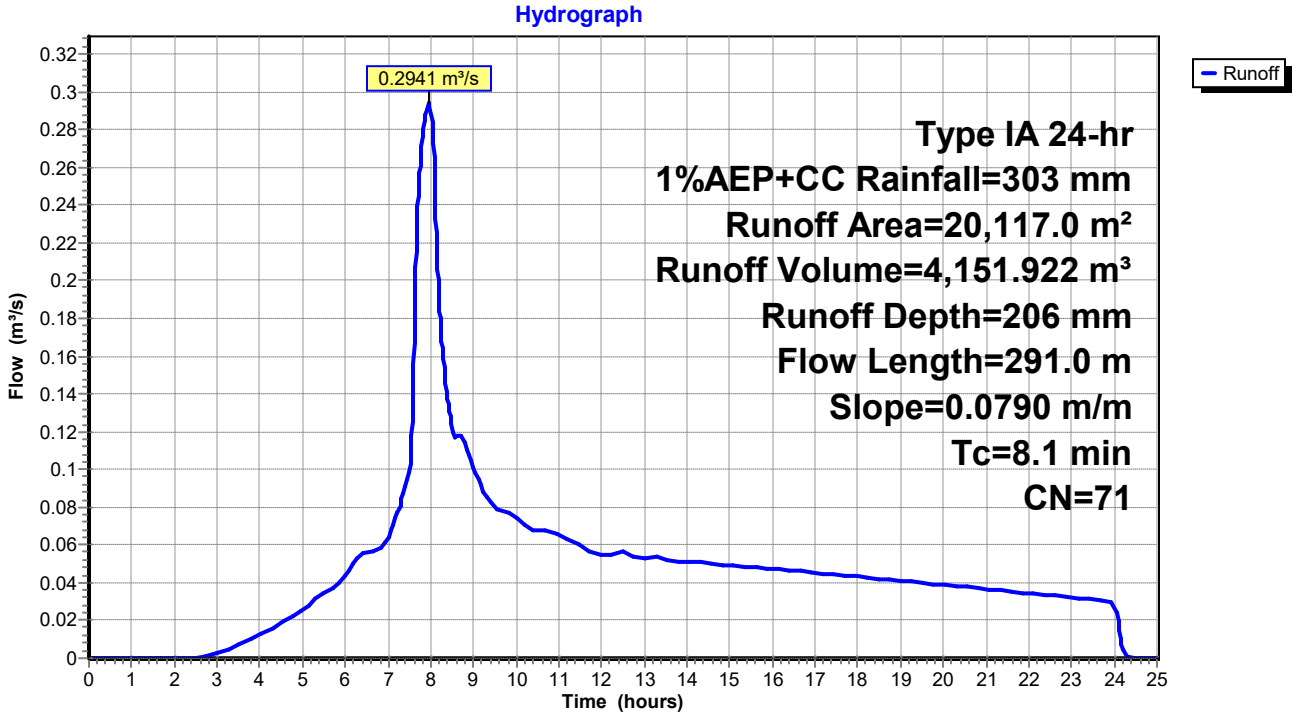
Runoff = 0.2941 m³/s @ 7.95 hrs, Volume= 4,151.922 m³, Depth= 206 mm
Routed to Reach 12R : Channel XSection 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	20,117.0	71	Weighted CN Existing
	20,117.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
8.1	291.0	0.0790	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 11S: SubCat3 [20,117m²]



Summary for Subcatchment 13S: SubCat4 [71,215m²]

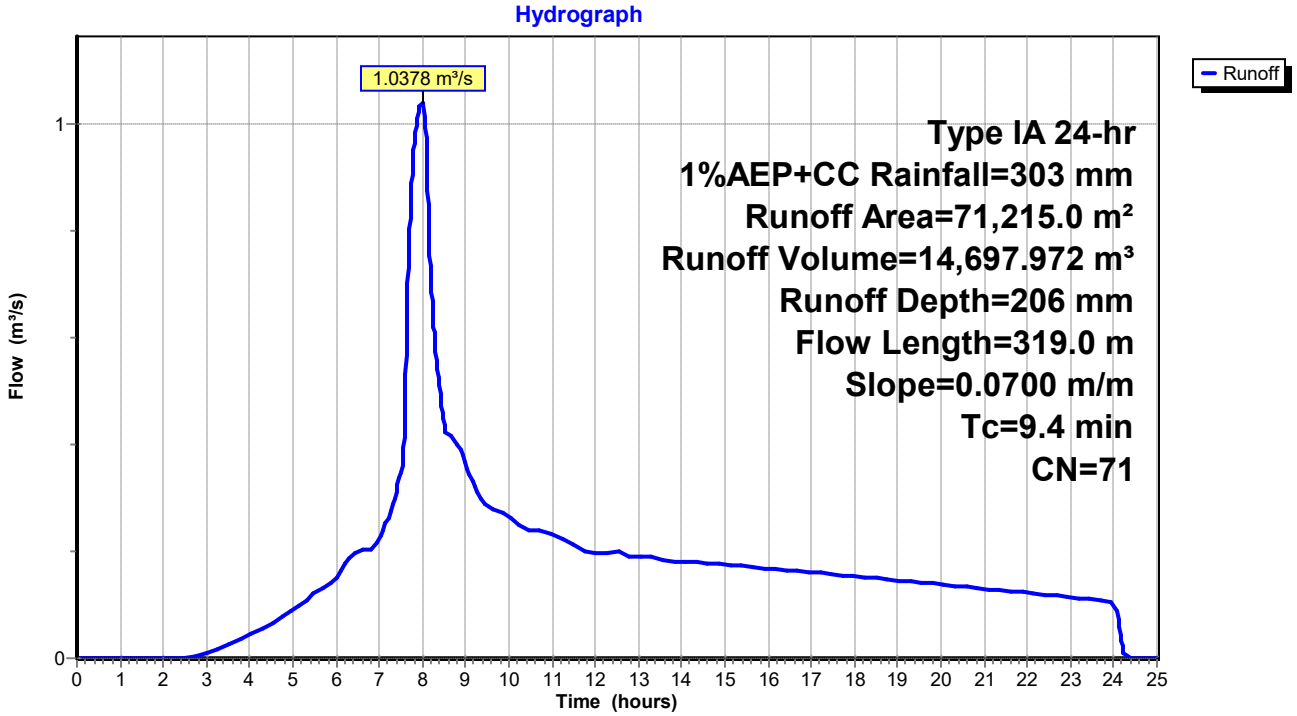
Runoff = 1.0378 m³/s @ 7.99 hrs, Volume= 14,697.972 m³, Depth= 206 mm
Routed to Reach 14R : Channel XSection 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	71,215.0	71	Weighted CN Existing
	71,215.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
9.4	319.0	0.0700	0.56		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 13S: SubCat4 [71,215m²]



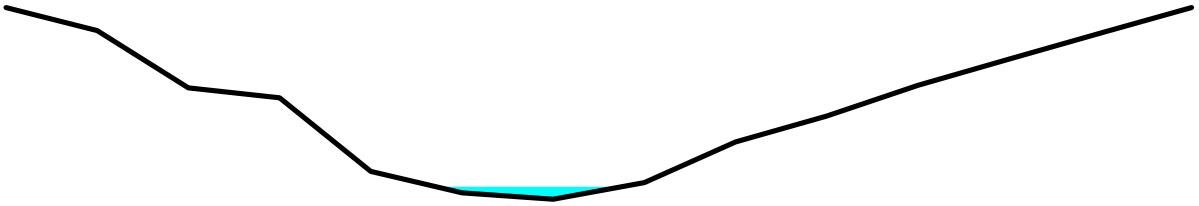
Summary for Reach 8R: Channel XSection 1

Inflow Area = 1.0153 ha, 0.00% Impervious, Inflow Depth = 206 mm for 1%AEP+CC event
Inflow = 0.1494 m³/s @ 7.90 hrs, Volume= 2,095.465 m³
Outflow = 0.1489 m³/s @ 7.98 hrs, Volume= 2,095.438 m³, Atten= 0%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.91 m/s, Min. Travel Time= 2.9 min
Avg. Velocity = 0.51 m/s, Avg. Travel Time= 5.3 min

Peak Storage= 26.3 m³ @ 7.93 hrs
Average Depth at Peak Storage= 0.14 m , Surface Width= 2.04 m
Bank-Full Depth= 2.10 m Flow Area= 14.34 m², Capacity= 71.5580 m³/s

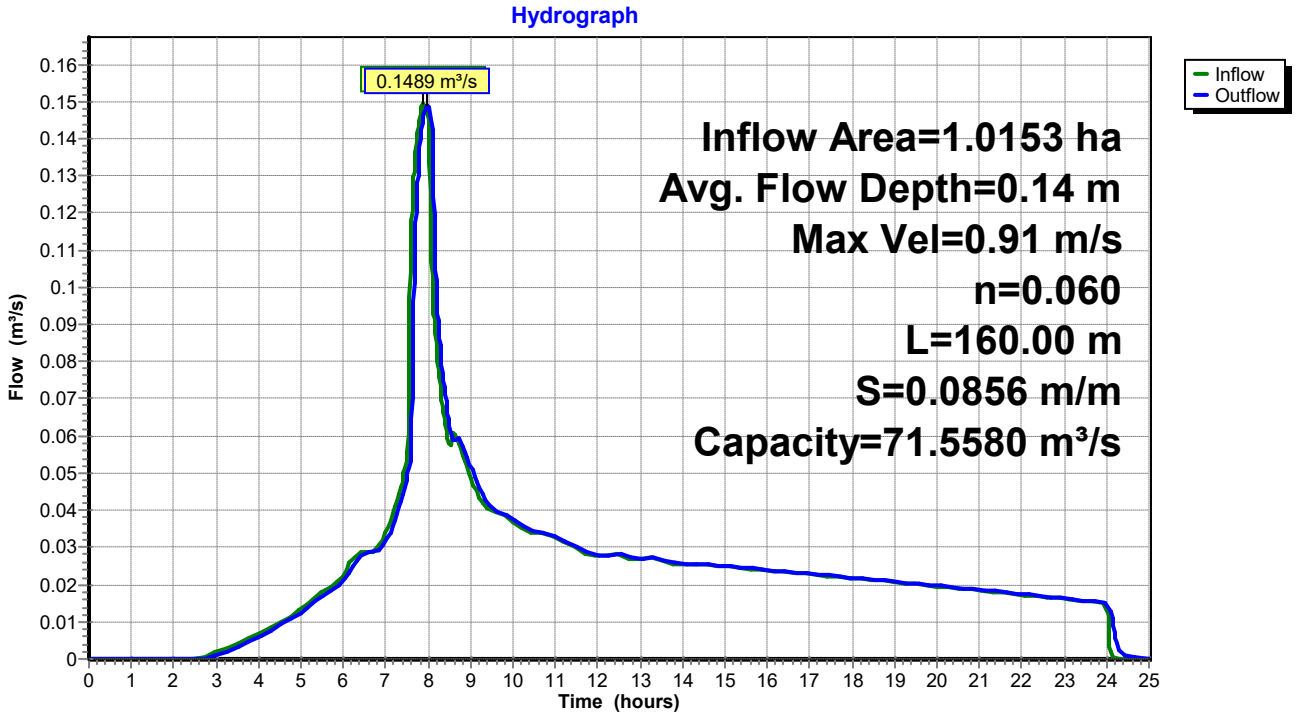
Custom cross-section, Length= 160.00 m Slope= 0.0856 m/m (111 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 37.200 m



Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	34.823	0.00
3.000	34.569	0.25
4.000	33.943	0.88
5.000	33.833	0.99
6.000	33.025	1.80
7.000	32.791	2.03
8.000	32.721	2.10
9.000	32.903	1.92
10.000	33.348	1.48
11.000	33.635	1.19
12.000	33.969	0.85
13.000	34.257	0.57
14.000	34.541	0.28
15.000	34.823	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.07	0.05	1.39	1.38	7.8	0.0252
0.18	0.26	2.51	2.48	42.4	0.2883
0.30	0.62	3.35	3.27	98.5	0.9715
0.63	1.86	4.65	4.40	296.8	4.8997
0.91	3.31	6.15	5.75	530.0	10.6916
1.11	4.53	7.09	6.59	725.6	16.4149
1.22	5.33	8.44	7.92	853.3	19.1446
1.25	5.54	8.58	8.04	886.5	20.1939
1.54	8.07	10.16	9.50	1,290.7	33.7345
1.82	10.97	11.73	10.96	1,755.5	51.1647
1.85	11.28	11.89	11.10	1,804.9	53.1174
2.10	14.34	13.86	13.00	2,294.6	71.5580

Reach 8R: Channel XSection 1



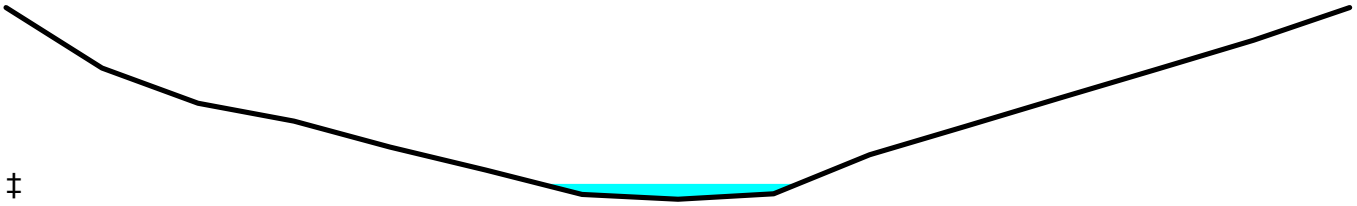
Summary for Reach 10R: Channel XSection 2

Inflow Area = 1.6413 ha, 0.00% Impervious, Inflow Depth = 206 mm for 1%AEP+CC event
Inflow = 0.2409 m³/s @ 7.93 hrs, Volume= 3,387.458 m³
Outflow = 0.2396 m³/s @ 8.04 hrs, Volume= 3,386.990 m³, Atten= 1%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.99 m/s, Min. Travel Time= 3.9 min
Avg. Velocity = 0.51 m/s, Avg. Travel Time= 7.5 min

Peak Storage= 55.9 m³ @ 7.97 hrs
Average Depth at Peak Storage= 0.13 m , Surface Width= 2.69 m
Bank-Full Depth= 1.59 m Flow Area= 13.20 m², Capacity= 61.2091 m³/s

Custom cross-section, Length= 230.00 m Slope= 0.0873 m/m (108 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 30.820 m

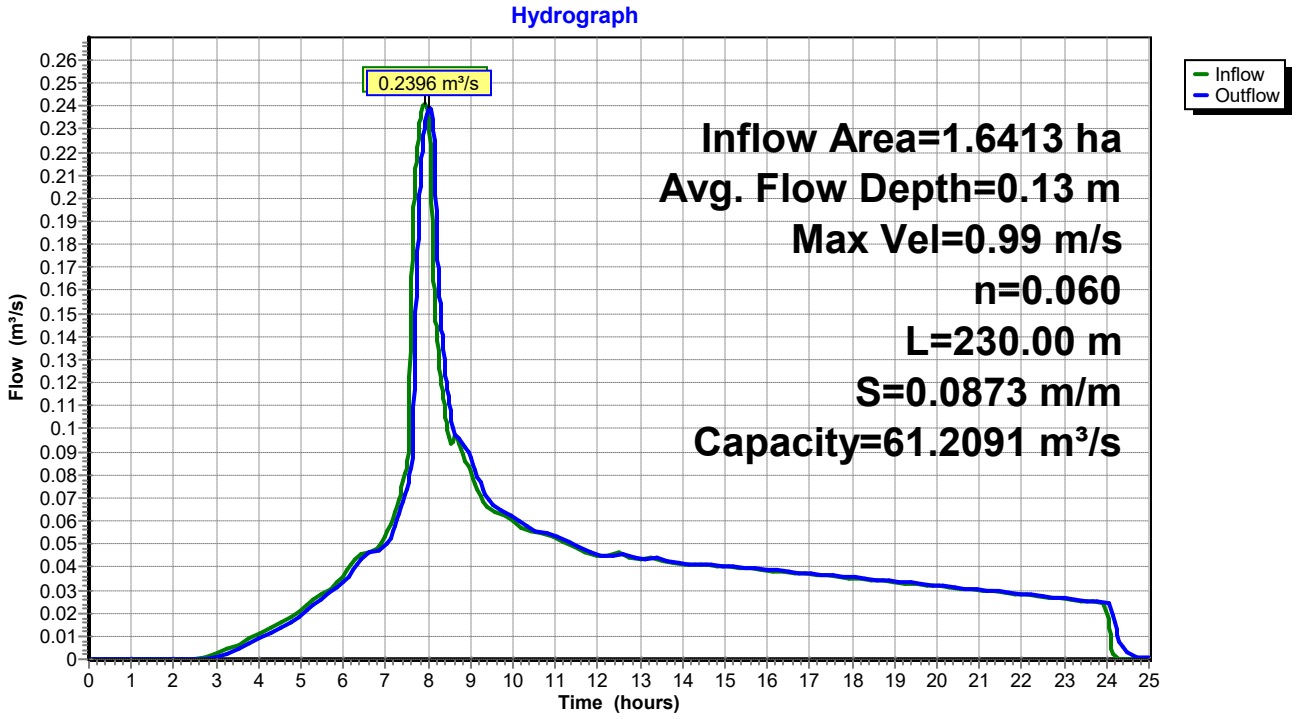


‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	32.376	0.00
3.000	31.872	0.50
4.000	31.580	0.80
5.000	31.430	0.95
6.000	31.216	1.16
7.000	31.024	1.35
8.000	30.822	1.55
9.000	30.782	1.59
10.000	30.826	1.55
11.000	31.152	1.22
12.000	31.390	0.99
13.000	31.628	0.75
14.000	31.866	0.51
15.000	32.104	0.27
16.000	32.376	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.04	1.91	1.91	8.8	0.0138
0.04	0.05	2.02	2.02	10.6	0.0182
0.24	0.60	3.66	3.61	138.7	0.8926
0.37	1.13	4.75	4.67	260.5	2.1441
0.43	1.45	5.37	5.27	333.6	2.9857
0.61	2.50	6.95	6.81	575.4	6.2333
0.65	2.78	7.32	7.17	639.7	7.1885
0.80	3.98	8.97	8.80	915.1	11.3956
0.85	4.41	9.35	9.16	1,014.3	13.1565
1.08	6.81	11.23	10.98	1,565.6	24.0093
1.09	6.87	11.28	11.03	1,580.8	24.3303
1.32	9.60	12.79	12.46	2,207.4	39.0196
1.59	13.20	14.44	14.00	3,035.1	61.2091

Reach 10R: Channel XSection 2



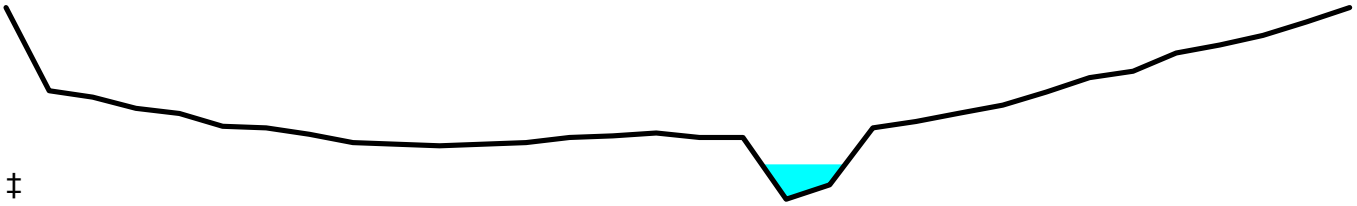
Summary for Reach 12R: Channel XSection 3

Inflow Area = 2.0117 ha, 0.00% Impervious, Inflow Depth = 206 mm for 1%AEP+CC event
Inflow = 0.2941 m³/s @ 7.95 hrs, Volume= 4,151.922 m³
Outflow = 0.2921 m³/s @ 8.08 hrs, Volume= 4,151.260 m³, Atten= 1%, Lag= 7.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.15 m/s, Min. Travel Time= 4.2 min
Avg. Velocity = 0.63 m/s, Avg. Travel Time= 7.7 min

Peak Storage= 74.0 m³ @ 8.01 hrs
Average Depth at Peak Storage= 0.22 m , Surface Width= 1.92 m
Bank-Full Depth= 1.19 m Flow Area= 20.00 m², Capacity= 67.0923 m³/s

Custom cross-section, Length= 291.00 m Slope= 0.0736 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 29.490 m



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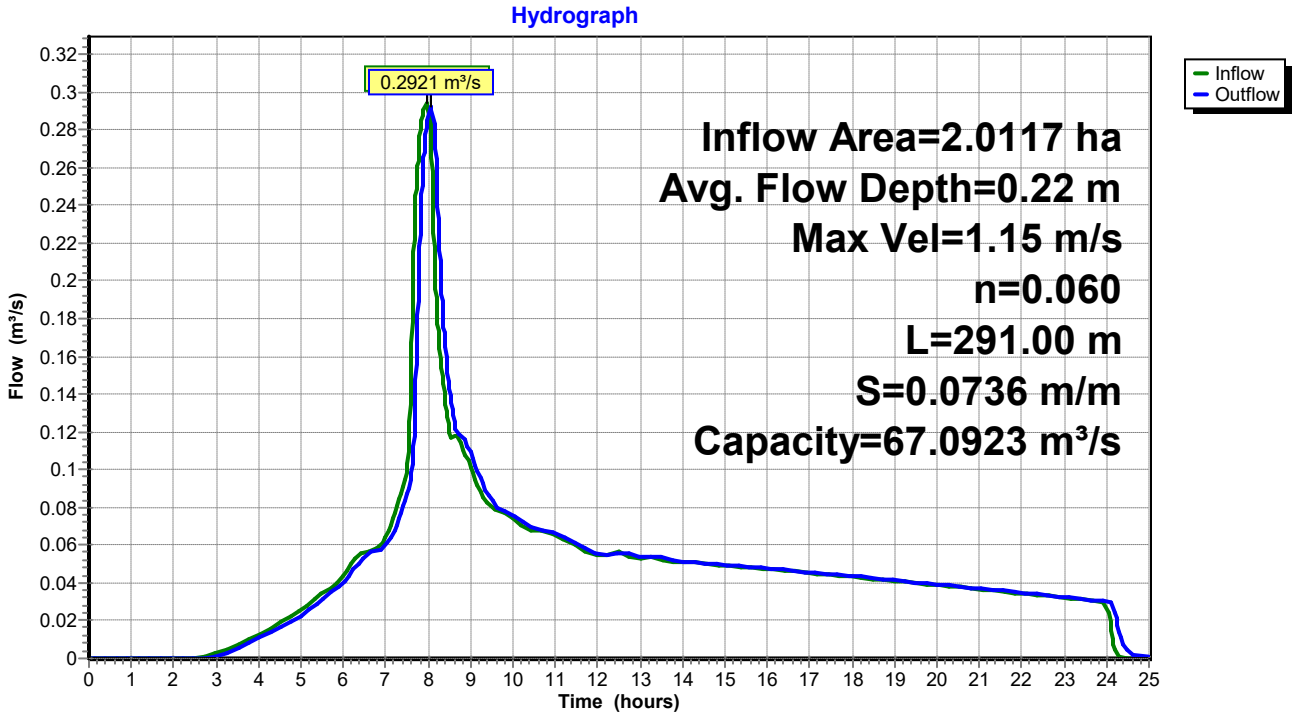
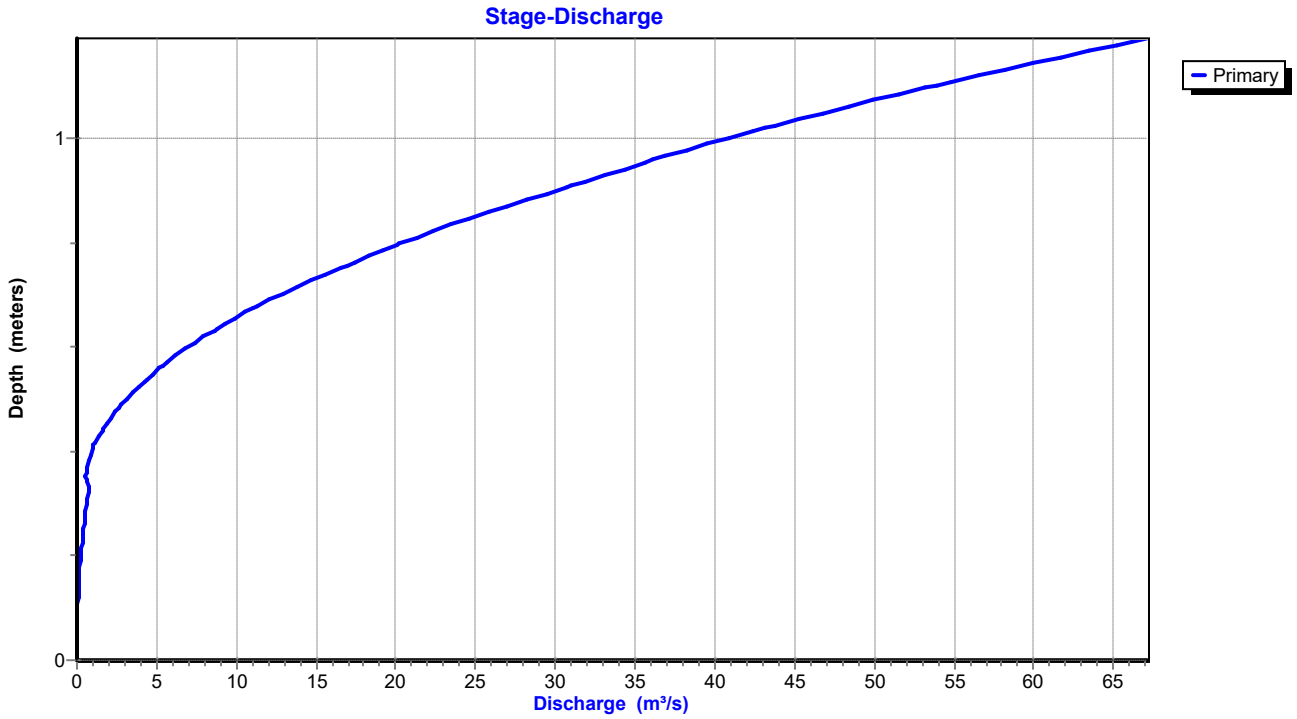
Reach 12R: Channel XSection 3



Reach 12R: Channel XSection 3



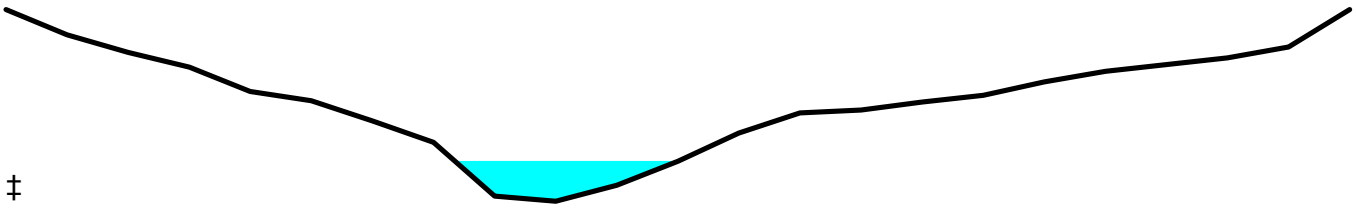
Summary for Reach 14R: Channel XSection 4

Inflow Area = 7.1215 ha, 0.00% Impervious, Inflow Depth = 206 mm for 1%AEP+CC event
Inflow = 1.0378 m³/s @ 7.99 hrs, Volume= 14,697.972 m³
Outflow = 1.0322 m³/s @ 8.08 hrs, Volume= 14,695.847 m³, Atten= 1%, Lag= 5.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.46 m/s, Min. Travel Time= 3.6 min
Avg. Velocity = 0.82 m/s, Avg. Travel Time= 6.5 min

Peak Storage= 225.3 m³ @ 8.02 hrs
Average Depth at Peak Storage= 0.30 m , Surface Width= 3.66 m
Bank-Full Depth= 1.44 m Flow Area= 15.27 m², Capacity= 52.6908 m³/s

Custom cross-section, Length= 319.00 m Slope= 0.0708 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 28.300 m

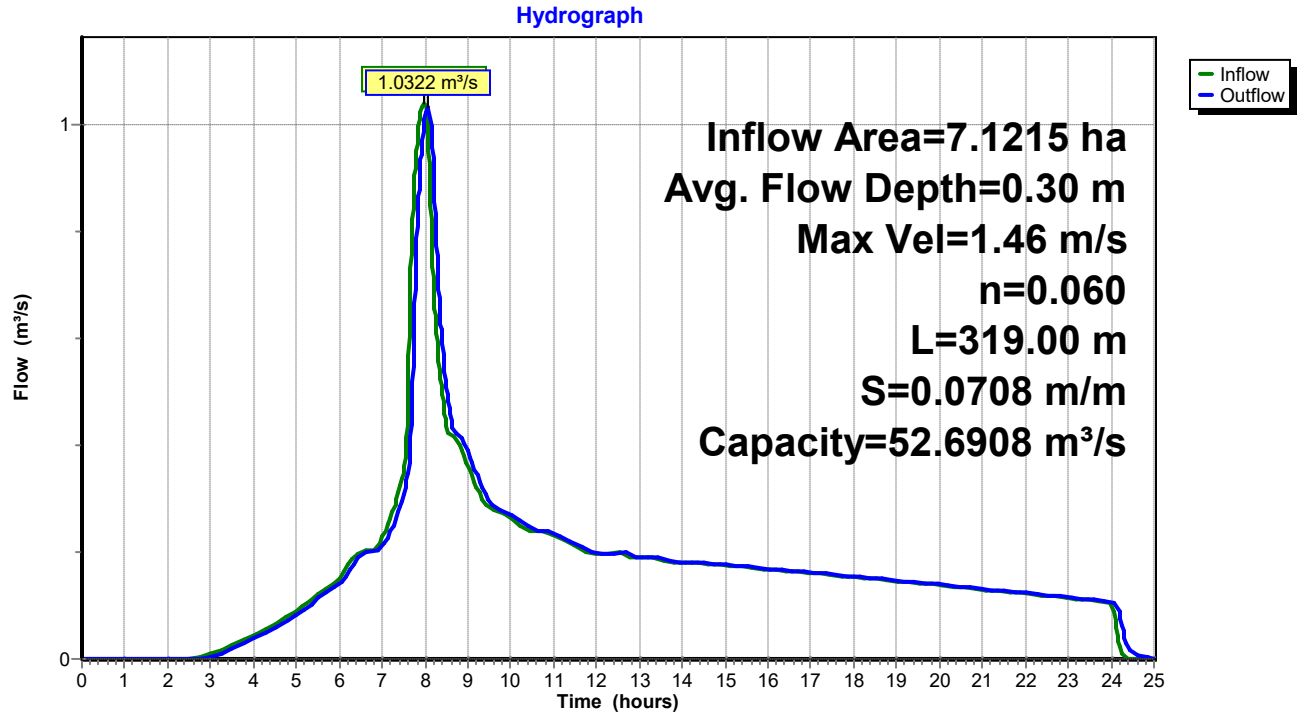


‡

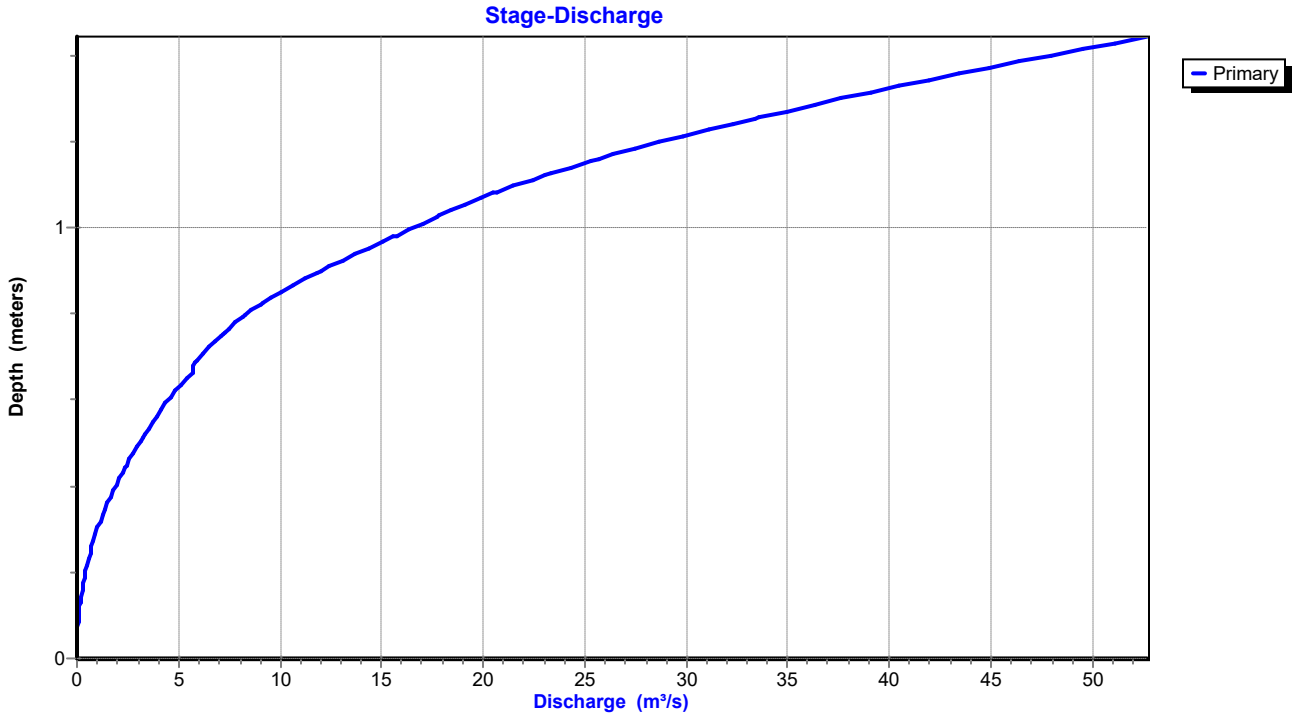
Offset (meters)	Elevation (meters)	Chan.Depth (meters)
8.000	29.287	0.00
9.000	29.097	0.19
10.000	28.965	0.32
11.000	28.853	0.43
12.000	28.671	0.62
13.000	28.601	0.69
14.000	28.449	0.84
15.000	28.288	1.00
16.000	27.882	1.40
17.000	27.844	1.44
18.000	27.964	1.32
19.000	28.146	1.14
20.000	28.358	0.93
21.000	28.510	0.78
22.000	28.530	0.76
23.000	28.590	0.70
24.000	28.642	0.64
25.000	28.742	0.54
26.000	28.822	0.46
27.000	28.872	0.41
28.000	28.924	0.36
29.000	29.004	0.28
30.000	29.287	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.03	1.32	1.32	8.0	0.0079
0.12	0.17	2.23	2.20	54.0	0.1348
0.30	0.70	3.73	3.65	223.9	1.0234
0.44	1.29	4.79	4.67	412.3	2.3950
0.51	1.65	5.57	5.43	525.1	3.2418
0.61	2.19	6.74	6.60	699.8	4.6030
0.67	2.62	7.56	7.40	836.0	5.7392
0.69	2.78	8.69	8.53	886.8	5.7691
0.75	3.33	10.09	9.93	1,063.5	7.0684
0.76	3.44	10.38	10.21	1,098.8	7.3268
0.80	3.89	11.75	11.59	1,241.4	8.2628
0.83	4.24	12.46	12.29	1,351.8	9.1602
0.90	5.15	13.57	13.39	1,642.6	11.9737
0.98	6.28	15.02	14.83	2,002.7	15.5704
1.01	6.75	15.81	15.62	2,153.3	16.9750
1.03	7.05	16.36	16.17	2,249.6	17.8490
1.08	7.93	17.83	17.63	2,530.0	20.4996
1.12	8.67	18.72	18.51	2,766.4	23.0363
1.16	9.41	19.50	19.30	3,001.6	25.6771
1.25	11.25	20.55	20.33	3,589.3	33.4021
1.44	15.27	22.27	22.00	4,872.1	52.6908

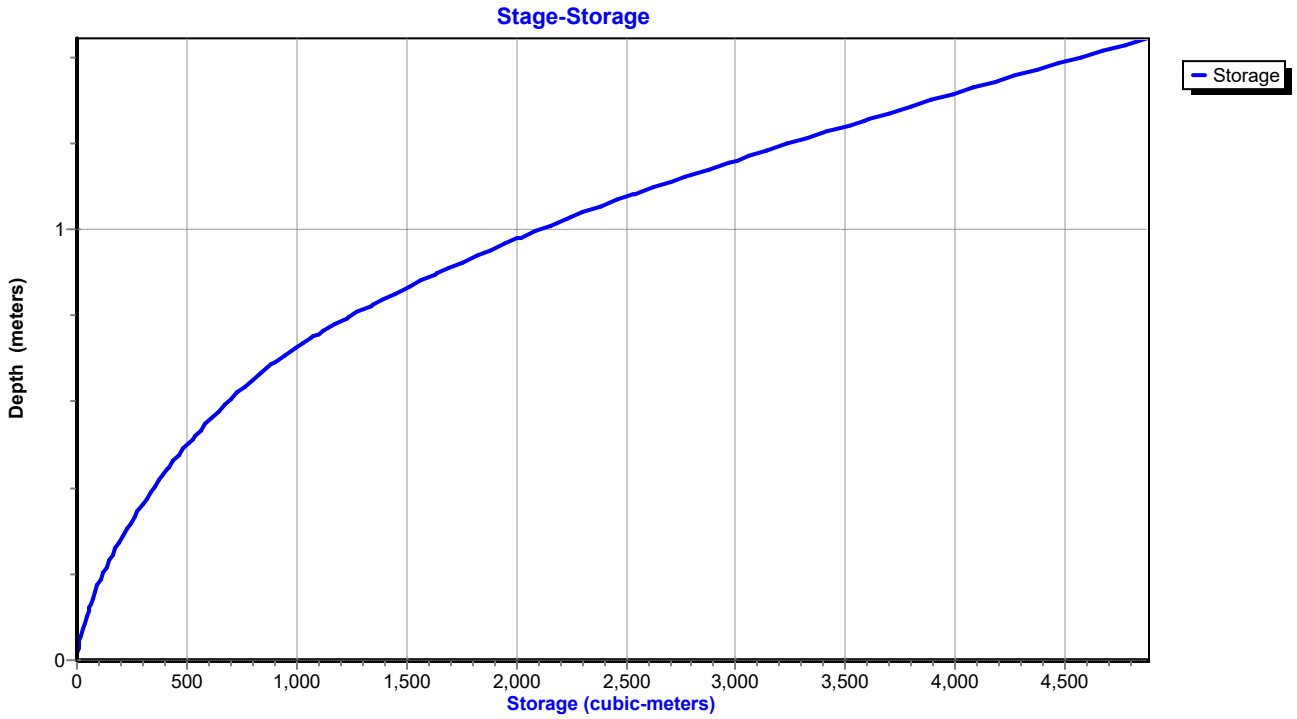
Reach 14R: Channel XSection 4

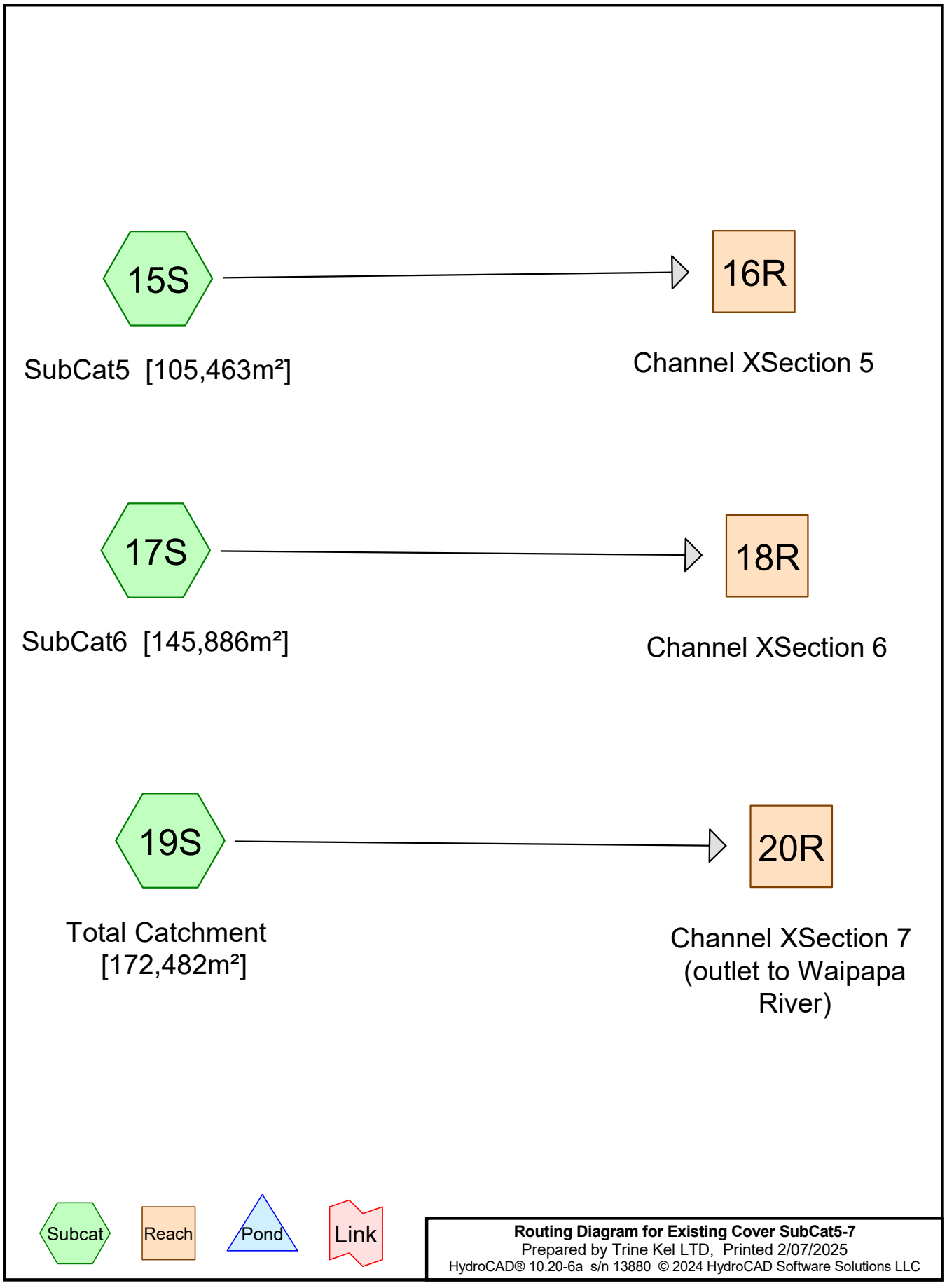


Reach 14R: Channel XSection 4



Reach 14R: Channel XSection 4




15S
16R
SubCat5 [105,463m²]
Channel XSection 5
17S
18R
SubCat6 [145,886m²]
Channel XSection 6
19S
20R
Total Catchment
[172,482m²]
Channel XSection 7
(outlet to Waipapa
River)
Subcat
Reach
Pond
Link
Routing Diagram for Existing Cover SubCat5-7
Prepared by Trine Kel LTD, Printed 2/07/2025
HydroCAD® 10.20-6a s/n 13880 © 2024 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
42.3831	71	Calculated Weighted Curve Number for Existing Total Catchment Cover (15S, 17S, 19S)
42.3831	**71**	**TOTAL AREA**

