Wellington Water

Tuesday 4 April 2023

OIA IRO-383
Name: [redacted]
Email: [redacted]@morrisonkent.com

Kia ora [redacted]

Official information request for held information on 106 Mohaka Street, Wainuiomata.

Thank you for your official information request dated Tuesday 14 March 2023.

The Local Government Official Information and Meetings Act 1987 (the Act) requires that we advise you of our decision on your request no later than 20 working days after the day we received it. Unfortunately, we cannot meet the timeframe and must therefore extend the time to make our decision to Friday 28 April 2023.

Pursuant to Section 14(1) of the Act, this extension is necessary as there is a large quantity of information to process and in addition, consultations to decide on your request are such that a proper response cannot reasonably be made within the original time limit.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Ngā mihi,

[redacted]
Governance Coordinator

Wellington Water

Friday 28 April 2023

OIA IRO-383
Name: [redacted]
Email: [redacted]@morrisonkent.com

Kia ora [redacted]

Official information request for held information on 106 Mohaka Street, Wainuiomata.

Thank you for your official information request dated Tuesday 14 March 2023. On Tuesday 4 April 2023, we extended the time to make our decision to Friday 28 April 2023.

The Local Government Official Information and Meetings Act 1987 (the Act) requires that we advise you of our decision on your request no later than 20 working days after the day we received your request. Unfortunately, it will not be possible to meet that time limit and we are therefore writing to notify you of an extension of the time to make our decision, to Friday 19 May 2023.

Pursuant to Section 14(1)(a) this extension is necessary because your request necessitates a search through a large quantity of information and meeting the original time limit would unreasonably interfere with our operations.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

If you wish to discuss any aspect of your request with us, including this decision, please feel free to contact [details of contact person].

Ngā mihi,

[redacted]
Team Lead, Communications and Engagement

Wednesday 24 May 2023

OIA IRO-383
Name: [redacted]
Email: [redacted]@morrisonkent.com

Kia ora [redacted]

Official information request for information on 106 Mohaka Street.

Thank you for your official information request dated Tuesday 14 March 2023 for all information held on 106 Mohaka Street, Wainuiomata.

We have considered your request in accordance with the Local Government Official Information and Meetings Act 1987 and determined that we are able to grant your request in full.

Please see attached in this Dropbox file part of the correspondence we hold. Further information has been identified by our team and this is in the process of being collated. This further information will be sent to you by close of business Friday 16 May 2023.

Pursuant to Section 7(2)(a) of the Act, some of the information within the provided correspondence has been redacted as it is personal information about private individuals. Furthermore, four attachments as part of Email 21 have been excluded as the information pertains to a separate development.

On Page One of Email 23, some information has been withheld under Section 7(2)(f)(i) of the Act.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Ngā mihi,

[redacted]
Acting Group Manager, Network Strategy & Planning

Thursday 1 June 2023

OIA IRO-383
Name: [redacted]
Email: [redacted]@morrisonkent.com

Kia ora [redacted]

Official information request for information on 106 Mohaka Street.

Thank you for your official information request dated Tuesday 14 March 2023 for all information held on 106 Mohaka Street, Wainuiomata. Please accept my sincerest apologies for the time it has taken to provide you with the information requested.

Following our part response on Wednesday 24 May 2023, please see in this Dropbox file the remainder of the correspondence.

Pursuant to Section 7(2)(a) of the Act, some of the information within the provided correspondence has been redacted as it is personal information about private individuals. Furthermore, in accordance with Section 7(2)(b)(ii) we are withholding Attachment 1 to EMAIL 39 on the basis that the information is commercially sensitive.

We have also removed Attachment 1 and 3 from EMAIL 37 as the information is not within scope of the request and refers to another project.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Ngā mihi,

[redacted]
Group Manager, Network Strategy & Planning

From: [redacted]
To:
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Thursday, May 4, 2023 1:02:14 PM
Attachments: image003.jpg
image012.png
image013.png
image014.png
image017.jpg
image018.gif
image019.jpg
image020.jpg
image004.png
image001.jpg
image002.jpg
image005.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

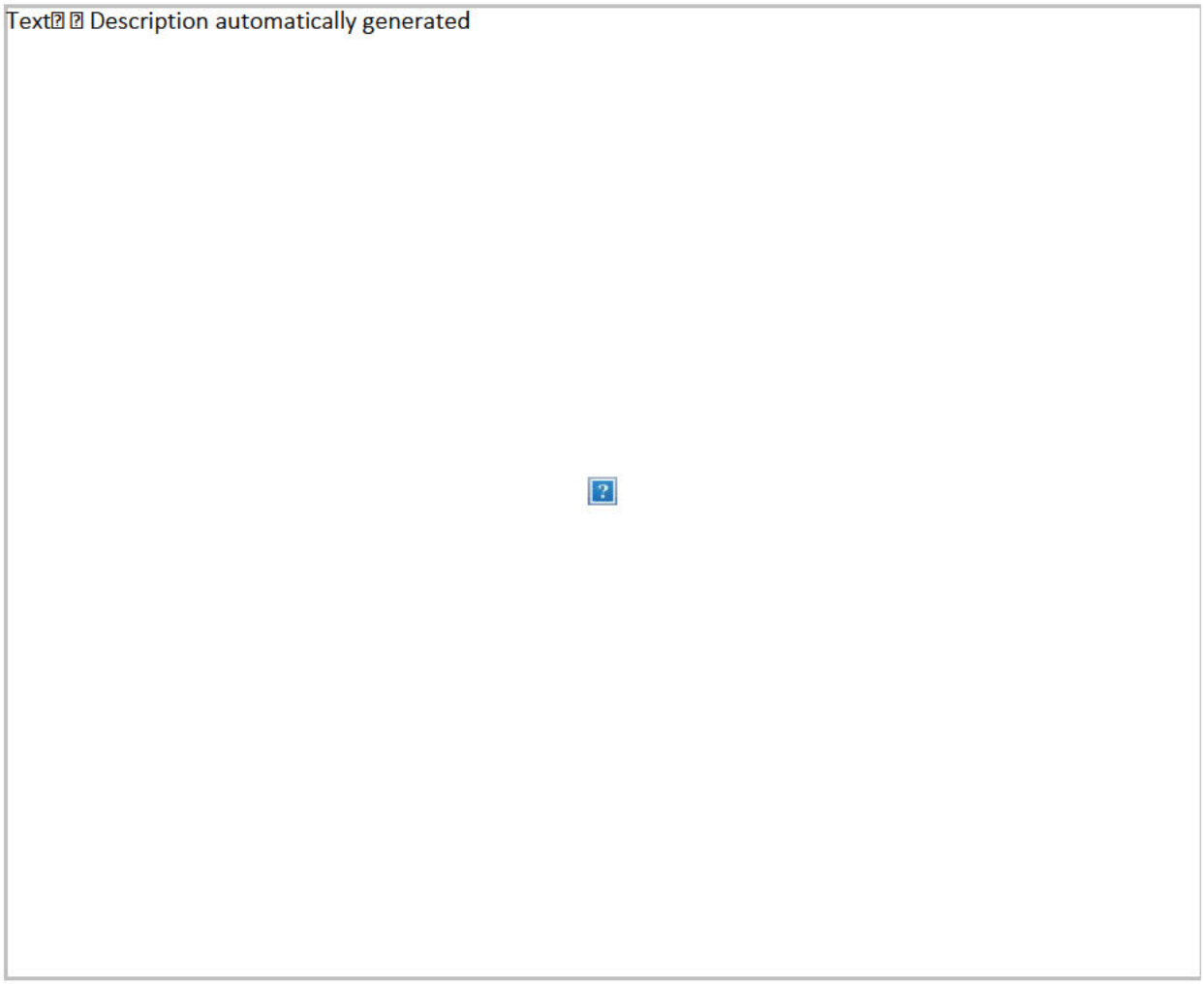
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, January 10, 2022 4:44 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and Happy New Year also.

The WWL recommended approach for time of concentration is outlined in Section 2.5 of our *Reference Guide for Design Storm Hydrology*. For the catchment you highlighted below, I think the recommendation would be the use of the Ramser-Kirpich and Bransby-Williams approaches (see below). In the end this is what we would compare the results from any other method against to check suitability, so we recommended external parties adopt it from the outset. Let me know if I can provide any additional information.



cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045

Level 4, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 10 January 2022 4:16 pm

To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Happy New Year and thanks for your message, which we are looking into now.

Before we prepare a response, can you please clarify what is the recommended time of concentration method you are referring to? we are using the Equal Areas Method to determine average catchment slope, and the SCS method to calculate time of concentration using the average slope and length – see extract below.

Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

Producing the best professionals in our field.

To influence and contribute to a more sustainable world.

AR & Associates Ltd
Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 23 December 2021 2:20 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks very much for your email and information. I was hoping to meet/chat with you before any more modelling was done so I could supply our CN and IA layer (attached) for a more accurate representation in your model. Unfortunately in the layer attached, the majority of the catchment upstream of the site has a CN value

over 60, which may impact your results. If you do further model runs, can you confirm you have used our recommended approach for calculating the time of concentration and apply the nested profile we have developed (I have attached a spreadsheet template for it).

With regard to the upstream channels, do you have any images available of the survey locations for the channel sections and photos of the channels at the time of survey? I am viewing the site with google maps aerial photography which shows significant vegetation across the channel footprint. Also, can you confirm that the condition of the channels will remain the same pre and post development (eg, the channels will not be cleared and made more efficient post development), or if changes are made they will be offset (eg potentially by increasing storage capacity from raising the existing crossing).

A great cross check to see would be a couple of Manning's calcs for the channels using a couple of surveyed sections to get a ballpark idea of their capacity. We can do this at our end if you would prefer and can supply us the surveyed sections.

cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045

Level 4, 25 Victoria Street, Petone, Lower Hutt

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From: [redacted]@arassociates.co.nz>
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Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz> [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please find attached our response to your information request last 16 December as per below.

Hopefully the response is self-explanatory, however please let me know if you'd like to discuss any aspect of this document.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Thursday, 16 December 2021 5:50 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

[redacted]
[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@urbanedgeplanning.co.nz>
Sent: Thursday, 16 December 2021 4:52 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: Fw: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi all

I've received the information below and attached from Wellington Water - they have a number of concerns/areas where additional information is needed. I've also been speaking to [redacted] today. Because WWL aren't able to provide written approval for the GWRC process, [redacted] [redacted] isn't happy signing off on the stormwater side of things, so the WWL issue is affecting both GWRC and HCC applications now.

[redacted] and [redacted] I'm happy for you to meet directly with Wellington Water online to work towards addressing their concerns/issues. It won't make sense at all to me as a non-engineer, so I'll sit out and let you both take charge of this side of things!

[redacted] do you want to get in touch with [redacted] to arrange a meeting?

Cheers

[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Thursday, 16 December 2021 11:02 am
To: [redacted]@urbanedgeplanning.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

See below for feedback from WWL on the flood modelling. It sounds like we may need to set up a meeting between the modellers.

Kind regards,
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 16 December 2021 10:54 AM
To: [redacted]@theurbanengineers.co.nz) [redacted]@theurbanengineers.co.nz>; [redacted]@huttcity.govt.nz>; Richard Taylor <Richard.Taylor@wellingtonwater.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>
Subject: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please see the following concerns from our modelling team, regarding the flood model & floor levels.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development
Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council
We manage their drinking water, wastewater and stormwater services

---

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, December 16, 2021 10:35 AM
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Kia ora [redacted]

Thanks for your email. My points of concern are below:

- Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.
- Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may over estimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.
- Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

A meeting (online) with the modellers would be very useful to discuss and potentially resolve these issues.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 15 December 2021 1:33 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: FW: RM210328 - 106 Mohaka Street

Hi [redacted] & [redacted]

Would you be able to provide a summary of the concerns regarding 106 Mohaka flood model/floor level /secondary flow path? Planner and RMA team is waiting for an update.

Thanks
[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, December 15, 2021 9:14 AM
To: Land Development <Land.Development@wellingtonwater.co.nz>; Sarah Zhou
[redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Hi [redacted]

I'm just following up as the applicant has requested an update. Have you had the chance to look at this one?

Thanks
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From:
To: [redacted]
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Thursday, May 4, 2023 1:02:46 PM
Attachments: image005.png
image006.png
image007.jpg
image008.jpg
image009.png
image010.png
image011.jpg
image012.jpg
image013.gif
image014.jpg
image015.jpg
f807f41c-3b23-4921-a0f6-fa51c73a6341.png
P20-156-M01-RevB-RFI Response -COMPILED.pdf
image002.jpg
image001.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@wellingtonwater.co.nz>
Sent: Tuesday, January 18, 2022 11:24 AM
To: [redacted]@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>
Cc: Modelling Team <Modelling.Team@wellingtonwater.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

How are you? I have gone over the updated work done by [redacted] (attached) and also spoken with him on the phone. They have updated the modelling based on our hydrology specifications and provided photos of the boundary channels which were my main concerns. The result of their updated assessment is that the proposed development has a negligible downstream impact. I am comfortable with the updated assessment of effects from stormwater/flooding perspective. Let me know if I can provide any additional information.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 17 January 2022 8:07 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

We have reviewed the hydrological analysis following the guidelines that you provided in your 23/12/21 and 120/01/22 emails, and attach our response within the revised memo herein.

Trust this now meets your requirements, however please feel free to give me a call if you have any further queries.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 10 January 2022 4:44 PM
To: [redacted]@arassociates.co.nz>
Cc [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and Happy New Year also.

The WWL recommended approach for time of concentration is outlined in Section 2.5 of our *Reference Guide for Design Storm Hydrology*. For the catchment you highlighted below, I think the recommendation would be the use of the Ramser-Kirpich and Bransby-Williams approaches (see below). In the end this is what we would compare the results from any other method against to check suitability, so we recommended external parties adopt it from the outset. Let me know if I can provide any additional information.

Text Description automatically generated

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 10 January 2022 4:16 pm

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Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
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Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 23 December 2021 2:20 PM
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Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
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Kia ora [redacted]

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A great cross check to see would be a couple of Manning's calcs for the channels using a couple of surveyed sections to get a ballpark idea of their capacity. We can do this at our end if you would prefer and can supply us the surveyed sections.

cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045

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Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

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Hopefully the response is self-explanatory, however please let me know if you'd like to discuss any aspect of this document.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m. [redacted]
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From: [redacted]@arassociates.co.nz>
Sent: Thursday, 16 December 2021 5:50 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

[redacted]
[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@urbanedgeplanning.co.nz>
Sent: Thursday, 16 December 2021 4:52 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: Fw: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi all

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[redacted] and [redacted] I'm happy for you to meet directly with Wellington Water online to work towards addressing their concerns/issues. It won't make sense at all to me as a non-engineer, so I'll sit out and let you both take charge of this side of things!

Stu, do you want to get in touch with [redacted] to arrange a meeting?

Cheers

[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Thursday, 16 December 2021 11:02 am
To: [redacted]@urbanedgeplanning.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

See below for feedback from WWL on the flood modelling. It sounds like we may need to set up a meeting between the modellers.

Kind regards,
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted] W www.huttcity.govt.nz

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Cc: [redacted]@wellingtonwater.co.nz>
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Hi [redacted]

Please see the following concerns from our modelling team, regarding the flood model & floor levels.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development
Tel [redacted] Mob [redacted]
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We manage their drinking water, wastewater and stormwater services

---

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Sent: Thursday, December 16, 2021 10:35 AM
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Kia ora [redacted]

Thanks for your email. My points of concern are below:

- Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.
- Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may over estimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.
- Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

A meeting (online) with the modellers would be very useful to discuss and potentially resolve these issues.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 15 December 2021 1:33 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: FW: RM210328 - 106 Mohaka Street

Hi [redacted] & [redacted]

Would you be able to provide a summary of the concerns regarding 106 Mohaka flood model/floor level /secondary flow path? Planner and RMA team is waiting for an update.

Thanks
[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, December 15, 2021 9:14 AM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Hi [redacted]

I'm just following up as the applicant has requested an update. Have you had the chance to look at this one?

Thanks
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

Memo

To	Wellington Water	Date	17 January 2022
Attn.	[redacted]	Pages	4 + Attachments
From	[redacted]	Ref.	P20-156-M01-RevB
Re. //	RM210328 - 106 Mohaka Street – Wellington Water RFIs 16/12/2021, 23/12/2021 and 10/01/2022		

Dear [redacted]

This memo is in response to your 16 December 2021 information request, and subsequent emails on 23 December 2011 and 10 January 2022 in respect of the above application / development.

Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.

Response: The previously submitted calculations were guided by the HEC-HMS Technical Reference Manual for the estimation of curve number (CN) and initial abstraction (Ia) parameters. We have now updated the calculations to account for the CN and Ia parameters given in Appendix B of Wellington Water's Reference Guide for Design Storm Hydrology, as per files provided on 10/01/2022.

Additionally, as requested we have calculated time of concentration parameters based on an average between the Ramser-Kirpich and Bransby-Williams approaches, as per Section 2.5 of Wellington Water's Reference Guide for Design Storm Hydrology. Please find Revision C of the calculations attached.

The revised hydrological parameters used are summarised in the table below (red italic underlined numbers refer to values that were revised as part of this update):

Catchment	Catchment Area (Ha)	Curve Number (CN)	Longest Drainage Path (m)	Average Slope (%)	Time of Concentration Tc (min)	Initial Abstraction Ia (mm)
Western	44.48	*63*	1,133	10.8	*55.10*	*14.92*
Northern	55.83	*63*	1,666	10.0	*77.77*	*14.92*
Eastern	1.720	*63*	234	11.3	*20.82*	*14.92*

Table 1 – Summary Catchment Design Parameters

We note that while the curve number values are higher (with corresponding initial abstraction values being lower) the suggested time of concentration approach results in considerably higher times of concentration compared to those obtained based on the SCS method in our original calculation. This results in the revised peak flows being somewhat lower to those originally presented, hence demonstrating the original design was conservative.

Regarding hydraulic neutrality, we confirm that the stormwater design does account for on-site hydraulic neutrality for the 10- and 100-year ARI events, to keep post-development peak flows to pre-development levels. The infrastructure report, drawings and calculations have been submitted to council as part of the EPA application package.

Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may overestimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.

Response: Please note that a detailed topographical survey of the site and perimeter channels was carried out for purposes of the flood assessment, hence we can confirm that the channel geometry given in the flood model is accurate.

Additionally, as requested in the 23/12/0222 email, we have included two photos showing a typical representation of the channels around the site perimeter. These photos show bare channel sides and floor (despite the dense vegetation overhead), suggesting a relatively low level of hydraulic resistance which is in line with the design assumptions and the assumed Mannings value of 0.07.

Further, I confirm that the condition of the existing perimeter channels will not be modified as part of the proposed development (i.e. they will remain in the same condition post-development).

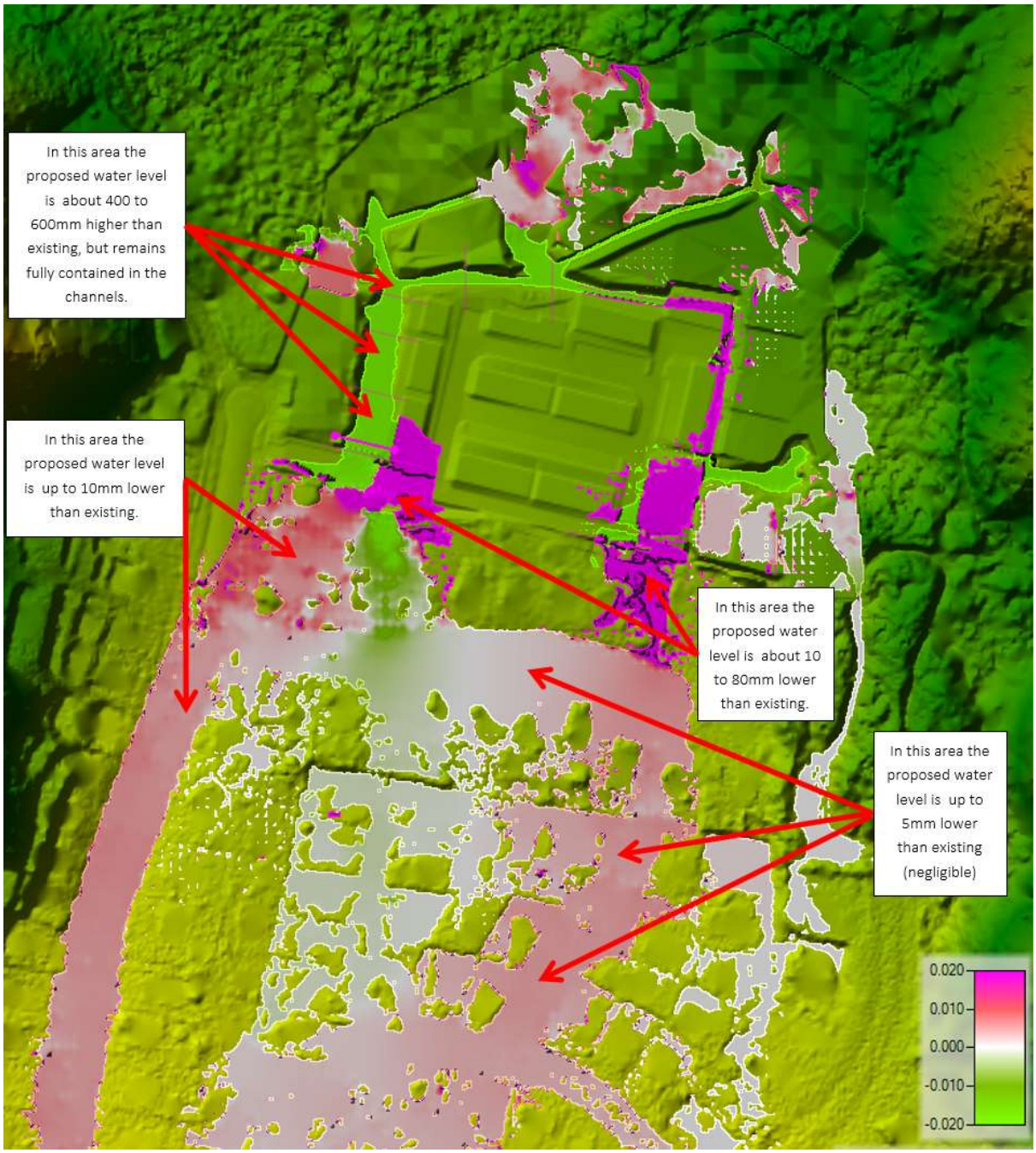
Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

Response: We have updated the previously supplied Please pre and post development 100yr ARI water surface elevation, depth and velocity maps in sheets 12 to 17 of the calculations, and a flood level surface comparison map in sheet 18 (reproduced again in the figure below).

The post development flood assessment is based on surface runoff only and assumes that all piped systems (including the proposed on-site stormwater attenuation device) are 100% blocked, which is conservative.

As part of the proposed works, the existing crossing over the stream will be raised in level, and this will result in additional storage within the existing channels during the 100-year ARI event. While this causes water levels to rise behind the culvert, the flows will remain fully contained within the channels, thereby avoiding any adverse impacts on adjacent properties.

Downstream of the development, the revised 100yr ARI flood levels are predicted to decrease at every location, typically by approximately 5-10mm but up to about 80mm adjacent to the southern fringe of the site, as shown below.



In conclusion, the revised analysis again shows that the proposed development will result in “no more than minor” effects with regards to flooding (in fact likely to result in net positive results given the predicted reduced flow depth downstream), and especially considering that any benefits likely to arise from the proposed on-site attenuation is ignored in the analysis.

Trust this meets your requirements however please do not hesitate to contact me if you'd like to discuss or if you require any further information.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
AR & Associates Ltd

Appendix A – Revised Calculations

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

106 Mohaka Street, Wainuiomata, Lower Hutt

Flood Assessment

CONTENTS:

Reason for this Revision: Wellington Water Queries

Calculations By:	[redacted]
Checked By:	AR
Ref:	P20-156-Clc02
Date:	17.01.2022
Revision:	C

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 1
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17 01 2022	Checked:	AR	

A Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1 06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821) AR & Associates Ltd (ARAL) has been requested to assist in the flood modelling and report

This document presents the flood modelling for the post development scenario

B Basis of Design

The design presented herein is based on Wellington's Land Development and Subdivision Code of Practice and associated documents, for the contributing catchment assuming maximum probable development (MPD) conditions The hydrology parameters are selected based on guidance from Wellington Water's Reference Guide for Design Storm Hydrology

C Stormwater

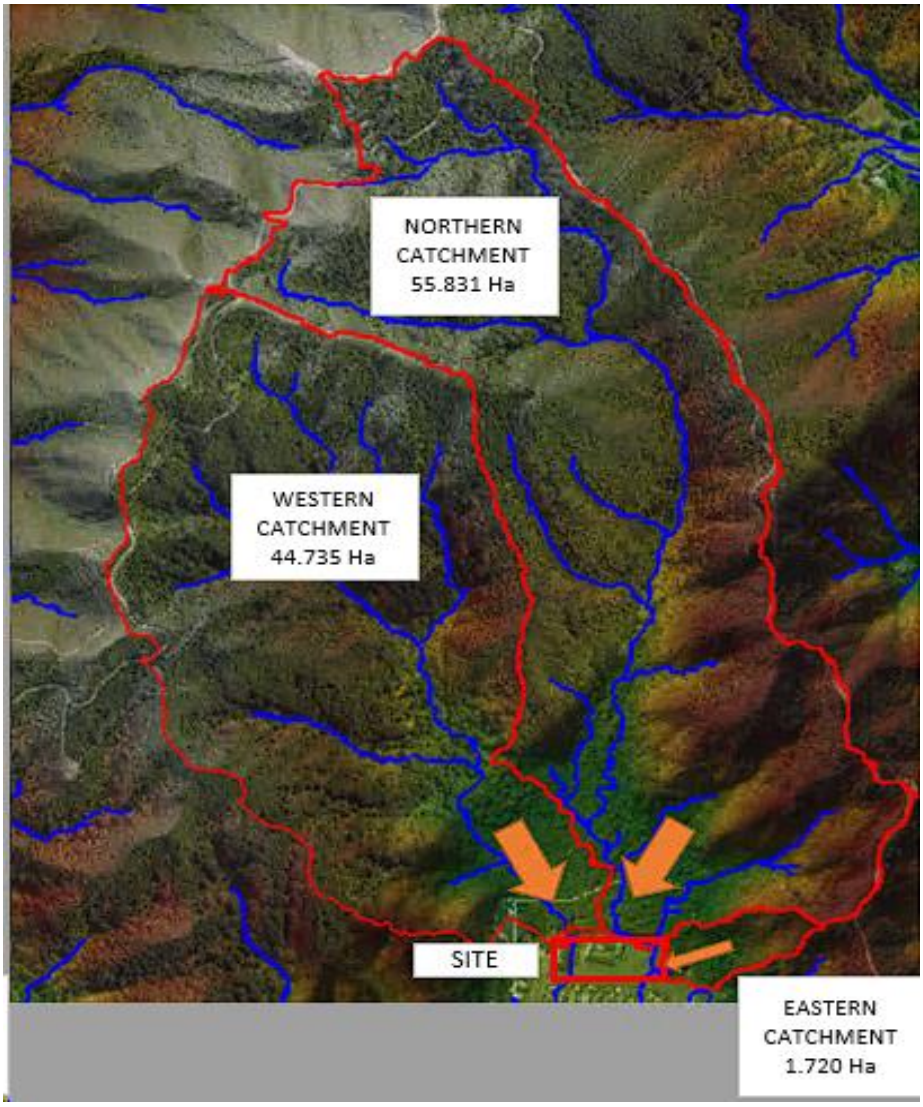
C.1 Flood Management Design Philosophy

The area is under the influence of the unnamed catchments as shown below ARAL has undertaken an independent hydrology and hydraulics analysis using HEC-HMS and HEC-RAS to determine the peak flows and flooding extents

The design philosophy focuses on retaining the existing topography as much as possible and applying a low impact design (LID) approach to maintain pre-development hydrology and flows, and minimise adverse effects on the environment and neighbouring properties which may result from the development

This calculation sheet will cover the 100-year peak flows and flood mapping regarding max water depth, max water surface level, and max water velocity for an MPD condition

The 100yr Catchments showing the site location are shown below



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	2
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17 01 2022	Checked:	AR		

C.2 Design Assumptions and Parameters

Climate Change:

The SCS Curve Number method was used with the HEC-HMS modelling software to calculate the amount of runoff from a rainfall event The 1% Annual Exceedance Probability (AEP) or 100-year Average Recurrence Interval (AR) event was assessed for the flood analysis An RCP6 0 for the year 2081-2100 was used for the climate change factor from HIRDS v4

**** Nested Storm rainfall profile (12-hour storm duration is used for this assessment)**

RCP6 0 for the period 2081-2100(Depth, mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	
1.58	0.633	8.29	11.3	13.6	19.1	26.7	44.4	59.4	77.4	
2	0.5	9.16	12.4	15	21.1	29.5	48.9	65.4	84.8	
5	0.2	12.2	16.5	19.9	27.8	38.8	64.1	85 5	110	
10	0.1	14.5	19.5	23.6	32.9	45.8	75.4	101	130	
20	0.05	16.9	22.7	27.4	38.1	53.1	87.2	116	149	
30	0.033	18.3	24.7	29.7	41.4	57.5	94.3	125	161	
40	0.025	19.4	26.1	31.4	43.7	60.6	99.5	132	169	
50	0.02	20.2	27.2	32.8	45.5	63.2	103	137	176	
60	0.017	20.9	28.2	33.9	47	65.2	107	142	182	
80	0.012	22.1	29.7	35.7	49.5	68.6	112	148	190	
100	0.01	22.9	30.8	37	51.4	71.1	116	154	197	
250	0.004	26.6	35.6	42.8	59.2	81.8	133	176	225	

Curve Numbers:

	CN	
Upstream undeveloped catchments	63	Based on Appendix B or Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	98	

Initial Abstraction:

The Initial Abstraction parameter is estimated as 0 1 x S, as per Wellington Water's Reference Guide for Design Storm Hydrology, as follows:

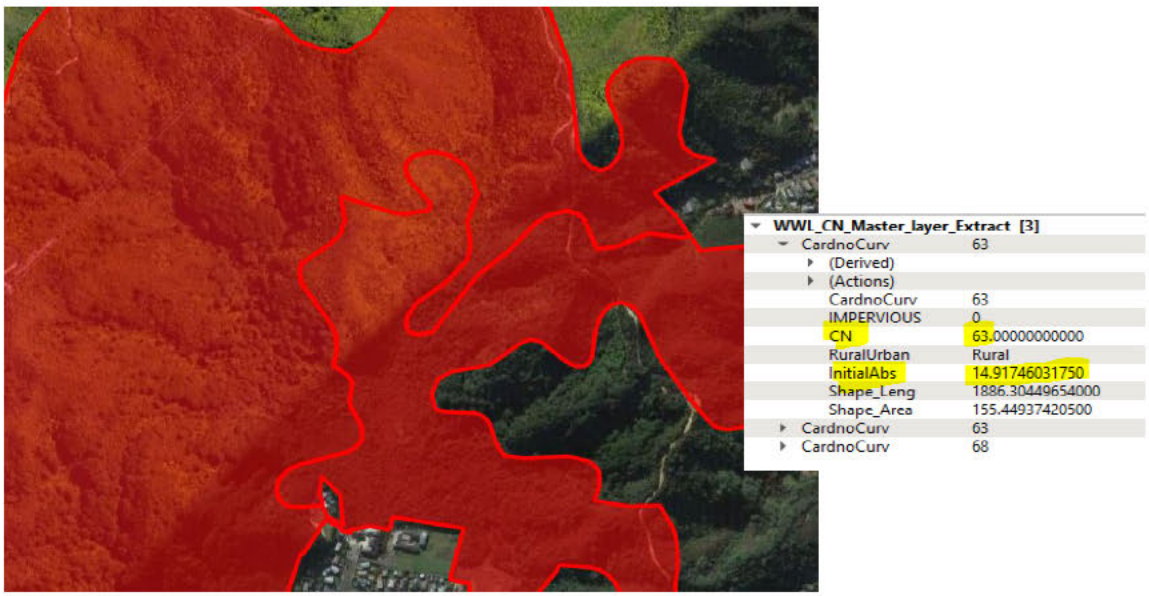
	Ia	
Upstream undeveloped catchments	15	Based on Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	0	

Terrain Data:

- Wellington Lidar 1m DEM (2013-2014, LINZ), Projection: NZGD / Wellington 2000, Vertical Datum: NZVD2016
- Existing survey completed by Cuttriss, Surveyors, Engineers, Planners Ltd, 11 2020
- Proposed Terrain design for project site by AR Associates Ltd
- Site scheme plan, Moore Design, 23 12 20

Proposed Plan:

	Max Coverage	Average MPD Impervious	
Pre-Development	0%	0%	
Post-Development	65%	70%	<- Assumed



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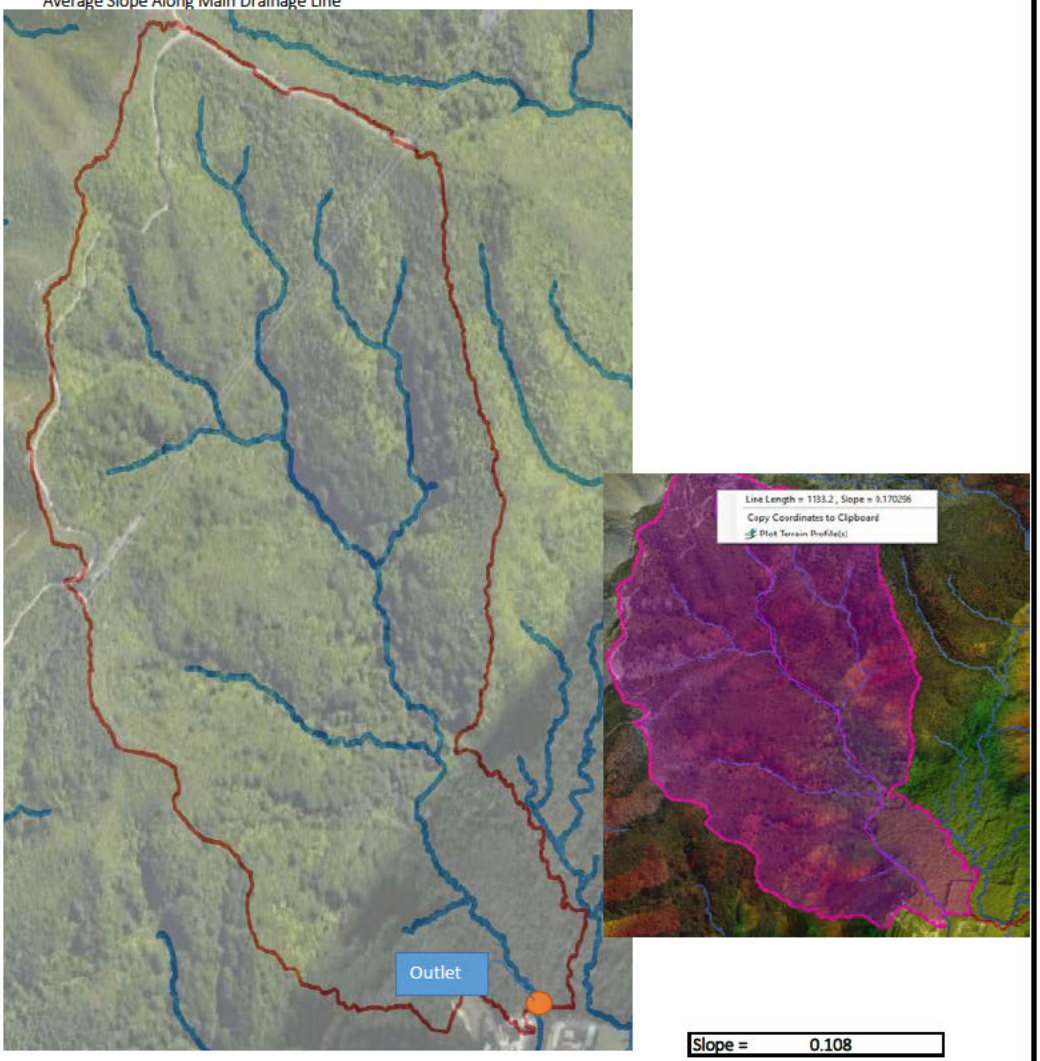
CALCULATION SHEET

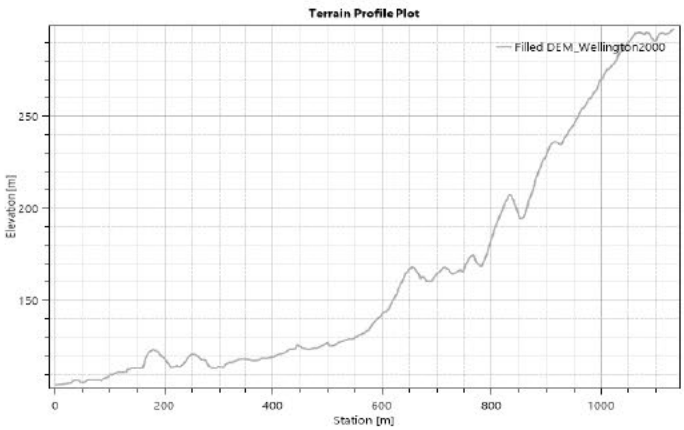
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	3
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

C.3 Catchment Analysis - Western Catchment

Average Slope Along Main Drainage Line



Slope =	0.108



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	4
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

Catchment Area

Total	444783	m2
	0.444783	km2
	44.4783	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.13	From above
Catchment slope Sc (equal area method)	0.108	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.45	(TP108)
Tc (min)	27.26	
Lag time (min)	18.17	
Tc (min)	10.32	**(Ramser Kirpich Tc)**
Lag time (min)	6.88	
Tc (min)	99.88	(Bransby Williams Tc)
Lag time (min)	66.59	
Average(min)	55.10	
Lag time (min)	36.73	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		44478	10.0%
CN (Mountainous)	63		400305	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

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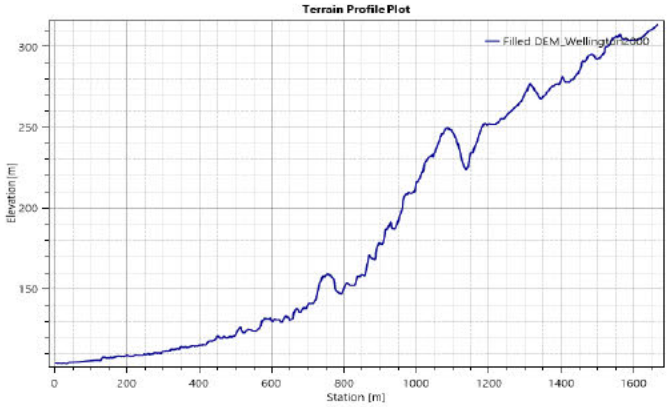
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	5
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

C.4 Catchment Analysis - Northern Catchment

Average Slope Along Main Drainage Line

Slope = 0.0998



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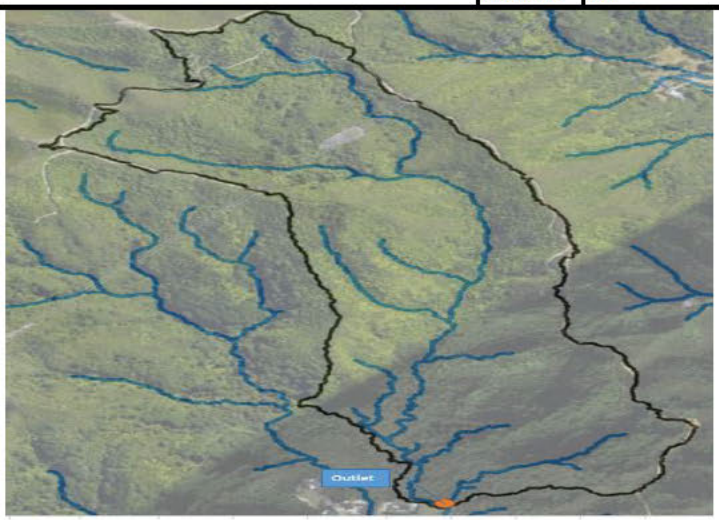
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	6
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		



Catchment Area

Total	558312	m2
	0.558312	km2
	55.8312	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.67	From above
Catchment slope Sc (equal area method)	0.0998	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.60	
Tc (min)	36.02	
Lag time (min)	24.01	
Tc (min)	14.33	**(Ramser Kirpich Tc)**
Lag time (min)	9.55	
Tc (min)	141.22	(Bransby Williams Tc)
Lag time (min)	94.15	
Average(min)	**77.77**	
Lag time (min)	51.85	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		55831.2	10.0%
CN (Mountainous)	63		502480.8	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

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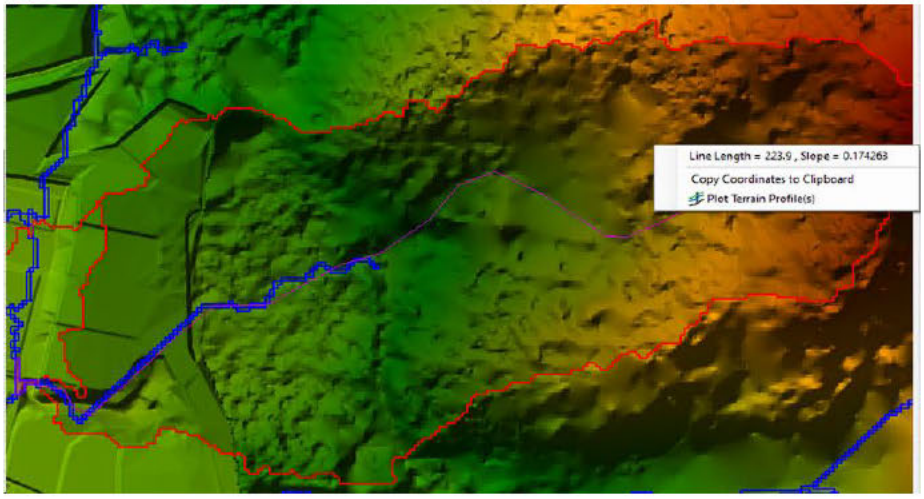
CALCULATION SHEET

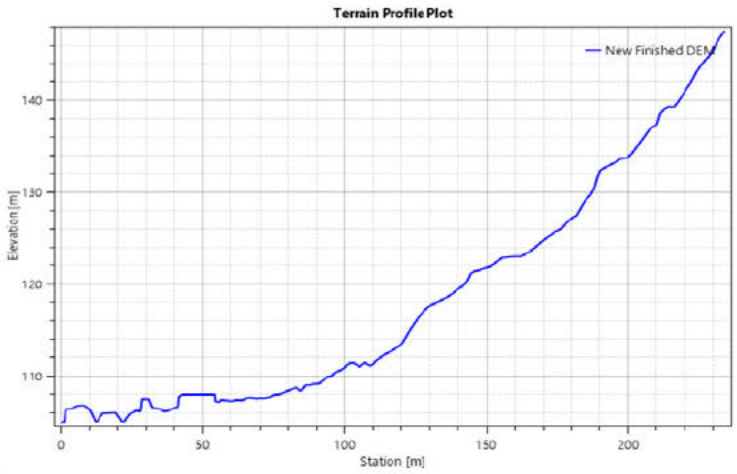
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	7
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17 01.2022	Checked:	AR		

C.5 Catchment Analysis - Eastern Catchment

Average Slope Along Main Drainage Line



Slope = 0.1127



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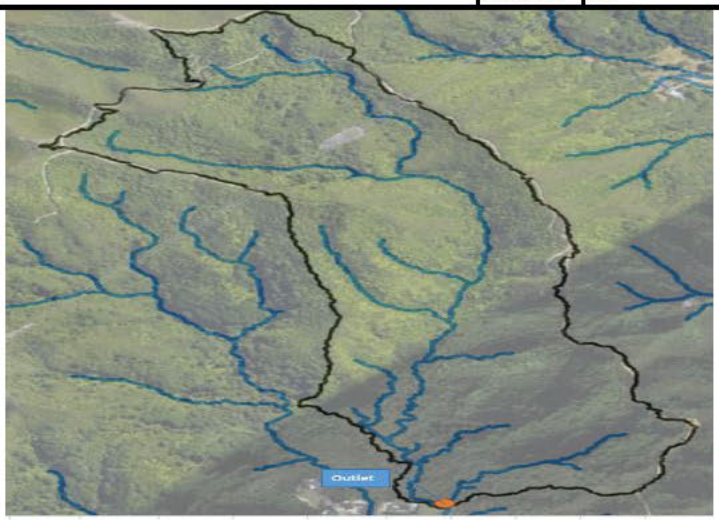
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	8
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		



Catchment Area

Total	17206	m2
	0.017206	km2
	1.7206	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	0.23	From above
Catchment slope Sc (equal area method)	0.1127	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.17	
Tc (min)	10.20	
Lag time (min)	6.80	
Tc (min)	3.02	**(Ramser Kirpich Tc)**
Lag time (min)	**2.01**	
Tc (min)	38.62	(Bransby Williams Tc)
Lag time (min)	25.75	
Average(min)	**20.82**	
Lag time (min)	13.88	

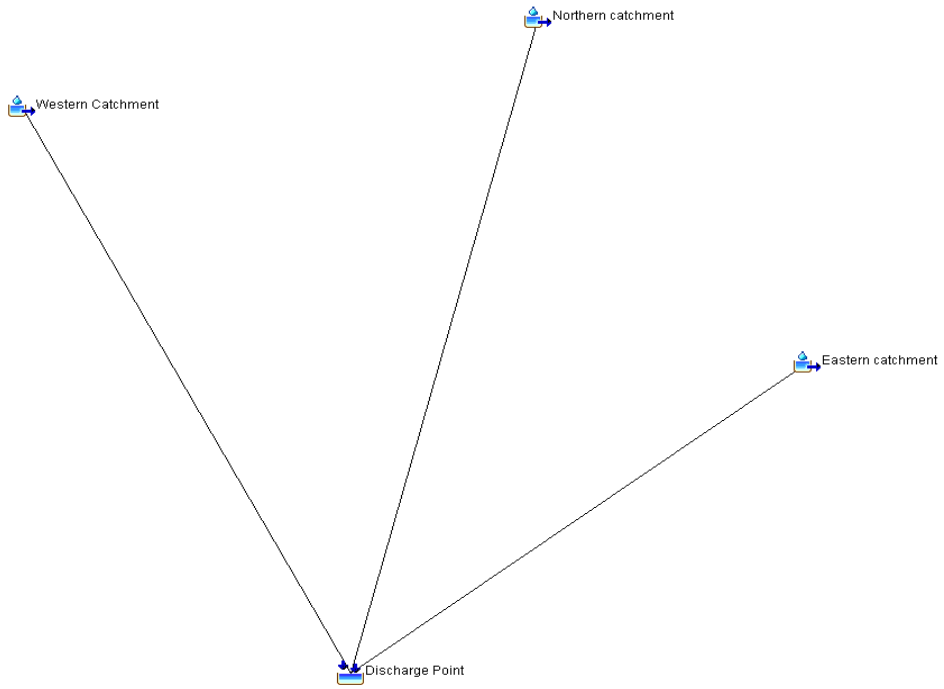
Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		1720.6	10.0%
CN (Mountainous)	63		15485.4	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	9
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17 01.2022	Checked:	AR	

C.6 HEC-HMS Model & Results



Ramser

Project: P20-156-WWL Simulation Run: 100yr Proposed

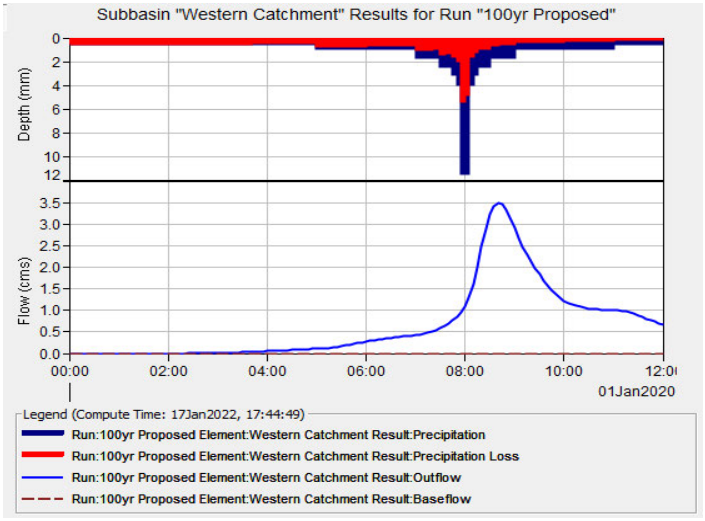
Start of Run: 01Jan2020, 00:00
End of Run: 01Jan2020, 12:00
Compute Time: 17Jan2022, 17:44:49

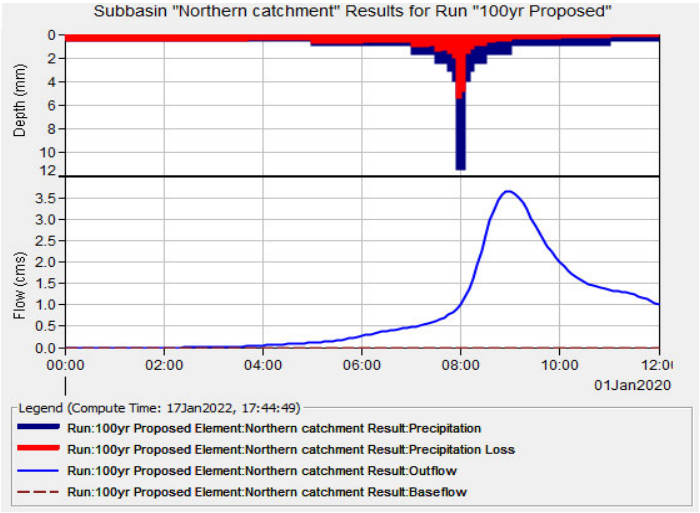
Basin Model: 100yr Proposed
Meteorologic Model: 100yr +CC
Control Specifications: 24hr

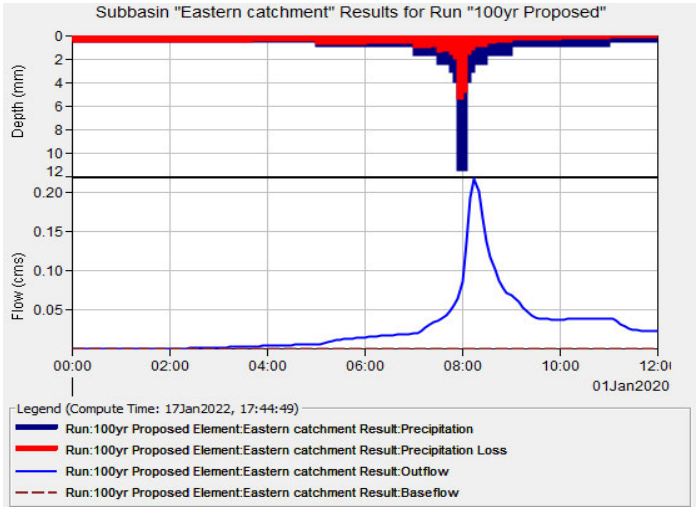
Show Elements: All Elements | Volume Units: (•) MM ( ) 1000 M3 | Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Western Catchment	0.444783	3.5	01Jan2020, 08:40	63.26
Northern catchment	0.558312	3.7	01Jan2020, 09:00	61.08
Eastern catchment	0.017206	0.2	01Jan2020, 08:15	65.86
Discharge Point	1.020301	7.0	01Jan2020, 08:50	62.11

C.6 HEC-HMS Model & Results







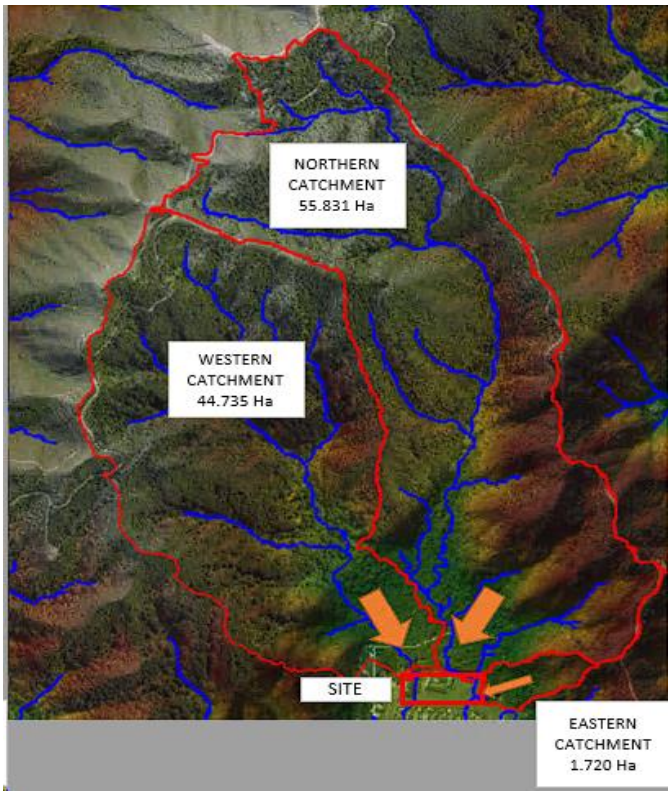
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 11
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17.01.2022	Checked:	AR	

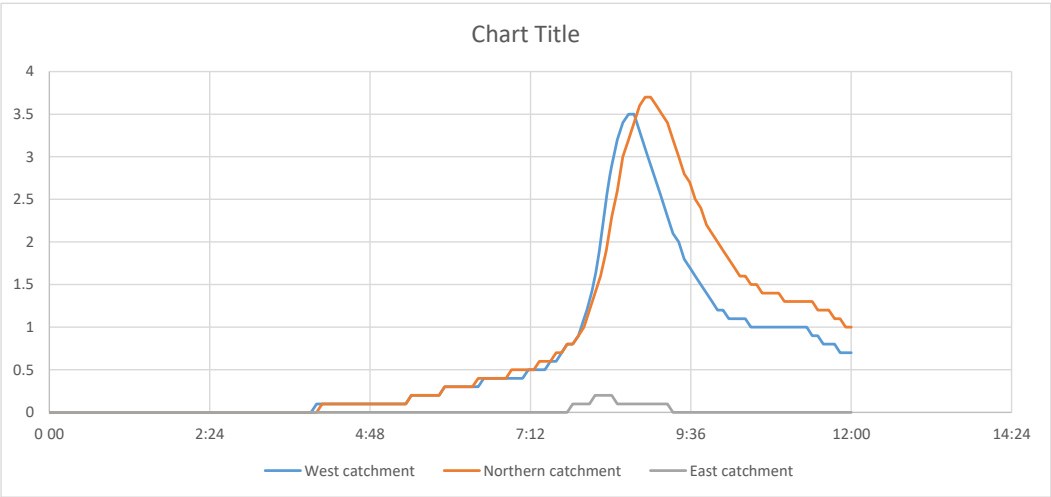
C.7 HEC-RAS Setup

Grid Size: 2m x 2m
Computation Interval: 0 5 sec

HEC-RAS Model Build:



100-yr Hydrograph to be used for HEC-RAS



AR & ASSOCIATES
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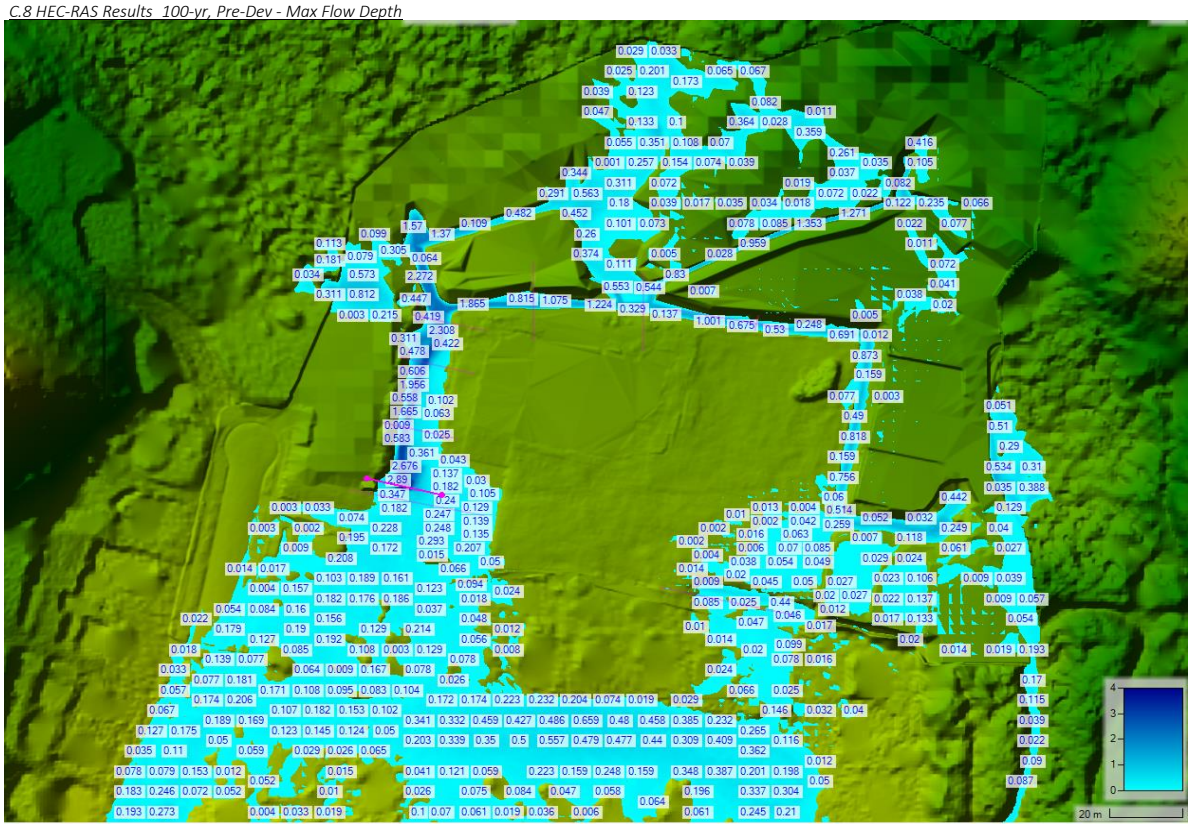
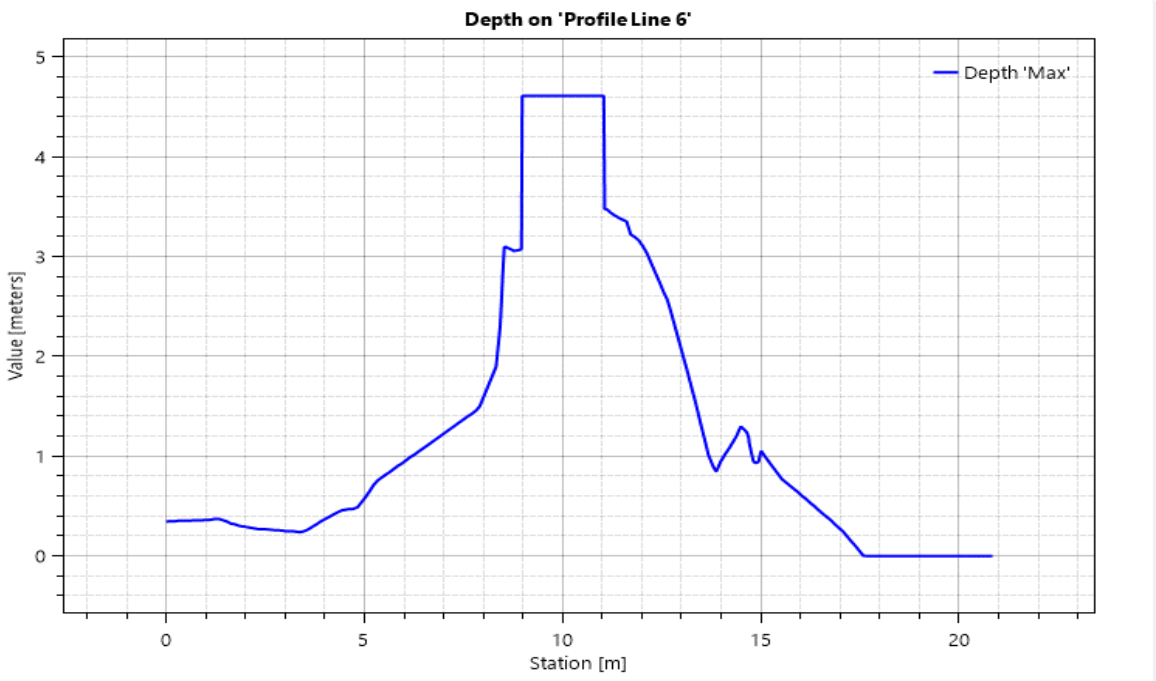
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	12
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.8 HEC-RAS Results 100-yr, Pre-Dev - Max Flow Depth



Cross Line: Water Depth Profile (Left -> Right)

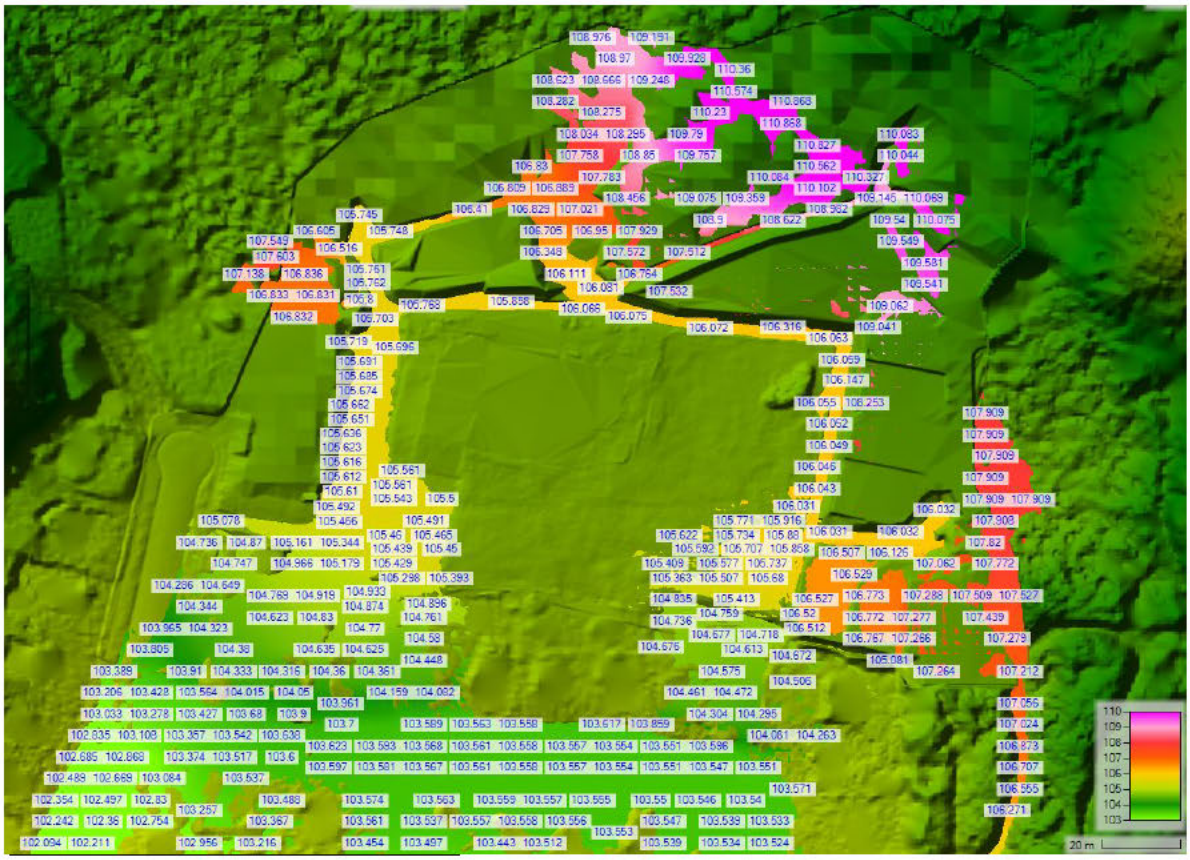


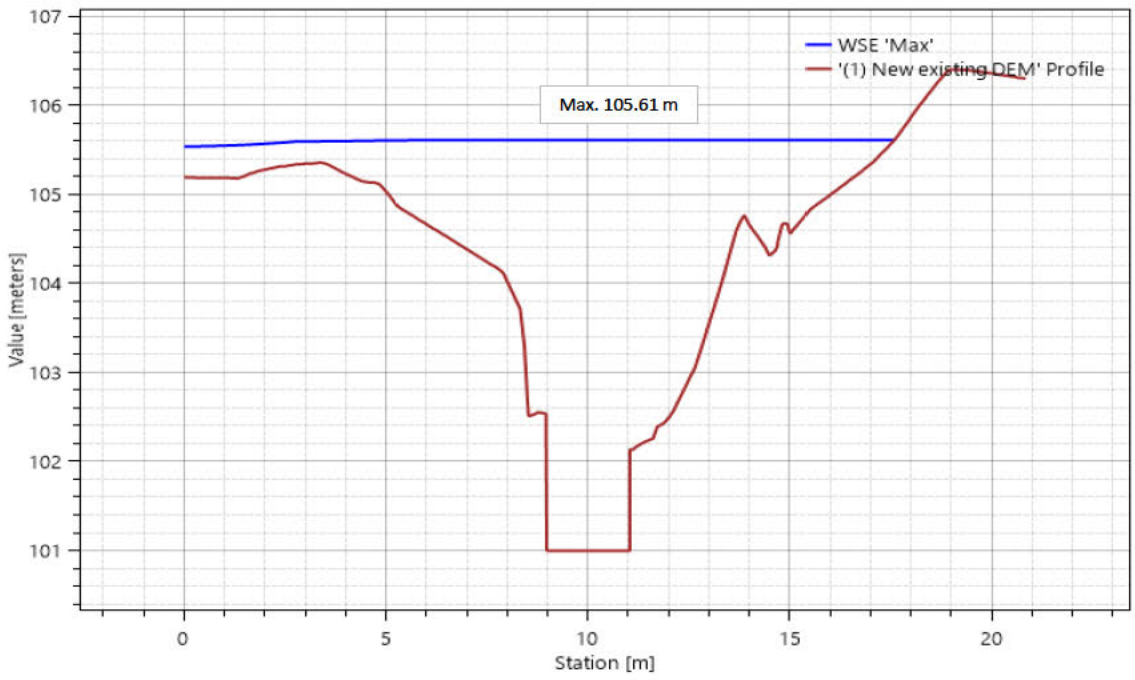
AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	13
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.9 HEC-RAS Results 100-yr, Pre-Dev - Water Surface Elevation





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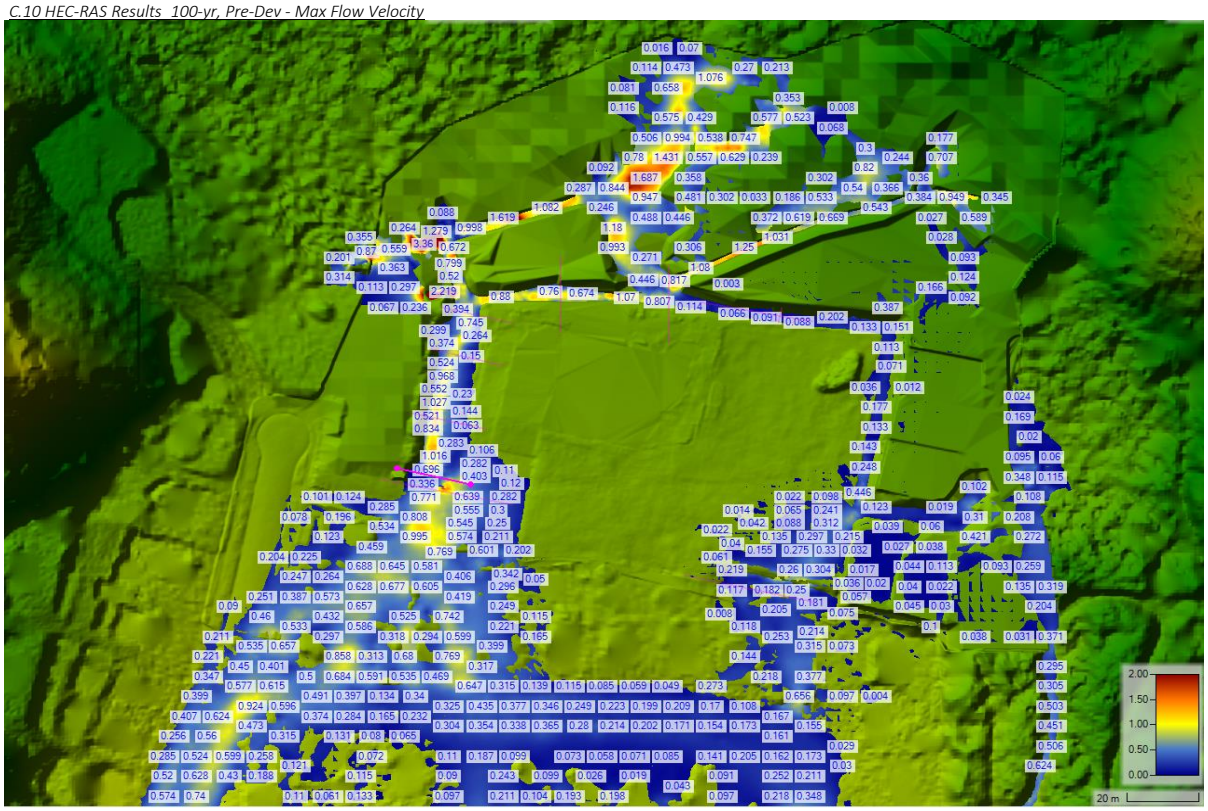
CIVIL | ENVIRONMENT | PLANNING

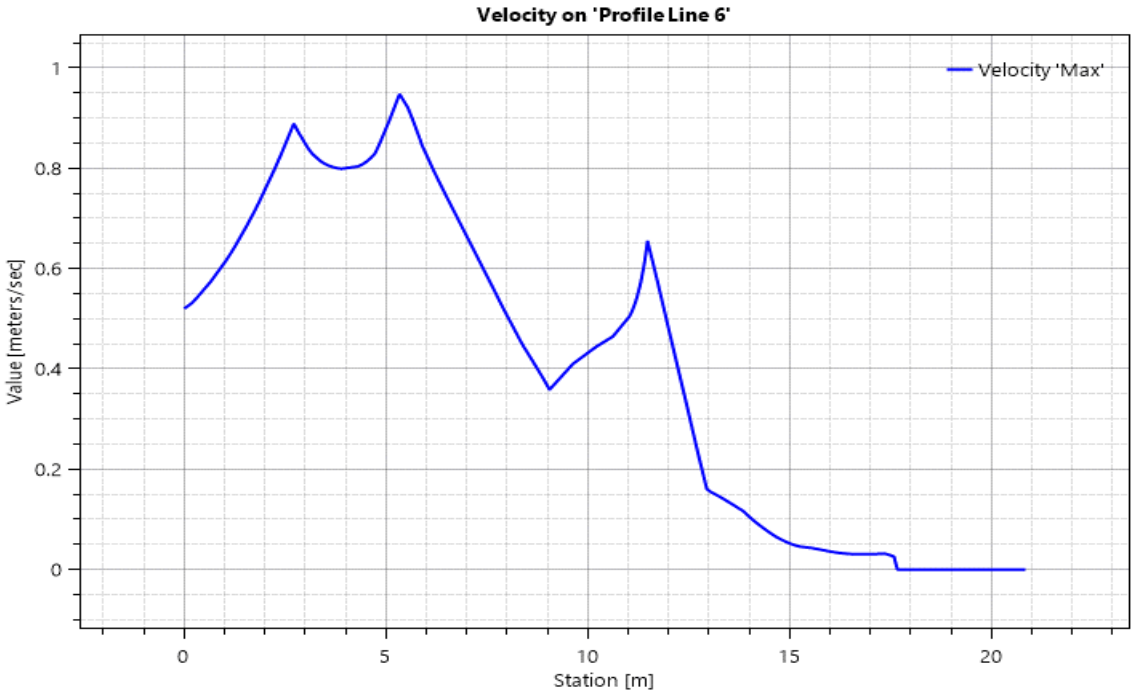
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	14
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.10 HEC-RAS Results_100-yr, Pre-Dev - Max Flow Velocity



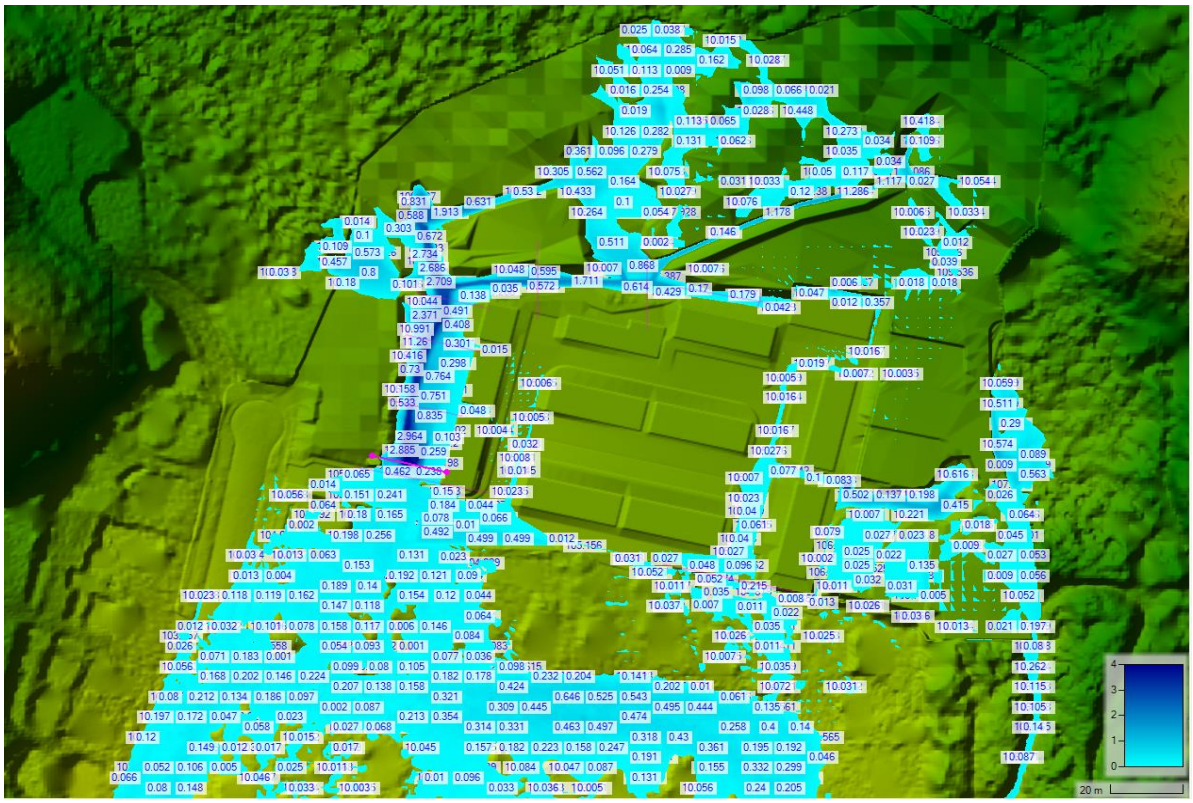
Cross Line: Max. Velocity Profile (Left -> Right)



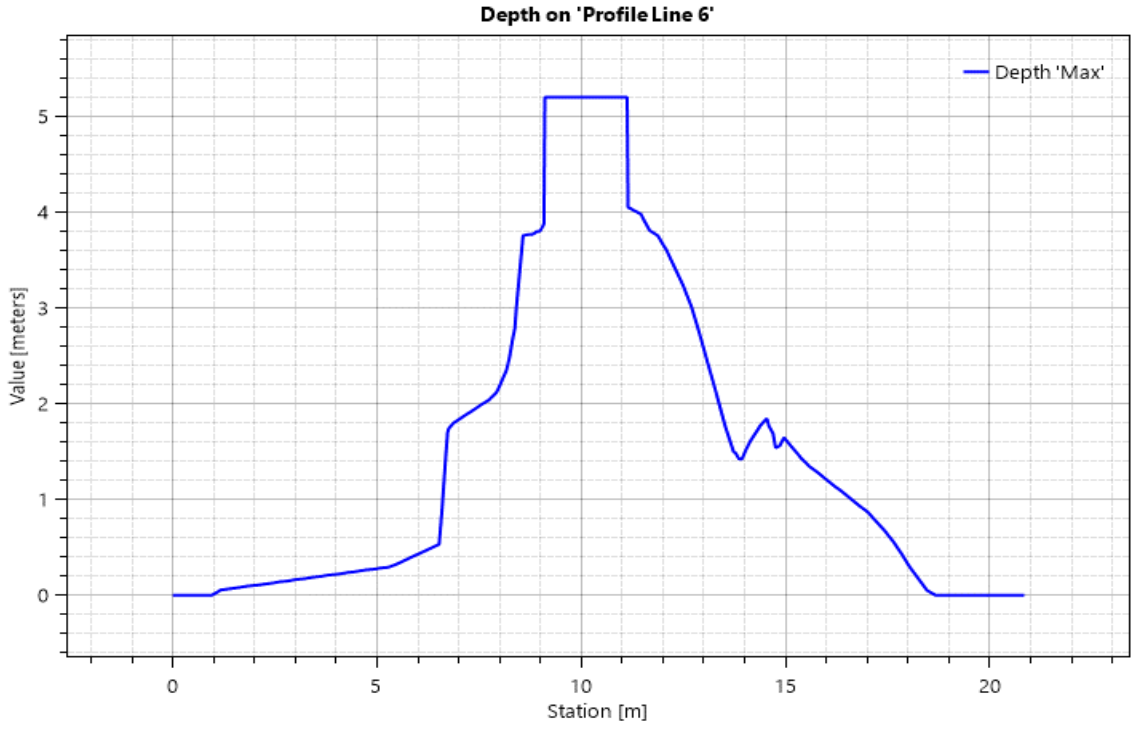
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	15
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

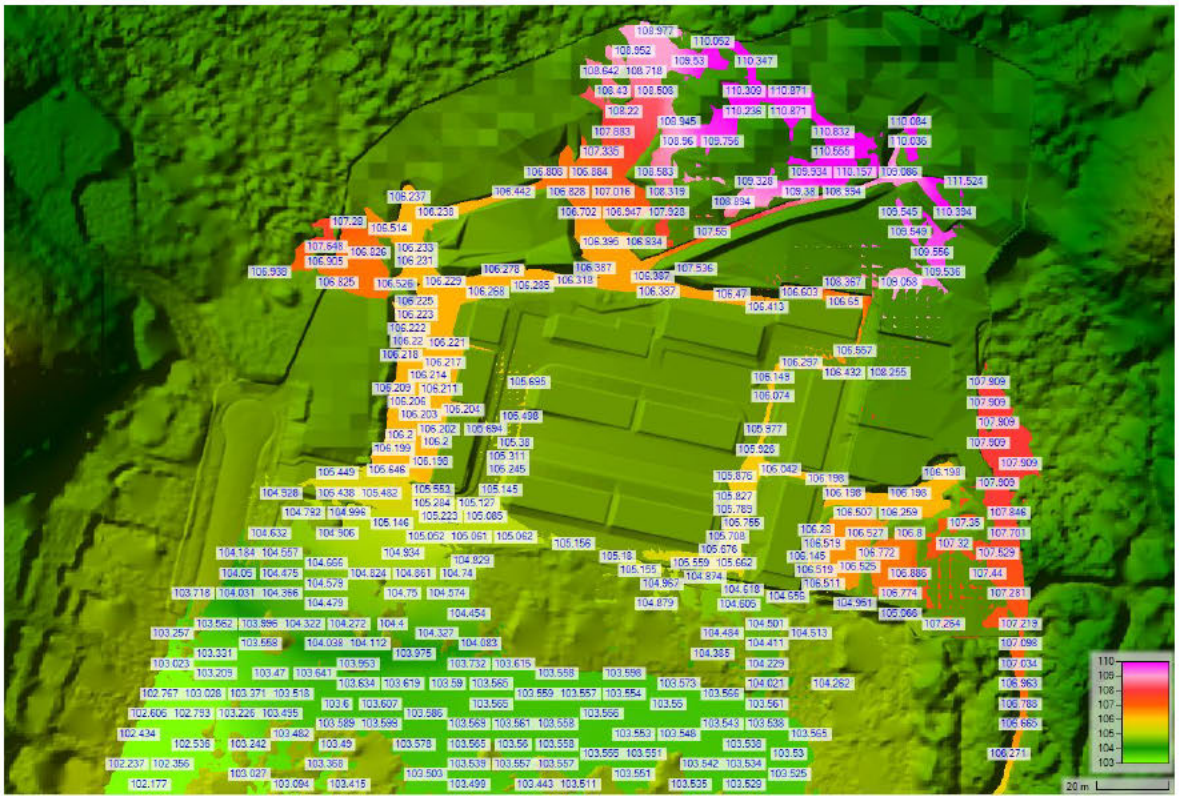
C.11 HEC-RAS Results 100-yr, Post-Dev- Max Flow Depth



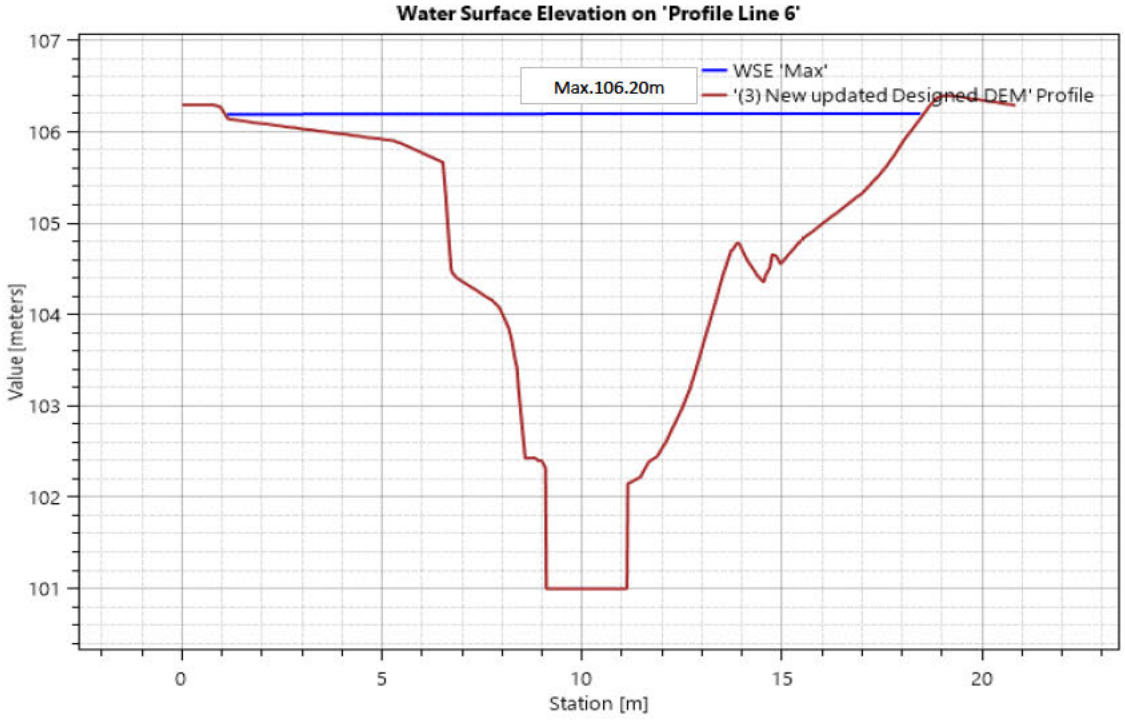
Cross Line: Water Depth Profile (Left -> Right)



C.12 HEC-RAS Results 100-yr, Post-Dev - Water Surface Elevation



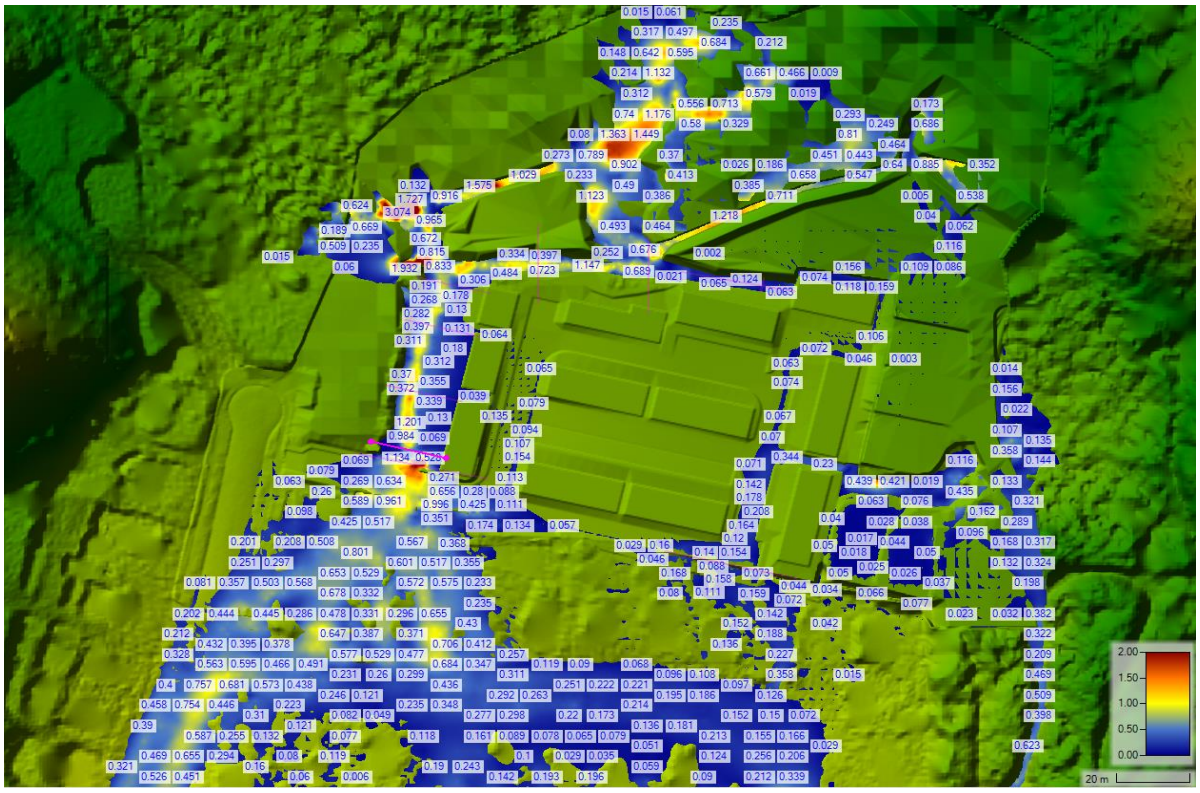
Cross Line: Water Surface Elevation Profile (Left -> Right)



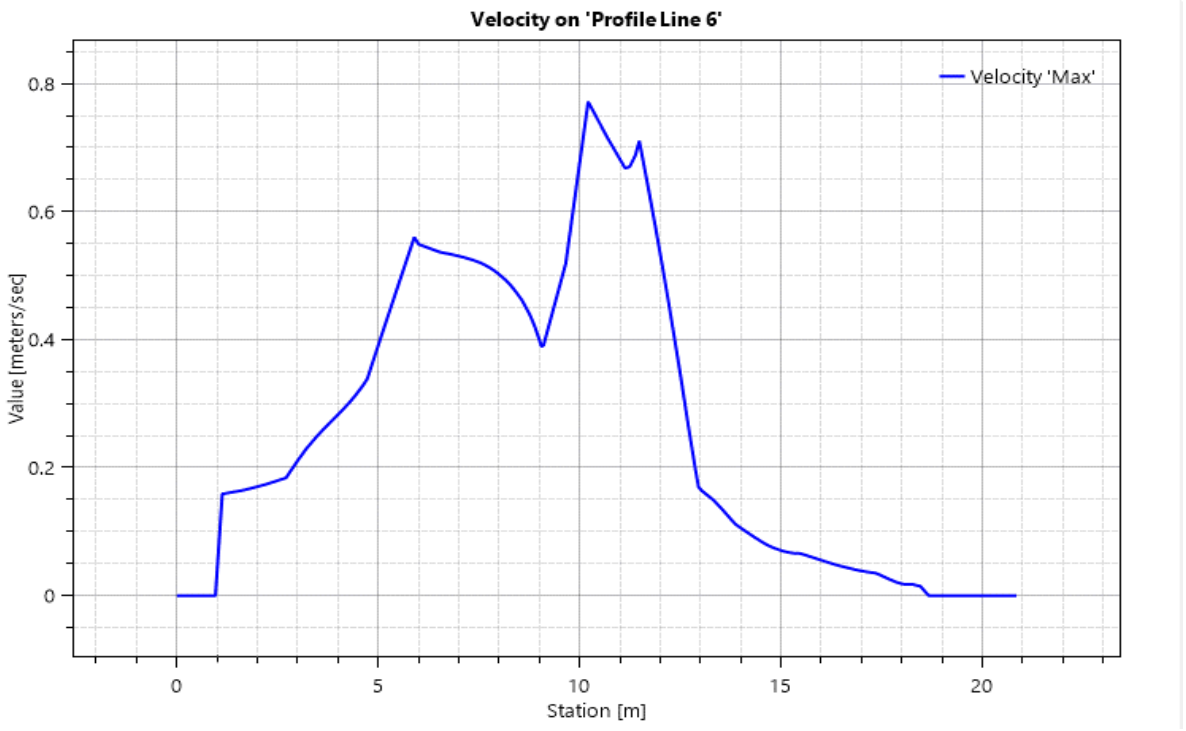
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	17
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.13 HEC-RAS Results 100-yr, Post-Dev - Max Flow Velocity



Cross Line: Max. Velocity Profile (Left -> Right)



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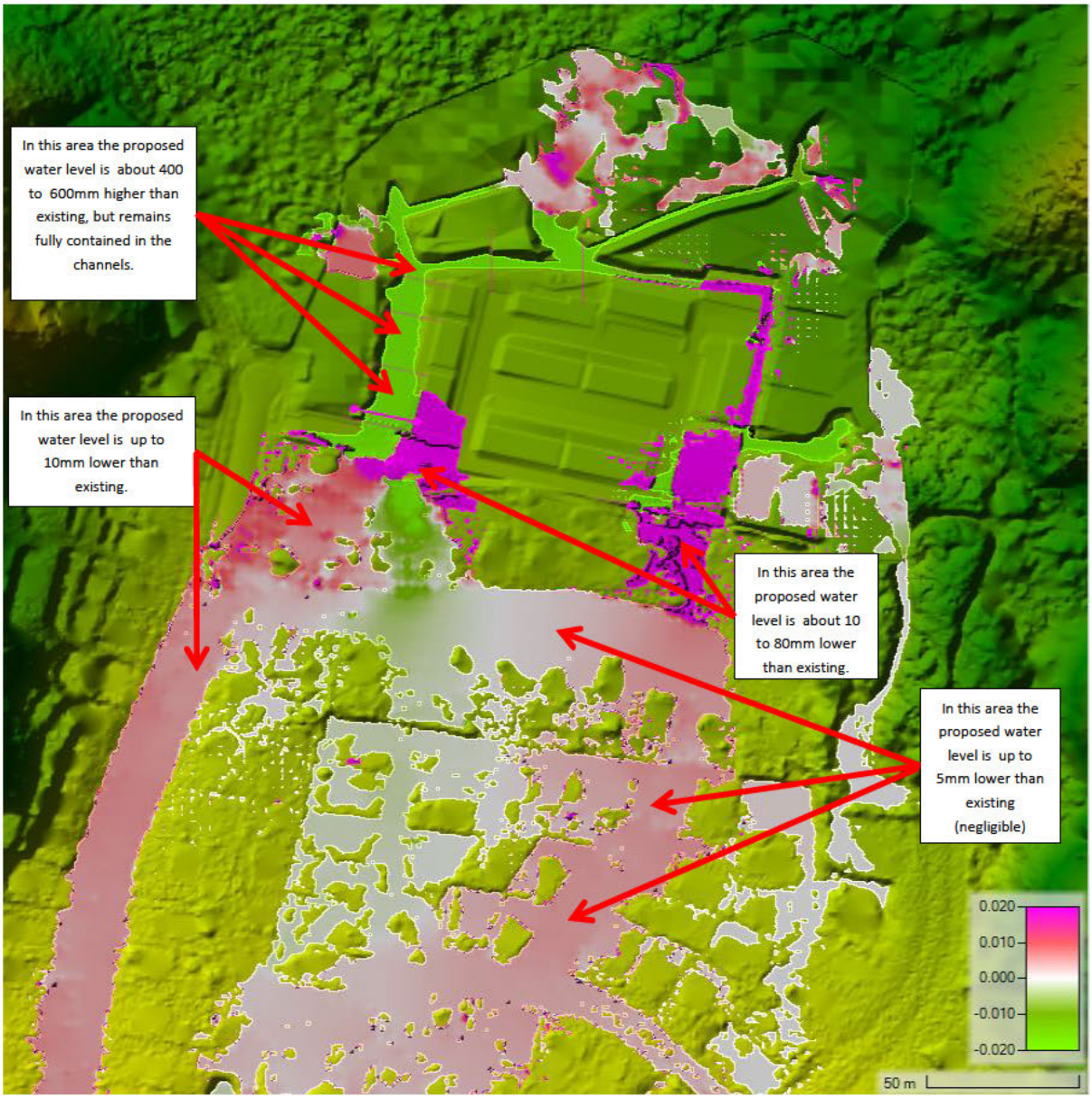
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	18
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.14 Flood Level Comparison Map (Existing Minus Post-Development)



Appendix B – Photographs of existing Site Perimeter Channels

channels below.

From: [redacted]
To:
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 2 July 2021
Date: Thursday, May 4, 2023 1:04:55 PM
Attachments: image001.gif
image002.jpg
image003.jpg
image004.jpg
image005.jpg
image006.jpg
image007.jpg
image008.jpg
image009.jpg
image010.jpg
image011.jpg
SW_HCC_2021-07-01_106 Mohaka Street, Wainuiomata.pdf
image012.jpg
image013.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804 Wellington Mail Centre 5045
Level 4 25 Victoria Street Petone Lower Hutt

From [redacted]
Sent: Friday, July 2, 2021 9:23 AM
To: Land Development <Land.Development@wellingtonwater co.nz>; [redacted] @huttcity govt.nz>
Cc: Resource Consents (ResourceConsents@huttcity govt.nz) <ResourceConsents@huttcity.govt.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 2 July 2021

Hi [redacted]

Please find the updated stormwater modeling info for this site if you haven't got it already:

Thanks
[redacted]

[redacted] **Senior Engineer - Land Development**

Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: Land Development
Sent: Thursday, June 3, 2021 10:10 AM
To: [redacted] @huttcity.govt.nz>; Land Development <Land.Development@wellingtonwater co.nz>
Cc: Resource Consents (ResourceConsents@huttcity govt.nz) <ResourceConsents@huttcity.govt.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 3 June 2021

Hi [redacted]

We recommend the developer assess the impact of the earth works on the flood extent. We cannot recommend minimum floor levels at this stage as we expect that the proposed earth works would significantly alter levels on site. Also the development may change the flow across the site resulting in lesser flow from site to some neighbouring properties and greater flow to others which would not be acceptable to those neighbours that would receive more flow.

We can recommend the following modellers who we often work with:

[redacted] @stantec com

[redacted] @ghd.com

[redacted] @awa.kiwi

[redacted] @jacobs.com

Thanks
[redacted]

[redacted] Senior Engineer - Land Development

Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water, wastewater and stormwater services.

From [redacted]@huttcity.govt.nz>
Sent: Monday, May 31, 2021 4:48 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 5 Mar 2021

Hi [redacted]

I am processing an earthworks consent for this one (see attached) at 106 Mohaka. They are proposing 810m3 cut and 545m3 fill over a combined face area of 5850m2. Could you advise if you have any concern with the potential displacement of floodwaters resulting from the proposal? I wasn't sure if this was covered by the previous advice.

Kind regards,
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From: Land Development [mailto:Land.Development@wellingtonwater.co.nz]
Sent: Friday, 5 March 2021 3:39 PM
To: [redacted]
Cc: [redacted]
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 5 Mar 2021

Hi [redacted]

Please find the following wastewater modelling summary regarding the proposed development. Based on the assessment, wastewater mitigation is required for this site.

There are 61 dwellings planned that represents a significant increase.
The PWWF estimated by the developer is in accordance with the Regional Standard
The model predicts that the addition of the development PWWF is predicted to have the following impact on the local network during a 1-year LTS design flow
Increased surcharging (by up to 0.5m) in approximately 47% of the downstream local network. Increased surcharging in parts of the local network catchment that the property is located in. An overflow of about 11m3 is predicted at manhole 71001R00908 (i.e. a non-engineered overflow) that currently is not predicted to overflow.

This assessment is based on the results from WWL hydraulic models. It does not take into account the impact on the spare design capacity of other developments that have occurred since then, are currently underway, or possible future developments (e.g. 80 Meremere St and 80 Parkway). Non-hydraulic parameters like pipe age, conditions and likelihood of their failure have not been assessed. Flow monitoring may be required to verify these results. This development may impact on the spare design capacity available for possible future developments along the downstream network.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development

Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water, wastewater and stormwater services.

From: [redacted]@arassociates.co.nz>
Sent: Friday, 26 February 2021 12:33 PM
To: [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]

[redacted]@arassociates co nz>
Subject: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl

Good day[redacted]

Following[redacted] email below please find attached engineering plans for the overland flow path diversion channel.
Just wondering has the team manage to run the WW network model based on the flow rates provided earlier?

Have a great weekend.

Kind regards,

[redacted]
BE (Civil)
[redacted]

AR & Associates Ltd
Building 8, Level 3
36 Grant Road, Frankton
Queenstown 9300
M:[redacted]
www arassociates co nz

From [redacted]@arassociates.co.nz>
Sent: Tuesday, 23 February 2021 11:24 am
To: [redacted]@wellingtonwater co.nz>; [redacted]@huttcity govt.nz>
Cc [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@wellingtonwater co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021

[redacted]

Thank you for your time on the phone earlier this morning. Much appreciated!

Key points from discussion noted below…

Wastewater:
Wellington Water will complete their modelling assessment of the downstream network to confirm what mitigation requirements, if any, the subject site is constrained to This information is expected today/tomorrow

Stormwater:
Civil Engineer will provide updated package to include:
Cross sections through proposed cut off drain
Calculations to confirm 100 year peak flow into drain
Level of 100 year stormwater flow in cut-off drain to confirm the drain has sufficient capacity
Catchment plan showing contributing catchment size
Geotech Engineer to provide a memo confirming the following:
Batter slope stability as proposed in the drain is appropriate
Commentary on high water table and the potential implications on the cut off drain

[redacted] we will look to get the updated information to you shortly.

Thank you. Talk soon.

[redacted]

From [redacted]@wellingtonwater.co.nz>
Sent: Monday, 15 February 2021 12:20 PM
To: [redacted]@huttcity govt.nz>
Cc [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; [redacted]@arassociates co.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@wellingtonwater co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021

Hi[redacted]

Please find the attached earlier comments provided by Marlene.

Regarding wastewater, due to the scale of the development has changed(originally only for 7-20 sections), the applicant will need to provide a peak flow estimate, then our wastewater modeller will confirm if mitigation is required.

Regarding stormwater, I believe a feasibility study on the drainage options should be carried out by the applicant, including all necessary geotechnical study and identification on all secondary flow paths. There are pros and cons for the 2 options mentioned in your email.

Northern side cut off drain:

This option is a preferred option for a new site. It can minimise future stormwater impact on the residents.

This cut off drain shall be designed for 100 year, to ensure less over flow across the northern side buildings. Therefore, both size of the drain and constructability shall also be evaluated.

Suitability of the proposed cut off drain shall be confirmed by a geotechnical engineer, i.e., stability of the soil, ground water table etc. Liner/riprap may be required if ground water level is high.

Diversion pipe through the site:

A few pipe sections are proposed to go through private properties. Secondary flow arrangement shall be assessed around these locations. Total building numbers will have to be reduced to allow secondary flow path.

Cut off drain will still be required at north of each site, to reduce flow crossing these properties.

Thanks

[redacted]

[redacted] Senior Engineer - Land Development

Tel [redacted] Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

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We manage their drinking water wastewater and stormwater services.

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Thursday, 11 February 2021 3:22 PM
To: [redacted] @wellingtonwater co.nz>
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation

From [redacted] @huttcity.govt.nz>
Sent: Wednesday, 20 January 2021 4:41 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>
Cc [redacted] @huttcity.govt.nz>; [redacted] @huttcity.govt.nz>; [redacted] @arassociates co.nz
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation

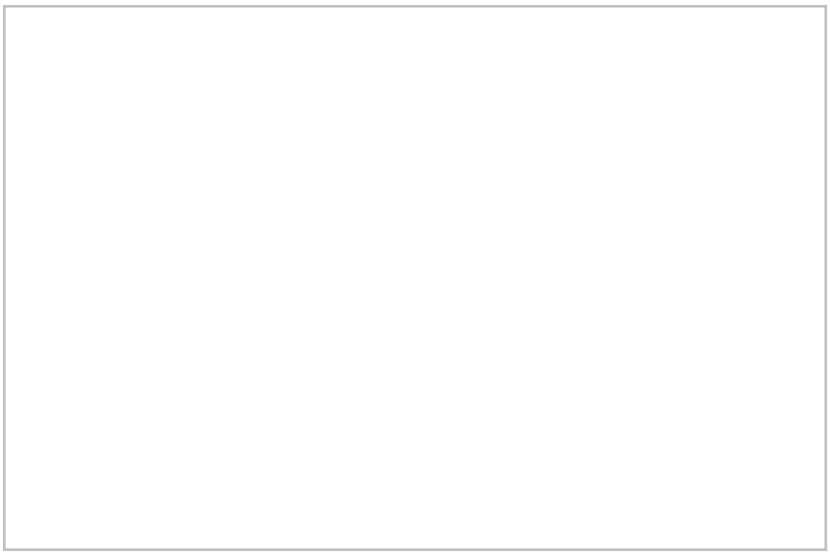
Hi Team. HNY. I hope you guys had a nice break

Please see the below request.

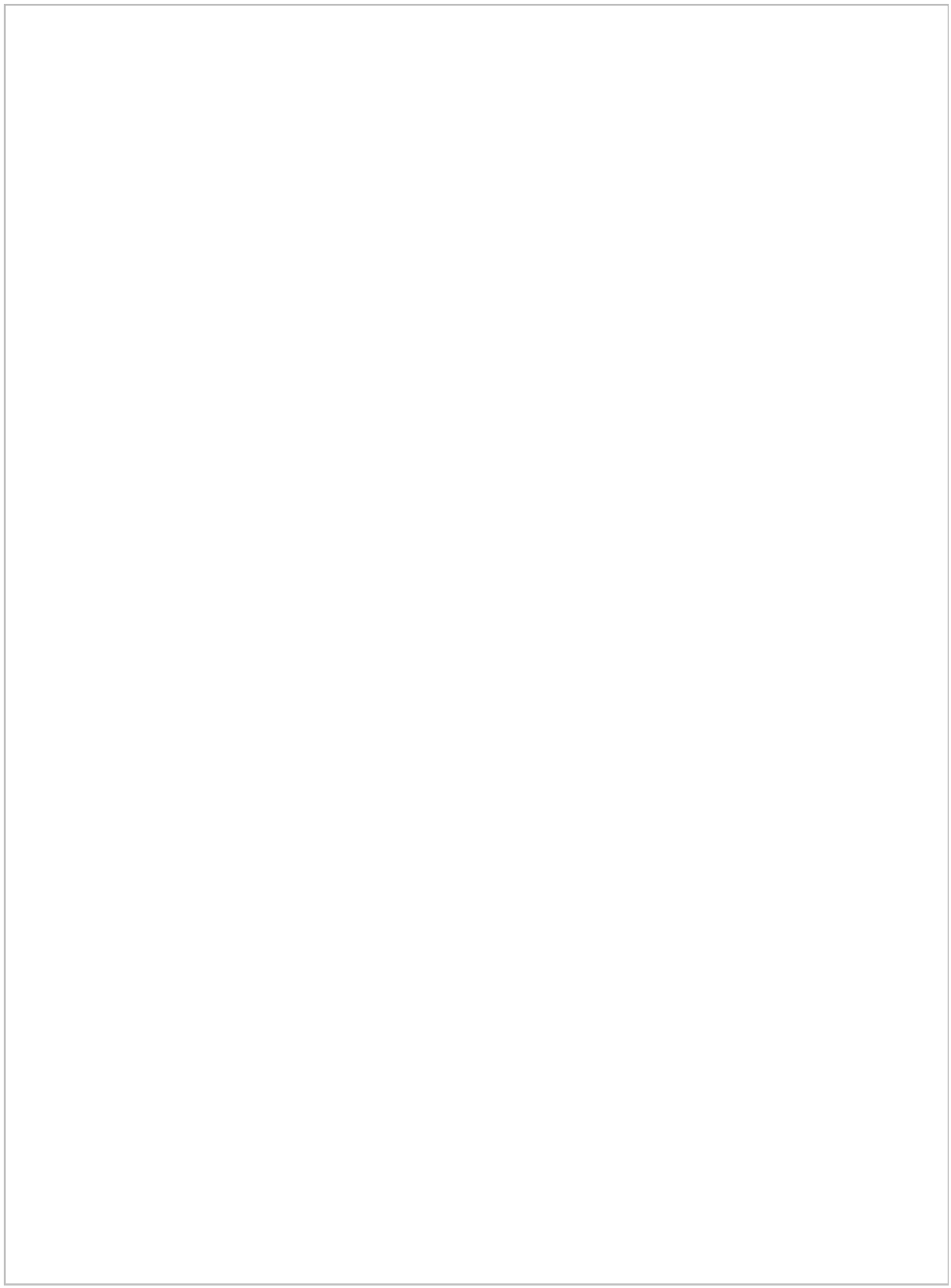
I don't believe the relocation of the drain into the Council Land is a practical solution to serve the eastern catchment above Meremere Street for the following reasons.

The drain previously ran through the middle of the site a number of years ago and then was diverted towards the boundary of the property (I don't think there was any consenting to move it) The existing drain is already approx 3m deep in the north eastern corner of the property (See the eastern section of the drain in the Cuttriss plans included in the attached email) and based on the below contours any further relocation further to the north will make the drain even deeper and therefore not feasible

The eastern Meremere catchment could be piped through the development however there is still the runoff from the larger north eastern catchment to contend with as well as the runoff from the hillside. I'll have to have a look on site to confirm where the north eastern catchment connects into the northern drain. If it is near the eastern end then it to is probably best piped through the subdivision and then a small swale type drain can be installed to collect the runoff from the hillside, or potentially just collect this runoff in the individual house drains.



