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?	NgāiTakoto iwi, Te Rarawa iwi, Ngāi Tohianga
Who else have you consulted with?	Discussions have been undertaken with a number of landowners - see assessment of environmental effects for more information.

*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: Far North District Council C/o Jared Olsen - Hoskin Civil Ltd

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: Makarena Dalton

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:

Property Address/ Location: Section 85 Block V Takahue Survey, Lot 1 Deposited Plan 168717 and Lot 1 Deposited Pl

Postcode 0410

8. Application Site Details

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

Name/s: Far North District Council

Site Address/ Location: Section 85 Block V Takahue Survey, Lot 1 Deposited Plan 168717 and Lot 1 Deposited Pl

Postcode 0410

Legal Description: Section 85 Block V Takahue Surve **Val Number:** N/A

Certificate of title: N/A

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.

N/A

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.

Public storm water network upgrades

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)** N/A # 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**

10. Other Consent required/being applied for under different legislation (more than one circle can be ticked):

O Building Consent (BC ref # if known)

O Regional Council Consent (ref # if known)

O National Environmental Standard consent

O Other (please specify)

11. 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 (further information in regard to this NES is available on the Council's planning web pages):

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)

O yes O no O don't know

Is the proposed activity an activity covered by the NES? (If the activity is any of the activities listed below, then you need to tick the 'yes' circle).

O yes O no O don't know

O Subdividing land

O Changing the use of a piece of land

O Disturbing, removing or sampling soil

O Removing or replacing a fuel storage system

12. 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.

Please attach your AEE to this application.

13. 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 all names in full) Far North District Council

Email:

Postal Address:

Phone Numbers:

[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: Mary Moore (please print)

Signat[redacted] (signature of bill payer – **mandatory**) Date: 14/03/2025

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) Makarena Dalton

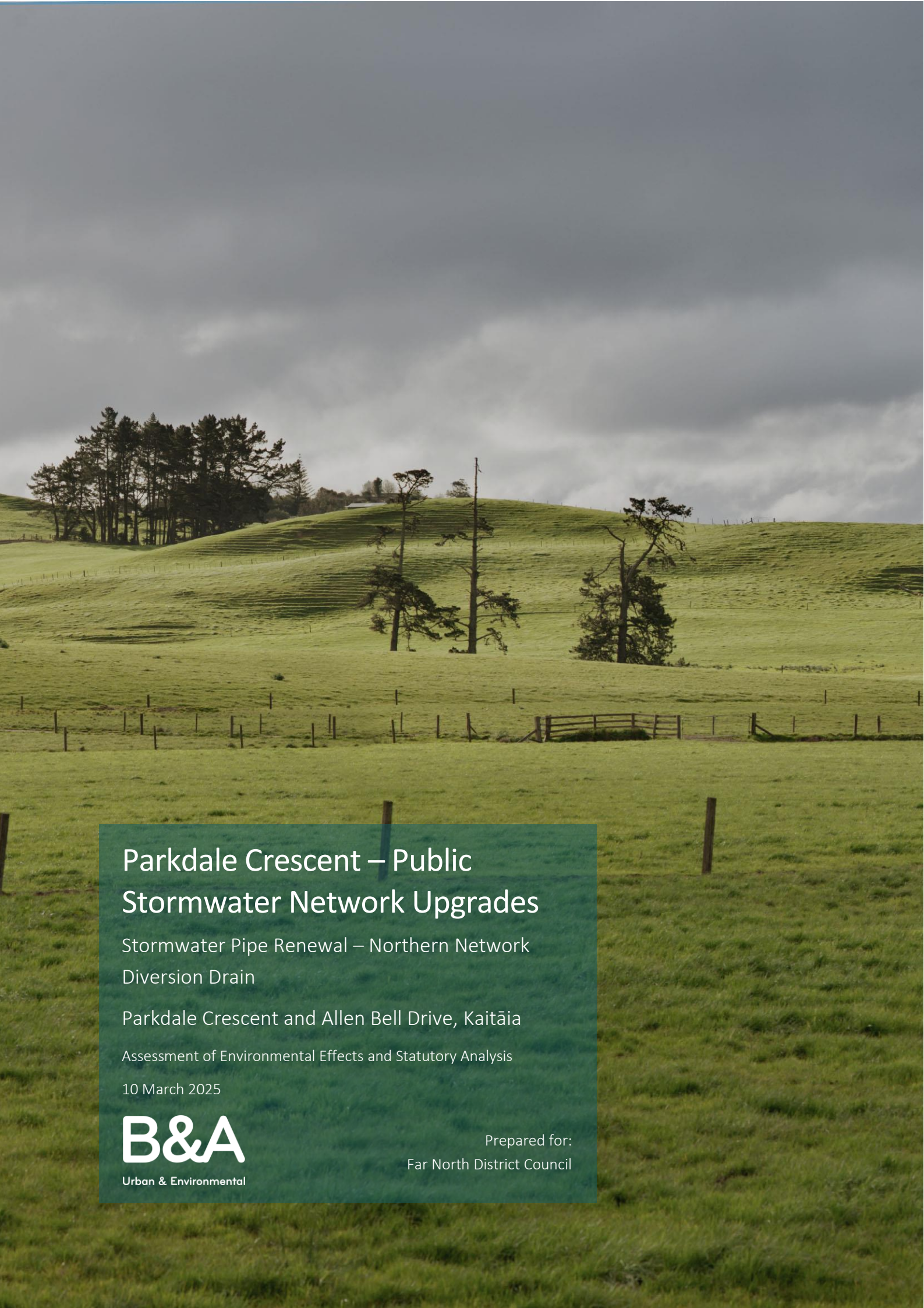
Signature: [redacted] **Date** 11-Mar-2025

A signature is not required if the application is made by electronic means

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.



Parkdale Crescent – Public Stormwater Network Upgrades

Stormwater Pipe Renewal – Northern Network Diversion Drain

Parkdale Crescent and Allen Bell Drive, Kaitāia

Assessment of Environmental Effects and Statutory Analysis

10 March 2025

B&A
Urban & Environmental

Prepared for:
Far North District Council

B&A Reference:

20734

Status:

Final Revision A

Date:

10 March 2025

Prepared by:

Magdalena Regnault

Senior Planner, Barker & Associates Limited

Reviewed by:

Makarena Dalton

Senior Associate, Barker & Associates Limited

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1.0 Applicant and Property Details

To:	Far North District Council
Site Address:	Road Reserve Parkdale Crescent and Allen Bell Drive, Kaitāia and the private properties legally described below.
Applicant Name:	Far North District Council – Infrastructure Strategy Department
Address for Service:	Barker & Associates Ltd 62 Kerikeri Road Kerikeri Attention: Makarena Dalton
Legal Description:	Section 85 Block V Takahue Survey, Lot 1 Deposited Plan 168717 and Lot 1 Deposited Plan 173052 (refer to Records of Title as **Appendix 1**)
Site Area:	Approximately 7,000m^2
Site Owner:	Far North District Council, Foy Farms Limited & Ken Lewis Limited
District Plan:	Operative Far North District Plan (OFNDP) Proposed Far North District Plan (PFNDP)
Operative Plan Zone	Rural Living Zone
Operative Plan Overlays & Controls:	N/A
Proposed Plan Zone:	Rural Residential Zone
Proposed Plan Overlays & Controls:	River Flood Hazard Zone 10, 50 and 100-year ARI Event
Locality Diagram:	Refer to **Figure 2**
Brief Description of Proposal:	Public stormwater network upgrades
Summary of Reasons for Consent:	OFNDP: Discretionary consent is required pursuant to rule 12.3.2.2 Earthworks and excavation within the Rural Living Zone. Consent is also sought pursuant to 8.7.5.3.6 Setback from Boundaries. A summary of reasons for consent is outlined in **Section 5** below. PFNDP: N/A

2.0 Overview

This report has been prepared in support of a resource consent application on behalf of the applicant, Far North District Council ('**FNDC**'), for public stormwater network upgrades at Allen Bell Drive, Kaitāia.

This Assessment of Environmental Effects ('**AEE**') has been prepared in accordance with the requirements of section 88 of and Schedule 4 to the Resource Management Act 1991 ('**the Act**') and is intended to provide the information necessary for a full understanding of the activity for which consent is sought and any actual or potential effects the proposal may have on the environment.

2.1 Background

The proposal has originated from the "Parkdale Crescent Stormwater Pipe – Northern Network – Pipe Renewals" project ('Pipe Renewal Project') which is proposes to upgrade and realign of approximately 220m of existing stormwater reticulation pipes that are currently in poor condition and located under existing dwellings, in the northern portion of Parkdale Crescent.

During the preliminary design of the Pipe Renewal Project, it was identified that significant diversion works will be required in order to keep the stormwater reticulation in service during construction.

The initial idea for the diversion works investigated the construction of a cofferdam and the regrading of the existing unlined channel along the eastern side of Allen Bell Drive. The intention was to create a unidirectional flow to the Awanui River as a temporary diversion. Further investigation of the temporary diversion works revealed that the diversion drain could be designed as a permanent solution to redirect some of the surface water flows from larger events away from the piped network, thereby reducing localized flooding in the area.

An initial concept design of the diversion drain has revealed that it is possible to regrade the existing unlined channel and culverts to the south enabling flow to into the Awanui River and away for the northern network inlet. The concept design also demonstrated that it is feasible to upgrade these structures and ensure there is capacity to handle a 100-year ARI storm event, with provisions for climate change and consideration of Awanui River tailwater, therefore eliminating the need for the Northern Pipe Network to convey and discharge surface water flows from the two larger northern and eastern catchments.

A consent is being sought from Northland Regional Council for earthworks across the wider site concurrently.

2.2 Pre-lodgement Consultation & Engagement

2.2.1 Landowners

The existing open drain along Allen Bell Drive now included in the proposal for redesign as a permanent solution for flood management purposes is contained within private land legally described as Lot 1 DP 168717 and Section 85 Block Takahue SD owned by Foy Farms Limited. There is no easement currently registered on the title to facilitate this.

Discussions with the Foys have been undertaken, and the preparation of the necessary legal instrument to facilitate the existing and proposed works are underway.

Works are also proposed within existing drainage easement (in gross) in favour of FNDC over the area marked 'Easement A' within Pt Lot 1 DP 173052 owned by Ken Lewis Limited indicated in pink in **Figure 1** below.

The terms of the easement (included in **Appendix 1**) grants FNDC the right to undertake the following which will facilitate the works proposed:

'drain storm and surface water along and through the drainage easement and for that purpose to enter into the said land for the purpose of constructing the necessary works including fencing, gates, culvert, piping and grassing'.

Regardless, consultation with the landowner has been undertaken to ensure they are aware of the proposed works and no concerns have been raised.

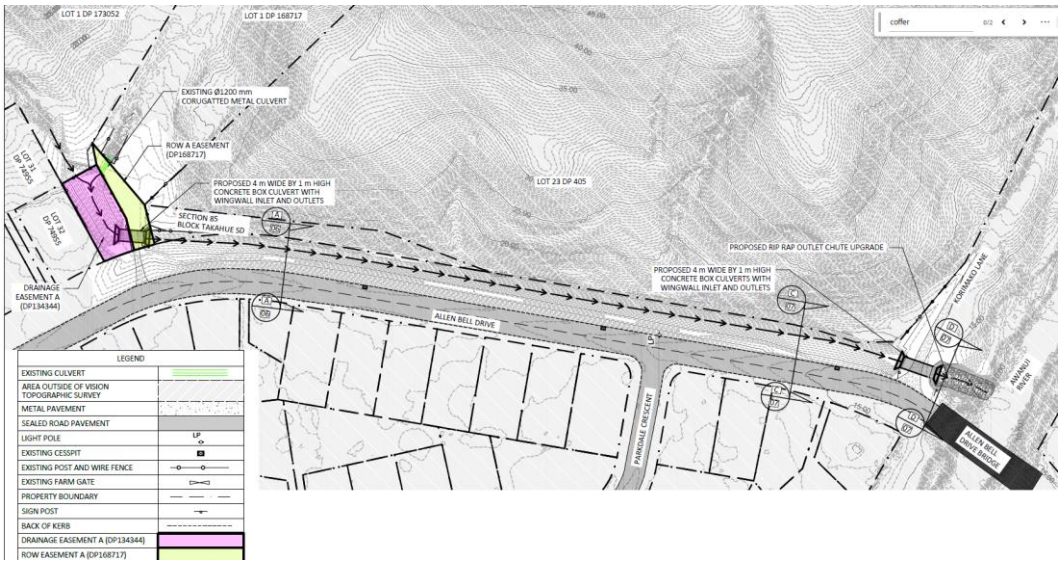


Figure 1: Existing site and servicing plans showing the existing drainage easement area in pink and location of existing open drain. Full scale drawings provided as Appendix 2.

2.2.2 Iwi Engagement

Pre-lodgement engagement was undertaken with NgāiTakoto iwi, Te Rarawa iwi and Ngāi Tohianga hapū prior to lodging the resource consent application. This comprised email correspondence with information regarding the project and site visits. In summary:

- Communications with Ngaitakoto representatives confirmed they were in support of the project particularly the improved outcome in terms of flooding impact on the community.
- Communications with Te Runanga o Te Rarawa Environmental representatives confirmed that the proposal was acceptable and that any adverse cultural effects would be less than minor.
- Communications with Oturu Marae representatives on behalf of Ngāi Tohianga hapū acknowledge the significant importance of the Awanui River including for its abundance Of kai, and also the Kerekere Pa locate within proximity to the proposed works. Further discussion to confirm any recommendations to ensure adverse effects on any cultural values are minimised are anticipated throughout the processing of these consent.

3.0 Site Context

3.1 Site Description

The site to which this application relates is located along the eastern side of Allen Bell Drive, extending approximately 350m northward from the Awanui River bridge as shown below in **Figure 2.**

Figure 2: Locality plan. Source: Emaps.

The area of works to which this Application relates to the Allen Bell Road Reserve and extends into three privately owned properties being Lot 1 DP 173052, Lot 1 DP 168717, Part Lot 23 DP 405 and Section 85 Block V Takahue Survey District (referred to hereon as '**the site'**) as shown in **Figure 2** above.

The topography of the site is predominantly flat to gently sloping, with contributing catchment hillslopes characterized by moderate to steep slopes. The eastern roadside berm on Allen Bell Drive currently slopes up from the physical road formation to the top of the western bank of the open channel with slopes up to approximately 17 degrees.

The existing open drain is covered with a mix of dense grass, weedy scrub, and small to medium sized trees. The grass-covered roadside berm, between the open channel and Allen Bell Drive, contains large trees sporadically spaced along its length. Upstream of the existing pipe network inlet, the area is generally covered with grass and weedy vegetation.

In terms of the Operative District Plan, the site is zoned Rural Living Zone and is not subject to any overlays or controls. In terms of the Proposed District Plan, the site is zoned Rural Residential and is subject to River Flood Hazard Zone 10- and 100-year ARI Event overlays.

3.2 Surrounding Locality

The site is located in to the eastern extent of the urban area of Kaitāia township.

North and east of the site, the area is categorised by large, rural allotments with undulating topography. There are a range of rural activities occurring within the surrounding area such as forestry as well as, the farming of livestock and produce. The remaining surrounding area to the south and west is otherwise residential in nature, typically accommodated within older, single unit dwellings and infill development.

In terms of nearby natural features, the Awanui River is located to the south of the site. The river spans approximately 30km, before flowing into the Rangauni Harbour.

4.0 Proposal

A detailed description of the proposed stormwater network upgrades is set out in the Flood Assessment Report and Concept Design prepared by Vision Consulting Engineers and included as **Appendix 3**. A summary of the key elements of the proposed works within the site is set out below.

- **Stormwater Upgrades:** The concept design is included as **Appendix 3** and is demonstrated within **Figure 2** below. The concept design details the following upgrades:
    - **Diversion Drain**: It is proposed to deepen and widen the existing open and unlined channel on the eastern side of Allen Bell Drive providing a levee on the western side of the Diversion Drain enabling the re-grading of the diversion drain to flow south to the Awanui River. Rip-Rap projection will be included at the outlet to prevent erosion and scour.
    - **Culverts:** The existing culverts will be removed and upgraded with two new 4m x 1m concrete box culverts with wingwall inlet and outlet. The third culvert will be decommissioned. The new culverts are sized to convey the 1% AEP + climate change storm event and the tail water associated with the 1% AEP Awanui River flood level. The culvert at the will be fitted with a flood gate.
- **Earthworks:** Land disturbance of approximately 2,882m^3 cut/fill over an area of 3,500m^2 is required to re-grade the channel to convey stormwater to the Awanui River, create a small bund to aid in containing the water within the channel and facilitate the works described above. Maximum cut depths and fill heights will not exceed 2.5m. These works are demonstrated within the Earthworks Plan prepared by Vision Consulting Engineers and included as **Appendix 4**.

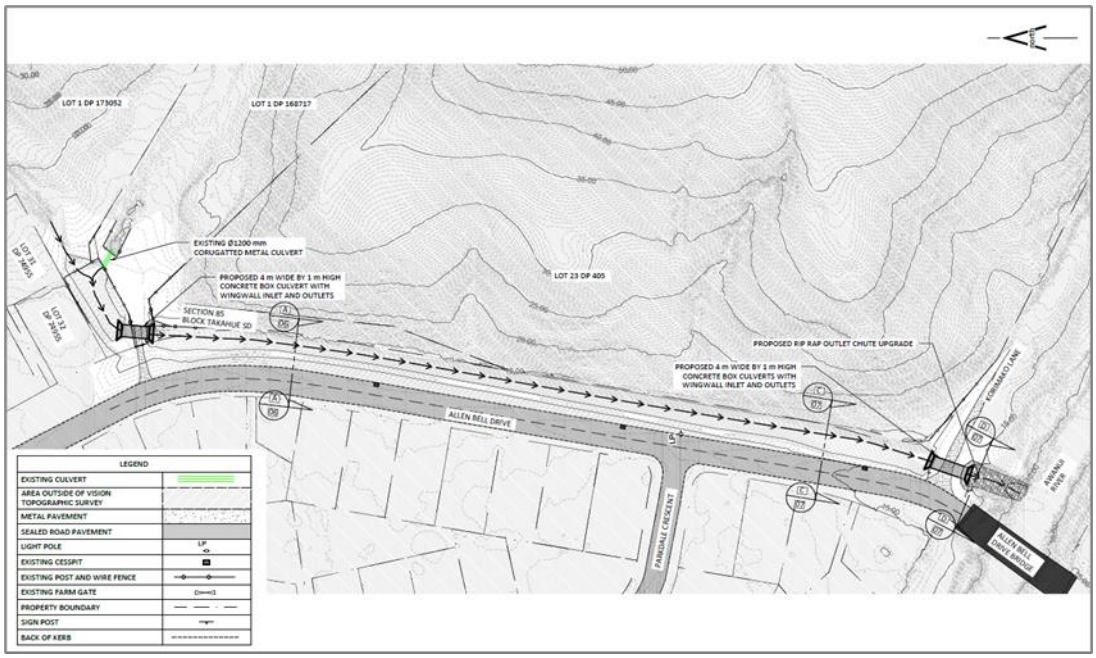


Figure 2: Stormwater Upgrades Concept Design. Source: Flood Assessment (Appendix 3).

5.0 Reasons for Consent

A rules assessment against the provisions of the Operative Far North District Plan ('OFNDP') and the Proposed Far North District Plan ('PFNDP') is attached as **Appendix 5.**

The proposal requires consent for the matters outlined below.

5.1 Operative Far North District Plan

Consent is sought for the following reasons:

- Pursuant to **Rule 12.3.2.2**, excavation and filling of approximately 2,882m^3 with a cut or fill face of approximately 2.4m in height in the Rural Living Zone is a **discretionary activity**.
- Pursuant to Rule 8.7.5.3.6, setback from boundary the northern most culvert straddles two properties that form part of the site and may not meet the necessary setback from road reserve (also part of the site) requiring **restricted discretionary** consent.

Overall consent is sought as a **discretionary activity**.

5.2 Proposed Far North District Plan

No rules with immediate legal effect trigger reasons for consent in accordance with section 96F of the RMA.

5.3 National Environmental Standard – Contaminated Soils

The NES Contaminated Soils were gazetted on 13th October 2011 and took effect on 1st January 2012.

The standards are applicable if the land in question is, or has been, or is more likely than not to have been used for a hazardous activity or industry and the applicant proposes to subdivide or change the use of the land, or disturb the soil, or remove or replace a fuel storage system.

The subject site is not mapped on Northland Regional Councils Selected Land Use register and there is no information that suggests that the sites have been used for any activities that are on the Hazardous Activities and Industry List (HAIL) or evidence of migration of hazardous substances from adjacent land use.

Based on the above, the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS) does not apply to the proposal.

5.4 National Environmental Standard for Freshwater

Resource consent is not required under the provisions of the National Environmental Standard for Freshwater ("NES-F").

5.5 Proposed Northland Regional Plan (PRP)

Resource consent will be sought concurrently from Northland Regional Council as necessary for bulk earthworks and stormwater discharge.

5.6 Activity Status

Overall, this application is for a discretionary activity.

6.0 Public Notification Assessment (Sections 95A, 95C and 95D)

6.1 Assessment of Steps 1 to 4 (Sections 95A)

Section 95A specifies the steps the council is to follow to determine whether an application is to be publicly notified. These are addressed in statutory order below.

6.1.1 Step 1: Mandatory public notification is required in certain circumstances

Step 1 requires public notification where this is requested by the applicant; or the application is made jointly with an application to exchange of recreation reserved land under section 15AA of the Reserves Act 1977.

The above does not apply to the proposal.

6.1.2 Step 2: If not required by step 1, public notification precluded in certain circumstances

Step 2 describes that public notification is precluded where all applicable rules and national environmental standards preclude public notification; or where the application is for a controlled activity; or a restricted discretionary, discretionary or non-complying boundary activity.

In this case, the applicable rules do not preclude public notification, and the proposal is not a controlled activity or boundary activity. Therefore, public notification is not precluded.

6.1.3 Step 3: If not required by step 2, public notification required in certain circumstances

Step 3 describes that where public notification is not precluded by step 2, it is required if the applicable rules or national environmental standards require public notification, or if the activity is likely to have adverse effects on the environment that are more than minor.

As noted under step 2 above, public notification is not precluded, and an assessment in accordance with section 95A is required, which is set out in the sections below. As described below, it is considered that any adverse effects will be less than minor.

6.1.4 Step 4: Public notification in special circumstances

If an application is not required to be publicly notified as a result of any of the previous steps, then the council is required to determine whether special circumstances exist that warrant it being publicly notified.

Special circumstances are those that are:

- Exceptional or unusual, but something less than extraordinary; or
- Outside of the common run of applications of this nature; or
- Circumstances which make notification desirable, notwithstanding the conclusion that the adverse effects will be no more than minor.

It is considered that there is nothing noteworthy about the proposal. It is therefore considered that the application cannot be described as being out of the ordinary or giving rise to special circumstances.

6.2 Section 95D Statutory Matters

In determining whether to publicly notify an application, section 95D specifies a council must decide whether an activity will have, or is likely to have, adverse effects on the environment that are more than minor.

In determining whether adverse effects are more than minor:

- Adverse effects on persons who own or occupy the land within which the activity will occur, or any land adjacent to that land, must be disregarded.

  The land to be excluded from the assessment is listed in section 6.3 below.

- Adverse effects permitted by a rule in a plan or national environmental standard (the 'permitted baseline') may be disregarded.

  In this case the permitted baseline considered relevant to this proposal are:

  - Earthworks with a maximum excavation and fill volume of 300m3 with a cut or fill height less than 1.5m; and

- Traffic movements associated with construction traffic.

- Trade competition must be disregarded.

This is not considered to be a relevant matter in this case.

- The adverse effects on those persons who have provided their written approval must be disregarded.

No persons have provided their written approval for this proposal.

The sections below set out an assessment in accordance with section 95D, including identification of adjacent properties, and an assessment of adverse effects.

6.3 Land Excluded from the Assessment

In terms of the tests for public notification (but not for the purposes of limited notification or service of notice), the adjacent properties to be excluded from the assessment are include 31, 31A, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53A, 55, 57 Allend Bell Drive.

6.4 Assessment of Effects on the Wider Environment

The following sections set out an assessment of wider effects of the proposal, and it is considered that effects in relation to the following matters are relevant:

- Land Disturbance and Construction Activities;
- Character and Amenity Effects;
- Flood Hazard;
- Cultural Effects; and
- Cumulative Effects.

These matters are set out and discussed below.

6.4.1 Land Disturbance and Construction Activities

Land disturbance of approximately 2,882m^3 cut/fill over an area of 3,500m^2 is required to deepen, widen and re-grade the existing channel to facilitate the works described in **Section 3**. These works are demonstrated within the Earthworks Plan prepared by Vision Consulting and included as **Appendix 4**.

In terms of timing and duration, the staging proposed in the Erosion and Sediment Control Plan (ESCP) prepared by Vision Consulting Engineers and included as **Appendix 4** demonstrates that earthworks will be undertaken within the construction season; from November to April. Avoidance of winter works will aid in reducing the risk of sediment generation and discharge from the site.

The ESCP includes the following control measures:

- Top soil and grass seeding: Top soil and grass seed will be applied to short – medium term stock piles. Seeding involves the planting and establishment of quick growing and/or perennial grass

to provide temporary and/or permanent stabilisation on exposed areas. The practice is usually undertaken in conjunction with the placement of topsoil.

- Geotextiles: Geotexiles and control blankets will be applied to disturbed areas to instantly reduce the potential for erosion. This practice involves the placement of geotextiles, mats, plastic covers or erosion control blankets to stabilise disturbed soil areas and protect soils from erosion by wind or water. In this context, geotextiles are permeable fabrics which, when used in association with soil, have the ability to stabilise and protect.
- Silt fences: Silt fences will be utilised to detain runoff flows and reduce the potential for the transport of sediment. Silt fences temporarily impound sediment-laden runoff, slowing down the flow rate and allowing sediment to settle out of the water.
- Silt socks: Silt socks will be used for small, flat and isolated catchment areas. The socks temporarily impound sediment-laden runoff, reducing the flow rate and allowing sediment to settle out of water.
- Stormwater inlet protection: Inlet protection will be installed around a catchpit to intercept and filter sediment-laden runoff before it enters a reticulated stormwater system. This measure will only be used in conjunction with other sediment control devices.

All sediment and control measures will be monitored for the duration of the bulk earthworks stage to ensure that the devices are performing as intended. This includes more thorough inspections to be undertaken at the end of each week before and after a forecast major storm event to identify any preventative and/or corrective maintenance required.

In terms of construction effects, it is acknowledged that the proposal involves widening and deepening the existing channel through earthworks cut, resulting in heavy vehicle movements to and from the site as well as heavy machinery utilised on site. It is anticipated the Construction Management Plan (CMP) will be required as a conditions of consent. The CMP will outline timeframes and duration of the works proposed. With regards to construction traffic related to the earthworks it is noted that there is sufficient space on the site to provide for parking for earthworks related construction vehicles. Further the stabilised access will ensure that any adverse effects on the roading network in regards to tracking dirt will be minimised. Traffic and parking capacity effects of the construction period will be able to be appropriately managed and will be temporary in nature.

For the reasons described above, adverse effects generated by the location, extent, timing and duration of earthworks proposed are considered to be temporary in nature with measures proposed to manage effects to a level that is less than minor.

6.4.2 Character and Amenity Effects

The site is an existing stormwater channel, accordingly, on-going maintenance of the channel is anticipated.

The existing open drain is covered with a mix of dense grass, weedy scrub, and small to medium sized trees. The grass-covered roadside berm, between the open channel and Allen Bell Drive, contains large trees sporadically spaced along its length.

Land disturbance to facilitate the stormwater upgrades will result in temporary exposure of soil, however, will be progressively stabilised with seed with no faces left exposed upon completion of the works. Trees located adjacent to the channel will be retained where possible. Upon

completion, the proposed works will result in an interface with Allen Bell Drive that is similar to, if not improved upon, the existing situation.

In terms of noise, construction noise will be generated by the proposal, particularly noise from vehicle movements and machinery to undertake the works. However, this is anticipated to comply with the relevant constructions noise standards. To ensure this is achieved, the provision of a CMP has been offered to ensure hours of operation and construction timeframes occur within suitable hours.

With respect to traffic movements and as set out in Section 6.2 of this report, traffic movements are exempt from the overall traffic generation calculations and are is considered relevant in terms of trip generation. This acknowledges the temporal nature of construction traffic on the character and amenity of the wider and immediate locality. Like construction noise, it is considered that construction traffic will be managed through the provision of a CMP to ensure effects on the localised environment will be managed.

On this basis, effects of the bulk earthworks are considered temporary, resulting in less than minor adverse effects on the character and amenity of the wider environment.

6.4.3 Flooding Hazard

The proposed upgrade of the channel is part of a broader stormwater management strategy aimed at reducing the risk of flooding in the area. As described in Section 3, the site is located within the mapped Flood Hazard area. The potential effects on the flood hazard have been considered within the Flood Assessment Report prepared by Vision Consulting Engineers and included as Appendix 3. In summary, the report confirms that the proposed works will reduce the flood extent when compared to the existing scenario.

The Flood Assessment Report confirms that the proposed works eliminate predicting flooding within Parkdale Cresent, a small additional flow (4.33 m3 /s) into the Awanui River under worse-case conditions where peak river level coincides with the peak flow will occur. It is highlighted however that this scenario is predicted to increase the river's peak flood height by 0.047 metres upstream of the Allen Bell Drive Bridge

When considering the above, in particular the improvement to Parkdale Cresent it is considered that overall the potential flooding effects will be less than minor.

6.4.4 Ecological Effects

The site is an existing stormwater channel, on-going maintenance of the channel is anticipated.

In terms of ecological effects, Vision notes that the overall catchment area and its characteristics will remain unchanged. There will be no significant alterations to land use or zoning (primarily farmland, scattered trees, and residential areas with roads). Therefore, the type of stormwater runoff, including potential pollutants, is expected to remain the same as with existing conditions.

Since there's no change in catchment size, type, or land use, the overall impact on water quality at the Awanui River outlet is expected to be negligible (net zero effect). While the upgraded channel and piped network will improve stormwater management and reduce flooding risks, they are not anticipated to introduce new pollutants or increase existing ones in the stormwater system.

For the above reason, effects on freshwater ecology are considered to be less than minor.

6.4.5 Cultural Effects

The application site is not located within an identified area of cultural significance to Māori or have any notations that indicate the site contains sensitive archaeological material.

Notwithstanding the above, Ngāi Takoto and Te Rarawa are recognised as holding a statutory acknowledgement over the Awanui River. It is recognised that the Awanui River is located in close proximity to the site and while the proposal is to upgrade an existing discharge to the waterbody it is recognised that runoff from the site has the potential to reach the Awanui.

Engagement has been undertaken with NgāiTakoto iwi, Te Rarawa iwi and Ngāi Tohianga hapū prior to lodging the resource consent application. A summary of the discussions to date is provided in Section 2.2.2.

Further consultation with Ngāi Tohianga hapū via Oturu Marae representative will be undertaken during the processing of the consent to confirm to identify any necessary next steps to understand if there are any adverse effects on cultural values associated with the area of works that need further consideration noting the following mitigation measures included as part of the application:

- Comprehensive Erosion and sediment control measures including those identified in Section 6.4.1 to mitigate the potential for any adverse effects on the water quality of the Awanui River; and
- Requirement to comply with the accidental discovery protocols under the Heritage New Zealand Pouhere Taonga Act 2014 will stop works and enable suitable engagement to be undertaken as required.

6.4.6 Cumulative Effects

Cumulative adverse effects have the potential to arise as a result of the bulk earthworks in combination with potential stormwater runoff. However, in this instance, it is considered that the proposal involves sufficient mitigation measures to manage the effects of the proposed works. In particular, the detailed erosion and sediment control measures in combination with temporary stormwater runoff and treatment devices designed to direct and treat any runoff. Further, the CMP will ensure construction works will be undertaken in a manner that are acceptable to avoid generating effects that have potential to create nuisance to surrounding properties or cause damage to the local transport network.

Taking into account the mitigation and monitoring measures proposed, cumulative adverse effects are considered to be less than minor.

6.5 Summary of Effects

Overall, it is considered that any adverse effects on the environment relating to this proposal will be less than minor.

6.6 Public Notification Conclusion

Having undertaken the section 95A public notification tests, the following conclusions are reached:

- Under step 1, public notification is not mandatory;
- Under step 2, public notification is not precluded;

- Under step 3, public notification is not required as it is considered that the activity will result in less than minor adverse effects; and
- Under step 4, there are no special circumstances.

Therefore, based on the conclusions reached under steps 3 and 4, it is recommended that this application be processed without public notification.

7.0 Limited Notification Assessment (Sections 95B, 95E to 95G)

7.1 Assessment of Steps 1 to 4 (Sections 95B)

If the application is not publicly notified under section 95A, the council must follow the steps set out in section 95B to determine whether to limited notify the application. These steps are addressed in the statutory order below.

7.1.1 Step 1: Certain affected protected customary rights groups must be notified

Step 1 requires limited notification where there are any affected protected customary rights groups or customary marine title groups; or affected persons under a statutory acknowledgement affecting the land.

The above applies to this proposal. Ngāi Takoto and Te Rarawa are recognised as holding a statutory acknowledgement over the Awanui River. Both iwi have indicated via representatives that they support the proposal, accordingly they are not considered affected.

7.1.2 Step 2: If not required by step 1, limited notification precluded in certain circumstances

Step 2 describes that limited notification is precluded where all applicable rules and national environmental standards preclude limited notification; or the application is for a controlled activity (other than the subdivision of land).

In this case, the applicable rules do not preclude limited notification and the proposal is not a controlled activity. Therefore, limited notification is not precluded.

7.1.3 Step 3: If not precluded by step 2, certain other affected persons must be notified

Step 3 requires that, where limited notification is not precluded under step 2 above, a determination must be made as to whether any of the following persons are affected persons:

- In the case of a boundary activity, an owner of an allotment with an infringed boundary;
- In the case of any other activity, a person affected in accordance with s95E.

The application is not for a boundary activity, and therefore an assessment in accordance with section 95E is required and is set out below.

Overall, it is considered that any adverse effects on persons will be less than minor, and accordingly, that no persons are adversely affected.

7.1.4 Step 4: Further notification in special circumstances

In addition to the findings of the previous steps, the council is also required to determine whether special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined as eligible for limited notification.

In this instance, having regard to the assessment in section 6.1.4 above, it is considered that special circumstances do not apply.

7.2 Section 95E Statutory Matters

If the application is not publicly notified, a council must decide if there are any affected persons and give limited notification to those persons. A person is affected if the effects of the activity on that person are minor or more than minor (but not less than minor).

In deciding who is an affected person under section 95E:

- Adverse effects permitted by a rule in a plan or national environmental standard (the 'permitted baseline') may be disregarded;
- Only those effects that relate to a matter of control or discretion can be considered (in the case of controlled or restricted discretionary activities); and
- The adverse effects on those persons who have provided their written approval must be disregarded.

These matters were addressed in section 6.2 above.

Having regard to the above provisions, an assessment is provided below.

7.3 Assessment of Effects on Persons

Wider effects, such as land disturbance and construction activities, character and amenity effects, flood hazard, cultural effects and cumulative effects were considered in section 6.4 above, and considered to be less than minor. The same conclusions are considered to apply in a localised context. In particular:

- Ngāi Takoto and Te Rarawa are recognised as holding a statutory acknowledgement over the Awanui River. Both iwi have indicated via representatives that they support the proposal, accordingly they are not considered affected by this proposal.
- Lot 1 DP 173052 and Lot 1 DP 168717, Part Lot 23 DP 405, and Section 85 Block V Takahue Survey District form part of the application site and it highlighted that the necessary easement are in place in the case of Lot 1 DP 173052 and agreed/underway with the owners of Lot 1 DP 168717, Part Lot 23 DP 405, and Section 85 Block V Takahue Survey District. Accordingly effects on these properties do not need to be considered further.
- It is anticipated that a CMP required as a condition of consent will ensure detail the timeframes, duration, noise, traffic, and hours of operation of the works to manage any construction effects generated by the proposal. Further, the effects generated by construction works are considered to be temporary in nature and with noise anticipated to comply with the permitted activity standards of the zone. With respect to construction traffic and taking into account the

permitted baseline, there is sufficient area within the site to accommodate construction vehicles and the vehicle access will be stabilised to manage effects on the roading network;

- In terms of character and amenity, the proposal is to maintain and improve an existing stormwater channel. The proposal will not significantly change the outlook for properties within the surrounding area. However, as described above the site will be progressively stabilised with grass and trees will be retained where possible.
- Land disturbance and construction effects were considered in section 6.4.1 and were concluded as less than minor.
- Stormwater quality and flood hazard effects were considered in section 6.4.2 and were concluded as less than minor.
- Cumulative effects are considered to be suitably managed by the mitigation measures proposed and detailed in the erosion and sediment control plan included as **Appendix 5.**

7.3.1 Summary of Effects

Taking the above into account, it is considered that there are no adversely affected persons in relation to this proposal.

7.4 Limited Notification Conclusion

Having undertaken the section 95B limited notification tests, the following conclusions are reached:

- Under step 1, limited notification is not mandatory;
- Under step 2, limited notification is not precluded;
- Under step 3, limited notification is not required as it is considered that the activity will not result in any adversely affected persons; and
- Under step 4, there are no special circumstances.

Therefore, it is recommended that this application be processed without limited notification.

8.0 Consideration of Applications (Section 104)

8.1 Statutory Matters

Subject to Part 2 of the Act, when considering an application for resource consent and any submissions received, a council must, in accordance with section 104(1) of the Act have regard to:

- Any actual and potential effects on the environment of allowing the activity;
- Any relevant provisions of a national environmental standard, other regulations, national policy statement, a New Zealand coastal policy statement, a regional policy statement or proposed regional policy statement; a plan or proposed plan; and
- Any other matter a council considers relevant and reasonably necessary to determine the application.

As a discretionary activity, section 104B of the Act states that a council:

(a) may grant or refuse the application; and

(b) if it grants the application, may impose conditions under section 108.

8.2 Weighting of Proposed Plan Changes: Proposed FNDP

The Act requires that before a proposed plan becomes operative, any resource consent application is considered in terms of the provisions of both the operative plan and the proposed plan.

With regard to the assessment of an application for resource consent and the decision-making process, where an application is being assessed under both an operative plan and a proposed plan, it is standard practice to establish a weighting of the plans. Case law indicates that more weight should generally be placed on the controls of an operative plan until such time as a proposed plan has advanced sufficiently through the statutory process, although this is not the only criterion.

Weighting only becomes relevant in the event different outcomes arise from assessments of objectives and policies under the operative and proposed plans.

On the 27th July 2022 FNDC notified their FNPDP), at the time of preparing this AEE, only rules identified as having immediate legal effect have been considered. This will remain the case until FNDC releases a decision on the FNPDP (this will occur once hearings have been completed).

Evaluation of the objectives and policies of the FNODP and FNPDP is provided in Section 10.2 and 10.3 of this report. While there are some differences noted, it is considered that the proposal is not contrary to the FNPDP and it is considered that the proposal is consistent with both sets of provisions. Accordingly, 'weighting' has not been considered necessary, and has not been applied.

9.0 Effects on the Environment (Section 104(1)(A))

Having regard to the actual and potential effects on the environment of the activity resulting from the proposal, it was concluded in the assessment above that any wider adverse effects relating to the proposal will be less than minor and that no persons would be adversely affected by the proposal.

Further, it is considered that the proposal will also result in positive effects including facilitating improvements to the existing situation as it relates to flooding.

Overall, it is considered that when taking into account the positive effects, any actual and potential adverse effects on the environment of allowing the activity are acceptable.

10.0 District Plan and Statutory Documents (Section 104(1)(B))

10.1 Northland Regional Policy Statement

The Northland Regional Policy Statement (**RPS**) covers the management of natural and physical resources across the Northland region. The provisions within the RPS give guidance at a higher planning level in terms of the significant regional issues. As such it does not contain specific rules that trigger the requirement for consent but rather give guidance to consent applications on a regional level.

Amongst other things, the RPS presents policies regarding improving overall water quality (Policy 4.2.1), maintaining and protecting significant ecological areas and habitats (Policy 4.4.1), promoting active management (Policy 4.7.1) and planned and coordinated development (Policy 5.5.1) which are relevant for the consideration of the proposed works.

The strategic policy direction in the RPS is to regulate earthworks to minimise erosion and discharge of sediment to water. Given the application seeks consent for earthworks with appropriate erosion and sediment control measures to ensure sediment laden runoff reaching receiving waters is minimised, it is considered that the proposed development satisfies the relevant objectives and policies for development within the Northland Region.

For these reasons, it is considered that the proposal is consistent with the relevant RPS provisions.

10.2 Proposed Northland Regional Plan

10.2.1 Chapter D – Land and Water

10.2.1.1 D.4.31 Managing the Effects of Land-Disturbing Activities

Earthworks, vegetation clearance and cultivation must:

(1) be done in accordance with established good management practices, and

(2) avoid significant adverse effects, and avoid, remedy or mitigate other adverse effects on:

(a) human drinking water supplies, and

(b) areas of high recreational use, and

(c) aquatic receiving environments that are sensitive to sediment or phosphorus accumulation.

It is proposed to undertake works in accordance with the Erosion and Sediment Control Plan included as Appendix 5. Adherence to the plan will manage any sediment laden runoff for the duration of the activity ensure that any stormwater discharge will be contained within the subject site and appropriately managed to minimise any risk of soil erosion, or surface or groundwater contamination. For these reasons, it is considered that the proposal is will not be contrary to the expected outcomes of the PNRP.

10.2.1.2 D.4.21 Land Drainage

Land drainage activities that require consent must:

(1) maintain bed and bank stability, and

(2) ensure that peatlands are not adversely affected, and

(3) ensure that significant adverse effects on groundwater levels are avoided, and

(4) ensure the effects of ground subsidence from dewatering are avoided, or where avoidance is not possible, remedied or mitigated, and

(5) maintain the values of natural wetlands, and

(6) maintain existing fish passages and where possible, encourage development of new fish passage opportunities.

The subject site does not include any freshwater features such as wetlands or streams. The stormwater discharge to the Awanui River is not anticipated to result in instability of the river bank. No dewatering is proposed as a part of the proposal. For these reasons, it is considered that the proposal is will not be contrary to the expected outcomes of the PNRP.

10.3 Objectives and Policies of the Operative Far North District Plan

10.3.1 Chapter 12.3 – Soils and Minerals

12.3.3.1 To achieve an integrated approach to the responsibilities of the Northland Regional Council and Far North District Council in respect to the management of adverse effects arising from soil excavation and filling, and minerals extraction.

12.3.3.2 To maintain the life supporting capacity of the soils of the District.

12.3.3.3 To avoid, remedy or mitigate adverse effects associated with soil excavation or filling.

12.3.3.4 To enable the efficient extraction of minerals whilst avoiding, remedying or mitigating any adverse environmental effects that may arise from this activity.

12.3.4.1 That the adverse effects of soil erosion are avoided, remedied or mitigated.

12.3.4.4 That soil excavation and filling, and mineral extraction activities be designed, constructed and operated to avoid, remedy or mitigate adverse effects on people and the environment.

It is considered that the proposed earthworks will be consistent with these objectives and policies of the FNDP as the works have been designed and located to incorporate best practice erosion and sediment control measures, including silt fences, socks, stormwater inlet protection and monitoring for the duration of the works. The existing situation being a stormwater channel, does not provide for life supporting capacity of the soil.

The proposed works are not considered contrary to the anticipated outcomes of the FNDP.

10.4 Objectives and Policies of the Proposed Far North District Plan

10.4.1 Part 2 – District Wide Matters – General District Wide Matters - Earthworks

EW-O1 Earthworks are enabled where they are required to facilitate the efficient subdivision and development of land, while managing adverse effects on waterbodies, coastal marine area, public safety, surrounding land and infrastructure.

EW-O2 Earthworks are appropriately designed, located and managed to protect historical and cultural values, natural environmental values, preserve amenity and safeguard the life-supporting capacity of soils.

EW-O3 Earthworks are undertaken in a manner which does not compromise the stability of land, infrastructure and public safety.

EW-P1 Enable earthworks necessary to provide for the district's social, economic and cultural well-being, and their health and safety where they provide for:

a. urban land uses and development within urban zones;

b. *rural land uses and development including, farm tracks, land drainage, and other farming activities within the Rural zones;*

c. *conservation and recreation activities;*

d. *land drainage and flood control works; and*

e. *installation, upgrade and maintenance of infrastructure.*

EW-P5 Manage effects on historic heritage and cultural values that may be discovered when undertaking earthworks by:

a. *requiring a protocol for the accidental discovery of archaeology, kōiwi and artefacts of Māori origin; and*

b. *undertaking appropriate actions in accordance with mātauranga and tikanga Māori when managing effects on cultural values.*

EW-P6 Require that all earthworks are designed and undertaken in a manner that ensures the stability and safety of surrounding land, buildings or structures.

As noted throughout this report, there are no mapped sites of significance to Māori, heritage resources or other sensitive natural environment features that indicate specific measures that require avoidance as part of the earthworks design. The site is an existing stormwater channel located within the legal road and the Rural Residential Zone. Accordingly, on-going maintenance of the channel is anticipated. Taking into account mitigation proposed, technical advice and lack of mapped features over the site, it is considered the proposal is consistent with the objectives and policies of the FNPDP.

10.5 Summary

It is considered that the proposed development is generally in accordance with the objectives and policies of the Northland Regional Policy Statement, Proposed Northland Regional Plan, and Operative and Proposed Far North District Plans.

11.0 Part 2 Matters

Section 5 of Part 2 identifies the purpose of the RMA as being the sustainable management of natural and physical resources. This means managing the use, development and protection of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being and health and safety while sustaining those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

Section 6 of the Act sets out a number of matters of national importance including (but not limited to) the protection of outstanding natural features and landscapes and historic heritage from inappropriate subdivision, use and development.

Section 7 identifies a number of “other matters” to be given particular regard by Council and includes (but is not limited to) Kaitiakitanga, the efficient use of natural and physical resources, the maintenance and enhancement of amenity values, and maintenance and enhancement of the quality of the environment.

Section 8 requires Council to take into account the principles of the Treaty of Waitangi.

Overall, as the effects of the proposal are considered to be acceptable, and the proposal accords with the relevant Proposed Northland Regional Plan objectives and policies, it is considered that the proposal will not offend against the general resource management principles set out in Part 2 of the Act.

12.0 Other Matters (Section 104(1)(C))

12.1 Other Approvals

A resource consent application has been prepared seeking resource consent from the Northland Regional Council. It is considered that this process can occur in parallel with the resource consent application sought from Far North District Council.

12.2 Record of Title Interests

The site to which this application relates comprises multiple Record of Title which are subject to a number of interests (refer **Appendix 1**). Those of interest/relevance are discussed in **Table 1** below:

Table 1: Record of Title interests

Interest	Comment
Record of Title identifier NA105B/60 (Lot 1DP 173052, Ken Lewis Limited)	
Subject to a drainage right (in gross) over part marked A in Favour of Far North District Council.	Part of the proposed works will take place in Easement A, see comments **Section 2.2.2** re: consultation with landowners.
Record of Title identifier NA102C/738 (Lot 1 DP 168717, Foy Farms)	
221 Consent Notice - C94788	A Consent Notice pursuant to Section 221(1) Resource Management Act applies to Lot 1 DP 168717. The consent notice relates to the formation of a right-of-way at the time of any application to erect a dwelling at the site. The proposed application will not impede on access to the site.

13.0 Conclusion

The proposal involves public stormwater network upgrades at Parkdale Crescent and Allen Bell Drive. Based on the above report it is considered that:

- Public notification is not required as adverse effects in relation to land disturbance, construction activities, flood hazard, character and amenity, cultural and cumulative effects are considered to be less than minor. There are also positive effects including improving the existing situation as it relates to reducing the flood extent;
- Limited notification is not required as effects to all persons are less than minor;

- The proposal accords with the relevant RPS, PNRP, FNODP and FNPDP objectives and policies; and
- The proposal is considered to be consistent with Part 2 of the Act.

It is therefore concluded that the proposal satisfies all matters the consent authority is required to assess, and that it can be granted on a non-notified basis.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **1090108**

Land Registration District **North Auckland**

Date Issued 16 September 2022

Prior References

NA50B/447 NA50B/454

Estate Fee Simple

Area 908 square metres more or less

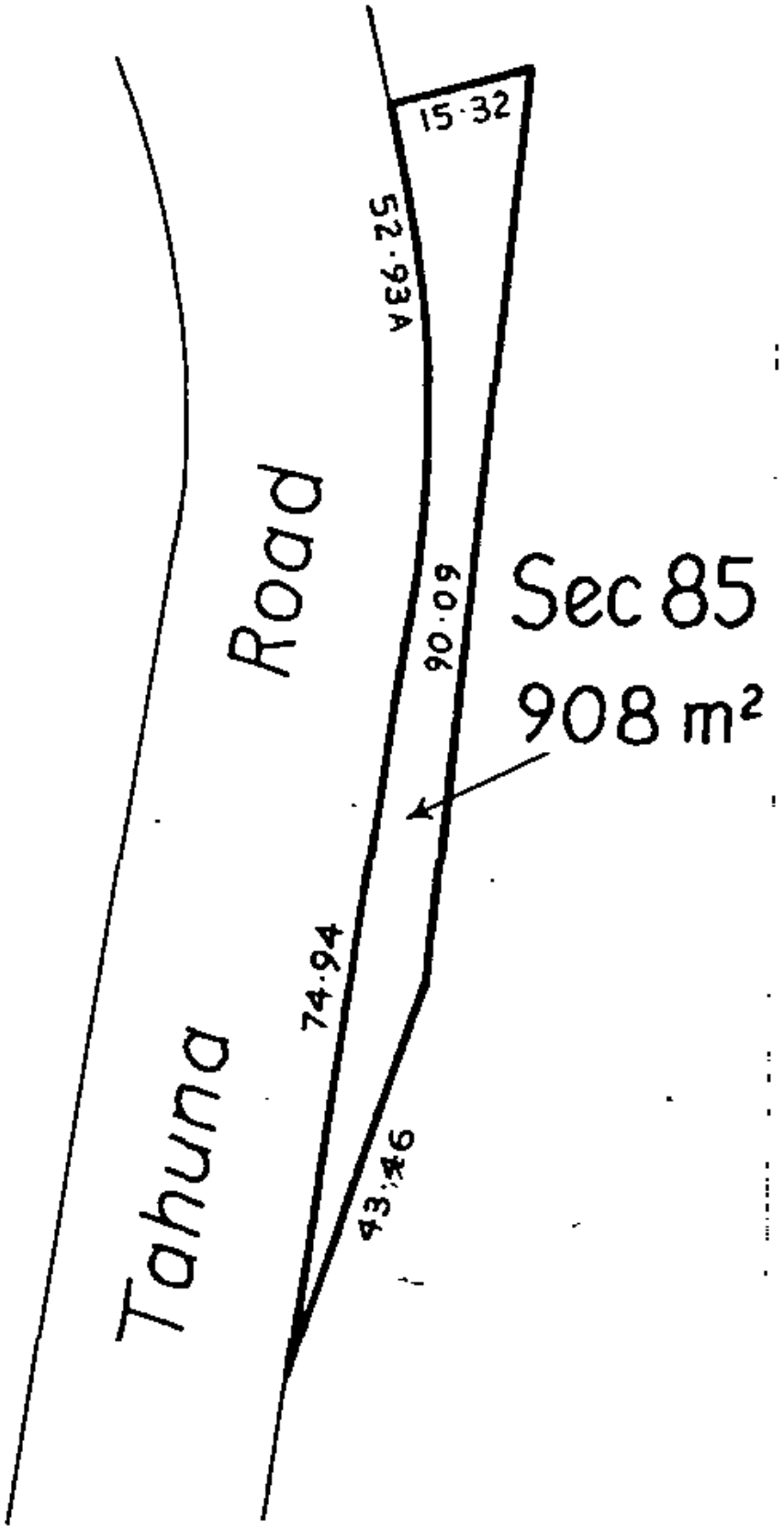
Legal Description Section 85 Block V Takahue Survey District

Registered Owners

Foy Farms Limited

Interests

12557834.4 Mortgage to ANZ Bank New Zealand Limited - 16.9.2022 at 12:12 pm


15·32
52·93A
Road
90·09
Sec 85
908 m²
74·94
Tahuna
43·46

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**NA102C/738**
Land Registration District	**North Auckland**
Date Issued	30 January 1996

Prior References
NA64B/189

Estate	Fee Simple
Area	4.9797 hectares more or less
Legal Description	Lot 1 Deposited Plan 168717
Registered Owners	

Foy Farms Limited

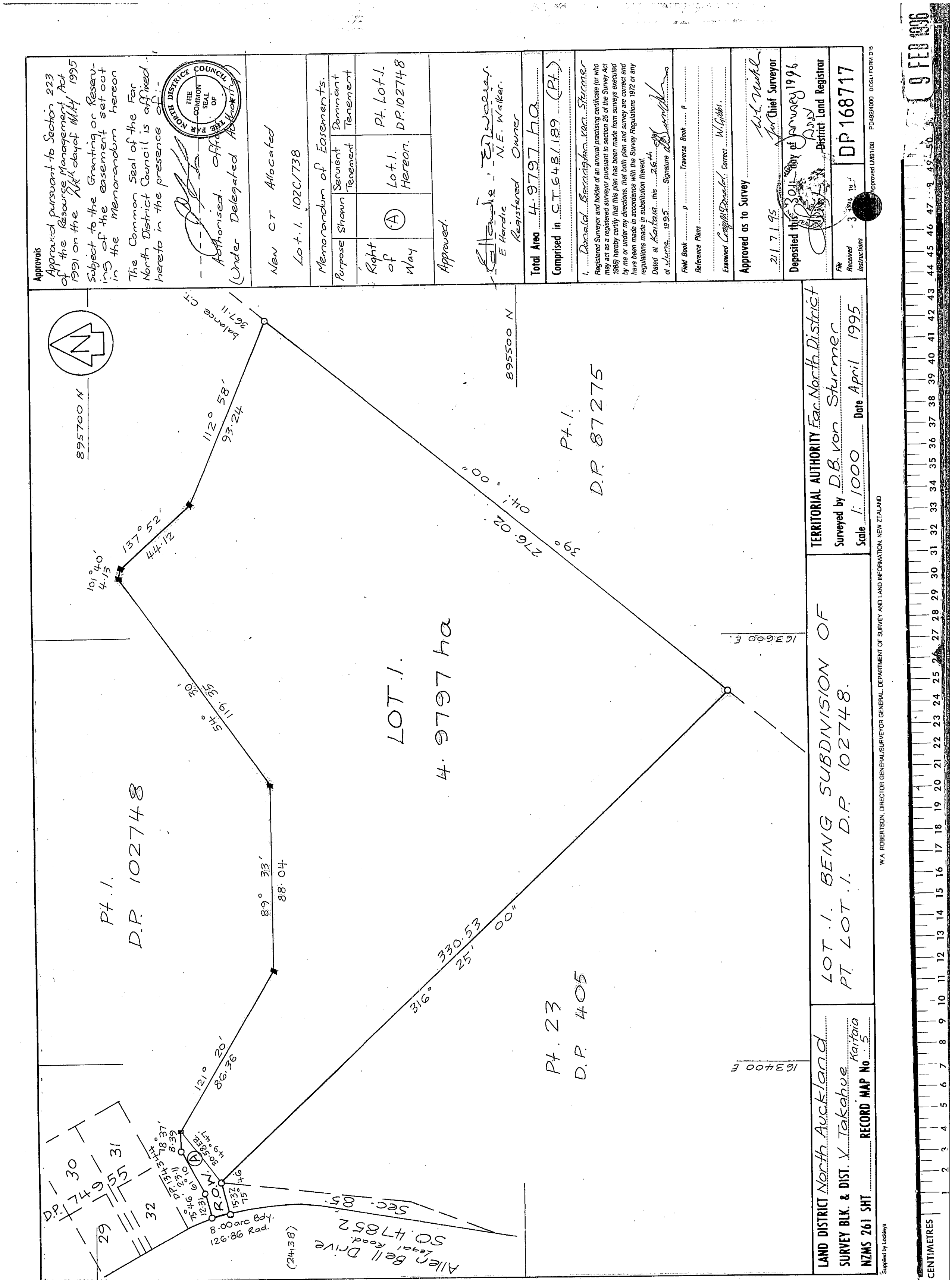
Interests

C947883.2 Consent Notice pursuant to Section 221(1) Resource Management Act 1991 - 30.1.1996 at 9.08 am

Subject to a right of way over part marked A on DP 168717 specified in Easement Certificate C947883.4 - 30.1.1996 at 9.08 am

The easements specified in Easement Certificate C947883.4 are subject to Section 243 (a) Resource Management Act 1991

12557834.4 Mortgage to ANZ Bank New Zealand Limited - 16.9.2022 at 12:12 pm



LOT 1.
4.9797 ha
Pt. 1.
D.P. 102748
Pt. 1.
D.P. 87275
Pt. 23
D.P. 405
Allen Bell Drive
SO. 47852
R.O.W.
New CT Allocated
Lot. 1. 102C/738
Memorandum of Easements.
Purpose
Shown
Servient Tenement
Dominant Tenement
Right of Way
A
Lot. 1. Hereon.
Pt. Lot. 1. DP. 102748
Approved.
Registered Owner
Total Area 4.9797 ha
Comprised in CT 64B/189 (Pt.)
TERRITORIAL AUTHORITY Far North District
Surveyed by D.B. von Sturmer
Scale 1:1000
Date April 1995
LAND DISTRICT North Auckland
SURVEY BLK. & DIST. V Takahue
LOT 1. BEING SUBDIVISION OF PT. LOT. 1. D.P. 102748.
Approved as to Survey
Chief Surveyor
Deposited this 30th day of January 1996
District Land Registrar
DP 168717
9 FEB 1996
CENTIMETRES

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **NA105B/60**

Part-Cancelled

Land Registration District **North Auckland**

Date Issued 30 January 1996

Prior References
NA64B/189

Estate Fee Simple

Area 62.6293 hectares more or less

Legal Description Lot 1 Deposited Plan 173052

Registered Owners
Ken Lewis Limited

Interests

Subject to a drainage right (in gross) over part marked A on Plan 134344 in favour of the Far North District Council created by Transfer C402061.1

Subject to a right of way over part marked A on Plan 154031 created by Transfer C471903.1

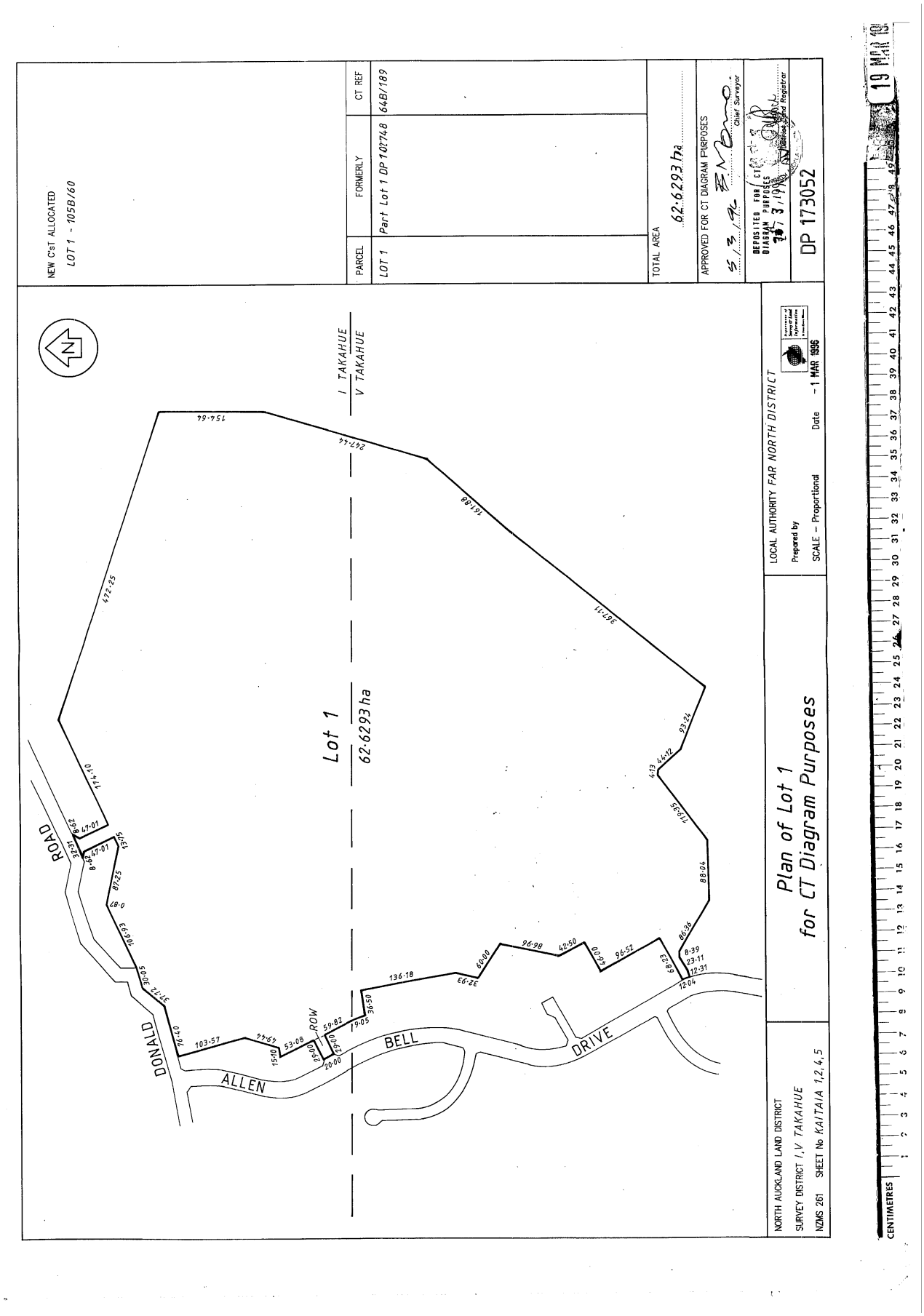
Appurtenant hereto is a right of way specified in Easement Certificate C947883.4 - 30.1.1996 at 9.08 am

The easements specified in Easement Certificate C947883.4 are subject to Section 243 (a) Resource Management Act 1991

5589887.1 STATUTORY LAND CHARGE PURSUANT TO SECTION 162 RATING POWERS ACT 1988 - 16.5.2003 at 9:00 am

8855394.1 Gazette 2011 page 3596 declares Section 1 SO 416315 is acquired for water storage and is vested in Far North District Council. CIR 564975 issued - 5.9.2011 at 7:00 am

Subject to a right of way easement in gross over parts marked A and C on SO 416315 and a right to convey water, electricity, telecommunications and computer media easement in gross over parts marked A and B on SO 416315 in favour of Far North District Council created by Gazette Notice 8855394.1 - 5.9.2011 at 7:00 am


NEW C'ST ALLOCATED
LOT 1 - 105B/60
PARCEL
FORMERLY
CT REF
LOT 1
Part Lot 1 DP 10748
64B/189
TOTAL AREA
62.6293 ha
APPROVED FOR CT DIAGRAM PURPOSES
Chief Surveyor
DEPOSITED FOR CT DIAGRAM PURPOSES
Land Registrar
DP 173052
I TAKAHUE
V TAKAHUE
Lot 1
62.6293 ha
ROAD
DONALD
ALLEN
BELL
DRIVE
ROW
Plan of Lot 1
for CT Diagram Purposes
LOCAL AUTHORITY FAR NORTH DISTRICT
Prepared by
SCALE – Proportional
Date - 1 MAR 1996
NORTH AUCKLAND LAND DISTRICT
SURVEY DISTRICT I, V TAKAHUE
NZMS 261 SHEET No KAITAIA 1,2,4,5
CENTIMETRES
19 MAR 96

Land and Easement Acquired—Donald Road, Kaitaia, Far North District

Pursuant to sections 20 and 28 of the Public Works Act 1981, and to a delegation from the Minister for Land Information, Ainslie Drysdale, Land Information New Zealand, declares that, pursuant to an agreement to that effect having been entered into:

(a) The land described in the First Schedule to this notice is acquired for water storage and is vested in the Far North District Council;

(b) A right of way easement in gross is acquired over the land described in the Second Schedule to this notice upon terms and conditions described in the Fourth Schedule to this notice vesting in the Far North District Council;

(c) A right to convey water, electricity, telecommunications and computer media easement in gross is acquired over the land described in the Third Schedule to this notice upon terms and conditions described in the Fourth Schedule to this notice vesting in the Far North District Council

on the date of publication hereof in the *New Zealand Gazette*.