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15S: SubCat5 Runoff Area=105,463.0 m² 0.00% Impervious Runoff Depth=206 mm
Flow Length=374.0 m Slope=0.0630 m/m Tc=11.7 min CN=71 Runoff=1.5252 m³/s 21,766.372 m³

Subcatchment 17S: SubCat6 Runoff Area=145,886.0 m² 0.00% Impervious Runoff Depth=206 mm
Flow Length=495.0 m Slope=0.0510 m/m Tc=17.2 min CN=71 Runoff=2.0444 m³/s 30,109.223 m³

Subcatchment 19S: Total Catchment Runoff Area=172,482.0 m² 0.00% Impervious Runoff Depth=206 mm
Flow Length=663.0 m Slope=0.0530 m/m Tc=22.5 min CN=71 Runoff=2.3215 m³/s 35,598.337 m³

Reach 16R: Channel Avg. Flow Depth=0.31 m Max Vel=1.35 m/s Inflow=1.5252 m³/s 21,766.372 m³
n=0.060 L=374.00 m S=0.0630 m/m Capacity=31.5808 m³/s Outflow=1.5086 m³/s 21,766.180 m³

Reach 18R: Channel Avg. Flow Depth=0.27 m Max Vel=0.78 m/s Inflow=2.0444 m³/s 30,109.223 m³
n=0.060 L=495.00 m S=0.0515 m/m Capacity=114.8947 m³/s Outflow=1.9147 m³/s 30,106.716 m³

Reach 20R: Channel Avg. Flow Depth=0.38 m Max Vel=1.12 m/s Inflow=2.3215 m³/s 35,598.337 m³
n=0.060 L=663.00 m S=0.0534 m/m Capacity=155.3490 m³/s Outflow=2.1609 m³/s 35,594.341 m³

Total Runoff Area = 42.3831 ha Runoff Volume = 87,473.933 m³ Average Runoff Depth = 206 mm
100.00% Pervious = 42.3831 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 15S: SubCat5 [105,463m²]

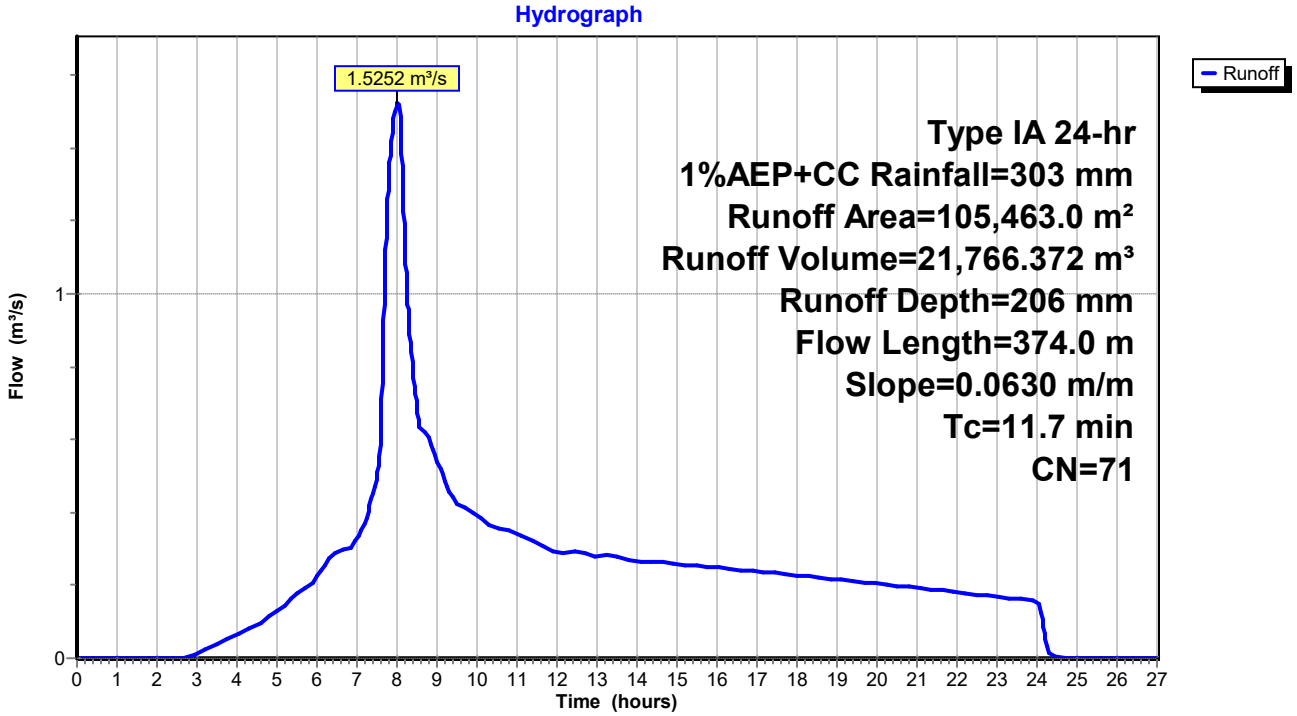
Runoff = 1.5252 m³/s @ 8.02 hrs, Volume= 21,766.372 m³, Depth= 206 mm
Routed to Reach 16R : Channel XSection 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	105,463.0	71	Calculated Weighted Curve Number for Existing Total Catchment Cover
	105,463.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
11.7	374.0	0.0630	0.53		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 15S: SubCat5 [105,463m²]



Summary for Subcatchment 17S: SubCat6 [145,886m²]

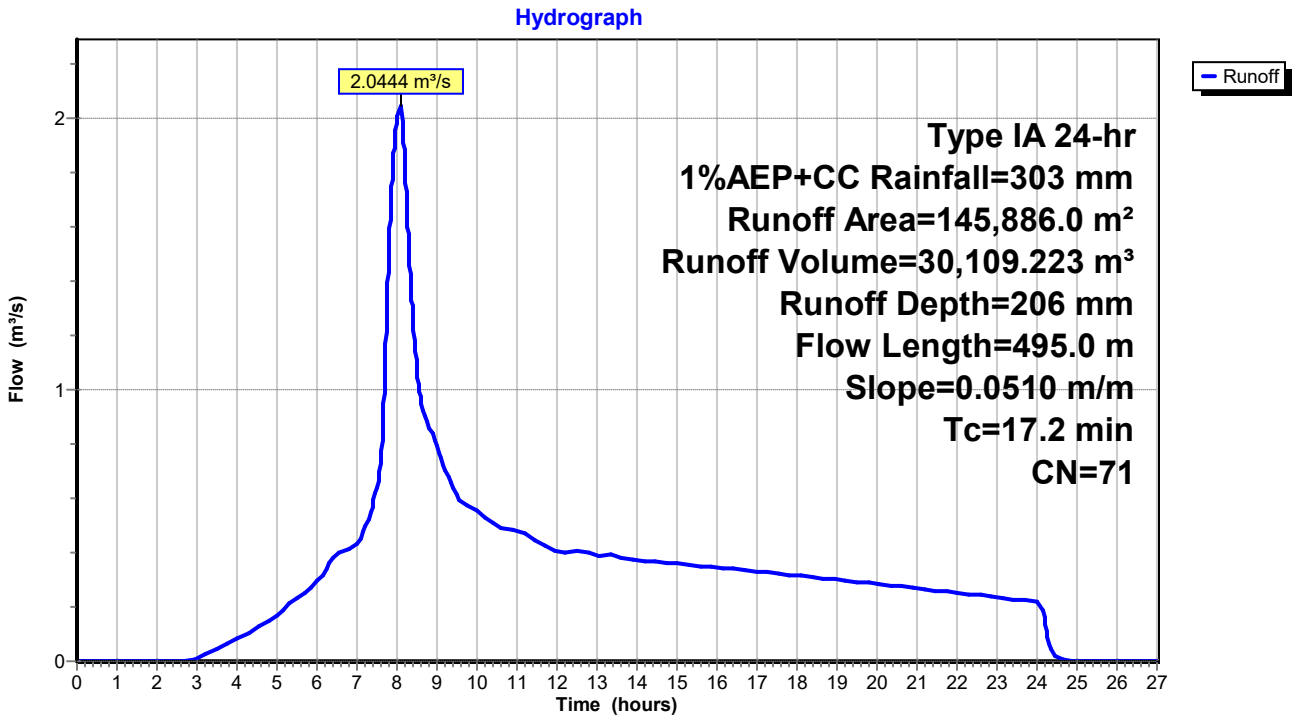
Runoff = 2.0444 m³/s @ 8.08 hrs, Volume= 30,109.223 m³, Depth= 206 mm
Routed to Reach 18R : Channel XSection 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	145,886.0	71	Calculated Weighted Curve Number for Existing Total Catchment Cover
	145,886.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
17.2	495.0	0.0510	0.48		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 17S: SubCat6 [145,886m²]



Summary for Subcatchment 19S: Total Catchment [172,482m²]

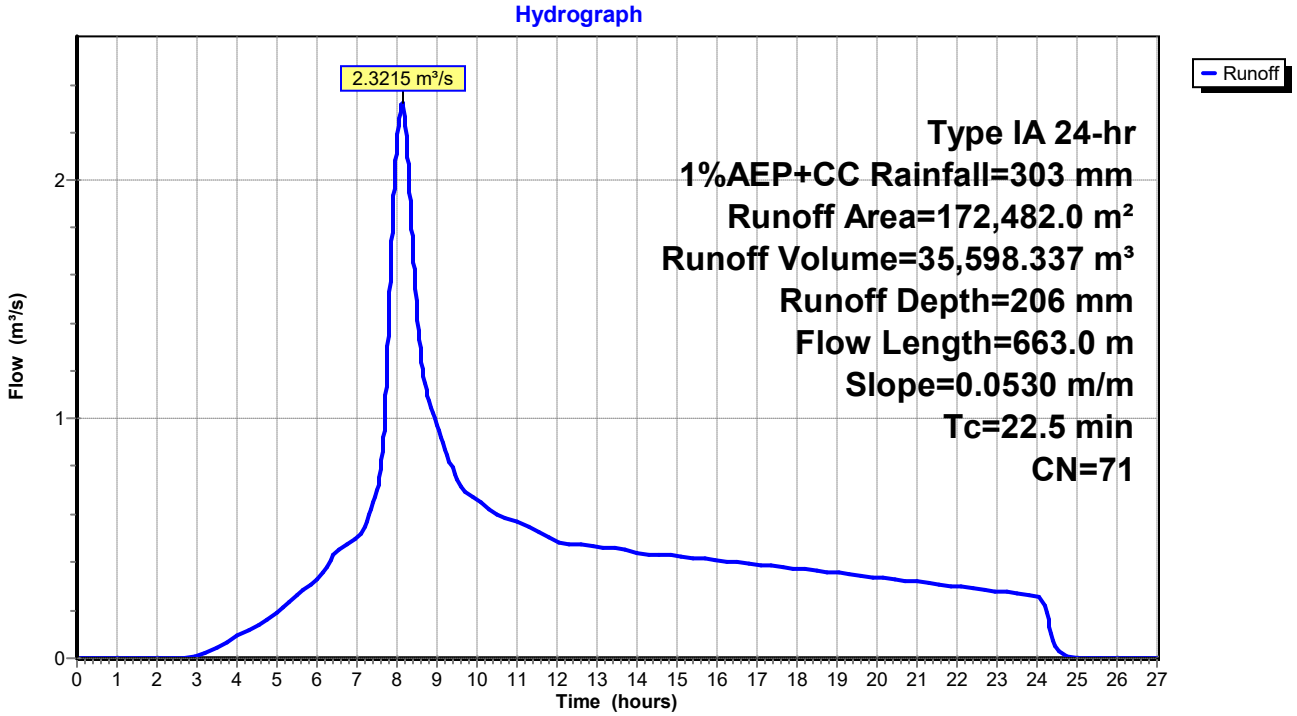
Runoff = 2.3215 m³/s @ 8.13 hrs, Volume= 35,598.337 m³, Depth= 206 mm
Routed to Reach 20R : Channel XSection 7 (outlet to Waipapa River)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	172,482.0	71	Calculated Weighted Curve Number for Existing Total Catchment Cover
	172,482.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
22.5	663.0	0.0530	0.49		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 19S: Total Catchment [172,482m²]



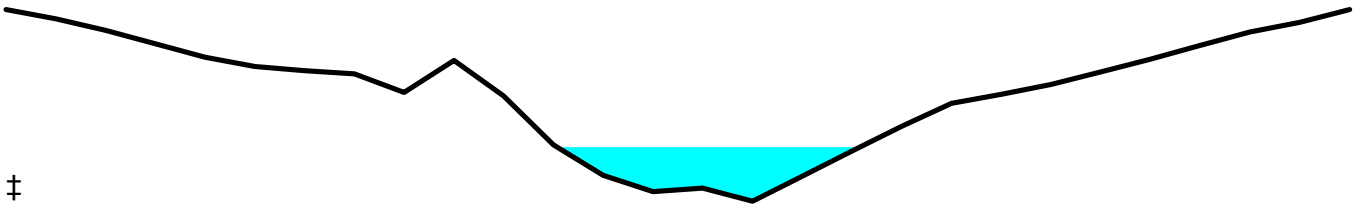
Summary for Reach 16R: Channel XSection 5

Inflow Area = 10.5463 ha, 0.00% Impervious, Inflow Depth = 206 mm for 1%AEP+CC event
Inflow = 1.5252 m³/s @ 8.02 hrs, Volume= 21,766.372 m³
Outflow = 1.5086 m³/s @ 8.13 hrs, Volume= 21,766.180 m³, Atten= 1%, Lag= 6.9 min

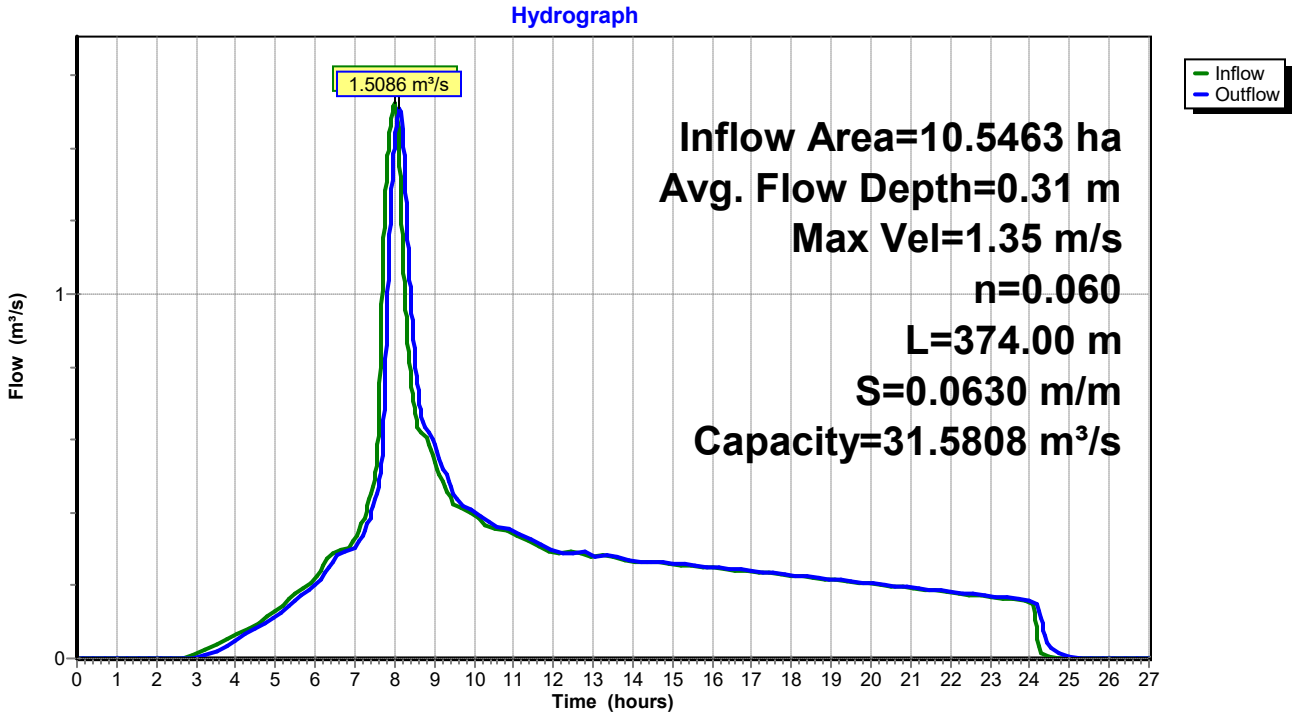
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.35 m/s, Min. Travel Time= 4.6 min
Avg. Velocity = 0.70 m/s, Avg. Travel Time= 8.9 min

Peak Storage= 418.8 m³ @ 8.06 hrs
Average Depth at Peak Storage= 0.31 m , Surface Width= 6.09 m
Bank-Full Depth= 1.08 m Flow Area= 12.60 m², Capacity= 31.5808 m³/s

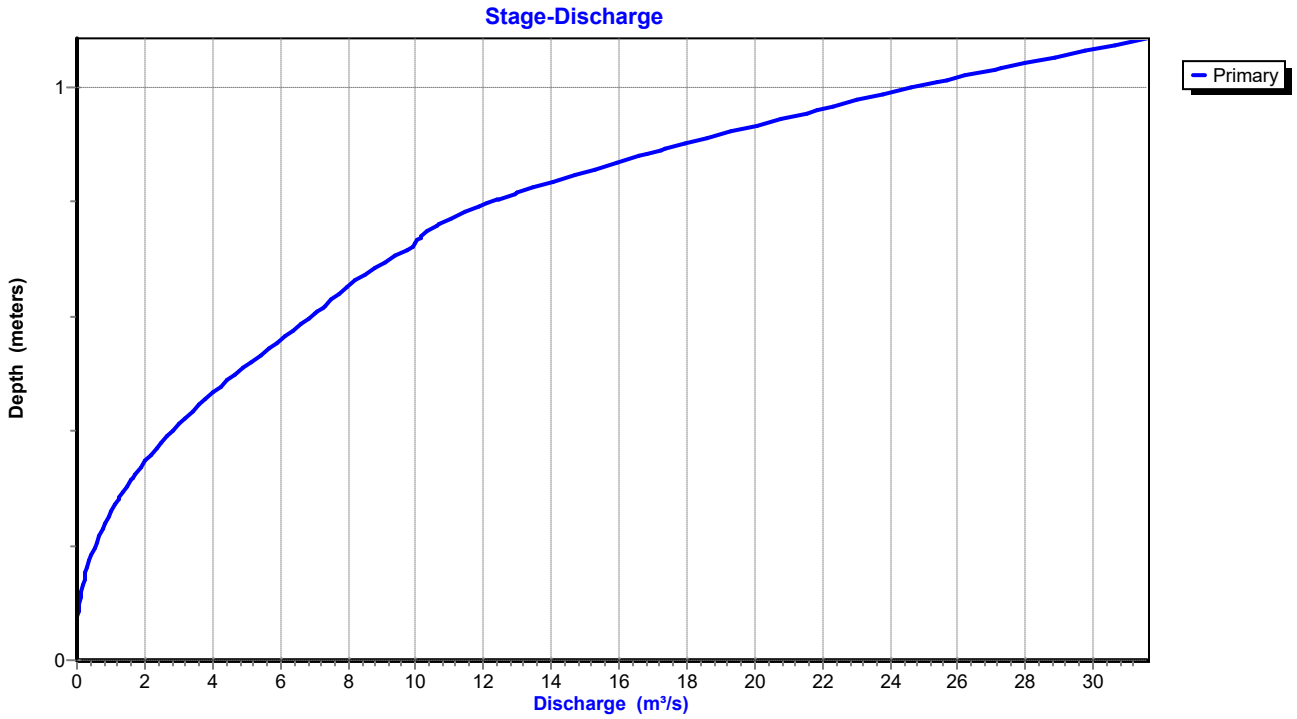
Custom cross-section, Length= 374.00 m Slope= 0.0630 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 27.338 m



Reach 16R: Channel XSection 5



Reach 16R: Channel XSection 5



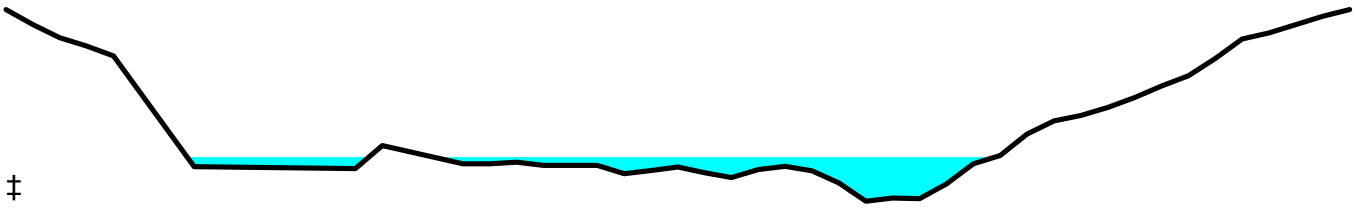
Summary for Reach 18R: Channel XSection 6

Inflow Area = 14.5886 ha, 0.00% Impervious, Inflow Depth = 206 mm for 1%AEP+CC event
Inflow = 2.0444 m³/s @ 8.08 hrs, Volume= 30,109.223 m³
Outflow = 1.9147 m³/s @ 8.34 hrs, Volume= 30,106.716 m³, Atten= 6%, Lag= 16.1 min

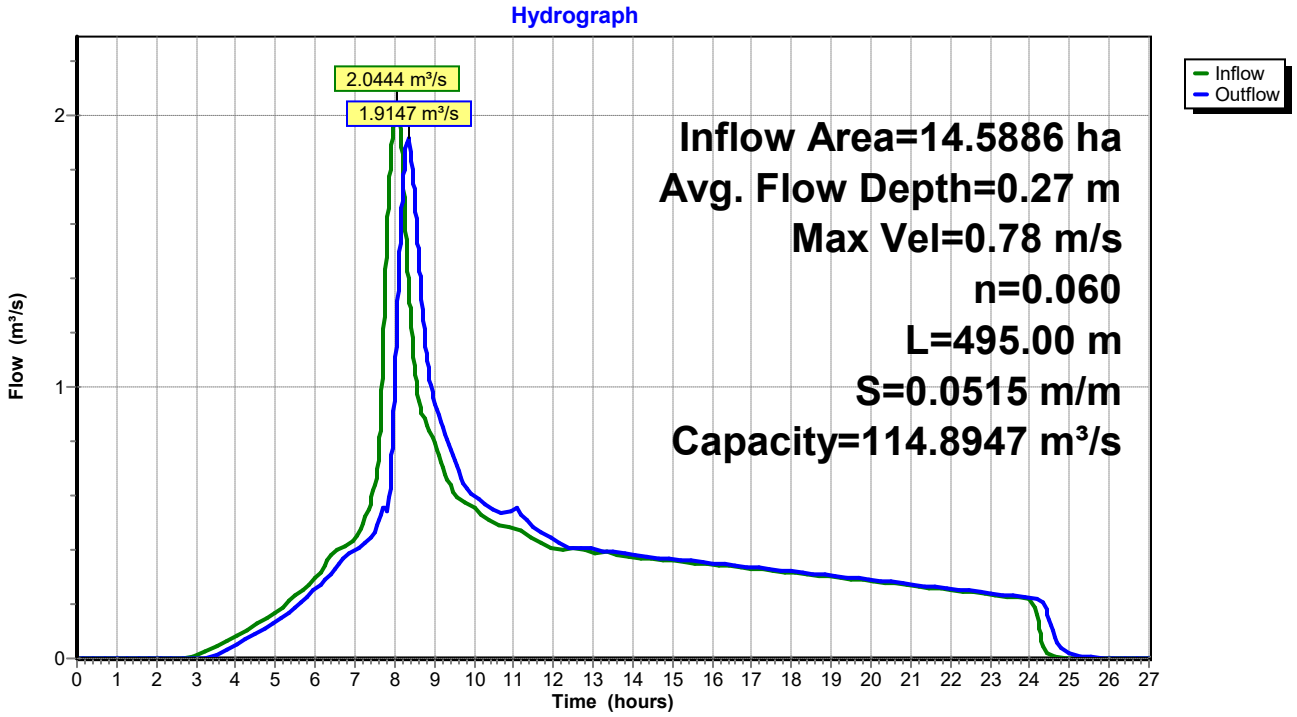
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.78 m/s, Min. Travel Time= 10.6 min
Avg. Velocity = 0.63 m/s, Avg. Travel Time= 13.1 min

Peak Storage= 1,243.1 m³ @ 8.17 hrs
Average Depth at Peak Storage= 0.27 m , Surface Width= 27.71 m
Bank-Full Depth= 1.17 m Flow Area= 37.13 m², Capacity= 114.8947 m³/s

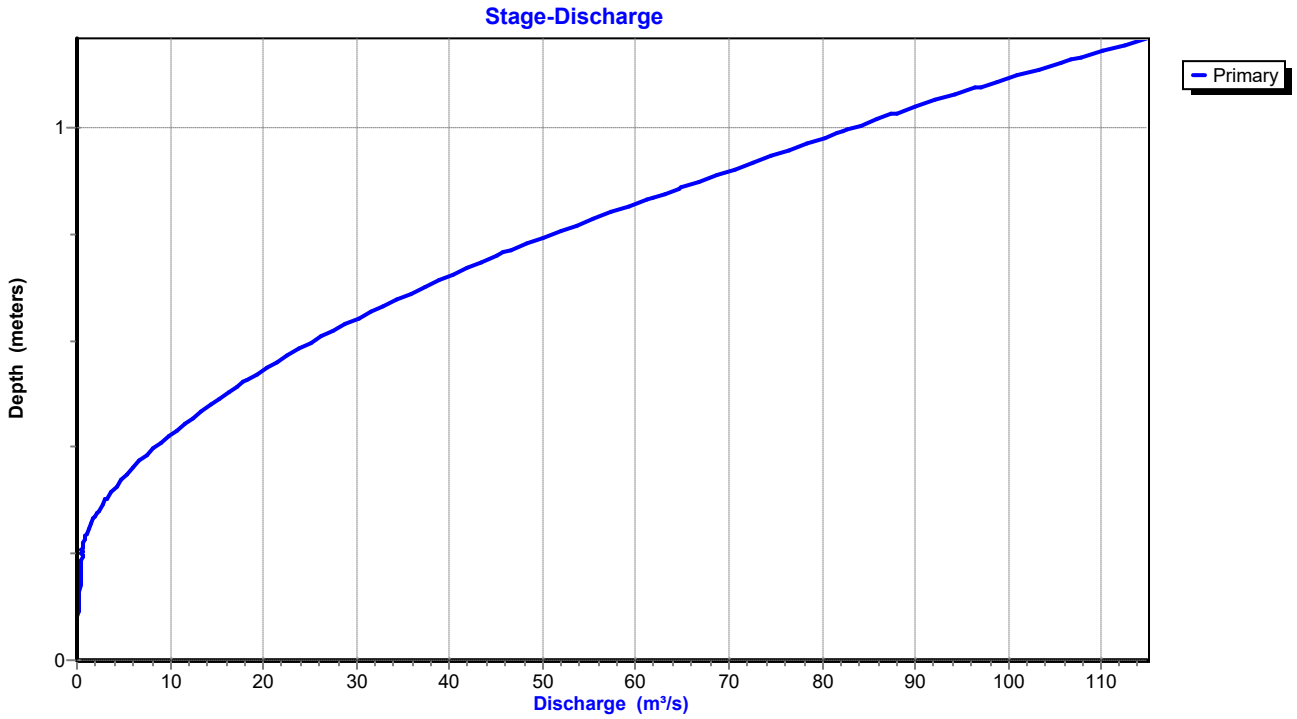
Custom cross-section, Length= 495.00 m Slope= 0.0515 m/m (126 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 25.420 m



Reach 18R: Channel XSection 6



Reach 18R: Channel XSection 6



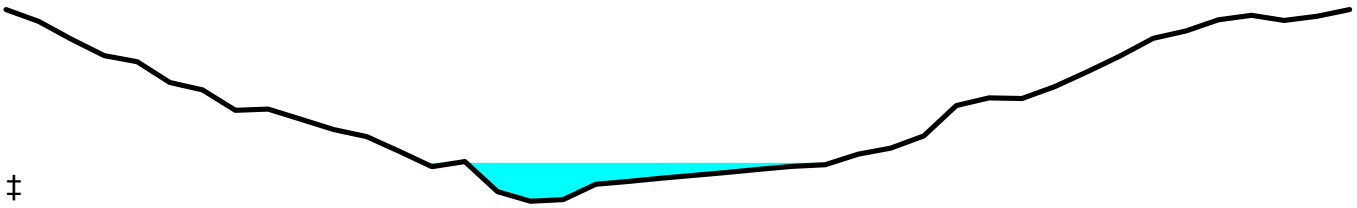
Summary for Reach 20R: Channel XSection 7 (outlet to Waipapa River)

Inflow Area = 17.2482 ha, 0.00% Impervious, Inflow Depth = 206 mm for 1%AEP+CC event
Inflow = 2.3215 m³/s @ 8.13 hrs, Volume= 35,598.337 m³
Outflow = 2.1609 m³/s @ 8.41 hrs, Volume= 35,594.341 m³, Atten= 7%, Lag= 16.8 min

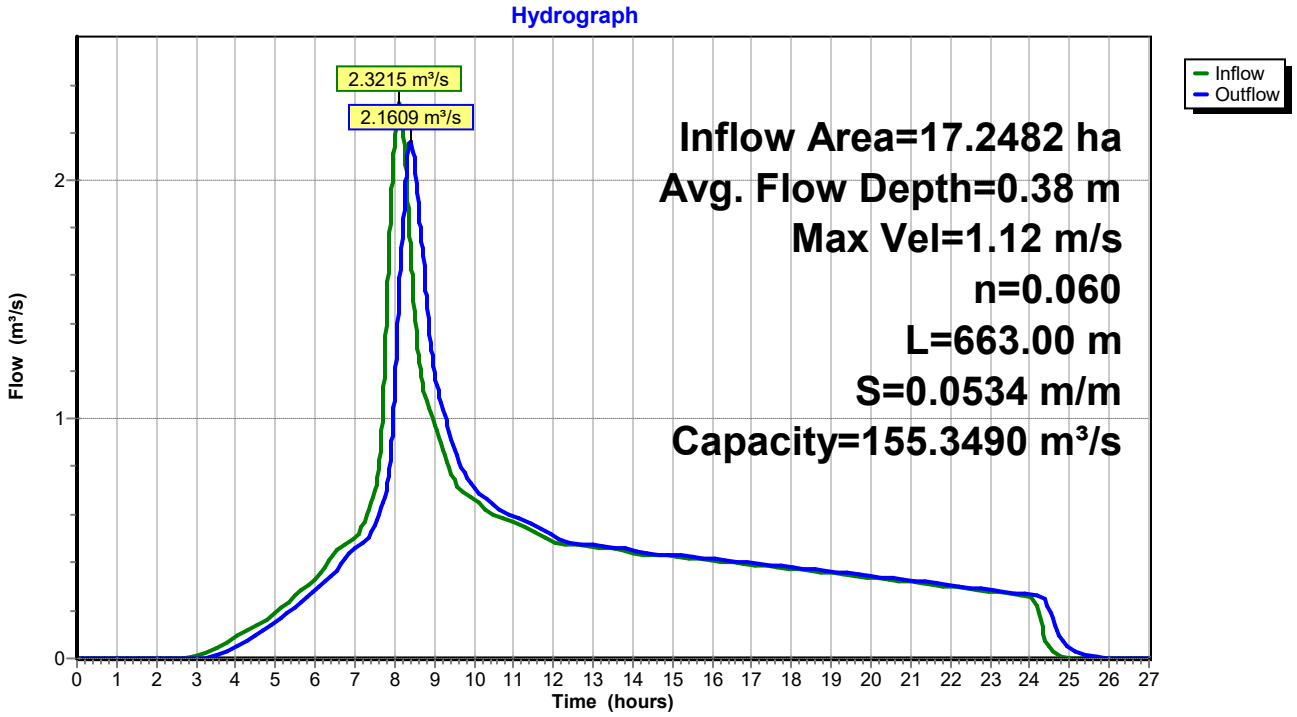
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.12 m/s, Min. Travel Time= 9.8 min
Avg. Velocity = 0.79 m/s, Avg. Travel Time= 14.0 min

Peak Storage= 1,276.3 m³ @ 8.24 hrs
Average Depth at Peak Storage= 0.38 m , Surface Width= 12.16 m
Bank-Full Depth= 1.89 m Flow Area= 40.73 m², Capacity= 155.3490 m³/s

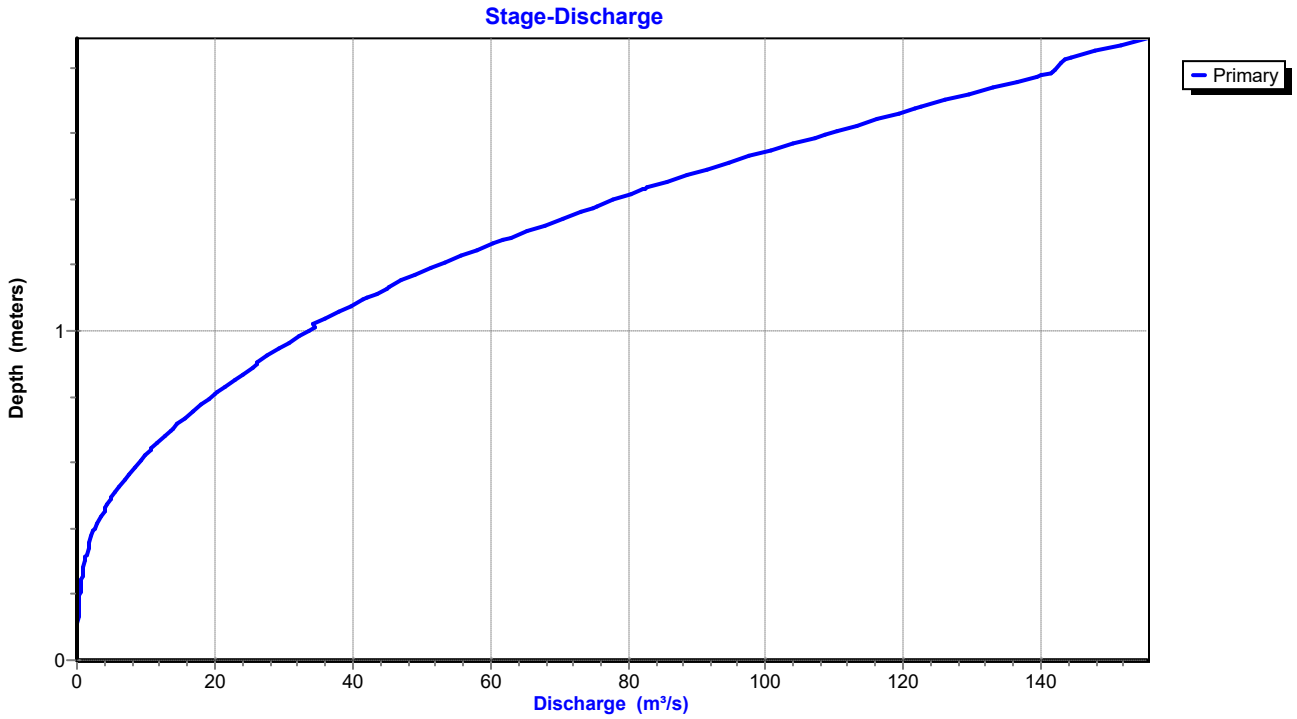
Custom cross-section, Length= 663.00 m Slope= 0.0534 m/m (129 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 15.520 m

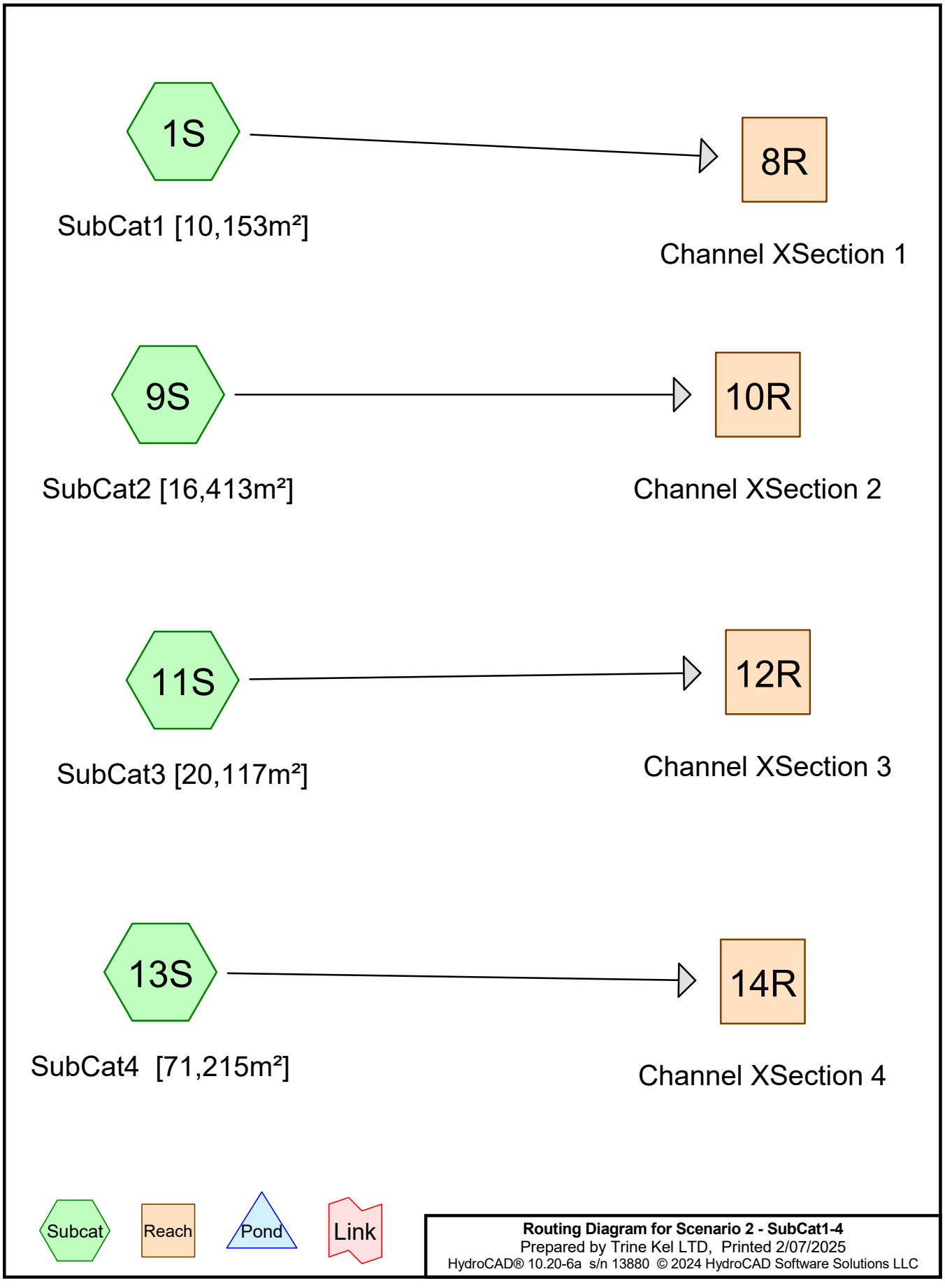


Reach 20R: Channel XSection 7 (outlet to Waipapa River)



Reach 20R: Channel XSection 7 (outlet to Waipapa River)




1S
8R
SubCat1 [10,153m²]
Channel XSection 1
9S
10R
SubCat2 [16,413m²]
Channel XSection 2
11S
12R
SubCat3 [20,117m²]
Channel XSection 3
13S
14R
SubCat4 [71,215m²]
Channel XSection 4
Subcat
Reach
Pond
Link
Routing Diagram for Scenario 2 - SubCat1-4
Prepared by Trine Kel LTD, Printed 2/07/2025
HydroCAD® 10.20-6a s/n 13880 © 2024 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
11.7898	72	Weighted CN 17 Waters Lane Post-Dev (1S, 9S, 11S, 13S)
11.7898	**72**	**TOTAL AREA**

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SubCat1 [10,153m²] Runoff Area=10,153.0 m² 0.00% Impervious Runoff Depth=210 mm
Flow Length=150.0 m Slope=0.0800 m/m Tc=4.1 min CN=72 Runoff=0.1525 m³/s 2,132.203 m³