A possible option is to pipe the stormwater through the site as indicated below. The applicant will need to consult GWRC to see the ramification of piping /moving and filling in the drain. Secondary flow paths for a piped network will also be a consideration



Another option is to leave the drain where it is however form memory (based on an inspection a number of years back) I think the banks are quite steep and a little unstable and maintenance will be an issue. If the drain were to remain I think potentially Council may have to take over the maintenance of it and then we would require a 3m plus easement for access, depending on bank stability issues. Obviously this option dramatically reduces the potential yield

I assume wastewater mitigation will apply given the downstream wastewater capacity issues

Stormwater neutrality in a 1 in 10 and 1 in 100 years is also likely to apply due to downstream flooding issues

Water sensitive urban design requirements will also be required because they are creating a new road. One thing we will need to check is whether or not the area they are providing for WSUD is sufficient for the proposed development in accordance with the Wellington Water WSUD design guide

Do you have any recommended floor levels for this area?

Please comment on the above, including any water supply issues/requirements for this area.

Regards

[redacted]

[redacted]
Senior Subdivision Engineer

Hutt City Council, 30 Laings Road, Private Bag 31912, Lower Hutt 5040, New Zealand
T [redacted]. M [redacted]. W www.huttcity.govt.nz

From: [redacted]@arassociates.co.nz]
Sent: Wednesday, 20 January 2021 12:20 PM
To: [redacted]
Cc: [redacted]@aprotean.co.nz); [redacted]
Subject: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation

Morning [redacted]

Thank you for your time on the phone yesterday to discuss the proposal at 106 Mohaka Street - a 61 unit development. Scheme plan attached for your reference.

As noted, we had a pre-application meeting with [redacted] yesterday to discuss the development proposal; unfortunately due to the short notice however, there was no Council engineering representation present to discuss our engineering related solutions.

There is an existing stormwater drain within the northern portion of the subject site which conveys stormwater runoff from the upstream catchment from the north towards the existing channel to the west of the site. In order to render the proposed development feasible we would require to access the land occupied by the stormwater drain.

The location of this existing drain currently compromises the site by significantly reducing the developable area. Additionally the existing drain is at near conveyance capacity and does not provide adequate freeboard to the surrounding properties.

As such we are proposing to relocate the drain beyond the property boundary to the north, within Councils reserve space such to replicate and improve upon the hydraulic characteristics of the current arrangement. Given the proposed works are within Councils' land, we are keen to understand Councils view point of the above proposal.

We believe this approach is the best outcome for Council and the Developer given the reasons listed below:
Reduced flooding risks to proposed properties by improving the conveyance capacity as part of the realignment
By replicating the current arrangement of above-ground stormwater conveyance, we are mimicking the hydraulic and hydrological characteristics of the stormwater system
Having the conveyance system above ground in comparison to below ground presents access and maintenance benefits, in the short and long term
Health and safety improvements – Existing channel side slopes are hazardous due to extremely steep (in excess of 1:0 5) New channel would provide mild side slopes of 1:2 or 1:3 respectively
Reduced water depth – wider channel reduced the peak flow depth in the channel hence reducing the DxV
Restoration of native planting - gives an opportunity to restore native planting along boundary hence improving the natural habitat
Reduced bank Erosion and sedimentation – sediment yield reduction, existing channel banks are steep and prone to erosion

Alternative solution is to pipe the channel under the proposed road, however we feel this solution is the less appropriate outcome and it comes with an array of long term operations and maintenance issues; flow conveyance issues as well as safety concerts.

Given the above, we believe that the best practicable solution for this project is to re-align the channel.

Keen to get in front of you soon to discuss this further and hear your thoughts.

Regards,

[redacted]

[redacted]

Producing the best professionals in our field.

AR & Associates Ltd
Level 3 Building 8 5 Mile Centre
28 Grant Road Frankton
Queenstown 9371
m.[redacted]
www.arassociates.co.nz

Wellington Water

MEMO

TO [redacted]

COPIED TO

FROM [redacted]

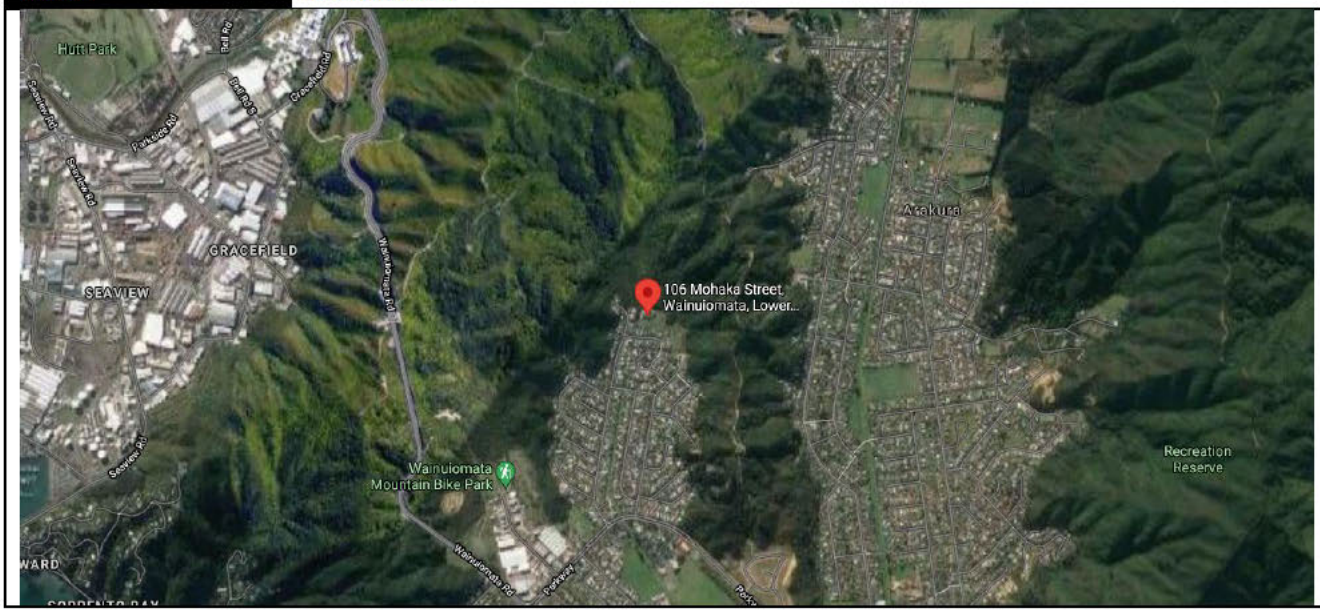
DATE 1/07/2021

SUBJECT Response to Land Development Enquiry for 106 Mohaka St

FOR YOUR INFORMATION

Asset impact assessment

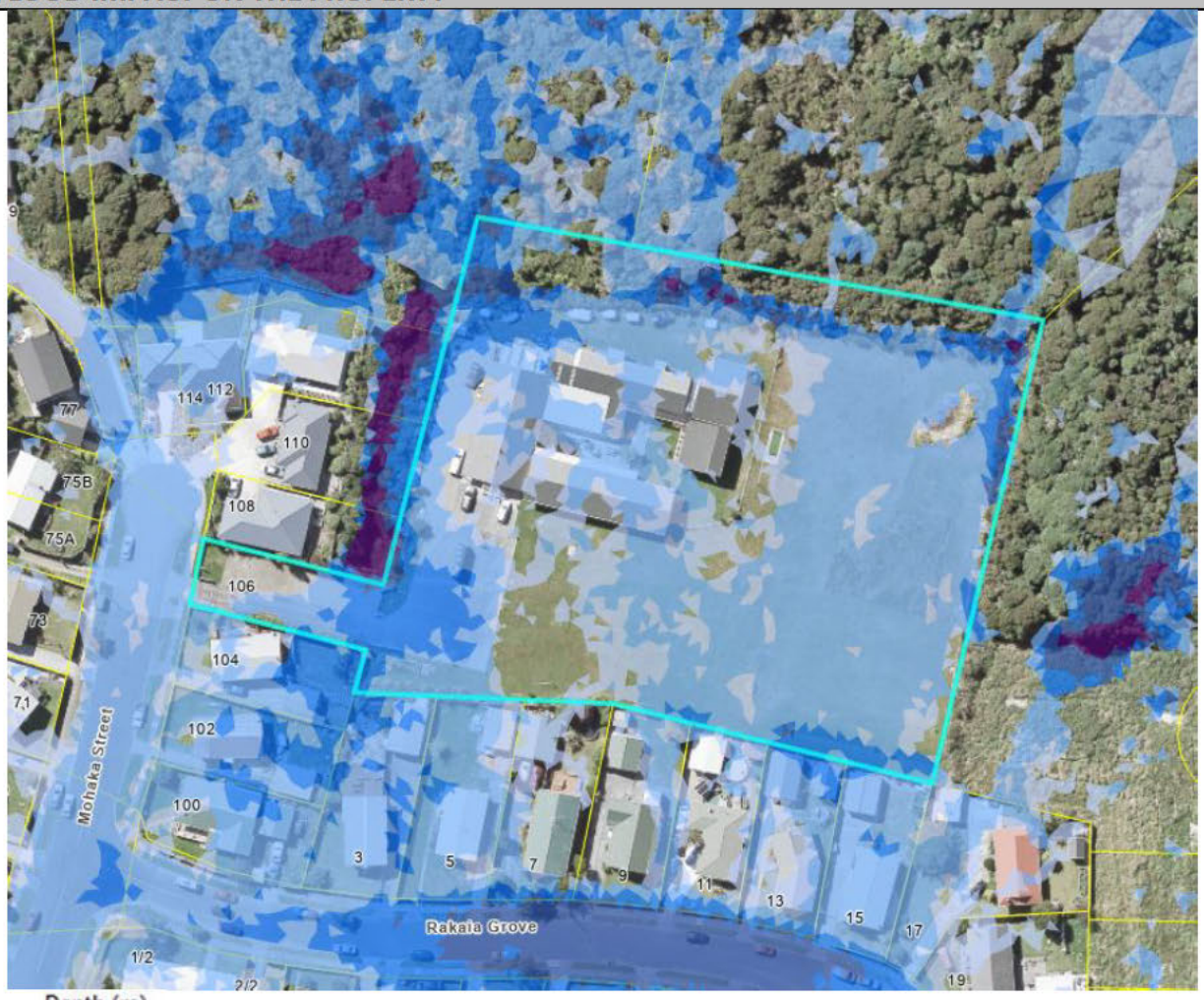
SITE DETAILS	
Address	106 Mohaka Street, Wainuiomata
Source	Email dated 1 July 2021
Type	Development enquiry
Reference	
Asset	Stormwater



DISCLAIMER
Hazard Classification and Flood Depth data is derived from Wellington Water models. Mapped flooding information may not be survey-accurate, and is bound by the model assumptions and limitations. Care should be taken that information is verified as part of any flood risk analysis, concept or detail design

FLOODING RESULTS	
Software	InfoWorks ICM
Model	Wainuiomata
Model Status	Validated
Flood Scenario	100 year ARI + Climate Change (assuming 2.1 C temperature increase)
Sea Water Level	2.1 m aMSL
Vertical Datum	Wellington 1953

FLOOD IMPACT ON THE PROPERTY



Maximum Flood Depth	1.2m
Maximum Water Level	107.1m aMSL
Minimum Water Level	104.6m aMSL
Overland Flow	2m/s

RECOMMENDATIONS	
Minimum Floor Level (including 200 mm Freeboard)	Water level and water depth varies significantly over the site; in the absence of building location, minimum floor level is recommended to be set to 107.3m aMSL or FGL + 1.4 m whichever is more convenient. More specific floor levels can be provided if building locations are given. (Minimum floor level provided is quoted to the underside of the concrete slab or floor timber joist.)
Overland Flow	The site is sitting on top of a potential overland flow path. We recommend that development is made on piles with care taken to avoid abstraction of flow with cladding.

From:
To: [redacted]
Subject: FW: 106 Mohaka street , wainuiomata - WW Pre-app Advice - 29 June 2021
Date: Thursday, May 4, 2023 1:02:31 PM
Attachments: image001.png
image004.gif
image005.jpg
image006.png
image002.jpg
image003.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@wellingtonwater.co.nz> **On Behalf Of** Modelling Team
Sent: Thursday, July 1, 2021 4:00 PM
To: [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka street , wainuiomata - WW Pre-app Advice - 29 June 2021

Hi [redacted]

Assessment for this query is here:
[redacted]

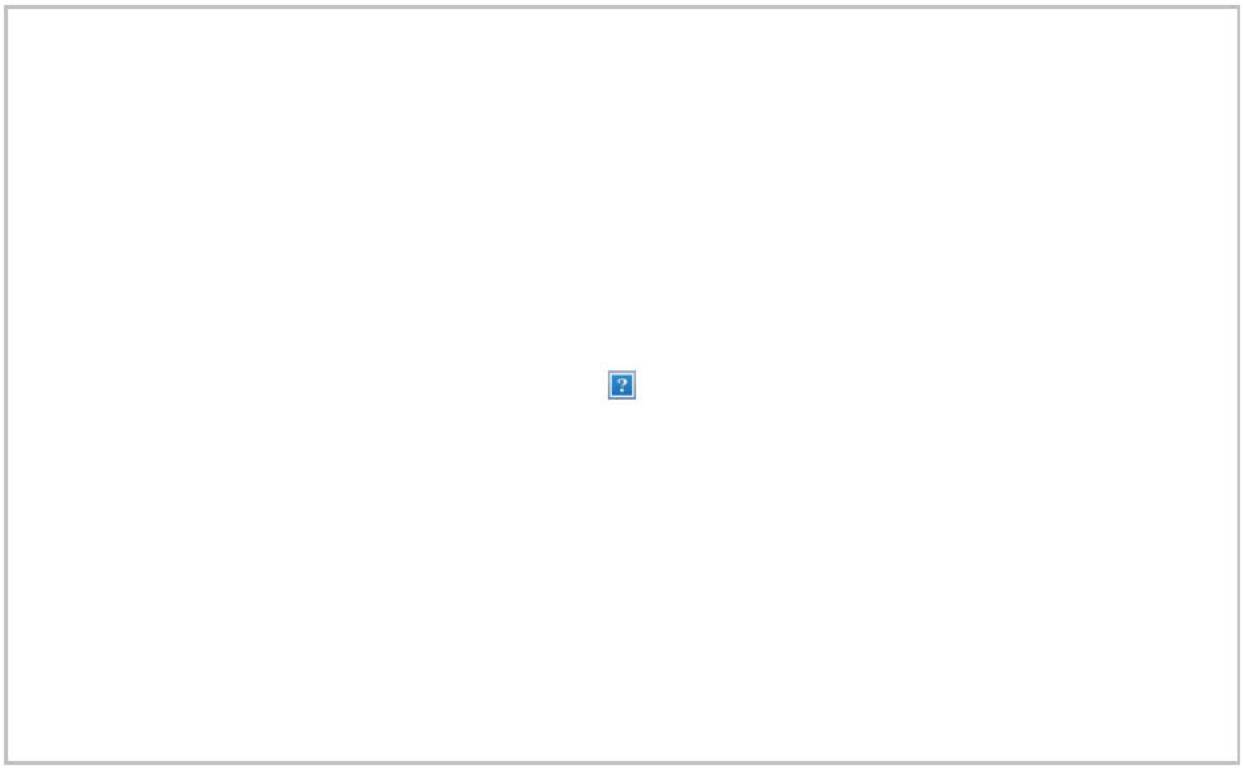
Regards
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Tuesday, 29 June 2021 4:05 pm
To: Modelling Team <Modelling.Team@wellingtonwater.co.nz>
Subject: FW: 106 Mohaka street , wainuiomata - WW Pre-app Advice - 29 June 2021

(Stormwater)

Hi Team

Please provide stormwater modelling info for this site below:



Thanks
[redacted]

[redacted] Senior Engineer - Land Development
Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council
We manage their drinking water, wastewater and stormwater services

---

From: [redacted]@wellingtonwater.co.nz> **On Behalf Of** Land Development
Sent: Monday, October 5, 2020 5:59 PM
To: [redacted]@gmail.com>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: 106 Mohaka street , wainuiomata - WW Pre-app Advice - Response - 5/10/2020

Good afternoon [redacted]

Wastewater

The current site will connect to local network at manhole 710007R00929 on the premises of the site. This part of the local network discharges to the trunk network at the Wise Park pump station (PS454) in Rata St. This local network is of varying capacity with the first 1050m having generally at least 5 to 10 litres/sec of spare design capacity during a 1-year LTD design event. From this point on (i.e. the last approx. 1000m) the model shows that the local

network is generally over its design capacity with some surcharging occurring during a 1-year LTS design event. Nevertheless, no overflows are predicted. Hence further development of this property should be treated with caution.

Based on our guideline for wastewater connections where 3 or more additional lots are being created and where there is lack of capacity wastewater mitigation would be required. In this case the overflow is at a constructed overflow , and hence the significance of that overflow needs to be taken into account. As the frequency and level of overflow is unknown and other proposed development has not been taken into account, at this stage **Wastewater Mitigation is not required.** However as this information is not static and depending on the timing of your development this requirement may need to be revised.
This assessment is based on the results from WWL hydraulic models. It does not take into account the impact on the spare design capacity of other developments that have occurred since then, are currently underway, or possible future developments. Non-hydraulic parameters like pipe age, conditions and likelihood of their failure have not been assessed. Flow monitoring may be required to verify these results.

Water Supply

The model shows that minimum pressure at the point of supply on the public main is expected to be about 65-70m, which meets the level of service criteria for pressure. The model also indicates that available fire flow capacity from the existing hydrant(s) is expected to be compliant with the NZ Fire code for residential areas. (FW2).

This modelling assessment only represents the existing network based on WWL hydraulic model developed in 2015. This takes no account of other developments that occurred since then or currently underway. Non-hydraulic parameters like pipe age, conditions and likelihood of their failure have not been assessed. Please also note the above are just the result of WWL hydraulic model and may need to be verified in the field through pressure logging and hydrant flow tests.

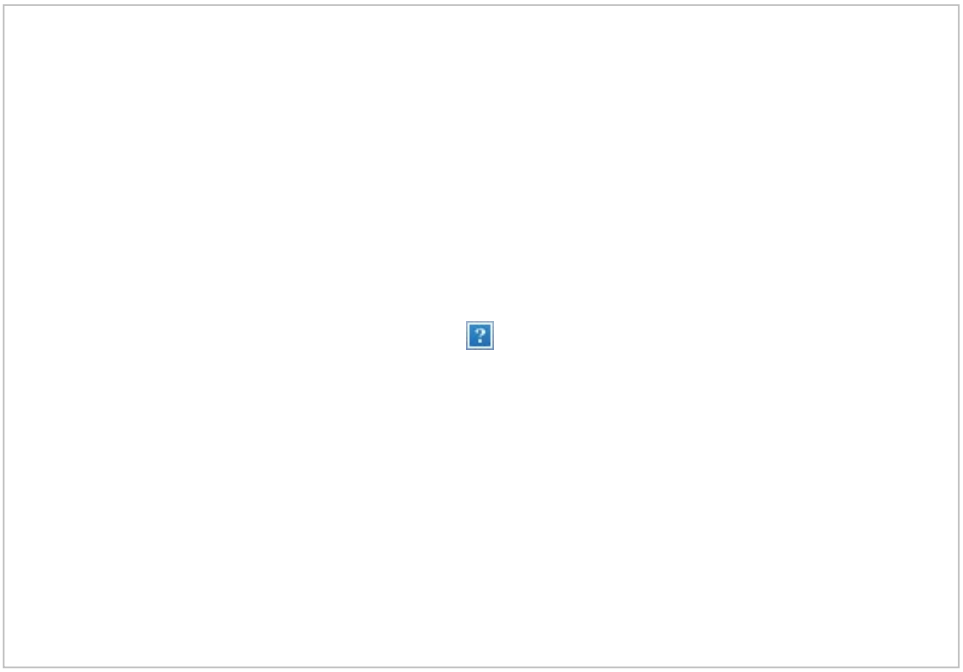
Stormwater

- Unfortunately this area is not represented in our Wainuiomata model which mainly focusses on the main flooding zones in the lower areas of the town. The overland flow path layer shown in the figure below suggests that the main flow paths originating in the hills go around the property on its West and its East boundary.

- As our model does not include this area we recommend that a catchment analysis be carried out to determine minimum floor levels and confirm overland flow paths – this is to ensure the proposed development will be constructed above possible flood levels and

outside of any secondary flow path. It is also recommended that you contact GWRC to ascertain whether or not they have any information regarding flooding in this area.

- As per plan change 43, stormwater neutrality will be require.



Thanks

[redacted]

From: [redacted]@gmail.com>
Sent: Friday, 25 September 2020 4:24 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: Re: 106 Mohaka street , wainuiomata - Pre-app - WW Response - 25/9/2020

Hi [redacted]
not entirely clear yet as there are a range of options from medium density 300's with around 20 sections or perhaps simpler with 7 much larger sections on the L shaped portion outside the existing buildings (we still need to live somewhere and its nice there)

thanks
[redacted]

On Fri, Sep 25, 2020 at 2:50 PM Land Development <Land.Development@wellingtonwater.co nz> wrote:

> Good afternoon [redacted] – can you please say the scale of development you are looking at?
>
> Thanks
>
> [redacted]
>
> **From:** [redacted]@gmail.com>
> **Sent:** Thursday, 24 September 2020 4:34 PM
> **To:** Land Development <Land.Development@wellingtonwater.co.nz>

Cc: [redacted]@outlook.com>
Subject: flooding modelling data for the Mohaka street area, wainuiomata

Hi [redacted]

We have been in contact before on other issues but this one has nothing to do with my Huttcity Council role :)

My wife and I own 106 Mohaka Street, a residentially zoned former school site of around 10500 sqm as per aerial below. We are looking at development options and wonder if there is any data Wgtn water can provide as to flooding potential and minimum floor heights ?

We are also interested in any considerations in terms of wastewater and water supply system constraints

thanks
[redacted]
106 Mohaka Street
Wainuiomata
[redacted]

image.png

From: [redacted]
To:
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 1 June 2021
Date: Thursday, May 4, 2023 1:02:48 PM
Attachments: image010.gif
image012.jpg
image013.jpg
image014.jpg
image015.jpg
image016.jpg
image017.jpg
image018.jpg
image019.jpg
image020.jpg
image001.jpg
image002.jpg
image003.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804 Wellington Mail Centre 5045
Level 4 25 Victoria Street Petone Lower Hutt

From [redacted]@wellingtonwater.co.nz> **On Behalf Of** Modelling Team
Sent: Wednesday, June 2, 2021 10:32 AM
To: Land Development <Land.Development@wellingtonwater co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 1 June 2021

Hi [redacted]

I think the developer should assess the impact of the earth works on the flood extent. We cannot recommend minimum floor levels at this stage as we expect that the proposed earth works would significantly alter levels on site. Also the development may change the flow across the site resulting in lesser flow from site to some neighbouring properties and greater flow to others which would not be acceptable to those neighbours that would receive more flow.

We can recommend the following modellers who we often work with:

[redacted]@stantec com

[redacted]@ghd.com

[redacted]@awa.kiwi

[redacted]@jacobs.com

Kind Regards

[redacted]

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Tuesday, 1 June 2021 9:41 AM
To: Modelling Team <Modelling.Team@wellingtonwater co.nz>
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 1 June 2021

(Stormwater only)

Hi Team

Cut and fill is proposed at this site (please refer to the attachment). Please provide stormwater modeling assessment, and confirm if cut and fill is likely to affect any neighboring properties, if further modelling assessment is required by the applicant.

Thanks
[redacted]

[redacted] **Senior Engineer - Land Development**

Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From [redacted]@huttcity govt.nz>
Sent: Monday, May 31, 2021 4:48 PM
To: Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@wellingtonwater co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 5 Mar 2021

Hi [redacted]

I am processing an earthworks consent for this one (see attached) at 106 Mohaka. They are proposing 810m3 cut and 545m3 fill over a combined face area of 5850m2. Could you advise if you have any concern with the potential displacement of floodwaters resulting from the proposal? I wasn't sure if this was covered by the previous advice.

Kind regards,

[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity govt nz

From: Land Development [mailto:Land Development@wellingtonwater.co.nz]
Sent: Friday, 5 March 2021 3:39 PM
To: [redacted]
Cc: [redacted]
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 5 Mar 2021

Hi [redacted]

Please find the following wastewater modelling summary regarding the proposed development. Based on the assessment, wastewater mitigation is required for this site.

There are 61 dwellings planned that represents a significant increase.
The PWWF estimated by the developer is in accordance with the Regional Standard
The model predicts that the addition of the development PWWF is predicted to have the following impact on the local network during a 1-year LTS design flow
Increased surcharging (by up to 0.5m) in approximately 47% of the downstream local network. Increased surcharging in parts of the local network catchment that the property is located in. An overflow of about 11m3 is predicted at manhole 71001R00908 (i.e. a non-engineered overflow) that currently is not predicted to overflow.

This assessment is based on the results from WWL hydraulic models. It does not take into account the impact on the spare design capacity of other developments that have occurred since then, are currently underway, or possible future developments (e.g. 80 Meremere St and 80 Parkway). Non-hydraulic parameters like pipe age, conditions and likelihood of their failure have not been assessed. Flow monitoring may be required to verify these results. This development may impact on the spare design capacity available for possible future developments along the downstream network.

Thanks

[redacted]

[redacted] Senior Engineer - Land Development

Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
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From: [redacted]@arassociates co nz>
Sent: Friday, 26 February 2021 12:33 PM
To: [redacted]@arassociates co nz>; [redacted]@wellingtonwater co nz>; [redacted]@huttcity govt nz>
Cc: [redacted]@huttcity govt nz>; [redacted]@huttcity govt nz>; Land Development <Land Development@wellingtonwater co nz>; [redacted]@wellingtonwater co nz>; [redacted]@wellingtonwater co nz>; [redacted]@arassociates co nz>
Subject: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl

Good day [redacted]

Following [redacted] email below please find attached engineering plans for the overland flow path diversion channel.
Just wondering has the team manage to run the WW network model based on the flow rates provided earlier?

Have a great weekend.

Kind regards,

[redacted]
BE (Civil)
[redacted]

AR & Associates Ltd
Building 8, Level 3
36 Grant Road, Frankton
Queenstown 9300
M: [redacted]
www.arassociates.co.nz

From [redacted]@arassociates.co.nz>
Sent: Tuesday, 23 February 2021 11:24 am
To: [redacted]@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>
Cc [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021

[redacted]

Thank you for your time on the phone earlier this morning. Much appreciated!

Key points from discussion noted below...

Wastewater:
Wellington Water will complete their modelling assessment of the downstream network to confirm what mitigation requirements, if any, the subject site is constrained to This information is expected today/tomorrow

Stormwater:
Civil Engineer will provide updated package to include:
Cross sections through proposed cut off drain
Calculations to confirm 100 year peak flow into drain
Level of 100 year stormwater flow in cut-off drain to confirm the drain has sufficient capacity
Catchment plan showing contributing catchment size
Geotech Engineer to provide a memo confirming the following:
Batter slope stability as proposed in the drain is appropriate
Commentary on high water table and the potential implications on the cut off drain

[redacted] we will look to get the updated information to you shortly.

Thank you. Talk soon.

[redacted]

From [redacted]@wellingtonwater.co.nz>
Sent: Monday, 15 February 2021 12:20 PM
To: [redacted]@huttcity.govt.nz>
Cc [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; [redacted]@arassociates.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021

Hi [redacted]

Please find the attached earlier comments provided by [redacted]

Regarding wastewater, due to the scale of the development has changed(originally only for 7-20 sections), the applicant will need to provide a peak flow estimate, then our wastewater modeller will confirm if mitigation is required.

Regarding stormwater, I believe a feasibility study on the drainage options should be carried out by the applicant, including all necessary geotechnical study and identification on all secondary flow paths. There are pros and cons for the 2 options mentioned in your email.

Northern side cut off drain:

This option is a preferred option for a new site. It can minimise future stormwater impact on the residents.

This cut off drain shall be designed for 100 year, to ensure less over flow across the northern side buildings. Therefore, both size of the drain and constructability shall also be evaluated.

Suitability of the proposed cut off drain shall be confirmed by a geotechnical engineer, i.e., stability of the soil, ground water table etc. Liner/riprap may be required if ground

water level is high.

Diversion pipe through the site:

A few pipe sections are proposed to go through private properties. Secondary flow arrangement shall be assessed around these locations. Total building numbers will have to be reduced to allow secondary flow path.

Cut off drain will still be required at north of each site, to reduce flow crossing these properties.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development

Tel [redacted] Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

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We manage their drinking water wastewater and stormwater services.

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Thursday, 11 February 2021 3:22 PM
To: [redacted]@wellingtonwater co.nz>
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation

From [redacted]@huttcity.govt.nz>
Sent: Wednesday, 20 January 2021 4:41 PM
To: Land Development <Land.Development@wellingtonwater co.nz>
Cc [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; [redacted]@arassociates co.nz
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation

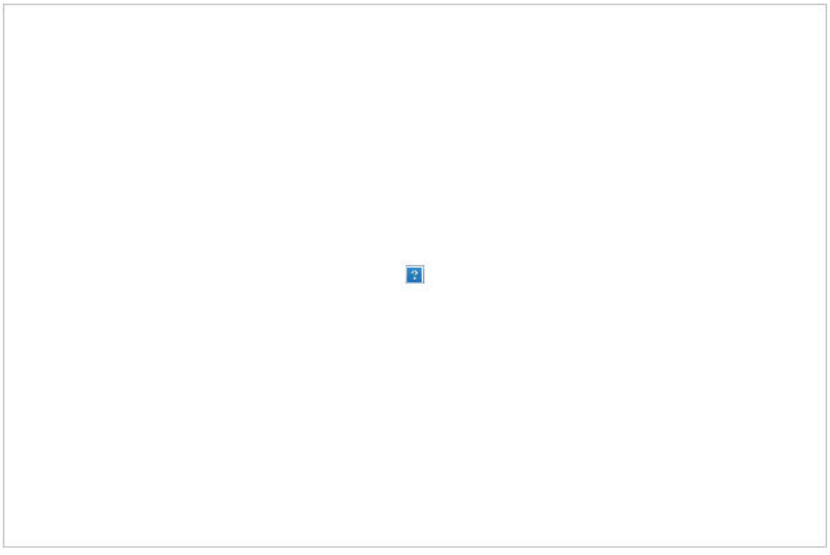
Hi Team. HNY. I hope you guys had a nice break

Please see the below request.

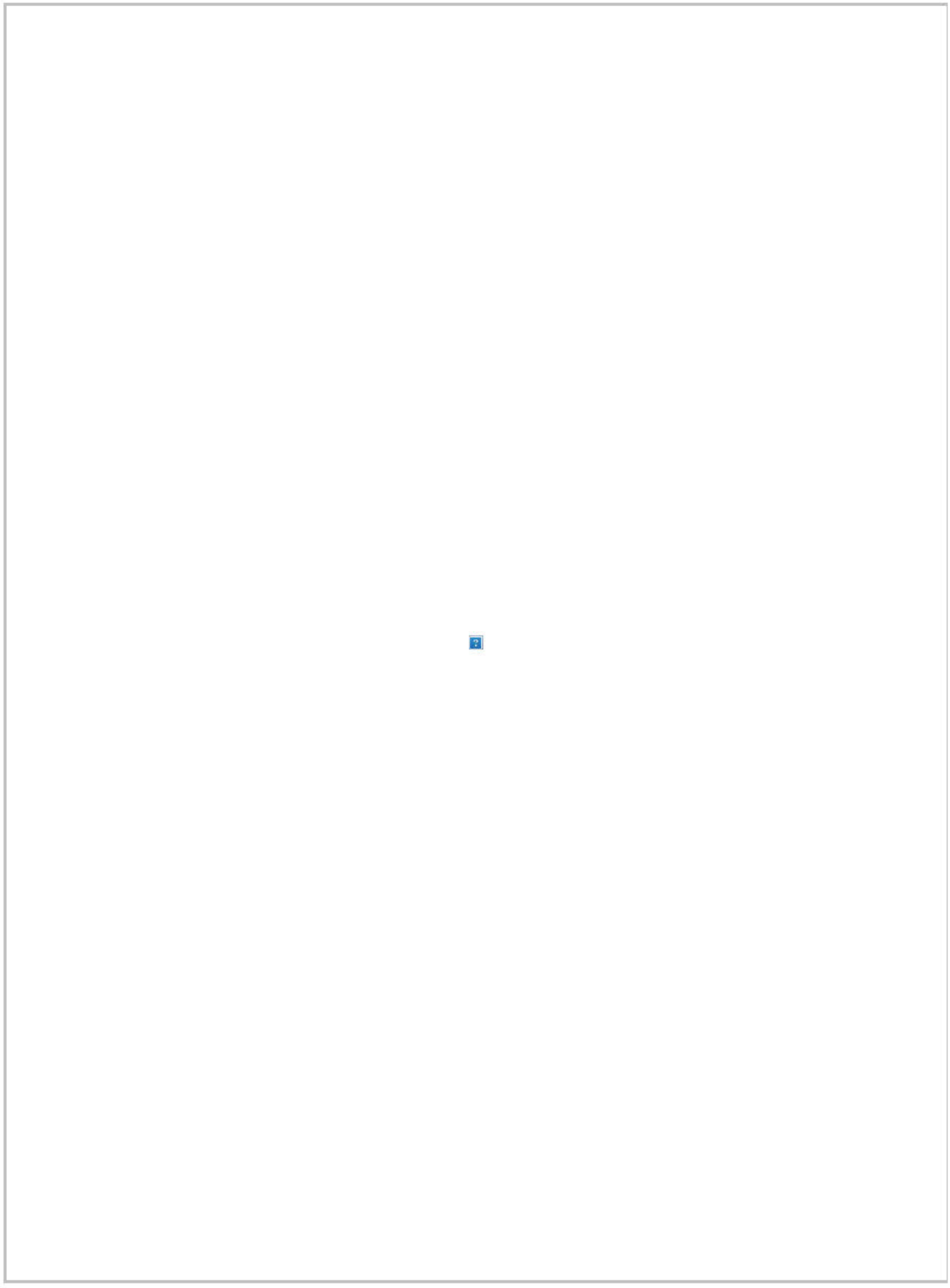
I don't believe the relocation of the drain into the Council Land is a practical solution to serve the eastern catchment above Meremere Street for the following reasons.

The drain previously ran through the middle of the site a number of years ago and then was diverted towards the boundary of the property (I don't think there was any consenting to move it) The existing drain is already approx 3m deep in the north eastern corner of the property (See the eastern section of the drain in the Cuttriss plans included in the attached email) and based on the below contours any further relocation further to the north will make the drain even deeper and therefore not feasible

The eastern Meremere catchment could be piped through the development however there is still the runoff from the larger north eastern catchment to contend with as well as the runoff from the hillside. I'll have to have a look on site to confirm where the north eastern catchment connects into the northern drain. If it is near the eastern end then it to is probably best piped through the subdivision and then a small swale type drain can be installed to collect the runoff from the hillside, or potentially just collect this runoff in the individual house drains.



A possible option is to pipe the stormwater through the site as indicated below. The applicant will need to consult GWRC to see the ramification of piping /moving and filling in the drain. Secondary flow paths for a piped network will also be a consideration



Another option is to leave the drain where it is however form memory (based on an inspection a number of years back) I think the banks are quite steep and a little unstable and maintenance will be an issue. If the drain were to remain I think potentially Council may have to take over the maintenance of it and then we would require a 3m plus easement for access, depending on bank stability issues. Obviously this option dramatically reduces the potential yield

I assume wastewater mitigation will apply given the downstream wastewater capacity issues

Stormwater neutrality in a 1 in 10 and 1 in 100 years is also likely to apply due to downstream flooding issues

Water sensitive urban design requirements will also be required because they are creating a new road. One thing we will need to check is whether or not the area they are providing for WSUD is sufficient for the proposed development in accordance with the Wellington Water WSUD design guide

Do you have any recommended floor levels for this area?

Please comment on the above, including any water supply issues/requirements for this area.

Regards

[redacted]

[redacted]
Senior Subdivision Engineer

Hutt City Council, 30 Laings Road, Private Bag 31912, Lower Hutt 5040, New Zealand
T [redacted]. M [redacted]. W www.huttcity.govt.nz

From: [redacted]@arassociates.co.nz]
Sent: Wednesday, 20 January 2021 12:20 PM
To: [redacted]
Cc: [redacted]@aprotean.co.nz); [redacted]
Subject: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation

Morning [redacted]

Thank you for your time on the phone yesterday to discuss the proposal at 106 Mohaka Street - a 61 unit development. Scheme plan attached for your reference.

As noted, we had a pre-application meeting with [redacted] yesterday to discuss the development proposal; unfortunately due to the short notice however, there was no Council engineering representation present to discuss our engineering related solutions.

There is an existing stormwater drain within the northern portion of the subject site which conveys stormwater runoff from the upstream catchment from the north towards the existing channel to the west of the site. In order to render the proposed development feasible we would require to access the land occupied by the stormwater drain.

The location of this existing drain currently compromises the site by significantly reducing the developable area. Additionally the existing drain is at near conveyance capacity and does not provide adequate freeboard to the surrounding properties.

As such we are proposing to relocate the drain beyond the property boundary to the north, within Councils reserve space such to replicate and improve upon the hydraulic characteristics of the current arrangement. Given the proposed works are within Councils' land, we are keen to understand Councils view point of the above proposal.

We believe this approach is the best outcome for Council and the Developer given the reasons listed below:
Reduced flooding risks to proposed properties by improving the conveyance capacity as part of the realignment
By replicating the current arrangement of above-ground stormwater conveyance, we are mimicking the hydraulic and hydrological characteristics of the stormwater system
Having the conveyance system above ground in comparison to below ground presents access and maintenance benefits, in the short and long term
Health and safety improvements – Existing channel side slopes are hazardous due to extremely steep (in excess of 1:0 5) New channel would provide mild side slopes of 1:2 or 1:3 respectively
Reduced water depth – wider channel reduced the peak flow depth in the channel hence reducing the DxV
Restoration of native planting - gives an opportunity to restore native planting along boundary hence improving the natural habitat
Reduced bank Erosion and sedimentation – sediment yield reduction, existing channel banks are steep and prone to erosion

Alternative solution is to pipe the channel under the proposed road, however we feel this solution is the less appropriate outcome and it comes with an array of long term operations and maintenance issues; flow conveyance issues as well as safety concerts.

Given the above, we believe that the best practicable solution for this project is to re-align the channel.

Keen to get in front of you soon to discuss this further and hear your thoughts.

Regards,

[redacted]

Producing the best professionals in our field.

AR & Associates Ltd
Level 3 Building 8 5 Mile Centre
28 Grant Road Frankton
Queenstown 9371
m [redacted]
www.arassociates.co.nz

From: [redacted]
To:
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021
Date: Thursday, May 4, 2023 1:01:12 PM
Attachments: image001.jpg
image002.gif
image003.jpg
image004.png
image005.jpg
image006.jpg
image007.jpg
P20-156-Clc01-A.pdf
image008.jpg
image009.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804 Wellington Mail Centre 5045
Level 4 25 Victoria Street Petone Lower Hutt

From [redacted]
Sent: Tuesday, March 2, 2021 12:15 PM
To: [redacted]@wellingtonwater co.nz>
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021

Hi [redacted]

Please review the peak flow calculations and confirm confirm if the downstream capacity is OK to handle the proposed peak flows.

Thanks
[redacted]

From [redacted].@arassociates.co.nz>
Sent: Wednesday, 17 February 2021 12:47 PM
To: [redacted].@wellingtonwater co.nz>; [redacted].@huttcity govt.nz>
Cc [redacted].@huttcity.govt.nz>; [redacted].@huttcity.govt.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted].@wellingtonwater co.nz>; [redacted].@wellingtonwater.co.nz>; [redacted].@aprotean.co.nz); [redacted].@aprotean.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021

Afternoon [redacted]

Please refer attached for calculation on peak wastewater flows as requested. Total Peak Wastewater Flow of 3.8L/sec anticipated from the proposed development.

Ground stability confirmation pending. Standby.

[redacted]

From [redacted]
Sent: Monday, 15 February 2021 12:52 PM
To: [redacted].@wellingtonwater co nz>; [redacted].@huttcity govt nz>
Cc [redacted].@huttcity.govt.nz>; [redacted].@huttcity.govt.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]dy@wellingtonwater co.nz>; [redacted].@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021

Hi [redacted]

Thank you for your response. Much appreciated.

We will look to provide you with the estimated peak wastewater flows shortly.

Re stormwater our preference as noted to Steve in the attached email is for the northern cut-off drain. The proposed drain has been designed to cater for the 100 year flow. We will look to provide the appropriate confirmations re stability of soil and ground water table shortly.

Give me a call with any questions.

[redacted]

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	Sheet:	11
Description:	Resource Consent Calculations	Designed:	[redacted]		
Date:	16/02/21	Checked:	[redacted]		

L **Wastewater Demand**

Proposed development WW demand
Values are taken from the RSWS V2 Table 5.1

Length of WW pipes **(proposed)**	0.314	km
Catchment Area	1.00	ha
Average Daily Water Flow **ADWG**	0.0023	L/s/person
Peaking factor **PF**	7.23	x Area^-0.2 in Ha
Infiltraton Allowance	0.25	L/s/km
Direct Inflow	0.55	L/s/km
Population	3.5	per dwelling
Population =	**213.5**	

Calculate amount of residents

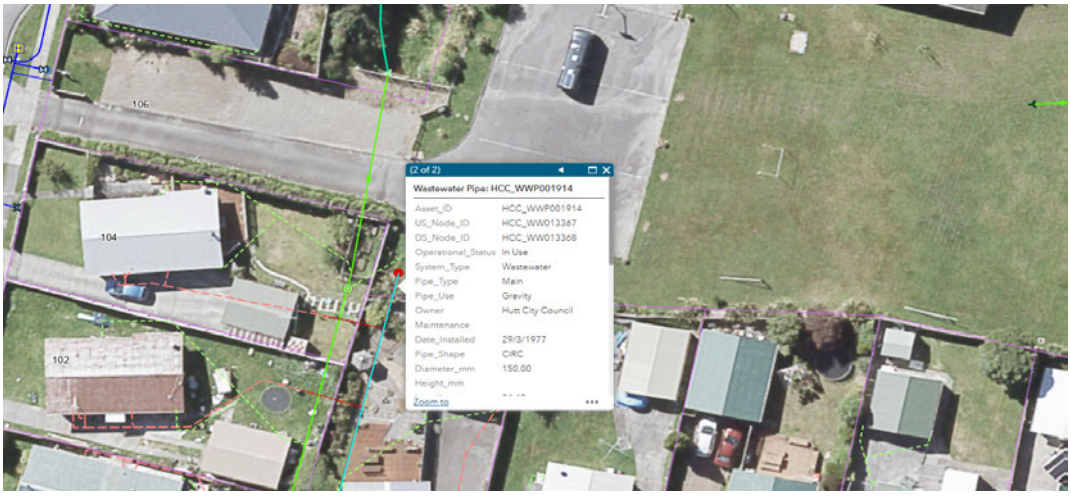
Population Equivalent	60	p/p/ha
Number of dwellings	61	
Population per dwelling	3.5	Table 5.1 (HCC)
Total Population	**213.5**	

Calculate Residential Flows

ADFW	0.49	l/s
Direct Inflow	0.1727	l/s
Infiltration	0.08	l/s
Peaking Factor	7.23	
PWWF (Peak Wet Weather Flow)	3.80	l/s

Total Peak Wastewater Flows from the proposed development **3.80** l/s

WW Pipe GIS ID & Material	***Design Flows (m^3/s)***	*Pipe Diameter (mm)*	*Colebrook-White 'k'*	*Pipe Gradient*	*Flow Velocity (m/s)*	***Pipe Capacity (m^3/s)***	*Meet Design Flow?*
PROP WW PVC	**0.004**	150	1.50	1.00%	0.87	**0.015**	Y
HCC_WWP 001914	**0.004**	150	1.50	0.76%	0.76	**0.013**	Y



From: [redacted]
To: [redacted]@huttcity.govt.nz
Cc: Subdivision; Land Development; [redacted]
Subject: RM220475 - 106 Mohaka St - Resource Consent - WWL Assessment.
Attachments: image001.png

Hi [redacted]

Understanding and Background.
I understand the request below to relate to:

- Subdivision of Lot 53 and 54 (to be created under RM210328) to create 10 residential allotments with amalgamated parking spaces, access and shared recreation areas.
- Land Use for the construction of 10 residential units,
- S127 change of condition associated with RM210328.

I understand that Lots 53 and 54 have not yet been created – ie s224 for RM210328 has not yet been achieved.

WWL Assessment
RM210328 assumed 10 residential units would be constructed on Lots 53 and 54.

I do not have access to the final approved plans under RM210328 however overlay of the scheme plan for the 10 residential lots appears to match the previous approved scheme plan – does not change any boundaries. I would recommend checking this.

The servicing for these 10 residential lots was assessed under RM210328.

A site specific flood assessment was prepared for the site and FFL requirements for Lots 53 and 54 were assessed under RM210328. Condition 39 of RM210328 sets Finished Floor Levels (to the underside of the floor construction and / or timber joists) of 106.77. There is no information in the AEE or scheme plan provided to WWL regarding the site levels, finished floor levels. The applicant should be asked to confirm that there are no GL changes over those approved under RM210328 and that FFL's for the new buildings comply with condition 39 of RM210328.

As RM210328 has not been enacted all servicing conditions on RM210328 need to be transferred to RM220475 or a condition provided stating that s224 for RM220475 and Code of Compliance or Occupation of the LU cannot be achieved until s224 for RM210328 has been achieved.

Please let me know if you would like me to review the exact conditions.

Change of Conditions
The applicant is seeking to change condition 69 relating to building heights – WWL have no comment regarding this proposed change.

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team

m [redacted]

From: Subdivision <Subdivision@huttcity.govt.nz>
Sent: Thursday, 16 February 2023 12:19 pm
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RM220475 - 106 Mohaka St - WWL Comments Request

Hi [redacted]

Kindly please assist with three waters comments and flood assessment for the above resource consent.

Many thanks

Ngā Mihi | Kind regards,
[redacted]
Engineering Technician
Hutt City Council, 30 Laings Road, Lower Hutt 5040
W: www.huttcity.govt.nz

From: [redacted]
To:
Subject: FW: Servicing constraints - 106 Mohaka Street, Wainuiomata
Date: Thursday, May 4, 2023 1:02:00 PM
Attachments: 106 Mohaka street wainuiomata - WW Pre-app Advice - Response - 5102020.msg
image001.gif
image004.jpg
image002.jpg
image003.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted] **On Behalf Of** Land Development
Sent: Tuesday, October 13, 2020 4:37 PM
To: [redacted]@urbanedgeplanning.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: Servicing constraints - 106 Mohaka Street, Wainuiomata

Hi [redacted]

Please find the attached earlier response.

Thanks
[redacted]

[redacted] **Senior Engineer - Land Development**
Tel [redacted] **Mob** [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@urbanedgeplanning.co.nz>
Sent: Tuesday, 13 October 2020 1:56 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: Servicing constraints - 106 Mohaka Street, Wainuiomata

Good afternoon,

Our client is wanting to develop the above site and construct up to 70 dwellings on site. Could you please let us know what the servicing constraints will be?

Kind regards

[redacted]

Job Manager

Ph [redacted] (Please note new temporary number from 12/10/2020)

[redacted]@urbanedgeplanning.co.nz

Please note my hours are Mon & Wed 9-5, Tues, Thur & Fri 9-2

Bouverie Business Centre (BBC)

Suite 1, 5 Bouverie Street, Petone

PO Box 39071, Wellington Mail Centre, Lower Hutt 5045

From: [redacted]
To: [redacted]
Cc: [redacted]@aprotean.co.nz; [redacted]
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021
Date: Friday, February 19, 2021 1:10:06 PM
Attachments: image001.png
image003.jpg
image004.gif
image005.jpg
image006.png
image007.jpg
image008.jpg
image010.jpg
image009.jpg
image011.png

Hi [redacted]
Please note that the ground water table is 0.7m b.g.l. The soil at the top 1m contains some loose/soft material. For resources consent stage, please consider slope of 3H:1V with riprap.
Cheers,

[redacted]
M [redacted]
Plimmer Towers, Level 18, 2-6 Gilmer Tce 6011
[redacted]@engeo.co.nz http://www.engeo.co.nz/

From [redacted]@arassociates.co.nz>
Sent: Thursday, February 18, 2021 9:20 PM
To: [redacted]@aprotean.co.nz; [redacted]@engeo.co.nz>; [redacted]@arassociates.co.nz>
Cc [redacted]@engeo.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021
Hi [redacted]
A follow up on the below request please.
[redacted]

From [redacted]
Sent: Wednesday, 17 February 2021 2:12 PM
To [redacted]@aprotean.co.nz; [redacted]@engeo.co.nz>; [redacted]@arassociates.co.nz>
Cc: [redacted]@engeo.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021
Hi [redacted]
We need confirmation from a geotech re stability of soil and ground water table relating to the Mohaka site in response to Wellington Waters query as noted below.
Can you give me a call when you can to discuss please?
[redacted]

From [redacted]@aprotean.co.nz>
Sent: Wednesday, 17 February 2021 1 04 PM
To: [redacted]@arassociates.co.nz>; [redacted]@engeo.co.nz>; [redacted]@arassociates.co.nz>
Cc [redacted]@engeo.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021
H [redacted]
Can you please liaise with ARAL on the below. This will probably tie into my liquefaction queries last week.
Kind Regards

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From [redacted]@arassociates.co.nz>
Sent: Wednesday, 17 February 2021 12:48 pm
To: [redacted]@aprotean.co.nz) [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021
Can we get confirmation from greotech?

From [redacted]
Sent: Monday, 15 February 2021 12:52 PM
To: [redacted]@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>
Cc [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; Land Development <Land Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl - 15 Feb 2021
Hi [redacted]
Thank you for your response. Much appreciated.
We will look to provide you with the estimated peak wastewater flows shortly.
Re stormwater our preference as noted to [redacted] in the attached email is for the northern cut-off drain. The proposed drain has been designed to cater for the 100 year flow.
We will look to provide the appropriate confirmations re stability of soil and ground water table shortly.
Give me a call with any questions.

[redacted]
Logo for documents
Producing the best professionals in our field.
AR & Associates Ltd
Level 1 193 Main Road
Tawa Wellington
m [redacted]
www.arassociates.co.nz

From [redacted]@wellingtonwater.co.nz>

From: [redacted]
To:
Subject: FW: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 2 Mar 2021
Date: Thursday, May 4, 2023 1:01:43 PM
Attachments: image001.gif
image002.png
image003.jpg
image004.png
image005.jpg
image006.jpg
image007.jpg
image008.jpg
image009.jpg
259f0723-fe20-4895-9b38-7f89d8d69399.png
P20-156-Clc01-A.pdf
image010.jpg
image011.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804 Wellington Mail Centre 5045
Level 4 25 Victoria Street Petone Lower Hutt

From [redacted]@arassociates co.nz>
Sent: Tuesday, March 2, 2021 12:35 PM
To: Land Development <Land.Development@wellingtonwater co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 2 Mar 2021

Hi[redacted]

WW Calculation sheet attached. Let me know if you need anything else!

Kind regards,

[redacted]
BE (Civil)
[redacted]

AR & Associates Ltd
Building 8, Level 3
36 Grant Road, Frankton
Queenstown 9300
M:[redacted]
www arassociates co nz

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Tuesday, 2 March 2021 11:38 am
To:[redacted]@arassociates.co.nz>
Subject: RE: 106 Mohaka Street, Wainuiomata - Existing stormwater drain relocation-wwl- 2 Mar 2021

Hi[redacted]

I couldn't find your calculations regarding the peak flow estimate. Can you forward me a copy? Our modeller would like to see if the estimate is consistent with the current model (Based on Regional Standard).

Thanks
[redacted]

[redacted] **Senior Engineer - Land Development**

Tel [redacted] Mo [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www wellingtonwater co nz

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	Sheet:	11
Description:	Resource Consent Calculations	Designed:	[redacted]		
Date:	16/02/21	Checked:	[redacted]		

L **Wastewater Demand**

Proposed development WW demand
Values are taken from the RSWS V2 Table 5.1

Length of WW pipes **(proposed)**	0.314	km
Catchment Area	1.00	ha
Average Daily Water Flow **ADWG**	0.0023	L/s/person
Peaking factor **PF**	7.23	x Area^-0.2 in Ha
Infiltraton Allowance	0.25	L/s/km
Direct Inflow	0.55	L/s/km
Population	3.5	per dwelling
Population =	**213.5**	

Calculate amount of residents

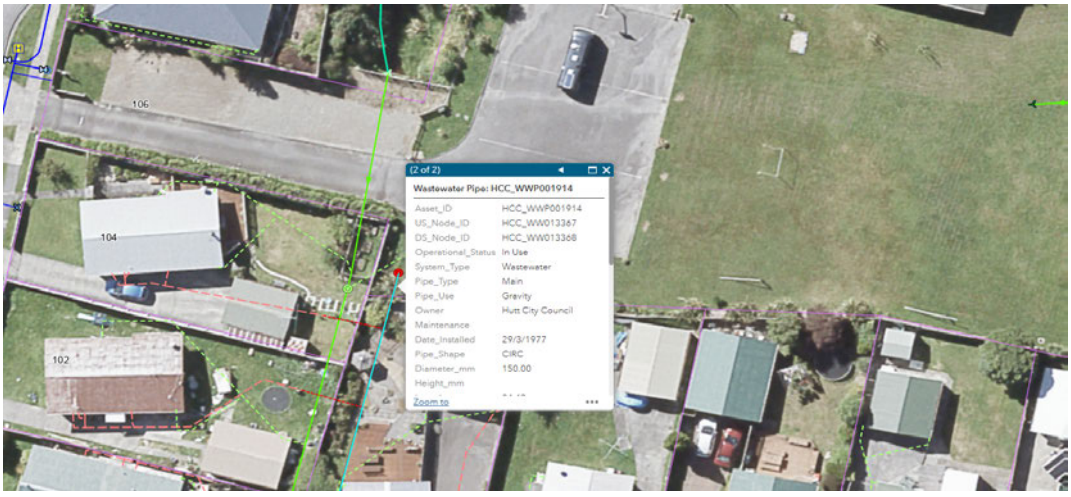
Population Equivalent	60	p/p/ha
Number of dwellings	61	
Population per dwelling	3.5	Table 5.1 (HCC)
Total Population	**213.5**	

Calculate Residential Flows

ADFW	0.49	l/s
Direct Inflow	0.1727	l/s
Infiltration	0.08	l/s
Peaking Factor	7.23	
PWWF (Peak Wet Weather Flow)	3.80	l/s

Total Peak Wastewater Flows from the proposed development **3.80** l/s

WW Pipe GIS ID & Material	***Design Flows (m^3/s)***	*Pipe Diameter (mm)*	*Colebrook-White 'k'*	*Pipe Gradient*	*Flow Velocity (m/s)*	***Pipe Capacity (m^3/s)***	*Meet Design Flow?*
PROP WW PVC	**0.004**	150	1.50	1.00%	0.87	**0.015**	Y
HCC_WWP 001914	**0.004**	150	1.50	0.76%	0.76	**0.013**	Y



From: [redacted]
To:
Subject: FW: 106 Mohaka street , wainuiomata - Request for Modelling Info - WS
Date: Thursday, May 4, 2023 1:00:51 PM
Attachments: image001.jpg
image002.png
image003.png

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, October 5, 2020 4:25 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka street , wainuiomata - Request for Modelling Info - WS

Hi [redacted]

The model shows that minimum pressure at the point of supply on the public main is expected to be about 65-70m, which meets the level of service criteria for pressure. The model also indicates that available fire flow capacity from the existing hydrant(s) is expected to be compliant with the NZ Fire code for residential areas. (FW2).

This modelling assessment only represents the existing network based on WWL hydraulic model developed in 2015. This takes no account of other developments that occurred since then, currently underway, or future developments. Non-hydraulic parameters like pipe age, conditions and likelihood of their failure have not been assessed. Please also note the above are just the result of WWL hydraulic model and may need to be verified in the field through

pressure logging and hydrant flow tests.

Regards,
[redacted]

[redacted] Senior Modeller

Tel [redacted] DDI [redacted] Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045

Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

From: [redacted]@wellingtonwater.co.nz> **On Behalf Of** Land Development
Sent: Tuesday, 29 September 2020 2:39 PM
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Cc: Modelling Team <Modelling.Team@wellingtonwater.co.nz>
Subject: 106 Mohaka street , wainuiomata - Request for Modelling Info

Good afternoon – can I please have some modelling advice for this site possible up to 20 lots.

When you reply can you put WS OR SW or WW at the end of the subject line.

Thanks

[redacted]

From: [redacted]@gmail.com>
Sent: Friday, 25 September 2020 4:24 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: Re: 106 Mohaka street , wainuiomata - Pre-app - WW Response - 25/9/2020

Hi [redacted]
not entirely clear yet as there are a range of options from medium density 300's with around 20 sections or perhaps simpler with 7 much larger sections on the L shaped portion outside the existing buildings (we still need to live somewhere and its nice there)

thanks
[redacted]

On Fri, Sep 25, 2020 at 2:50 PM Land Development <Land.Development@wellingtonwater.co.nz> wrote:

From: [redacted]
To: [redacted]
Subject: 106 Mohaka St Flood Model
Attachments: RM210328 - 106 Mohaka Street.msg
image001.gif

Hi [redacted]

I understand [redacted] is busy today. Does next Mon suit everyone better?

Thanks
[redacted]

Hi [redacted] & [redacted]

Can you provide comments regarding the flood model provided for 106 Mohaka St (52 lots)? [redacted] can you confirm if the proposed min floor levels on site are acceptable.

HEC-HMS and HEC-RAS are used for the model. Only 100 year event is modelled. There is no flow direction change shown on the result.

Cheers
[redacted]

[redacted] Senior Engineer - Land Development

Tel [redacted] Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz <http://scanmail.trustwave.com/?c=4062&d=wvvK3FdiO2x-Kbx0ezw4pU4bFgRcW1u1Uxh7t3JlrQ&s=1279&u=http%3a%2f%2fwww%2ewellingtonwater%2eco%2enz%2f>

From: [redacted]
To: Land Development; [redacted]
Subject: RM210328 - 106 Mohaka Street
Date: Thursday, November 25, 2021 5:15:49 PM
Attachments: hccsmalllogo_fc6f6e05-be46-4dd3-bc01-910915b54a7e.jpg
RE 106 Mohaka Street Wainuiomata - Existing stormwater drain relocation-wwl- 2 July 2021.msg

---

Hi [redacted]

The applicant has undertaken flood modelling for this proposal (52 residential lots at 106 Mohaka Street), as well as updated servicing information and an infrastructure report detailing wastewater and stormwater mitigation. I have attached the earlier advice provided for the site, and links to the updated application information below.

Could you please review the flood report and advise if you agree with the conclusions on suitable floor levels, displacement effects and whether it suitably accounts for overland flow? Could you also let me know if you any other feedback on servicing/infrastructure capacity?

Let me know if you would like to discuss.

Kind regards,
[redacted]

You received 7 files from [redacted]@huttcity.govt.nz via kiteworks

PLANS - Architectural Plans.PDF
22.56 MB

PLANS - Subdivision Civils Earthworks Plans.PDF
28.13 MB

PLANS - Landscaping Plans.PDF
144.63 MB

APPLICATION - Civils Calculations.PDF
1.07 MB

APPLICATION - Flood Assessment Calculations.PDF
14.77 MB

APPLICATION - Flood Report.PDF

19.92 MB

APPLICATION - Infrastructure Report.PDF
21.73 MB

File links expire: May 24, 2022

Access files

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand
T [redacted], **W** www.huttcity.govt.nz

From: [redacted]
To: [redacted]
Cc: [redacted]
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Monday, January 17, 2022 8:07:43 PM
Attachments: image005.png
image006.png
image007.jpg
image008.jpg
image009.png
image010.png
image011.jpg
image012.jpg
image013.gif
image014.jpg
image015.jpg
f807f41c-3b23-4921-a0f6-fa51c73a6341.png
P20-156-M01-RevB-RFI Response -COMPILED.pdf

Hi [redacted]

We have reviewed the hydrological analysis following the guidelines that you provided in your 23/12/21 and 120/01/22 emails, and attach our response within the revised memo herein.

Trust this now meets your requirements, however please feel free to give me a call if you have any further queries.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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AR & Associates Ltd
Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

nor be responsible for any delay in receipt.

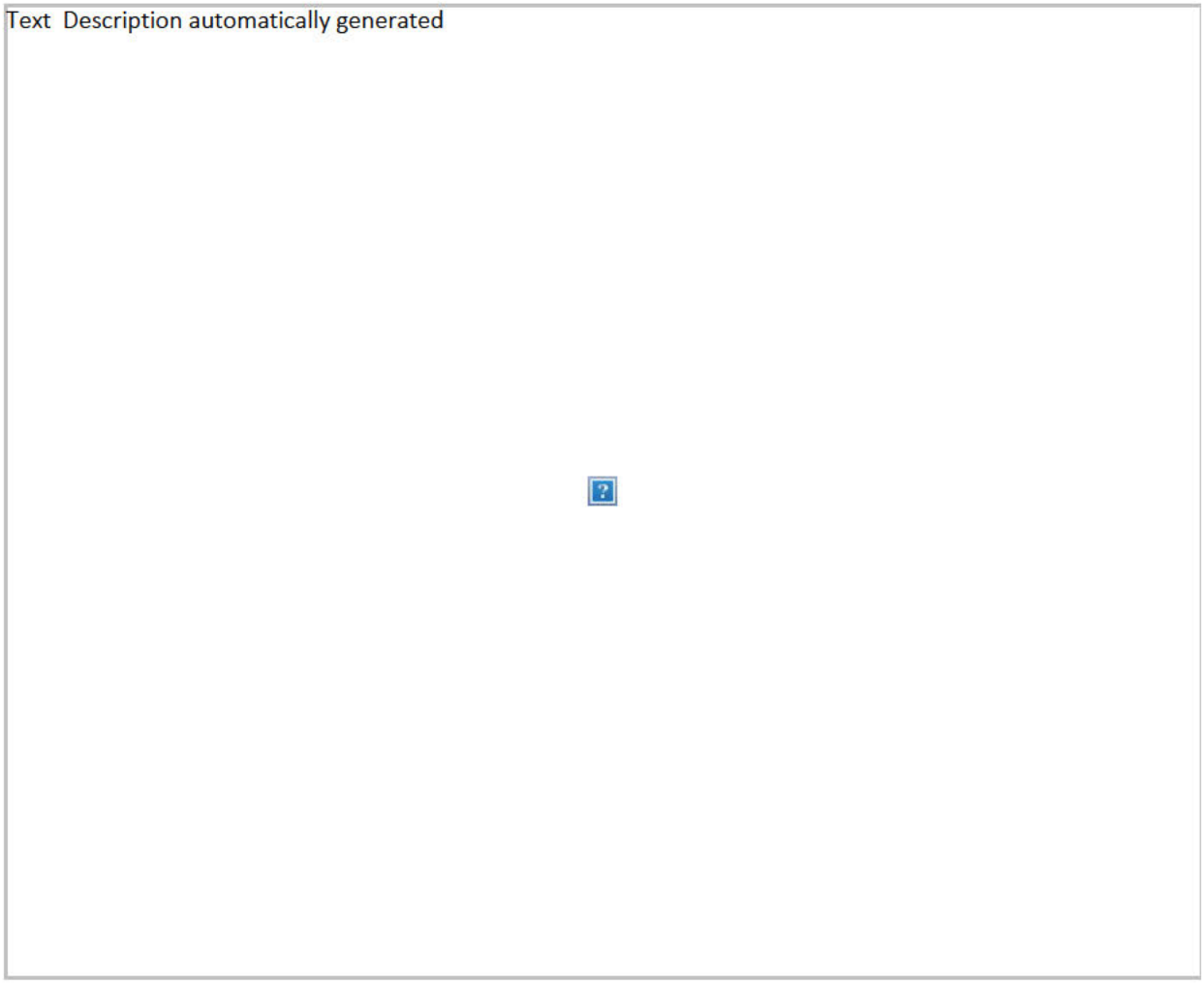
From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 10 January 2022 4:44 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and Happy New Year also.

The WWL recommended approach for time of concentration is outlined in Section 2.5 of our *Reference Guide for Design Storm Hydrology*. For the catchment you highlighted below, I think the recommendation would be the use of the Ramser-Kirpich and Bransby-Williams approaches (see below). In the end this is what we would compare the results from any other method against to check suitability, so we recommended external parties adopt it from the outset. Let me know if I can provide any additional information.

Text Description automatically generated



cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045

Level 4, 25 Victoria Street, Petone, Lower Hutt

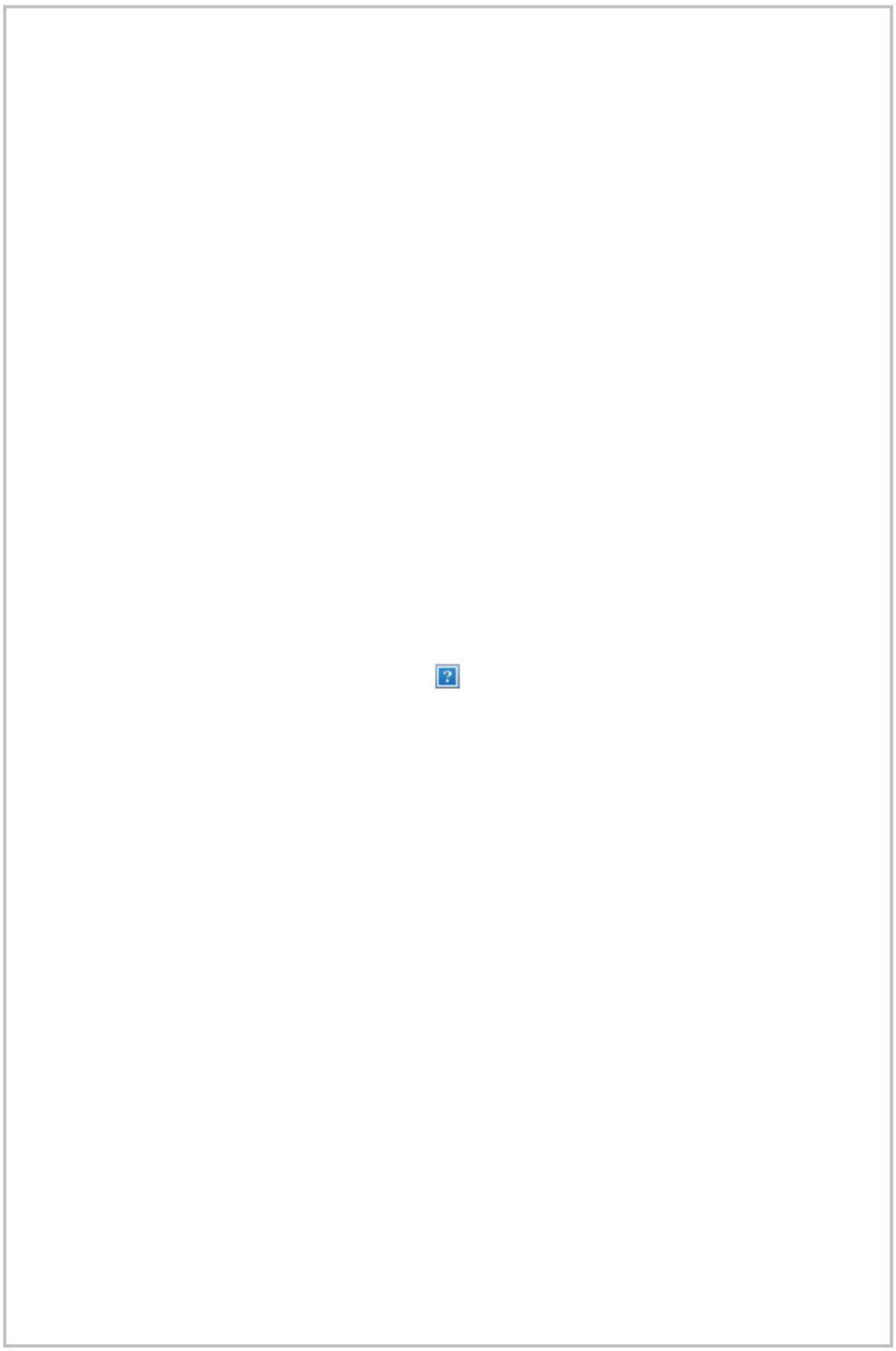
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 10 January 2022 4:16 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Happy New Year and thanks for your message, which we are looking into now.

Before we prepare a response, can you please clarify what is the recommended time of concentration method you are referring to? we are using the Equal Areas Method to determine average catchment slope, and the SCS method to calculate time of concentration using the average slope and length – see extract below.



Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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AR & Associates Ltd
Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 23 December 2021 2:20 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks very much for your email and information. I was hoping to meet/chat with you before any more modelling was done so I could supply our CN and IA layer (attached) for a more accurate representation in your model. Unfortunately in the layer attached, the majority of the catchment upstream of the site has a CN value

over 60, which may impact your results. If you do further model runs, can you confirm you have used our recommended approach for calculating the time of concentration and apply the nested profile we have developed (I have attached a spreadsheet template for it).

With regard to the upstream channels, do you have any images available of the survey locations for the channel sections and photos of the channels at the time of survey? I am viewing the site with google maps aerial photography which shows significant vegetation across the channel footprint. Also, can you confirm that the condition of the channels will remain the same pre and post development (eg, the channels will not be cleared and made more efficient post development), or if changes are made they will be offset (eg potentially by increasing storage capacity from raising the existing crossing).

A great cross check to see would be a couple of Manning's calcs for the channels using a couple of surveyed sections to get a ballpark idea of their capacity. We can do this at our end if you would prefer and can supply us the surveyed sections.

cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 **Mob** [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday, 22 December 2021 6:08 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted],

Please find attached our response to your information request last 16 December as per below.

Hopefully the response is self-explanatory, however please let me know if you'd like to discuss any aspect of this document.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Thursday, 16 December 2021 5:50 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@urbanedgeplanning.co.nz>
Sent: Thursday, 16 December 2021 4:52 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: Fw: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi all

I've received the information below and attached from Wellington Water - they have a number of concerns/areas where additional information is needed. I've also been speaking to [redacted] today. Because WWL aren't able to provide written approval for the GWRC process, [redacted] isn't happy signing off on the stormwater side of things, so the WWL issue is affecting both GWRC and HCC applications now.

[redacted] and [redacted] I'm happy for you to meet directly with Wellington Water online to work towards addressing their concerns/issues. It won't make sense at all to me as a non-engineer, so I'll sit out and let you both take charge of this side of things!

[redacted] do you want to get in touch with [redacted] to arrange a meeting?

Cheers

[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Thursday, 16 December 2021 11:02 am
To: [redacted]@urbanedgeplanning.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

See below for feedback from WWL on the flood modelling. It sounds like we may need to set up a meeting between the modellers.

Kind regards,
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 16 December 2021 10:54 AM
To: [redacted]@theurbanengineers.co.nz) [redacted]@theurbanengineers.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>
Subject: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please see the following concerns from our modelling team, regarding the flood model & floor levels.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development
Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council
We manage their drinking water, wastewater and stormwater services

---

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, December 16, 2021 10:35 AM
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Kia ora [redacted]

Thanks for your email. My points of concern are below:

- Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.
- Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may over estimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.
- Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

A meeting (online) with the modellers would be very useful to discuss and potentially resolve these issues.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 15 December 2021 1:33 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: FW: RM210328 - 106 Mohaka Street

Hi [redacted] & [redacted]

Would you be able to provide a summary of the concerns regarding 106 Mohaka flood model/floor level /secondary flow path? Planner and RMA team is waiting for an update.

Thanks
[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, December 15, 2021 9:14 AM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Hi [redacted]

I'm just following up as the applicant has requested an update. Have you had the chance to look at this one?

Thanks
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From: [redacted]
To: [redacted]
Cc: [redacted]@huttcity.govt.nz; [redacted] Land Development
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Thursday, April 28, 2022 9:51:26 AM
Attachments: image006.png
image029.jpg
image030.jpg
image031.png
image032.png
image033.png
image034.png
image035.png
image036.png
image037.png
image038.png
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image048.png
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image050.jpg
image051.gif
image052.jpg
image053.jpg
image054.jpg
image055.jpg
e39e3c24-28ef-4e29-baaa-1c2b0077fe16.png
P20-156-R03-RevF-Flood Report.pdf

Hi [redacted]

I wanted to let you know we have updated our flood report, all the modelling remains the same, but we have made some adjustments to the minimum recommended flood levels on Table 2.
We have also stated that the minimum recommended floor levels are to be to the bottom of the structural concrete slab.

I understand that you are happy with the methodology, would we be able to get the flood modelling and report approved/signed off?

Kind Regards,

[redacted]
BEng (Hons)
[redacted]

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36 Grant Road, Frankton
Queenstown 9371
m [redacted]
www.arassociates.co.nz

-

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 20 April 2022 5:29 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for the email. I am happy with your methodology for the hydrological and hydraulic modelling.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

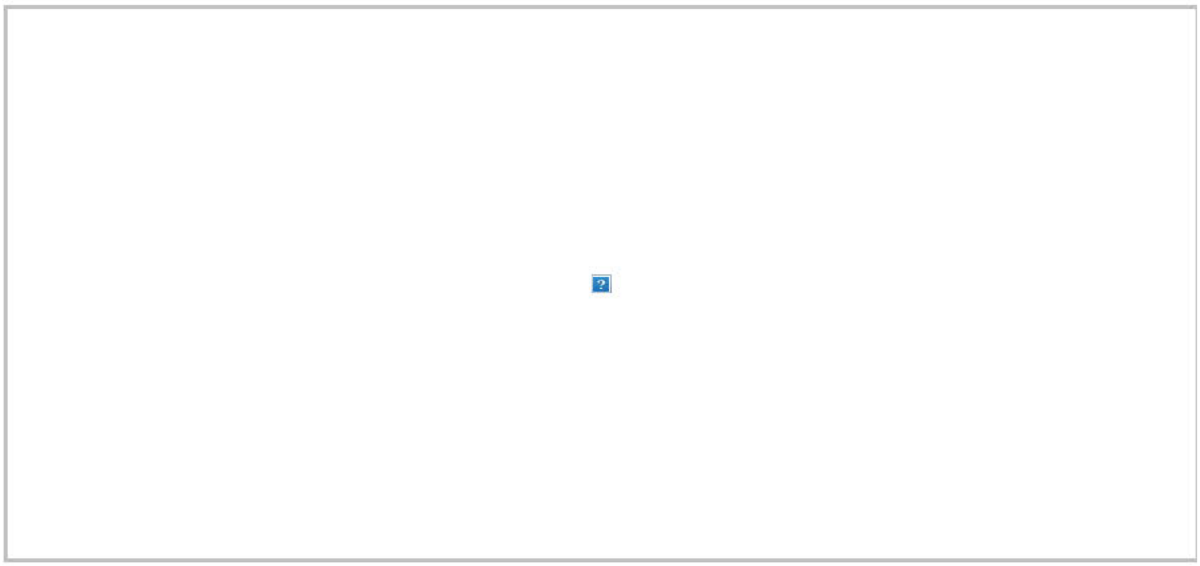
From: [redacted]@arassociates co nz>
Sent: Wednesday, 20 April 2022 3:46 pm
To: [redacted]@wellingtonwater.co.nz>
Subject: Re: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted] just following up on this please.

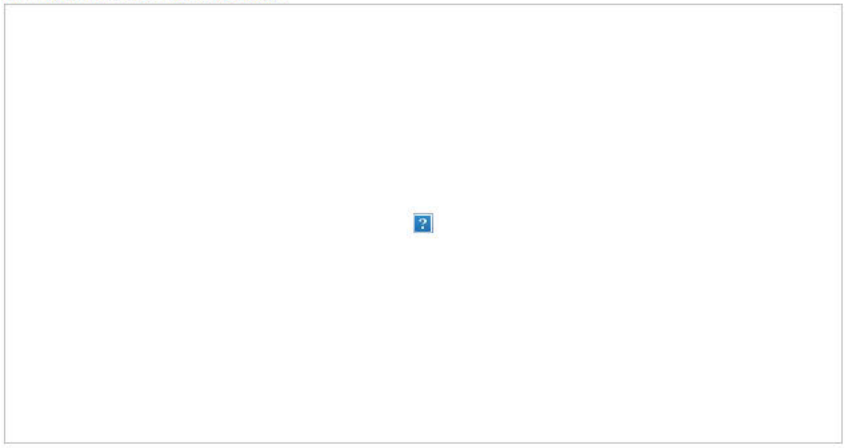
Thanks

[redacted]
Sent from my iPhone

> On 12/04/2022, at 10:05 AM, [redacted]@arassociates.co.nz> wrote:
>
> Hi [redacted]
>
> Thanks for your message.
>
> The areas you circled below are in our view attributed to minor anomalies in the LiDAR data used (this is a Wellington Lidar 1m DEM 2013-2014 obtained from LINZ), are located in very localised areas and are within the margin of error of the models.
>
> The results show that due to the increased storage upstream of the culvert, the downstream flows are considerably mitigated, with predicted post-development flood levels downstream of the site being consistently lower than pre-development conditions.
>
> The two areas you circled below are very small in area and likely to be anomalies in the terrain, coupled with model margins of error. In my view the wider overall trend is that levels downstream go down, not up, and this is consistent with the increased storage and associated attenuation effect upstream of the culvert.
>
> I have shown additional snapshots of the areas in question below, and as you can see the general trend is for the water levels to go down compared to pre-development conditions.
>
> - Pre-development(WSE)
>
> Post-development(WSE)



1. The pointed area is Building section.



Trust this addresses your query however if you have any further questions please let me know.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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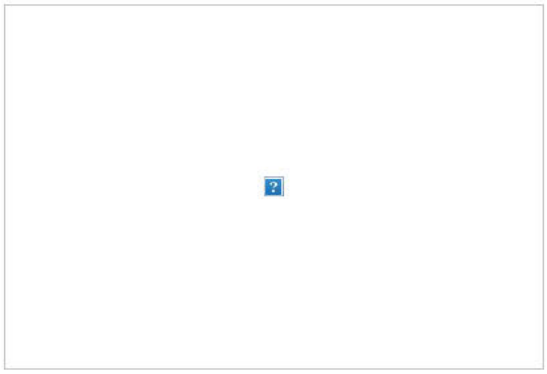
159 Hurstmere Road, Takapuna, Auckland 0622
PO Box 65 576 Mairangi Bay, Auckland 0754
m [redacted]
www.arassociates.co.nz

From: [redacted]@wellingtonwater.co.nz>

Sent: Friday, 8 April 2022 11:10 AM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and the images. I see there is some improvement in water depth downstream. However, I am not sure if I am reading the images wrong but it also looks like there are areas, particularly on 104 Mohaka St, and 3 Rakaia Gr, where water is deeper (>30mm) in the post development scenario – circled in yellow below. Is that correct? If it is, it may be that this is effect considered no more than minor (a decision for the Wellington Water Land Development team and/or HCC), however it would be worth noting those areas.



cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday, 6 April 2022 1:22 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

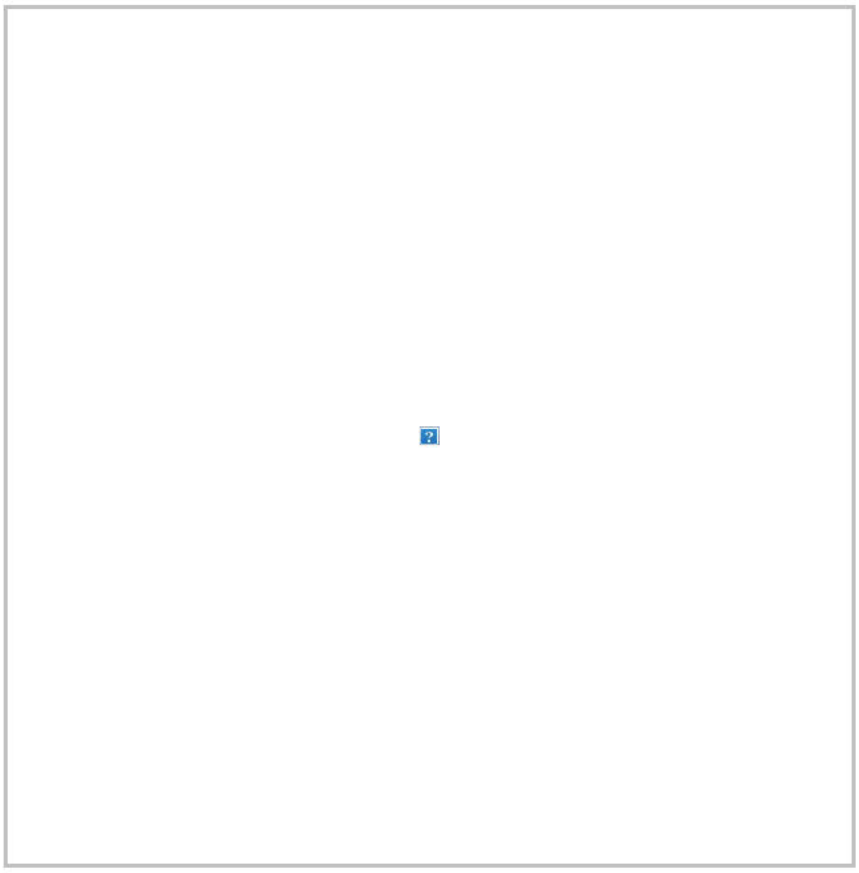
Hi [redacted]

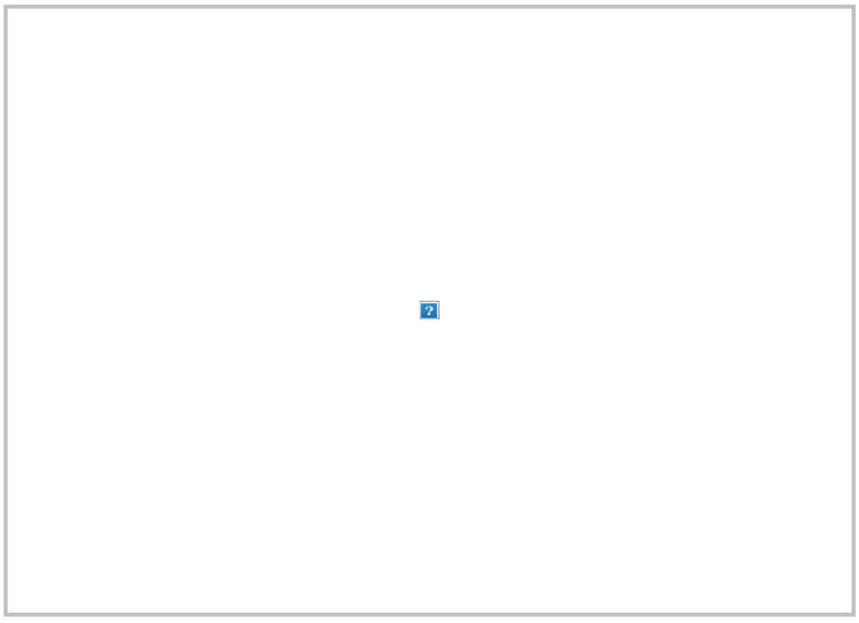
Please see screen shots below which better illustrate the pre and post development situation downstream.

As you can see, in most areas downstream the flood impact is positive (lower flood levels in the post-development vs pre-development). There is only one area where there is a 10mm predicted increase in flood levels, which is negligible and within the margin of error of the model.

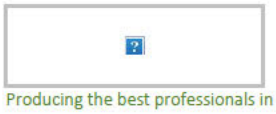
If you are satisfied with this response, we will update the flood report to reflect this, and issue as a final for approval.

Regards,





[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]



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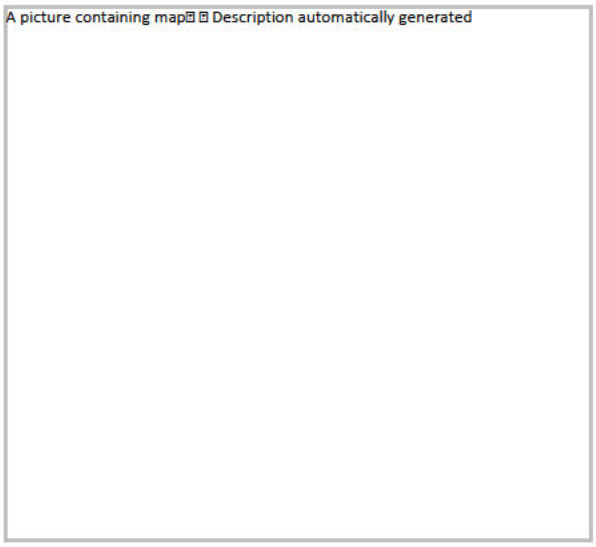
From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 4 April 2022 11:45 AM
To: [redacted]@arassociates co.nz>
Cc: [redacted]@aprotean co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land Development@wellingtonwater co nz>; [redacted]@huttcity govt nz>; [redacted]@wellingtonwater co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thank you for the discussions and your updated memo. I have gone over it and am comfortable that the hydrological methodology aligns with the designated Wellington Water approach.

I am a little unsure about the downstream impacts, particularly on properties 100 – 104 Mohaka St and 3-5 Rakaia Gr. Would it be possible to revise the pre and post difference map (Figure 10) to show if there are any areas with >=50mm difference. The pre and post water level maps do not seem to align well with the difference map (Figure 10).



cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Thursday, 31 March 2022 3:16 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@huttcity govt.nz>; [redacted]@wellingtonwater co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your response. We have re-worked the models based on the curve number of 61, and in line with your requirements for the other parameters. Please find updated flood report attached, for your perusal.

Please can you advise at your earliest convenience whether this now meets your requirements.

Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 31 March 2022 9:42 AM
To: [redacted]@arassociates co.nz>
Cc: [redacted]@aprotean co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@huttcity govt.nz>; [redacted]@wellingtonwater co nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Please see the comments below from our consultant hydrologist. In the case of the Curve Number, I am happy for 61 to be used in place of 63 as per our earlier discussion.

In response to [redacted] questions,

1. Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question. No. I think this was sufficiently addressed in our previous response. The Tc resulting from averaging the BW and RK methods calibrated well.
2. Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment? No. Please see curve number comments below.
3. Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing? ALI - YOU PROVIDED THIS?
4. Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction? Please see initial abstraction comments below.
5. Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters? We don't believe the recommended parameters are conservative. They have been through a thorough peer review process and validated against a number of different methods. For the design of infrastructure to manage the risk of flooding, and the risk this poses to people and property, these values are appropriate.

Curve Number
The curve number values from Appendix B of the Reference Guide were not a direct import of the values from TR55, the original SCS reference manual (and which are tabulated in the Hec-HMS reference manual). They were initially derived from TR55, then adjusted to improve the calibration to observed hydrographs in rainfall-runoff modelling.

With regard to the catchment upstream of 106 Mohaka Street, we are in agreement that the soil should be classified group C. The landcover is a mix of indigenous forest; broadleaved indigenous hardwoods; and gorse and/or broom. The first two have been classified in the Reference Guide as Forest, while the latter more closely resembles the nature of Scrub/Flax. The CN for forest was adapted from the TR55 table for Brush in Good condition. This had a value of 65. Adjusted for the Wellington region, the value is 63. Scrub/Flax in soil group C has a CN value of 68.

The CN value for the catchment to 106 Mohaka St, should be a weighted CN based on the percentage area of forest x CN63 + percentage area of scrub/flax x CN68.

This value of 63 is the least conservative when compared to recommended values in the Kapiti District (Greywacke group C soils, bush = CN65), Auckland (mudstone/sandstone group C soils, bush, not-grazed = CN70) and in the Waikato region (group C soils, bush = CN 72; bush-weed-grass mix = CN65).

Initial Abstraction

Background to the initial abstraction estimate is provided in the SCS rainfall-runoff model calibration report, which has recently been provided to you. In NZ it is common to use initial abstraction estimates of 0mm for impervious areas, and 5mm for pervious areas. These values are used in the Kapiti and Auckland regions, and have some backing within literature. In the Waikato region, initial abstraction is calculated as a factor of the potential maximum storage, using a coefficient of 0 05 (Ia = 0 05S). This is more conservative than the 0.1S adopted by Wellington Water for undeveloped areas (more conservative in that it leads to greater runoff).

When deciding on an estimate for initial abstraction in the Wellington region, we evaluated various literature, both in NZ and in TR55 and concluded that 0mm in impervious areas and 5mm in pervious developed areas, and 0.1S in undeveloped areas, is reasonable. The difference between pervious developed areas and undeveloped areas, is the former is more likely to have been reshaped/compacted/mowed etc, while the latter is in a more natural form so likely to have greater storage potential.

In comparison to methods being employed throughout NZ, the methodology stipulated in the Reference Guide is, by no means, conservative, and parameters have been set based on calibrating rainfall-runoff models to the local hydrology.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Thursday, 24 March 2022 11:23 am
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your time on the phone earlier.

I look forward to receiving your response to my requests below.

You mentioned that based on the new curve number tool, the curve number for the upstream catchment is now 61, which is slightly lower than the previous curve number of 63. Can you confirm that please and also indicate what is the associated initial abstraction? Also are you able to provide a copy of that tool as per previous request?

Also please can you send through gauge information for the catchment as discussed, and any other background information you may be able to provide.

Your soonest response is appreciated.

Thanks

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

From: [redacted]
Sent: Monday, 21 March 2022 12 09 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean co nz>; [redacted]@arassociates co nz>; [redacted]@belgraviacapital co nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@huttcity govt.nz>; [redacted]@wellingtonwater co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Good morning [redacted]

Tried to call you but couldn't get through.

Just following up on my request below please, if you could possibly let us know when we can expect to hear back, it would be appreciated.

Our client is very urged to get this resolved, please feel free to call me if you need to discuss.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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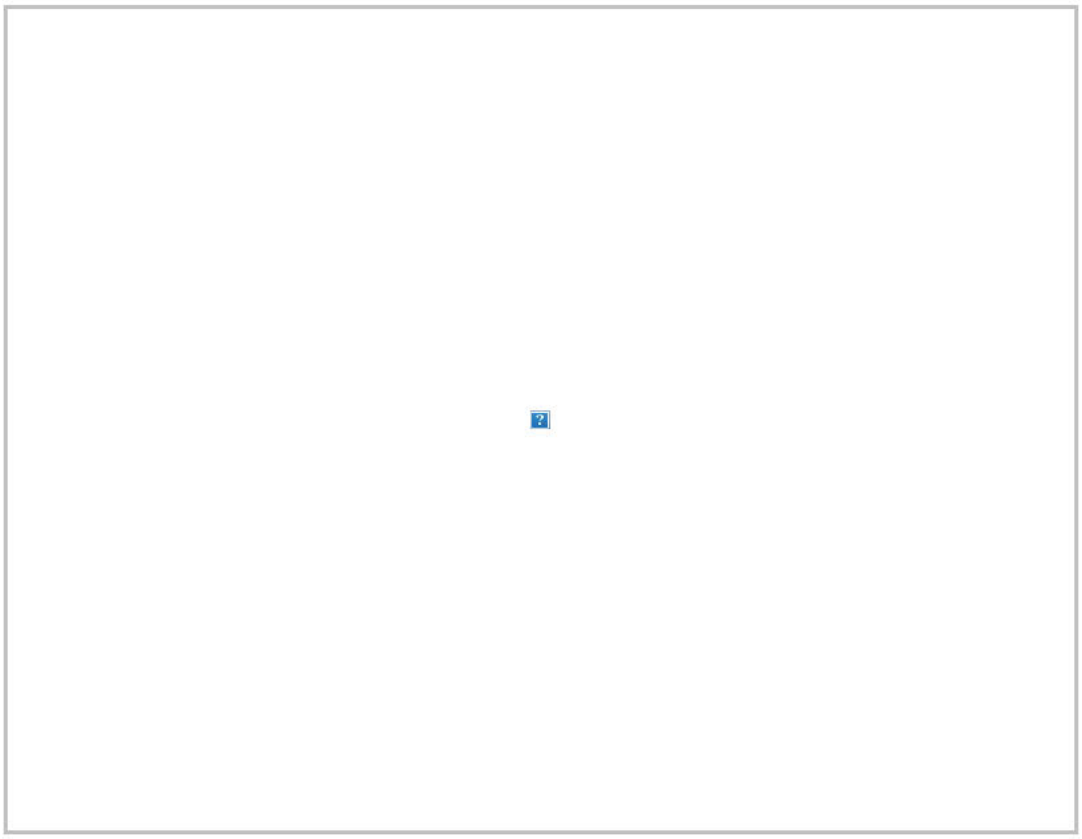
From: [redacted]
Sent: Thursday, 17 March 2022 5:26 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@huttcity govt.nz>; [redacted]@wellingtonwater co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Many thanks for your message and the chat earlier. To summarise our discussion and the next steps further:

1. Time of Concentration:

I still believe that the average Tc approach, which results in a Tc of 19 minutes in the case of the western catchment, seems excessively low for the catchments that we are dealing with, as they have a very dense forest cover (as per below screen shot). I have run an independent check of Tc using SCS methodology and obtained 27 minutes, which is in line with the Bransby-Williams result.

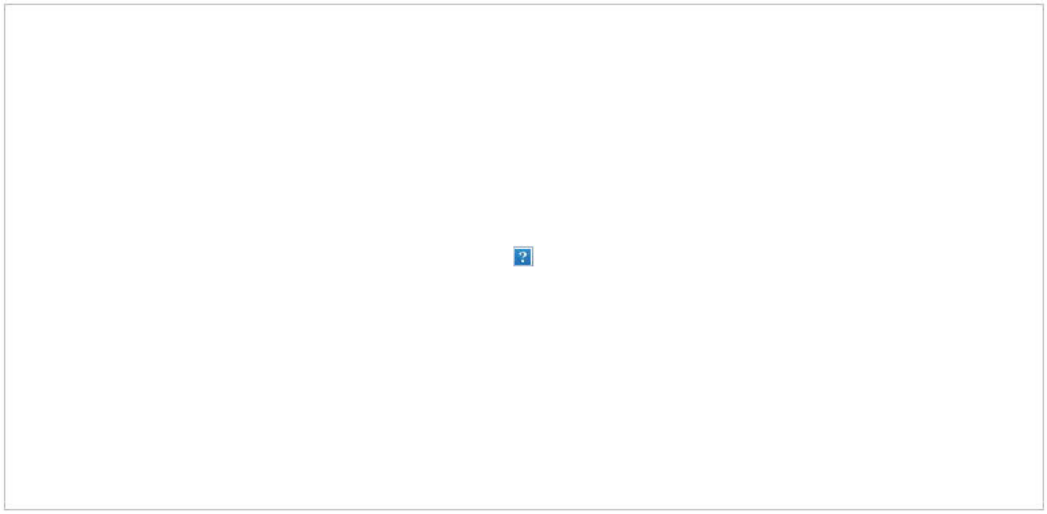


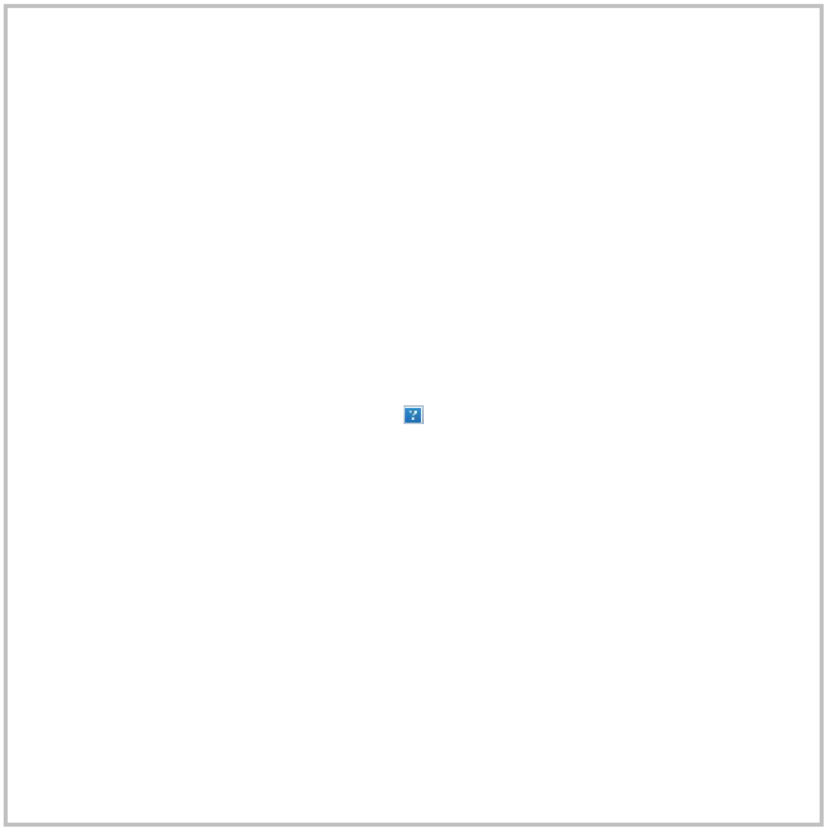
2. Curve Number:

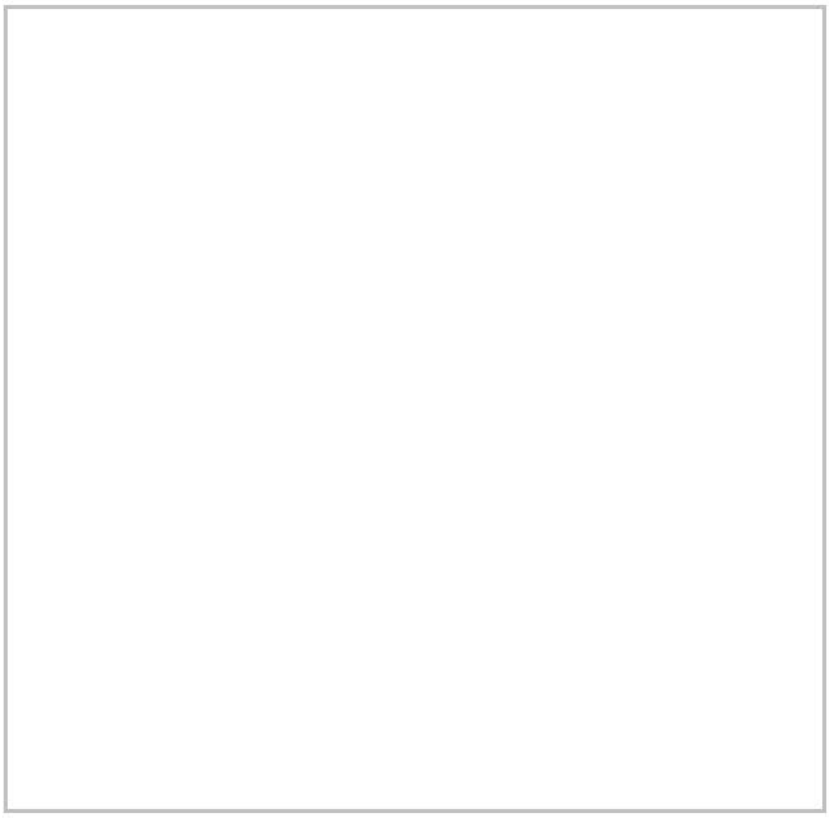
In addition, the curve number parameter map that you supplied suggests a CN=63, which again seems high and therefore potentially adds another layer of conservatism to the analysis. The HEC-HMS reference manual gives curve numbers of CN=30, 41 and 48 for soil groups B, C, and D respectively, and ground cover characterised by a forest with woody and brush understorey (see below).

S-map on line tool suggests the soil group that applies to the upstream catchments ranges from a B to a D classification (being Bushcroft and Taitapu soil units, see below and soil report files attached). On this basis, the representative curve number would appear to be somewhere between 30 and 48 (for "good" ground cover, being >70% vegetation cover which applies in this case). In our original analysis we had used CN=48, which we believed was conservative at the time.

You mentioned that Wellington Water is in the process of releasing a new tool to estimate curve number. If you could possibly share that with us, it would be very helpful.







3. Initial Abstraction:

Wellington Water's hydrological modelling guidelines specify that Initial abstraction be obtained from the formula Ia=0.1S. However SCS methodology, being the US Natural Resources Conservation Service method that originally developed the CN and Ia parameters, recommends that Initial Abstraction be calculated as Ia-=0.2S. Wellington Water's specified reduction of the initial abstraction parameter by 50% is obviously conservative as it results in greater discharge rates and volumes. Are you able to clarify the reasons for this?

4. Compounded Effect:

Our view is that the compounded effect of combining conservative hydrological parameters (e.g. Tc, CN and Ia etc), in addition to the requirement for climate change allowance which in itself increases rainfall by 17-30%, is likely to result in excessively high and potentially unrealistic levels of conservatism when calculating peak flows.

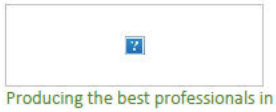
To summarise, it would be appreciated if you could please consider and clarify the following:

- Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question.
- Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment?
- Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing?
- Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction?
- Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters?

Please feel free to call me if you'd like to discuss further.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]



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129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi [redacted] m [redacted]
www arassociates co nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 17 March 2022 11:39 AM
To: [redacted]@arassociates co.nz>
Cc: [redacted]@aprotean co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater co.nz>; [redacted]@huttcity govt.nz>; [redacted]@wellingtonwater co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

How are you? Thanks for your email and for the call on Tuesday.

With regard to your proposal to only use the Bransby-Williams methodology for calculating the time of concentration for the hill catchments upstream of 106 Mohaka St, unfortunately Wellington Water would not find this an acceptable approach.

Below are some more -depth comments from our consultant hydrologists who were involved in the development of the WWL rainfall-runoff methodology, but to summarise it;

- The averaged RK-BW approach was established through review of real events in a real, nearby catchment, so the BW approach by itself would result in unsuitably long Tc values.

. I have undertaken a few checks to reach this conclusion:

- During development of the model parameters, the nearby catchment Wainuiomata River at Manuka Track was used for calibration. This has a catchment area of 27km^2. The observed time of concentration was between 120 mins and 220 mins across three events (average 180 mins). Being real events, this is also dependant on the storm event (spatial and temporal distribution of rainfall over the catchment), however these estimates provide an approximate indication of catchment Tc. The average Tc using Ramser Kirpich (RK) and Bransby Williams (BW) was 120 mins. This calibrated fairly well.

  Using a Tc of 55 minutes for the Mohaka catchment, which is approximately 0.43km^2 does not align with results from the calibrated rainfall-runoff model.

- My estimates for RW and BW were 10 mins and 28 mins (BW: using a length of 1150m, area of 43ha and equal-area slope of 116 m/km), the average being 19 minutes. This BW estimate is shorter than the applicants estimate of 55 minutes. I acknowledge that different analysts are likely to get slightly different numbers, however, their estimate is approximately double. When using their equal area slope estimate (of 108 m/km from the email below) this makes very little difference, increasing the Tc to 29 minutes. Perhaps one of us has made some inaccurate assumptions??

- An alternative method to empirical equations, is using the Tc component parts. Empirical equations are recommended for larger catchments, where the catchment length exceeds 1000m. As this catchment is only just exceeding the 1000m threshold, estimating Tc from the component parts is a useful check. This also (independently) came out at 19 minutes (overland flow 11 5 minutes + shallow concentrated flow 1.7 minutes + channel flow 6 minutes). It is acknowledged that there is more variation between analysts when following the component parts approach due to the various assumptions that need to be made.

I appreciate the engineers comment in that the Ramser Kirpich equation gives a much faster time of concentration, that on its own, would not be reasonable for this catchment. However during calibration of the model parameters, neither the RK or BW method gave estimates that perfectly aligned with the observed hydrographs. Taking the average of the two methods acknowledged that neither method provided an appropriate representation of catchment runoff characteristics in the region, however when averaging the two, model results calibrated well.

Please let me know if I can provide any additional information.

cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 **Mob** [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
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From: [redacted]@arassociates.co.nz>
Sent: Monday, 14 March 2022 3:05 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Further to my voicemail today, this is to let you know that we have further reviewed the hydrology for the above development, and would like to propose a change to the time of concentration (Tc) parameter used in our hydrological model.

As you know, the Wellington Water guideline specifies that the Tc parameter should be calculated based on the Ramser-Kirpich and Bransby-Williams methods. Our previous RFI response had accordingly estimated Tc values that were based on the average between both of these methods.

However, upon further review of available technical literature on the Ramser-Kirpich method, we note that the literature warns that this method can lead to excessively low time of concentration values (and associated high rainfall intensities) if incorrectly applied, given that this method is actually designed for catchments that have well-defined channels. This is in fact evidenced in our calculations, where Tc's of about 10 and 14 minutes were obtained for the western and northern catchments, which seem excessively low given that both these catchments are undeveloped forest and over a kilometre long.

On the other hand, the Bransby-Williams formula applies to catchments without well defined channels, and where runoff is characterised by overland flow. In our view this method is more representative of the catchments we are dealing with, as they are undeveloped with a heavy forest canopy, and where runoff is therefore likely to be dominated by overland flows (rather than flow via well-defined channels). We therefore consider that for this project, the Ramser-Kirpich formula should be ignored altogether, and the Bransby-Williams equation adopted instead, as the method to calculate Tc.

I would be grateful if you could possibly look into this and let me know if you agree with this change, in which case we will tweak the calculations and submit a revised version.

Please feel free to call me if you'd like to discuss further.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

Producing the best professionals in our field.

To influence and contribute to a more sustainable world.

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From: [redacted]
Sent: Monday, 17 January 2022 8:07 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

We have reviewed the hydrological analysis following the guidelines that you provided in your 23/12/21 and 120/01/22 emails, and attach our response

within the revised memo herein.

Trust this now meets your requirements, however please feel free to give me a call if you have any further queries.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

Producing the best professionals in our field.

To influence and contribute to a more sustainable world.

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From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 10 January 2022 4:44 PM
To: [redacted]@arassociates co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and Happy New Year also.

The WWL recommended approach for time of concentration is outlined in Section 2.5 of our *Reference Guide for Design Storm Hydrology*. For the catchment you highlighted below, I think the recommendation would be the use of the Ramser-Kirpich and Bransby-Williams approaches (see below). In the end this is what we would compare the results from any other method against to check suitability, so we recommended external parties adopt it from the outset. Let me know if I can provide any additional information.

MHV Ltd

106 Mohaka St, Wainuiomata, Lower Hutt

Flood Report

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

Reference P20-156-R03-RevF
6th April 2022

AR & Associates Ltd // Level 2, The Nielsen Centre
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Document Control Sheet

Client		MHV Ltd				
Project address		106 Mohaka St, Wainuiomata, Lower Hutt				
Report title		Flood Report				
Reference		P20-156-R03				
Revision	Author	Reviewer	Approver	Purpose	Issued to	Date
D	AR	JL	AR	Council RFI	Client	29.03.2022
E	AR	JL	AR	Council RFI	Client	06.04.2022
F	CM	AR	AR	Updated Table 2	Client	22.04.2022

Limitation

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Appendices

1 // Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to undertake a flood assessment, to understand the flood risks at the site and downstream areas, for both the existing and post development conditions.