North Auckland Land District—Far North District

First Schedule

Land Acquired for Water Storage

Area m^2	Description
1765	Part Lot 1 DP 173052; shown as Section 1 on SO 416315 (part Computer Freehold Register NA105B/60).

Second Schedule

Easement to be Acquired

	Description
—	Part Lot 1 DP 173052; marked "A" and "C" on SO 416315 (part Computer Freehold Register NA105B/60).

Third Schedule

Easement to be Acquired

	Description
—	Part Lot 1 DP 173052; marked "A" and "B" on SO 416315 (part Computer Freehold Register NA105B/60).

Fourth Schedule

Terms of Easements

The rights and powers implied shall be those set out in the standard provisions of Schedule 4 of the Land Transfer Regulations 2002 and Schedule 5 of the Property Law Act 2007.

Dated at Wellington this 8th day of August 2011.

A. DRYSDALE, for the Minister for Land Information.

(LINZ CPC/2005/10885)

ln5559

CIR 564975 issued for Section 1 SO 416315 – 5.9.2011 at 7:00 am

for RGL

NOTICE NO: 5559

Landonline User ID: cpswh

LODGING FIRM: Crown Property Services Ltd

Address: PO Box 377
Whangarei

Uplifting Box Number:

ASSOCIATED FIRM:

Client Code / Ref: FNDC Donald rd

HEREWITH

Survey Plan (#)	
Title Plan (#)	
Traverse Sheets (#)	
Field Notes (#)	
Calc Sheets (#)	
Survey Report	

Other (state)

Dealing / SUD Number: (LINZ Use only)

Priority barcode/Date Stamp (LINZ use only)

GN 8855394.1 Gazette Noti
Cpy – 02/04.Pgs – 002.02/09/11.12:33

Copies
(inc. original)
Ccid: 512831559

Plan Number Pre-Allocated or to be Deposited:

Rejected Dealing Number:

Priority Order	CT Ref:	Type of Instrument	Names of Parties	DOCUMENT OR SURVEY FEES	RESUBMISSION	NOTICES	ADVERTISING	NEW TITLES	OTHER	PRIORITY CAPTURE	FEES $ GST INCLUSIVE
1	NA105B/60	GN	Lewis FNDC	0.00							
2											
3											
4											
5											
6											

Land Information New Zealand Lodgement Form

Annotations (LINZ use only)

Subtotal (for this page)	
Total for this dealing	$0.00
Less Fees paid on Dealing #	
Cash/Cheque enclosed for	$0.00

Fees Receipt and Tax Invoice

GST Registered Number 17-022-895

LINZ Form P005

LINZ Form P005 - PDF

Original Signatures? _____

Version 1.8. 1 September 2007

Approved by the Registrar-General of Land, Wellington, No. 367635.80

C402061.1 TE

Under the Land Transfer Act 1952

Memorandum of Transfer

WHEREAS CYRIL TERRENCE MARTIN FOLEY of Kaitaia farmer (hereinafter called "the transferor") is registered as proprietor of an estate in fee simple

subject however to such encumbrances, liens and interests as are notified by memoranda underwritten or endorsed hereon in that piece of land situated in the Land District of North Auckland containing 67.6090 hectares

more or less being Lot 1 Deposited Plan 102748 and being all the land in Certificate of Title Volume 64B Folio 189 (hereinafter called "the said land")

AND WHEREAS for the consideration hereafter appearing the transferor has agreed to grant the FAR NORTH DISTRICT COUNCIL (hereinafter called "the transferee") a drainage easement in gross over that part of the said land being the area marked "A" on Deposited Plan 134344 for the purposes of draining stormwater (hereinafter called "the drainage easement").

NOW THEREFORE in consideration of a certain agreement between the transferor and the Kaitaia Borough Council bearing date the 14th day of November 1989

THE TRANSFEROR TRANSFERS AND GRANTS to the transferee the perpetual right to drain storm and surface water along and through the drainage easement and for that purpose to enter onto the said land for the purposes of constructing the necessary works including fencing, gates, culverts, piping and grassing

AND THE TRANSFEREE AGREES that it will be responsible for properly maintaining the drainage easement including removing and distributing topsoil all to the reasonable satisfaction of the transferor and will further provide the transferor with free water for farming use PROVIDED that this latter right will end on the death of the transferor or on his transferring the whole of the said land

TO THE INTENT that the drainage easement shall be forever appurtenant to the transferee or any territorial body taking over the functions of the transferee.

~~**In Consideration of**~~

(the receipt of which sum is hereby acknowledged)

Do **hereby Transfer** to the said

all estate and interest in the

~~said land above described~~

In witness whereof these presents have been executed this 26th day

of June 19 92

Signed by the above named

CYRIL TERRENCE MARTIN FOLEY) T Foley

)

in the presence of:—

Solicitor Kaikohe

The Common Seal of the FAR)
NORTH DISTRICT COUNCIL was)
hereunto affixed in the)
presence of:)

.....

.....

THE FAR NORTH DISTRICT COUNCIL
THE COMMON SEAL OF

No.

TRANSFER OF Drainage Easement in Gross

Correct for the purposes of the Land Transfer Act

.....

SOLICITOR FOR THE TRANSFEREE

.....C.T.M.FOLEY.....Transferor

I hereby certify that this transaction does not contravene the provisions of Part 11A of the Land Settlement Promotion and Land Acquisition Act 1952.

.....

SOLICITOR FOR THE TRANSFEREE

.....FAR NORTH DISTRICT COUNCIL.....Transferee

I hereby certify for the purposes of the Stamp and Cheque Duties Act 1971 that no conveyance duty is payable on this instrument by reason of the application of Section 24(1) of the Act and that the provisions of subsection (2) of that section do not apply.

.....

SOLICITOR FOR THE TRANSFEREE

Particulars entered in the Register as shown herein on the date and at the time endorsed below.

.....

Assistant / District Land Registrar

of the District of .....

PARTICULARS ENTERED IN REGISTER
LAND REGISTRY AUCKLAND
ASST. LAND REGISTRAR

241 06.AUG92 C 402061.1

NORTH AUCKLAND NEW ZEALAND REGISTRAR

IF E 1/46
CT 6XB/189

Clive Patterson
Solicitor
KAITAIA

Solicitors for the Transferee

Approved by the Registrar-General of Land, Wellington, No. 367635.80

C 471903.1 TE

Under the Land Transfer Act 1952

Memorandum of Transfer

RIGHT OF WAY EASEMENT

WHEREAS CYRIL TERRENCE MARTIN FOLEY of Ahipara farmer (hereinafter called "the Grantor")

is ~~being~~ registered as proprietor

of an estate in fee simple

subject however to such encumbrances, liens and interests as are notified by memoranda underwritten or endorsed hereon in that piece of land situated in the Land District of North Auckland containing 67.6090 hectares more or less being part Lot 1 Deposited Plan 102748 and being allotment 30 and part Allotment 23 Parish of Awanui, part Section 84 Block V Takahue Survey District and part Old Land Claim No. 214 and being all of the land comprised and described in Certificate of Title 64B/189 (North Auckland Registry)
~~more or less being~~

SUBJECT TO: 1) Drainage Easement in Transfer C.402061.1

AND WHEREAS HER MAJESTY THE QUEEN for STATE Housing Purposes under the Housing Act 1955 (hereinafter called "the Grantee") as the registered proprietor of an estate in fee simple subject however to such encumbrances, liens and interests as are notified by Memoranda underwritten or endorsed hereon in the piece or pieces of land herein containing 717m^2 more or less being lot 3 Deposited Plan 131584 and being part Old Land Claim No. 214 and being also all the land comprised and described in Certificate of Title 77A/455 (North Auckland Registry)

In Consideration of Five hundred dollars ($500.00). Paid by the Grantee to the Grantor

(the receipt of which sum is hereby acknowledged) the Grantor

Do th hereby Transfer ~~to the said~~ and Grant to the Grantee the Right of Way over the area marked "A" on the compiled Plan 154031 Subject to the terms and conditions as set out in the Seventh Schedule to the Land Transfer Act 1952, and the Ninth Schedule of the Property Law Act 1952.

~~all~~ ~~estate and interest in the~~

~~said land above described~~

In witness whereof these presents have been executed this 8th day of April 1993

Signed by the above named

CYRIL TERRENCE MARTIN FOLEY)

in the presence of:—

J. Foley

J Van Lear

LEGAL EXECUTIVE TO
CLIVE PATTERSON
SOLICITOR
KAITAIA

IN WITNESS WHEREOF these presents have been executed on behalf of HER MAJESTY THE QUEEN by Housing Corporation of New Zealand pusuant to Section 36 of the Housing Act 1955

SIGNED for and on behalf of
the Housing Corporation of
New Zealand By

.....Conrad Hugh Tawsend.....

acting for the said Corporation pursuant
to section 15 of the Housing Corporation
Act 1974 in the presence of:

Parsot.

HUNSHA PARSOT
LEGAL EXECUTIVE
Housing New Zealand
North West Region

No.

TRANSFER OF

.....Transferor

.....Transferee

Particulars entered in the Register as shown herein on the date and at the time endorsed below.

.....

Assistant / District Land Registrar

of the District of .....

Correct for the purposes of the Land Transfer Act

.....

SOLICITOR FOR THE TRANSFEREE

I hereby certify that this transaction does not contravene the provisions of Part 11A of the Land Settlement Promotion and Land Acquisition Act 1952.

.....

SOLICITOR FOR THE TRANSFEREE

I hereby certify for the purposes of the Stamp and Cheque Duties Act 1971 that no conveyance duty is payable on this instrument by reason of the application of Section 24(1) of the Act and that the provisions of subsection (2) of that section do not apply.

.....

SOLICITOR FOR THE TRANSFEREE

2.14 19.APR93 C 471903.1F

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

Solicitors for the Transferee

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

C947883.4EC.

EASEMENT CERTIFICATE

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

I/We ELIZABETH HARDIE of Pukekohe, Married Woman and NOELENE EDNA WALKER of Auckland, Married Woman as tenants in common in equal shares

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 North Auckland
on the day of 19 95 under No. 168717
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. 168717

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	lot 1	"A"	Part Lot 1 Deposited Plan 102748	64B/189 & 102C/738

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:

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

Dated this 1st day of December 19 95

Signed by the above-named
ELIZABETH HARDIE

in the presence of:

Witness .....

Occupation .....

Address .....

Signed by the abovenamed
NOELENE EDNA WALKER
in the presence of:

Witness .....

Occupation .....

Address .....

REGISTERED IN DUPLICATE

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

A.E.R.

9.08 30.JAN96 C 947883.4 (f)

PARTICULARS ENTERED IN THE REGISTER
LAND REGISTRY NORTH AUCKLAND

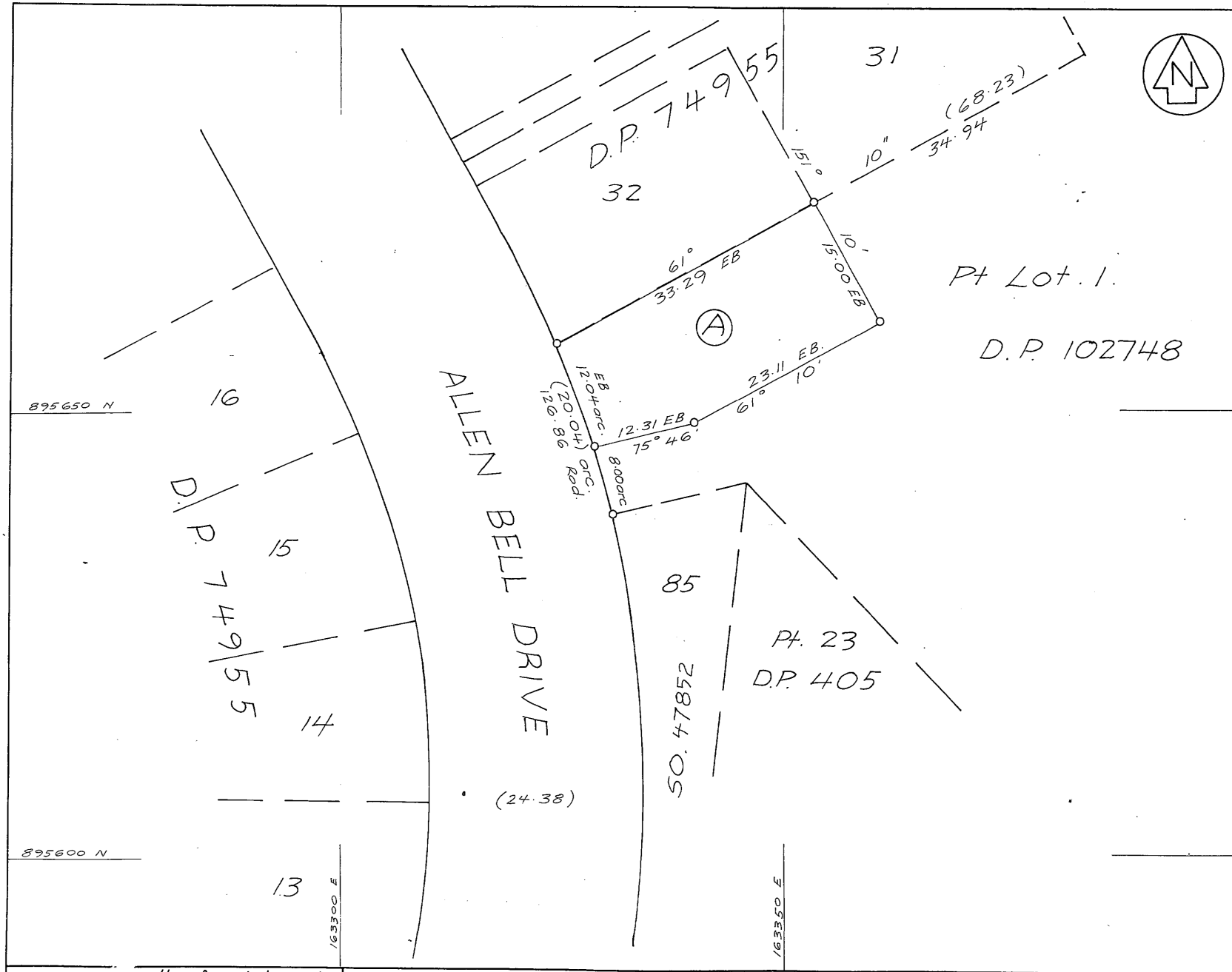
ASST. LAND REGISTRAR

102C/738
648/189

4F EC (drg)

102C/738
105B/60

Clive Patterson
Solicitor
KAITAIA



Approvals

Road Shown is Legal.

Proposed Easement in Gross

Purpose	Shown	Serv Ten	Grantee
Drainage (Stormwater)	(A)	Pt Lot 1 DP 102748	Kaitaia Borough Council

Approved

W.D. Foley

L.J.M. Foley

Registered Owner

Total Area

Comprised in C.T. 64B/189 (Pt)

I, Donald Barrington von Sturmer of Kaitaia 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 Kaitaia this 15th day of September 1989. Signature D. von Sturmer

Field Book p. Traverse Book p.

Reference Plans

Examined M.A. Chambers Correct Retraced

Approved as to Survey

27/10/89

G.D. Johnson
Deputy Chief Surveyor

Deposited this 30th **day of** October 1989

District Land Registrar

File Received Instructions

DP 134344

LAND DISTRICT North Auckland

SURVEY BLK. & DIST. V Takahue

NZMS 261 SHT **RECORD MAP No** KAITAIA 5

PROPOSED DRAINAGE EASEMENT OVER PT LOT 1 D.P. 102748

TERRITORIAL AUTHORITY Kaitaia Borough

Surveyed by D.B. von Sturmer

Scale 1:300 **Date** Sept. 1989

Supplied by Jas. S. Lockley Ltd. Auckland

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

DOSLI FORM D15

CENTIMETRES 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

MICROFILM SYSTEMS

Project:

DIVERSION DRAIN WORKS

PARKDALE CRESCENT

KAITAIA

INDEX OF SHEETS

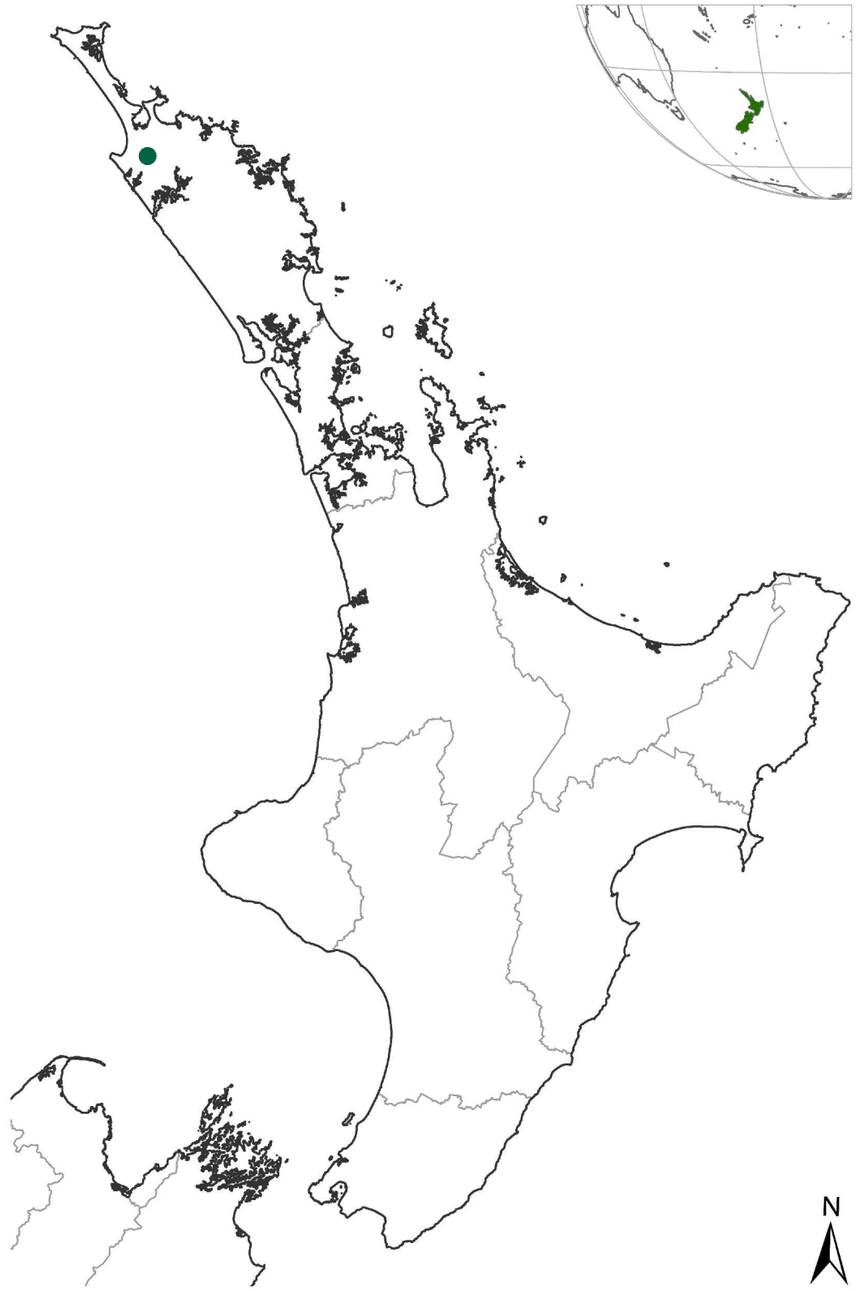
SHEETS	DESCRIPTION
01	SHEET INDEX
02-03	EXISTING AND PROPOSED SITE PLANS
04	EARTHWORKS
05-07	SECTION DETAILS
08-09	DIVERSION DRAIN INLET DETAILS

Date of issue:
20/01/2025

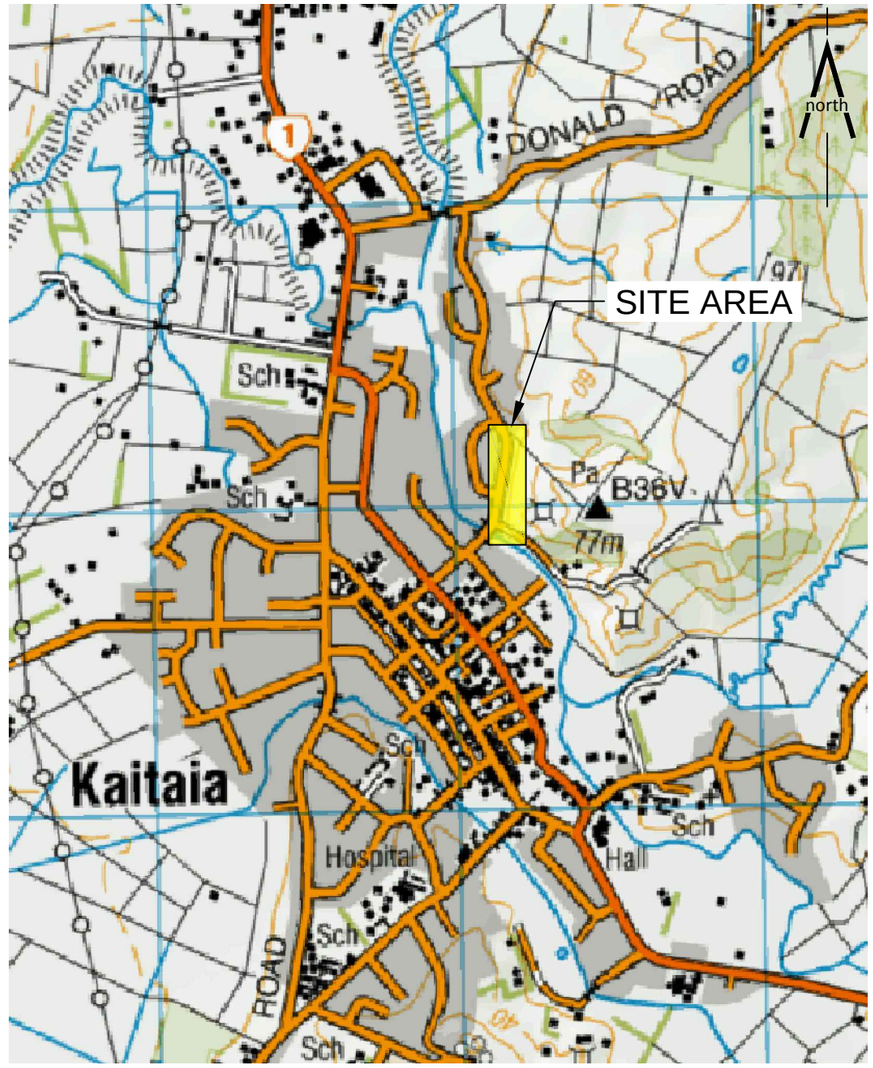
Project Team

Client:
FAR NORTH DISTRICT COUNCIL

Engineering Team:
- Vision Consutling Engineers Ltd



Engineering Drawings
FOR CONSULTATION



Level 1, 62 Kerikeri Road
Kerikeri 0230
Northland
Tel: +64 09 401 6287
Email: info@vce.co.nz

VISION CONSULTING
Engineers

Prepared for:

Far North District Council

CONTENTS				
SHEET	DESCRIPTION	ISSUE DATE	STATUS	REVISION
	DRAWINGS			
01	SHEET INDEX	20/01/2025	FOR CONSULTATION	D
02	EXISTING SITE AND SERVICES PLAN	20/01/2025	FOR CONSULTATION	D
03	PROPOSED SITE PLAN	20/01/2025	FOR CONSULTATION	D
04	EARTHWORKS PLAN	20/01/2025	FOR CONSULTATION	D
05	DIVERSION DRAIN LONG SECTION	15/05/2024	FOR CONSULTATION	C
06	DIVERSION DRAIN SECTION - 1	15/05/2024	FOR CONSULTATION	C
07	DIVERSION DRAIN SECTION - 2	15/05/2024	FOR CONSULTATION	C
08	PROPOSED DIVERSION DRAIN INLET PLAN	20/01/2025	FOR CONSULTATION	D
09	PROPOSED DIVERSION DRAIN INLET BASIN AND CROSSING SECITONS	15/05/2024	FOR CONSULTATION	C

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT Far North District Council

PROJECT
DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE
SHEET INDEX

SURVEY		----	A	CONCEPT	BCP	13/09/2023
DESIGN	CS	28/08/2023	B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
DRAWN	CS	20/01/2025	C	FOR RESOURCE CONSENT	BCP	14/05/2024
CHECKED	DS	20/01/2025	D	FOR CONSULTATION - EASEMENTS ADDED	DS	20/01/2025
APPROVED	DS	20/01/2025	No	REVISION	BY	DATE

SCALE N/A
SHEET 01
PROJECT J15335

REV D

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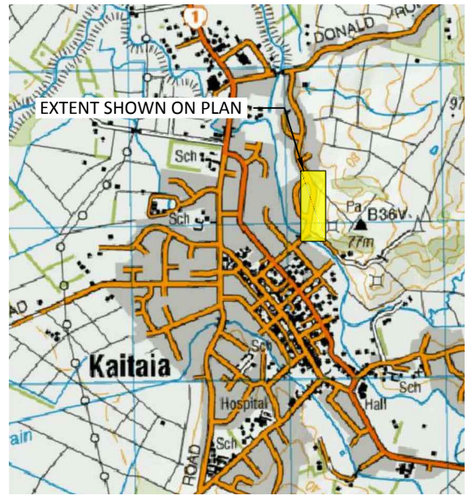


LOCALITY PLAN

SCALE (A3) NTS

LOT 1 DP 173052

LOT 1 DP 168717

EXISTING Ø1200 mm CORUGATTED METAL CULVERT

ROW A EASEMENT (DP168717)

EXISTING NORTHERN PARKDALE CRESCENT PIPE NETWORK INLET

LOT 31 DP 74955

LOT 32 DP 74955

LOT 23 DP 405

SECTION 85 BLOCK TAKAHUE SD

DRAINAGE EASEMENT A (DP134344)

EXISTING Ø900 mm CONCRETE AND CORRUGATE METAL CULVERT

ALLEN BELL DRIVE

EXISTING Ø900 mm CONCRETE CULVERT TO BE REMOVED

KORIMAKO LANE

PARKDALE CRESCENT

AWANUI RIVER

EXISTING Ø 900 mm CONCRETE CULVERT

ALLEN BELL DRIVE BRIDGE

LEGEND	
EXISTING CULVERT	
AREA OUTSIDE OF VISION TOPOGRAPHIC SURVEY	
METAL PAVEMENT	
SEALED ROAD PAVEMENT	
EXISTING TREE	
LIGHT POLE	LP
EXISTING CESSPIT	
EXISTING POST AND WIRE FENCE	
EXISTING FARM GATE	
PROPERTY BOUNDARY	
SIGN POST	

LV UNDERGROUND POWER CONDUIT (STREET LIGHTS)	
WATER MAINS	WM
WASTEWATER PIPE	SS
WATER METER	W
WASTEWATER MANHOLE	
BACK OF KERB	
DRAINAGE EASEMENT A (DP134344)	
ROW EASEMENT A (DP168717)	
OPEN DRAIN	

NOTE:

1. LOT BOUNDARIES ARE FROM WILLIAMS AND KING TOPOGRAPHIC SURVEY, REF 24236, DATED NOVEMBER 2023.
2. FEATURES SHOWN OUTSIDE OF THE VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN CREATED USING A COMBINATION OF AERIAL IMAGERY, SITE OBSERVATIONS AND ARE THEREFORE APPROXIMATE.
3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.
5. ONLY THE EXISTING SERVICES WITHIN THE AREA PROPOSED WORKS AND DIVERSION DRAIN ARE SHOWN.
6. EXISTING SERVICE ARE TAKEN FORM GIS AND AS BUILT PLANS OBTAINED FROM SERVICE PROVIDERS AND ARE INDICATIVE.
7. ACTUAL LOCATIONS OF SERVICES WILL NEED TO BE CONFIRMED BY THE CONTRACTOR AND/OR AS PART OF DETAILED DESIGN.

0 10 20 30 40 50

Scale 1:1000 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS PARKDALE CRESCENT KAITAIA

DRAWING TITLE: EXISTING SITE AND SERVICES PLAN

			No	REVISION	BY	DATE
SURVEY			A	CONCEPT	BCP	13/09/2023
DESIGN	CS	28/08/2023	B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
DRAWN	CS	20/01/2025	C	FOR RESOURCE CONSENT	BCP	15/05/2024
CHECKED	DS	20/01/2025	D	FOR CONSULTATION - EASEMENTS ADDED	DS	20/01/2025
APPROVED	DS	20/01/2025				

SCALE 1:1000

SHEET 02

PROJECT J15335

REV D

north

LOT 1 DP 173052

LOT 1 DP 168717

EXISTING Ø1200 mm
CORUGATTED METAL CULVERT

ROW A EASEMENT
(DP168717)

LOT 31
DP 74955

LOT 32
DP 74955

PROPOSED 4 m WIDE BY 1 m HIGH
CONCRETE BOX CULVERT WITH
WINGWALL INLET AND OUTLETS

SECTION 85
BLOCK TAKAHUE SD

LOT 23 DP 405

PROPOSED RIP RAP OUTLET CHUTE UPGRADE

PROPOSED 4 m WIDE BY 1 m HIGH
CONCRETE BOX CULVERTS WITH
WINGWALL INLET AND OUTLETS

DRAINAGE
EASEMENT A
(DP134344)

ALLEN BELL DRIVE

PARKDALE CRESCENT

KORIMAKO LANE

AWANUI
RIVER

ALLEN BELL
DRIVE BRIDGE

LEGEND	
EXISTING CULVERT	
AREA OUTSIDE OF VISION TOPOGRAPHIC SURVEY	
METAL PAVEMENT	
SEALED ROAD PAVEMENT	
LIGHT POLE	LP
EXISTING CESSPIT	
EXISTING POST AND WIRE FENCE	
EXISTING FARM GATE	
PROPERTY BOUNDARY	
SIGN POST	
BACK OF KERB	
DRAINAGE EASEMENT A (DP134344)	
ROW EASEMENT A (DP168717)	
OPEN DRAIN	

NOTE:
1. LOT BOUNDARIES ARE FROM WILLIAMS AND KING TOPOGRAPHIC SURVEY, REF 24236, DATED NOVEMBER 2023.
2. FEATURES SHOWN OUTSIDE OF THE VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN CREATED USING A COMBINATION OF AERIAL IMAGERY, SITE OBSERVATIONS AND ARE THEREFORE APPROXIMATE.
3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.

0 10 20 30 40 50
Scale 1:1000 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT: Far North District Council

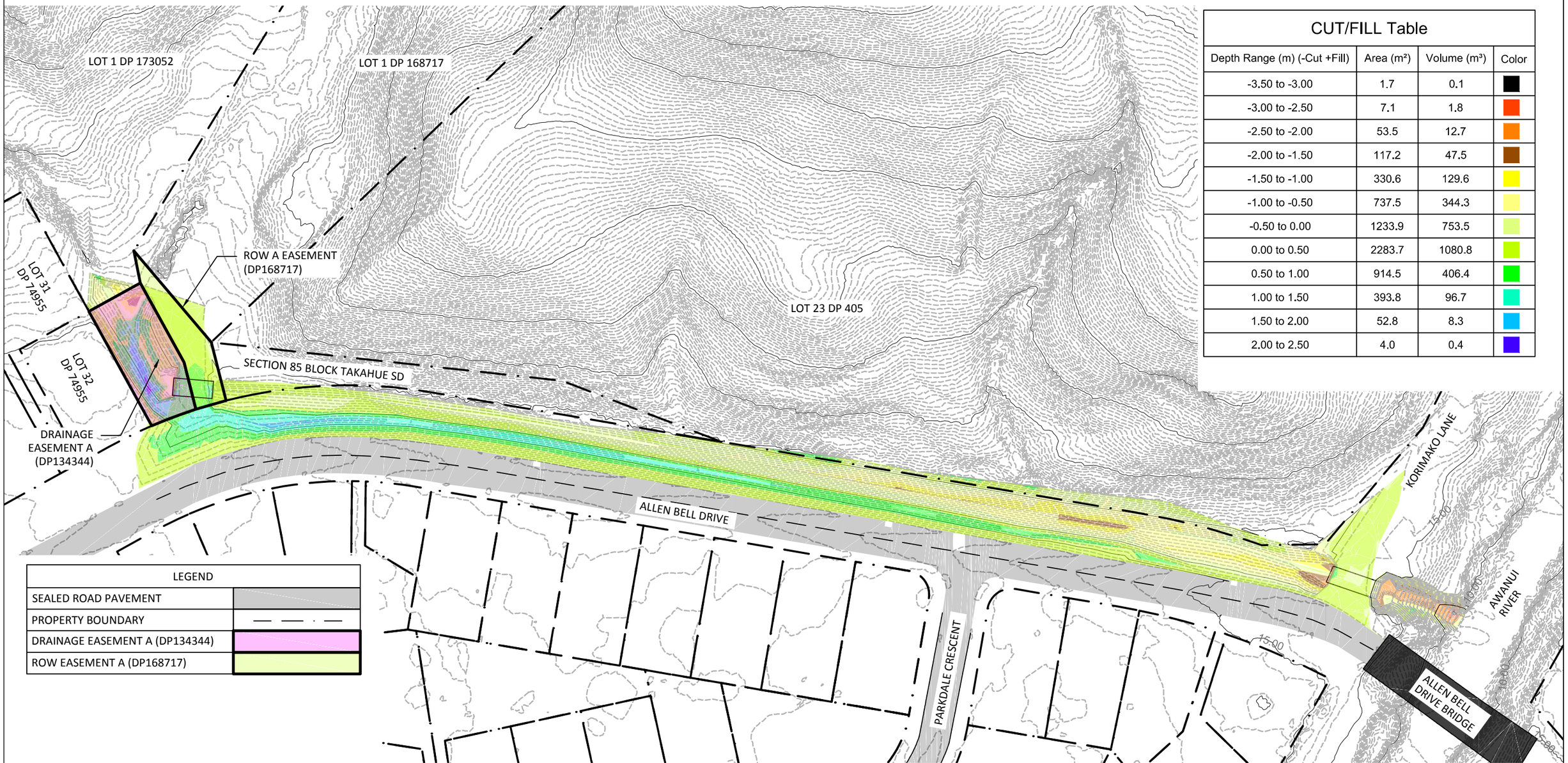
PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: PROPOSED SITE PLAN

SURVEY			A	CONCEPT	BCP	13/09/2023	SCALE 1:1000
DESIGN	CS	25/08/2023	B	FOR PUBLIC CONSULTATION	BCP	11/10/2023	SHEET 03
DRAWN	CS	20/01/2025	C	FOR RESOURCE CONSENT	BCP	15/05/2024	PROJECT J15335
CHECKED	DS	20/01/2025	D	FOR CONSULTATION - EASEMENTS ADDED	DS	20/01/2025	THIS ARTWORK IS THE COPY RIGHT MATERIAL OF VCE©
APPROVED	DS	20/01/2025	No	REVISION	BY	DATE	REV D

north

CUT/FILL Table			
Depth Range (m) (-Cut +Fill)	Area (m²)	Volume (m³)	Color
-3.50 to -3.00	1.7	0.1	
-3.00 to -2.50	7.1	1.8	
-2.50 to -2.00	53.5	12.7	
-2.00 to -1.50	117.2	47.5	
-1.50 to -1.00	330.6	129.6	
-1.00 to -0.50	737.5	344.3	
-0.50 to 0.00	1233.9	753.5	
0.00 to 0.50	2283.7	1080.8	
0.50 to 1.00	914.5	406.4	
1.00 to 1.50	393.8	96.7	
1.50 to 2.00	52.8	8.3	
2.00 to 2.50	4.0	0.4	



LEGEND	
SEALED ROAD PAVEMENT	
PROPERTY BOUNDARY	
DRAINAGE EASEMENT A (DP134344)	
ROW EASEMENT A (DP168717)	

NOTE:
1. LOT BOUNDARIES ARE FROM WILLIAMS AND KING TOPOGRAPHIC SURVEY, REF 24236, DATED NOVEMBER 2023.
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3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.
5. EARTHWORKS DEPTH AND VOLUMES ARE BASED ON THE DIFFERENCE BETWEEN THE EXISTING GROUND SURFACE AND THE CONCEPT FINISHED GROUND SURFACE AND DOES NOT TAKE INTO ACCOUNT ANY TOPSOIL/UNSUITABLE MATERIAL REMOVAL OR ADDITION OF ANY EROSION PROTECTION OR REINSTATEMENT OF PAVEMENTS.

0 10 20 30 40 50
Scale 1:1000 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS, PARKDALE CRESCENT, KAITAIA

DRAWING TITLE: EARTHWORKS PLAN

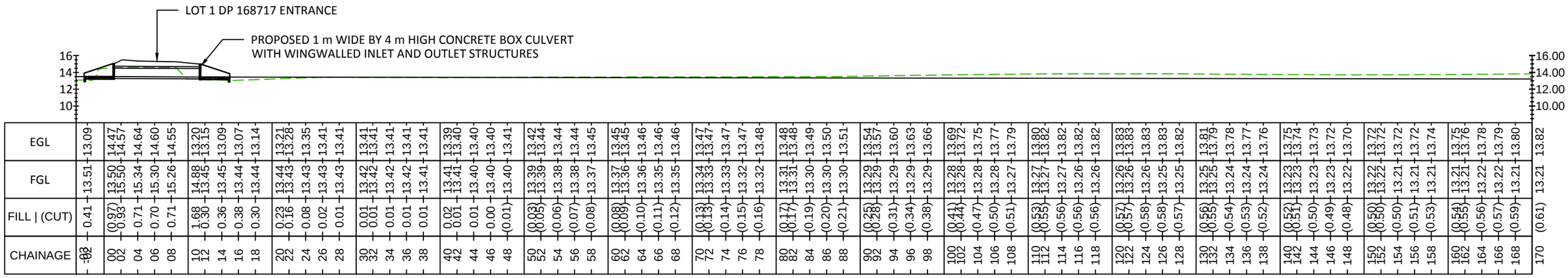
SURVEY			A	CONCEPT	BCP	13/09/2023
DESIGN	CS	25/08/2023	B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
DRAWN	CS	20/01/2025	C	FOR RESOURCE CONSENT	BCP	15/05/2024
CHECKED	DS	20/01/2025	D	FOR CONSULTATION - EASEMENTS ADDED	DS	20/01/2025
APPROVED	DS	20/01/2025	No	REVISION	BY	DATE

SCALE 1:1000
SHEET 04
PROJECT J15335
REV D

STATION 0 m TO 170 m
DIVERSION DRAIN LONG SECTION

SCALE (A3) 1:500

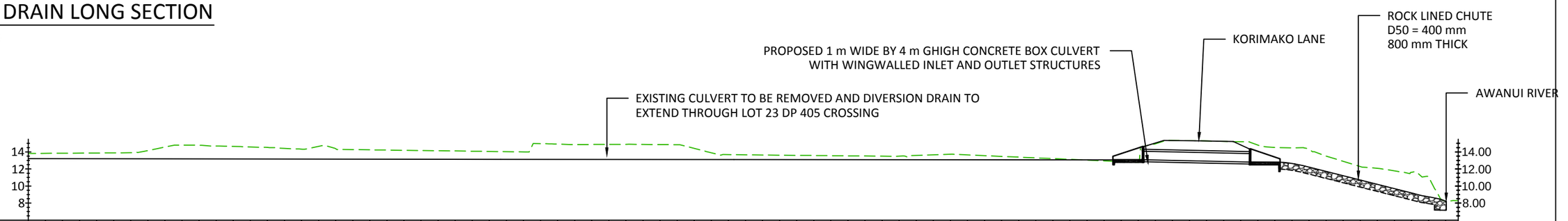
LEGEND	
EXISTING GROUND SURFACE	- - - - - - - - -
PROPOSED CONCEPT FINISHED SURFACE	———



CHAINAGE	FILL | (CUT)	FGL	EGL
-00	0.41	13.51	13.09
00	(0.97)	13.50	14.47
02	0.93	15.50	14.57
04	0.71	15.34	14.64
06	0.70	15.30	14.60
08	0.71	15.26	14.55
10	1.68	14.88	13.20
12	0.30	13.45	13.15
14	0.36	13.45	13.09
16	0.38	13.44	13.07
18	0.30	13.44	13.14
20	0.23	13.44	13.21
22	0.16	13.43	13.28
24	0.08	13.43	13.35
26	0.02	13.43	13.41
28	0.01	13.43	13.41
30	0.01	13.42	13.41
32	0.01	13.42	13.41
34	0.01	13.42	13.41
36	0.01	13.42	13.41
38	0.01	13.41	13.41
40	0.02	13.41	13.39
42	0.01	13.41	13.40
44	0.01	13.40	13.40
46	0.00	13.40	13.40
48	(0.01)	13.40	13.41
50	(0.03)	13.39	13.42
52	(0.05)	13.39	13.44
54	(0.06)	13.38	13.44
56	(0.07)	13.38	13.44
58	(0.08)	13.37	13.45
60	(0.08)	13.37	13.45
62	(0.09)	13.36	13.45
64	(0.10)	13.36	13.46
66	(0.11)	13.35	13.46
68	(0.12)	13.35	13.46
70	(0.13)	13.34	13.47
72	(0.13)	13.33	13.47
74	(0.14)	13.33	13.47
76	(0.15)	13.32	13.47
78	(0.16)	13.32	13.48
80	(0.17)	13.31	13.48
82	(0.17)	13.31	13.48
84	(0.19)	13.30	13.49
86	(0.20)	13.30	13.50
88	(0.21)	13.30	13.51
90	(0.25)	13.29	13.54
92	(0.28)	13.29	13.57
94	(0.31)	13.29	13.60
96	(0.34)	13.29	13.63
98	(0.38)	13.29	13.66
100	(0.41)	13.28	13.69
102	(0.44)	13.28	13.72
104	(0.47)	13.28	13.75
106	(0.50)	13.28	13.77
108	(0.51)	13.27	13.79
110	(0.53)	13.27	13.80
112	(0.55)	13.27	13.82
114	(0.56)	13.27	13.82
116	(0.56)	13.26	13.82
118	(0.56)	13.26	13.82
120	(0.57)	13.26	13.83
122	(0.57)	13.26	13.83
124	(0.58)	13.26	13.83
126	(0.58)	13.25	13.83
128	(0.57)	13.25	13.82
130	(0.56)	13.25	13.81
132	(0.55)	13.25	13.79
134	(0.54)	13.24	13.78
136	(0.53)	13.24	13.77
138	(0.52)	13.24	13.76
140	(0.52)	13.23	13.75
142	(0.51)	13.23	13.74
144	(0.50)	13.23	13.73
146	(0.49)	13.23	13.72
148	(0.48)	13.22	13.70
150	(0.50)	13.22	13.72
152	(0.50)	13.22	13.72
154	(0.50)	13.21	13.72
156	(0.51)	13.21	13.72
158	(0.53)	13.21	13.74
160	(0.54)	13.21	13.75
162	(0.55)	13.21	13.76
164	(0.56)	13.22	13.78
166	(0.57)	13.22	13.79
168	(0.59)	13.21	13.80
170	(0.61)	13.21	13.82

STATION 170 m TO AWANUI RIVER
DIVERSION DRAIN LONG SECTION

SCALE (A3) 1:500



CHAINAGE	FILL | (CUT)	FGL	EGL
170	(0.61)	13.21	13.82
172	(0.82)	13.21	13.83
174	(0.64)	13.20	13.84
176	(0.66)	13.20	13.86
178	(0.67)	13.20	13.87
180	(0.69)	13.19	13.88
182	(0.71)	13.19	13.90
184	(0.97)	13.19	14.16
186	(1.39)	13.18	14.57
188	(1.62)	13.18	14.80
190	(1.61)	13.18	14.78
192	(1.51)	13.17	14.68
194	(1.48)	13.17	14.65
196	(1.42)	13.17	14.58
198	(1.36)	13.16	14.52
200	(1.25)	13.16	14.40
202	(1.17)	13.15	14.32
204	(1.50)	13.15	14.65
206	(1.23)	13.15	14.37
208	(1.12)	13.15	14.27
210	(1.10)	13.14	14.24
212	(1.07)	13.14	14.21
214	(1.05)	13.14	14.19
216	(1.02)	13.14	14.16
218	(1.00)	13.13	14.13
220	(0.98)	13.13	14.11
222	(0.95)	13.13	14.08
224	(0.93)	13.13	14.05
226	(0.91)	13.12	14.03
228	(0.88)	13.12	14.00
230	(1.80)	13.12	14.92
232	(1.80)	13.12	14.92
234	(1.75)	13.11	14.86
236	(1.76)	13.11	14.87
238	(1.77)	13.11	14.88
240	(1.78)	13.11	14.89
242	(1.77)	13.11	14.88
244	(1.75)	13.11	14.86
246	(1.74)	13.10	14.84
248	(1.31)	13.10	14.41
250	(0.88)	13.10	13.98
252	(0.58)	13.10	13.68
254	(0.56)	13.10	13.66
256	(0.54)	13.10	13.64
258	(0.52)	13.10	13.62
260	(0.50)	13.09	13.60
262	(0.48)	13.09	13.58
264	(0.46)	13.09	13.55
266	(0.44)	13.09	13.53
268	(0.42)	13.09	13.51
270	(0.41)	13.09	13.50
272	(0.41)	13.08	13.50
274	(0.50)	13.08	13.58
276	(0.57)	13.08	13.65
278	(0.65)	13.07	13.72
280	(0.58)	13.07	13.65
282	(0.49)	13.07	13.56
284	(0.41)	13.07	13.47
286	(0.32)	13.06	13.39
288	(0.24)	13.06	13.30
290	(0.15)	13.06	13.21
292	(0.07)	13.06	13.12
294	0.02	13.06	13.04
296	0.11	13.05	12.94
298	0.20	13.05	12.85
300	0.26	13.05	12.79
302	0.43	15.37	14.94
304	(0.01)	15.34	15.35
306	(0.01)	15.31	15.32
308	0.00	15.28	15.28
310	0.02	15.25	15.23
312	0.42	14.78	15.20
314	(1.99)	12.80	14.79
316	(1.71)	12.80	14.51
318	(1.84)	12.65	14.48
320	(2.08)	12.22	14.30
322	(1.79)	11.71	13.50
324	(1.69)	11.20	12.89
326	(1.58)	10.70	12.28
328	(1.88)	10.19	12.07
330	(2.09)	9.68	11.77
332	(2.42)	9.18	11.60
334	(2.34)	8.74	11.08
336	0.02	8.23	8.22
337			

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

0 5 10 15 20 25
Scale 1:500 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: DIVERSION DRAIN LONG SECTION

SURVEY		
DESIGN	CS	28/08/2023
DRAWN	CS	09/05/2024
CHECKED	DS	20/01/2025
APPROVED	DS	20/01/2025

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024

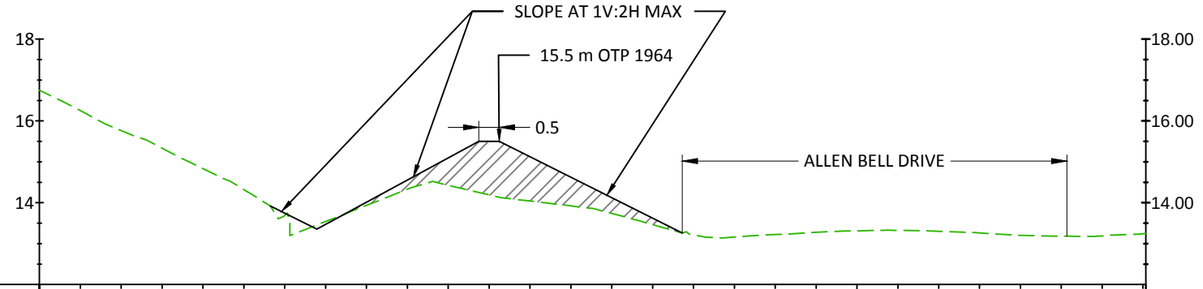
SCALE 1:500
SHEET 05
PROJECT J15335

REV C

A
03

DIVERSION DRAIN CROSS SECTION
SECTION 1

SCALE (A3) 1:150



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	27
EGL	16.75	16.25	15.76	15.33	14.83	14.32	13.69	13.54	13.93	14.33	14.42	14.19	14.04	13.92	13.74	13.47	13.21	13.16	13.22	13.28	13.31	13.32	13.30	13.26	13.20	13.18	13.19	13.24	13.25
FGL	16.75	16.25	15.76	15.33	14.83	14.00	13.62	13.47	14.01	14.55	15.09	15.50	15.12	14.62	14.13	13.63	13.21	13.16	13.22	13.28	13.31	13.32	13.30	13.26	13.20	13.18	13.19	13.24	13.25
FILL | (CUT)	0.00	0.00	0.00	0.00	0.00	(0.32)	(0.07)	(0.07)	0.07	0.22	0.66	1.31	1.08	0.70	0.39	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

LEGEND	
EXISTING GROUND SURFACE	
PROPOSED CONCEPT FINISHED SURFACE	
ENGINEERED FILL (TO BE SPECIFIED)	

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

0 1.5 3 4.5 6 7.5
Scale 1:150 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: DIVERSION DRAIN SECTION - 1