Subcatchment 9S: SubCat2 [16,413m²] Runoff Area=16,413.0 m² 0.00% Impervious Runoff Depth=210 mm
Flow Length=230.0 m Slope=0.0900 m/m Tc=6.0 min CN=72 Runoff=0.2459 m³/s 3,446.848 m³

Subcatchment 11S: SubCat3 Runoff Area=20,117.0 m² 0.00% Impervious Runoff Depth=210 mm
Flow Length=291.0 m Slope=0.0790 m/m Tc=8.1 min CN=72 Runoff=0.3003 m³/s 4,224.715 m³

Subcatchment 13S: SubCat4 Runoff Area=71,215.0 m² 0.00% Impervious Runoff Depth=210 mm
Flow Length=319.0 m Slope=0.0700 m/m Tc=9.4 min CN=72 Runoff=1.0595 m³/s 14,955.662 m³

Reach 8R: Channel XSection Avg. Flow Depth=0.14 m Max Vel=0.91 m/s Inflow=0.1525 m³/s 2,132.203 m³
n=0.060 L=160.00 m S=0.0856 m/m Capacity=71.5580 m³/s Outflow=0.1520 m³/s 2,132.176 m³

Reach 10R: Channel Avg. Flow Depth=0.13 m Max Vel=0.99 m/s Inflow=0.2459 m³/s 3,446.848 m³
n=0.060 L=230.00 m S=0.0873 m/m Capacity=61.2091 m³/s Outflow=0.2447 m³/s 3,446.380 m³

Reach 12R: Channel Avg. Flow Depth=0.22 m Max Vel=1.16 m/s Inflow=0.3003 m³/s 4,224.715 m³
n=0.060 L=291.00 m S=0.0736 m/m Capacity=67.0923 m³/s Outflow=0.2982 m³/s 4,224.052 m³

Reach 14R: Channel Avg. Flow Depth=0.31 m Max Vel=1.47 m/s Inflow=1.0595 m³/s 14,955.662 m³
n=0.060 L=319.00 m S=0.0708 m/m Capacity=52.6908 m³/s Outflow=1.0539 m³/s 14,953.536 m³

Total Runoff Area = 11.7898 ha Runoff Volume = 24,759.428 m³ Average Runoff Depth = 210 mm
100.00% Pervious = 11.7898 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 1S: SubCat1 [10,153m²]

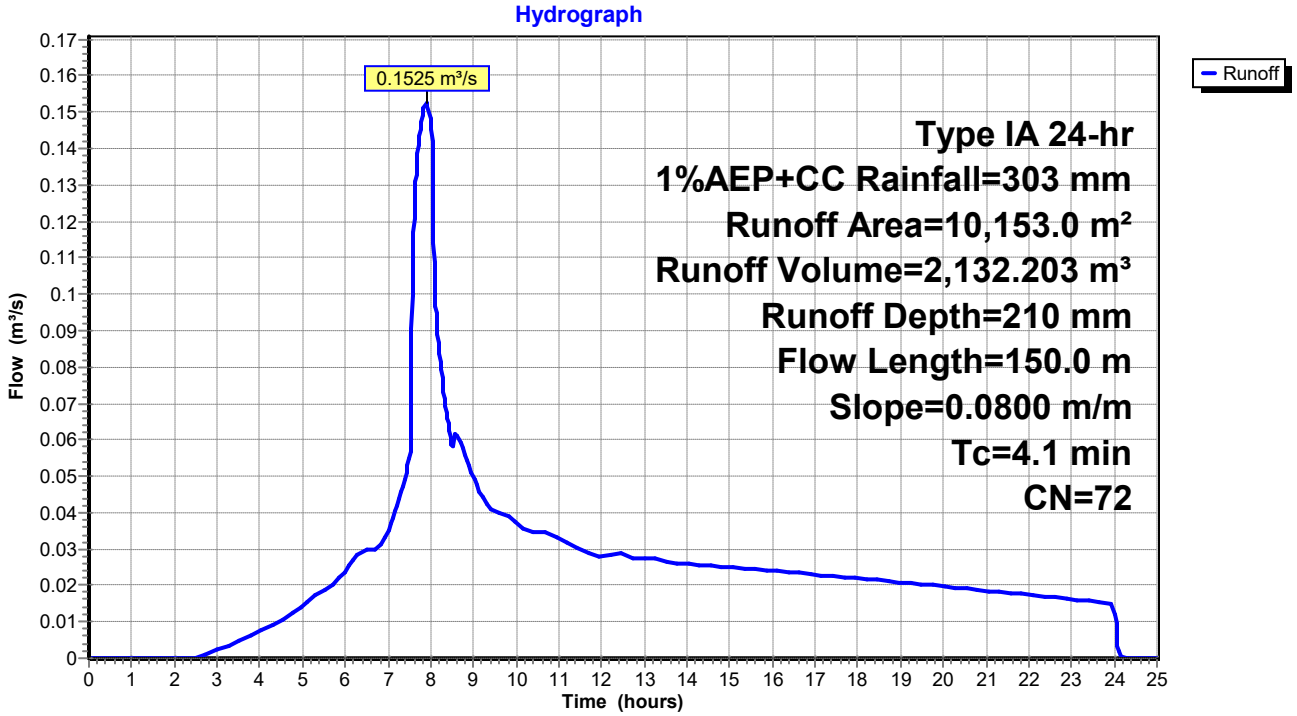
Runoff = 0.1525 m³/s @ 7.89 hrs, Volume= 2,132.203 m³, Depth= 210 mm
Routed to Reach 8R : Channel XSection 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	10,153.0	72	Weighted CN 17 Waters Lane Post-Dev
	10,153.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
4.1	150.0	0.0800	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 1S: SubCat1 [10,153m²]



Summary for Subcatchment 9S: SubCat2 [16,413m²]

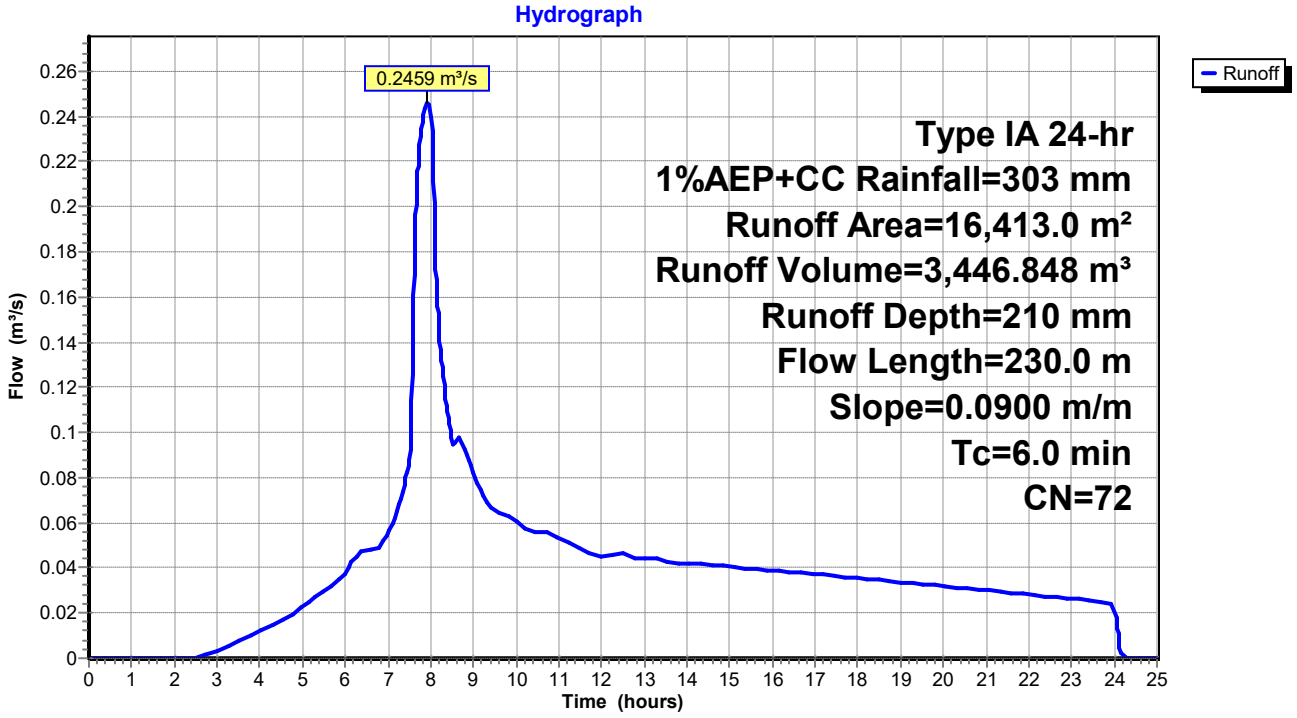
Runoff = 0.2459 m³/s @ 7.93 hrs, Volume= 3,446.848 m³, Depth= 210 mm
Routed to Reach 10R : Channel XSection 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	16,413.0	72	Weighted CN 17 Waters Lane Post-Dev
	16,413.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
6.0	230.0	0.0900	0.64		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 9S: SubCat2 [16,413m²]



Summary for Subcatchment 11S: SubCat3 [20,117m²]

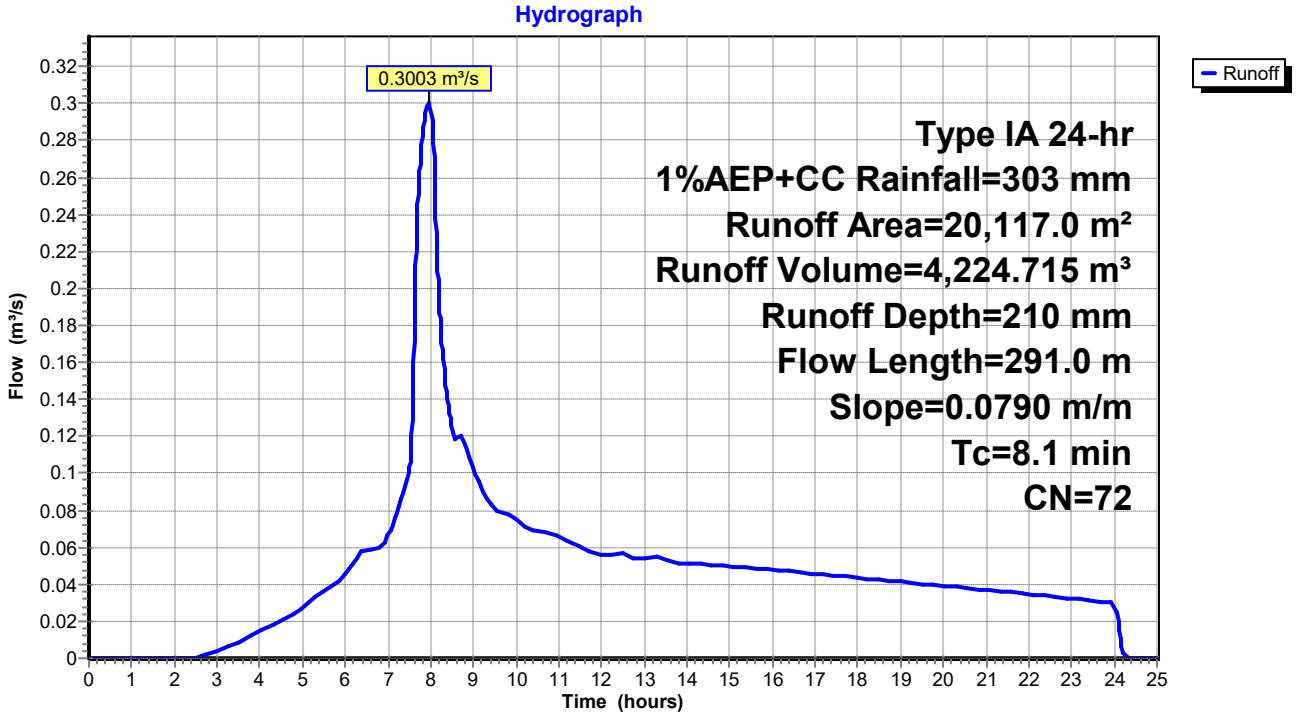
Runoff = 0.3003 m³/s @ 7.95 hrs, Volume= 4,224.715 m³, Depth= 210 mm
Routed to Reach 12R : Channel XSection 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	20,117.0	72	Weighted CN 17 Waters Lane Post-Dev
	20,117.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
8.1	291.0	0.0790	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 11S: SubCat3 [20,117m²]



Summary for Subcatchment 13S: SubCat4 [71,215m²]

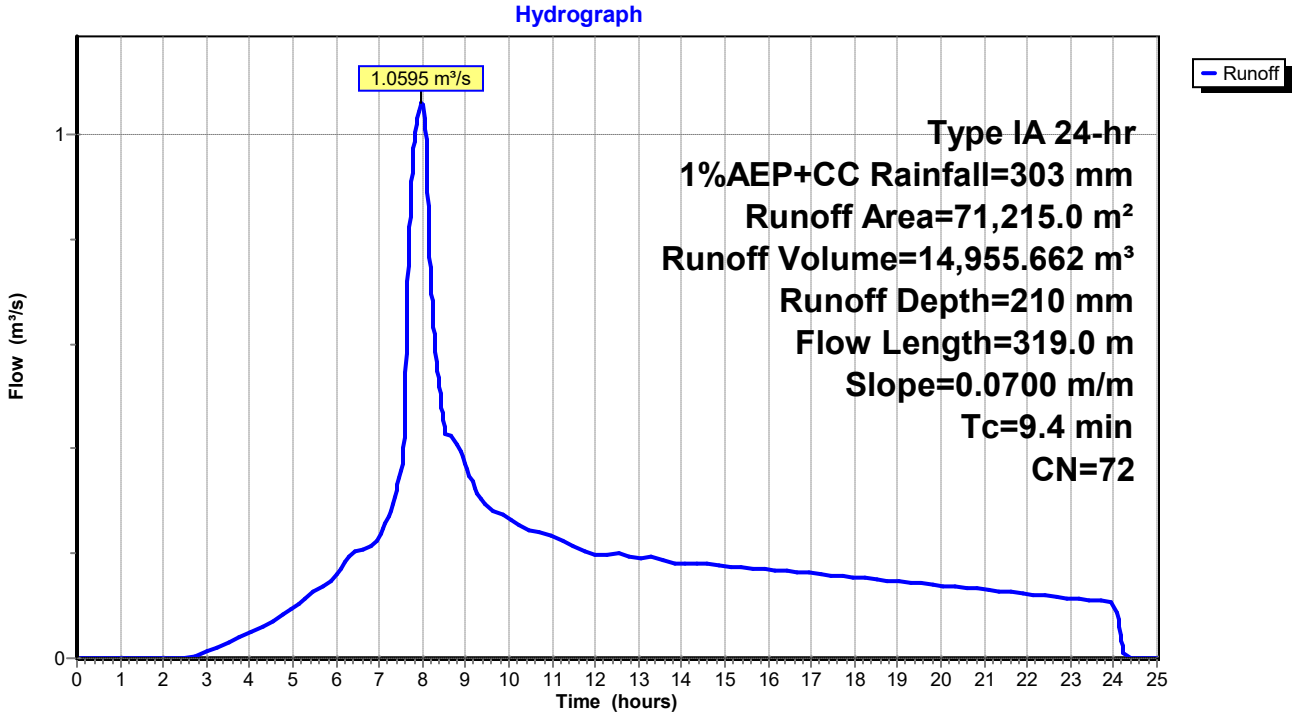
Runoff = 1.0595 m³/s @ 7.97 hrs, Volume= 14,955.662 m³, Depth= 210 mm
Routed to Reach 14R : Channel XSection 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	71,215.0	72	Weighted CN 17 Waters Lane Post-Dev
	71,215.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
9.4	319.0	0.0700	0.56		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 13S: SubCat4 [71,215m²]



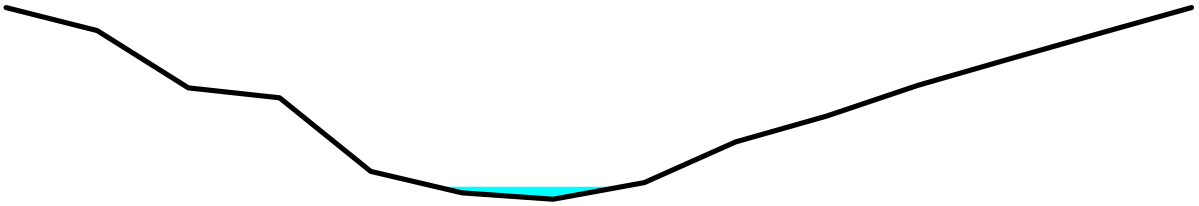
Summary for Reach 8R: Channel XSection 1

Inflow Area = 1.0153 ha, 0.00% Impervious, Inflow Depth = 210 mm for 1%AEP+CC event
Inflow = 0.1525 m³/s @ 7.89 hrs, Volume= 2,132.203 m³
Outflow = 0.1520 m³/s @ 7.98 hrs, Volume= 2,132.176 m³, Atten= 0%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.91 m/s, Min. Travel Time= 2.9 min
Avg. Velocity = 0.51 m/s, Avg. Travel Time= 5.2 min

Peak Storage= 26.7 m³ @ 7.93 hrs
Average Depth at Peak Storage= 0.14 m , Surface Width= 2.05 m
Bank-Full Depth= 2.10 m Flow Area= 14.34 m², Capacity= 71.5580 m³/s

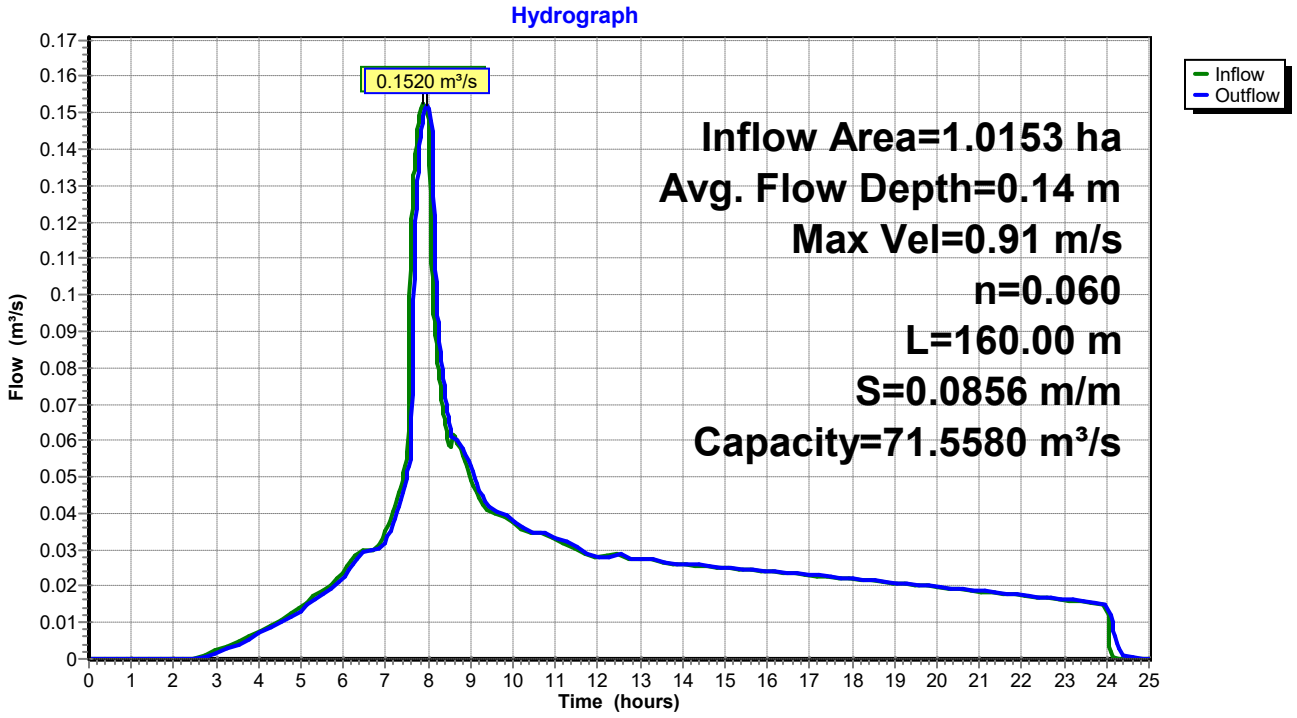
Custom cross-section, Length= 160.00 m Slope= 0.0856 m/m (111 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 37.200 m



Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	34.823	0.00
3.000	34.569	0.25
4.000	33.943	0.88
5.000	33.833	0.99
6.000	33.025	1.80
7.000	32.791	2.03
8.000	32.721	2.10
9.000	32.903	1.92
10.000	33.348	1.48
11.000	33.635	1.19
12.000	33.969	0.85
13.000	34.257	0.57
14.000	34.541	0.28
15.000	34.823	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.07	0.05	1.39	1.38	7.8	0.0252
0.18	0.26	2.51	2.48	42.4	0.2883
0.30	0.62	3.35	3.27	98.5	0.9715
0.63	1.86	4.65	4.40	296.8	4.8997
0.91	3.31	6.15	5.75	530.0	10.6916
1.11	4.53	7.09	6.59	725.6	16.4149
1.22	5.33	8.44	7.92	853.3	19.1446
1.25	5.54	8.58	8.04	886.5	20.1939
1.54	8.07	10.16	9.50	1,290.7	33.7345
1.82	10.97	11.73	10.96	1,755.5	51.1647
1.85	11.28	11.89	11.10	1,804.9	53.1174
2.10	14.34	13.86	13.00	2,294.6	71.5580

Reach 8R: Channel XSection 1



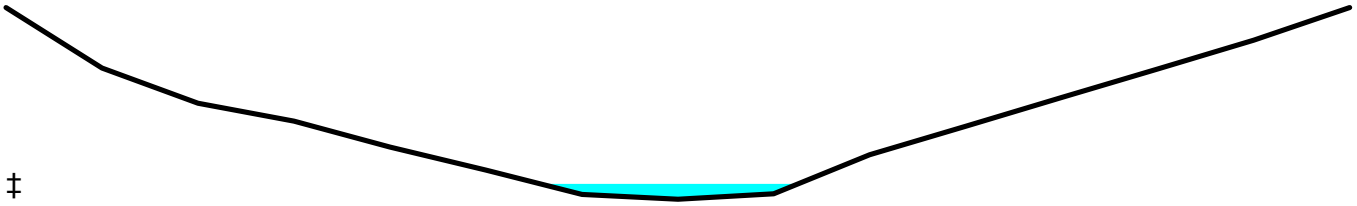
Summary for Reach 10R: Channel XSection 2

Inflow Area = 1.6413 ha, 0.00% Impervious, Inflow Depth = 210 mm for 1%AEP+CC event
Inflow = 0.2459 m³/s @ 7.93 hrs, Volume= 3,446.848 m³
Outflow = 0.2447 m³/s @ 8.03 hrs, Volume= 3,446.380 m³, Atten= 0%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.99 m/s, Min. Travel Time= 3.9 min
Avg. Velocity = 0.52 m/s, Avg. Travel Time= 7.4 min

Peak Storage= 56.7 m³ @ 7.97 hrs
Average Depth at Peak Storage= 0.13 m , Surface Width= 2.70 m
Bank-Full Depth= 1.59 m Flow Area= 13.20 m², Capacity= 61.2091 m³/s

Custom cross-section, Length= 230.00 m Slope= 0.0873 m/m (108 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 30.820 m

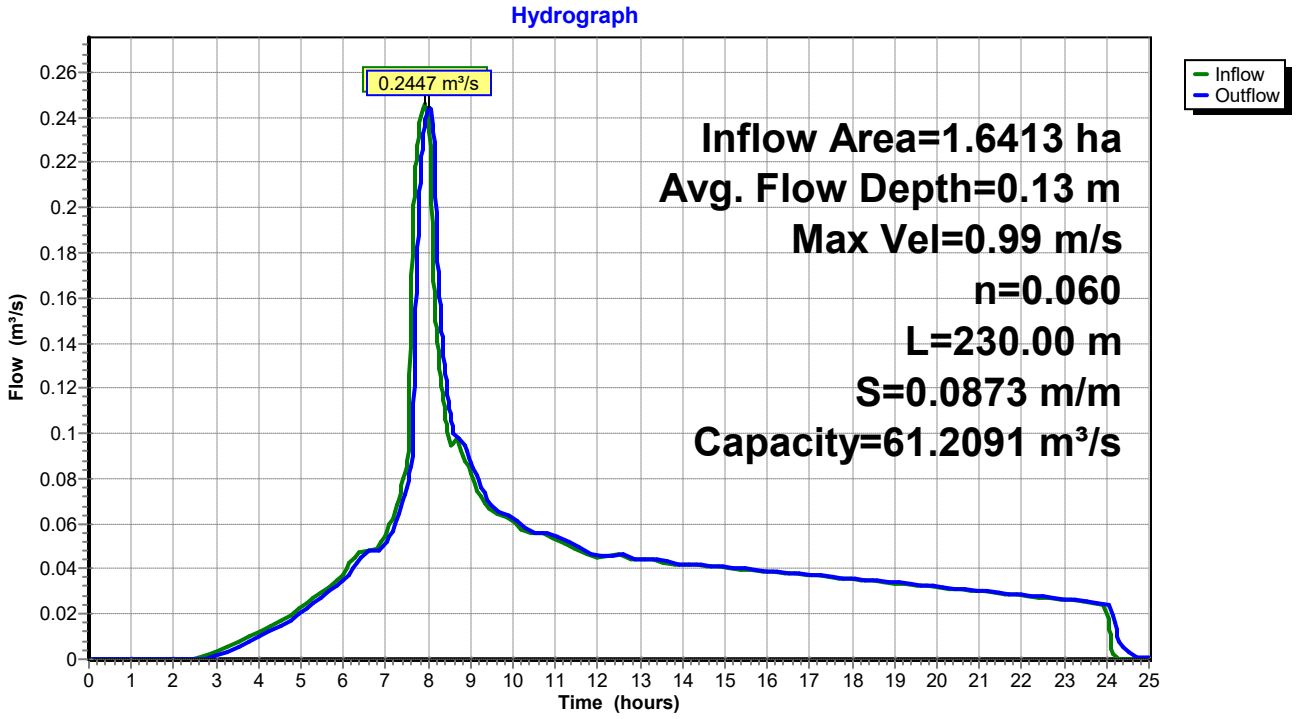


‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	32.376	0.00
3.000	31.872	0.50
4.000	31.580	0.80
5.000	31.430	0.95
6.000	31.216	1.16
7.000	31.024	1.35
8.000	30.822	1.55
9.000	30.782	1.59
10.000	30.826	1.55
11.000	31.152	1.22
12.000	31.390	0.99
13.000	31.628	0.75
14.000	31.866	0.51
15.000	32.104	0.27
16.000	32.376	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.04	1.91	1.91	8.8	0.0138
0.04	0.05	2.02	2.02	10.6	0.0182
0.24	0.60	3.66	3.61	138.7	0.8926
0.37	1.13	4.75	4.67	260.5	2.1441
0.43	1.45	5.37	5.27	333.6	2.9857
0.61	2.50	6.95	6.81	575.4	6.2333
0.65	2.78	7.32	7.17	639.7	7.1885
0.80	3.98	8.97	8.80	915.1	11.3956
0.85	4.41	9.35	9.16	1,014.3	13.1565
1.08	6.81	11.23	10.98	1,565.6	24.0093
1.09	6.87	11.28	11.03	1,580.8	24.3303
1.32	9.60	12.79	12.46	2,207.4	39.0196
1.59	13.20	14.44	14.00	3,035.1	61.2091

Reach 10R: Channel XSection 2



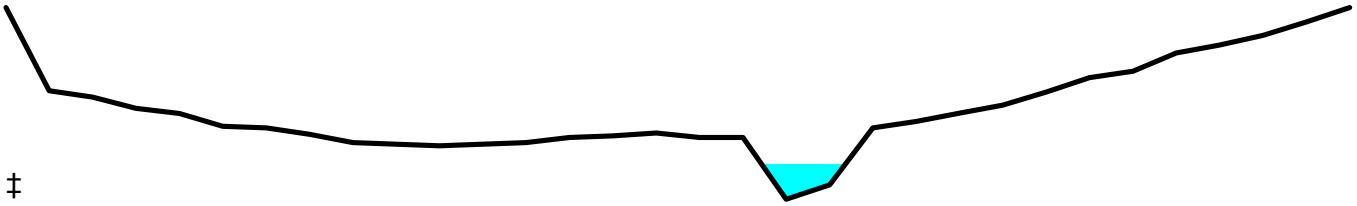
Summary for Reach 12R: Channel XSection 3

Inflow Area = 2.0117 ha, 0.00% Impervious, Inflow Depth = 210 mm for 1%AEP+CC event
Inflow = 0.3003 m³/s @ 7.95 hrs, Volume= 4,224.715 m³
Outflow = 0.2982 m³/s @ 8.08 hrs, Volume= 4,224.052 m³, Atten= 1%, Lag= 7.4 min

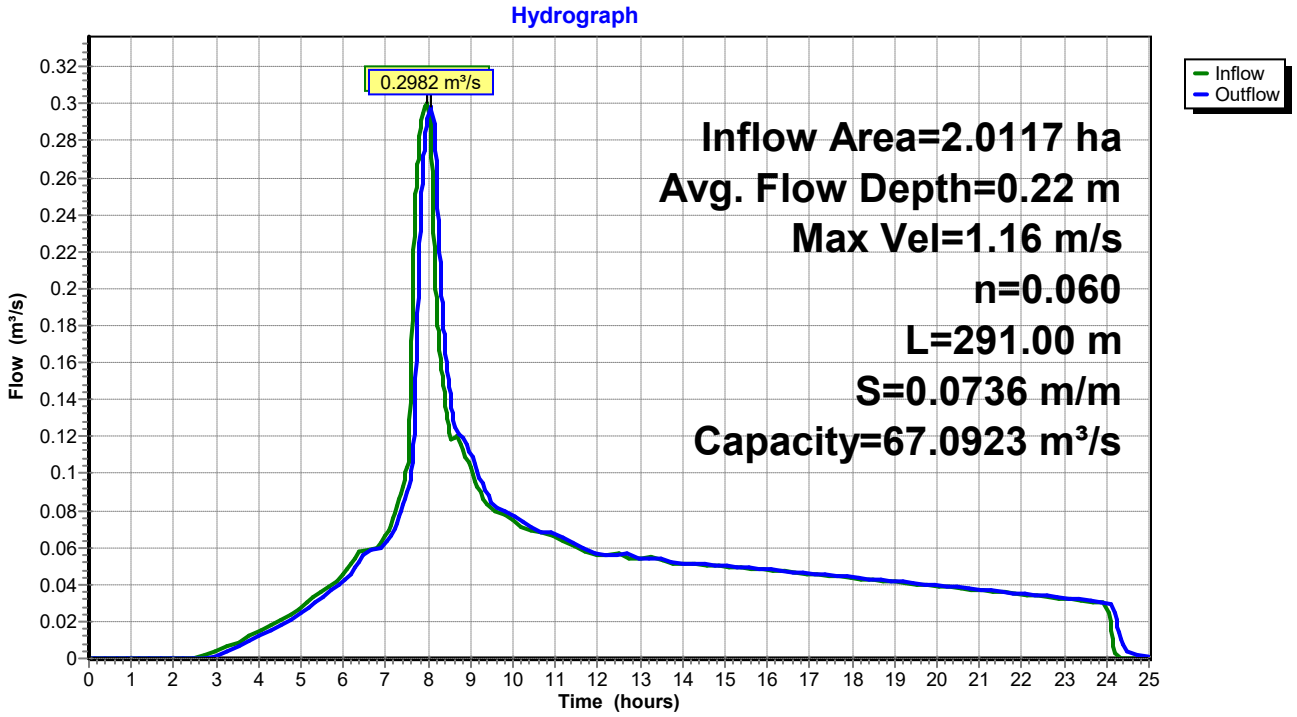
Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.16 m/s, Min. Travel Time= 4.2 min
Avg. Velocity = 0.64 m/s, Avg. Travel Time= 7.6 min

Peak Storage= 75.1 m³ @ 8.01 hrs
Average Depth at Peak Storage= 0.22 m , Surface Width= 1.93 m
Bank-Full Depth= 1.19 m Flow Area= 20.00 m², Capacity= 67.0923 m³/s

Custom cross-section, Length= 291.00 m Slope= 0.0736 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 29.490 m



Reach 12R: Channel XSection 3



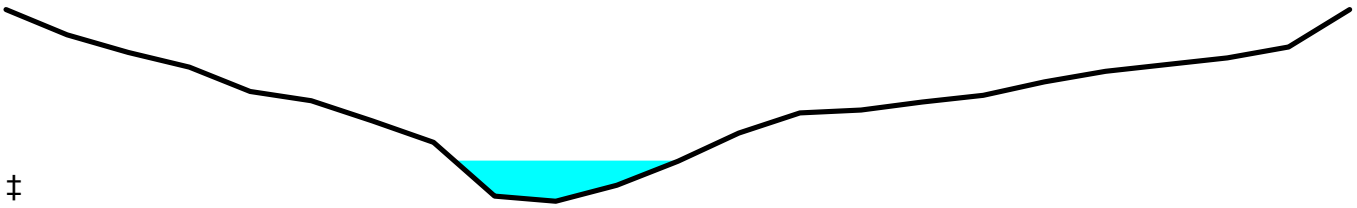
Summary for Reach 14R: Channel XSection 4

Inflow Area = 7.1215 ha, 0.00% Impervious, Inflow Depth = 210 mm for 1%AEP+CC event
Inflow = 1.0595 m³/s @ 7.97 hrs, Volume= 14,955.662 m³
Outflow = 1.0539 m³/s @ 8.08 hrs, Volume= 14,953.536 m³, Atten= 1%, Lag= 6.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.47 m/s, Min. Travel Time= 3.6 min
Avg. Velocity = 0.83 m/s, Avg. Travel Time= 6.4 min

Peak Storage= 228.6 m³ @ 8.02 hrs
Average Depth at Peak Storage= 0.31 m , Surface Width= 3.68 m
Bank-Full Depth= 1.44 m Flow Area= 15.27 m², Capacity= 52.6908 m³/s

Custom cross-section, Length= 319.00 m Slope= 0.0708 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 28.300 m

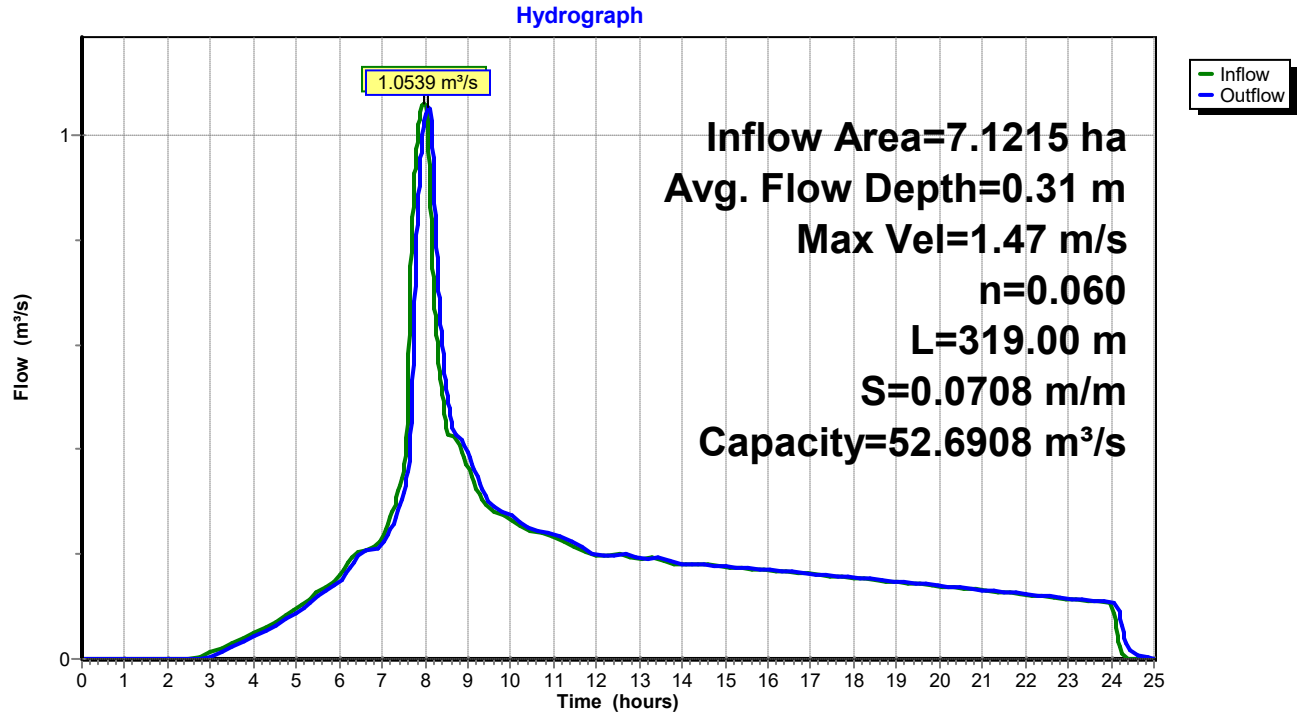


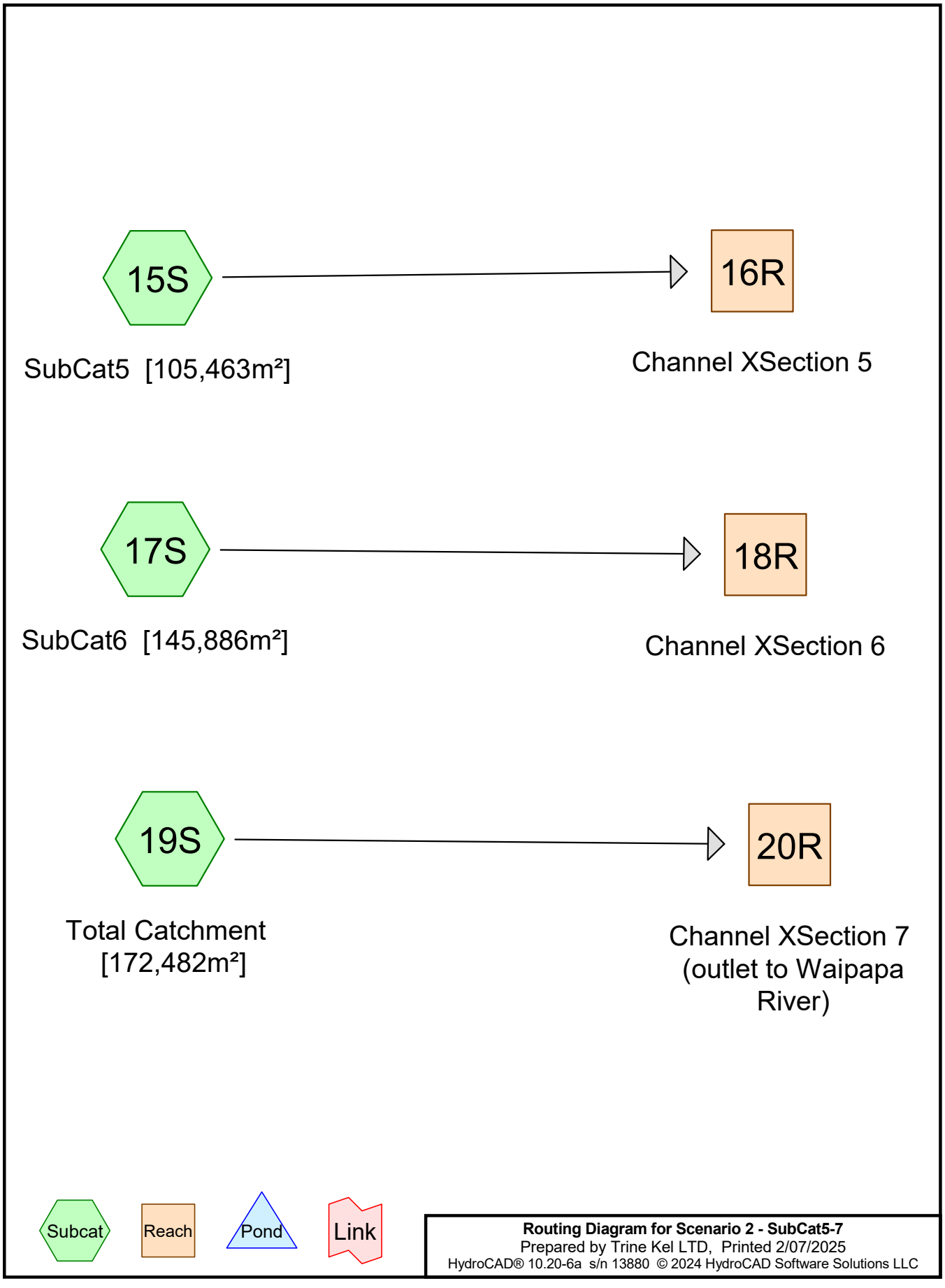
‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
8.000	29.287	0.00
9.000	29.097	0.19
10.000	28.965	0.32
11.000	28.853	0.43
12.000	28.671	0.62
13.000	28.601	0.69
14.000	28.449	0.84
15.000	28.288	1.00
16.000	27.882	1.40
17.000	27.844	1.44
18.000	27.964	1.32
19.000	28.146	1.14
20.000	28.358	0.93
21.000	28.510	0.78
22.000	28.530	0.76
23.000	28.590	0.70
24.000	28.642	0.64
25.000	28.742	0.54
26.000	28.822	0.46
27.000	28.872	0.41
28.000	28.924	0.36
29.000	29.004	0.28
30.000	29.287	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.03	1.32	1.32	8.0	0.0079
0.12	0.17	2.23	2.20	54.0	0.1348
0.30	0.70	3.73	3.65	223.9	1.0234
0.44	1.29	4.79	4.67	412.3	2.3950
0.51	1.65	5.57	5.43	525.1	3.2418
0.61	2.19	6.74	6.60	699.8	4.6030
0.67	2.62	7.56	7.40	836.0	5.7392
0.69	2.78	8.69	8.53	886.8	5.7691
0.75	3.33	10.09	9.93	1,063.5	7.0684
0.76	3.44	10.38	10.21	1,098.8	7.3268
0.80	3.89	11.75	11.59	1,241.4	8.2628
0.83	4.24	12.46	12.29	1,351.8	9.1602
0.90	5.15	13.57	13.39	1,642.6	11.9737
0.98	6.28	15.02	14.83	2,002.7	15.5704
1.01	6.75	15.81	15.62	2,153.3	16.9750
1.03	7.05	16.36	16.17	2,249.6	17.8490
1.08	7.93	17.83	17.63	2,530.0	20.4996
1.12	8.67	18.72	18.51	2,766.4	23.0363
1.16	9.41	19.50	19.30	3,001.6	25.6771
1.25	11.25	20.55	20.33	3,589.3	33.4021
1.44	15.27	22.27	22.00	4,872.1	52.6908