This document presents the results of our assessment, including associated recommendations around flood management and proposed minimum floor levels.

2 // Site Description

The site is located adjacent to the north-eastern corner of the Mohaka Street cul-de-sac, in Wainuiomata, Lower Hutt (Lot 5 DP 65821).

In its existing condition, about one third of the site is covered by a number of buildings and associated driveway and parking areas, with the remaining areas being predominately covered in grass and low vegetation.

Topography within the site is relatively flat, however beyond the northern and north-eastern boundaries the land rises steeply and is covered by a densely vegetated bush reserve.

There are a series of bush clad open streams / drains immediately adjacent to the western and northern boundaries, which collect most of the runoff generated from the bush-clad catchments to the north. These streams discharge to an existing 1050 mm diameter culvert that passes under the access road to the site, and which discharges some 300 m downstream.

An aerial photo of the existing site with associated existing 3-water services (obtained from the Wellington Water GIS maps) is shown in **Figure 1** below.

Figure 1:- Existing site layout showing surrounding areas and 3-waters services

There is a new residential subdivision of 75 to 102 Meremere St currently under development adjacent to the eastern site boundary. This development drains stormwater runoff from the contributing eastern catchment onto the subject site, which is captured by a 1050 mm diameter scruffy dome and 525 mm RC pipe at the eastern boundary, as shown in the AR & Associates design drawings.

There are established residential areas to the south of the site boundary, and west of the western stream.

3 // Proposed Development

The development comprises a 52-lot residential subdivision, accessed from the eastern side of Mokaka St. A number of internal local roads are proposed to provide access to the various lots.

The proposed stormwater network will consist of the main primary piped network in addition to a 1050 mm dia. concrete pipe which will act as a detention tank to attenuate 10% and 1% AEP flows on the site, to ensure that post-development peak flows do not exceed pre-development levels.

Stormwater from the northern bush clad mountain catchment will be conveyed along the northern and eastern open drainage channels, while runoff from the eastern catchment will be captured by a 1050 mm scruffy dome and 525 mm pipe and conveyed into the detention system prior to discharge into the existing 1050 mm culvert that services the site.

The proposed subdivision layout showing the various stormwater components is illustrated in **Figure 2**.

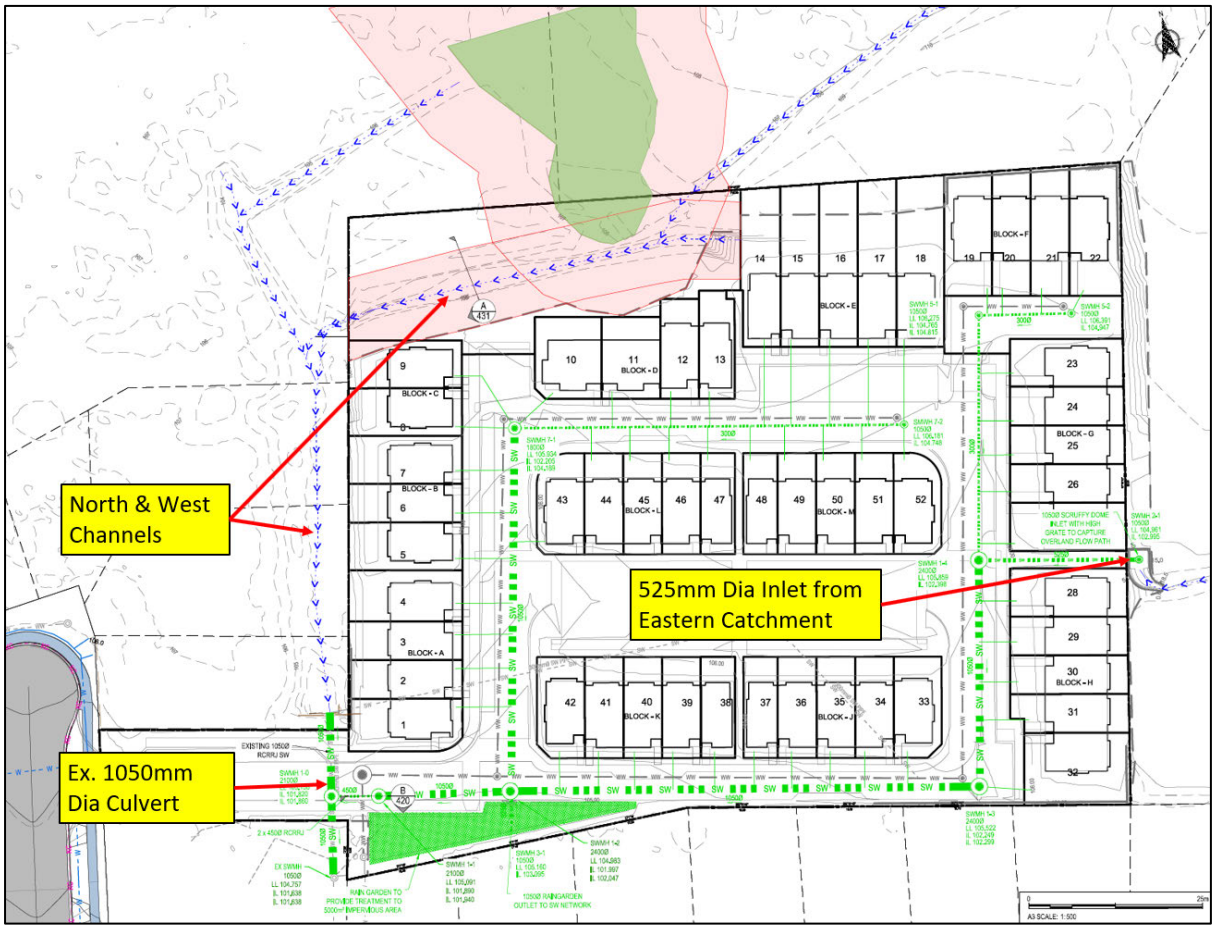

Figure 2:- Proposed development showing key stormwater components

4 // Basis of Design

4.1 Design Parameters

The assessment presented herein is based on Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0) and reference guide for design storm hydrology-standardised parameters for hydrological modelling (Wellington Water Ltd, 9 April 2019). The primary and secondary stormwater infrastructure design requirements under this standard include the following key criteria:

- Primary piped systems in residential areas to be designed to accommodate runoff from the 10-year ARI (10% AEP) rainfall event, or the 100-year ARI (1% AEP) rainfall event where no secondary flow path is available.
- Secondary systems shall consist of overland flow paths capable to conveying runoff from the 100-year ARI (1% AEP) rainfall event.
- Maximum acceptable flood depths during the 100-year ARI event in local / minor roads, which apply to the site, shall be 200 mm, with a flow velocity of no more than 2 m/s.
- Minimum freeboard of habitable floor levels shall be 500 mm above the water level during secondary flood protection events. Commercial and industrial buildings shall have a freeboard of 300 mm and all other building freeboards shall be 200 mm.
- The minimum freeboard shall be measured from the water surface level to the building platform level or underside of the floor joists or structural concrete slab of the building.
- Rainfall depths are taken from NIWA's HIRDS Version 4, with allowance for Climate Change. An RCP6.0 for the year 2081-2100 was used for purposes of this assessment.

The following additional parameters were used in this assessment:

- The SCS Curve Number method was used with HEC-HMS modelling software to determine hydrology and flows generated within the contributing catchments.
- Curve numbers were obtained from the appendix A of reference guide design storm report. For the contributing upstream catchments, which are heavily vegetated in bush, a CN of 61 has been assumed (mountain brush with good hydrological condition). Impervious areas are assumed to have a CN=98.
- Time of Concentration parameters were calculated using the empirical equations of Ramser Kirpich and Bransby Williams, and the answers averaged.
- Initial Abstraction parameters were obtained using Wellington Water Ltd CN layer extract.
- A Manning's Coefficient of 0.07 (Excavated or dredged channels / streams with clean bottom, brush on side, highest stage) was used for purposes of assessing capacity of the upstream watercourses.
- Used Nested storm rainfall profile that 12-hour storm duration is recommended for model runs by the reference guide storm report.
- Wellington Water Standards do not specifically require blockage to be allowed for culverts or pipes during the secondary (100-year ARI storm) event. However, for purposes of our analysis,

culverts have been assumed to be 20% (1050 mm and 525 mm) and 50% (225 mm) blocked during secondary flow conditions.

- Our analysis has assumed that appropriate maintenance of these structures will be undertaken by Council (or appropriate party responsible), in order to prevent blockage from exceeding the assumed 20% during the 100-year ARI event.

4.2 Catchments

There are three main catchments contributing flow to the site, as shown on **Figure 3** below.

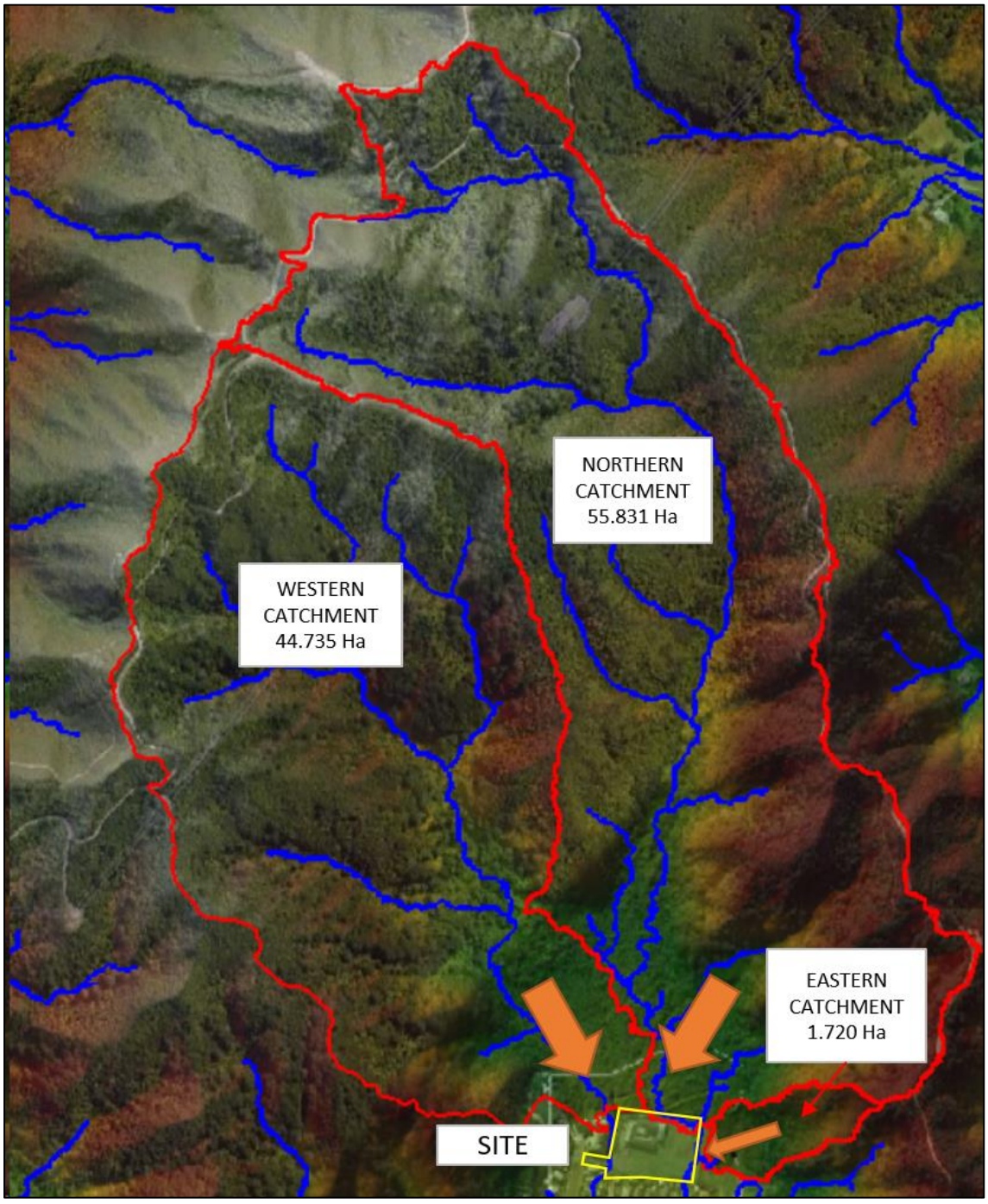

Figure 3:- Contributing stormwater catchments

These catchments have been assessed and measured using council LiDAR data and SCS methodology. The main catchment parameters are summarised in **Table 1** below.

Catchment	Catchment Area (Ha)	Curve Number (CN)	Longest Drainage Path (m)	Catchment Slope (%)	Time of Concentration Tc (min)	Initial Abstraction Ia (mm)
Western	44.73	61	1,133	10.8	19.25	16.24
Northern	55.83	61	1,666	10.0	27.74	16.24
Eastern	1.72	61	234	11.3	5.50	16.24

Table 1 – Summary Catchment Design Parameters

All of the contributing catchments are covered by undeveloped bush reserve land, with exception of a small portion of the eastern catchment, which will be covered by the adjacent 9-lot subdivision that is currently under development at the end of Meremere St.

However, we understand that peak flow attenuation will be provided within the Meremere St subdivision. As such, for purposes of this analysis, all contributing catchments are assumed to be in a greenfields in terms of peak flows generated for both the pre and post development condition.

5 // Results

5.1 Modelling Results, Pre-Development (Existing) Condition

The pre-development (existing) condition has been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development (existing) 100-year ARI flood levels, flood depths and flow velocities are shown in **Figures 4, 5** and **6** below, respectively.

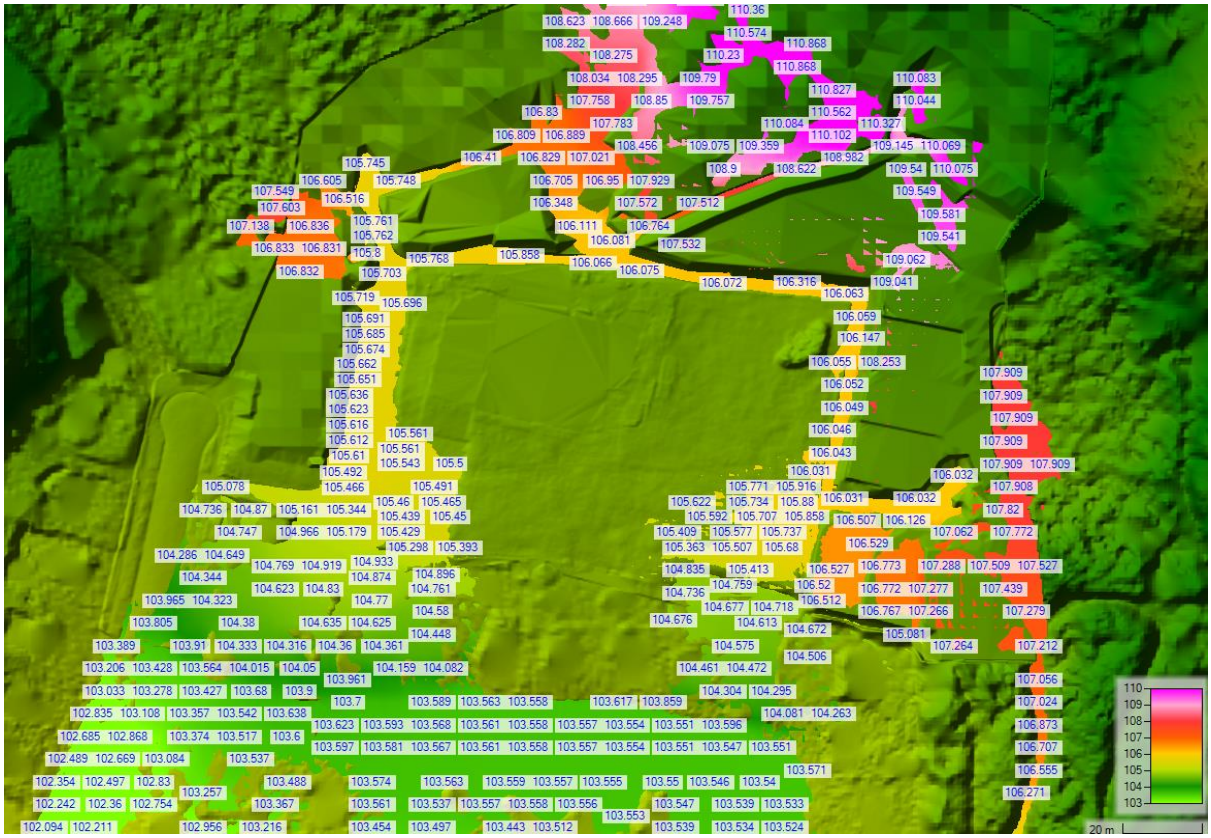

Figure 4: Pre-Development 100-year ARI Flood Map showing Flood Levels

The pre-development results show that stormwater runoff from the northern and eastern catchments is directed along the existing perimeter channels around the eastern, northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance.

The results show that in the existing condition, and assuming a 20% blockage scenario for the culvert, there is some spillage of flows across the entrance to the site. The peak flow estimated to spill across the culvert embankment under this scenario is estimated to be 3.45 m^3/s, approximately.

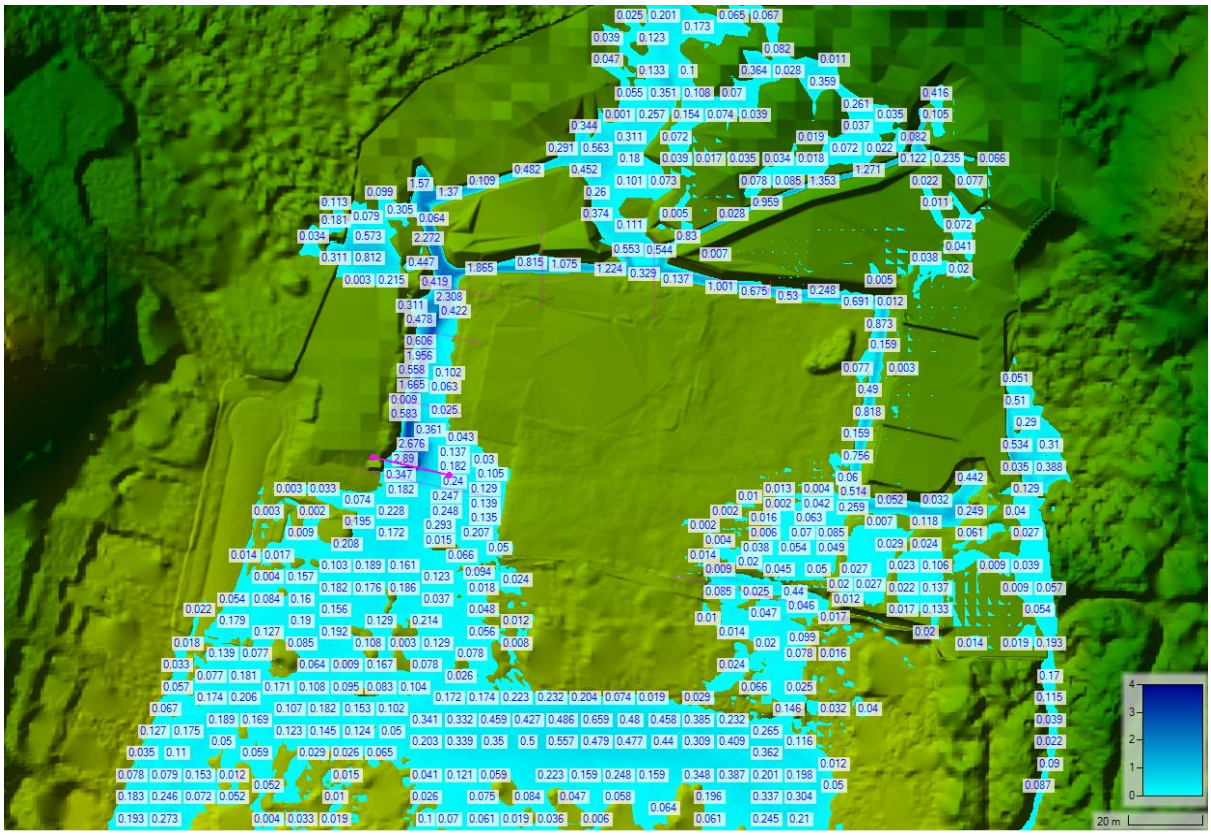

Figure 5: Pre-Development 100-year ARI Flood Map showing Flood Depths

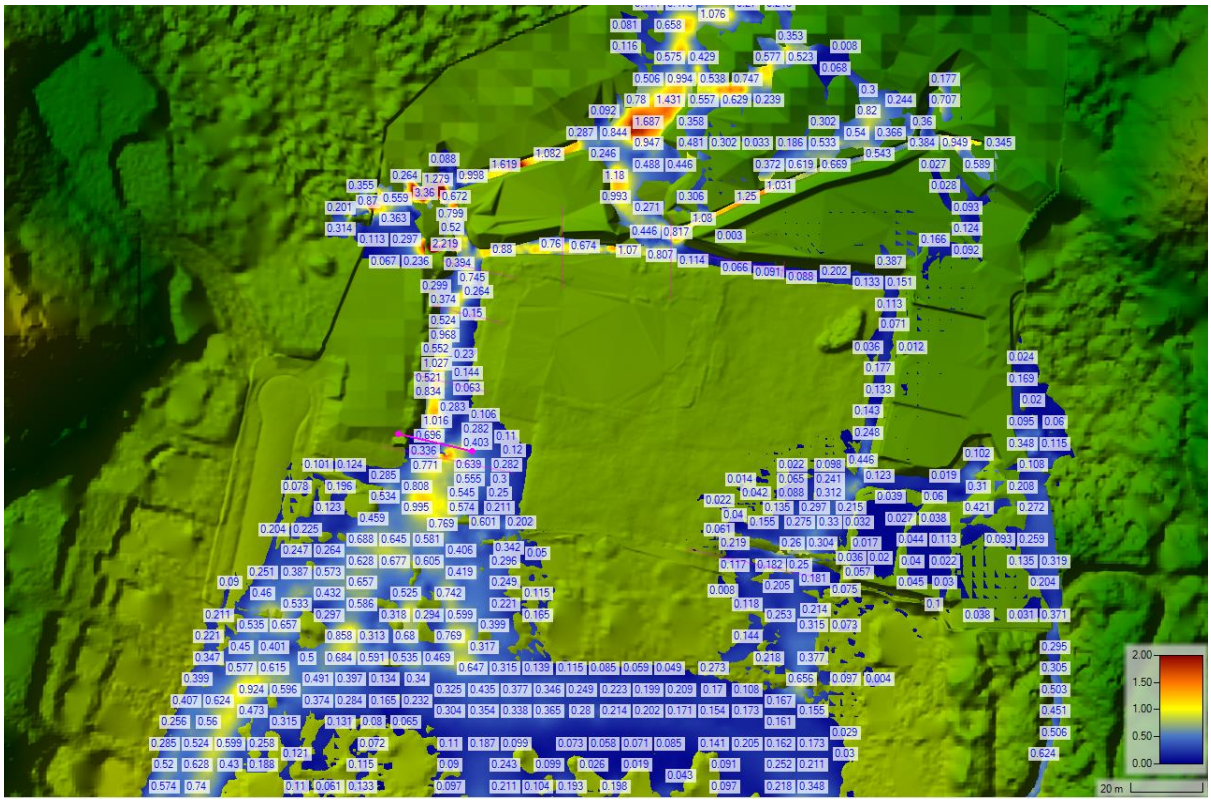

Figure 6: Pre-Development 100-year ARI Flood Map showing Flow Velocities

5.2 Modelling Results, Post-Development Condition

The post-development condition has also been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development 100-year ARI flood levels, flood depths and flow velocities are shown in Figures 7, 8 and 9 below, respectively.

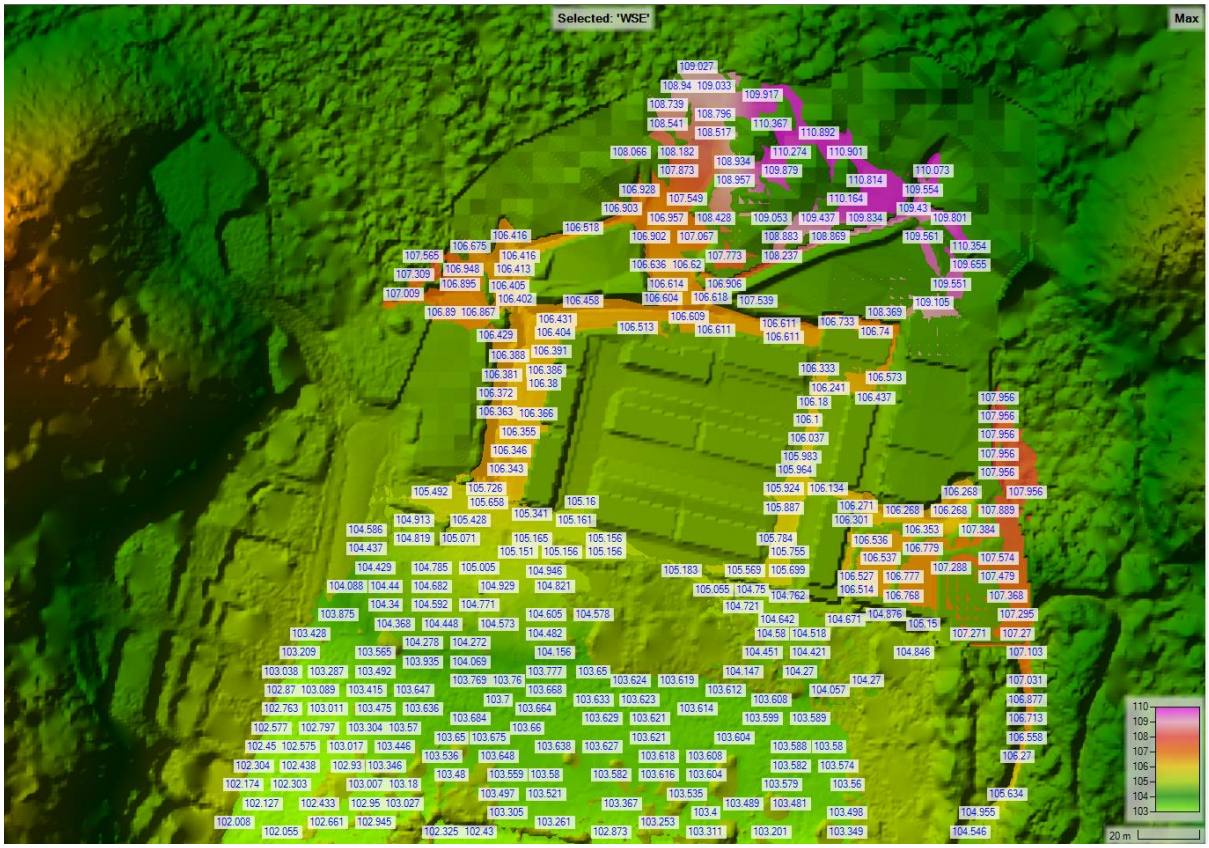

Figure 7: Post-Development 100-year ARI Flood Map showing Flood Levels

The results for the post-development scenario show that stormwater runoff from the northern catchment is directed along the channels adjacent to northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance. For this scenario, runoff from the eastern catchment is connected within the proposed pipe network, which ultimately discharges into the 1050 mm culvert.

Apart from the spillage across the culvert embankment, the post-development scenario also shows a very small amount of flow spilling across the south-eastern corner, of maximum 3.52 m^3/s. This flow is insignificant in the context of the 100-year ARI event, and it is expected that it will be fully contained within the kerb and channel in the proposed southern road (the design of this will be finalised during detailed design stage). The impact on downstream properties is thus expected to be negligible.

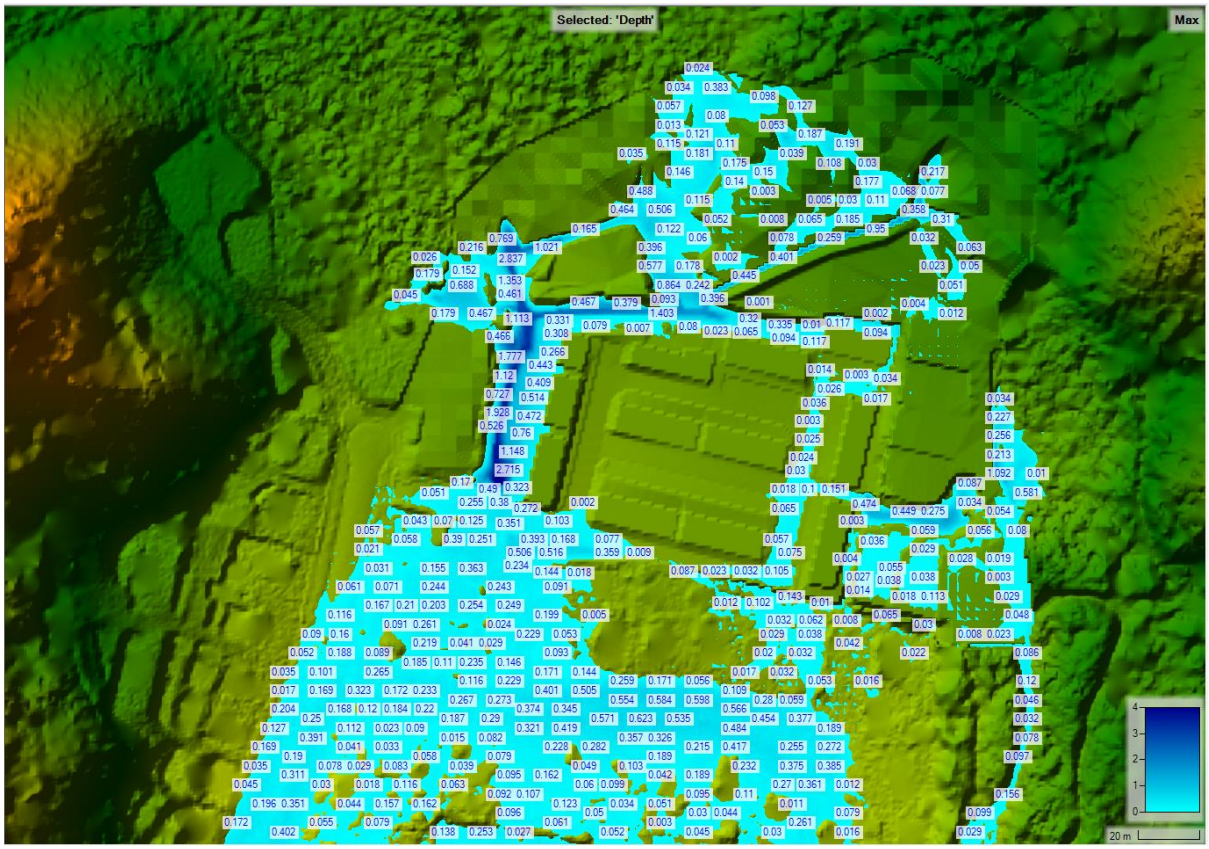

Figure 8: Post-Development 100-year ARI Flood Map showing Flood Depths

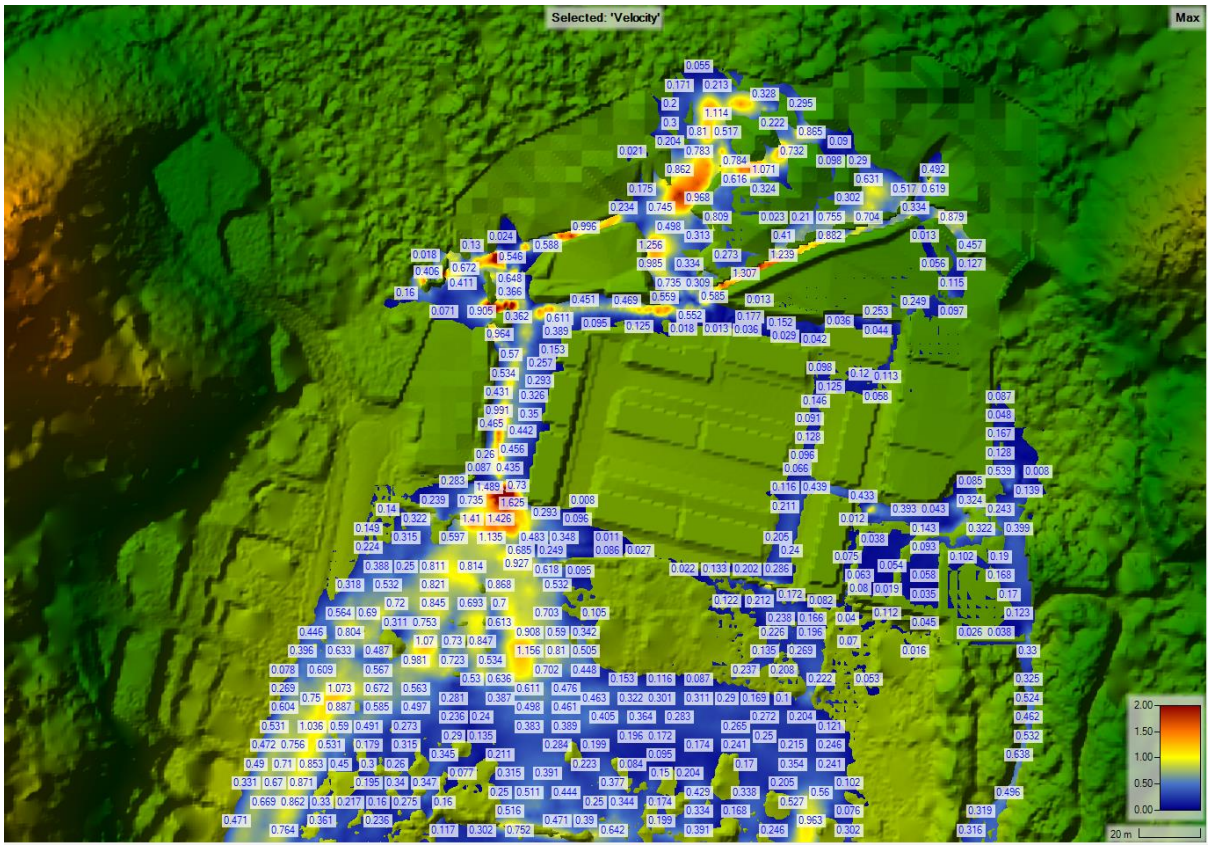

Figure 9: Post-Development 100-year ARI Flood Map showing Flow Velocities

5.3 Impact on Downstream Properties

As part of the proposed works, the existing crossing over the stream will be raised in level, and this will result in additional storage within the existing channels during the 100-year ARI event. While this causes water levels to rise behind the culvert, the flows will remain fully contained within the channels, thereby avoiding any adverse impacts on adjacent properties.

Downstream of the development, the revised 100yr ARI flood levels are predicted to decrease at west-southern and east-southern location, typically up to 370 mm by each location (green), as shown in Figure 10 below.

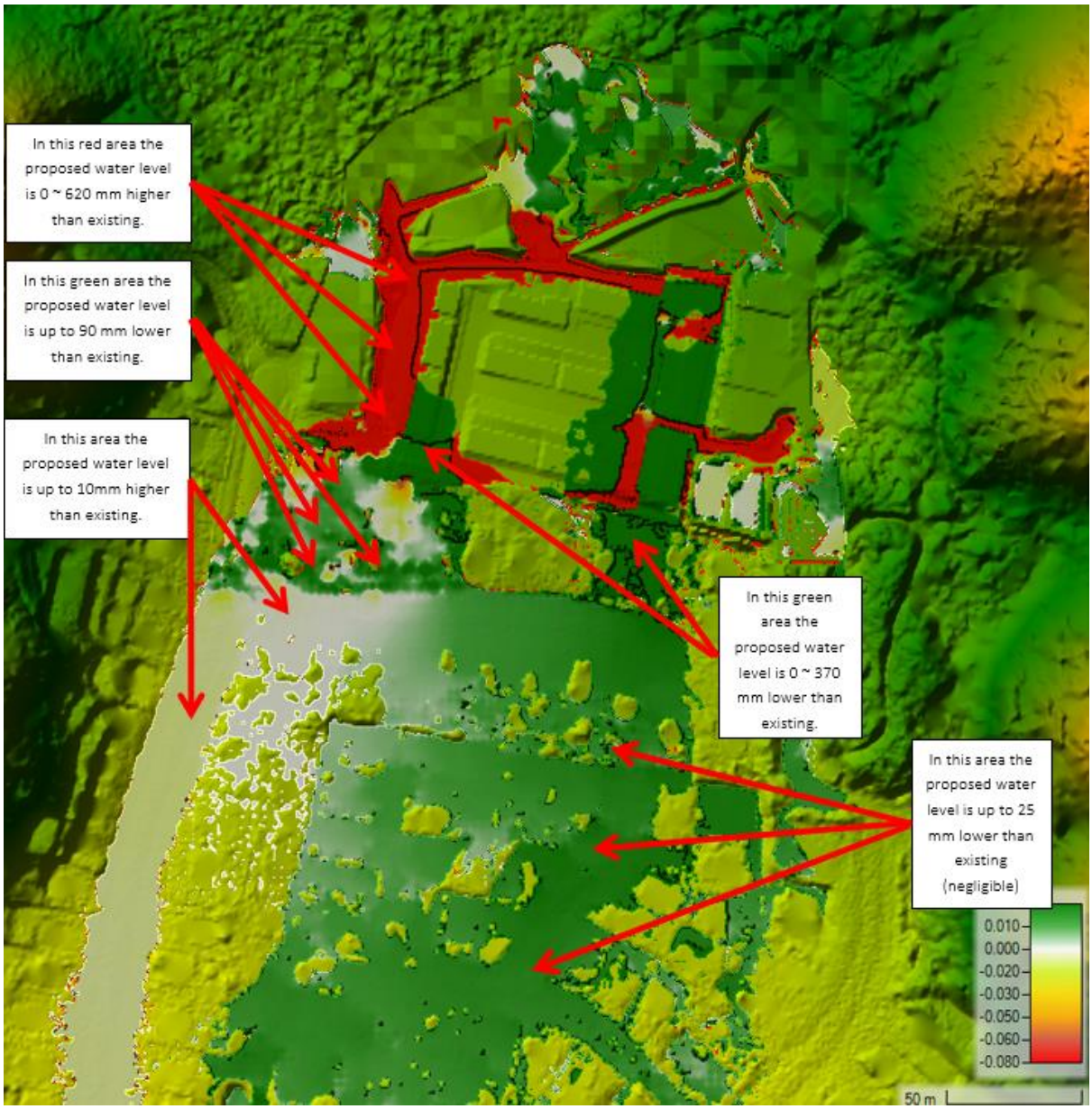

Figure 10: Comparison existing WSL and proposed WSL

In case of west-southern downstream impact, particularly on properties 100-104 Mohaka and 3-5 Rakaia Grove's proposed flood level is reduced up to 90 mm. as shown in Figure 11, 12, 13, 14 and 15 below, respectively.

Figure 11: Cross-sections for Pre-Development and Post-Development flood levels on west-southern properties.

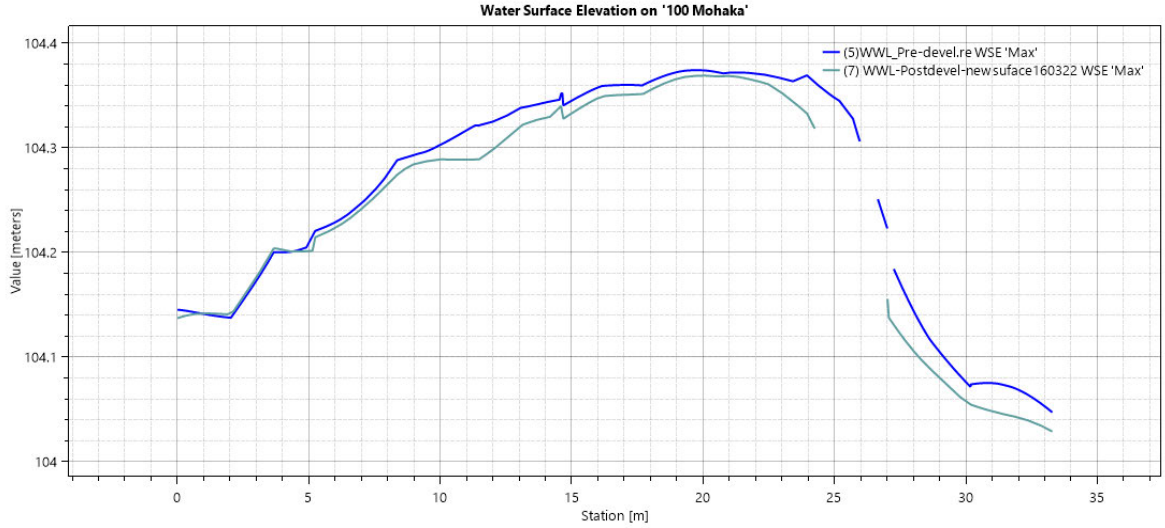

Figure 12: Pre-Development and Post-Development flood levels on 100 Mohaka St.

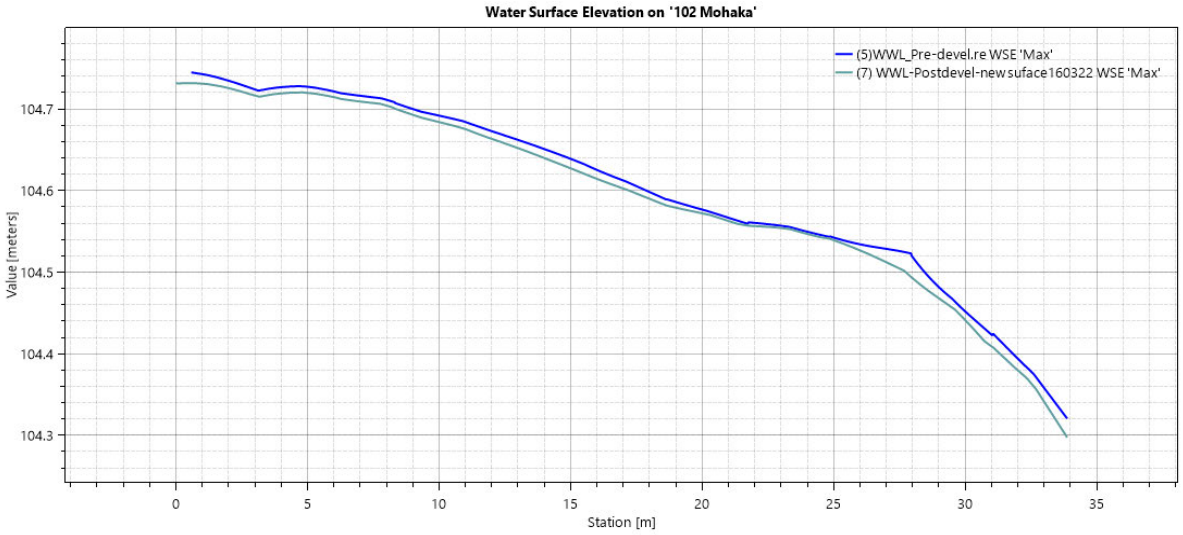

Figure 13: Pre-Development and Post-Development flood levels on 102 Mohaka St.

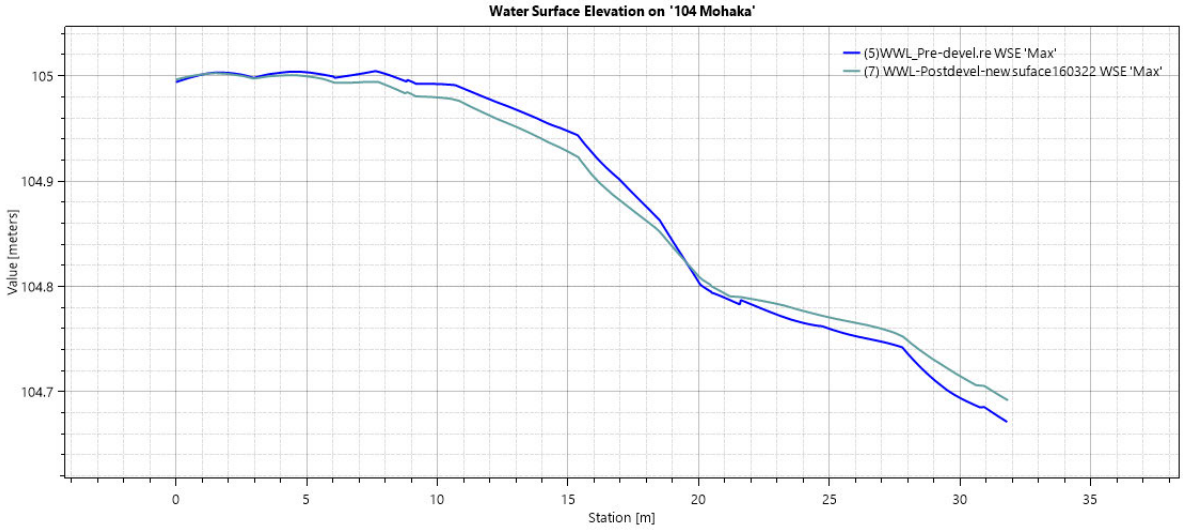

Figure 14: Pre-Development and Post-Development flood levels on 104 Mohaka St.

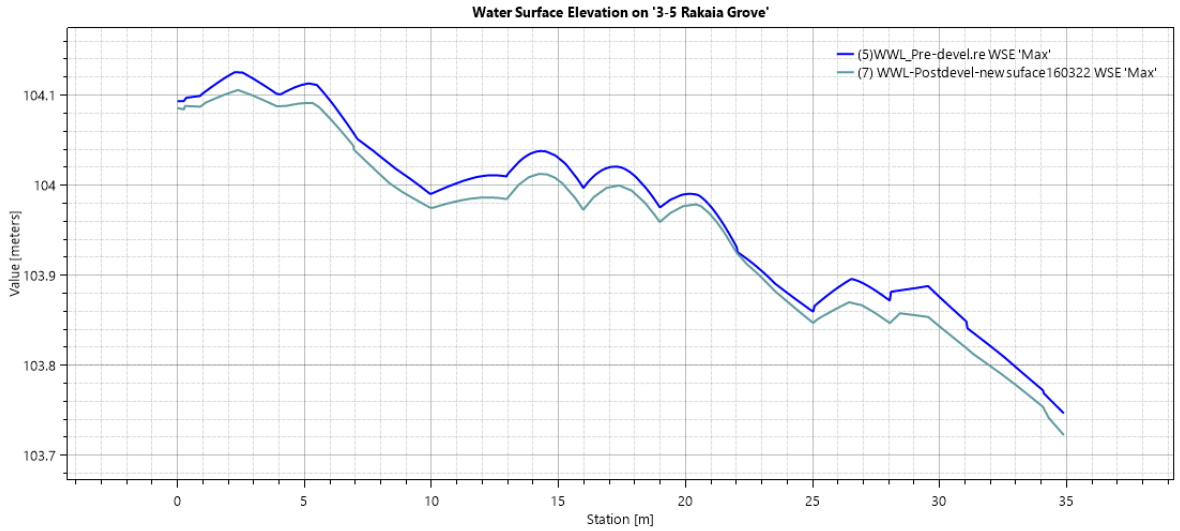

Figure 15: Pre-Development and Post-Development flood levels on 3-5 Rakaia Grove

In conclusion, the analysis shows that the proposed development will result in "no more than minor" effects with regards to flooding (in fact likely to result in net positive results given the predicted reduced flow depth downstream), and especially considering that any benefits likely to arise from the proposed on-site attenuation is ignored in the analysis.

5.4 Minimum Recommended Floor Levels

Based on the flood assessment, minimum floor levels have been determined based on council's criteria for a minimum freeboard of 500 mm above the predicted 100-year ARI flood levels, for habitable floors that are adjacent to a 100-year floodplain or overland flow path.

For all other lots, a 200 mm freeboard to the adjacent ground is required in accordance with the requirements of the building code.

Refer **Table 2** below for the minimum recommended level for the underside of the structural concrete slab (or underside of floor joists).

Lot #	Adjacent to 100yr ARI OLFP or Flood Plain?	100-year ARI Flood Level (RL. m)	Recommended Minimum Underside of Slab Level (m)	Freeboard (mm)
1	Yes	106.36	106.86	500 above Flood Level
2	Yes	106.36	106.86	500 above Flood Level
3	Yes	106.36	106.86	500 above Flood Level
4	Yes	106.36	106.86	500 above Flood Level
5	Yes	106.39	106.89	500 above Flood Level
6	Yes	106.39	106.89	500 above Flood Level
7	Yes	106.39	106.89	500 above Flood Level
8	Yes	106.41	106.91	500 above Flood Level
9	Yes	106.41	106.91	500 above Flood Level
10	Yes	106.61	107.11	500 above Flood Level
11	Yes	106.61	107.11	500 above Flood Level
12	Yes	106.61	107.11	500 above Flood Level
13	Yes	106.61	107.11	500 above Flood Level
14	Yes	106.61	107.11	500 above Flood Level
15	Yes	106.61	107.11	500 above Flood Level
16	Yes	106.61	107.11	500 above Flood Level
17	Yes	106.61	107.11	500 above Flood Level
18	Yes	106.61	107.11	500 above Flood Level
19	Yes	106.74	107.24	500 above Flood Level
20	Yes	106.74	107.24	500 above Flood Level
21	Yes	106.74	107.24	500 above Flood Level
22	Yes	106.74	107.24	500 above Flood Level
23	Yes	106.27	106.77	500 above Flood Level
24	Yes	106.27	106.77	500 above Flood Level

25	Yes	106.27	106.77	500 above Flood Level
26	Yes	106.27	106.77	500 above Flood Level
27	Yes	106.27	106.77	500 above Flood Level
28	Yes	106.27	106.77	500 above Flood Level
29	Yes	106.27	106.77	500 above Flood Level
30	Yes	106.27	106.77	500 above Flood Level
31	Yes	106.27	106.77	500 above Flood Level
32	Yes	106.27	106.77	500 above Flood Level
33	Yes	105.80	106.30	500 above Flood Level
34	No	N/A	106.10	200 above Ground Level
35	No	N/A	106.10	200 above Ground Level
36	No	N/A	106.10	200 above Ground Level
37	No	N/A	106.10	200 above Ground Level
38	No	N/A	105.87	200 above Ground Level
39	No	N/A	105.87	200 above Ground Level
40	No	N/A	105.87	200 above Ground Level
41	No	N/A	105.87	200 above Ground Level
42	No	N/A	105.87	200 above Ground Level
43	No	N/A	106.23	200 above Ground Level
44	No	N/A	106.23	200 above Ground Level
45	No	N/A	106.23	200 above Ground Level
46	No	N/A	106.23	200 above Ground Level
47	No	N/A	106.23	200 above Ground Level
48	No	N/A	106.39	200 above Ground Level
49	No	N/A	106.39	200 above Ground Level
50	No	N/A	106.39	200 above Ground Level
51	No	N/A	106.39	200 above Ground Level
52	Yes	106.00	106.50	500 above Flood Level

Table 2 – 100-year ARI Flood Level and Minimum Habitable Floor Freeboard Requirements

5.5 Internal Overland Flow Paths

As discussed in the previous sections, 100-year ARI overland flows arising from the upstream catchments will be managed via the perimeter drainage channels, 1050mm culvert and internal reticulation that accepts flows from the eastern catchment, which is designed to convey 100-year ARI flows.

Overland flows within the subdivision itself are small, as any runoff generated within the site originates only from the site itself. Any excess flows in addition to the capacity of the underground piped network will be conveyed along the internal local roads toward the southwestern part of the site, where the 1050mm culvert breach point is located.

6 // Conclusion

This report has been prepared to assess the flood risk both within the site and at the adjacent residential properties west and south (downstream) of the site.

Our analysis concludes that the 100-year flows are adequately controlled in the post-development condition, and such that any impact on downstream properties to the south and properties to the west of the site no more than minor.

Minimum recommended floor levels have been identified through this work to ensure that the 100-year ARI freeboard requirements are achieved in accordance with Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0).

All other aspects of the stormwater system will be designed to conform with the relevant council standards and building code requirements.

As such we consider that Wellington Water and Hutt City Council should give favourable consideration to the proposed development, from a flood risk perspective.

Appendix A – Engineering Calculations

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106 Mohaka Street, Wainuiomata, Lower Hutt

Flood Assessment

CONTENTS:

Reason for this Revision: Wellington Water Queries

Calculations By:	PP
Checked By:	AR
Ref:	P20-156-Clc02
Date:	06.04.2022
Revision:	D

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	1
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

A Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to assist in the flood modelling and report.

This document presents the flood modelling for the post development scenario.

B Basis of Design

The design presented herein is based on Wellington's Land Development and Subdivision Code of Practice and associated documents, for the contributing catchment assuming maximum probable development (MPD) conditions. The hydrology parameters are selected based on guidance from Wellington Water's Reference Guide for Design Storm Hydrology.

C Stormwater

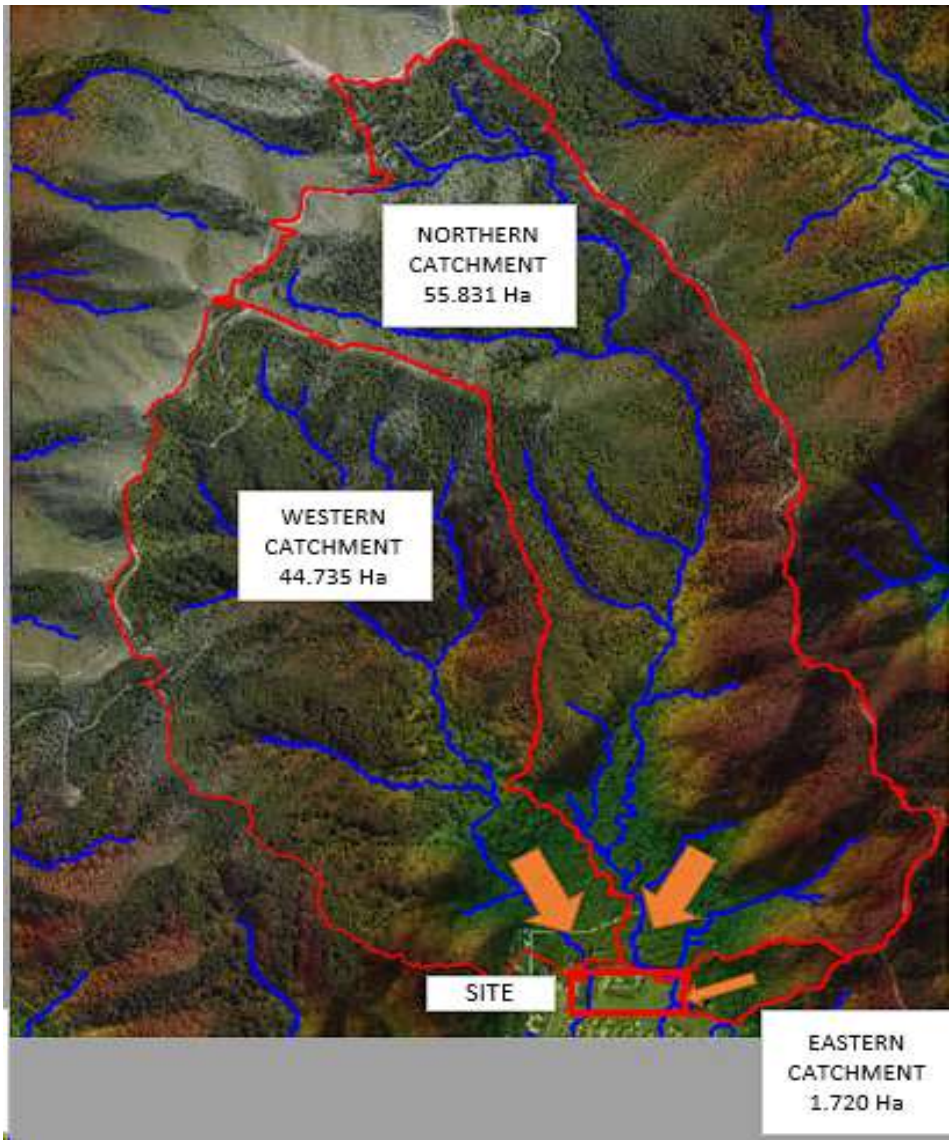
C.1 Flood Management Design Philosophy

The area is under the influence of the unnamed catchments as shown below. ARAL has undertaken an independent hydrology and hydraulics analysis using HEC-HMS and HEC-RAS to determine the peak flows and flooding extents.

The design philosophy focuses on retaining the existing topography as much as possible and applying a low impact design (LID) approach to maintain pre-development hydrology and flows, and minimise adverse effects on the environment and neighbouring properties which may result from the development.

This calculation sheet will cover the 100-year peak flows and flood mapping regarding max. water depth, max. water surface level, and max. water velocity for an MPD condition.

The 100yr Catchments showing the site location are shown below.



C.2 Design Assumptions and Parameters

Climate Change:

The SCS Curve Number method was used with the HEC-HMS modelling software to calculate the amount of runoff from a rainfall event. The 1% Annual Exceedance Probability (AEP) or 100-year Average Recurrence Interval (ARI) event was assessed for the flood analysis. An RCP6.0 for the year 2081-2100 was used for the climate change factor from HIRDS v4.

**** Nested Storm rainfall profile (12-hour storm duration is used for this assessment)**

RCP6.0 for the period 2081-2100(Depth, mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	
1.58	0.633	8.29	11.3	13.6	19.1	26.7	44.4	59.4	77.4	
2	0.5	9.16	12.4	15	21.1	29.5	48.9	65.4	84.8	
5	0.2	12.2	16.5	19.9	27.8	38.8	64.1	85.5	110	
10	0.1	14.5	19.5	23.6	32.9	45.8	75.4	101	130	
20	0.05	16.9	22.7	27.4	38.1	53.1	87.2	116	149	
30	0.033	18.3	24.7	29.7	41.4	57.5	94.3	125	161	
40	0.025	19.4	26.1	31.4	43.7	60.6	99.5	132	169	
50	0.02	20.2	27.2	32.8	45.5	63.2	103	137	176	
60	0.017	20.9	28.2	33.9	47	65.2	107	142	182	
80	0.012	22.1	29.7	35.7	49.5	68.6	112	148	190	
100	0.01	22.9	30.8	37	51.4	71.1	116	154	197	
250	0.004	26.6	35.6	42.8	59.2	81.8	133	176	225	

Curve Numbers:

	CN	
Upstream undeveloped catchments	61	Based on Appendix B or Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	98	

Initial Abstraction:

The Initial Abstraction parameter is estimated as 0.1 x S, as per Wellington Water's Reference Guide for Design Storm Hydrology, as follows:

	Ia	
Upstream undeveloped catchments	16.24	Based on Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	0	

Terrain Data:

- Wellington Lidar 1m DEM (2013-2014, LINZ), Projection: NZGD / Wellington 2000, Vertical Datum: NZVD2016
- Existing survey completed by Cuttriss, Surveyors, Engineers, Planners Ltd, 11.2020
- Proposed Terrain design for project site by AR Associates Ltd.
- Site scheme plan, Moore Design, 23.12.20

Proposed Plan:

	Max Coverage	Average MPD Impervious	
Pre-Development	0%	0%	
Post-Development	65%	70%	<- Assumed

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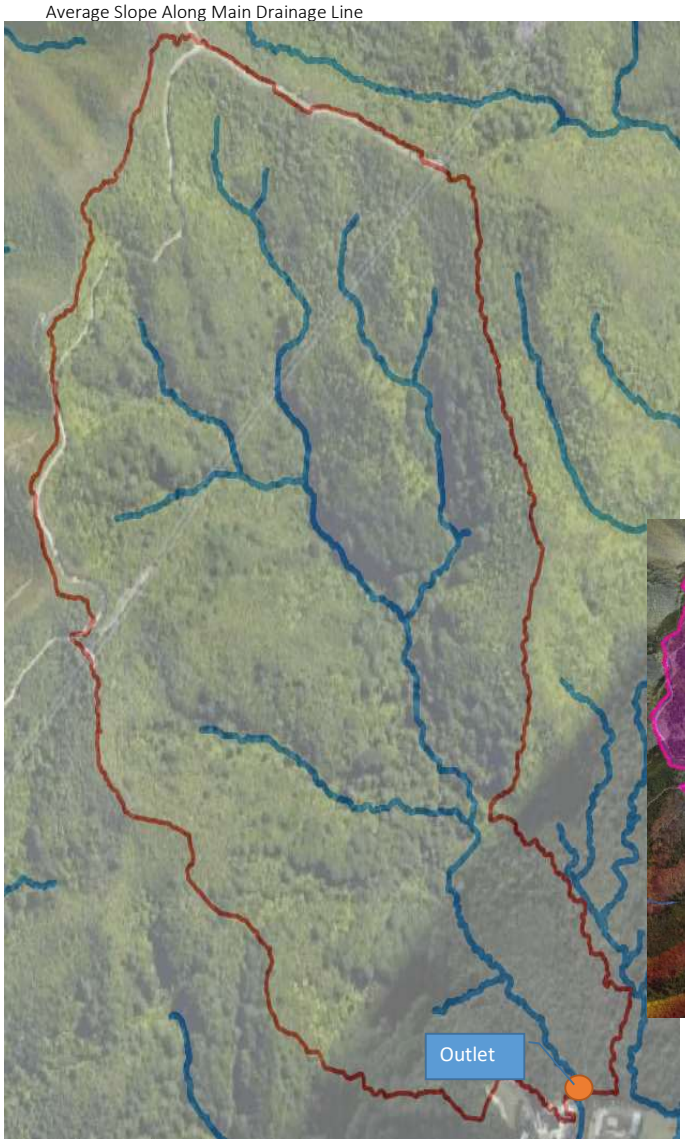
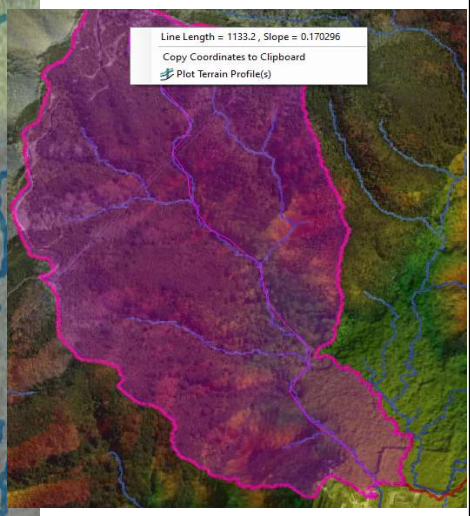
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	3
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

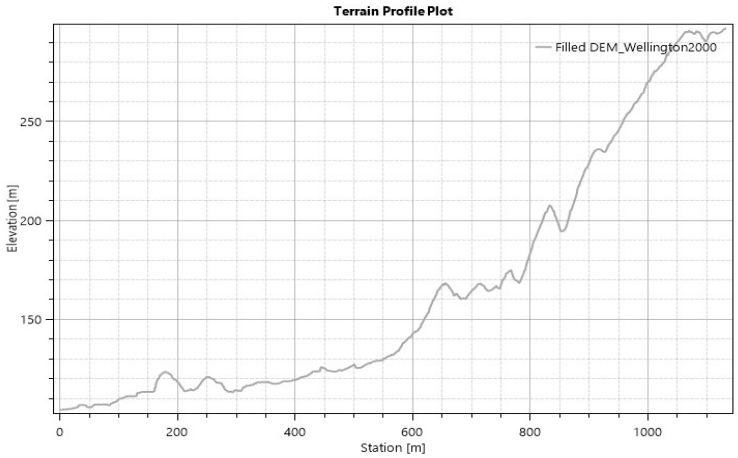
C.3 Catchment Analysis - Western Catchment

Average Slope Along Main Drainage Line





Slope =	0.108



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	4
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

Catchment Area

Total	444783	m2
	0.444783	km2
	44.4783	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.13	From above
Catchment slope Sc (equal area method)	0.108	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.47	(TP108)
Tc (min)	27.97	
Lag time (min)	18.65	
Tc (min)	10.32	(Ramser Kirpich Tc) - Suited to catchments with well-defined drainage channels.
Lag time (min)	6.88	
Tc (min)	28.17	(Bransby Williams Tc) - Suited to catchments without well-defined drainage channels.
Lag time (min)	18.78	
Average(min)	**19.25**	
Lag time (min)	**12.83**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		44478	10.0%
CN (Mountainous)	61		400305	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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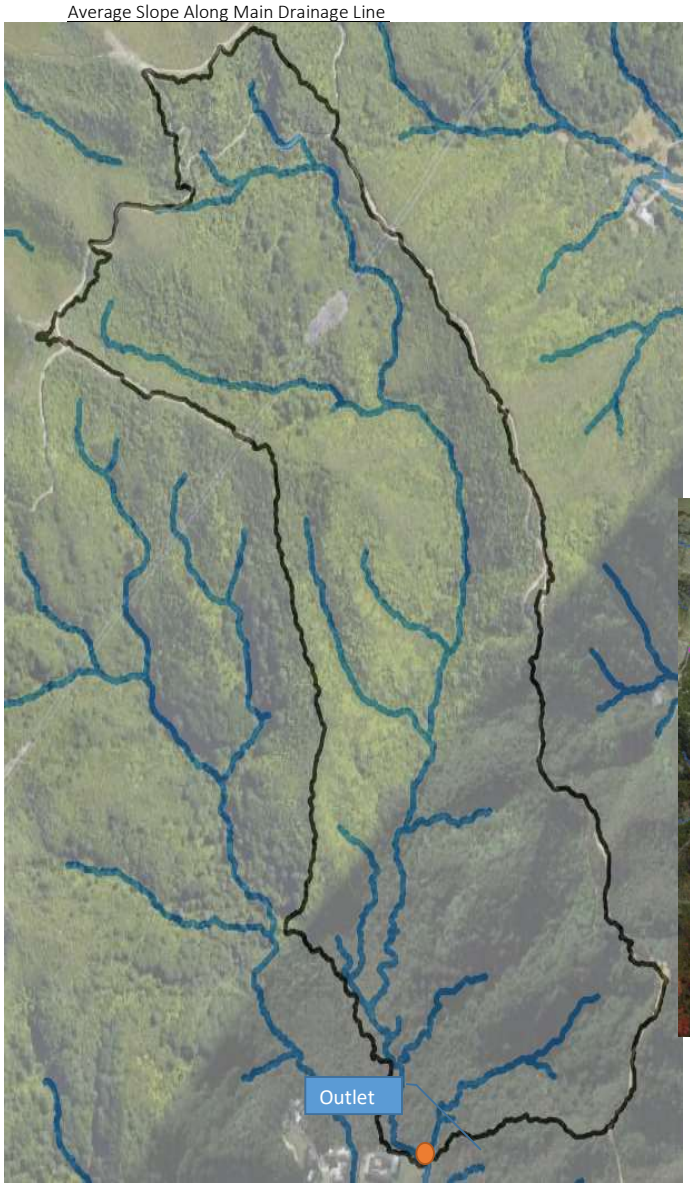
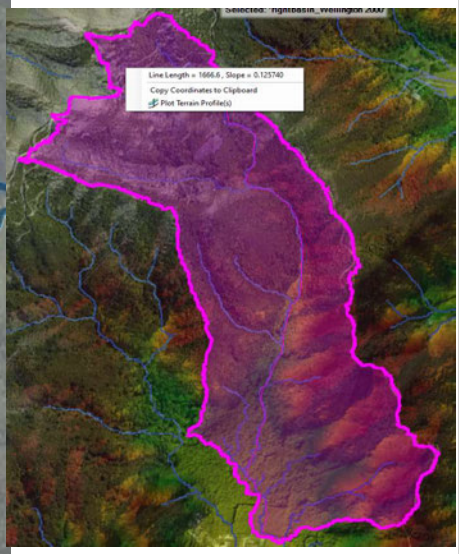
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	5
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

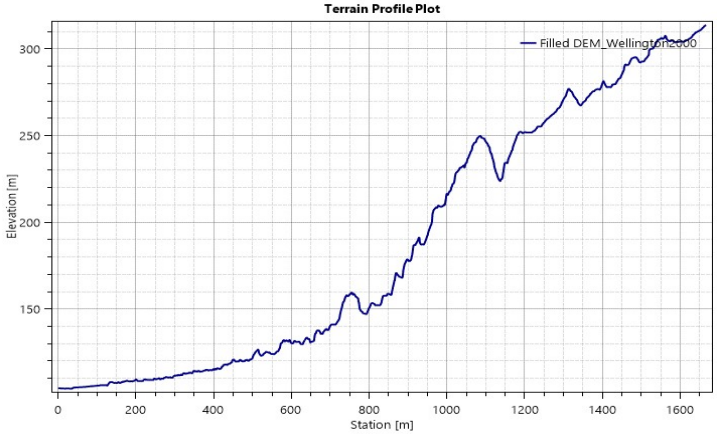
C.4 Catchment Analysis - Northern Catchment

Average Slope Along Main Drainage Line





Slope = 0.0998



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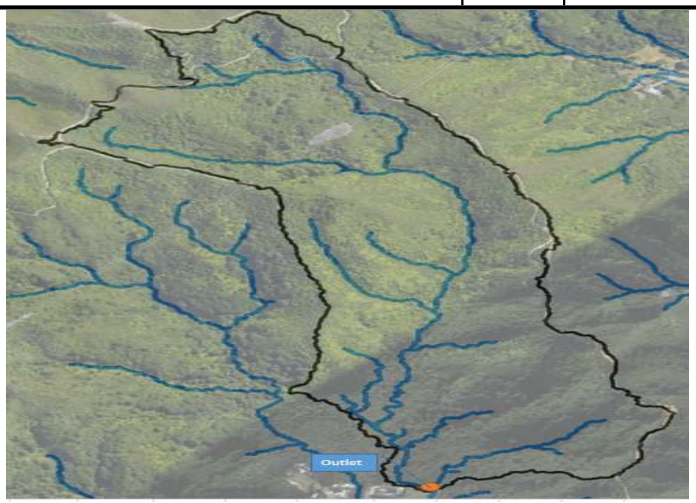
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	6
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		



Catchment Area

Total	558312	m2
	0.558312	km2
	55.8312	ha

Pre-Development

Impervious Area

	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.67	From above
Catchment slope Sc (equal area method)	0.0998	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.62	
Tc (min)	36.96	
Lag time (min)	24.64	
Tc (min)	14.33	**(Ramser Kirpich Tc)**
Lag time (min)	9.55	
Tc (min)	41.16	(Bransby Williams Tc)
Lag time (min)	27.44	
Average(min)	**27.74**	
Lag time (min)	**18.50**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		55831.2	10.0%
CN (Mountainous)	61		502480.8	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	7
Description:	Flood Assessment	Designed:	PP		
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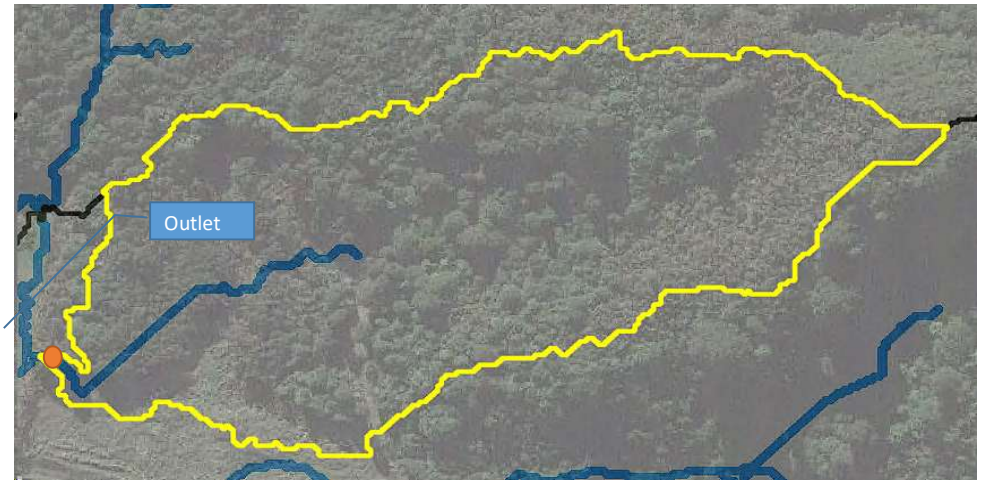
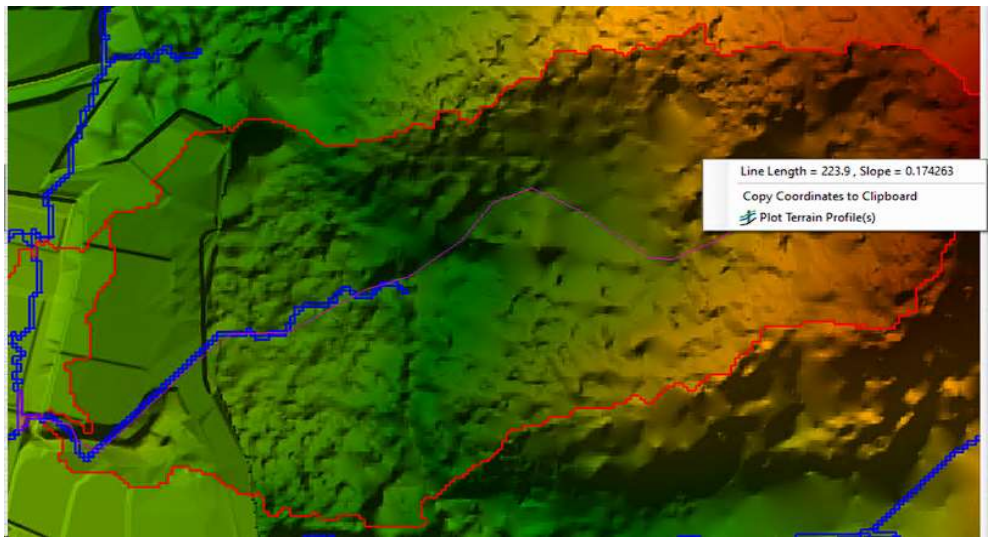
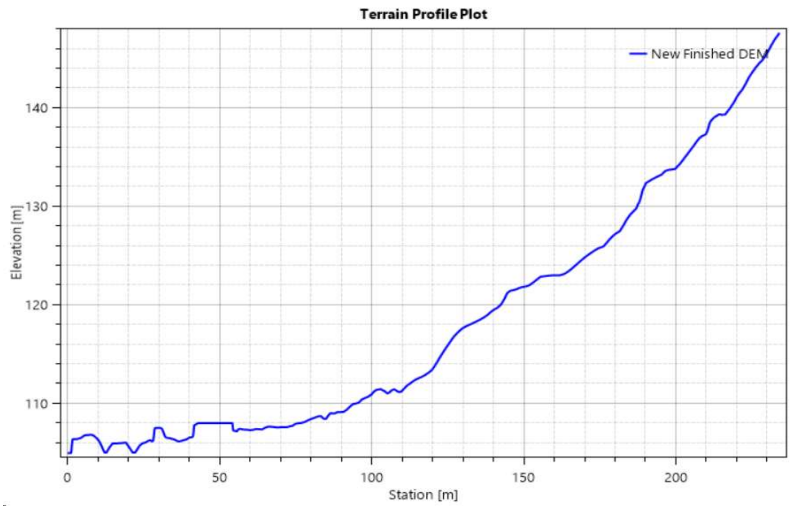
C.5 Catchment Analysis - Eastern Catchment

Average Slope Along Main Drainage Line





Slope = 0.1127



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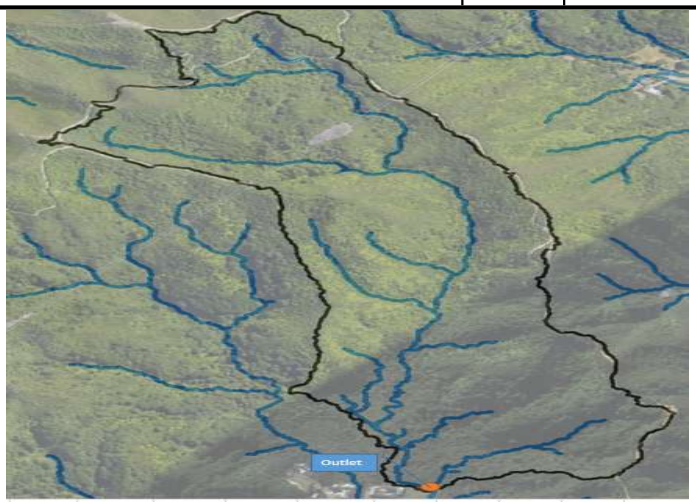
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	8
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		



Catchment Area

Total	17206	m2
	0.017206	km2
	1.7206	ha

Pre-Development

Impervious Area 0 m2

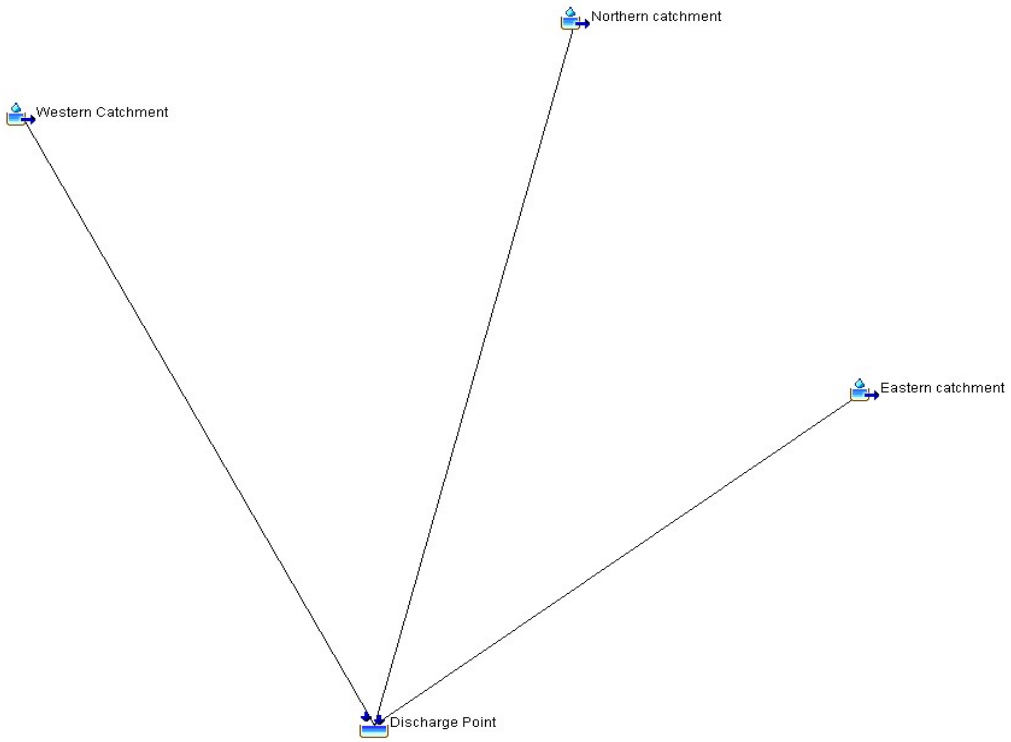
Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	0.23	From above
Catchment slope Sc (equal area method)	0.1127	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.17	
Tc (min)	10.20	
Lag time (min)	6.80	
Tc (min)	3.02	**(Ramser Kirpich Tc)**
Lag time (min)	2.01	
Tc (min)	7.99	(Bransby Williams Tc)
Lag time (min)	5.32	
Average(min)	**5.50**	
Lag time (min)	**3.67**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		1720.6	10.0%
CN (Mountainous)	61		15485.4	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

C.6 HEC-HMS Model & Results



Average Tc (Ramser and Bransby)

Global Summary Results for Run "100yr Proposed"

Project: P20-156-WWL Simulation Run: 100yr Proposed

Start of Run: 01Jan2020, 00:00
End of Run: 01Jan2020, 12:00
Compute Time: 25Mar2022, 13:10:54

Basin Model: 100yr Proposed
Meteorologic Model: 100yr +CC
Control Specifications: 24hr

Show Elements: All Elem... Volume Units: MM 1000 M3 Sorting: Hydrol...

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Western Catchment	0.444783	5.9	01Jan2020, 08:14	62.23
Northern catchment	0.558312	6.1	01Jan2020, 08:20	61.68
Eastern catchment	0.017206	0.3	01Jan2020, 08:06	63.12
Discharge Point	1.020301	11.7	01Jan2020, 08:16	61.94

CALCULATION SHEET

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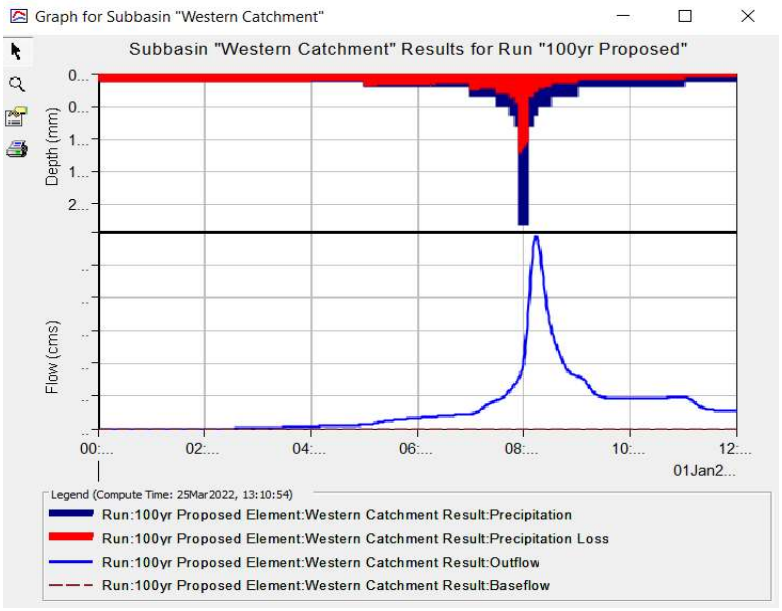
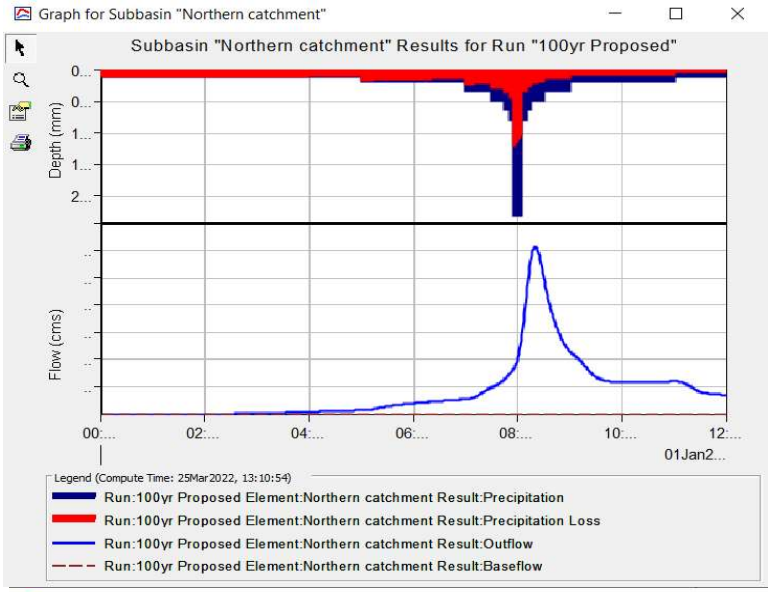
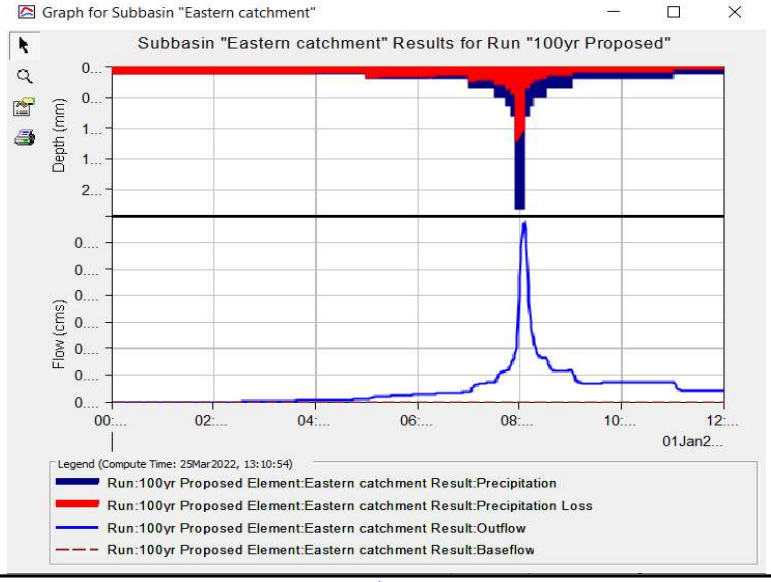
C.6 HEC-HMS Model & Results







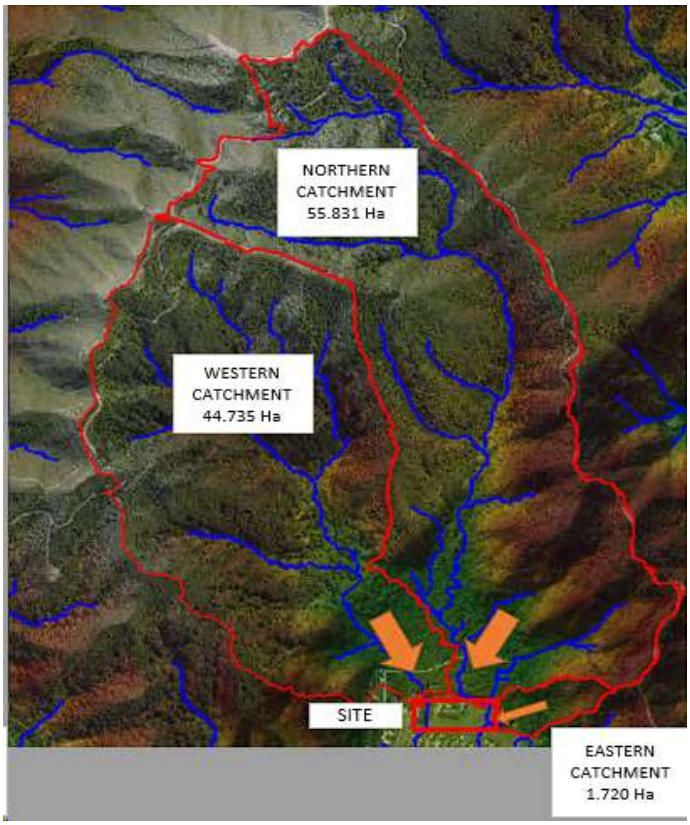
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	11
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

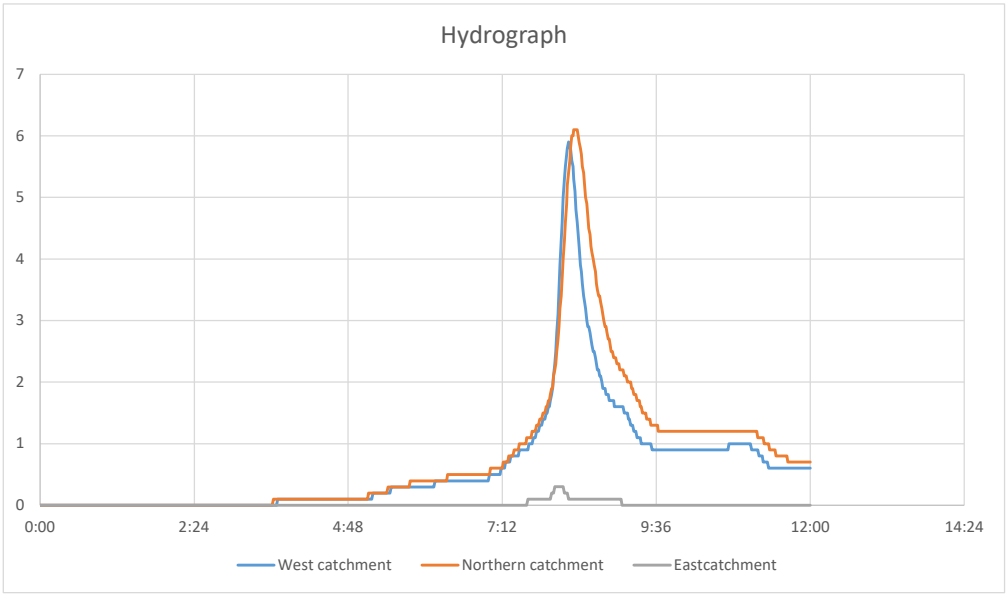
C.7 HEC-RAS Setup

Grid Size: 3m x 3m
Computation Interval: 0.5 sec
Manning: 0.07
Culvert blockage: Ex. Culvet 1050 (20%), Ex. Culvert 225 (50%), Prop. Culvert 525 (20%)

HEC-RAS Model Build:



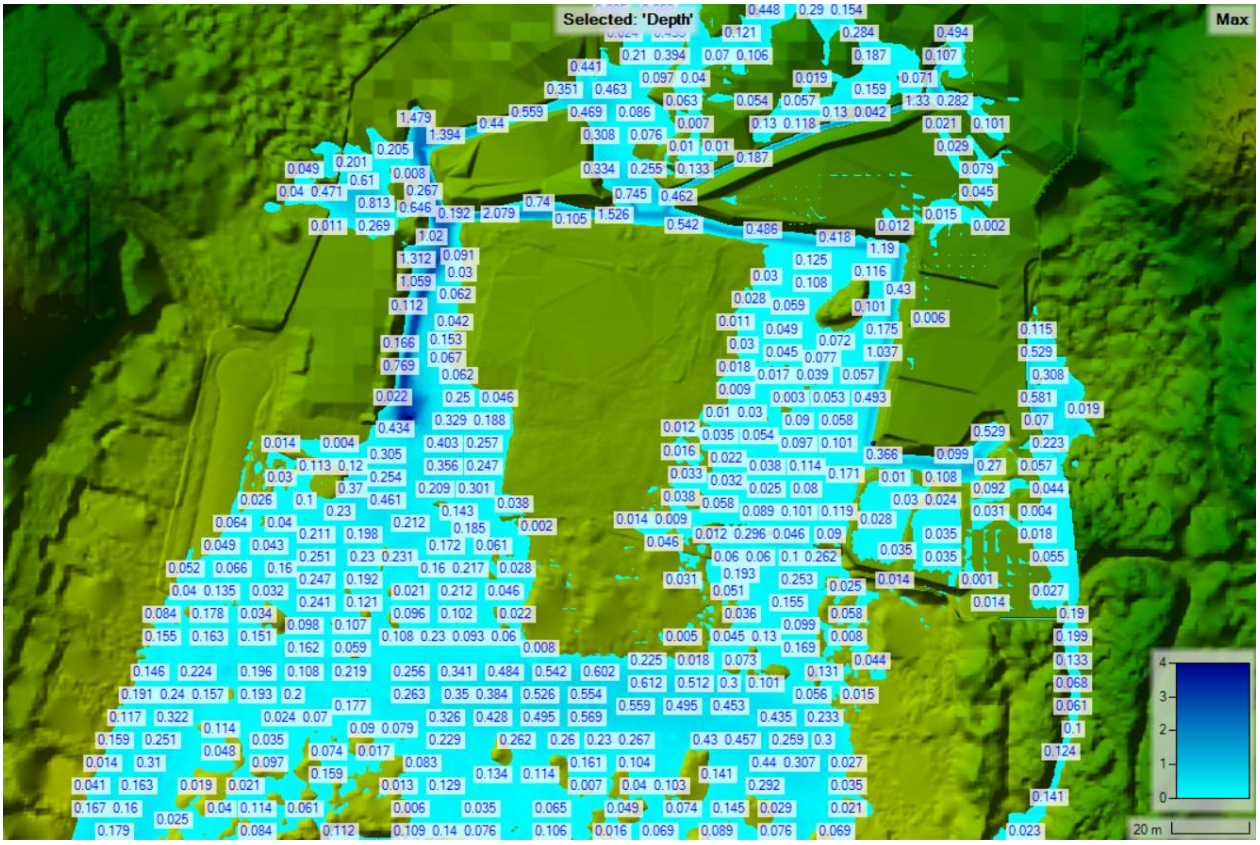
100-yr Hydrograph to be used for HEC-RAS



CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 12
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

C.8 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Depth



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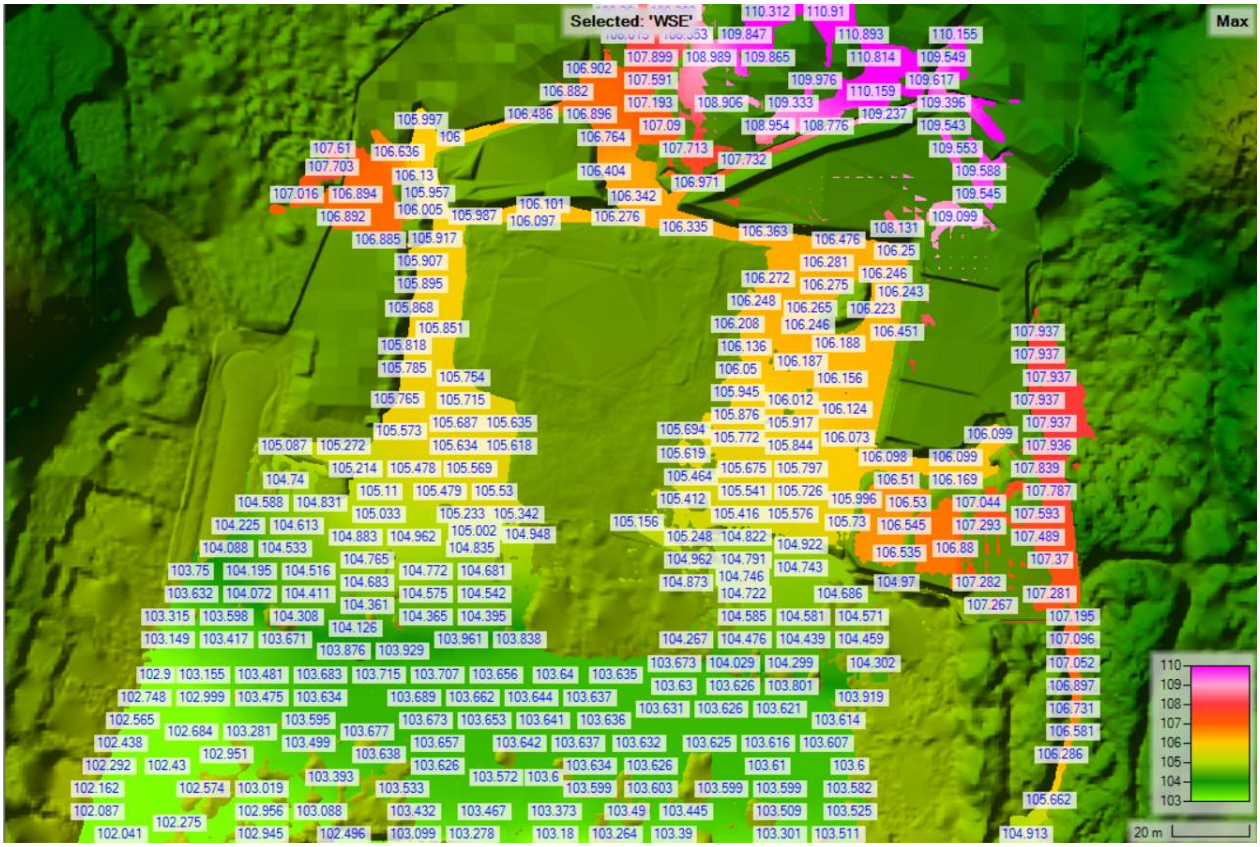
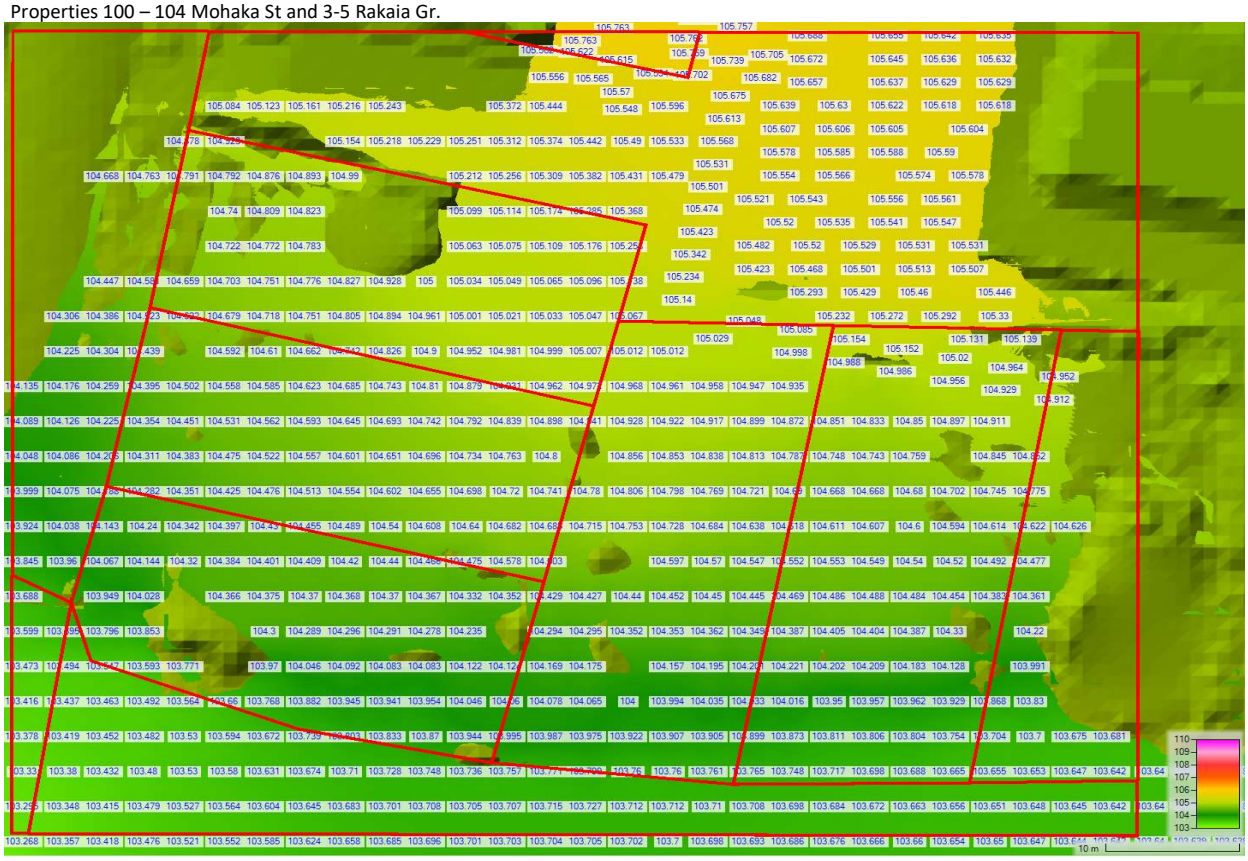
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	13
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.9 HEC-RAS Results: 100-yr, Pre-Dev - Water Surface Elevation



Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.



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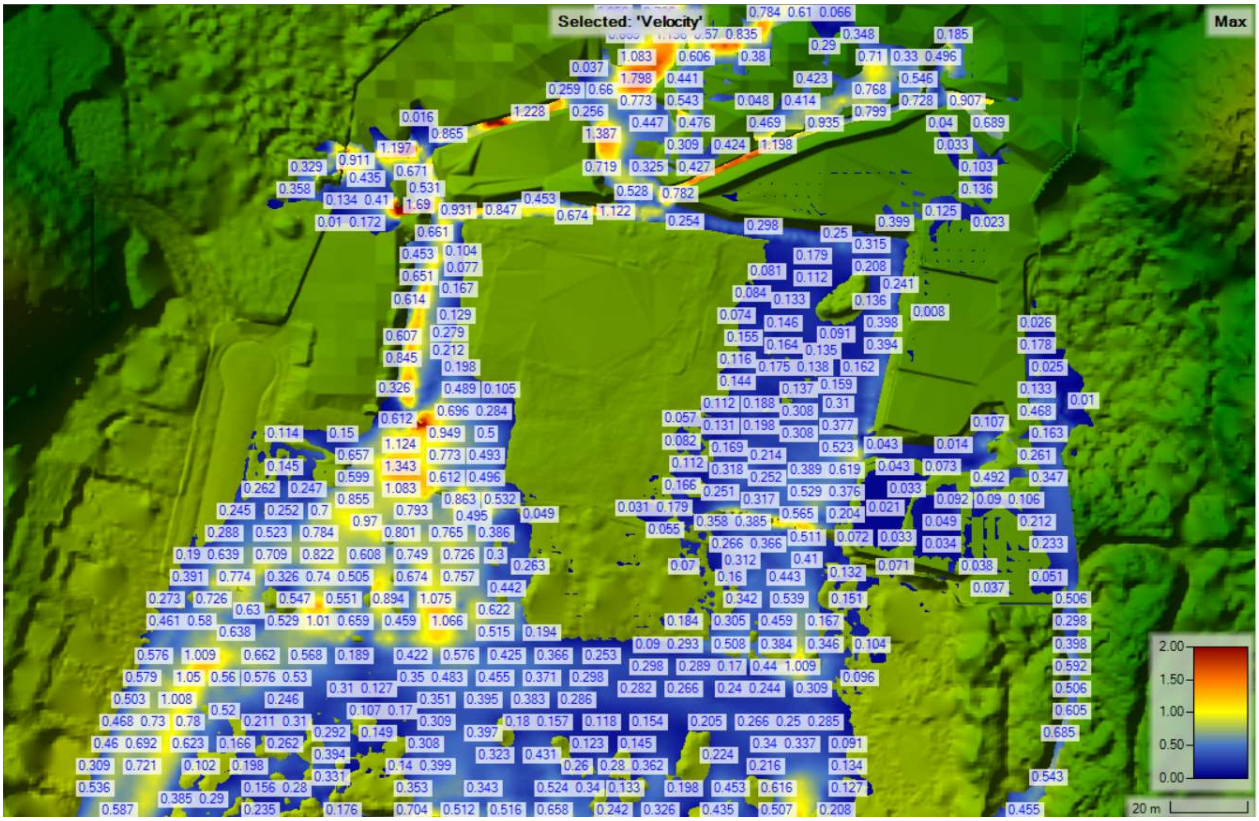
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	14
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.10 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Velocity



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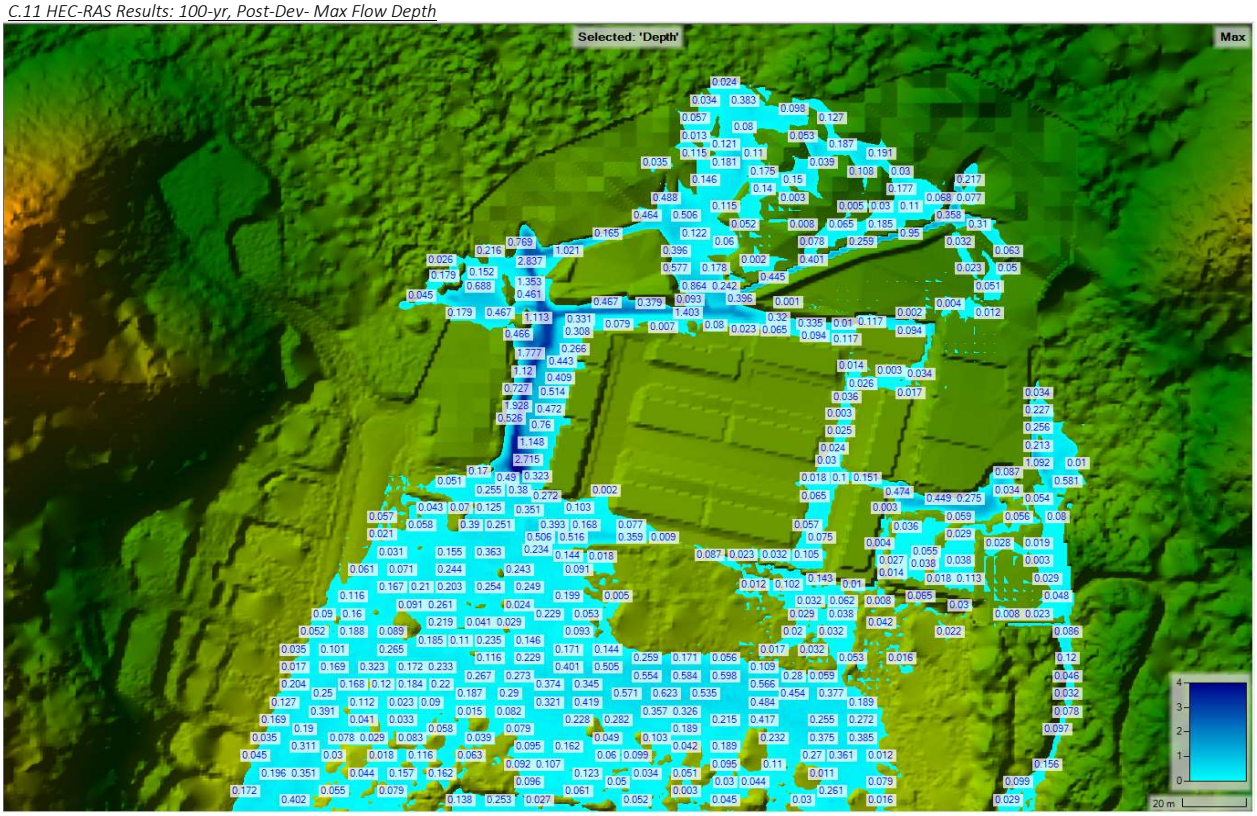
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	15
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

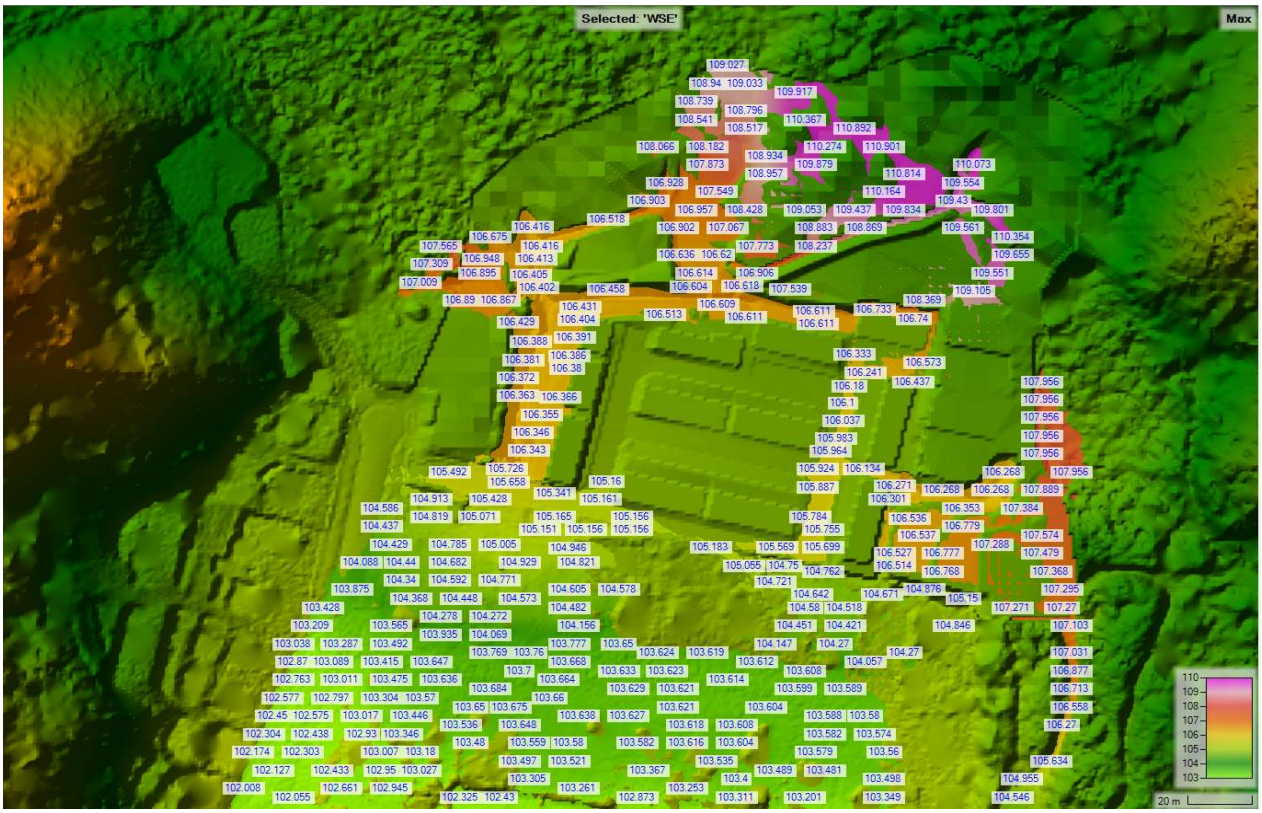
C.11 HEC-RAS Results: 100-yr, Post-Dev- Max Flow Depth



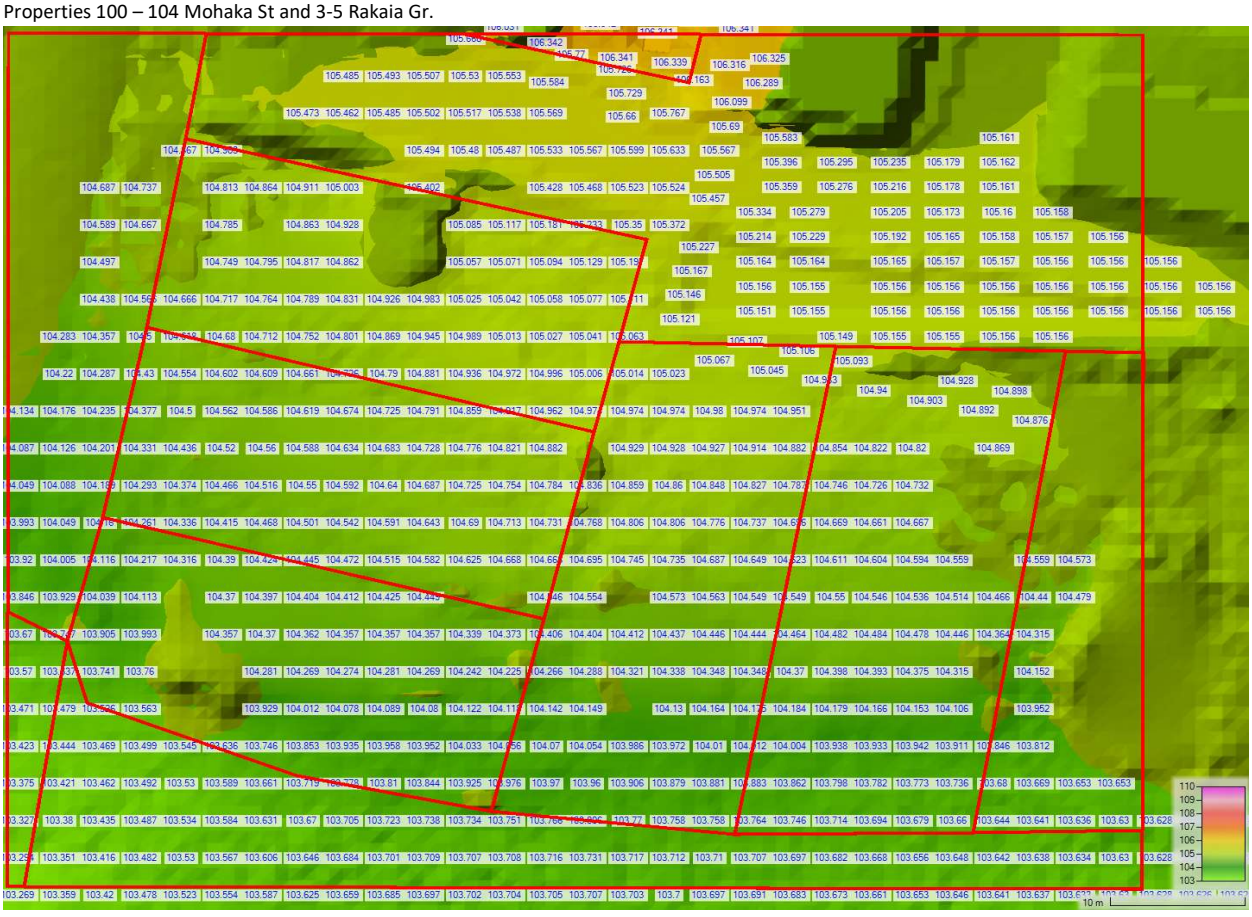
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	16
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.12 HEC-RAS Results: 100-yr, Post-Dev - Water Surface Elevation



Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.