SURVEY		
DESIGN	CS	28/08/2023
DRAWN	CS	09/05/2024
CHECKED	DS	20/01/2025
APPROVED	DS	20/01/2025

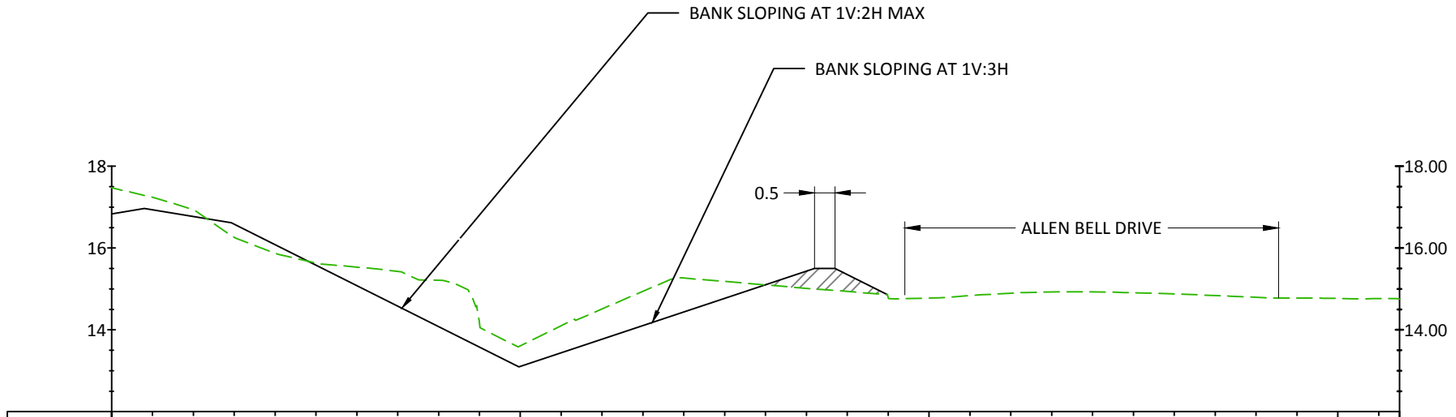
No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024

SCALE 1:150
SHEET 06
PROJECT J15335
REV C

C
03

DIVERSION DRAIN CROSS SECTION
SECTION 3

SCALE (A3) 1:150



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
EGL	17.48	17.24	16.94	16.26	15.87	15.63	15.53	15.43	15.21	14.16	13.61	14.10	14.51	14.94	15.27	15.18	15.10	15.02	14.94	14.78	14.78	14.84	14.90	14.93	14.93	14.91	14.88	14.84	14.80	14.78	14.77	14.76	14.75
FGL	17.48	17.24	16.94	16.58	16.08	15.58	15.08	14.58	14.08	13.58	13.10	13.40	13.70	14.00	14.29	14.59	15.03	15.47	15.35	14.78	14.78	14.84	14.90	14.93	14.93	14.91	14.88	14.84	14.80	14.78	14.77	14.76	14.75
FILL | (CUT)	0.00	0.00	0.00	0.32	0.20	(0.05)	(0.46)	(0.85)	(1.14)	(0.59)	(0.51)	(0.70)	(0.81)	(0.95)	(0.97)	(0.59)	(0.07)	0.46	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DIVERSION DRAIN OUTLET CROSS SECTION
SECTION 4

D
03

SCALE (A3) 1:150

CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
EGL	15.52	15.46	15.44	15.46	15.47	15.47	15.47	15.44	15.42	15.55	15.55	15.51	15.39	15.22	15.10	14.69	14.05	13.23	13.31	14.53	14.85	15.12	15.16	15.18	15.19	15.21	15.13	15.08	15.03	14.98	14.99	15.00	15.01
FGL	15.52	15.46	15.44	15.46	15.47	15.47	15.47	15.44	15.42	15.55	15.55	15.51	15.39	15.22	14.89	14.20	13.52	12.95	12.75	12.75	12.75	13.06	13.73	14.41	15.07	15.20	15.13	15.08	15.03	14.98	14.99	15.00	15.01
FILL | (CUT)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	(0.21)	(0.49)	(0.54)	(0.28)	(0.56)	(1.79)	(2.10)	(2.06)	(1.42)	(0.77)	(0.12)	(0.01)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

LEGEND	
EXISTING GROUND SURFACE	
PROPOSED CONCEPT FINISHED SURFACE	
ENGINEERED FILL (TO BE SPECIFIED)	
RIP-RAP PROTECTION	
GAP65	

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

0 1.5 3 4.5 6 7.5
Scale 1:150 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT: Far North District Council

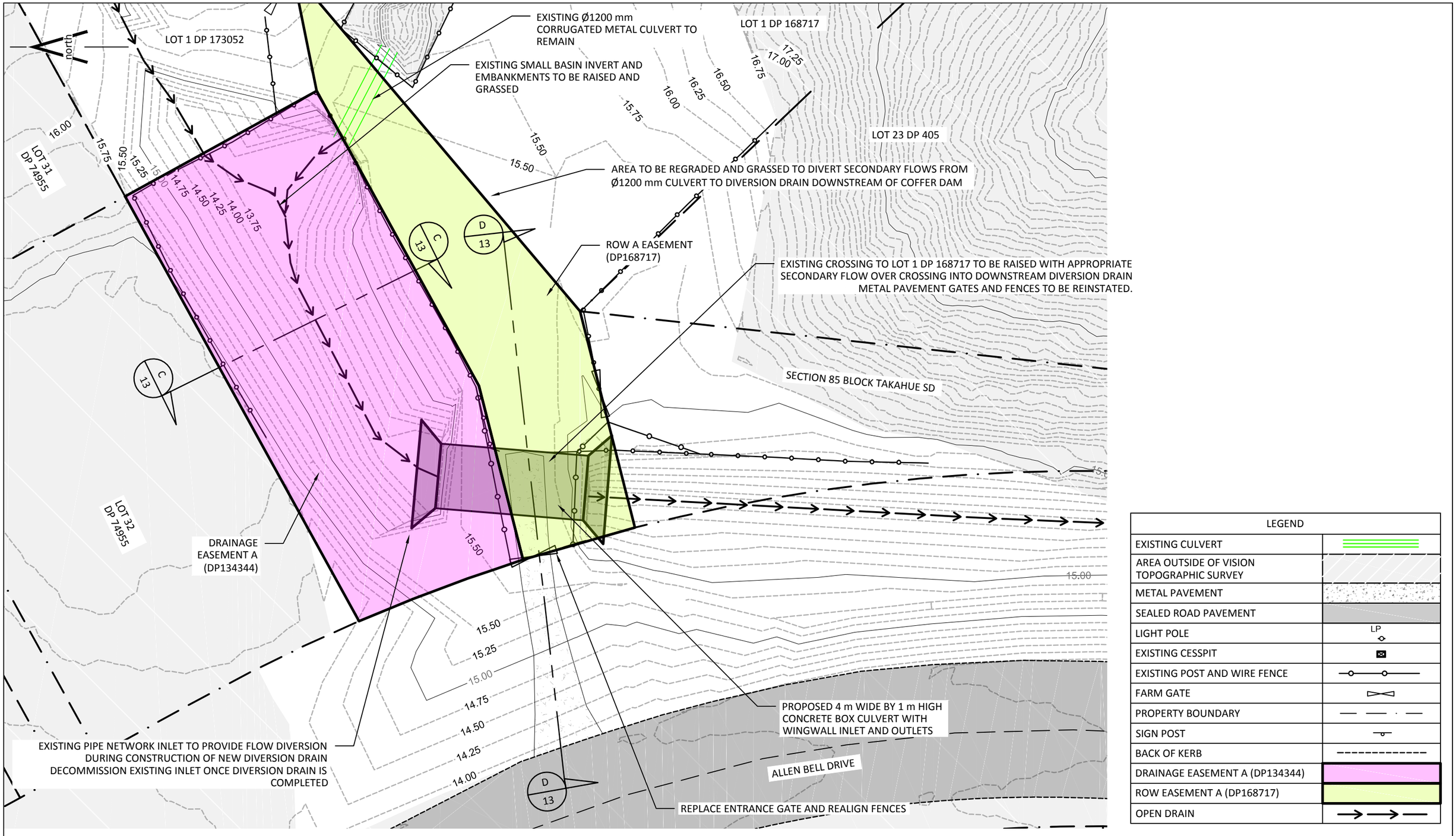
PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: DIVERSION DRAIN SECTION - 2

SURVEY			
DESIGN	CS	28/08/2024	
DRAWN	CS	09/05/2024	
CHECKED	DS	20/01/2025	
APPROVED	DS	20/01/2025	

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTAITON	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024

SCALE 1:150
SHEET 07
PROJECT J15335
REV C



LEGEND	
EXISTING CULVERT	
AREA OUTSIDE OF VISION TOPOGRAPHIC SURVEY	
METAL PAVEMENT	
SEALED ROAD PAVEMENT	
LIGHT POLE	LP
EXISTING CESSPIT	
EXISTING POST AND WIRE FENCE	
FARM GATE	
PROPERTY BOUNDARY	
SIGN POST	
BACK OF KERB	
DRAINAGE EASEMENT A (DP134344)	
ROW EASEMENT A (DP168717)	
OPEN DRAIN	

NOTE:
1. LOT BOUNDARIES ARE FROM WILLIAMS AND KING TOPOGRAPHIC SURVEY, REF 24236, DATED NOVEMBER 2023.
2. FEATURES SHOWN OUTSIDE OF THE VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN CREATED USING A COMBINATION OF AERIAL IMAGERY, SITE OBSERVATIONS AND ARE THEREFORE APPROXIMATE.
3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.

0 2.5 5 7.5 10 12.5
Scale 1:250 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: PROPOSED DIVERSION DRAIN INLET PLAN

SURVEY			
DESIGN	CS	28/08/2023	
DRAWN	CS	20/01/2025	
CHECKED	DS	20/01/2025	
APPROVED	DS	20/01/2025	

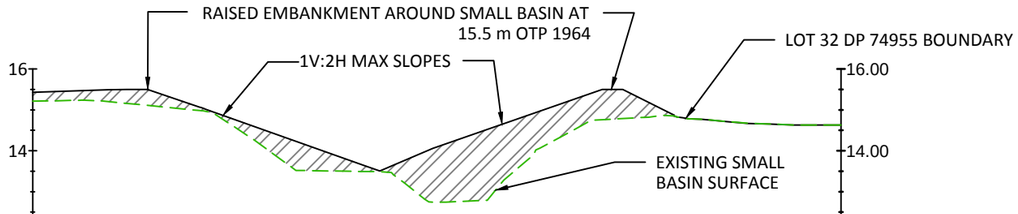
No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024
D	FOR CONSULTATION - EASEMENTS ADDED	DS	20/01/2025

SCALE 1:250
SHEET 08
PROJECT J15335
REV D

C 09 COFFER DAM UPSTREAM BASIN CROSS SECTION

SCALE (A3) 1:150

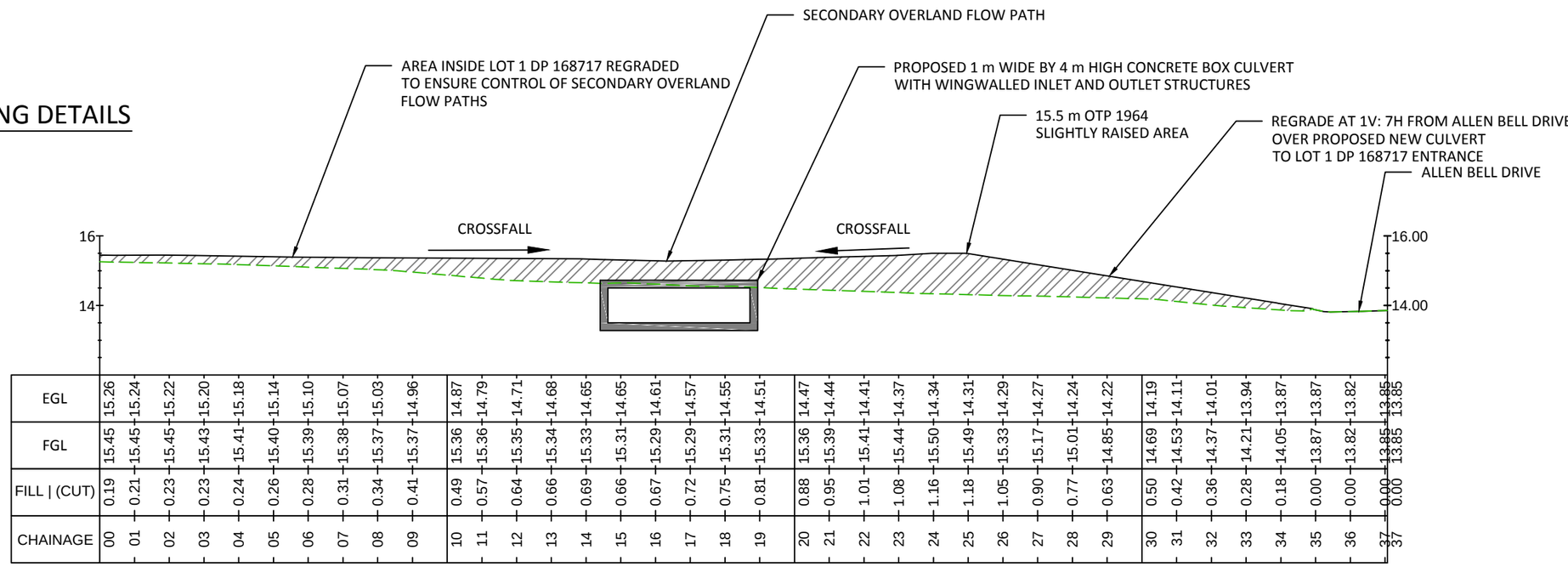
LEGEND	
EXISTING GROUND SURFACE	
PROPOSED CONCEPT FINISHED SURFACE	
ENGINEERED FILL (TO BE SPECIFIED)	



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
EGL	15.21	15.23	15.19	15.09	14.99	14.54	13.84	13.51	13.50	13.28	12.74	12.78	13.68	14.38	14.76	14.82	14.79	14.71	14.65	14.63	14.63
FGL	15.43	15.46	15.49	15.44	15.10	14.74	14.39	14.03	13.68	13.72	14.13	14.48	14.83	15.18	15.50	15.22	14.79	14.71	14.65	14.63	14.63
FILL | (CUT)	0.21	0.23	0.31	0.35	0.10	0.20	0.55	0.52	0.18	0.44	1.39	1.70	1.14	0.79	0.74	0.40	0.00	0.00	0.00	0.00	0.00

D 09 COFFER DAM OUTLET PIPE CROSSING DETAILS

SCALE (A3) 1:150



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
EGL	15.26	15.24	15.22	15.20	15.18	15.14	15.10	15.07	15.03	14.96	14.87	14.79	14.71	14.68	14.65	14.65	14.61	14.57	14.55	14.51	14.47	14.44	14.41	14.37	14.34	14.31	14.29	14.27	14.24	14.22	14.19	14.11	14.01	13.94	13.87	13.87	13.82	13.85
FGL	15.45	15.45	15.45	15.43	15.41	15.40	15.39	15.38	15.37	15.37	15.36	15.36	15.35	15.34	15.33	15.31	15.29	15.29	15.31	15.33	15.36	15.39	15.41	15.44	15.50	15.49	15.33	15.17	15.01	14.85	14.69	14.53	14.37	14.21	14.05	13.87	13.82	13.85
FILL | (CUT)	0.19	0.21	0.23	0.23	0.24	0.26	0.28	0.31	0.34	0.41	0.49	0.57	0.64	0.66	0.69	0.66	0.67	0.72	0.75	0.81	0.88	0.95	1.01	1.08	1.16	1.18	1.05	0.90	0.77	0.63	0.50	0.42	0.36	0.28	0.18	0.00	0.00	0.00

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

0 1.5 3 4.5 6 7.5
Scale 1:150 (m)

FOR CONSULTATION

VISION CONSULTING Engineers

CLIENT Far North District Council

PROJECT
DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE
PROPOSED DIVERSION DRAIN INLET BASIN AND CROSSING SECITONS

SURVEY		
DESIGN	CS	28/08/2023
DRAWN	CS	09/05/2024
CHECKED	DS	20/01/2025
APPROVED	DS	20/01/2025

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024

SCALE 1:150
SHEET 09
PROJECT J15335

REV C

FLOOD ASSESSMENT REPORT

Parkdale Crescent Stormwater Pipe Renewal – Northern Network Diversion Drain

Prepared for

Far North District Council

15/05/2024

Report Information Summary

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Document Acceptance

Action	Name	Signed	Date
Author	Callum Smith	Intermediate Engineer, BEng (Hons)	15/05/2024
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The nature and continuity of the subsurface materials are inferred and it must be appreciated that actual conditions could vary from that described herein.

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Acronyms and Abbreviations

AEP	Annual Exceedance Probability
ARC	Auckland Regional Council
ARI	Annual Reoccurrence Interval
CN	Curve Number
DEM	Digital Elevation Model
FNDC	Far North Regional Council
HIRDS	High Intensity Rainfall Design System
hr	Hour
LiDAR	Light Detection and Ranging
m^3/s	metres cubed per second
NIWA	National Institute of Water and Atmospheric Research
NRC	Northland Regional Council
OTP 1964	One Tree Point 1964 Vertical Datum
TP-108	Technical Publication-108
yr	Year
VISION	Vision Consulting Engineers Ltd.

1 Introduction

The Far North District Council (FNDC) is preparing to lodge an application for resource consent from the Northland Regional Council (NRC) for the "Parkdale Crescent Stormwater Pipe – Northern Network – Diversion Drain" project (the Diversion Drain Project).

Vision Consulting Engineers (VISION) has been requested by Hoskin Civil on behalf of the Far North District Council (FNDC) to carry out a Flood Assessment Report to support the resource consent application.

The objective of this report is to describe the findings of site specific flood modelling of the concept design for the diversion drain compared to existing conditions and the potential impact the works may have on the flood levels of the Awanui River at the diversion drain outlet.

The site area, locality and site features of the Diversion Drain Project can be seen in Figure 1 with a site description in Section 1.2.

Figure 1. Site location of Diversion Drain Project

The area subject to the Diversion Drain Project is shown; the existing Unlined Channel in blue arrows depicting flow direction, the approximate location of the existing Northern Pipe Network to be upgraded is shown in yellow, north up the page, not to scale.

1.1 Project Scope

The following scope of work for this report is as follows:

- Liaise with the NRC to obtain time series flood hydrographs for up to 5 cross sections across the Awanui River.
- Carry out a rain on grid model for the 10, 50 and 100 year ARI event using HEC-RAS, NRC LiDAR and river flow data obtained from the NRC for the existing condition.
- Carry out a rain on grid model for the 10, 50 and 100 year ARI event using HEC-RAS, model previously developed as part of the concept design and river flow data obtained from the NRC for the proposed new Diversion Drain.
- Assessment of reduction in flooding in the area to the west of Allen Bell Drive.
- Assessment of the impacts of the proposed Diversion Drain works to the Awanui River flood flows and heights immediately upstream and downstream of the Allen Bell Bridge.
- Assessment on the potential flow velocities within the proposed Diversion Drain.
- Prepare a flood model/assessment report presenting the findings of our assessment to support the Resource Consent application.

1.2 Site Description and Details

The project site is situated in the northeastern outskirts of Kaitaia, spanning the eastern side of Allen Bell Drive and extending northward for approximately 350 meters from the Awanui River. Noteworthy features include the inlet to the existing northern pipe network and an unlined channel exhibiting a split flow pattern. The central and northern segments of the channel direct flow northward into the existing northern network inlet, while the southern portion channels water southward towards the Awanui River.

The topography of the site is predominantly flat to gently sloping, with contributing catchment hill slopes characterized by moderate to steep slopes. The eastern roadside berm on Allen Bell Drive currently slopes up from Allen Bell Drive to the top of the western bank of the open channel with slopes up to approximately 17 degrees.

The existing open drain is covered with a mix of dense grass, weedy scrub, and small to medium-sized trees. The grass-covered roadside berm, between the open channel and Allen Bell Drive, contains large trees sporadically spaced along its length. Upstream of the existing pipe network inlet, the area is generally covered with grass and weedy vegetation

1.3 Project Background

The Diversion Drain project has originated from the “Parkdale Crescent Stormwater Pipe – Northern Network – Pipe Renewals” project (the Pipe Renewal Project) which is proposing to upgrade and realign of approximately 220 m of existing stormwater reticulation pipes that are currently in poor condition and located under existing dwellings, in the northern portion of Parkdale Crescent and shown in Figure 2.

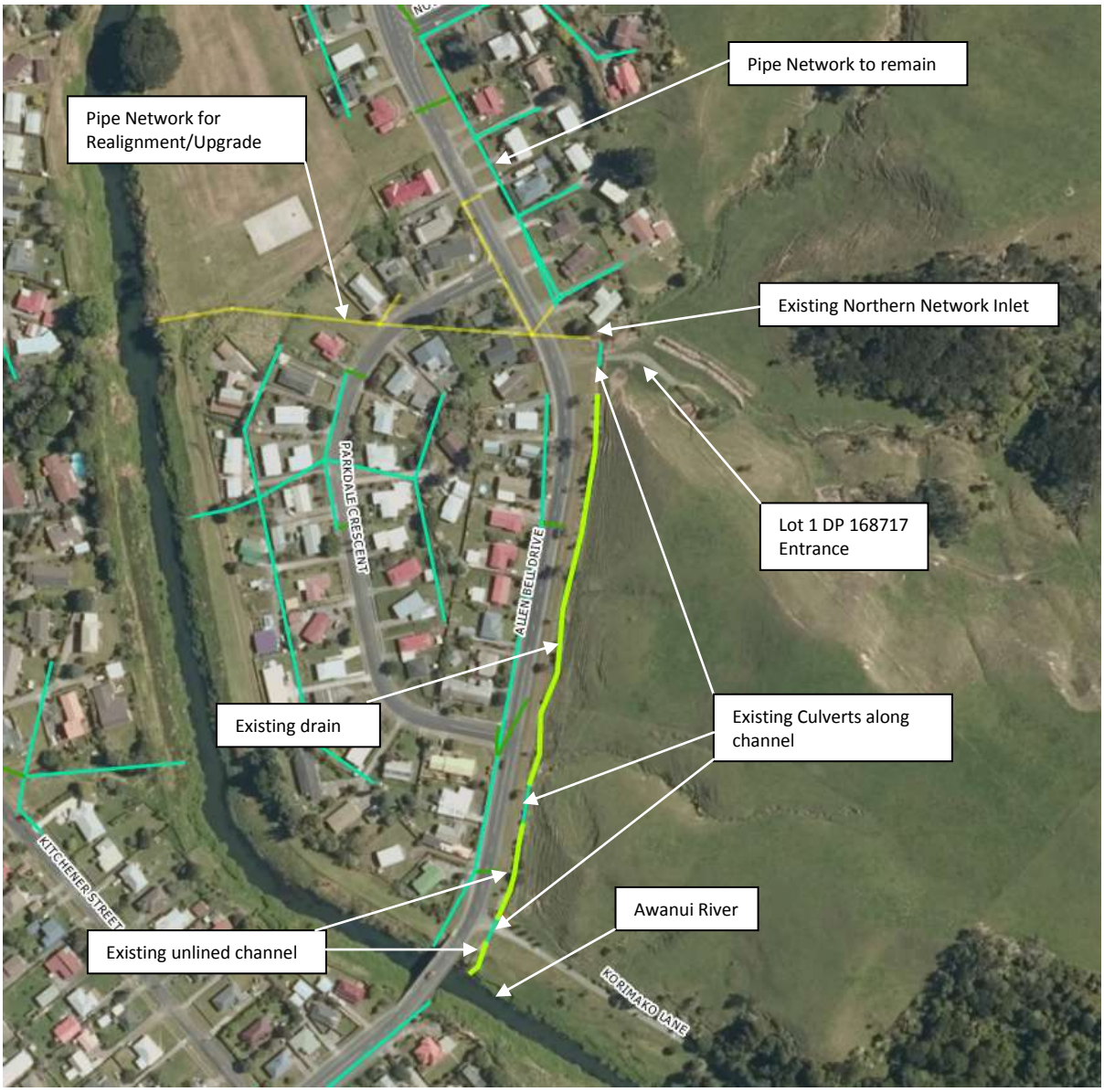


Figure 2. Site location of Pipe Renewal Project

The area subject to the Pipe Renewal Project is shown with, existing stormwater pipes in turquoise, existing unlined channels in green and pipes to be realigned and upgrades in yellow, north up the page, not to scale.

During the preliminary design of the Pipe Renewal Project it was identified that significant diversion works will be required in order to keep the stormwater reticulation in service during construction.

The initial idea for the diversion works investigated the construction of a cofferdam and the regrading of the existing unlined channel along the eastern side of Allen Bell Drive. The intention was to create a unidirectional flow to the Awanui River as a temporary diversion. Further investigation of the temporary diversion works revealed that the diversion drain could be designed as a permanent solution to redirect some of the surface water flows from larger events away from the piped network, thereby reducing localized flooding in the area.

An initial concept design of the Diversion Drain has revealed that it is possible to regrade the existing unlined channel and culverts to the south enabling flow to into the Awanui River and away for the northern network inlet. The concept design also demonstrated that it is feasible to upgrade these structures and ensure there is capacity to handle a 100 year ARI storm event, with provisions for climate change and consideration of Awanui River tailwater, therefore eliminating the need for the Northern Pipe Network to convey and discharge surface water flows from the two larger northern and eastern catchments.

1.4 Diversion Drain Project

The concept design for the Diversion Drain Project is shown in the drawing set attached to Appendix B and summarised below:

- Deepening and widening the existing unlined channel and providing a levee on the western side of the Diversion Drain, this enables the re-grading of the diversion drain to flow south to the Awanui River.
- Replacing the existing culverts located along the existing unlined channel and upgrading the culverts to convey the 1% AEP storm event with allowance for climate change and the tailwater associated with the 1% AEP Awanui River flood level. The culvert at the outlet will be fitted with a flood gate.
- Earthworks in the area around the Lot 1 DP 168717 entrance and access to Allen Bell Drive to ensure secondary flows from Lot 1 DP 168717 enter the Diversion Drain and not Allen Bell Drive.
- Earthworks around the existing Northern Pipe Network inlet to ensure all surface water is collected and conveyed to the Diversion Drain.
- Decommissioning of one of the culverts within the Diversion Drain north of Korimako Lane.
- Decommissioning the existing Northern Pipe Network inlet once the specified erosion protection in the Diversion Drain (to be confirmed in detailed design) has been established.
- Providing Rip-Rap protection at the Diversion Drain Outlet and regrading the outlet at the Awanui River to prevent erosion and scour.

As part of the project the existing pipe network is to remain open during construction of the diversion drain. At the completion of the diversion drain, and after a period where appropriate channel protection can establish, the existing inlet to the pipe network can be decommissioned with all flows diverted to the new drain. This will allow the construction of the proposed new northern network to be completed without the requirement of major flow diversion during construction.

1.5 Existing Flood Hazard

The site is mapped by the Northland Regional Councils (NRC) Priority Rivers Model as being partially inundated in the 10, 50 and 100 year ARI events as shown in Figure 3.

Figure 3. NRC Priority Rivers Flood Hazard Map

Dark blue indicates the 10 year ARI, medium blue indicates the 50 year ARI and light blue indicated the 100 year ARI event. North at top, not to scale (source: NRC maps)

The site is also mapped by the Northland Regional Councils (NRC) Region Wide Model and as being mostly inundated in the 100 year ARI event as shown in Figure 4.

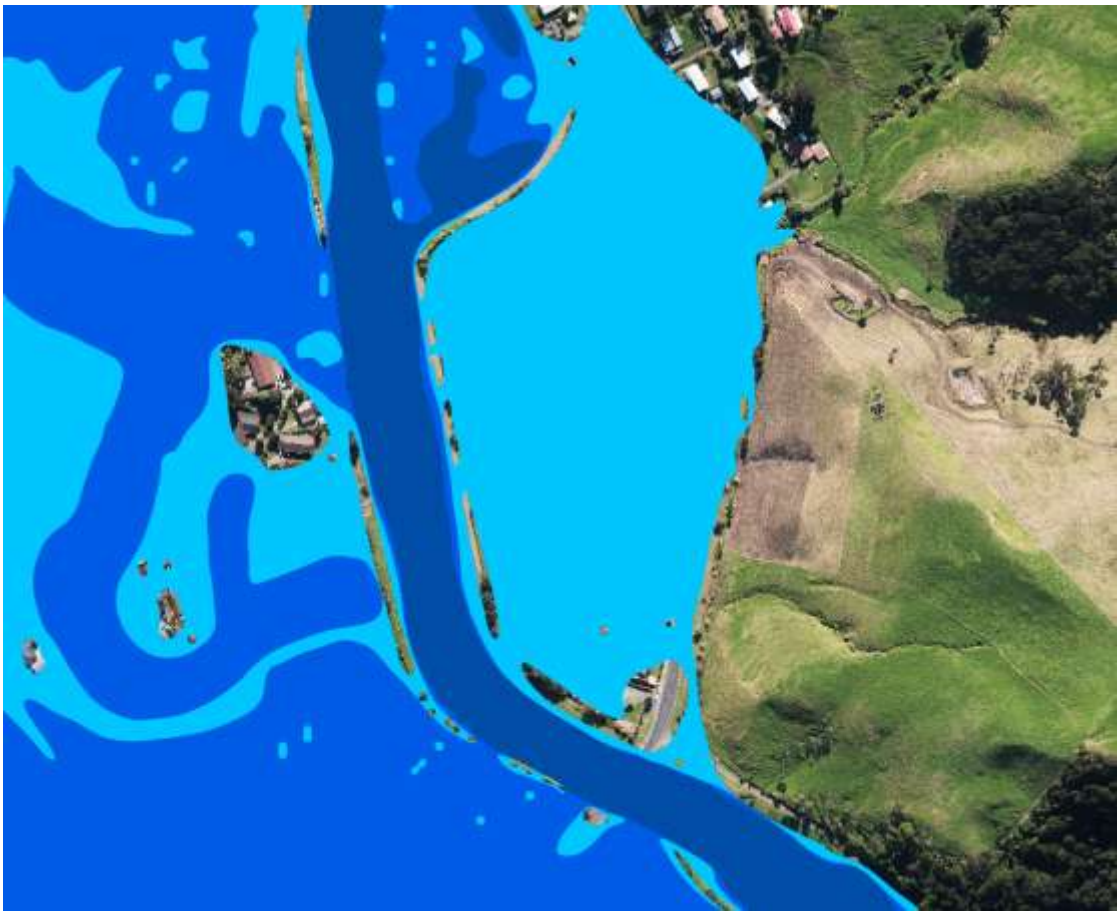


Figure 4. NRC Region Wide Model Flood Hazard Map

Dark blue indicates the 10 year ARI, medium blue indicates the 50 year ARI and light blue indicated the 100 year RI event. North at top, not to scale (source: NRC maps)

1.5.1 Awanui River Flood Elevations

Anticipated levels of the Awanui River have been provided by NRC for a range of storm events based on the most recent model data. The locations of the data supplied are shown in Figure 5 and the flood height and discharge data is supplied in Appendix A. Levels of the Awanui River at the existing Northern Pipe Network outlet, noted as Point 6 in Table 1, were previously been provided by the NRC for the 100 year ARI with an allowance for climate change and 10 year ARI events.

Table 1. Northern Pipe Network Outlet Tail water Levels

Location	Storm Event - River Elevation (m OTP)	
	10 Year ARI	100 Year ARI
Point 1	14.7	15.35
Point 2	14.6	15.31
Point 3	14.6	15.25
Point 4	14.3	15.00
Point 5	14.0	14.50
Point 6	13.9	14.25*

*At the time of preparing this report, Point 6 data includes an allowance for climate change.

Figure 5. NRC Recent Model Flood Data Locations

Flood data locations shown by red crosses, north up the page, not to scale.

2 Flood Model Design Methodology

A two-step modelling approach was developed to assess the impact of the proposed Diversion Drain on the surrounding area. The first step involved utilising the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) to simulate the catchment-scale hydrologic processes and generate time-series rainfall excess data. This data, representing the amount of rainfall that directly contributes to runoff, served as input for the subsequent hydraulic modelling step.

The HEC-HMS model was configured to incorporate the catchment's physical characteristics, including land cover, soil type, and topography. Additionally, the model accounted for various loss mechanisms, such as infiltration, to realistically represent the how much of rainfall becomes surface runoff or groundwater recharge.

The second step in the modelling process involved the application of the Hydrologic Engineering Center's River Analysis System (HEC-RAS) to simulate the hydraulics of the Diversion Drain and its interaction with the surrounding drainage system. HEC-RAS is a two-dimensional hydraulic modelling software that enables the calculation of water surfaces, flow velocities, and flood inundation extents.

The HEC-HMS and HEC-RAS models were integrated to achieve an understanding of the Diversion Drain's impact on the area.

To assess the Diversion Drain's performance under a range of storm conditions, a series of modeling scenarios were evaluated. These scenarios encompassed varying storm durations (1, 6, 12, and 24 hours), annual exceedence probabilities (AEP) of 1%, 2%, and 10% and modeling with tailwater or without tailwater in the Awanui River. The AEP represents the probability of a storm event of a given magnitude occurring in any given year.

The following sections provide details on the construction of the hydrologic and hydraulic models and the results of the flood modelling assessment.

2.1 Hydrologic (HEC-HMS) Model

The HEC-HMS model was primarily used to simulate how much water would soak into the ground within the catchment area and to generate a series of data representing what rainfall would result in surface water runoff, this is technically called rainfall excess. This data is then used in the HEC-RAS model for the larger catchment area study. It's important to note that some data related to time of concentration and catchment area was included as inputs to make the model run properly, even though it didn't directly affect the rainfall excess calculation. This data was also used to generate discharge hydrographs, which helped to verify the accuracy of the HEC-RAS model. Details on the construction of the HEC-HMS model are provided in this section. Table 2 provides a brief summary of the model.

Table 2. HEC-HMS Model Method & Design Parameters

Site	Latitude: -35.1057; Longitude: 173.2662
Model Software	HEC-HMS v 4.11
Model Method	ARC TP-108 (SCS Curve Number)
Rainfall Data	HIRDSv4
Design Storm	1, 2 and 10 % AEP, 24-hr rainfall (Temporal Pattern taken from NIWA HIRDs V4 (Section 6))
	1, 2 and 10 % AEP, 12 hr rainfall (Temporal Pattern taken from NIWA HIRDs V4 (Section 6))
	1, 2 and 10 % AEP, 6 hr rainfall (Temporal Pattern taken from NIWA HIRDs V4 (Section 6))
	1, 2 and 10 % AEP, 1 hr rainfall (Temporal Pattern taken from NIWA HIRDs V4 (Section 6))

2.1.1 Design Storm Data

Rainfall data was taken from the High Intensity Rainfall Design System V4 (HIRDSv4). The site and event information are provided in Table 3. This method is consistent with that used by the NRC Region-wide modelling of the area. The design storm hyetographs used for the model storm durations are shown in Figure 6.

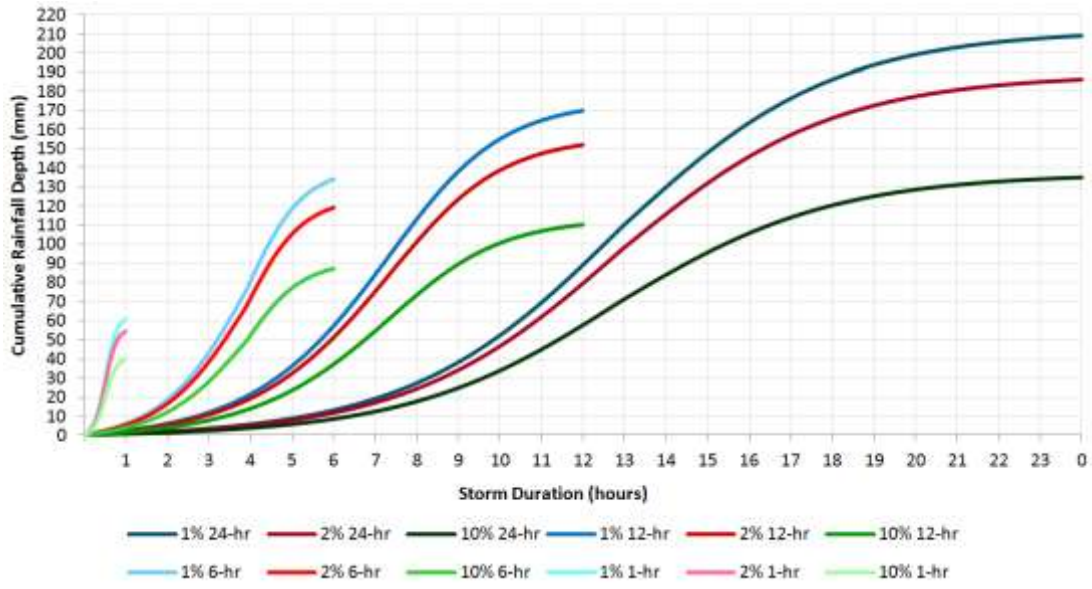


Figure 6. Temporal Hyetograph for Design Rainfall Durations and ARI

Temporal pattern taken from Section 6 of NIWA HIRDS Version 4 - north of North Island to create the Design Storm.

2.1.2 Catchment

The Diversion Channel's greater catchment was delineated based on a visual assessment of a LiDAR derived 1m Digital Elevation Model (DEM). In addition, contours and aerial imagery analysis provided input into assessing the catchment extents. The extent of the catchment is shown in Figure 7.

Figure 7. Catchment

Catchment boundary shown in yellow dashed line, longest flow paths as blue line, , elevation banding shown with higher elevations in green and lower elevations in blue, north up the page, not to scale.

2.1.3 Weighted Curve Number

In order to calculate the weighted curve number, the catchment was assessed as a series of sub catchments comprised of different soil types and land cover conditions. The soil types were determined from the 1:250,000 geological map, "Geological maps of the Kaitaia Area" (Isaac 2003) and the cover conditions from the Land Cover Database (2018). Curve numbers were assigned based on TP-108 Appendix B tables. Based on site observations and the possible presence of cemented hard pans the hydrological soil class was assigned as "C" for all catchments.

Note that no site testing was completed as part of this assessment.

2.1.4 Initial Abstraction

Initial abstraction is specified as being 5mm for a 'pervious catchment'.

2.1.5 Time of Concentration

The time of concentration was calculated using the equal area method and time of concentration equation specified in TP-108.

The lag time which is required in HEC-HMS is specified by TP108 as:

$$\text{Lag time } (T_L) = 2/3 \times T_C$$

2.1.6 HEC-HMS Model Parameters

The simulation model incorporated the following parameters.

Table 3. Model Input

Surface	Area (m^2)	Soil Type	CN	Area×CN	HEC-HMS Parameters
Pervious (Bush)	12800	C	55.00	704000	
Pervious (Scrub)	0	C	73.00	0	
Pervious (Grass/Brush/Weeds)	319333	C	79.00	25227307	
Impermeable Cover	0	-	98.00	0	
Total	332133			25931307	
Weighted CN					78.1
Initial Abstraction					5.0 mm
Lag Time					25 min

2.1.7 Rainfall Excess Hyetographs

The rainfall hyetographs used as precipitation boundary conditions in the HEC-RAS models are displayed in Figures 8 – 10 below.

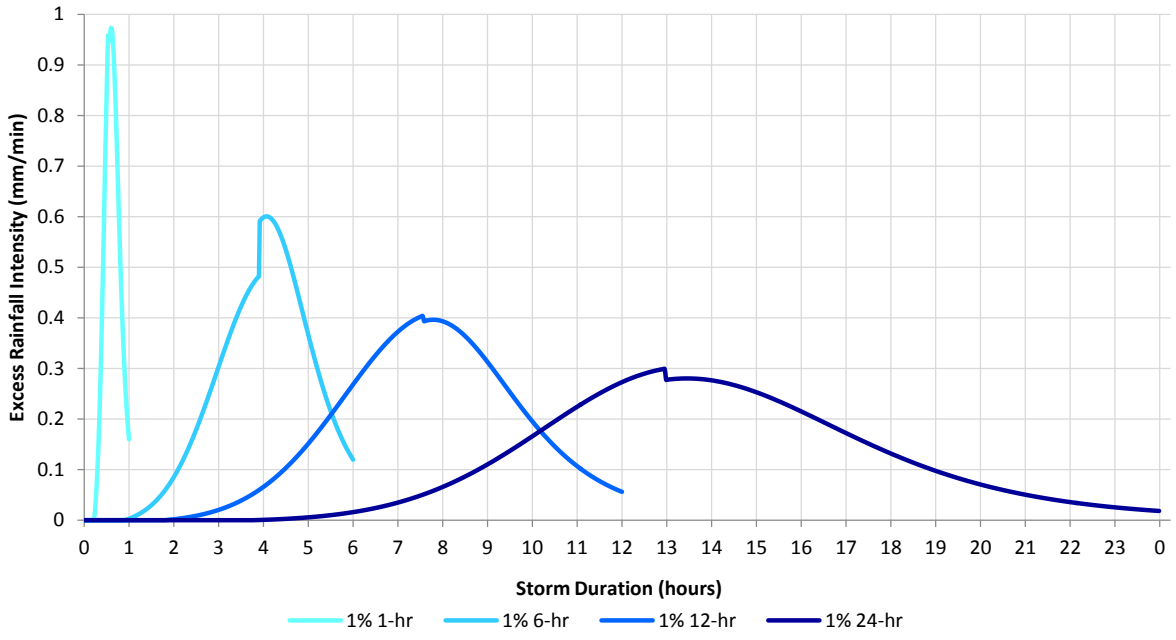


Figure 8. Rainfall Excess Hyetograph, 1% AEP

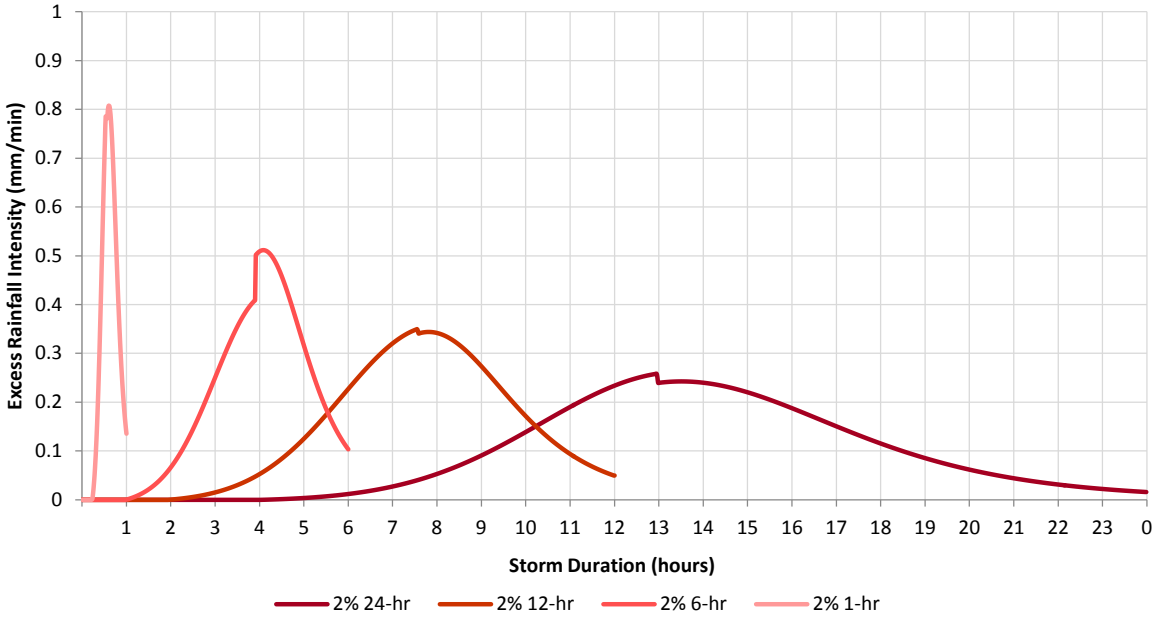


Figure 9. Rainfall Excess Hyetograph, 2% AEP

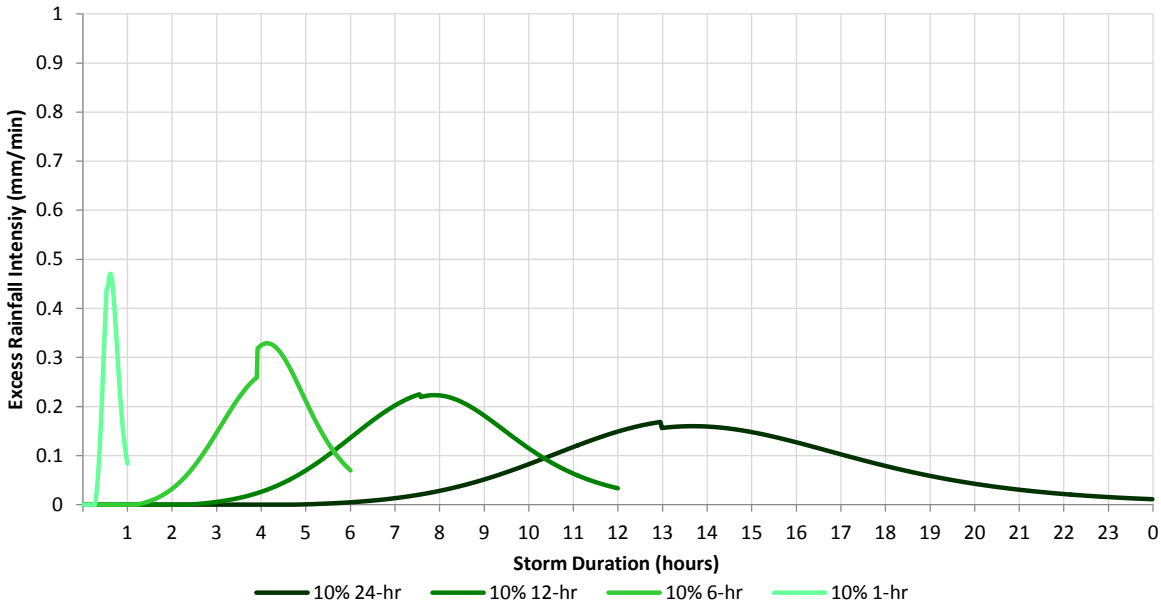


Figure 10. Rainfall Excess Hyetograph, 10% AEP

2.1.8 Catchment Discharge Hydrographs

The discharge hydrographs for use as HEC-RAS model verification are displayed in Figure 11 below. Please note the most critical 1% AEP storm event was used for the model validation and therefore is the only storm frequency displayed.

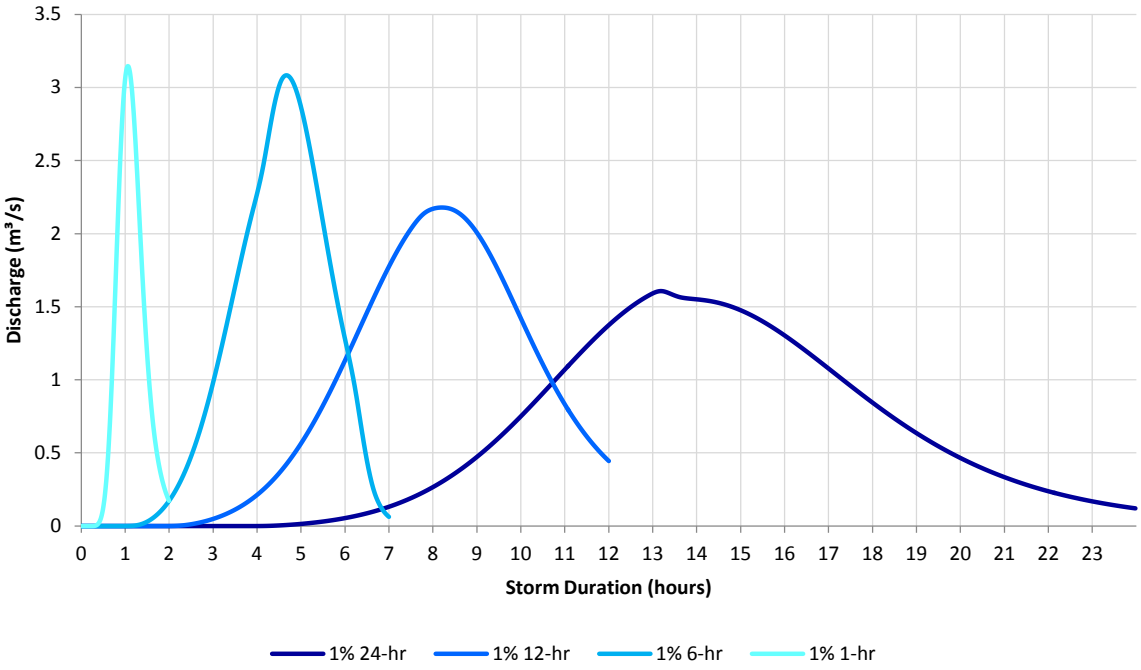


Figure 11. 1% AEP Outflow Hydrographs

2.2 Hydraulic Model (HEC-RAS) Model

This section provides additional detail on the models run in HEC-RAS and the development of the 2-D model geometry and terrain.

2.2.1 Terrain Model and Modifications

VISION completed a GPS topographic survey on the 26th July 2023 around the area of the proposed diversion drain in order to create a terrain model in HEC-RAS.

The area around the existing unlined channel contains dense and tall weeds and trees which limited the accuracy of the survey in this area. The invert of the drain was taken at a small number of points along the drain and an assumption made that the grade of the unlined channel grade between the surveyed points was constant in order to create the terrain model.

A 3D surface TIN was created in Autocad Civil 3D by combining the 1m DEM based on Northland Regional Council's (NRC) 2018 LiDAR data for the greater catchment overlain with the surveyed surface. The final surface was converted to a 0.2 m DEM for use in HEC-RAS. The HEC-RAS terrain model of existing surface levels is shown in Figure 12.

A proposed terrain model was created by including the concept earthworks, levee and other terrain modifications required to convey the 1% AEP event. The HEC-RAS terrain model of proposed surface levels is shown in Figure 13.

The building structures have been added to the terrain within Parkdale Crescent. These buildings were added as terrain modifications with exaggerated elevations to block the flow of water through the buildings. In reality buildings with timber subfloors that are raised off the ground will have some permeability to allow water to flow through or under the building, however due to the unknown building types at this stage, all buildings have been modelled as solid blocks.

The concept design drawings are included in Appendix B which further illustrates the differences between the two terrain models around the Diversion Drain area.

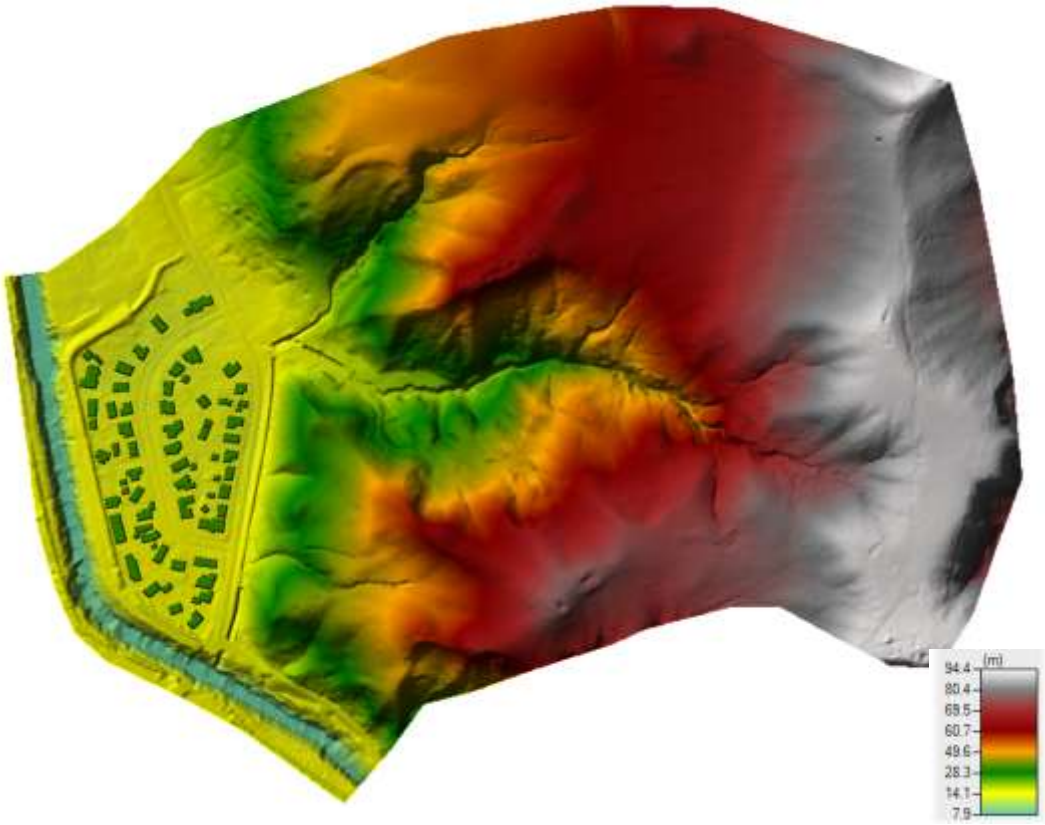


Figure 12. Terrain Model (existing condition)

Elevation banding from areas of higher elevation (grey) to lower elevations (blue), north up the page, not to scale.

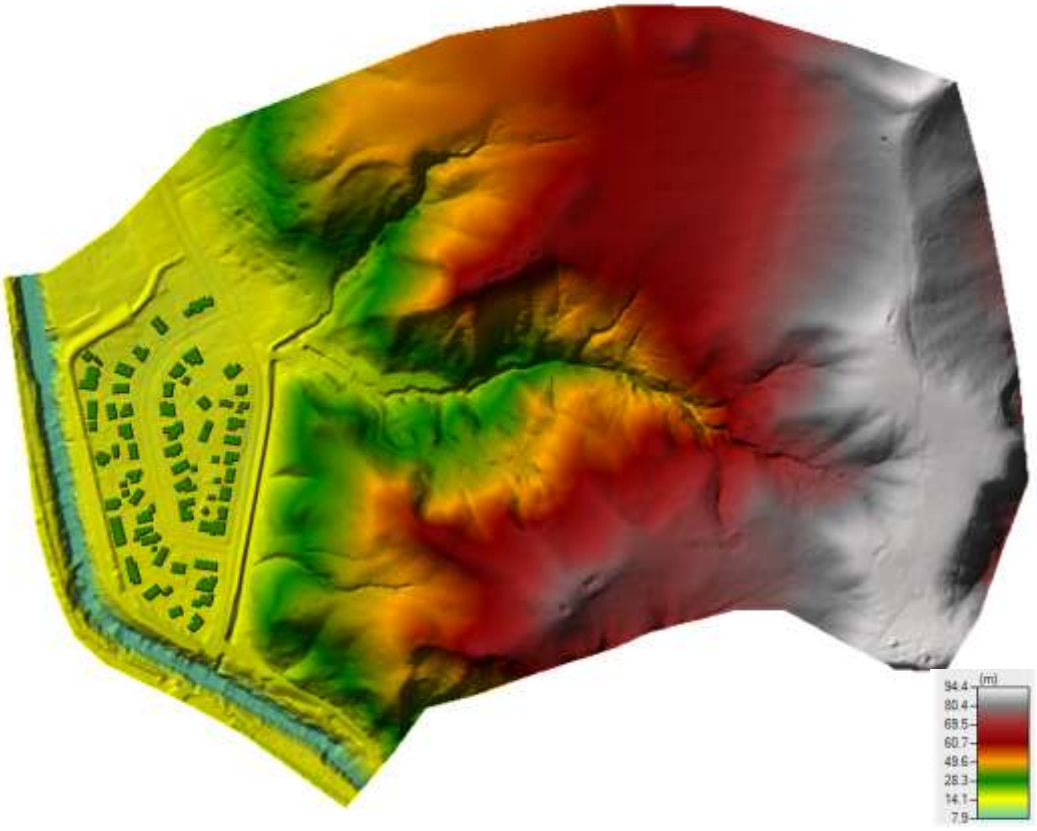


Figure 13. Terrain Model (proposed condition)

Elevation banding from areas of higher elevation (grey) to lower elevations (blue), north up the page, not to scale.

2.2.2 Grid Delineation and 2-D Geometry

Multiple 2-D geometry areas are used for both the existing and proposed terrain models. The existing model includes four areas, as depicted in Figure 14. The proposed model includes the same areas as the exiting model with the exception that the Awanui River DS is excluded. It can be excluded from the model because no water flows into the Northern Network Inlet.

All 2-D flow areas contained two primary components being the greater mesh and refinement areas. To create the refinement areas breaklines are added along channels, banks, Allen Bell Drive and drain crossings. Table 4 provides parameters used in defining the 2-D geometry areas. The greater mesh is described as the Max Mesh while the Minimum Mesh size is a result of the refinement areas.