Reach 14R: Channel XSection 4




15S
16R
SubCat5 [105,463m²]
Channel XSection 5
17S
18R
SubCat6 [145,886m²]
Channel XSection 6
19S
20R
Total Catchment
[172,482m²]
Channel XSection 7
(outlet to Waipapa
River)
Subcat
Reach
Pond
Link
Routing Diagram for Scenario 2 - SubCat5-7
Prepared by Trine Kel LTD, Printed 2/07/2025
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Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
42.3831	72	Calculated Weighted Curve Number for Total Catchment + 17 Waters Lane Development (15S, 17S, 19S)
42.3831	**72**	**TOTAL AREA**

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15S: SubCat5 Runoff Area=105,463.0 m² 0.00% Impervious Runoff Depth=210 mm
Flow Length=374.0 m Slope=0.0630 m/m Tc=11.7 min CN=72 Runoff=1.5567 m³/s 22,147.989 m³

Subcatchment 17S: SubCat6 Runoff Area=145,886.0 m² 0.00% Impervious Runoff Depth=210 mm
Flow Length=495.0 m Slope=0.0510 m/m Tc=17.2 min CN=72 Runoff=2.0874 m³/s 30,637.110 m³

Subcatchment 19S: Total Catchment Runoff Area=172,482.0 m² 0.00% Impervious Runoff Depth=210 mm
Flow Length=663.0 m Slope=0.0530 m/m Tc=22.5 min CN=72 Runoff=2.3712 m³/s 36,222.461 m³

Reach 16R: Channel Avg. Flow Depth=0.31 m Max Vel=1.36 m/s Inflow=1.5567 m³/s 22,147.989 m³
n=0.060 L=374.00 m S=0.0630 m/m Capacity=31.5808 m³/s Outflow=1.5404 m³/s 22,147.796 m³

Reach 18R: Channel Avg. Flow Depth=0.27 m Max Vel=0.78 m/s Inflow=2.0874 m³/s 30,637.110 m³
n=0.060 L=495.00 m S=0.0515 m/m Capacity=114.8947 m³/s Outflow=1.9592 m³/s 30,634.600 m³

Reach 20R: Channel Avg. Flow Depth=0.38 m Max Vel=1.13 m/s Inflow=2.3712 m³/s 36,222.461 m³
n=0.060 L=663.00 m S=0.0534 m/m Capacity=155.3490 m³/s Outflow=2.2113 m³/s 36,218.464 m³

Total Runoff Area = 42.3831 ha Runoff Volume = 89,007.559 m³ Average Runoff Depth = 210 mm
100.00% Pervious = 42.3831 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 15S: SubCat5 [105,463m²]

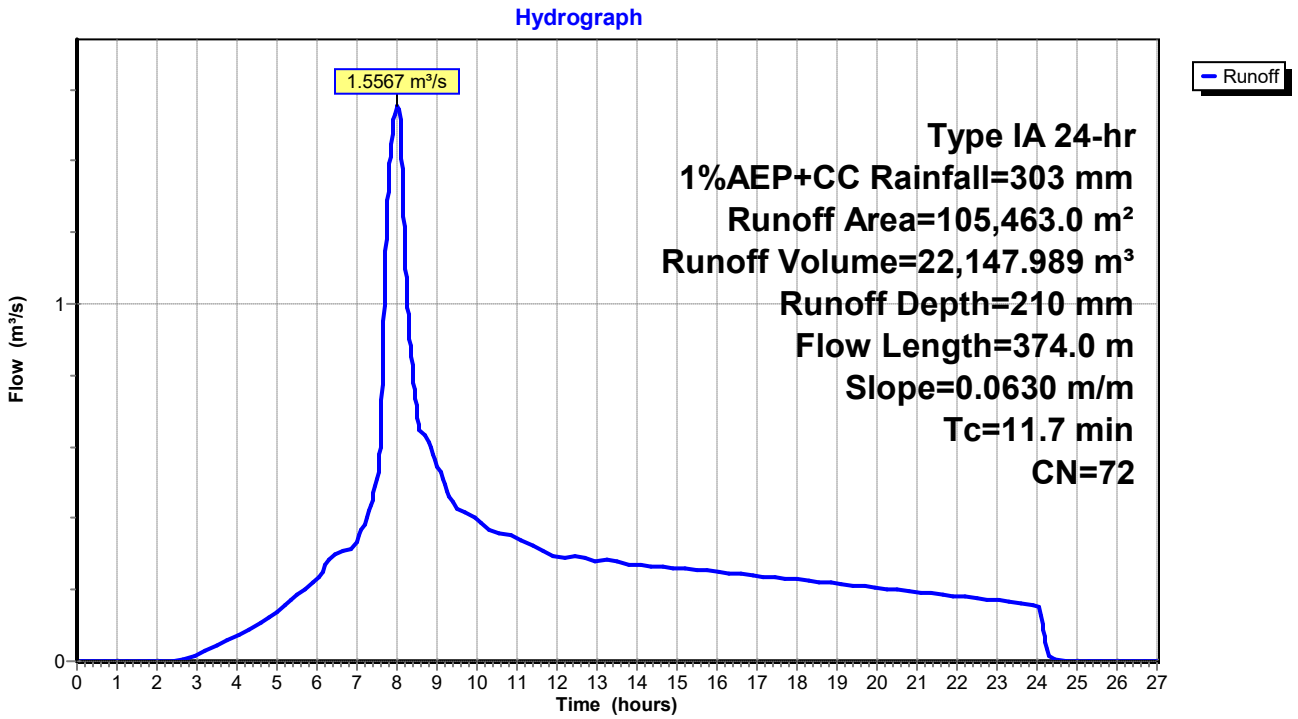
Runoff = 1.5567 m³/s @ 8.02 hrs, Volume= 22,147.989 m³, Depth= 210 mm
Routed to Reach 16R : Channel XSection 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	105,463.0	72	Calculated Weighted Curve Number for Total Catchment + 17 Waters Lane Development
	105,463.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
11.7	374.0	0.0630	0.53		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 15S: SubCat5 [105,463m²]



Summary for Subcatchment 17S: SubCat6 [145,886m²]

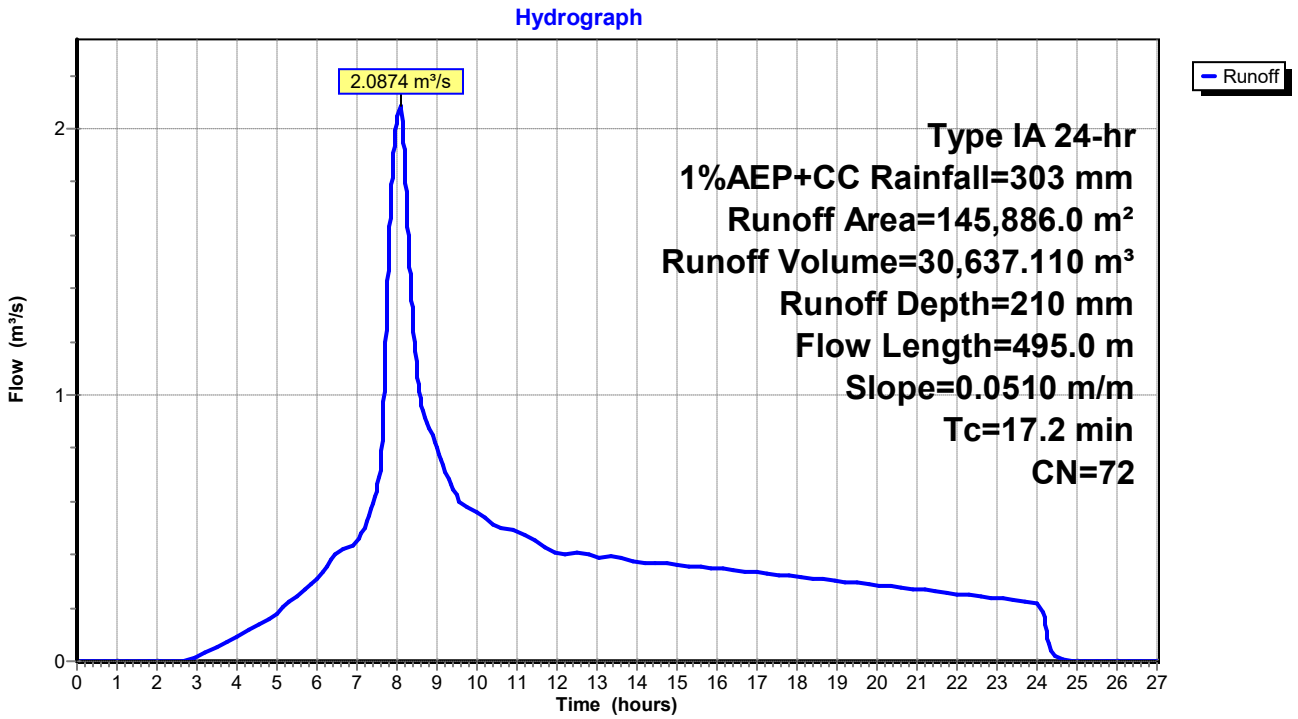
Runoff = 2.0874 m³/s @ 8.08 hrs, Volume= 30,637.110 m³, Depth= 210 mm
Routed to Reach 18R : Channel XSection 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	145,886.0	72	Calculated Weighted Curve Number for Total Catchment + 17 Waters Lane Development
	145,886.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
17.2	495.0	0.0510	0.48		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 17S: SubCat6 [145,886m²]



Summary for Subcatchment 19S: Total Catchment [172,482m²]

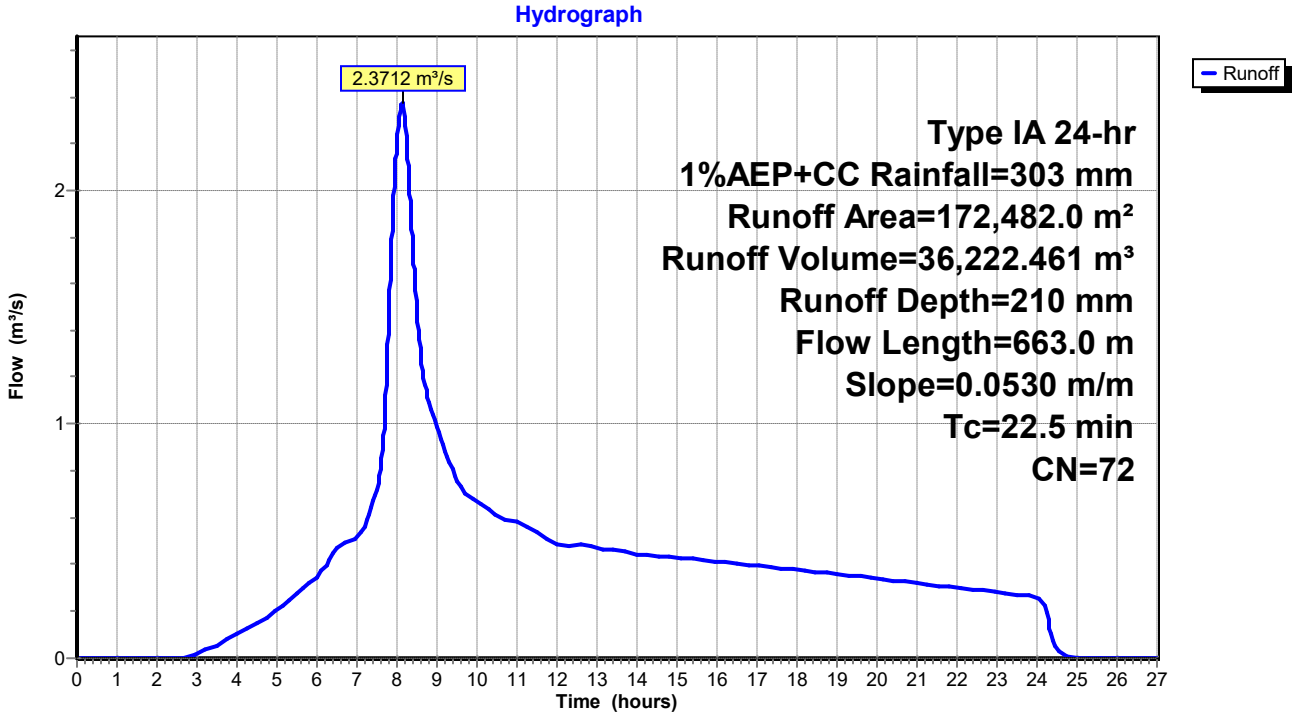
Runoff = 2.3712 m³/s @ 8.13 hrs, Volume= 36,222.461 m³, Depth= 210 mm
Routed to Reach 20R : Channel XSection 7 (outlet to Waipapa River)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	172,482.0	72	Calculated Weighted Curve Number for Total Catchment + 17 Waters Lane Development
	172,482.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
22.5	663.0	0.0530	0.49		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 19S: Total Catchment [172,482m²]



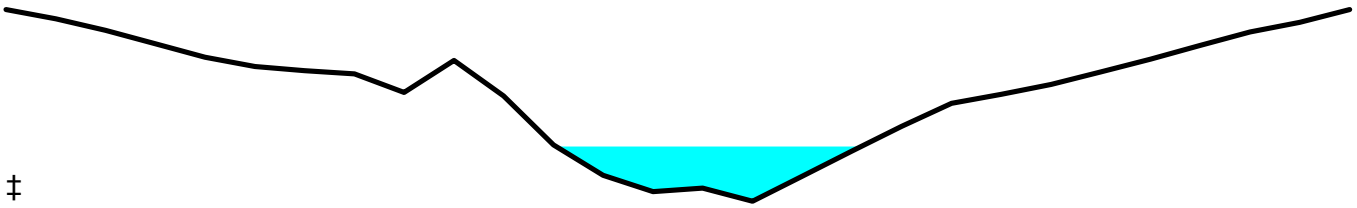
Summary for Reach 16R: Channel XSection 5

Inflow Area = 10.5463 ha, 0.00% Impervious, Inflow Depth = 210 mm for 1%AEP+CC event
Inflow = 1.5567 m³/s @ 8.02 hrs, Volume= 22,147.989 m³
Outflow = 1.5404 m³/s @ 8.13 hrs, Volume= 22,147.796 m³, Atten= 1%, Lag= 6.8 min

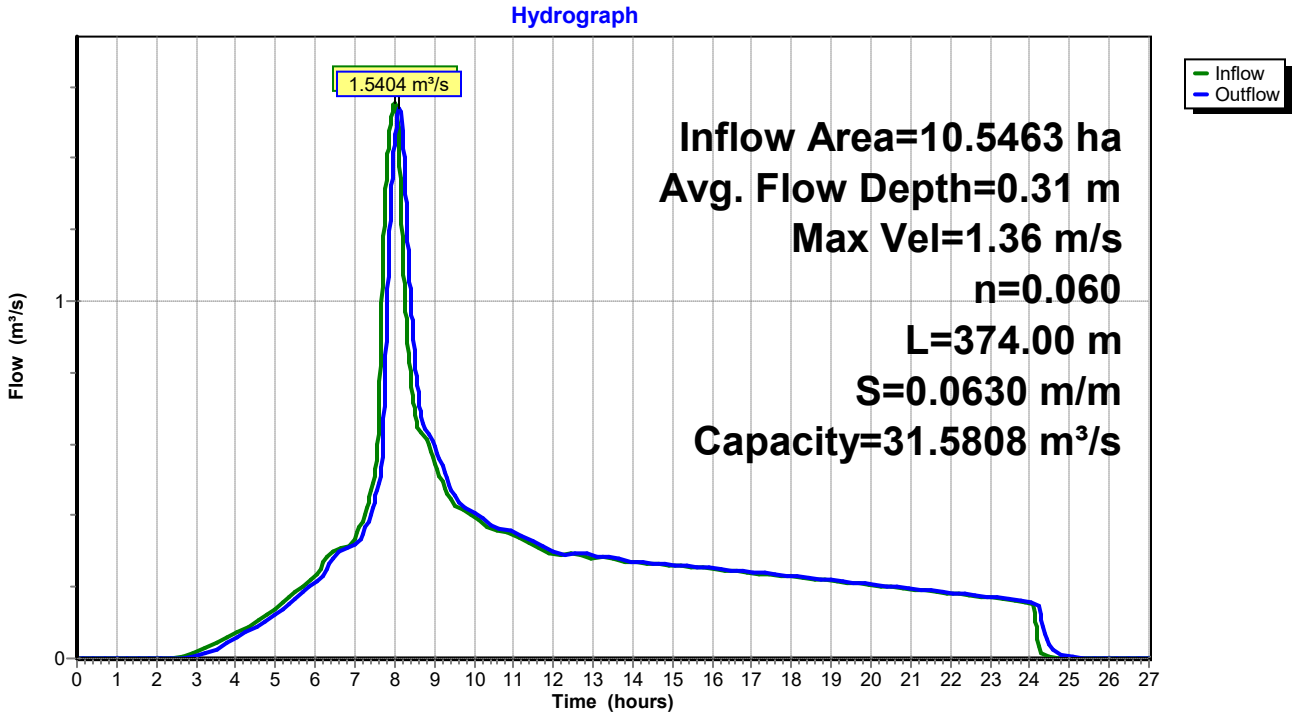
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.36 m/s, Min. Travel Time= 4.6 min
Avg. Velocity = 0.70 m/s, Avg. Travel Time= 8.9 min

Peak Storage= 425.1 m³ @ 8.05 hrs
Average Depth at Peak Storage= 0.31 m , Surface Width= 6.12 m
Bank-Full Depth= 1.08 m Flow Area= 12.60 m², Capacity= 31.5808 m³/s

Custom cross-section, Length= 374.00 m Slope= 0.0630 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 27.338 m



Reach 16R: Channel XSection 5



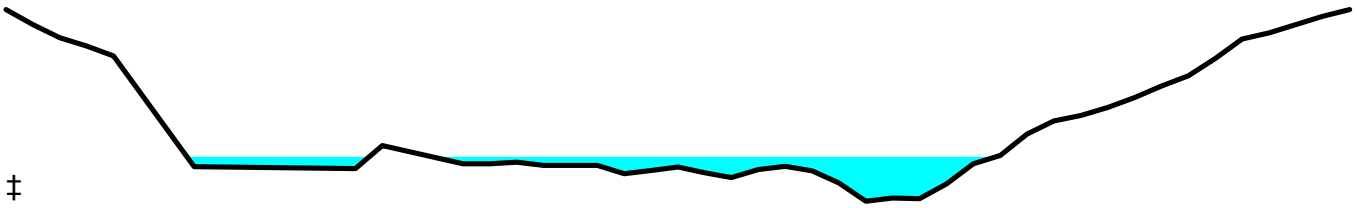
Summary for Reach 18R: Channel XSection 6

Inflow Area = 14.5886 ha, 0.00% Impervious, Inflow Depth = 210 mm for 1%AEP+CC event
Inflow = 2.0874 m³/s @ 8.08 hrs, Volume= 30,637.110 m³
Outflow = 1.9592 m³/s @ 8.34 hrs, Volume= 30,634.600 m³, Atten= 6%, Lag= 16.0 min

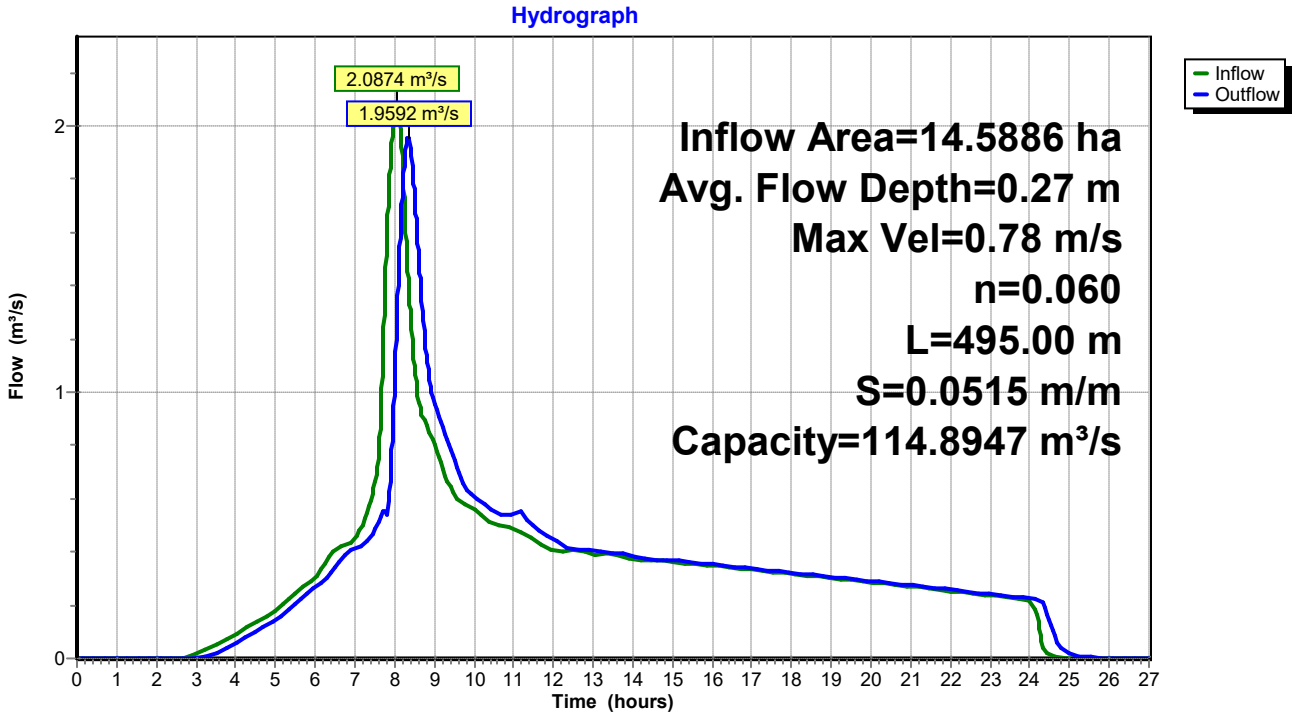
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.78 m/s, Min. Travel Time= 10.6 min
Avg. Velocity = 0.63 m/s, Avg. Travel Time= 13.1 min

Peak Storage= 1,261.5 m³ @ 8.17 hrs
Average Depth at Peak Storage= 0.27 m , Surface Width= 27.79 m
Bank-Full Depth= 1.17 m Flow Area= 37.13 m², Capacity= 114.8947 m³/s

Custom cross-section, Length= 495.00 m Slope= 0.0515 m/m (126 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 25.420 m



Reach 18R: Channel XSection 6



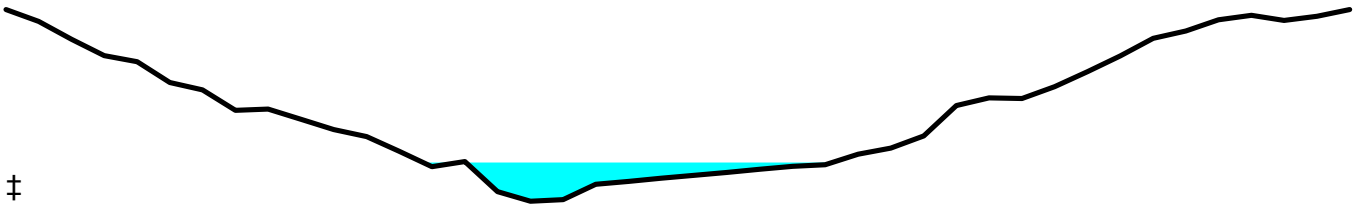
Summary for Reach 20R: Channel XSection 7 (outlet to Waipapa River)

Inflow Area = 17.2482 ha, 0.00% Impervious, Inflow Depth = 210 mm for 1%AEP+CC event
Inflow = 2.3712 m³/s @ 8.13 hrs, Volume= 36,222.461 m³
Outflow = 2.2113 m³/s @ 8.40 hrs, Volume= 36,218.464 m³, Atten= 7%, Lag= 16.6 min

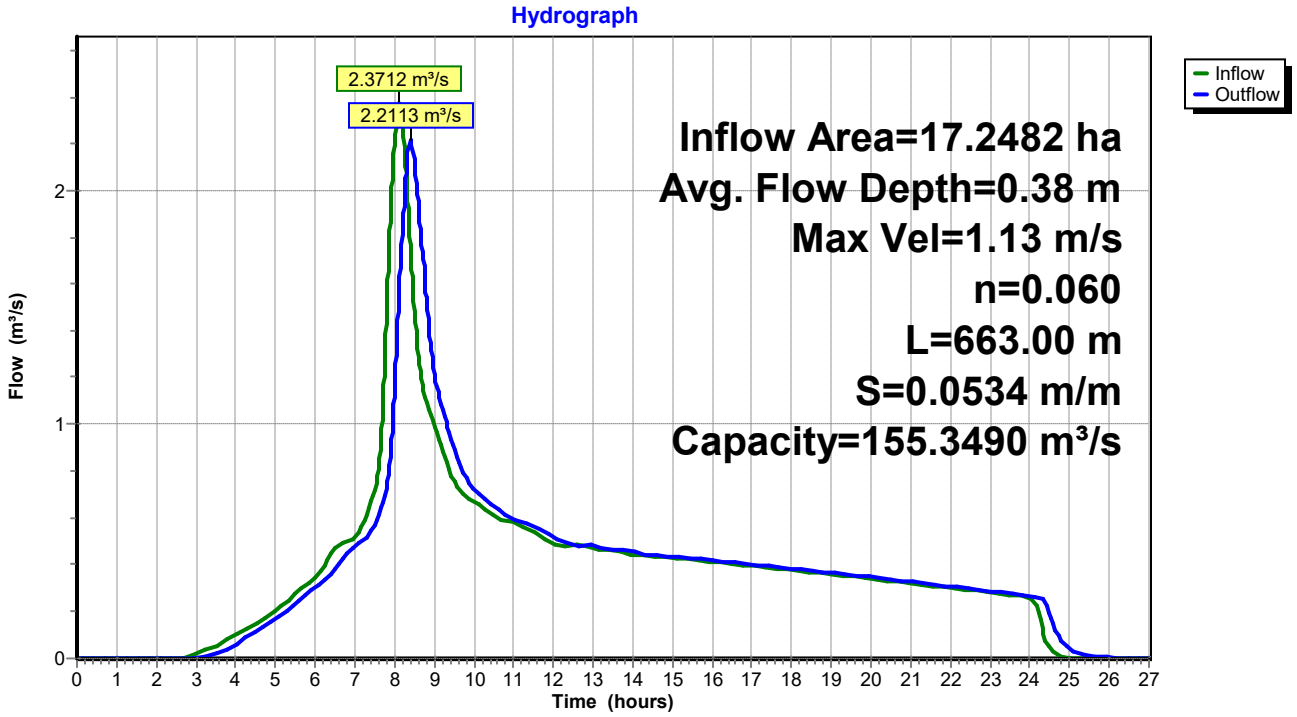
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.13 m/s, Min. Travel Time= 9.8 min
Avg. Velocity = 0.79 m/s, Avg. Travel Time= 14.0 min

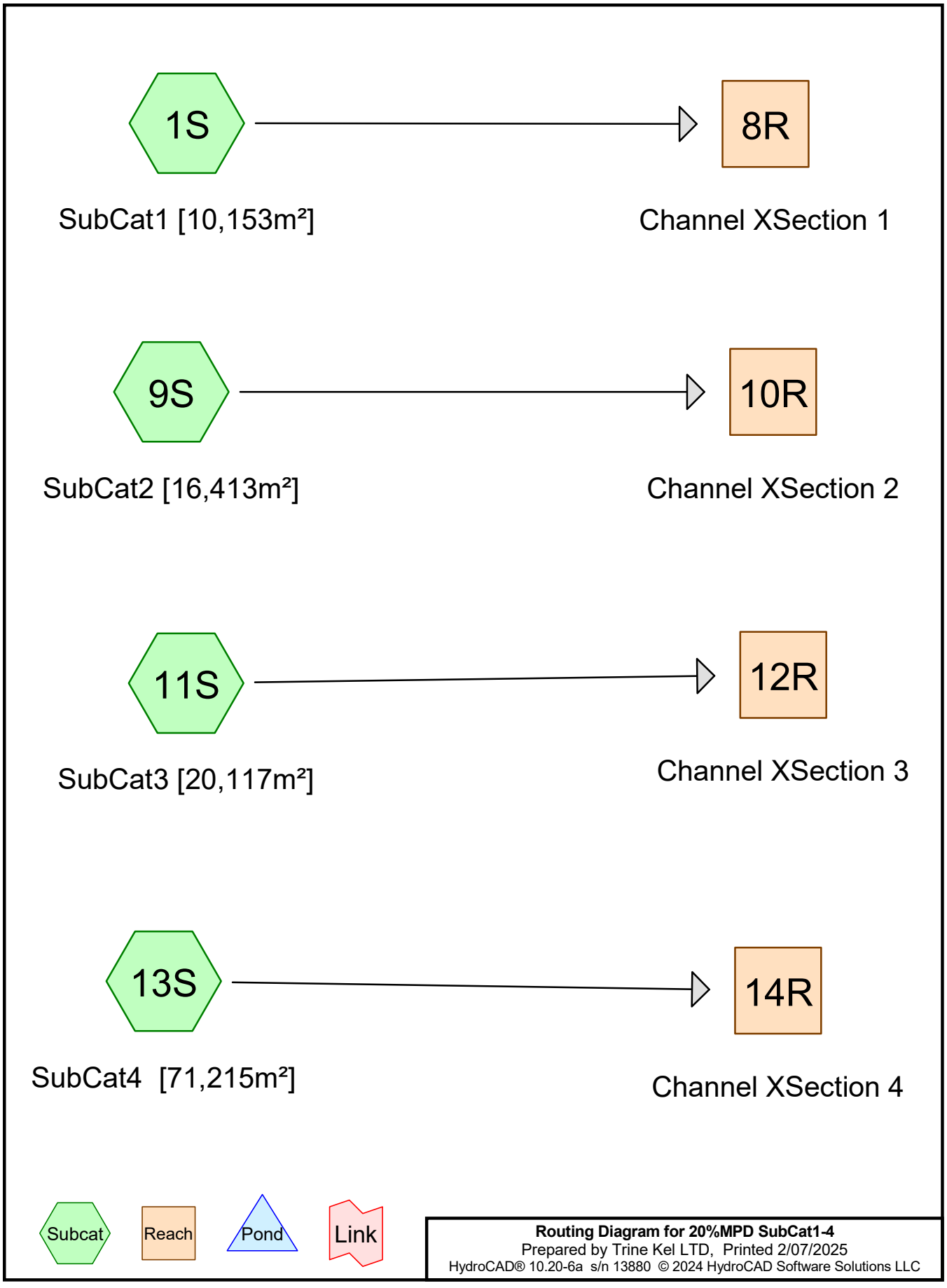
Peak Storage= 1,298.6 m³ @ 8.24 hrs
Average Depth at Peak Storage= 0.38 m , Surface Width= 12.27 m
Bank-Full Depth= 1.89 m Flow Area= 40.73 m², Capacity= 155.3490 m³/s

Custom cross-section, Length= 663.00 m Slope= 0.0534 m/m (129 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 15.520 m



Reach 20R: Channel XSection 7 (outlet to Waipapa River)





Routing Diagram for 20%MPD SubCat1-4
Prepared by Trine Kel LTD, Printed 2/07/2025

Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
11.7898	75	20% Total Catchment Cover Calculated Curve Number (1S, 9S, 11S, 13S)
11.7898	**75**	**TOTAL AREA**

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SubCat1 [10,153m²] Runoff Area=10,153.0 m² 0.00% Impervious Runoff Depth=221 mm
Flow Length=150.0 m Slope=0.0800 m/m Tc=4.1 min CN=75 Runoff=0.1615 m³/s 2,241.131 m³

Subcatchment 9S: SubCat2 [16,413m²] Runoff Area=16,413.0 m² 0.00% Impervious Runoff Depth=221 mm
Flow Length=230.0 m Slope=0.0900 m/m Tc=6.0 min CN=75 Runoff=0.2604 m³/s 3,622.938 m³

Subcatchment 11S: SubCat3 Runoff Area=20,117.0 m² 0.00% Impervious Runoff Depth=221 mm
Flow Length=291.0 m Slope=0.0790 m/m Tc=8.1 min CN=75 Runoff=0.3180 m³/s 4,440.543 m³

Subcatchment 13S: SubCat4 Runoff Area=71,215.0 m² 0.00% Impervious Runoff Depth=221 mm
Flow Length=319.0 m Slope=0.0700 m/m Tc=9.4 min CN=75 Runoff=1.1221 m³/s 15,719.704 m³

Reach 8R: Channel XSection Avg. Flow Depth=0.14 m Max Vel=0.93 m/s Inflow=0.1615 m³/s 2,241.131 m³
n=0.060 L=160.00 m S=0.0856 m/m Capacity=71.5580 m³/s Outflow=0.1610 m³/s 2,241.131 m³

Reach 10R: Channel Avg. Flow Depth=0.13 m Max Vel=1.01 m/s Inflow=0.2604 m³/s 3,622.938 m³
n=0.060 L=230.00 m S=0.0873 m/m Capacity=61.2091 m³/s Outflow=0.2592 m³/s 3,622.937 m³

Reach 12R: Channel Avg. Flow Depth=0.22 m Max Vel=1.18 m/s Inflow=0.3180 m³/s 4,440.543 m³
n=0.060 L=291.00 m S=0.0736 m/m Capacity=67.0923 m³/s Outflow=0.3159 m³/s 4,440.528 m³

Reach 14R: Channel Avg. Flow Depth=0.31 m Max Vel=1.50 m/s Inflow=1.1221 m³/s 15,719.704 m³
n=0.060 L=319.00 m S=0.0708 m/m Capacity=52.6908 m³/s Outflow=1.1163 m³/s 15,719.657 m³

Total Runoff Area = 11.7898 ha Runoff Volume = 26,024.315 m³ Average Runoff Depth = 221 mm
100.00% Pervious = 11.7898 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 1S: SubCat1 [10,153m²]

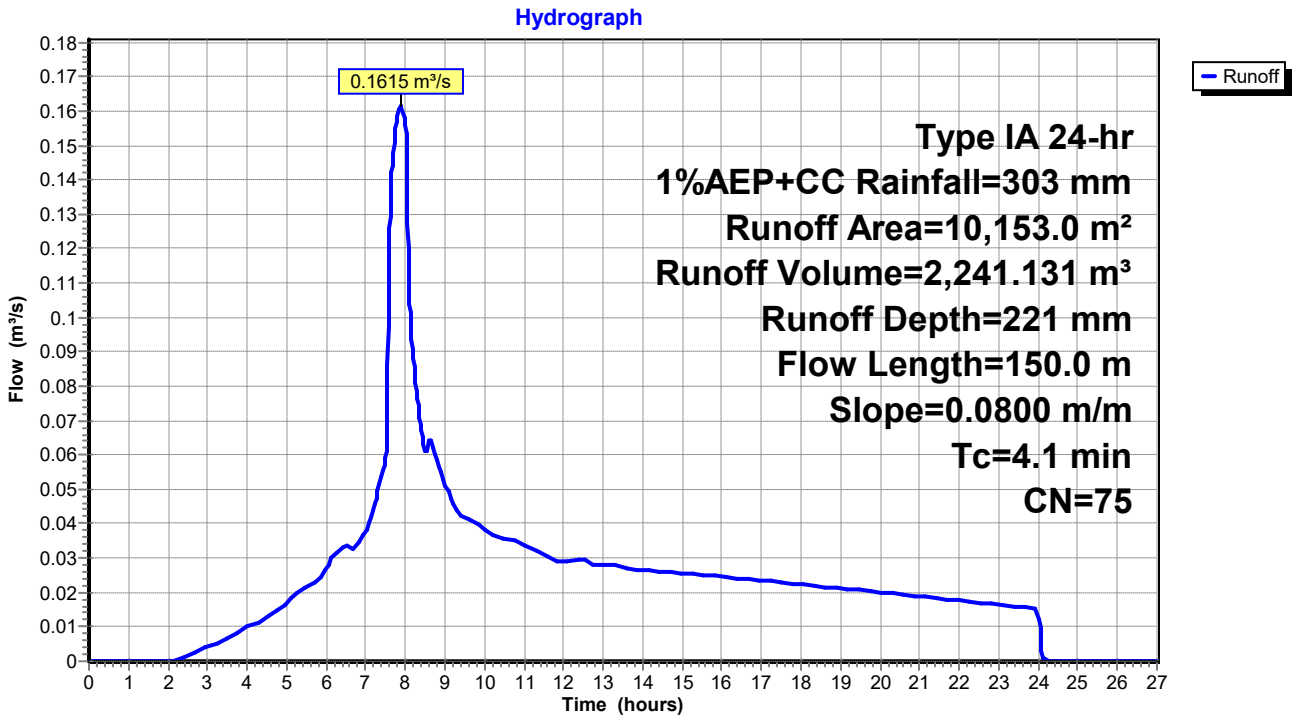
Runoff = 0.1615 m³/s @ 7.89 hrs, Volume= 2,241.131 m³, Depth= 221 mm
Routed to Reach 8R : Channel XSection 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	10,153.0	75	20% Total Catchment Cover Calculated Curve Number
	10,153.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
4.1	150.0	0.0800	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 1S: SubCat1 [10,153m²]



Summary for Subcatchment 9S: SubCat2 [16,413m²]

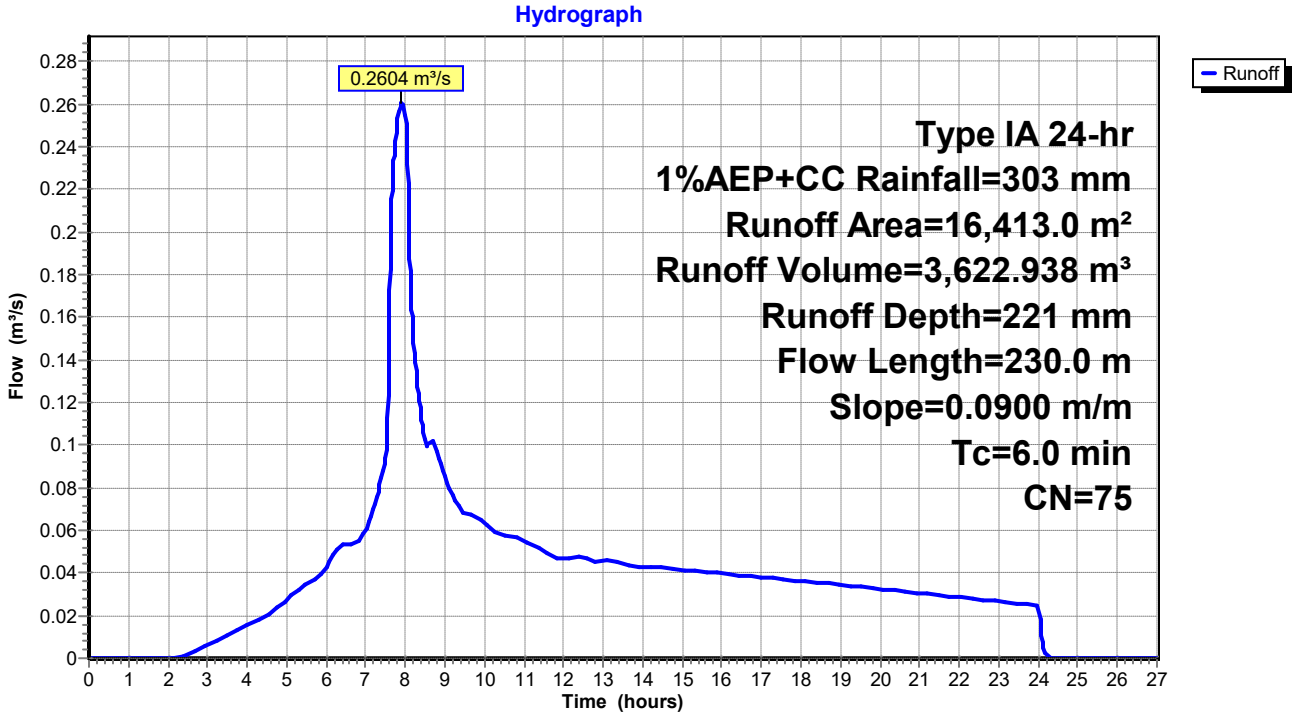
Runoff = 0.2604 m³/s @ 7.91 hrs, Volume= 3,622.938 m³, Depth= 221 mm
Routed to Reach 10R : Channel XSection 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	16,413.0	75	20% Total Catchment Cover Calculated Curve Number
	16,413.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
6.0	230.0	0.0900	0.64		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 9S: SubCat2 [16,413m²]



Summary for Subcatchment 11S: SubCat3 [20,117m²]