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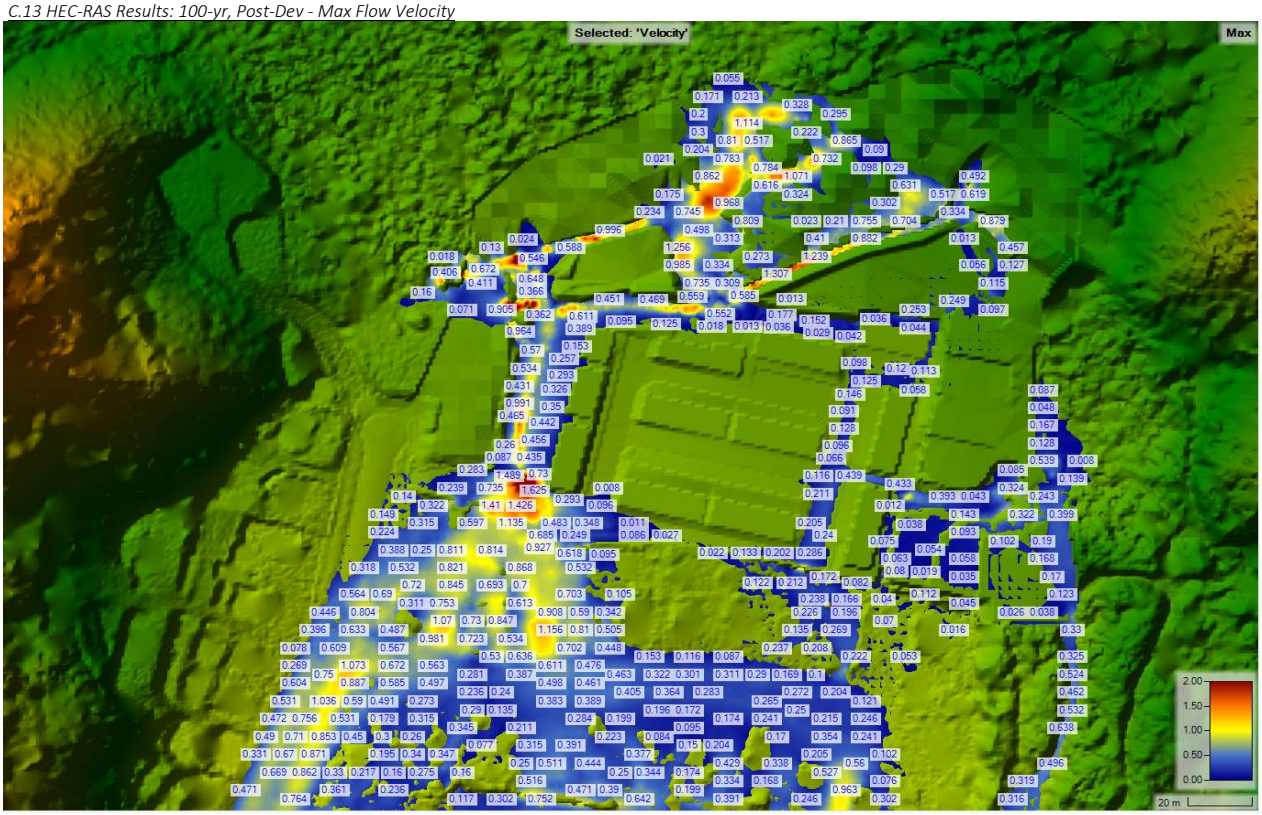
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 17
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

C.13 HEC-RAS Results: 100-yr, Post-Dev - Max Flow Velocity



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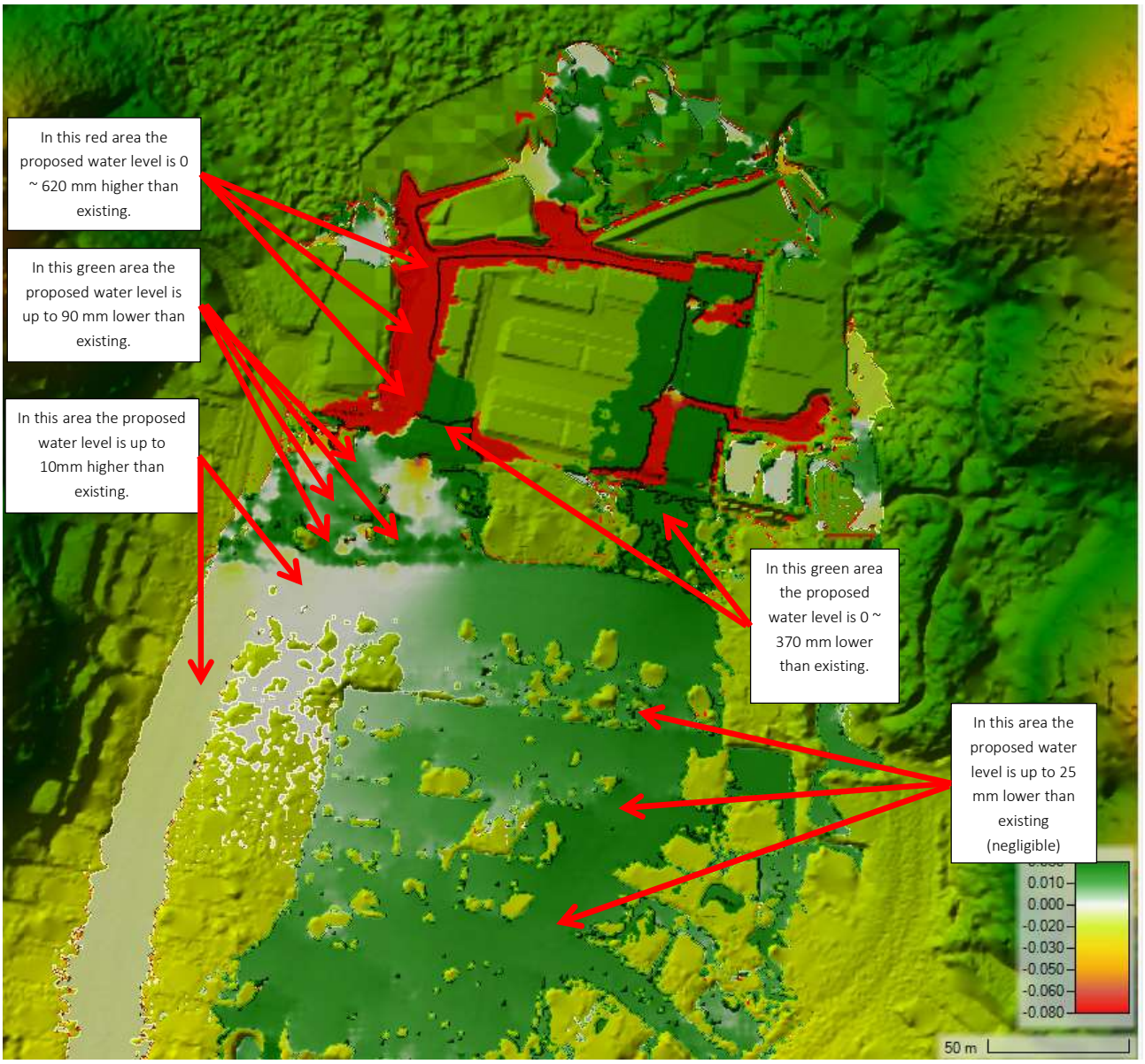
CALCULATION SHEET

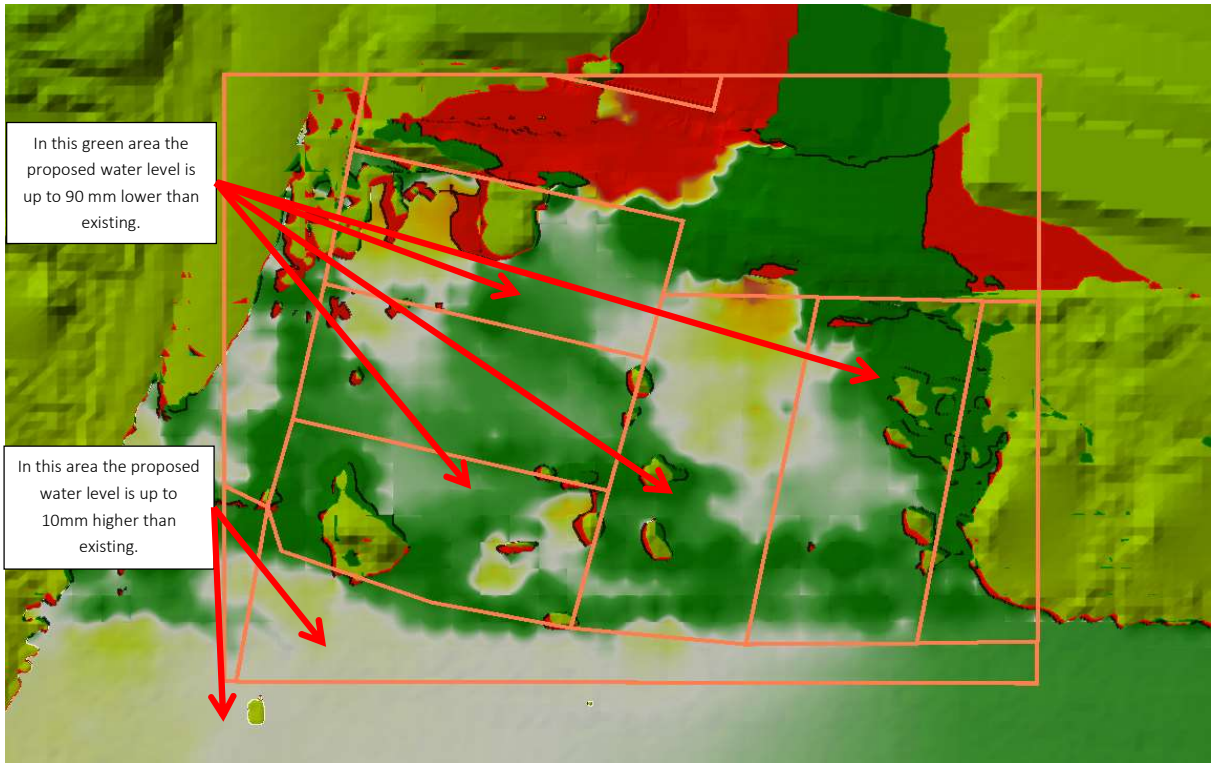
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 18
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

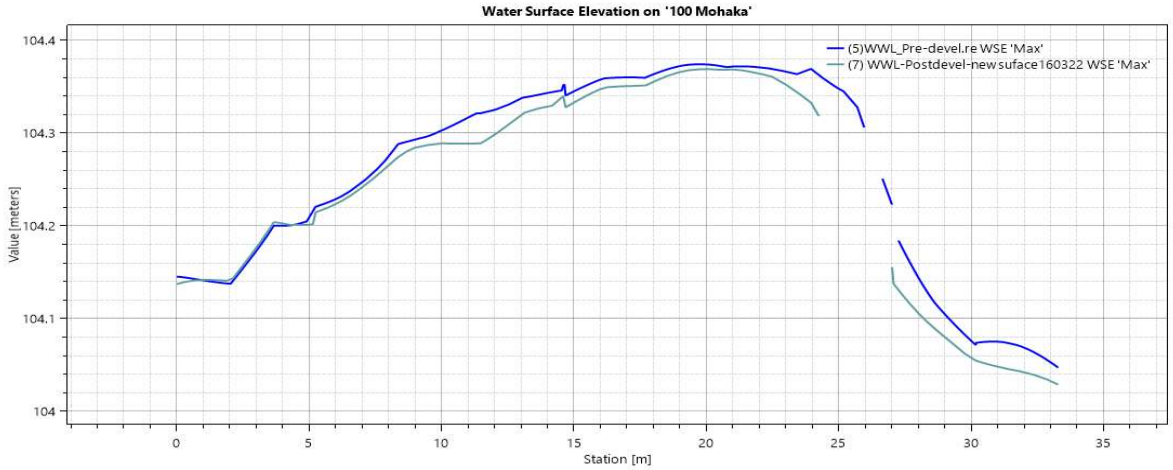
C.14 Flood Level Comparison Map (Existing Minus Post-Development)

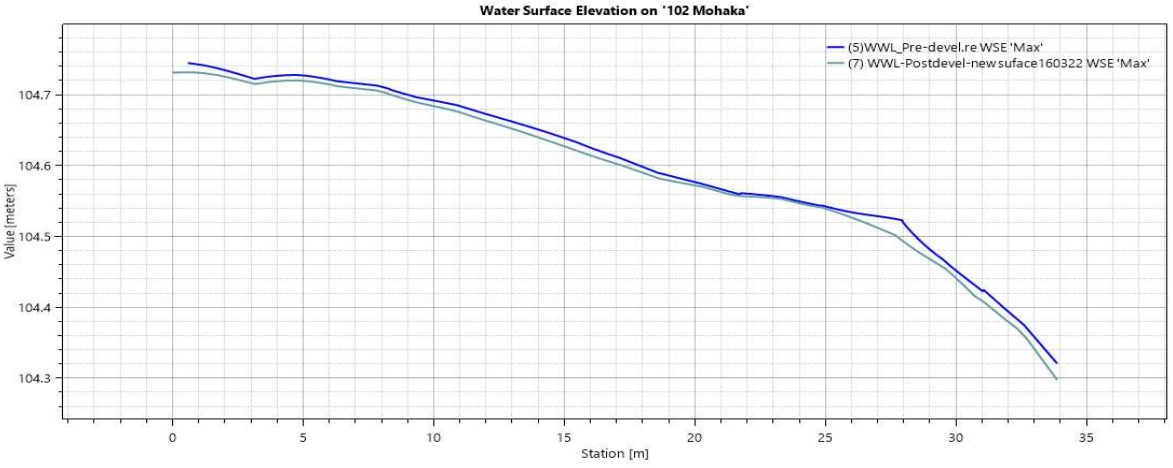


C.14 Flood Level Comparison Map (Existing Minus Post-Development)

Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.

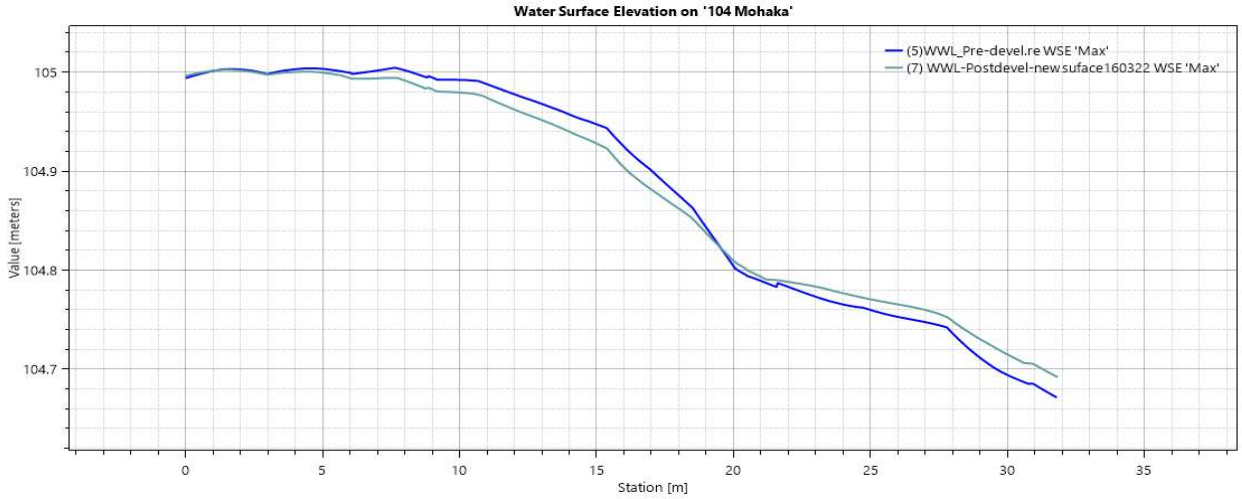


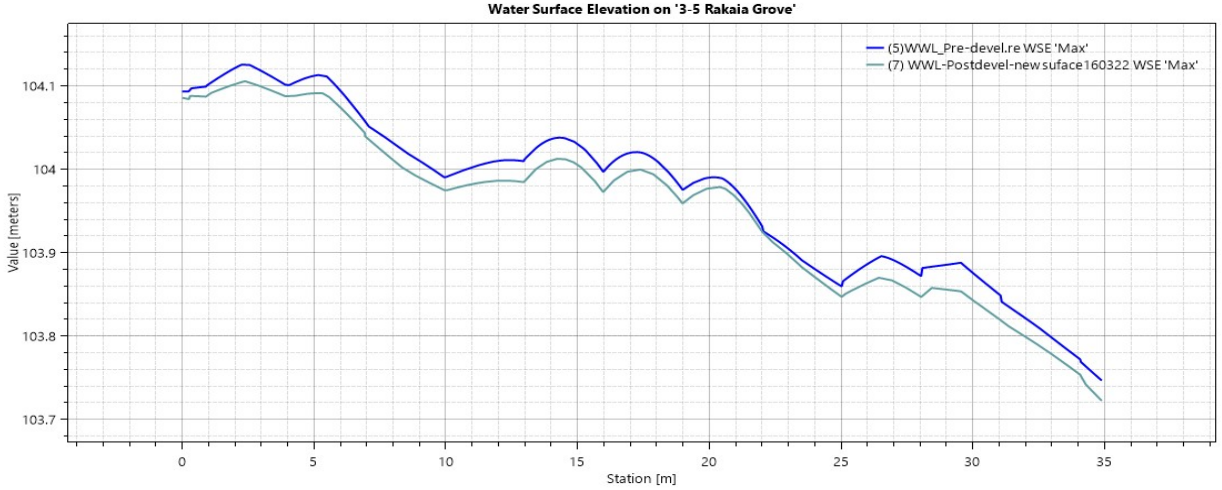




C.14 Flood Level Comparison Map (Existing Minus Post-Development)

Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.





S

Memo

To	Wellington Water	Date	17 January 2022
Attn.	[redacted]	Pages	4 + Attachments
From	[redacted]	Ref.	P20-156-M01-RevB
Re. //	RM210328 - 106 Mohaka Street – Wellington Water RFIs 16/12/2021, 23/12/2021 and 10/01/2022		

Dear [redacted]

This memo is in response to your 16 December 2021 information request, and subsequent emails on 23 December 2011 and 10 January 2022 in respect of the above application / development.

Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.

Response: The previously submitted calculations were guided by the HEC-HMS Technical Reference Manual for the estimation of curve number (CN) and initial abstraction (Ia) parameters. We have now updated the calculations to account for the CN and Ia parameters given in Appendix B of Wellington Water's Reference Guide for Design Storm Hydrology, as per files provided on 10/01/2022.

Additionally, as requested we have calculated time of concentration parameters based on an average between the Ramser-Kirpich and Bransby-Williams approaches, as per Section 2.5 of Wellington Water's Reference Guide for Design Storm Hydrology. Please find Revision C of the calculations attached.

The revised hydrological parameters used are summarised in the table below (red italic underlined numbers refer to values that were revised as part of this update):

Catchment	Catchment Area (Ha)	Curve Number (CN)	Longest Drainage Path (m)	Average Slope (%)	Time of Concentration Tc (min)	Initial Abstraction Ia (mm)
Western	44.48	*63*	1,133	10.8	*55.10*	*14.92*
Northern	55.83	*63*	1,666	10.0	*77.77*	*14.92*
Eastern	1.720	*63*	234	11.3	*20.82*	*14.92*

Table 1 – Summary Catchment Design Parameters

We note that while the curve number values are higher (with corresponding initial abstraction values being lower) the suggested time of concentration approach results in considerably higher times of concentration compared to those obtained based on the SCS method in our original calculation. This results in the revised peak flows being somewhat lower to those originally presented, hence demonstrating the original design was conservative.

Regarding hydraulic neutrality, we confirm that the stormwater design does account for on-site hydraulic neutrality for the 10- and 100-year ARI events, to keep post-development peak flows to pre-development levels. The infrastructure report, drawings and calculations have been submitted to council as part of the EPA application package.

Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may overestimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.

Response: Please note that a detailed topographical survey of the site and perimeter channels was carried out for purposes of the flood assessment, hence we can confirm that the channel geometry given in the flood model is accurate.

Additionally, as requested in the 23/12/0222 email, we have included two photos showing a typical representation of the channels around the site perimeter. These photos show bare channel sides and floor (despite the dense vegetation overhead), suggesting a relatively low level of hydraulic resistance which is in line with the design assumptions and the assumed Mannings value of 0.07.

Further, I confirm that the condition of the existing perimeter channels will not be modified as part of the proposed development (i.e. they will remain in the same condition post-development).

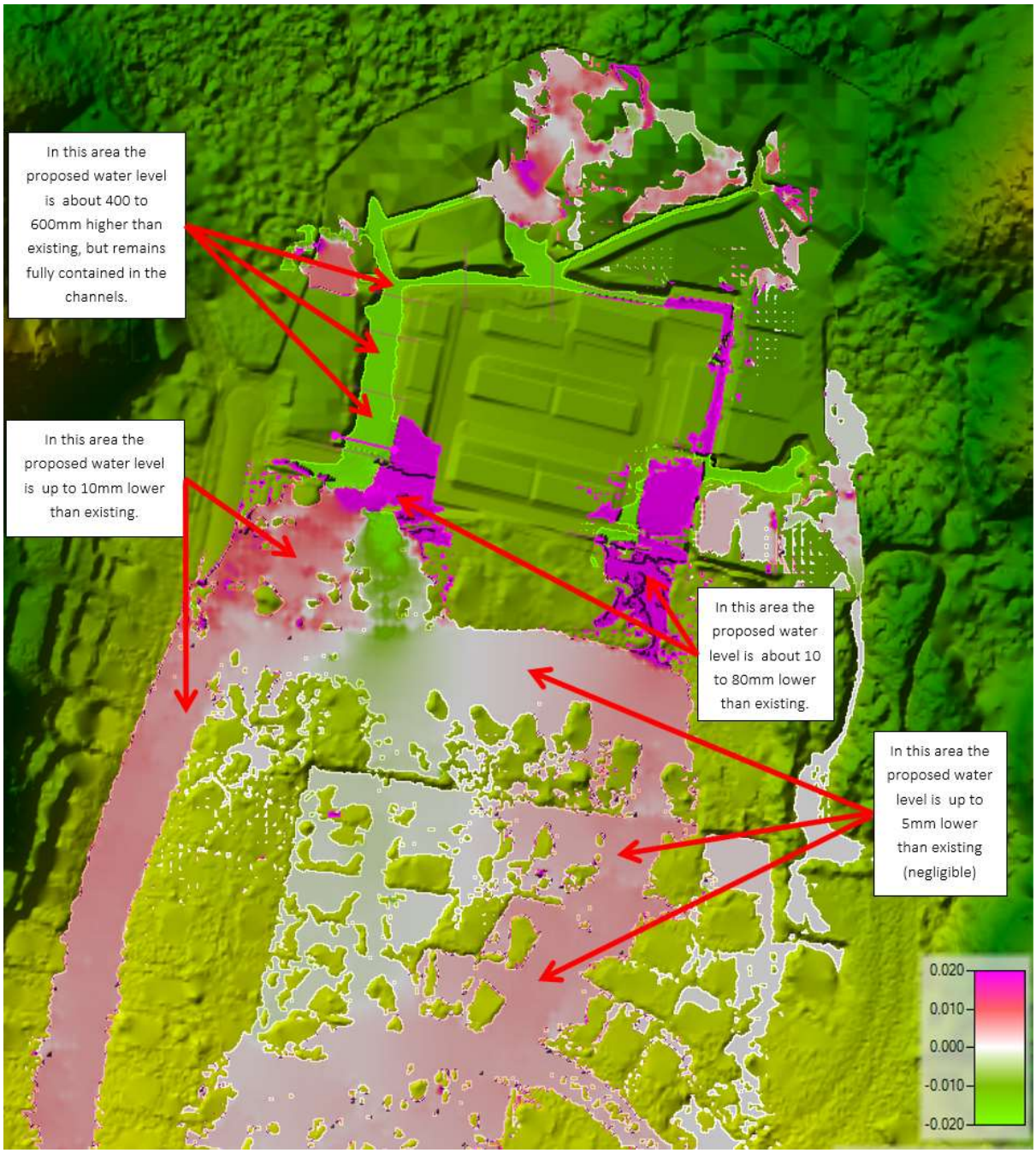
Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

Response: We have updated the previously supplied Please pre and post development 100yr ARI water surface elevation, depth and velocity maps in sheets 12 to 17 of the calculations, and a flood level surface comparison map in sheet 18 (reproduced again in the figure below).

The post development flood assessment is based on surface runoff only and assumes that all piped systems (including the proposed on-site stormwater attenuation device) are 100% blocked, which is conservative.

As part of the proposed works, the existing crossing over the stream will be raised in level, and this will result in additional storage within the existing channels during the 100-year ARI event. While this causes water levels to rise behind the culvert, the flows will remain fully contained within the channels, thereby avoiding any adverse impacts on adjacent properties.

Downstream of the development, the revised 100yr ARI flood levels are predicted to decrease at every location, typically by approximately 5-10mm but up to about 80mm adjacent to the southern fringe of the site, as shown below.



In conclusion, the revised analysis again shows that the proposed development will result in “no more than minor” effects with regards to flooding (in fact likely to result in net positive results given the predicted reduced flow depth downstream), and especially considering that any benefits likely to arise from the proposed on-site attenuation is ignored in the analysis.

Trust this meets your requirements however please do not hesitate to contact me if you'd like to discuss or if you require any further information.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
AR & Associates Ltd

Appendix A – Revised Calculations

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106 Mohaka Street, Wainuiomata, Lower Hutt

Flood Assessment

CONTENTS:

Reason for this Revision: Wellington Water Queries

Calculations By:	[redacted]
Checked By:	AR
Ref:	P20-156-Clc02
Date:	17.01.2022
Revision:	C

AR & ASSOCIATES
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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 1
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17 01 2022	Checked:	AR	

A Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1 06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821) AR & Associates Ltd (ARAL) has been requested to assist in the flood modelling and report

This document presents the flood modelling for the post development scenario

B Basis of Design

The design presented herein is based on Wellington's Land Development and Subdivision Code of Practice and associated documents, for the contributing catchment assuming maximum probable development (MPD) conditions The hydrology parameters are selected based on guidance from Wellington Water's Reference Guide for Design Storm Hydrology

C Stormwater

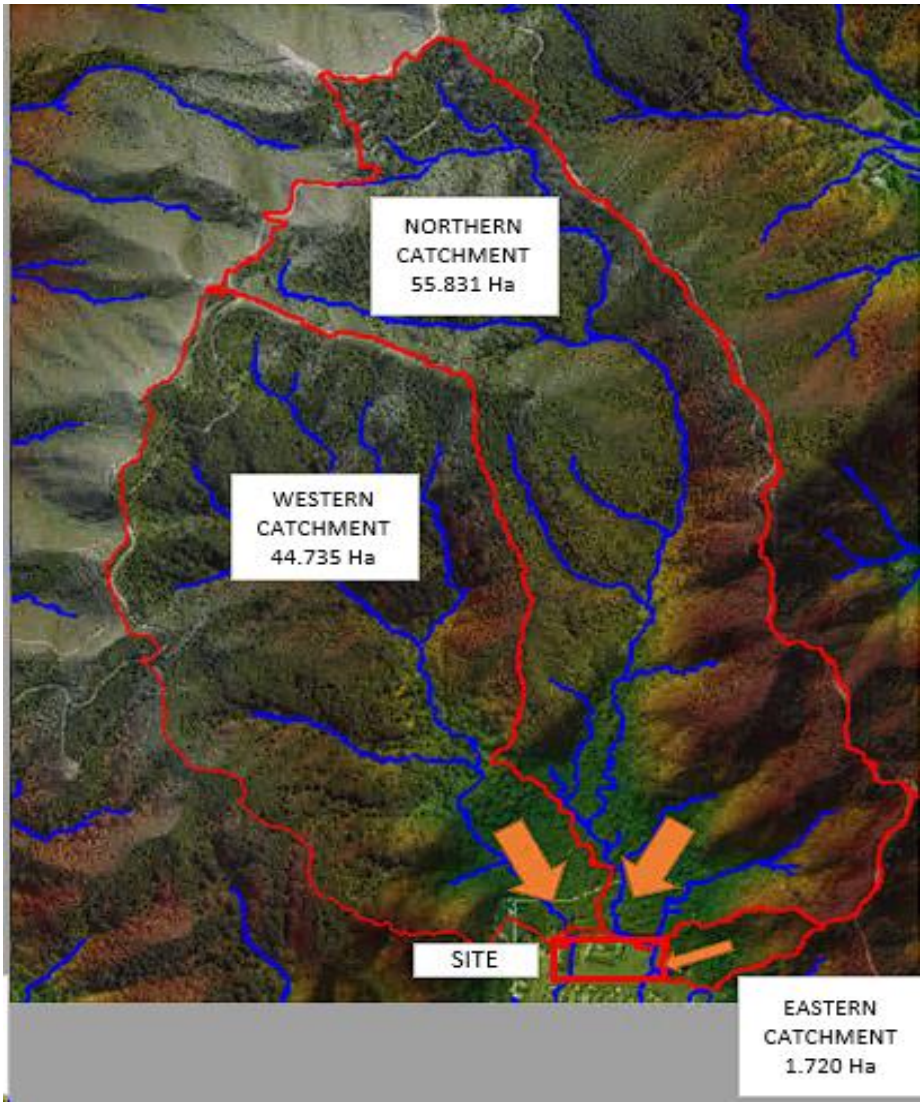
C.1 Flood Management Design Philosophy

The area is under the influence of the unnamed catchments as shown below ARAL has undertaken an independent hydrology and hydraulics analysis using HEC-HMS and HEC-RAS to determine the peak flows and flooding extents

The design philosophy focuses on retaining the existing topography as much as possible and applying a low impact design (LID) approach to maintain pre-development hydrology and flows, and minimise adverse effects on the environment and neighbouring properties which may result from the development

This calculation sheet will cover the 100-year peak flows and flood mapping regarding max water depth, max water surface level, and max water velocity for an MPD condition

The 100yr Catchments showing the site location are shown below



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	2
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17 01 2022	Checked:	AR		

C.2 Design Assumptions and Parameters

Climate Change:

The SCS Curve Number method was used with the HEC-HMS modelling software to calculate the amount of runoff from a rainfall event The 1% Annual Exceedance Probability (AEP) or 100-year Average Recurrence Interval (AR) event was assessed for the flood analysis An RCP6 0 for the year 2081-2100 was used for the climate change factor from HIRDS v4

**** Nested Storm rainfall profile (12-hour storm duration is used for this assessment)**

RCP6 0 for the period 2081-2100(Depth, mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	
1.58	0.633	8.29	11.3	13.6	19.1	26.7	44.4	59.4	77.4	
2	0.5	9.16	12.4	15	21.1	29.5	48.9	65.4	84.8	
5	0.2	12.2	16.5	19.9	27.8	38.8	64.1	85 5	110	
10	0.1	14.5	19.5	23.6	32.9	45.8	75.4	101	130	
20	0.05	16.9	22.7	27.4	38.1	53.1	87.2	116	149	
30	0.033	18.3	24.7	29.7	41.4	57.5	94.3	125	161	
40	0.025	19.4	26.1	31.4	43.7	60.6	99.5	132	169	
50	0.02	20.2	27.2	32.8	45.5	63.2	103	137	176	
60	0.017	20.9	28.2	33.9	47	65.2	107	142	182	
80	0.012	22.1	29.7	35.7	49.5	68.6	112	148	190	
100	0.01	22.9	30.8	37	51.4	71.1	116	154	197	
250	0.004	26.6	35.6	42.8	59.2	81.8	133	176	225	

Curve Numbers:

	CN	
Upstream undeveloped catchments	63	Based on Appendix B or Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	98	

Initial Abstraction:

The Initial Abstraction parameter is estimated as 0 1 x S, as per Wellington Water's Reference Guide for Design Storm Hydrology, as follows:

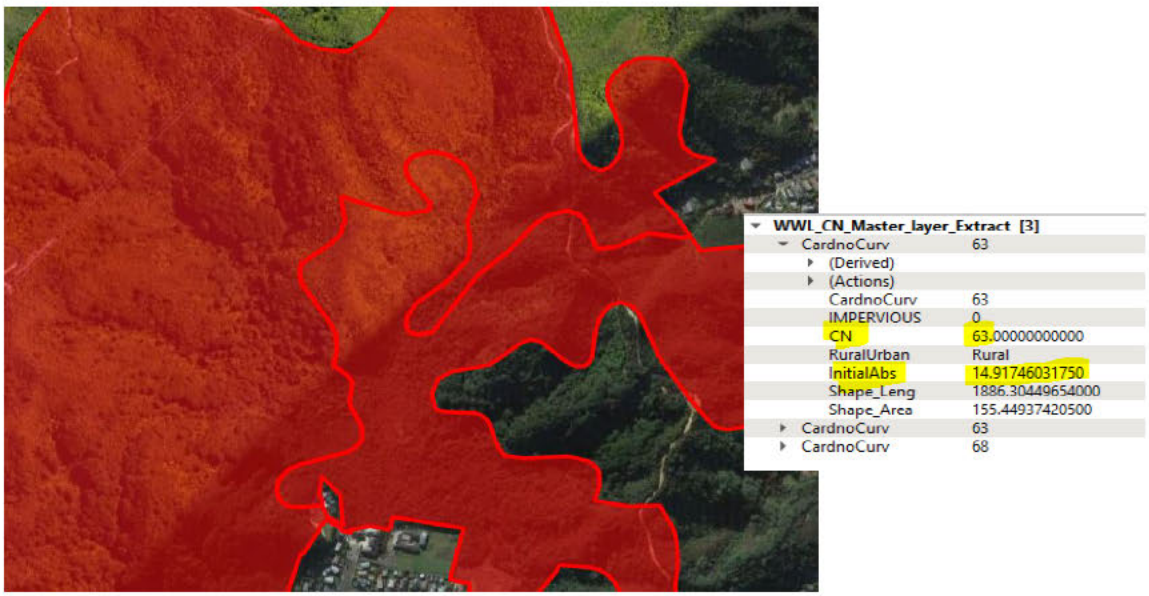
	Ia	
Upstream undeveloped catchments	15	Based on Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	0	

Terrain Data:

- Wellington Lidar 1m DEM (2013-2014, LINZ), Projection: NZGD / Wellington 2000, Vertical Datum: NZVD2016
- Existing survey completed by Cuttriss, Surveyors, Engineers, Planners Ltd, 11 2020
- Proposed Terrain design for project site by AR Associates Ltd
- Site scheme plan, Moore Design, 23 12 20

Proposed Plan:

	Max Coverage	Average MPD Impervious	
Pre-Development	0%	0%	
Post-Development	65%	70%	<- Assumed



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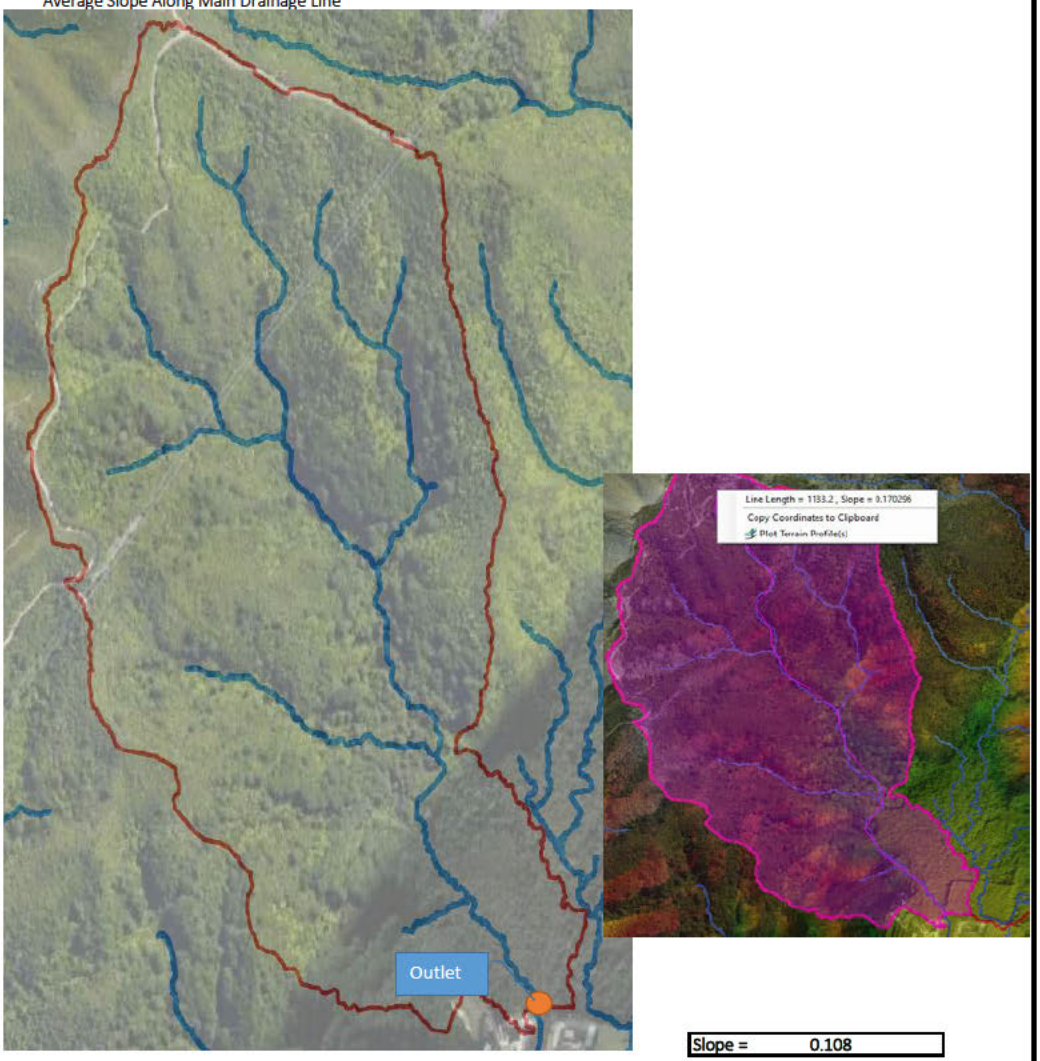
CALCULATION SHEET

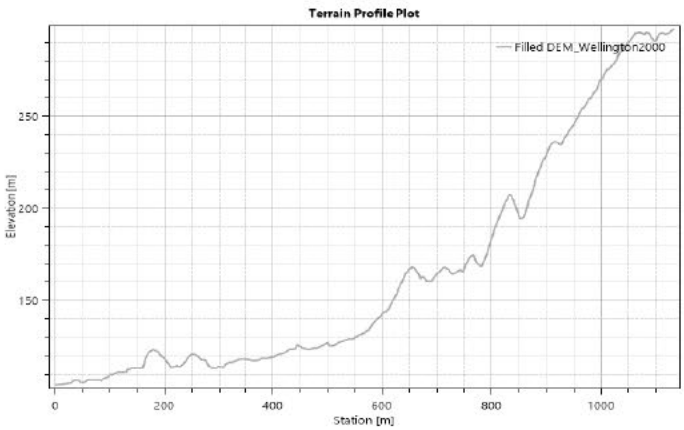
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	3
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

C.3 Catchment Analysis - Western Catchment

Average Slope Along Main Drainage Line



Slope =	0.108



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	4
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

Catchment Area

Total	444783	m2
	0.444783	km2
	44.4783	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.13	From above
Catchment slope Sc (equal area method)	0.108	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.45	(TP108)
Tc (min)	27.26	
Lag time (min)	18.17	
Tc (min)	10.32	**(Ramser Kirpich Tc)**
Lag time (min)	6.88	
Tc (min)	99.88	(Bransby Williams Tc)
Lag time (min)	66.59	
Average(min)	55.10	
Lag time (min)	36.73	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		44478	10.0%
CN (Mountainous)	63		400305	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

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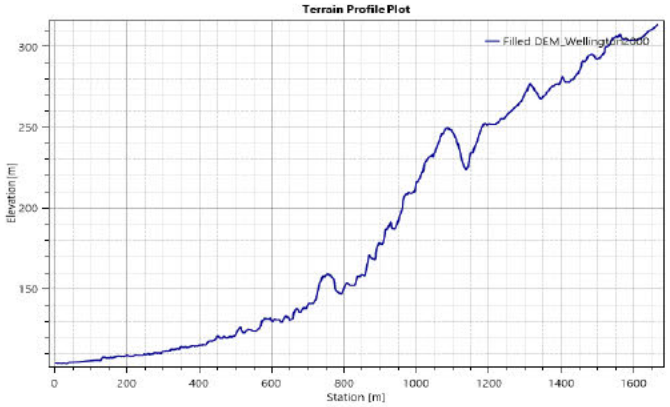
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	5
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

C.4 Catchment Analysis - Northern Catchment

Average Slope Along Main Drainage Line

Slope = 0.0998



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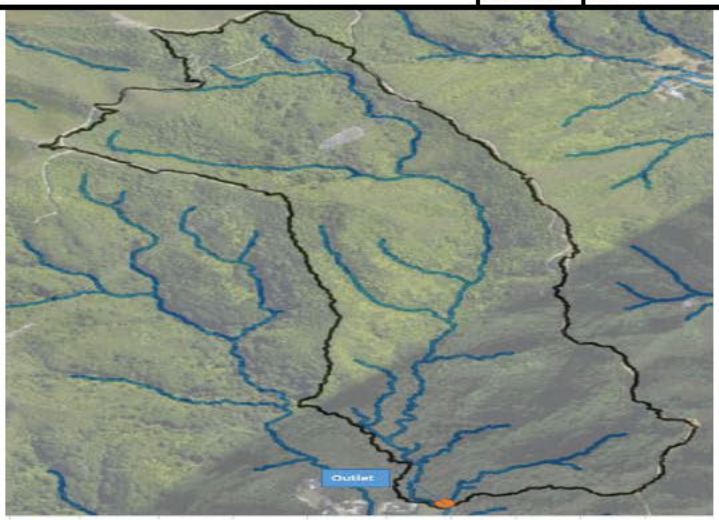
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	6
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		



Catchment Area

Total	558312	m2
	0.558312	km2
	55.8312	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.67	From above
Catchment slope Sc (equal area method)	0.0998	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.60	
Tc (min)	36.02	
Lag time (min)	24.01	
Tc (min)	14.33	**(Ramser Kirpich Tc)**
Lag time (min)	9.55	
Tc (min)	141.22	(Bransby Williams Tc)
Lag time (min)	94.15	
Average(min)	**77.77**	
Lag time (min)	51.85	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		55831.2	10.0%
CN (Mountainous)	63		502480.8	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

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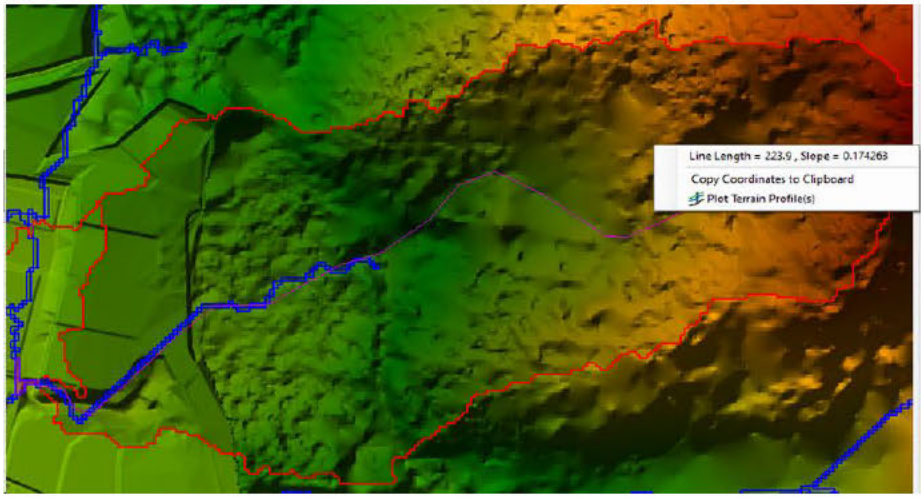
CALCULATION SHEET

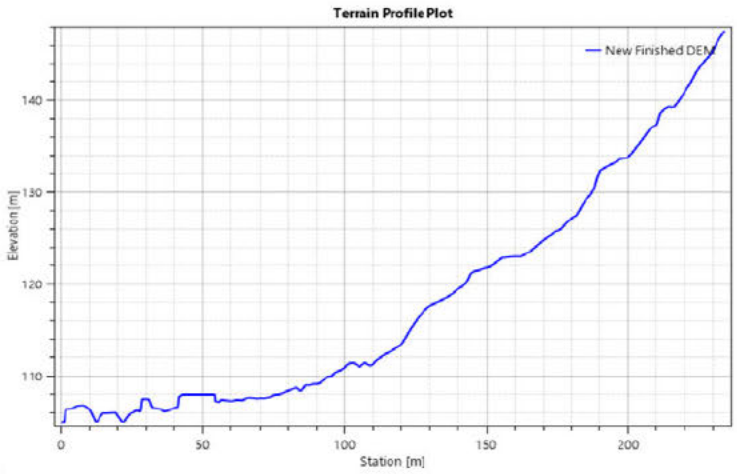
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	7
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17 01.2022	Checked:	AR		

C.5 Catchment Analysis - Eastern Catchment

Average Slope Along Main Drainage Line



Slope = 0.1127



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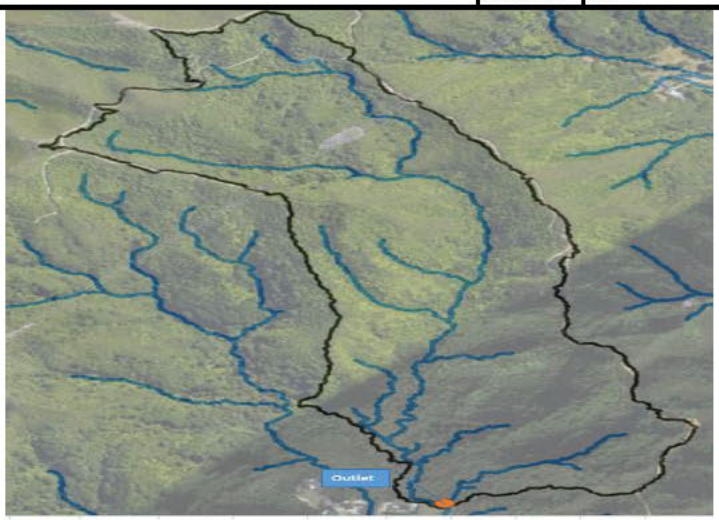
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	8
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		



Catchment Area

Total	17206	m2
	0.017206	km2
	1.7206	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	0.23	From above
Catchment slope Sc (equal area method)	0.1127	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.17	
Tc (min)	10.20	
Lag time (min)	6.80	
Tc (min)	3.02	**(Ramser Kirpich Tc)**
Lag time (min)	**2.01**	
Tc (min)	38.62	(Bransby Williams Tc)
Lag time (min)	25.75	
Average(min)	**20.82**	
Lag time (min)	13.88	

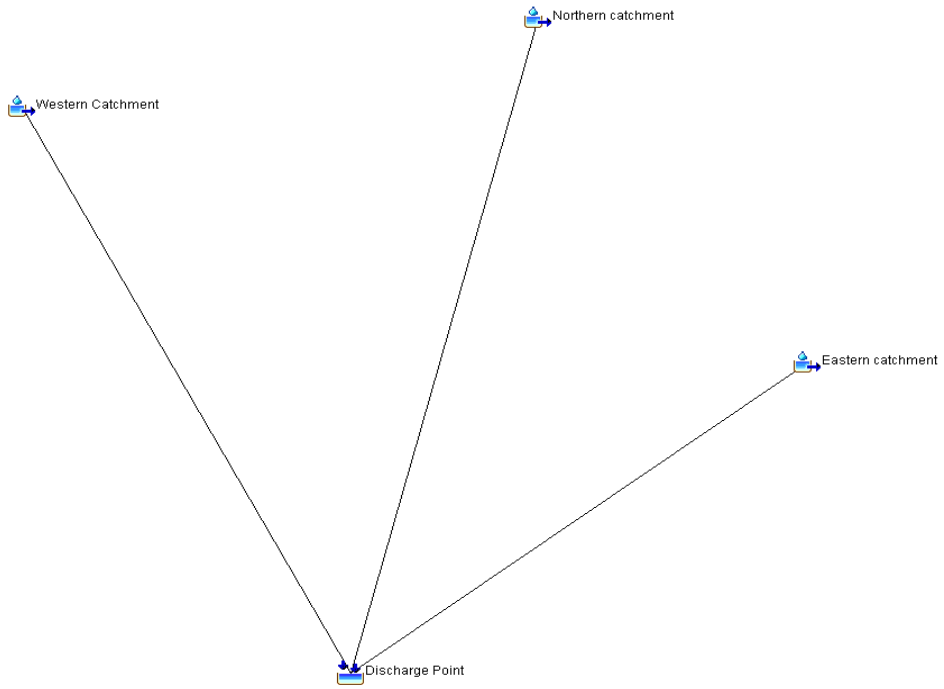
Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		1720.6	10.0%
CN (Mountainous)	63		15485.4	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	9
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17 01.2022	Checked:	AR	

C.6 HEC-HMS Model & Results



Ramser

Project: P20-156-WWL Simulation Run: 100yr Proposed

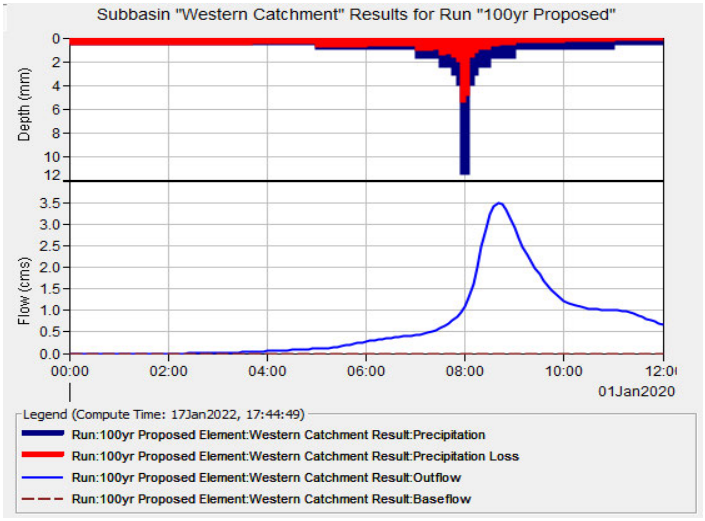
Start of Run: 01Jan2020, 00:00
End of Run: 01Jan2020, 12:00
Compute Time: 17Jan2022, 17:44:49

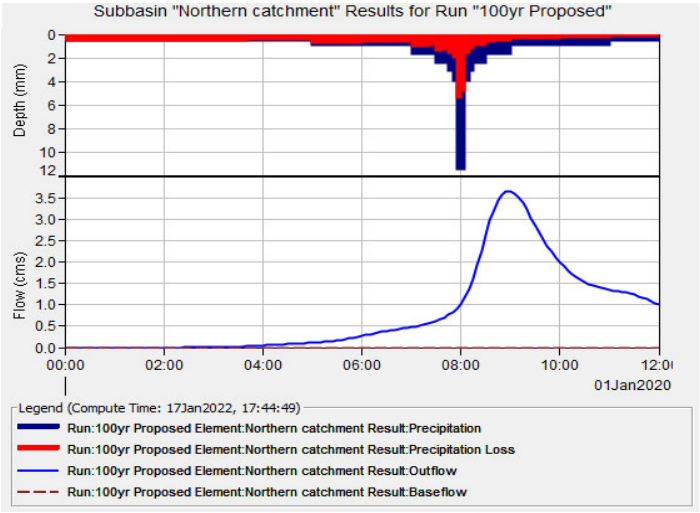
Basin Model: 100yr Proposed
Meteorologic Model: 100yr +CC
Control Specifications: 24hr

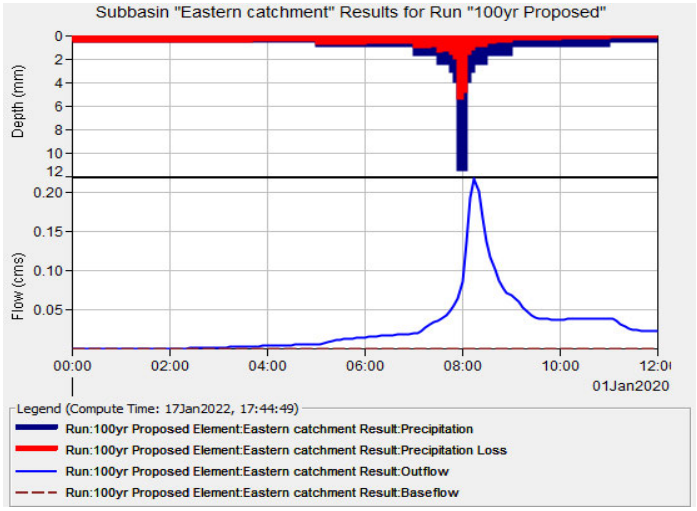
Show Elements: All Elements | Volume Units: (•) MM ( ) 1000 M3 | Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Western Catchment	0.444783	3.5	01Jan2020, 08:40	63.26
Northern catchment	0.558312	3.7	01Jan2020, 09:00	61.08
Eastern catchment	0.017206	0.2	01Jan2020, 08:15	65.86
Discharge Point	1.020301	7.0	01Jan2020, 08:50	62.11

C.6 HEC-HMS Model & Results







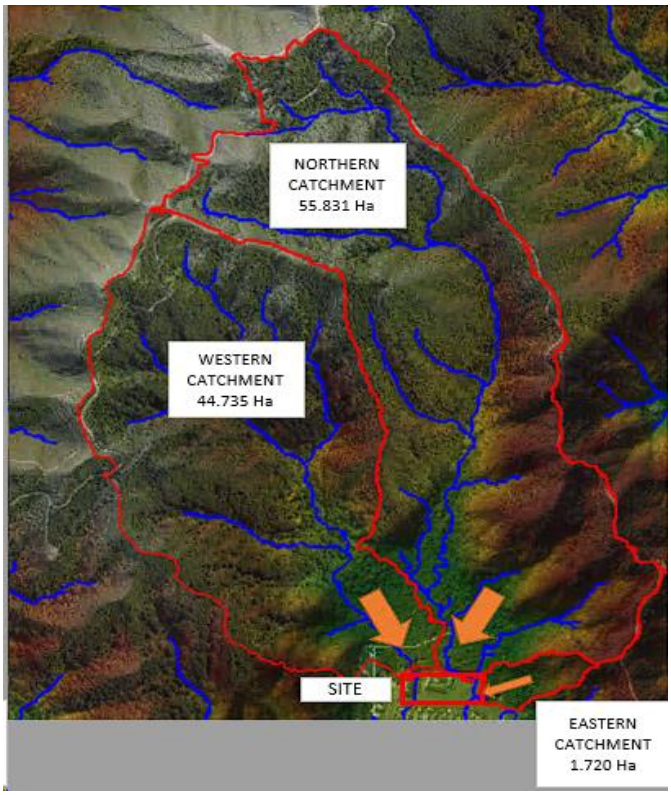
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 11
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17.01.2022	Checked:	AR	

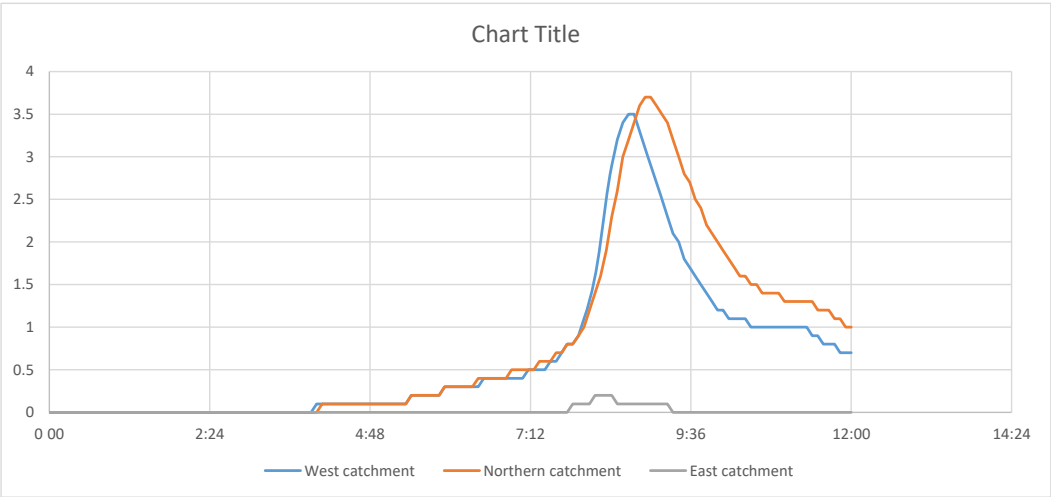
C.7 HEC-RAS Setup

Grid Size: 2m x 2m
Computation Interval: 0 5 sec

HEC-RAS Model Build:



100-yr Hydrograph to be used for HEC-RAS



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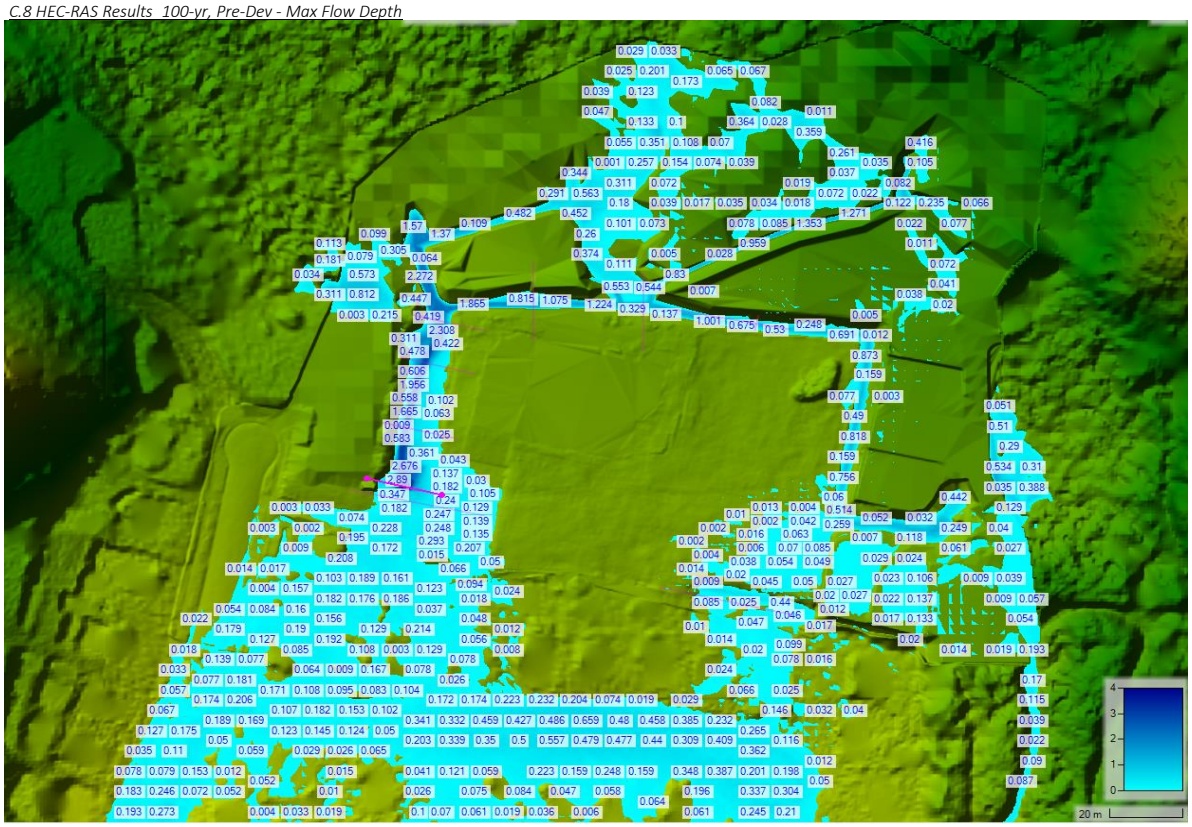
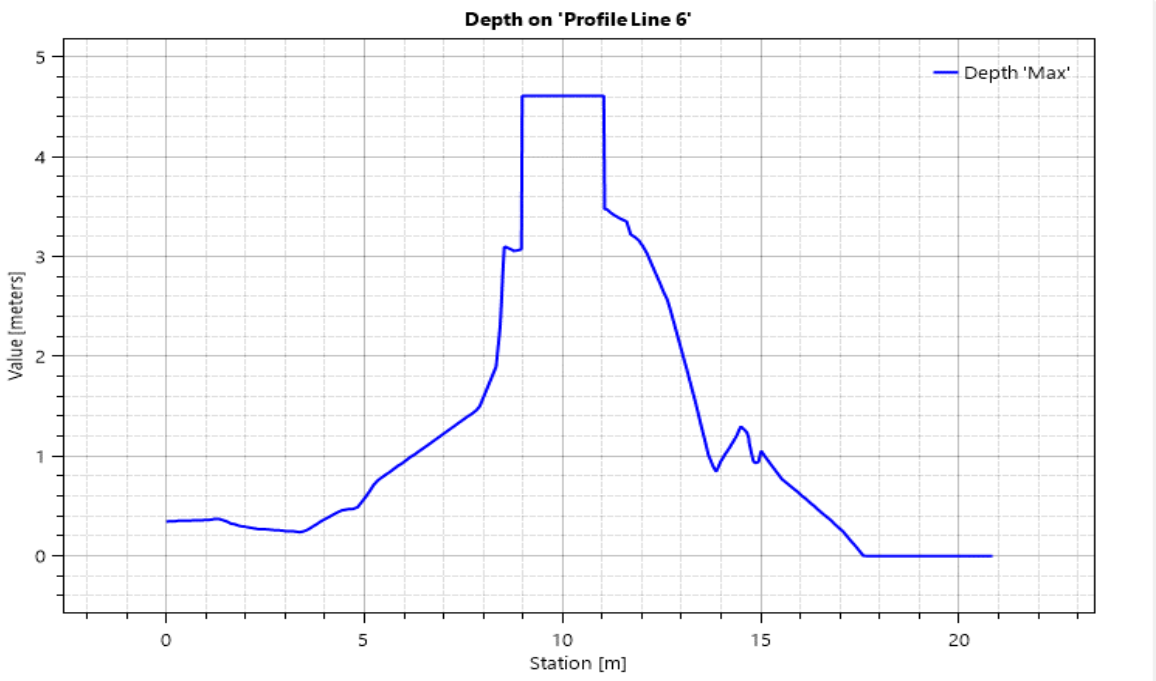
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	12
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.8 HEC-RAS Results 100-yr, Pre-Dev - Max Flow Depth



Cross Line: Water Depth Profile (Left -> Right)



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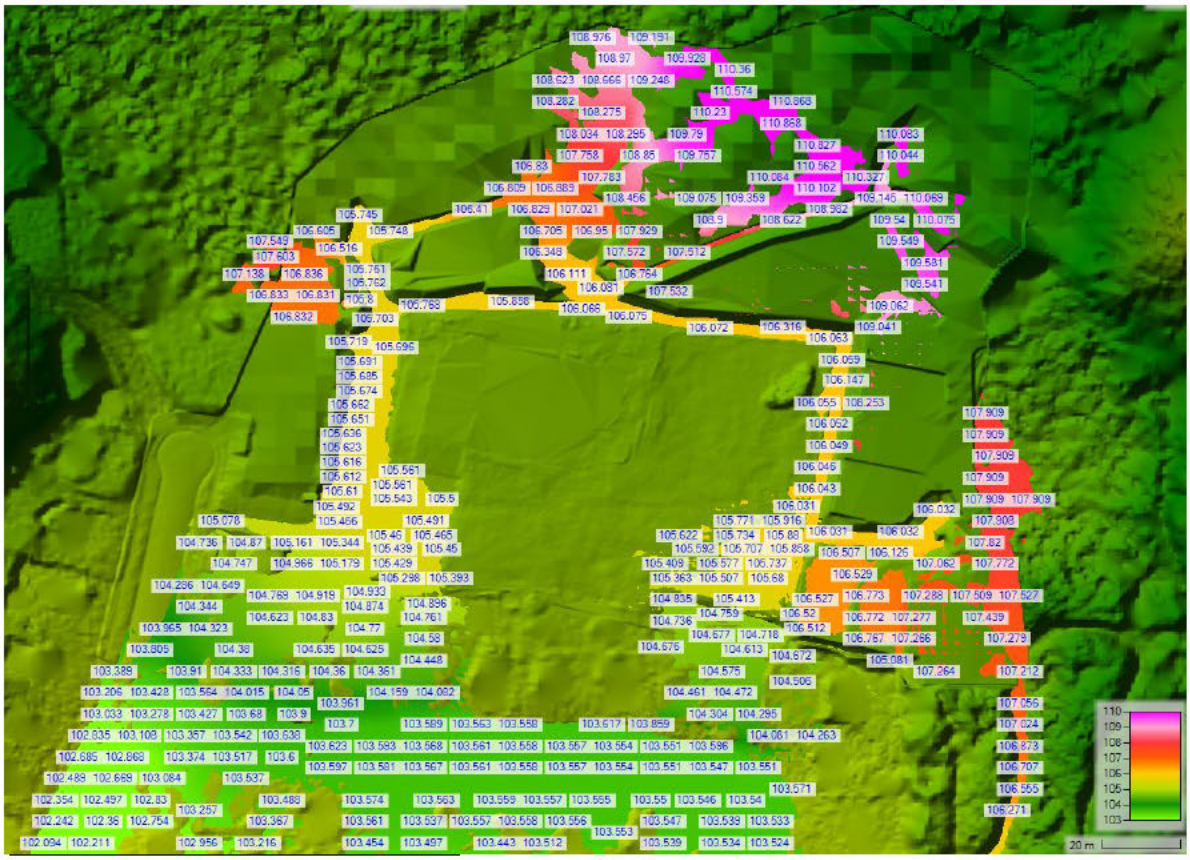
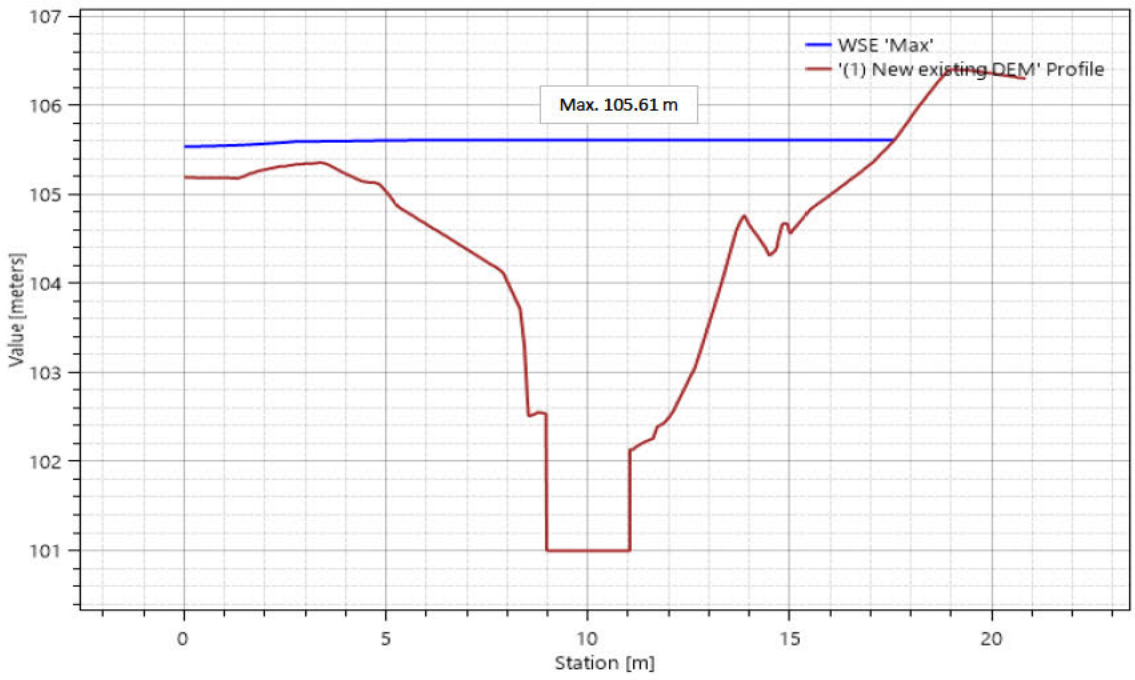
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	13
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.9 HEC-RAS Results 100-yr, Pre-Dev - Water Surface Elevation





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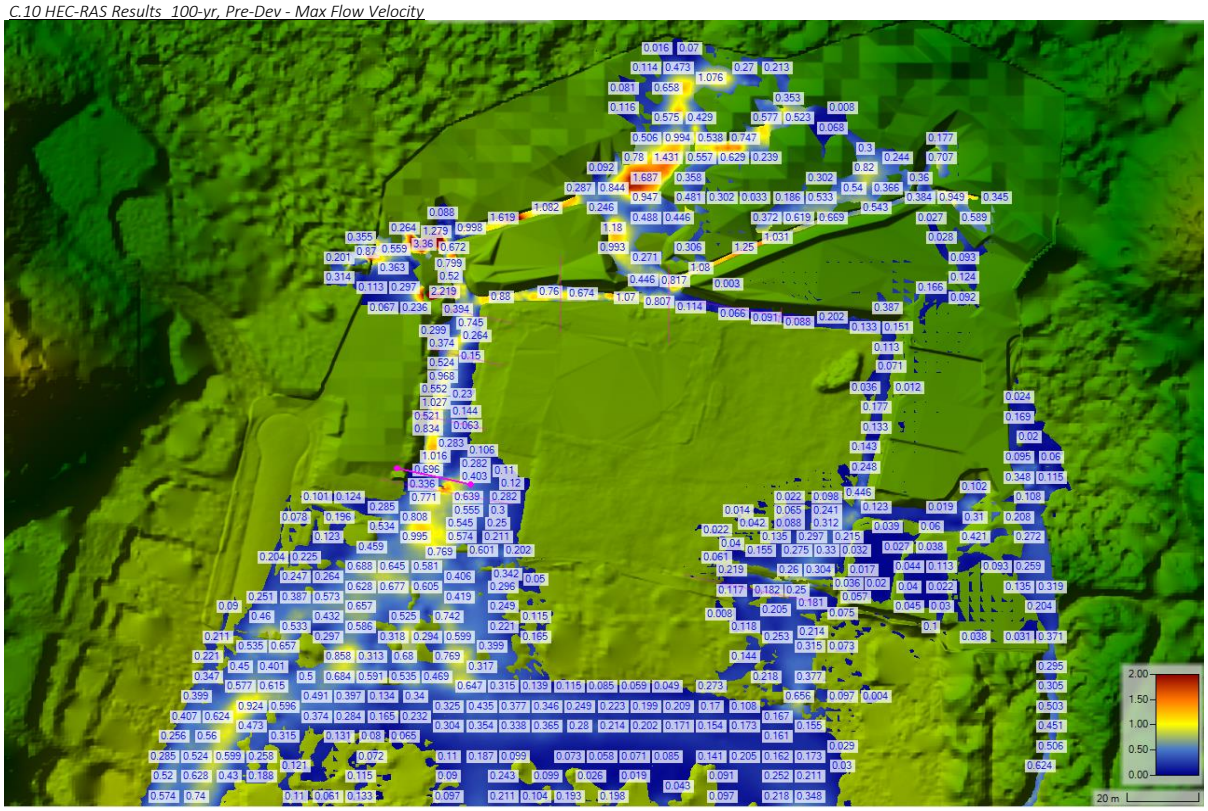
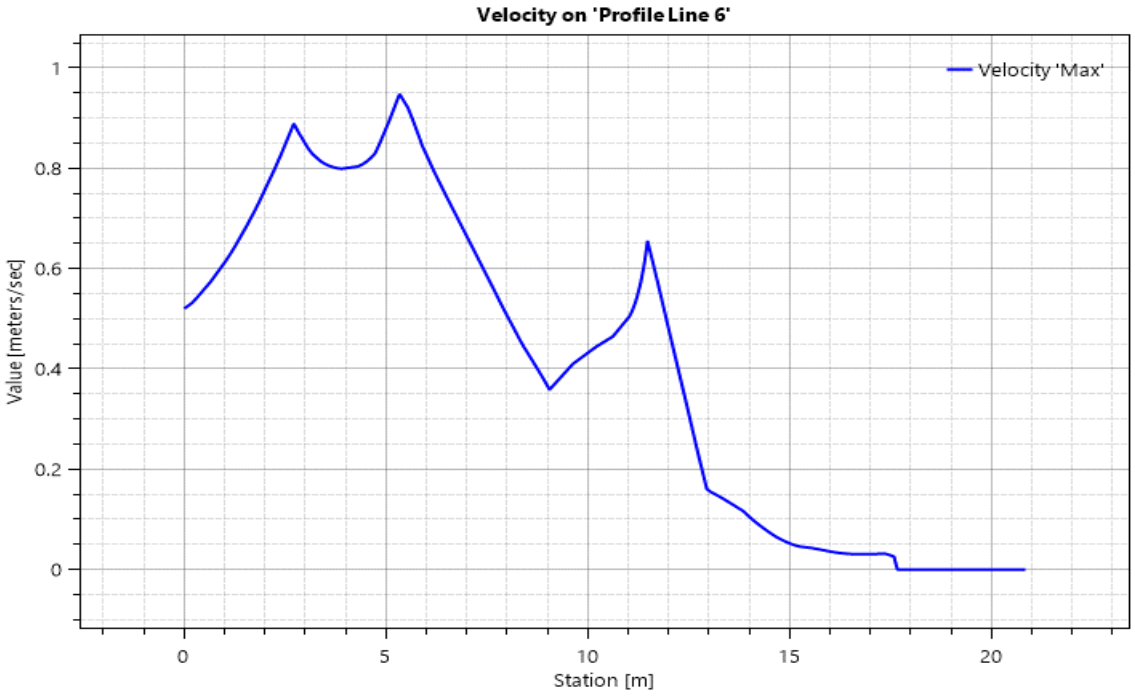
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	14
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.10 HEC-RAS Results_100-yr, Pre-Dev - Max Flow Velocity



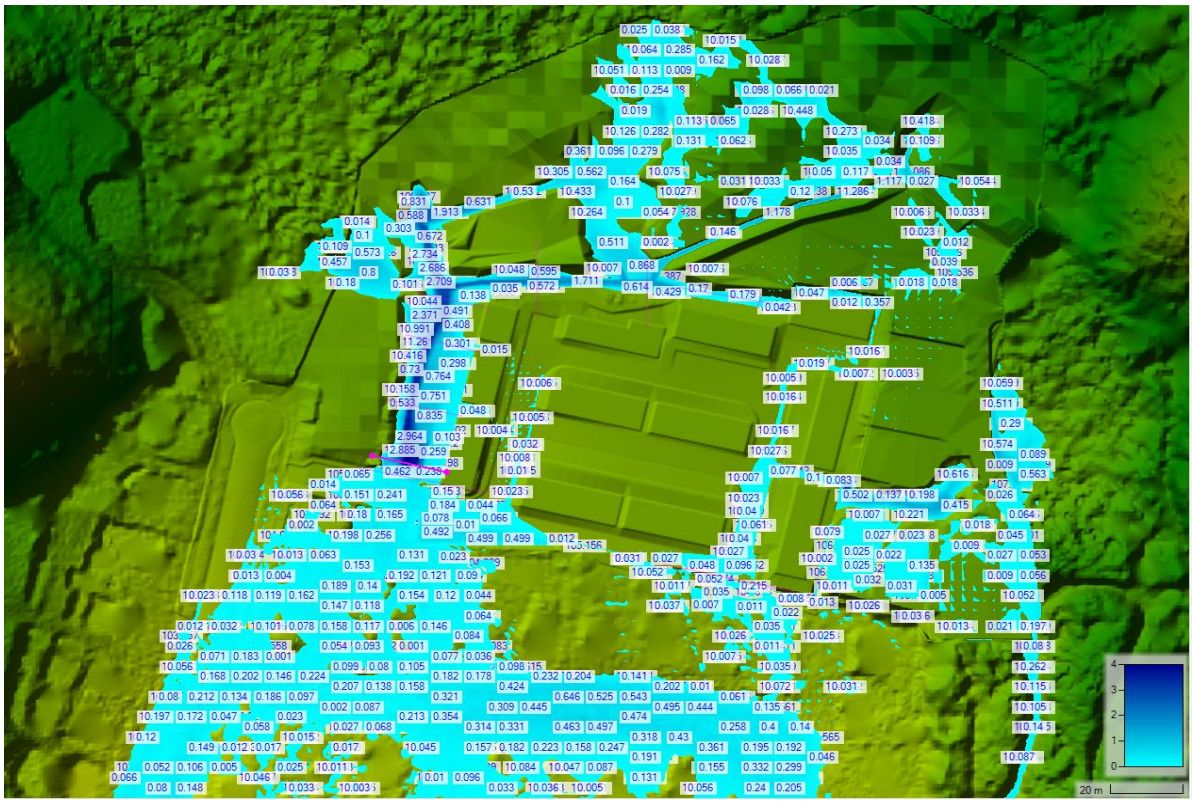
Cross Line: Max. Velocity Profile (Left -> Right)



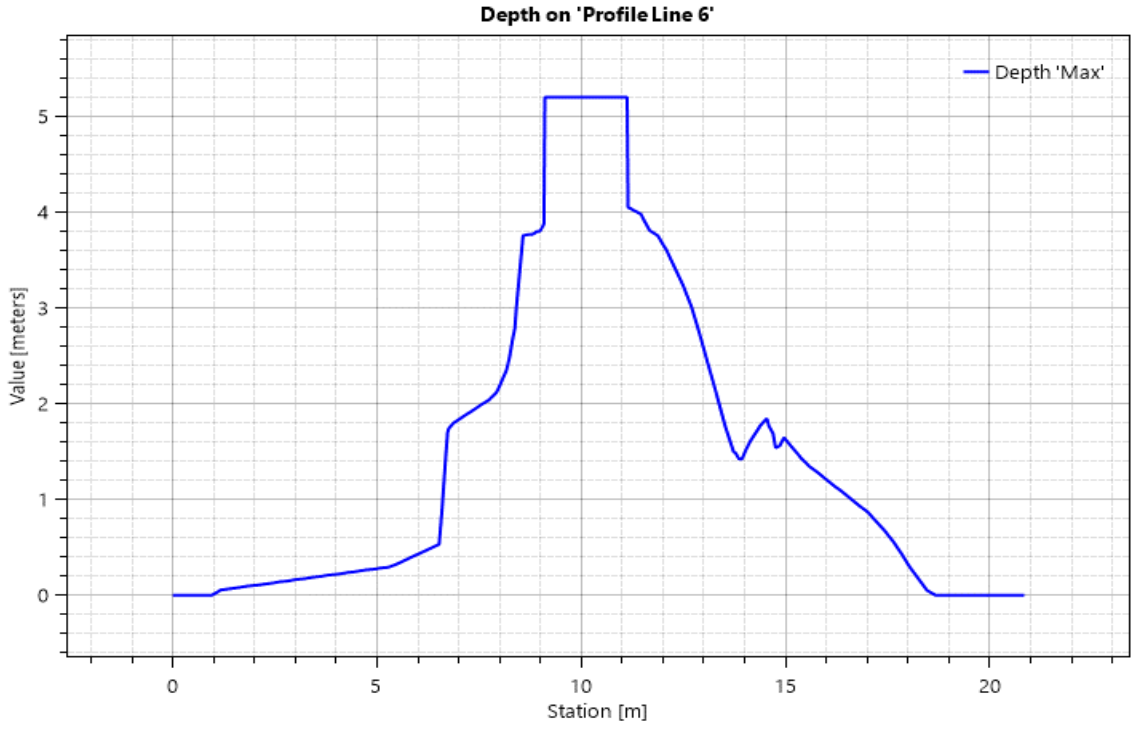
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	15
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

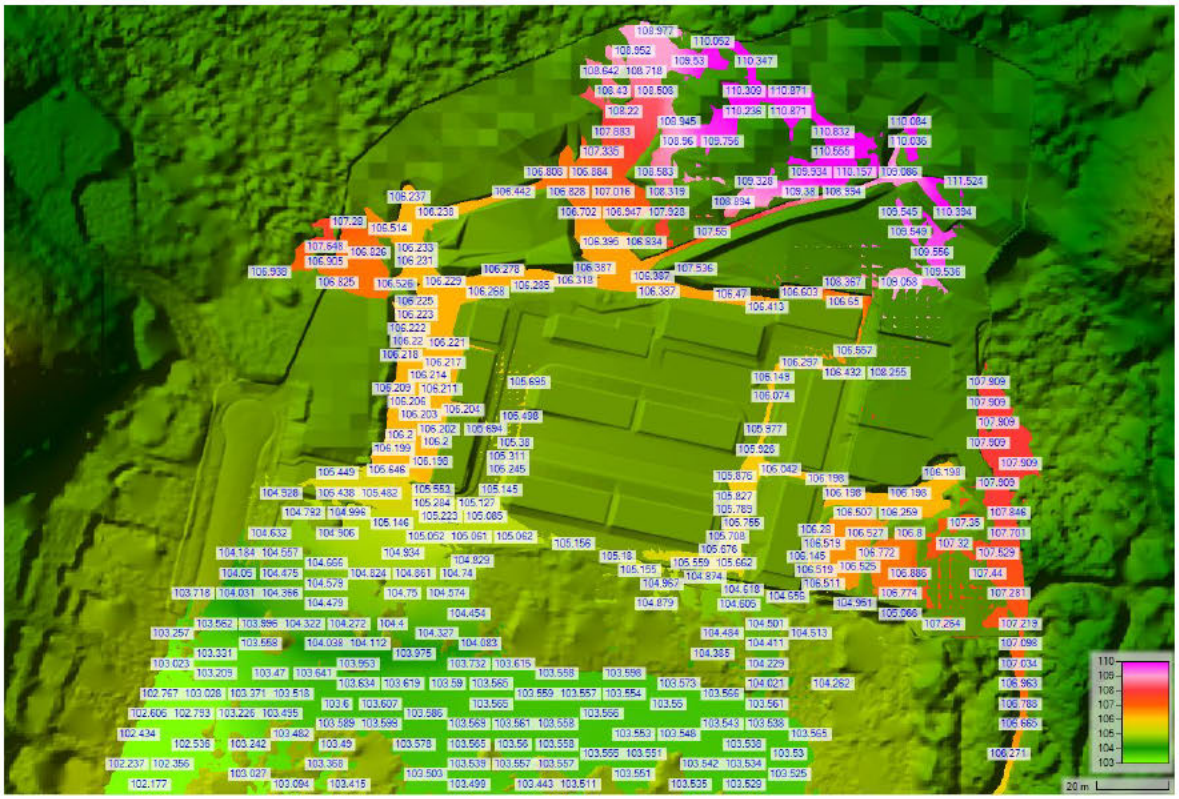
C.11 HEC-RAS Results 100-yr, Post-Dev- Max Flow Depth



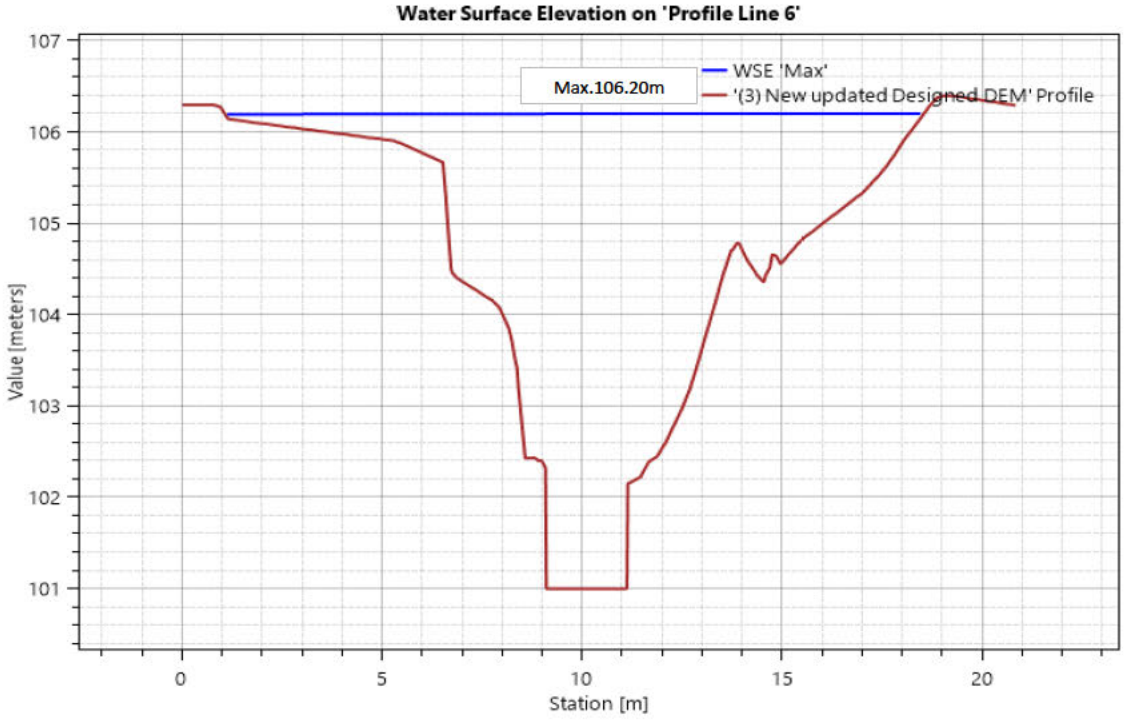
Cross Line: Water Depth Profile (Left -> Right)



C.12 HEC-RAS Results 100-yr, Post-Dev - Water Surface Elevation



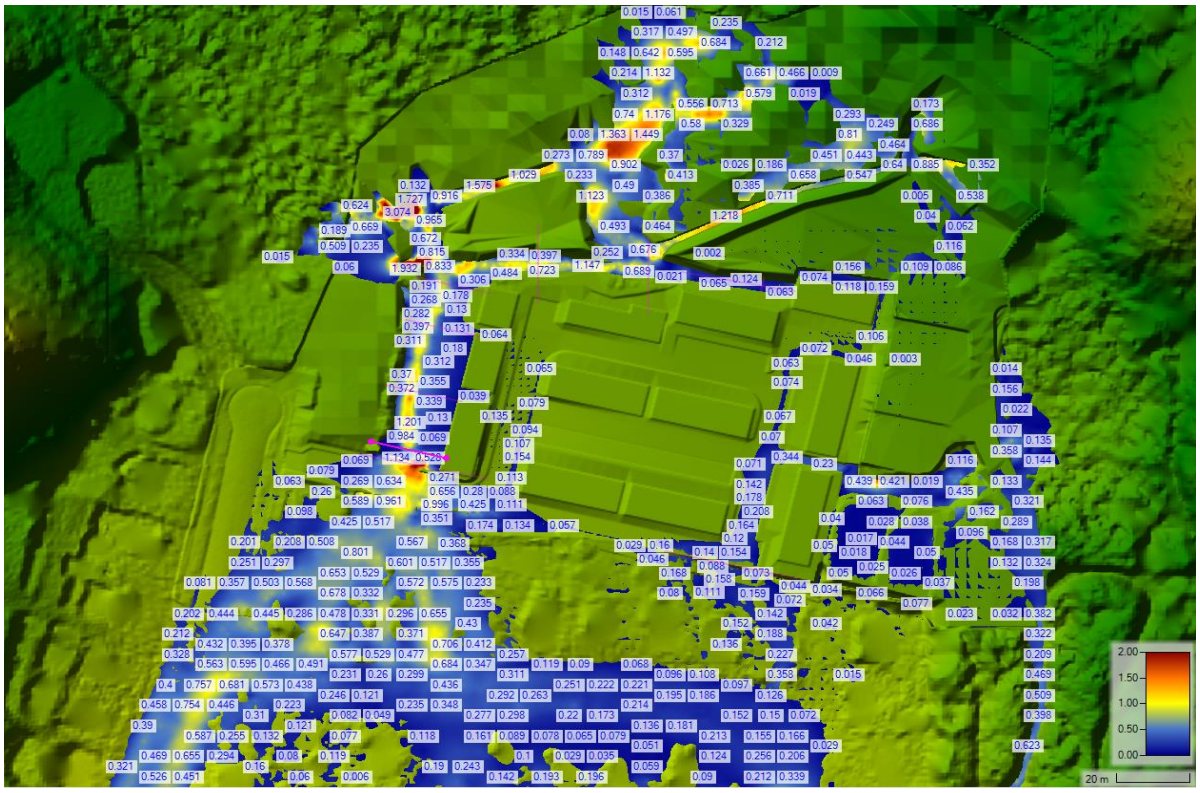
Cross Line: Water Surface Elevation Profile (Left -> Right)



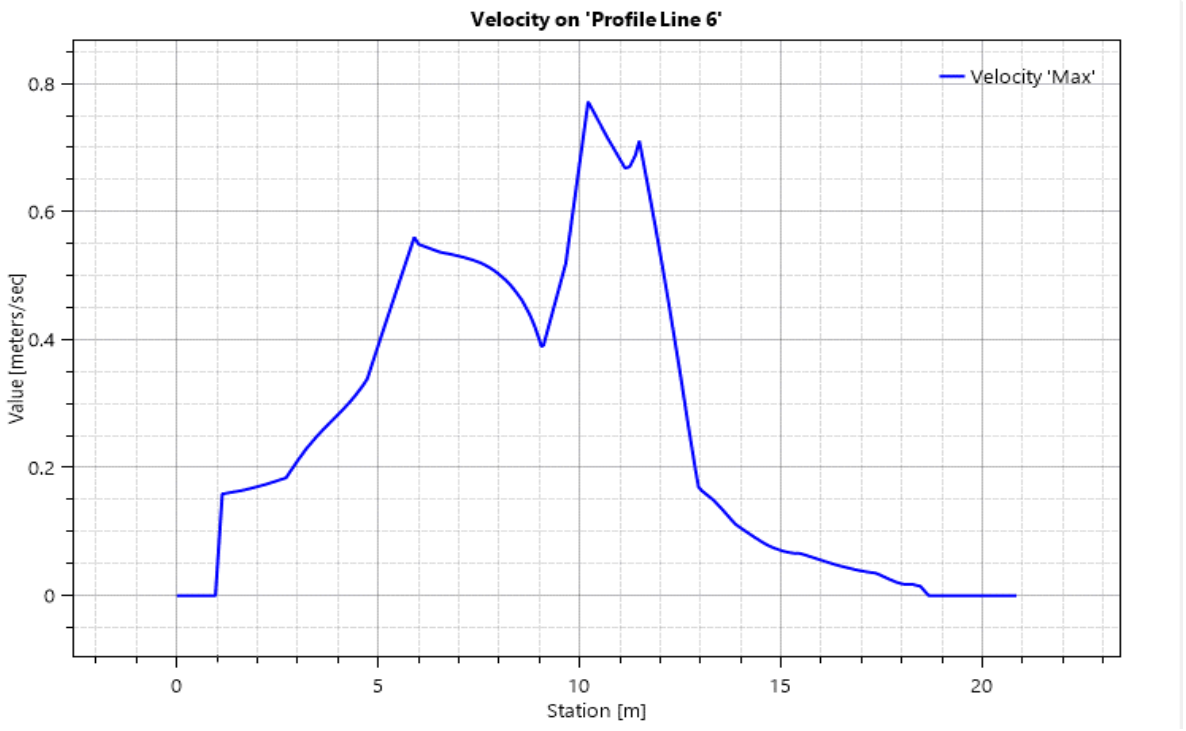
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	17
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.13 HEC-RAS Results 100-yr, Post-Dev - Max Flow Velocity



Cross Line: Max. Velocity Profile (Left -> Right)



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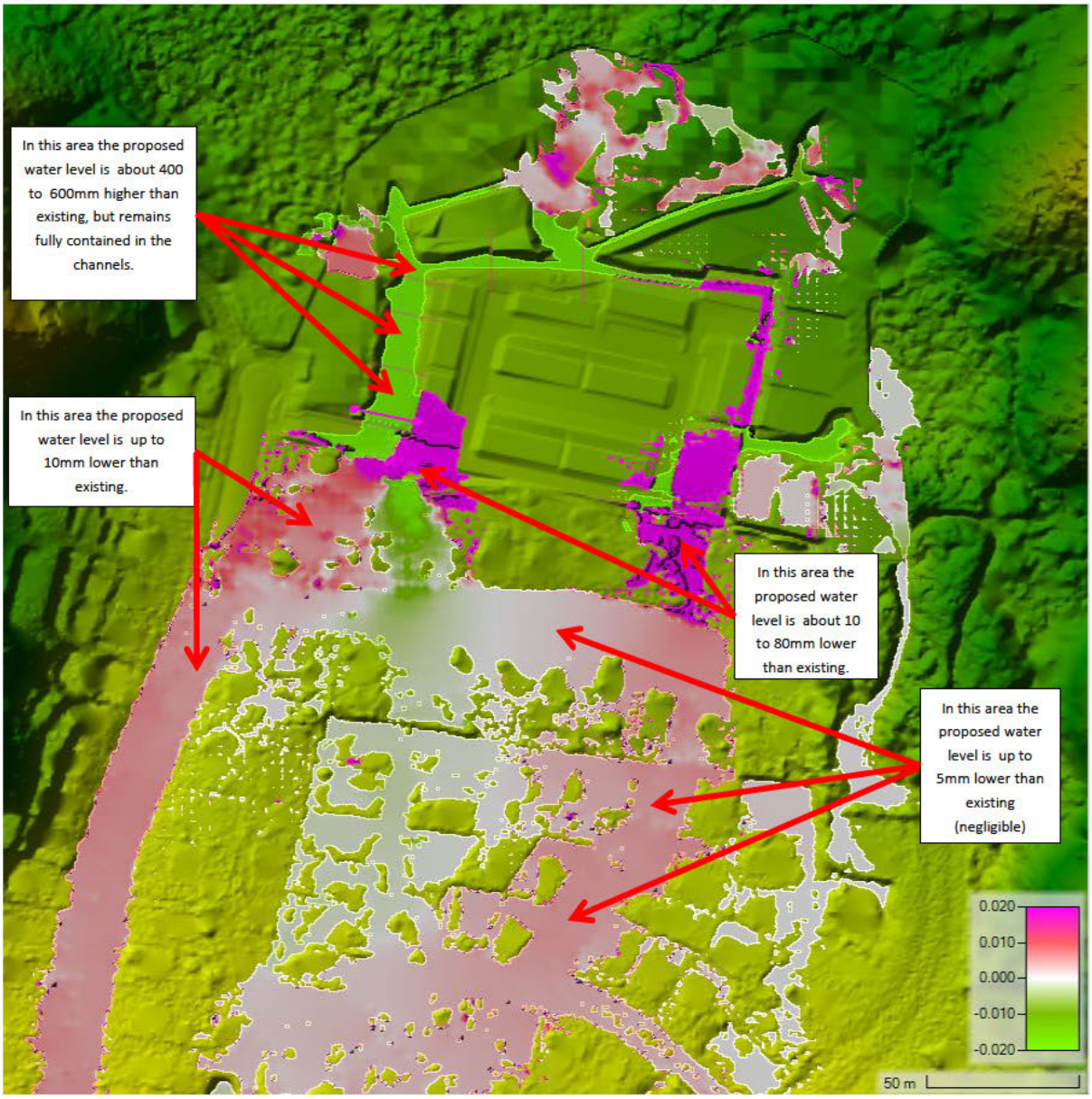
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	18
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.14 Flood Level Comparison Map (Existing Minus Post-Development)



Appendix B – Photographs of existing Site Perimeter Channels

channels below.

From: [redacted]
To: [redacted]
Cc: [redacted] ; Land Development; [redacted]
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Thursday, March 31, 2022 3:16:39 PM
Attachments: image001.png
image002.jpg
image003.jpg
image004.jpg
image005.jpg
image006.jpg
image007.jpg
image008.jpg
image009.png
image010.jpg
image011.png
image012.png
image013.jpg
image014.jpg
image015.gif
image016.jpg
image017.jpg
image018.jpg
image019.jpg
P20-156-R03-RevD-Flood Report.pdf

Hi [redacted]

Thanks for your response. We have re-worked the models based on the curve number of 61, and in line with your requirements for the other parameters. Please find updated flood report attached, for your perusal.

Please can you advise at your earliest convenience whether this now meets your requirements.

Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m [redacted]
www.arassociates.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 31 March 2022 9:42 AM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Please see the comments below from our consultant hydrologist. In the case of the Curve Number, I am happy for 61 to be used in place of 63 as per our earlier discussion.

In response to [redacted] questions,

1. Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question. No. I think this was sufficiently addressed in our previous response. The Tc resulting from averaging the BW and RK methods calibrated well.
2. Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment? No. Please see curve number comments below.
3. Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing? ALI - YOU PROVIDED THIS?
4. Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction? Please see initial abstraction comments below.
5. Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters? We don't believe the recommended parameters are conservative. They have been through a thorough peer review process and validated against a number of different methods. For the design of infrastructure to manage the risk of flooding, and the risk this poses to people and property, these values are appropriate.

Curve Number

The curve number values from Appendix B of the Reference Guide were not a direct import of the values from TR55, the original SCS reference manual (and which are tabulated in the Hec-HMS reference manual). They were initially derived from TR55, hen adjusted to improve the calibra ion to observed hydrographs in rainfall-runoff modelling.

With regard to the catchment upstream of 106 Mohaka Street, we are in agreement that the soil should be classified group C. The landcover is a mix of indigenous forest; broadleaved indigenous hardwoods; and gorse and/or broom. The first two have been classified in the Reference Guide as Forest, while the latter more closely resembles the nature of Scrub/Flax. The CN for forest was adapted from he TR55 table for Brush in Good condition. This had a value of 65. Adjusted for the Wellington region, the value is 63. Scrub/Flax in soil group C has a CN value of 68.

The CN value for he catchment to 106 Mohaka St, should be a weighted CN based on the percentage area of forest x CN63 + percentage area of scrub/flax x CN68.

This value of 63 is the least conservative when compared to recommended values in the Kapiti District (Greywacke group C soils, bush = CN65), Auckland (mudstone/sandstone group C soils, bush, not-grazed = CN70) and in the Waikato region (group C soils, bush = CN 72; bush-weed-grass mix = CN65).

Initial Abstraction

Background to the initial abstraction estimate is provided in the SCS rainfall-runoff model calibration report, which has recently been provided to you. In NZ it is common to use initial abstraction estimates of 0mm for impervious areas, and 5mm for pervious areas. These values are used in the Kapi i and Auckland regions, and have some backing within literature. In the Waikato region, initial abstraction is calculated as a factor of the potential maximum storage, using a coefficient of 0.05 (Ia = 0.05S). This is more conservative han the 0.1S adopted by Wellington Water for undeveloped areas (more conservative in hat it leads to greater runoff).

When deciding on an estimate for initial abstraction in the Wellington region, we evaluated various literature, both in NZ and in TR55 and concluded that 0mm in impervious areas and 5mm in pervious developed areas, and 0.1S in undeveloped areas, is reasonable. The difference between pervious developed areas and undeveloped areas, is the former is more likely to have been reshaped/compacted/mowed etc, while the latter is in a more natural form so likely to have greater storage potential.

In comparison to methods being employed throughout NZ, he methodology stipulated in he Reference Guide is, by no means, conservative, and parameters have been set based on calibrating rainfall-runoff models to the local hydrology.

cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 **Mob** [redacted]

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Level 4, 25 Victoria Street, Petone, Lower Hutt

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From: [redacted]@arassociates.co.nz>
Sent: Thursday, 24 March 2022 11:23 am
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted] <craig.walton@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted] [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your time on the phone earlier.

I look forward to receiving your response to my requests below.

You mentioned that based on the new curve number tool, the curve number for the upstream catchment is now 61, which is slightly lower than the previous curve number of 63. Can you confirm that please and also indicate what is the associated initial abstraction? Also are you able to provide a copy of that tool as per previous request?

Also please can you send through gauge information for the catchment as discussed, and any other background information you may be able to provide.

Your soonest response is appreciated.

Thanks

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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From: [redacted]
Sent: Monday, 21 March 2022 12:09 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Good morning [redacted]

Tried to call you but couldn't get through.

Just following up on my request below please, if you could possibly let us know when we can expect to hear back, it would be appreciated.