Table 4. 2-D Flow Areas

Name	**Max Mesh**	**Minimum Mesh**	**Existing Model**	**Proposed Model**	**Linked Area**	**Purpose**
Awanui River US	2 m x 2 m	1 m x 1 m	Y	Y	Parkdale Crescent	Model tailwater conditions in Awanui River
Awanui River DS	2 m x 2 m	1 m x 1 m	Y	N	Drain Catchment	Model tailwater conditions in Awanui River
Drain Catchment	5 m x 5 m	1 m x 1 m	Y	Y	Parkdale Crescent and Awanui River US	Model rain on grid and hydraulic flows
Parkdale Crescent	5 m x 5 m	1 m x 1 m	Y	Y	Drain Catchment	Model hydraulic flows to assess flood extents

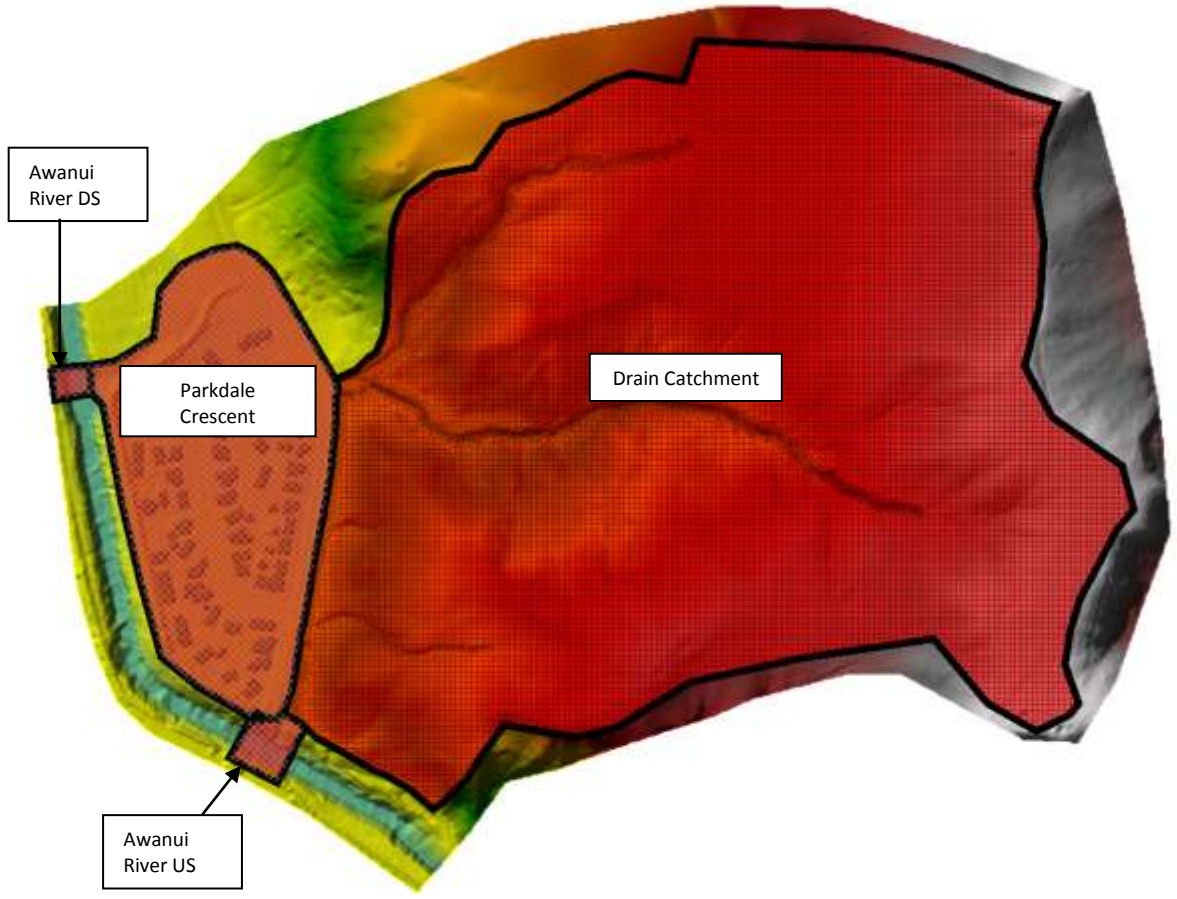


Figure 14. 2-D Flow Areas

2.2.3 Boundary Conditions

The model was set up using a number of boundary conditions to help generate tailwater conditions and allow water to exit the model.

Figure 15 shows the boundary conditions used on the existing condition model. The proposed condition model uses the same boundary condition lines as the existing model, excluding those associated with the Awanui River DS 2-D flow area. The proposed condition model was also run without simulating tailwater from Boundary Condition Line 2 to model peak velocities predicted in the drain and outlet. The details of the boundary conditions are provided in Table 5.

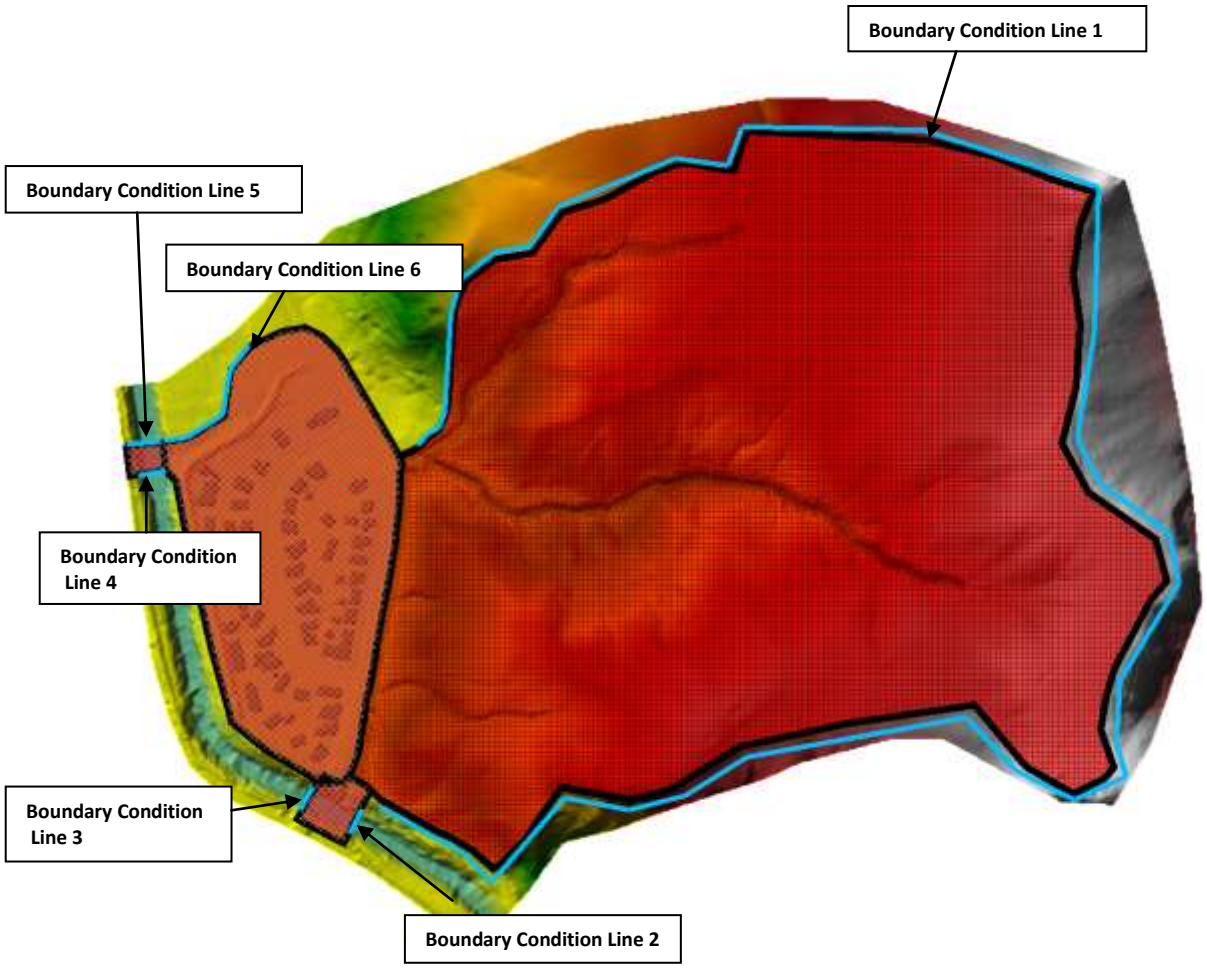


Figure 15. Boundary Conditions

Boundary Condition lines shown in blue, north up the page, not to scale.

Table 5. Boundary Condition Details

Line Number	Boundary Condition Type	2-D Flow Area	Application
1	Normal Depth (1%)	Drain Catchment	To allow for the over prediction of the catchment boundary and ensure water can exit the model that is not part the actual catchment
2	Stage Hydrograph	Awanui River US	A stage hydrograph, constant elevation at peak height, taken from NRC flood model data was applied to the US side of the Awanui River US flow area to generate the river level in the river during the associated storm event.
3	Normal Depth (1%)	Awanui River US	To allow the water to exit the 2-D flow area. The friction slope was calibrated to get the river level to match the NRC flood model data.
4	Stage Hydrograph	Awanui River DS (Existing Condition only)	A stage hydrograph, constant elevation at peak height, taken from NRC flood model data was applied to the US side of the Awanui River US flow area to generate the river level in the river during the associated storm event.
5	Normal Depth (0.3%)	Awanui River DS (Existing Condition only)	To allow the water to exit the 2-D flow area. The friction slope was calibrated to get the river level to match the NRC flood model data.
6	Normal Depth (1%)	Parkdale Crescent	To allow the water introduced from the Awanui River DS 2-D flow area to exit the model.

The mixed use of flood level data was necessary due to data limitations. The use of projected flood heights with climate change effects for the Awanui River DS is a conservative assessment of the flooding risk. To ensure the reliability and robustness of the modelling results, the sensitivity of the model to the mixed use of flood level data was evaluated. The findings indicate that the overall impact on the flood inundation extent within Parkdale Crescent for the proposed Diversion Drain is minimal. This suggests that the mixed use of flood level data does not significantly compromise the accuracy of the modelling results.

2.2.4 Land Cover

The land cover map layer was taken from the Land Cover Database (2018) with minor modifications around the diversion drain to remove a portion of 'Built up Area' that extended into the drain.

The upper limits of the Manning 'n' values, suggested by the National Resources Conservation Service (NRCS) and included in the HEC-RAS Users Manual, were applied to all model cells based on the cover type shown in Table 6.

Table 6. Landcover Groups and Mannings N Values

ID	Land Cover Type	Mannings N Value
1	Built Up Area	0.08
2	Manuka and-or Kanuka[1]	0.15
3	Indigenous Forest	0.15
4	Gorse and-or Broom	0.045
5	Urban Parkland-Open Space	0.04
6	Deciduous Hardwoods	0.15
7	High Producing Exotic Grassland	0.045

[1]Manuka and-or Kanuka was not located over any 2-D-flow areas

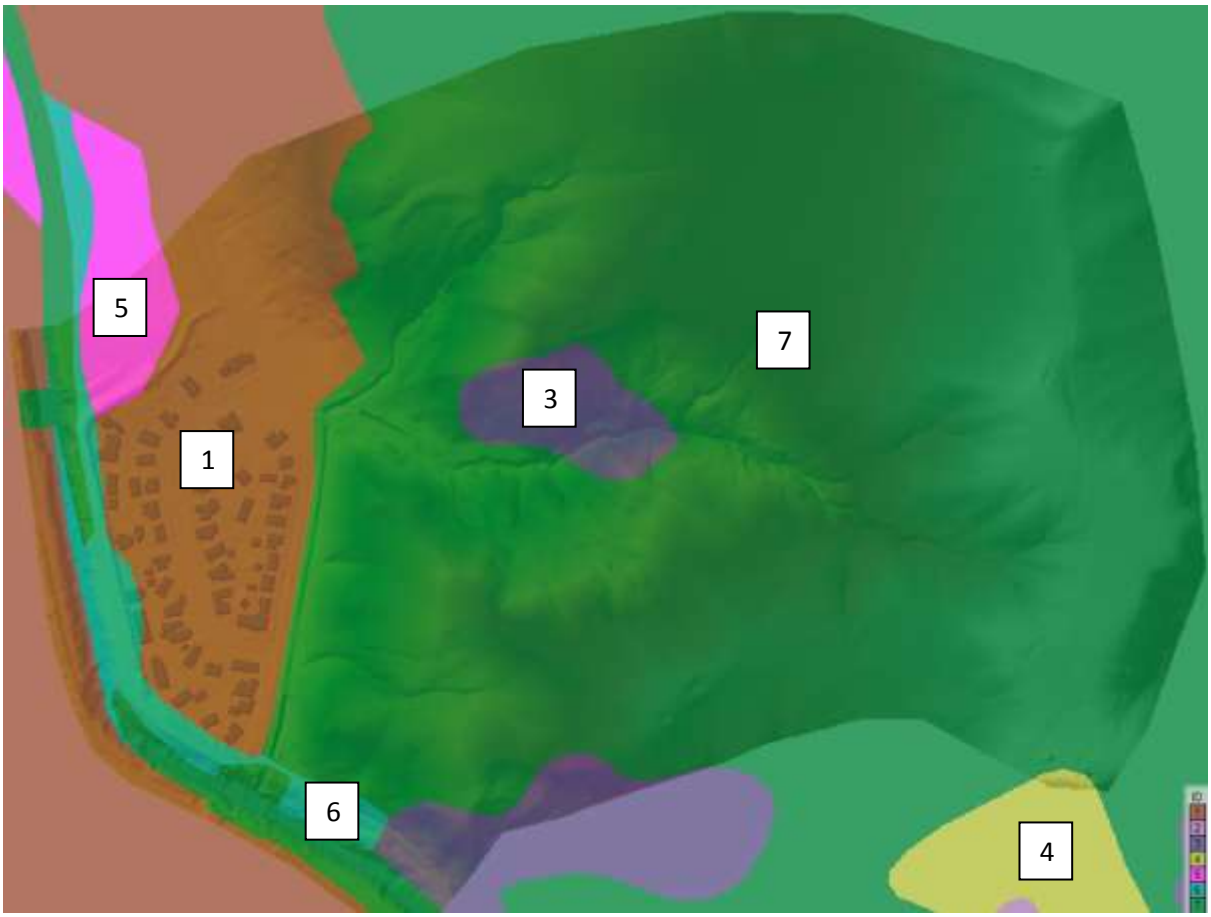


Figure 16. Land Cover
North up the page, not to scale.

2.2.5 2-D Connections and Culverts

All 2-D flow areas have been connected using 2-D connections to allow the water to flow between 2-D flow areas. Additional 2-D connections have been applied over the existing and proposed culverts in order to build the culverts into the model. The Northern Pipe Network was also included and modelled as one continuous ϕ1200 mm culvert. Locations of the culverts are shown in Figure 17. Note the existing and proposed flood gates were unable to be included in the HEC-RAS model which is discussed further in Section 3.1.1.4.

2.2.6 Tailwater Conditions

When modeling the performance of the proposed Diversion Drain it is important to consider the Awanui River with varying tailwater levels to simulate the worst case scenario in terms of flood extent and flow velocities.

High tailwater levels create backpressure within the drain and reduce the hydraulic gradient and therefore the flow capacity of the drain. This scenario tends to lead to higher water levels required to drive the required flows within the drain and to the outlet and is important when evaluating flood extents due to the higher water levels.

When there is no tailwater there is no restriction to the flow within the drain and the water within the drain can reach the maximum possible velocity for the given drain slope and discharge which is the critical scenario to evaluate drain velocities and potential erosion.

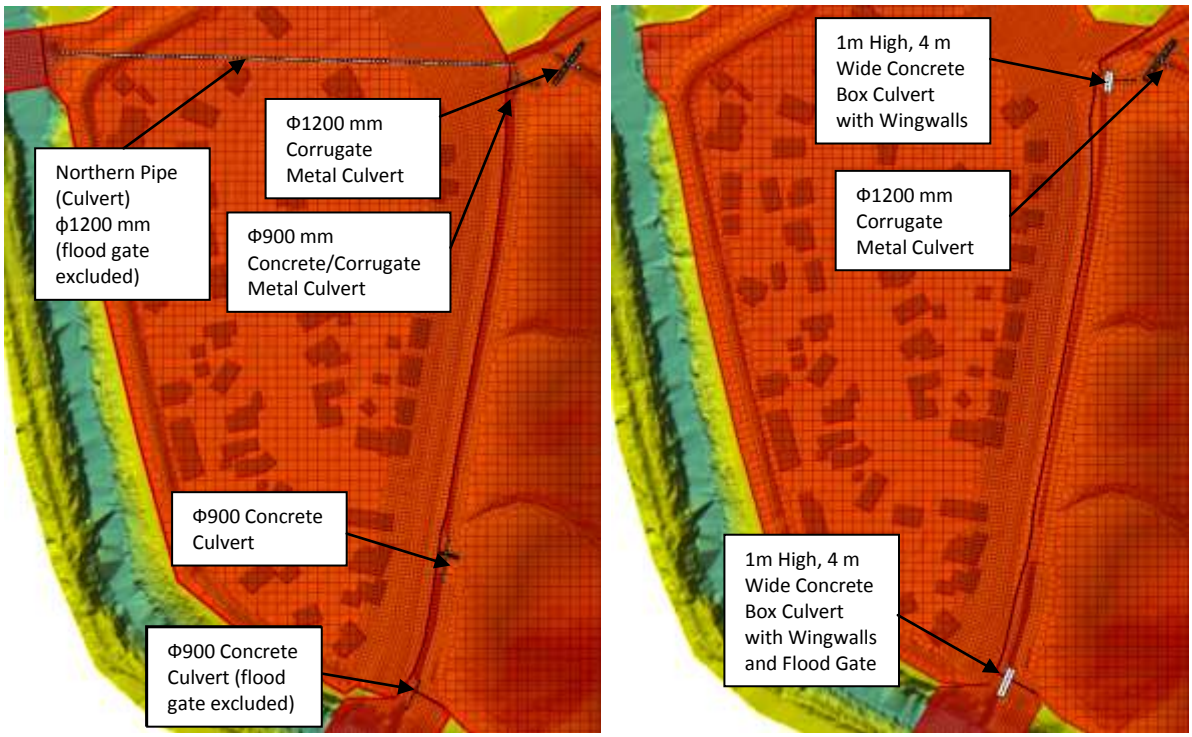


Figure 17. Culvert Locations

North up the page, Existing condition shown in image on the left and proposed condition shown on the right, not to scale.

3 Model Results

VISION ran simulations for various storm events and durations as outlined in Table 2. This assessed the Diversion Drain's performance under different storm conditions and captured the critical storm durations.

Tailwater conditions were only considered for the evaluation of the maximum flood extent. The maximum velocity was evaluated from proposed condition models excluding tailwater, give a worse-case scenario.

Each model simulation was extended for an additional hour beyond the storm duration to account for the 25 minute lag time from the Drain Catchment.

The results presented in the following section focuses on flood inundation extent to evaluate the Diversion Drain's impact on localised flooding in Parkdale Crescent.

3.1 Flooding Extent

The following figures display the flood inundation extent for various storm scenarios, comparing the existing drainage conditions (left-hand side images) with the proposed Diversion Drain modifications (right-hand side images). The blue-shaded overlay on the images represents the extent of the flooding. By comparing these images, one can clearly observe the impact of the Diversion Drain on mitigating flood risk in the Parkdale Crescent area.

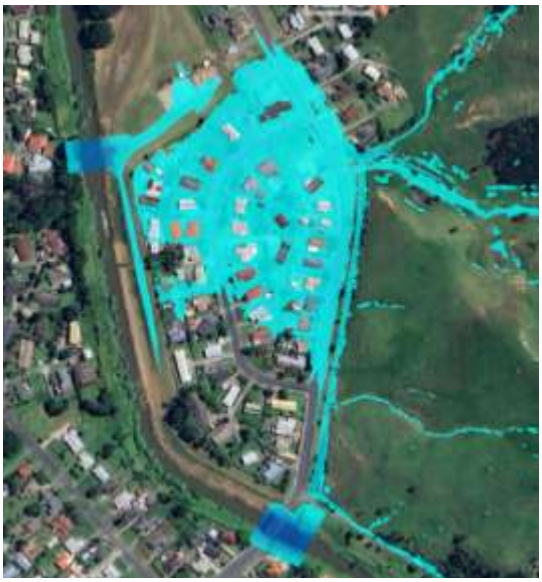


Figure 18. 1% AEP - 1 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 19. 1% AEP - 6 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 20. 1% AEP - 12 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 21. 1% AEP - 24 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 22. 2% AEP - 1 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 23. 2% AEP - 6 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 24. 2% AEP - 12 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 25. 2% AEP - 24 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 26. 10% AEP - 1Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 27. 10% AEP - 6 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 28. 10% AEP - 12 Hour

Flood inundation shown in blue, north up the page, not to scale.

Figure 29. 10% AEP – 24 Hour

Flood inundation shown in blue, north up the page, not to scale.

3.1.1 Flood Inundation for Existing Conditions

The figures presented in Section 3.1 demonstrate that flooding occurs within Parkdale Crescent for all existing condition storm events and durations. The most severe flooding event under existing conditions is the 100 year ARI 24-hour storm, depicted in Figure 21. The extensive flooding is attributed to the high tailwater levels in the Awanui River, leading the Northern Pipe Network Inlet overtopping and flooding in Parkdale Crescent. This inundation has the potential to damage properties.

In the absence of a secondary flow path within Parkdale Crescent, longer the storm durations allow for greater runoff accumulation within the area, resulting in more widespread flooding. This is because the existing drainage system is quickly overwhelmed during prolonged rainfall events from the limited capacity, especially when tailwater levels in the river are high.

3.1.2 Flood Inundation for Proposed Condition

In contrast to the existing conditions, the Diversion Drain demonstrates adequate capacity to prevent flooding in Parkdale Crescent under all proposed condition model runs with no buildings subject to flooding. This is evident in Figure 18, which illustrates the performance of the Diversion Drain during the critical event, the 1% AEP 1-hour storm. The effectiveness of the Diversion Drain in mitigating flooding highlights the potential to significantly improve drainage conditions in the area.

Figure 30 below highlights the area of land that shows a minor difference in flooding extent in the proposed 10% AEP event. This difference in flooding extent is mainly confined within the proposed new drain and the modified area around the Northern Pipe Network Inlet.

During detailed design this area is to be graded to ensure the flows in the areas of overland flow are safe for people and vehicles to pass.

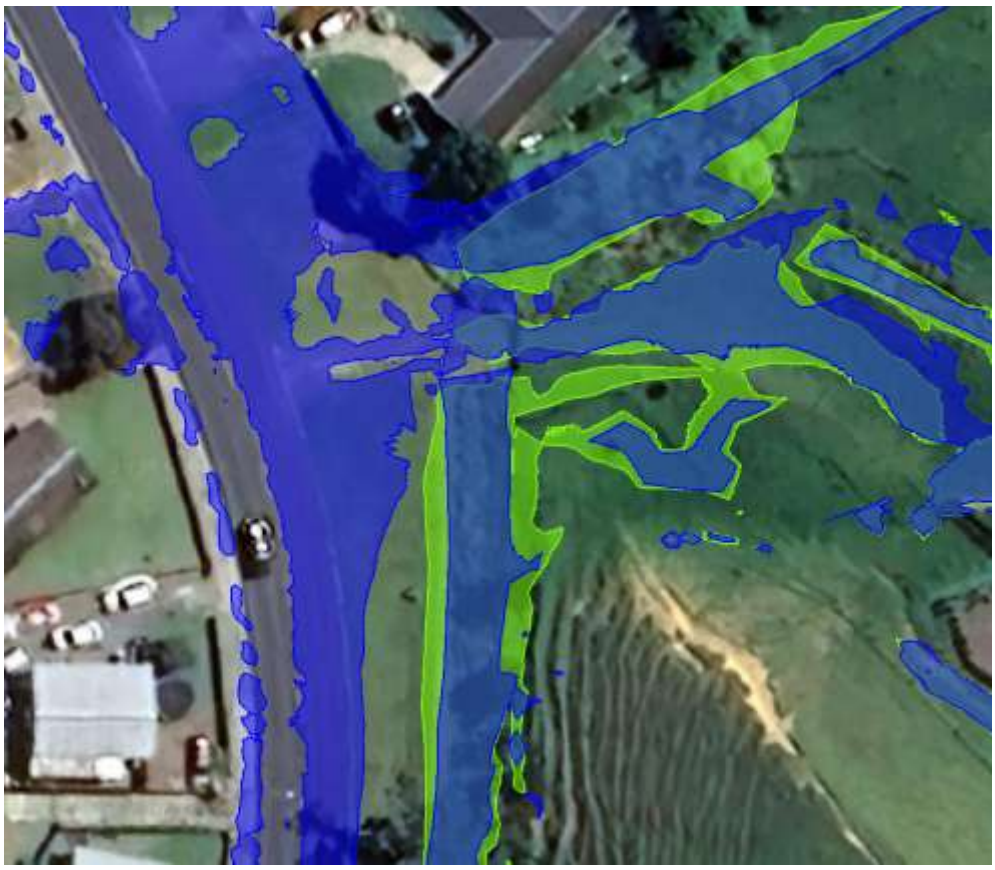


Figure 30. 10% AEP – 1 Hour, Flood Extent Comparison

Existing condition flood extent shown in blue, proposed condition flood extent shown in green, north up the page, not to scale.

3.2 Flow Velocities

The following figures display the flow velocities within the Diversion Drain and the outlet for the 1% 1 hour critical storm event, for the proposed condition.

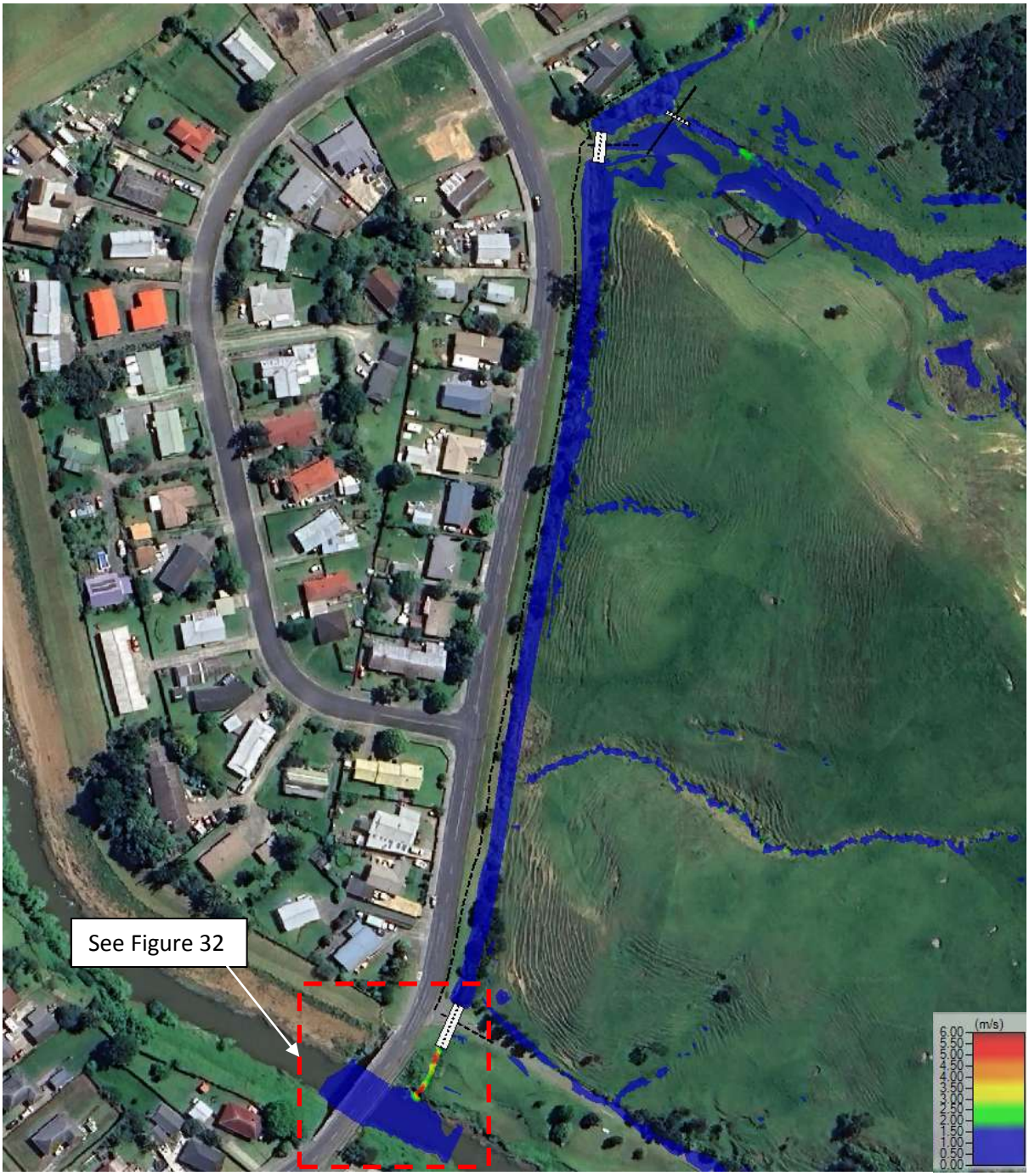


Figure 31. 1% AEP – 1 Hour, Diversion Drain Velocities (no tailwater)

Flow velocities shown by banding included in legend, north up the page, not to scale.

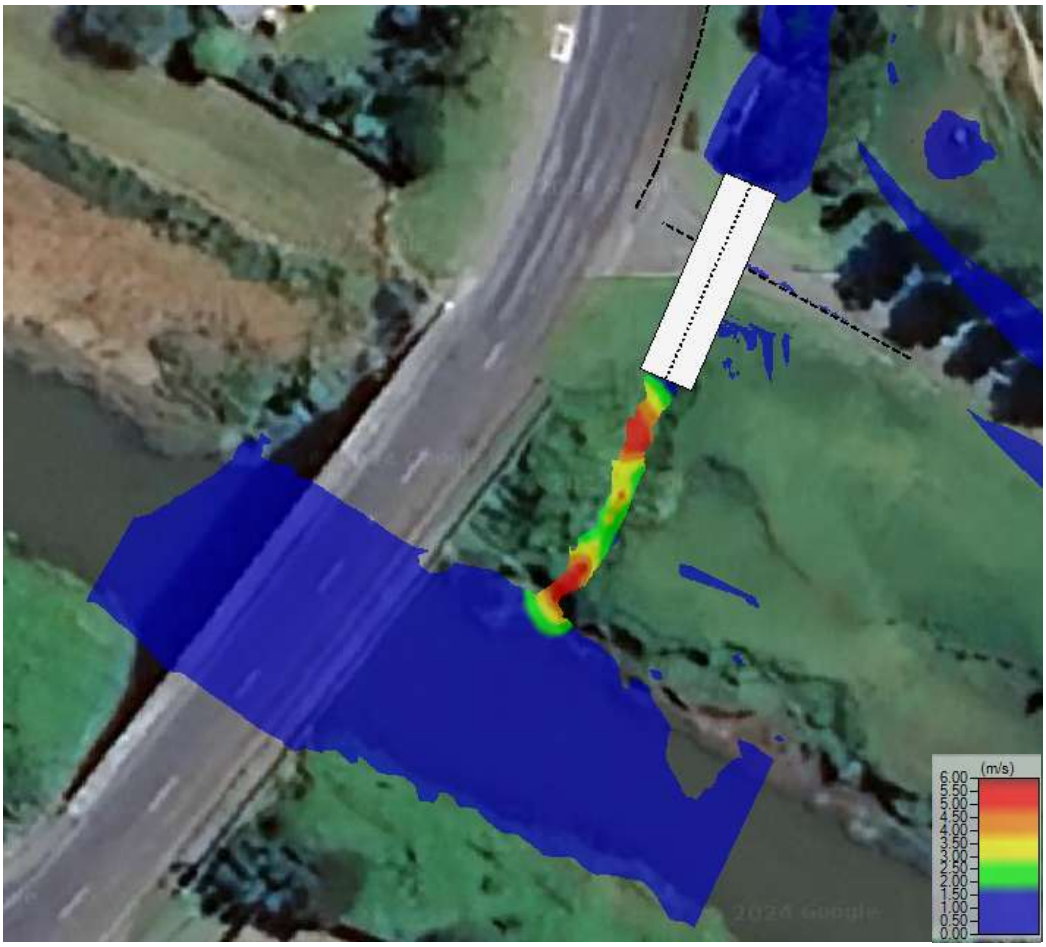


Figure 32. 1% AEP – 1 Hour, Outlet Velocities (no tailwater)

Flow velocities shown by banding included in legend, north up the page, not to scale.

3.2.1 Flow Velocities for Proposed Conditions

The proposed Diversion Drain has been modelled with a Mannings n of 0.045 to represent a channel with a clean bottom and brush on the sides.

Figure 31 shows the majority of the proposed Diversion Drain with velocities of less than 1.5 m/s meaning a grassed lined channel should be satisfactory protection against scour and erosion.

Figure 32 shows the velocities at the outlet exceeding 1.5 m/s and up to 5.65 m/s in the worst areas. The worst areas are localised around areas in the existing drain where head cutting and erosion is already present.

Appendix B drawings include a potential concept design of the outlet using Rip-Rap protection for the outlet to protect against scour. It is also proposed to regrade the outlet to reduce the high velocities that are predicted.

3.3 Tailwater Conditions

To assess the Diversion Drain's performance under the most adverse conditions, the flood extent models were run with the assumption that the peak tailwater levels in the river coincide with the peak discharge from the Diversion Drain catchment. This scenario represents the worst-case flooding scenario and is highly unlikely to occur in reality due to the significant difference in time of concentrations between the river catchment and the Diversion Drain catchment. Nevertheless, considering this worst-case scenario allowed for a comprehensive evaluation of the Diversion Drain's ability to mitigate flooding under modelled conditions.

The flow velocity models do not include any tailwater in the Awanui River. This scenario represents the worst case for flow velocities and again is very unlikely, however valuable to highlight the

consideration needed around the design of erosion protection that will need to be incorporated into detailed design of the outlet.

3.4 Flood Gates

Due to limitations in HEC-RAS, the models were unable to simulate the operation of flood gates in both the existing and proposed scenarios. The inclusion of flood gates would have prevented backflow of water from the Awanui River through the culverts at the beginning of our simulations. This could provide more time for the existing drainage system and the Northern Pipe Network to reach their capacity, delaying the discharge of water into Parkdale Crescent. As a result, the introduction of flood gates might lead to a reduction in the volume of runoff entering Parkdale Crescent and a subsequent decrease in the extent of flooding.

However, closer examination revealed that the areas immediately upstream of the culverts equipped with flood gates have limited storage capacity to attenuate runoff. Consequently, the impact of the flood gates on reducing the flooding extent is anticipated to be relatively minor. This observation is further supported by the fact that the inlet structures associated with the Northern Pipe Network, located within Parkdale Crescent (although not included in the model), could potentially submerge the pipe network and replicate the backflow conditions observed in our simulations.

Additionally, the headwater levels upstream of the culverts with flood gates are likely to be modelled lower than what could potentially be observed due to energy losses associated with the flood gates. This lower headwater level could, in turn, contribute to an increase in the flooding extent within Parkdale Crescent under existing conditions. However, this does not apply to the proposed Diversion Drain as it has been designed to accommodate the energy losses linked to the proposed flood gate, ensuring that the flood gate has no adverse effects on our proposed flood models.

4 Model Verification

Due to the absence of gauged flow data within the project catchment, design flow verification was completed using empirical estimations to estimate rainfall runoff and peak discharges. This lack of gauged data precluded the traditional approach of model calibration, which involves comparing model outputs to observed data. Instead, alternative methods were employed to assess the reliability and accuracy of the flood modeling results.

Empirical estimations, such as the Rational Method and the SCS Curve Number method, provide established formulas for calculating rainfall runoff and peak discharges. By comparing the model outputs to these empirical estimates, it is possible to evaluate the model's performance and ensure that the results are within a reasonable range.

The Rational Method is a simplified approach for estimating peak discharges in urban areas, considering factors such as catchment area, rainfall intensity, and time of concentration. The SCS Curve Number method, on the other hand, accounts for soil type, land use, and antecedent moisture conditions to estimate runoff volume.

By comparing the model outputs to these empirical methods, the flood modelling results were validated and deemed reliable for predicting the impacts of the proposed Diversion Drain on the surrounding area.

4.1 Rainfall-Runoff Verification

The discharge hydrographs presented in Section 2.1.8, taken from the HEC-HMS model, serve as a baseline for comparing the discharge hydrographs from the 1% AEP proposed HEC-RAS model runs with the SCS Curve Number method. The 1% AEP proposed model was selected because all flows

from the catchment are routed to the Awanui River outlet, aligning with the assumptions of the SCS Curve Number method in the HEC-HMS results.

Figure 33 below shows a good correlation between the HEC-HMS rainfall-runoff estimates and the HEC-RAS proposed model, particularly for the storm durations of 6-, 12- and 24- hours. All models indicate a slightly earlier peak discharge compared to the HEC-HMS models. Moreover, the 1-hour HEC-RAS model shows an increased peak discharge.

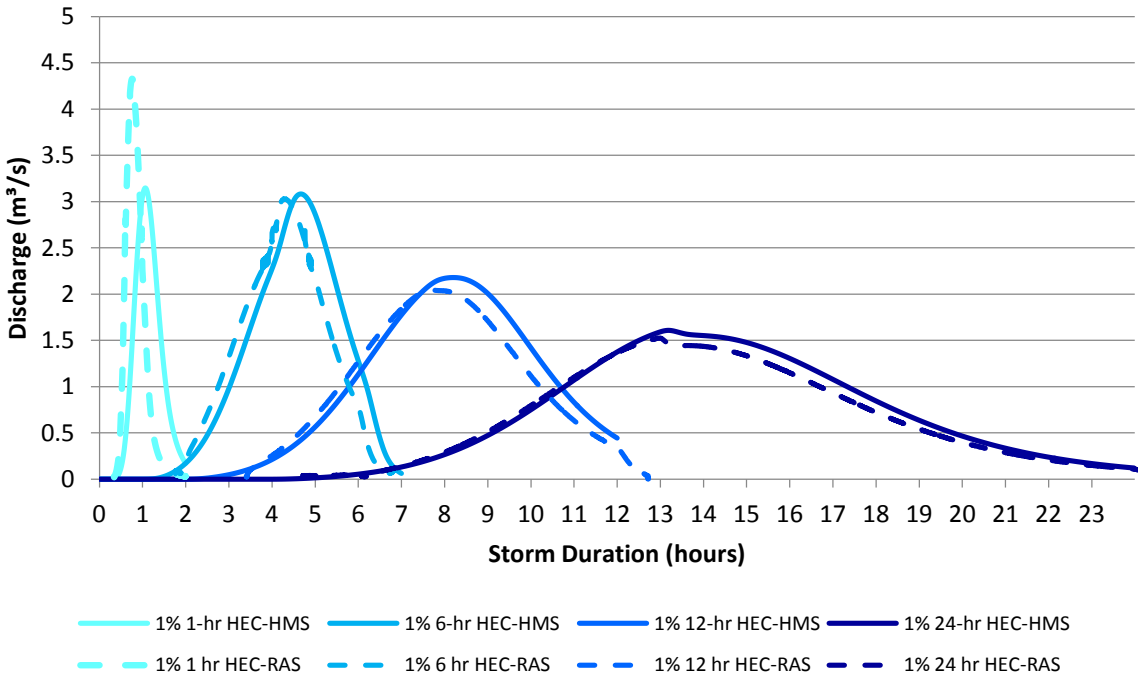


Figure 33. Correlation of 1% AEP Discharge Hydrographs Between Model Types

4.2 Peak Flow Verification

Table 7 compares the peak flows for the proposed condition critical duration (1% AEP 1-hour), including the Rational Method estimate. A slight variation in peak flows is observed for each method, likely to be attributed to the Mannings 'n' values in the model not accounting for the depth-varying roughness. This roughness is needed to accurately model the more concentrated flows associated with the higher intensity rainfall in the shorter duration storm events.

Table 7. Peak Flow Estimates (1% AEP 1-hour)

Method	Peak Flow (m³/s)
SCS	3.15
Rational	3.736
HEC-RAS Model	4.33

Figure 34 presents the peak flows for all methods and storm durations. This Figure reveals a strong agreement between the SCS method and the HEC-RAS models for the 6, 12 and 24 hour storm durations.

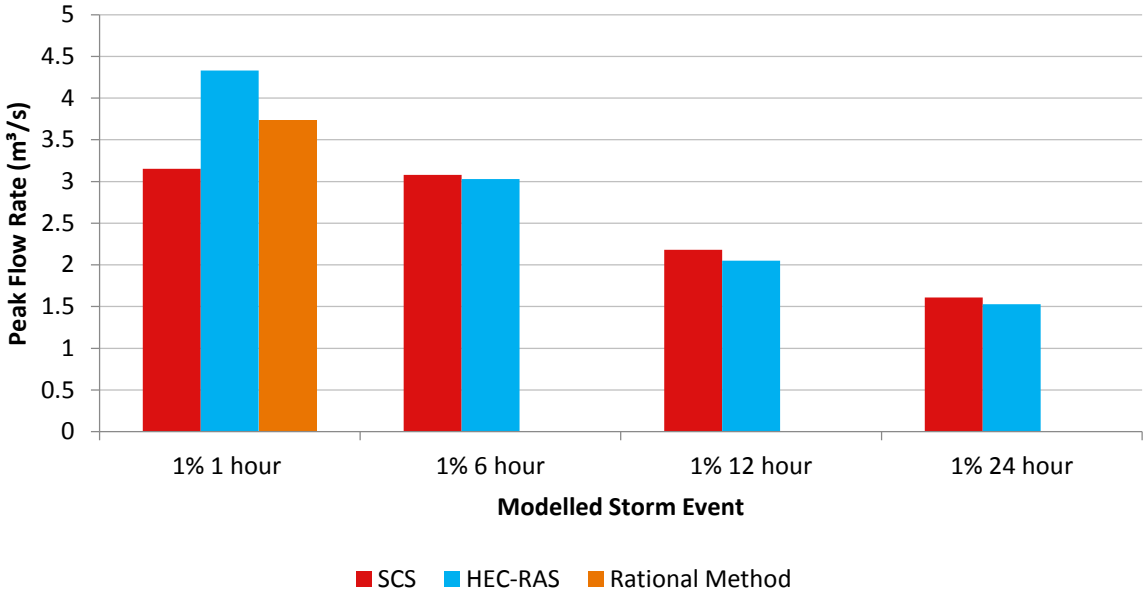


Figure 34. Peak Flow Comparison for All Methods and Storm Durations

This figure shows the peak flow estimates for the SCS method, Rational Method, and HEC-RAS model across various storm durations (1, 6, 12, and 24 hours). It highlights a strong agreement between the SCS and HEC-RAS models for longer durations (6, 12, and 24 hours).

Figures 33 and 34 indicate that the modelled flows are within an acceptable range compared to other empirical estimates. The HEC-RAS model overestimates the peak flow for the critical duration and can therefore be considered a more conservative estimate. This peak flow estimate has been used in the following section to predict the impacts of the proposed works on the Awanui River flood level.

5 Awanui River Impact Assessment

This section evaluates the potential impacts of the proposed Diversion Drain on the Awanui River's flood levels. A conservative scenario, assuming simultaneous peak flows from the catchment and the river (highly unlikely), is used to assess the worst-case impact.

5.1 Additional Flows and River Level Change

The HEC-RAS models were used to determine the additional flow entering the Awanui River from the Diversion Drain (4.33 m³/s). This represents a 1.35% increase in the total flood flow at the outlet.

Manning's equation was applied to assess the impact on flood height using the river cross-section data and existing flow conditions. The calculated increase in flood height due to the additional flow is minimal (0.047 meters), which translates to a 0.66% rise in existing river depth (assuming an existing depth of 7.12 meters). See Section 5.2 and Appendix C for detailed calculations.

5.2 Manning's Equation to Estimate Flood Height

An assessment of the potential impact on the Awanui River flood height was assessed using Manning's Equation with river cross-sectional data taken from the NRC 1m LiDAR DEM.

5.2.1 Mannings Equation Parameters

5.2.1.1 Channel Slope

Due to the flat nature of the terrain near the project site, the channel slope value was derived from the elevation difference in the river for a distance of approximately 200 m upstream and downstream of the Diversion Drain outlet.

The channel slope used was 0.05%.

5.2.1.2 Cross Sectional Data

Figure 35 depicts the Awanui River cross-section, extracted from the NRC 1m LiDAR DEM, immediately downstream of the proposed Diversion Drain outlet.

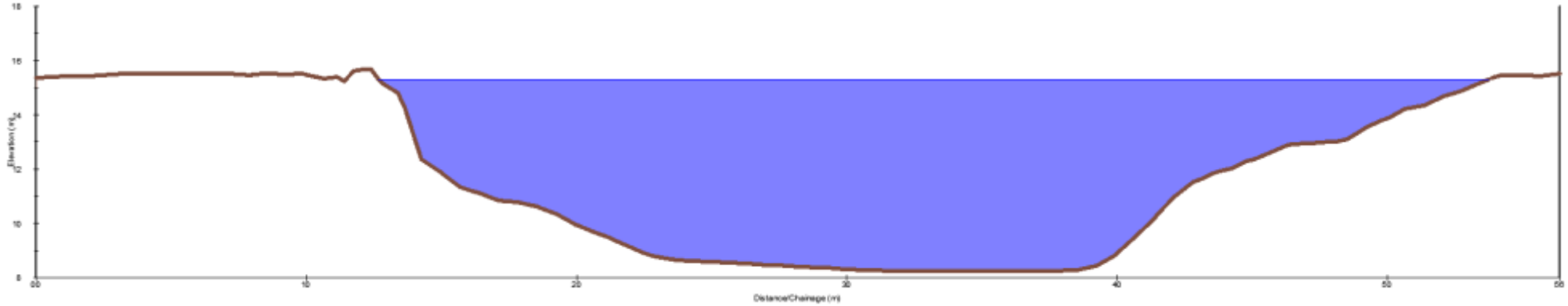


Figure 35. Awanui River Cross Section

Existing 1% AEP Awanui River flow area shown in blue at 15.31 m OTP 1964, terrain shown by brown line.

This cross section was used to calculate the flow area and perimeter required determine the hydraulic radius and the river elevation when conveying the peak flow.

5.2.1.3 Manning's n

A Manning's n value in the river was calculated from the existing condition as:

$$n = \frac{1}{Q} \times A \times R^{\frac{2}{3}} \times S^{0.5}$$

where:

Q = Peak Flow Rate (m^3/s)

A = Cross Sectional Flow Area (m^2)

R = Hydraulic Radius

S = Channel Slope (m/m)

The final Mannings' n value was determined to be 0.0432, which aligns with values from Badient et al[1] for a major stream of irregular and rough section ranging between 0.035 and 0.1.

5.2.2 Manning's Equation Results

Using the Manning's Equation parameters and a peak flow of 325.33 m^3/s, the resultant river elevation was calculated to be at 15.357 m (OTP 1964).

This implies that the predicted increase in the Awanui River flood height, based on the worst-case model scenario, is 0.047 metres. This translates to a 0.66% increase in the existing river flow depth based on the cross-section data.

6 Water Quailty

The proposed upgrade of the Diversion Drain is part of a broader stormwater management strategy aimed at reducing the risk of flooding in the area. This plan includes retaining portions of the existing piped stormwater network within Parkdale Crescent.

Importantly, the overall catchment area and its characteristics will remain unchanged. There will be no significant alterations to land use or zoning (primarily farmland, scattered trees, and residential areas with roads). Therefore, the type of stormwater runoff, including potential pollutants, is expected to remain the same as with existing conditions.

Since there's no change in catchment size, type, or land use, the overall impact on water quality at the Awanui River outlet is expected to be negligible (net zero effect). While the upgraded Diversion Drain and piped network will improve stormwater management and reduce flooding risks, they are not anticipated to introduce new pollutants or increase existing ones in the stormwater system.

7 Summary

This report presents the results of modelling the proposed Diversion Drain on the east side of Allen Bell Drive in Kaitaia. The simulations consider various storm events and durations, including worst-case scenarios for flooding and flow velocities, using conservative tailwater conditions.

The key findings are:

[1] Bedient, P, Huber, W, Vieux, B (2008), *Hydrology and Floodplain Analysis,* Fourth Edition, Prentice-Hall, Upper Saddle River, NJ.

- The Diversion Drain effectively eliminates predicted flooding within Parkdale Crescent associated with the existing site conditions.
- The Diversion Drain introduces a small additional flow (4.33 m^3/s) into the Awanui River under worse-case conditions where peak river level coincides with the peak flow. This scenario is predicted to increase the riiver's peak flood height by 0.047 metres upstream of the Allen Bell Drive Bridge.
- Flow velocities within the Diversion Drain itself are generally less then 1.5 m/s, allowing for grass lining. However outlet velocities reach up to 5.65 m/s, requiring upgrades like the proposed rock-lined chute to prevent erosion and scour.
- Model verification suggests the predicted impacts on the Awanui River are conservative.
- The overall catchment area and type remain unchanged, resulting in no change on water quality at the Awanui River outlet.
- The proposed works are located outside the 10-meter buffer zone of existing flood defences.

8 Additional Limitations

8.1 General

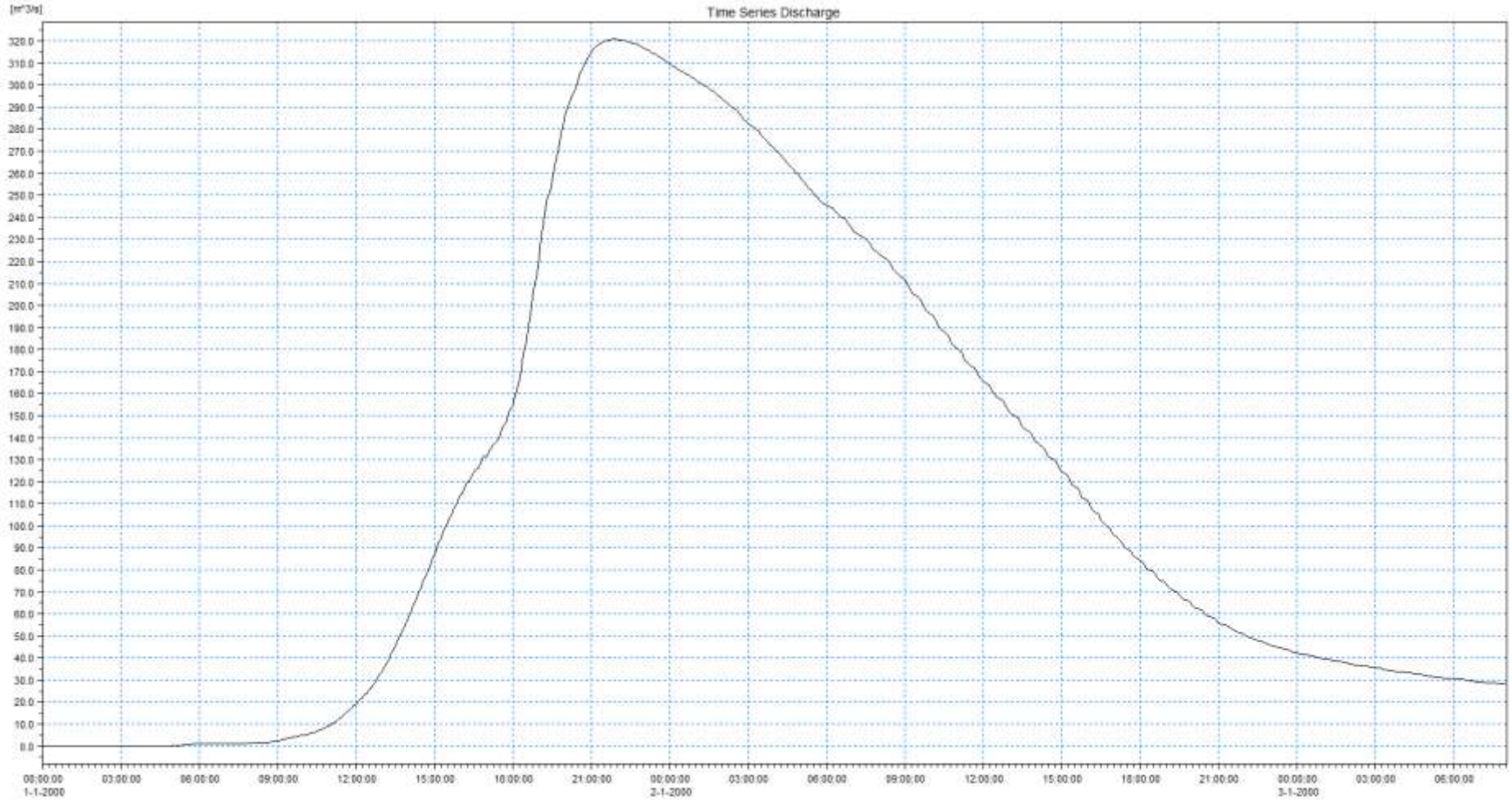
- The information in this report is provided at a concept level and should not be construed as detailed design or for construction.

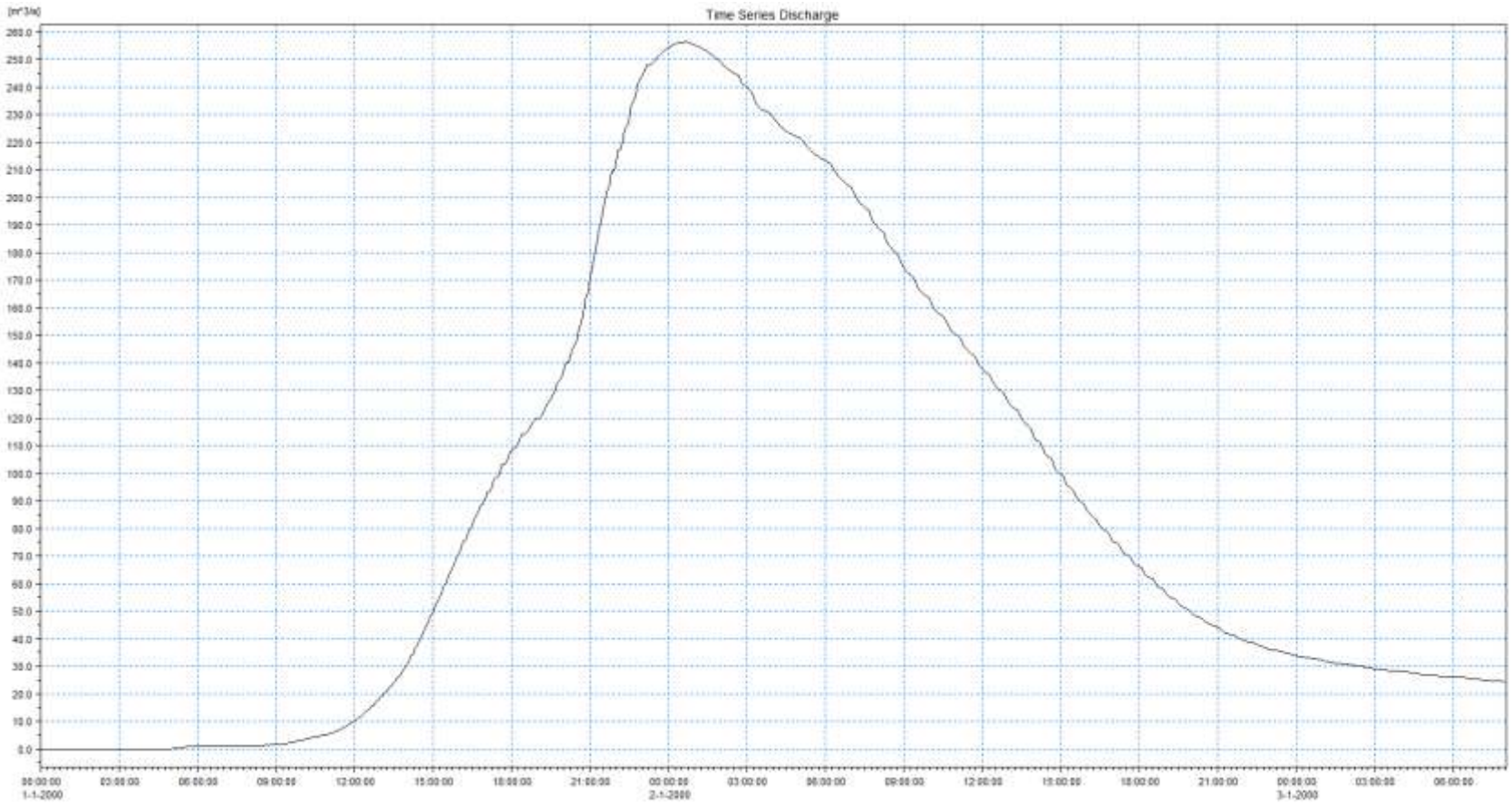
8.2 Hydraulics and Hydrology

- The report is based on the assumption that the hydraulic and hydrologic parameters used in the design are accurate. However, these parameters are subject to uncertainty, and the actual performance of the Diversion Drain may vary from the predicted performance.
- The report does not consider the effects of sediment transport or debris accumulation on the Diversion Drains capacity or performance.