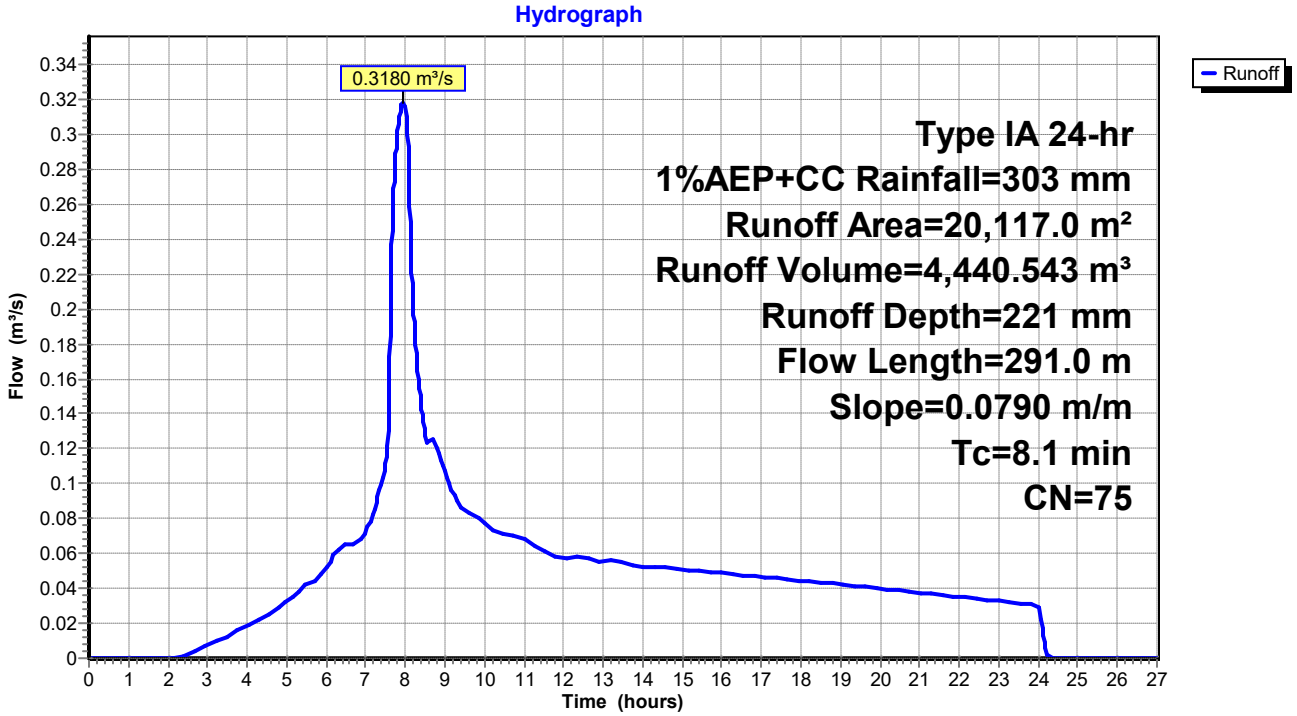
Runoff = 0.3180 m³/s @ 7.95 hrs, Volume= 4,440.543 m³, Depth= 221 mm
Routed to Reach 12R : Channel XSection 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	20,117.0	75	20% Total Catchment Cover Calculated Curve Number
	20,117.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
8.1	291.0	0.0790	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 11S: SubCat3 [20,117m²]



Summary for Subcatchment 13S: SubCat4 [71,215m²]

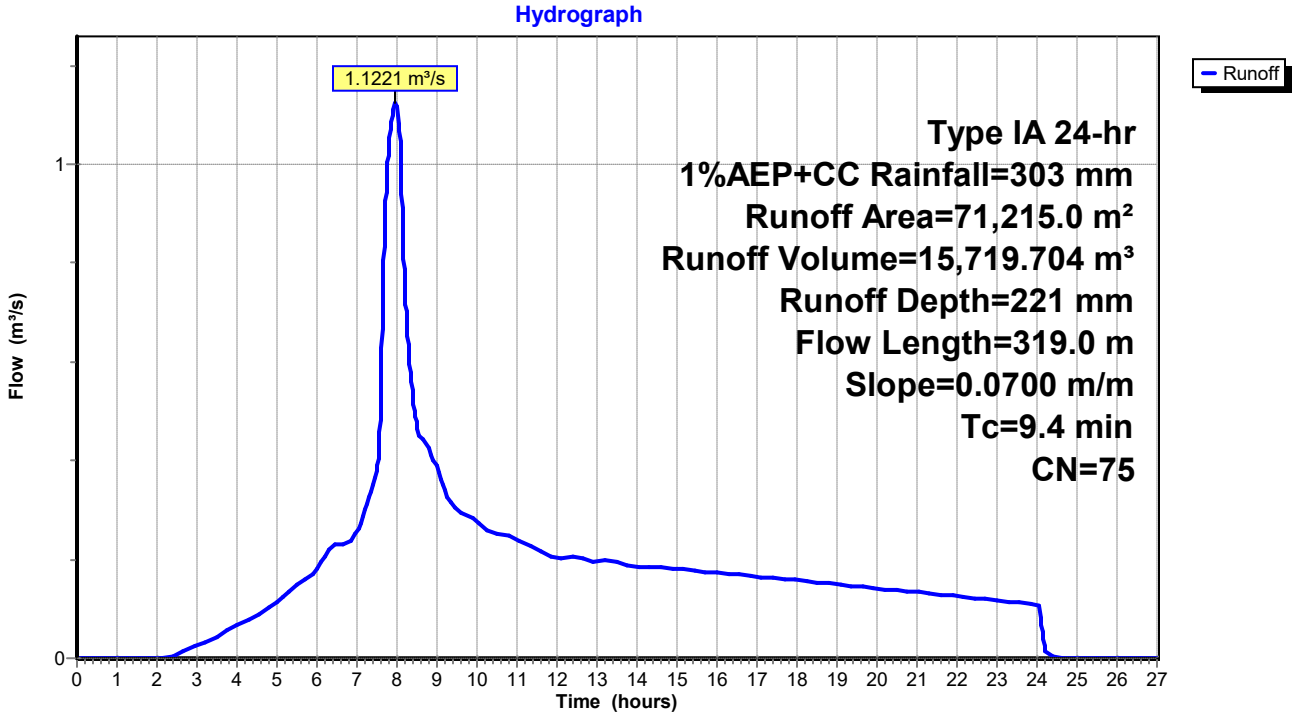
Runoff = 1.1221 m³/s @ 7.97 hrs, Volume= 15,719.704 m³, Depth= 221 mm
Routed to Reach 14R : Channel XSection 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	71,215.0	75	20% Total Catchment Cover Calculated Curve Number
	71,215.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
9.4	319.0	0.0700	0.56		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 13S: SubCat4 [71,215m²]



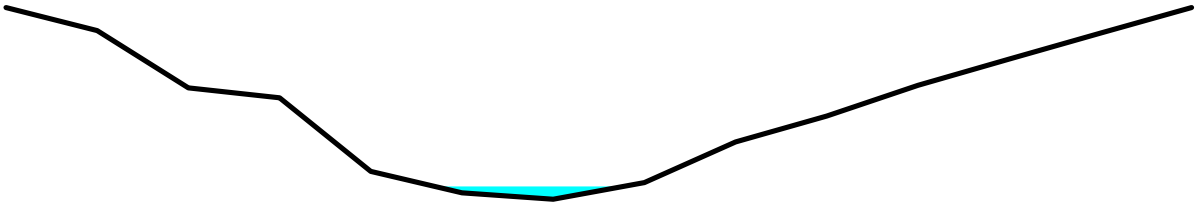
Summary for Reach 8R: Channel XSection 1

Inflow Area = 1.0153 ha, 0.00% Impervious, Inflow Depth = 221 mm for 1%AEP+CC event
Inflow = 0.1615 m³/s @ 7.89 hrs, Volume= 2,241.131 m³
Outflow = 0.1610 m³/s @ 7.97 hrs, Volume= 2,241.131 m³, Atten= 0%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.93 m/s, Min. Travel Time= 2.9 min
Avg. Velocity = 0.51 m/s, Avg. Travel Time= 5.2 min

Peak Storage= 27.8 m³ @ 7.92 hrs
Average Depth at Peak Storage= 0.14 m , Surface Width= 2.09 m
Bank-Full Depth= 2.10 m Flow Area= 14.34 m², Capacity= 71.5580 m³/s

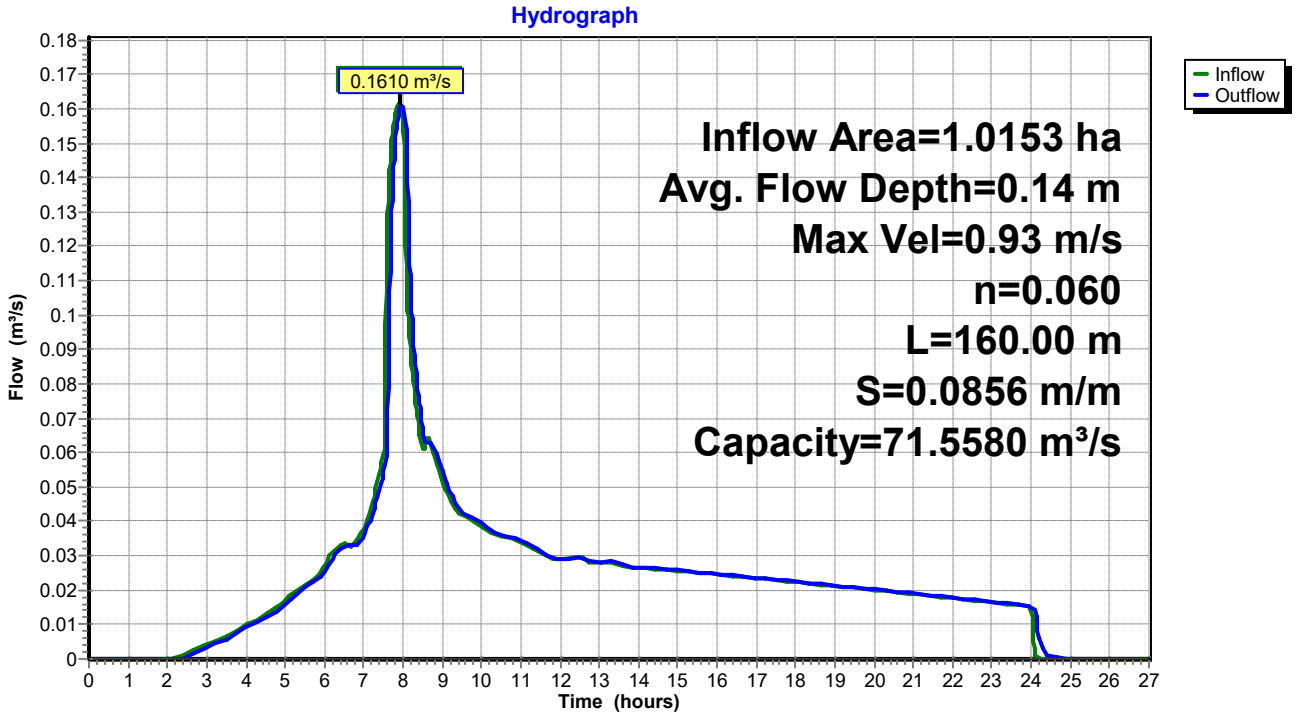
Custom cross-section, Length= 160.00 m Slope= 0.0856 m/m (111 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 37.200 m



Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	34.823	0.00
3.000	34.569	0.25
4.000	33.943	0.88
5.000	33.833	0.99
6.000	33.025	1.80
7.000	32.791	2.03
8.000	32.721	2.10
9.000	32.903	1.92
10.000	33.348	1.48
11.000	33.635	1.19
12.000	33.969	0.85
13.000	34.257	0.57
14.000	34.541	0.28
15.000	34.823	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m^3/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.07	0.05	1.39	1.38	7.8	0.0252
0.18	0.26	2.51	2.48	42.4	0.2883
0.30	0.62	3.35	3.27	98.5	0.9715
0.63	1.86	4.65	4.40	296.8	4.8997
0.91	3.31	6.15	5.75	530.0	10.6916
1.11	4.53	7.09	6.59	725.6	16.4149
1.22	5.33	8.44	7.92	853.3	19.1446
1.25	5.54	8.58	8.04	886.5	20.1939
1.54	8.07	10.16	9.50	1,290.7	33.7345
1.82	10.97	11.73	10.96	1,755.5	51.1647
1.85	11.28	11.89	11.10	1,804.9	53.1174
2.10	14.34	13.86	13.00	2,294.6	71.5580

Reach 8R: Channel XSection 1



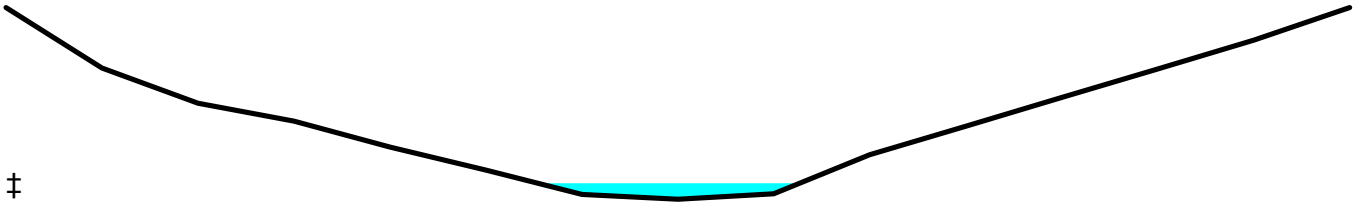
Summary for Reach 10R: Channel XSection 2

Inflow Area = 1.6413 ha, 0.00% Impervious, Inflow Depth = 221 mm for 1%AEP+CC event
Inflow = 0.2604 m³/s @ 7.91 hrs, Volume= 3,622.938 m³
Outflow = 0.2592 m³/s @ 8.02 hrs, Volume= 3,622.937 m³, Atten= 0%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.01 m/s, Min. Travel Time= 3.8 min
Avg. Velocity = 0.51 m/s, Avg. Travel Time= 7.5 min

Peak Storage= 58.9 m³ @ 7.96 hrs
Average Depth at Peak Storage= 0.13 m , Surface Width= 2.73 m
Bank-Full Depth= 1.59 m Flow Area= 13.20 m², Capacity= 61.2091 m³/s

Custom cross-section, Length= 230.00 m Slope= 0.0873 m/m (108 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 30.820 m

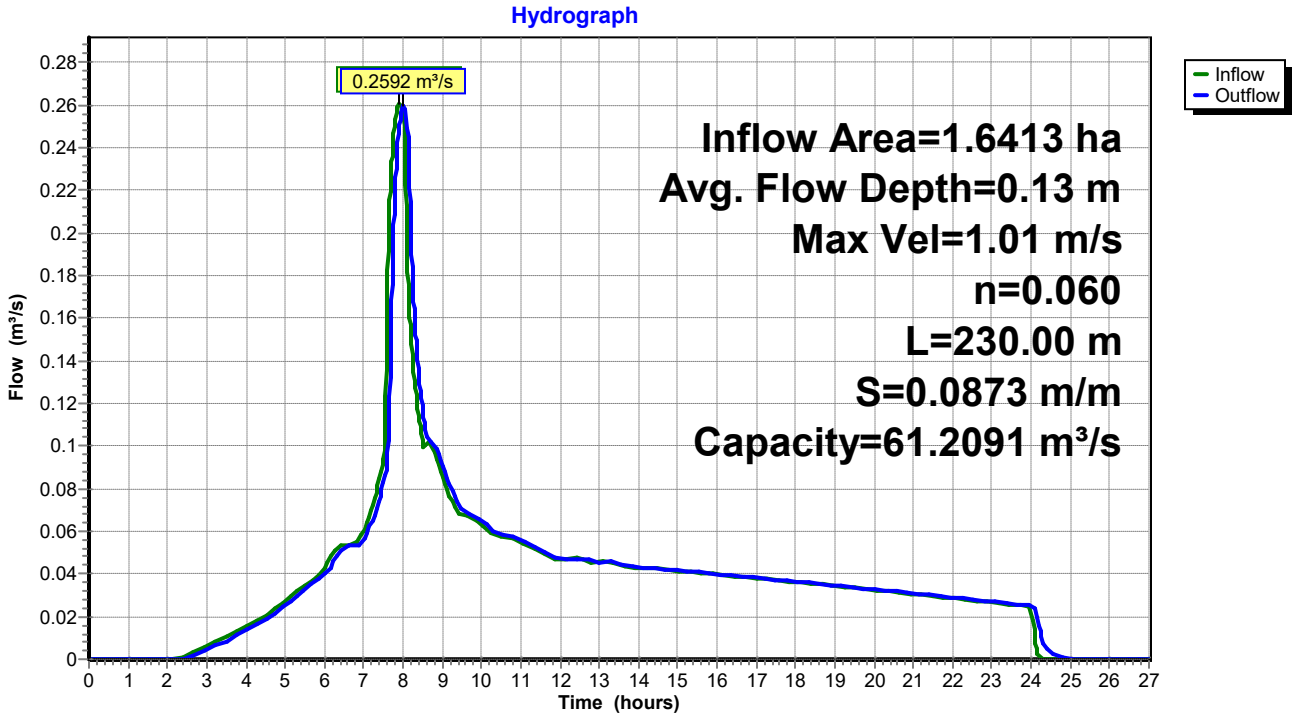


‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	32.376	0.00
3.000	31.872	0.50
4.000	31.580	0.80
5.000	31.430	0.95
6.000	31.216	1.16
7.000	31.024	1.35
8.000	30.822	1.55
9.000	30.782	1.59
10.000	30.826	1.55
11.000	31.152	1.22
12.000	31.390	0.99
13.000	31.628	0.75
14.000	31.866	0.51
15.000	32.104	0.27
16.000	32.376	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.04	1.91	1.91	8.8	0.0138
0.04	0.05	2.02	2.02	10.6	0.0182
0.24	0.60	3.66	3.61	138.7	0.8926
0.37	1.13	4.75	4.67	260.5	2.1441
0.43	1.45	5.37	5.27	333.6	2.9857
0.61	2.50	6.95	6.81	575.4	6.2333
0.65	2.78	7.32	7.17	639.7	7.1885
0.80	3.98	8.97	8.80	915.1	11.3956
0.85	4.41	9.35	9.16	1,014.3	13.1565
1.08	6.81	11.23	10.98	1,565.6	24.0093
1.09	6.87	11.28	11.03	1,580.8	24.3303
1.32	9.60	12.79	12.46	2,207.4	39.0196
1.59	13.20	14.44	14.00	3,035.1	61.2091

Reach 10R: Channel XSection 2



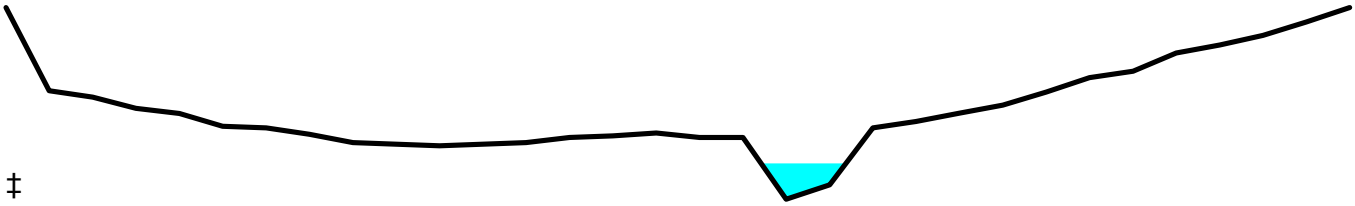
Summary for Reach 12R: Channel XSection 3

Inflow Area = 2.0117 ha, 0.00% Impervious, Inflow Depth = 221 mm for 1%AEP+CC event
Inflow = 0.3180 m³/s @ 7.95 hrs, Volume= 4,440.543 m³
Outflow = 0.3159 m³/s @ 8.07 hrs, Volume= 4,440.528 m³, Atten= 1%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.18 m/s, Min. Travel Time= 4.1 min
Avg. Velocity = 0.61 m/s, Avg. Travel Time= 7.9 min

Peak Storage= 78.2 m³ @ 8.00 hrs
Average Depth at Peak Storage= 0.22 m , Surface Width= 1.96 m
Bank-Full Depth= 1.19 m Flow Area= 20.00 m², Capacity= 67.0923 m³/s

Custom cross-section, Length= 291.00 m Slope= 0.0736 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 29.490 m



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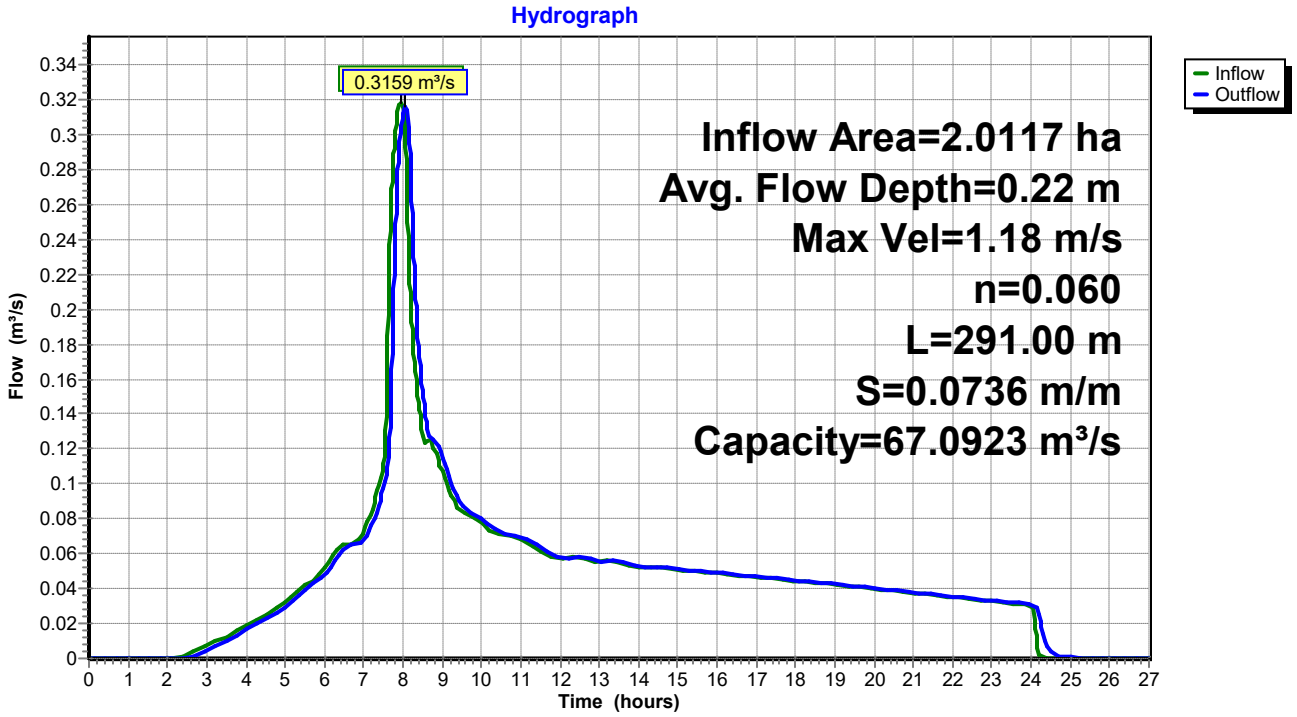
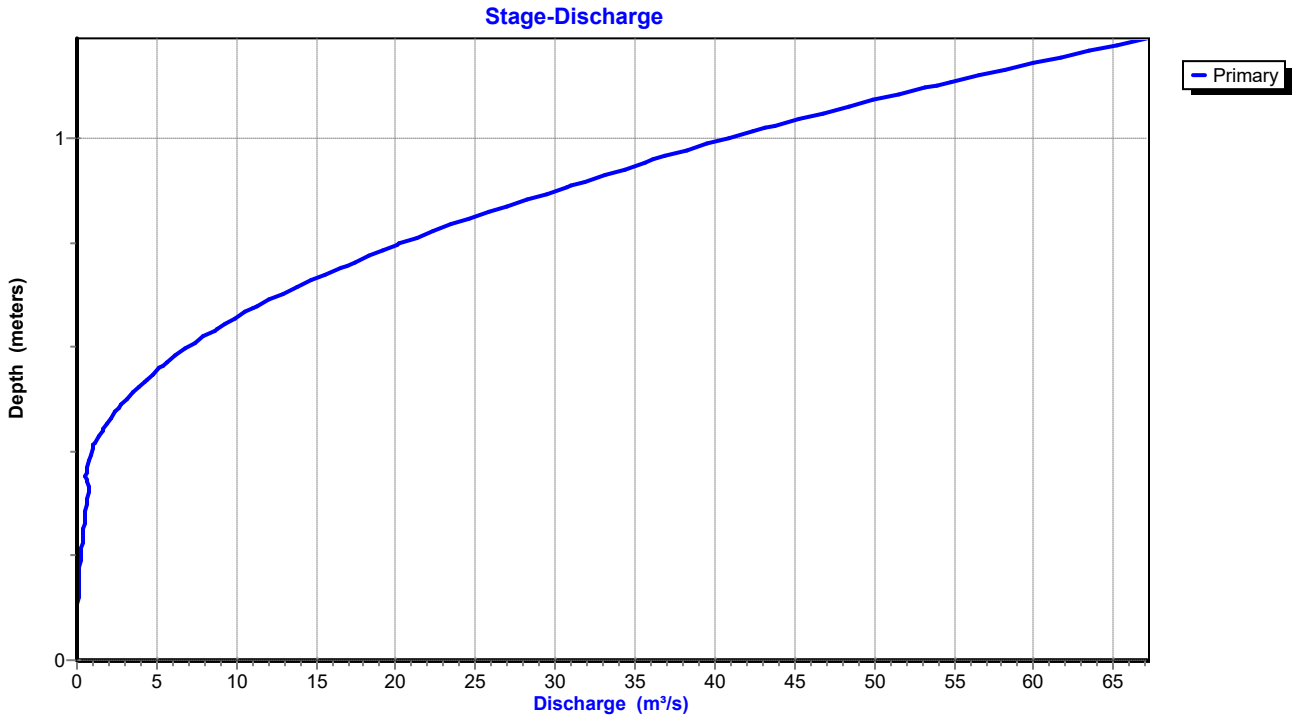
Reach 12R: Channel XSection 3



Reach 12R: Channel XSection 3



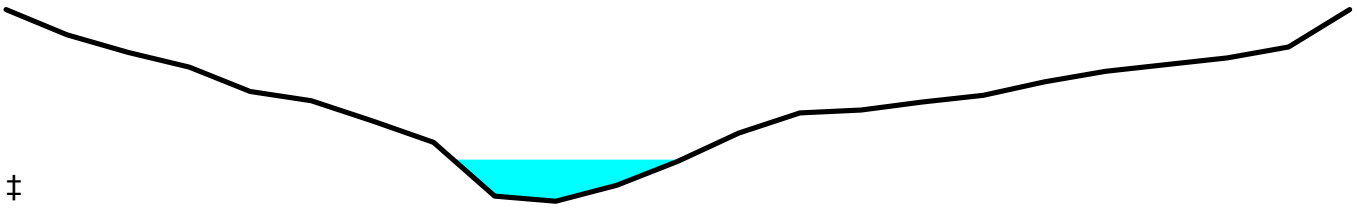
Summary for Reach 14R: Channel XSection 4

Inflow Area = 7.1215 ha, 0.00% Impervious, Inflow Depth = 221 mm for 1%AEP+CC event
Inflow = 1.1221 m³/s @ 7.97 hrs, Volume= 15,719.704 m³
Outflow = 1.1163 m³/s @ 8.07 hrs, Volume= 15,719.657 m³, Atten= 1%, Lag= 6.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.50 m/s, Min. Travel Time= 3.6 min
Avg. Velocity = 0.78 m/s, Avg. Travel Time= 6.8 min

Peak Storage= 238.2 m³ @ 8.01 hrs
Average Depth at Peak Storage= 0.31 m , Surface Width= 3.74 m
Bank-Full Depth= 1.44 m Flow Area= 15.27 m², Capacity= 52.6908 m³/s

Custom cross-section, Length= 319.00 m Slope= 0.0708 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 28.300 m

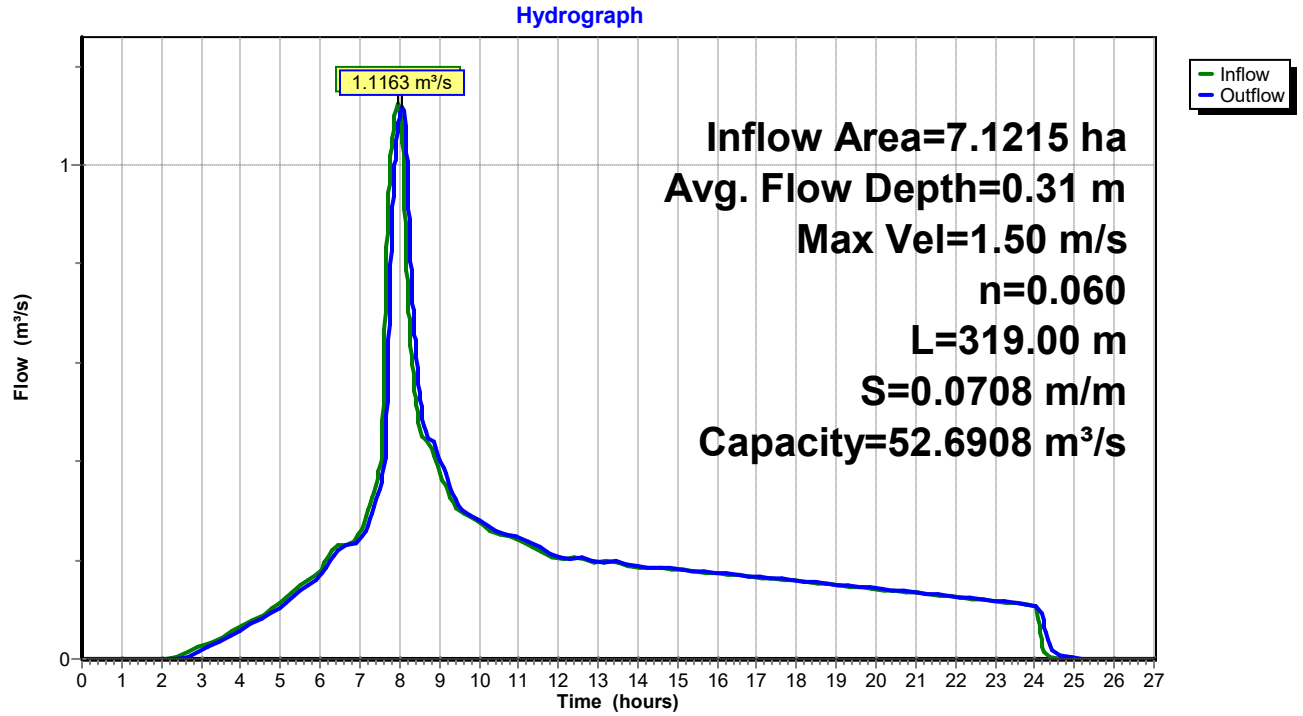


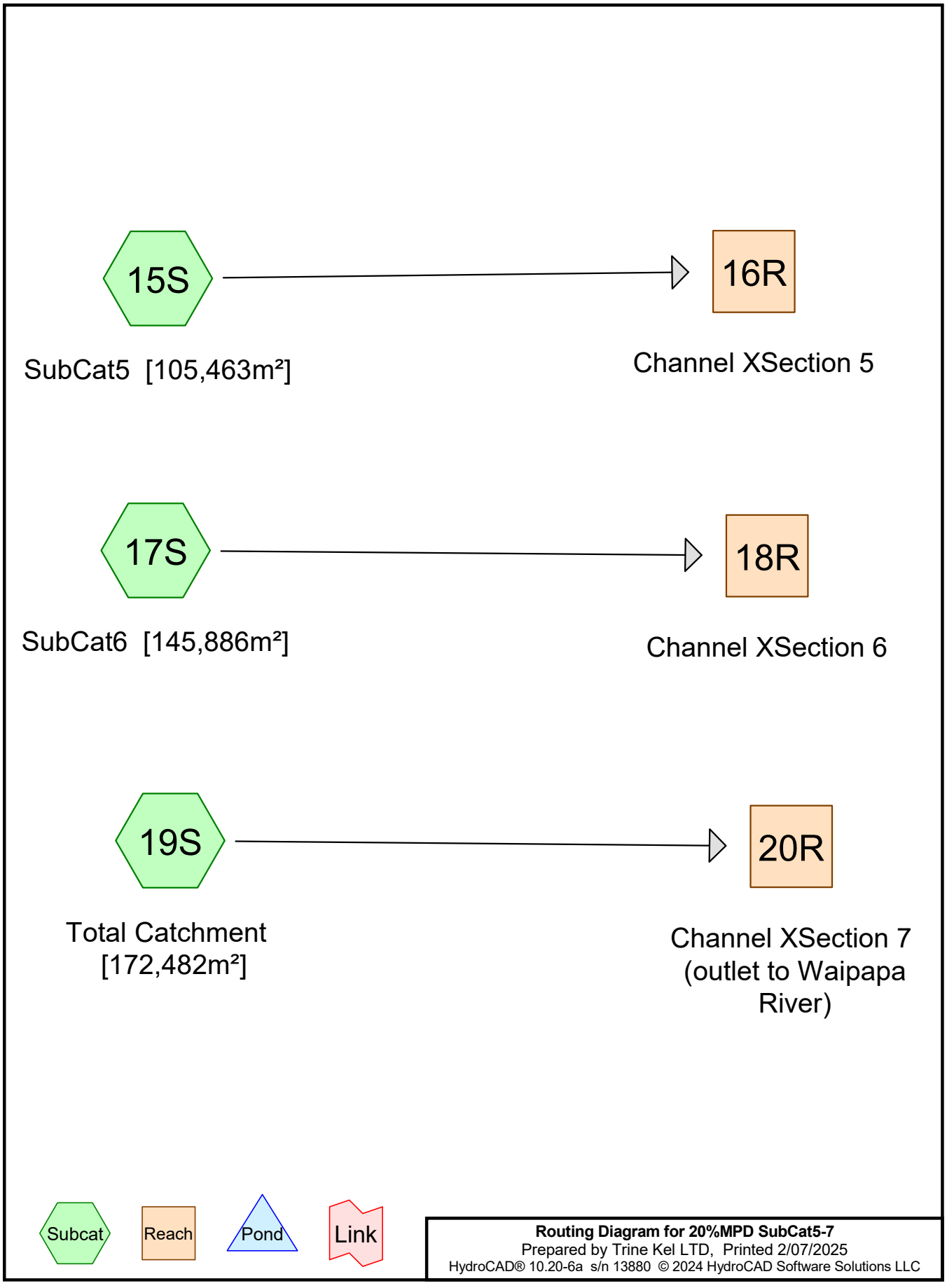
‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
8.000	29.287	0.00
9.000	29.097	0.19
10.000	28.965	0.32
11.000	28.853	0.43
12.000	28.671	0.62
13.000	28.601	0.69
14.000	28.449	0.84
15.000	28.288	1.00
16.000	27.882	1.40
17.000	27.844	1.44
18.000	27.964	1.32
19.000	28.146	1.14
20.000	28.358	0.93
21.000	28.510	0.78
22.000	28.530	0.76
23.000	28.590	0.70
24.000	28.642	0.64
25.000	28.742	0.54
26.000	28.822	0.46
27.000	28.872	0.41
28.000	28.924	0.36
29.000	29.004	0.28
30.000	29.287	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.03	1.32	1.32	8.0	0.0079
0.12	0.17	2.23	2.20	54.0	0.1348
0.30	0.70	3.73	3.65	223.9	1.0234
0.44	1.29	4.79	4.67	412.3	2.3950
0.51	1.65	5.57	5.43	525.1	3.2418
0.61	2.19	6.74	6.60	699.8	4.6030
0.67	2.62	7.56	7.40	836.0	5.7392
0.69	2.78	8.69	8.53	886.8	5.7691
0.75	3.33	10.09	9.93	1,063.5	7.0684
0.76	3.44	10.38	10.21	1,098.8	7.3268
0.80	3.89	11.75	11.59	1,241.4	8.2628
0.83	4.24	12.46	12.29	1,351.8	9.1602
0.90	5.15	13.57	13.39	1,642.6	11.9737
0.98	6.28	15.02	14.83	2,002.7	15.5704
1.01	6.75	15.81	15.62	2,153.3	16.9750
1.03	7.05	16.36	16.17	2,249.6	17.8490
1.08	7.93	17.83	17.63	2,530.0	20.4996
1.12	8.67	18.72	18.51	2,766.4	23.0363
1.16	9.41	19.50	19.30	3,001.6	25.6771
1.25	11.25	20.55	20.33	3,589.3	33.4021
1.44	15.27	22.27	22.00	4,872.1	52.6908

Reach 14R: Channel XSection 4




15S
16R
SubCat5 [105,463m²]
Channel XSection 5
17S
18R
SubCat6 [145,886m²]
Channel XSection 6
19S
20R
Total Catchment
[172,482m²]
Channel XSection 7
(outlet to Waipapa
River)
Subcat
Reach
Pond
Link
Routing Diagram for 20%MPD SubCat5-7
Prepared by Trine Kel LTD, Printed 2/07/2025
HydroCAD® 10.20-6a s/n 13880 © 2024 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
42.3831	75	20% Total Catchment Cover Calculated Curve Number (15S, 17S, 19S)
42.3831	**75**	**TOTAL AREA**

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15S: SubCat5 Runoff Area=105,463.0 m² 0.00% Impervious Runoff Depth=221 mm
Flow Length=374.0 m Slope=0.0630 m/m Tc=11.7 min CN=75 Runoff=1.6485 m³/s 23,279.465 m³

Subcatchment 17S: SubCat6 Runoff Area=145,886.0 m² 0.00% Impervious Runoff Depth=221 mm
Flow Length=495.0 m Slope=0.0510 m/m Tc=17.2 min CN=75 Runoff=2.2116 m³/s 32,202.270 m³

Subcatchment 19S: Total Catchment Runoff Area=172,482.0 m² 0.00% Impervious Runoff Depth=221 mm
Flow Length=663.0 m Slope=0.0530 m/m Tc=22.5 min CN=75 Runoff=2.5153 m³/s 38,072.961 m³

Reach 16R: Channel Avg. Flow Depth=0.32 m Max Vel=1.38 m/s Inflow=1.6485 m³/s 23,279.465 m³
n=0.060 L=374.00 m S=0.0630 m/m Capacity=31.5808 m³/s Outflow=1.6326 m³/s 23,279.272 m³

Reach 18R: Channel Avg. Flow Depth=0.28 m Max Vel=0.79 m/s Inflow=2.2116 m³/s 32,202.270 m³
n=0.060 L=495.00 m S=0.0515 m/m Capacity=114.8947 m³/s Outflow=2.0866 m³/s 32,199.757 m³

Reach 20R: Channel Avg. Flow Depth=0.39 m Max Vel=1.15 m/s Inflow=2.5153 m³/s 38,072.961 m³
n=0.060 L=663.00 m S=0.0534 m/m Capacity=155.3490 m³/s Outflow=2.3556 m³/s 38,068.963 m³

Total Runoff Area = 42.3831 ha Runoff Volume = 93,554.696 m³ Average Runoff Depth = 221 mm
100.00% Pervious = 42.3831 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 15S: SubCat5 [105,463m²]

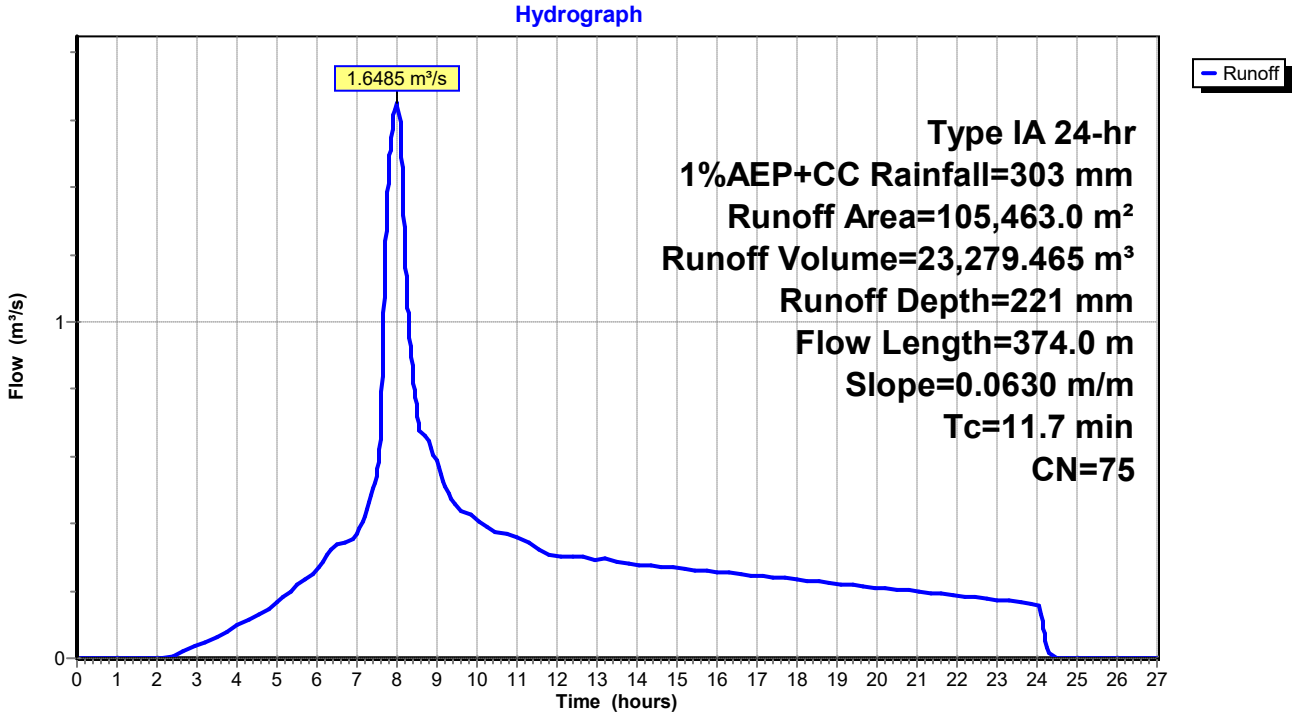
Runoff = 1.6485 m³/s @ 8.00 hrs, Volume= 23,279.465 m³, Depth= 221 mm
Routed to Reach 16R : Channel XSection 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	105,463.0	75	20% Total Catchment Cover Calculated Curve Number
	105,463.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
11.7	374.0	0.0630	0.53		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 15S: SubCat5 [105,463m²]