Our client is very urged to get this resolved, please feel free to call me if you need to discuss.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m. [redacted]
www.arassociates.co.nz

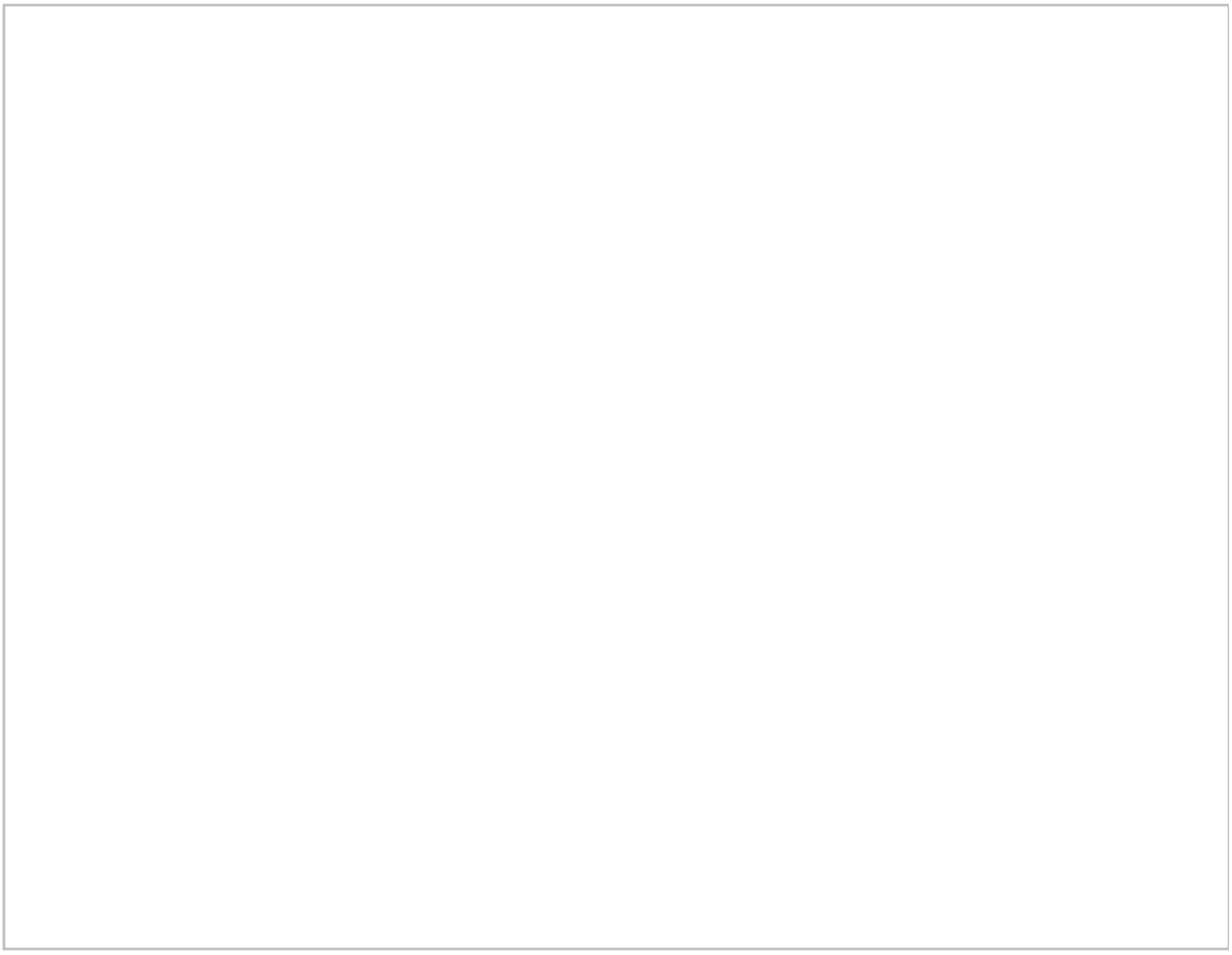
From: [redacted]
Sent: Thursday, 17 March 2022 5:26 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Many thanks for your message and the chat earlier. To summarise our discussion and the next steps further:

1. Time of Concentration:

I still believe that the average Tc approach, which results in a Tc of 19 minutes in the case of the western catchment, seems excessively low for the catchments that we are dealing with, as they have a very dense forest cover (as per below screen shot). I have run an independent check of Tc using SCS methodology and obtained 27 minutes, which is in line with the Bransby-Williams result.

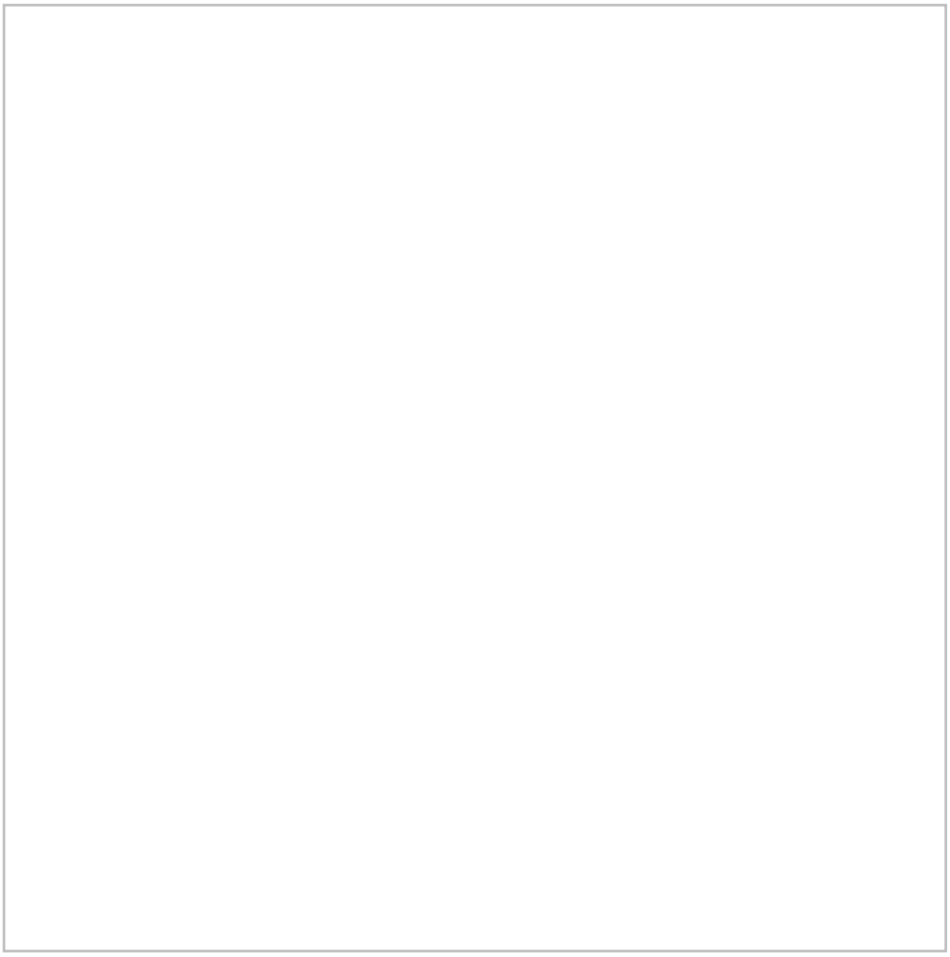


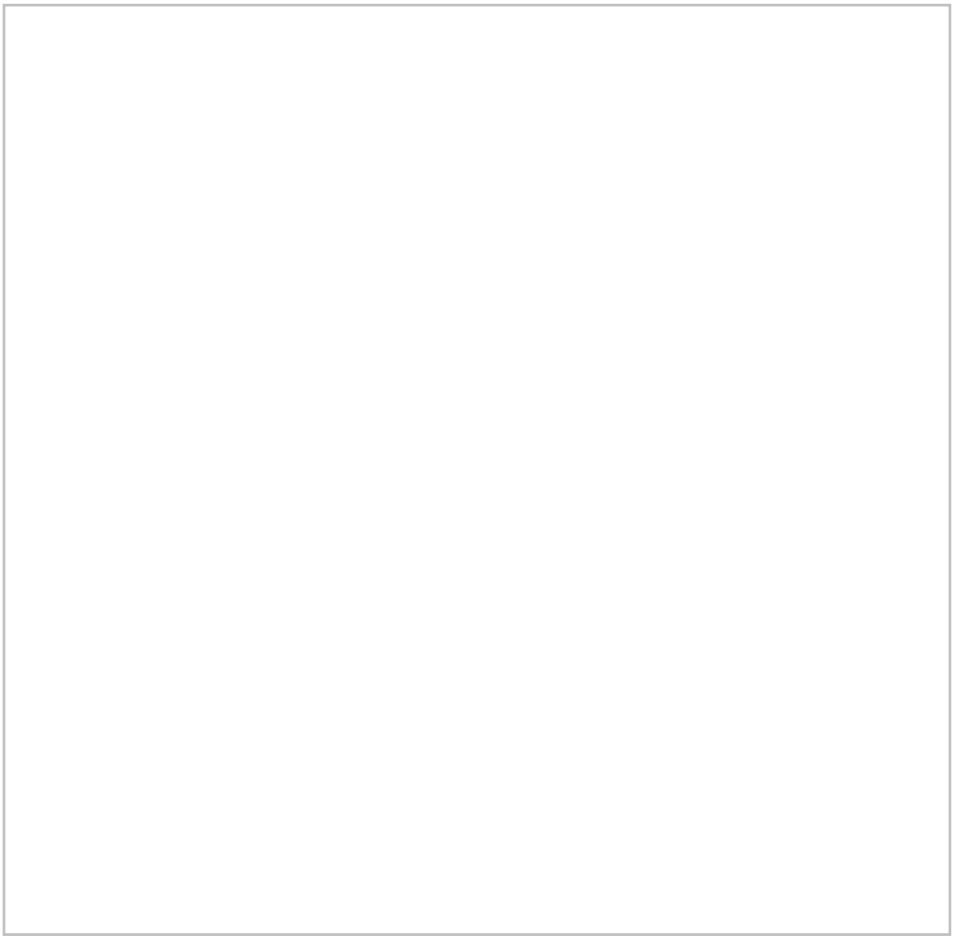
2. Curve Number:

In addition, the curve number parameter map that you supplied suggests a CN=63, which again seems high and therefore potentially adds another layer of conservatism to the analysis. The HEC-HMS reference manual gives curve numbers of CN=30, 41 and 48 for soil groups B, C, and D respectively, and ground cover characterised by a forest with woody and brush understorey (see below).

S-map on line tool suggests the soil group that applies to the upstream catchments ranges from a B to a D classification (being Bushcroft and Taitapu soil units, see below and soil report files attached). On this basis, the representative curve number would appear to be somewhere between 30 and 48 (for “good” ground cover, being >70% vegetation cover which applies in this case). In our original analysis we had used CN=48, which we believed was conservative at the time.

You mentioned that Wellington Water is in the process of releasing a new tool to estimate curve number. If you could possibly share that with us, it would be very helpful.





3. Initial Abstraction:

Wellington Water's hydrological modelling guidelines specify that Initial abstraction be obtained from the formula Ia=0.1S. However SCS methodology, being the US Natural Resources Conservation Service method that originally developed the CN and Ia parameters, recommends that Initial Abstraction be calculated as Ia-=0.2S. Wellington Water's specified reduction of the initial abstraction parameter by 50% is obviously conservative as it results in greater discharge rates and volumes. Are you able to clarify the reasons for this?

4. Compounded Effect:

Our view is that the compounded effect of combining conservative hydrological parameters (e.g. Tc, CN and Ia etc), in addition to the requirement for climate change allowance which in itself increases rainfall by 17-30%, is likely to result in excessively high and potentially unrealistic levels of conservatism when calculating peak flows.

To summarise, it would be appreciated if you could please consider and clarify the following:

- Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question.
- Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment?
- Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing?
- Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction?
- Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters?

Please feel free to call me if you'd like to discuss further.

Kind regards,

[redacted]

CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m. [redacted]
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From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 17 March 2022 11:39 AM
To: [redacted].@arassociates.co.nz>
Cc: [redacted].@aprotean.co.nz>; [redacted].@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

How are you? Thanks for your email and for the call on Tuesday.

With regard to your proposal to only use the Bransby-Williams methodology for calculating the time of concentration for the hill catchments upstream of 106 Mohaka St, unfortunately Wellington Water would not find this an acceptable approach.

Below are some more -depth comments from our consultant hydrologists who were involved in the development of the WWL rainfall-runoff methodology, but to summarise it;

- The averaged RK-BW approach was established through review of real events in a real, nearby catchment, so the BW approach by itself would result in unsuitably long Tc values.

. I have undertaken a few checks to reach this conclusion:

- During development of the model parameters, the nearby catchment Wainuiomata River at Manuka Track was used for calibra ion. This has a catchment area of 27km^2. The observed time of concentra ion was between 120 mins and 220 mins across three events (average 180 mins). Being real events, this is also dependant on the storm event (spatial and temporal distribution of rainfall over he catchment), however these estimates provide an approximate indication of catchment Tc. The average Tc using Ramser Kirpich (RK) and Bransby Williams (BW) was 120 mins. This calibrated fairly well.

  Using a Tc of 55 minutes for the Mohaka catchment, which is approximately 0.43km^2 does not align with results from the calibrated rainfall-runoff model.

- My es imates for RW and BW were 10 mins and 28 mins (BW: using a length of 1150m, area of 43ha and equal-area slope of 116 m/km), the average being 19 minutes. This BW estimate is shorter than the applicants estimate of 55 minutes. I acknowledge that different analysts are likely to get sligh ly different numbers, however, their estimate is approximately double. When using their equal area slope es imate (of 108 m/km from the email below) this makes very little difference, increasing the Tc to 29 minutes. Perhaps one of us has made some inaccurate assumptions??

- An alternative method to empirical equa ions, is using the Tc component parts. Empirical equations are recommended for larger catchments, where the catchment length exceeds 1000m. As this catchment is only just exceeding the 1000m threshold, es imating Tc from the component parts is a useful check. This also (independently) came out at 19 minutes (overland flow 11.5 minutes + shallow concentrated flow 1.7 minutes + channel flow 6 minutes). It is acknowledged hat here is more variation between analysts when following the component parts approach due to the various assumptions that need to be made.

I appreciate the engineers comment in that the Ramser Kirpich equation gives a much faster time of concentration, that on its own, would not be reasonable for this catchment. However during calibration of the model parameters, neither the RK or BW method gave estimates that perfectly aligned with the observed hydrographs. Taking the average of the two methods acknowledged hat nei her method provided an appropriate representa ion of catchment runoff characteris ics in he region, however when averaging the two, model results calibrated well.

Please let me know if I can provide any additional information.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

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From: [redacted]@arassociates.co.nz>
Sent: Monday, 14 March 2022 3:05 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi Alistair,

Further to my voicemail today, this is to let you know that we have further reviewed the hydrology for the above development, and would like to propose a change to the time of concentration (Tc) parameter used in our hydrological model.

As you know, the Wellington Water guideline specifies that the Tc parameter should be calculated based on the Ramser-Kirpich and Bransby-Williams methods. Our previous RFI response had accordingly estimated Tc values that were based on the average between both of these methods.

However, upon further review of available technical literature on the Ramser-Kirpich method, we note that the literature warns that this method can lead to excessively low time of concentration values (and associated high rainfall intensities) if incorrectly applied, given that this method is actually designed for catchments that have well-defined channels. This is in fact evidenced in our calculations, where Tc's of about 10 and 14 minutes were obtained for the western and northern catchments, which seem excessively low given that both these catchments are undeveloped forest and over a kilometre long.

On the other hand, the Bransby-Williams formula applies to catchments without well defined channels, and where runoff is characterised by overland flow. In our view this method is more representative of the catchments we are dealing with, as they are undeveloped with a heavy forest canopy, and where runoff is therefore likely to be dominated by overland flows (rather than flow via well-defined channels). We therefore consider that for this project, the Ramser-Kirpich formula should be ignored altogether, and the Bransby-Williams equation adopted instead, as the method to calculate Tc.

I would be grateful if you could possibly look into this and let me know if you agree with this change, in which case we will tweak the calculations and submit a revised version.

Please feel free to call me if you'd like to discuss further.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m. [redacted]
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From: [redacted]
Sent: Monday, 17 January 2022 8:07 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted] [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

We have reviewed the hydrological analysis following the guidelines that you provided in your 23/12/21 and 120/01/22 emails, and attach our response within the revised memo herein.

Trust this now meets your requirements, however please feel free to give me a call if you have any further queries.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 10 January 2022 4:44 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and Happy New Year also.

The WWL recommended approach for time of concentration is outlined in Section 2.5 of our *Reference Guide for Design Storm Hydrology*. For the catchment you highlighted below, I think the recommendation would be the use of the Ramser-Kirpich and Bransby-Williams approaches (see below). In the end this is what we would compare the results from any other method against to check suitability, so we recommended external parties adopt it from the outset. Let me know if I can provide any additional information.

Text Description automatically generated

cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 **Mob** [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 10 January 2022 4:16 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted] [redacted] [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Happy New Year and thanks for your message, which we are looking into now.

Before we prepare a response, can you please clarify what is the recommended time of concentration method you are referring to? we are using the Equal Areas Method to determine average catchment slope, and the SCS method to calculate time of concentration using the average slope and length – see extract below.

Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 23 December 2021 2:20 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks very much for your email and information. I was hoping to meet/chat with you before any more modelling was done so I could supply our CN and IA layer (attached) for a more accurate representation in your model. Unfortunately in the layer attached, the majority of the catchment upstream of the site has a CN value over 60, which may impact your results. If you do further model runs, can you confirm you have used our recommended approach for calculating the time of concentration and apply the nested profile we have developed (I have attached a spreadsheet template for it).

With regard to the upstream channels, do you have any images available of the survey locations for the channel sections and photos of the channels at the time of survey? I am viewing the site with google maps aerial photography which shows significant vegetation across the channel footprint. Also, can you confirm that the condition of the channels will remain the same pre and post development (eg, the channels will not be cleared and made more efficient post development), or if changes are made they will be offset (eg potentially by increasing storage capacity from raising the existing crossing).

A great cross check to see would be a couple of Manning's calcs for the channels using a couple of surveyed sections to get a ballpark idea of their capacity. We can do this at our end if you would prefer and can supply us the surveyed sections.

cheers

[redacted] **(he, him)** Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

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Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday, 22 December 2021 6:08 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please find attached our response to your information request last 16 December as per below.

Hopefully the response is self-explanatory, however please let me know if you'd like to discuss any aspect of this document.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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From: [redacted]@arassociates.co.nz>
Sent: Thursday, 16 December 2021 5:50 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@urbanedgeplanning.co.nz>
Sent: Thursday, 16 December 2021 4:52 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]' [redacted]@belgraviacapital.co.nz>
Subject: Fw: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi all

I've received the information below and attached from Wellington Water - they have a number of concerns/areas where additional information is needed. I've also been speaking to [redacted] today. Because WWL aren't able to provide written approval for the GWRC process, [redacted] isn't happy signing off on the stormwater side of things, so the WWL issue is affecting both GWRC and HCC applications now.

[redacted] and [redacted] I'm happy for you to meet directly with Wellington Water online to work towards addressing their concerns/issues. It won't make sense at all to me as a non-engineer, so I'll sit out and let you both take charge of this side of things!

[redacted] do you want to get in touch with [redacted] to arrange a meeting?

Cheers

[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Thursday, 16 December 2021 11:02 am
To: [redacted]@urbanedgeplanning.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

See below for feedback from WWL on the flood modelling. It sounds like we may need to set up a meeting between the modellers.

Kind regards,
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 16 December 2021 10:54 AM
To: [redacted]@theurbanengineers.co.nz [redacted]@theurbanengineers.co.nz>; [redacted]@huttcity.govt.nz>;

[redacted]@wellingtonwater.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>
Subject: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please see the following concerns from our modelling team, regarding the flood model & floor levels.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development
Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt Porirua Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water wastewater and stormwater services.

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, December 16, 2021 10:35 AM
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Kia ora [redacted]

Thanks for your email. My points of concern are below:

- Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.
- Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may over estimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.
- Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

A meeting (online) with the modellers would be very useful to discuss and potentially resolve these issues.

cheers

[redacted] (he, him) Senior Hydraulic Modeller
Tel 04 912 4400 Mob [redacted]
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Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 15 December 2021 1:33 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: FW: RM210328 - 106 Mohaka Street

Hi [redacted] & [redacted]

Would you be able to provide a summary of the concerns regarding 106 Mohaka flood model/floor level /secondary flow path? Planner and RMA team is waiting for an update.

Thanks
[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, December 15, 2021 9:14 AM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Hi [redacted]

I'm just following up as the applicant has requested an update. Have you had the chance to look at this one?

Thanks
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

MHV Ltd

106 Mohaka St, Wainuiomata, Lower Hutt

Flood Report

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

Reference P20-156-R03-RevD
29th March 2022

AR & Associates Ltd // Level 2, The Nielsen Centre
129 Hurstmere Road, Takapuna
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Document Control Sheet

Client		MHV Ltd				
Project address		106 Mohaka St, Wainuiomata, Lower Hutt				
Report title		Flood Report				
Reference		P20-156-R03				
Revision	Author	Reviewer	Approver	Purpose	Issued to	Date
D	AR	JL	AR	Council RFI	Client	29.03.2022

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Appendices

1 // Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to undertake a flood assessment, to understand the flood risks at the site and downstream areas, for both the existing and post development conditions.

This document presents the results of our assessment, including associated recommendations around flood management and proposed minimum floor levels.

2 // Site Description

The site is located adjacent to the north-eastern corner of the Mohaka Street cul-de-sac, in Wainuiomata, Lower Hutt (Lot 5 DP 65821).

In its existing condition, about one third of the site is covered by a number of buildings and associated driveway and parking areas, with the remaining areas being predominately covered in grass and low vegetation.

Topography within the site is relatively flat, however beyond the northern and north-eastern boundaries the land rises steeply and is covered by a densely vegetated bush reserve.

There are a series of bush clad open streams / drains immediately adjacent to the western and northern boundaries, which collect most of the runoff generated from the bush-clad catchments to the north. These streams discharge to an existing 1050 mm diameter culvert that passes under the access road to the site, and which discharges some 300 m downstream.

An aerial photo of the existing site with associated existing 3-water services (obtained from the Wellington Water GIS maps) is shown in **Figure 1** below.

Figure 1:- Existing site layout showing surrounding areas and 3-waters services

There is a new residential subdivision of 75 to 102 Meremere St currently under development adjacent to the eastern site boundary. This development drains stormwater runoff from the contributing eastern catchment onto the subject site, which is captured by a 1050 mm diameter scruffy dome and 525 mm RC pipe at the eastern boundary, as shown in the AR & Associates design drawings.

There are established residential areas to the south of the site boundary, and west of the western stream.

3 // Proposed Development

The development comprises a 52-lot residential subdivision, accessed from the eastern side of Mokaka St. A number of internal local roads are proposed to provide access to the various lots.

The proposed stormwater network will consist of the main primary piped network in addition to a 1050 mm dia. concrete pipe which will act as a detention tank to attenuate 10% and 1% AEP flows on the site, to ensure that post-development peak flows do not exceed pre-development levels.

Stormwater from the northern bush clad mountain catchment will be conveyed along the northern and eastern open drainage channels, while runoff from the eastern catchment will be captured by a 1050 mm scruffy dome and 525 mm pipe and conveyed into the detention system prior to discharge into the existing 1050 mm culvert that services the site.

The proposed subdivision layout showing the various stormwater components is illustrated in **Figure 2**.

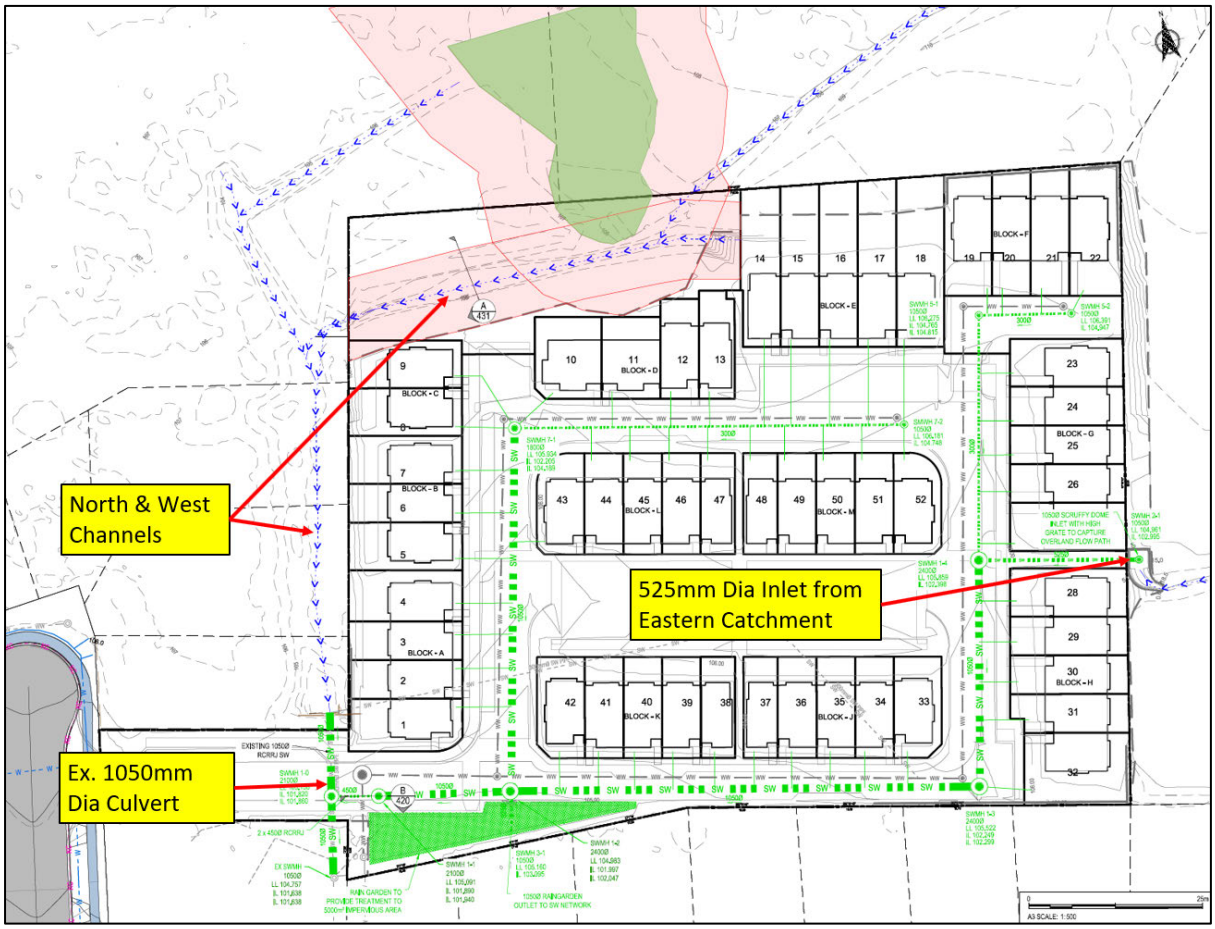

Figure 2:- Proposed development showing key stormwater components

4 // Basis of Design

4.1 Design Parameters

The assessment presented herein is based on Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0) and reference guide for design storm hydrology-standardised parameters for hydrological modelling (Wellington Water Ltd, 9 April 2019). The primary and secondary stormwater infrastructure design requirements under this standard include the following key criteria:

- Primary piped systems in residential areas to be designed to accommodate runoff from the 10-year ARI (10% AEP) rainfall event, or the 100-year ARI (1% AEP) rainfall event where no secondary flow path is available.
- Secondary systems shall consist of overland flow paths capable to conveying runoff from the 100-year ARI (1% AEP) rainfall event.
- Maximum acceptable flood depths during the 100-year ARI event in local / minor roads, which apply to the site, shall be 200 mm, with a flow velocity of no more than 2 m/s.
- Minimum freeboard of habitable floor levels shall be 500 mm above the water level during secondary flood protection events. Commercial and industrial buildings shall have a freeboard of 300 mm and all other building freeboards shall be 200 mm.
- The minimum freeboard shall be measured from the water surface level to the building platform level or underside of the floor joists or structural concrete slab of the building.
- Rainfall depths are taken from NIWA's HIRDS Version 4, with allowance for Climate Change. An RCP6.0 for the year 2081-2100 was used for purposes of this assessment.

The following additional parameters were used in this assessment:

- The SCS Curve Number method was used with HEC-HMS modelling software to determine hydrology and flows generated within the contributing catchments.
- Curve numbers were obtained from the appendix A of reference guide design storm report. For the contributing upstream catchments, which are heavily vegetated in bush, a CN of 61 has been assumed (mountain brush with good hydrological condition). Impervious areas are assumed to have a CN=98.
- Time of Concentration parameters were calculated using the empirical equations of Ramser Kirpich and Bransby Williams, and the answers averaged.
- Initial Abstraction parameters were obtained using Wellington Water Ltd CN layer extract.
- A Manning's Coefficient of 0.07 (Excavated or dredged channels / streams with clean bottom, brush on side, highest stage) was used for purposes of assessing capacity of the upstream watercourses.
- Used Nested storm rainfall profile that 12-hour storm duration is recommended for model runs by the reference guide storm report.
- Wellington Water Standards do not specifically require blockage to be allowed for culverts or pipes during the secondary (100-year ARI storm) event. However, for purposes of our analysis,

culverts have been assumed to be 20% (1050 mm and 525 mm) and 50% (225 mm) blocked during secondary flow conditions.

- Our analysis has assumed that appropriate maintenance of these structures will be undertaken by Council (or appropriate party responsible), in order to prevent blockage from exceeding the assumed 20% during the 100-year ARI event.

4.2 Catchments

There are three main catchments contributing flow to the site, as shown on **Figure 3** below.

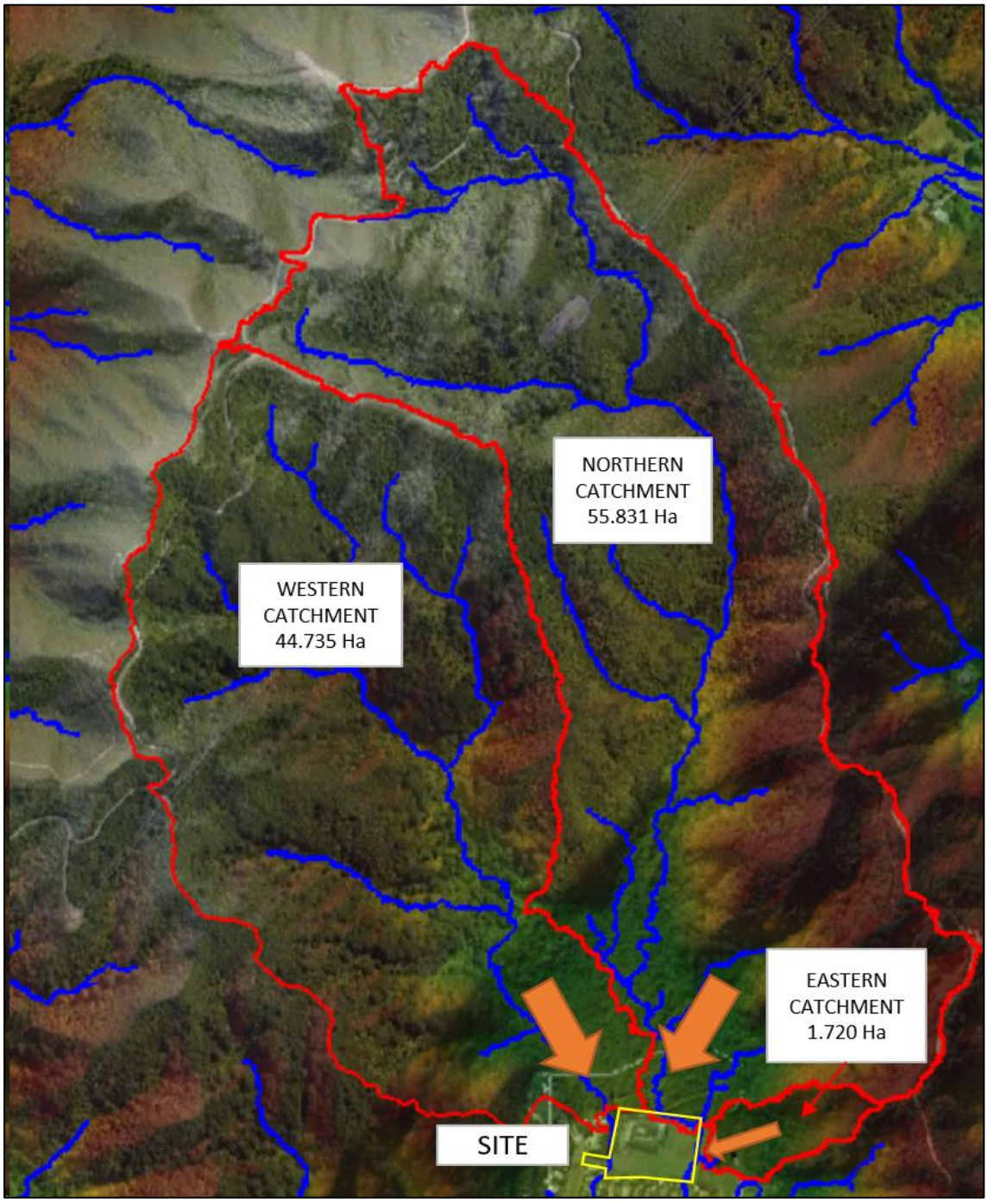

Figure 3:- Contributing stormwater catchments

These catchments have been assessed and measured using council LiDAR data and SCS methodology. The main catchment parameters are summarised in **Table 1** below.

Catchment	Catchment Area (Ha)	Curve Number (CN)	Longest Drainage Path (m)	Catchment Slope (%)	Time of Concentration Tc (min)	Initial Abstraction Ia (mm)
Western	44.73	61	1,133	10.8	19.25	16.24
Northern	55.83	61	1,666	10.0	27.74	16.24
Eastern	1.72	61	234	11.3	5.50	16.24

Table 1 – Summary Catchment Design Parameters

All of the contributing catchments are covered by undeveloped bush reserve land, with exception of a small portion of the eastern catchment, which will be covered by the adjacent 9-lot subdivision that is currently under development at the end of Meremere St.

However, we understand that peak flow attenuation will be provided within the Meremere St subdivision. As such, for purposes of this analysis, all contributing catchments are assumed to be in a greenfields in terms of peak flows generated for both the pre and post development condition.

5 // Results

5.1 Modelling Results, Pre-Development (Existing) Condition

The pre-development (existing) condition has been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development (existing) 100-year ARI flood levels, flood depths and flow velocities are shown in **Figures 4, 5** and **6** below, respectively.

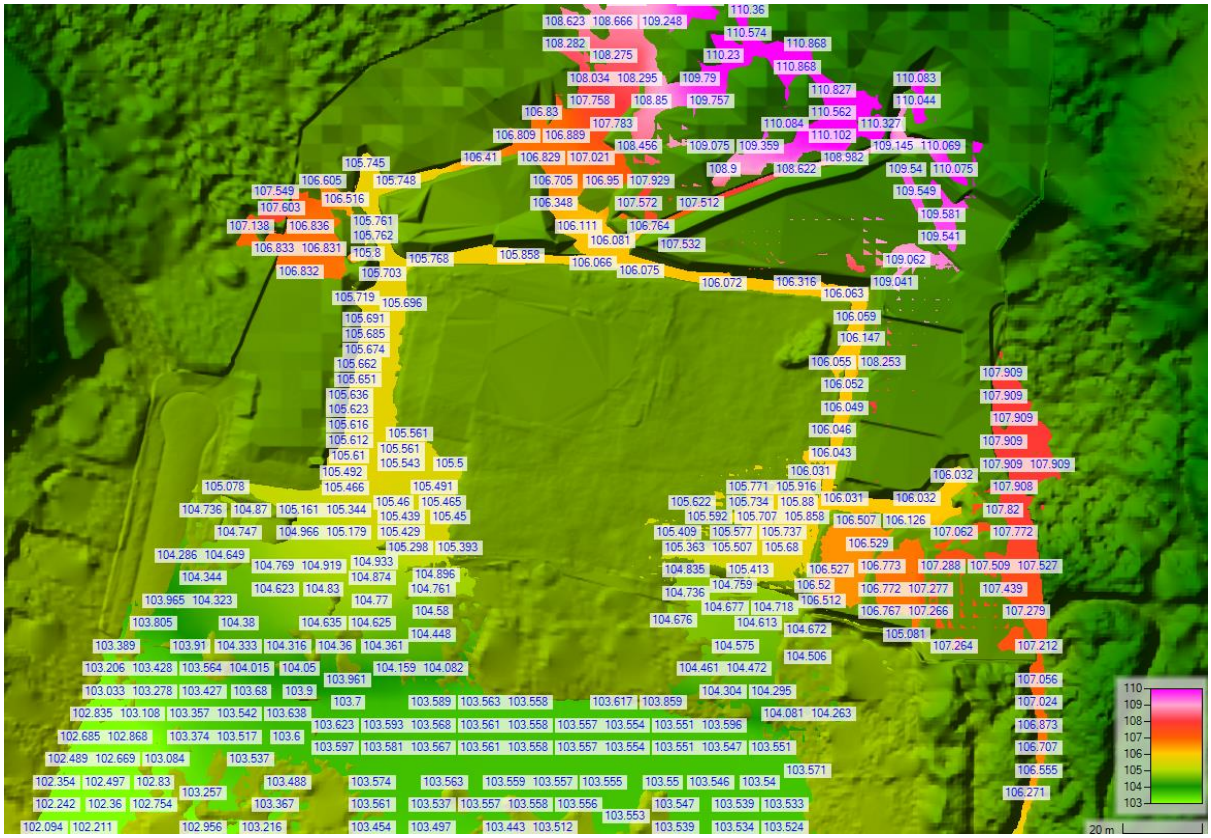

Figure 4: Pre-Development 100-year ARI Flood Map showing Flood Levels

The pre-development results show that stormwater runoff from the northern and eastern catchments is directed along the existing perimeter channels around the eastern, northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance.

The results show that in the existing condition, and assuming a 20% blockage scenario for the culvert, there is some spillage of flows across the entrance to the site. The peak flow estimated to spill across the culvert embankment under this scenario is estimated to be 3.45 m^3/s, approximately.

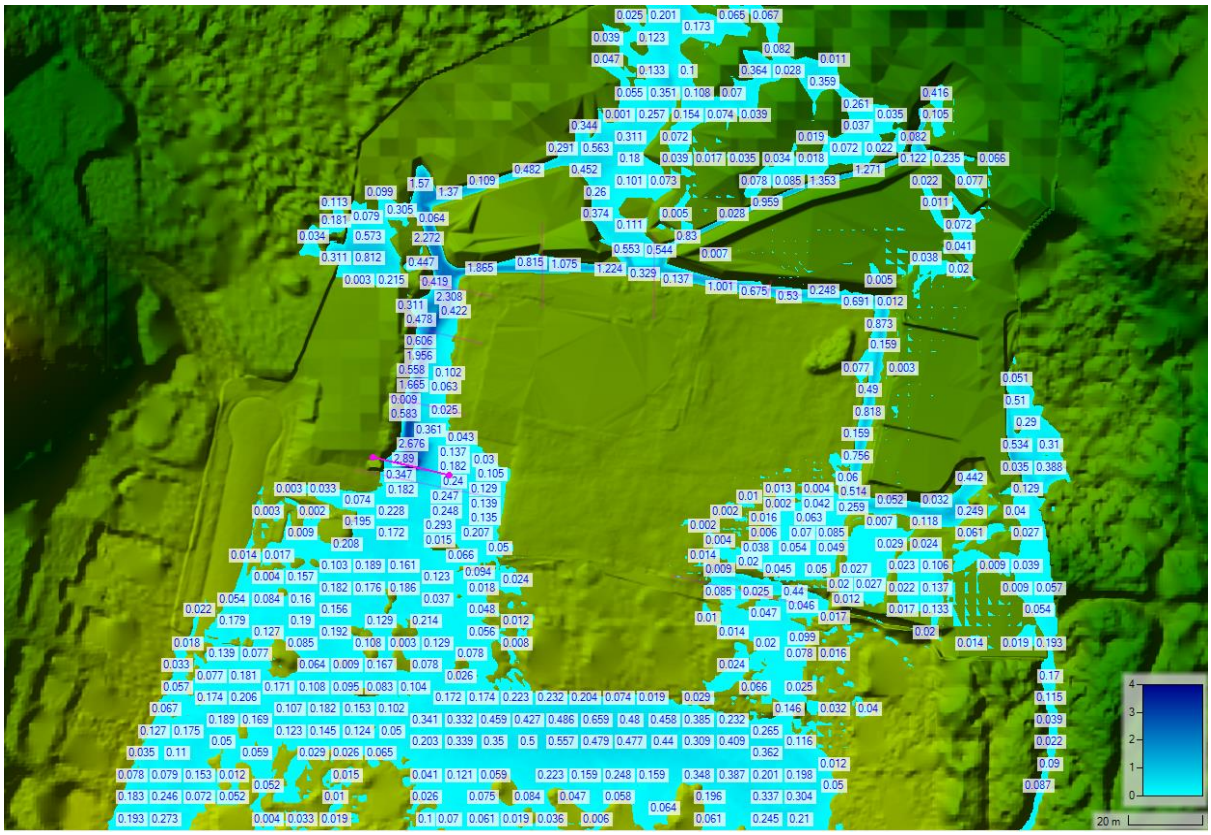

Figure 5: Pre-Development 100-year ARI Flood Map showing Flood Depths

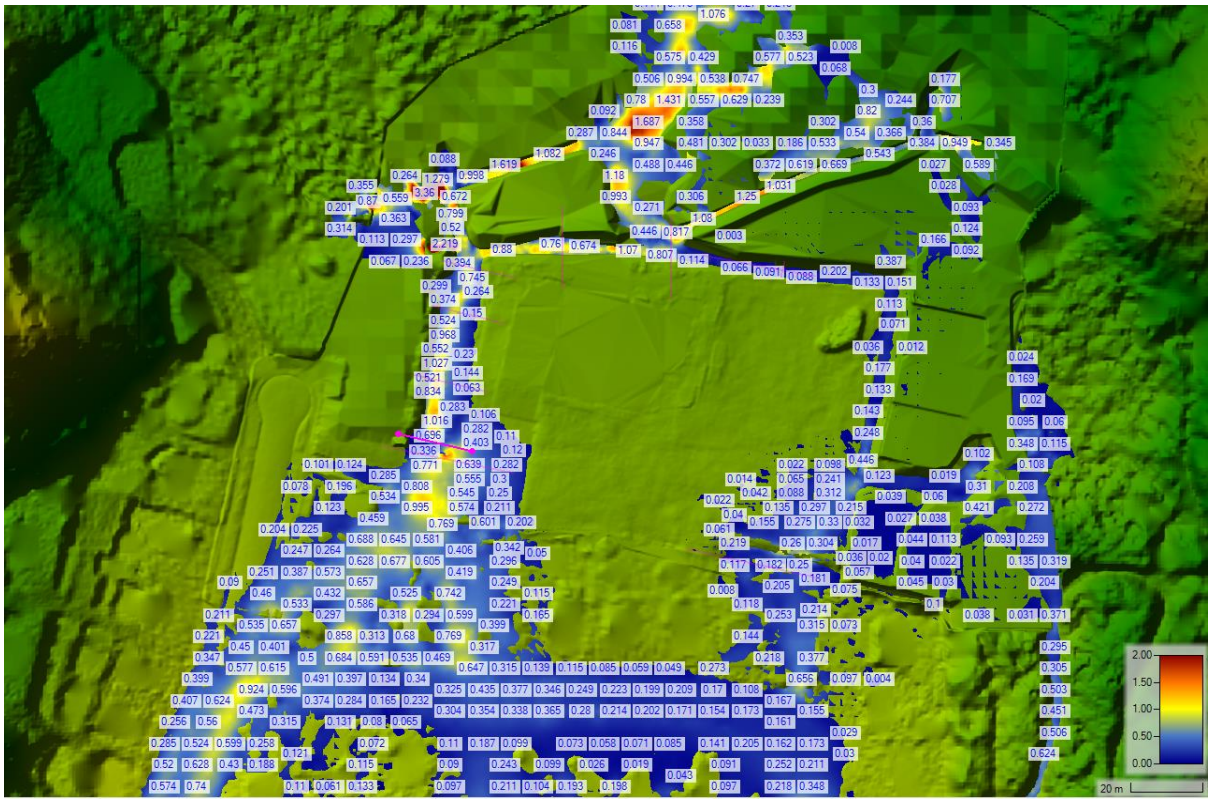

Figure 6: Pre-Development 100-year ARI Flood Map showing Flow Velocities

5.2 Modelling Results, Post-Development Condition

The post-development condition has also been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development 100-year ARI flood levels, flood depths and flow velocities are shown in Figures 7, 8 and 9 below, respectively.

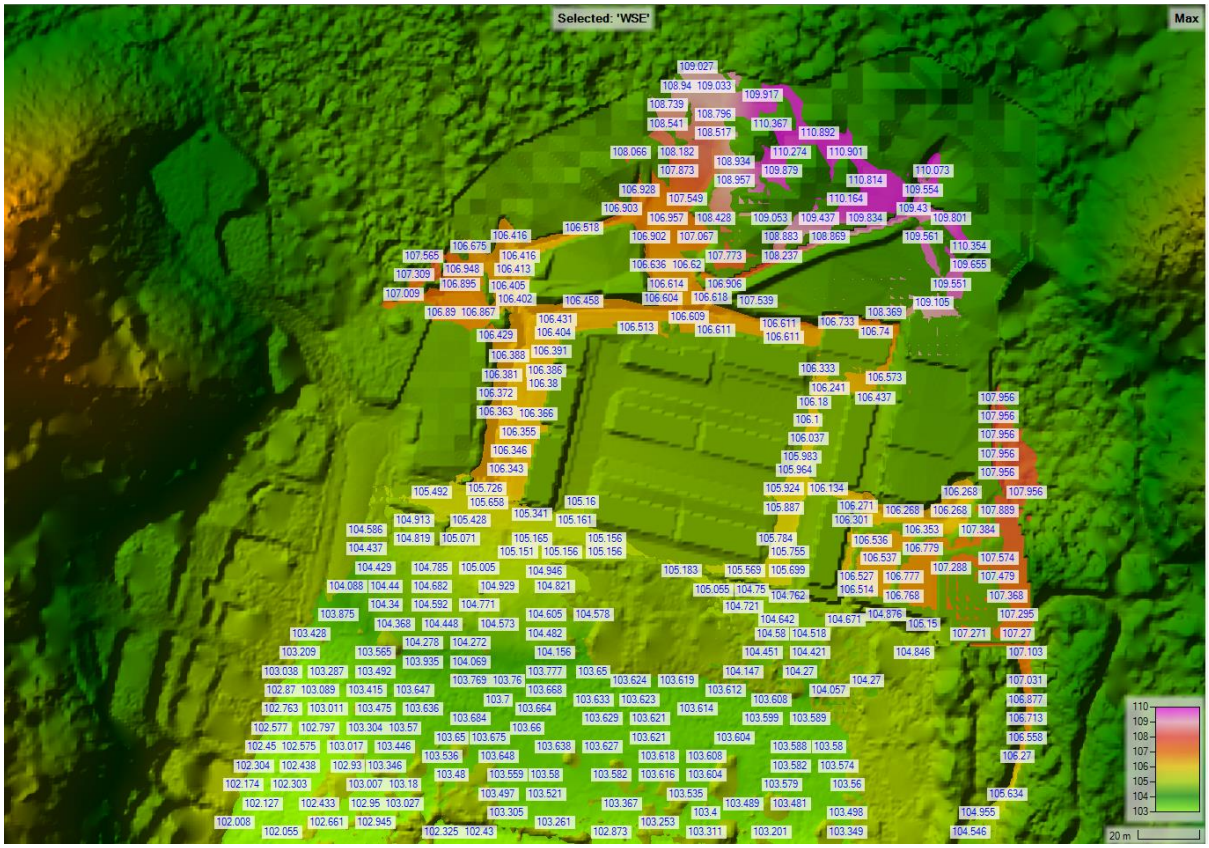

Figure 7: Post-Development 100-year ARI Flood Map showing Flood Levels

The results for the post-development scenario show that stormwater runoff from the northern catchment is directed along the channels adjacent to northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance. For this scenario, runoff from the eastern catchment is connected within the proposed pipe network, which ultimately discharges into the 1050 mm culvert.

Apart from the spillage across the culvert embankment, the post-development scenario also shows a very small amount of flow spilling across the south-eastern corner, of maximum 3.52 m^3/s. This flow is insignificant in the context of the 100-year ARI event, and it is expected that it will be fully contained within the kerb and channel in the proposed southern road (the design of this will be finalised during detailed design stage). The impact on downstream properties is thus expected to be negligible.

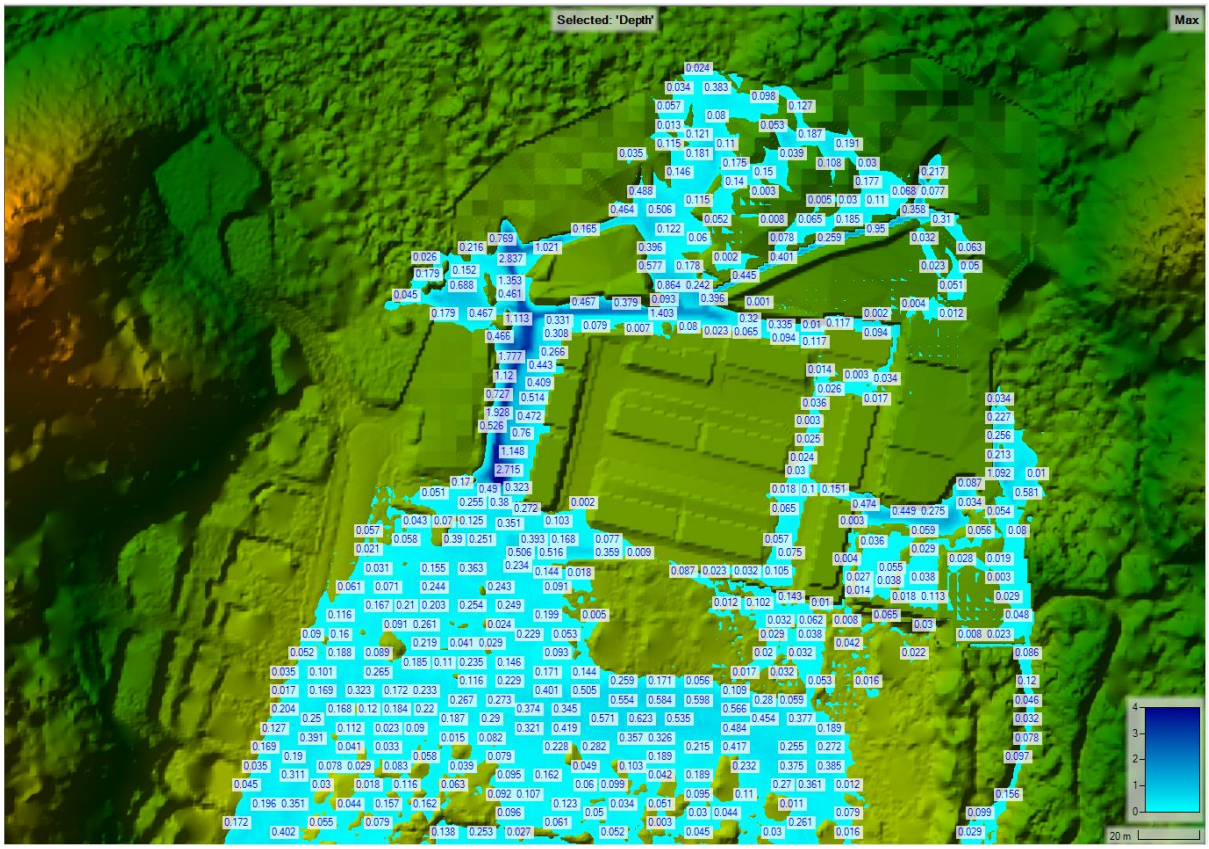

Figure 8: Post-Development 100-year ARI Flood Map showing Flood Depths

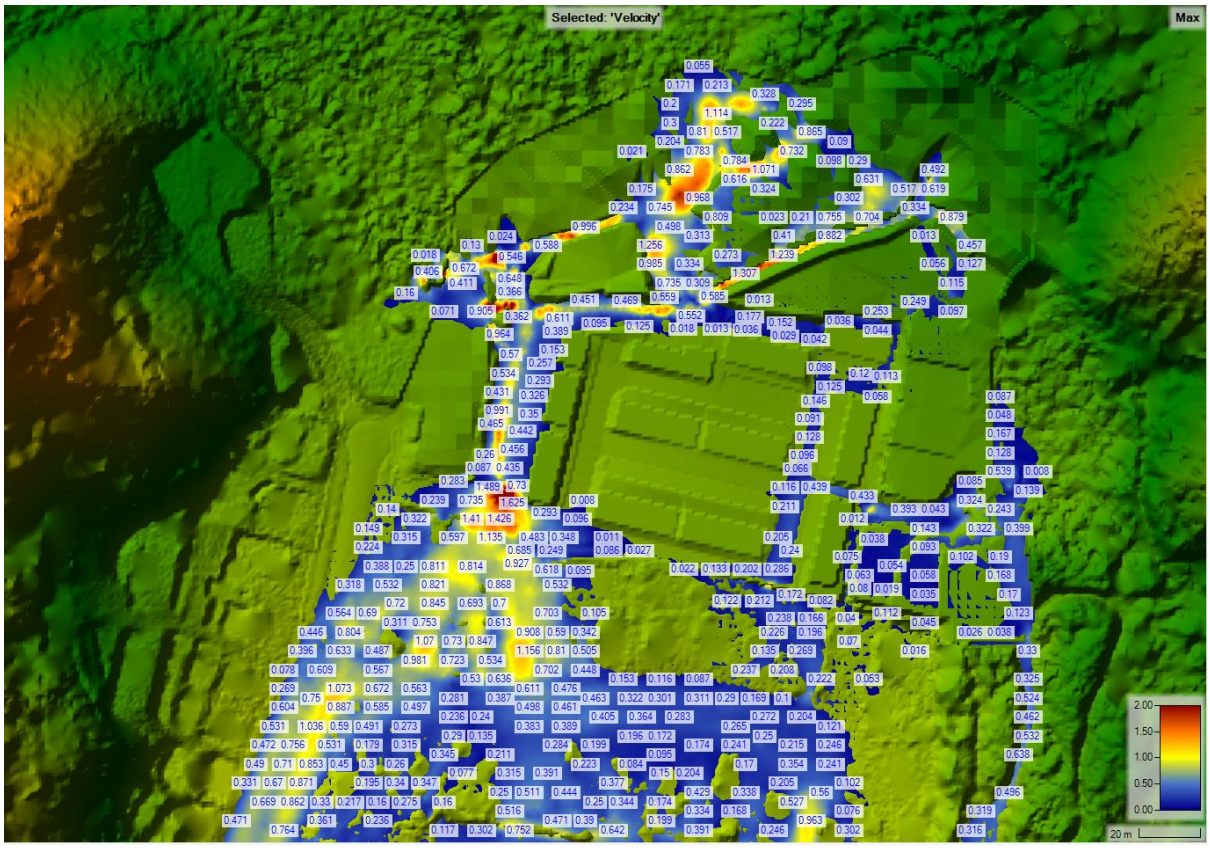

Figure 9: Post-Development 100-year ARI Flood Map showing Flow Velocities

5.3 Impact on Downstream Properties

As part of the proposed works, the existing crossing over the stream will be raised in level, and this will result in additional storage within the existing channels during the 100-year ARI event. While this causes water levels to rise behind the culvert, the flows will remain fully contained within the channels, thereby avoiding any adverse impacts on adjacent properties.

Downstream of the development, the revised 100yr ARI flood levels are predicted to increase at west southern location, typically up to 10 mm and to decrease at east-south area up to 25 mm, as shown in Figure 10 below.

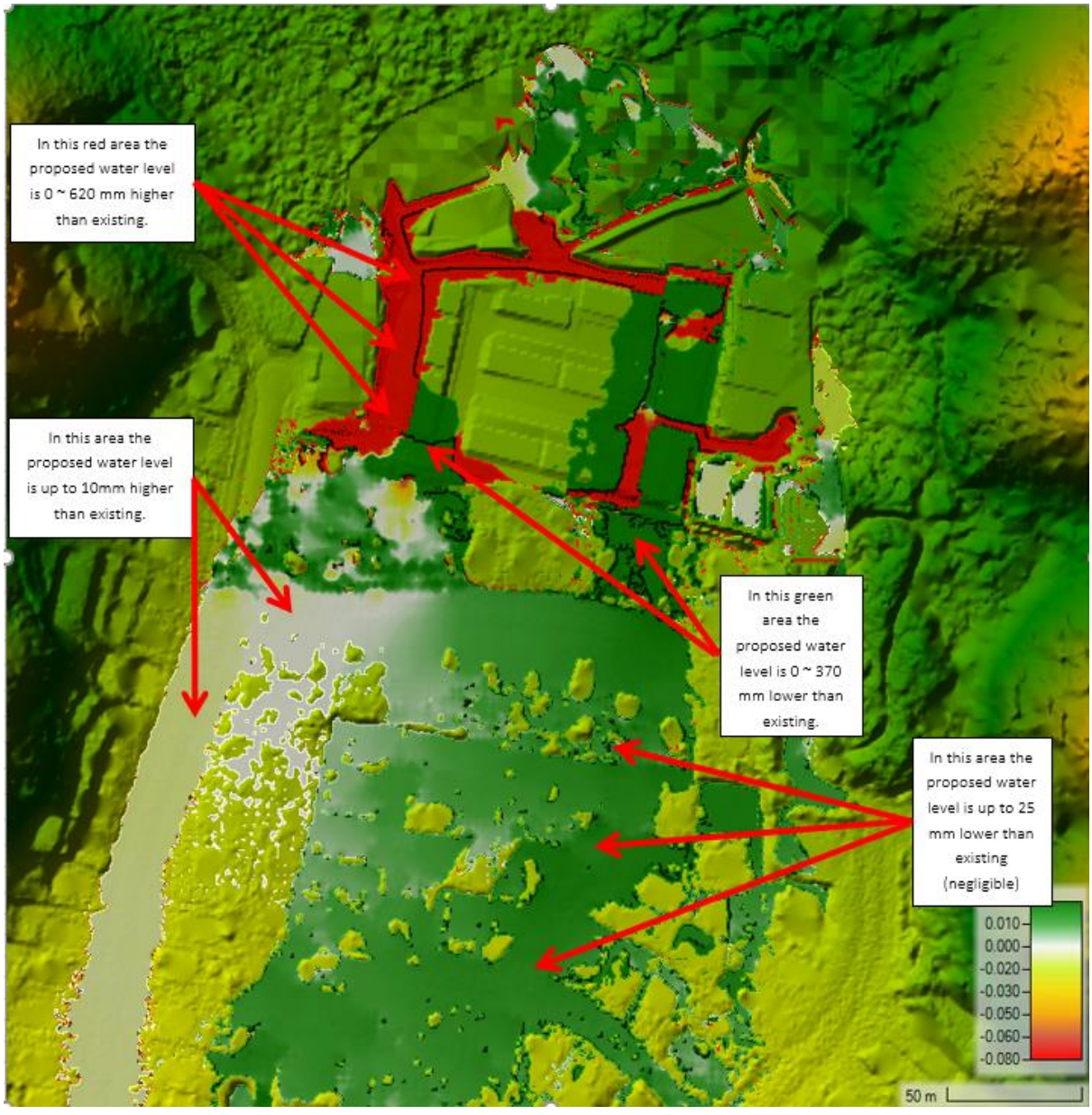

Figure 10: Comparison existing WSL and proposed WSL

In conclusion, the analysis shows that the proposed development will result in "no more than minor" effects with regards to flooding (in fact likely to result in net positive results given the predicted reduced flow depth downstream), and especially considering that any benefits likely to arise from the proposed on-site attenuation is ignored in the analysis.

5.4 Minimum Recommended Floor Levels

Based on the flood assessment, minimum floor levels have been determined based on council's criteria for a minimum freeboard of 500 mm above the predicted 100-year ARI flood levels, for habitable floors that are adjacent to a 100-year floodplain or overland flow path.

For all other lots, a 200 mm freeboard to the adjacent ground is required in accordance with the requirements of the building code.

Refer **Table 2** below for minimum floor levels recommended.

Lot #	Adjacent to 100yr ARI OLFP or Flood Plain?	100-year ARI Flood Level (RL. m)	Recommended Minimum FFL (m)	Freeboard (mm)
1	Yes	106.41	106.91	500 above Flood Level
2	Yes	106.41	106.91	500 above Flood Level
3	Yes	106.41	106.91	500 above Flood Level
4	Yes	106.41	106.91	500 above Flood Level
5	Yes	106.43	106.93	500 above Flood Level
6	Yes	106.43	106.93	500 above Flood Level
7	Yes	106.43	106.93	500 above Flood Level
8	Yes	106.48	106.98	500 above Flood Level
9	Yes	106.48	106.98	500 above Flood Level
10	Yes	106.58	107.08	500 above Flood Level
11	Yes	106.58	107.08	500 above Flood Level
12	Yes	106.58	107.08	500 above Flood Level
13	Yes	106.58	107.08	500 above Flood Level
14	Yes	106.63	107.13	500 above Flood Level
15	Yes	106.63	107.13	500 above Flood Level
16	Yes	106.63	107.13	500 above Flood Level
17	Yes	106.63	107.13	500 above Flood Level
18	Yes	106.63	107.13	500 above Flood Level
19	Yes	106.68	107.18	500 above Flood Level
20	Yes	106.68	107.18	500 above Flood Level
21	Yes	106.68	107.18	500 above Flood Level
22	Yes	106.68	107.18	500 above Flood Level
23	Yes	106.27	106.77	500 above Flood Level
24	Yes	106.27	106.77	500 above Flood Level
25	Yes	106.27	106.77	500 above Flood Level

26	Yes	106.27	106.77	500 above Flood Level
27	Yes	106.27	106.77	500 above Flood Level
28	Yes	106.27	106.77	500 above Flood Level
29	Yes	106.27	106.77	500 above Flood Level
30	Yes	106.27	106.77	500 above Flood Level
31	Yes	106.27	106.77	500 above Flood Level
32	Yes	106.27	106.77	500 above Flood Level
33	Yes	105.8	106.30	500 above Flood Level
34	No	N/A	106.10	200 above Ground Level
35	No	N/A	106.10	200 above Ground Level
36	No	N/A	106.10	200 above Ground Level
37	No	N/A	106.10	200 above Ground Level
38	No	N/A	105.87	200 above Ground Level
39	No	N/A	105.87	200 above Ground Level
40	No	N/A	105.87	200 above Ground Level
41	No	N/A	105.87	200 above Ground Level
42	No	N/A	105.87	200 above Ground Level
43	No	N/A	106.23	200 above Ground Level
44	No	N/A	106.23	200 above Ground Level
45	No	N/A	106.23	200 above Ground Level
46	No	N/A	106.23	200 above Ground Level
47	No	N/A	106.23	200 above Ground Level
48	No	N/A	106.39	200 above Ground Level
49	No	N/A	106.39	200 above Ground Level
50	No	N/A	106.39	200 above Ground Level
51	No	N/A	106.39	200 above Ground Level
52	Yes	106	106.50	500 above Flood Level

Table 2 – *100-year ARI Flood Level and Minimum Habitable Floor Freeboard Requirements*

5.5 Internal Overland Flow Paths

As discussed in the previous sections, 100-year ARI overland flows arising from the upstream catchments will be managed via the perimeter drainage channels, 1050mm culvert and internal reticulation that accepts flows from the eastern catchment, which is designed to convey 100-year ARI flows.

Overland flows within the subdivision itself are small, as any runoff generated within the site originates only from the site itself. Any excess flows in addition to the capacity of the underground piped network will be conveyed along the internal local roads toward the southwestern part of the site, where the 1050mm culvert breach point is located.

6 // Conclusion

This report has been prepared to assess the flood risk both within the site and at the adjacent residential properties west and south (downstream) of the site.

Our analysis concludes that the 100-year flows are adequately controlled in the post-development condition, and such that any impact on downstream properties to the south and properties to the west of the site no more than minor.

Minimum recommended floor levels have been identified through this work to ensure that the 100-year ARI freeboard requirements are achieved in accordance with Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0).

All other aspects of the stormwater system will be designed to conform with the relevant council standards and building code requirements.

As such we consider that Wellington Water and Hutt City Council should give favourable consideration to the proposed development, from a flood risk perspective.

Appendix A – Engineering Calculations

106 Mohaka Street, Wainuiomata, Lower Hutt

Flood Assessment

CONTENTS:

Reason for this Revision: Wellington Water Queries

Calculations By:	PP
Checked By:	AR
Ref:	P20-156-Clc02
Date:	29.03.2022
Revision:	D

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	1
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		

A Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to assist in the flood modelling and report.

This document presents the flood modelling for the post development scenario.

B Basis of Design

The design presented herein is based on Wellington's Land Development and Subdivision Code of Practice and associated documents, for the contributing catchment assuming maximum probable development (MPD) conditions. The hydrology parameters are selected based on guidance from Wellington Water's Reference Guide for Design Storm Hydrology.

C Stormwater

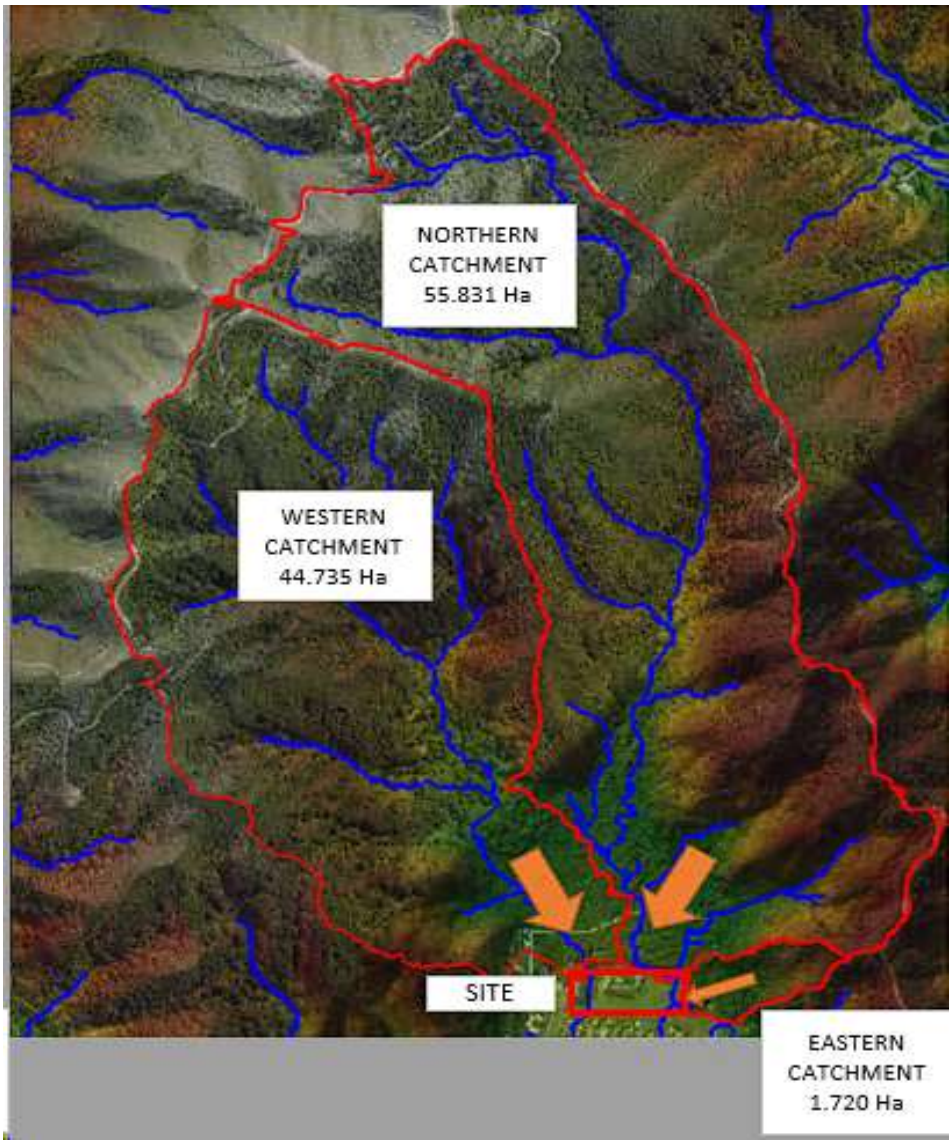
C.1 Flood Management Design Philosophy

The area is under the influence of the unnamed catchments as shown below. ARAL has undertaken an independent hydrology and hydraulics analysis using HEC-HMS and HEC-RAS to determine the peak flows and flooding extents.

The design philosophy focuses on retaining the existing topography as much as possible and applying a low impact design (LID) approach to maintain pre-development hydrology and flows, and minimise adverse effects on the environment and neighbouring properties which may result from the development.

This calculation sheet will cover the 100-year peak flows and flood mapping regarding max. water depth, max. water surface level, and max. water velocity for an MPD condition.

The 100yr Catchments showing the site location are shown below.



C.2 Design Assumptions and Parameters

Climate Change:

The SCS Curve Number method was used with the HEC-HMS modelling software to calculate the amount of runoff from a rainfall event. The 1% Annual Exceedance Probability (AEP) or 100-year Average Recurrence Interval (ARI) event was assessed for the flood analysis. An RCP6.0 for the year 2081-2100 was used for the climate change factor from HIRDS v4.

**** Nested Storm rainfall profile (12-hour storm duration is used for this assessment)**

RCP6.0 for the period 2081-2100(Depth, mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	
1.58	0.633	8.29	11.3	13.6	19.1	26.7	44.4	59.4	77.4	
2	0.5	9.16	12.4	15	21.1	29.5	48.9	65.4	84.8	
5	0.2	12.2	16.5	19.9	27.8	38.8	64.1	85.5	110	
10	0.1	14.5	19.5	23.6	32.9	45.8	75.4	101	130	
20	0.05	16.9	22.7	27.4	38.1	53.1	87.2	116	149	
30	0.033	18.3	24.7	29.7	41.4	57.5	94.3	125	161	
40	0.025	19.4	26.1	31.4	43.7	60.6	99.5	132	169	
50	0.02	20.2	27.2	32.8	45.5	63.2	103	137	176	
60	0.017	20.9	28.2	33.9	47	65.2	107	142	182	
80	0.012	22.1	29.7	35.7	49.5	68.6	112	148	190	
100	0.01	22.9	30.8	37	51.4	71.1	116	154	197	
250	0.004	26.6	35.6	42.8	59.2	81.8	133	176	225	

Curve Numbers:

	CN	
Upstream undeveloped catchments	61	Based on Appendix B or Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	98	

Initial Abstraction:

The Initial Abstraction parameter is estimated as 0.1 x S, as per Wellington Water's Reference Guide for Design Storm Hydrology, as follows:

	Ia	
Upstream undeveloped catchments	16.24	Based on Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	0	

Terrain Data:

- Wellington Lidar 1m DEM (2013-2014, LINZ), Projection: NZGD / Wellington 2000, Vertical Datum: NZVD2016
- Existing survey completed by Cuttriss, Surveyors, Engineers, Planners Ltd, 11.2020
- Proposed Terrain design for project site by AR Associates Ltd.
- Site scheme plan, Moore Design, 23.12.20

Proposed Plan:

	Max Coverage	Average MPD Impervious	
Pre-Development	0%	0%	
Post-Development	65%	70%	<- Assumed

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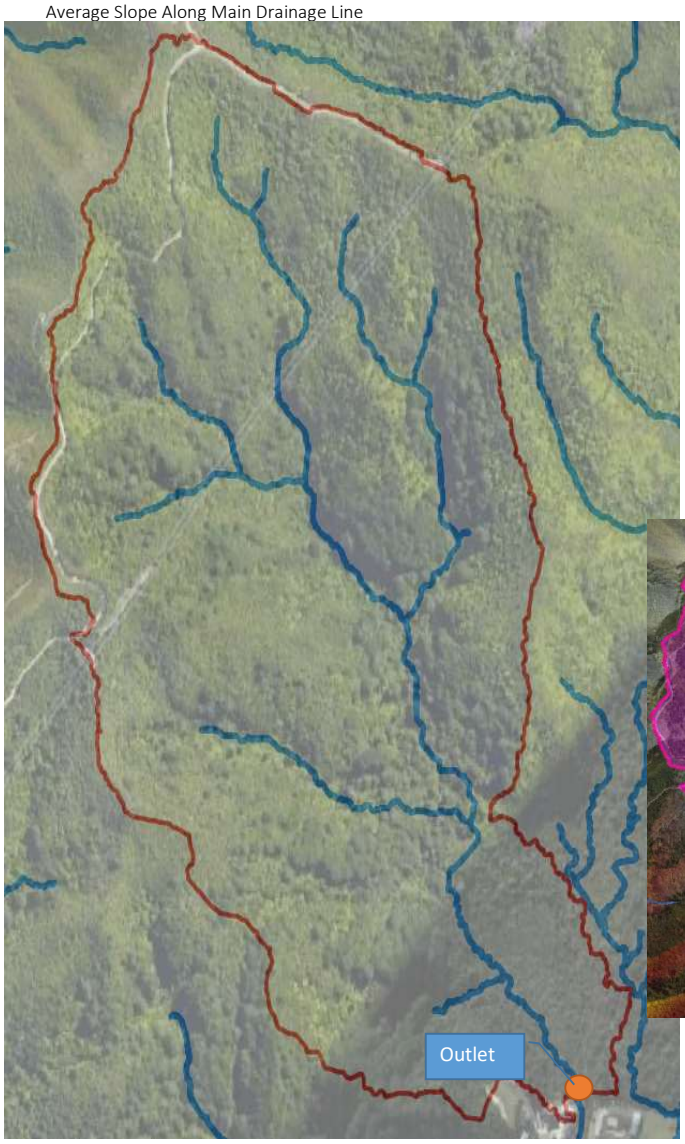
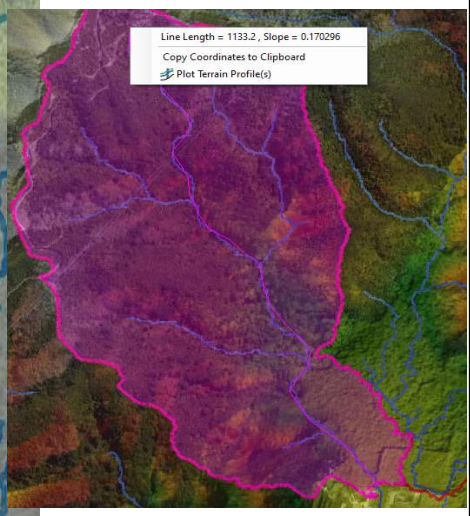
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	3
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		

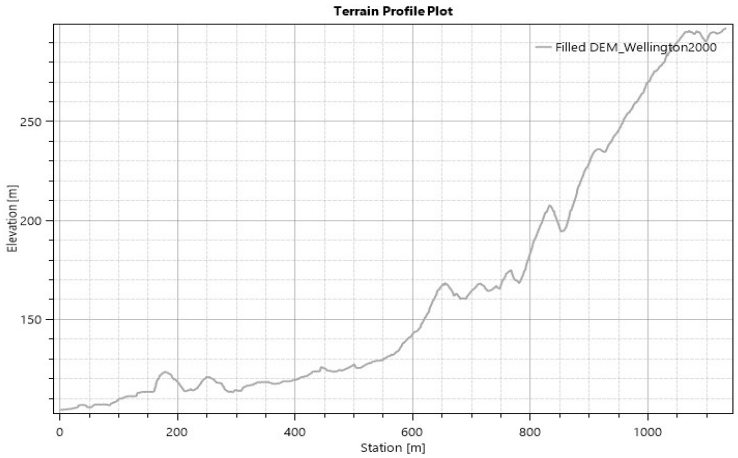
C.3 Catchment Analysis - Western Catchment

Average Slope Along Main Drainage Line





Slope =	0.108



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	4
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		

Catchment Area

Total	444783	m2
	0.444783	km2
	44.4783	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.13	From above
Catchment slope Sc (equal area method)	0.108	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.47	(TP108)
Tc (min)	27.97	
Lag time (min)	18.65	
Tc (min)	10.32	(Ramser Kirpich Tc) - Suited to catchments with well-defined drainage channels.
Lag time (min)	6.88	
Tc (min)	28.17	(Bransby Williams Tc) - Suited to catchments without well-defined drainage channels.
Lag time (min)	18.78	
Average(min)	**19.25**	
Lag time (min)	**12.83**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		44478	10.0%
CN (Mountainous)	61		400305	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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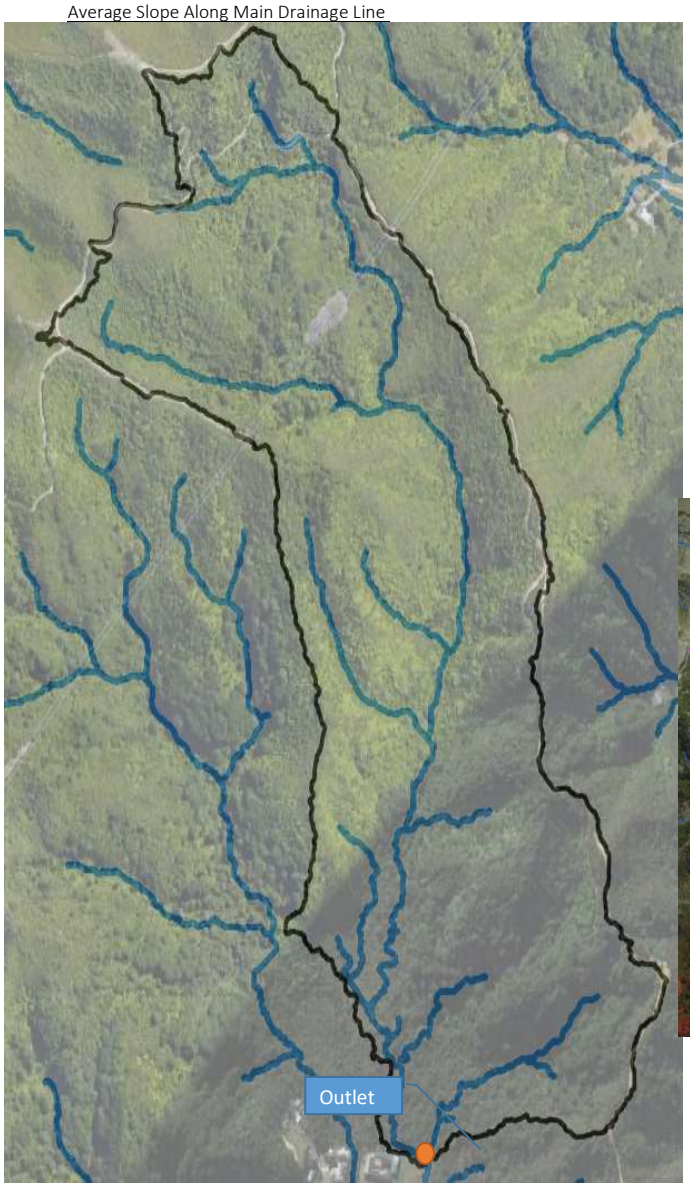
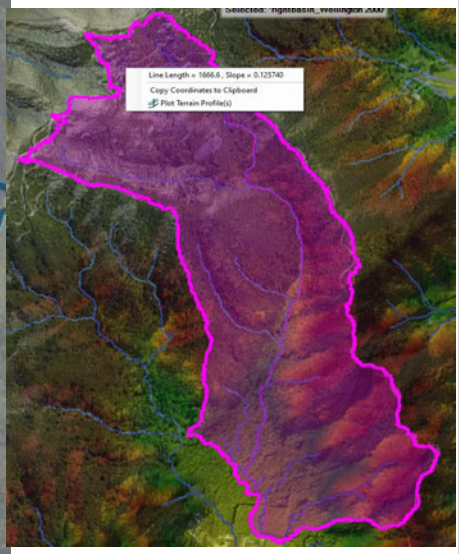
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	5
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		

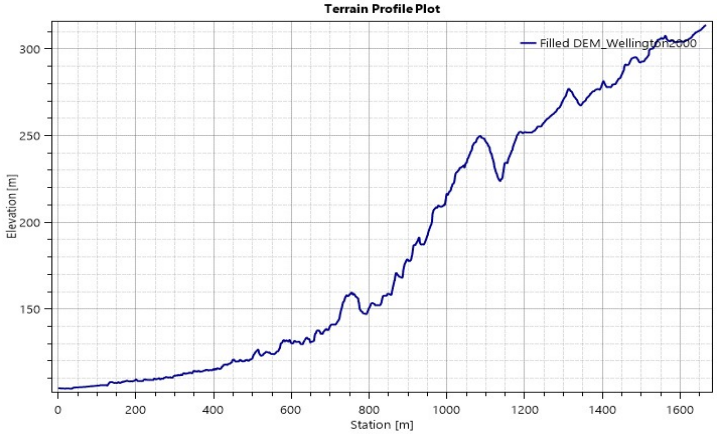
C.4 Catchment Analysis - Northern Catchment

Average Slope Along Main Drainage Line





Slope = 0.0998



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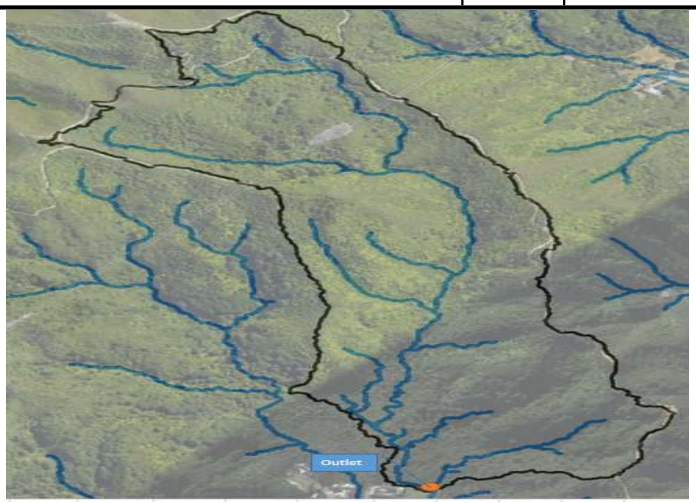
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	6
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		



Catchment Area

Total	558312	m2
	0.558312	km2
	55.8312	ha

Pre-Development

Impervious Area

	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.67	From above
Catchment slope Sc (equal area method)	0.0998	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.62	
Tc (min)	36.96	
Lag time (min)	24.64	
Tc (min)	14.33	**(Ramser Kirpich Tc)**
Lag time (min)	9.55	
Tc (min)	41.16	(Bransby Williams Tc)
Lag time (min)	27.44	
Average(min)	**27.74**	
Lag time (min)	**18.50**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		55831.2	10.0%
CN (Mountainous)	61		502480.8	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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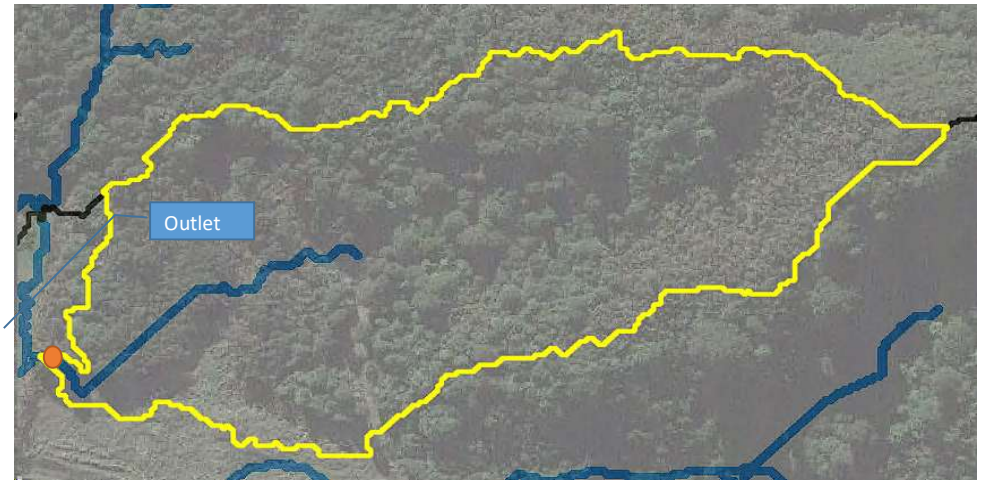
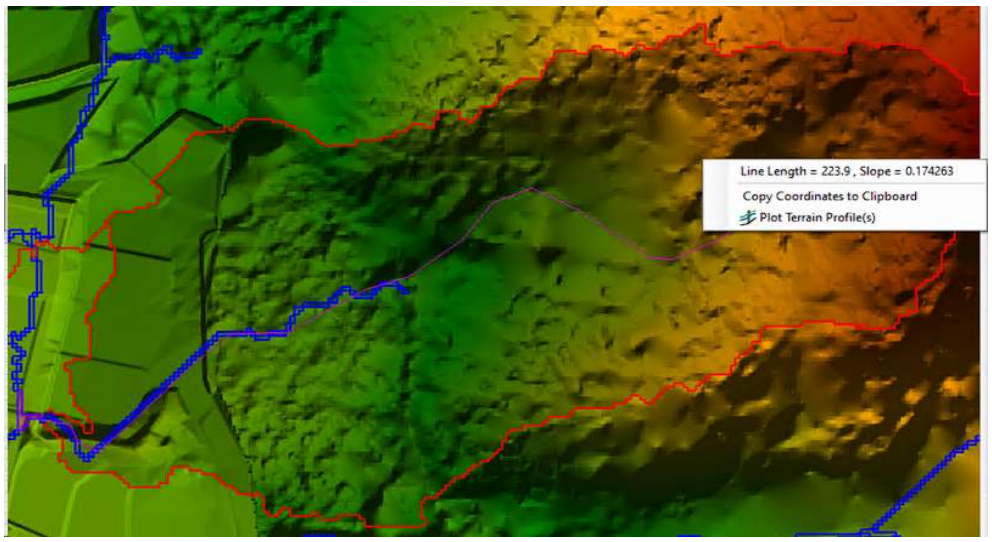
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	7
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		

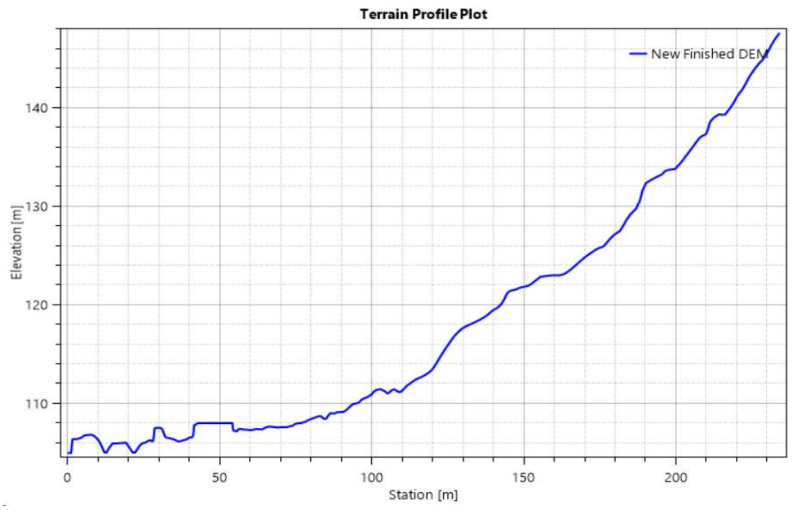
C.5 Catchment Analysis - Eastern Catchment

Average Slope Along Main Drainage Line





Slope = 0.1127



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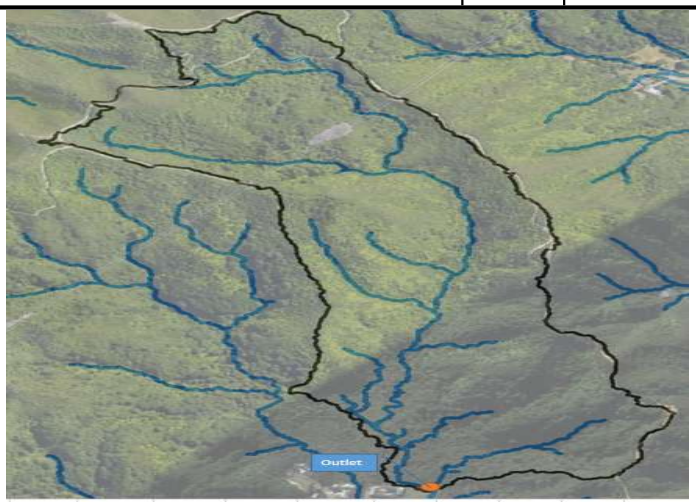
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	8
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		



Catchment Area

Total	17206	m2
	0.017206	km2
	1.7206	ha

Pre-Development

Impervious Area	0	m2

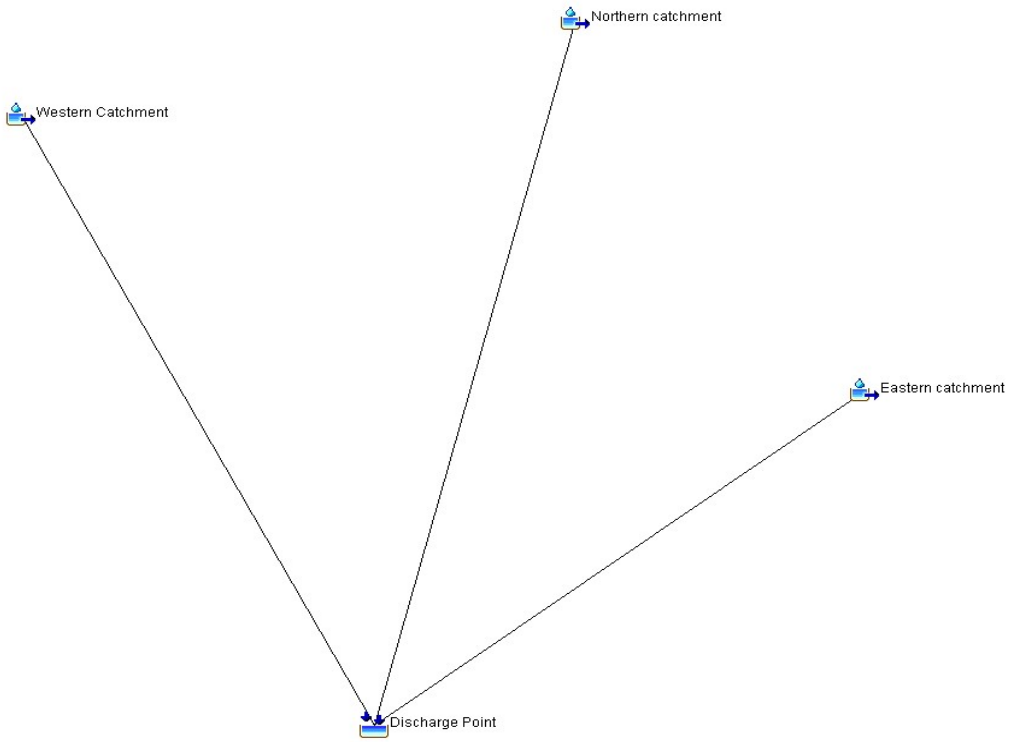
Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	0.23	From above
Catchment slope Sc (equal area method)	0.1127	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.17	
Tc (min)	10.20	
Lag time (min)	6.80	
Tc (min)	3.02	**(Ramser Kirpich Tc)**
Lag time (min)	2.01	
Tc (min)	7.99	(Bransby Williams Tc)
Lag time (min)	5.32	
Average(min)	**5.50**	
Lag time (min)	**3.67**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		1720.6	10.0%
CN (Mountainous)	61		15485.4	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

C.6 HEC-HMS Model & Results



Average Tc (Ramser and Bransby)

Global Summary Results for Run "100yr Proposed"

Project: P20-156-WWL Simulation Run: 100yr Proposed

Start of Run: 01Jan2020, 00:00
End of Run: 01Jan2020, 12:00
Compute Time: 25Mar2022, 13:10:54

Basin Model: 100yr Proposed
Meteorologic Model: 100yr +CC
Control Specifications: 24hr

Show Elements: All Elem... Volume Units: MM 1000 M3 Sorting: Hydrol...