Appendix A
NRC Flood Data

Point 1 10 Year ARI




Time Series Discharge
[m^3/s]
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250.0
240.0
230.0
220.0
210.0
200.0
190.0
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130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
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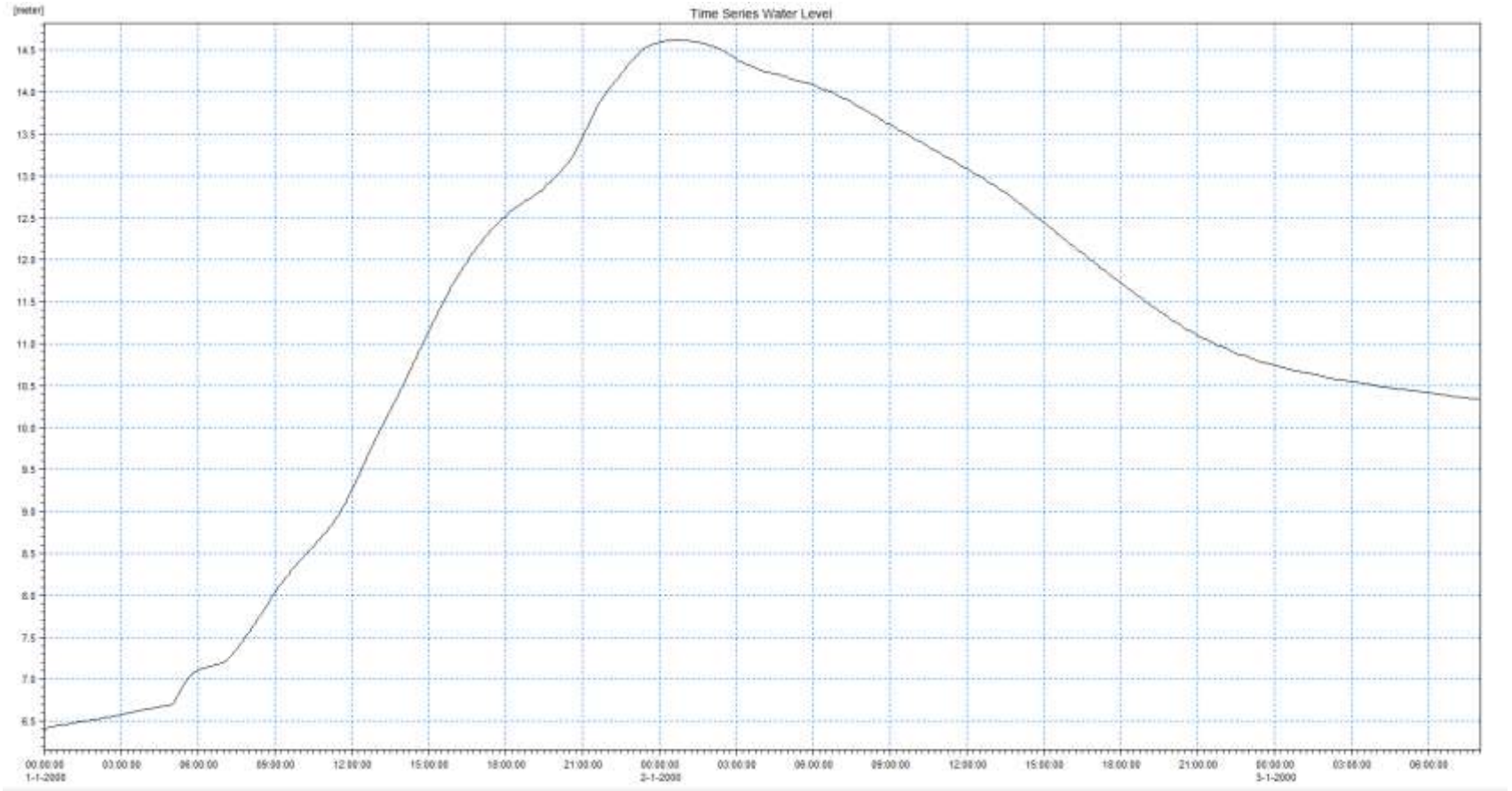
06:00:00


[meter]
Time Series Water Level
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14.0
13.5
13.0
12.5
12.0
11.5
11.0
10.5
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9.0
8.5
8.0
7.5
7.0
6.5
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09:00:00
12:00:00
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18:00:00
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00:00:00
3-1-2000
03:00:00
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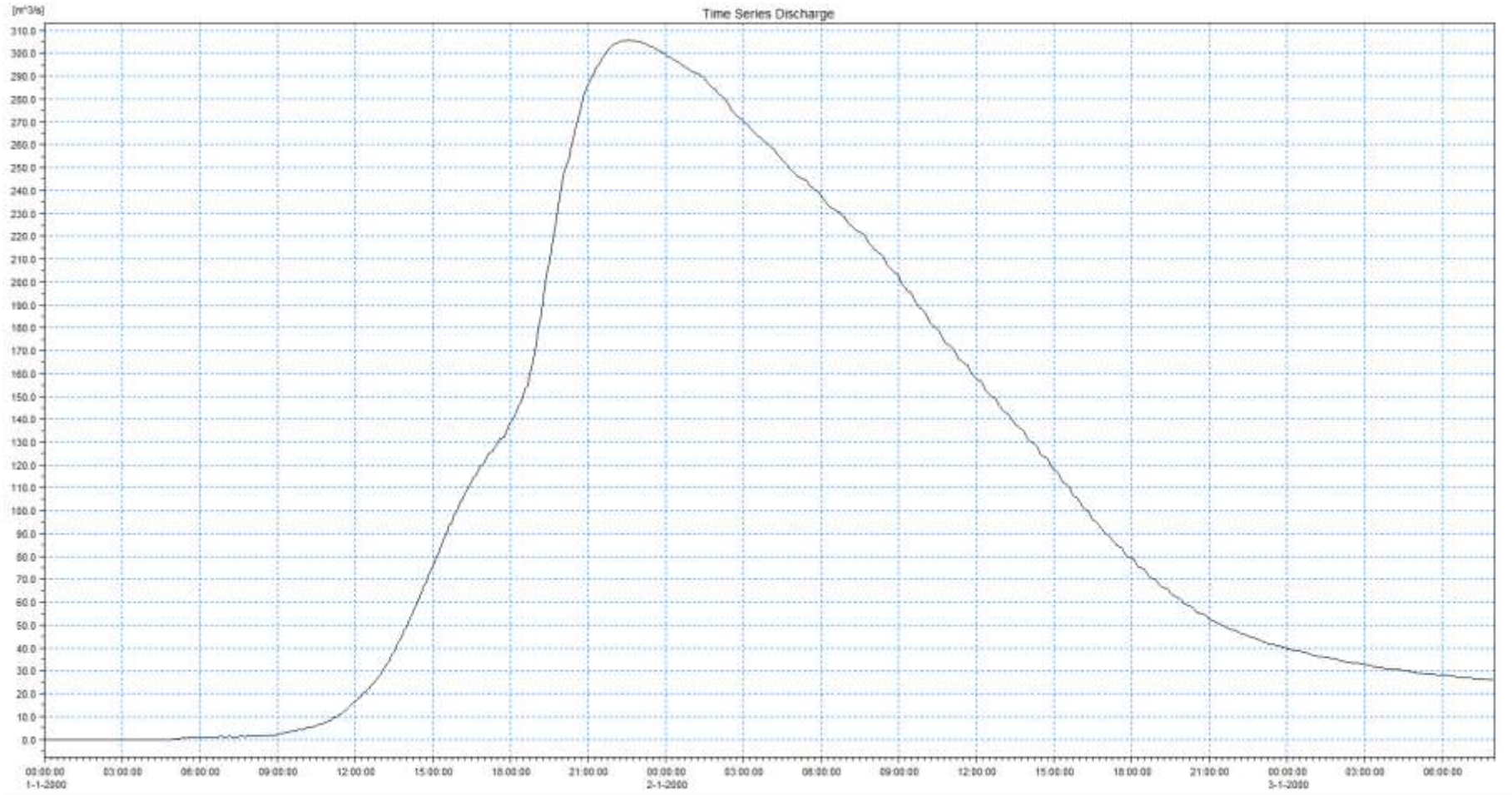
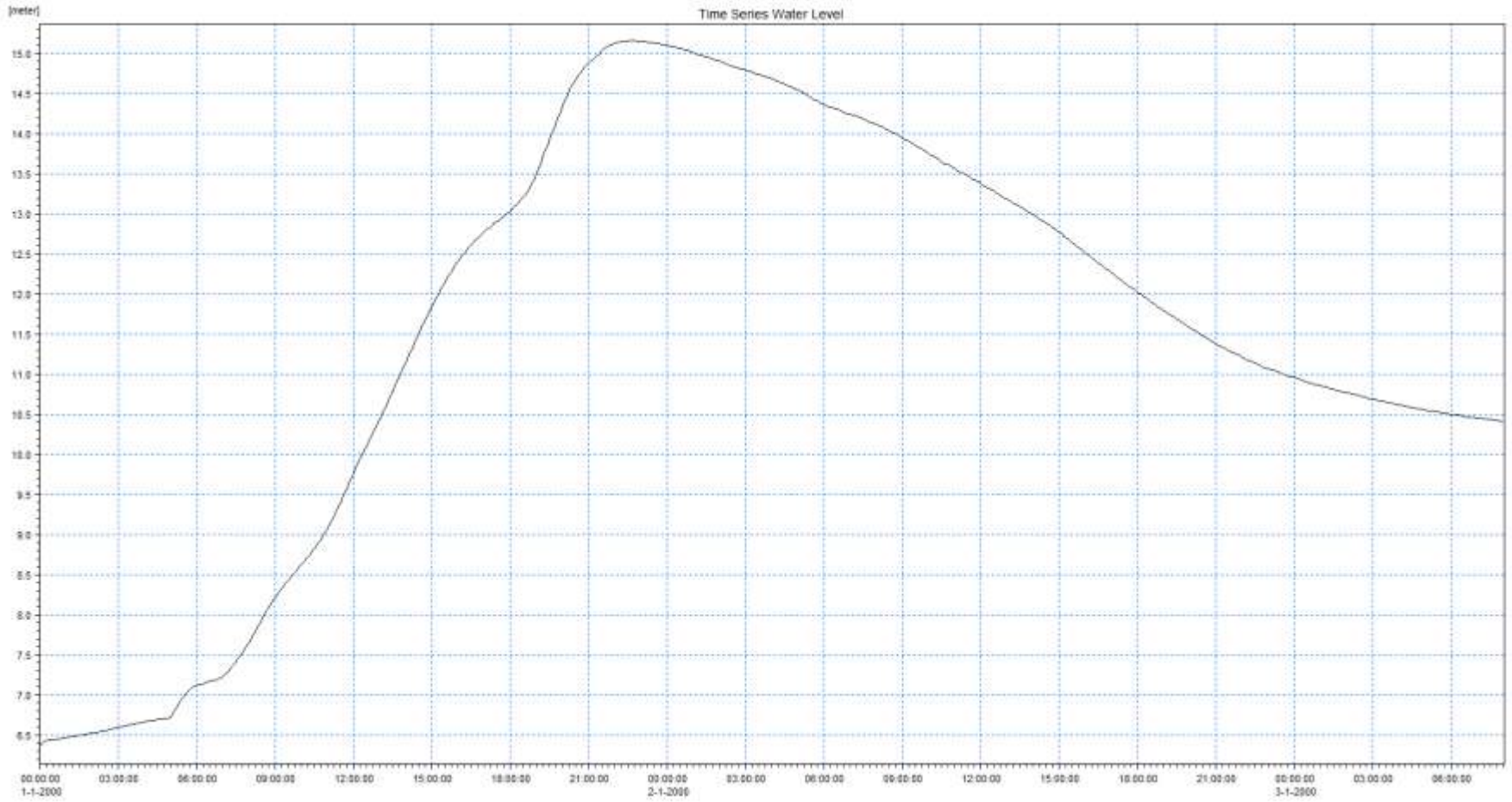
Point 1 50 year ARI

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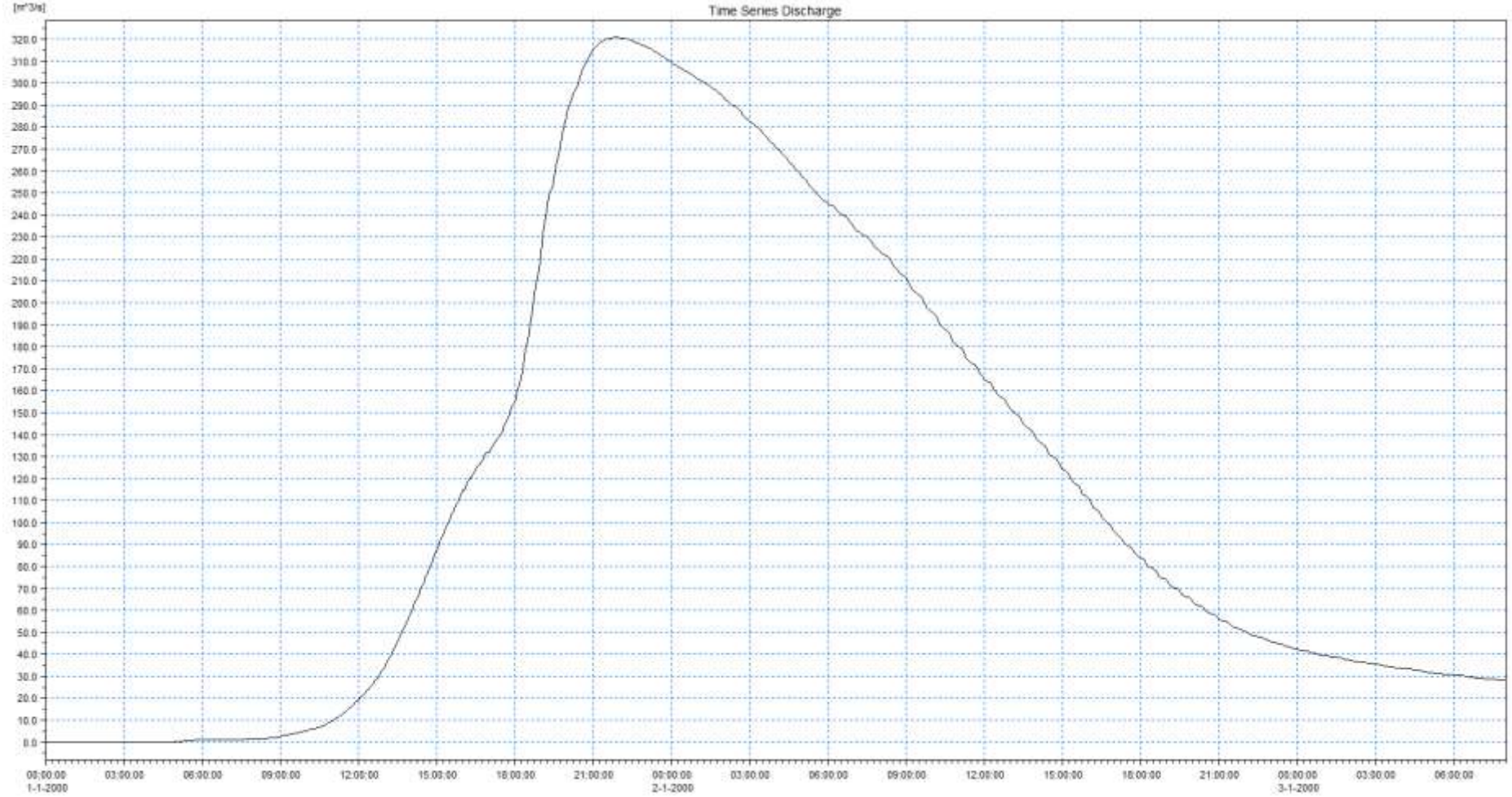

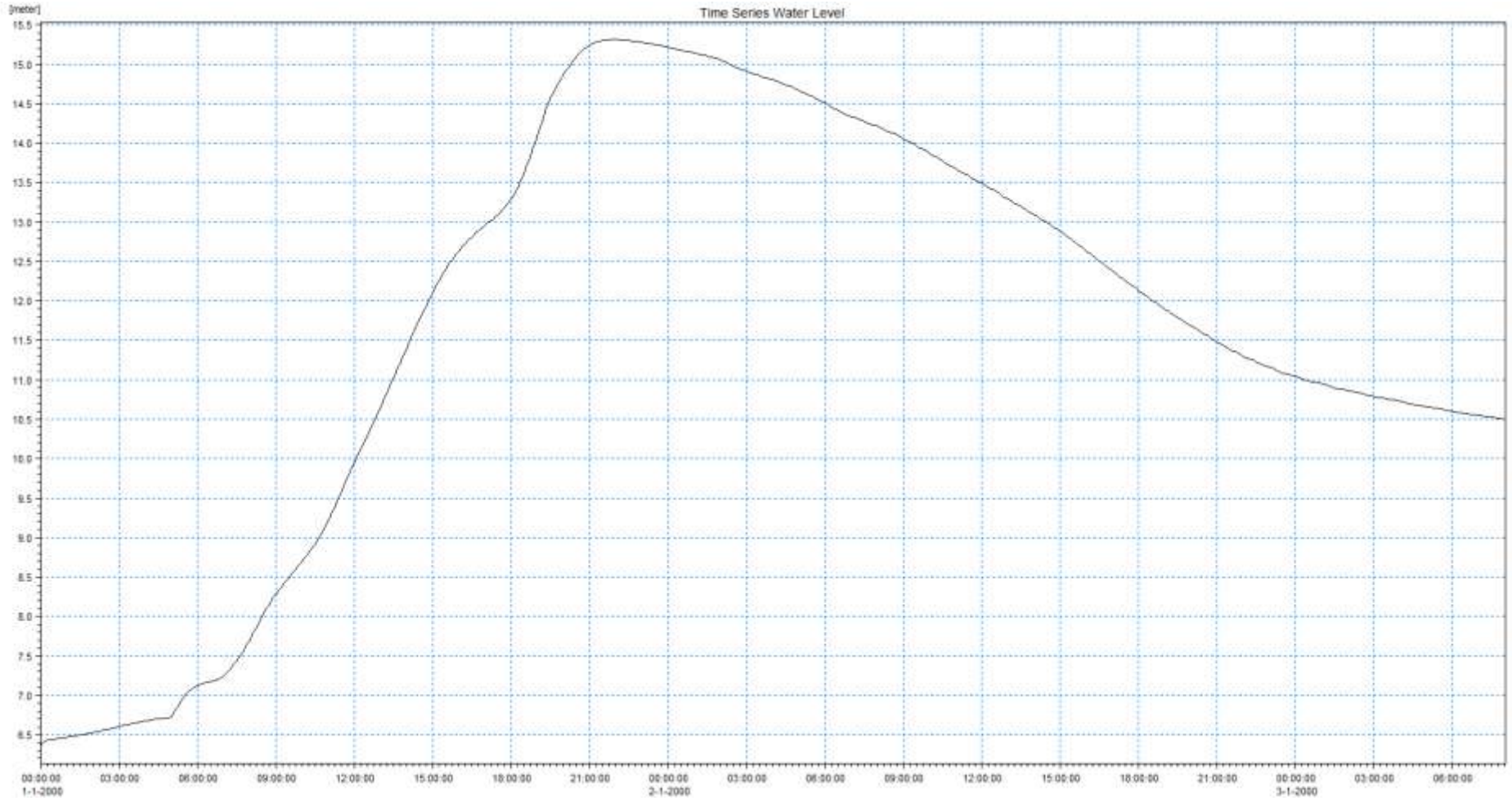
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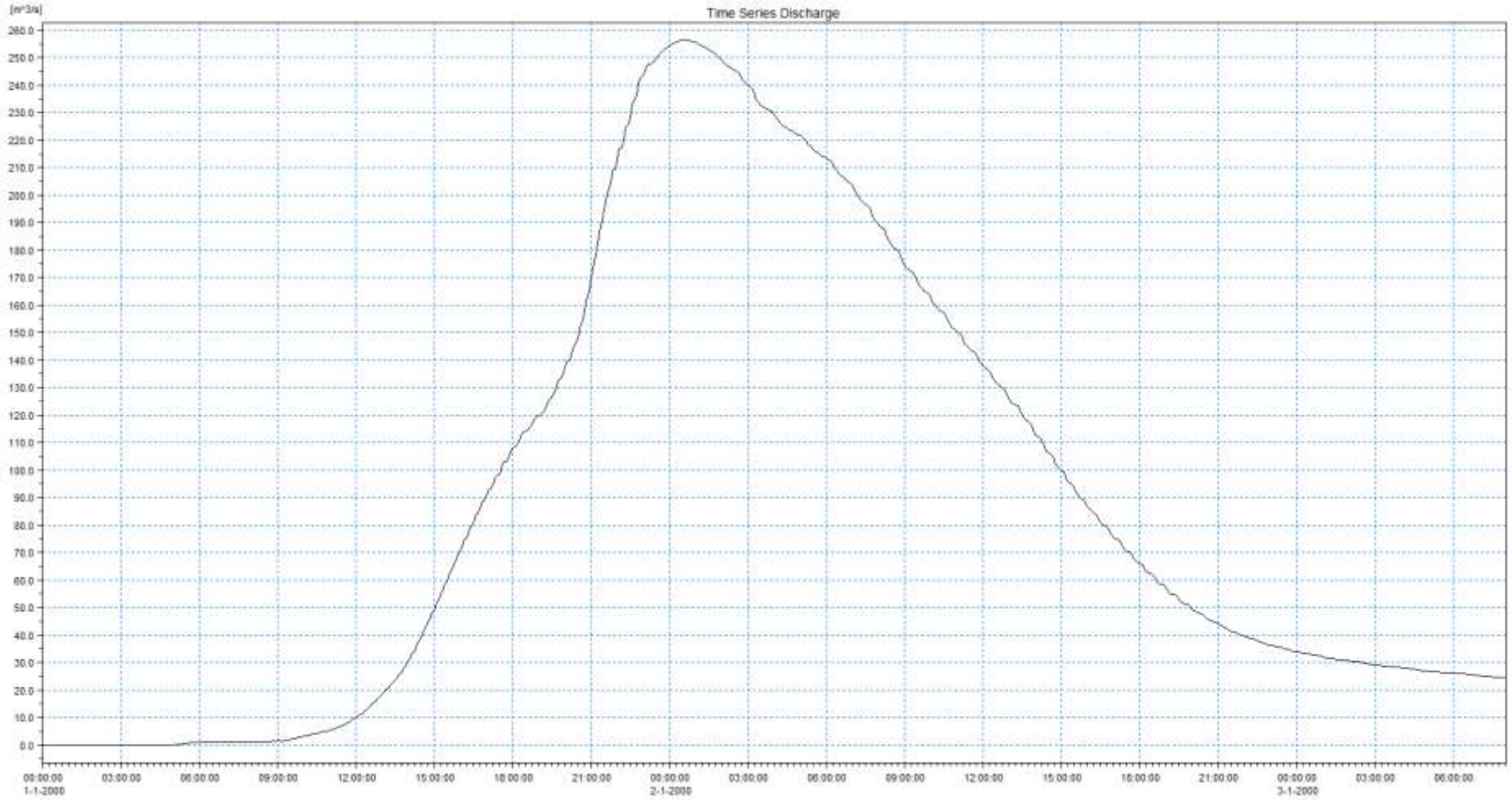

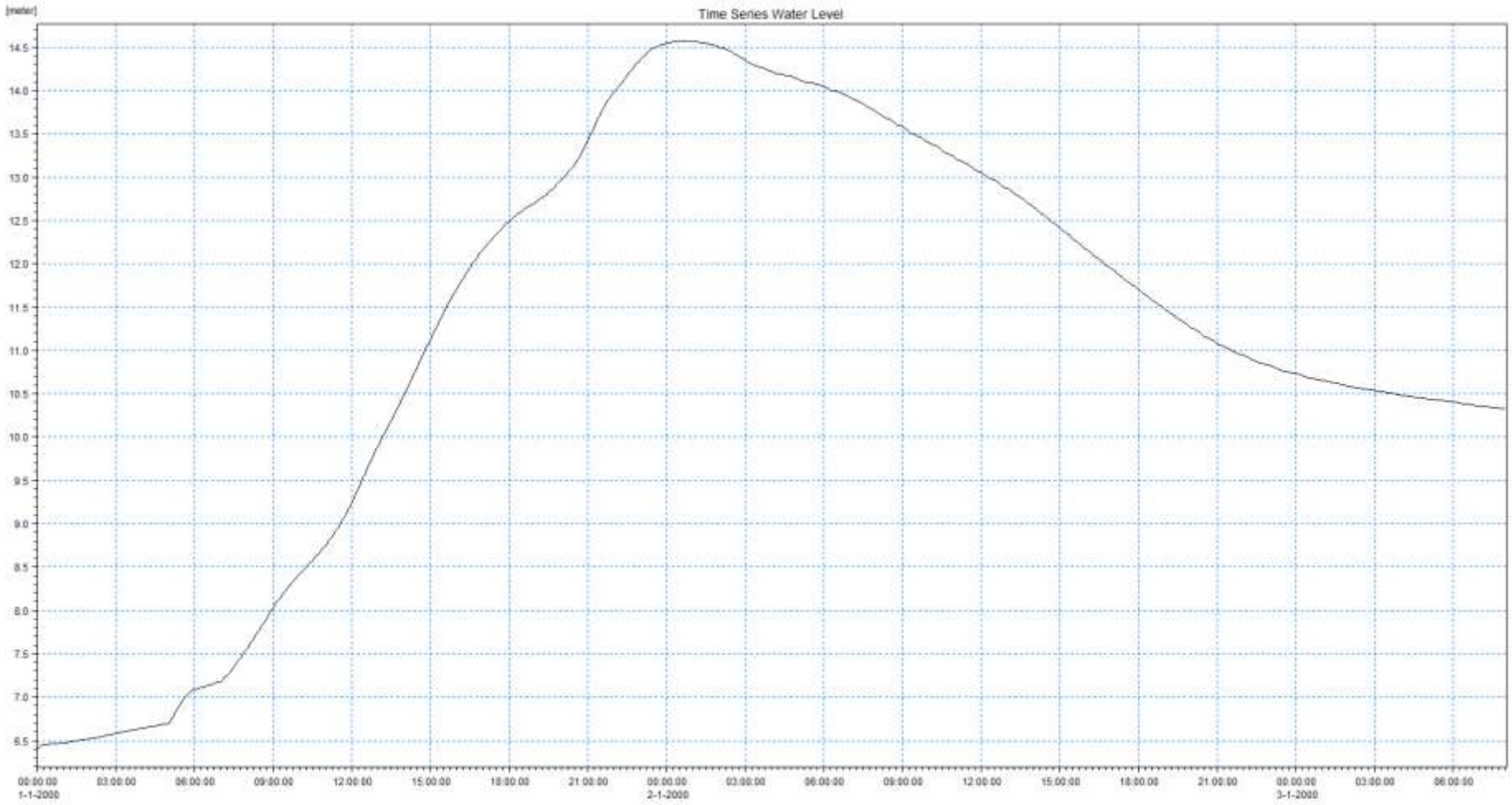
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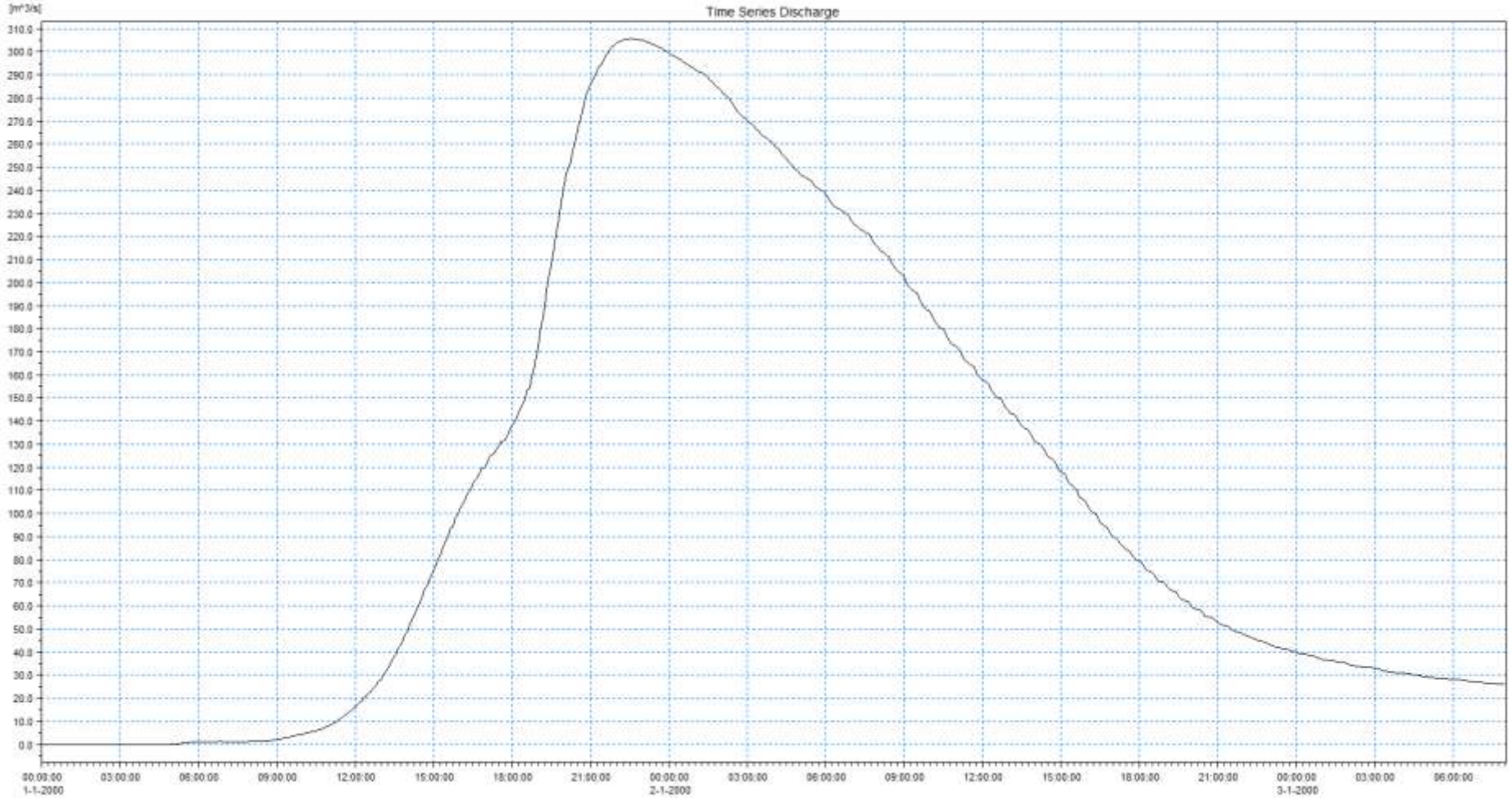

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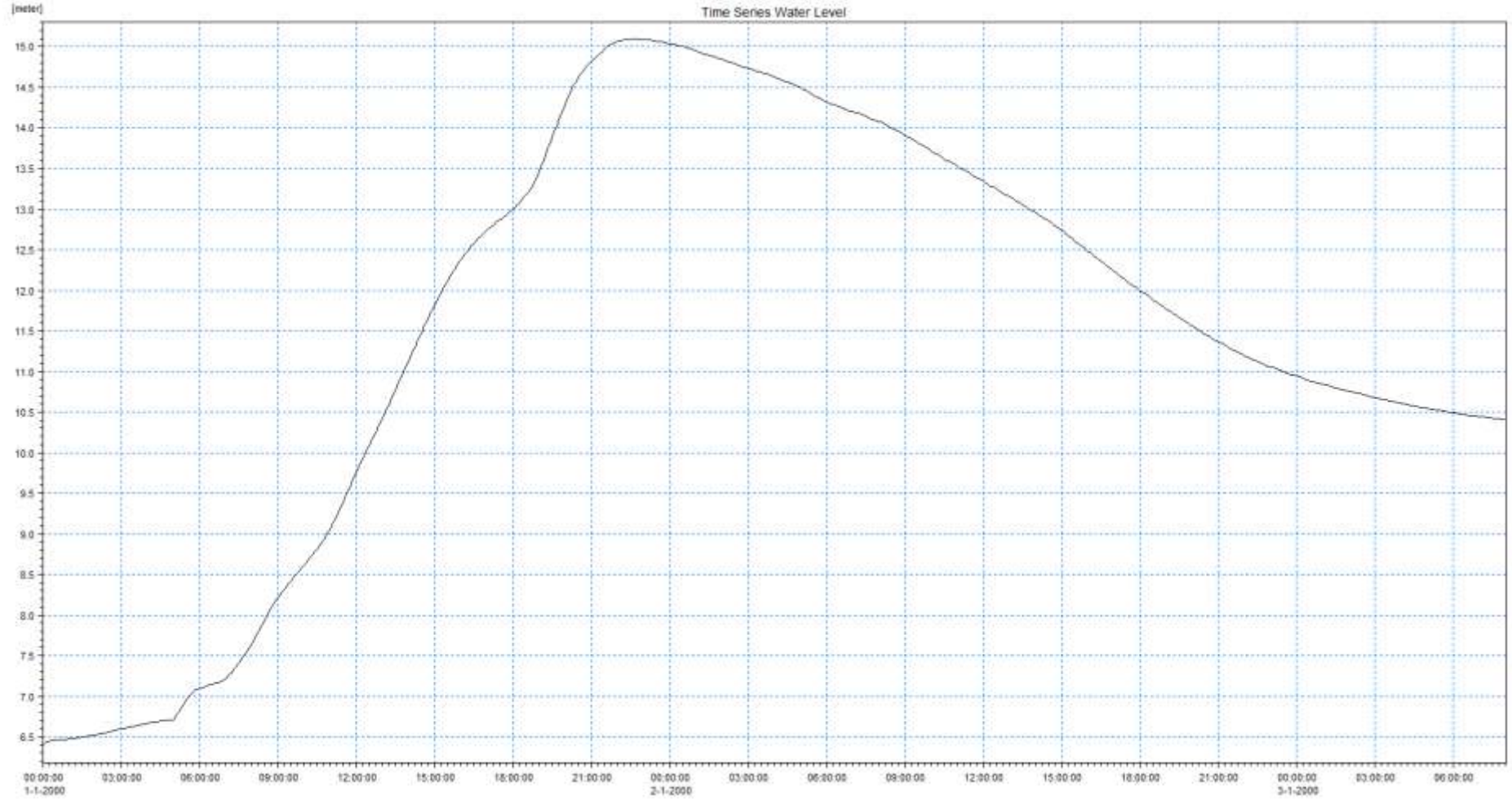

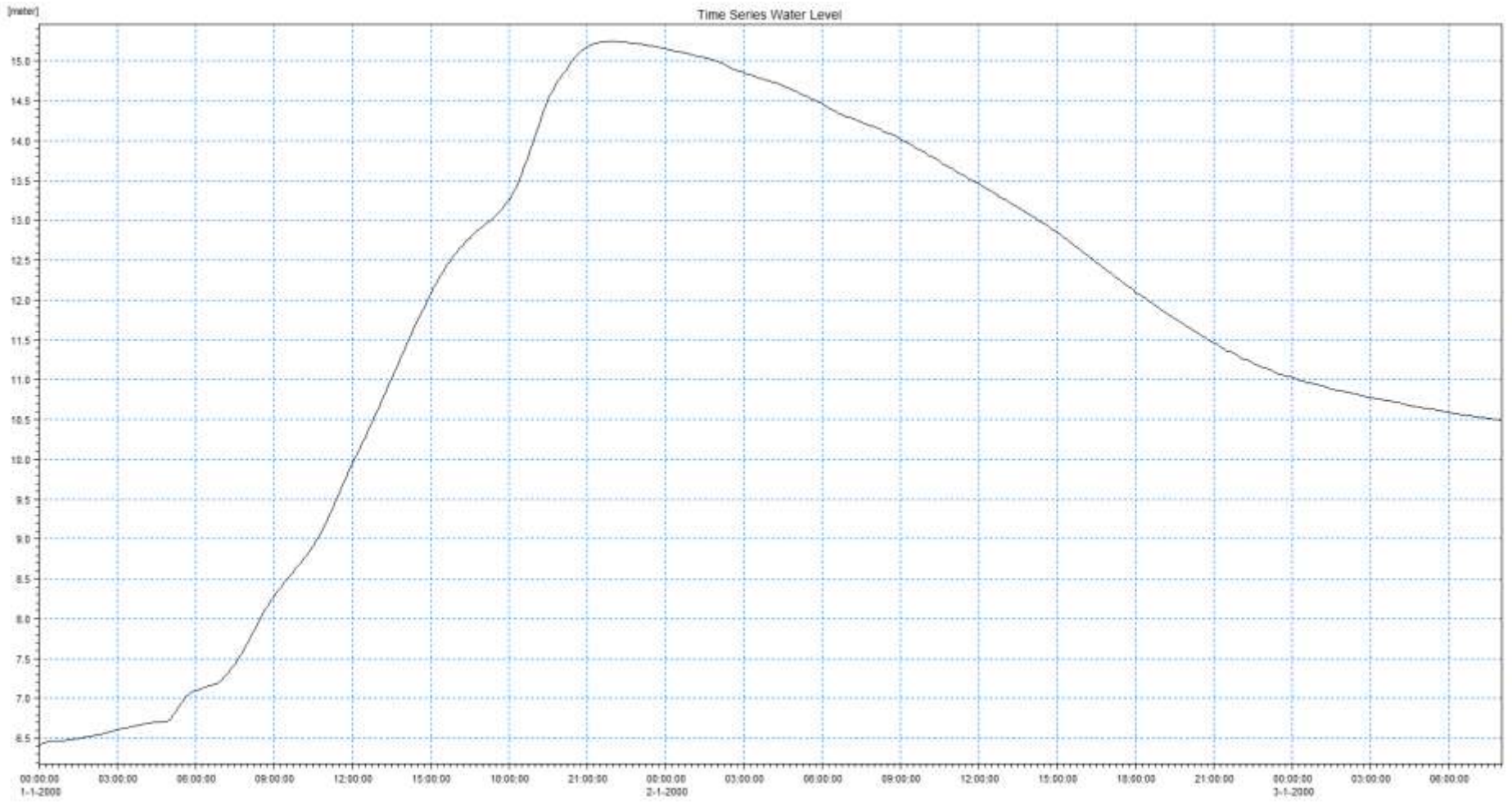
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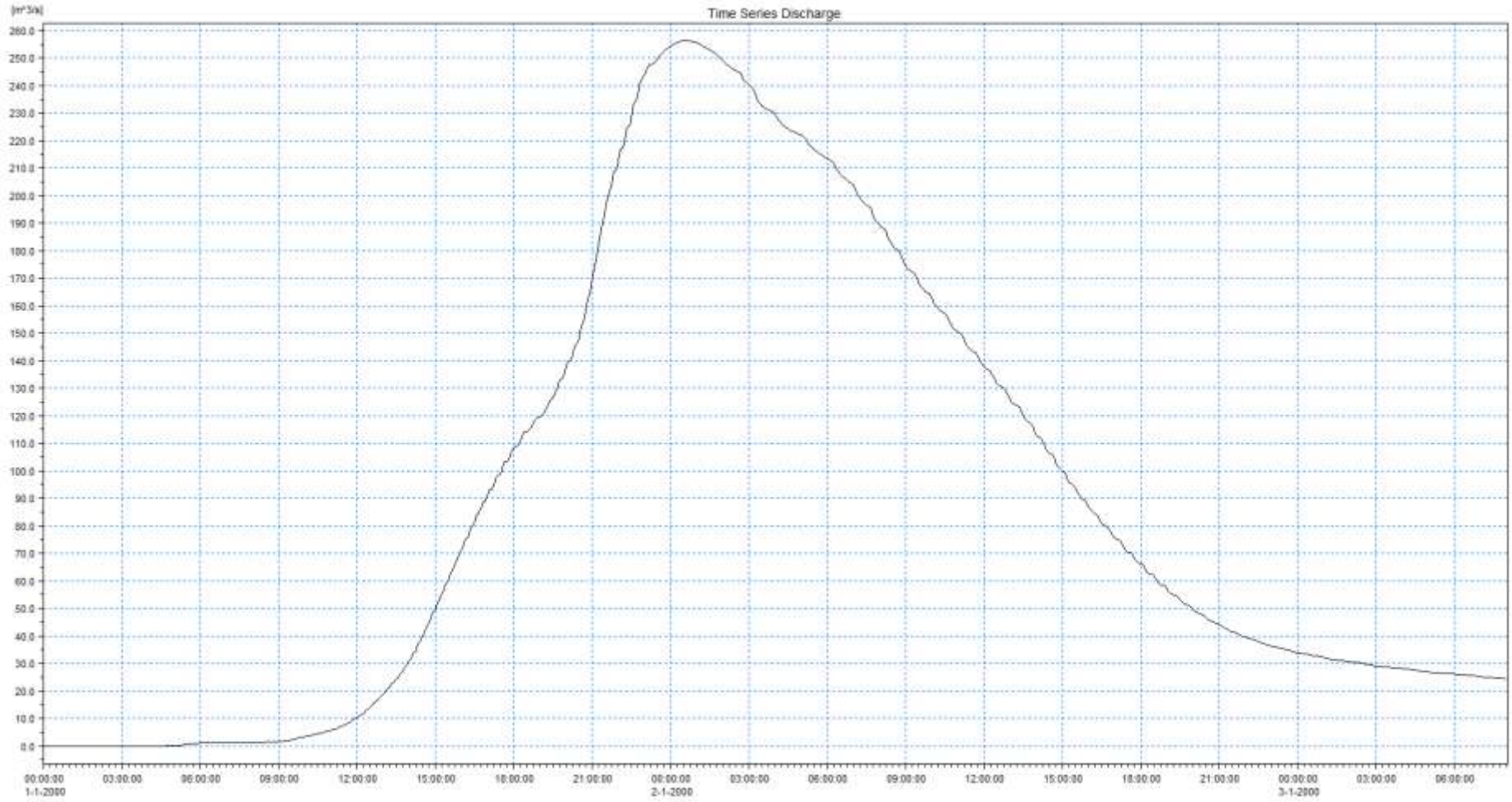

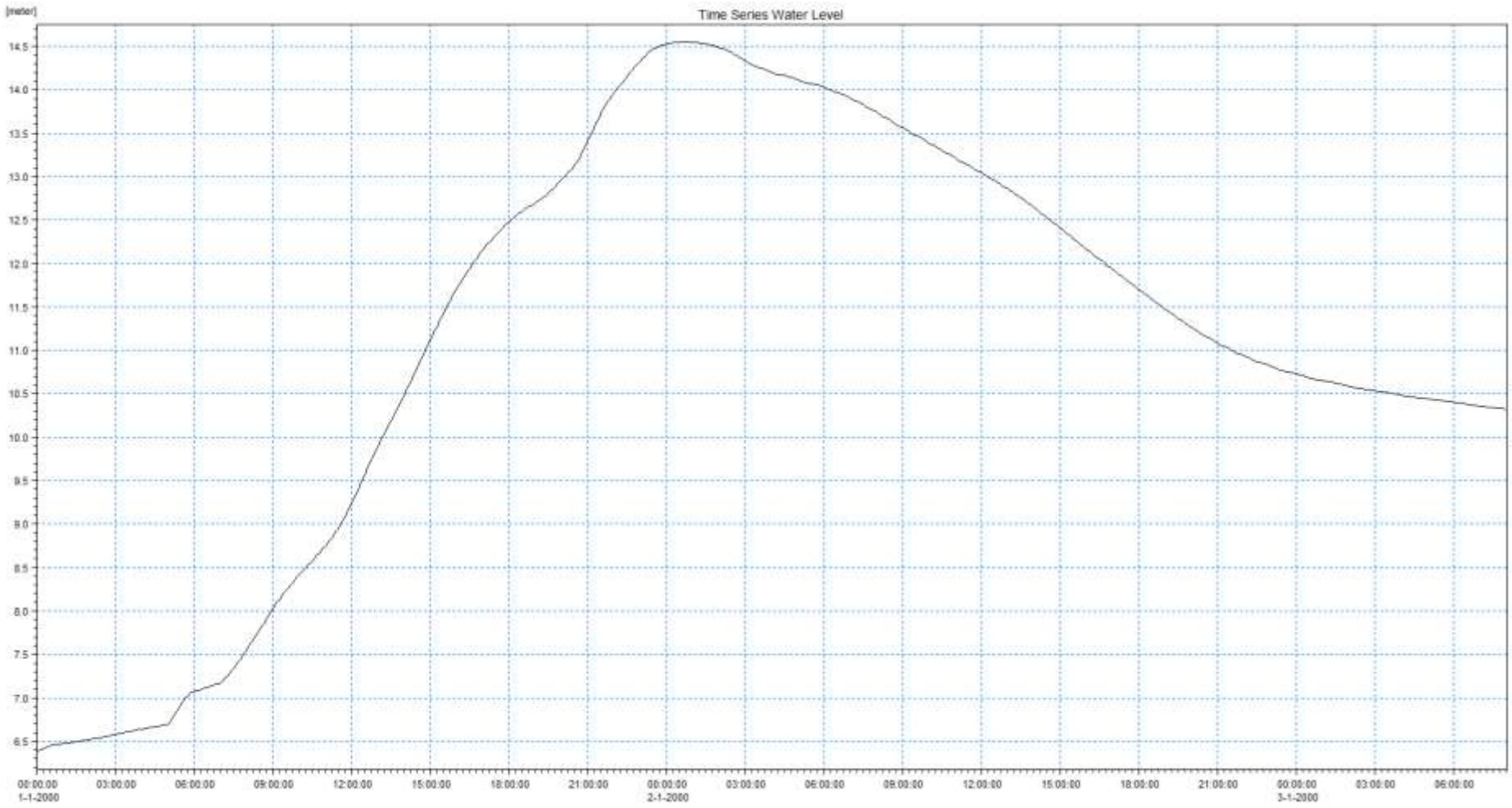
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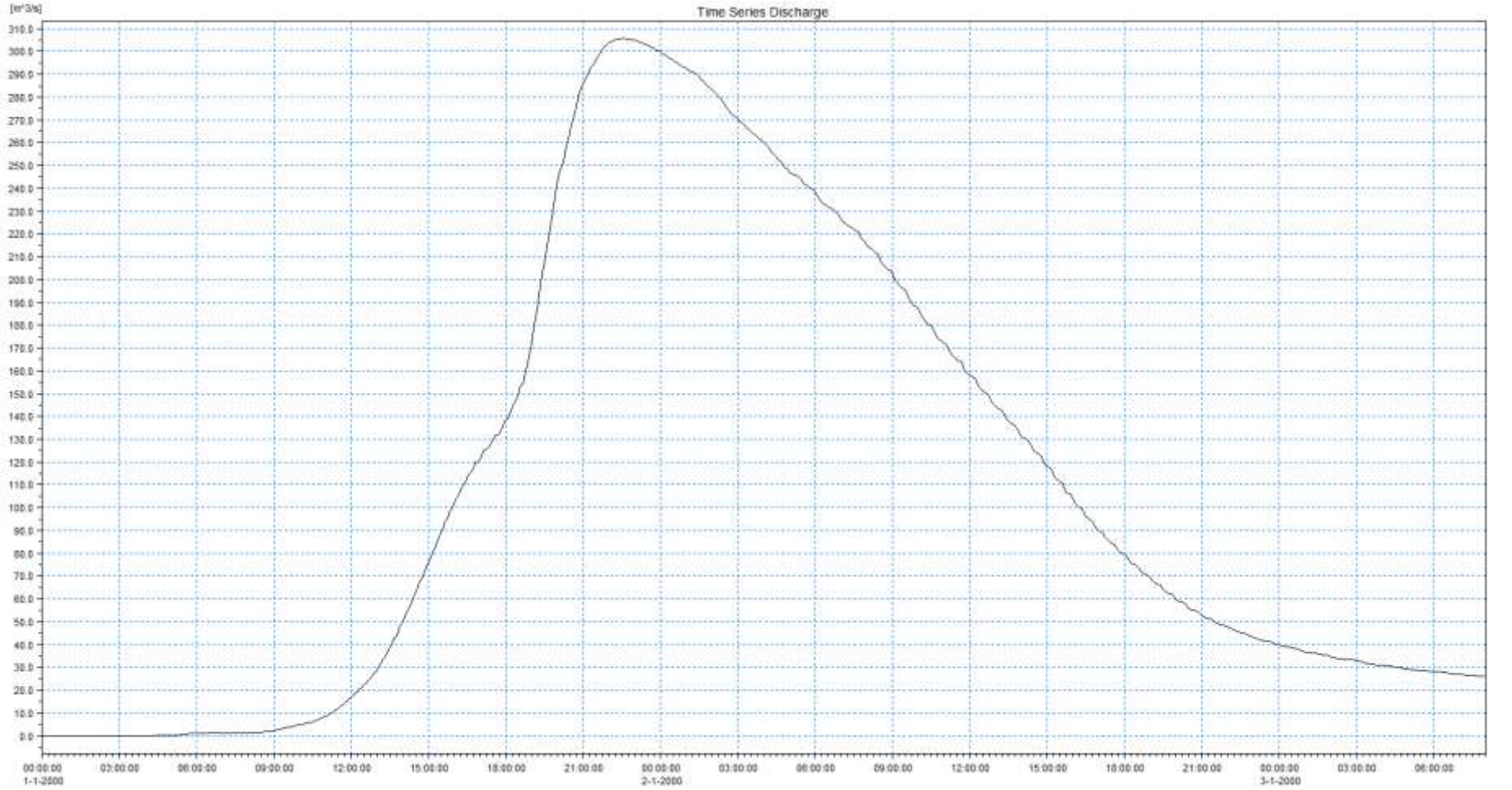

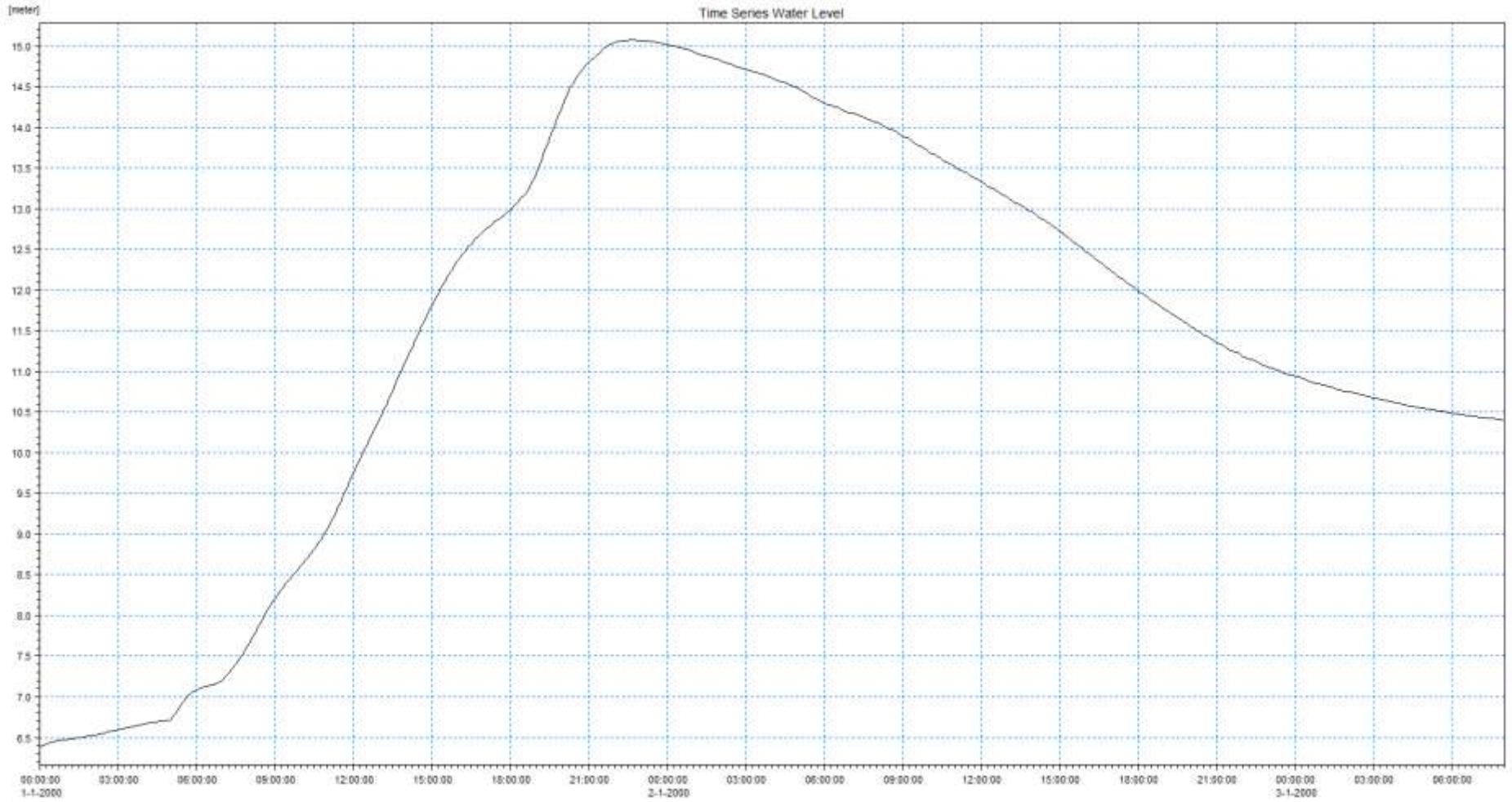
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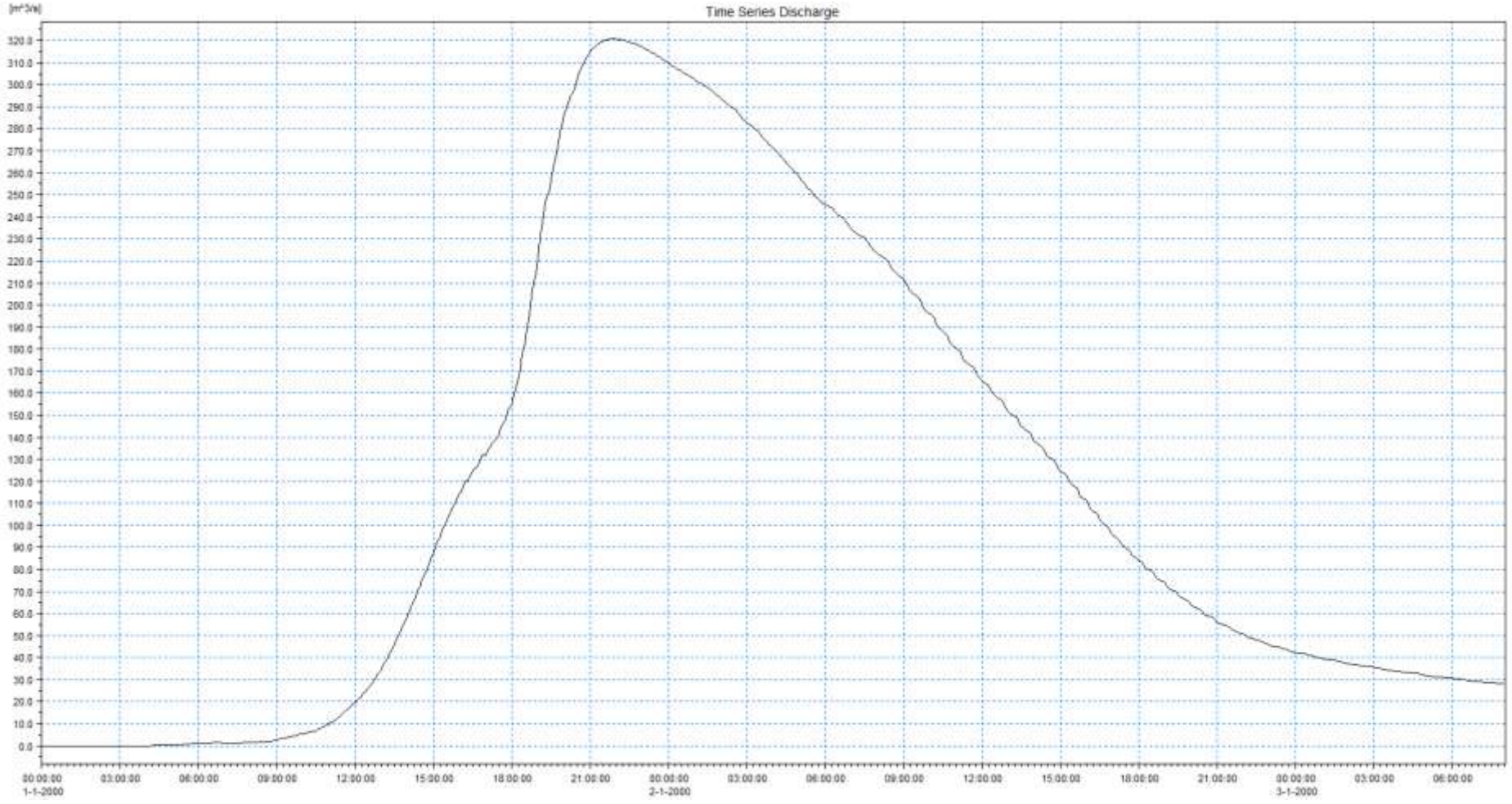