Summary for Subcatchment 17S: SubCat6 [145,886m²]

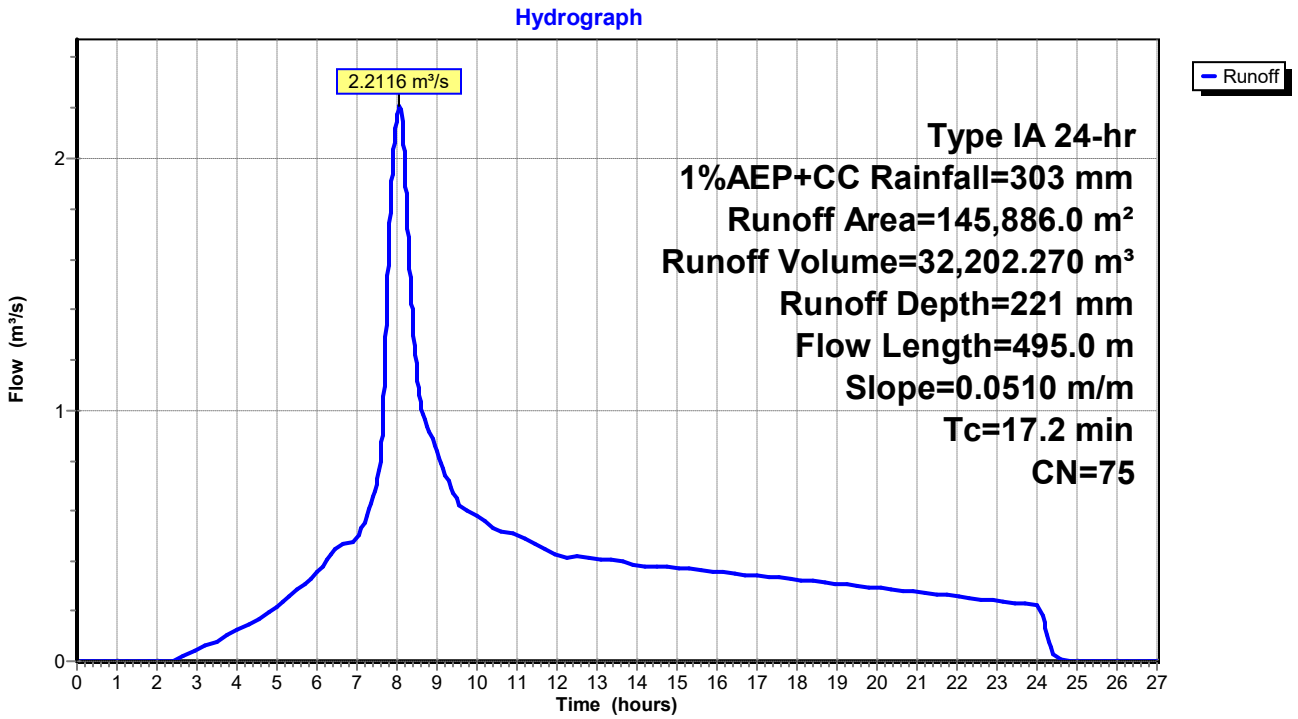
Runoff = 2.2116 m³/s @ 8.07 hrs, Volume= 32,202.270 m³, Depth= 221 mm
Routed to Reach 18R : Channel XSection 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	145,886.0	75	20% Total Catchment Cover Calculated Curve Number
	145,886.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
17.2	495.0	0.0510	0.48		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 17S: SubCat6 [145,886m²]



Summary for Subcatchment 19S: Total Catchment [172,482m²]

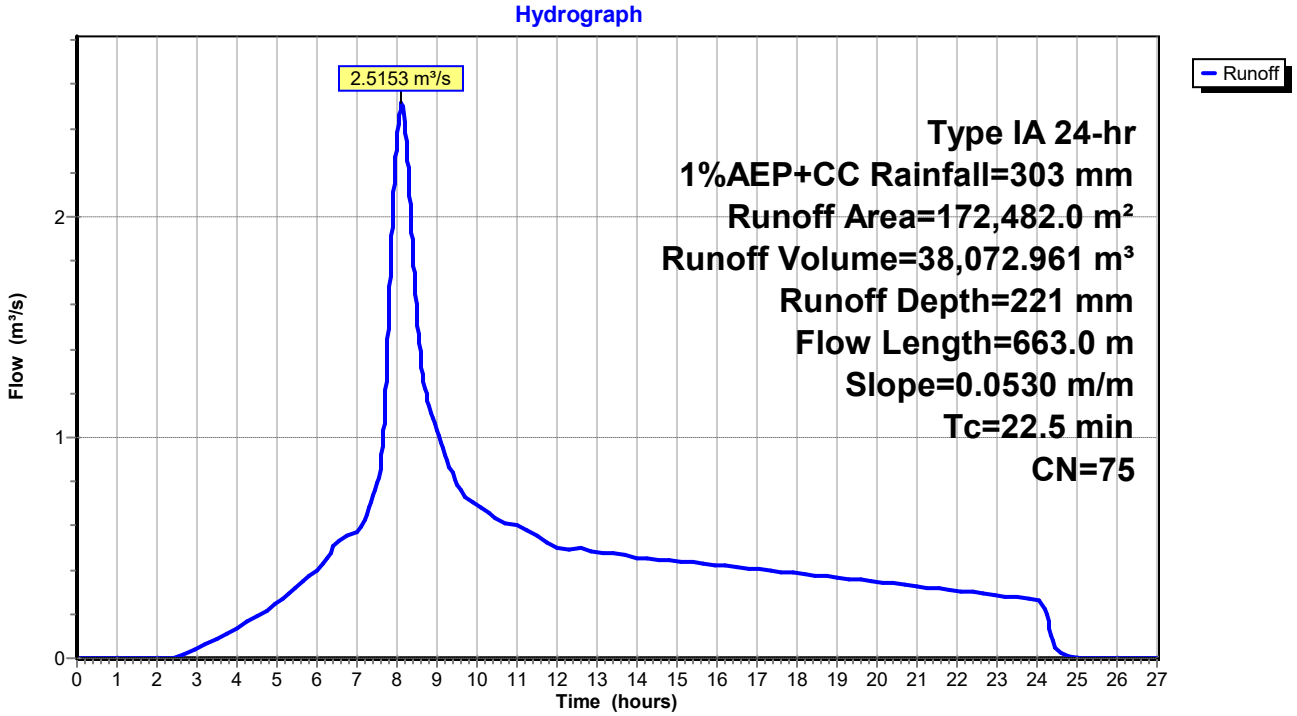
Runoff = 2.5153 m³/s @ 8.12 hrs, Volume= 38,072.961 m³, Depth= 221 mm
Routed to Reach 20R : Channel XSection 7 (outlet to Waipapa River)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	172,482.0	75	20% Total Catchment Cover Calculated Curve Number
	172,482.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
22.5	663.0	0.0530	0.49		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 19S: Total Catchment [172,482m²]



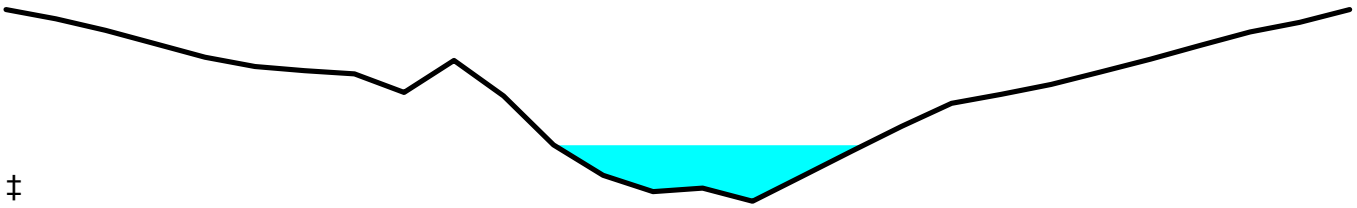
Summary for Reach 16R: Channel XSection 5

Inflow Area = 10.5463 ha, 0.00% Impervious, Inflow Depth = 221 mm for 1%AEP+CC event
Inflow = 1.6485 m³/s @ 8.00 hrs, Volume= 23,279.465 m³
Outflow = 1.6326 m³/s @ 8.13 hrs, Volume= 23,279.272 m³, Atten= 1%, Lag= 7.5 min

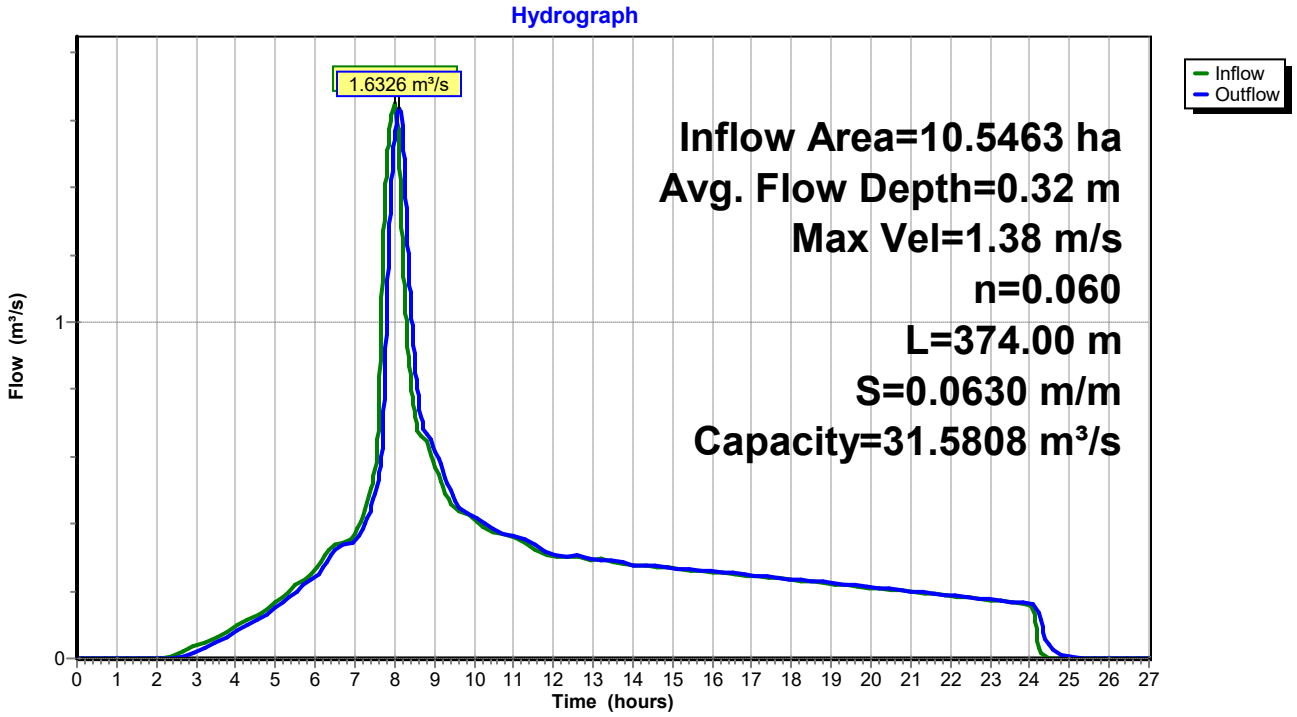
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.38 m/s, Min. Travel Time= 4.5 min
Avg. Velocity = 0.71 m/s, Avg. Travel Time= 8.8 min

Peak Storage= 443.1 m³ @ 8.05 hrs
Average Depth at Peak Storage= 0.32 m , Surface Width= 6.22 m
Bank-Full Depth= 1.08 m Flow Area= 12.60 m², Capacity= 31.5808 m³/s

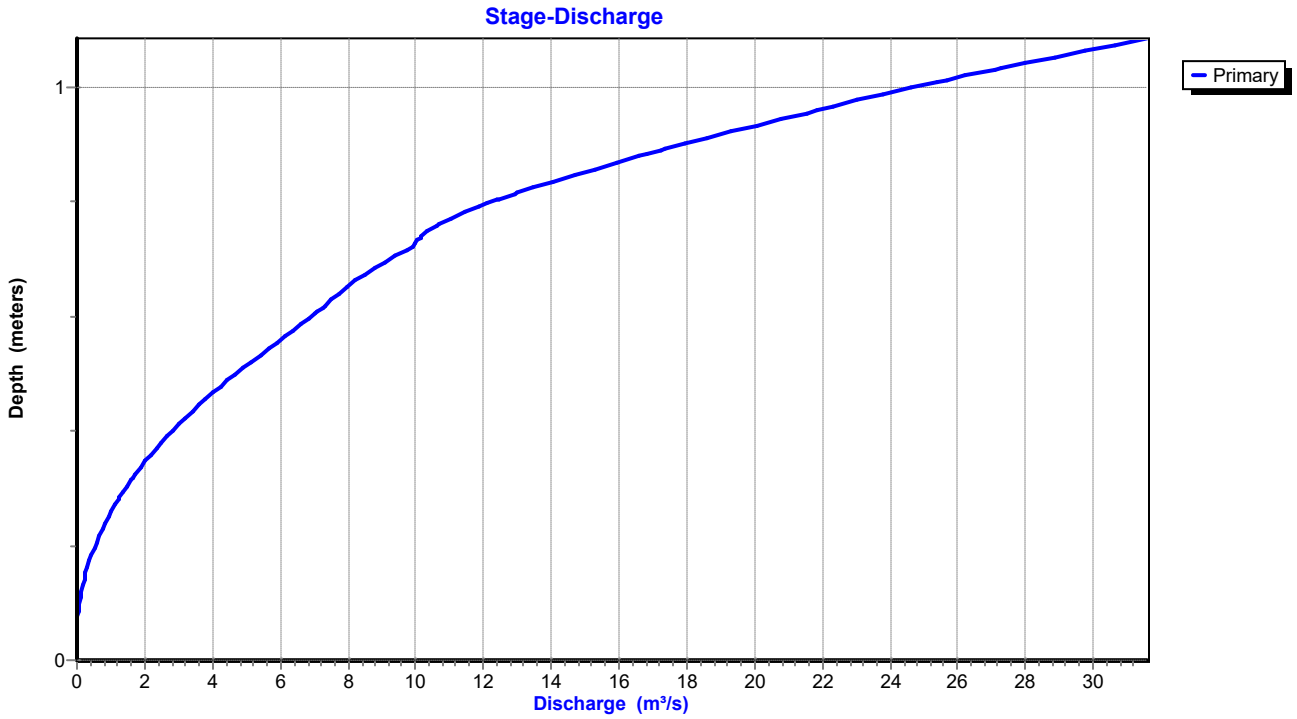
Custom cross-section, Length= 374.00 m Slope= 0.0630 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 27.338 m



Reach 16R: Channel XSection 5



Reach 16R: Channel XSection 5



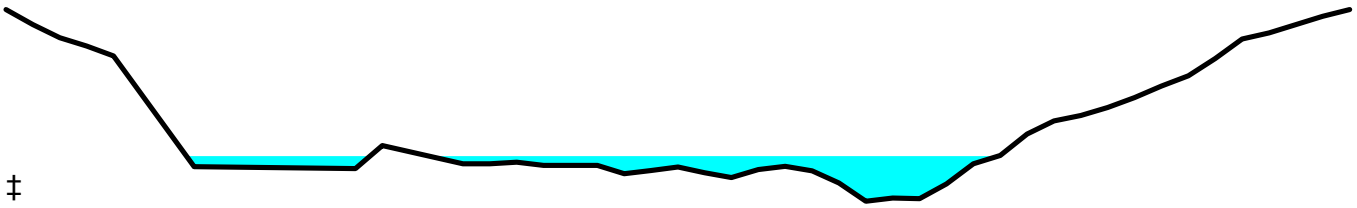
Summary for Reach 18R: Channel XSection 6

Inflow Area = 14.5886 ha, 0.00% Impervious, Inflow Depth = 221 mm for 1%AEP+CC event
Inflow = 2.2116 m³/s @ 8.07 hrs, Volume= 32,202.270 m³
Outflow = 2.0866 m³/s @ 8.34 hrs, Volume= 32,199.757 m³, Atten= 6%, Lag= 16.0 min

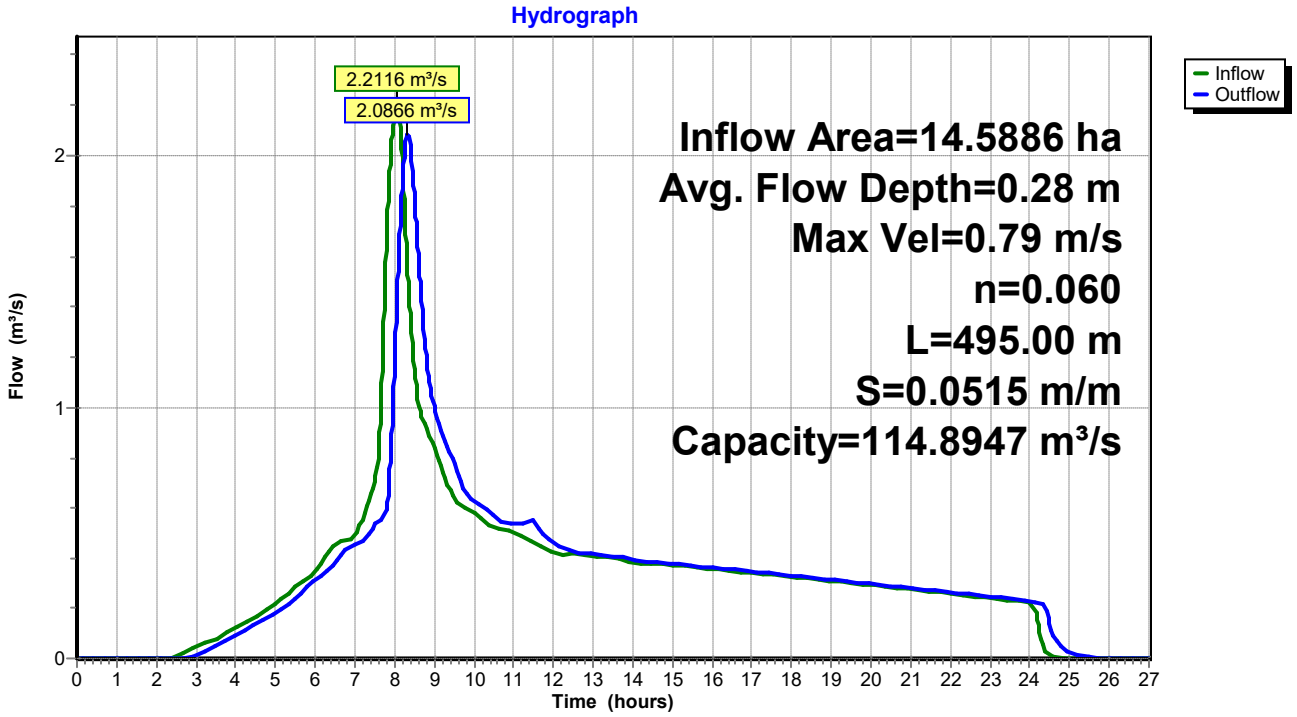
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.79 m/s, Min. Travel Time= 10.5 min
Avg. Velocity = 0.63 m/s, Avg. Travel Time= 13.1 min

Peak Storage= 1,314.4 m³ @ 8.16 hrs
Average Depth at Peak Storage= 0.28 m , Surface Width= 28.02 m
Bank-Full Depth= 1.17 m Flow Area= 37.13 m², Capacity= 114.8947 m³/s

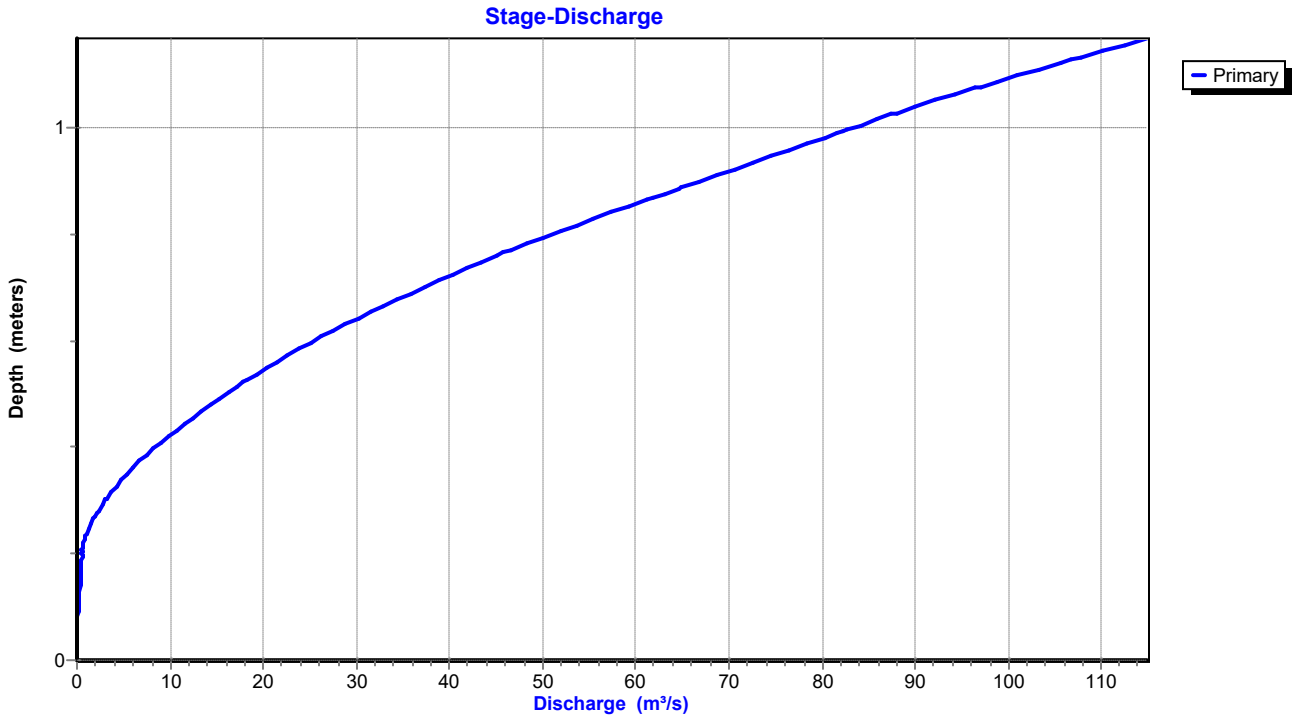
Custom cross-section, Length= 495.00 m Slope= 0.0515 m/m (126 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 25.420 m



Reach 18R: Channel XSection 6



Reach 18R: Channel XSection 6



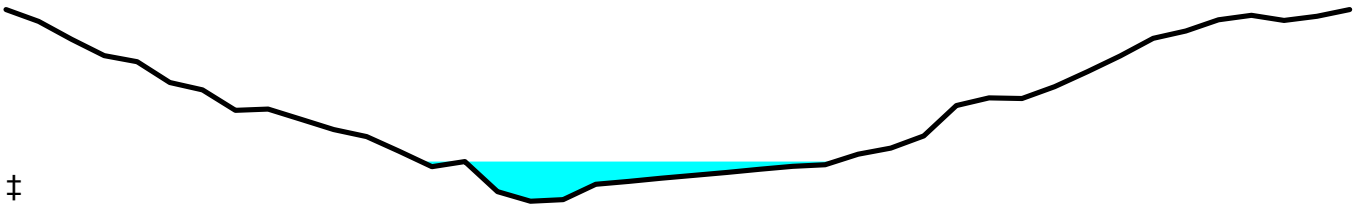
Summary for Reach 20R: Channel XSection 7 (outlet to Waipapa River)

Inflow Area = 17.2482 ha, 0.00% Impervious, Inflow Depth = 221 mm for 1%AEP+CC event
Inflow = 2.5153 m³/s @ 8.12 hrs, Volume= 38,072.961 m³
Outflow = 2.3556 m³/s @ 8.40 hrs, Volume= 38,068.963 m³, Atten= 6%, Lag= 16.2 min

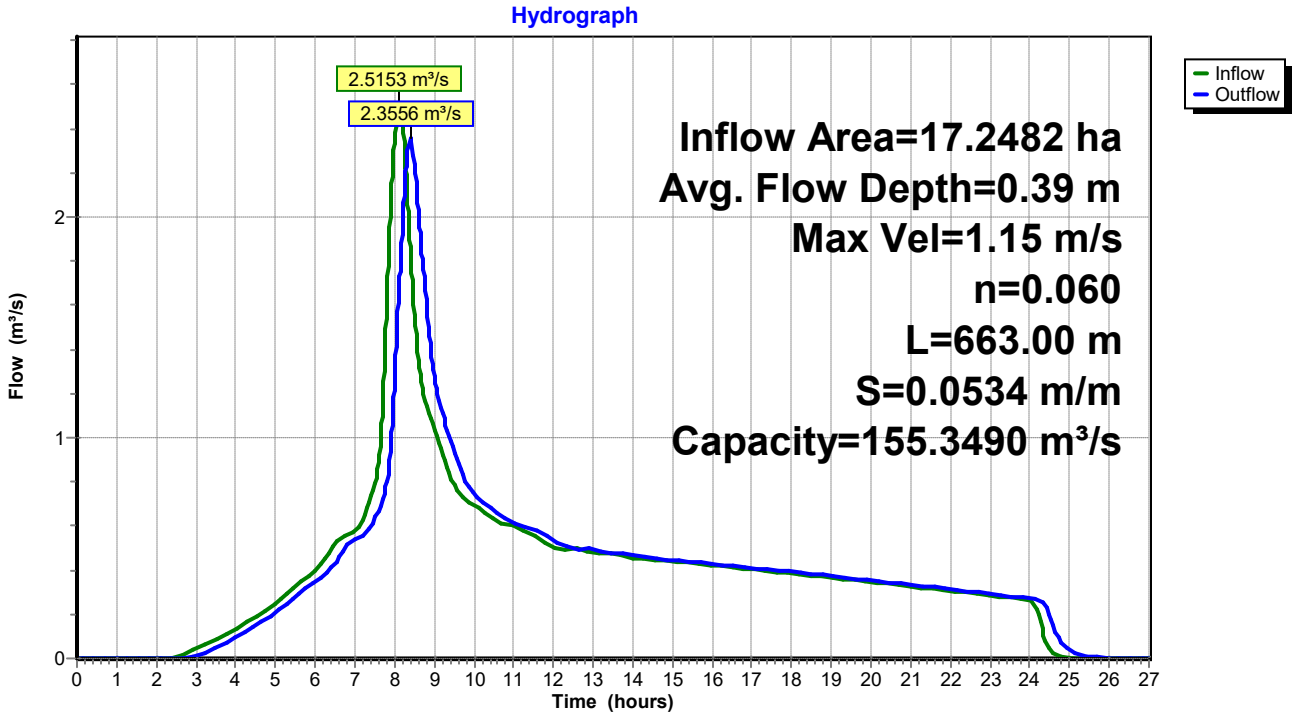
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.15 m/s, Min. Travel Time= 9.6 min
Avg. Velocity = 0.79 m/s, Avg. Travel Time= 13.9 min

Peak Storage= 1,362.2 m³ @ 8.23 hrs
Average Depth at Peak Storage= 0.39 m , Surface Width= 12.58 m
Bank-Full Depth= 1.89 m Flow Area= 40.73 m², Capacity= 155.3490 m³/s

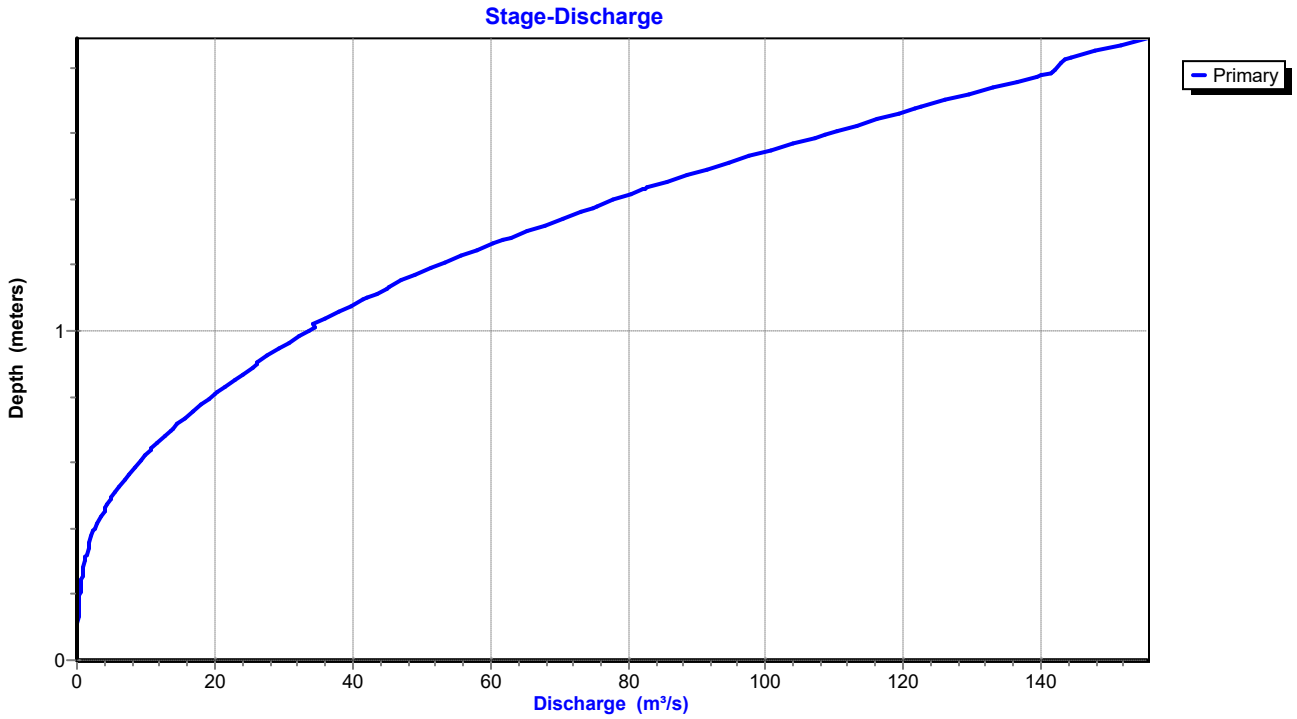
Custom cross-section, Length= 663.00 m Slope= 0.0534 m/m (129 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 15.520 m

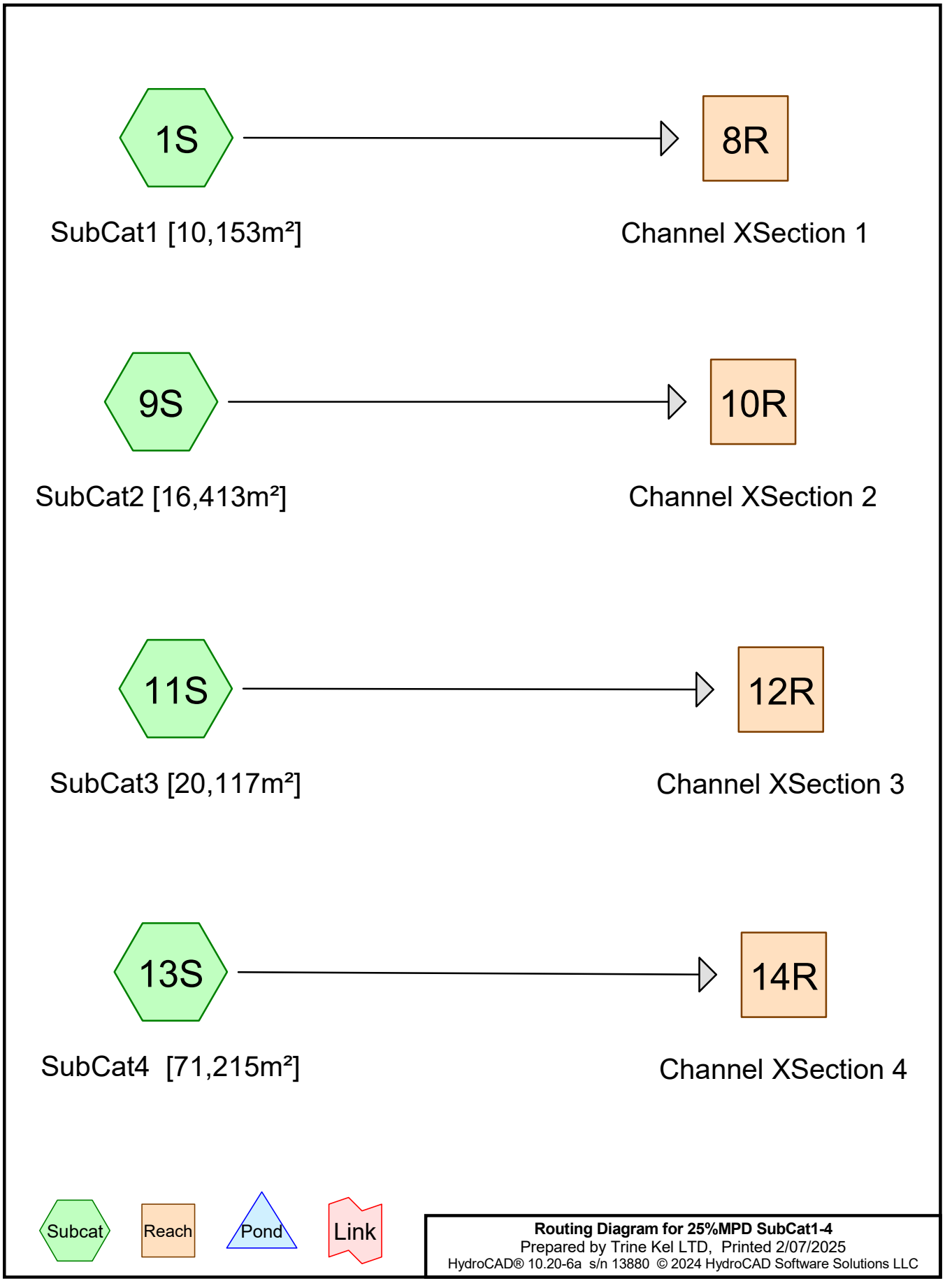


Reach 20R: Channel XSection 7 (outlet to Waipapa River)



Reach 20R: Channel XSection 7 (outlet to Waipapa River)





Routing Diagram for 25%MPD SubCat1-4
Prepared by Trine Kel LTD, Printed 2/07/2025

Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
11.7898	78	25% Total Catchment Cover Calculated Curve Number (1S, 9S, 11S, 13S)
11.7898	**78**	**TOTAL AREA**

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SubCat1 [10,153m²] Runoff Area=10,153.0 m² 0.00% Impervious Runoff Depth=231 mm
Flow Length=150.0 m Slope=0.0800 m/m Tc=4.1 min CN=78 Runoff=0.1700 m³/s 2,348.137 m³

Subcatchment 9S: SubCat2 [16,413m²] Runoff Area=16,413.0 m² 0.00% Impervious Runoff Depth=231 mm
Flow Length=230.0 m Slope=0.0900 m/m Tc=6.0 min CN=78 Runoff=0.2742 m³/s 3,795.919 m³

Subcatchment 11S: SubCat3 Runoff Area=20,117.0 m² 0.00% Impervious Runoff Depth=231 mm
Flow Length=291.0 m Slope=0.0790 m/m Tc=8.1 min CN=78 Runoff=0.3348 m³/s 4,652.562 m³

Subcatchment 13S: SubCat4 Runoff Area=71,215.0 m² 0.00% Impervious Runoff Depth=231 mm
Flow Length=319.0 m Slope=0.0700 m/m Tc=9.4 min CN=78 Runoff=1.1810 m³/s 16,470.261 m³

Reach 8R: Channel XSection Avg. Flow Depth=0.15 m Max Vel=0.94 m/s Inflow=0.1700 m³/s 2,348.137 m³
n=0.060 L=160.00 m S=0.0856 m/m Capacity=71.5580 m³/s Outflow=0.1695 m³/s 2,348.137 m³

Reach 10R: Channel Avg. Flow Depth=0.14 m Max Vel=1.03 m/s Inflow=0.2742 m³/s 3,795.919 m³
n=0.060 L=230.00 m S=0.0873 m/m Capacity=61.2091 m³/s Outflow=0.2729 m³/s 3,795.918 m³

Reach 12R: Channel Avg. Flow Depth=0.23 m Max Vel=1.19 m/s Inflow=0.3348 m³/s 4,652.562 m³
n=0.060 L=291.00 m S=0.0736 m/m Capacity=67.0923 m³/s Outflow=0.3326 m³/s 4,652.548 m³

Reach 14R: Channel Avg. Flow Depth=0.32 m Max Vel=1.52 m/s Inflow=1.1810 m³/s 16,470.261 m³
n=0.060 L=319.00 m S=0.0708 m/m Capacity=52.6908 m³/s Outflow=1.1753 m³/s 16,470.214 m³

Total Runoff Area = 11.7898 ha Runoff Volume = 27,266.879 m³ Average Runoff Depth = 231 mm
100.00% Pervious = 11.7898 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 1S: SubCat1 [10,153m²]

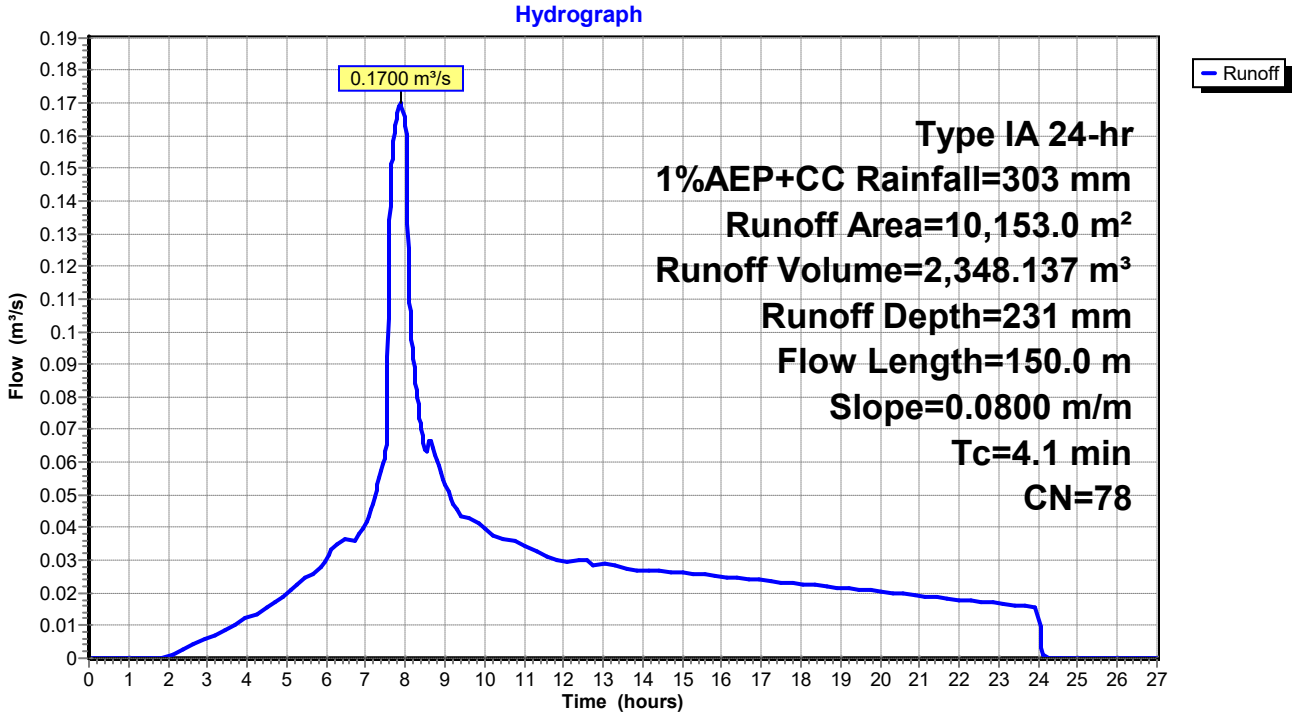
Runoff = 0.1700 m³/s @ 7.88 hrs, Volume= 2,348.137 m³, Depth= 231 mm
Routed to Reach 8R : Channel XSection 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	10,153.0	78	25% Total Catchment Cover Calculated Curve Number
	10,153.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
4.1	150.0	0.0800	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 1S: SubCat1 [10,153m²]



Summary for Subcatchment 9S: SubCat2 [16,413m²]