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Western Catchment	0.444783	5.9	01Jan2020, 08:14	62.23
Northern catchment	0.558312	6.1	01Jan2020, 08:20	61.68
Eastern catchment	0.017206	0.3	01Jan2020, 08:06	63.12
Discharge Point	1.020301	11.7	01Jan2020, 08:16	61.94

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	10
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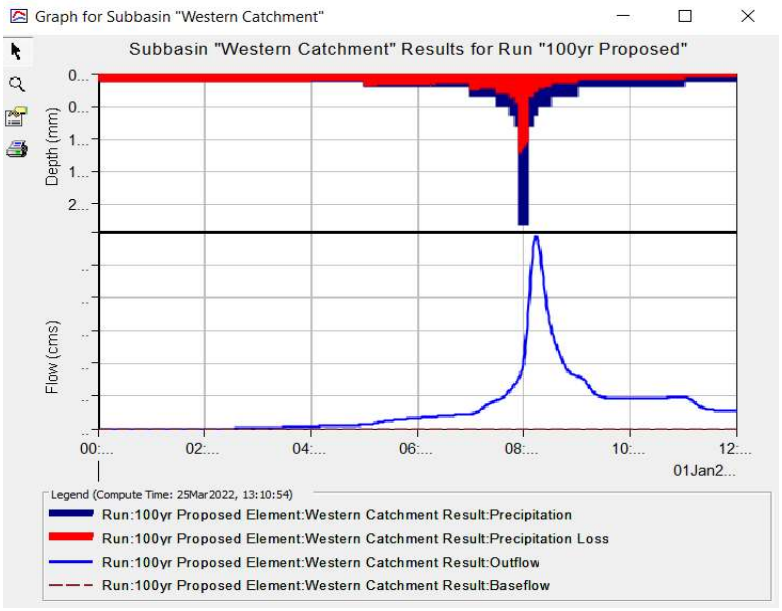
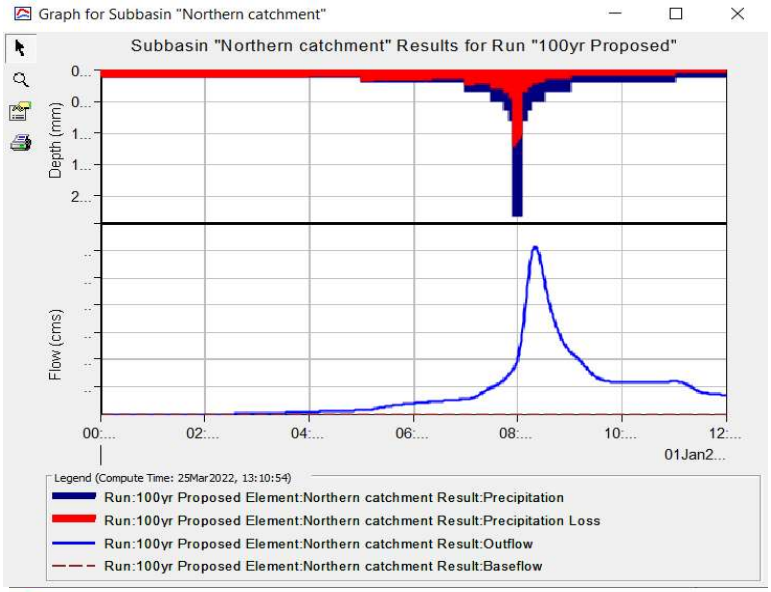
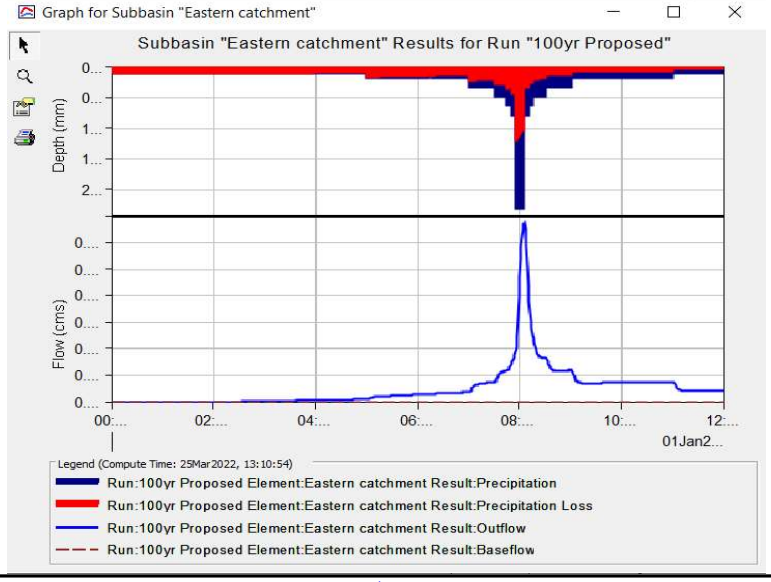
C.6 HEC-HMS Model & Results



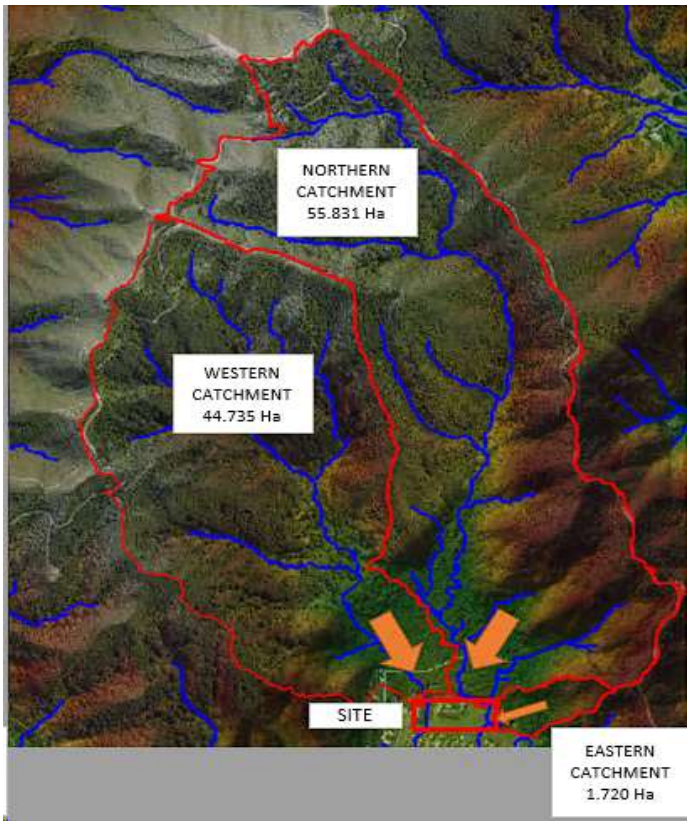




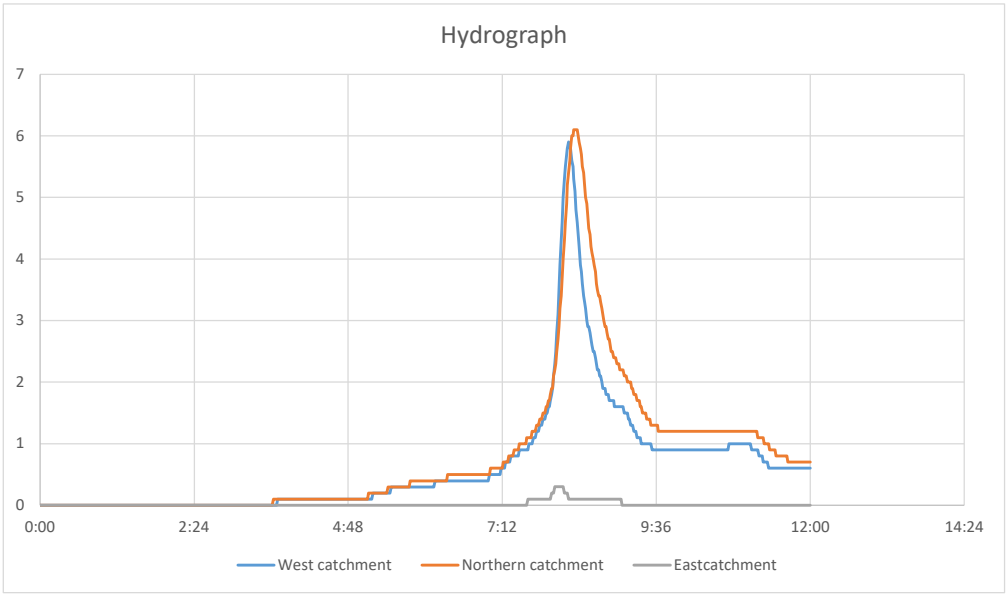
C.7 HEC-RAS Setup

Grid Size: 3m x 3m
Computation Interval: 0.5 sec
Manning: 0.07
Culvert blockage: Ex. Culvet 1050 (20%), Ex. Culvert 225 (50%), Prop. Culvert 525 (20%)

HEC-RAS Model Build:



100-yr Hydrograph to be used for HEC-RAS



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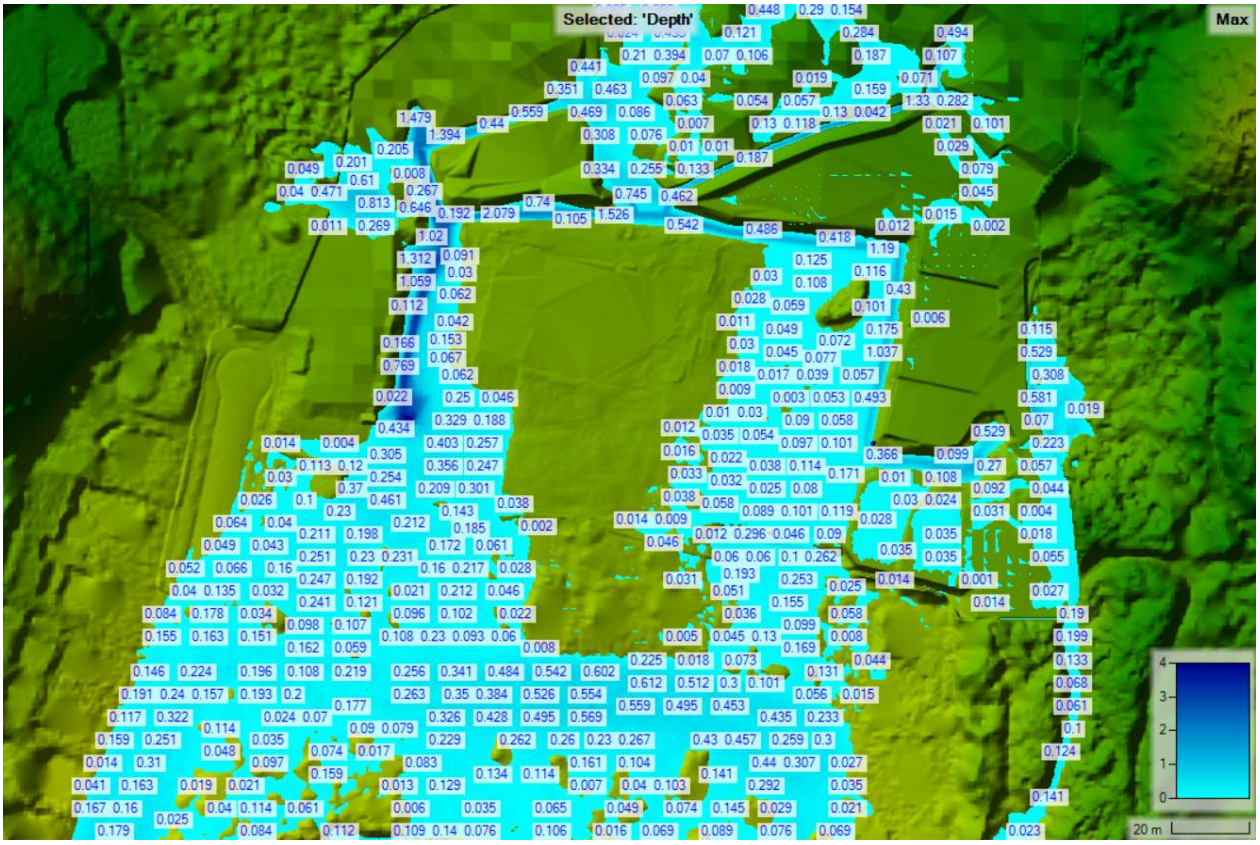
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 12
Description:	Flood Assessment	Designed:	PP	
Date:	29.03.2022	Checked:	AR	

C.8 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Depth



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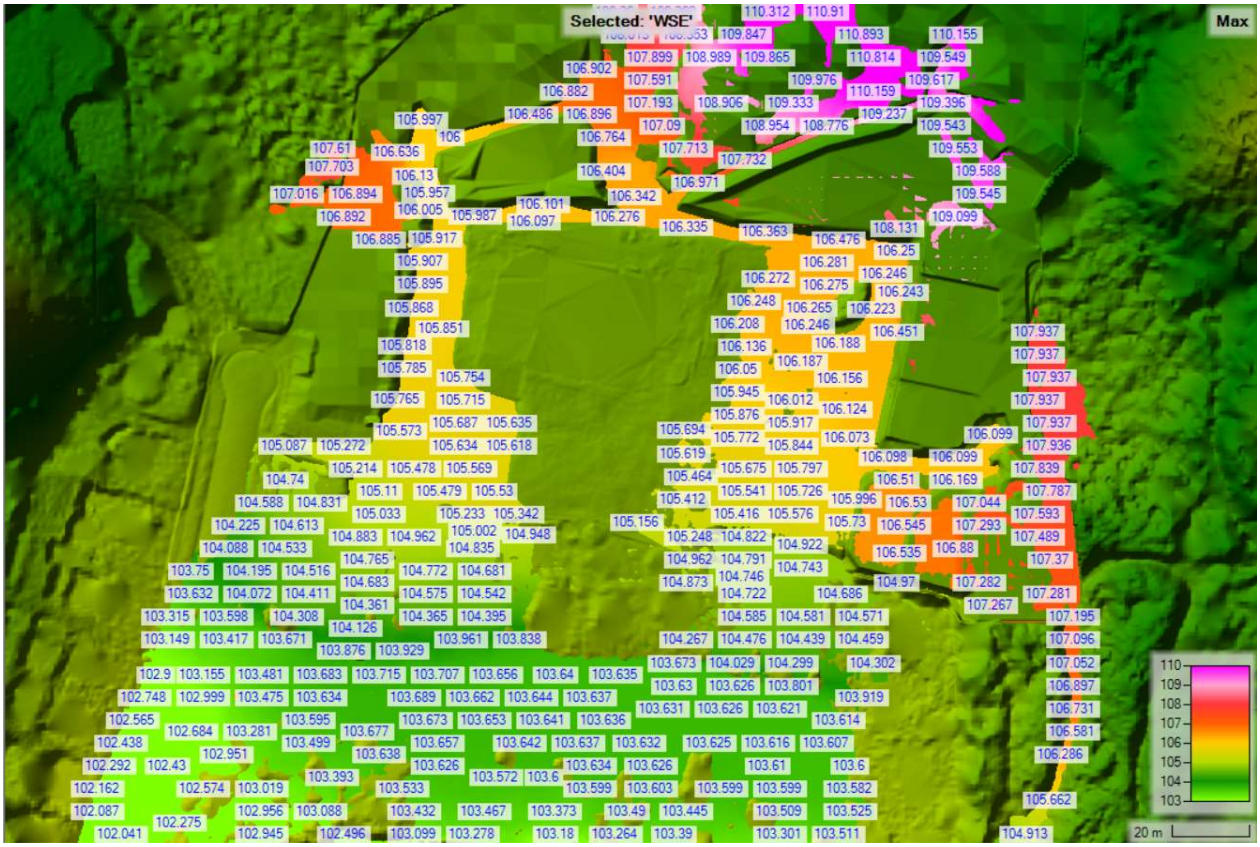
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	13
Description:	Flood Assessment	Designed:	PP		
Date:	29.03.2022	Checked:	AR		

C.9 HEC-RAS Results: 100-yr, Pre-Dev - Water Surface Elevation



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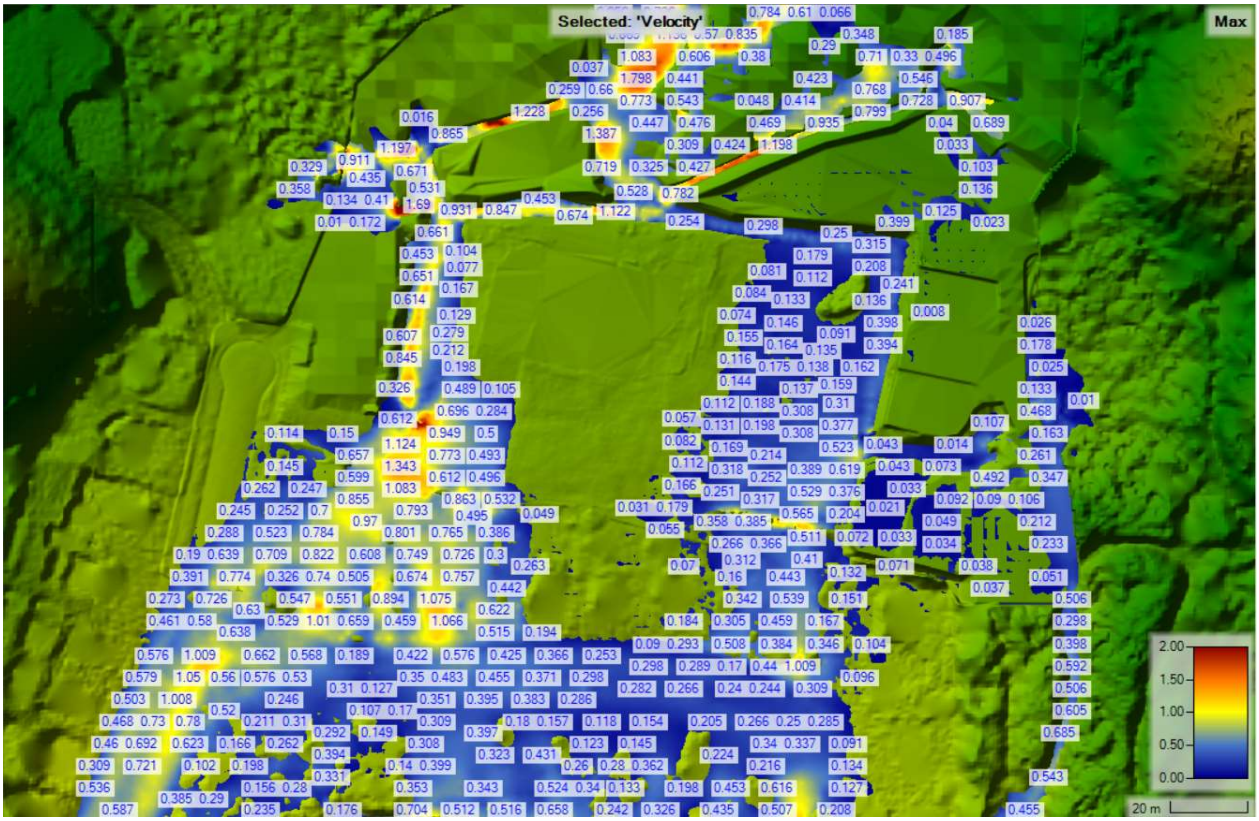
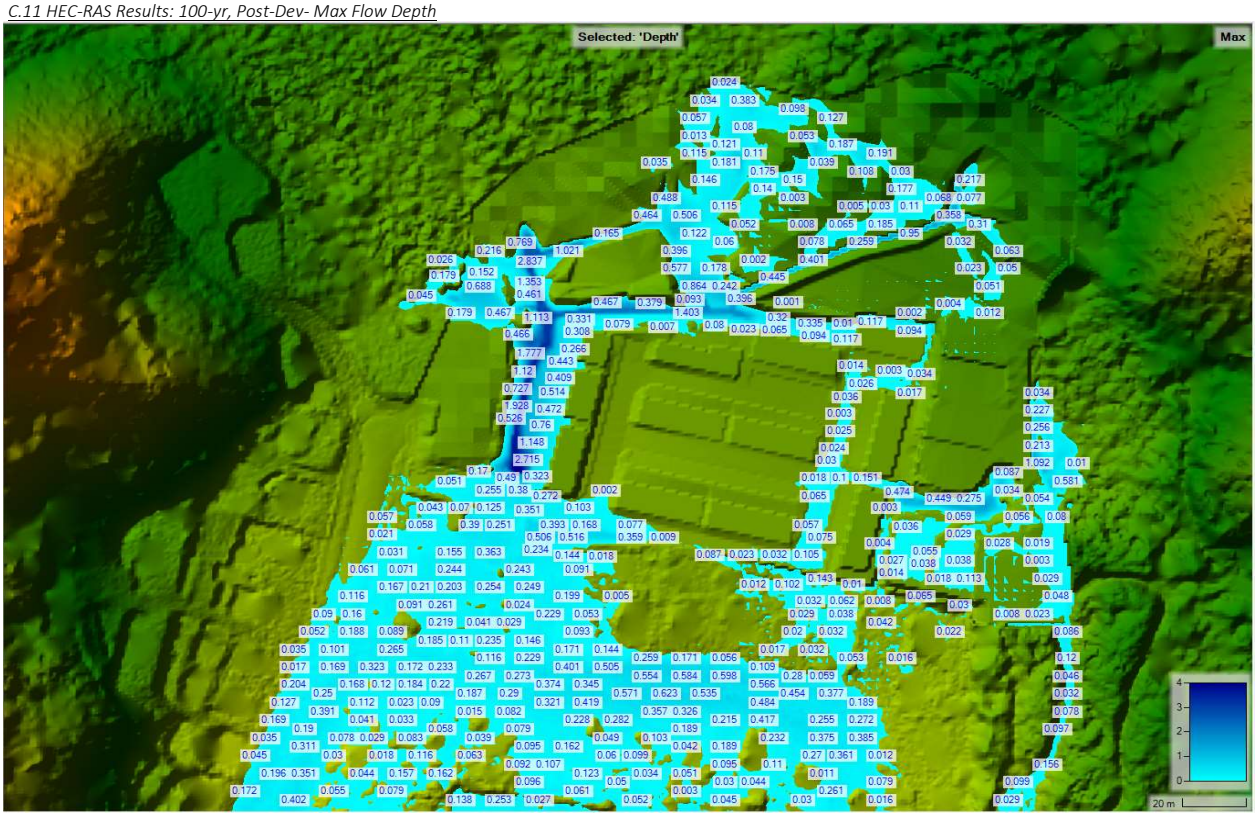
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 14
Description:	Flood Assessment	Designed:	PP	
Date:	29.03.2022	Checked:	AR	

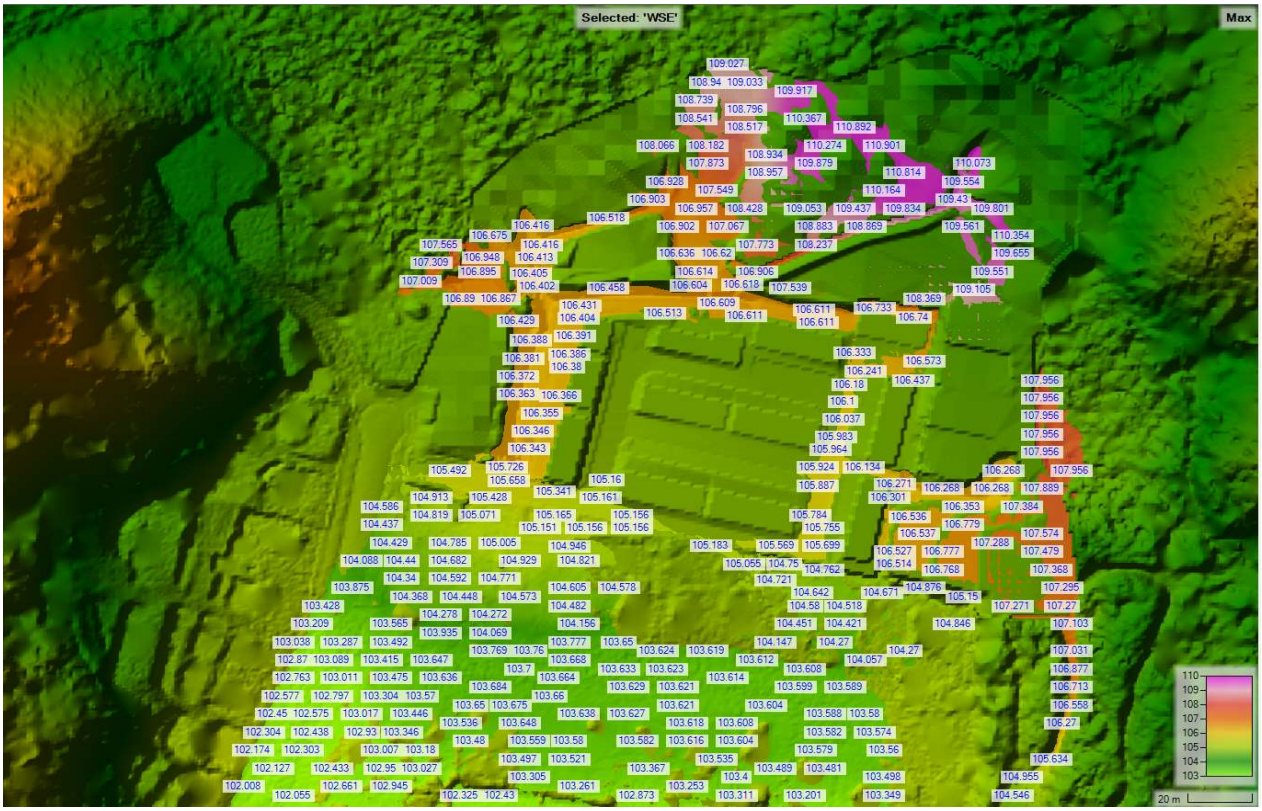
C.10 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Velocity



C.11 HEC-RAS Results: 100-yr, Post-Dev- Max Flow Depth



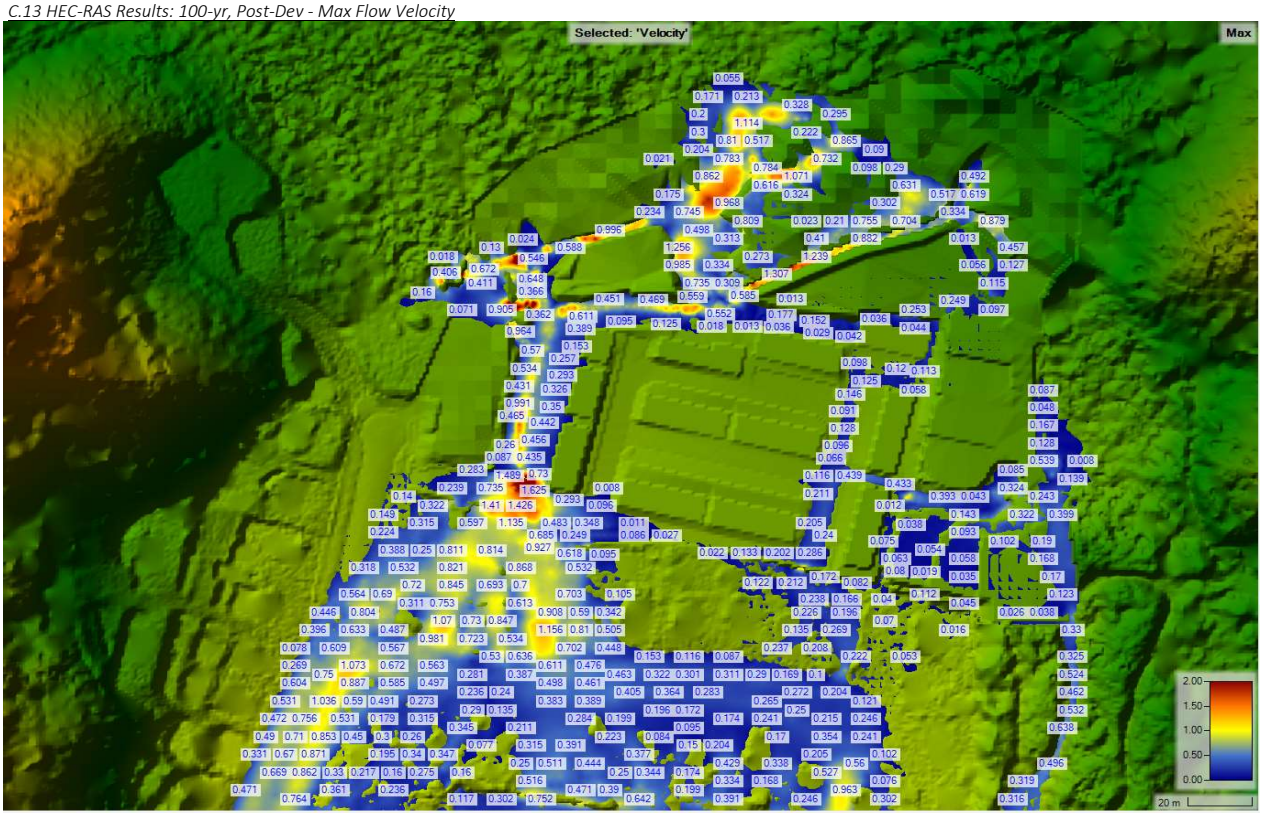
C.12 HEC-RAS Results: 100-yr, Post-Dev - Water Surface Elevation



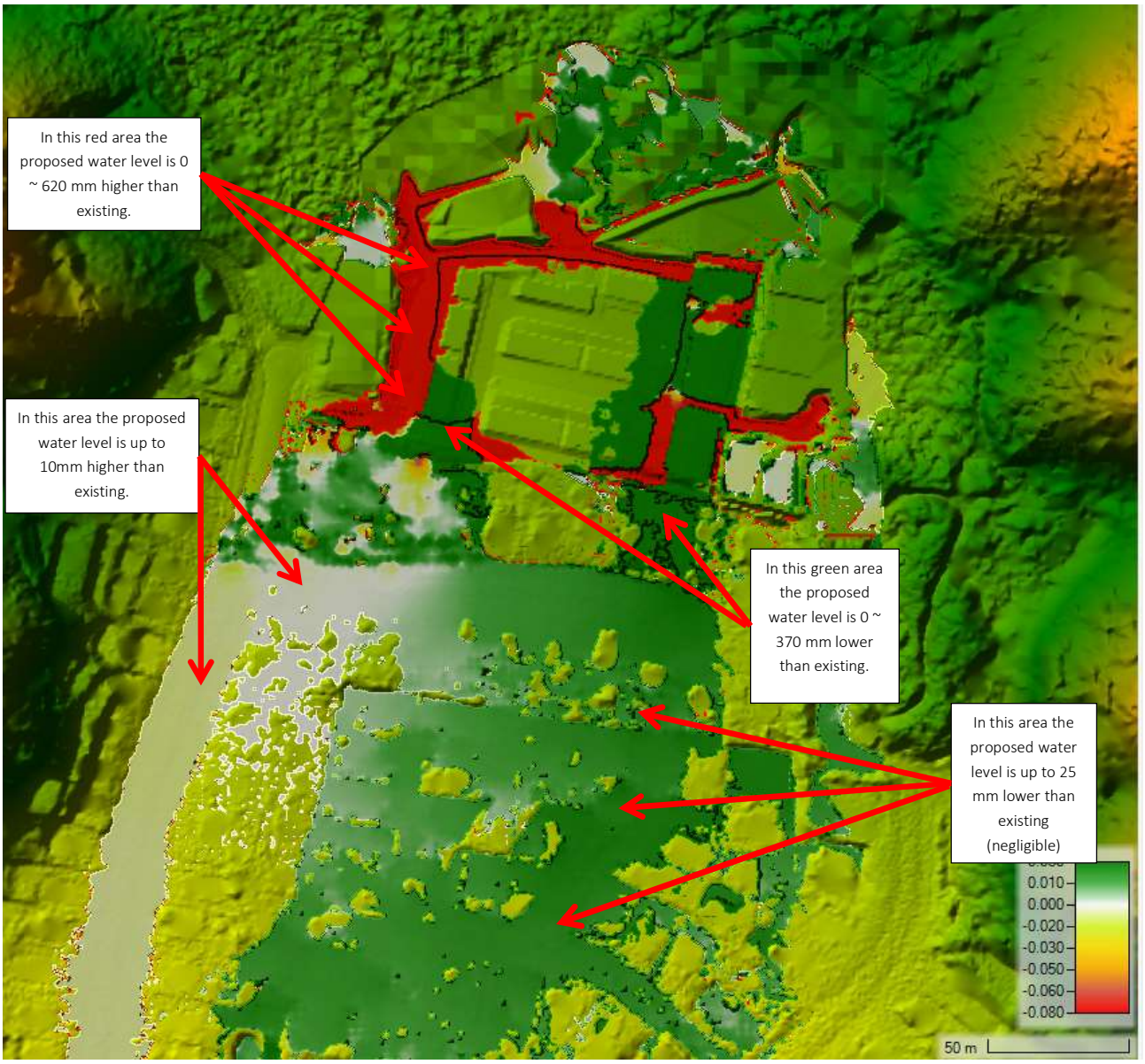
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 17
Description:	Flood Assessment	Designed:	PP	
Date:	29.03.2022	Checked:	AR	

C.13 HEC-RAS Results: 100-yr, Post-Dev - Max Flow Velocity



C.14 Flood Level Comparison Map (Existing Minus Post-Development)



From: [redacted]
To: [redacted]
Subject: FW: RM210328: 106 Mohaka ST
Date: Wednesday, March 2, 2022 2:47:14 PM
Attachments: image001.png
ATT00001.png
FW EXTERNAL RE 106 Mohaka Street.msg
RE EXTERNAL FW RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021.msg

---

HI [redacted]

I have been given the development at 106 Mohaka St to review and condition.

I see that you have been all over the modelling. Would it be possible, say next Thursday morning, to have a teams meeting to go through together??

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 1 March 2022 8:55 am
To: [redacted]@huttcity.govt.nz>
Subject: RE: RM210328: 106 Mohaka ST

Hi [redacted]

I just sent an email to [redacted] as I was told he might be processing. I had an enquiry from GW who are processing a related consent, who wanted confirmation that the on-site detention systems are considered suitable. Have replied to your comments below.

Cheers
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: [redacted] **M:** **W:** www.huttcity.govt.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 1 March 2022 8:41 AM
To: [redacted]@huttcity.govt.nz>
Subject: RM210328: 106 Mohaka ST

Hi [redacted]

I presume you are the planner looking after this project as I can see you have been included in various communications.

I have started a engineering review but have some questions of various aspects before I go too far.

- What is the status of the earthworks consent RM210168? For some reason when I look under that consent I cant find any documents.

Will send through approval docs shortly

- What is the status of consents with GWRC – earthworks, both diverting and filling a watercourse, wetland works

GW are requesting confirmation from HCC that on-site detention systems are suitable, which I think is for a stormwater consent. I think bulk earthworks may have already been approved by GW.

- I note 16th Dec 2021 WWL modellers questioned the modelling methodology – has anything happened post this?

Yes, this was resolved, have attached relevant email.

- Crucial aspects of the stormwater design and lot layout relies on consent from the owner(s) of adjoining property in Meremere St – what is the status of this?

They initially had written approval from the east abutting neighbour, however they are now seeking approval from a new owner on this boundary following completion of a subdivision.

Cheers

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]
To: [redacted]@envelope-eng.co.nz
Subject: FW: [EXTERNAL] RE: 106 Mohaka Street
Attachments: image001.png
image002.jpg
image003.jpg
image004.jpg
image005.png
image006.png
image007.jpg
image008.png
image009.png
image010.jpg
image011.jpg
image012.gif
image013.jpg
image014.jpg
image015.jpg

From: [redacted]
To: [redacted]
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Thursday, January 27, 2022 10:27:58 AM
Attachments: image002.jpg
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image016.jpg
image017.png
image018.png
image019.jpg
image020.png
image021.png
image022.jpg
image023.jpg
image024.gif
image025.jpg
image026.jpg
image027.jpg
P20-156-M01-RevB-RFI Response -COMPILED.pdf

Memo

To	Wellington Water	Date	17 January 2022
Attn.	[redacted]	Pages	4 + Attachments
From	[redacted]	Ref.	P20-156-M01-RevB
Re. //	RM210328 - 106 Mohaka Street – Wellington Water RFIs 16/12/2021, 23/12/2021 and 10/01/2022		

Dear [redacted]

This memo is in response to your 16 December 2021 information request, and subsequent emails on 23 December 2011 and 10 January 2022 in respect of the above application / development.

Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.

Response: The previously submitted calculations were guided by the HEC-HMS Technical Reference Manual for the estimation of curve number (CN) and initial abstraction (Ia) parameters. We have now updated the calculations to account for the CN and Ia parameters given in Appendix B of Wellington Water's Reference Guide for Design Storm Hydrology, as per files provided on 10/01/2022.

Additionally, as requested we have calculated time of concentration parameters based on an average between the Ramser-Kirpich and Bransby-Williams approaches, as per Section 2.5 of Wellington Water's Reference Guide for Design Storm Hydrology. Please find Revision C of the calculations attached.

The revised hydrological parameters used are summarised in the table below (red italic underlined numbers refer to values that were revised as part of this update):

Catchment	Catchment Area (Ha)	Curve Number (CN)	Longest Drainage Path (m)	Average Slope (%)	Time of Concentration Tc (min)	Initial Abstraction Ia (mm)
Western	44.48	*63*	1,133	10.8	*55.10*	*14.92*
Northern	55.83	*63*	1,666	10.0	*77.77*	*14.92*
Eastern	1.720	*63*	234	11.3	*20.82*	*14.92*

Table 1 – Summary Catchment Design Parameters

We note that while the curve number values are higher (with corresponding initial abstraction values being lower) the suggested time of concentration approach results in considerably higher times of concentration compared to those obtained based on the SCS method in our original calculation. This results in the revised peak flows being somewhat lower to those originally presented, hence demonstrating the original design was conservative.

Regarding hydraulic neutrality, we confirm that the stormwater design does account for on-site hydraulic neutrality for the 10- and 100-year ARI events, to keep post-development peak flows to pre-development levels. The infrastructure report, drawings and calculations have been submitted to council as part of the EPA application package.

Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may overestimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.

Response: Please note that a detailed topographical survey of the site and perimeter channels was carried out for purposes of the flood assessment, hence we can confirm that the channel geometry given in the flood model is accurate.

Additionally, as requested in the 23/12/0222 email, we have included two photos showing a typical representation of the channels around the site perimeter. These photos show bare channel sides and floor (despite the dense vegetation overhead), suggesting a relatively low level of hydraulic resistance which is in line with the design assumptions and the assumed Mannings value of 0.07.

Further, I confirm that the condition of the existing perimeter channels will not be modified as part of the proposed development (i.e. they will remain in the same condition post-development).

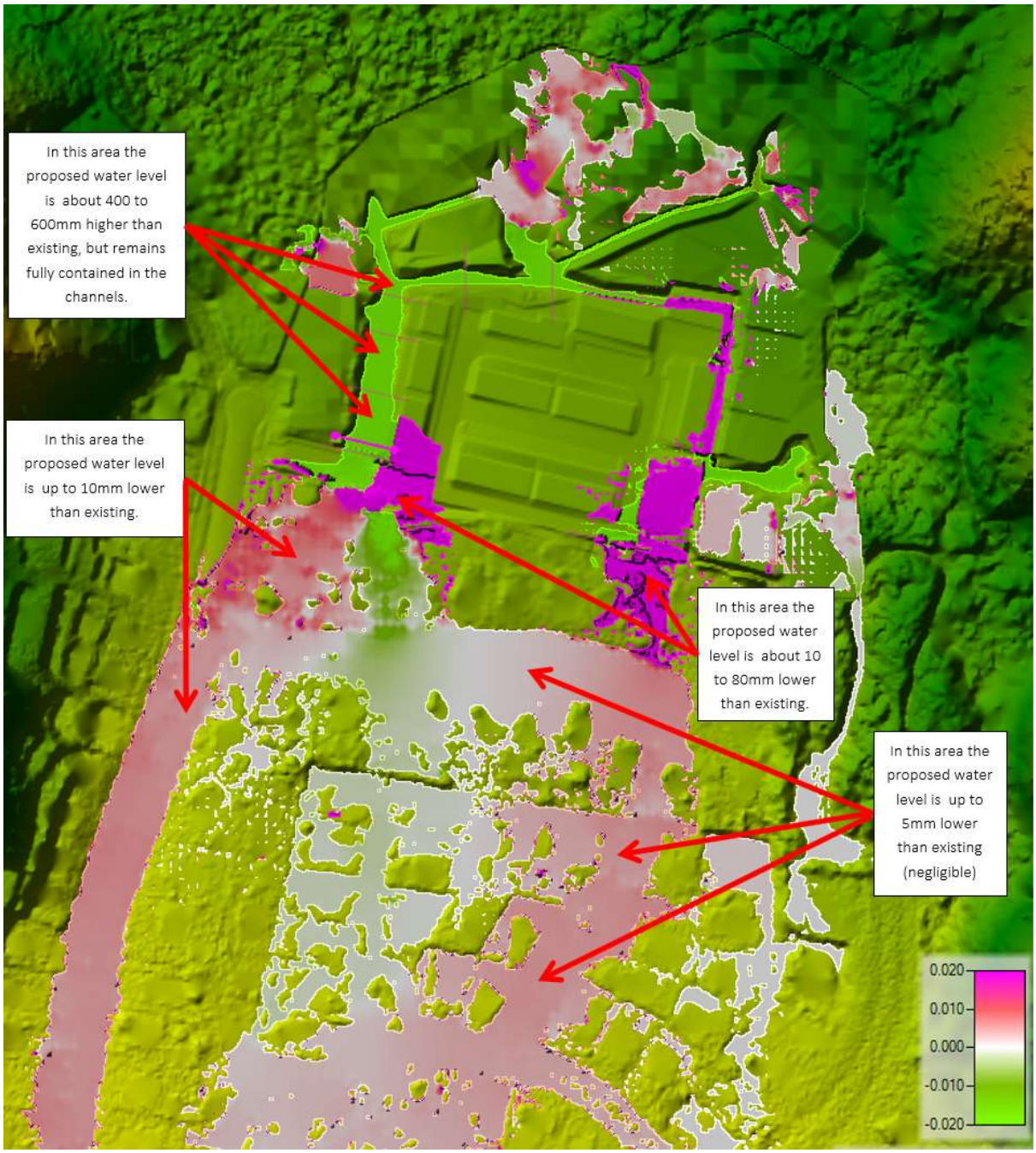
Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

Response: We have updated the previously supplied Please pre and post development 100yr ARI water surface elevation, depth and velocity maps in sheets 12 to 17 of the calculations, and a flood level surface comparison map in sheet 18 (reproduced again in the figure below).

The post development flood assessment is based on surface runoff only and assumes that all piped systems (including the proposed on-site stormwater attenuation device) are 100% blocked, which is conservative.

As part of the proposed works, the existing crossing over the stream will be raised in level, and this will result in additional storage within the existing channels during the 100-year ARI event. While this causes water levels to rise behind the culvert, the flows will remain fully contained within the channels, thereby avoiding any adverse impacts on adjacent properties.

Downstream of the development, the revised 100yr ARI flood levels are predicted to decrease at every location, typically by approximately 5-10mm but up to about 80mm adjacent to the southern fringe of the site, as shown below.



In conclusion, the revised analysis again shows that the proposed development will result in “no more than minor” effects with regards to flooding (in fact likely to result in net positive results given the predicted reduced flow depth downstream), and especially considering that any benefits likely to arise from the proposed on-site attenuation is ignored in the analysis.

Trust this meets your requirements however please do not hesitate to contact me if you'd like to discuss or if you require any further information.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
AR & Associates Ltd

Appendix A – Revised Calculations

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106 Mohaka Street, Wainuiomata, Lower Hutt

Flood Assessment

CONTENTS:

Reason for this Revision: Wellington Water Queries

Calculations By:	[redacted]
Checked By:	AR
Ref:	P20-156-Clc02
Date:	17.01.2022
Revision:	C

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 1
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17 01 2022	Checked:	AR	

A Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1 06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821) AR & Associates Ltd (ARAL) has been requested to assist in the flood modelling and report

This document presents the flood modelling for the post development scenario

B Basis of Design

The design presented herein is based on Wellington's Land Development and Subdivision Code of Practice and associated documents, for the contributing catchment assuming maximum probable development (MPD) conditions The hydrology parameters are selected based on guidance from Wellington Water's Reference Guide for Design Storm Hydrology

C Stormwater

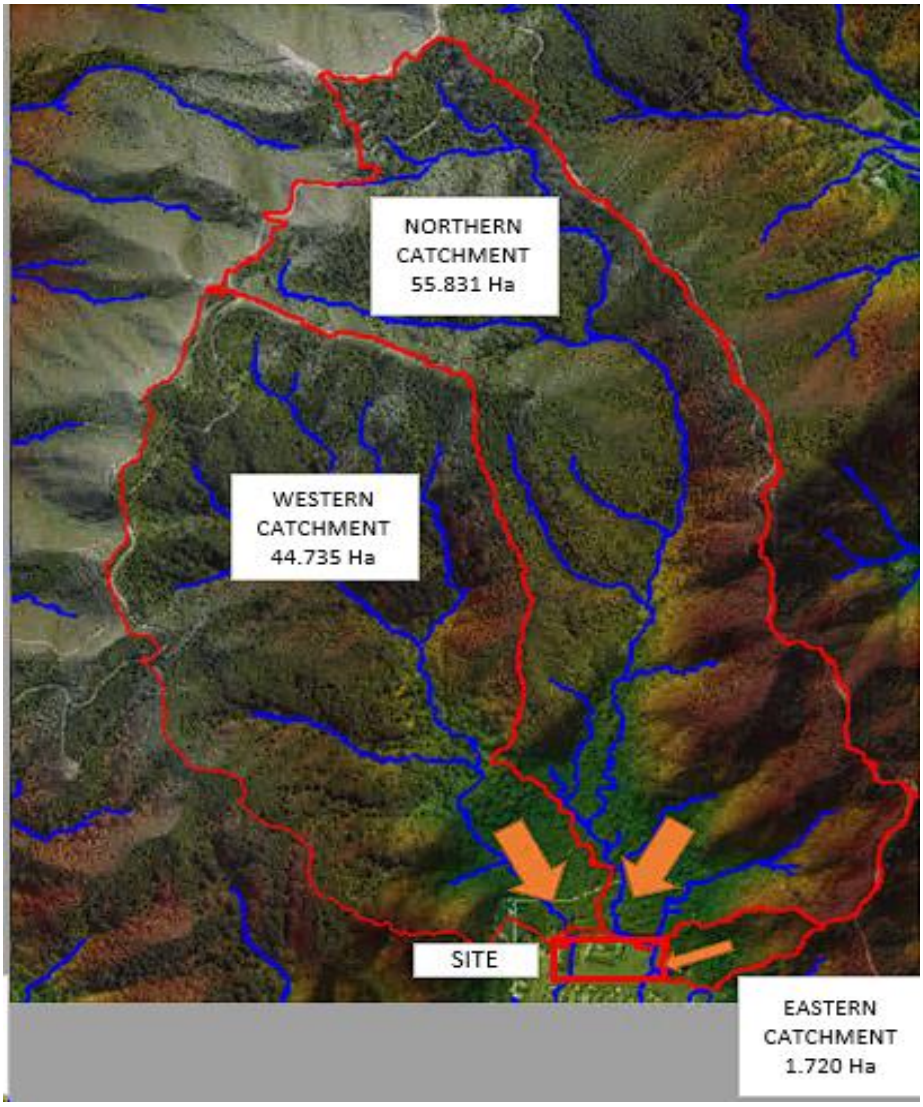
C.1 Flood Management Design Philosophy

The area is under the influence of the unnamed catchments as shown below ARAL has undertaken an independent hydrology and hydraulics analysis using HEC-HMS and HEC-RAS to determine the peak flows and flooding extents

The design philosophy focuses on retaining the existing topography as much as possible and applying a low impact design (LID) approach to maintain pre-development hydrology and flows, and minimise adverse effects on the environment and neighbouring properties which may result from the development

This calculation sheet will cover the 100-year peak flows and flood mapping regarding max water depth, max water surface level, and max water velocity for an MPD condition

The 100yr Catchments showing the site location are shown below



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	2
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17 01 2022	Checked:	AR		

C.2 Design Assumptions and Parameters

Climate Change:

The SCS Curve Number method was used with the HEC-HMS modelling software to calculate the amount of runoff from a rainfall event The 1% Annual Exceedance Probability (AEP) or 100-year Average Recurrence Interval (AR) event was assessed for the flood analysis An RCP6 0 for the year 2081-2100 was used for the climate change factor from HIRDS v4

**** Nested Storm rainfall profile (12-hour storm duration is used for this assessment)**

RCP6 0 for the period 2081-2100(Depth, mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	
1.58	0.633	8.29	11.3	13.6	19.1	26.7	44.4	59.4	77.4	
2	0.5	9.16	12.4	15	21.1	29.5	48.9	65.4	84.8	
5	0.2	12.2	16.5	19.9	27.8	38.8	64.1	85 5	110	
10	0.1	14.5	19.5	23.6	32.9	45.8	75.4	101	130	
20	0.05	16.9	22.7	27.4	38.1	53.1	87.2	116	149	
30	0.033	18.3	24.7	29.7	41.4	57.5	94.3	125	161	
40	0.025	19.4	26.1	31.4	43.7	60.6	99.5	132	169	
50	0.02	20.2	27.2	32.8	45.5	63.2	103	137	176	
60	0.017	20.9	28.2	33.9	47	65.2	107	142	182	
80	0.012	22.1	29.7	35.7	49.5	68.6	112	148	190	
100	0.01	22.9	30.8	37	51.4	71.1	116	154	197	
250	0.004	26.6	35.6	42.8	59.2	81.8	133	176	225	

Curve Numbers:

	CN	
Upstream undeveloped catchments	63	Based on Appendix B or Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	98	

Initial Abstraction:

The Initial Abstraction parameter is estimated as 0 1 x S, as per Wellington Water's Reference Guide for Design Storm Hydrology, as follows:

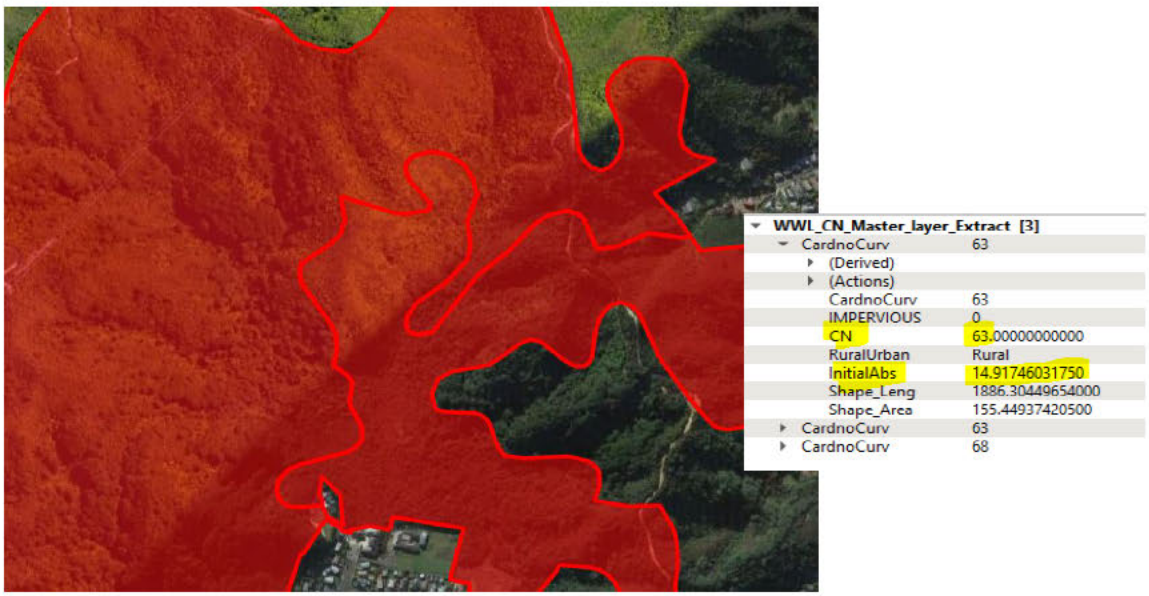
	Ia	
Upstream undeveloped catchments	15	Based on Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	0	

Terrain Data:

- Wellington Lidar 1m DEM (2013-2014, LINZ), Projection: NZGD / Wellington 2000, Vertical Datum: NZVD2016
- Existing survey completed by Cuttriss, Surveyors, Engineers, Planners Ltd, 11 2020
- Proposed Terrain design for project site by AR Associates Ltd
- Site scheme plan, Moore Design, 23 12 20

Proposed Plan:

	Max Coverage	Average MPD Impervious	
Pre-Development	0%	0%	
Post-Development	65%	70%	<- Assumed



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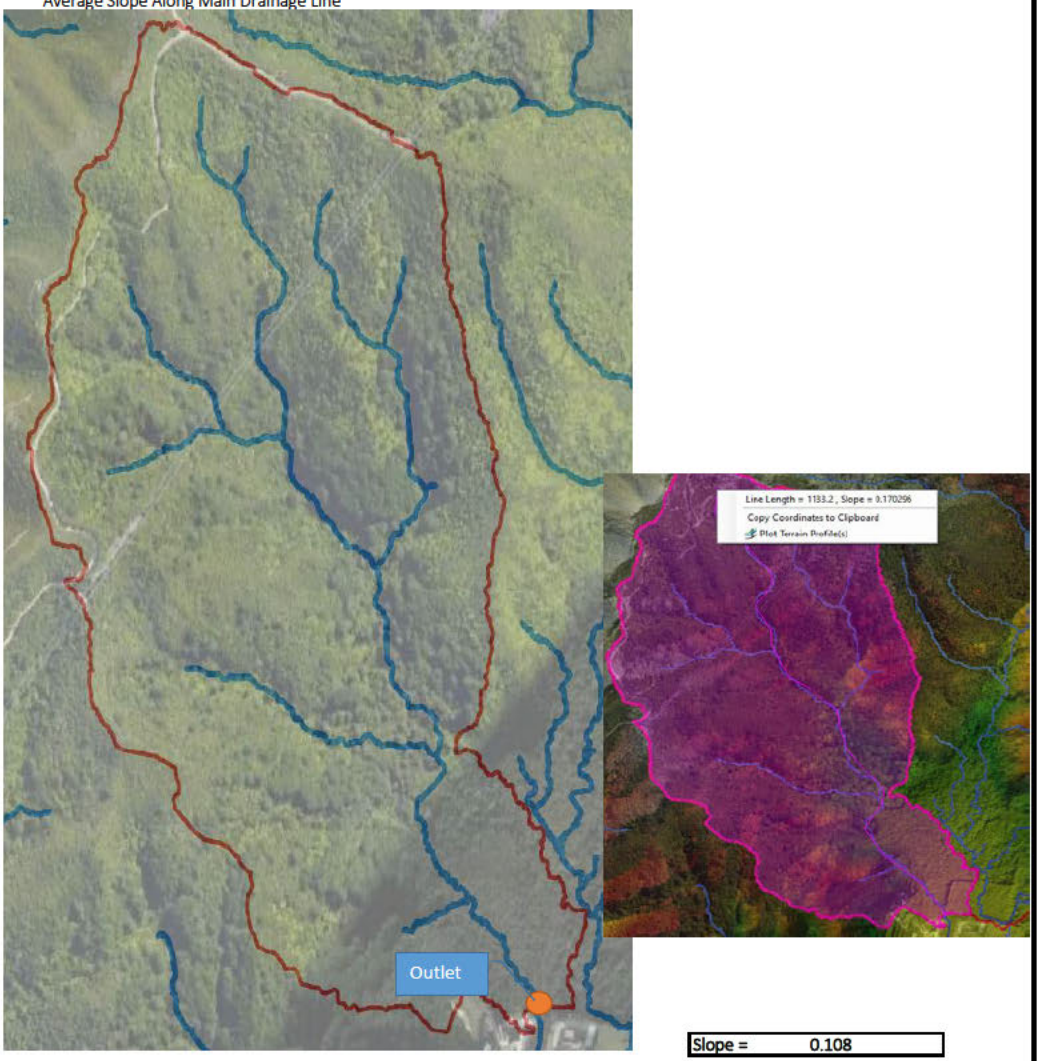
CALCULATION SHEET

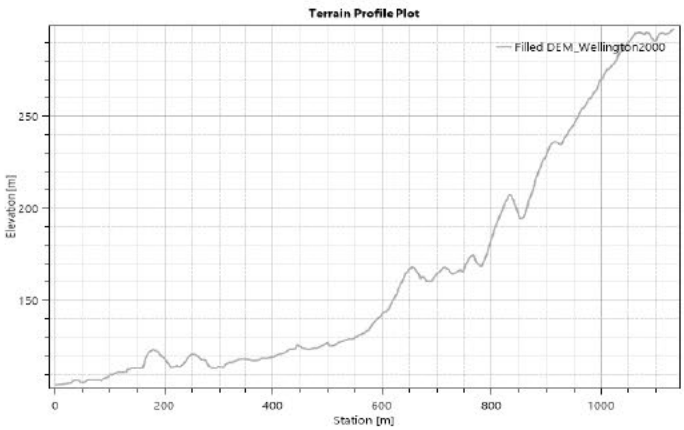
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	3
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

C.3 Catchment Analysis - Western Catchment

Average Slope Along Main Drainage Line



Slope =	0.108



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	4
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

Catchment Area

Total	444783	m2
	0.444783	km2
	44.4783	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.13	From above
Catchment slope Sc (equal area method)	0.108	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.45	(TP108)
Tc (min)	27.26	
Lag time (min)	18.17	
Tc (min)	10.32	**(Ramser Kirpich Tc)**
Lag time (min)	6.88	
Tc (min)	99.88	(Bransby Williams Tc)
Lag time (min)	66.59	
Average(min)	55.10	
Lag time (min)	36.73	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		44478	10.0%
CN (Mountainous)	63		400305	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

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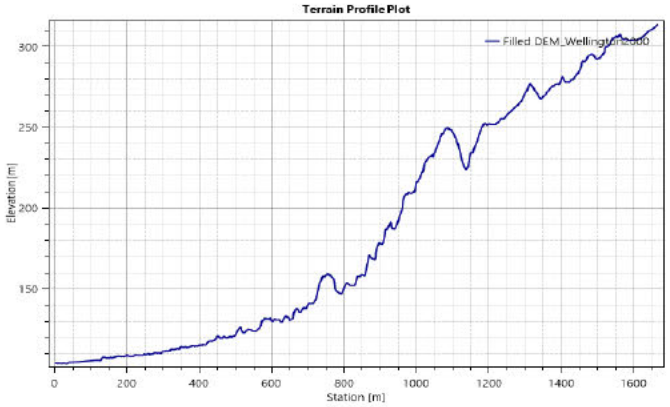
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	5
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		

C.4 Catchment Analysis - Northern Catchment

Average Slope Along Main Drainage Line

Slope = 0.0998



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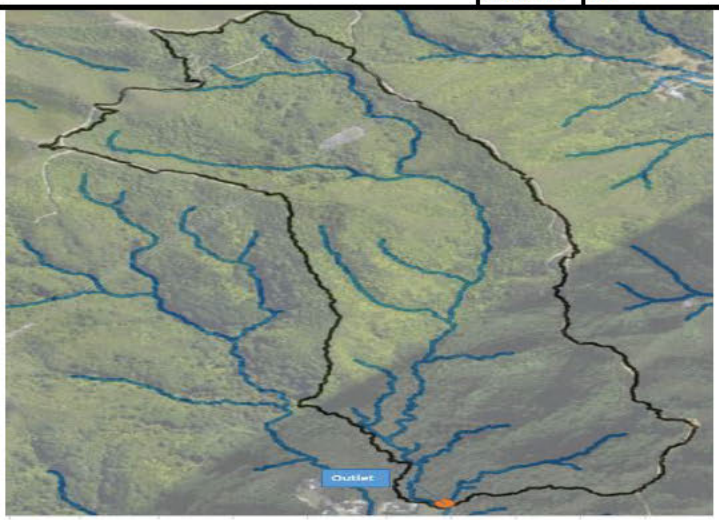
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	6
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		



Catchment Area

Total	558312	m2
	0.558312	km2
	55.8312	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.67	From above
Catchment slope Sc (equal area method)	0.0998	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.60	
Tc (min)	36.02	
Lag time (min)	24.01	
Tc (min)	14.33	**(Ramser Kirpich Tc)**
Lag time (min)	9.55	
Tc (min)	141.22	(Bransby Williams Tc)
Lag time (min)	94.15	
Average(min)	**77.77**	
Lag time (min)	51.85	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		55831.2	10.0%
CN (Mountainous)	63		502480.8	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

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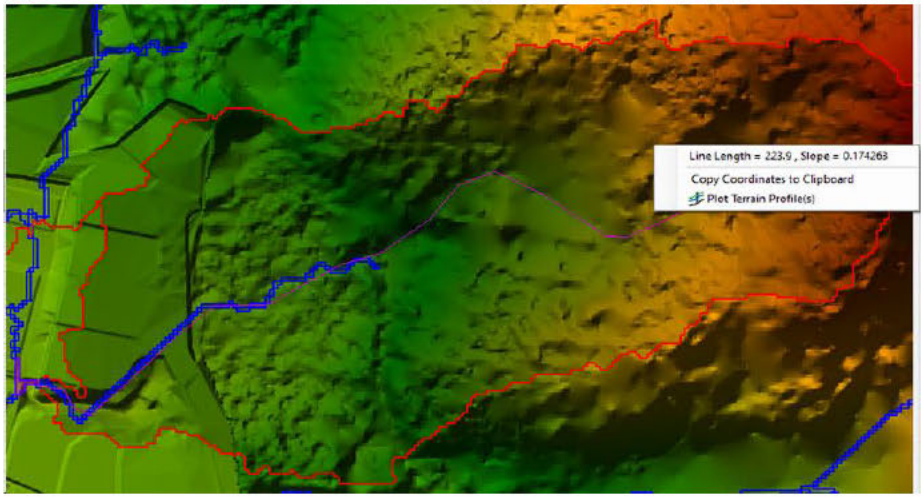
CALCULATION SHEET

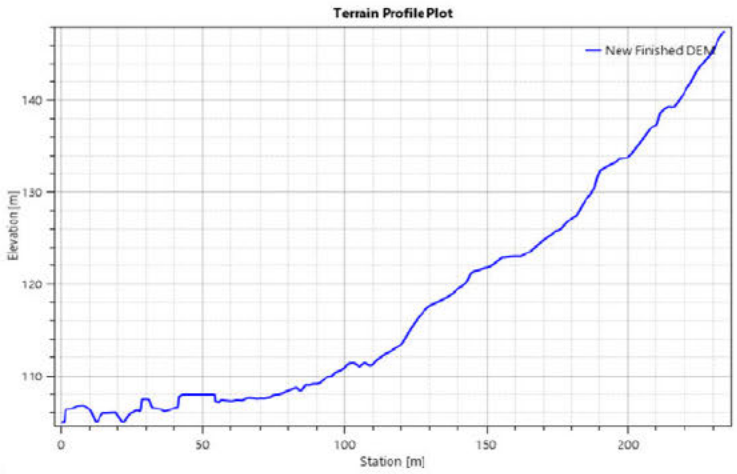
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	7
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17 01.2022	Checked:	AR		

C.5 Catchment Analysis - Eastern Catchment

Average Slope Along Main Drainage Line



Slope = 0.1127



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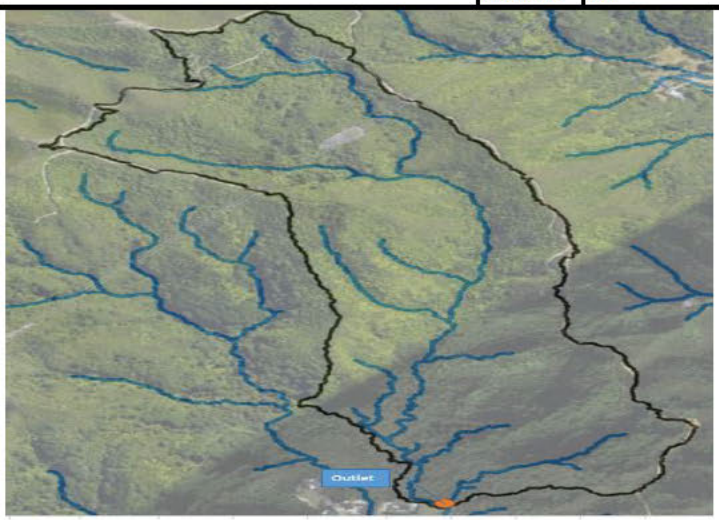
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	8
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01.2022	Checked:	AR		



Catchment Area

Total	17206	m2
	0.017206	km2
	1.7206	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	0.23	From above
Catchment slope Sc (equal area method)	0.1127	From above
Runoff factor (CN/(200-CN))	0.46	From below
Tc (hr)	0.17	
Tc (min)	10.20	
Lag time (min)	6.80	
Tc (min)	3.02	**(Ramser Kirpich Tc)**
Lag time (min)	**2.01**	
Tc (min)	38.62	(Bransby Williams Tc)
Lag time (min)	25.75	
Average(min)	**20.82**	
Lag time (min)	13.88	

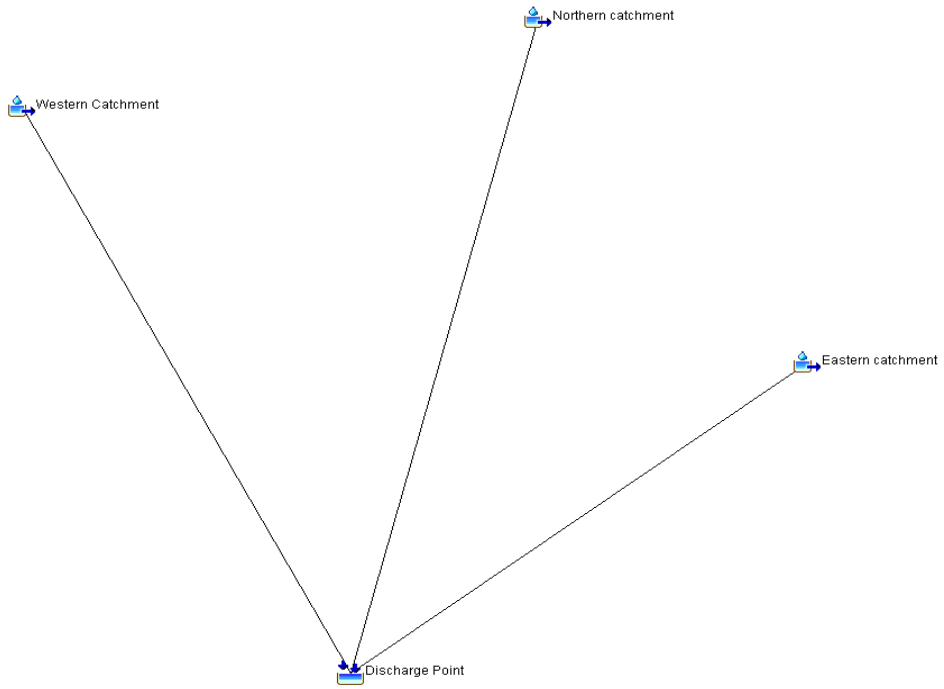
Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	63		1720.6	10.0%
CN (Mountainous)	63		15485.4	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**63.0**	Assuming	100%	mountainous
Storage (mm)	149			
Ia (mm) (=0.1S)	**15**			

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	9
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17 01.2022	Checked:	AR	

C.6 HEC-HMS Model & Results



Ramser

Project: P20-156-WWL Simulation Run: 100yr Proposed

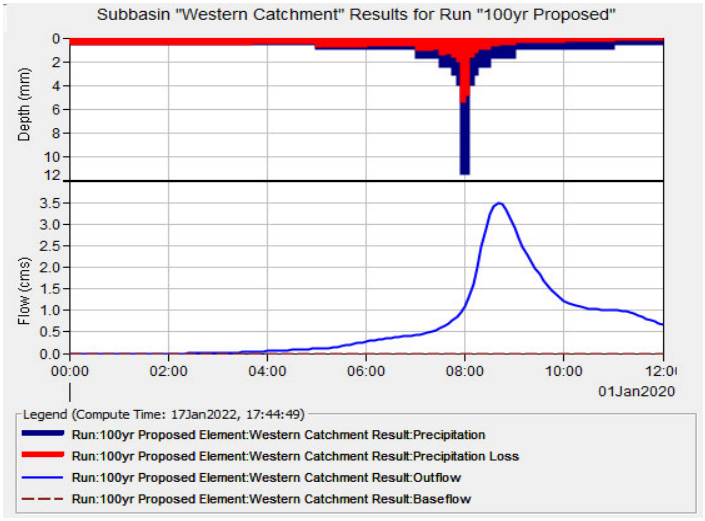
Start of Run: 01Jan2020, 00:00
End of Run: 01Jan2020, 12:00
Compute Time: 17Jan2022, 17:44:49

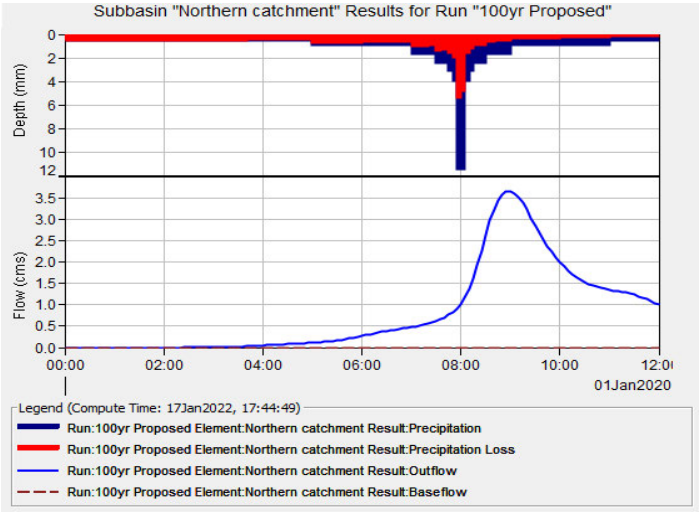
Basin Model: 100yr Proposed
Meteorologic Model: 100yr +CC
Control Specifications: 24hr

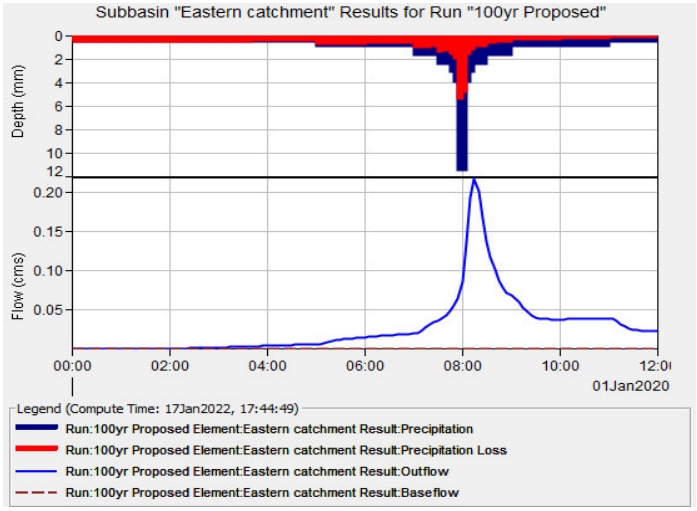
Show Elements: All Elements | Volume Units: (•) MM ( ) 1000 M3 | Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Western Catchment	0.444783	3.5	01Jan2020, 08:40	63.26
Northern catchment	0.558312	3.7	01Jan2020, 09:00	61.08
Eastern catchment	0.017206	0.2	01Jan2020, 08:15	65.86
Discharge Point	1.020301	7.0	01Jan2020, 08:50	62.11

C.6 HEC-HMS Model & Results







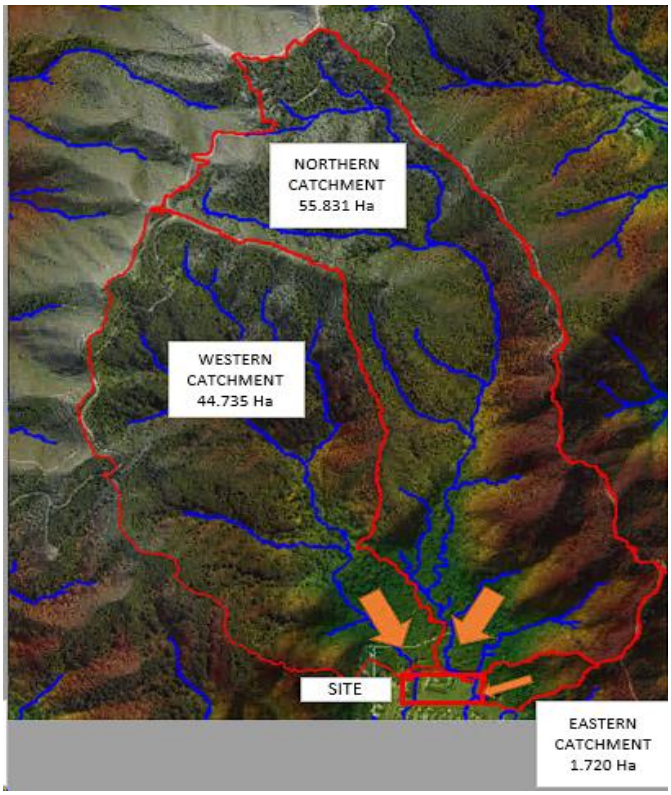
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 11
Description:	Flood Assessment	Designed:	[redacted]	
Date:	17.01.2022	Checked:	AR	

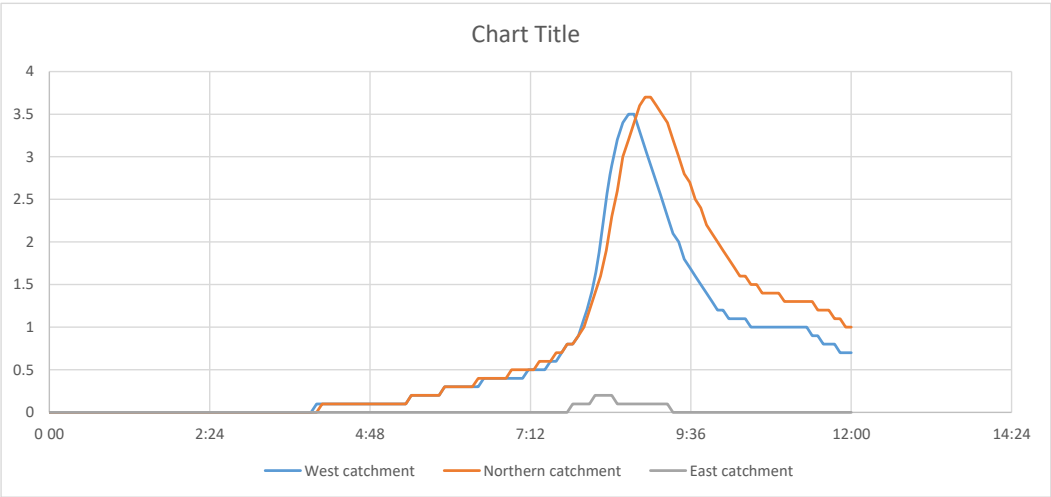
C.7 HEC-RAS Setup

Grid Size: 2m x 2m
Computation Interval: 0 5 sec

HEC-RAS Model Build:



100-yr Hydrograph to be used for HEC-RAS



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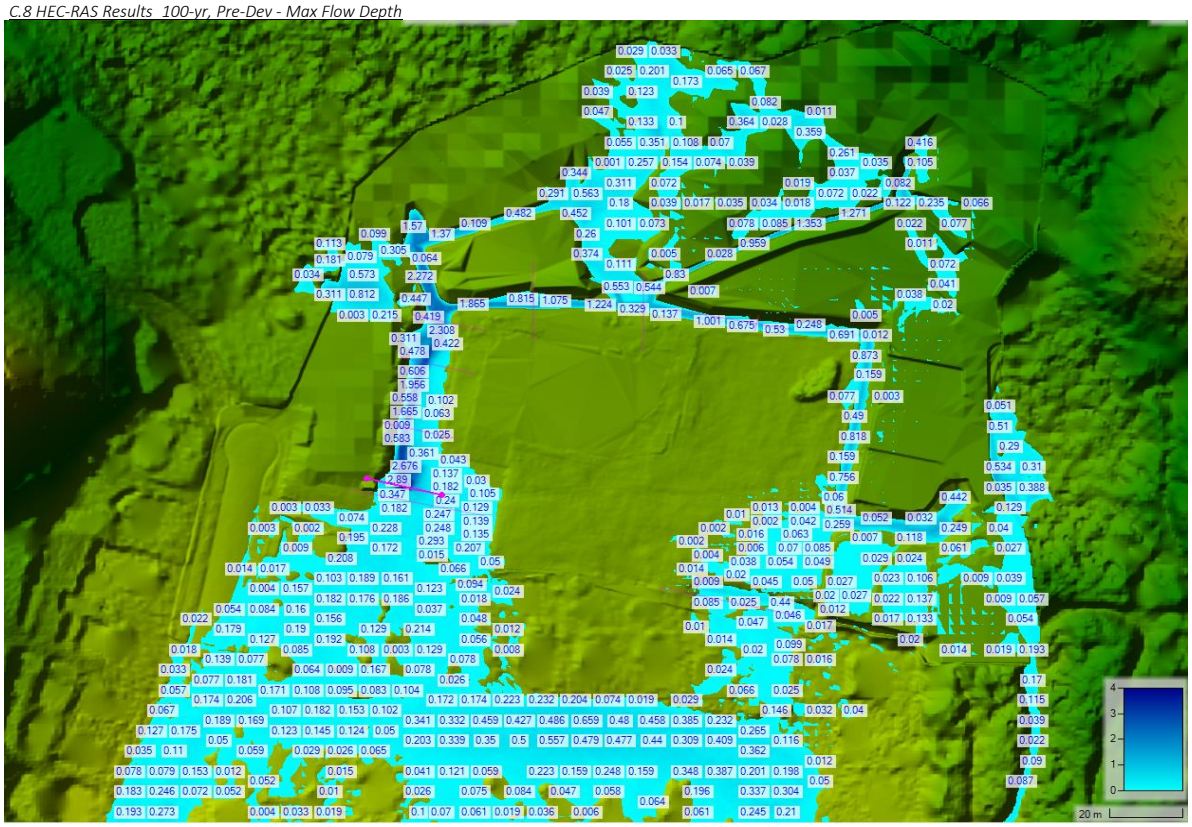
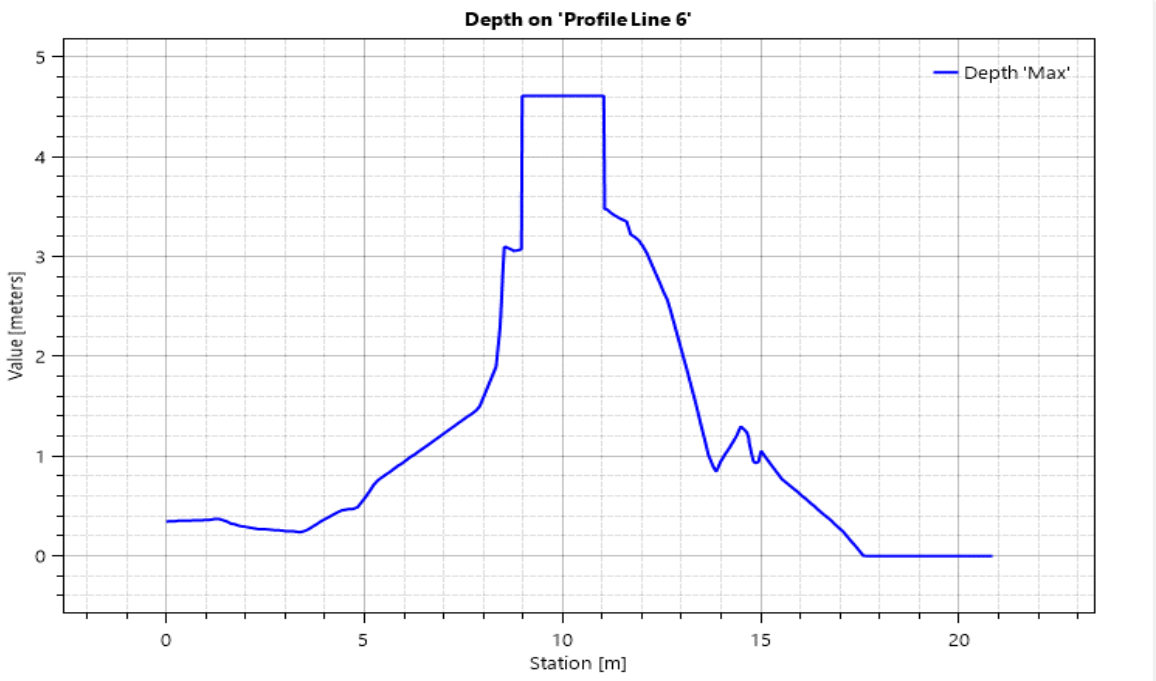
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	12
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.8 HEC-RAS Results 100-yr, Pre-Dev - Max Flow Depth



Cross Line: Water Depth Profile (Left -> Right)

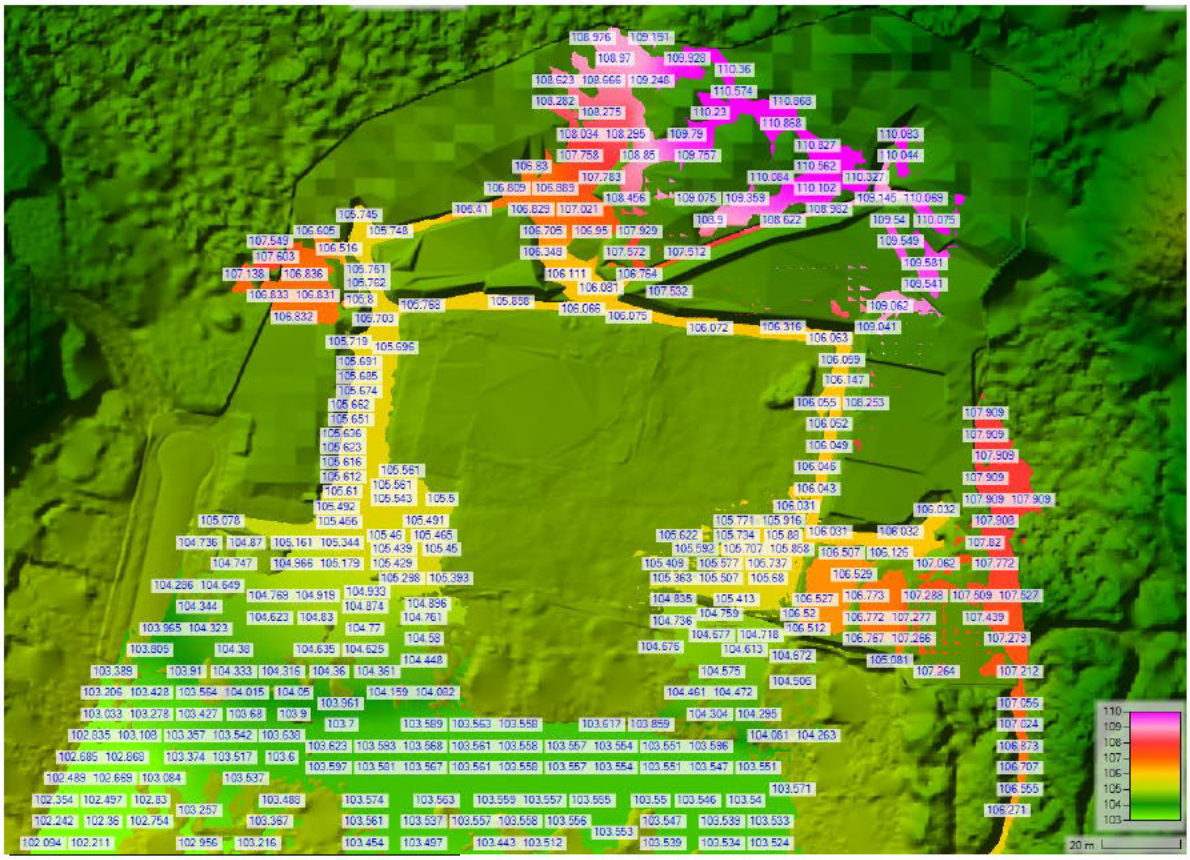


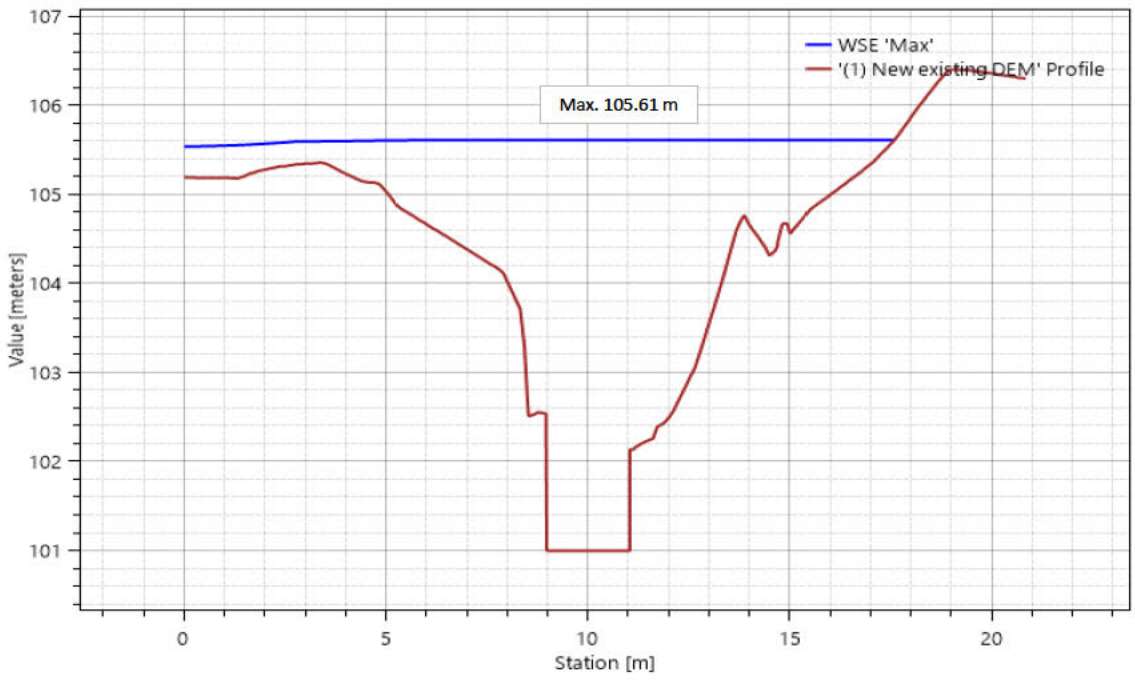
AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	13
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.9 HEC-RAS Results 100-yr, Pre-Dev - Water Surface Elevation





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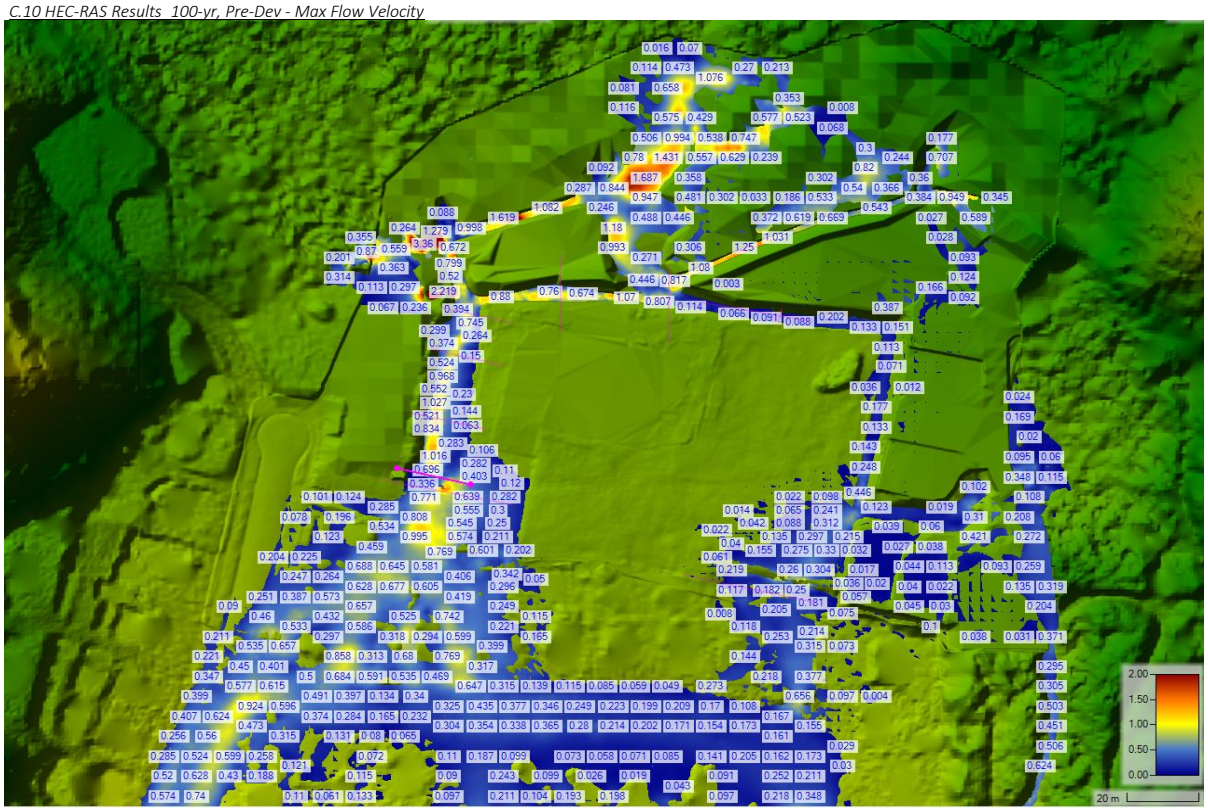
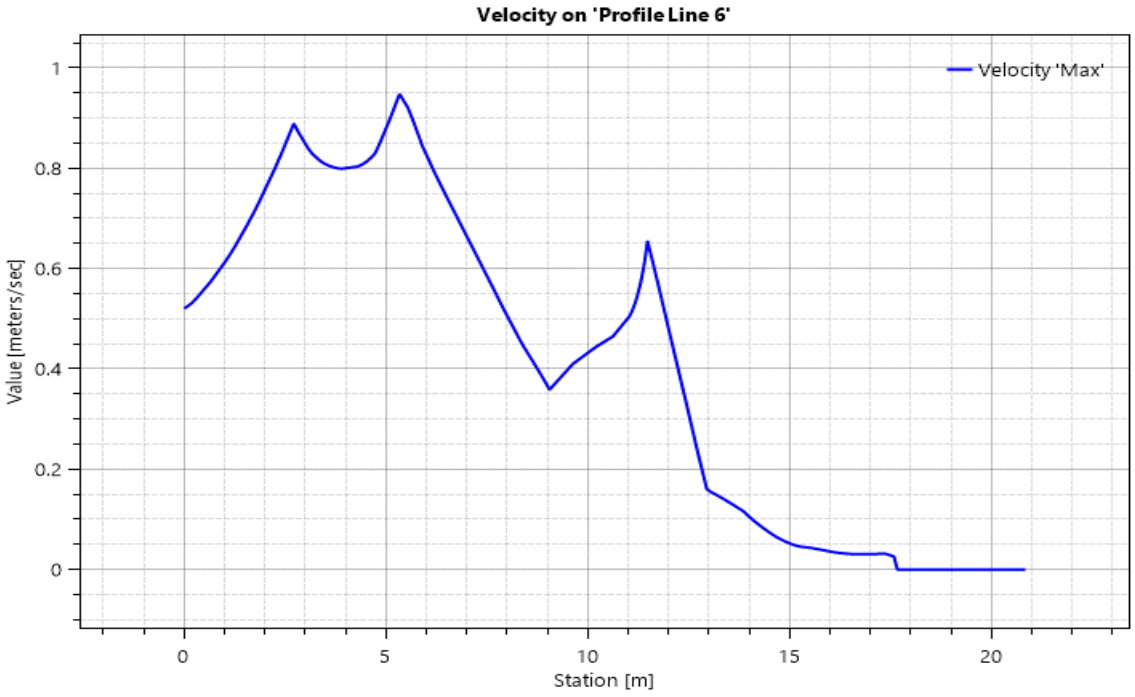
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	14
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.10 HEC-RAS Results_100-yr, Pre-Dev - Max Flow Velocity



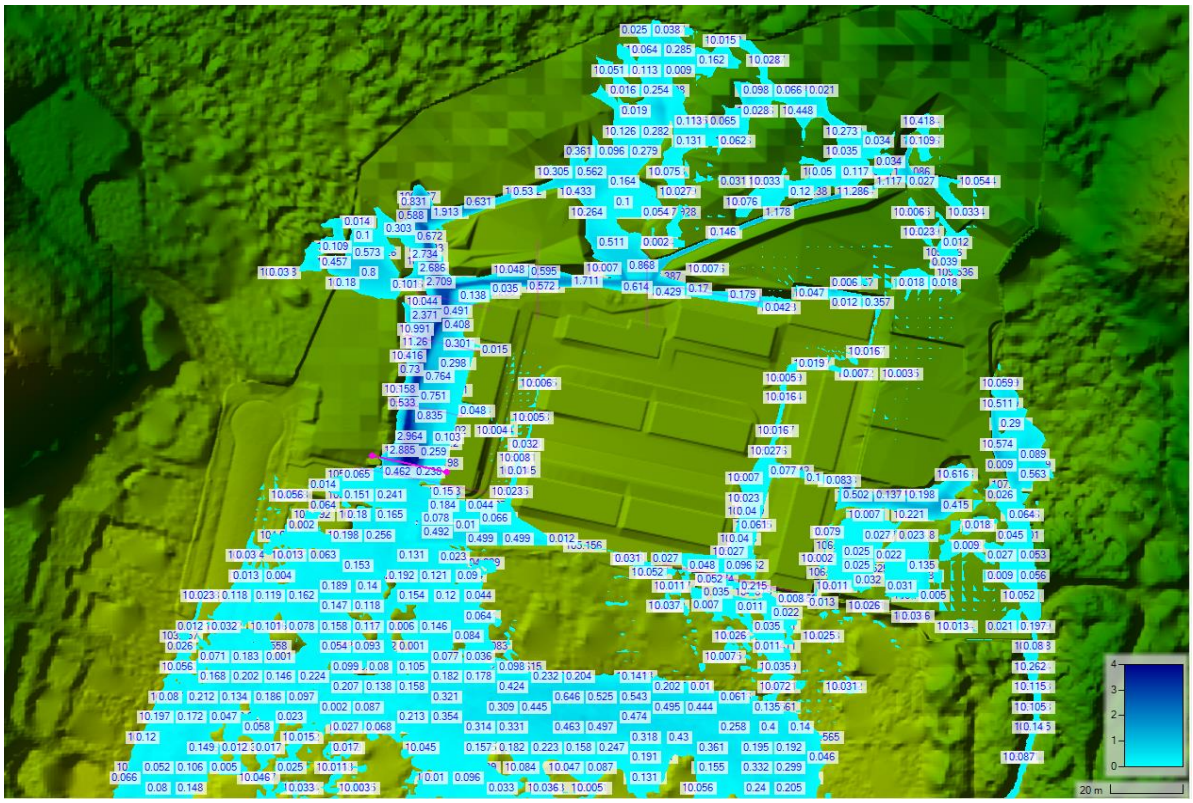
Cross Line: Max. Velocity Profile (Left -> Right)



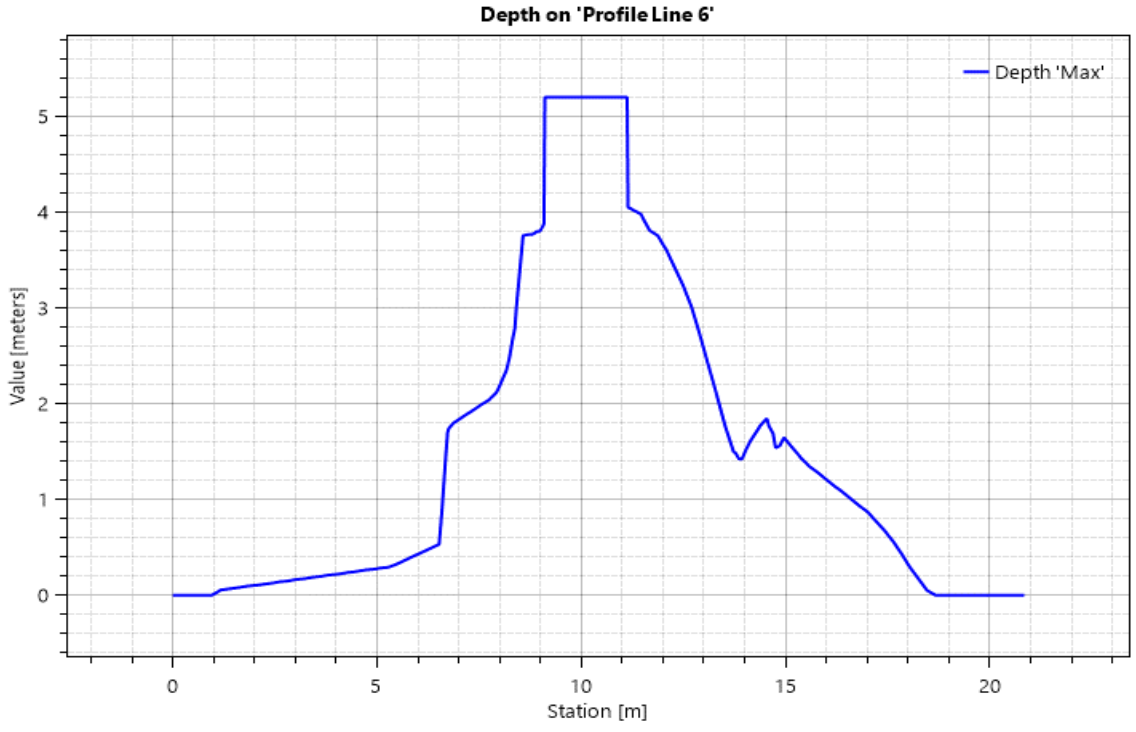
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	15
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

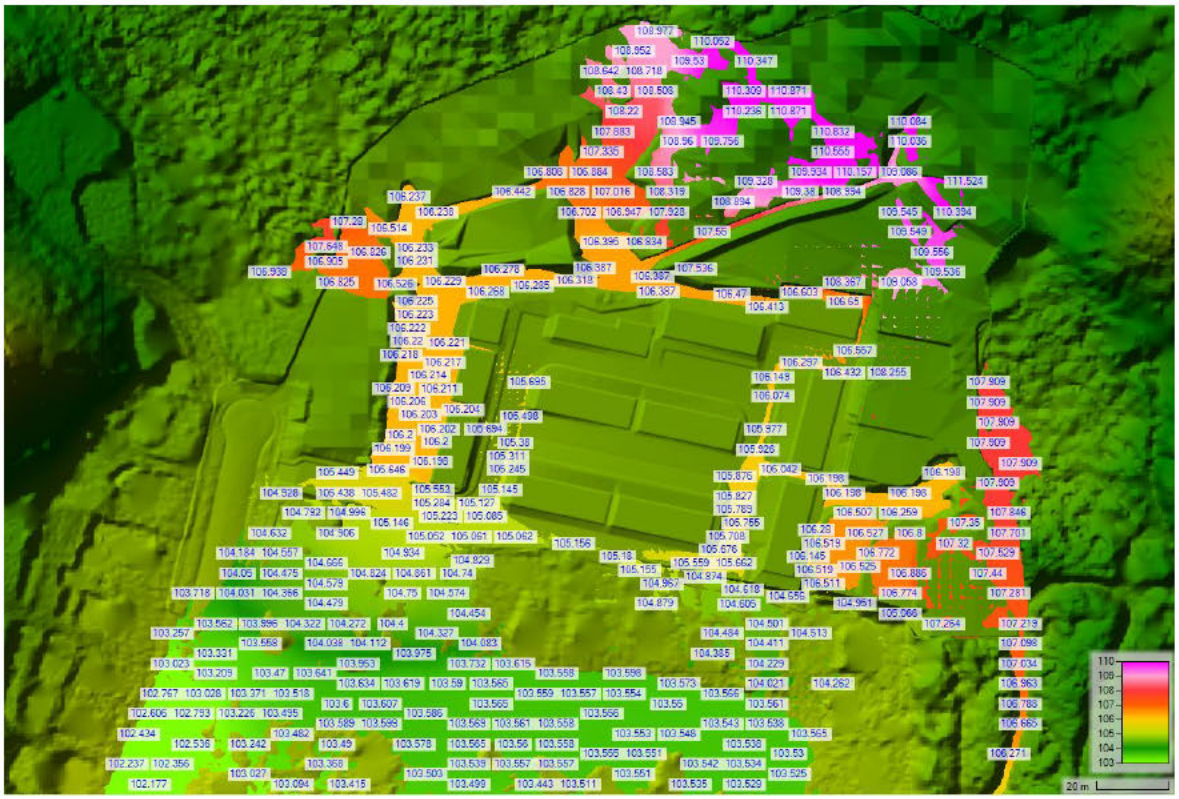
C.11 HEC-RAS Results 100-yr, Post-Dev- Max Flow Depth



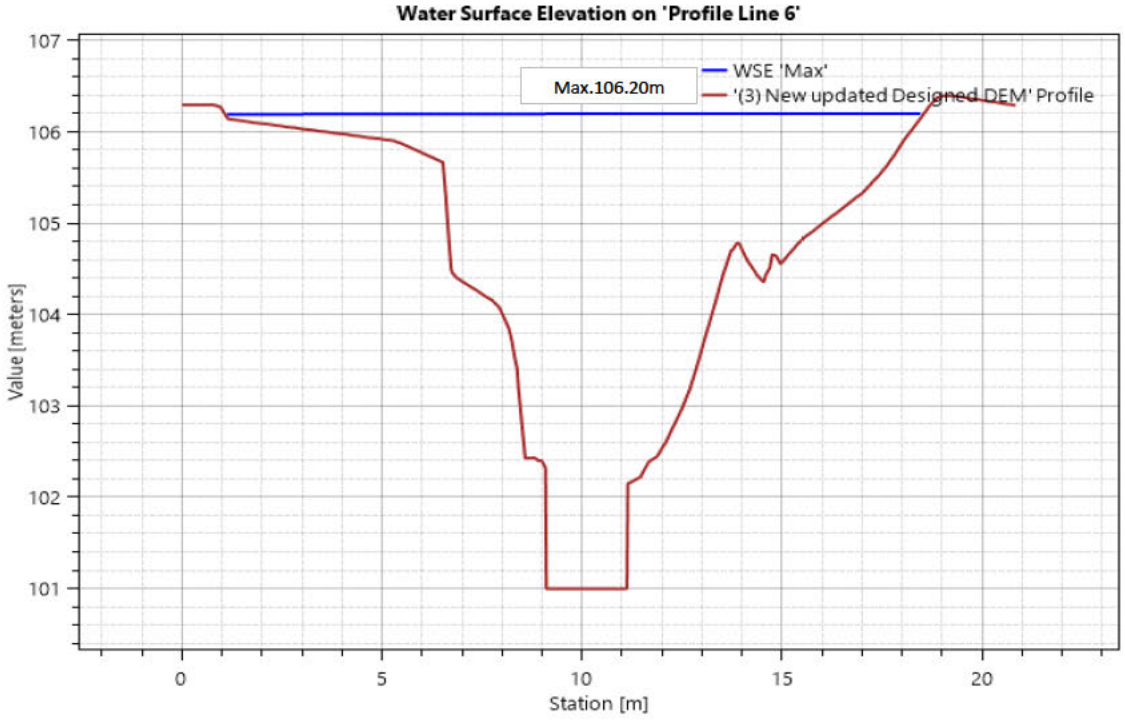
Cross Line: Water Depth Profile (Left -> Right)



C.12 HEC-RAS Results 100-yr, Post-Dev - Water Surface Elevation



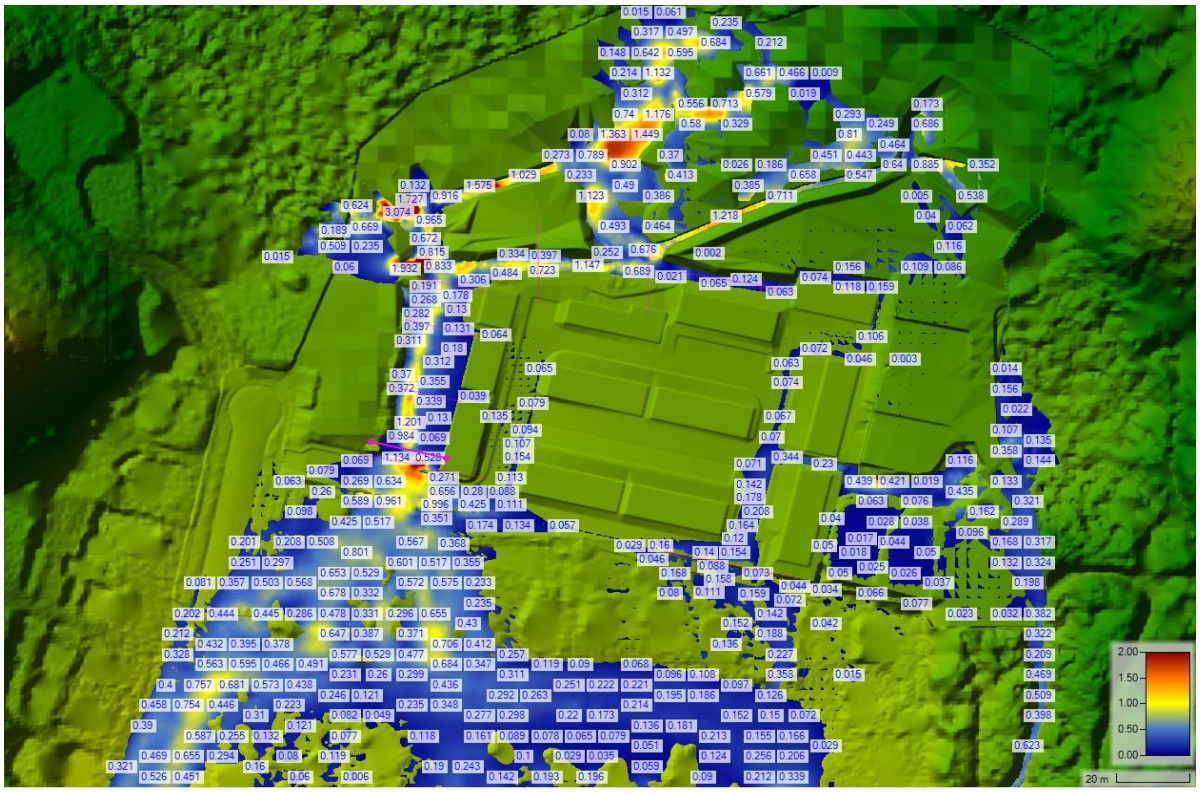
Cross Line: Water Surface Elevation Profile (Left -> Right)



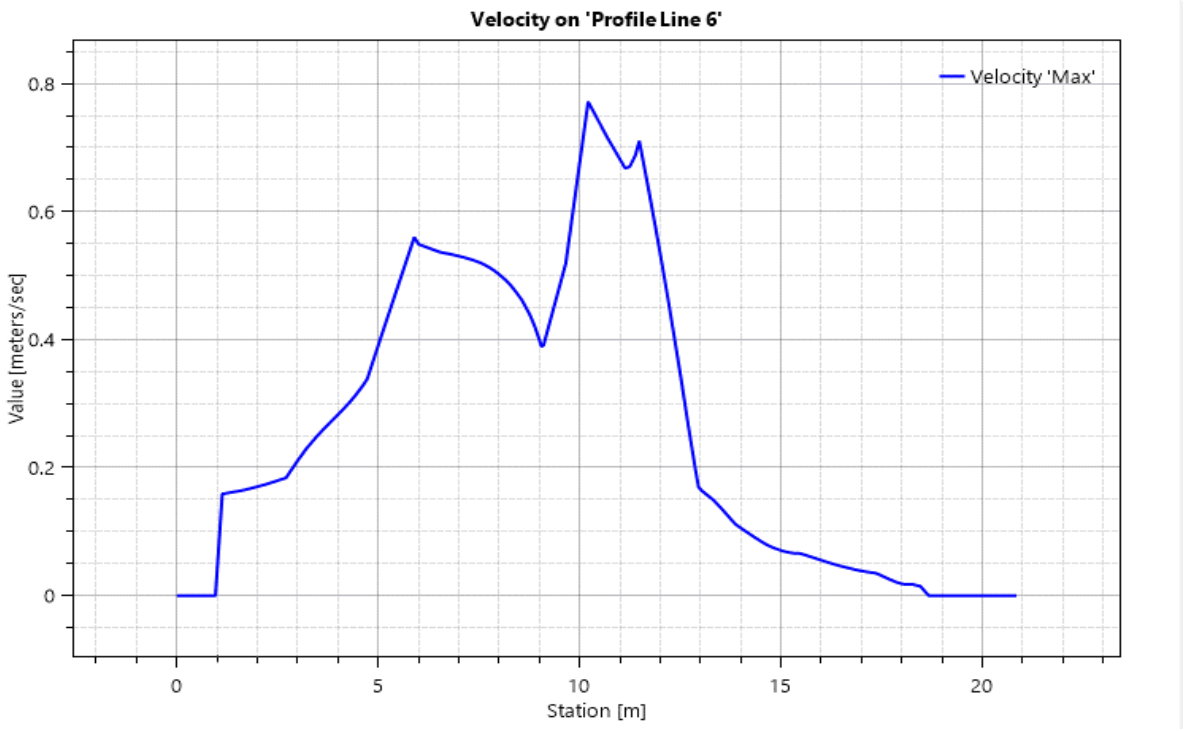
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	17
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.13 HEC-RAS Results 100-yr, Post-Dev - Max Flow Velocity



Cross Line: Max. Velocity Profile (Left -> Right)



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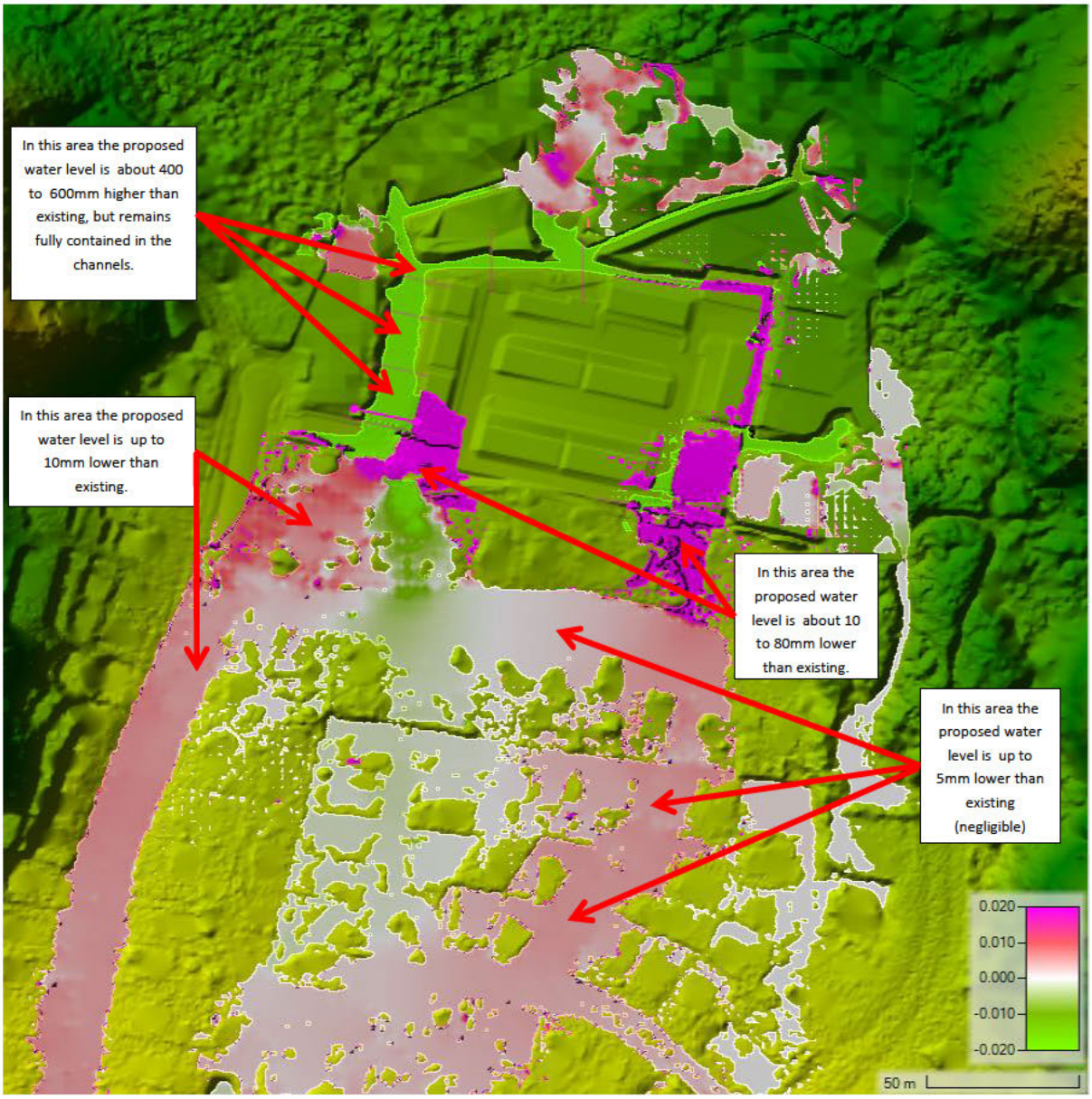
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	18
Description:	Flood Assessment	Designed:	[redacted]		
Date:	17.01 2022	Checked:	AR		

C.14 Flood Level Comparison Map (Existing Minus Post-Development)



Appendix B – Photographs of existing Site Perimeter Channels

channels below.

From: noreply@beforeudig.co.nz
To: Dispatch Service Plans
Subject: beforeUdig - Job No: 1985705 Customer Id - 155475 (E)
Date: Wednesday, March 2, 2022 2:29:41 PM
Attachments: 1985705.PDF
beforeUdig-New App.pdf

***** IMPORTANT PLEASE READ *****

beforeUdig does not maintain information regarding the location of underground assets. There are also owners of underground assets which do not participate in the referral service operated by beforeUdig. Therefore, beforeUdig cannot make any representation or warranty as to the accuracy, reliability or completeness of the information contained in this notice.
beforeUdig and its employees, agents and consultants shall have no liability (except insofar as liability under any statute that cannot be excluded) arising in respect thereof or in any other way for errors or omissions including responsibility to any person by reason of negligence.

Amendment or cancellation of a job previously lodged has to be directed to the Utilities listed on your confirmation sheet. Please quote the relevant sequence number when making this enquiry.
If you have requested the services of a locator, please note that some Utilities may charge for this service. For further information please contact the Utilities listed on your notification sheet and quote the relevant sequence number.

Please find attached your confirmation advice.

(See attached: "1985705.PDF")

Enquiry Confirmation Sheet

Job No 1985705

Phone: 0800248344
www.beforeudig.co.nz

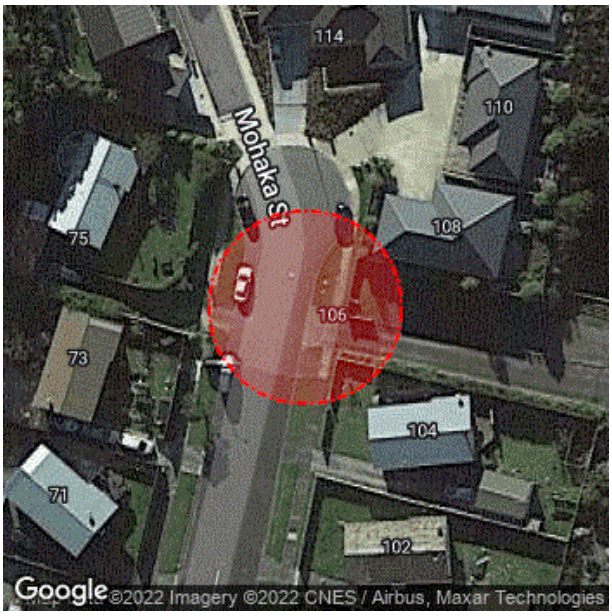
Caller Details

Contact: [redacted]
Company: Wellington Water Ltd
Address: Level 4 25 Victoria Street
Petone Wellington 5012

Caller Id: 155475 **Phone:** 049124470
Mobile: Not Supplied **Fax:** Not Supplied
Email: dispatchserviceplans@wellingtonwater.co.nz

Dig Site and Enquiry Details

WARNING: The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables.
The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



User Reference: HCC559871
Working on Behalf of:
Wellington Water

Enquiry Date:	Start Date:	End Date:
02/03/2022	05/03/2022	05/03/2022

Address:
106 Mohaka St
Wainuiomata Lower Hutt 5014

For Planning:	Onsite Activity:
No	Hand Digging
Plans Requested	Yes
Workplace Location:	**Location in Road:**
Road Reserve	CarriageWay,Footpath,Berm
Locate Requested:	**Preferred Locate Date:**
No	Not Supplied

- Check that the location of the dig site is correct. If not you must submit a new enquiry.
- Should the scope of works change, or plan validity dates expire, you must submit a new enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

Notes/Description of Works:
NEED PLANS PLEASE: NOTE: LOCATE / STAND OVERS WILL BE ORDERED SEPERATELY AS WE NEED TO PLAN FOR THESE JOBS.

Your Responsibilities and Duty of Care

- If plans are **NOT** received within **TWO WORKING DAYS**, do not start work, contact the asset owner(s) directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using the beforeUdig service, you agree to our privacy policy and the terms and conditions set out at **www.beforeudig.co.nz**
- **For more information about the beforeUdig service, visit www.beforeudig.co.nz**

Asset Owner Details

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days.
Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the beforeUdig service, this confirmation will not provide details of those asset owners so it is **your responsibility** to identify and contact directly any asset owners not listed here. Known Non-Member Utilities are listed on the beforeUdig website under the 'Utilities & Members' Tab.
Any asset owner name listed below with the status 'Not Notified' is an associate member of beforeUdig, which ONLY NOTIFIES YOU they may have assets present. You will need to contact them directly to obtain information about the location of their assets.

Where an Asset Locate has been requested, asset owners who provide Locate services will endeavour to respond to your preferred locate date, where possible. However, asset owners may complete the Locate at their convenience.
Locates are supplied by individual asset owners, NOT beforeUdig. EACH asset owner may charge a fee for Location services – it is your responsibility to discuss this directly with EACH utility, prior to the service being provided.
Asset owners highlighted by asterisks ** **Do Not** supply plans and/or information regarding the existence of underground assets on private property.
Asset owners highlighted with a hash request you reference their attachment for further instructions on how to obtain plans.

Seq. No.	Authority Name	Phone	Status
10135439	Chorus **	0800822003	Notification Sent
10135437	Hutt City Council - CAR Only	045706666	CAR Not Required
10135438	Hutt City Council – Water & Waste	[redacted]	Notification Sent
10135442	LINZ	[redacted]	Notification Sent
10135441	Powerco Gas (HVP) – Detect Services	[redacted]	Notification Sent
10135440	Vodafone New Zealand Ltd	0508 369637 Option 4	Notification Sent
10135443	Wellington Electricity	0800248148	Notification Sent

END OF UTILITIES LIST

From: b4udig PowercoGas
To: Dispatch Service Plans
Subject: 599081_106_Mohaka_Street_Lower_Hutt_HVP
Date: Thursday, March 3, 2022 3:14:19 PM
Attachments: 599081_106_Mohaka_Street_Lower_Hutt_HVP.pdf

Conditions for use of plans

Powerco plans must be used in accordance with the conditions contained in the attached Underground Enquiry Sheet and the conditions shown on the plans themselves. In particular, note that:

- **Plans are provided as a guide only**;
- Contact the location provider in your area 2 working days prior to excavation;
- **Use the contact details below** in the event of any query arising before or during excavation;
- **The person in charge of the work must ensure compliance with** the relevant Acts and Regulations, Codes of Practice and the relevant WorkSafe New Zealand booklets including **the Guide for Safety with Underground Services**.

Plans must be printed in **colour** on a **single page** and at their **original A3 scale**.

[redacted] | [redacted]
Detect Services

For Plan Enquiries please phone (06) 968 5781

For Electricity Location Enquiries please phone (0508) 483-649
For Electricity Standover Requests please phone (0800) 769-372

For Gas Location Enquiries and Standover Requests please contact:
Manawatu/Levin – [redacted]
Hawkes Bay – [redacted]
Hutt Valley/Porirua – [redacted]
Wellington – [redacted]
Taranaki – Detect Services Ltd (0800) 338-328

From: b4udig PowercoGas
To: Dispatch Service Plans
Subject: 599081_106_Mohaka_Street_Lower_Hutt_HVP
Date: Thursday, March 3, 2022 3:14:19 PM
Attachments: 599081_106_Mohaka_Street_Lower_Hutt_HVP.pdf

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- Contact the location provider in your area 2 working days prior to excavation;
- **Use the contact details below** in the event of any query arising before or during excavation;
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Plans must be printed in **colour** on a **single page** and at their **original A3 scale**.