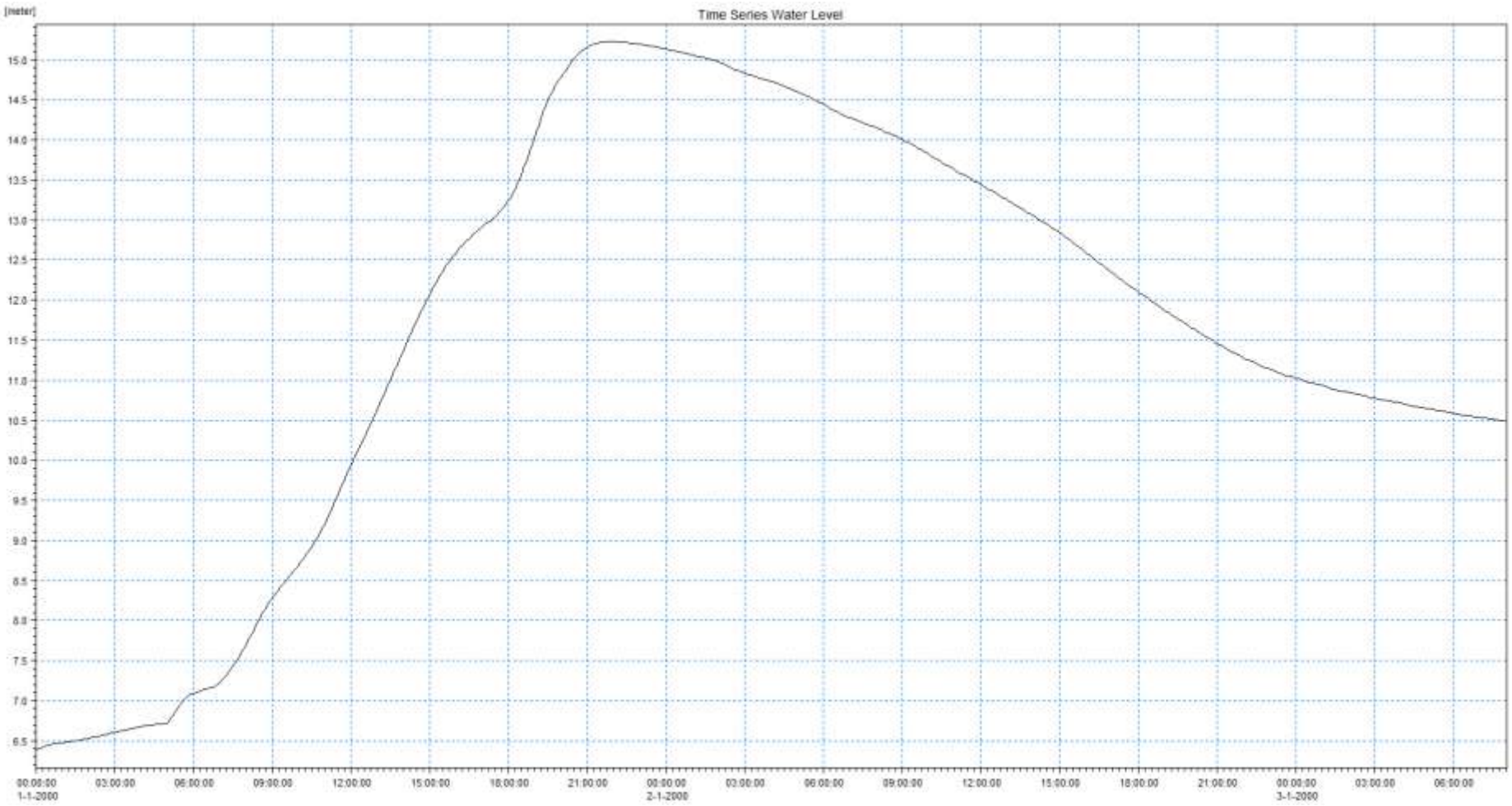
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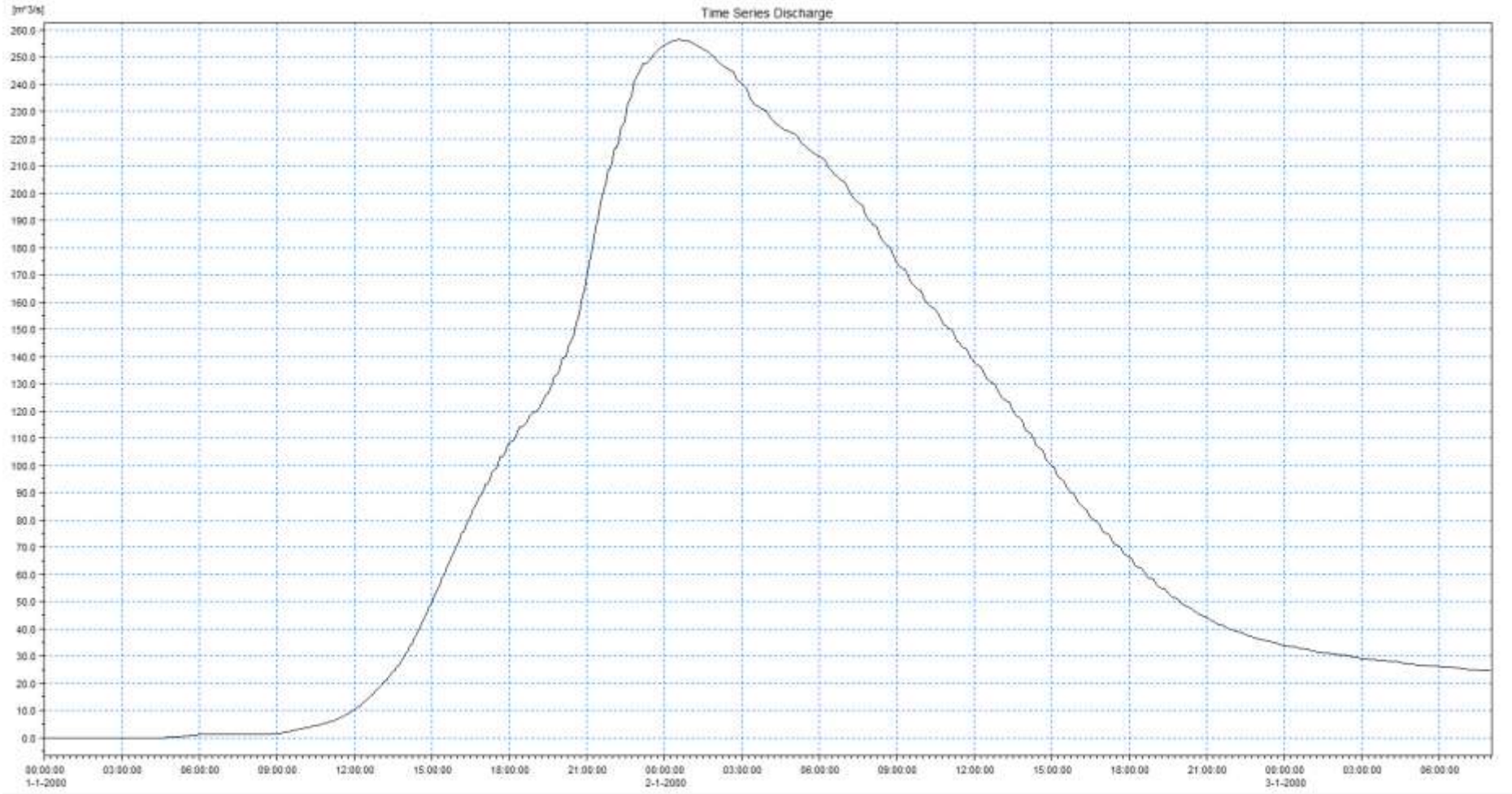

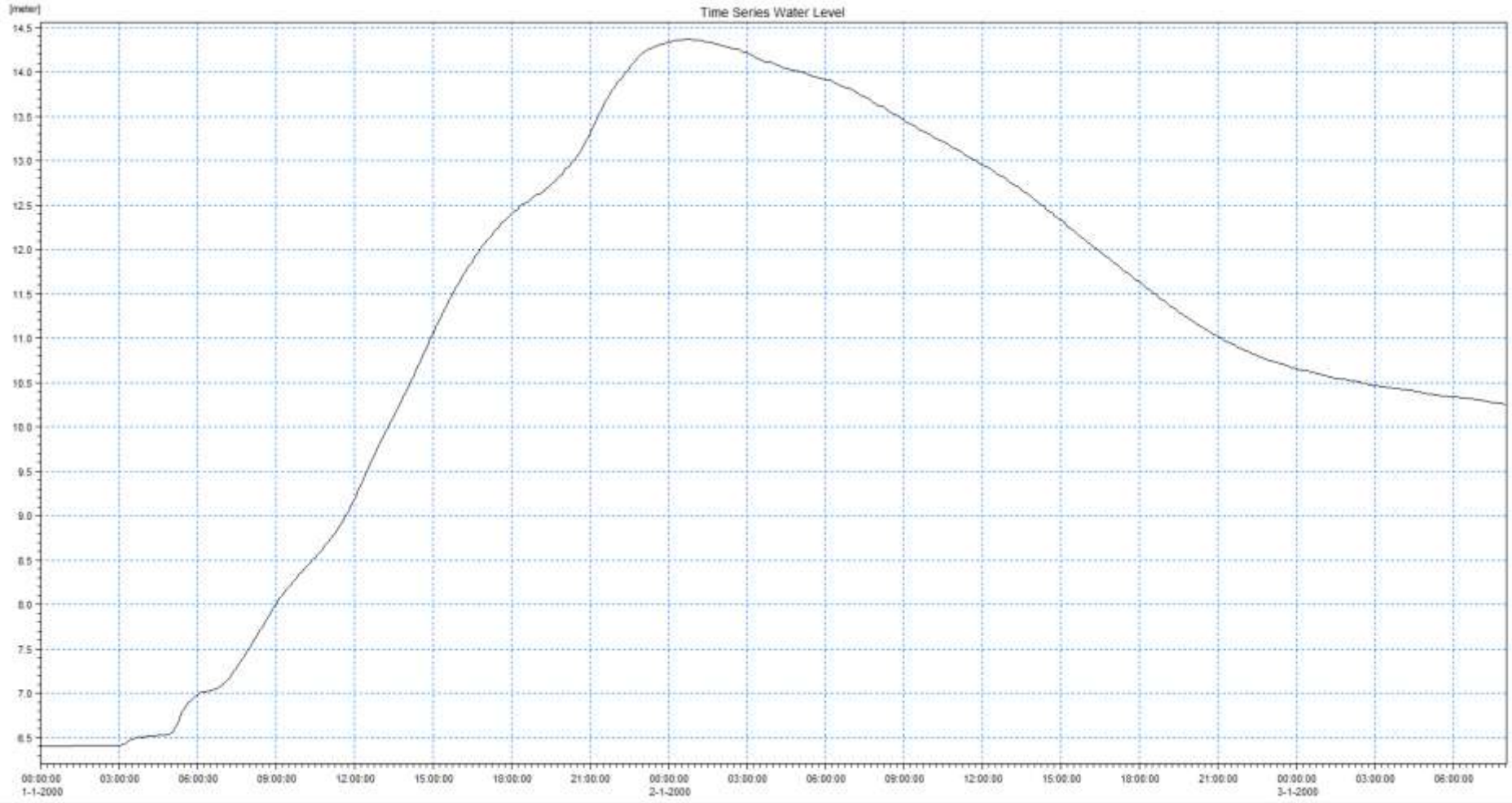
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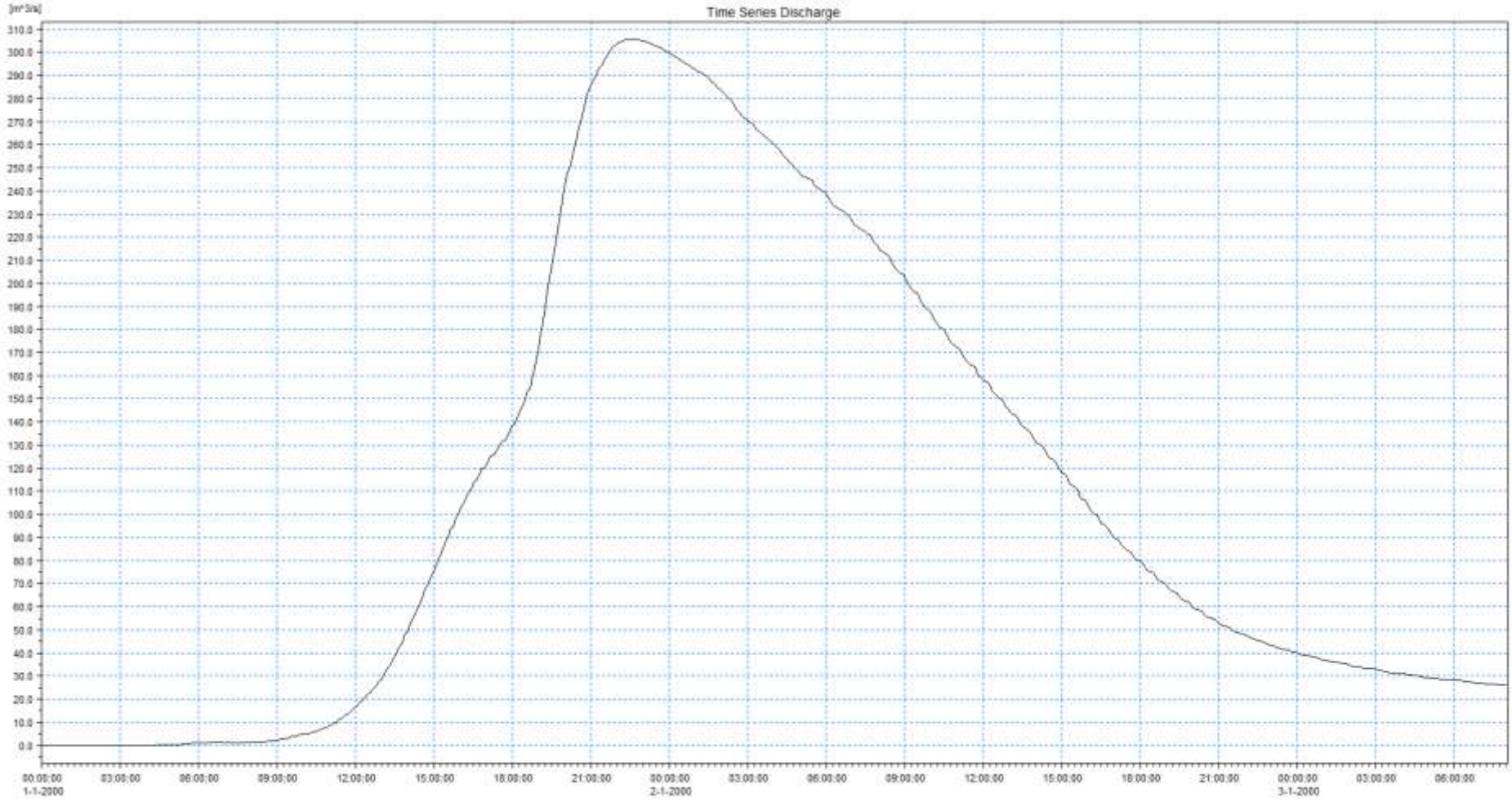

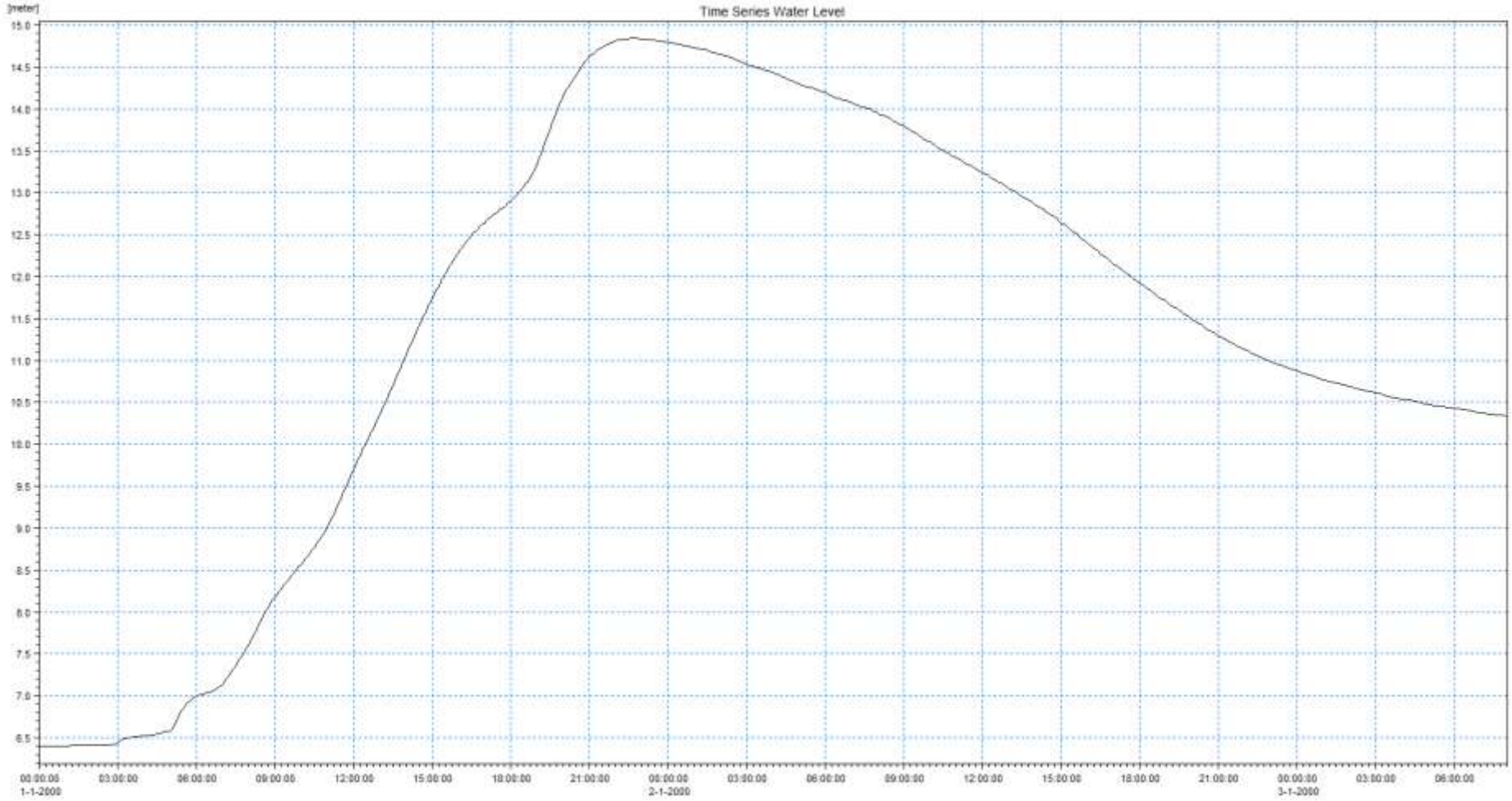
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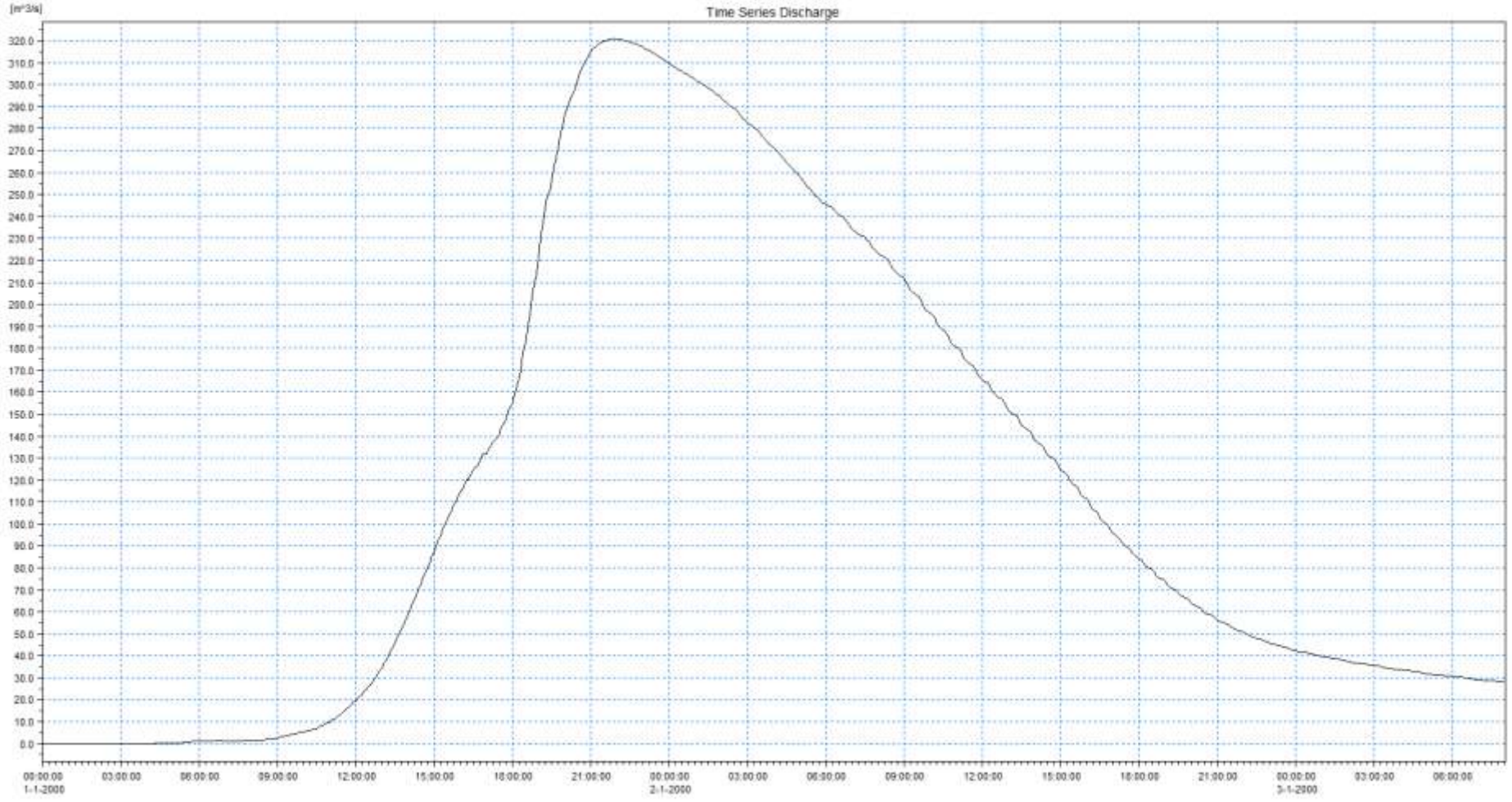

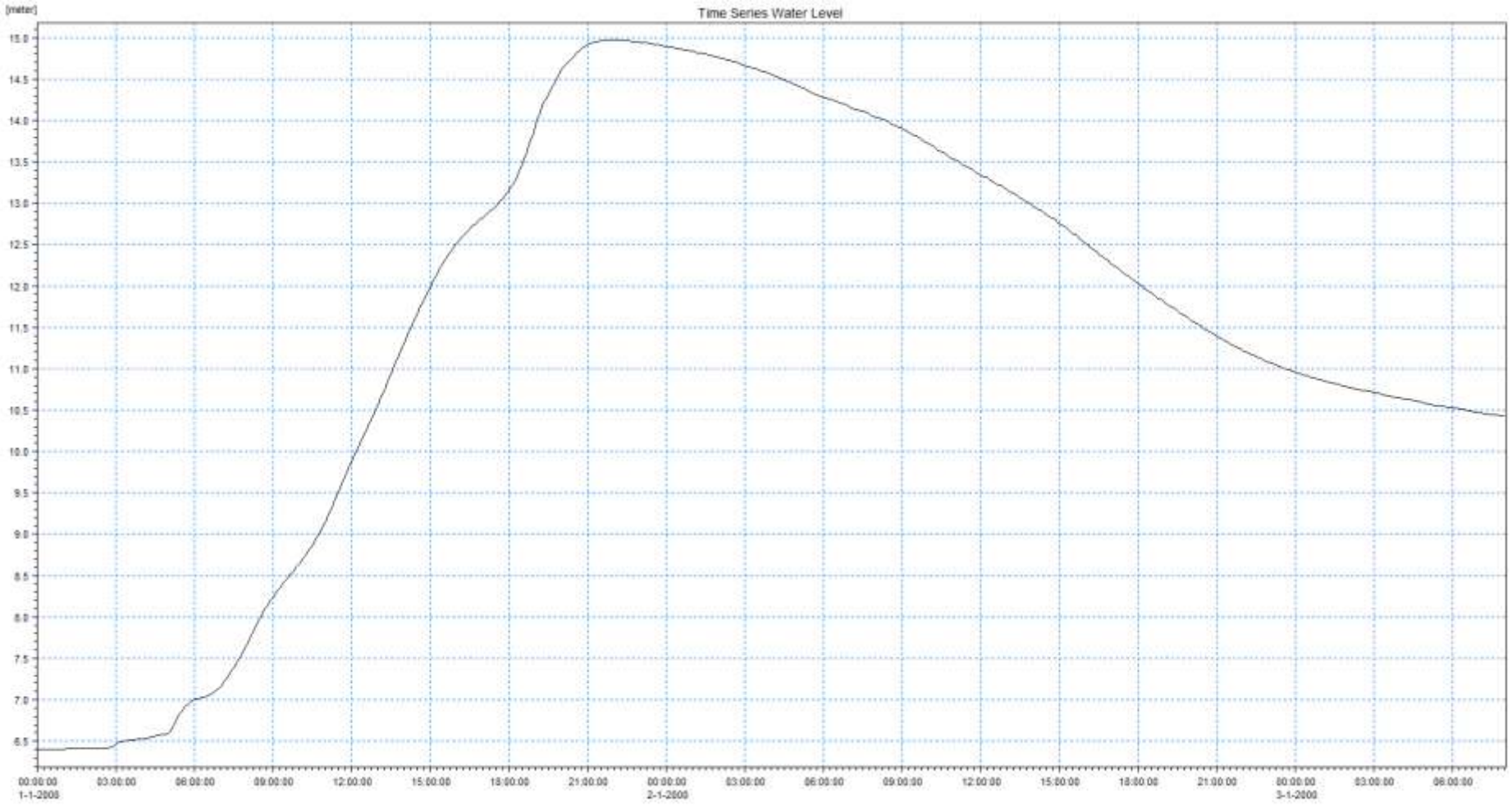
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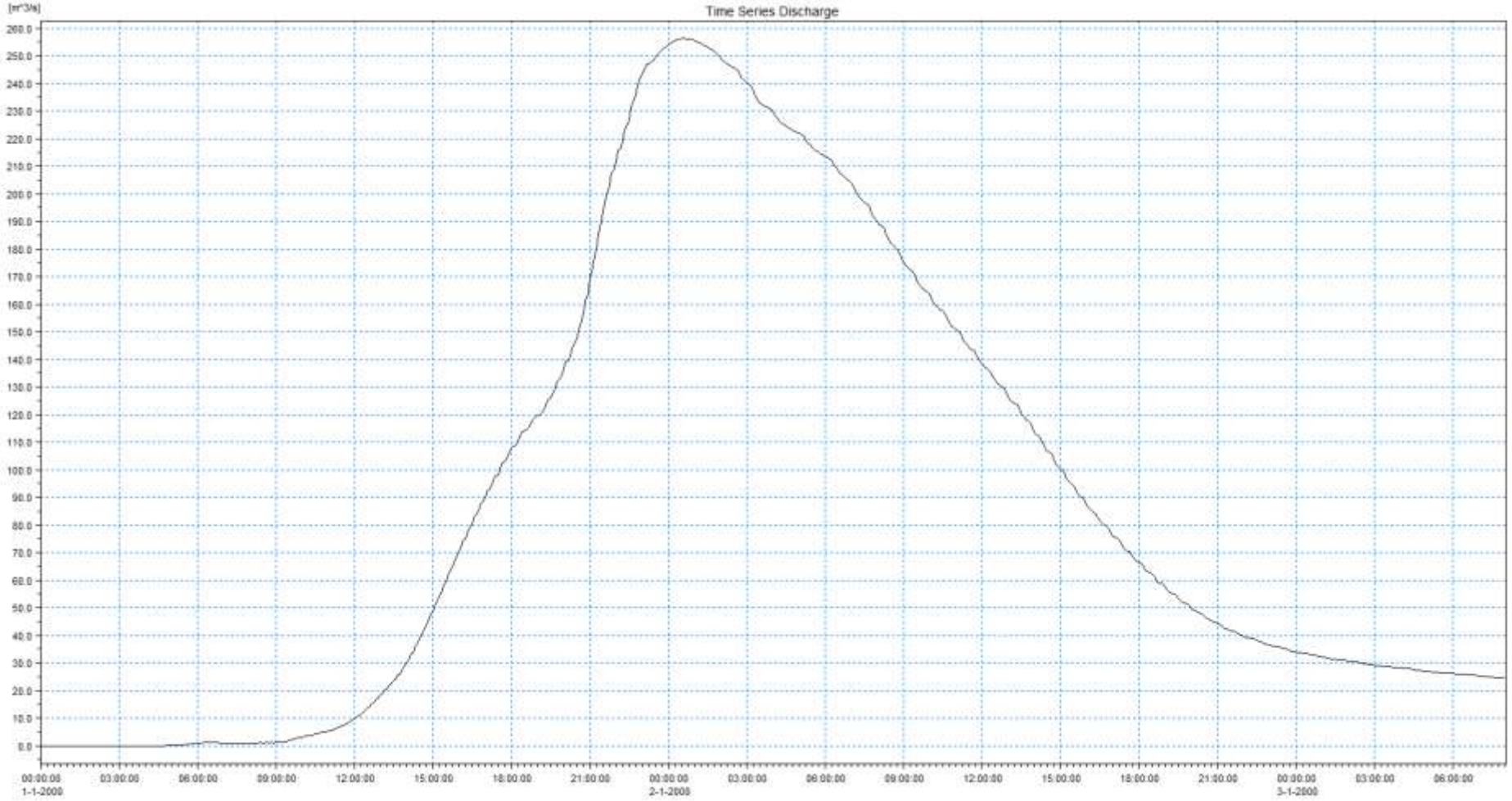

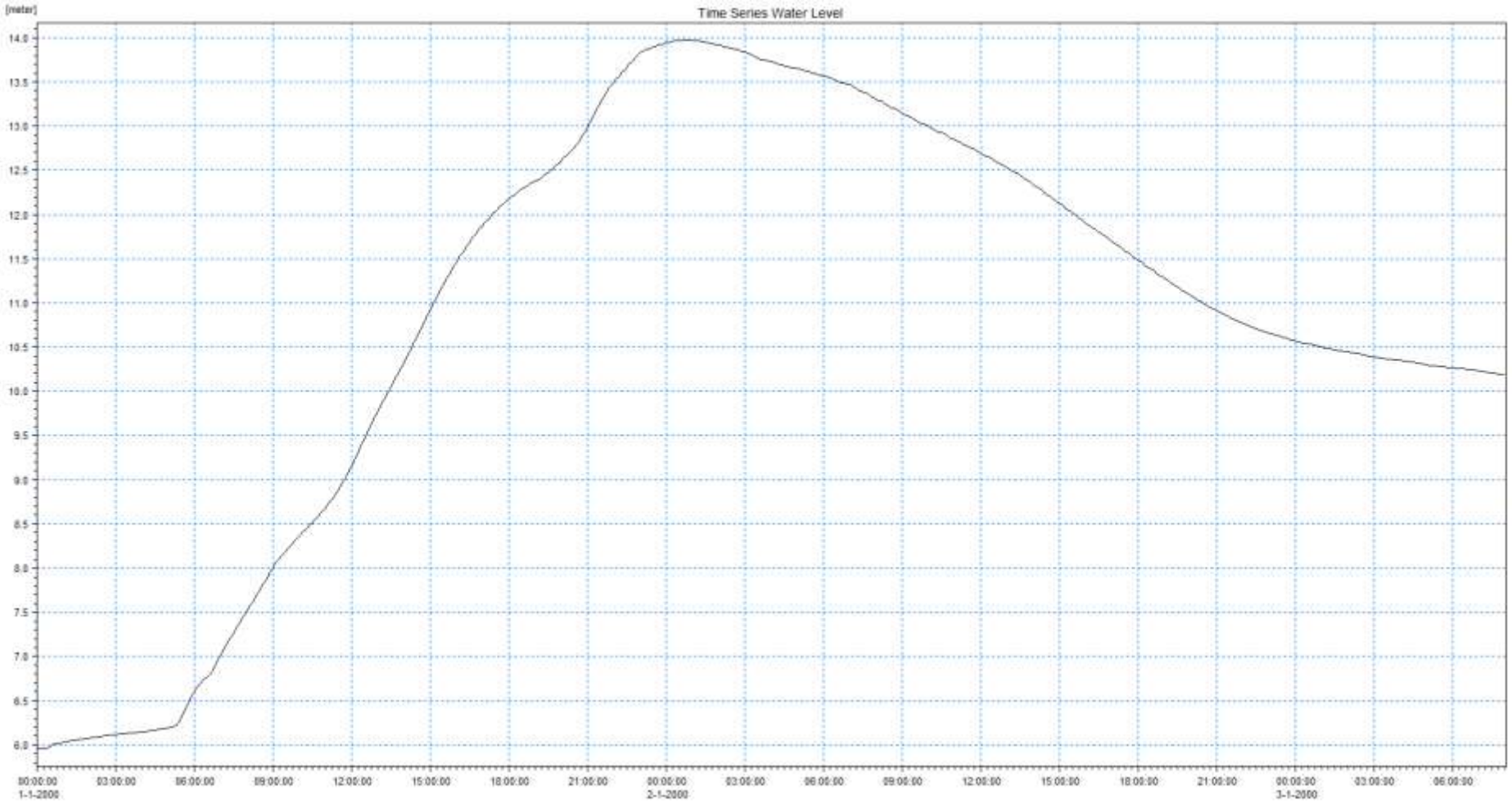
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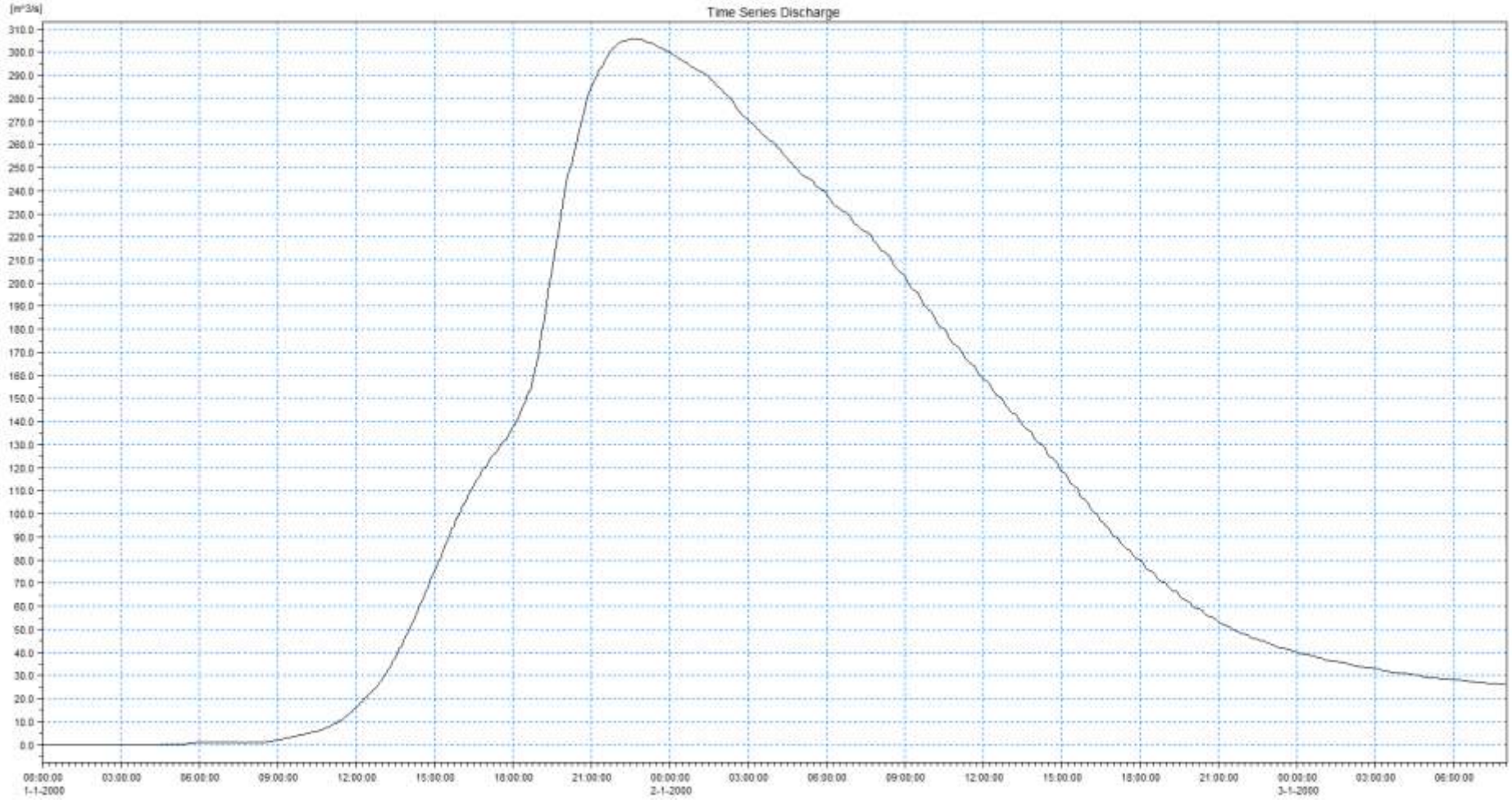

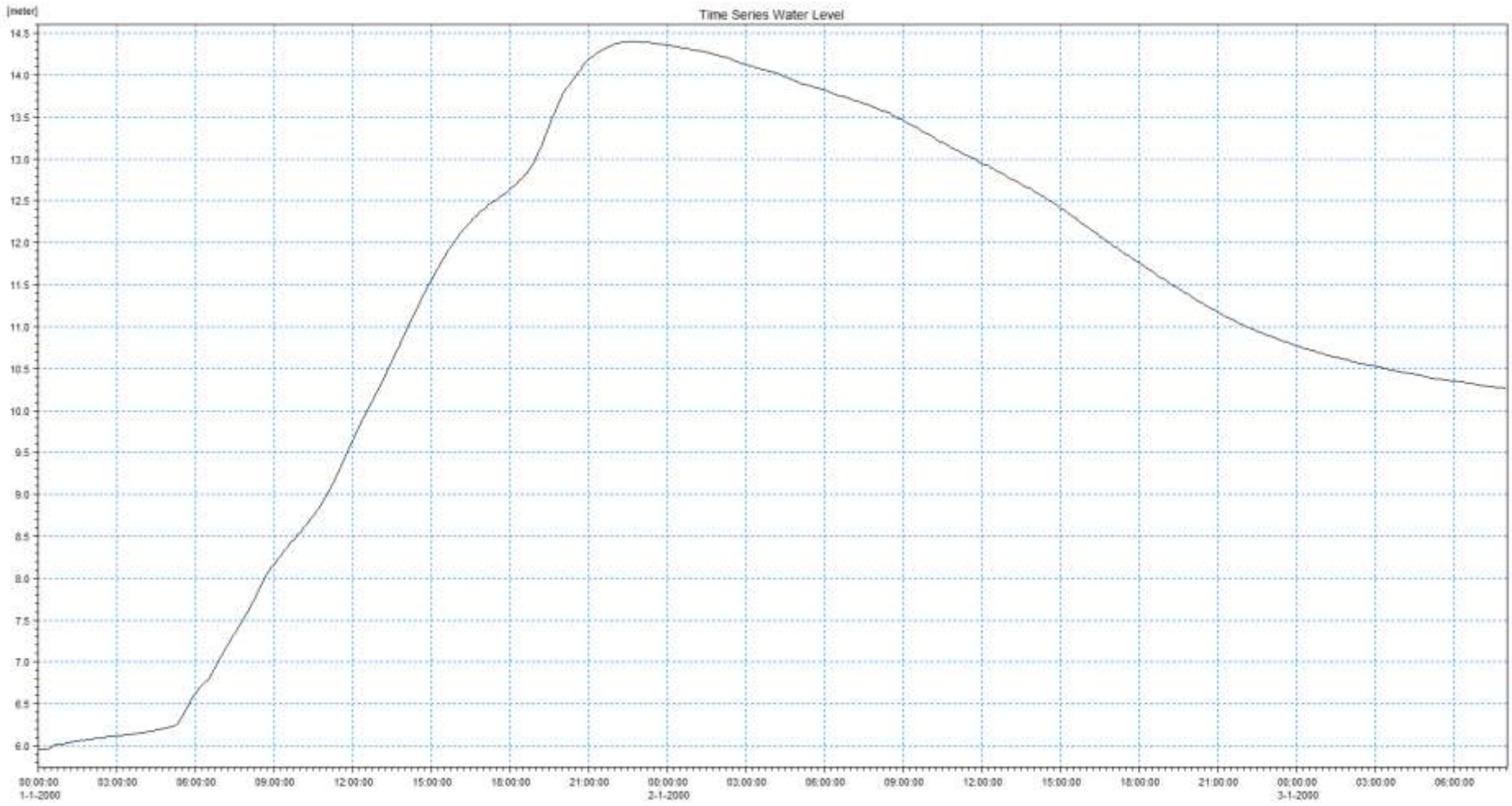
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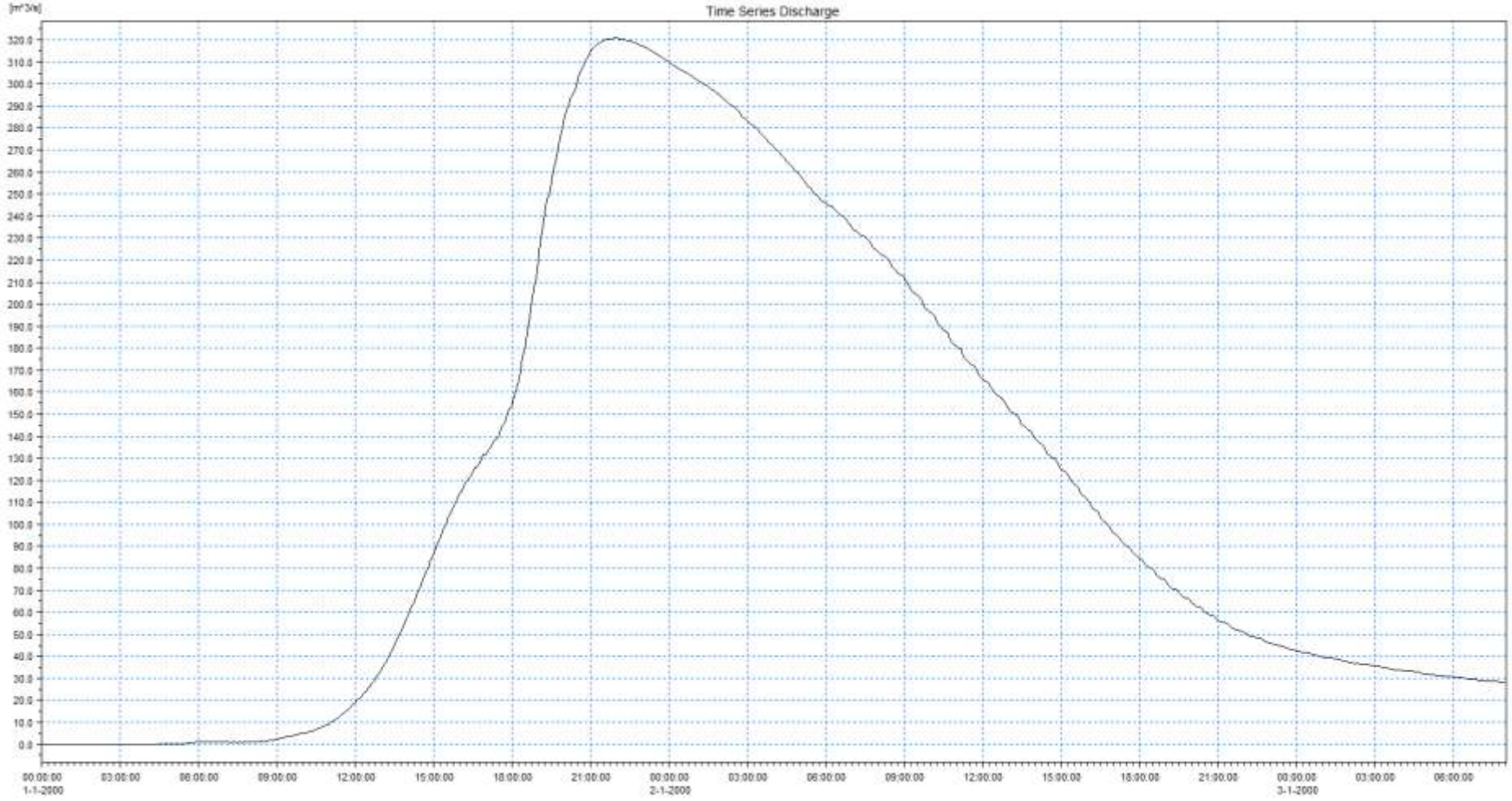

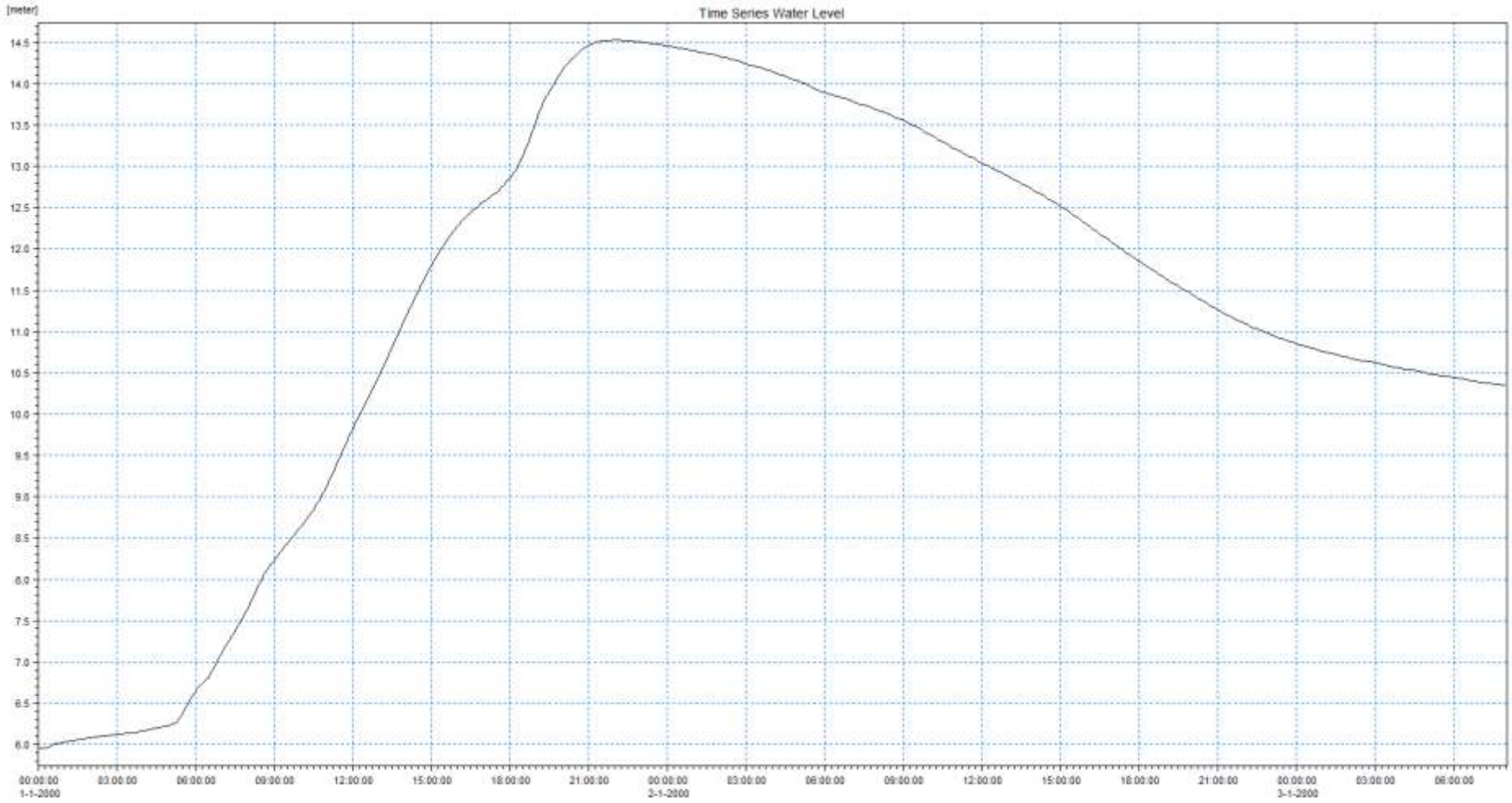
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Appendix B
Concept Design Drawings

Project:

DIVERSION DRAIN WORKS

PARKDALE CRESCENT

KAITAIA

INDEX OF SHEETS

SHEETS	DESCRIPTION
01	SHEET INDEX
02-03	EXISTING AND PROPOSED SITE PLANS
04	EARTHWORKS
05-07	SECTION DETAILS
08-09	DIVERSION DRAIN INLET DETAILS

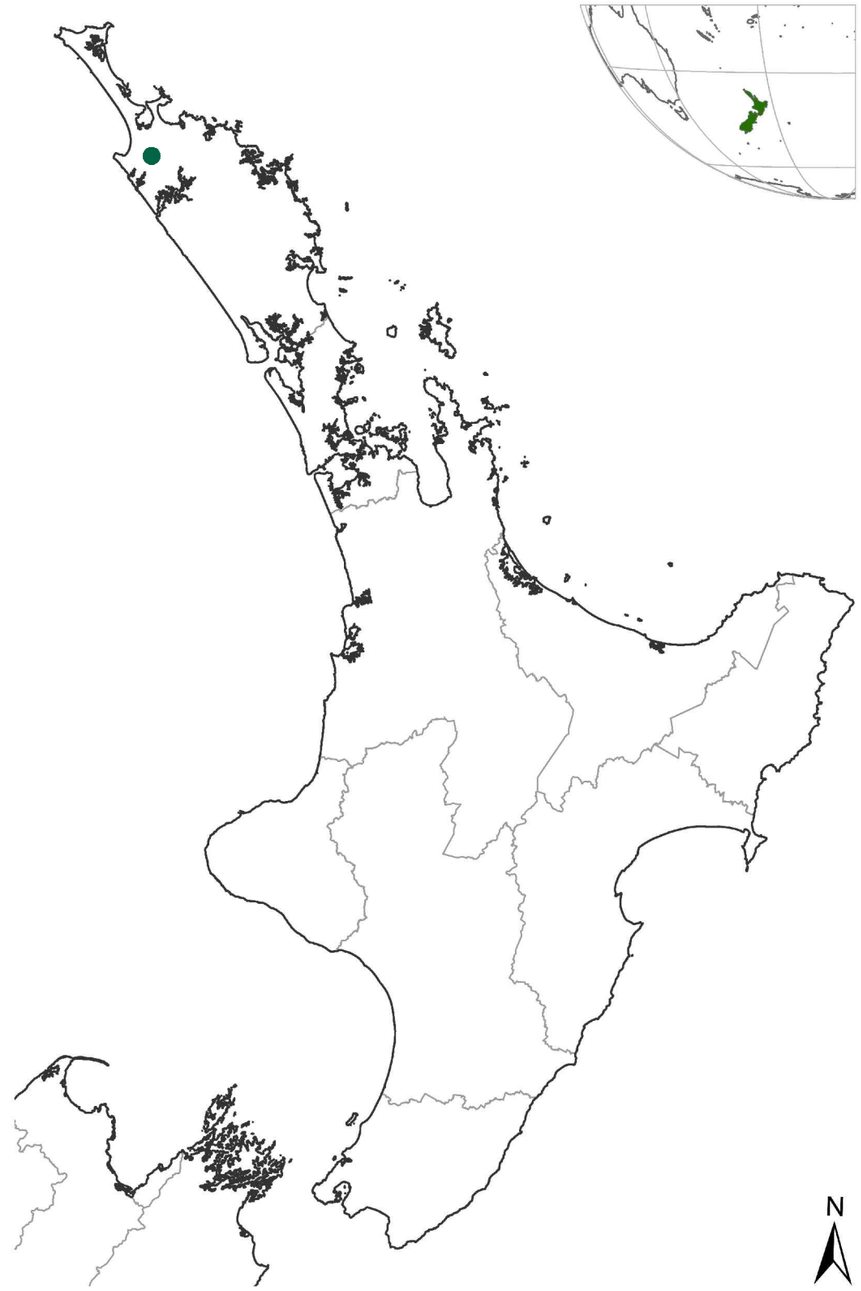
Date of issue:
15/05/2024

Project Team

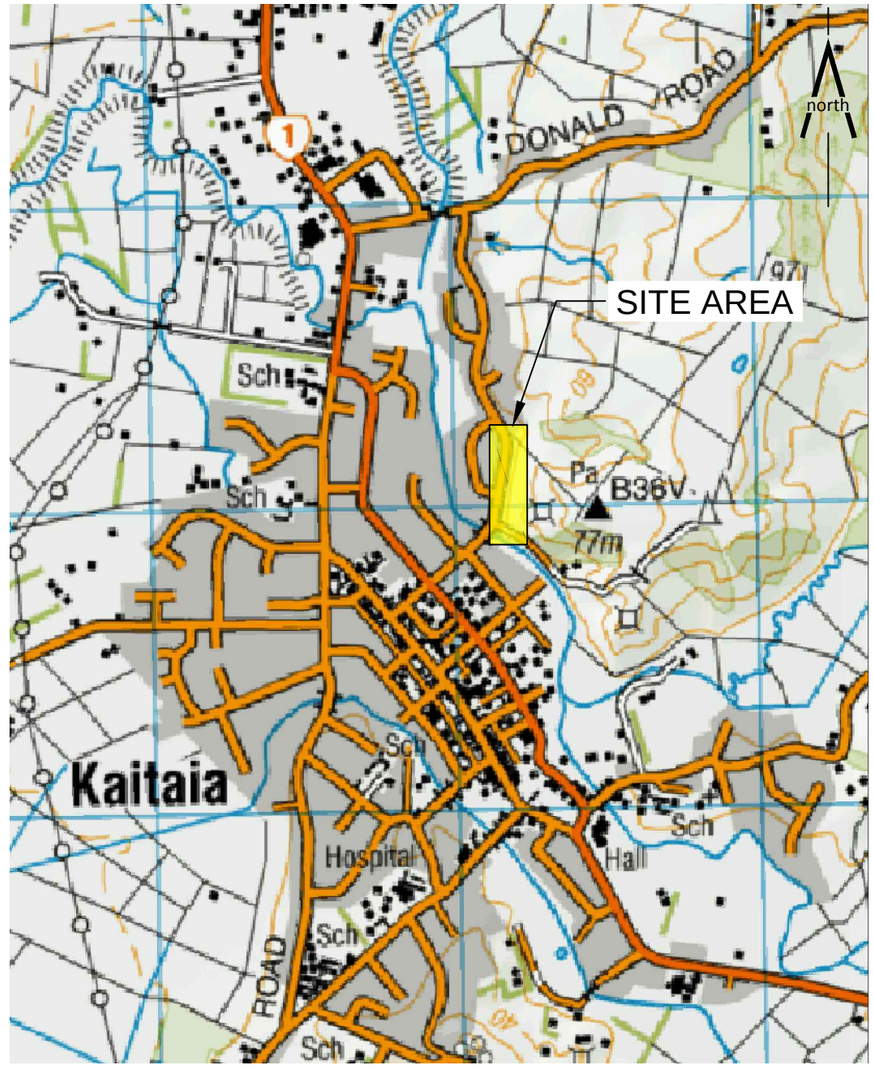
Client:
FAR NORTH DISTRICT COUNCIL

Engineering Team:
- Vision Consutling Engineers Ltd

Level 1, 62 Kerikeri Road
Kerikeri 0230
Northland
Tel: +64 09 401 6287
Email: info@vce.co.nz



Engineering Drawings
FOR RESOURCE CONSENT



VISION CONSULTING
Engineers

Prepared for:

Far North District Council

CONTENTS				
SHEET	DESCRIPTION	ISSUE DATE	STATUS	REVISION
	DRAWING NOTES			
01	SHEET INDEX	15/05/2024	FOR RESOURCE CONSENT	C
02	EXISTING SITE AND SERVICES PLAN	15/05/2024	FOR RESOURCE CONSENT	C
03	PROPOSED SITE PLAN	15/05/2024	FOR RESOURCE CONSENT	C
04	EARTHWORKS PLAN	15/05/2024	FOR RESOURCE CONSENT	C
05	DIVERSION DRAIN LONG SECTION	15/05/2024	FOR RESOURCE CONSENT	C
06	DIVERSION DRAIN SECTIONS - 1	15/05/2024	FOR RESOURCE CONSENT	C
07	DIVERSION DRAIN SECTIONS - 2	15/05/2024	FOR RESOURCE CONSENT	C
08	PROPOSED DIVERSION DRAIN INLET PLAN	15/05/2024	FOR RESOURCE CONSENT	C
09	PROPOSED DIVERSION DRAIN INLET BASIN AND CROSSING SECITONS	15/05/2024	FOR RESOURCE CONSENT	C

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT Far North District Council

PROJECT
DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE
SHEET INDEX

SURVEY			
DESIGN	CS	25/08/2023	
DRAWN	CS	09/05/2024	
CHECKED	BCP	14/05/2024	
APPROVED	BCP	15/05/2024	

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
D	FOR TENDER-MINOR CHANGES	BCP	14/05/2020

SCALE N/A
SHEET 01
PROJECT J15335
REV C

north

LOCALITY PLAN

SCALE (A3) NTS

LOT 1 DP 173052

LOT 1 DP 168717

LOT 23 DP 405

LOT 31 DP 74955

LOT 32 DP 74955

EXISTING Ø1200 mm CORUGATTED METAL CULVERT

EXISTING NORTHERN PARKDALE CRESCENT PIPE NETWORK INLET

SECTION 85 BLOCK TAKAHUE SD

EXISTING Ø900 mm CONCRETE AND CORRUGATE METAL CULVERT

ALLEN BELL DRIVE

EXISTING Ø900 mm CONCRETE CULVERT TO BE REMOVED

KORIMAKO LANE

AWANUI RIVER

PARKDALE CRESCENT

EXISTING Ø 900 mm CONCRETE CULVERT

ALLEN BELL DRIVE BRIDGE

LEGEND	
EXISTING CULVERT	
AREA OUTSIDE OF VISION TOPOGRAPHIC SURVEY	
METAL PAVEMENT	
SEALED ROAD PAVEMENT	
EXISTING TREE	
LIGHT POLE	LP
EXISTING CESSPIT	
EXISTING POST AND WIRE FENCE	
EXISTING FARM GATE	
PROPERTY BOUNDARY	
SIGN POST	

LV UNDERGROUND POWER CONDUIT (STREET LIGHTS)	
WATER MAINS	WM
WASTEWATER PIPE	SS SS
WATER METER	W
WASTEWATER MANHOLE	
BACK OF KERB	

NOTE:

1. LOT BOUNDARIES ARE FROM LINZ PARCEL BOUNDARIES FROM LANDONLINE.
2. FEATURES SHOWN OUTSIDE OF THE VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN CREATED USING A COMBINATION OF AERIAL IMAGERY, SITE OBSERVATIONS AND ARE THEREFORE APPROXIMATE.
3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.
5. ONLY THE EXISTING SERVICES WITHIN THE AREA PROPOSED WORKS AND DIVERSION DRAIN ARE SHOWN.
6. EXISTING SERVICE ARE TAKEN FORM GIS AND AS BUILT PLANS OBTAINED FROM SERVICE PROVIDERS AND ARE INDICATIVE.
7. ACTUAL LOCATIONS OF SERVICES WILL NEED TO BE CONFIRMED BY THE CONTRACTOR AND/OR AS PART OF DETAILED DESIGN.