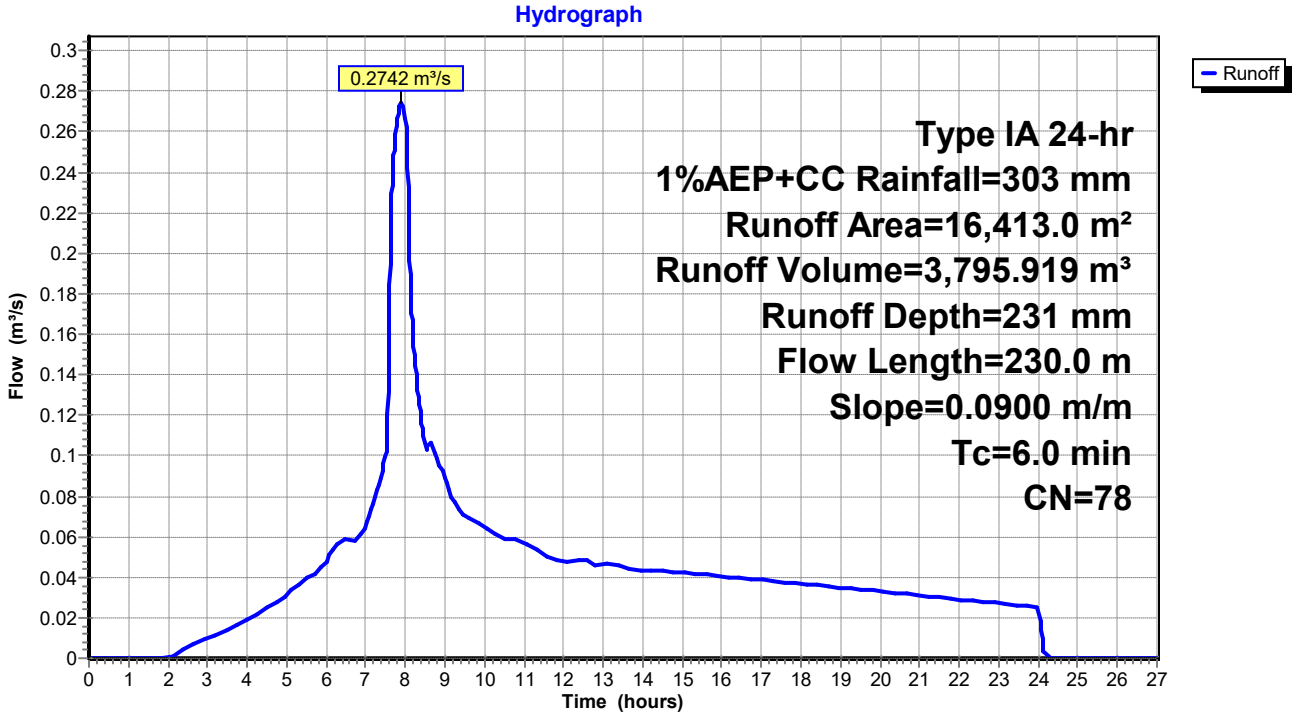
Runoff = 0.2742 m³/s @ 7.90 hrs, Volume= 3,795.919 m³, Depth= 231 mm
Routed to Reach 10R : Channel XSection 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	16,413.0	78	25% Total Catchment Cover Calculated Curve Number
	16,413.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
6.0	230.0	0.0900	0.64		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 9S: SubCat2 [16,413m²]



Summary for Subcatchment 11S: SubCat3 [20,117m²]

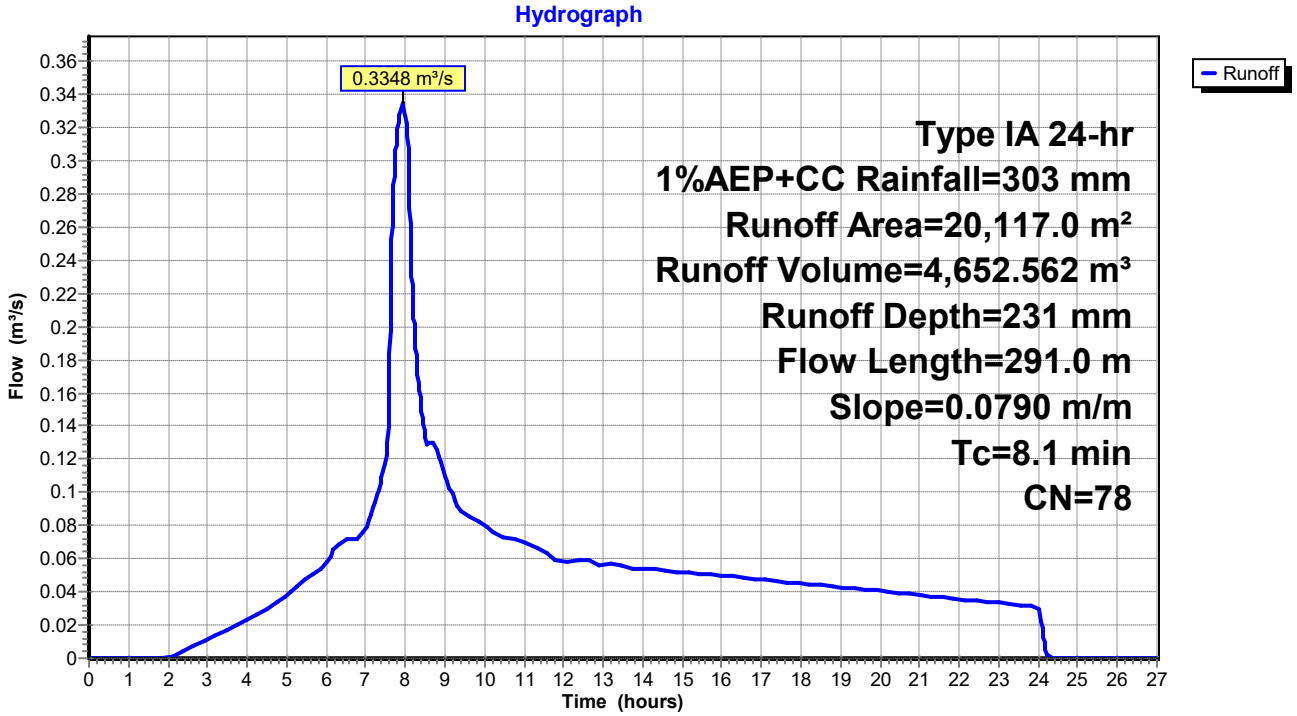
Runoff = 0.3348 m³/s @ 7.93 hrs, Volume= 4,652.562 m³, Depth= 231 mm
Routed to Reach 12R : Channel XSection 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	20,117.0	78	25% Total Catchment Cover Calculated Curve Number
	20,117.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
8.1	291.0	0.0790	0.60		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 11S: SubCat3 [20,117m²]



Summary for Subcatchment 13S: SubCat4 [71,215m²]

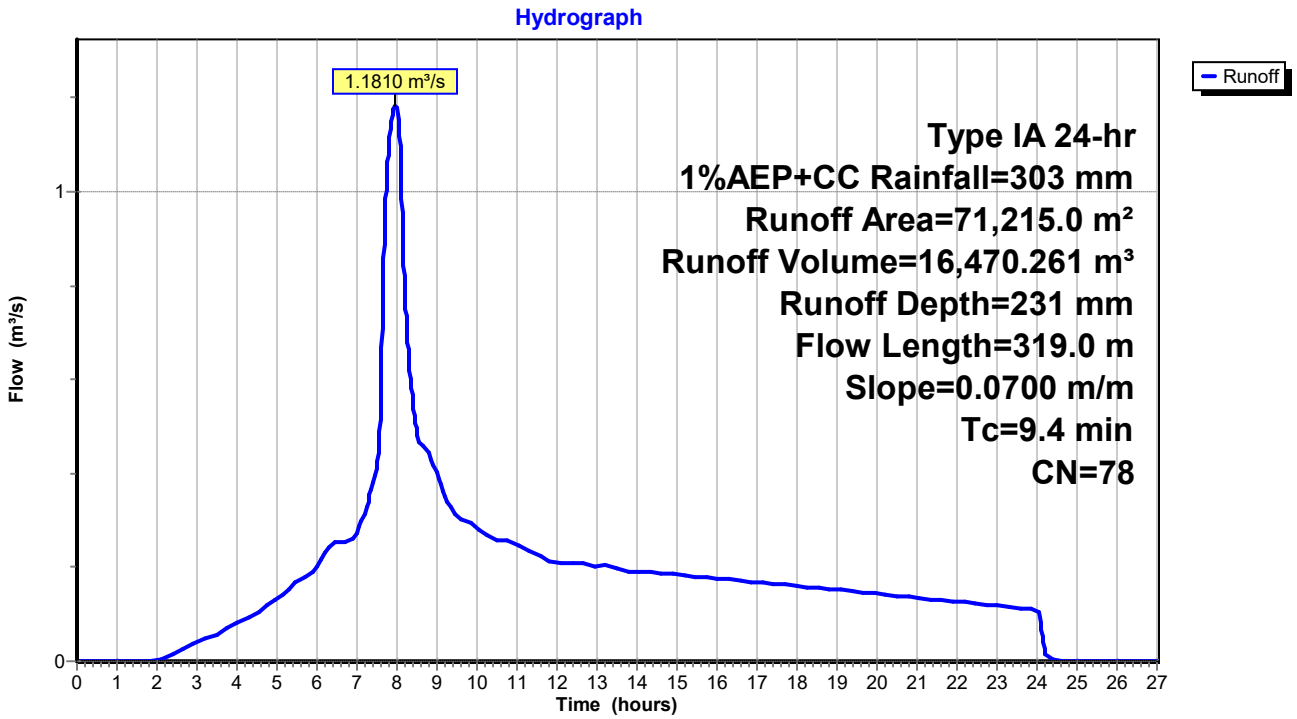
Runoff = 1.1810 m³/s @ 7.97 hrs, Volume= 16,470.261 m³, Depth= 231 mm
Routed to Reach 14R : Channel XSection 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm

	Area (m²)	CN	Description
*	71,215.0	78	25% Total Catchment Cover Calculated Curve Number
	71,215.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
9.4	319.0	0.0700	0.56		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 13S: SubCat4 [71,215m²]



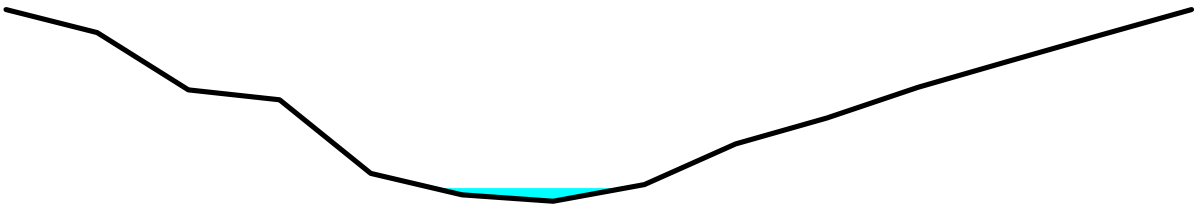
Summary for Reach 8R: Channel XSection 1

Inflow Area = 1.0153 ha, 0.00% Impervious, Inflow Depth = 231 mm for 1%AEP+CC event
Inflow = 0.1700 m³/s @ 7.88 hrs, Volume= 2,348.137 m³
Outflow = 0.1695 m³/s @ 7.96 hrs, Volume= 2,348.137 m³, Atten= 0%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.94 m/s, Min. Travel Time= 2.8 min
Avg. Velocity = 0.52 m/s, Avg. Travel Time= 5.1 min

Peak Storage= 28.9 m³ @ 7.91 hrs
Average Depth at Peak Storage= 0.15 m , Surface Width= 2.12 m
Bank-Full Depth= 2.10 m Flow Area= 14.34 m², Capacity= 71.5580 m³/s

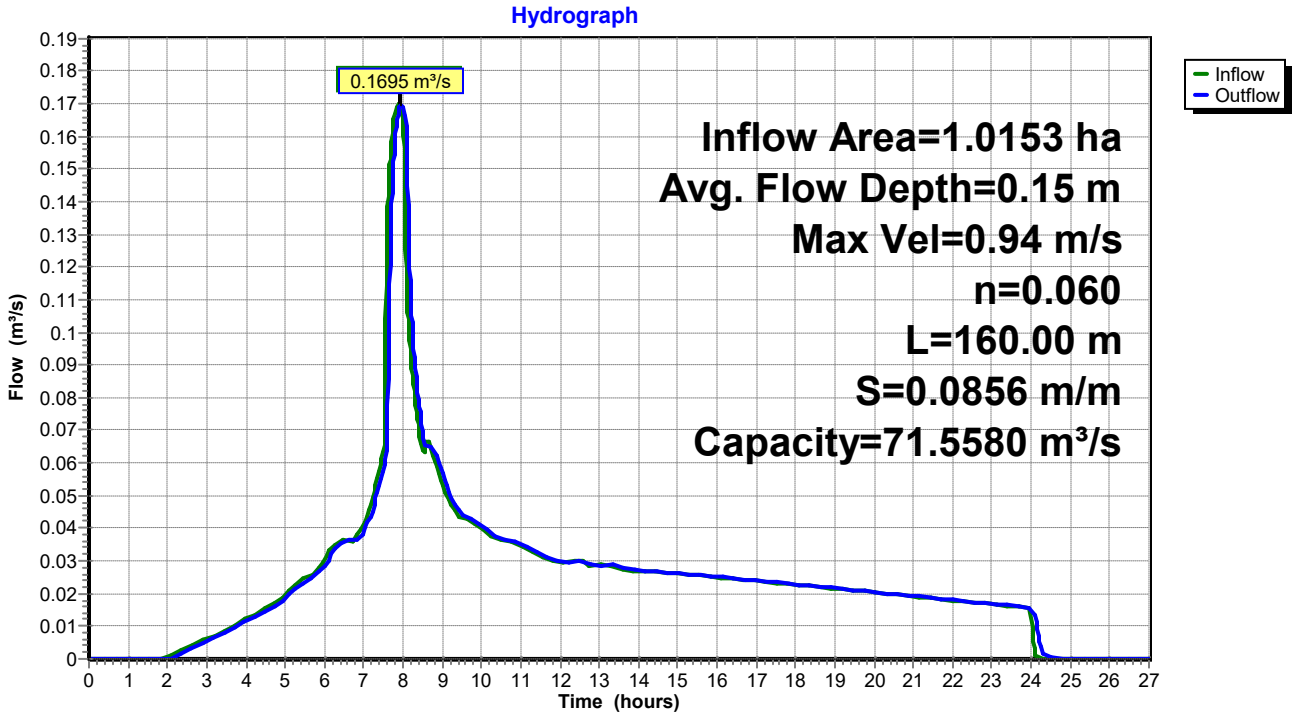
Custom cross-section, Length= 160.00 m Slope= 0.0856 m/m (111 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 37.200 m



Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	34.823	0.00
3.000	34.569	0.25
4.000	33.943	0.88
5.000	33.833	0.99
6.000	33.025	1.80
7.000	32.791	2.03
8.000	32.721	2.10
9.000	32.903	1.92
10.000	33.348	1.48
11.000	33.635	1.19
12.000	33.969	0.85
13.000	34.257	0.57
14.000	34.541	0.28
15.000	34.823	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.07	0.05	1.39	1.38	7.8	0.0252
0.18	0.26	2.51	2.48	42.4	0.2883
0.30	0.62	3.35	3.27	98.5	0.9715
0.63	1.86	4.65	4.40	296.8	4.8997
0.91	3.31	6.15	5.75	530.0	10.6916
1.11	4.53	7.09	6.59	725.6	16.4149
1.22	5.33	8.44	7.92	853.3	19.1446
1.25	5.54	8.58	8.04	886.5	20.1939
1.54	8.07	10.16	9.50	1,290.7	33.7345
1.82	10.97	11.73	10.96	1,755.5	51.1647
1.85	11.28	11.89	11.10	1,804.9	53.1174
2.10	14.34	13.86	13.00	2,294.6	71.5580

Reach 8R: Channel XSection 1



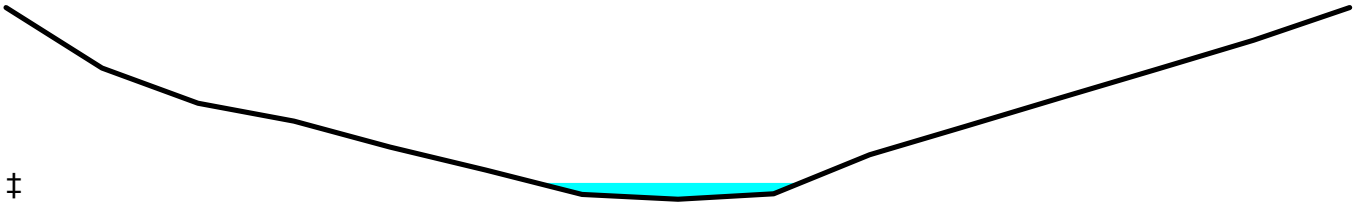
Summary for Reach 10R: Channel XSection 2

Inflow Area = 1.6413 ha, 0.00% Impervious, Inflow Depth = 231 mm for 1%AEP+CC event
Inflow = 0.2742 m³/s @ 7.90 hrs, Volume= 3,795.919 m³
Outflow = 0.2729 m³/s @ 8.01 hrs, Volume= 3,795.918 m³, Atten= 0%, Lag= 6.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.03 m/s, Min. Travel Time= 3.7 min
Avg. Velocity = 0.52 m/s, Avg. Travel Time= 7.4 min

Peak Storage= 61.0 m³ @ 7.95 hrs
Average Depth at Peak Storage= 0.14 m , Surface Width= 2.75 m
Bank-Full Depth= 1.59 m Flow Area= 13.20 m², Capacity= 61.2091 m³/s

Custom cross-section, Length= 230.00 m Slope= 0.0873 m/m (108 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 30.820 m

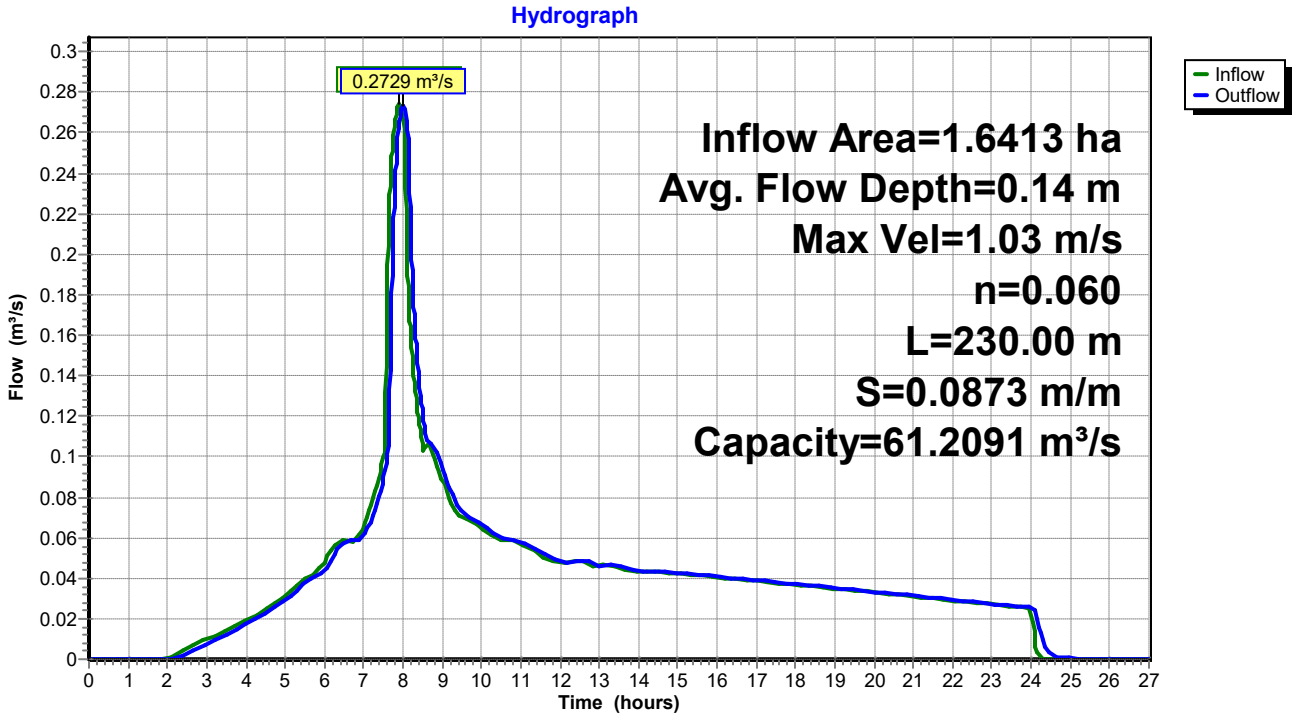


‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
2.000	32.376	0.00
3.000	31.872	0.50
4.000	31.580	0.80
5.000	31.430	0.95
6.000	31.216	1.16
7.000	31.024	1.35
8.000	30.822	1.55
9.000	30.782	1.59
10.000	30.826	1.55
11.000	31.152	1.22
12.000	31.390	0.99
13.000	31.628	0.75
14.000	31.866	0.51
15.000	32.104	0.27
16.000	32.376	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.04	1.91	1.91	8.8	0.0138
0.04	0.05	2.02	2.02	10.6	0.0182
0.24	0.60	3.66	3.61	138.7	0.8926
0.37	1.13	4.75	4.67	260.5	2.1441
0.43	1.45	5.37	5.27	333.6	2.9857
0.61	2.50	6.95	6.81	575.4	6.2333
0.65	2.78	7.32	7.17	639.7	7.1885
0.80	3.98	8.97	8.80	915.1	11.3956
0.85	4.41	9.35	9.16	1,014.3	13.1565
1.08	6.81	11.23	10.98	1,565.6	24.0093
1.09	6.87	11.28	11.03	1,580.8	24.3303
1.32	9.60	12.79	12.46	2,207.4	39.0196
1.59	13.20	14.44	14.00	3,035.1	61.2091

Reach 10R: Channel XSection 2



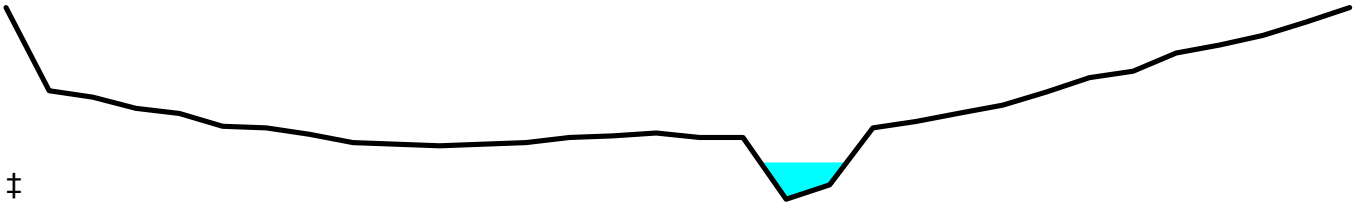
Summary for Reach 12R: Channel XSection 3

Inflow Area = 2.0117 ha, 0.00% Impervious, Inflow Depth = 231 mm for 1%AEP+CC event
Inflow = 0.3348 m³/s @ 7.93 hrs, Volume= 4,652.562 m³
Outflow = 0.3326 m³/s @ 8.06 hrs, Volume= 4,652.548 m³, Atten= 1%, Lag= 7.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.19 m/s, Min. Travel Time= 4.1 min
Avg. Velocity = 0.62 m/s, Avg. Travel Time= 7.8 min

Peak Storage= 81.1 m³ @ 7.99 hrs
Average Depth at Peak Storage= 0.23 m , Surface Width= 1.99 m
Bank-Full Depth= 1.19 m Flow Area= 20.00 m², Capacity= 67.0923 m³/s

Custom cross-section, Length= 291.00 m Slope= 0.0736 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 29.490 m



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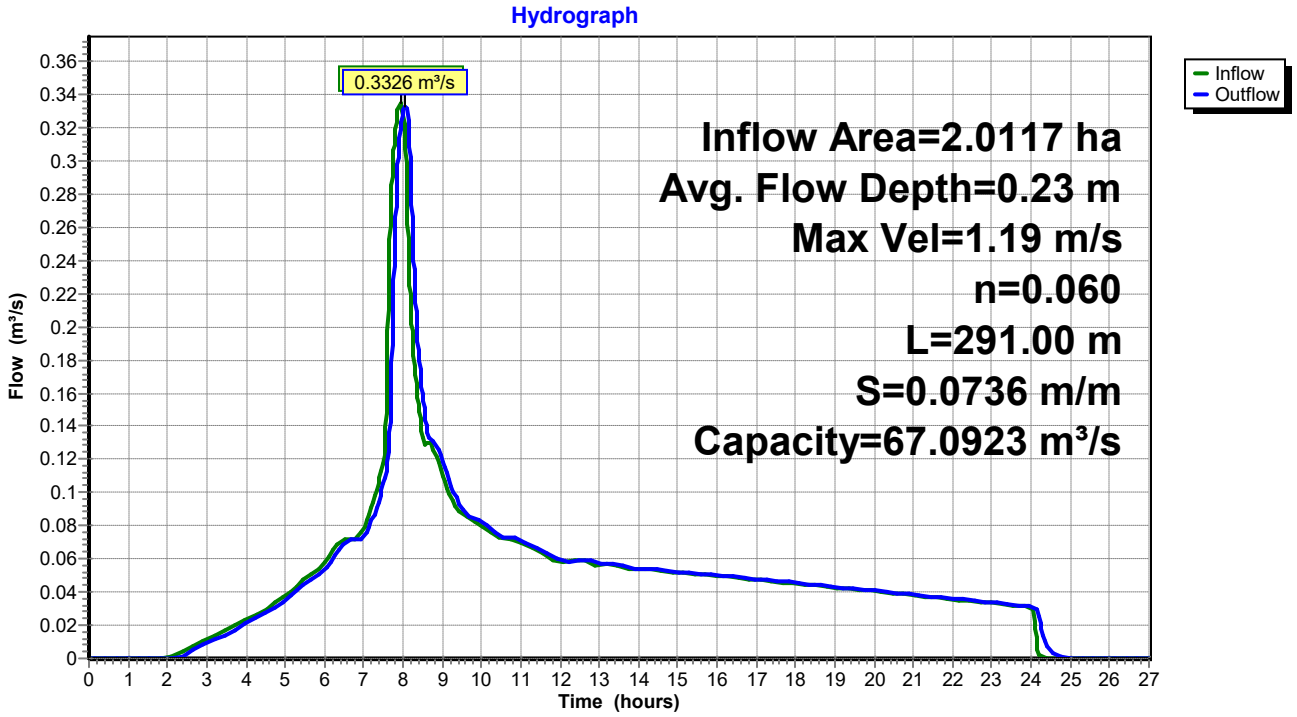
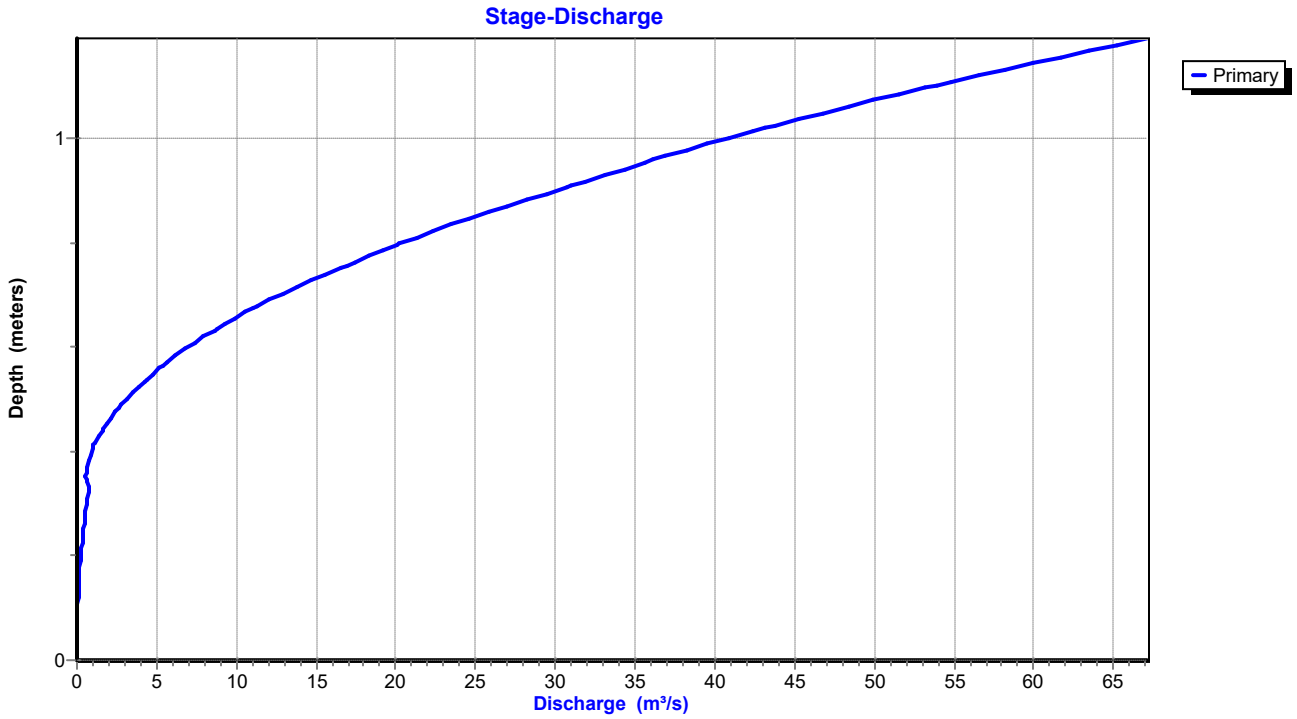
Reach 12R: Channel XSection 3



Reach 12R: Channel XSection 3



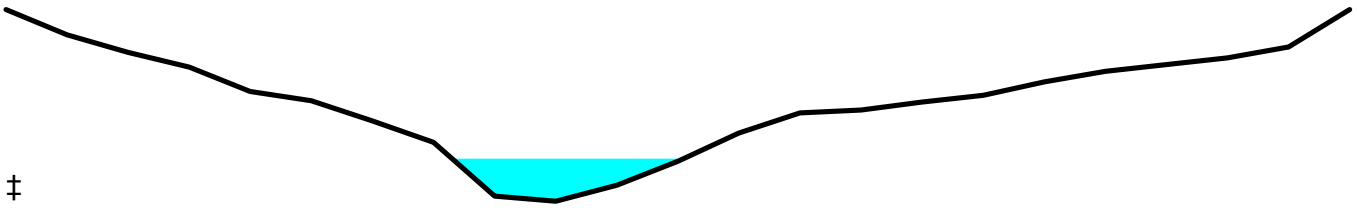
Summary for Reach 14R: Channel XSection 4

Inflow Area = 7.1215 ha, 0.00% Impervious, Inflow Depth = 231 mm for 1%AEP+CC event
Inflow = 1.1810 m³/s @ 7.97 hrs, Volume= 16,470.261 m³
Outflow = 1.1753 m³/s @ 8.06 hrs, Volume= 16,470.214 m³, Atten= 0%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.52 m/s, Min. Travel Time= 3.5 min
Avg. Velocity = 0.79 m/s, Avg. Travel Time= 6.7 min

Peak Storage= 247.1 m³ @ 8.00 hrs
Average Depth at Peak Storage= 0.32 m , Surface Width= 3.79 m
Bank-Full Depth= 1.44 m Flow Area= 15.27 m², Capacity= 52.6908 m³/s

Custom cross-section, Length= 319.00 m Slope= 0.0708 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 28.300 m

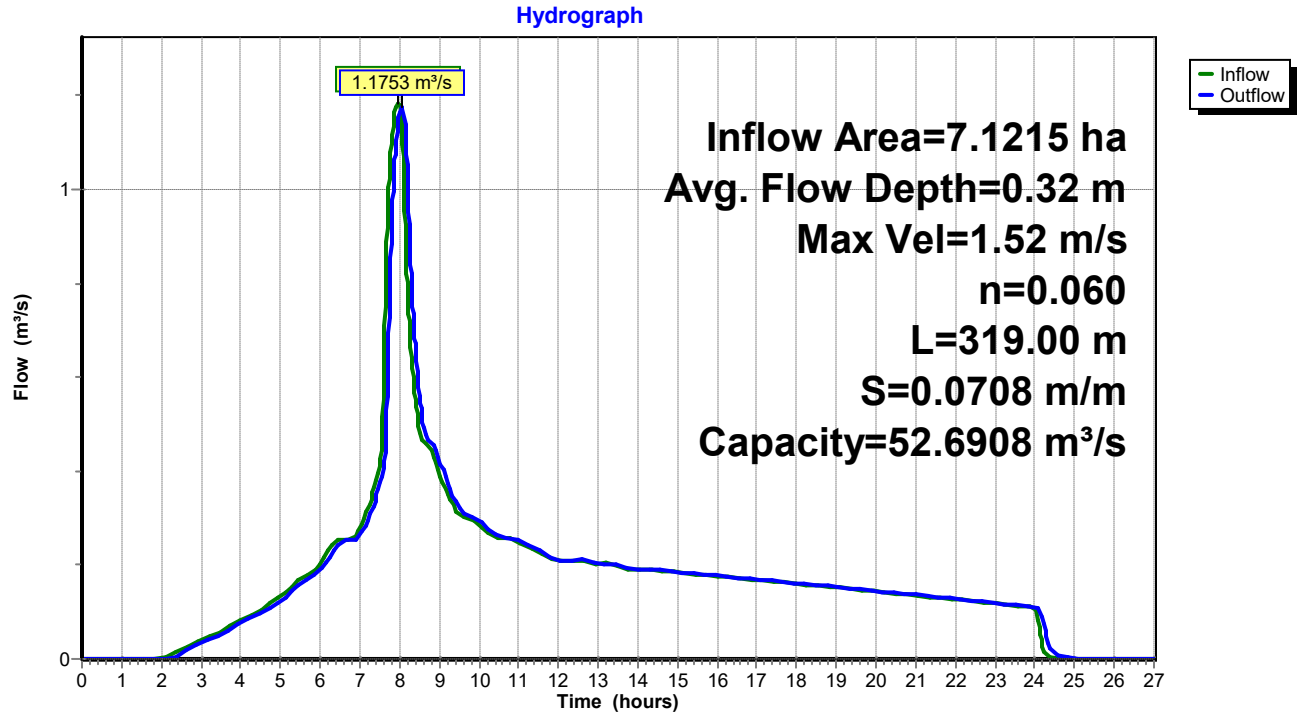


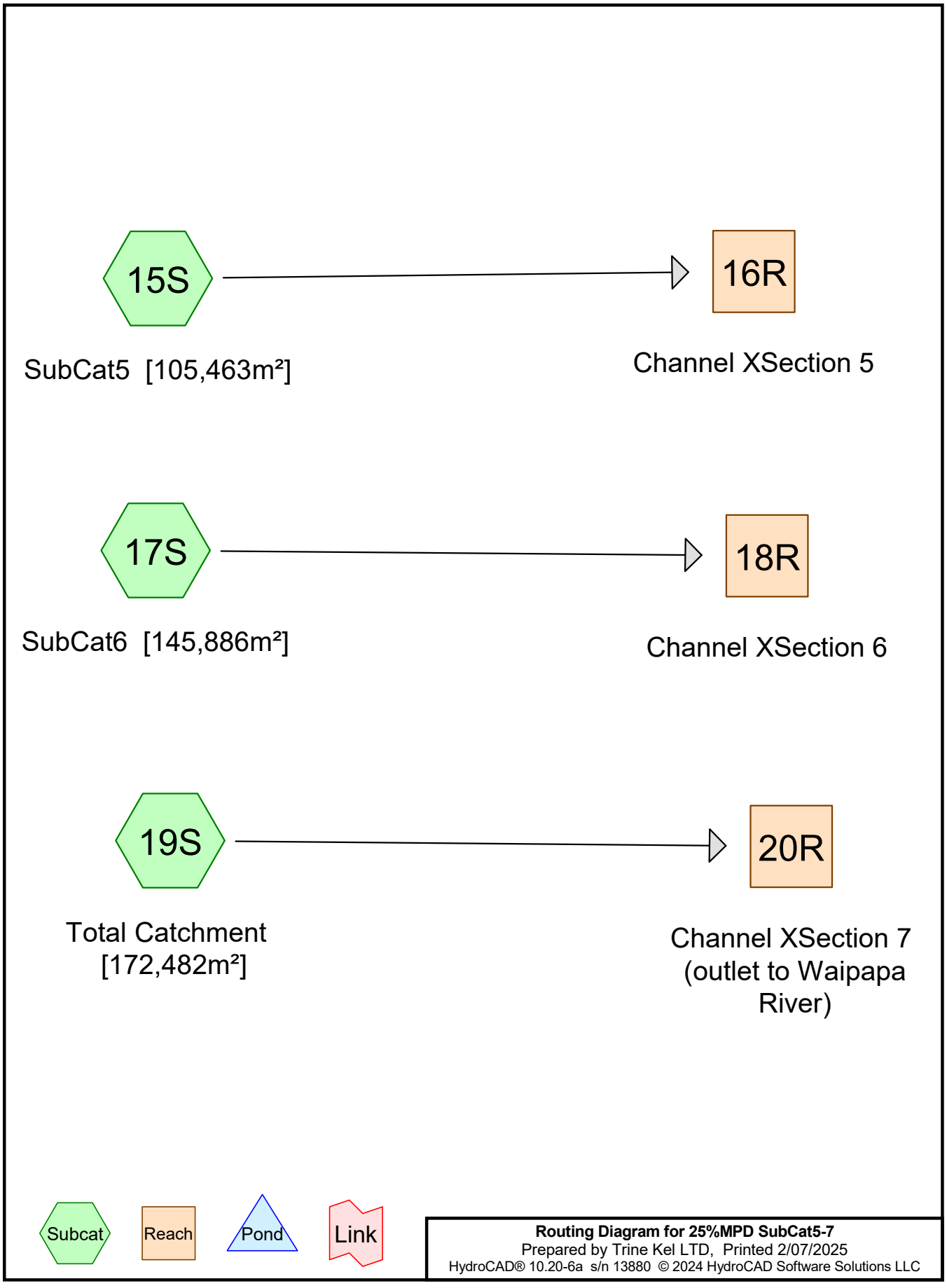
‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
8.000	29.287	0.00
9.000	29.097	0.19
10.000	28.965	0.32
11.000	28.853	0.43
12.000	28.671	0.62
13.000	28.601	0.69
14.000	28.449	0.84
15.000	28.288	1.00
16.000	27.882	1.40
17.000	27.844	1.44
18.000	27.964	1.32
19.000	28.146	1.14
20.000	28.358	0.93
21.000	28.510	0.78
22.000	28.530	0.76
23.000	28.590	0.70
24.000	28.642	0.64
25.000	28.742	0.54
26.000	28.822	0.46
27.000	28.872	0.41
28.000	28.924	0.36
29.000	29.004	0.28
30.000	29.287	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
0.04	0.03	1.32	1.32	8.0	0.0079
0.12	0.17	2.23	2.20	54.0	0.1348
0.30	0.70	3.73	3.65	223.9	1.0234
0.44	1.29	4.79	4.67	412.3	2.3950
0.51	1.65	5.57	5.43	525.1	3.2418
0.61	2.19	6.74	6.60	699.8	4.6030
0.67	2.62	7.56	7.40	836.0	5.7392
0.69	2.78	8.69	8.53	886.8	5.7691
0.75	3.33	10.09	9.93	1,063.5	7.0684
0.76	3.44	10.38	10.21	1,098.8	7.3268
0.80	3.89	11.75	11.59	1,241.4	8.2628
0.83	4.24	12.46	12.29	1,351.8	9.1602
0.90	5.15	13.57	13.39	1,642.6	11.9737
0.98	6.28	15.02	14.83	2,002.7	15.5704
1.01	6.75	15.81	15.62	2,153.3	16.9750
1.03	7.05	16.36	16.17	2,249.6	17.8490
1.08	7.93	17.83	17.63	2,530.0	20.4996
1.12	8.67	18.72	18.51	2,766.4	23.0363
1.16	9.41	19.50	19.30	3,001.6	25.6771
1.25	11.25	20.55	20.33	3,589.3	33.4021
1.44	15.27	22.27	22.00	4,872.1	52.6908

Reach 14R: Channel XSection 4




15S
16R
SubCat5 [105,463m²]
Channel XSection 5
17S
18R
SubCat6 [145,886m²]
Channel XSection 6
19S
20R
Total Catchment
[172,482m²]
Channel XSection 7
(outlet to Waipapa
River)
Subcat
Reach
Pond
Link
Routing Diagram for 25%MPD SubCat5-7
Prepared by Trine Kel LTD, Printed 2/07/2025
HydroCAD® 10.20-6a s/n 13880 © 2024 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
42.3831	78	25% Total Catchment Cover Calculated Curve Number (15S, 17S, 19S)
42.3831	**78**	**TOTAL AREA**

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15S: SubCat5 Runoff Area=105,463.0 m² 0.00% Impervious Runoff Depth=231 mm
Flow Length=374.0 m Slope=0.0630 m/m Tc=11.7 min CN=78 Runoff=1.7354 m³/s 24,390.972 m³

Subcatchment 17S: SubCat6 Runoff Area=145,886.0 m² 0.00% Impervious Runoff Depth=231 mm
Flow Length=495.0 m Slope=0.0510 m/m Tc=17.2 min CN=78 Runoff=2.3305 m³/s 33,739.808 m³

Subcatchment 19S: Total Catchment Runoff Area=172,482.0 m² 0.00% Impervious Runoff Depth=231 mm
Flow Length=663.0 m Slope=0.0530 m/m Tc=22.5 min CN=78 Runoff=2.6511 m³/s 39,890.802 m³

Reach 16R: Channel Avg. Flow Depth=0.32 m Max Vel=1.40 m/s Inflow=1.7354 m³/s 24,390.972 m³
n=0.060 L=374.00 m S=0.0630 m/m Capacity=31.5808 m³/s Outflow=1.7201 m³/s 24,390.779 m³

Reach 18R: Channel Avg. Flow Depth=0.28 m Max Vel=0.80 m/s Inflow=2.3305 m³/s 33,739.808 m³
n=0.060 L=495.00 m S=0.0515 m/m Capacity=114.8947 m³/s Outflow=2.2058 m³/s 33,737.298 m³

Reach 20R: Channel Avg. Flow Depth=0.40 m Max Vel=1.17 m/s Inflow=2.6511 m³/s 39,890.802 m³
n=0.060 L=663.00 m S=0.0534 m/m Capacity=155.3490 m³/s Outflow=2.4996 m³/s 39,886.805 m³

Total Runoff Area = 42.3831 ha Runoff Volume = 98,021.582 m³ Average Runoff Depth = 231 mm
100.00% Pervious = 42.3831 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 15S: SubCat5 [105,463m²]