[redacted] | [redacted]
Detect Services

For Plan Enquiries please phone (06) 968 5781

For Electricity Location Enquiries please phone (0508) 483-649
For Electricity Standover Requests please phone (0800) 769-372

For Gas Location Enquiries and Standover Requests please contact:
Manawatu/Levin – [redacted]49
Hawkes Bay – [redacted]
Hutt Valley/Porirua – [redacted]
Wellington – [redacted]
Taranaki – [redacted]

Underground Gas Enquiry Sheet

Date/Time Recd: 2/03/2022 2:30:00 p.m. **Sequence No:** 10135441 **Enquiry No:** 599081

Enquiry Type: ☐ Personal ☐ Mail ☐ Fax ☐ Phone ☑ E Mail

Company: Wellington Water (Lower Hutt) **Phone:** [redacted]

Contact Name: [redacted] **Mobile:** [redacted]

Location of Work: 106 Mohaka Street; Lower Hutt

Additional Info on Property: HCC559871. NEED PLANS PLEASE: NOTE: LOCATE / STAND OVERS WILL BE ORDERED SEPERATELY AS WE NEED TO PLAN FOR THESE JOBS.

Description of Work: Hand Digging

Proposed Commencement Date: 05/03/2022

Information Provided

Gas Record Plans Showing Mains/Service Pipes

☐ Low Pressure ☑ Medium Pressure ☐ Intermediate Pressure NO GAS IN AREA ☐

Plan	599081 - 106 Mohaka Street Plans.pdf

Strategic Pipes in Area? Yes: ☐ No: ☑

Standover may be required: Yes: ☐ No: ☑

Plans Issued to: [redacted] **Date/Time:** 03/03/2022 03:13 PM

On-Site Location Required: Yes: ☐ No: ☑ **Date:** **Time:**

General Comments: GENERATED: 2/2 Plans

Processed By: Nehaa Shah

Conditions

- The purpose of this document is to outline conditions that apply and precautions that should be taken when undertaking excavation work in the vicinity of underground gas pipes.
- Information concerning the location of underground Powerco owned gas pipes is freely available from Powerco and *must* be obtained *prior* to commencing any excavation work.
- The information shown on the plans provided relate only to Powerco's *gas* reticulation. Other relevant service authorities should be contacted to obtain information concerning their services.
- The plans provided may not necessarily indicate all redundant pipes or all service pipes (e.g. pipes, in road reserve, connecting the Consumer to Powerco's reticulation system).
- The record plans must be kept on site while excavations are in progress.
- On-site gas pipeline location marking carried out by Powerco is to be used as a guide only and no warranty as to its accuracy is given or implied.
- It must be noted that it is the *Contractors*' responsibility to determine the exact location of the underground gas pipes by hand-digging. In the event of being unable to locate the gas pipe, Powerco should be contacted for further assistance prior to commencing any further excavation work.

Damage to Powerco Underground Plant:

Any accidental damage to gas pipes, however slight, must be reported to Powerco immediately. This will enable

prompt and cost efficient repairs to be carried out and will avoid subsequent complications and more expensive remedial work being undertaken should a fault develop at a later date.

- **To report any damage to gas pipes, contact the Powerco Help Desk on 0800 111 848 immediately.**

Clearances:

It is the responsibility of the person in charge of the work to ensure that the minimum clearances shown below are maintained at all times during the progress of the work. This person is also responsible for compliance with the requirements of the relevant Acts and Regulations, Codes of Practice as well as the relevant WorkSafe New Zealand booklet "*Guide for Safety with Underground Services*".

Electricity Regulations 1997 Regulation 93 - Every person who is operating mechanical equipment near conductors of overhead electric lines shall ensure that the equipment does not encroach within 4 metres of the conductor, unless the written permission of the owner of the electric line has been obtained.

NZ Electrical Code Of Practice No 34 : 2001 for Electrical Safe Distances - Section 2 - Minimum Safe Distances for Excavation and Construction Near Overhead Electric Line Supports.

Underground Gas Pipes:

1. Machine Digging

Strategic Intermediate Pressure [feeder main operating at pressures greater than 700kPa (100psi)] and Medium Pressure Gas Pipes

(a) Machine digging is not permitted closer than 1.0m from any Strategic Intermediate Pressure and Medium Pressure gas mains or services. Any excavation work within this distance must be performed by hand digging and under the observation of a Powerco Approved Works Protection Observer including the backfilling operation.

(b) Please refer to the Powerco Standard "*Excavation Works in the Vicinity of Strategic Cables and Pipes*" before commencing excavation work in the vicinity of Strategic Gas Pipes.

Medium and Low Pressure Gas Pipes

(c) Machine digging is not permitted closer than 500mm from any Medium or Low Pressure gas main or service unless the position of the pipes has been verified by hand digging and exposing them first.

2. Personnel On-Site

It will be necessary for a Powerco Approved Works Protection Observer to be on site where any strategic intermediate or medium pressure main or service is to be exposed or crossed.

3. Notification of work near Strategic Intermediate Pressure and Medium Pressure Gas Pipes

(a) At least *2 working days*' notice must be given to Powerco prior to any excavation work taking place.

(b) It is the Excavation Contractor's responsibility to contact the Powerco Help Desk on 0800 769 372 for the above notification.

(c) The Excavation Contractor will be issued with a Works Agreement, which must be completed and signed prior to any excavation work taking place near any Strategic Intermediate Pressure or Medium Pressure gas pipes.

4. Location of other services

(a) Intermediate Pressure Gas Pipes
No service shall be laid closer than 300mm from any Intermediate Pressure Gas Pipe

(b) Low or Medium Pressure Gas Pipes
No service shall be laid closer than 250mm from any Low or Medium Pressure Gas Pipe

Sequence No 10135441

Ph: 0800248344
www.beforeudig.co.nz

Utility Details

Please be advised the person below has requested information about underground assets in your jurisdiction. You are required to respond within 2 working days and reference the Job Number, Sequence Number and the User Reference (where supplied).

To: [redacted]
Utility ID: 70051
Utility Name: Powerco Gas (HVP) –Detect Services
Email: b4udig_HVPGas@powerco.co.nz

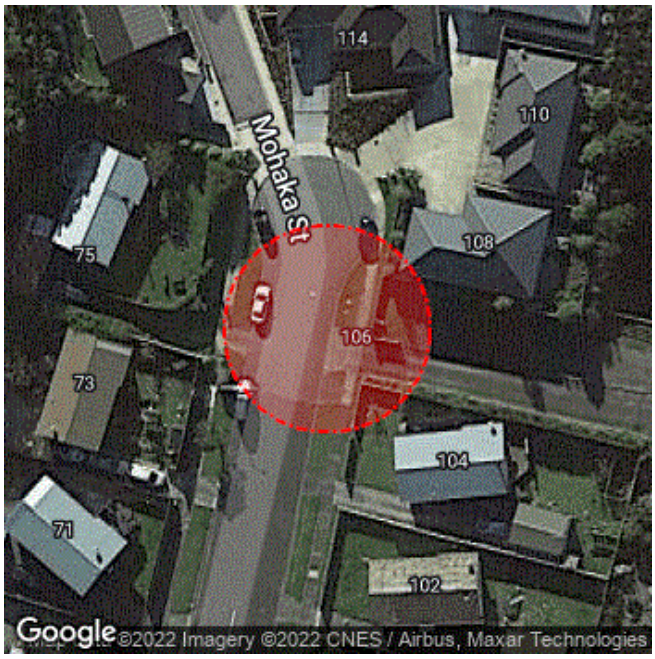
Enquiry Date: 02/03/2022
Priority Type: Normal
Enquiry Medium: Web

Customer Details

Customer ID: 155475
Company: Wellington Water Ltd
Address: Level 4 25 Victoria Street
Petone Wellington 5012
Email: dispatchserviceplans@wellingtonwater.co.nz

Contact: Ms Glenis Bruin
Phone: 049124470
Mobile: Not Supplied
Fax: Not Supplied

Proposed Site Location



WARNING: The adjacent map displays the extent of the proposed dig site as specified and confirmed by the beforeUdig customer.

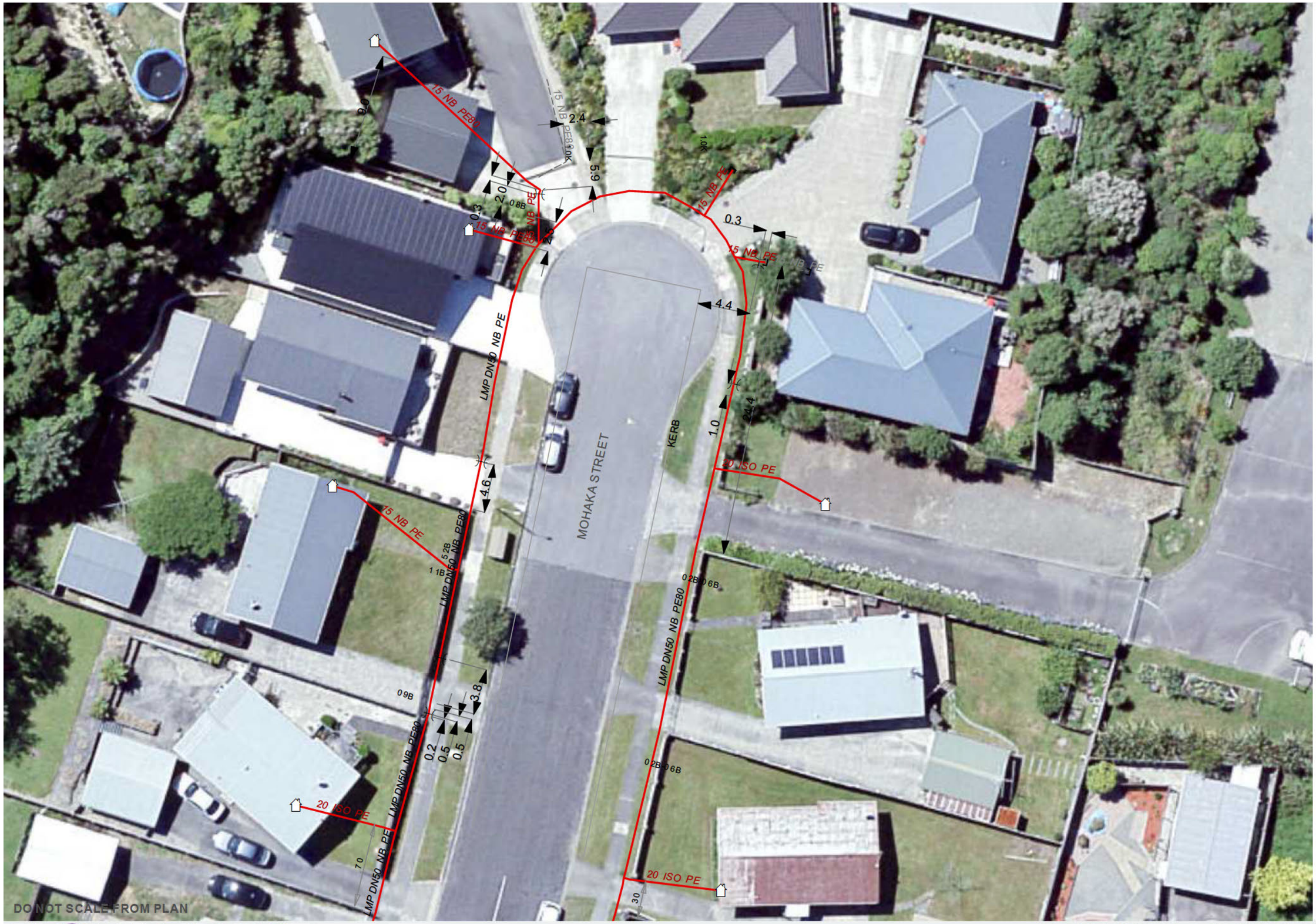
User Reference:
HCC559871
Working on Behalf of:
Wellington Water
Start Date: 05/03/2022
End Date: 05/03/2022
Address:
106 Mohaka St
Wainuiomata Lower Hutt 5014

For Planning: No
Plans Requested: Yes
Asset Locate: No
Preferred Locate Date: Not Supplied
Workplace Location: Road Reserve
Location in Road: CarriageWay,Footpath,Berm
Nature of Works: Hand Digging

Additional Work Site Notes:
NEED PLANS PLEASE: NOTE: LOCATE / STAND OVERS WILL BE ORDERED SEPERATELY AS WE NEED TO PLAN FOR THESE JOBS.

END OF TRANSMISSION – V4.5.0

Job No 1985705



DO NOT SCALE FROM PLAN

Gas Network

- Customer Location
- Gas Gate
- Regulator Station
- Gas Valve
- Valve Station
- Squeeze Location
- Anode
- Insulation Joint
- Rectifier
- Test Point

Fittings

Tee	End Cap	Reducer	Transition

Pipes

	Pressure | Status
	Intermediate Presure | Live
	Medium Pressure | Live
	Low Pressure | Live
	Proposed | Assume Live
	Unknown Pressure | Live
	No Pressure | Out of Service
	Other | Assume Live
	Duct
	Special Crossing
	CP Cable

Reference Features

- Building
- Pole
- Manhole (MH)
- Fire Hydrant (FH)
- Sump
- Survey Peg
- Box
- Post \| Other
- Bank
- Easement
- Fence
- Kerb/Path
- Treeline
- Unusual Depths (1.5)

Locate/markout before you dig

Hand dig before excavating

Can't find it? In a different place? Call 0800 769 372 for help

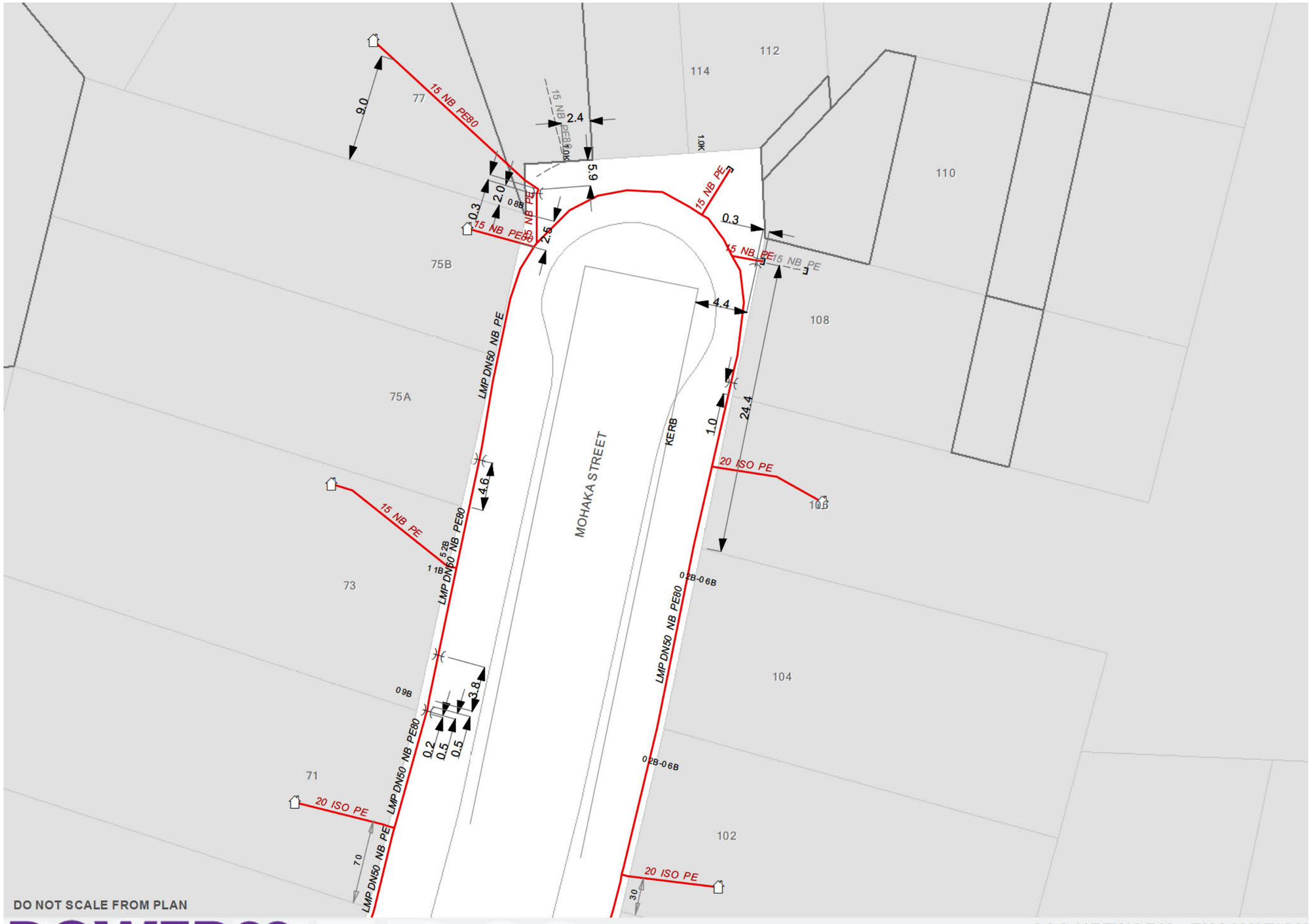
POWERCO

GAS NETWORK - EXCAVATION

599081 - 106 Mohaka Street - Aerial

For excavation purposes only. This plan expires 1 month from this date 3/03/2022 For more information go to www.powerco.co.nz

This plan must be used in conjunction with the conditions in the accompanying email and on this plan. It shows approximate positions as a guide only and no warranty to its accuracy is given or implied.
This plan may not show all gas pipes or cables, e.g. pipe may be missing and new pipes or cables may have been laid since this plan was printed. Measurements shown are a guide only. Position of assets is unknown if no measurements are shown.



Gas Network

- Customer Location
- Gas Gate
- Regulator Station
- Gas Valve
- Valve Station
- Squeeze Location
- Anode
- Insulation Joint
- Rectifier
- Test Point

Fittings

Tee	End Cap	Reducer	Transition

Pipes

Pressure | Status
Intermediate Presure | Live
Medium Pressure | Live
Low Pressure | Live
Proposed | Assume Live
Unknown Pressure | Live
No Pressure | Out of Service
Other | Assume Live
Duct
Special Crossing
CP Cable

Reference Features

- Building
- Pole
- Manhole
- Fire Hydrant
- Sump
- Survey Peg
- Box
- Post \| Other
- Bank
- Easement
- Fence
- Kerb/Path
- Treeline
- Unusual Depths

Locate/markout before you dig

Hand dig before excavating

Can't find it? In a different place? Call 0800 769 372 for help

DO NOT SCALE FROM PLAN

POWERCO

GAS NETWORK - EXCAVATION

599081 - 106 Mohaka Street

For excavation purposes only. This plan expires 1 month from this date 3/03/2022 For more information go to www.powerco.co.nz

This plan must be used in conjunction with the conditions in the accompanying email and on this plan. It shows approximate positions as a guide only and no warranty to its accuracy is given or implied.
This plan may not show all gas pipes or cables, e.g. pipe may be missing and new pipes or cables may have been laid since this plan was printed. Measurements shown are a guide only. Position of assets is unknown if no measurements are shown.

From: [redacted]
To:
Cc:
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Tuesday, January 18, 2022 12:25:18 PM
Attachments: Resource consent application for WWL approval.msg
Resource consent WGN220052 for review.msg
image001.jpg
image002.jpg
image003.png
image004.png
image005.jpg
image006.png
image007.png
image008.jpg
image009.jpg
image010.gif
image011.jpg
image012.jpg
image013.jpg

Hi [redacted]
Interesting but we seam to be talking about two different things.
GWRC are considering us affected for effects of the new networks as part of this development not the earthworks to raise ground level for flooding of the homes for this development.
So we are interested in the pipes and water treatment devices etc which are part of the proposed development and SW volume increase effects on the existing networks that they connect to as well as any maintenance effects on our operations.
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Tuesday, 18 January 2022 12:13 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Hi [redacted]
Please find the attached updated modelling report for 106 Mohaka St, and modelling teams final comments below.
Based on these, I do not have further concerns on the proposed floor level and impact of site filling.
Thanks
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Tuesday, January 18, 2022 11:24 AM
To: [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Cc: Modelling Team <Modelling.Team@wellingtonwater.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Kia ora [redacted]
How are you? I have gone over the updated work done by [redacted] (attached) and also spoken with him on the phone. They have updated the modelling based on our hydrology specifications and provided photos of the boundary channels which were my main concerns. The result of their updated assessment is that the proposed development has a negligible downstream impact. I am comfortable with the updated assessment of effects from stormwater/flooding perspective. Let me know if I can provide any additional information.
cheers
[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 17 January 2022 8:07 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]
We have reviewed the hydrological analysis following the guidelines that you provided in your 23/12/21 and 120/01/22 emails, and attach our response within the revised memo herein.
Trust this now meets your requirements, however please feel free to give me a call if you have any further queries.
Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

AR & Associates Ltd
Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 10 January 2022 4:44 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>

From: [redacted]
To: [redacted]
Cc: [redacted]@incite.co.nz
Subject: Resource consent application for WWL approval
Date: Friday, September 24, 2021 12:24:20 PM
Attachments: image001.png
WGN220052 - Pv.0297 11 The Strand, Wainuiomata GWRC Earthworks AEE v3 As Lodged.pdf
Resource consent WGN220052 for review.msg
Form-1b-Written-approval-of-an-affected-person.pdf

Hi [redacted]

GWRC have received an application to discharge stormwater to the stormwater network for a new subdivision at 11 The Strand, Wainuiomata. I have attached the application and the comments received from Stu Farrant regarding stormwater matters.

The application states that discharges will be to the Hutt City Council stormwater system and new rain gardens will be vested to HCC. In accordance with the agreement between GWRC and WWL I consider WWL to be an affected party to this application (under S95E of the RMA) for the effects of volumes from discharges on the capacity of the SW network, and for management of new assets vested.

[redacted] (cc'ed into this email) is the agent.

Kind regards

makaurangi

[redacted]
Kaitohutohu / Resource Advisor, Environmental Regulation
GREATER WELLINGTON REGIONAL COUNCIL
Te Pane Matua Taiao
M [redacted]
100 Cuba Street, Wellington 6011 | PO Box 11646, Manners Street, Wellington 6142
www.gw.govt.nz

From: [redacted]
To: [redacted]
Cc: Subdivision; [redacted]
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168
Date: Wednesday, March 2, 2022 11:49:57 AM
Attachments: image003.png
image004.png
image024.png
image025.png
image026.png
image027.png
image028.png
image029.png
image030.png
image031.png
image032.jpg
image033.jpg
image034.jpg
image035.jpg
image036.jpg
image037.jpg
image038.jpg
image039.jpg
image040.jpg
image041.jpg
image001.png
image002.png

Hi [redacted]
Can you confirm who at Wellington Water is reviewing this design?
Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@envelope-eng.co.nz>
Sent: Wednesday, 2 March 2022 10:54 am
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168
Hi [redacted]
Sorry I won't be able to be definitive. The general arrangement looks ok to me, but, Wellington Water are reviewing it and will have input into the final conditions – in the past I've seen this apply to tank sizes and controls (telemetry vs simple timer control). There is a reasonable risk that the final conditions could lead to a required design revision.
Regards

[redacted]
A Level 1, 68 Dixon Street, Te Aro Wellington

From: [redacted]@aprotean.co.nz>
Sent: Tuesday, 1 March 2022 9:38 PM
To: [redacted]@envelope-eng.co.nz>; [redacted]

[redacted]@arassociates.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168
Thanks for this [redacted]
Could you please confirm that barring some other unforeseen change in the consent conditions; that you could provide approval for the sewer in its current form on issuing of the consent?
I appreciate this is a strange way to ask this question but it will afford the developer the opportunity to assess his situation better.
Kind Regards

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@envelope-eng.co.nz>
Sent: Wednesday, 2 March 2022 10:36 am
To: [redacted]@arassociates.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168
Hi [redacted]
Thanks, this additional info has answered my earlier queries. Unfortunately, I'm not in a position to provide any approval until the consent has been issued. I'm not involved in the processing of the consent, but I have followed up and will keep an eye out for it as it progresses.
Regards

[redacted]
A Level 1, 68 Dixon Street, Te Aro Wellington

From: [redacted]@arassociates.co.nz>
Sent: Tuesday, 22 February 2022 9:59 PM
To: [redacted]@envelope-eng.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168
Good day [redacted]
Following up on below if you had a chance to review the information?
We have now completed water hydraulic model. Please find attached the requested information.
Note: only change to water pipe network is at Block F from 25 to 63mm
Regards,

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]
Sent: Friday, 11 February 2022 6:14 pm
To: [redacted]@envelope-eng.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: FW: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Apologies, resending email, failed to attached 12d pipe section for CP lead.

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]
Sent: Friday, 11 February 2022 6:09 pm
To: [redacted]@envelope-eng.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

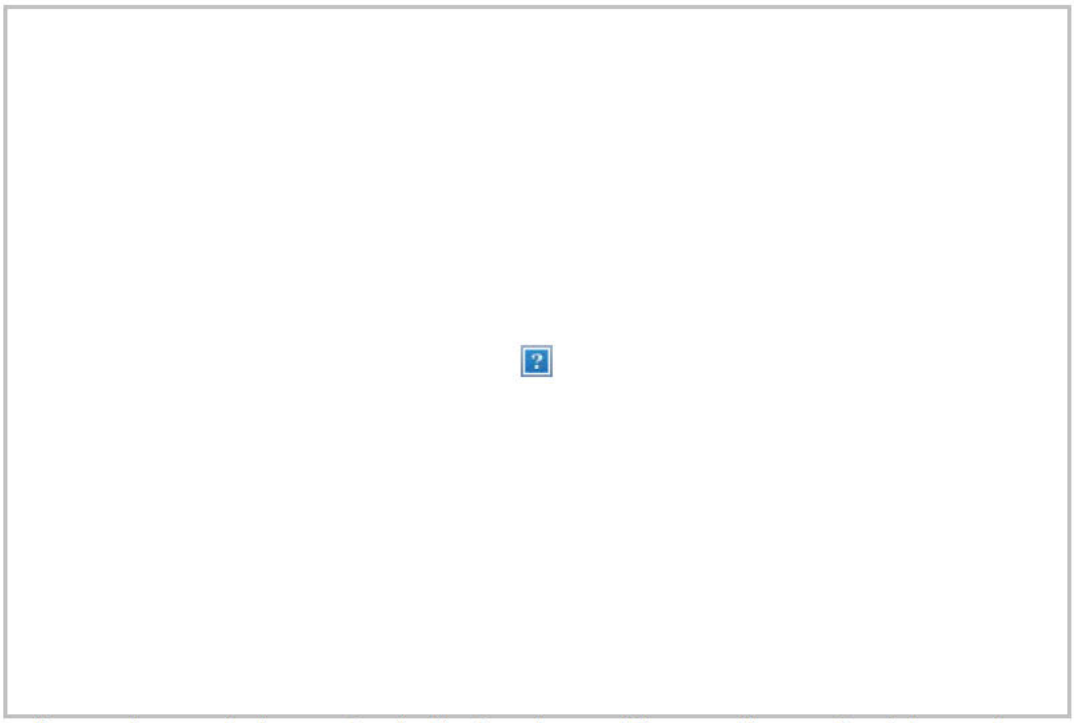
Hi [redacted]

I hope you are well.

Our response to below is as follows:

Stormwater:

We have reviewed the proposal of adding the SWCP's with shallow pipes draining to the treatment device as recommended. Unfortunately, the proposal is not feasible as the pipe cover on catchpits leads will exceed minimum acceptable values. Below snapshot illustrates a long section of a catchpit lead. It can be seen that the pipe cover at the road crossing is 280mm (excluding a PVC pipe thickness).



Following that, we had more detailed look at the road flows and have refined the catchment areas to illustrate more realistic scenario (original proposal was overly conservative). The following findings are:

- The Peak flow rate in 10 yr ARI rainfall even will be 40 l/s in the worst case position (See Section B drawing 430 on plan 451). Section C has a lesser impact as it does not directly cross the road. In addition based on the 12hr storm duration the peak flows usually last for 2-5 minutes only.
- DxV (depth x velocity) is 0.03 which is well below the recommended 0.4.
- The 10yr ARI peak flow depth at the worst section will be around 55mm. (See updated section on drawing 430)

Given the constrains on site and taking into consideration the above findings we believe that proposal to convey surface flows via kerb & channel without catchpits for this development is adequate. The flows do not pose any danger to pedestrians, property, and/or any other traffic participants.
We hope this resolves the outstanding issue.

Wastewater:

Please find attached:

- LPS design report – PS1 will follow soon.
- Updated WW plan 500 covering issues:
    - Public and Private pipe using same line style (causing misunderstanding)
    - Note added that minimum grade for private WW pipe should be 1%.

Water:

- Awaiting hydrant test results to complete the hydraulic modelling. – will update you hopefully next week.

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini

M: [redacted]
www.arassociates.co.nz

From: [redacted]@envelope-eng.co.nz>
Sent: Friday, 4 February 2022 10:04 am
To: [redacted]@arassociates.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

In relation to the surface water, as discussed additional sumps will be required to reduce the risk of ponding within the road. I understand your proposed stormwater treatment methodology – I think a shallow piped network could connect in to your rain garden, this would not be a major change to what you have already proposed.

Although, as per previous email, compliance with consent conditions may result in other design changes being required.

Regards

[redacted]

A Level 1, 68 Dixon Street, Te Aro Wellington

From: [redacted]@arassociates.co.nz>
Sent: Tuesday, 25 January 2022 1:23 AM
To: [redacted]@envelope-eng.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

Thanks for the partial approval to proceed with SW pipe works.

With the respect to surface water Can we please organise another meeting tomorrow morning to discuss?

Regards,

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@envelope-eng.co.nz>
Sent: Tuesday, 25 January 2022 1:59 am
To: [redacted]@arassociates.co.nz>

Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

Thanks.

Following discussion, I'm ok with the stormwater attenuation and treatment system proposed.

Please note, I need to confirm one of two things with Council. I will do this on Tuesday.

In the interim I am ok with stormwater works commencing within the site providing all consent conditions and wellington water specifications are complied with. Please note the requirement for filter fabric on the pipes. Do not do any work downstream of manhole 1-2, or outside of the site until the approval letter is issued.

I have started to look at the roading aspects, initial queries:

- The surface conveyance distance appears to be too long and it is likely that sumps will be required. The road should be substantially clear of standing water during a 10%AEP rain event. This likely to result in some additional pipes being required. Sumps should be positioned to retain the stormwater within the channel.

Further to discussion earlier:

- The water pipes are to be SDR11, this is now the WWL standard.

Kind Regards

[redacted]

[redacted]

A Level 1, 68 Dixon Street, Te Aro Wellington

From: [redacted]@arassociates.co.nz>
Sent: Monday, 24 January 2022 1:24 AM
To: [redacted]@envelope-eng.co.nz>; [redacted]@envelope-eng.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

Appreciate the call this morning. I trust it was productive to review the stormwater model and answer your queries.

Attached is the email from [redacted] confirming he is happy with the SW approach.

Let us know if we are able to proceed with stormwater works.

I will follow up with WW and Water later this week as discussed.

[redacted]

[redacted]

AR & Associates Ltd
Building 6, Level 2

1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]
Sent: Sunday, 23 January 2022 3:14 pm
To: [redacted]@envelope-eng.co.nz>; [redacted]@envelope-eng.co.nz
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: FW: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

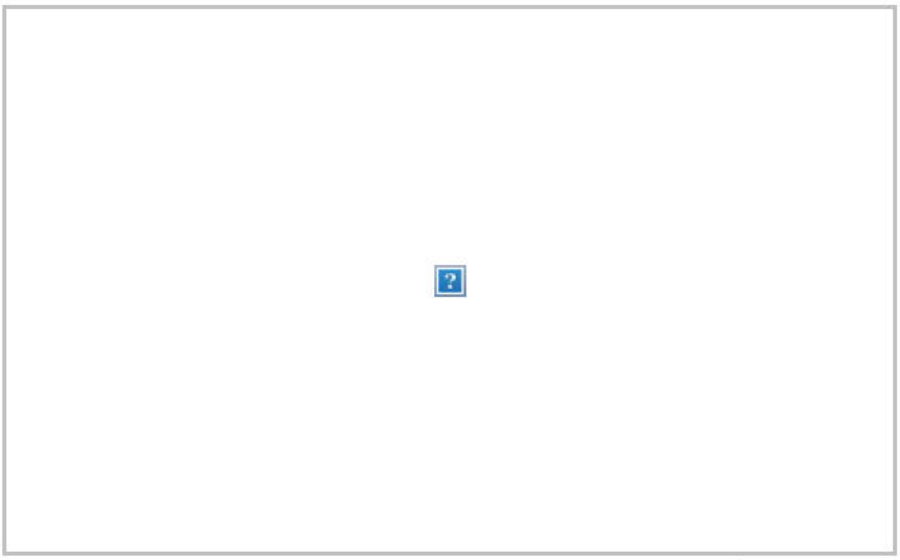
Good afternoon [redacted]

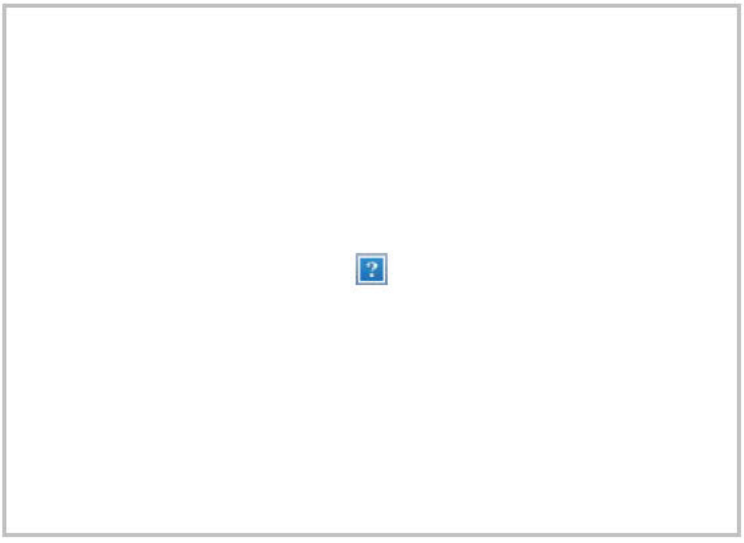
Appreciate the speedy review! Apologies for my delayed response, drove down from Queenstown to Auckland yesterday/overnight.

Our response to SW RFI:

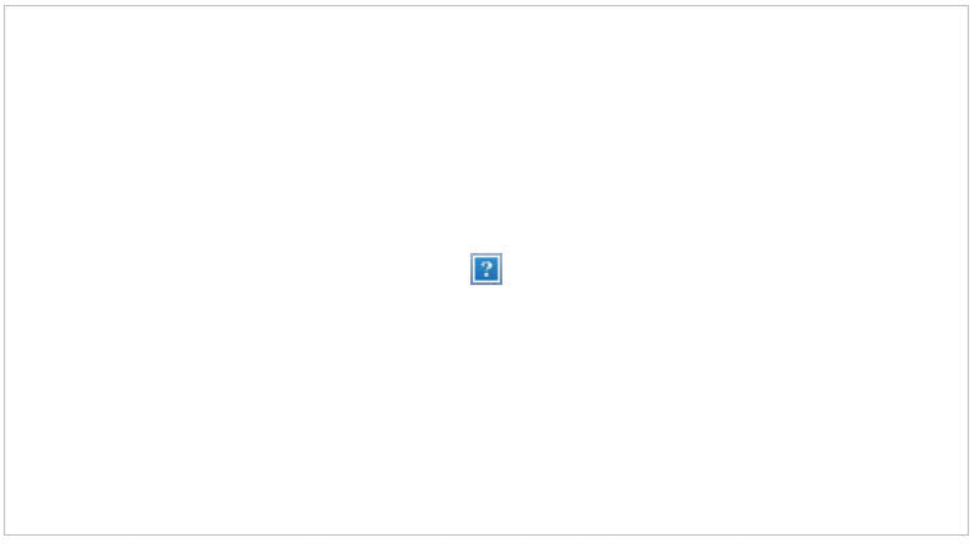
- Please confirm flood report P20-156-R03 is the latest? Is this the one that WWL have approved? – **Correct, as well as the report has been supplemented with the attached M01 RFI response letter.**
- I would like to discuss the overall approach to flow attenuation. My concern is that the orifice size may be too large and therefore not allow much attenuation. **HEC-HMS modelling results indicate that overall site discharge in pre vs post development scenario has been reduced with the given outlet pipe sizes. (during both 10 and 100yr rainfall events)**

Please see summary table on Page 10 in calculations sheet, as well as HEC-HMS discharge summary on Page 9. The culvert outlet/orifice discharge values can be compared between calculations sheets 11 and 13 where 11 is an elevation-discharge summary from HY8, on page 13 an orifice calculation "sanity check" is presented.



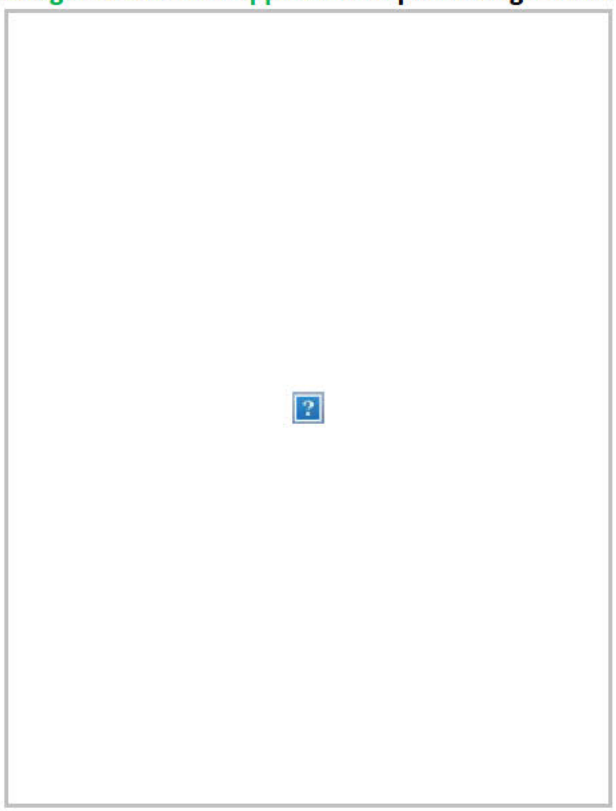


- Please confirm self-cleansing flow velocity at 50% AEP event. – **The pipe flow velocity in 1050mm diameter main pipeline will be 1.38 m/s which is above the minimum requirements according to WWL RSWS 4.3.2.6**



- Please confirm orifice coefficient used. – **Orifice discharge coefficient of 0.62 is used, see page 13**

in calculations sheet for formula. However, to determine outlet pipe hydraulic performance we have opted in to use culvert flow calculations instead. (noted on sheet 11) The short and stubby pipe hydraulically does not perform as a 'pipe' nor as an orifice. Therefore, for inlet configuration losses applied are Squared Edge with headwall loss coefficient Ke=0.5.



With the respect to the comments on detail drawing:

- Invert levels: Apologies, there is a drafting error. The top pipe IL is 600mm above the IL of the bottom pipe. Please see attached revise drawing 420.
- Pipe separation: Accounting for PVC pipe wall thickness the pipe separation will be around 120mm. The pipes are stacked vertically to avoid oversized manholes (MH 1-1 and 1-2, especially 1-1 given the proximity to existing SW asset). The contractor has been interfacing with the manhole manufacture to confirm the that general pipe clearances do not affect manhole structural integrity. The contractor will insert polystyrene packers in between pipes to provide adequate support for the top pipe.

I will follow with a response to Wastewater and Water queries later next week.
I hope this helps to clarify the SW questions. Please let us know if you are satisfied with the responses and are in a position to issue a partial SW approval.
Regards,

[redacted]
[redacted]
AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]

www.arassociates.co.nz

From: [redacted]@envelope-eng.co.nz>
Sent: Saturday, 22 January 2022 4:42 am
To: [redacted]@arassociates.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>; [redacted]@aprotean.co.nz
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

I have had a look through the information provided and have several comments. In addition to those noted on attached:

Stormwater:

- Please confirm flood report P20-156-R03 is the latest? Is this the one that WWL have approved?
- I would like to discuss the overall approach to flow attenuation. My concern is that the orifice size may be too large and therefore not allow much attenuation.
- Please confirm self-cleansing flow velocity at 50% AEP event.
- Please confirm orifice coefficient used.

Wastewater

- Detailed design for pump system required (Ecoflow report states it is prelim only).
- Please confirm previous discussions, etc with WWL.

Water Supply

- Hydraulic design will be required.
- Please provide pressure and flow test results.

It might be best to talk some of these queries through over the phone/teams. Please advise your availability.

Regards

From: [redacted]@arassociates.co.nz>
Sent: Thursday, 20 January 2022 10:09 PM
To: [redacted]@envelope-eng.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

Sorry to be pain, could you please review the stormwater component prior to the rest of the of the package at your earliest convenience please.

The stormwater connection is the critical path for this project. A Partial approval would be greatly appreciated!

We would like to proceed with the pipe lay from next week.

Regards,

[redacted]

On 20/01/2022 8:40 am, [redacted]@arassociates.co.nz> wrote:

Good morning [redacted]

Happy New Year! I hope you had a good break.

Thanks for attending this Engineering review. Apologies for inconvenience, I have reuploaded the calculations sheet to the OneDrive link below. (also attached for convenience)

We have also just received an approval to our Hydrological model from Wellington Water (see attached email from [redacted]

Let us know please if you have any questions.

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@envelope-eng.co.nz>
Sent: Thursday, 20 January 2022 5:05 am
To: [redacted]@arassociates.co.nz>
Cc: Subdivision <Subdivision@huttcity.govt.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

I've been engaged by Hutt City Council to review this application for Engineering Approval.
I am still reviewing the submission and expect to conclude this next week, however, I've noticed that the Appendix B calculations appear to relate to a different project. Can you please check this and update or resubmit the appropriate calculations?
Thanks

[redacted]

A Level 1, 68 Dixon Street, Te Aro Wellington

From: [redacted]@arassociates.co.nz>
Sent: Friday, 17 December 2021 4:49 PM
To: Subdivision <Subdivision@huttcity.govt.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Good afternoon development Team,
I hope you are doing well.
We have now completed design our design of Engineering Package and would like to supplement the previous application with the addition of Roading, Water and Wastewater design. (full Engineering package)
Please follow the link to find attached full scope of:

- Engineering Drawings;
- Calculations;
- Infrastructure Reporting.

2021.12.17 - EPA PACKAGE

Happy holidays everyone.
Regards,

[redacted]

Associate - Civil Engineer

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: Subdivision <Subdivision@huttcity.govt.nz>
Sent: Friday, 10 December 2021 11:07 am
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; Craig Walton <craig.walton@belgraviacapital.co.nz>
Subject: RE: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Hi [redacted]

I have sent through the request for engineering approval.

Thank you

Regards

[redacted]

From: [redacted]@arassociates.co.nz>
Sent: Friday, 10 December 2021 10:14 AM
To: Subdivision <Subdivision@huttcity.govt.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: [EXTERNAL] P20-156 - 106 Mohaka Street - RM210168

Good morning team,

We would like to apply for Engineering Approval for the proposed stormwater line extension on 106 Mohaka Street to enable further stages of this development. The Resource Consent for this site is under RM210168. (attached)

Please follow the link below to OneDrive directory to access:

- Engineering Drawings,
- Calculations,
- Infrastructure report
- Flood Modelling report (for information)

For the proposed stormwater works

2021.12.10 - SW EPA PACKAGE

Please let us know is there any further information you require.

Regards,

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini

M: [redacted]
www.arassociates.co.nz

From: [redacted]
To: [redacted]
Subject: Fwd: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Friday, May 6, 2022 5:55:40 PM
Attachments: image048.png
image038.png
image051.gif
image041.jpg
image045.png
image050.jpg
image054.jpg
image044.jpg
image052.jpg
0fe19430-f551-4506-8bf0-8646e95fadc9.png
image043.jpg
image047.png
image036.png
image053.jpg
image034.png
image042.jpg
image049.jpg
image035.png
image032.png
image031.png
image040.jpg
image029.jpg
image046.jpg
image037.png
image030.jpg
image003.png
image055.jpg
image033.png
image039.png

[redacted]

Begin forwarded message:

From: [redacted]@arassociates.co.nz>
Date: 6 May 2022 at 5:29:54 PM NZST
To: [redacted]@wellingtonwater.co nz>
Cc: [redacted]@huttcity.govt nz>, [redacted]@arassociates.co nz>, [redacted]@arassociates.co nz>, [redacted]@aprotean.co.nz, [redacted]@belgraviacapital.co nz>, [redacted]@aprotean.co nz>, [redacted]@wellingtonwater.co.nz>, Land Development <Land.Development@wellingtonwater.co.nz>, [redacted]@arassociates.co nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your quick response.

With respect to your email 8.4.22 around "a decision for the Wellington Water Land Development team and/or HCC ultimately approving", this related to the query on water depth being >30mm for 101 Mohaka Street and 3 Raikaia Grove, not the methodology/proposal as a whole (the query was nevertheless positively responded to). It seems to me that this query related to the effects arising from the mitigated stormwater solution, which in our view we had agreed were no more than minor (rather than the methodology), and it was therefore not unreasonable for us to assume (and advise our client) that the overall proposed approach had been accepted in principle by Wellington Water.

As I'm sure you'll appreciate, the delays in obtaining approval for the proposal are having a material impact on our client and we really do need to resolve this issue urgently.

I'm at a loss as to how we can explain a situation to our client where, after five months of engagement with Wellington Water and associated modelling iterations, we now need to wait further for approval from an as yet, unknown individual/team. With little certainty on who is actually the approving person/team and even

less certainty on timing, this situation is fast becoming untenable for our client.

Whilst I completely respect your position and the overall process required, I think in fairness to our client we urgently need clarity as to who the specific team or person is that will be the ultimate decision maker in order that we can help expedite the process. It might be that dealing directly with the designated person is the most efficient way of ensuring we do everything we can to mitigate further losses.

I appreciate your help with this [redacted] and I'm more than happy to call you to discuss if you'd prefer.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

[cid:image003.png@01D86168.1F3045E0]
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159 Hurstmere Road, Takapuna, Auckland 0622
PO Box 65 576 Mairangi Bay, Auckland 0754
m. [redacted]
www.arassociates.co.nz<http://www.arassociates.co.nz/>

From: [redacted]@wellingtonwater.co nz>
Sent: Friday, 6 May 2022 3:42 PM
To: [redacted]@arassociates.co nz>
Cc: [redacted]@huttcity.govt nz>; [redacted]@arassociates.co nz>; [redacted]@arassociates.co nz>; [redacted]@aprotean.co.nz; [redacted]@belgraviacapital.co nz>; [redacted]@aprotean.co nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted] and [redacted]

Thanks for your emails, and for the electronic flood modelling results.

I'm sorry for the confusion, I had tried to highlight in my email on 8/04/2022 that ultimately it is HCC and/or the Wellington Water Land Development team that would provide confirmation of acceptance the conclusion of the flood modelling report of no more than minor offsite effects. This is why my email on 20/04/2022 referred specifically to the methodology.

I also did not respond to [redacted] email on 28/04/2022 as I wanted to touch base with [redacted] about how to go forward. Apologies, I could have been more clear that I was going to defer response until I had been in touch with Sheryl.

[redacted] and I were able to discuss this site yesterday, where I expressed my hesitation around confirming no more than minor offsite effects particularly for properties 3 and 5 Rakaia Gr. Thank you for the electronic modelling results to address this issue. During our discussion we also noted that it wasn't clear in the flood modelling report as whether or not runoff from the site was included in the modelling, my understanding was that it is not (based on Section 5.5 of the report). If this is the case, does this runoff have an impact on offsite flood levels?

With regard to your queries below, please see my responses in blue. As a way forward, I will provide comments to Sheryl for her consideration.

1. Do we have approval from Wellington Water on the flood modelling and associated flood mitigation works?

* There is Wellington Water approval for the flood modelling but not necessarily the proposed flood mitigation works. If a specifically Wellington Water (rather than HCC) approval is required for the proposed flood mitigation works it will need to come from the Land Development Team.

1. If not, then how long do you expect the approval process to take?

* I will review the digital model results provided early next week and provide comment to [redacted] by the end of Wednesday.

1. Is there any further information that you are still waiting for us to provide?

* Thanks for digital results, I am specifically interested in the 100yr+CC water surface/elevation pre and post development, could you please confirm which result files would be suitable for this (currently I'm guessing WSE (Max).(1) New existing DEM.NEW EXISTING.tif and WSE (Max).(2) New post Devel DEM.NEW FINISHED.tif are the ones).

1. Is there anything else we can do to help expedite the approval process?

* Not at the moment.

Please let me know if I can provide any additional information.

cheers

[redacted] (he, him) Senior Hydraulic Modeller
[Wellington Water]
Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co nz<http://www.wellingtonwater.co nz/>

[cid:image030.jpg@01D86168.1F3045E0]<https://www.wellingtonwater.co nz/your-water/drinking-water/looking-after-your-water/water-conservation/>

From: [redacted] @arassociates.co nz<mailto [redacted] @arassociates.co nz>>
Sent: Friday, 6 May 2022 1:46 pm
To: [redacted] @wellingtonwater.co nz<mailto [redacted] @wellingtonwater.co.nz>>
Cc: [redacted] @huttcity.govt nz<mailto [redacted] @huttcity.govt nz>>; [redacted] @arassociates.co.nz<mailto [redacted] @arassociates.co nz>>; [redacted] @arassociates.co nz<mailto [redacted] @arassociates.co nz>>; [redacted] @aprotean.co.nz<mailto [redacted] @aprotean.co nz>; [redacted] @belgraviacapital.co nz<mailto [redacted] @belgraviacapital.co nz>>; [redacted] @aprotean.co nz<mailto [redacted] @aprotean.co nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Importance: High

Hi [redacted]

Tried to call you earlier but couldn't find you, have left you a voicemail to call me back.

You may be aware that Hutt City are of the opinion that Wellington Water has not yet approved our flood model / flood report.

As you know we have communicated extensively with you and your team on this matter, and we have updated the model to reflect your / Wellington Water's required hydraulic and hydrological parameters.

We have had several iterations on this matter and the latest model had shown that the additional storage behind the 1050mm culvert is such that it effectively results in attenuation of secondary flows, which translates to a net reduction of peak flow discharging across the road at this location. In our opinion this therefore constitutes mitigation of the 100 year ARI flow to a level that ensures the effects downstream that are no more than minor (and potentially positive in some locations).

The on-going comms we had with you had concluded with your email of the 20th April 2022 (below), where you had confirmed that you are happy with out flood assessment methodology. We had understood this to mean that we had approval for our flood model and mitigation proposal (at least in principle) from Wellington Water.

So after having been through this process with you, I'm sure you'll appreciate that hearing from Hutt City representatives that the Wellington Water approval is still not across the line came as a big surprise to us. Unfortunately the delays with these approvals are costing our client money and valuable time in his project and we just want to get this resolved at the earliest convenience.

To that end, I'd be grateful if you could please confirm:

1. Do we have approval from Wellington Water on the flood modelling and associated flood mitigation works?
2. If not, then how long do you expect the approval process to take?
3. Is there any further information that you are still waiting for us to provide?
4. Is there anything else we can do to help expedite the approval process?

I look forward to your earliest response.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

[cid:image003.png@01D86168.1F3045E0]
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m. [redacted]
www.arassociates.co.nz<http://www.arassociates.co.nz/>

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From: [redacted]
[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Sent: Wednesday, 20 April 2022 5:29 PM
To: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Cc: [redacted]@huttcity.govt nz<mailto [redacted]@huttcity.govt nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for the email. I am happy with your methodology for the hydrological and hydraulic modelling.

cheers

[redacted] (he, him) Senior Hydraulic Modeller
[Wellington Water]
Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co nz<http://www.wellingtonwater.co nz/>

[cid:image030.jpg@01D86168.1F3045E0]<https://www.wellingtonwater.co nz/your-water/drinking-water/looking-after-your-water/water-conservation/>

From: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Sent: Wednesday, 20 April 2022 3:46 pm
To: [redacted]
[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Subject: Re: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted] just following up on this please.

Thanks

[redacted]
Sent from my iPhone

On 12/04/2022, at 10:05 AM, [redacted]
[redacted]@arassociates.co.nz<mailto:[redacted]@arassociates.co nz>> wrote:

Hi [redacted]

Thanks for your message.

The areas you circled below are in our view attributed to minor anomalies in the LiDAR data used (this is a Wellington Lidar 1m DEM 2013-2014 obtained from LINZ), are located in very localised areas and are within the margin of error of the models.

The results show that due to the increased storage upstream of the culvert, the downstream flows are considerably mitigated, with predicted post-development flood levels downstream of the site being consistently lower than pre-development conditions.

The two areas you circled below are very small in area and likely to be anomalies in the terrain, coupled with model margins of error. In my view the wider overall trend is that levels downstream go down, not up, and this is consistent with the increased storage and associated attenuation effect upstream of the culvert.

I have shown additional snapshots of the areas in question below, and as you can see the general trend is for the water levels to go down compared to pre-development conditions.

* Pre-development(WSE) Post-development(WSE)
[cid:image031.png@01D86168.1F3045E0] [cid:image032.png@01D86168.1F3045E0]

1. The pointed area is Building section.
[cid:image033.png@01D86168.1F3045E0]

Trust this addresses your query however if you have any further questions please let me know.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

[cid:image003.png@01D86168.1F3045E0]
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m. [redacted]
www.arassociates.co.nz<http://www.arassociates.co.nz/>

From: [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Sent: Friday, 8 April 2022 11:10 AM
To: [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>
Cc: [redacted]@aprotean.co nz<mailto[redacted]@aprotean.co.nz>>; [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]@belgraviacapital.co nz<mailto[redacted]@belgraviacapital.co nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted]@huttcity.govt.nz<mailto[redacted]@huttcity.govt nz>>; [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and the images. I see there is some improvement in water depth downstream. However, I am not sure if I am reading the images wrong but it also looks like there are areas, particularly on 104 Mohaka St, and 3 Rakaia Gr, where water is deeper (>30mm) in the post development scenario – circled in yellow below. Is that correct? If it is, it may be that this is effect considered no more than minor (a decision for the Wellington Water Land Development team and/or HCC), however it would be worth noting those areas.

[A map of a city Description automatically generated with low confidence]

cheers

[redacted] (he, him) Senior Hydraulic Modeller
[Wellington Water]
Tel 04 912 4400 Mob 021 365 961

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co nz<http://www.wellingtonwater.co nz/>

[cid:image030.jpg@01D86168.1F3045E0]<https://www.wellingtonwater.co nz/your-water/drinking-water/looking-after-your-water/water-conservation/>

From: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Sent: Wednesday, 6 April 2022 1:22 pm
To: [redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Cc: [redacted]@aprotean.co nz<mailto [redacted]@aprotean.co.nz>>; [redacted]
<[redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>; [redacted]
<[redacted]@belgraviacapital.co nz<mailto [redacted]@belgraviacapital.co nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted]
<[redacted]@huttcity.govt.nz<mailto [redacted]@huttcity.govt nz>>; [redacted]
<[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please see screen shots below which better illustrate the pre and post development situation downstream.

As you can see, in most areas downstream the flood impact is positive (lower flood levels in the post-development vs pre-development). There is only one area where there is a 10mm predicted increase in flood levels, which is negligible and within the margin of error of the model.

If you are satisfied with this response, we will update the flood report to reflect this, and issue as a final for approval.

Regards,

[cid:image035.png@01D86168.1F3045E0]

[cid:image036.png@01D86168.1F3045E0]

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

[cid:image003.png@01D86168.1F3045E0]
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From: [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Sent: Monday, 4 April 2022 11:45 AM
To: [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>
Cc: [redacted]<stuart.dixon@aprotean.co nz<mailto[redacted]@aprotean.co.nz>>; [redacted]
<[redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]
<[redacted]@belgraviacapital.co nz<mailto[redacted]@belgraviacapital.co nz>>; Land Development
<Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted]
[redacted]<[redacted]@huttcity.govt.nz<mailto[redacted]@huttcity.govt nz>>; [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thank you for the discussions and your updated memo. I have gone over it and am comfortable that the hydrological methodology aligns with the designated Wellington Water approach.

I am a little unsure about the downstream impacts, particularly on properties 100 – 104 Mohaka St and 3-5 Rakaia Gr. Would it be possible to revise the pre and post difference map (Figure 10) to show if there are any areas with >=50mm difference. The pre and post water level maps do not seem to align well with the difference map (Figure 10).

[Map Description automatically generated]

[A picture containing map Description automatically generated]

[Map Description automatically generated]

cheers

[redacted] (he, him) Senior Hydraulic Modeller
[Wellington Water]
Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co nz<http://www.wellingtonwater.co nz/>

[cid:image030.jpg@01D86168.1F3045E0]<https://www.wellingtonwater.co nz/your-water/drinking-water/looking-after-your-water/water-conservation/>

From: [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>
Sent: Thursday, 31 March 2022 3:16 pm
To: [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Cc [redacted]@aprotean.co nz<mailto[redacted]@aprotean.co.nz>>; [redacted]
<[redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]
<[redacted]@belgraviacapital.co nz<mailto[redacted]@belgraviacapital.co nz>>; Land Development
<Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted]
[redacted]<[redacted]@huttcity.govt.nz<mailto[redacted]@huttcity.govt nz>>; [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your response. We have re-worked the models based on the curve number of 61, and in line with your requirements for the other parameters. Please find updated flood report attached, for your perusal.

Please can you advise at your earliest convenience whether this now meets your requirements.

Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

[cid:image003.png@01D86168.1F3045E0]
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PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz<http://www.arassociates.co.nz>

From: [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Sent: Thursday, 31 March 2022 9:42 AM
To: [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>
Cc: [redacted]@aprotean.co nz<mailto[redacted]@aprotean.co.nz>>; [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]@belgraviacapital.co nz<mailto[redacted]@belgraviacapital.co nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted]@huttcity.govt.nz<mailto[redacted]@huttcity.govt nz>>; [redacted]<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Please see the comments below from our consultant hydrologist. In the case of the Curve Number, I am happy for 61 to be used in place of 63 as per our earlier discussion.

In response to Andres questions,

1. Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question. No. I think this was sufficiently addressed in our previous response. The Tc resulting from averaging the BW and RK methods calibrated well.
2. Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment? No. Please see curve number comments below.

3. Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing? ALI - YOU PROVIDED THIS?
4. Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction? Please see initial abstraction comments below.
5. Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters? We don't believe the recommended parameters are conservative. They have been through a thorough peer review process and validated against a number of different methods. For the design of infrastructure to manage the risk of flooding, and the risk this poses to people and property, these values are appropriate.

Curve Number
The curve number values from Appendix B of the Reference Guide were not a direct import of the values from TR55, the original SCS reference manual (and which are tabulated in the Hec-HMS reference manual). They were initially derived from TR55, then adjusted to improve the calibration to observed hydrographs in rainfall-runoff modelling.

With regard to the catchment upstream of 106 Mohaka Street, we are in agreement that the soil should be classified group C. The landcover is a mix of indigenous forest; broadleaved indigenous hardwoods; and gorse and/or broom. The first two have been classified in the Reference Guide as Forest, while the latter more closely resembles the nature of Scrub/Flax. The CN for forest was adapted from the TR55 table for Brush in Good condition. This had a value of 65. Adjusted for the Wellington region, the value is 63. Scrub/Flax in soil group C has a CN value of 68.

The CN value for the catchment to 106 Mohaka St, should be a weighted CN based on the percentage area of forest x CN63 + percentage area of scrub/flax x CN68.

This value of 63 is the least conservative when compared to recommended values in the Kapiti District (Greywacke group C soils, bush = CN65), Auckland (mudstone/sandstone group C soils, bush, not-grazed = CN70) and in the Waikato region (group C soils, bush = CN 72; bush-weed-grass mix = CN65).

Initial Abstraction
Background to the initial abstraction estimate is provided in the SCS rainfall-runoff model calibration report, which has recently been provided to you. In NZ it is common to use initial abstraction estimates of 0mm for impervious areas, and 5mm for pervious areas. These values are used in the Kapiti and Auckland regions, and have some backing within literature. In the Waikato region, initial abstraction is calculated as a factor of the potential maximum storage, using a coefficient of 0.05 (Ia = 0.05S). This is more conservative than the 0.1S adopted by Wellington Water for undeveloped areas (more conservative in that it leads to greater runoff).

When deciding on an estimate for initial abstraction in the Wellington region, we evaluated various literature, both in NZ and in TR55 and concluded that 0mm in impervious areas and 5mm in pervious developed areas, and 0.1S in undeveloped areas, is reasonable. The difference between pervious developed areas and undeveloped areas, is the former is more likely to have been reshaped/compacted/mowed etc, while the latter is in a more natural form so likely to have greater storage potential.

In comparison to methods being employed throughout NZ, the methodology stipulated in the Reference Guide is, by no means, conservative, and parameters have been set based on calibrating rainfall-runoff models to the local hydrology.

cheers

[redacted] [redacted] (he, him) Senior Hydraulic Modeller
[Wellington Water]
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From: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Sent: Thursday, 24 March 2022 11:23 am
To: [redacted]
<[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Cc: [redacted]@aprotean.co nz<mailto [redacted]@aprotean.co.nz>>; [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>; [redacted]@belgraviacapital.co nz<mailto [redacted]@belgraviacapital.co nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted] <[redacted]@huttcity.govt.nz<mailto [redacted]@huttcity.govt nz>>; [redacted] <[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your time on the phone earlier.

I look forward to receiving your response to my requests below.

You mentioned that based on the new curve number tool, the curve number for the upstream catchment is now 61, which is slightly lower than the previous curve number of 63. Can you confirm that please and also indicate what is the associated initial abstraction? Also are you able to provide a copy of that tool as per previous request?

Also please can you send through gauge information for the catchment as discussed, and any other background information you may be able to provide.

Your soonest response is appreciated.

[redacted]

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From: [redacted]
Sent: Monday, 21 March 2022 12:09 PM
To: [redacted]
[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>

Cc: [redacted] @aprotean.co nz<mailto [redacted] @aprotean.co.nz>>; [redacted] [redacted] @arassociates.co nz<mailto [redacted] @arassociates.co nz>>; [redacted] [redacted] @belgraviacapital.co nz<mailto [redacted] @belgraviacapital.co nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted] [redacted] @huttcity.govt.nz<mailto [redacted] @huttcity.govt nz>>; [redacted] [redacted] @wellingtonwater.co nz<mailto [redacted] @wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Good morning [redacted]

Tried to call you but couldn't get through.

Just following up on my request below please, if you could possibly let us know when we can expect to hear back, it would be appreciated.

Our client is very urged to get this resolved, please feel free to call me if you need to discuss.

Kind regards,

[redacted]
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From: [redacted]
Sent: Thursday, 17 March 2022 5:26 PM
To: [redacted] @wellingtonwater.co nz<mailto [redacted] @wellingtonwater.co.nz>>
Cc: [redacted] @aprotean.co nz<mailto [redacted] @aprotean.co.nz>>; [redacted] <[redacted] @arassociates.co nz<mailto [redacted] @arassociates.co nz>>; [redacted] <[redacted] @belgraviacapital.co nz<mailto [redacted] @belgraviacapital.co nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted] [redacted] @huttcity.govt.nz<mailto [redacted] @huttcity.govt nz>>; [redacted] [redacted] @wellingtonwater.co nz<mailto [redacted] @wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Many thanks for your message and the chat earlier. To summarise our discussion and the next steps further:

1. Time of Concentration:

I still believe that the average Tc approach, which results in a Tc of 19 minutes in the case of the western catchment, seems excessively low for the catchments that we are dealing with, as they have a very dense forest cover (as per below screen shot). I have run an independent check of Tc using SCS methodology and obtained 27 minutes, which is in line with the Bransby-Williams result.

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1. Curve Number:

In addition, the curve number parameter map that you supplied suggests a CN=63, which again seems high and therefore potentially adds another layer of conservatism to the analysis. The HEC-HMS reference manual gives curve numbers of CN=30, 41 and 48 for soil groups B, C, and D respectively, and ground cover characterised by a forest with woody and brush understorey (see below).

S-map on line tool suggests the soil group that applies to the upstream catchments ranges from a B to a D classification (being Bushcroft and Taitapu soil units, see below and soil report files attached). On this basis, the representative curve number would appear to be somewhere between 30 and 48 (for "good" ground cover, being >70% vegetation cover which applies in this case). In our original analysis we had used CN=48, which we believed was conservative at the time.

You mentioned that Wellington Water is in the process of releasing a new tool to estimate curve number. If you could possibly share that with us, it would be very helpful.

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[cid:image043.jpg@01D86168.1F3045E0]

[cid:image044.jpg@01D86168.1F3045E0]

1. Initial Abstraction:

Wellington Water's hydrological modelling guidelines specify that Initial abstraction be obtained from the formula Ia=0.1S. However SCS methodology, being the US Natural Resources Conservation Service method that originally developed the CN and Ia parameters, recommends that Initial Abstraction be calculated as Ia-=0.2S. Wellington Water's specified reduction of the initial abstraction parameter by 50% is obviously conservative as it results in greater discharge rates and volumes. Are you able to clarify the reasons for this?

1. Compounded Effect:

Our view is that the compounded effect of combining conservative hydrological parameters (e.g. Tc, CN and Ia etc), in addition to the requirement for climate change allowance which in itself increases rainfall by 17-30%, is likely to result in excessively high and potentially unrealistic levels of conservatism when calculating peak flows.

To summarise, it would be appreciated if you could please consider and clarify the following:

* Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question.
* Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment?
* Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing?

* Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction?
* Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters?

Please feel free to call me if you'd like to discuss further.

Kind regards,

[redacted]
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From: [redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Sent: Thursday, 17 March 2022 11:39 AM
To: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Cc: [redacted]@aprotean.co nz<mailto [redacted]@aprotean.co.nz>>; [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>; [redacted]@belgraviacapital.co nz<mailto [redacted]@belgraviacapital.co nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted]@huttcity.govt.nz<mailto [redacted]@huttcity.govt nz>>; [redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

How are you? Thanks for your email and for the call on Tuesday.

With regard to your proposal to only use the Bransby-Williams methodology for calculating the time of concentration for the hill catchments upstream of 106 Mohaka St, unfortunately Wellington Water would not find this an acceptable approach.

Below are some more -depth comments from our consultant hydrologists who were involved in the development of the WWL rainfall-runoff methodology, but to summarise it;

* The averaged RK-BW approach was established through review of real events in a real, nearby

catchment, so the BW approach by itself would result in unsuitably long Tc values.

. I have undertaken a few checks to reach this conclusion:

* During development of the model parameters, the nearby catchment Wainuiomata River at Manuka Track was used for calibration. This has a catchment area of 27km2. The observed time of concentration was between 120 mins and 220 mins across three events (average 180 mins). Being real events, this is also dependant on the storm event (spatial and temporal distribution of rainfall over the catchment), however these estimates provide an approximate indication of catchment Tc. The average Tc using Ramser Kirpich (RK) and Bransby Williams (BW) was 120 mins. This calibrated fairly well.

Using a Tc of 55 minutes for the Mohaka catchment, which is approximately 0.43km2 does not align with results from the calibrated rainfall-runoff model.

* My estimates for RW and BW were 10 mins and 28 mins (BW: using a length of 1150m, area of 43ha and equal-area slope of 116 m/km), the average being 19 minutes. This BW estimate is shorter than the applicants estimate of 55 minutes. I acknowledge that different analysts are likely to get slightly different numbers, however, their estimate is approximately double. When using their equal area slope estimate (of 108 m/km from the email below) this makes very little difference, increasing the Tc to 29 minutes. Perhaps one of us has made some inaccurate assumptions??

* An alternative method to empirical equations, is using the Tc component parts. Empirical equations are recommended for larger catchments, where the catchment length exceeds 1000m. As this catchment is only just exceeding the 1000m threshold, estimating Tc from the component parts is a useful check. This also (independently) came out at 19 minutes (overland flow 11.5 minutes + shallow concentrated flow 1.7 minutes + channel flow 6 minutes). It is acknowledged that there is more variation between analysts when following the component parts approach due to the various assumptions that need to be made.

I appreciate the engineers comment in that the Ramser Kirpich equation gives a much faster time of concentration, that on its own, would not be reasonable for this catchment. However during calibration of the model parameters, neither the RK or BW method gave estimates that perfectly aligned with the observed hydrographs. Taking the average of the two methods acknowledged that neither method provided an appropriate representation of catchment runoff characteristics in the region, however when averaging the two, model results calibrated well.

Please let me know if I can provide any additional information.

cheers
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[Wellington Water]
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From: [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>
Sent: Monday, 14 March 2022 3:05 pm
To: [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Cc: [redacted]@aprotean.co nz<mailto[redacted]@aprotean.co.nz>>; [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]@belgraviacapital.co nz<mailto[redacted]@belgraviacapital.co nz>>

Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Further to my voicemail today, this is to let you know that we have further reviewed the hydrology for the above development, and would like to propose a change to the time of concentration (Tc) parameter used in our hydrological model.

As you know, the Wellington Water guideline specifies that the Tc parameter should be calculated based on the Ramser-Kirpich and Bransby-Williams methods. Our previous RFI response had accordingly estimated Tc values that were based on the average between both of these methods.

However, upon further review of available technical literature on the Ramser-Kirpich method, we note that the literature warns that this method can lead to excessively low time of concentration values (and associated high rainfall intensities) if incorrectly applied, given that this method is actually designed for catchments that have well-defined channels. This is in fact evidenced in our calculations, where Tc's of about 10 and 14 minutes were obtained for the western and northern catchments, which seem excessively low given that both these catchments are undeveloped forest and over a kilometre long.

On the other hand, the Bransby-Williams formula applies to catchments without well defined channels, and where runoff is characterised by overland flow. In our view this method is more representative of the catchments we are dealing with, as they are undeveloped with a heavy forest canopy, and where runoff is therefore likely to be dominated by overland flows (rather than flow via well-defined channels). We therefore consider that for this project, the Ramser-Kirpich formula should be ignored altogether, and the Bransby-Williams equation adopted instead, as the method to calculate Tc.

I would be grateful if you could possibly look into this and let me know if you agree with this change, in which case we will tweak the calculations and submit a revised version.

Please feel free to call me if you'd like to discuss further.

Kind regards,

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From: [redacted]
Sent: Monday, 17 January 2022 8:07 PM
To: [redacted]

<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Cc: [redacted] <[redacted]@urbanedgeplanning.co nz<mailto[redacted]@urbanedgeplanning.co.nz>>; [redacted]
[redacted] <[redacted]@aprotean.co nz<mailto[redacted]@aprotean.co nz>>; [redacted]
<[redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>; Land Development
<Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

We have reviewed the hydrological analysis following the guidelines that you provided in your 23/12/21 and 120/01/22 emails, and attach our response within the revised memo herein.

Trust this now meets your requirements, however please feel free to give me a call if you have any further queries.

Kind regards,

[redacted]
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From: [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Sent: Monday, 10 January 2022 4:44 PM
To: [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>
Cc [redacted]@urbanedgeplanning.co nz<mailto[redacted]@urbanedgeplanning.co.nz>>; [redacted]
[redacted] <[redacted]@aprotean.co nz<mailto[redacted]@aprotean.co nz>>; [redacted]
<[redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>; Land Development
<Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and Happy New Year also.

The WWL recommended approach for time of concentration is outlined in Section 2.5 of our Reference

Guide for Design Storm Hydrology. For the catchment you highlighted below, I think the recommendation would be the use of the Ramser-Kirpich and Bransby-Williams approaches (see below). In the end this is what we would compare the results from any other method against to check suitability, so we recommended external parties adopt it from the outset. Let me know if I can provide any additional information.

[Text Description automatically generated]

cheers

[redacted] (he, him) Senior Hydraulic Modeller
[Wellington Water]
Tel 04 912 4400 Mob[redacted]

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[cid:image046.jpg@01D86168.1F3045E0]<https://www.wellingtonwater.co nz/your-water/drinking-water/looking-after-your-water/water-conservation/>

From: [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>
Sent: Monday, 10 January 2022 4:16 pm
To: [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Cc: [redacted]na@urbanedgeplanning.co nz<mailto[redacted]@urbanedgeplanning.co.nz>>; [redacted]@aprotean.co nz<mailto[redacted]@aprotean.co nz>>; [redacted]@arassociates.co nz<mailto[redacted]@arassociates.co nz>>; [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>; Land Development <Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi[redacted]

Happy New Year and thanks for your message, which we are looking into now.

Before we prepare a response, can you please clarify what is the recommended time of concentration method you are referring to? we are using the Equal Areas Method to determine average catchment slope, and the SCS method to calculate time of concentration using the average slope and length – see extract below.

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[cid:image048.png@01D86168.1F3045E0]

Regards,

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CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
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From: [redacted]
[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Sent: Thursday, 23 December 2021 2:20 PM
To: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Cc: [redacted]@urbanedgeplanning.co nz<mailto [redacted]@urbanedgeplanning.co.nz>>; [redacted]
[redacted]@aprotean.co nz<mailto [redacted]@aprotean.co nz>>; [redacted]
<[redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>; [redacted]
[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>; Land Development
<Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks very much for your email and information. I was hoping to meet/chat with you before any more modelling was done so I could supply our CN and IA layer (attached) for a more accurate representation in your model. Unfortunately in the layer attached, the majority of the catchment upstream of the site has a CN value over 60, which may impact your results. If you do further model runs, can you confirm you have used our recommended approach for calculating the time of concentration and apply the nested profile we have developed (I have attached a spreadsheet template for it).

With regard to the upstream channels, do you have any images available of the survey locations for the channel sections and photos of the channels at the time of survey? I am viewing the site with google maps aerial photography which shows significant vegetation across the channel footprint. Also, can you confirm that the condition of the channels will remain the same pre and post development (eg, the channels will not be cleared and made more efficient post development), or if changes are made they will be offset (eg potentially by increasing storage capacity from raising the existing crossing).

A great cross check to see would be a couple of Manning's calcs for the channels using a couple of surveyed sections to get a ballpark idea of their capacity. We can do this at our end if you would prefer and can supply us the surveyed sections.

cheers

[redacted] (he, him) Senior Hydraulic Modeller
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[cid:image049.jpg@01D86168.1F3045E0]<https://www.wellingtonwater.co nz/your-water/drinking-water/looking-after-your-water/water-conservation/>

From: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Sent: Wednesday, 22 December 2021 6:08 pm
To: [redacted]
<[redacted]@wellingtonwater.co nz<mailto [redacted]@wellingtonwater.co.nz>>
Cc: [redacted]@urbanedgeplanning.co nz<mailto [redacted]@urbanedgeplanning.co.nz>>; [redacted]
[redacted]@aprotean.co nz<mailto [redacted]@aprotean.co nz>>; [redacted]

<[redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please find attached our response to your information request last 16 December as per below.

Hopefully the response is self-explanatory, however please let me know if you'd like to discuss any aspect of this document.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

[cid:image003.png@01D86168.1F3045E0]
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PO Box 65 576 Mairangi Bay, Auckland 0754
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www.arassociates.co.nz<http://www.arassociates.co.nz>

From: [redacted]@arassociates.co.nz<mailto:[redacted]@arassociates.co.nz>>
Sent: Thursday, 16 December 2021 5:50 PM
To: [redacted]@arassociates.co nz<mailto [redacted]@arassociates.co nz>>
Cc: [redacted]@urbanedgeplanning.co nz<mailto [redacted]@urbanedgeplanning.co.nz>>; [redacted] Dixon [redacted]@aprotean.co nz<mailto [redacted]@aprotean.co nz>>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

[redacted]

[cid:image003.png@01D86168.1F3045E0]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz<http://www.arcivil.co.nz/>

From: [redacted] @urbanedgeplanning.co nz<mailto [redacted] @urbanedgeplanning.co.nz>>
Sent: Thursday, 16 December 2021 4:52 pm
To: [redacted] @aprotean.co nz<mailto [redacted] @aprotean.co.nz>>; [redacted]
< [redacted] @arassociates.co nz<mailto [redacted] @arassociates.co nz>>; [redacted] '
[redacted] @belgraviacapital.co nz<mailto [redacted] @belgraviacapital.co nz>>
Subject: Fw: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi all

I've received the information below and attached from Wellington Water - they have a number of concerns/areas where additional information is needed. I've also been speaking to [redacted] today. Because WWL aren't able to provide written approval for the GWRC process, [redacted] [redacted] isn't happy signing off on the stormwater side of things, so the WWL issue is affecting both GWRC and HCC applications now.

[redacted] and [redacted] I'm happy for you to meet directly with Wellington Water online to work towards addressing their concerns/issues. It won't make sense at all to me as a non-engineer, so I'll sit out and let you both take charge of this side of things!

[redacted], do you want to get in touch with [redacted] to arrange a meeting?

Cheers

[redacted]

From: [redacted] @huttcity.govt nz<mailto [redacted] @huttcity.govt.nz>>
Sent: Thursday, 16 December 2021 11:02 am
To: [redacted] @urbanedgeplanning.co nz<mailto [redacted] @urbanedgeplanning.co.nz>>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

See below for feedback from WWL on the flood modelling. It sounds like we may need to set up a meeting between the modellers.

Kind regards,

[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www huttcity.govt nz<http://www huttcity.govt.nz>

[cid:image050.jpg@01D86168.1F3045E0]

From: [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Sent: Thursday, 16 December 2021 10:54 AM
To: [redacted]@theurbanengineers.co nz<mailto[redacted]@theurbanengineers.co nz>)
<[redacted]@theurbanengineers.co nz<mailto[redacted]@theurbanengineers.co.nz>>; [redacted]
<[redacted]@huttcity.govt.nz<mailto:[redacted]@huttcity.govt nz>>; [redacted]
[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co nz>>
Cc: [redacted]
<[redacted]@wellingtonwater.co.nz<mailto:[redacted]@wellingtonwater.co nz>>
Subject: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please see the following concerns from our modelling team, regarding the flood model & floor levels.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development

[cid:image051.gif@01D86168.1F3045E0]

Tel [redacted] Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co nz<http://scanmail.trustwave.com/?c=4062&d=wvvK3FdiO2x-Kbx0ezw4pU4bFgRcW1u1Uxh7t3JlrQ&s=1279&u=http%3a%2f%2fwww%2ewellingtonwater%2eco%2enz%2f>

Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water, wastewater and stormwater services.

From: [redacted]
<[redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Sent: Thursday, December 16, 2021 10:35 AM
To: [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>; [redacted]
[redacted]@wellingtonwater.co.nz<mailto[redacted]@wellingtonwater.co.nz>>
Subject: RE: RM210328 - 106 Mohaka Street

Kia ora [redacted]

Thanks for your email. My points of concern are below:

* Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology

specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.
* Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may over estimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.
* Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

A meeting (online) with the modellers would be very useful to discuss and potentially resolve these issues.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

[Wellington Water]

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co nz<http://www.wellingtonwater.co nz/>

[cid:image052.jpg@01D86168.1F3045E0]<https://www.wellingtonwater.co nz/your-water/drinking-water/looking-after-your-water/water-conservation/>

From: [redacted]@wellingtonwater.co nz<mailto[redacted]@wellingtonwater.co.nz>>
Sent: Wednesday, 15 December 2021 1:33 pm
To: [redacted]@wellingtonwater.co nz<[redacted]@wellingtonwater.co.nz>>; [redacted]@wellingtonwater.co.nz<mailto:[redacted]@wellingtonwater.co.nz>>
Subject: FW: RM210328 - 106 Mohaka Street

Hi [redacted] & [redacted]

Would you be able to provide a summary of the concerns regarding 106 Mohaka flood model/floor level /secondary flow path? Planner and RMA team is waiting for an update.

Thanks
[redacted]

From: [redacted] @huttcity.govt nz<mailto[redacted] @huttcity.govt.nz>>
Sent: Wednesday, December 15, 2021 9:14 AM
To: Land Development
<Land.Development@wellingtonwater.co nz<mailto:Land.Development@wellingtonwater.co.nz>>; [redacted]
[redacted] @wellingtonwater.co.nz<mailto [redacted] @wellingtonwater.co nz>>
Subject: RE: RM210328 - 106 Mohaka Street

Hi [redacted]

I'm just following up as the applicant has requested an update. Have you had the chance to look at this one?

Thanks

[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www huttcity.govt nz<http://www huttcity.govt.nz>

[cid:image050.jpg@01D86168.1F3045E0]

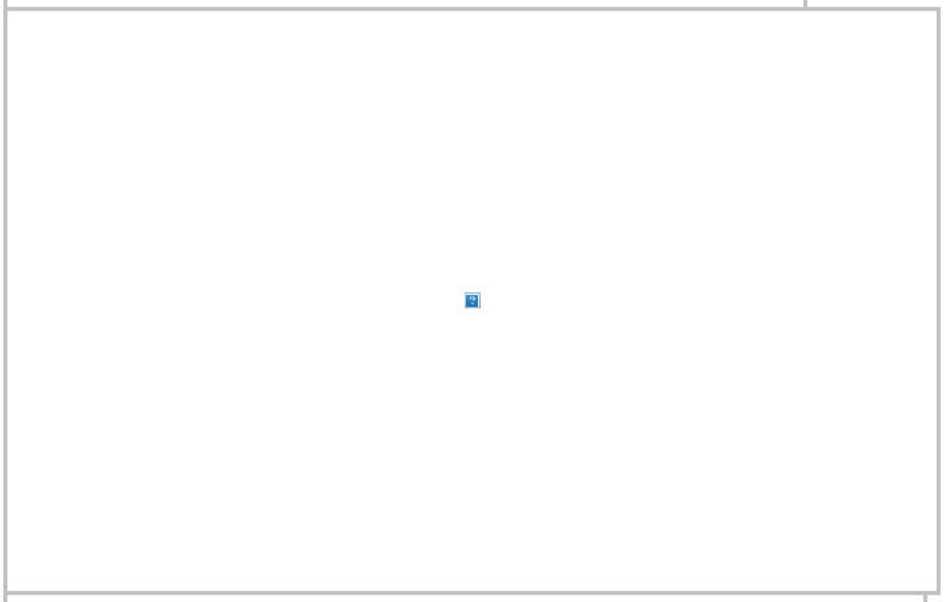
From: [redacted]
To: [redacted]
Cc: [redacted]
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment
Date: Tuesday, May 17, 2022 2:24:02 PM
Attachments: image005.jpg
image006.jpg
image009.png
image011.png
image012.png
m_ge015.png
image016.png
image018.png
m_ge022.png
image023.jpg
image025.png
image026.png
image027.png
image028.png
image029.png
image031.png
image037.png
image039.png
image040.jpg
m_ge041.jpg
image042.jpg
image043.jpg
m_ge001.png

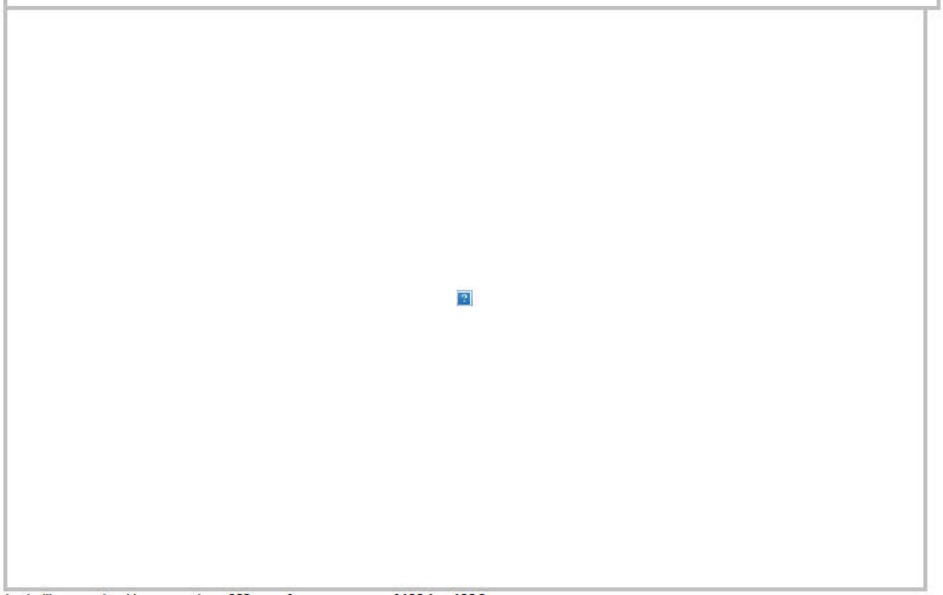
Kia ora [redacted]
Thanks for your email. I think it would be reasonable to ask the 106 Mohaka folk to confirm their modelled water levels do not have an adverse impact of the SW drainage system of the Meremere development. I m not sure how the network and outlets for the Meremere development were designed but a specific downstream condition may have been assumed/applied. If it is different to the currently modelled post 106 Mohaka development levels then an assessment of the future performance of the outlets may be needed.
I do need to caveat the comments above by saying I m not a drainage engineer and I m not entirely up to speed on subdivision development rules so feel free to discard my comments if you don t think they apply.
cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

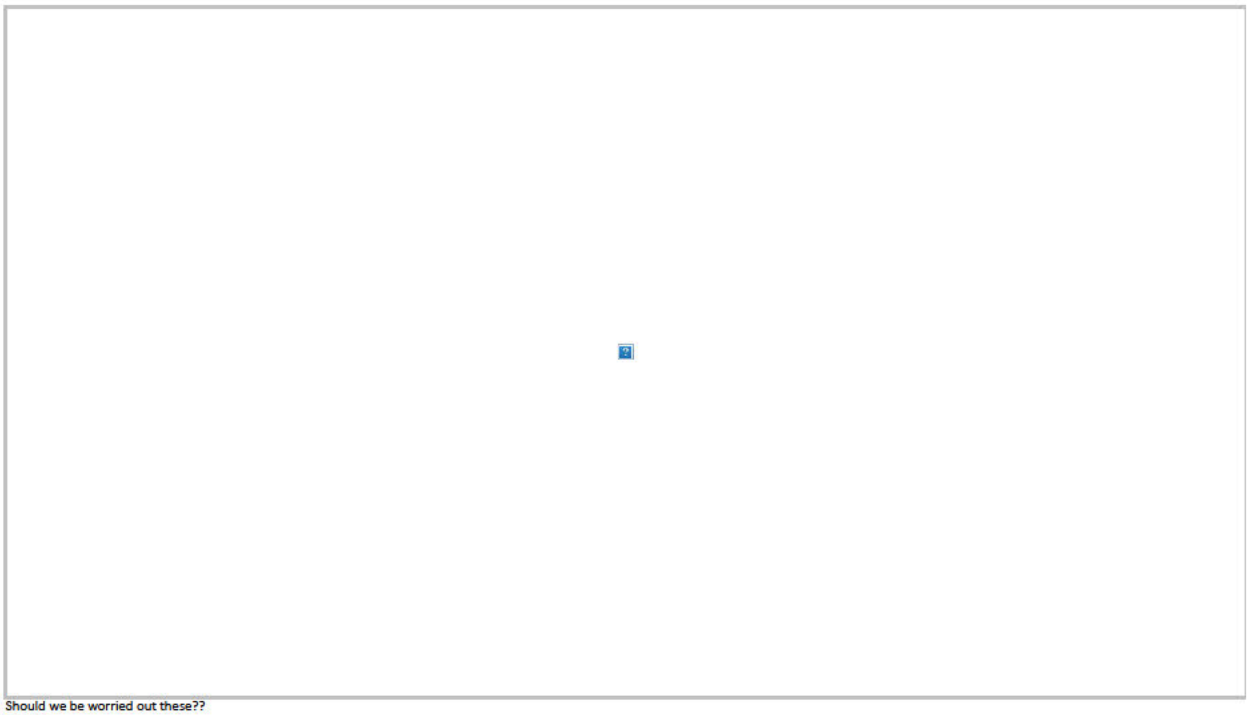
Tel 04 912 4400 **Mob** [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday 17 May 2022 2 00 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@e2environmental.com>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment
Hi [redacted]
Thanks for all your efforts – just one bit I am concerned with I sthe back up within the Meremere St channel.





Looks like water level increases about 200mm – from an average of 106.1 to 106.3.
Looking at outfalls of the adjoining lots in Meremere – which were supposed to be at 100 year level (or as close as possible) – the additional 200mm would flood 2 of the outfalls (already constructed).



Should we be worried out these??
Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Friday 13 May 2022 4 15 pm
To: [redacted]@huttcity.govt.nz>
Cc: [redacted]@e2environmental.com>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: FW [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora[redacted]
How are things? I think I may be happy with the hydraulic modelling and hydrology both methodology and output.
In terms of offsite effects I think the increase backyard channel in through 108 to 112 Mohaka St is acceptable. Downstream of the site the water level difference are also acceptable. There wide areas of increased water level except perhaps in 3 Rakaia Gr in the vicinity of the existing garage. However I think this increase is likely to be a result of an issue in the ground model (where the building has been removed from the LiDAR data) and probably wouldn t exist in reality – that is the extra volume of water we are seeing collecting there would be distributed across the site resulting a negligible difference in pre and post water levels.
With regard to onsite runoff I haven t gone over the calcs sorry. I m in two minds about including it in the model [redacted] point about the shorter time of concentration is valid and theoretically local runoff will have disappeared by the time the upstream flows arrive. But that potentially depends on how fast runoff/ponding from the roads will clear. Keen to hear what you think.

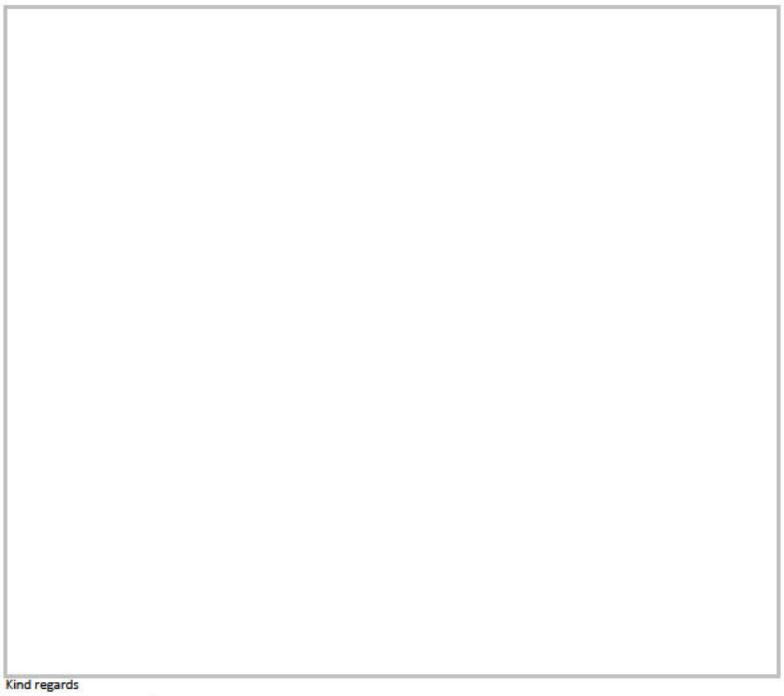
Hope you have a good weekend.
Cheers

[redacted] **(he, him)** Senior Hydraulic Modeller

Tel 04 912 4400 Mob[redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Friday 13 May 2022 8 28 am
To: [redacted]@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

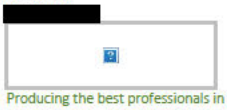
Morena[redacted]
Yes that is correct. n HEC-RAS modelling we used a Manning's coef. 0.07 on entire 2D flow area like below picture.



Kind regards

[redacted]
ME CPEng

[redacted]



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ph [redacted] m [redacted]
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From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday 12 May 2022 12 05 pm
To: [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora [redacted]
Thanks for that (and for your second email with the cross-sections). One quick follow up query with regard to the roughness. Is the Manning's coefficient of 0.07 of applied across the whole model in particular downstream of 106 Mohaka St where there are residential properties?
cheers

[redacted] **(he, him)** Senior Hydraulic Modeller

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Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday 11 May 2022 5 10 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora [redacted]
Thank you for your prompt follow up appreciate it.
Based on the ariel the surface roughness appears to be minor natural streams with medium to dense shrubs and trees – natural vegetation. Hence Manning's coefficient of 0.07 is adopted in our calculations. The site is very small are with very small time of concentration when compared to other catchments. Therefore runoff from the site is not expected to alter the flood surface modelling. However happy to include if required.
With regards to the cross sections we are working on it and hope to provide it to you by tomorrow.
Kind regards

[redacted]

ME CPEng
[redacted]

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ph. [redacted] m. [redacted]
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From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday 11 May 2022 11 53 am
To: [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>
Cc: [redacted]@arassociates co nz>; [redacted]@arassociates co nz>; [redacted]@belgraviacapital co nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora [redacted]

Apologies for the quick follow up email. Could you please provide some cross-sections showing water level and width/extent for the lines (or similar) shown below (yellow lines) – I note on some of the report figures there are section lines already drawn – these existing line positions are fine to use. We are keen to confirm that the increased water levels shown in 108 to 112 Mohaka St and in the upstream Meremere development are contained within the existing channels or if there are any new wet areas.

A map of a city⊟⊟ Description automatically generated with medium confidence

cheers

[redacted] **(he, him)** Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Tuesday 10 May 2022 8 25 pm
To: [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted] and [redacted]

Thank you for your comments and your assistance in resolving issues. This SharePoint link 2022.05.10 - RFI RESPONSE 3 Contains

1. Technical Memo - Flood Risk Management and Fish Passage;
2. Revised Calculations; and
3. RFI tracking spreadsheet.

I hope the above information provided will address all of your information request. Should you have any queries please feel free to contact me.

Kind regards

[redacted]
ME CPEng
[redacted]

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PO Box 65 576 Mairangi Bay Auckland 0754
ph [redacted] m [redacted]
www arassociates co nz

From: [redacted] @arassociates.co.nz>
Sent: Tuesday 10 May 2022 9 29 am
To: [redacted] @huttcity.govt.nz>; [redacted] @aprotean.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity govt nz>; [redacted] @e2environmental com>; [redacted] @wellingtonwater co nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Good morning [redacted]
Confirming we will incorporate the fish passage pipe into the model we hope to be able to provide the results of the revised model today.
Regards

[redacted]
CPEng CMEngNZ IntPE (NZ) DipGeothermTech

[redacted]

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Level 3 Takapuna Finance Centre
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PO Box 65 576 Mairangi Bay Auckland 0754
m [redacted]
www arassociates co nz

From: [redacted] @huttcity.govt.nz>
Sent: Tuesday 10 May 2022 6 17 AM
To: [redacted] @aprotean.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

HI Team
I am presuming with the change in design there will be a new version of the model being run? Please confirm ASAP.
I don t want [redacted] reviewing the existing modelling results further if they are going to be updated and a new version coming out.
Cheers

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www huttcity govt nz

From: [redacted] @aprotean co nz>
Sent: Monday 9 May 2022 3 13 pm
To: [redacted] @huttcity.govt.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean co nz>; [redacted] @belgraviacapital co nz>; [redacted] @urbanedgeplanning co nz>; [redacted] @arassociates co nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted]
No the 525 would be scrapped all together. Only the overland flow path would remain effectively.
We will investigate the pipe type selection.
Regards

[redacted]
L1 193-195 Main Road Tawa 5028
M: [redacted] E: [redacted] @aprotean.co.nz

From: [redacted] @huttcity.govt.nz>
Sent: Monday 9 May 2022 3 10 pm
To: [redacted] @aprotean co nz>; [redacted] @arassociates co nz>; [redacted] @arassociates co nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

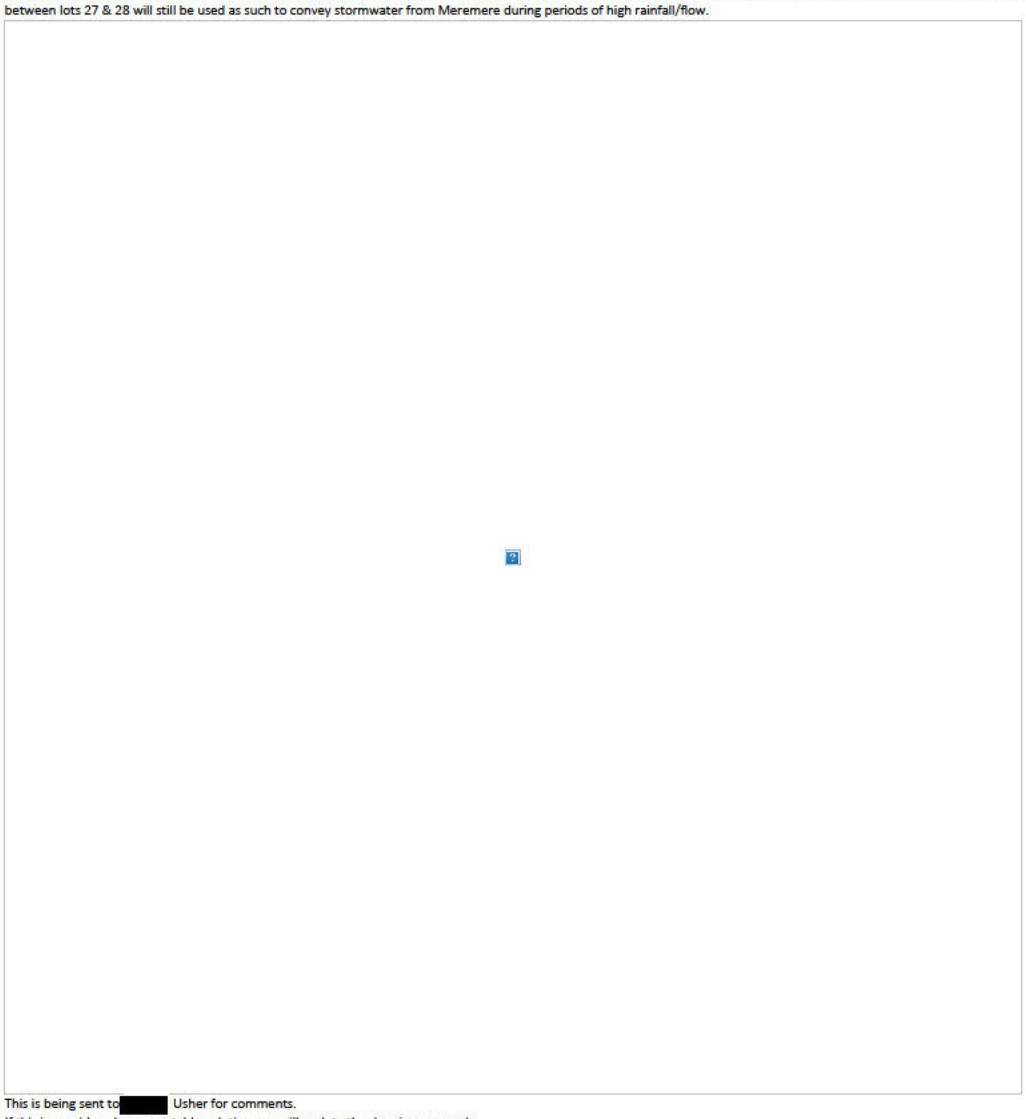
HI [redacted]

So low flows to 375 but higher flows to 525 between units 27 & 28? Do you have a sketch for how this looks at intake? Will this require modelling to be updated??
Presume this pipe is to be public as taking Meremere flows – please check but don t think stormboss pipe is on WWL approved product list?
Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www huttcity govt nz

From: [redacted]@aprotean.co.nz>
Sent: Monday 9 May 2022 3 01 pm
To: [redacted]@huttcity.govt.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment
Hi [redacted]
Currently we are looking at an alternative to promote fish passage from the Meremere intake.
Please see below sketch showing the proposed pipe work to manage the ephemeral flows and fish passage. Note that the pipe work will maintain current watercourse inverts and grades. The overland flow path between lots 27 & 28 will still be used as such to convey stormwater from Meremere during periods of high rainfall/flow.



This is being sent to [redacted] Usher for comments.
If this is considered an acceptable solution we will update the drawings properly.
Regards
[redacted]
L1 193-195 Main Road Tawa 5028
M: [redacted] E: [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Monday 9 May 2022 2 51 pm
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hey Team

Understand after all of the others matters noted today – we (if I haven t missed something) – only have fish passage to go. Just need to know there is a solution that can be finalised under detailed design that will fit with everything currently in play then I can condition around it.

I will stop looking at engineering stuff for now and get back in GWRC docs.

Cheers

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www huttcity govt nz

From: [redacted]
Sent: Monday 9 May 2022 2 48 pm
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

HI team

Not an issue really now but for detailed design please note

- Two line 5 long sections– either line 5 & continued Line 5 or 5a & b
- Line 5a – detention understand you cant lay flatter than 1 in 200 (maybe 300 at a push) 1 in 500 shown.
- Presume SWLine swpill existing culver under entrance

Cheers

[redacted]

From: [redacted]
Sent: Monday 9 May 2022 11 18 am
To: [redacted]@arassociates co nz>; [redacted]@arassociates co nz>; [redacted]@aprotean co nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi Team

Notes on Services

- Resolved 1.1m fall at MH downstream of Meremere intake by adding new MH in between to step main – max 0.5m. Note haven t checked MH sizes this will be a detailed design aspect.
- Pte shared SW in front of 23-27 moved to be under carparks to connect to new MH above
- I have sent off to WWL for confirmation re 4m access/easement between units 27 & 28 – but note will likely need the following
  - Access is required 24/7 this will see need to remove carparks/ landscaping to achieve – this is a big one!
  - easements shown on lot 27 28 and ROW
  - consent notice for the units 27 & 28 requiring foundation design to RSWS
  - condition for accessway to be formed as part of civil works – sealed or possibly gabion blocks?
  - Consent notice 27 & 28 that accessway to remain 24/7 and no fencing to obscure
  - Condition that residents association maintain accessway
  - Look at how we can stop people using as a carpark – bollards with WWL padlock?
- Detail D-421 to be updated to show accessway & overland flow path
- As previously noted services seem close to water ridermain – this is a detailed design aspect and will be conditioned to confirm clearances met at detailed design stage.

Cheers

[redacted]

From: [redacted]
Sent: Monday 9 May 2022 10 05 am
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted].Osborne@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

HI [redacted]

Thank you for the link and updated information. I have started looking through and have the following comments/queries on the WSUD ponding info

Ponding cross-sections – see attached marked-up (scribbled on) plans

- Section C depth of ponding most of mountable kerb depth. Understood plan was to have full F&C here based on DWGS3.300. Presume k&c will have gaps for raingarden intake?? – please confirm
- Section D3 – dish channel at edge of carparking? Please confirm depth of flow being stepped into.
- Section D4 – as above
- Section D5 – raised chicane removed – noted in roading section H "traffic calming chicane enclosed by edge beams tree pit or similar planting". If planting in place then detail will ned to be updated to allow for pit(?) – will this be flooded during events?? Has this been agreed with traffic engineer??
- Section E1 – as above
- Section E2 – what is the break in roadway indicated?
- Section E4 – should this not show a dish channel ??
- DWG S3-433 – seems double up of S3-432

Cheers

[redacted]

From: [redacted]@arassociates.co.nz>
Sent: Friday 6 May 2022 5 45 pm
To: [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>

Subject: [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted]

Thank you for your assistance in getting this project over the line.

As per your request Connor has provided HEC-RAS modelling data and the out puts to [redacted] is following it up with [redacted]

Please also find enclosed SharePoint link 2022 05 06 -RFI RESPONSE 2 containing the documents you have requested at the meeting as below.

1. Cross-sections showing the 1 in 10 and 1 in 100 year ponding at the locations identified in your email. The ponding will expected to last for a short duration when the street activities are minimum.
2. Updated set of drawings showing the new pump stations are now located in the parking areas. An additional manhole is added in line 2 (Meremere street intake) as suggested. Line 5 is realigned to get the 90 degree connection.
3. Updated calculations.

Thank you again and hope to get all the queries resolved by Monday.

Kind regards

[redacted]
ME CPEng
[redacted]

Producing the best professionals in our field

To influence and contribute to a more sustainable world.

AR & Associates Ltd
Level 3 Takapuna Finance Centre
159 Hurstmere Rd Takapuna Auckland 0622
PO Box 65 576 Mairangi Bay Auckland 0754
ph [redacted] m [redacted]
www.arassociates.co.nz

From: Land Development
To: [redacted] Land Development; [redacted]
Subject: RE: WGN210346 - MHV Limited development - 106 Mohaka Street -wwl - 29 June 2021
Date: Tuesday, June 29, 2021 3:53:33 PM
Attachments: image002.gif
image003.png

Hi [redacted]
Can we ask the applicant if they can demonstrate/confirm the cut and fill has min effect on the stormwater movement, and min effect to neighboring properties?
Thanks

[redacted] **Senior Engineer - Land Development**
Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water, wastewater and stormwater services.

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, June 16, 2021 8:07 AM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: FW: WGN210346 - MHV Limited development - 106 Mohaka Street
Hi team,
We have be asked to provided an affected party approval for the earthworks phase of a development in Wainuiomata, details attached.
Approval is required for effects to the existing networks in terms of capacity with GWRC authorising sediment controls etc for water quality.
Are you able to please advise if there are any concerns or issues that would mean our approval should not be provided.
Thanks for your help with this.
Regards
[redacted]

From: [redacted]@gw.govt.nz>
Sent: Tuesday, 15 June 2021 4:43 pm
To: [redacted]@wellingtonwater.co.nz>
Subject: WGN210346 - MHV Limited development - 106 Mohaka Street
Hi [redacted]
I am in the process of processing a consent for earthworks and sediment-laden water at 106 Mohaka Street, Wainuiomata. The sediment-laden water will discharge via decanting earth bunds to the stormwater network on Mohaka Street. This is shown on Figure 1 of the earthworks report, which is attached. At this stage the applicant has not sought consent for operational-phase stormwater. This will be sought at a later date alongside application for earthworks and sediment-laden discharges from the exclusion zone (as shown on Figure 1 of the earthworks report).
The erosion and sediment controls have been reviewed and are acceptable. I have attached a copy

of this review too.
The applicant is also seeking resource consent from Upper Hutt City Council.
Could you please let me know whether WWL have any issues with this proposal?
If not and WWL are happy with what is proposed and the discharge to the network, could you please provide written approval to this effect?
Give me a call if you would like to discuss.
Thanks,

[redacted]

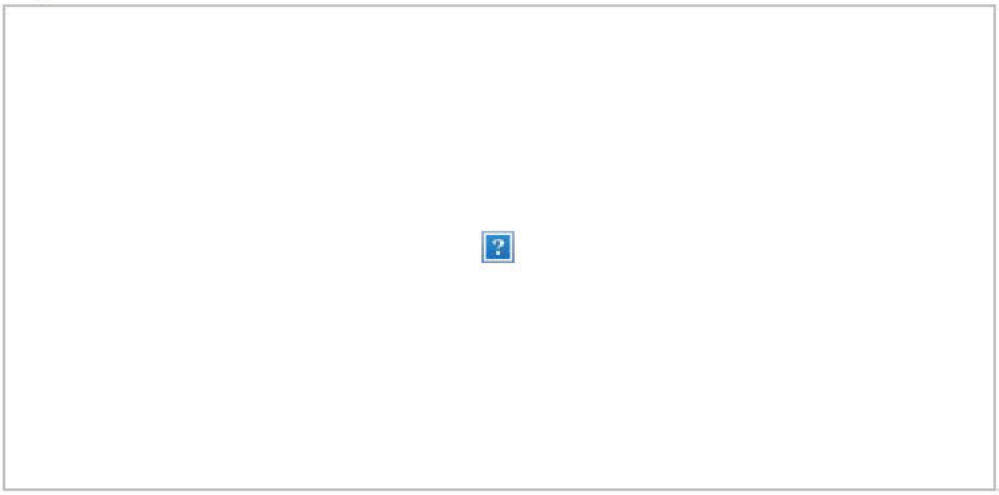
makaurangi

[redacted] (she/her)
Kaitohutohu / Resource Advisor
Greater Wellington Te Pane Matua Taiao
Ph: [redacted]
100 Cuba St, Te Aro, Wellington 6011
Follow us online: Facebook | Twitter | gw.govt.nz

From: [redacted]
To: Land Development; [redacted]
Subject: RE: WWL affected party - WGN220073 - 106 Mohaka Street
Date: Friday, December 3, 2021 4:16:16 PM
Attachments: image001.png
image003.png

Cool! I will have a chat with you on Mon.
Cheers
[redacted]

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Friday, December 3, 2021 4:05 PM
To: [redacted]@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>; Land Development
<Land.Development@wellingtonwater.co.nz>
Subject: RE: WWL affected party - WGN220073 - 106 Mohaka Street
Hi [redacted]
There is a flood model and at one stage we were thinking the site could be used for flood attenuation. Happy to discuss what I know worth you next week. Wainuiomata growth report has some information in SW sections.
Regards



From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 1 December 2021 12:31 pm
To: [redacted]@wellingtonwater.co.nz>; Land Development
<Land.Development@wellingtonwater.co.nz>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: RE: WWL affected party - WGN220073 - 106 Mohaka Street
Hi [redacted]
The applicant just supplied a new set of design info to HCC. I am reviewing those info at the moment. I believe there is not sufficient info at the moment, especially for the flood model. I have scheduled a modelling review with modelling team next Mon.
Can you confirm which aspect you would like me to review specifically?
Thanks
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, December 1, 2021 12:19 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: WWL affected party - WGN220073 - 106 Mohaka Street

Hi Team,

WWL is now being considered as affected for the operational discharges and the vesting of assets for the residential redevelopment at 106 Mohaka in Wainui.