0 10 20 30 40 50

Scale 1:1000 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: EXISTING SITE AND SERVICES PLAN

SURVEY			
DESIGN	CS	25/08/2023	
DRAWN	CS	09/05/2024	
CHECKED	BCP	14/05/2024	
APPROVED	BCP	15/05/2024	

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/23
A	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024

SCALE 1:1000

SHEET 02

PROJECT J15335

REV C

north

LOT 1 DP 173052

LOT 1 DP 168717

LOT 23 DP 405

LOT 31 DP 74955

LOT 32 DP 74955

EXISTING Ø1200 mm CORUGATTED METAL CULVERT

PROPOSED 4 m WIDE BY 1 m HIGH CONCRETE BOX CULVERT WITH WINGWALL INLET AND OUTLETS

SECTION 85 BLOCK TAKAHUE SD

PROPOSED RIP RAP OUTLET CHUTE UPGRADE

PROPOSED 4 m WIDE BY 1 m HIGH CONCRETE BOX CULVERTS WITH WINGWALL INLET AND OUTLETS

ALLEN BELL DRIVE

PARKDALE CRESCENT

KORIMAKO LANE

AWANUI RIVER

ALLEN BELL DRIVE BRIDGE

LEGEND	
EXISTING CULVERT	
AREA OUTSIDE OF VISION TOPOGRAPHIC SURVEY	
METAL PAVEMENT	
SEALED ROAD PAVEMENT	
LIGHT POLE	LP
EXISTING CESSPIT	
EXISTING POST AND WIRE FENCE	
EXISTING FARM GATE	
PROPERTY BOUNDARY	
SIGN POST	
BACK OF KERB	

NOTE:
1. LOT BOUNDARIES ARE FROM LINZ PARCEL BOUNDARIES FROM LANDONLINE.
2. FEATURES SHOWN OUTSIDE OF THE VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN CREATED USING A COMBINATION OF AERIAL IMAGERY, SITE OBSERVATIONS AND ARE THEREFORE APPROXIMATE.
3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.

0 10 20 30 40 50
Scale 1:1000 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: PROPOSED SITE PLAN

SURVEY		
DESIGN	CS	25/08/2023
DRAWN	CS	09/05/2024
CHECKED	BCP	14/05/2024
APPROVED	BCP	15/05/2024

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONCENT	BCP	15/05/2024

SCALE 1:1000
SHEET 03
PROJECT J15335

REV C

north

CUT/FILL Table			
Depth Range (m) (-Cut +Fill)	Area (m²)	Volume (m³)	Color
-3.50 to -3.00	1.7	0.1	
-3.00 to -2.50	7.1	1.8	
-2.50 to -2.00	53.5	12.7	
-2.00 to -1.50	117.2	47.5	
-1.50 to -1.00	330.6	129.6	
-1.00 to -0.50	737.5	344.3	
-0.50 to 0.00	1233.9	753.5	
0.00 to 0.50	2283.7	1080.8	
0.50 to 1.00	914.5	406.4	
1.00 to 1.50	393.8	96.7	
1.50 to 2.00	52.8	8.3	
2.00 to 2.50	4.0	0.4	

LEGEND	
SEALED ROAD PAVEMENT	
PROPERTY BOUNDARY	

NOTE:
1. LOT BOUNDARIES ARE FROM LINZ PARCEL BOUNDARIES FROM LANDONLINE.
2. FEATURES SHOWN OUTSIDE OF THE VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN CREATED USING A COMBINATION OF AERIAL IMAGERY, SITE OBSERVATIONS AND ARE THEREFORE APPROXIMATE.
3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.
5. EARTHWORKS DEPTH AND VOLUMES ARE BASED ON THE DIFFERENCE BETWEEN THE EXISTING GROUND SURFACE AND THE CONCEPT FINISHED GROUND SURFACE AND DOES NOT TAKE INTO ACCOUNT ANY TOPSOIL/UNSUITABLE MATERIAL REMOVAL OR ADDITION OF ANY EROSION PROTECTION OR REINSTATEMENT OF PAVEMENTS.

0 10 20 30 40 50
Scale 1:1000 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: EARTHWORKS PLAN

SURVEY		
DESIGN	CS	25/08/2023
DRAWN	CS	09/05/2024
CHECKED	BCP	14/05/2024
APPROVED	BCP	15/05/2024

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
BCP	FOR RESOURCE CONCENT		15/05/2024

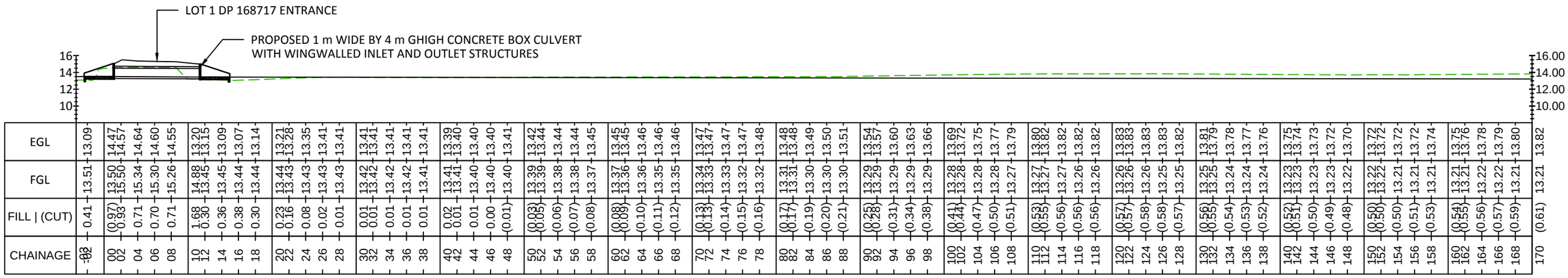
SCALE 1:1000
SHEET 04
PROJECT J15335

REV C

STATION 0 m TO 170 m
DIVERSION DRAIN LONG SECTION

SCALE (A3) 1:500

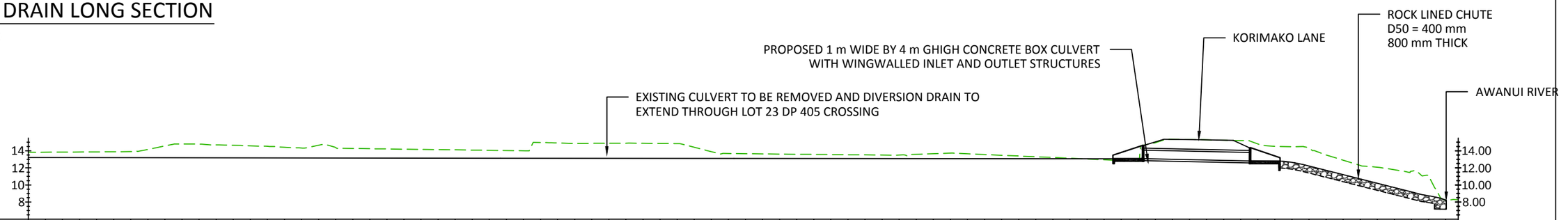
LEGEND	
EXISTING GROUND SURFACE	- - - - - - - - -
PROPOSED CONCEPT FINISHED SURFACE	———



CHAINAGE	FILL | (CUT)	FGL	EGL
-00	0.41	13.51	13.09
00	(0.97)	13.50	14.47
02	0.93	15.50	14.57
04	0.71	15.34	14.64
06	0.70	15.30	14.60
08	0.71	15.26	14.55
10	1.68	14.88	13.20
12	0.30	13.45	13.15
14	0.36	13.45	13.09
16	0.38	13.44	13.07
18	0.30	13.44	13.14
20	0.23	13.44	13.21
22	0.16	13.43	13.28
24	0.08	13.43	13.35
26	0.02	13.43	13.41
28	0.01	13.43	13.41
30	0.01	13.42	13.41
32	0.01	13.42	13.41
34	0.01	13.42	13.41
36	0.01	13.42	13.41
38	0.01	13.41	13.41
40	0.02	13.41	13.39
42	0.01	13.41	13.40
44	0.01	13.40	13.40
46	0.00	13.40	13.40
48	(0.01)	13.40	13.41
50	(0.03)	13.39	13.42
52	(0.05)	13.39	13.44
54	(0.06)	13.38	13.44
56	(0.07)	13.38	13.44
58	(0.08)	13.37	13.45
60	(0.08)	13.37	13.45
62	(0.09)	13.36	13.45
64	(0.10)	13.36	13.46
66	(0.11)	13.35	13.46
68	(0.12)	13.35	13.46
70	(0.13)	13.34	13.47
72	(0.13)	13.33	13.47
74	(0.14)	13.33	13.47
76	(0.15)	13.32	13.47
78	(0.16)	13.32	13.48
80	(0.17)	13.31	13.48
82	(0.17)	13.31	13.48
84	(0.19)	13.30	13.49
86	(0.20)	13.30	13.50
88	(0.21)	13.30	13.51
90	(0.25)	13.29	13.54
92	(0.28)	13.29	13.57
94	(0.31)	13.29	13.60
96	(0.34)	13.29	13.63
98	(0.38)	13.29	13.66
100	(0.41)	13.28	13.69
102	(0.44)	13.28	13.72
104	(0.47)	13.28	13.75
106	(0.50)	13.28	13.77
108	(0.51)	13.27	13.79
110	(0.53)	13.27	13.80
112	(0.55)	13.27	13.82
114	(0.56)	13.27	13.82
116	(0.56)	13.26	13.82
118	(0.56)	13.26	13.82
120	(0.57)	13.26	13.83
122	(0.57)	13.26	13.83
124	(0.58)	13.26	13.83
126	(0.58)	13.25	13.83
128	(0.57)	13.25	13.82
130	(0.56)	13.25	13.81
132	(0.55)	13.25	13.79
134	(0.54)	13.24	13.78
136	(0.53)	13.24	13.77
138	(0.52)	13.24	13.76
140	(0.52)	13.23	13.75
142	(0.51)	13.23	13.74
144	(0.50)	13.23	13.73
146	(0.49)	13.23	13.72
148	(0.48)	13.22	13.70
150	(0.50)	13.22	13.72
152	(0.50)	13.22	13.72
154	(0.50)	13.21	13.72
156	(0.51)	13.21	13.72
158	(0.53)	13.21	13.74
160	(0.54)	13.21	13.75
162	(0.55)	13.21	13.76
164	(0.56)	13.22	13.78
166	(0.57)	13.22	13.79
168	(0.59)	13.21	13.80
170	(0.61)	13.21	13.82

STATION 170 m TO AWANUI RIVER
DIVERSION DRAIN LONG SECTION

SCALE (A3) 1:500



CHAINAGE	FILL | (CUT)	FGL	EGL
170	(0.61)	13.21	13.82
172	(0.82)	13.21	13.83
174	(0.64)	13.20	13.84
176	(0.66)	13.20	13.86
178	(0.67)	13.20	13.87
180	(0.69)	13.19	13.88
182	(0.71)	13.19	13.90
184	(0.97)	13.19	14.16
186	(1.39)	13.18	14.57
188	(1.62)	13.18	14.80
190	(1.61)	13.18	14.78
192	(1.51)	13.17	14.68
194	(1.48)	13.17	14.65
196	(1.42)	13.17	14.58
198	(1.36)	13.16	14.52
200	(1.25)	13.16	14.40
202	(1.17)	13.15	14.32
204	(1.50)	13.15	14.65
206	(1.23)	13.15	14.37
208	(1.12)	13.15	14.27
210	(1.10)	13.14	14.24
212	(1.07)	13.14	14.21
214	(1.05)	13.14	14.19
216	(1.02)	13.14	14.16
218	(1.00)	13.13	14.13
220	(0.98)	13.13	14.11
222	(0.95)	13.13	14.08
224	(0.93)	13.13	14.05
226	(0.91)	13.12	14.03
228	(0.88)	13.12	14.00
230	(1.80)	13.12	14.92
232	(1.80)	13.12	14.92
234	(1.75)	13.11	14.86
236	(1.76)	13.11	14.87
238	(1.77)	13.11	14.88
240	(1.78)	13.11	14.89
242	(1.77)	13.11	14.88
244	(1.75)	13.11	14.86
246	(1.74)	13.10	14.84
248	(1.31)	13.10	14.41
250	(0.88)	13.10	13.98
252	(0.58)	13.10	13.68
254	(0.56)	13.10	13.66
256	(0.54)	13.10	13.64
258	(0.52)	13.10	13.62
260	(0.50)	13.09	13.60
262	(0.48)	13.09	13.58
264	(0.46)	13.09	13.55
266	(0.44)	13.09	13.53
268	(0.42)	13.09	13.51
270	(0.41)	13.09	13.50
272	(0.41)	13.08	13.50
274	(0.50)	13.08	13.58
276	(0.57)	13.08	13.65
278	(0.65)	13.07	13.72
280	(0.58)	13.07	13.65
282	(0.49)	13.07	13.56
284	(0.41)	13.07	13.47
286	(0.32)	13.06	13.39
288	(0.24)	13.06	13.30
290	(0.15)	13.06	13.21
292	(0.07)	13.06	13.12
294	0.02	13.06	13.04
296	0.11	13.05	12.94
298	0.20	13.05	12.85
300	0.26	13.05	12.79
302	0.43	15.37	14.94
304	(0.01)	15.34	15.35
306	(0.01)	15.31	15.32
308	0.00	15.28	15.28
310	0.02	15.25	15.23
312	0.42	14.78	15.20
314	(1.99)	12.80	14.79
316	(1.71)	12.80	14.51
318	(1.84)	12.65	14.48
320	(2.08)	12.22	14.30
322	(1.79)	11.71	13.50
324	(1.69)	11.20	12.89
326	(1.58)	10.70	12.28
328	(1.88)	10.19	12.07
330	(2.09)	9.68	11.77
332	(2.42)	9.18	11.60
334	(2.34)	8.74	11.08
336	0.02	8.23	8.22
337			

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

0 5 10 15 20 25
Scale 1:500 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: DIVERSION DRAIN LONG SECTION

SURVEY		
DESIGN	CS	28/08/2023
DRAWN	CS	09/05/2024
CHECKED	BCP	14/05/2024
APPROVED	BCP	15/05/2024

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024

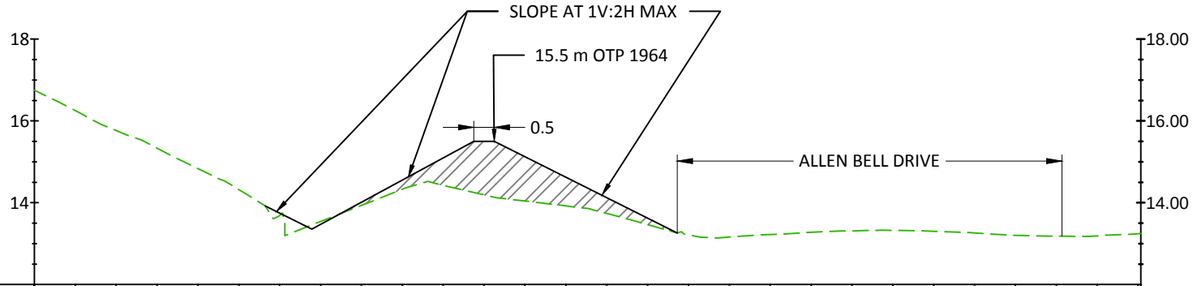
SCALE 1:500
SHEET 05
PROJECT J15335

REV C

A
03

DIVERSION DRAIN CROSS SECTION
SECTION 1

SCALE (A3) 1:150



EGL	16.75	16.25	15.76	15.33	14.83	14.32	13.69	13.54	13.93	14.33	14.42	14.19	14.04	13.92	13.74	13.47	13.21	13.16	13.22	13.28	13.31	13.32	13.30	13.26	13.20	13.18	13.19	13.24	13.25	
FGL	16.75	16.25	15.76	15.33	14.83	14.00	13.62	13.47	14.01	14.55	15.09	15.50	15.12	14.62	14.13	13.63	13.21	13.16	13.22	13.28	13.31	13.32	13.30	13.26	13.20	13.18	13.19	13.24	13.25	
FILL | (CUT)	0.00	0.00	0.00	0.00	0.00	(0.32)	(0.07)	(0.07)	0.07	0.22	0.66	1.31	1.08	0.70	0.39	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	27	

LEGEND	
EXISTING GROUND SURFACE	
PROPOSED CONCEPT FINISHED SURFACE	
ENGINEERED FILL (TO BE SPECIFIED)	

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

0 1.5 3 4.5 6 7.5
Scale 1:150 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: DIVERSION DRAIN SECTIONS - 1

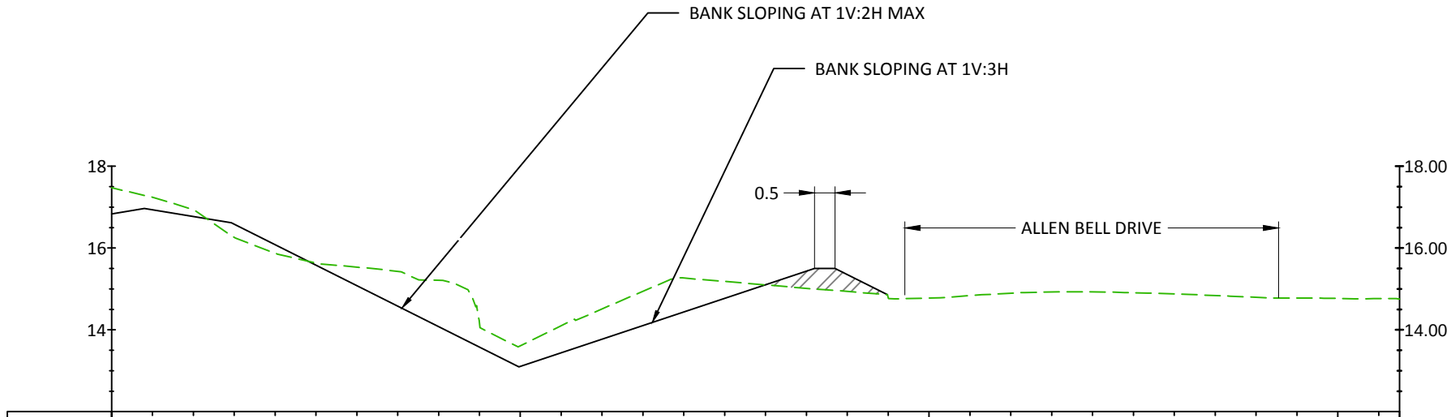
SURVEY		
DESIGN	CS	28/08/2023
DRAWN	CS	09/05/2024
CHECKED	BCP	14/05/2024
APPROVED	BCP	15/05/2024

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/04/2024

SCALE 1:150
SHEET 06
PROJECT J15335
REV C

C/03 DIVERSION DRAIN CROSS SECTION SECTION 3

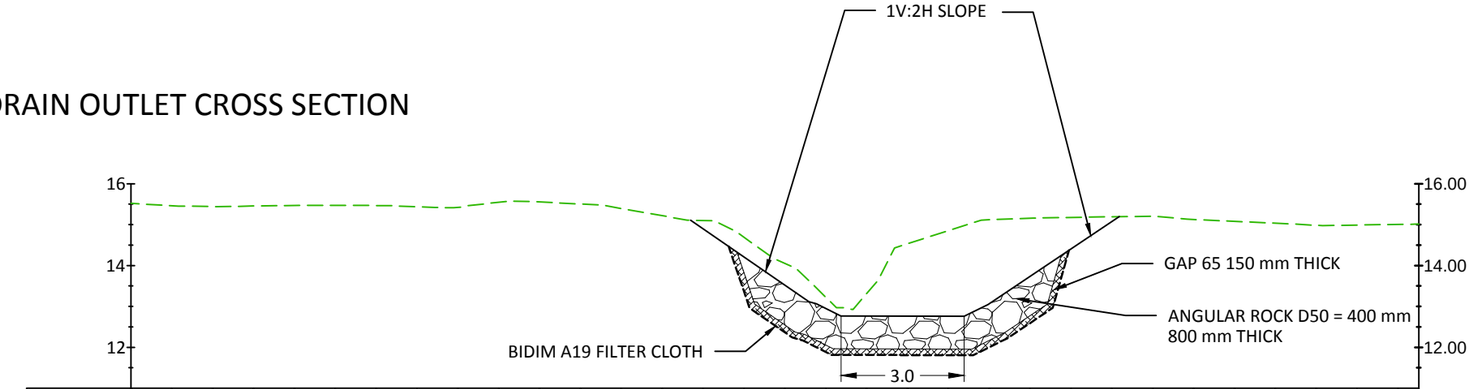
SCALE (A3) 1:150



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
EGL	17.48	17.24	16.94	16.26	15.87	15.63	15.53	15.43	15.21	14.16	13.61	14.10	14.51	14.94	15.27	15.18	15.10	15.02	14.94	14.78	14.78	14.84	14.90	14.93	14.93	14.91	14.88	14.84	14.80	14.78	14.77	14.76	14.75
FGL	17.48	17.24	16.94	16.58	16.08	15.58	15.08	14.58	14.08	13.58	13.10	13.40	13.70	14.00	14.29	14.59	15.03	15.47	15.35	14.78	14.78	14.84	14.90	14.93	14.93	14.91	14.88	14.84	14.80	14.78	14.77	14.76	14.75
FILL | (CUT)	0.00	0.00	0.00	0.32	0.20	(0.05)	(0.46)	(0.85)	(1.14)	(0.59)	(0.51)	(0.70)	(0.81)	(0.95)	(0.97)	(0.59)	(0.07)	0.46	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C/03 DIVERSION DRAIN OUTLET CROSS SECTION SECTION 4

SCALE (A3) 1:150



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
EGL	15.52	15.46	15.44	15.46	15.47	15.47	15.47	15.44	15.42	15.55	15.55	15.51	15.39	15.22	15.10	14.69	14.05	13.23	13.31	14.53	14.85	15.12	15.16	15.18	15.19	15.21	15.13	15.08	15.03	14.98	14.99	15.00	15.01
FGL	15.52	15.46	15.44	15.46	15.47	15.47	15.47	15.44	15.42	15.55	15.55	15.51	15.39	15.22	14.89	14.20	13.52	12.95	12.75	12.75	12.75	13.06	13.73	14.41	15.07	15.20	15.13	15.08	15.03	14.98	14.99	15.00	15.01
FILL | (CUT)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	(0.21)	(0.49)	(0.54)	(0.28)	(0.56)	(1.79)	(2.10)	(2.06)	(1.42)	(0.77)	(0.12)	(0.01)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

LEGEND	
EXISTING GROUND SURFACE	
PROPOSED CONCEPT FINISHED SURFACE	
ENGINEERED FILL (TO BE SPECIFIED)	
RIP-RAP PROTECTION	
GAP65	

0 1.5 3 4.5 6 7.5

Scale 1:150 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

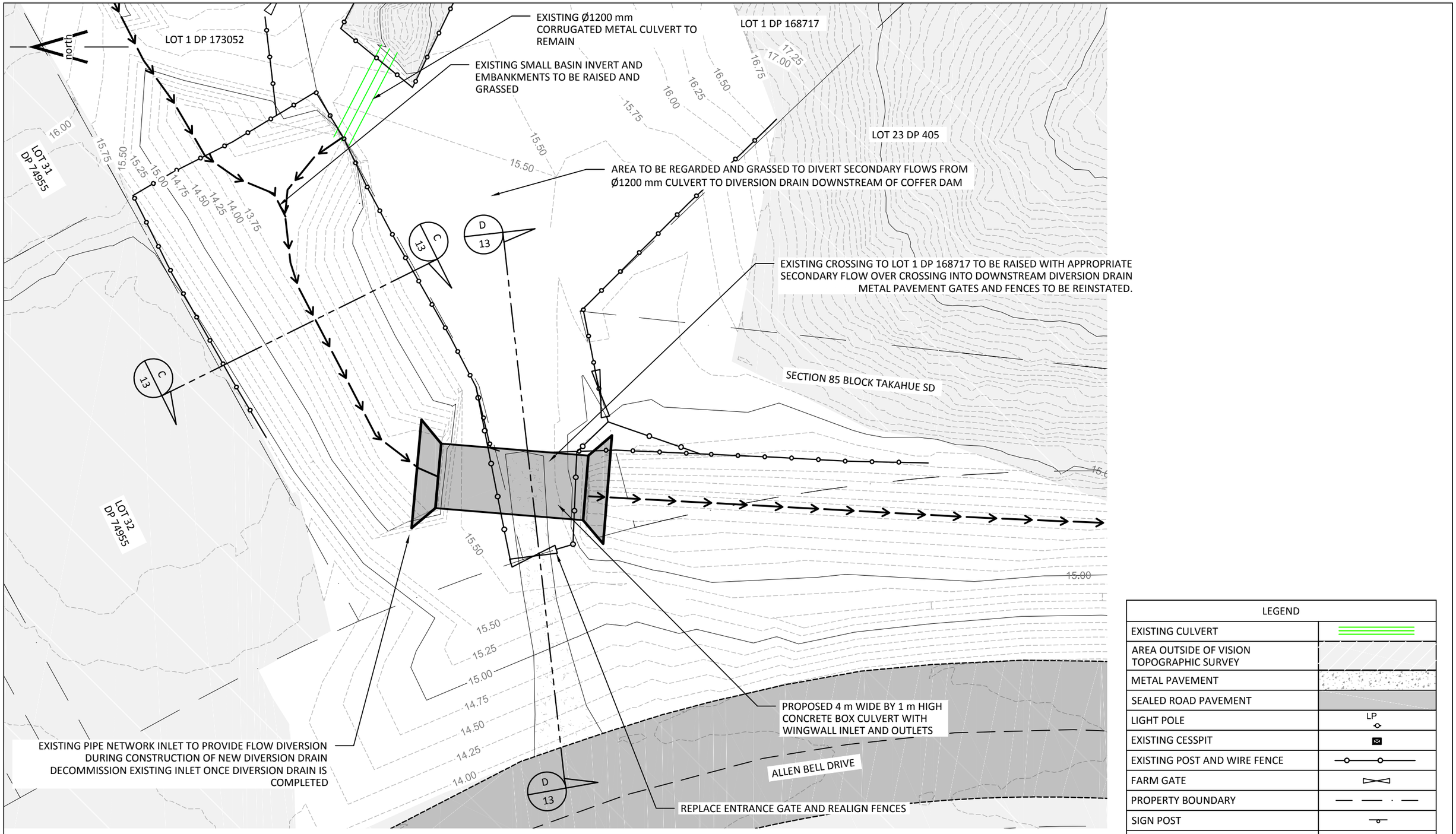
PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: DIVERSION DRAIN SECTIONS - 2

SURVEY			
DESIGN	CS	28/08/2023	
DRAWN	CS	09/05/2024	
CHECKED	BCP	14/05/2024	
APPROVED	BCP	15/05/2024	

No	REVISION	BY	DATE
A	CONCEPT	BP	13/09/2023
B	FOR PUBLIC CONSULTATION	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/05/2024

SCALE 1:150
SHEET 07
PROJECT J15335
REV C



LEGEND	
EXISTING CULVERT	
AREA OUTSIDE OF VISION TOPOGRAPHIC SURVEY	
METAL PAVEMENT	
SEALED ROAD PAVEMENT	
LIGHT POLE	LP
EXISTING CESSPIT	
EXISTING POST AND WIRE FENCE	
FARM GATE	
PROPERTY BOUNDARY	
SIGN POST	
BACK OF KERB	

NOTE:
1. LOT BOUNDARIES ARE FROM LINZ PARCEL BOUNDARIES FROM LANDONLINE .
2. FEATURES SHOWN OUTSIDE OF THE VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN CREATED USING A COMBINATION OF AERIAL IMAGERY, SITE OBSERVATIONS AND ARE THEREFORE APPROXIMATE.
3. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
4. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM.

0 2.5 5 7.5 10 12.5
Scale 1:250 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: PROPOSED DIVERSION DRAIN INLET PLAN

SURVEY		
DESIGN	CS	28/08/2023
DRAWN	CS	09/05/2024
CHECKED	BCP	14/05/2024
APPROVED	BCP	15/05/2024

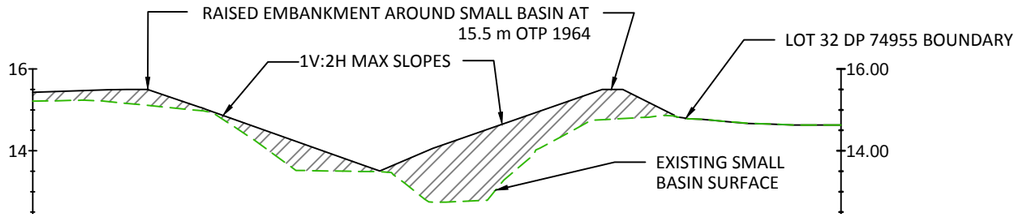
No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
B	UPDATED CONCEPT DESIGN	BCP	11/10/2023
C	FOR RESOURCE CONSENT	BCP	15/04/2024

SCALE 1:250
SHEET 08
PROJECT J15335
REV C

C/09 COFFER DAM UPSTREAM BASIN CROSS SECTION

SCALE (A3) 1:150

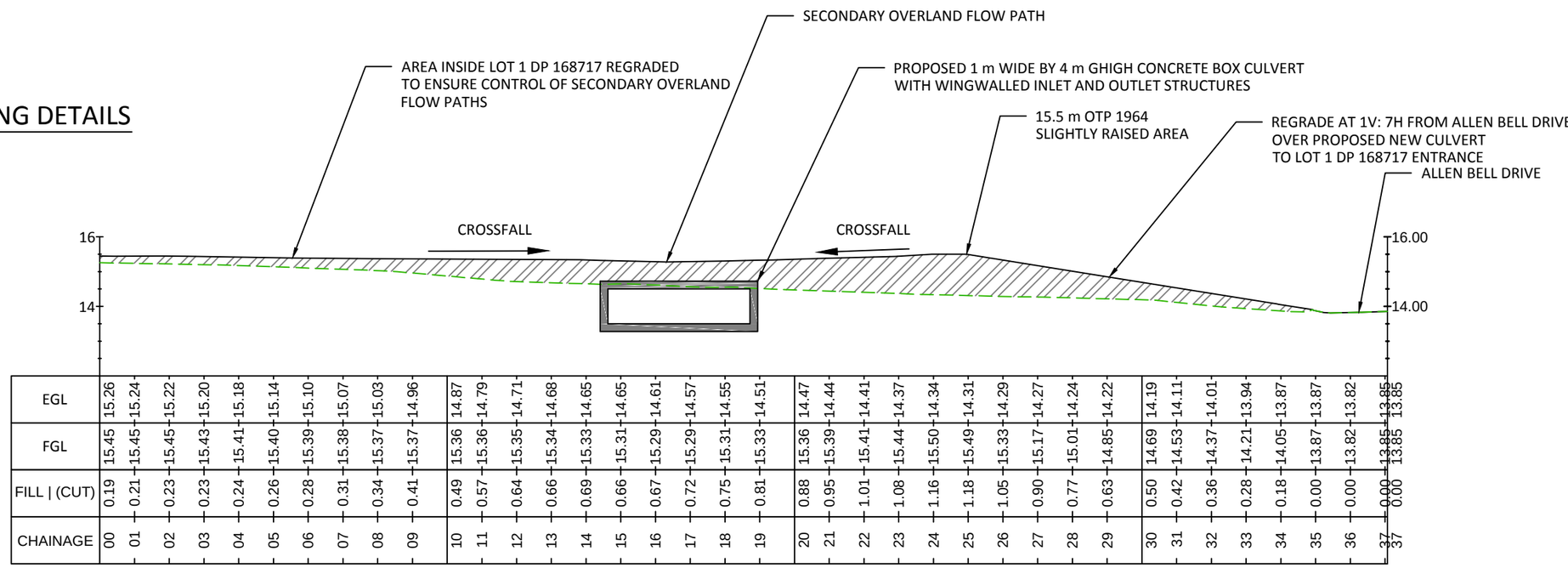
LEGEND	
EXISTING GROUND SURFACE	
PROPOSED CONCEPT FINISHED SURFACE	
ENGINEERED FILL (TO BE SPECIFIED)	



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
EGL	15.21	15.23	15.19	15.09	14.99	14.54	13.84	13.51	13.50	13.28	12.74	12.78	13.68	14.38	14.76	14.82	14.79	14.71	14.65	14.63	14.63
FGL	15.43	15.46	15.49	15.44	15.10	14.74	14.39	14.03	13.68	13.72	14.13	14.48	14.83	15.18	15.50	15.22	14.79	14.71	14.65	14.63	14.63
FILL | (CUT)	0.21	0.23	0.31	0.35	0.10	0.20	0.55	0.52	0.18	0.44	1.39	1.70	1.14	0.79	0.74	0.40	0.00	0.00	0.00	0.00	0.00

D/09 COFFER DAM OUTLET PIPE CROSSING DETAILS

SCALE (A3) 1:150



CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
EGL	15.26	15.24	15.22	15.20	15.18	15.14	15.10	15.07	15.03	14.96	14.87	14.79	14.71	14.68	14.65	14.65	14.61	14.57	14.55	14.51	14.47	14.44	14.41	14.37	14.34	14.31	14.29	14.27	14.24	14.22	14.19	14.11	14.01	13.94	13.87	13.87	13.82	13.85
FGL	15.45	15.45	15.45	15.43	15.41	15.40	15.39	15.38	15.37	15.37	15.36	15.36	15.35	15.34	15.33	15.31	15.29	15.29	15.31	15.33	15.36	15.39	15.41	15.44	15.50	15.49	15.33	15.17	15.01	14.85	14.69	14.53	14.37	14.21	14.05	13.87	13.82	13.85
FILL | (CUT)	0.19	0.21	0.23	0.23	0.24	0.26	0.28	0.31	0.34	0.41	0.49	0.57	0.64	0.66	0.69	0.66	0.67	0.72	0.75	0.81	0.88	0.95	1.01	1.08	1.16	1.18	1.05	0.90	0.77	0.63	0.50	0.42	0.36	0.28	0.18	0.00	0.00	0.00

NOTE:
1. ELEVATIONS ARE WITH REFERENCE TO OTP 1964 VERTICAL DATUM.

0 1.5 3 4.5 6 7.5
Scale 1:150 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRAIN WORKS
PARKDALE CRESCENT
KAITAIA

DRAWING TITLE: PROPOSED DIVERSION DRAIN INLET BASIN AND CROSSING SECITONS

SURVEY		
DESIGN	CS	28/08/2023
DRAWN	CS	28/08/2023
CHECKED	BCP	14/05/2024
APPROVED	BCP	15/05/2024

No	REVISION	BY	DATE
A	CONCEPT	BCP	13/09/2023
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C	FOR RESOURCE CONSENT	BCP	15/04/2024

SCALE 1:150
SHEET 09
PROJECT J15335
REV C

Appendix C
VISION Calculations

Stormwater Design Sheet

HIRDS V4 Data

Client Far North District Council
Project J15335
Site Parkdale Cresent Coffer Dam and Diversion Drain
Designed by CS
Approvd by BCP
Date 28/08/2023
Scenario RCP6.0 for the period 2081-2100

HIRDS V4 Depth-Duration-Frequency Results
Sitename: Custom Location
Coordinate system: WGS84
Longitude: 173.2662
Latitude: -35.1057

DDF Model Parameters:	c	d	e	f	g	h	i
Values:	0.001471	0.501669	-0.03777	0	0.254972	-0.01089	3.164654

Example:	Duration (h	ARI (yrs)	x	y	Rainfall Depth (mm)
	24	100	3.178054	4.600149	208.8456

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.53	13	16.4	23.7	32.9	51.5	65.2	79.6	93.7	101	106	110
2	0.5	9.35	14.3	18	26	36.1	56.6	71.6	87.5	103	111	117	121
5	0.2	12.2	18.6	23.5	33.9	47.2	74	93.8	115	135	146	154	159
10	0.1	14.3	21.8	27.5	39.8	55.4	87.1	110	135	160	173	182	188
20	0.05	16.4	25.1	31.7	45.9	64	101	128	156	185	200	210	218
30	0.033	17.7	27.1	34.2	49.5	69.1	109	138	169	200	217	228	236
40	0.025	18.6	28.6	36.1	52.2	72.8	115	146	179	211	229	240	249
50	0.02	19.4	29.7	37.5	54.3	75.7	119	152	186	220	238	250	259
60	0.017	20	30.6	38.7	56	78.1	123	157	192	227	246	259	268
80	0.013	20.9	32.1	40.5	58.7	81.9	129	164	201	238	258	272	281
100	0.01	21.6	33.2	42	60.8	84.9	134	170	209	247	268	282	292
250	0.004	24.7	37.9	47.9	69.4	97.1	153	195	240	284	308	324	335

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	1.1	1.4	1.6	2.4	3.3	6	8.3	3.5	4.1	4.6	4.1	6.1
2	0.5	1.2	1.5	1.7	2.6	3.6	6.5	9.1	3.7	4.5	5	4.4	6.6
5	0.2	1.7	2.2	2.5	3.7	5.1	8.9	12	5.7	6.9	7.7	6.9	9.7
10	0.1	2.2	3	3.4	4.9	6.7	11	15	8.1	9.6	11	10	13
20	0.05	2.8	4	4.7	6.4	8.9	15	19	11	13	15	14	17
30	0.033	3.2	4.7	5.6	7.5	11	17	22	14	16	18	18	21
40	0.025	3.5	5.3	6.3	8.4	12	19	24	15	18	20	20	23
50	0.02	3.9	5.8	6.9	9.2	13	20	26	17	20	22	22	26
60	0.017	4.1	6.2	7.5	9.9	14	22	27	18	22	24	24	28
80	0.013	4.6	7	8.4	11	16	24	30	21	24	27	27	31
100	0.01	5	7.6	9.2	12	17	27	33	23	27	29	30	34
250	0.004	7	11	13	17	25	38	45	33	38	41	43	48

Rainfall depths (mm) :: RCP2.6 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.13	13.9	17.6	25.3	35.1	54.4	68.3	82.9	96.9	104	109	113
2	0.5	10	15.3	19.3	27.8	38.6	59.8	75.2	91.2	107	115	121	124
5	0.2	13.1	20	25.2	36.4	50.6	78.6	98.9	120	141	152	159	164
10	0.1	15.4	23.5	29.7	42.9	59.6	92.6	117	142	166	179	188	194
20	0.05	17.7	27.1	34.2	49.5	68.8	107	135	164	193	208	218	225
30	0.033	19.1	29.3	37	53.5	74.4	116	146	178	209	225	236	244
40	0.025	20.1	30.8	38.9	56.3	78.4	122	154	187	220	238	249	258
50	0.02	20.9	32.1	40.5	58.6	81.6	127	160	195	229	248	260	268
60	0.017	21.6	33.1	41.7	60.4	84.1	131	166	201	237	256	268	277
80	0.013	22.6	34.7	43.8	63.4	88.3	138	174	211	249	269	282	291
100	0.01	23.4	35.9	45.3	65.7	91.5	143	180	219	258	279	293	302
250	0.004	26.7	40.9	51.7	75	105	164	207	252	296	320	336	347

Rainfall depths (mm) :: RCP2.6 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.13	13.9	17.6	25.3	35.1	54.4	68.3	82.9	96.9	104	109	113
2	0.5	10	15.3	19.3	27.8	38.6	59.8	75.2	91.2	107	115	121	124
5	0.2	13.1	20	25.2	36.4	50.6	78.6	98.9	120	141	152	159	164
10	0.1	15.4	23.5	29.7	42.9	59.6	92.6	117	142	166	179	188	194
20	0.05	17.7	27.1	34.2	49.5	68.8	107	135	164	193	208	218	225
30	0.033	19.1	29.3	37	53.5	74.4	116	146	178	209	225	236	244
40	0.025	20.1	30.8	38.9	56.3	78.4	122	154	187	220	238	249	258
50	0.02	20.9	32.1	40.5	58.6	81.6	127	160	195	229	248	260	268
60	0.017	21.6	33.1	41.7	60.4	84.1	131	166	201	237	256	268	277
80	0.013	22.6	34.7	43.8	63.4	88.3	138	174	211	249	269	282	291
100	0.01	23.4	35.9	45.3	65.7	91.5	143	180	219	258	279	293	302
250	0.004	26.7	40.9	51.7	75	105	164	207	252	296	320	336	347

Rainfall depths (mm) :: RCP4.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.28	14.2	17.9	25.8	35.6	55.1	69.1	83.7	97.7	105	110	114
2	0.5	10.2	15.6	19.6	28.3	39.2	60.7	76.1	92.1	108	116	121	125

5	0.2	13.3	20.4	25.7	37.1	51.5	79.8	100	121	142	153	160	165
10	0.1	15.6	23.9	30.2	43.6	60.6	94	118	143	168	181	190	196
20	0.05	18	27.6	34.8	50.4	70	109	137	166	195	210	220	227
30	0.033	19.5	29.8	37.6	54.5	75.7	118	148	180	211	228	238	246
40	0.025	20.5	31.4	39.6	57.4	79.8	124	156	190	222	240	252	260
50	0.02	21.3	32.7	41.2	59.7	83	129	163	197	232	250	262	271
60	0.017	22	33.7	42.5	61.6	85.7	134	168	204	239	259	271	280
80	0.013	23	35.3	44.6	64.6	89.9	140	176	214	251	271	284	294
100	0.01	23.8	36.6	46.2	66.9	93.1	145	183	222	261	282	295	305
250	0.004	27.2	41.7	52.7	76.4	106	166	210	255	299	324	339	351

Rainfall depths (mm) :: RCP4.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.76	14.9	18.8	27.1	37.4	57.4	71.5	86.3	100	108	112	116
2	0.5	10.7	16.4	20.7	29.8	41.2	63.3	79	95.1	111	119	124	128
5	0.2	14	21.5	27.1	39.1	54.2	83.4	104	126	146	157	164	169
10	0.1	16.5	25.3	31.9	46.1	63.9	98.5	123	148	173	186	195	201
20	0.05	19.1	29.2	36.8	53.3	73.9	114	143	172	201	216	226	233
30	0.033	20.6	31.5	39.8	57.6	79.9	124	155	186	218	234	245	253
40	0.025	21.7	33.2	41.9	60.7	84.2	130	163	197	230	248	259	267
50	0.02	22.5	34.5	43.6	63.1	87.7	136	170	205	239	258	270	278
60	0.017	23.2	35.6	45	65.1	90.4	140	175	212	247	266	279	287
80	0.013	24.4	37.4	47.2	68.3	94.9	147	184	222	260	280	293	302
100	0.01	25.2	38.7	48.9	70.8	98.4	153	191	231	269	290	304	313
250	0.004	28.7	44.1	55.8	80.9	112	175	219	265	309	334	349	360

Rainfall depths (mm) :: RCP6.0 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.22	14.1	17.7	25.6	35.4	54.8	68.7	83.4	97.4	105	110	113
2	0.5	10.1	15.5	19.5	28.1	39	60.3	75.8	91.7	107	116	121	125
5	0.2	13.2	20.2	25.5	36.8	51.1	79.3	99.7	121	141	153	160	165
10	0.1	15.5	23.8	30	43.3	60.2	93.5	118	143	167	180	189	195
20	0.05	17.9	27.4	34.6	50	69.5	108	136	165	194	209	219	226
30	0.033	19.3	29.6	37.4	54.1	75.2	117	147	179	210	227	238	245
40	0.025	20.3	31.2	39.3	56.9	79.2	123	156	189	221	239	251	259
50	0.02	21.1	32.4	40.9	59.2	82.4	128	162	196	231	249	261	270
60	0.017	21.8	33.4	42.2	61.1	85	133	167	203	238	257	270	279
80	0.013	22.8	35	44.3	64.1	89.2	139	175	213	250	270	283	293
100	0.01	23.7	36.3	45.8	66.4	92.5	144	182	221	260	281	294	304
250	0.004	27	41.4	52.3	75.9	106	165	209	254	298	322	338	349

Rainfall depths (mm) :: RCP6.0 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	10.2	15.6	19.6	28.3	38.9	59.4	73.7	88.7	103	110	115	118
2	0.5	11.2	17.1	21.6	31.1	43	65.6	81.5	97.7	113	121	127	130
5	0.2	14.7	22.5	28.4	40.9	56.6	86.7	108	129	150	161	168	173
10	0.1	17.3	26.5	33.4	48.3	66.8	102	128	153	178	191	199	205
20	0.05	20	30.6	38.6	55.8	77.3	119	148	177	206	222	232	238
30	0.033	21.6	33.1	41.7	60.4	83.7	129	160	192	224	240	251	258
40	0.025	22.7	34.8	43.9	63.6	88.2	136	169	203	236	254	265	273
50	0.02	23.6	36.2	45.7	66.2	91.8	141	176	211	246	265	276	284
60	0.017	24.4	37.3	47.2	68.3	94.7	146	182	218	254	274	286	294
80	0.013	25.5	39.2	49.5	71.7	99.4	153	191	229	267	287	300	309
100	0.01	26.4	40.6	51.3	74.3	103	159	198	238	277	298	312	321
250	0.004	30.1	46.3	58.5	84.8	118	182	227	273	318	343	358	369

Rainfall depths (mm) :: RCP8.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.4	14.3	18.1	26.1	36	55.6	69.6	84.3	98.3	106	111	114
2	0.5	10.3	15.8	19.9	28.7	39.7	61.3	76.8	92.8	108	117	122	126
5	0.2	13.5	20.6	26	37.6	52.1	80.6	101	122	143	154	161	166
10	0.1	15.8	24.3	30.6	44.2	61.4	95.1	119	145	169	182	191	197
20	0.05	18.3	28	35.3	51.1	70.9	110	138	167	196	211	221	228
30	0.033	19.7	30.2	38.1	55.2	76.7	119	150	181	212	229	240	248
40	0.025	20.8	31.8	40.2	58.1	80.8	126	158	191	224	242	253	262
50	0.02	21.6	33.1	41.8	60.5	84.1	131	164	199	233	252	264	272
60	0.017	22.3	34.1	43.1	62.4	86.8	135	170	206	241	260	273	281
80	0.013	23.3	35.8	45.2	65.5	91.1	142	178	216	253	273	286	296
100	0.01	24.2	37.1	46.8	67.8	94.4	147	185	224	263	284	297	307
250	0.004	27.5	42.3	53.4	77.5	108	168	212	257	302	326	342	353

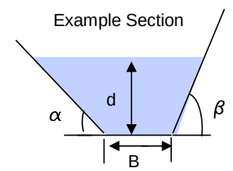
Rainfall depths (mm) :: RCP8.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	11.2	17	21.5	30.9	42.4	64	78.7	94	108	115	119	123
2	0.5	12.3	18.8	23.7	34.1	47	70.9	87.3	104	119	127	132	136
5	0.2	16.2	24.7	31.2	45.1	62.1	94.1	116	138	159	170	176	181
10	0.1	19.1	29.2	36.8	53.2	73.5	111	138	163	188	202	210	215
20	0.05	22	33.8	42.6	61.6	85.1	129	160	190	219	234	244	250
30	0.033	23.8	36.5	46.1	66.7	92.1	140	173	206	238	254	265	272
40	0.025	25.1	38.4	48.5	70.2	97.1	148	183	217	251	269	280	287
50	0.02	26.1	40	50.5	73.2	101	154	190	226	262	280	292	299
60	0.017	26.9	41.3	52.1	75.5	104	159	197	234	270	290	301	309
80	0.013	28.2	43.3	54.7	79.3	110	167	207	246	284	304	316	325
100	0.01	29.2	44.9	56.7	82.1	114	174	215	255	295	316	329	338
250	0.004	33.3	51.2	64.7	93.8	130	199	246	293	339	363	378	388

Stormwater Design Sheet

Open Drain Design

Client	Far North District Council
Project	J15335
Site	Parkdale Cresent Flood Assessment
Designed by	CS
Approvd by	BCP
Date	28/11/2023
Scenario	Historic Rainfall



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Drainage Area							Drain Data				Checks		
Decription	No	Flow $Q(m^3/s)$	Surface	n Mannings	S (%)	d (m)	A (m^2)	P (m)	R (m)	Provisional Flows Q (m^3/s)	υ (m/s)	$\upsilon \cdot d$ (m^2/s)	COMMENTS
Awanui River Exiting Condition	1	321.00	Grass	0.04321	0.07	7.063	197.67	45.77	4.32	321.000	1.62	11.47	
Awanui River Proposed Condition	2	325.33	Grass	0.04321	0.07	7.11	199.62	45.96	4.34	325.4	1.63	11.59	

[1] The design flow is based on HECRAS model outputs and NRC model data
[2] It is assuned that there are no inlet losses.
[3] Velocity is calculated based upon full-flow conditions for the
[4] Elevations, grades, and lengths have been estiamted from LiDAR data and are considered indicative.

Stormwater Design Sheet

Rock Lined Chute

Site: Parkdale Crescent, Kaitaia
Date: 8/05/2024
Project: J15335
Client: Far North District Council
By: CS
Reviewed: BCP
Method: Robinson, Rice and Kadavay from UBCR

VISION CONSULTING ENGINEERS

Decription	Design Q (m^3/s)	Chute Slope S (m/m)	Chute Width B (m)	Unit Discharge q_t ($m^3/s/m$)	Median Rock Size D50 (50% finer) (m)	Mannings n	Rock Thickness Reuqired t (m)	Velocity Through Rock $V_{m\ (m/s)}$	Unit Discharge through rock $q_{m\ (m^3/s/m)}$	Unit Discharge above rock $q_{s\ (m^3/s/m)}$	Velocity through chute $V_{s\ (m/s)}$	Flow Depth above rock d (m)
Outlet Chute	4.33	0.256	3	1.44	0.396	0.058	0.792	0.224	0.178	1.27	4.05	0.313

Summary		
D50	**0.40**	m
Chute Thickness	**0.79**	m
Radius at transitions	**15.8**	m
Bed Width	**3**	m

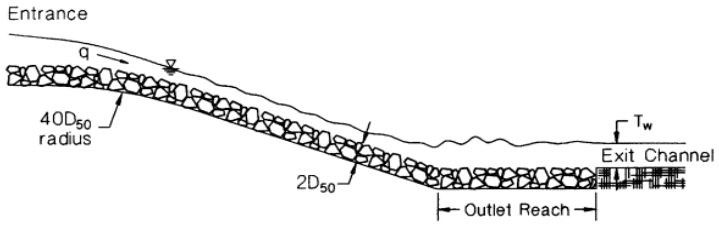

Figure 1—Typical rock chute profile.

Assumptions

Specific gravity of rock	2.54 to 2.82
Rock Type	Angular
Porosity of Rock	0.45
Gravity	9.81 m/s^2
Max side slopes	1V:1.5H

VISION CONSULTING
Engineers

EROSION AND SEDIMENT CONTROL PLAN

Diversion Drain Works, Parkdale Crescent, Kaitaia

Prepared for

Far North District Council

15/05/2024

Report Information Summary

Job no.	J15335
Report Author	Dan Simmonds
Report Reviewer	Ben Perry
Version No.	1
Status	Final
Date	15/05/2024

Version No.	Date	Description
1	15/05/2024	Final issued to client.

Document Acceptance

Action	Name	Signed	Date
Author	Dan Simmonds	 Senior Engineer, MIEAust CPEng, CMEngNZ	15/05/2024
Reviewer	Ben Perry	 Managing Director, FEngNZ, CPEng	15/05/2024

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1 General

Vision Consulting Engineers Limited (VISION) has been engaged by the Far North District Council to carry out the design for the Parkdale Crescent Stormwater Pipe – Northern Network – Diversion Drain project (Diversion Drain Project).

As a part of this project, VISION is preparing to lodge an application for resource consent from the Northland Regional Council (NRC). This Erosion and Sediment Control Plan (ESCP) has been prepared to support the Resource Consent application in general accordance with Auckland Council Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, Guideline Document 2006/005 dated June 2016 (GD05).

The recommendations included within this erosion and sediment control plan are to be implemented prior to the commencement of earthworks at the site.

This document should be treated as a 'living document', it is recommended that the document be updated following the completion of detailed design and by the contractor during construction to ensure that the objectives of GD05 are achieved during the course of earthworks and during vegetation establishment.

2 Site Setting and Conditions

The site is situated in the north eastern outskirts of Kaitaia, spanning the eastern side of Allen Bell Drive and extending northward for approximately 350 meters from the Awanui River. Noteworthy features include the inlet to the existing northern pipe network and an unlined channel exhibiting a split flow pattern. The central and northern segments of the channel direct flow northward into the existing northern network inlet, while the southern portion channels water southward towards the Awanui River.

The topography of the site is predominantly flat to gently sloping, with contributing catchment hill slopes characterized by moderate to steep slopes. The eastern roadside berm on Allen Bell Drive currently slopes up from Allen Bell Drive to the top of the western bank of the open channel with slopes up to approximately 17 degrees.