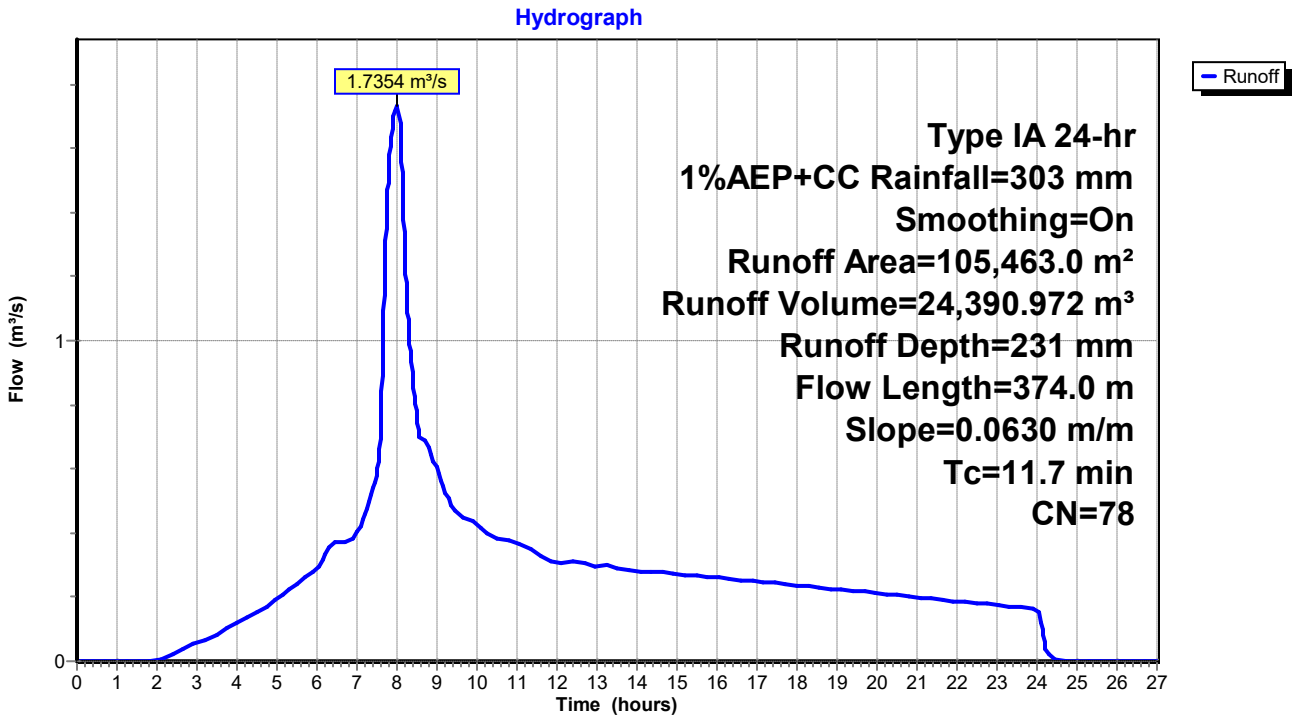
Runoff = 1.7354 m³/s @ 8.00 hrs, Volume= 24,390.972 m³, Depth= 231 mm
Routed to Reach 16R : Channel XSection 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm, Smoothing=On

	Area (m²)	CN	Description
*	105,463.0	78	25% Total Catchment Cover Calculated Curve Number
	105,463.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
11.7	374.0	0.0630	0.53		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 15S: SubCat5 [105,463m²]



Summary for Subcatchment 17S: SubCat6 [145,886m²]

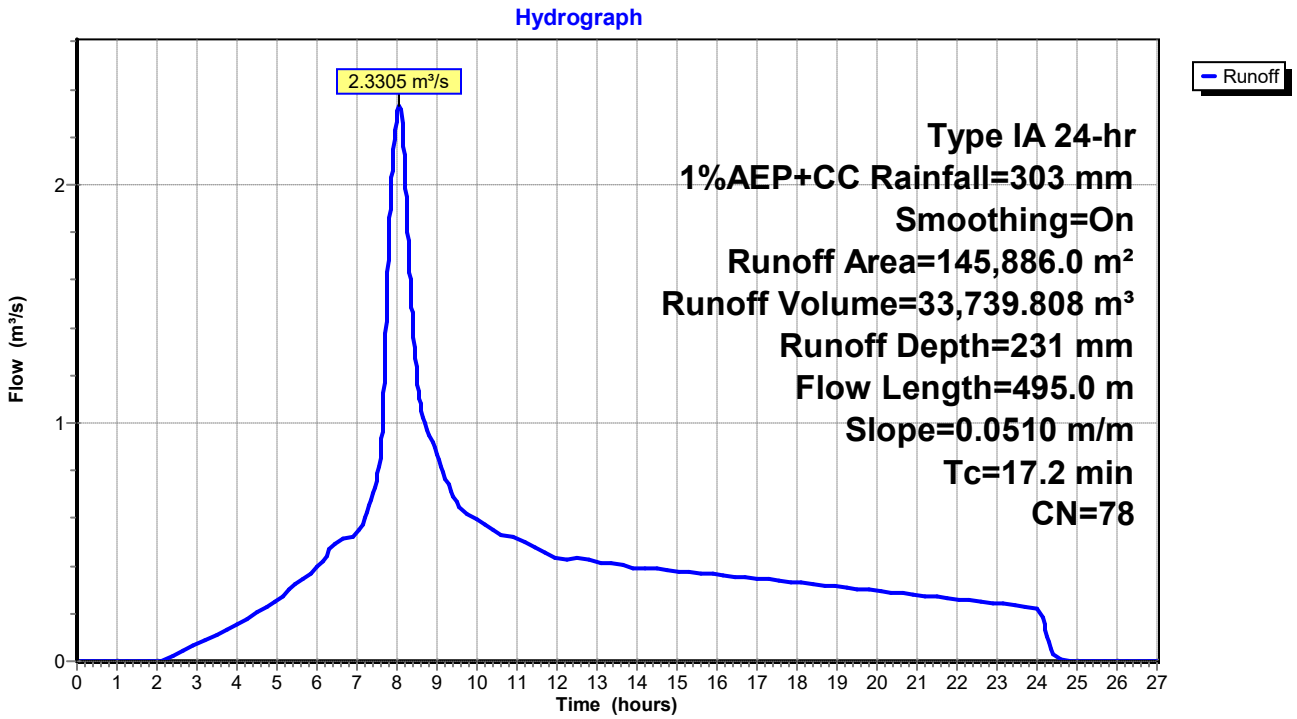
Runoff = 2.3305 m³/s @ 8.05 hrs, Volume= 33,739.808 m³, Depth= 231 mm
Routed to Reach 18R : Channel XSection 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm, Smoothing=On

	Area (m²)	CN	Description
*	145,886.0	78	25% Total Catchment Cover Calculated Curve Number
	145,886.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
17.2	495.0	0.0510	0.48		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 17S: SubCat6 [145,886m²]



Summary for Subcatchment 19S: Total Catchment [172,482m²]

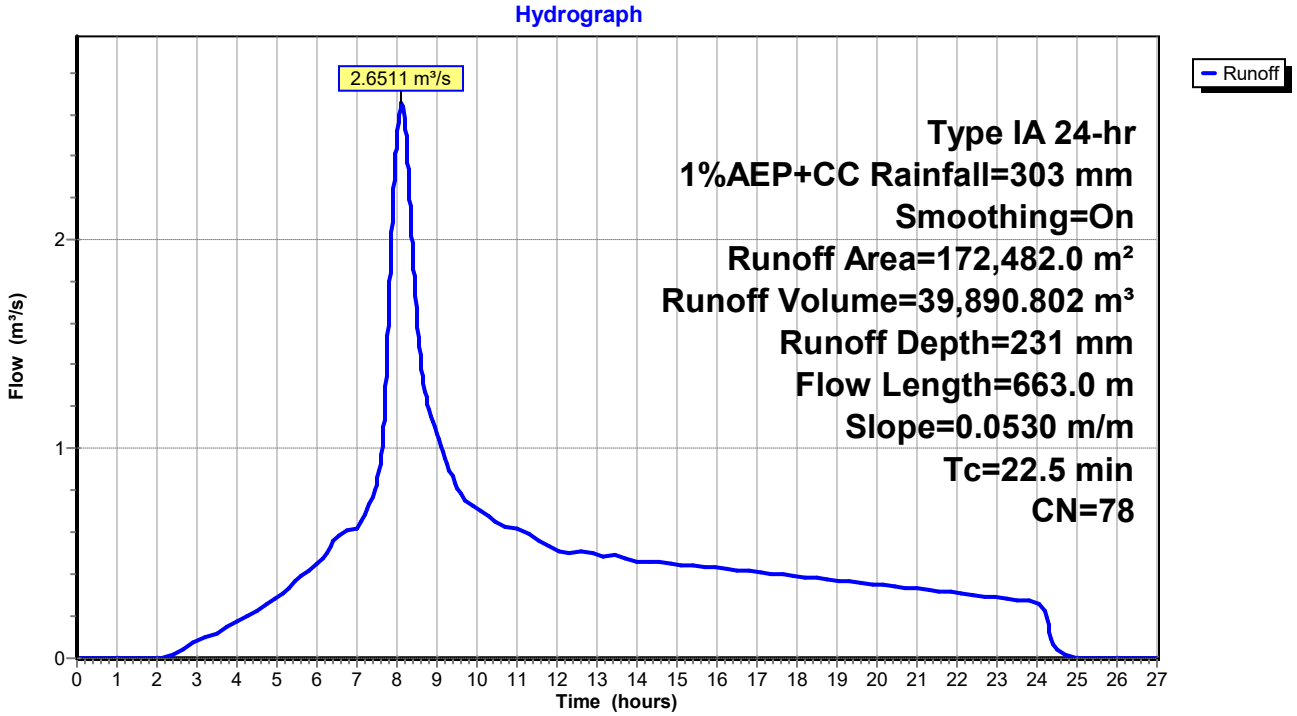
Runoff = 2.6511 m³/s @ 8.12 hrs, Volume= 39,890.802 m³, Depth= 231 mm
Routed to Reach 20R : Channel XSection 7 (outlet to Waipapa River)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type IA 24-hr 1%AEP+CC Rainfall=303 mm, Smoothing=On

	Area (m²)	CN	Description
*	172,482.0	78	25% Total Catchment Cover Calculated Curve Number
	172,482.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
22.5	663.0	0.0530	0.49		**Shallow Concentrated Flow, OLF** Short Grass Pasture Kv= 2.13 m/s

Subcatchment 19S: Total Catchment [172,482m²]



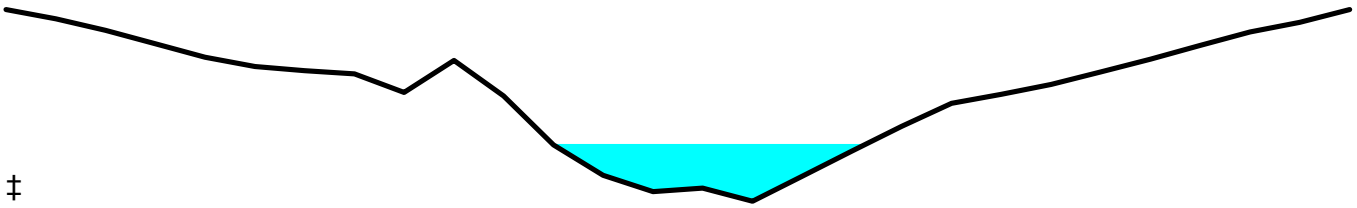
Summary for Reach 16R: Channel XSection 5

Inflow Area = 10.5463 ha, 0.00% Impervious, Inflow Depth = 231 mm for 1%AEP+CC event
Inflow = 1.7354 m³/s @ 8.00 hrs, Volume= 24,390.972 m³
Outflow = 1.7201 m³/s @ 8.12 hrs, Volume= 24,390.779 m³, Atten= 1%, Lag= 7.3 min

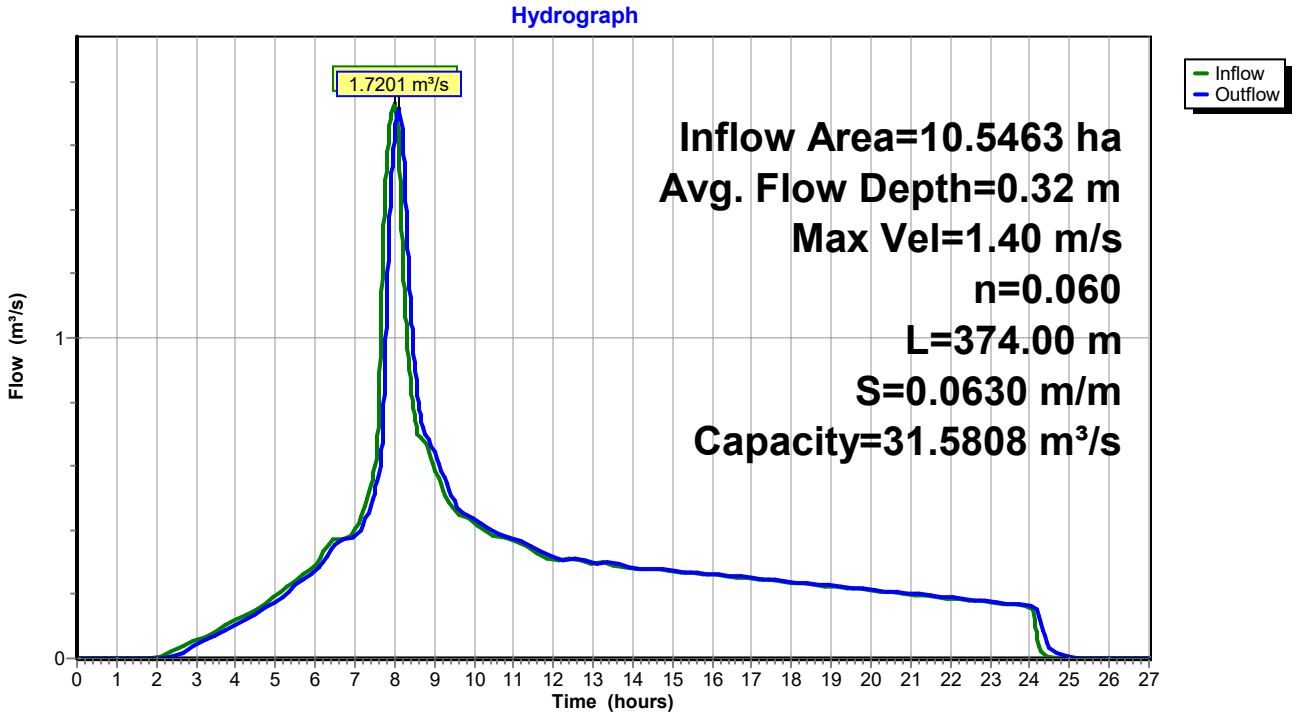
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.40 m/s, Min. Travel Time= 4.5 min
Avg. Velocity = 0.72 m/s, Avg. Travel Time= 8.7 min

Peak Storage= 459.6 m³ @ 8.04 hrs
Average Depth at Peak Storage= 0.32 m , Surface Width= 6.30 m
Bank-Full Depth= 1.08 m Flow Area= 12.60 m², Capacity= 31.5808 m³/s

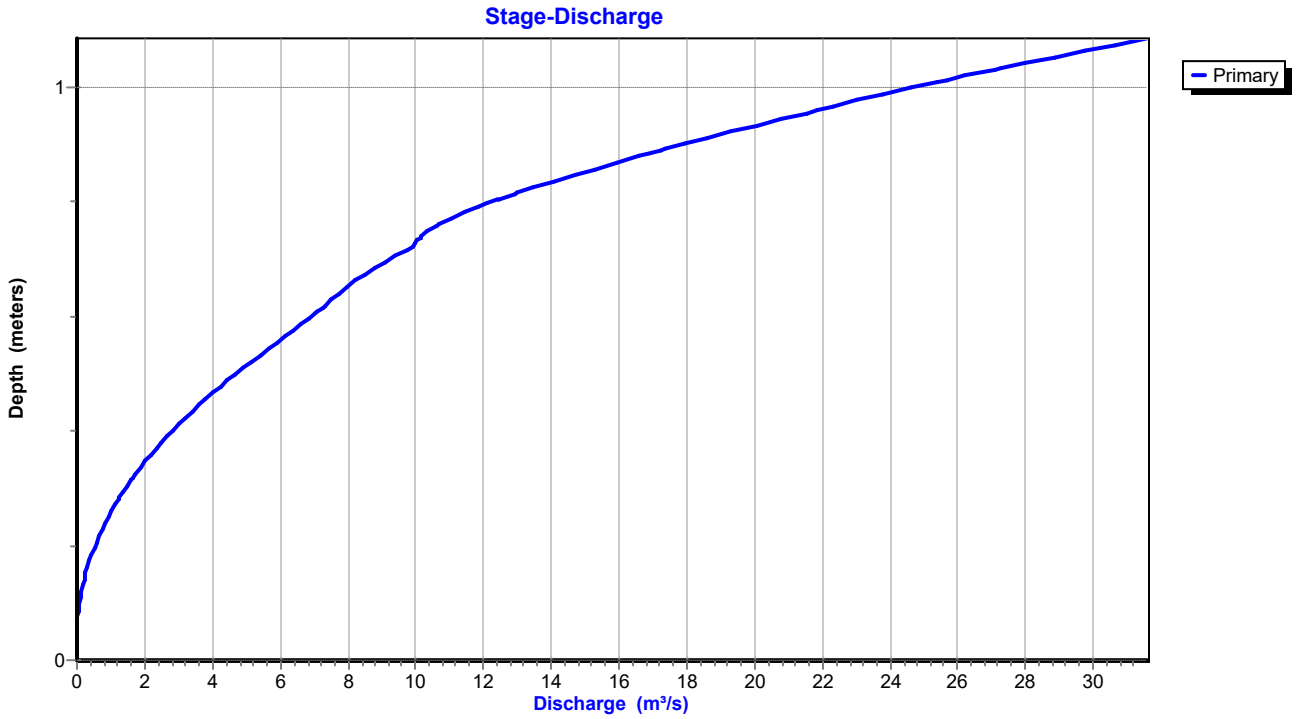
Custom cross-section, Length= 374.00 m Slope= 0.0630 m/m (117 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 27.338 m



Reach 16R: Channel XSection 5



Reach 16R: Channel XSection 5



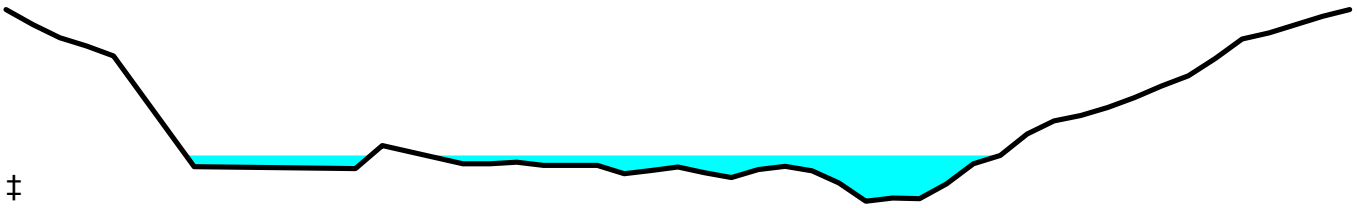
Summary for Reach 18R: Channel XSection 6

Inflow Area = 14.5886 ha, 0.00% Impervious, Inflow Depth = 231 mm for 1%AEP+CC event
Inflow = 2.3305 m³/s @ 8.05 hrs, Volume= 33,739.808 m³
Outflow = 2.2058 m³/s @ 8.33 hrs, Volume= 33,737.298 m³, Atten= 5%, Lag= 16.4 min

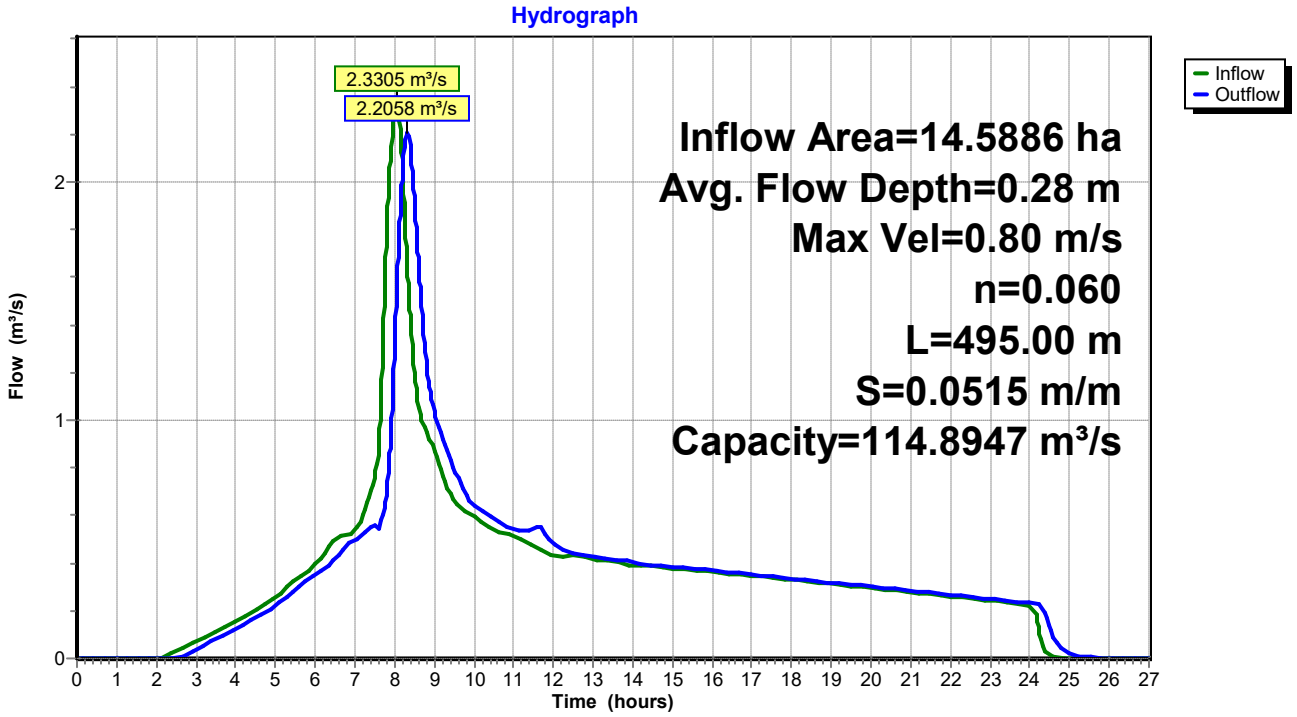
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.80 m/s, Min. Travel Time= 10.3 min
Avg. Velocity = 0.63 m/s, Avg. Travel Time= 13.1 min

Peak Storage= 1,363.4 m³ @ 8.16 hrs
Average Depth at Peak Storage= 0.28 m , Surface Width= 28.22 m
Bank-Full Depth= 1.17 m Flow Area= 37.13 m², Capacity= 114.8947 m³/s

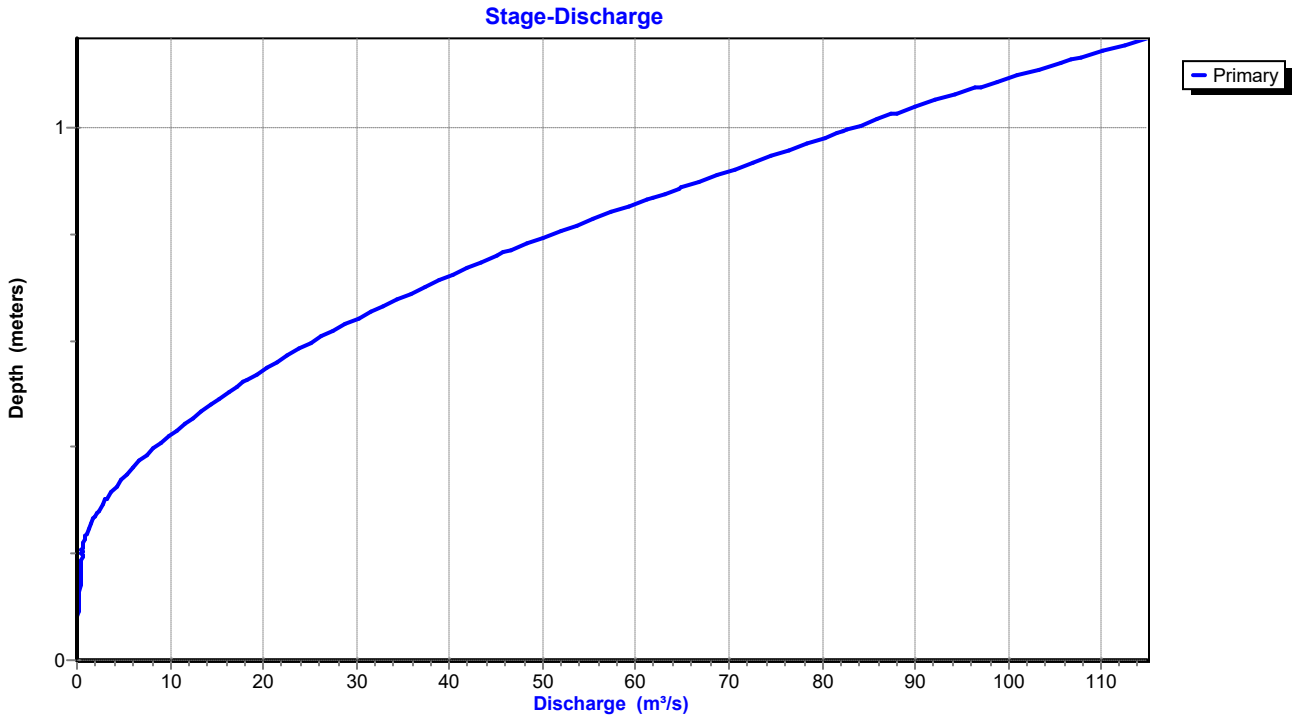
Custom cross-section, Length= 495.00 m Slope= 0.0515 m/m (126 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 25.420 m



Reach 18R: Channel XSection 6



Reach 18R: Channel XSection 6



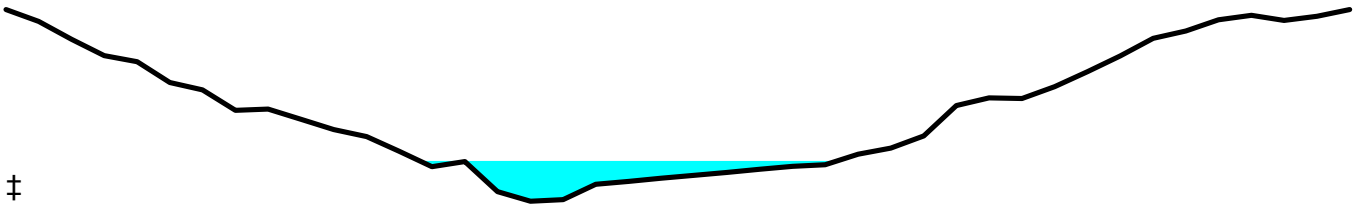
Summary for Reach 20R: Channel XSection 7 (outlet to Waipapa River)

Inflow Area = 17.2482 ha, 0.00% Impervious, Inflow Depth = 231 mm for 1%AEP+CC event
Inflow = 2.6511 m³/s @ 8.12 hrs, Volume= 39,890.802 m³
Outflow = 2.4996 m³/s @ 8.38 hrs, Volume= 39,886.805 m³, Atten= 6%, Lag= 15.6 min

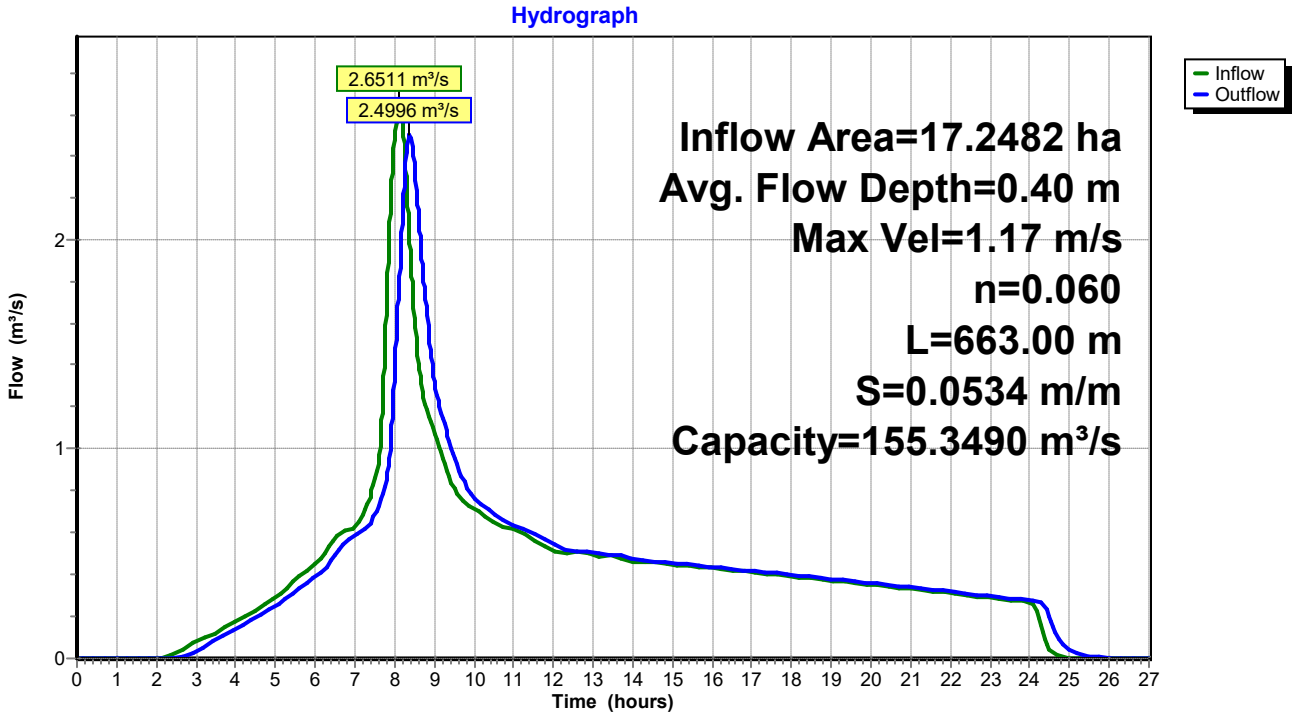
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.17 m/s, Min. Travel Time= 9.5 min
Avg. Velocity = 0.80 m/s, Avg. Travel Time= 13.8 min

Peak Storage= 1,418.7 m³ @ 8.23 hrs
Average Depth at Peak Storage= 0.40 m , Surface Width= 12.73 m
Bank-Full Depth= 1.89 m Flow Area= 40.73 m², Capacity= 155.3490 m³/s

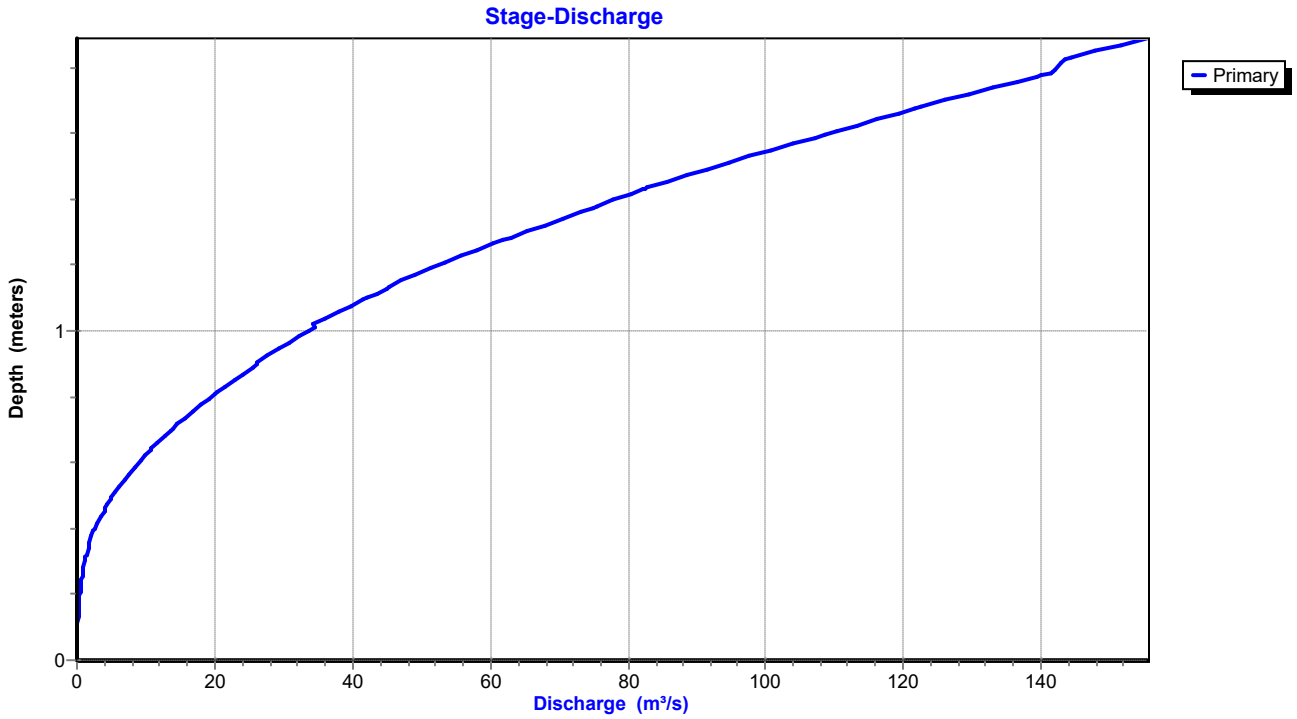
Custom cross-section, Length= 663.00 m Slope= 0.0534 m/m (129 Elevation Intervals)
Constant n= 0.060
Inlet Invert= 50.900 m, Outlet Invert= 15.520 m



Reach 20R: Channel XSection 7 (outlet to Waipapa River)



Reach 20R: Channel XSection 7 (outlet to Waipapa River)



Clause 8.7.5.2.2 – Stormwater Management

Table 11: Assessment Against Clause 8.7.5.2.2 – Stormwater Management

Clause	Assessment Requirement	Response
(a)	The extent to which building site coverage and impermeable surfaces contribute to total catchment impermeability and the provisions of any catchment or drainage plan.	The Development represents only a marginal increase at the broader catchment scale—raising total catchment imperviousness from 12.0% to 12.7%. A detailed hydrological and hydraulic assessment was undertaken to evaluate whether this increase would materially affect downstream flow behaviour. Results confirm that peak channel flow depth increased by only 30 mm under a 1% AEP storm event, with no meaningful change to inundation extent. These findings demonstrate that the development does not materially increase runoff to a degree where adverse effects are created at the catchment scale, and avoids any adverse downstream impacts. While no formal catchment or drainage plan applies to this area, the proposal is consistent with the performance-based approach permitted under Clause 4.3.3 of the FNDC Engineering Standards (2023).
(b)	The extent to which Low Impact Design (LID) principles have been used to reduce site impermeability.	LID principles are integrated through retention water tanks that provide potable water and a reduction in water outflow due to consumption in the home. Additional features include permeable gravel surfaces, rip-rap lined outfalls, and natural infiltration via the vegetated channel, reducing the development's effective impervious area and discharge effects.
(c)	Any cumulative effects on total catchment impermeability.	The cumulative increase to total catchment imperviousness from this development is approximately 0.7%, raising the weighted runoff coefficient (CNW) from 71 to 72. This is considered negligible, with modelling demonstrating no downstream impact under 1% AEP storm conditions.
(d)	The extent to which development will alter natural contours or drainage patterns.	Earthworks are minor and confined to forming building platforms and accessways. Existing drainage patterns are maintained, with stormwater continuing to discharge to the western boundary channel. No significant diversion or obstruction of natural overland flow will occur.
(e)	The physical qualities of the soil type.	The site is underlain by moderate-draining volcanic soils typical of the Kerikeri area. These soils exhibit good infiltration potential, supporting exfiltration-based stormwater disposal methods and reducing overland flow velocity and volume.
(f)	Availability of land for effluent and stormwater disposal without adverse effects on water bodies or adjacent sites.	Sufficient land is available on both lots for on-site wastewater disposal and stormwater management. The receiving channel has been shown to accommodate post-development runoff without adverse effects on neighbouring properties or natural waterways.
(g)	The extent to which paved, impermeable surfaces are necessary.	Impervious surfaces have been limited to essential access, parking, and building footprints. Alternative surfaces such as gravel have been used where possible to reduce the total impervious footprint and promote infiltration. The main access driveway to Lot 1 will consist of 2 x 1m wide strips to help reduce total impermeable cover.
(h)	The extent to which landscaping and vegetation reduce adverse effects of runoff.	Landscaping plays a key role in reducing runoff effects across the site. A continuous 4 m-wide Nikau palm garden has been introduced along the full length of the western boundary apart of the subdivision landscape preparation—directly adjacent to the receiving vegetated channel. This area is heavily mulched and densely planted, significantly increasing surface roughness and soil infiltration capacity. The combination of deep-rooted native vegetation, organic mulch, and shaded understory slows overland flow, encourages infiltration, and provides a highly effective natural buffer that reduces peak runoff velocity and

		sediment transport. This landscaped zone enhances the existing vegetated channel's ability to safely convey stormwater while minimising erosion risk. Additional landscaping measures will also be incorporated post-construction, further supporting site-level stormwater mitigation. Overall, the existing and proposed vegetation significantly contributes to the low-impact stormwater strategy for the site.
(i)	The means and effectiveness of mitigating stormwater runoff to that expected under the permitted threshold.	The primary objective of the permitted coverage threshold is to avoid or mitigate adverse stormwater effects. This has been achieved through a site- and catchment-specific assessment, rather than conventional attenuation infrastructure. Hydraulic and hydrological modelling confirms that runoff from the proposed development remains within the receiving channel's capacity, with no increased risk of flooding, erosion, or ponding. As such, the effects are avoided at source, consistent with the objectives and policies of the District Plan and the purpose of the Resource Management Act 1991. The performance-based approach not only meets the permitted activity outcomes but also enhances downstream resilience through additional vegetative buffers, including the newly planted Nikau palm garden.

13.1.1 Clause 13.10.4 - Stormwater Disposal

Table 12: Assessment Against 13.10.4 - Stormwater Disposal

Item	Assessment Requirement	Response
a	Whether the application complies with any regional rules relating to any water or discharge permits required under the Act, and with any resource consent issued to the District Council in relation to any urban drainage area stormwater management plan or similar plan.	The proposal complies with the relevant regional rules under the Northland Regional Plan. The development does not trigger any additional discharge consent requirements, and no conflict arises with any existing urban drainage scheme or permitted discharge conditions.
b	Whether the application complies with the provisions of the Council's "Engineering Standards and Guidelines" (2004) - Revised March 2009 (to be used in conjunction with NZS 4404:2004).	A performance-based approach has been adopted consistent with the intent of the FNDC Engineering Standards and NZS 4404:2004, ensuring that runoff is managed without causing flooding or nuisance effects.
c	Whether the application complies with the Far North District Council Strategic Plan – Drainage.	The proposal aligns with strategic drainage goals by managing runoff sustainably and reducing long-term infrastructure dependency through natural conveyance methods.
d	The degree to which Low Impact Design principles have been used to reduce site impermeability and to retain natural permeable areas.	LID principles have been incorporated through retention of vegetated areas, minimised site coverage, and discharging to a vegetated swale to enhance infiltration and reduce peak flows.
e	The adequacy of the proposed means of disposing of collected stormwater from the roof of all potential or existing buildings and from all impervious surfaces.	All roof and impervious surface runoff is directed to an established vegetated channel with confirmed capacity, ensuring effective conveyance and minimising surface ponding.
f	The adequacy of any proposed means for screening out litter, the capture of chemical spillages, the containment of contamination from roads and paved areas, and of siltation.	The vegetated swale provides passive treatment including sediment capture and minor contaminant filtration. No high-risk activities (e.g. fuel storage) are proposed.

g	The practicality of retaining open natural waterway systems for stormwater disposal in preference to piped or canal systems and adverse effects on existing waterways.	The proposed design retains an open channel system, avoiding unnecessary piping and preserving natural hydrological function and habitat.
h	Whether there is sufficient capacity available in the Council's outfall stormwater system to cater for increased run-off from the proposed allotments.	N.A
i	Where an existing outfall is not capable of accepting increased run-off, the adequacy of proposals and solutions for disposing of run-off.	The receiving vegetated swale has been assessed and confirmed as adequate to receive increased runoff without adverse effects, even under the 1% AEP with climate change allowance
j	The necessity to provide on-site retention basins to contain surface run-off where the capacity of the outfall is incapable of accepting flows, and where the outfall has limited capacity, any need to restrict the rate of discharge from the subdivision to the same rate of discharge that existed on the land before the subdivision takes place.	Not required. Modelling demonstrates that the receiving environment can safely accommodate flows without attenuation or flow restriction infrastructure.
k	Any adverse effects of the proposed subdivision on drainage to, or from, adjoining properties and mitigation measures proposed to control any adverse effects.	There is no increase in flood level or inundation extent on adjoining land. Catchment-specific modelling confirms effects less than minor.
l	In accordance with sustainable management practices, the importance of disposing of stormwater by way of gravity pipe lines. However, where topography dictates that this is not possible, the adequacy of proposed pumping stations put forward as a satisfactory alternative.	Complies.
m	The extent to which it is proposed to fill contrary to the natural fall of the country to obtain gravity outfall; the practicality of obtaining easements through adjoining owners' land to other outfall systems; and whether filling or pumping may constitute a satisfactory alternative.	N.A
n	For stormwater pipes and open waterway systems, the provision of appropriate easements in favour of either the registered user or in the case of the Council, easements in gross, to be shown on the survey plan for the subdivision, including private connections passing over other land protected by easements in favour of the user.	Proposed for Lot 2
o	Where an easement is defined as a line, being the centre line of a pipe already laid, the effect of any alteration of its size and the need to create a new easement.	Complies
p	For any stormwater outfall pipeline through a reserve, the prior consent of the Council, and the need for an appropriate easement.	N.A
q	The need for and extent of any financial contributions to achieve the above matters.	N.A
r	The need for a local purpose reserve to be set aside and vested in the Council as a site for any public utility required to be provided.	N.A