The existing open drain is covered with a mix of dense grass, weedy scrub, and small to medium-sized trees. The grass-covered roadside berm, between the open channel and Allen Bell Drive, contains large trees sporadically spaced along its length. Upstream of the existing pipe network inlet, the area is generally covered with grass and weedy vegetation.

The location of the site is shown in Figure 1.

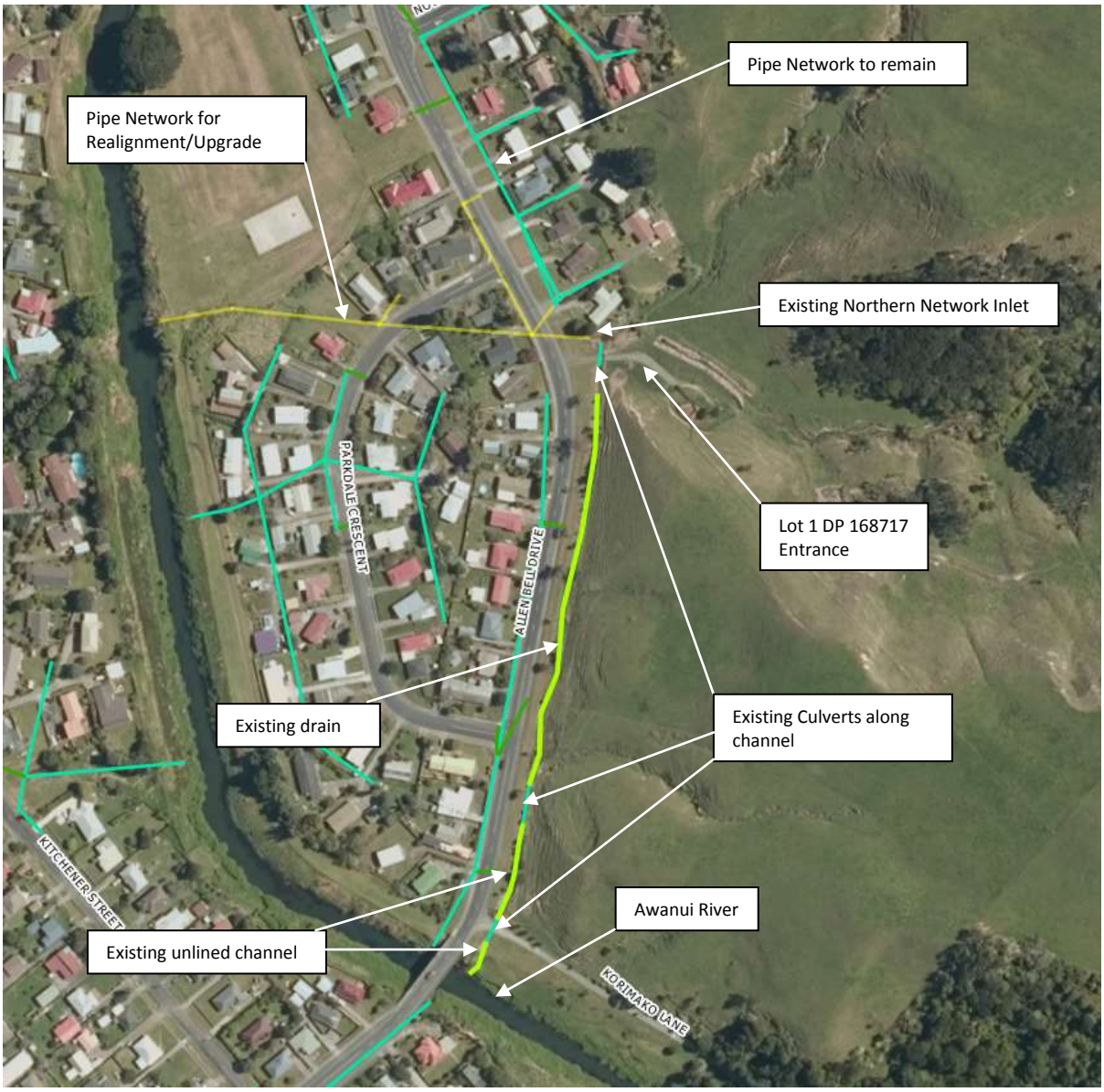


Figure 1. Site location of Pipe Renewal Project

The area subject to the Pipe Renewal Project is shown with existing stormwater pipes in turquoise, existing unlined channels in green and pipes to be realigned and upgrades in yellow, north up the page, not to scale.

3 Proposed Development

The concept design for the Diversion Drain Project is summarised below:

- Deepening and widening the existing unlined channel and providing a levee on the western side of the Diversion Drain, this enables the re-grading of the diversion drain to flow south to the Awanui River.
- Replacing the existing culverts located along the existing unlined channel and upgrading the culverts to convey the 1% AEP storm event with allowance for climate change and the tailwater associated with the 1% AEP Awanui River flood level. The culvert at the outlet will be fitted with a flood gate.
- Earthworks in the area around the Lot 1 DP 168717 entrance and access to Allen Bell Drive to ensure secondary flows from Lot 1 DP 168717 enter the Diversion Drain and not Allen Bell Drive.
- Earthworks around the existing Northern Pipe Network inlet to ensure all surface water is collected and conveyed to the Diversion Drain.
- Decommissioning of one of the culverts within the Diversion Drain north of Korimako Lane.
- Decommissioning the existing Northern Pipe Network inlet once the specified erosion protection in the Diversion Drain (to be confirmed in detailed design) has been established.
- Providing Rip-Rap protection at the Diversion Drain Outlet and regrading the outlet at the Awanui River to prevent erosion and scour.

As part of the project the existing pipe network is to remain open during construction of the diversion drain. At the completion of the diversion drain, and after a period where appropriate channel protection can establish, the existing inlet to the pipe network can be decommissioned with all flows diverted to the new drain. This will allow the construction of the proposed new northern network to be completed without the requirement of major flow diversion during construction.

4 Geology

The 1:250,000 geological map, Geology of the Kaitaia Area (Isaac et al 1996) indicates that the project extent is near a geological interface where the. Karioitahi Group and Awhitu Group meet.

The Karioitahi Group comprises unconsolidated to poorly consolidated sand, peat, mud and shell deposits (estuarine, lacustrine, swamp, alluvial and colluvial) and the Awhitu Group comprises Cemented dune sands and associated facies. A modified extract from the geological map is presented in Figure 2.

Figure 2. Site Geology

Site geology, extract from 1:250,000 Geological Map of Kaitaia, Isaac 1996, modified north up the page, not to scale.

5 Erosion Potential

The site is not shown to be erosion prone land based on published information from the Far North Regional Council (FNDC) or Northland Regional Council (NRC).

6 Staging

It is proposed to undertake the earthworks along with the sediment and erosion control measures in the following sequence:

Table 1. Stage 1 Earthworks

Timing of proposed works

Activity		Timeframe
1.	Silt socks to be installed around existing cesspits within Allen Bell Drive	During construction season, November to April
2.	Existing northern pipe network to remain in service as clear water diversion during Stage 1 earthworks.	
3.	Silt fence to be installed along Allen Bell Drive kerb line	
4.	Earthworks in proposed diversion drain to be lined with a biodegradeable blanket/mesh like grasstrike or similar as the earthworks progress along the drain and hydroseeded at the end of stage 1	
5.	Fill bund on western side of diversion drain to be topsoiled and grass seeded	

Table 2. Stage 2 Earthworks

Timing of proposed works

Activity		Timeframe
1.	Silt sock and silt fences to remain throughout Stage 2 until 80% grass cover over full extent of works.	Stage 1 earthworks to have achieved 80% grass cover prior to commencement of work.
2.	Northern pipe network to be closed off.	
3.	All earthworks in this area to be lined with Bidim A19 filter cloth and tightly packed angular rocks as permanent soil stabilisation	During construction season, November to April

7 Erosion and Sediment Control Measures

A plan presenting the erosion and sediment control measures to be implemented at the site is included in Appendix A. Details regarding the measures anticipated to be implemented at the site are presented in the following sections.

7.1.1 Topsoiling and grass seeding

Definition

Seeding involves the planting and establishment of quick growing and/or perennial grass to provide temporary and/or permanent stabilisation on exposed areas. The practice is usually undertaken in conjunction with the placement of topsoil.

Purpose

The purpose is to provide either a short-term or long-term cover for erosion control on disturbed areas. Vegetation protects exposed soils from raindrop impact, reduces runoff velocity and volume and binds soil particles together.

Rapid-growing annual grass will provide a short-term cover. It is primarily used where project works are still progressing but need temporary coverage (e.g. during winter shutdown period).

Perennial grasses will provide permanent erosion protection to disturbed areas following completion of the earthworks' activity. Ideally, permanent grassing should be undertaken progressively throughout the project as areas are finalised and brought to final grade.

Topsoiling provides a suitable soil medium for vegetative growth for erosion control while providing some protection of the subsoil layer and also increasing the absorption capacity of the soil.

Application

The practice applies to any site where vegetation establishment is important for stabilisation or landscape purposes.

Temporary and permanent seeding

- Use this on short to medium-term stockpiles, the outside of pond embankments or diversion bunds, on cut-and-fill slopes, access/haul road embankments and any other disturbed areas
- Used to establish vegetation and to protect bare earth. It may also be used on rough graded areas that will not be disturbed again for 12 months or more

- The main difference between temporary and permanent seeding is that permanent seeding is undertaken on completed sections of work. Additional differences are the seed type used and the quality of surface preparation undertaken prior to seeding.

Topsoiling

- Topsoiling is not a stabilisation measure itself and needs to be used in conjunction with temporary or permanent seeding. Topsoil provides growth media for root development and biological activities. It also has greater available water-holding capacity than clay subsoil layers
  - Topsoiling is recommended for sites where: o The texture and/or the organic component of the exposed subsoil or parent material cannot produce adequate vegetative growth
  - The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients
  - High quality vegetative cover is required to be established.

Design

Seedbed preparation

- If the site has contaminated material, this should be fully removed from the topsoil
- Topsoil should be applied at a minimum depth of 100 mm to allow for a loose and friable surface.

Soil amendments

- Apply fertiliser at the rate outlined in Table 3 of these guidelines. Check with your fertiliser supplier before using
- For large sites or unusual soil conditions, soil testing may be required, as some soils require the addition of lime to improve pH and/or trace elements for grass growth.

Seed application

- Seed mixes will vary, and a seeding contractor should be consulted before purchasing seed. Typical seed mixtures are detailed in Table 3
- Apply seed uniformly across the site. If hydroseeding is required, refer to Section E3.2. Traditional agricultural techniques such as drill seeding, broadcast seeding, or no tillage are appropriate for establishing grass on areas flatter than 25%. Ensure the methodology achieves a good seed-to-soil contact, thereby enhancing seed survival and germination rates
- For small areas, hand-broadcasting and raking may also be used to apply seed and fertiliser
- Use only fresh, certified seed with a high purity and germination percentage from reputable suppliers that are preferably local. Species selection must consider the project's ecological context. If permanent seeding is required, be mindful of the final landscape plans
- Apply establishment and maintenance fertiliser at the rate outlined in Table 3
- If irrigation is required, deliver a volume at least equal to the evapotranspiration rate and continue until natural rainfall provides the necessary soil moisture levels for plant survival
- Ensure that the site conditions and time of the year are appropriate for germination and vegetation establishment, prior to undertaking this activity. This may involve the placement of mulch and/or irrigation
- In order to maximise germination and growth rates, the preferred seeding windows for both temporary and permanent grassing are autumn and spring. With the use of mulch or geotextiles

to maintain soil temperatures, or irrigation to supply moisture, grassing may be done throughout the year

- Mulching, as outlined in Section E3.4, should be undertaken in conjunction with the seeding programme during dry or cold periods. This will protect both the seed and the soil, whilst also providing a better microclimate for the germination and growth of grass
- A minimum 80% ground cover over the entire subject area is considered a stabilised surface. The above photos provide examples of various grass strike densities.

Table 3. Typical seed and fertilizer application rates

Extract from Auckland Council GD05

Typical seed mix	**Application rate**	
Temporary seeding	Annual ryegrass	100-250 kg/ha
Permanent seeding	• Perennial ryegrass – 70% • Fescues/cocksfoot – 20% • Clover/lotus – 5% • Browntop – 5%	200-400 kg/ha
Fertiliser application	N:P:K (15:10:10)	200-800 kg/ha
Maintenance fertiliser	N:P:K (15:10:10) and Urea	As required

Note: In all circumstances, ensure that the seed and fertiliser application rates and mix is appropriate for your site. Always discuss with your seed and fertiliser supplier prior to utilisation.

Construction and operation

Preparing a good seedbed will ensure the success of establishing vegetation. It should be loose, uniform and free of large clods and other objectionable material. The soil surface should not be compacted or crusted.

Topsoil is a valuable resource. When placing topsoil in stockpiles, ensure that it is isolated by the up-slope diversion of clean water runoff, is stabilised appropriately and not stored in stockpiles greater than 3 m in height to maintain soil structure and integrity.

Maintenance

- Check the topsoil condition on a regular basis and re-grade and/or replace where necessary
- Always maintain the 100 mm minimum depth of topsoil and appropriate surface roughening
- Heavy rainfall can wash new seeding away before full establishment of the grass
- This is particularly evident on smoother hard surfaces, steep slopes and overland flow paths. Where vegetation establishment is unsatisfactory, the area will require a reapplication of seed or consideration will need to be given to other stabilisation techniques
- Apply additional fertiliser dosing at the ratio of 15:10:10 (N:P:K) approximately 6 to 12 weeks after seeding, or as required
- Protect all re-vegetated areas from construction traffic and other activities such as the installation of drainage lines and utility services. If required, erect temporary barrier fencing and/ or signage to restrict uncontrolled movement of equipment and vehicles onto grassed areas.

7.1.2 Geotextiles and erosion control blankets

Definition

This practice involves the placement of geotextiles, mats, plastic covers or erosion control blankets to stabilise disturbed soil areas and protect soils from erosion by wind or water. In this context, geotextiles are permeable fabrics which, when used in association with soil, have the ability to stabilise and protect.

Purpose

The purpose is to instantly reduce the erosion potential of the disturbed areas and/or reduce or eliminate erosion on critical sites. The practice may be used as a permanent or temporary measure to control erosion.

Application

These measures are used when disturbed soils may be particularly difficult to stabilise, including the following situations:

- In critical erosion-prone areas such as sediment retention pond outlets and inlet points
- In channels (both perennial and ephemeral) where the design flow produces tractive shear forces greater than what existing soils can withstand, which leads to soil surface erosion
- In areas on a temporary basis where there is inadequate space to install sediment controls
- In areas that may be slow to establish an adequate permanent vegetative cover (In this situation, the geotextile provides an early protective layer and assists in maintaining a higher soil temperature.)
- On short steep slopes, on batters, or stockpiles during periods of inactivity on the site
- In situations where tensile and shear strength characteristics of conventional mulches limit their effectiveness, such as high runoff velocities and overland flow paths
- In areas where the downstream environment is of high value and rapid stabilisation is required.

Design

The use of geotextile is typically categorised into temporary biodegradable geotextiles and permanent non-biodegradable geotextiles. The exception being plastic covers, which are a temporary, non-biodegradable measure for stockpile covering, as noted above.

Erosion control batter blankets are a specific group of proprietary rolled erosion-control products, commonly made from biodegradable materials. They provide an instant, short- to medium-term protective cover of the soil surface, shielding it from the erosive forces of wind, raindrop impact and sheet flows, until a vegetative cover can be established, or an alternative stabilisation methodology is used.

In all circumstances, for specific construction specifications, refer to the product information sheets supplied by the manufacturer.

In general, the minimum requirements for the various measures are as follows:

Non-woven geotextiles

Non-woven geotextiles are used as a temporary erosion control measure. They are useful for preventing raindrop erosion and scour from minor flows. Typical examples of their use include bund stabilisation, batter stabilisation, stockpile stabilisation, and low velocity channel stabilisation.

The main advantage of non-woven geotextiles is their ability to cling to the exposed surface. Their main disadvantage is their relative low strength. Where a high strength geotextile is needed (for instance in high flows), a woven geotextile should be used (refer below).

Woven geotextiles

A woven geotextile is used in high flow situations such as channels and flumes and as the upper fabric layer for pond spillways. For this, the woven geotextile must meet the following properties:

- Material should be a woven polypropylene fabric with a minimum wide width tensile strength ≥ 14 kN/m (AS, ASTM or ISO test methods allowed)
- The fabric should comply with a flow rate under 100 mm head of < 20 l/m^2/sec (AS, ASTM or ISO test methods allowed)
- Retained strength at 500h UV = 70% Minimum (AS, ASTM or ISO test methods allowed)
- Correct use/installation of geotextiles is critical to achieving the desired outcome of erosion control
- Geotextiles should be secured in place with ground staples, pins or sandbags and keyed into the tops of slopes and edges to prevent infiltration of surface water under the geotextile
- Specifications for installation are outlined in Figure 3 and Figure 4. Particular care is needed to overlap and pin geotextiles in place
- In all circumstances, pin geotextiles down on a 500 mm (min) grid. This is critical to ensure an appropriate number of contact points with the underlying soil. It will also prevent wind from lifting the geotextile from the slope it is protecting
- Ensure that pins are suitable for the geotextile and soil type.

Plastic covers

- Plastic covers are used where needed to prevent water from penetrating into the material covered (e.g. contaminated stockpiles, or stockpiles of material for reuse)
- Plastic sheeting should have a minimum thickness of 0.25 mm. It should be keyed in at the top of the slope and held firmly in place with sandbags or other weights placed no more than 3 m apart
- Seams are typically taped or weighted down their entire length with at least a 300 mm - 600 mm overlap of all seams
- Edges should be embedded a minimum of 150 mm into the soil.

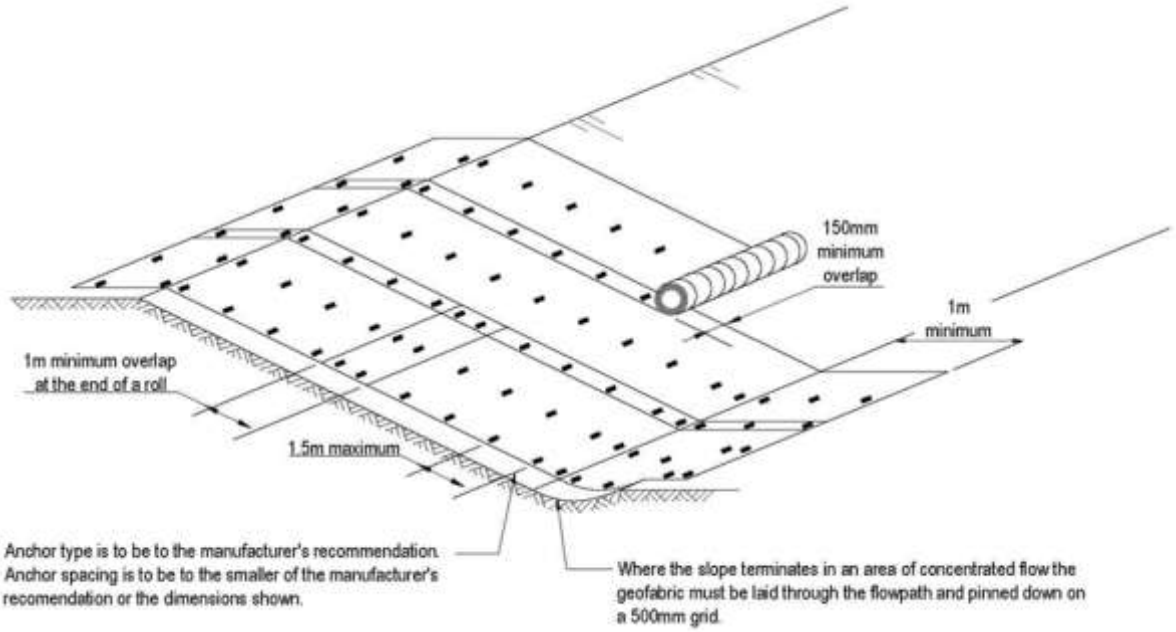


Figure 3. Geotextile Design - outfalls
Extract from Auckland Council GD05

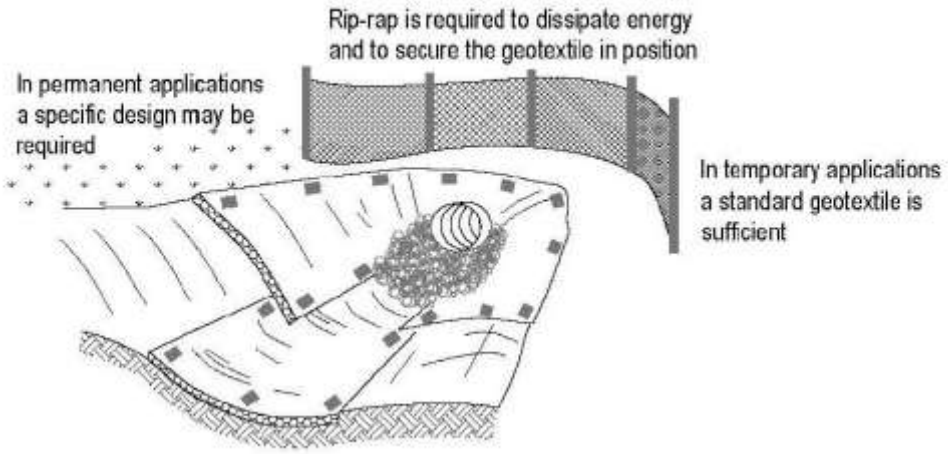


Figure 4. Geotextile Design - on slopes
Extract from Auckland Council GD05

Erosion control blankets/mats

Key design criteria for erosion control blankets/mats are detailed in Table 10 of Auckland Council GD02.

Construction and operation

Site preparation

- Undertake proper site preparation to ensure complete contact of the blanket or matting with the soil
- Grade and shape the area of installation

- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete and direct contact with the soil
- Prepare seedbed by loosening 50 mm to 75 mm of topsoil where seeding is proposed.

Seeding

- Seed the area before blanket installation for erosion control and revegetation
- Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded.

Anchoring

- Ground staples, or pins can be used to anchor mats and blankets to the ground surface
- The selection of anchors will depend on a number of factors including whether the stabilisation is temporary or permanent (potentially requiring biodegradable pins) and soil conditions
- The selection of anchors will also depend on whether the blanket or matting will be subject to significant flow forces
- Ground staples and pins should be driven flush to the soil surface
- All anchors should have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Installation on slopes

Installation should be in accordance with each manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 150 mm deep by 150 mm wide trench. Backfill trench and compact earth firmly
- Unroll blanket down-slope in the direction of the water flow
- Overlap the edges of adjacent parallel rolls by 50 - 75 mm and staple every 1 m
- When blankets must be spliced, place blankets end over end (shingle style) with 150 mm overlap. Staple through overlapped area, approximately 300 mm apart
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the centre and staggered with the staples placed along the edges.

Follow the manufacturer's recommendation for the spacing of the staples; although the staple densities in Table 4 generally apply.

Table 4. Staple density

Extract from Auckland Council GD05

Slope	Minimum staple density
>50%	2.0 staples/m^2
50 to 33%	1.5 staples/m^2
<33%	1.0 staples/m^2

Installation in channels

- Installation should be in accordance with the manufacturer's recommendations.

Maintenance

Areas treated with temporary soil stabilisation should be inspected daily and after each rainfall event. Areas treated with temporary soil stabilisation should be maintained to provide appropriate erosion control and reapplied or replaced on exposed soils when the area becomes exposed or exhibits visible erosion. The maintenance aspects to look for comprise:

- Lifting geotextile caused by vegetation growing up under the fabric
- Rilling caused by water flowing beneath the geotextile
- Torn geotextile, missing pins or other damage caused by high winds, machinery or vandalism.

Repair or replace any areas of geotextile damaged or dislodged in any way. If required, erect a temporary barrier and/or signage fencing to restrict uncontrolled movement of equipment and vehicles onto treated areas.

7.1.3 Silt Fences

Definition

A silt fence is a temporary barrier of woven geotextile fabric that is used to capture mainly coarse sediments carried in sheet flow (refer Figure 5 to Figure 6). Silt fences temporarily impound sediment-laden runoff, slowing down the flow rate and allowing sediment to settle out of the water.

Purpose

Its purpose is to detain runoff flows so that deposition of transported sediment can occur through settlement. They are not used to filter sediment out of runoff.

Application

Use silt fences:

- Where there is a need to control sediment by intercepting sheet flow
- Where a site is low gradient, or is confined with a small contributing catchment, such as short batter fills and around watercourses
- To delineate the limit of disturbance on an earthworks site, such as riparian areas or bush reserves
- Where installation of an earth or topsoil bund would destroy sensitive areas, such as bush and wetlands.

Do not install silt fences across watercourses or in areas of concentrated flows. Avoid trench excavations within the root zones of protected trees and trees that are to be retained.

Where there is a change in slope, no section of the fence should exceed a grade of 5% for a distance of more than 15 m.

Design

Key design criteria for silt fences are outlined below:

- Ensure silt fence height is 600 mm above ground level and 200 mm below ground level
- Maximum slope lengths, spacing of returns and angles for silt fences are shown in Table 5

- Locate supporting posts/waratahs for silt fences 2-4 m apart with support provided by a tensioned wire (2.5 mm HT) along the top of the silt fence
- Where a strong woven fabric is used in conjunction with a wire support, the distance between posts can be up to 4 m. Double the silt fence fabric over and fasten to the wire with silt fence clips at 500 mm spacings
- Ensure supporting posts/waratahs are embedded a minimum of 400 mm into the ground
- Always install silt fences along the contour (at a break in slope). Where this is not possible, or where there are long sections of silt fence, install short silt fence returns (refer Figure 5) projecting up-slope from the silt fence to minimise the concentration of flows. Silt fence returns should be a minimum 2 m in length and can incorporate a tie-back. They are generally constructed by continuing the silt fence around the return and doubling back, eliminating joins
- Join lengths of silt fence by doubling over fabric ends around a waratah or by stapling the fabric ends to a batten and butting the two battens together as shown in Figure 6
- Install silt fence returns at either end of the silt fence, projecting up-slope to a sufficient height to prevent outflanking
- In catchments of more than 0.3 ha, the use of silt fences requires careful consideration of specific site measures. Other control measures may be better, such as a super silt fence.

Table 5. Silt fence design criteria

Extract from Auckland Council GD05

Slope Steepness (%)	Slope length (m) (maximum)	Spacing of returns (m)	Silt fence length (m) (maximum)
Flatter than 2%	Unlimited	N/A	Unlimited
2-10%	40	60	300
10-20%	30	50	230
20-33%	20	40	150
33-50%	15	30	75
>50%	6	20	40

- Where water may pond regularly behind the silt fence, provide extra support for the silt fence with tie-backs from the silt fence to a central stable point on the upward side. Extra support can also be provided by stringing wire between support stakes and connecting the filter fabric to this wire
- As a minimum, the silt fence cloth must meet the following criteria for geotextile fabric:
  - Wide width tensile strength = ≥ 14 kN/m minimum (AS, ASTM or ISO test methods allowed)
  - Retained strength at 500h UV = 70% minimum (AS, ASTM or ISO test methods allowed)
  - Opening size (EOS) = 0.2-0.4 um (AS, ASTM or ISO test methods allowed).

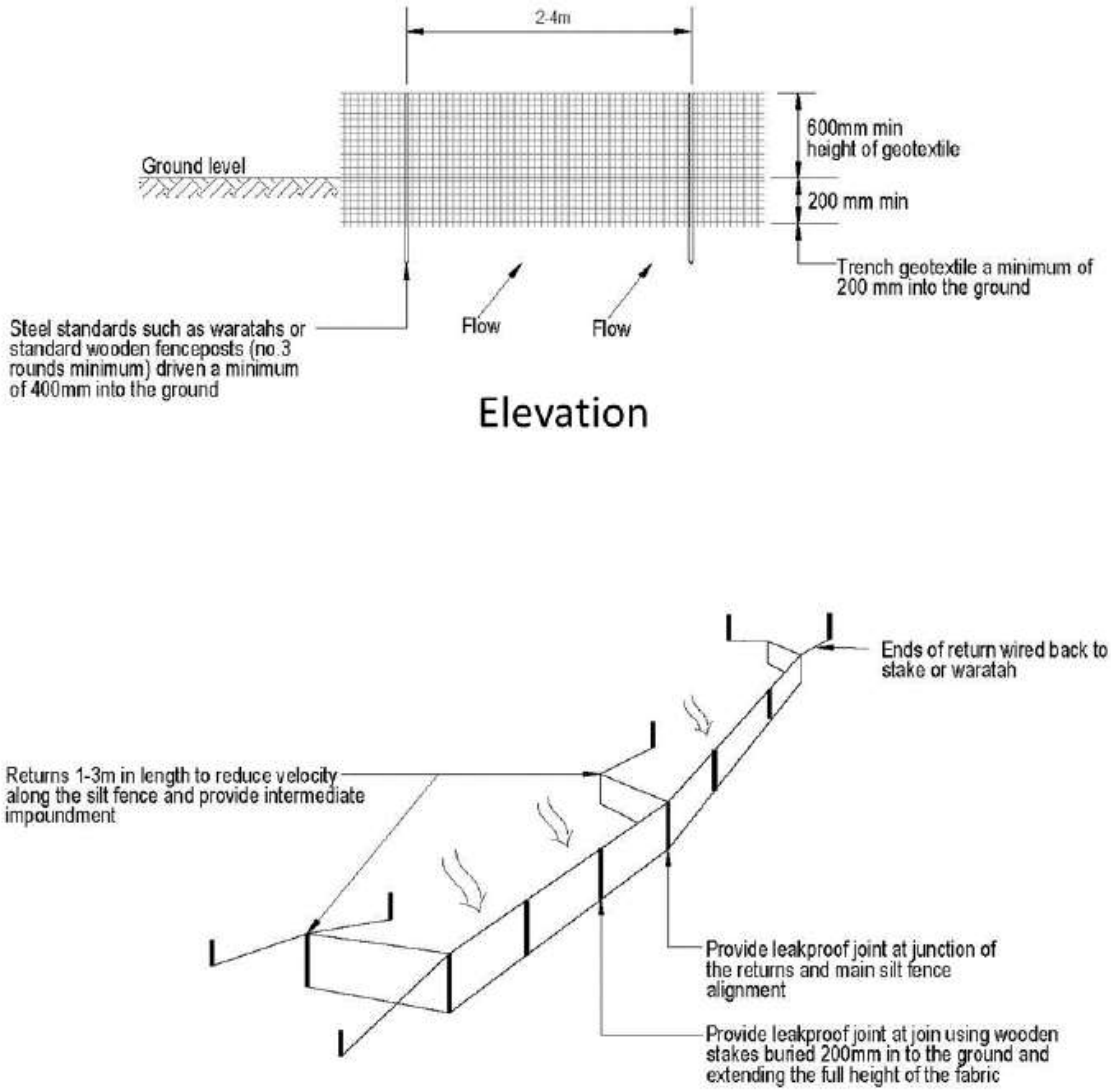
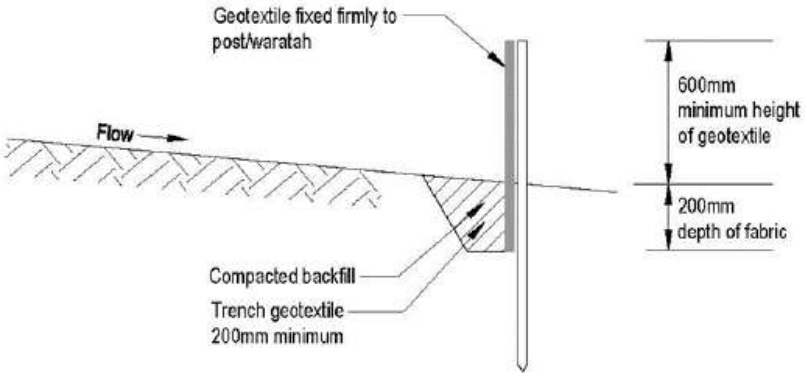


Figure 5. Schematic of silt fence
Extract from Auckland Council GD05



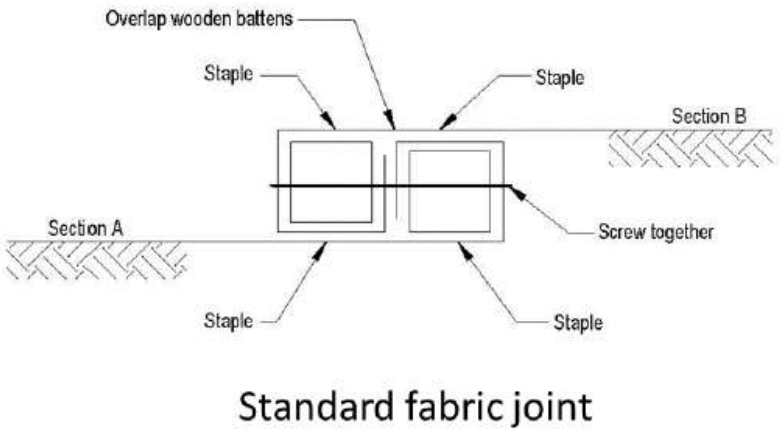


Figure 6. Silt fence cross section
Extract from Auckland Council GD05

Construction and operation

For constructing and/or operating silt fences, follow the following steps and refer to Figure 7 below:

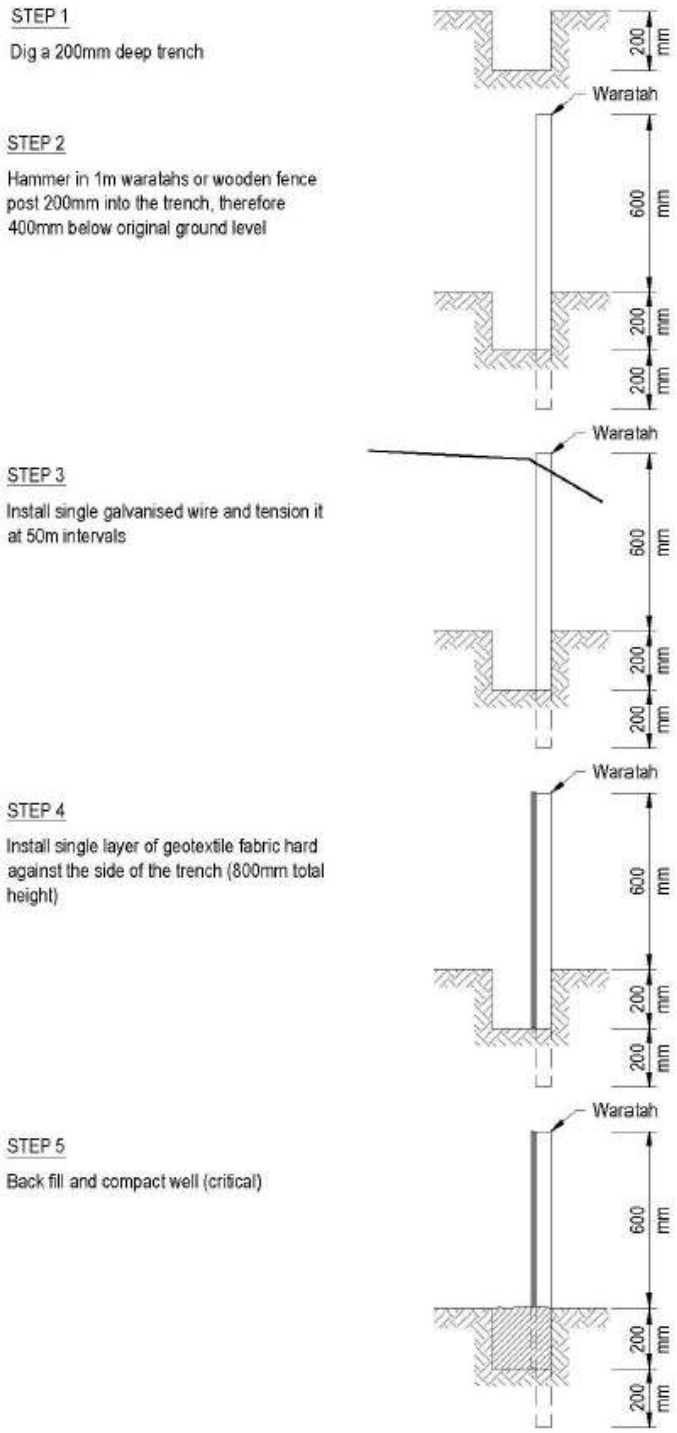


Figure 7. Step by step installation of a silt fence
Extract from Auckland Council GD05

- Use silt fence material appropriate to the site conditions and in accordance with the manufacturer's specifications
- Always install silt fences along the contour
- Excavate a trench to a minimum practicable width (the narrower the better to avoid loosening of surrounding soils) and 200 mm deep along the proposed line of the silt fence
- Use waratahs at least 1.5 m in length

- Install the support waratahs on the down-slope edge of the trench and silt fence fabric on the up-slope side of the support waratahs to the full depth of the trench, then backfill the trench with compacted soil
- Install the waratahs so that they are as flat as possible against the silt fence. If the waratah edge is against the silt fence, it will rub and eventually rip against the waratah
- Use correct silt fence clips or silt fence pins to secure the silt fence material to the top wire. Wire ties and staples rip the silt fence material when the weight of the impounded water pushes against the silt fence and are not to be used
- Reinforce the top of the silt fence fabric with a support made of high tensile 2.5 mm diameter galvanised wire. Tension the wire using permanent wire strainers attached to angled waratahs at the end of the silt fence
- Where ends of silt fence fabric come together, ensure they are overlapped, folded and stapled/ screwed to prevent sediment bypass.

Maintenance

To maintain silt fences:

- Inspect silt fences at least once a week and after each rainfall
- Check for damage including rips, tears, bulges in the fabric, broken support wires, loose waratahs, overtopping, outflanking, undercutting, and leaking joins in fabric
- Make any necessary repairs as soon as identified
- As the geotextile material becomes clogged with sediments, this will result in increased duration of ponding. Therefore, careful cleaning of the silt fence geotextile with a light broom or brush may be appropriate
- Remove sediment when bulges occur or when sediment accumulation reaches 20% of the fabric height
- Remove sediment deposits as necessary (prior to 20% of fabric height) to continue to allow for adequate sediment storage and reduce pressure on the silt fence
- Dispose of sediment to a secure area to ensure that it does not discharge to the receiving environment.

Decommissioning

When decommissioning a silt fence:

- Do not remove silt fence and accumulated sediment until the catchment area has been appropriately stabilised
- Remove and correctly dispose of accumulated sediment
- Backfill trench, re-grade and stabilise the disturbed area.

7.1.4 Silt Socks

Definition

Silt socks are a tubular stormwater sediment control and filtration device, consisting of a mesh tube filled with a filter material (e.g. compost, sawdust, wood bark, straw) used to intercept and filter runoff. They are also referred to as ‘filter socks’.

Purpose

Silt socks have a limited capacity to capture and treat sediment-laden flows and so are generally used for small, flat, isolated catchment areas (refer Table 6 and Table 7 below).

They temporarily impound sediment-laden runoff, slowing down the flow rate and allowing sediment to settle out of the water.

Silt socks can be used to:

- Intercept and impound sheetflow
- Intercept and impound runoff before it enters a catchpit or other stormwater inlet
- Reduce the velocity of runoff flows within a channel (as a check dam)
- Contain and impound discharges from pumped stormwater or concrete washwater (commonly referred to as a 'turkeys nest').

Silt socks can be used to divert flows and are commonly used for this purpose across haul roads when rain is forecast, or at the end of the day. They are also used as check structures in diversion drains and flow paths. These uses are not discussed in this section, which is restricted to the use of silt socks as a sediment management tool. For use of a silt sock device for catchpit protection refer to Section 7.1.5.

Application

Silt socks should be used:

- On small, low gradient sites (e.g. short batter fills and around watercourses and vegetated or protected areas) (refer Table 6 and Table 7)
- As a secondary containment and treatment structure where it is not possible to divert flows to a sediment retention facility
- Where it is necessary to slow channel velocity
- Where concrete washwater or pumped stormwater is required to be treated prior to discharge.

Design

The following design criteria apply to silt socks

Perimeter control

- Ensure that an appropriately sized silt sock is used (see design criteria in Table 6 and Table 7).

Table 6. 300 mm diameter silt sock

Extract from Auckland Council GD05

Slope Steepness (%)	Maximum slope length (m)	Spacing of returns (m)
Flatter than 2%	100	N/A
2-10%	40	30
10-20%	30	25
20-33%	10	10
33-50%	5	10
>50%	2	5

Table 7. 450 mm diameter silt sock

Extract from Auckland Council GD05

Slope Steepness (%)	Maximum slope length (m)	Spacing of returns (m)
Flatter than 2%	150	N/A
2-10%	60	30
10-20%	40	25
20-33%	20	10
33-50%	10	10
>50%	5	5

Compost specifications

- Ensure the compost medium used in the silt sock is free from contaminants and meets the specifications in Table 8.

Table 8. Specifications for compost

Extract from Auckland Council GD05

Parameter	Unit of measure	Specification
pH	pH units	5.0-8.5
Moisture Content	% wet weight basis	>60
Organic matter content	% dry weight basis	25-100
Particle size	% passing a selected mesh size, dray weight basis	50 mm 99 passing; 10mm 30-50% passing (or 50-70% retained); maximum 50mm

Bark specification

- Use 2-10 mm chip
- Ensure bark is free from contaminants.

Sawdust specification

- Do not use treated wood sawdust
- Ensure sawdust is free from contaminants.

Straw specification

- Ensure straw is free from weed seeds and contaminants.

General specifications for sock media

- The filter medium should be clean and free from contamination.

The material used to fill the sock will depend on the application. For example, if the sock is to be used as a filter, a porous material such as rocks or wood bark will not be effective.

Construction and operation

Silt socks can either be filled on site or prefabricated in suitable lengths prior to delivery to the site. The silt sock should be produced from HDPE or polyester material with abrasion resistant netting weaves (a thread diameter of not less than 0.3 mm). The recommended weave for a compost sock is an opening in the knitted mesh of 1-5 mm when filled. The weave for straw socks should have openings of no more than 20 mm. The silt sock shall then be filled with compacted filter material meeting the specifications detailed above.

Silt socks using a light filter medium such as straw or wood chips must be tied down using stakes and twine to prevent 'floating'.

Note: The above requirement to secure silt socks with a light filter medium will generally preclude their use on impervious surfaces such as concrete or seal.

For construction and/or operation of silt socks:

- Always install silt socks on the contour. Where this is not possible, or where there are long sections of silt sock, install short silt sock returns, projecting up-slope from the silt sock to minimise concentration of flows. Returns are to be a minimum of 2 m in length
- Where more than one length of silt sock is used, the silt socks are to be overlapped a minimum of 1 m or, according to the manufacturer's recommendation, and joined by a sleeve
- Install silt sock "wings" at either end of the silt sock, projecting a sufficient length up-slope to prevent outflanking
- Silt socks are to be pegged and secured depending on the application.

For additional security, bale twine may be used. The bale twine is secured (four turns with a half hitch) to the pine stakes and tensioned when the stakes are driven into place.

When using silt socks to construct turkeys' nests:

- Set up a ring of silt socks, with the proposed pumping discharge point in the centre of the ring
- Ensure that treated discharge from the "turkeys nest" will not result in erosion or the remobilisation of sediment
- The size of the ring will depend on the flows that are to be pumped. The flow and size of the ring will need to be such that the ring is not overtopped
- A base-laid permeable geotextile may be used to collect settled debris.

Maintenance

Consider the following when maintaining silt socks:

- Silt socks should be inspected regularly and after each rainfall event to ensure sediment control efficiency is maintained
- Accumulated sediment greater than 20% of the height of the silt sock should be removed, or another silt sock placed on top of the existing silt sock to maintain adequate sediment control
- Reuse of silt socks is possible provided the integrity of the sock and fill media is maintained.

Decommissioning

Consider the following when decommissioning (removing) silt socks:

- Do not remove the silt sock and accumulated sediment until the catchment area has been appropriately stabilised
- Remove and dispose of accumulated sediment.

7.1.5 Stormwater inlet protection

Definition

Stormwater inlet protection is a barrier across or around a catchpit, a water sensitive design (WSD) device (e.g. rain garden) or other stormwater inlet. The protection may take various forms depending upon the type of inlet to be protected.

Purpose

This practice is used to intercept and filter sediment-laden runoff before it enters a reticulated stormwater system, via a catchpit, scruffy dome, manhole or WSD device. This reduces discharge of sediment-laden flows into receiving environments or into a permanent sediment control system during construction.

Application

Stormwater inlet protection is a secondary sediment control device and must not be used as a standalone device. It must only be used in conjunction with other ESC measures, as part of a broader and more comprehensive ESC system.

Design

The following design criteria apply to stormwater inlet protection devices:

- Complete blocking of the stormwater system must be avoided, as this will divert flows during heavy rain and may cause other devices to become overwhelmed and/or create flooding hazards
- The height of catchpit protection within live road environments must be less than the kerb height so that runoff does not cause local flooding and/or direct flows to other nearby catchments.

Silt socks

A silt sock (refer Section 7.1.4) can be placed around the inlet to act as a small sediment trap immediately up-slope of the catchpit. The silt sock needs to completely 'ring fence' the catchpit.

This measure is only suitable for very small catchment areas.

Construction and operation

Consider the following when constructing and/or operating stormwater inlet protection devices:

- Construction specifications will vary according to the type of inlet protection
- Always ensure an emergency bypass is included
- Plan for where the bypass system will divert water
- Ensure the device does not allow water to bypass its intended flow path
- Keep all stockpiles and loose sediment away from roadside table drains.

Maintenance

Consider the following when maintaining stormwater inlet protection measures:

- • Maintenance will vary according to the type of inlet protection
- Inspect daily and during and after rainfall events
- Beware of blockages and leaks that may affect performance
- Check to see if flows have been diverted away from the device and what, if any, damage has been caused
- Clean all accumulated sediments immediately
- Repair and modify any problems immediately
- Remove devices as soon as works are complete.

Decommissioning

Consider the following when decommissioning stormwater inlet protection measures:

- Devices must be decommissioned and removed after use
- Decommissioning will vary according to the type of inlet protection
- Remove and dispose of any accumulated sediments
- Remove control measures, then reuse and recycle components
- Stabilise any disturbed areas.

Appendix A
VISION ESCP DRAWING SET

north

LOT 1 DP 173052

LOT 1 DP 168717

LOT 23 DP 405

LOT 31 DP 74955

LOT 32 DP 74955

SECTION 85 BLOCK TAKAHUE SD

ALLEN BELL DRIVE

PARKDALE CRESCENT

KORIMAKO LANE

AWANUI RIVER

ALLEN BELL DRIVE BRIDGE

LP

LINE WITH BIDIM-A19 FILTER CLOTH AND RIP-RAP AS PERMANENT SOIL STABILIZATION. (RIP-RAP TO BE SIZED DURING DETAILED DESIGN)

TOPSOILING AND GRASS SEEDING ALONG FULL EXTENT OF BUND ON THE WESTERN SIDE OF THE DIVERSION DRAIN

AREA WITHIN FULL EXTENT OF DIVERSION DRAIN TO BE LINED WITH GRASSTRIKE OR A SIMILAR GEOTEXTILE AND HYDRO SEEDED

BIDIM-A19 FILTER CLOTH AND RIP-RAP LINED OUTLET STABILIZATION. (RIP-RAP SIZE AND THICKNESS TO BE CONFIRMED DURING DETAILED DESIGN)

PROPOSED 4M WIDE X 1M HIGH CONCRETE BOX CULVERT WITH WINGWALL INLET AND OUTLET STRUCTURES

PROPOSED 4M WIDE X 1M HIGH CONCRETE BOX CULVERT WITH WINGWALL INLET AND OUTLET STRUCTURES

LEGEND	
EXISTING CULVERT	
STAGE 1 EARTHWORKS	
STAGE 2 EARTHWORKS	
NORTHERN PIPE NETWORK INLET	
METAL PAVEMENT	
SEALED ROAD PAVEMENT	
LIGHT POLE	LP
EXISTING CESSPIT WITH SILT SOCK	
PROPERTY BOUNDARY	
BACK OF KERB	
AREA OF EARTHWORKS (CUT)	
AREA OF EARTHWORKS (FILL)	
SILT FENCE	
PROPOSED DIVERSION DRAIN	

STAGE 1 EARTHWORKS:

1. EARTHWORKS IN PROPOSED DIVERSION DRAIN TO BE LINED WITH A BIODEGRADABLE BLANKET/MESH LIKE GRASSTRIKE OR SIMILAR AS THE EARTHWORKS PROGRESS ALONG THE DRAIN AND HYDO SEEDED AT THE END OF STAGE 1.
2. SILT SOCKS TO BE INSTALLED AROUND EXISTING CESSPITS WITHIN ALLEN BELL DRIVE.
3. EXISTING NORTHERN PIPE NETWORK TO REMAIN IN SERVICE AS CLEAN WATER DIVERSION DURING STAGE 1 EARTHWORKS.
4. FILL BUND ON WESTERN SIDE OF DIVERSION DRAIN TO BE TOPSOILED AND GRASS SEEDED.
5. SILT FENCE TO BE INSTALLED ALONG ALLEN BELL DRIVE KERB LINE.

STAGE 2 EARTHWORKS:

1. SILT SOCKS AND SILT FENCES TO REMAIN THROUGHOUT STAGE 2 AND UNTO 80% GRASS COVER OVER FULL EXTENT OF WORKS.
2. NORTHERN PIPE NETWORK TO BE CLOSED OFF AND ALL EARTHWORKS IN THIS AREA TO BE LINED WITH A BIDIM-A19 FILTER CLOTH AND TIGHTLY PACKED ANGULAR ROCKS AS PERMANENT SOIL STABILIZATION.

NOTE:

1. COORDINATES ARE WITH REFERENCE TO MOUNT EDEN 2000 WITH 0.25 m CONTOURS WITH REFERENCE TO ONE TREE POINT 1964 VERTICAL DATUM.
2. 0.25 m CONTOURS OUTSIDE OF VISION TOPOGRAPHIC SURVEY AREA HAVE BEEN TAKEN FROM NRC 1 m LiDAR DEM FLOWN IN 2018 WITH REFERNCE TO OPT 1964 VERTICAL DATUM
3. THIS PLAN IS INCLUDED IN A CONCEPT DESIGN FOR RESOURCE CONSENT AND SHOULD NOT BE USED FOR CONSTRUCTION.

0 10 20 30 40 50

Scale 1:1000 (m)

FOR RESOURCE CONSENT

VISION CONSULTING Engineers

CLIENT: Far North District Council

PROJECT: DIVERSION DRIAN WORKS PARKDALE CRESENT KAITAIA

DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN

SURVEY		
DESIGN	CS	13/05/2024
DRAWN	CS	13/05/2024
CHECKED	BCP	15/03/2024
APPROVED	BCP	15/05/2024

No	REVISION	BY	DATE
A	FIR RESOURCE CONSENT	BCP	15/05/2024

SCALE 1:1000

SHEET 01

PROJECT J15335

REV A

Rules Assessment

Proposal: Parkdale Cresent Stormwater Improvements.

Address: Road Reserve Parkdale Crescent and Allen Bell Drive, Kaitāia and private properties legally described as Section 85 Block V Takahue Survey, Lot 1 Deposited Plan 168717 and Lot 1 Deposited Plan 173052

District Plan: Operative Far North District Plan and Proposed Far North District Plan

Site Zoning	
Zone	**Rural Living Zone**
Overlays/Controls	Nil
Designations	Nil

Rule	Compliance	Non-Compliance
Rural Production Zone		
8.7.5.1.1 Residential Intensity	N/A no residential activities proposed	
8.7.5.1.2 Scale of Activities	N/A no commercial activities proposed	
8.7.5.1.3 Building height The maximum height of any building shall be 9m.	Complies	
8.7.5.1.4 Sunlight No part of any building shall project beyond a 45-degree recession plane as measured inwards from any point 2m vertically above ground level on any site boundary, except where a site boundary adjoins a legally established entrance strip, private way, access lot, or access way serving a rear site, the measurement shall be taken from the farthest boundary of the entrance strip, private way, access lot, or access way - **permitted activity**	Complies	
8.7.5.1.5 Stormwater Management The maximum proportion of the gross site area covered by buildings and other impermeable	Complies	

Rule	Compliance	Non-Compliance
surfaces shall be 15% - **permitted activity**		
8.7.5.1.6 Setback from boundaries (a) the minimum building setback from the boundary of any Rural Production Zone shall be 10m and from any boundary with the Minerals Zone the setback shall be 20m; (b) the minimum building setback from boundaries, apart from a boundary with any Rural Production and Minerals Zones, shall be 3m, and (c) a continuous shelter belt is to be established comprising species capable of growing to a height of 6m on any boundary which adjoins a Rural Production and Minerals Zone, provided that a break in this shelter belt is permitted where it is necessary in order to provide access to the site; (d) except that no building shall be erected within 12m of any road boundary with Kerikeri Road on properties with a road frontage with Kerikeri Road between its intersection with SH10 and Cannon Drive **Permitted activity**		**Does not comply –**the proposed culverts may meet the definition of building. The northern most culvert straddles two privately owned titles any may not meet the necessary 3m setback from road reserve. **Restricted Discretionary Activity.**
8.7.5.1.7 Screening for Neighbours – Non Residential Activities	N/A	
8.7.5.1.8 Transportation	N/A	
8.7.5.1.8 Building Height The maximum height of any building shall be 12m - **permitted activity**	Complies	
8.7.5.1.13 Building Coverage	Complies	
Soils and Minerals		
12.3.6.1.2 Excavation and/or filling, excluding mining and quarrying, in the Rural Living Zone (a) it does not exceed 300m³ in any 12 month period per site; and (b) it does not involve a cut or filled		**Does not comply** - 2,882m^3 with a cut or fill face of approximately 2.4m are proposed across the site. **Discretionary Activity**

Rule	Compliance	Non-Compliance
face exceeding 1.5m in height i.e. the maximum permitted cut and fill height may be 3m. **Permitted Activity**		
Lakes, Rivers, Wetlands and the Coastline		
12.7.6.1.1 Setback from Lakes, Rivers and the Coastal Marine Area Any building and any impermeable surface must be set back from the boundary of any lake (where a lake bed has an area of 8ha or more), river (where the average width of the riverbed is 3m or more) or the boundary of the coastal marine area, except that this rule does not apply to man-made private water bodies other than the Manuwai and Waingaro Reservoirs. The setback shall be: (a) a minimum of 30m in the Rural Production, Waimate North, Rural Living, Minerals, Recreational Activities, Conservation, General Coastal, South Kerikeri Inlet and Coastal Living Zones; (b) a minimum of 26m in the Residential, Coastal Residential and Russell Township Zones; (c) a minimum of 20m in the Commercial and Industrial Zones. Provided these setbacks do not apply: (v) to buildings and impermeable surfaces associated with utility service structures, provided that they do not exceed 2m in height or 5m in area; or (vi) to activities associated with the maintenance, replacement and upgrading of existing linear network utilities; or **Permitted Activity**	Complies – The proposal results in works within proximity to the Awanui River which comprise the replacement and upgrade of existing infrastructure. These works would be considered exempt from the setback pursuant to (v) and (vi).	

District Plan: Proposed Far North District Plan 'PDP'

Site Zoning	
Zone	**Rural Residential Zone**
Overlays/Controls	Nil
Designations	Nil

Rule	Compliance	Non-Compliance
Rules and Standards That Have Immediate Legal Effect under the PDP		
Part 2 – District Wide Matters /Hazards and Risks / Hazardous Substances		
Hazardous Substances	N/A The proposal does not involve any hazardous substances.	
Part 2 – District Wide Matters / Historical and Cultural Values		
Heritage Areas	N/A The proposal is not located in a Heritage Area.	
Historic Heritage	N/A The proposal does not involve any scheduled heritage resources.	
Notable Trees	N/A The proposal does not involve any notable trees.	
Sites and Areas of Significance to Māori	N/A The application site is not located within and sites or areas of significance to Māori.	
Part 2 – District Wide Matters / National Environment Values		
Ecosystems and Indigenous Biodiversity	N/A There is no vegetation clearance proposed.	
Part 2 – District Wide Matters / Subdivision		
Subdivision	N/A The proposal does not involve any subdivision.	
Part 2 – District Wide Matters / General District Wide Matters		
Activities on the Surface of Water	N/A No activities on the surface of water are proposed.	
Earthworks		
EW-R12 Earthworks and the Discovery of Suspected Sensitive Material	Complies Accidental discovery protocols will be followed as necessary.	
EW-R13 Earthworks and Erosion and Sediment Control	Complies All necessary erosion and sediment control guidelines.	

Rule	Compliance	Non-Compliance
Signs	N/A No signs are proposed.	
Part 3 – Area Specific Matters / Special Purpose Zones / Orongo Bay		
OBZ-R14 Comprehensive Development Plan	N/A – the site is not located in Orongo Bay.	