Details on woogle at the link below.

https://woogle.wellingtonwater.co.nz/team/regst/plan/Forms/aByName.aspx?RootFolder=%2Fteam%2Fregst%2Fplan%2FAffected%20party%20approvals%20requests%2F106%20Mohaka%20Street&FolderCTID=0x01200029D1D45BC11BAF498627EE823E2A6080&View=%7BF5A3CE13%2D01D2%2D405F%2DBEE5%2D124AF499C9DF%7D

We had previously provided our approval for the temporary discharges associated with the earthworks.

Are you able to please advise on whether we are happy to provide this approval?

Regards

[redacted]

From: [redacted]@gw.govt.nz>
Sent: Wednesday, 22 September 2021 6:16 pm
To: [redacted]@wellingtonwater.co.nz>
Subject: WGN220073 - 106 Mohaka Street

Hi [redacted]

I am processing an operational-phase stormwater consent for 106 Mohaka Street. This is currently being reviewed by a stormwater engineer – I will provide you with a copy of this when received. They have stated that stormwater up to the 1% AEP event will be managed on site, that they will achieve hydraulic neutrality and bioretention devices will be used for treatment.

A link to the application and infrastructure report is available here: https://greaterwellington-my.sharepoint.com/personal/rubie_mclintock_gw_govt_nz/_layouts/15/onedrive.aspx?id=%2Fpersonal%2F[redacted]%5Fgw%5Fgovt%5Fnz%2FDocuments%2F106%20Mohaka%20Street%20%2D%20docs (you will likely get another email from me with a link in it)

In addition to this, we are processing a consent for the discharge of sediment-laden water associated with the earthworks from the rest of the site. This will be discharged similarly to the method used for Stage 1 and 2 (via a SRP to the network). For the Stage 1 and 2 earthworks you recommended that a condition requiring them to inspect network with CCTV is imposed. Would you recommend that the same condition is included on this one too? The erosion and sediment controls are currently being reviewed and I can provide you with this review upon receipt.

Could you please let me know whether WWL have any issues with this proposal?

As the discharge is to the network, WWL are being treated as an affected party.

Thanks,

[redacted]

makaurangi

[redacted] (she/her)
Kaitohutohu / Resource Advisor
Greater Wellington Te Pane Matua Taiao
Ph: 021 813 384

100 Cuba St, Te Aro, Wellington 6011
Follow us online: Facebook | Twitter | gw.govt.nz

From: [redacted]
To: [redacted]; Land Development; [redacted]
Subject: RE: WWL affected party - WGN220073 - 106 Mohaka Street
Date: Wednesday, December 1, 2021 12:31:18 PM
Attachments: image001.png

Hi [redacted]
The applicant just supplied a new set of design info to HCC. I am reviewing those info at the moment. I believe there is not sufficient info at the moment, especially for the flood model. I have scheduled a modelling review with modelling team next Mon.
Can you confirm which aspect you would like me to review specifically?
Thanks
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, December 1, 2021 12:19 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: WWL affected party - WGN220073 - 106 Mohaka Street
Hi Team,
WWL is now being considered as affected for the operational discharges and the vesting of assets for the residential redevelopment at 106 Mohaka in Wainui.
Details on woogle at the link below.
https://woogle.wellingtonwater.co.nz/team/regst/plan/Forms/aByName.aspx?RootFolder=%2Fteam%2Fregst%2Fplan%2FAffected%20party%20approvals%20requests%2F106%20Mohaka%20Street&FolderCTID=0x01200029D1D45BC11BAF498627EE823E2A6080&View=%7BF5A3CE13%2D01D2%2D405F%2DBEE5%2D124AF499C9DF%7D
We had previously provided our approval for the temporary discharges associated with the earthworks.
Are you able to please advise on whether we are happy to provide this approval?
Regards
[redacted]

From: [redacted]@gw.govt.nz>
Sent: Wednesday, 22 September 2021 6:16 pm
To: [redacted]@wellingtonwater.co.nz>
Subject: WGN220073 - 106 Mohaka Street
Hi [redacted]
I am processing an operational-phase stormwater consent for 106 Mohaka Street. This is currently being reviewed by a stormwater engineer – I will provide you with a copy of this when received. They have stated that stormwater up to the 1% AEP event will be managed on site, that they will achieve hydraulic neutrality and bioretention devices will be used for treatment.
A link to the application and infrastructure report is available here: https://greaterwellington-my.sharepoint.com/personal/[redacted]_gw_govt_nz/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Frubie%5Fmclintock%5Fgw%5Fgovt%5Fnz%2FDocuments%2F106%20Mohaka%20Street%20%2D%20docs (you will likely get another email from me with a link in it)
In addition to this, we are processing a consent for the discharge of sediment-laden water associated with the earthworks from the rest of the site. This will be discharged similarly to the method used

for Stage 1 and 2 (via a SRP to the network). For the Stage 1 and 2 earthworks you recommended that a condition requiring them to inspect network with CCTV is imposed. Would you recommend that the same condition is included on this one too? The erosion and sediment controls are currently being reviewed and I can provide you with this review upon receipt.
Could you please let me know whether WWL have any issues with this proposal?
As the discharge is to the network, WWL are being treated as an affected party.
Thanks,

[redacted]

makaurangi

[redacted] (she/her)
Kaitohutohu / Resource Advisor
Greater Wellington Te Pane Matua Taiao
Ph: [redacted]
100 Cuba St, Te Aro, Wellington 6011
Follow us online: Facebook | Twitter | gw.govt.nz

From: [redacted]
To: [redacted] Land Development; [redacted]
Subject: RE: WWL affected party - WGN220073 - 106 Mohaka Street
Date: Wednesday, December 1, 2021 12:38:23 PM
Attachments: image001.png

Hi [redacted]
What I need to know is whether TA subdivision approvals have been provided ie the infrastructure being vested meets our regional design and spec guidelines therefore we are happy to take them on in terms of the ongoing management and maintenance. Also whether there are any capacity issued in the existing downstream network from the developed site.
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 1 December 2021 12:31 pm
To: [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: WWL affected party - WGN220073 - 106 Mohaka Street
Hi [redacted]
The applicant just supplied a new set of design info to HCC. I am reviewing those info at the moment. I believe there is not sufficient info at the moment, especially for the flood model. I have scheduled a modelling review with modelling team next Mon.
Can you confirm which aspect you would like me to review specifically?
Thanks
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, December 1, 2021 12:19 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: WWL affected party - WGN220073 - 106 Mohaka Street
Hi Team,
WWL is now being considered as affected for the operational discharges and the vesting of assets for the residential redevelopment at 106 Mohaka in Wainui.
Details on woogle at the link below.
https://woogle.wellingtonwater.co.nz/team/regst/plan/Forms/aByName.aspx?RootFolder=%2Fteam%2Fregst%2Fplan%2FAffected%20party%20approvals%20requests%2F106%20Mohaka%20Street&FolderCTID=0x01200029D1D45BC11BAF498627EE823E2A6080&View=%7BF5A3CE13%2D01D2%2D405F%2DBEE5%2D124AF499C9DF%7D
We had previously provided our approval for the temporary discharges associated with the earthworks.
Are you able to please advise on whether we are happy to provide this approval?
Regards
[redacted]

From: [redacted]@gw.govt.nz>
Sent: Wednesday, 22 September 2021 6:16 pm

To: [redacted]@wellingtonwater.co.nz>
Subject: WGN220073 - 106 Mohaka Street
Hi [redacted]
I am processing an operational-phase stormwater consent for 106 Mohaka Street. This is currently being reviewed by a stormwater engineer – I will provide you with a copy of this when received. They have stated that stormwater up to the 1% AEP event will be managed on site, that they will achieve hydraulic neutrality and bioretention devices will be used for treatment.
A link to the application and infrastructure report is available here: https://greaterwellington-my.sharepoint.com/personal/[redacted]_gw_govt_nz/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Frubie%5Fmclintock%5Fgw%5Fgovt%5Fnz%2FDocuments%2F106%20Mohaka%20Street%20%2D%20docs (you will likely get another email from me with a link in it)
In addition to this, we are processing a consent for the discharge of sediment-laden water associated with the earthworks from the rest of the site. This will be discharged similarly to the method used for Stage 1 and 2 (via a SRP to the network). For the Stage 1 and 2 earthworks you recommended that a condition requiring them to inspect network with CCTV is imposed. Would you recommend that the same condition is included on this one too? The erosion and sediment controls are currently being reviewed and I can provide you with this review upon receipt.
Could you please let me know whether WWL have any issues with this proposal?
As the discharge is to the network, WWL are being treated as an affected party.
Thanks,
Rubie

makaurangi

[redacted] (she/her)
Kaitohutohu / Resource Advisor
Greater Wellington Te Pane Matua Taiao
Ph: [redacted]
100 Cuba St, Te Aro, Wellington 6011
Follow us online: Facebook | Twitter | gw.govt.nz

From: [redacted]
To: [redacted]
Subject: 106 Mohaka Street - RFI Response
Date: Monday, April 4, 2022 2:00:42 PM
Attachments: image003.png
image014.png
image016.png
image021.png
image022.png
image023.png
image001.jpg
image002.jpg
image004.jpg
image005.png
image008.png
image009.png
image011.png
Untitled attachment 00013.png

FYI

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Friday, 1 April 2022 4:22 pm
To: [redacted]@huttcity.govt.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

HI [redacted]

Thanks for sending these through. [redacted] has been on the phone with [redacted] this afternoon to discuss the public/private stormwater solution. In this discussion Stu noted the following:

- There has been and is currently no dispute as to the effectiveness of the attenuation system
- The capturing of the 'stream' at the eastern boundary of the site is not dissimilar to the capture of overland flow from other council owned areas on at least two of our other jobs which also employ in line attenuation
- The use of inline attenuation has little or no maintenance burden beyond what could be expected from any other pipe network within the region

Given that the provision of a tank to attenuate this flow is not required from an engineering perspective The Developer is happy that the maintenance of the pipe network as installed remains the responsibility of the residents and owners association in perpetuity

- This should in principal resolve any issue which may require the addition of tanks or further piping to the site to attenuate the public flow from Meremere St

Please find below and attached in link comment from AR and Associates to the balance of the queries. The predominance of these have previously been worked through with either Envelope on behalf of HCC or WWL.

2022.04.01 - HCC RFI RESPONSE

Roading

- During Engineering Approval stage this concern was discussed with Wellington Water and ultimately the prosed surface flow conveyance via mountable kerb and channel was accepted as there is no ponding and the depth of peak flows does not pose any risk to pedestrians or traffic as DxV only 0.03 which is well below 0.4. This is a low-speed environment and at the point where surface flows concentrate across the road flows will be dispersed across the full cross section (very shallow) and cars do have to slow significantly to take a turn. Please see attached folder with the correspondence to the particular WWL RFI, that includes all attachments.

Wastewater

The proposed LPS has been designed in accordance with *WWL Pressure Sewer Design Guide Rev 0_Oct2021*. The proposed system does provide 36hr storage. See attached specialist report and calculations, also LPS guide provided.

Services

Please find attached services coordination plan showing all handholds and manifolds.

Stormwater/Flooding

Please find attached the latest flood report ***P20-156-R03-RevD*** supplied to Wellington Water. We have been closely working with Alistair Osborne to finalise the model (see email correspondence included). Recommended FFL's are provided in the report including depths of ponding and flows and comments on downstream.

With the respect to Stormwater network comments our response is as follows:

- The proposed detention system is an in line stormwater system with oversized pipes providing attenuation storage. (all reviewed by WWL and satisfied). Traditionally detention tanks have orifices which throttle flows and provide attenuation function, in this instance the orifice has been replaced with a smaller at grade pipe (450mm diameter) yet providing the same outcomes. The key difference is that the maintenance of such system is as little as for any other stormwater pipe networks in the region. There are no parts which are prone to blockages such as orifices or sumps, and are the key items usually requiring attention. In view of the ongoing maintenance required due to the use of the inline system, the effectiveness of the system, its ready adoption on other sites, and the rates burden, the public ownership of the pipes should not be any different to other SW pipe networks.

Water Supply

The latest water supply plans supplied, pipeline for Lots 19-22 has been upsized to 63mm OD as per detailed design outcomes. Detailed design memo ***P20-156-M02-RevA*** and relevant data files attached.

I believe the above and attached resolves all outstanding matters relating to engineering for the consent. If you could please review and advise it would be greatly appreciated.

Kind Regards

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, 30 March 2022 2:07 pm
To: [redacted]@aprotean.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hello [redacted] / [redacted]

Please see attached [redacted] comments. I have added a couple of comments where relevant. The red text denotes where a response is needed. Let me know if you would like to discuss.

Kind regards,
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040

P: [redacted] **M:** **W:** www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Wednesday, 30 March 2022 9:17 AM
To: [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@urbanedgeplanning.co.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

Can you please advise when you can send through the conditions for our review?

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, 30 March 2022 9:11 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Sent to [redacted] yesterday afternoon

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040

P: M: W: www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Wednesday, 30 March 2022 9:10 am
To: [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

Any update on when we will receive your notes and comments for review?

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 29 March 2022 2:56 pm
To: [redacted]@aprotean.co.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

HI [redacted]

I'm trying to get my notes and comment out today. After that maybe we can chat go through.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Tuesday, 29 March 2022 12:49 pm
To: [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

Can you please give me a call to discuss this matter. Alternatively, can you provide your phone number and I will give you a bell.

Regards,

[redacted]
r
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 29 March 2022 10:50 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; [redacted]@envelope-eng.co.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

I have received a little more information relating to the email you provided previously dated 25-1-22. This email was

sent by the Council engineer when it was (mis)understood that consent had been granted for the site. There was a consent but this only covered the stage 1 & 2 earthworks.

Once the engineer understood that there was no RC for the subdivision granted, they emailed 4-02-22 (attached) advising that works could not commence.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]
Sent: Tuesday, 29 March 2022 10:05 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>; [redacted]@envelope-eng.co.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

I am hoping to have all my notes and comments/feedback for this proposed development compiled later today. There will still be a few matters for which I have had to get external advise on that will still waiting on final feedback on.

You have provided an email from Councils engineer (attached), who is currently looking after engineering approvals, regarding the stormwater network – for which I understand you have considered approval to proceed with construction.

I do note that from the attached email they have advised that: *In the interim I am ok with stormwater works commencing within the site* providing all consent conditions and wellington water specifications are complied with.

Given consent conditions have still to be set, I would note that you are unable to confirm they have been/ will be compiled with and that a formal engineering approval hasn't been granted as there were still matters (in addition to the RC conditions) to be resolved. I also understand that there have been no inspections undertaken by the subdivisions team as would be required under both the RC and formal engineering approval process for pipework installed and particularly proposed to be vested to Council.

Cheers
[redacted]

From: [redacted]@aprotean.co.nz>
Sent: Tuesday, 29 March 2022 8:38 am
To: [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

Thanks for meeting me on site last week to assess the progress that had been made on site to date.

In light of what we discussed on site regarding stormwater attenuation, I refer you to the attached email we received on the 25th of January 2022 from [redacted] (Envelope Engineering). Envelope was undertaking the EPA on behalf of Hutt City and issued approval for the stormwater works within the development to proceed.

As you are now aware, the stormwater attenuation tank has already been installed in line with the latest plans issued by our designer (AR & Associates). This contradicts your assessment and comments discussed on site last week. We are now concerned that we have advanced the stormwater works based on the approval received from a representative of Hutt City conducting the EPA review which does not appear to be in line with the expected conditions we are due to receive.

We are eager to receive the conditions and assess what discrepancies now sit between EPA and the Subdivision Consent Conditions.

Please advise when we can expect to see the conditions for this development.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Thursday, 24 March 2022 8:13 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Great - hopefully not too wet , although rain could be useful as want to look at some stormwater aspects

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Thursday, 24 March 2022 7:54 am
To: [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Suits me.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E** [redacted]@aprotean.co.nz

From [redacted]@huttcity.govt.nz>
Sent: Thursday, 24 March 2022 7:49 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

1.30pm ??

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Thursday, 24 March 2022 7:48 am
To: [redacted]rker@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

[redacted],

What time suits you two?

Regards,

[redacted]
[redacted]
L1 193-195 Main Road, Tawa, 5028
M [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Thursday, 24 March 2022 7:05 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Thanks Hamish

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Wednesday, 23 March 2022 3:58 pm
To: [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

Tomorrow afternoon should be fine.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, 23 March 2022 2:46 pm
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Subject: FW: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

Would you be able to liaise a time with [redacted] for a site visit. Possibly later today or tomorrow afternoon?

Cheers,
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: [redacted] **M:** **W:** www.huttcity.govt.nz

From: [redacted]@urbanedgeplanning.co.nz>
Sent: Wednesday, 23 March 2022 2:12 PM
To: [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>
Subject: [EXTERNAL] Re: 106 Mohaka Street

Hi [redacted]

As I mentioned on the phone, works on Stage 1 are underway at the moment. [redacted] (cc'd in) is the project manager - flick him through an email and he'll be able to arrange for a site visit.

Cheers

[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, 23 March 2022 10:23 am
To: [redacted]@urbanedgeplanning.co.nz>
Subject: 106 Mohaka Street

Hi [redacted]

Our engineer would like to do a site visit. Would you be able to confirm the site is still accessible (ie not fenced off)? I expect to have something back from the engineer soon.

Kind regards
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: [redacted]45 **M:** **W:** www.huttcity.govt.nz

From: [redacted]
To: [redacted]
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021
Date: Wednesday, April 6, 2022 1:28:18 PM
Attachments: image006.png
image008.png
image012.jpg
image019.png
image020.jpg
image021.png
image022.png
image023.jpg
image024.jpg
image025.gif
image026.jpg
image027.jpg
image028.jpg
image029.jpg
image001.jpg
image002.png
image003.png
image004.png
image005.jpg
image030.jpg
image031.jpg
image032.jpg
image033.jpg
image034.jpg
image035.jpg
image036.jpg
Untitled attachment 00038.png

FYI

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday, 6 April 2022 1:22 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

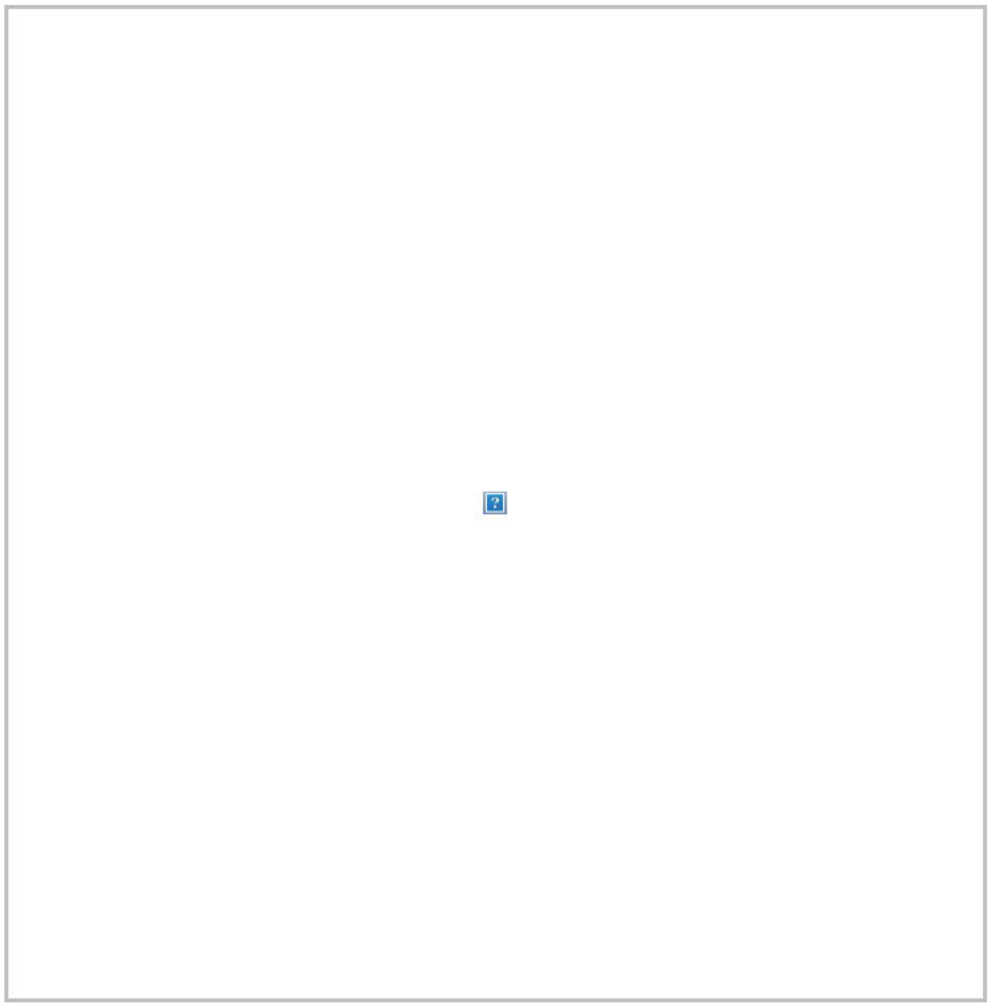
Hi [redacted]

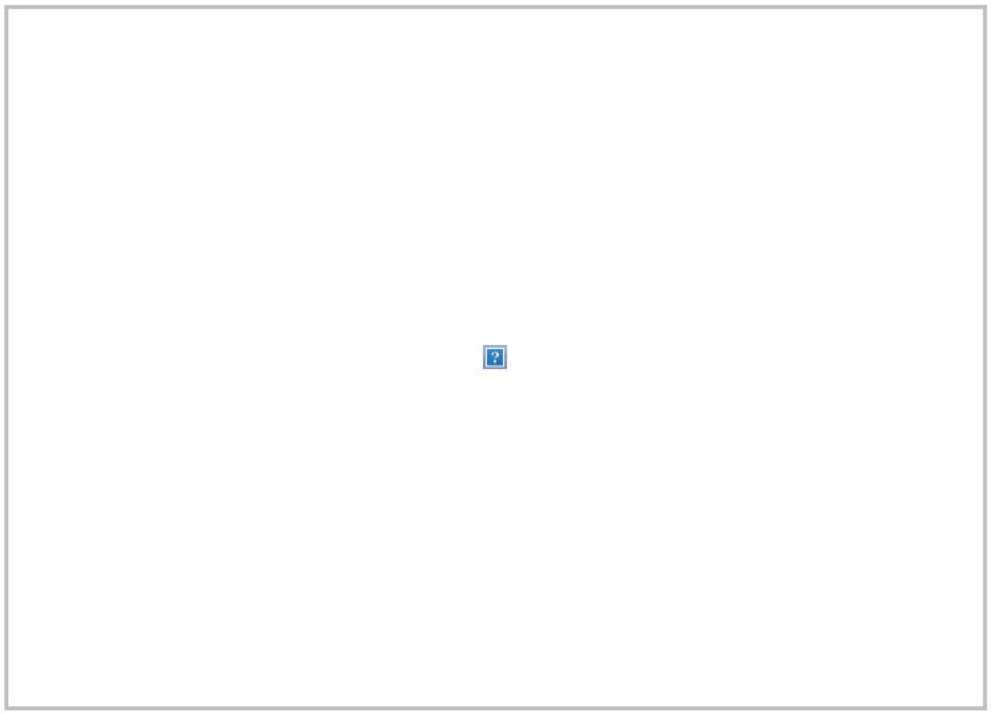
Please see screen shots below which better illustrate the pre and post development situation downstream.

As you can see, in most areas downstream the flood impact is positive (lower flood levels in the post-development vs pre-development). There is only one area where there is a 10mm predicted increase in flood levels, which is negligible and within the margin of error of the model.

If you are satisfied with this response, we will update the flood report to reflect this, and issue as a final for approval.

Regards,





[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech

[redacted]

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Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

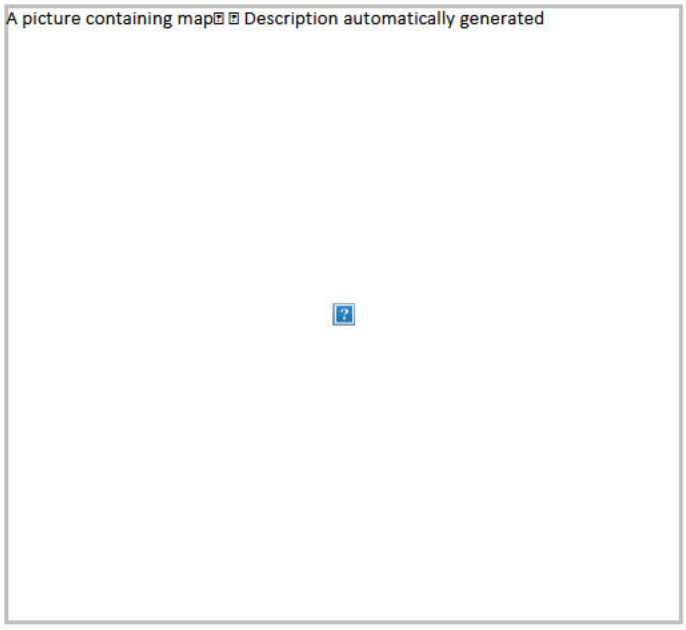
From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 4 April 2022 11:45 AM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thank you for the discussions and your updated memo. I have gone over it and am comfortable that the hydrological methodology aligns with the designated Wellington Water approach.

I am a little unsure about the downstream impacts, particularly on properties 100 – 104 Mohaka St and 3-5 Rakaia Gr. Would it be possible to revise the pre and post difference map (Figure 10) to show if there are any areas with >=50mm difference. The pre and post water level maps do not seem to align well with the difference map (Figure 10).


Map Description automatically generated


A picture containing map Description automatically generated

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Thursday, 31 March 2022 3:16 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your response. We have re-worked the models based on the curve number of 61, and in line with your requirements for the other parameters. Please find updated flood report attached, for your perusal.

Please can you advise at your earliest convenience whether this now meets your requirements.

Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 31 March 2022 9:42 AM
To: [redacted].@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Please see the comments below from our consultant hydrologist. In the case of the Curve Number, I am happy for 61 to be used in place of 63 as per our earlier discussion.

In response to [redacted] questions,

1. Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question. No. I think this was sufficiently addressed in our previous response. The Tc resulting from averaging the BW and RK methods calibrated well.
2. Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment? No. Please see curve number comments below.
3. Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing? ALI - YOU PROVIDED THIS?
4. Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction? Please see initial abstraction comments below.
5. Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters? We don't believe the recommended parameters are conservative. They have been through a thorough peer review process and validated against a number of different methods. For the design of infrastructure to manage the risk of flooding, and the risk this poses to people and property, these values are appropriate.

Curve Number

The curve number values from Appendix B of the Reference Guide were not a direct import of the values from TR55, the original SCS reference manual (and which are tabulated in the Hec-HMS reference manual). They were initially derived from TR55, hen adjusted to improve the calibra ion to observed hydrographs in rainfall-runoff modelling.

With regard to the catchment upstream of 106 Mohaka Street, we are in agreement that the soil should be classified group C. The landcover is a mix of indigenous forest; broadleaved indigenous hardwoods; and gorse and/or broom. The first two have been classified in the Reference Guide as Forest, while the latter more closely resembles the nature of Scrub/Flax. The CN for forest was adapted from he TR55 table for Brush in Good condition. This had a value of 65. Adjusted for the Wellington region, the value is 63. Scrub/Flax in soil group C has a CN value of 68.

The CN value for he catchment to 106 Mohaka St, should be a weighted CN based on the percentage area of forest x CN63 + percentage area of scrub/flax x CN68.

This value of 63 is the least conservative when compared to recommended values in the Kapiti District (Greywacke group C soils, bush = CN65), Auckland (mudstone/sandstone group C soils, bush, not-grazed = CN70) and in the Waikato region (group C soils, bush = CN 72; bush-weed-grass mix = CN65).

Initial Abstraction

Background to the initial abstraction estimate is provided in the SCS rainfall-runoff model calibration report, which has recently been provided to you. In NZ it is common to use initial abstraction estimates of 0mm for impervious areas, and 5mm for pervious areas. These values are used in the Kapi i and Auckland regions, and have some backing within literature. In the Waikato region, initial abstraction is calculated as a factor of the potential maximum storage, using a coefficient of 0.05 (Ia = 0.05S). This is more conservative han the 0.1S adopted by Wellington Water for undeveloped areas (more

conservative in hat it leads to greater runoff).

When deciding on an estimate for initial abstraction in the Wellington region, we evaluated various literature, both in NZ and in TR55 and concluded that 0mm in impervious areas and 5mm in pervious developed areas, and 0.1S in undeveloped areas, is reasonable. The difference between pervious developed areas and undeveloped areas, is the former is more likely to have been reshaped/compacted/mowed etc, while the latter is in a more natural form so likely to have greater storage potential.

In comparison to methods being employed throughout NZ, he methodology stipulated in he Reference Guide is, by no means, conservative, and parameters have been set based on calibrating rainfall-runoff models to the local hydrology.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Thursday, 24 March 2022 11:23 am
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Thanks for your time on the phone earlier.

I look forward to receiving your response to my requests below.

You mentioned that based on the new curve number tool, the curve number for the upstream catchment is now 61, which is slightly lower than the previous curve number of 63. Can you confirm that please and also indicate what is the associated initial abstraction? Also are you able to provide a copy of that tool as per previous request?

Also please can you send through gauge information for the catchment as discussed, and any other background information you may be able to provide.

Your soonest response is appreciated.

Thanks

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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Level 2, The Nielsen Centre
129 Hurstmere Rd, Takapuna, Auckland
PO Box 65 576 Mairangi Bay, Auckland 0754
ddi. [redacted] m. [redacted]
www.arassociates.co.nz

From: [redacted]
Sent: Monday, 21 March 2022 12:09 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Good morning [redacted]

Tried to call you but couldn't get through.

Just following up on my request below please, if you could possibly let us know when we can expect to hear back, it would be appreciated.

Our client is very urged to get this resolved, please feel free to call me if you need to discuss.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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AR & Associates Ltd
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www.arassociates.co.nz

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From: [redacted]
Sent: Thursday, 17 March 2022 5:26 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@wellingtonwater.co.nz>

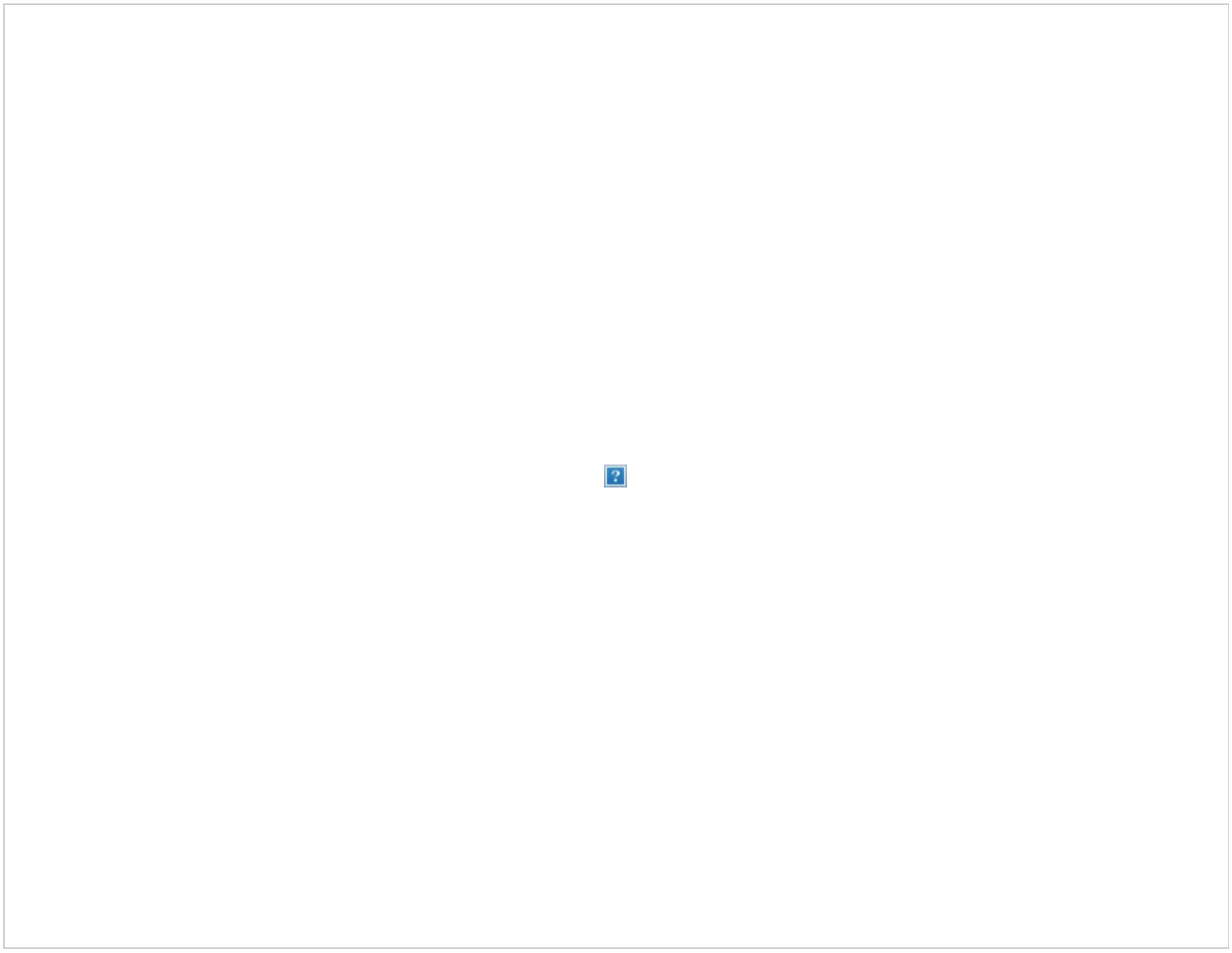
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Many thanks for your message and the chat earlier. To summarise our discussion and the next steps further:

1. Time of Concentration:

I still believe that the average Tc approach, which results in a Tc of 19 minutes in the case of the western catchment, seems excessively low for the catchments that we are dealing with, as they have a very dense forest cover (as per below screen shot). I have run an independent check of Tc using SCS methodology and obtained 27 minutes, which is in line with the Bransby-Williams result.

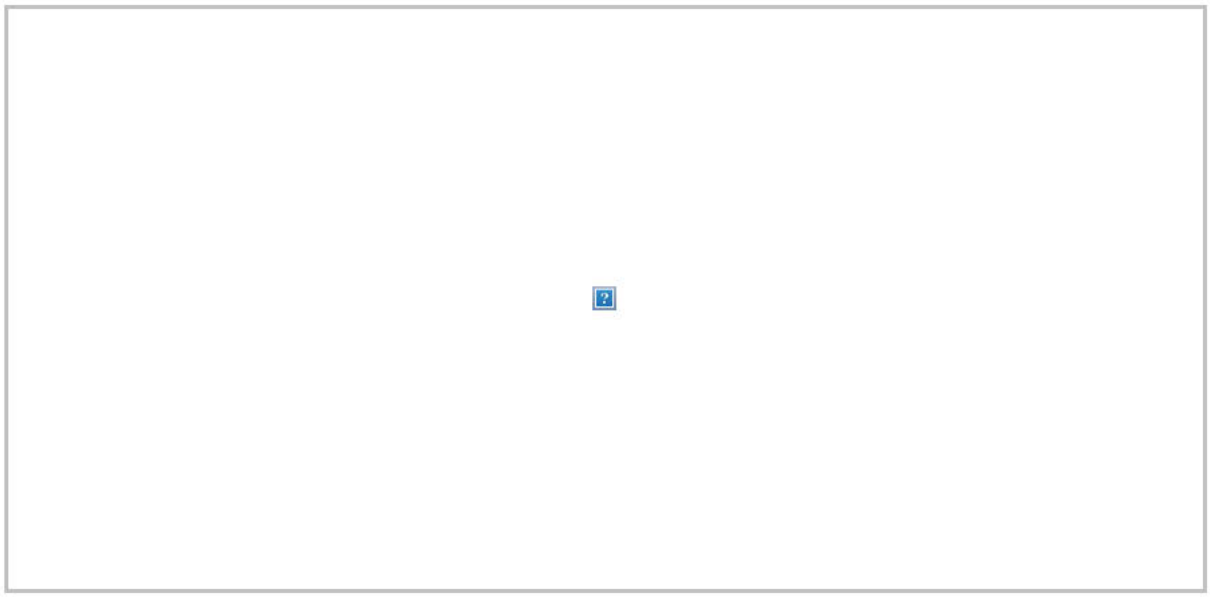


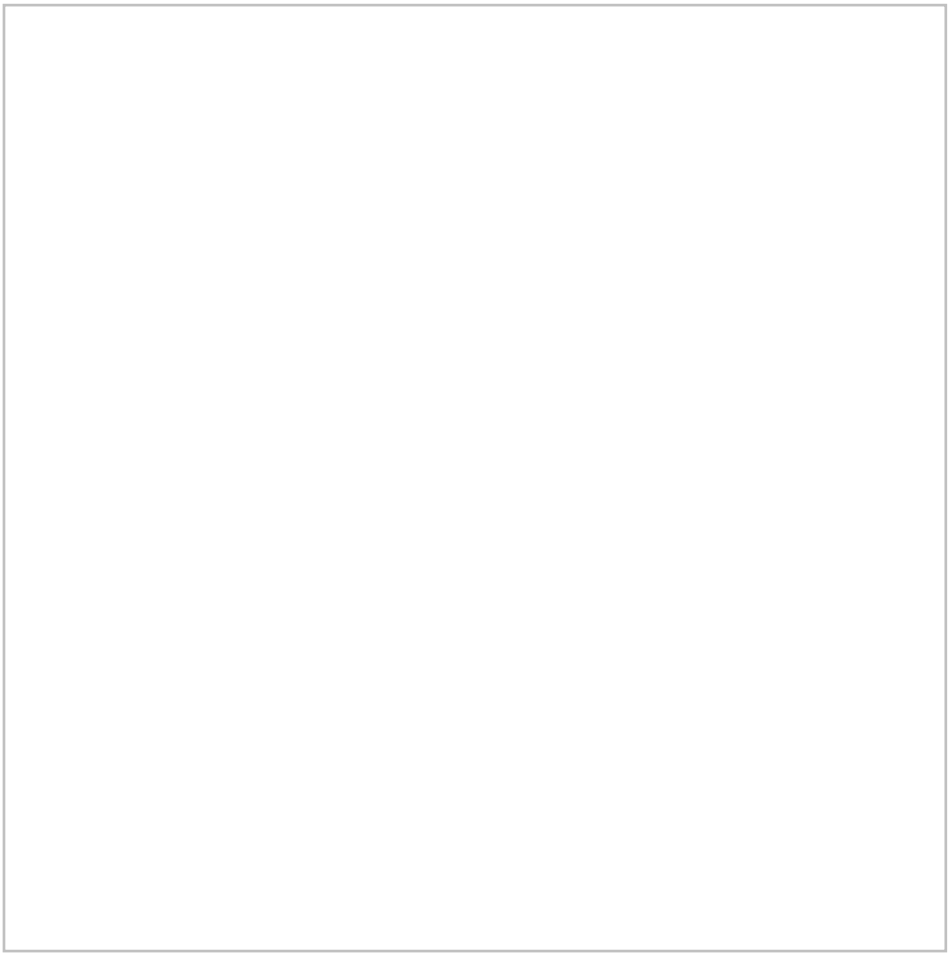
2. Curve Number:

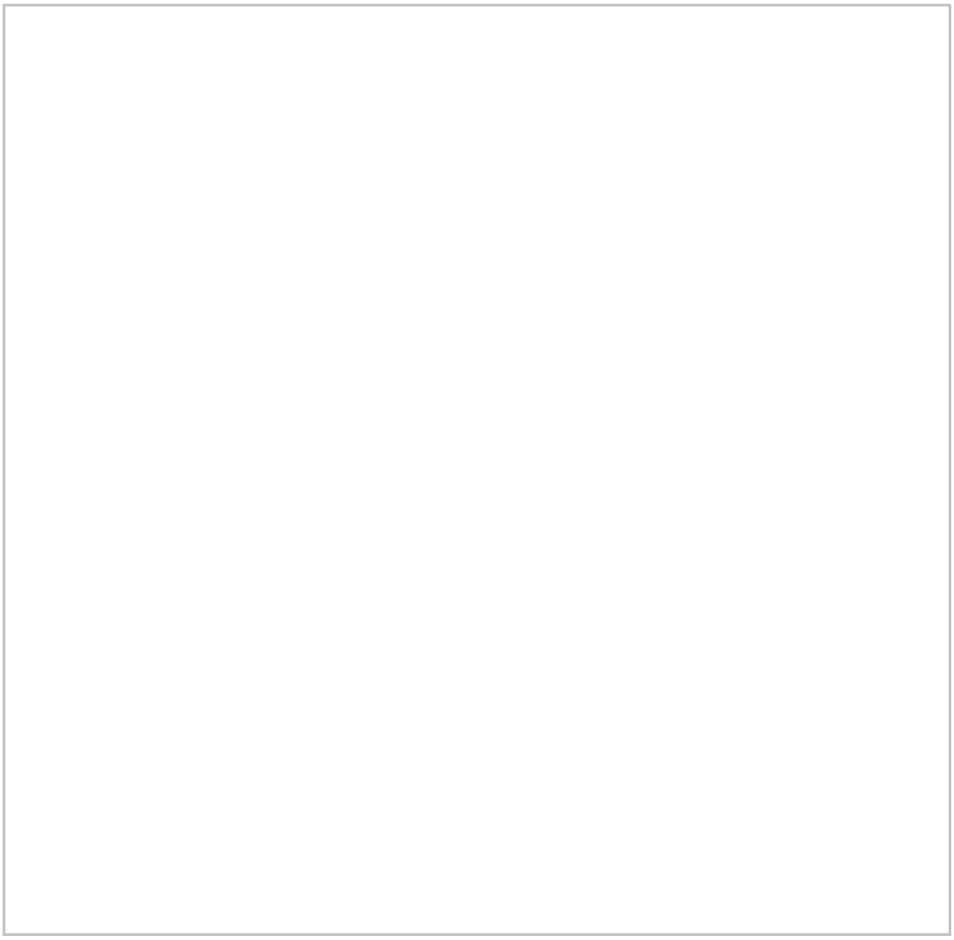
In addition, the curve number parameter map that you supplied suggests a CN=63, which again seems high and therefore potentially adds another layer of conservatism to the analysis. The HEC-HMS reference manual gives curve numbers of CN=30, 41 and 48 for soil groups B, C, and D respectively, and ground cover characterised by a forest with woody and brush understorey (see below).

S-map on line tool suggests the soil group that applies to the upstream catchments ranges from a B to a D classification (being Bushcroft and Taitapu soil units, see below and soil report files attached). On this basis, the representative curve number would appear to be somewhere between 30 and 48 (for “good” ground cover, being >70% vegetation cover which applies in this case). In our original analysis we had used CN=48, which we believed was conservative at the time.

You mentioned that Wellington Water is in the process of releasing a new tool to estimate curve number. If you could possibly share that with us, it would be very helpful.







3. Initial Abstraction:

Wellington Water's hydrological modelling guidelines specify that Initial abstraction be obtained from the formula Ia=0.1S. However SCS methodology, being the US Natural Resources Conservation Service method that originally developed the CN and Ia parameters, recommends that Initial Abstraction be calculated as Ia-=0.2S. Wellington Water's specified reduction of the initial abstraction parameter by 50% is obviously conservative as it results in greater discharge rates and volumes. Are you able to clarify the reasons for this?

4. Compounded Effect:

Our view is that the compounded effect of combining conservative hydrological parameters (e.g. Tc, CN and Ia etc), in addition to the requirement for climate change allowance which in itself increases rainfall by 17-30%, is likely to result in excessively high and potentially unrealistic levels of conservatism when calculating peak flows.

To summarise, it would be appreciated if you could please consider and clarify the following:

- Would you reconsider the use of Bransby Williams to estimate Tc, in view of the SCS method giving very similar results? Again, Kirpich is recommended for catchments with well defined channels, which I don't believe applies to the catchments in question.
- Would you reconsider the use of published SCS guidance around the estimation of curve number parameters, based on the information given above and the densely vegetated nature of the catchment?
- Are you able to share the new estimation tool to calculate curve number parameters that Wellington Water is in the process of developing?
- Can you please provide some background behind Wellington Water's recommended method to estimate initial abstraction?
- Given the unique context of this project, would you be open to considering relaxing one or more of the above parameters, to reduce the risk of potentially unrealistic flow results caused by the compounded effect of conservative parameters?

Please feel free to call me if you'd like to discuss further.

Kind regards,

[redacted]

CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m. [redacted]
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From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 17 March 2022 11:39 AM
To: [redacted].@arassociates.co.nz>
Cc: [redacted].@aprotean.co.nz>; [redacted].@arassociates.co.nz>; [redacted].@belgraviacapital.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>; [redacted].@huttcity.govt.nz>; [redacted].@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

How are you? Thanks for your email and for the call on Tuesday.

With regard to your proposal to only use the Bransby-Williams methodology for calculating the time of concentration for the hill catchments upstream of 106 Mohaka St, unfortunately Wellington Water would not find this an acceptable approach.

Below are some more -depth comments from our consultant hydrologists who were involved in the development of the WWL rainfall-runoff methodology, but to summarise it;

- The averaged RK-BW approach was established through review of real events in a real, nearby catchment, so the BW approach by itself would result in unsuitably long Tc values.

. I have undertaken a few checks to reach this conclusion:

- During development of the model parameters, the nearby catchment Wainuiomata River at Manuka Track was used for calibra ion. This has a catchment area of 27km^2. The observed time of concentra ion was between 120 mins and 220 mins across three events (average 180 mins). Being real events, this is also dependant on the storm event (spatial and temporal distribution of rainfall over he catchment), however these estimates provide an approximate indication of catchment Tc. The average Tc using Ramser Kirpich (RK) and Bransby Williams (BW) was 120 mins. This calibrated fairly well.

  Using a Tc of 55 minutes for the Mohaka catchment, which is approximately 0.43km^2 does not align with results from the calibrated rainfall-runoff model.

- My es imates for RW and BW were 10 mins and 28 mins (BW: using a length of 1150m, area of 43ha and equal-area slope of 116 m/km), the average being 19 minutes. This BW estimate is shorter than the applicants estimate of 55 minutes. I acknowledge that different analysts are likely to get sligh ly different numbers, however, their estimate is approximately double. When using their equal area slope es imate (of 108 m/km from the email below) this makes very little difference, increasing the Tc to 29 minutes. Perhaps one of us has made some inaccurate assumptions??

- An alternative method to empirical equa ions, is using the Tc component parts. Empirical equations are recommended for larger catchments, where the catchment length exceeds 1000m. As this catchment is only just exceeding the 1000m threshold, es imating Tc from the component parts is a useful check. This also (independently) came out at 19 minutes (overland flow 11.5 minutes + shallow concentrated flow 1.7 minutes + channel flow 6 minutes). It is acknowledged hat here is more variation between analysts when following the component parts approach due to the various assumptions that need to be made.

I appreciate the engineers comment in that the Ramser Kirpich equation gives a much faster time of concentration, that on its own, would not be reasonable for this catchment. However during calibration of the model parameters, neither the RK or BW method gave estimates that perfectly aligned with the observed hydrographs. Taking the average of the two methods acknowledged hat nei her method provided an appropriate representa ion of catchment runoff characteris ics in he region, however when averaging the two, model results calibrated well.

Please let me know if I can provide any additional information.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 14 March 2022 3:05 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Further to my voicemail today, this is to let you know that we have further reviewed the hydrology for the above development, and would like to propose a change to the time of concentration (Tc) parameter used in our hydrological model.

As you know, the Wellington Water guideline specifies that the Tc parameter should be calculated based on the Ramser-Kirpich and Bransby-Williams methods. Our previous RFI response had accordingly estimated Tc values that were based on the average between both of these methods.

However, upon further review of available technical literature on the Ramser-Kirpich method, we note that the literature warns that this method can lead to excessively low time of concentration values (and associated high rainfall intensities) if incorrectly applied, given that this method is actually designed for catchments that have well-defined channels. This is in fact evidenced in our calculations, where Tc's of about 10 and 14 minutes were obtained for the western and northern catchments, which seem excessively low given that both these catchments are undeveloped forest and over a kilometre long.

On the other hand, the Bransby-Williams formula applies to catchments without well defined channels, and where runoff is characterised by overland flow. In our view this method is more representative of the catchments we are dealing with, as they are undeveloped with a heavy forest canopy, and where runoff is therefore likely to be dominated by overland flows (rather than flow via well-defined channels). We therefore consider that for this project, the Ramser-Kirpich formula should be ignored altogether, and the Bransby-Williams equation adopted instead, as the method to calculate Tc.

I would be grateful if you could possibly look into this and let me know if you agree with this change, in which case we will tweak the calculations and submit a revised version.

Please feel free to call me if you'd like to discuss further.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m. [redacted]
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From: [redacted]
Sent: Monday, 17 January 2022 8:07 PM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

We have reviewed the hydrological analysis following the guidelines that you provided in your 23/12/21 and 120/01/22 emails, and attach our response within the revised memo herein.

Trust this now meets your requirements, however please feel free to give me a call if you have any further queries.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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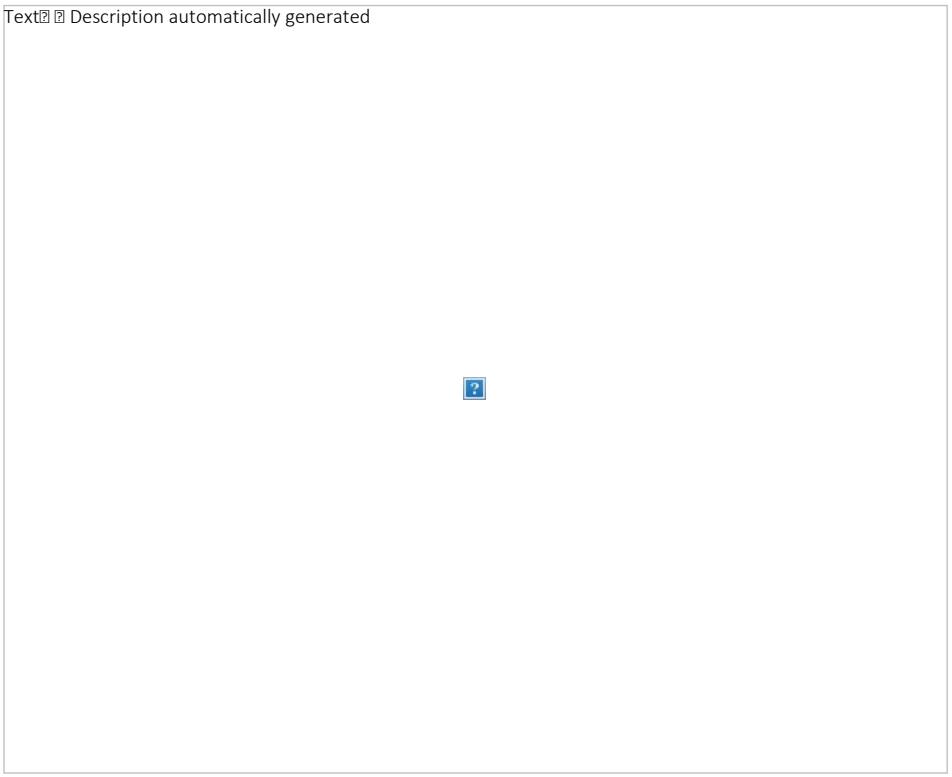
From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 10 January 2022 4:44 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks for your email and Happy New Year also.

The WWL recommended approach for time of concentration is outlined in Section 2.5 of our *Reference Guide for Design Storm Hydrology*. For the catchment you highlighted below, I think the recommendation would be the use of the Ramser-Kirpich and Bransby-Williams approaches (see below). In the end this is what we would compare the results from any other method against to check suitability, so we recommended external parties adopt it from the outset. Let me know if I can provide any additional information.

Text Description automatically generated



cheers

[redacted] **(he, him)** **Senior Hydraulic Modeller**

Tel 04 912 4400 **Mob** [redacted]

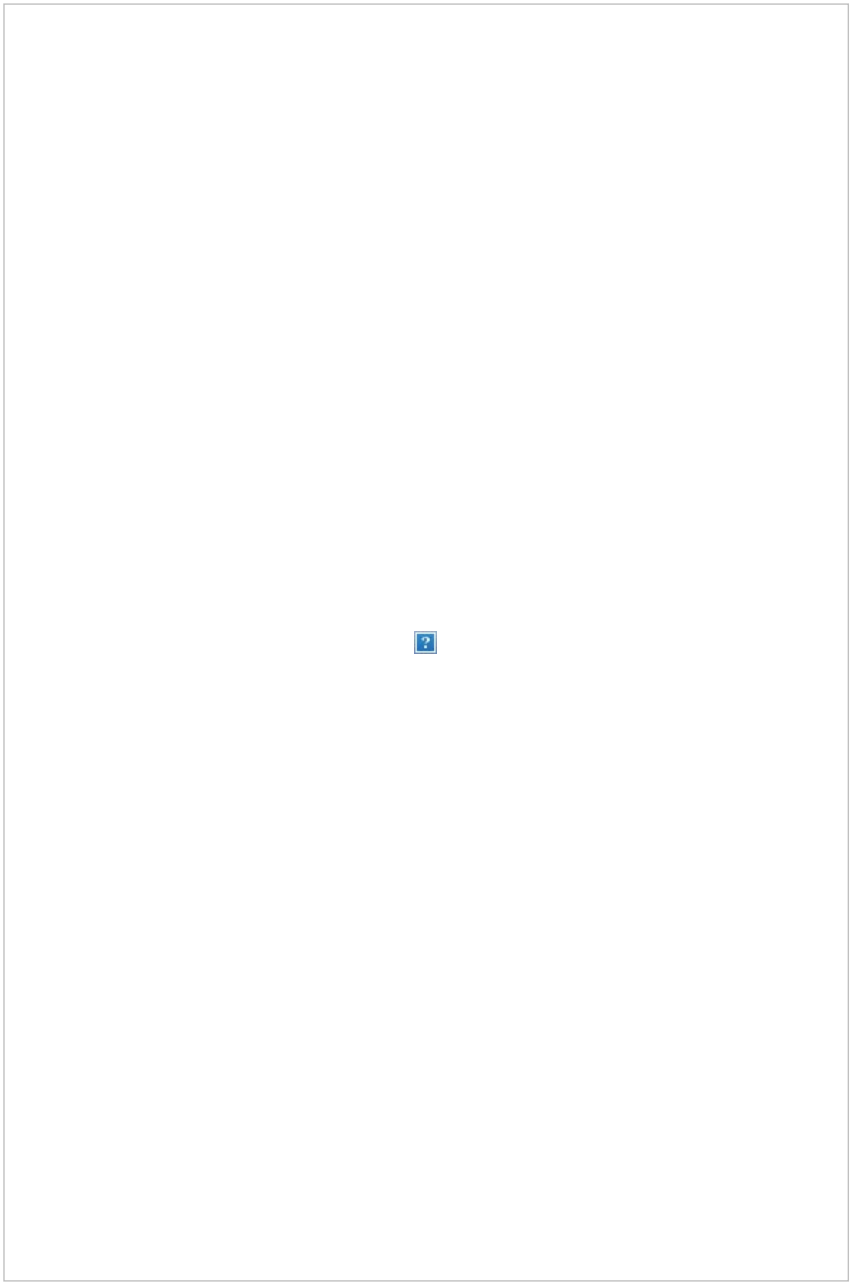
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Monday, 10 January 2022 4:16 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Happy New Year and thanks for your message, which we are looking into now.

Before we prepare a response, can you please clarify what is the recommended time of concentration method you are referring to? we are using the Equal Areas Method to determine average catchment slope, and the SCS method to calculate time of concentration using the average slope and length – see extract below.



Regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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ddi. [redacted] m. [redacted]
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From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 23 December 2021 2:20 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Kia ora [redacted]

Thanks very much for your email and information. I was hoping to meet/chat with you before any more modelling was done so I could supply our CN and IA layer (attached) for a more accurate representation in your model. Unfortunately in the layer attached, the majority of the catchment upstream of the site has a CN value over 60, which may impact your results. If you do further model runs, can you confirm you have used our recommended approach for calculating the time of concentration and apply the nested profile we have developed (I have attached a spreadsheet template for it).

With regard to the upstream channels, do you have any images available of the survey locations for the channel sections and photos of the channels at the time of survey? I am viewing the site with google maps aerial photography which shows significant vegetation across the channel footprint. Also, can you confirm that the condition of the channels will remain the same pre and post development (eg, the channels will not be cleared and made more efficient post development), or if changes are made they will be offset (eg potentially by increasing storage capacity from raising the existing crossing).

A great cross check to see would be a couple of Manning's calcs for the channels using a couple of surveyed sections to get a ballpark idea of their capacity. We can do this at our end if you would prefer and can supply us the surveyed sections.

cheers

[redacted] **(he, him)** Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday, 22 December 2021 6:08 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please find attached our response to your information request last 16 December as per below.

Hopefully the response is self-explanatory, however please let me know if you'd like to discuss any aspect of this document.

Kind regards,

[redacted]
CPEng, CMEngNZ, IntPE (NZ) DipGeothermTech
[redacted]

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From: [redacted]@arassociates.co.nz>
Sent: Thursday, 16 December 2021 5:50 PM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>; [redacted]@aprotean.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

[redacted]

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M: [redacted]
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From: [redacted]@urbanedgeplanning.co.nz>
Sent: Thursday, 16 December 2021 4:52 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: Fw: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi all

I've received the information below and attached from Wellington Water - they have a number of concerns/areas where additional information is needed. I've also been speaking to [redacted] today. Because WWL aren't able to provide written approval for the GWRC process, [redacted] isn't happy signing off on the stormwater side of things, so the WWL issue is affecting both GWRC and HCC applications now.

[redacted] and [redacted] I'm happy for you to meet directly with Wellington Water online to work towards addressing their concerns/issues. It won't make sense at all to me as a non-engineer, so I'll sit out and let you both take charge of this side of things!

[redacted] do you want to get in touch with [redacted] to arrange a meeting?

Cheers

[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Thursday, 16 December 2021 11:02 am
To: [redacted]@urbanedgeplanning.co.nz>
Subject: FW: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

See below for feedback from WWL on the flood modelling. It sounds like we may need to set up a meeting between the modellers.

Kind regards,
[redacted]

[redacted]

Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 16 December 2021 10:54 AM
To: [redacted]@theurbanengineers.co.nz) [redacted]@theurbanengineers.co.nz>; [redacted]@huttcity.govt.nz>;

[redacted]@wellingtonwater.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>
Subject: [EXTERNAL] FW: RM210328 - 106 Mohaka Street - wwl - 16 Dec 2021

Hi [redacted]

Please see the following concerns from our modelling team, regarding the flood model & floor levels.

Thanks
[redacted]

[redacted] Senior Engineer - Land Development
Tel [redacted] Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt Porirua Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water wastewater and stormwater services.

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, December 16, 2021 10:35 AM
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Kia ora [redacted]

Thanks for your email. My points of concern are below:

- Hydrology: The model hydrology does not conform to standard Wellington Water SW model hydrology specifications (attached), and the CN and IA values used differ from those in our WWL regional layers (we can supply our regional layers at the modellers request). Also, it would be good to confirm if hydraulic neutrality is proposed.
- Ground surface: The "burning in" of the boundary drains appears to result in straight, clean channels which may over estimate the capacity of the drains in the pre-development scenario. I would like to discuss the approach to combining the various sources of ground information with the modellers.
- Offsite impacts: I would like to see a difference map (if possible) of pre and post development flood depths to confirm "no more than minor" effects, particularly downstream of the site. If the boundary drains are not as efficient in the pre-development scenario as has been modelled, then greater downstream impact may be seen post development.

A meeting (online) with the modellers would be very useful to discuss and potentially resolve these issues.

cheers

[redacted] (he, him) Senior Hydraulic Modeller
Tel 04 912 4400 Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday, 15 December 2021 1:33 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: FW: RM210328 - 106 Mohaka Street

Hi [redacted] & [redacted]

Would you be able to provide a summary of the concerns regarding 106 Mohaka flood model/floor level /secondary flow path? Planner and RMA team is waiting for an update.

Thanks
[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, December 15, 2021 9:14 AM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210328 - 106 Mohaka Street

Hi [redacted]

I'm just following up as the applicant has requested an update. Have you had the chance to look at this one?

Thanks
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, 5040, Lower Hutt 5040, New Zealand

T [redacted], W www.huttcity.govt.nz

From: [redacted]
To: [redacted]
Subject: FW: [EXTERNAL] RE: RM210328 106 Mohaka - road cross sections ZB comment
Attachments: image002.png
image003.png
image004.jpg
Untitled attachment 00066.png
scan_barkers_2022-05-09-09-59-48.pdf

The depths generally look OK for the most part.

I would still be concerned the corner on the south eastern boundary and don't believe it is appropriate to discharge the 41 L/s (Q10) and 70 L/s (Q100) downstream of Cross Section B straight across the carriageway. This definitely requires addressing.

Cheers
[redacted]

From: [redacted]@huttcity.govt.nz>
Sent: Monday, 9 May 2022 10:05 AM
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

HI [redacted]

Thank you for the link and updated information. I have started looking through and have the following comments/queries on the WSUD ponding info:

Ponding cross-sections – see attached marked-up (scribbled on) plans

- Section C depth of ponding most of mountable kerb depth. Understood plan was to have full F&C here based on DWGS3.300. Presume k&c will have gaps for raingarden intake?? – please confirm
- Section D3 – dish channel at edge of carparking? Please confirm depth of flow being stepped into.
- Section D4 – as above
- Section D5 – raised chicane removed – noted in roading section H "traffic calming chicane enclosed by edge beams, tree pit or similar planting". If planting in place then detail will ned to be updated to allow for pit(?) – will this be flooded during events?? Has this been agreed with traffic engineer??
- Section E1 – as above

Section E2 – what is the break in roadway indicated?

- Section E4 – should this not show a dish channel ??
- DWG S3-433 – seems double up of S3-432

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@arassociates.co.nz>
Sent: Friday, 6 May 2022 5:45 pm
To: [redacted]@arassociates.co.nz>; [redacted] [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>; [redacted] [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted] [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted] [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted] [redacted]@huttcity.govt.nz>
Subject: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

Hi [redacted]

Thank you for your assistance in getting this project over the line.

As per your request [redacted] has provided HEC-RAS modelling data and the out puts to [redacted] is following it up with [redacted]

Please also find enclosed SharePoint link 2022.05.06 -RFI RESPONSE 2 containing the documents you have requested at the meeting as below.

1. Cross-sections showing the 1 in 10 and 1 in 100 year ponding at the locations identified in your email. The ponding will expected to last for a short duration when the street activities are minimum.

2. Updated set of drawings showing the new pump stations are now located in the parking areas. An additional manhole is added in line 2 (Meremere street intake) as suggested. Line 5 is realigned to get the 90 degree connection.

3. Updated calculations.

Thank you again and hope to get all the queries resolved by Monday.

Kind regards,

[redacted]
ME, CPEng,
[redacted]

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ph. [redacted] m. [redacted]
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LEGEND

- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- PROP MAJ CONTOUR
- PROP MIN CONTOUR
- EX MAJ CONTOUR
- EX MIN CONTOUR
- EXTENT OF EW
- SUBCATCHMENT BDRY
- CATCHMENT 1
- CATCHMENT 2
- CATCHMENT 3
- CATCHMENT 4
- OLFP DIRECTION

Lot 3 DP 390769

LOT 301 DP 502928

Lot 9 DP 484841

Lot 8 DP 484841

Lot 2 DP 424843

Lot 1 DP 424343

Lot 19 DP 48700

Lot 22 DP 48701

Lot 23 DP 48701

Lot 24 DP 48701

Lot 25 DP 48701

Lot 26 DP 48701

Lot 27 DP 48701

Lot 28 DP 48701

Lot 29 DP 48701

LOT 300 DP562281

LOT 300 DP 562261

LOT 22 DP 562261

LOT 5 DP 65821
WN34C/88

CATCHMENT 1:
4,975m²

CATCHMENT 2:
3,740m²

CATCHMENT 3:
460m²

CATCHMENT 4:
275m²

PROPOSED BIORETENTION DEVICE

D1 S3.432
D2 S3.432
D3 S3.432
D4 S3.432
D5 S3.432
E1 S3.433
E2 S3.433
E3 S3.433
E4 S3.433
B S3.430
C S3.430

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

0 25m

A3 SCALE: 1:500

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: G:\AJ Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\Stage 3\P20-156-S3-451.dwg

REV	DATE	AMENDMENT	DRAWN
C	06.05.22	ADDED CROSS SECTIONS	CM
B	07.09.21	S92	CM
A	23.06.21	PHASE 3	CM

DESIGNED	ORIGIN DATE
CM	FEB 2021
DRAWN	CHECKED
CM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: PROPOSED CATCHMENTS - 100-YR

AR & ASSOCIATES
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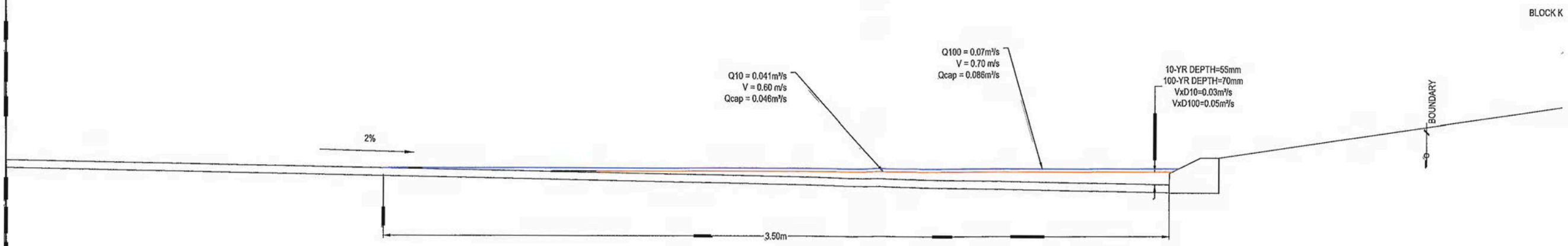
enquiries@arassociates.co.nz www.arassociates.co.nz

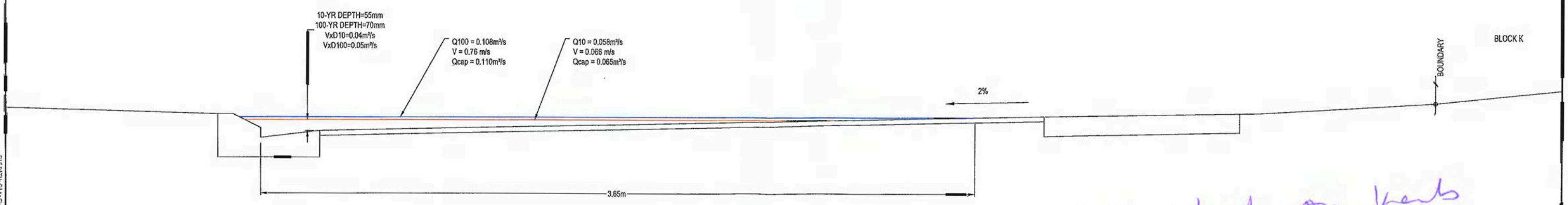
ace new zealand

A1 SCALE	A3 SCALE
1:250	1:500
JOB No.	DWG No.	REVISION
P20-156	S3.451	C

PRINTED: 6/05/2022 5:06:13 pm



B 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



C 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3

- depth high on kerb
- cars likely to be moving a bit faster

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

REV	DATE	AMENDMENT	DRAWN
D	02.05.22	EPA RFI MEETING	CM
C	11.02.22	EPA RFI	CM
B	07.09.21	FOR SECTION 92	RM
A	25.06.21	INITIAL ISSUE	JL

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
RM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: ROAD FLOW SECTIONS

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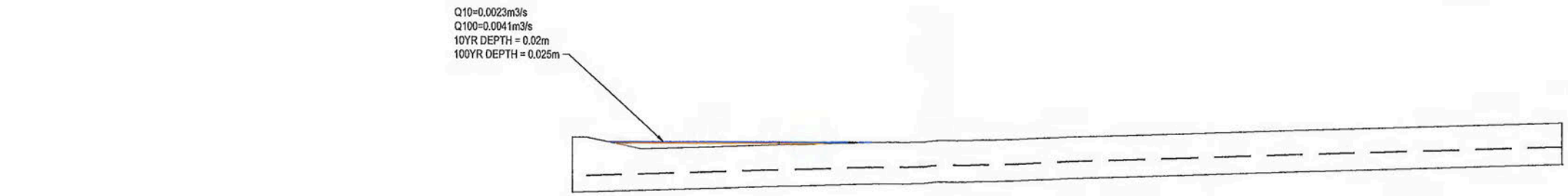
A1 SCALE	A3 SCALE	
AS SHOWN	AS SHOWN	
JOB No.	DWG No.	REVISION
P20-156	S3.430	D

PRINTED: 6/05/2022 5:04:45 pm

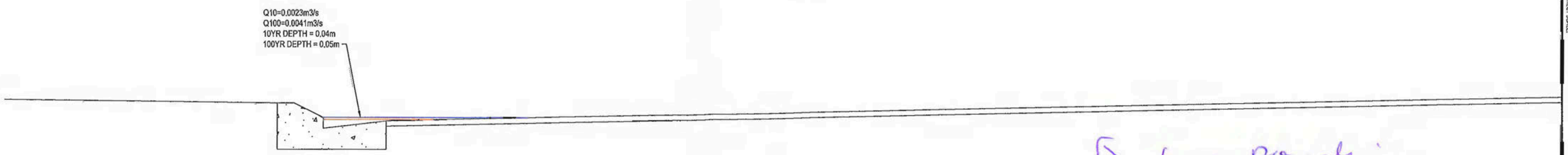
WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: G:\AA Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\Stage 3\P20-156-S3.430.dwg



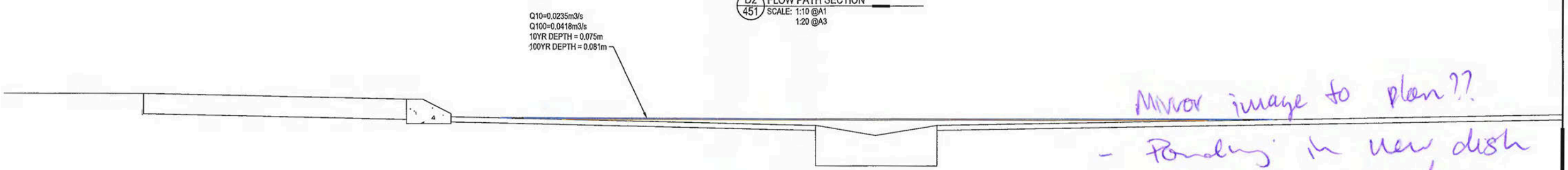
D1 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3

- low ponding & speeds.



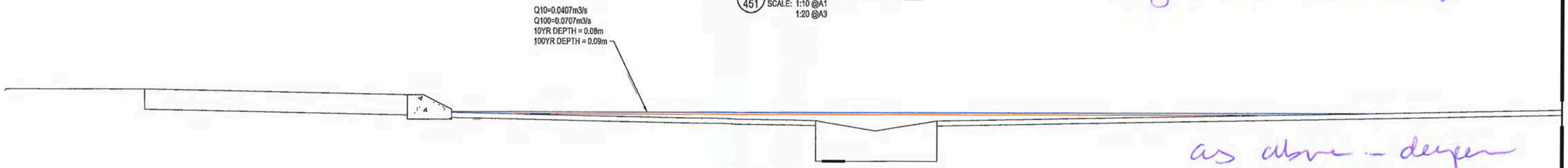
↖ low ponding.

D2 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



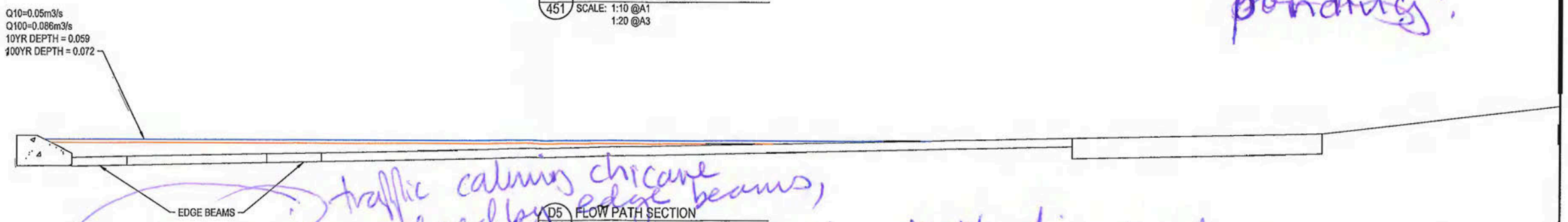
Mirror image to plan??
- Ponding in new dish right at car edge.

D3 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



D4 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3

as above - deeper ponding.



D5 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3

traffic calming chicane enclosed by edge beams, tree pit or similar planting - if planting need tree pit will this then flood??

roads CS H

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

REV	DATE	AMENDMENT	DRAWN
A	06.05.22	RC RFI	CM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
CM	CC

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: ROAD FLOW SECTIONS - SHEET 2

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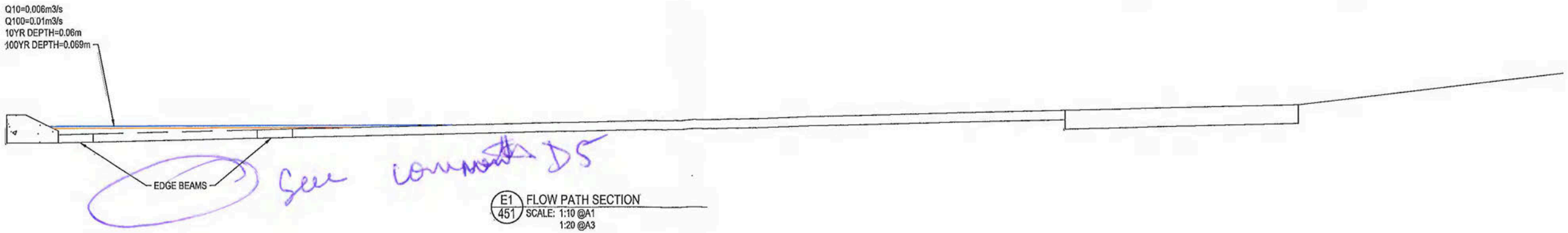
ace

A1 SCALE	A3 SCALE
AS SHOWN	AS SHOWN
JOB No.	DWG No.	REVISION
P20-156	S3.432	A

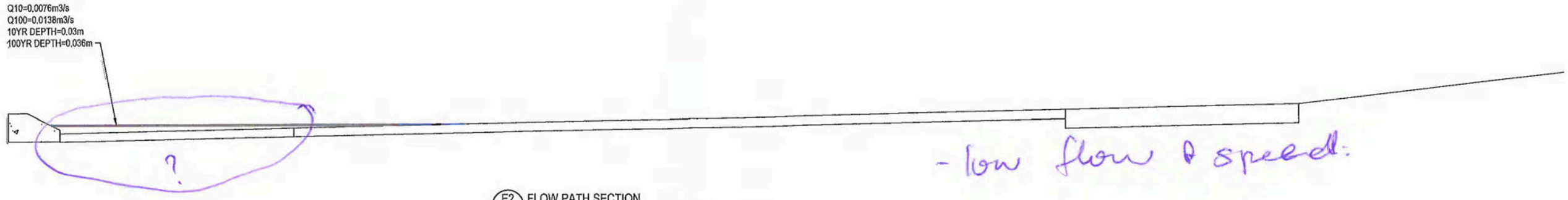
PRINTED: 6/05/2022 5:04:57 pm

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

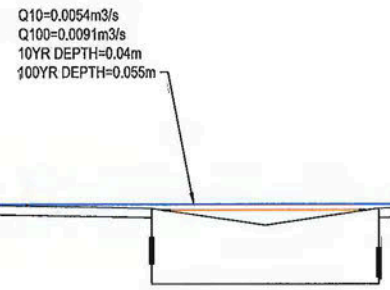
FILE PATH: G:\AV Civil\Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\stage 3\P20-156-S3-432.dwg



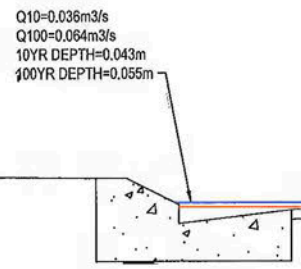
E1 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



E2 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



E3 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



E4 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

REV	DATE	AMENDMENT	DRAWN
A	06.05.22	RC RFI	CM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
CM	CC

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: ROAD FLOW SECTIONS - SHEET 3

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A1 SCALE	A3 SCALE
AS SHOWN	AS SHOWN
JOB No.	DWG No.
P20-156	S3.433

REVISION: A

PRINTED: 6/05/2022 5:05:08 pm

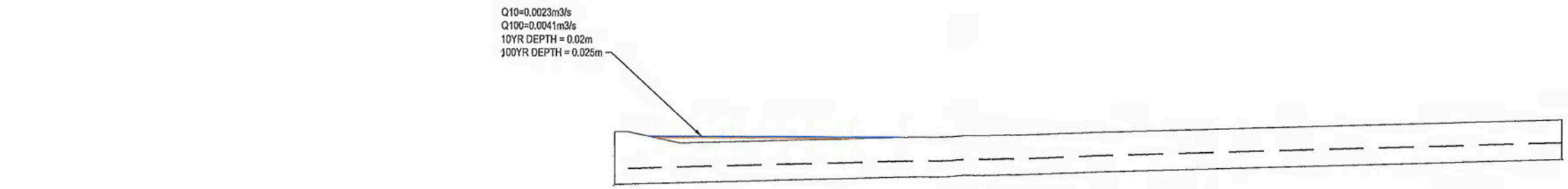
See comment D5

- low flow & speed

- low flow & speed.

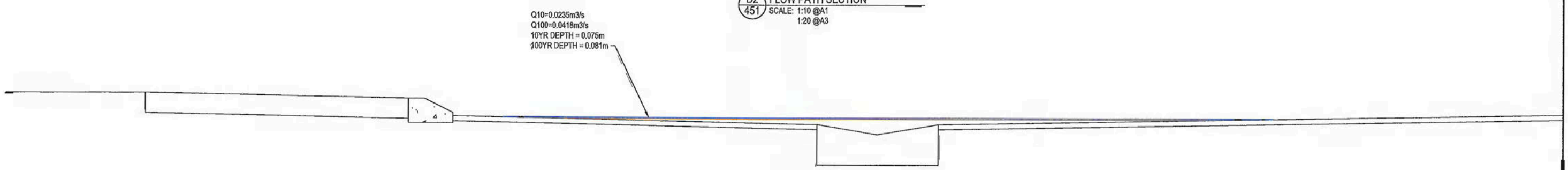
- channel back of cars

? Opposite #4 should show dish channel.

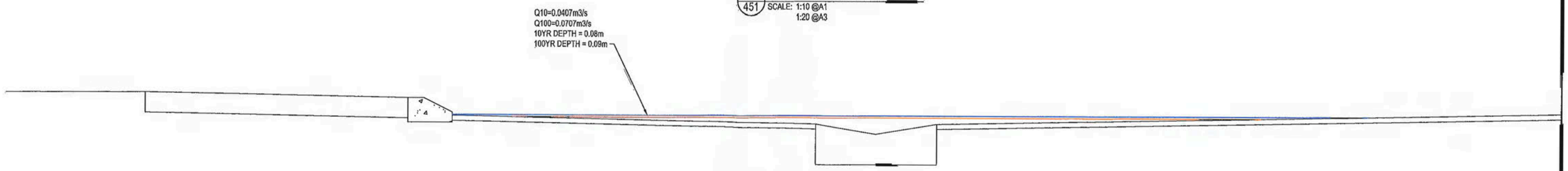


D1 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3

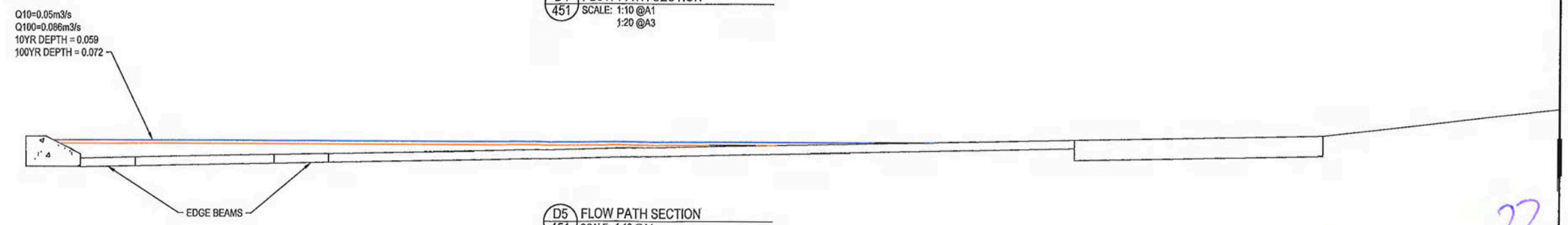
D2 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



D3 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



D4 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3



D5 451 FLOW PATH SECTION
SCALE: 1:10 @A1
1:20 @A3

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

Double up??

REV	DATE	AMENDMENT	DRAWN
A	06.05.22	RC RFI	CM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
CM	CC

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: ROAD FLOW SECTIONS - SHEET 3

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A1 SCALE	A3 SCALE
AS SHOWN	AS SHOWN

JOB No.	DWG No.	REVISION
P20-156	S3.433	A

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FILE PATH: G:\AA Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\dgn 3\P20-156 S3.430.dwg

From: [redacted]
To: [redacted]
Subject: 106 Mohaka St - RM210328 - RC RFI
Date: Thursday, April 28, 2022 11:55:10 AM
Attachments: image003.png
image007.png
image008.png
image010.png
image011.jpg
image004.png
image005.png
Untitled attachment 00003.png

Hey [redacted]

When you get a chance can you have a look at RFI responses to your items?

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Thursday, 28 April 2022 9:38 am
To: [redacted]@huttcity.govt.nz>; [redacted]
[redacted]@huttcity.govt.nz>
Cc: [redacted]aprotean.co.nz>; [redacted]
[redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]
[redacted]@arassociates.co.nz>; [redacted]

[redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>
Subject: [EXTERNAL] RE: RM210328 - engineering assessment

Hi[redacted] &[redacted]

Please see below link which has enclosed all the updated drawings, data and responses to your queries.

Please review our response and get back to us as soon as possible, we are eager to get this resolved.

Any questions please contact.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M:[redacted] **E:**[redacted]@aprotean.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday, 27 April 2022 6:41 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: RM210328 - engineering assessment

Hi[redacted]

Please see the attached sharepoint link to the ARAL responses to the RFIs with supporting documents.
2022.04.07 - RFI Responses

Drawings and Calculations have been updated, but there haven't been any major changes.
Attached are the Responses, drawings, calculations, flood report and a Screenshot of the HEC-RAS flood model of the back of block F.

Kind Regards,
[redacted]
BEng (Hons)

[redacted]

Producing the best professionals in our field.

To influence and contribute to a more sustainable world.

AR & Associates Ltd
Level 3, Building 8, 5 Mile Centre
36 Grant Road, Frankton
Queenstown 9371
m. [redacted]
www.arassociates.co.nz

-

From: [redacted]@aprotean.co.nz>
Sent: Thursday, 14 April 2022 8:27 am
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>
Subject: FW: RM210328 - engineering assessment

Hi All,

Please see attached comments back from HCC.

The bulk of the comments and queries relate to finished levels, flood modelling and stormwater treatment. They are still waiting for advice back from their roading experts with respect to mountable K&C and treatment. They have OK'd the detention tank but still want clarification on the calculations.

Following this meeting it is crucial that we all review these notes and start formulating a response to the queries raised. Most of these will require input from ARAL.

Talk soon.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, 13 April 2022 4:38 pm
To: [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>
Subject: FW: RM210328 - engineering assessment

Hi everyone

I received an out-of-office msg for [redacted] but please see attached for the updated engineering review which outlines the current status of the engineering assessment and matters which are unresolved or require further clarification. Could you please review and respond where relevant?

Kind regards,
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: [redacted] **M:** **W:** www.huttcity.govt.nz

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---

From: [redacted]
Sent: Wednesday, 13 April 2022 4:20 PM
To: [redacted]@urbanedgeplanning.co.nz>
Cc: [redacted]@huttcity.govt.nz>
Subject: RM210328 - engineering assessment

Hello [redacted]

[redacted] has provided the attached updated review which outlines the current status of the engineering assessment and matters which are unresolved or require further clarification. Could you please arrange for the engineering design team to review and respond where relevant? Let me know if you would like to discuss.

Kind regards,
[redacted]

From: [redacted]
To: [redacted]
Subject: 106 Mohaka Str, Wainuiomata - EOne/OneBox LPS system Enquiry
Date: Tuesday, August 31, 2021 1:53:17 PM
Attachments: image003.jpg
image004.jpg
image005.jpg
image006.png
image007.png
image008.jpg
Layout.pdf
Custom Tanks Duplex Typical.pdf

Hi [redacted]

Can you look after the enquiry below?

Thanks
[redacted]

From: [redacted]@wellingtonwater.co.nz>
Sent: Tuesday, August 31, 2021 8:50 AM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@ecoflow.co.nz>
Subject: FW: 2021-07-30 WWL WW Pump Controller re: 106 Mohaka Str, Wainuiomata - EOne/OneBox LPS system

Greetings [redacted]

As this is in Hutt City would you like to reply for me.

Kind regards
[redacted]

From: [redacted]@ecoflow.co.nz>
Sent: Thursday, 26 August 2021 1:48 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]
[redacted]@ecoflow.co.nz>
Subject: RE: 2021-07-30 WWL WW Pump Controller re: 106 Mohaka Str, Wainuiomata - EOne/OneBox LPS system

Hi [redacted]

I hope this email finds you and your family well?... Looks like Wellington might come through this lightly – fingers crossed!

Can I ask a favour? Could I quickly grab your thoughts regarding a project I'm assisting an engineer with – 106 Mohaka Str, Wainuiomata. See layout attached.

Note: Receiving manhole/discharge point is to the left before you exit the ROW onto Mohaka Str.

The engineer and I are looking at wastewater reticulation options. Discussed to date is a single municipal pump station (12hr storage) or go an LPS solution?

For LPS we have two options:

Option 1 –

1 x EOne System/Lot - can be done with our standard EOne controller or with OneBox where council/downstream infrastructure benefit from all its functionality.

- Negatives - finding space to squeeze in the EOne systems - high density development.

Option 2 –

1 x EOne 'custom' Duplex Systems/15 Lots - can be done with standard EOne Duplex (timer) controller or with OneBox where council/downstream infrastructure benefit from all its functionality.

- Positives - easier to install, less space required.

For option two if standard EOne Duplex (timer) controllers are used it would go private ownership and the body corp could manage the service and maintenance. If OneBox controllers are used the systems would need to be vested to council.

When you get a moment it would be great to hear from you… so we start as we mean to go on?

Warm regards,

[redacted]

[redacted] | [redacted]

Low Pressure Sewer, Wastewater & Stormwater Specialist
5 Ride Way, Albany, Auckland
p: [redacted] | m: [redacted] | w: www.ecoflow.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 2 August 2021 3:57 PM
To: [redacted]@ecoflow.co.nz>
Subject: RE: 2021-07-30 WWL WW Pump Controller re: 31 Adventure Drive - EOne/OneBox LPS system

Thanks [redacted]

[redacted] **Senior Engineer – Land Development**

Email: [redacted]@wellingtonwater.co.nz

Mob 04 912 4400 **Mob** [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, Petone Office, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

From: [redacted]@ecoflow.co.nz>
Sent: Monday, 2 August 2021 12:59 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]@orogen.nz>; [redacted]@ecoflow.co.nz>; [redacted] | Ecoflow [redacted]@ecoflow.co.nz>
Subject: 2021-07-30 WWL WW Pump Controller re: 31 Adventure Drive - EOne/OneBox LPS system

Hi [redacted]

Great chatting with you on the phone on Friday… I'm now super clear what Wellington Water (WW) is trying to achieve and this can only be done using our 'proven' OneBox/EOne technology. The Iota OneBox allows water authorities to mitigate wastewater flows downstream from their pressure sewer catchments during storm events or when maintenance is required. It also allows councils to run infiltration reports and even out the catchments peak flows using the 'peak flow smoothing' function. To see more OneBox features see brochure attached.

31 Adventure Drive Project –

We see two options which Wellington Water could proceed with to insure the use of OneBox:

- Install the OneBox - *giving all smart functionality straight away*

- Install standard EOne equipment including a 40mm conduit – *future proofing the network so OneBox controllers can be added at a later date*

Considerations:

Installing OneBox –

- Ownership arrangements System must be vested to council once homes receive final CCC.
- 3G – 4G signal strength Ecoflow has a signal strength test unit and we recommend checking this beforehand.
- Equipment difference and costs The EOne system using a OneBox controller uses the same pump minus the pressure switches due to the pump now being controlled by the OneBox and on-line portal. In addition to this we need to add a level transducer and high level float. Estimated cost increase is approximately $1200/system more expensive.
- Installation and Commissioning Differences Training will be required for the on-site electrician and drainlayer at the front end of the project. We also recommend that a trained council opps member be responsible for commissioning each system as they're livened up. This person would check the installation, plug in a laptop, create a new site, and connect the OneBox to the on-line portal.
- Annual Portal Fee $70/system/year. Ecoflow to invoice council for this.
- Ongoing Monitoring, Service and Maintenance A council ops member will require a user profile, access rights and training on how to monitor the portal and integrate the information. Also confirm what emails are getting the portal alarm notifications (by email and/or text). Op's members attending call outs will require a window's based laptop and training.

Note: All OneBox training will come from Ecoflow Ltd. Cost TBC.

Install standard EOne equipment including a 40mm conduit -

- Standard EOne System In the rare event of a pump fault, the standard EOne controller will alert the homeowner to call the service provider by audible and visual alarm. It is typical to have a mean time between service calls of around 10 years. Houses can change hands many times before an alarm sounds, therefore we recommend a label is attached to the controller with the service providers phone number. In order to upgrade to the OneBox at a later date we would recommend installing a 40mm conduit for the additional level transducer and float switch required.
- Standard EOne System $5956/system.
- Install OneBox Swap out standard EOne controller for OneBox $2200/system

We're entering a really exciting new age of wastewater and we would be happy to set up a meeting with South East Water to discuss how they use Onebox, operationally, policy etc. They have a major project on the go at the moment, Mornington Peninsula which consists of 15,000 additional properties to add to their existing LPS network.

I hope the above adds value with your discussions regarding 31 Adventure project tomorrow.

Let me know if you have any further questions?

Kind regards,

[redacted] | [redacted]

Low Pressure Sewer, Wastewater & Stormwater Specialist
5 Ride Way, Albany, Auckland
p: [redacted] | m: [redacted] | w: www.ecoflow.co.nz

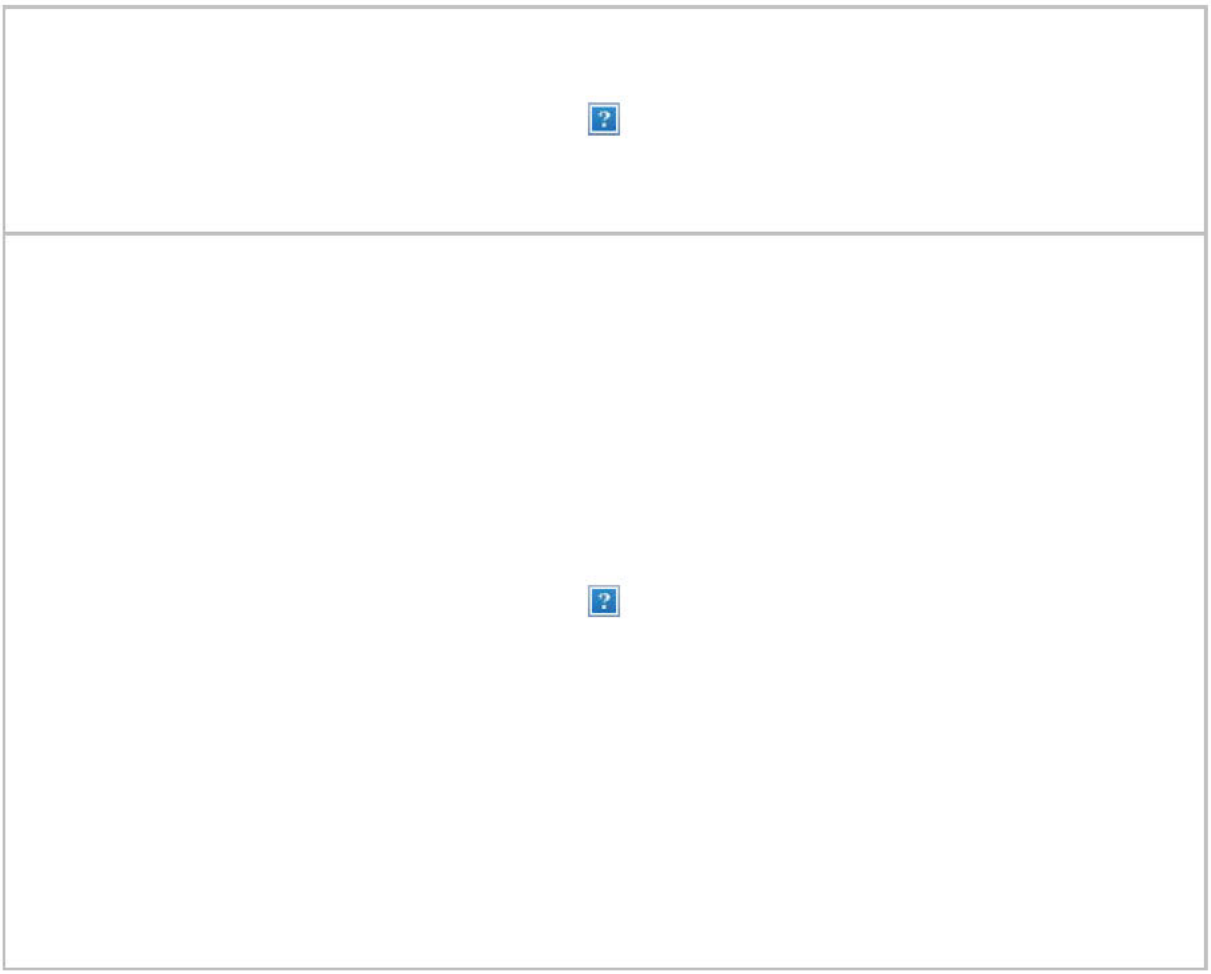
From: [redacted]@wellingtonwater.co.nz>
Sent: Friday, 30 July 2021 9:43 AM
To: [redacted]@ecoflow.co.nz>
Cc: [redacted]@orogen.nz>
Subject: 2021-07-30 WWL WW Pump Controller re: 31 Adventure Drive - EOne/OneBox LPS system

Greetings [redacted]

2021-07-30 - 31 Adventure Drive (RC8077) EOne&OneBox Smart Controller LPS system Building Consent & Engineering Approval

I was checking the consent conditions and the smart controller will be required for the development to meet condition 75(ii) *"… operates in accordance with the overall sewer system objectives for the subdivision*". The planners report '*Report and Decision RC8077 SL0003-20'* clearly states the low pressure sewer system is to mitigate effects from the development on wet weather peak flows in the downstream network.

I am keen to get this sorted early, so when we get to the building consent approvals we have the details sorted, avoiding delays at that stage.



I would really appreciate the additional details for the proposed controller (OneBox). [redacted] has already provided the attached pump specification and LPS sewer design.
Internally we are assuming the web based app will be an interface that WWL operators will be able to log into with a username and password in order to switch between the 3 operational modes either manually of via a batch script.

I have a meeting midday Tuesday to address internal stakeholders on

- budget (annual operational cost of $70/unit ($2170 pa for the 31 units)),
- ownership arrangements (Potentially council having a side agreement with residents to maintain and operate their pumps) and the
- internal operational interface setup.

Kind regards

[redacted] **Senior Engineer – Land Development**

Email: [redacted]@wellingtonwater.co.nz

Mob 04 912 4400 **Mob** [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, Petone Office, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

From: [redacted]@ecoflow.co.nz>
Sent: Thursday, 29 July 2021 3:57 pm
To: [redacted]@wellingtonwater.co.nz>
Subject: 31 Adventure Drive - EOne/OneBox LPS system

Hi [redacted]

Great chatting with you earlier on the phone.

I mentioned I would get an email to you with confirming the three controller options for 31 Adventure Drive project.

I've unfortunately had to get away early, but will get onto this first thing in the morning.

Talk to you tomorrow as well.

Regards,

[redacted] | [redacted]

Low Pressure Sewer, Wastewater & Stormwater Specialist
5 Ride Way, Albany, Auckland
p: [redacted] | m: [redacted] | w: www.ecoflow.co.nz

LEGEND

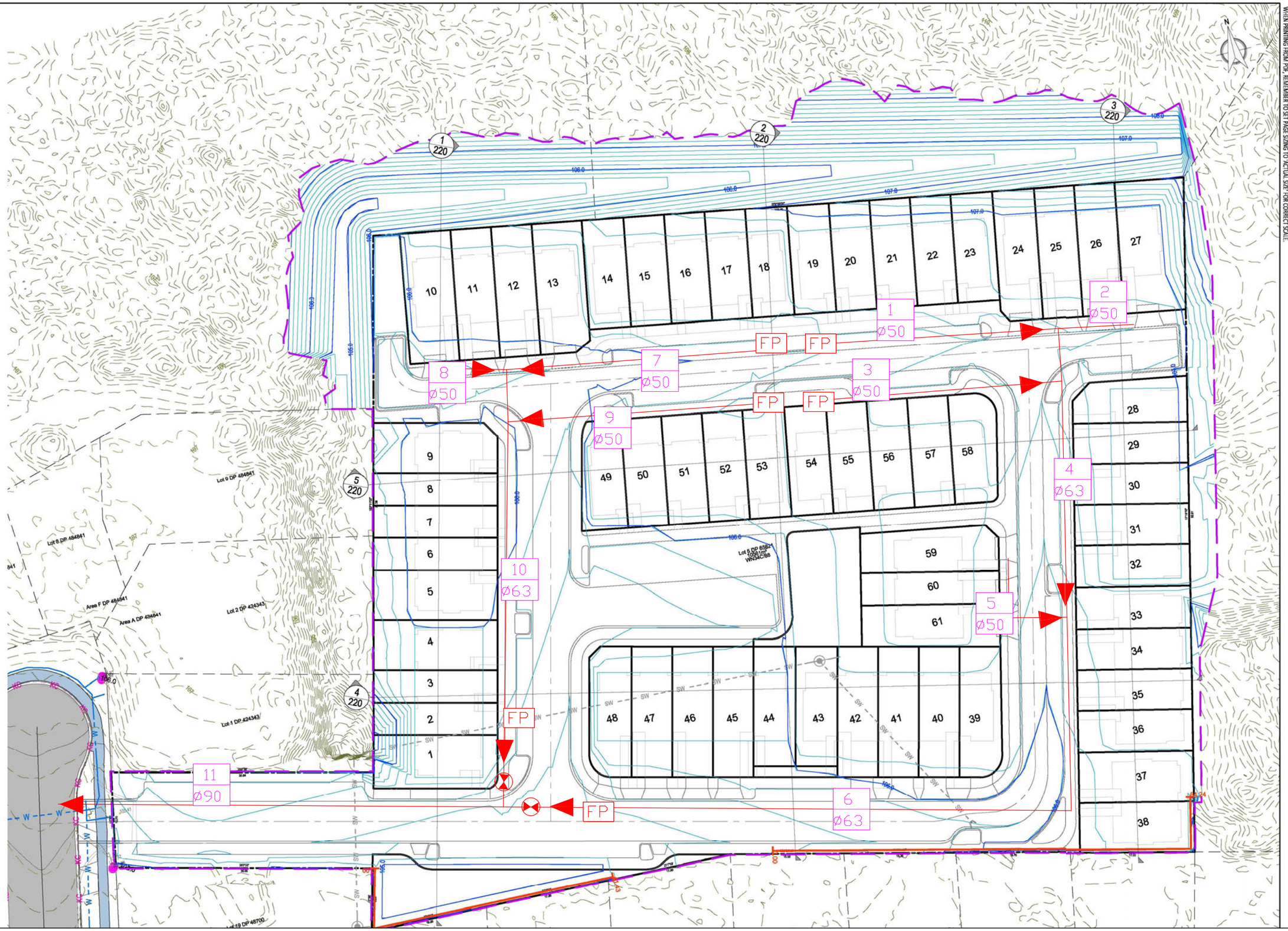
- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- PROP BOUNDARY
- PROP MAJ CONTOUR (16.0)
- PROP MIN CONTOUR (16.2)
- EX MAJ CONTOUR (16.0)
- EX MIN CONTOUR (16.2)
- EXTENT OF EW

Key:

- ► Zone End Indicator
- Isolation Valve
- FP Flushing Point
- AV Combination Air Valve
- 172 Zone Number
- ø180 Pipe Diameter

Notes:

- All LPS Pipes Shall Be PE100 SRD11 PN16
- All LPS Pipe Sizes Are OD
- LPS Laterals from LPS Tank to Main Shall Be 40mm OD
- This Plan is a Preliminary Design Only
- Locations Are Indicative Only



WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

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AUCKLAND - (Head Office)
16b Piemark Drive, North Harbour
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P.O Box 300–249, Albany, Auckland
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CHRISTCHURCH
15 Anchorage Road, Hornby
Hornby, Christchurch
Ph (03)349–2506

www.ecoflow.co.nz
Email: info@ecoflow.co.nz

DRAWN	JM	10/03/2021
CHECKED		
CLIENT APPROVED		
CLIENT		

TITLE

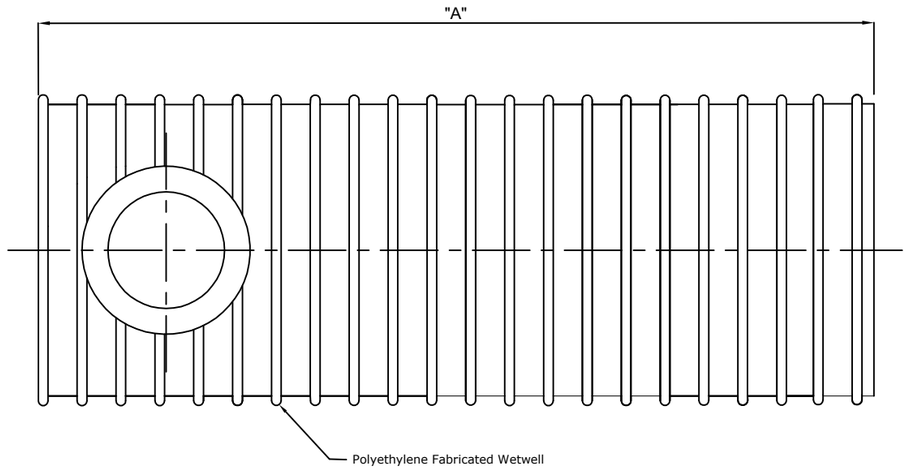
106 Mohaka Street
Low Pressure Sewer
Preliminary Design

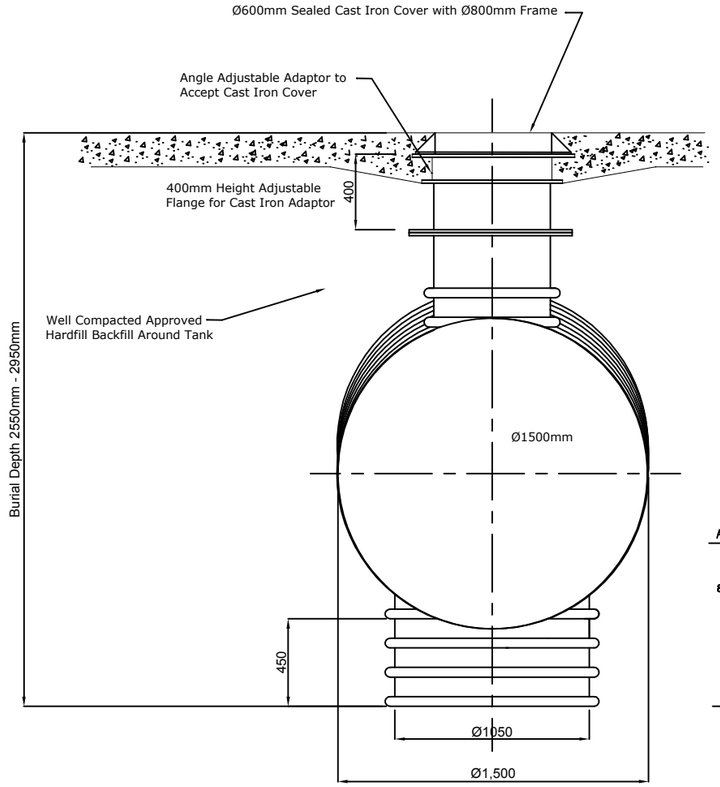
Job

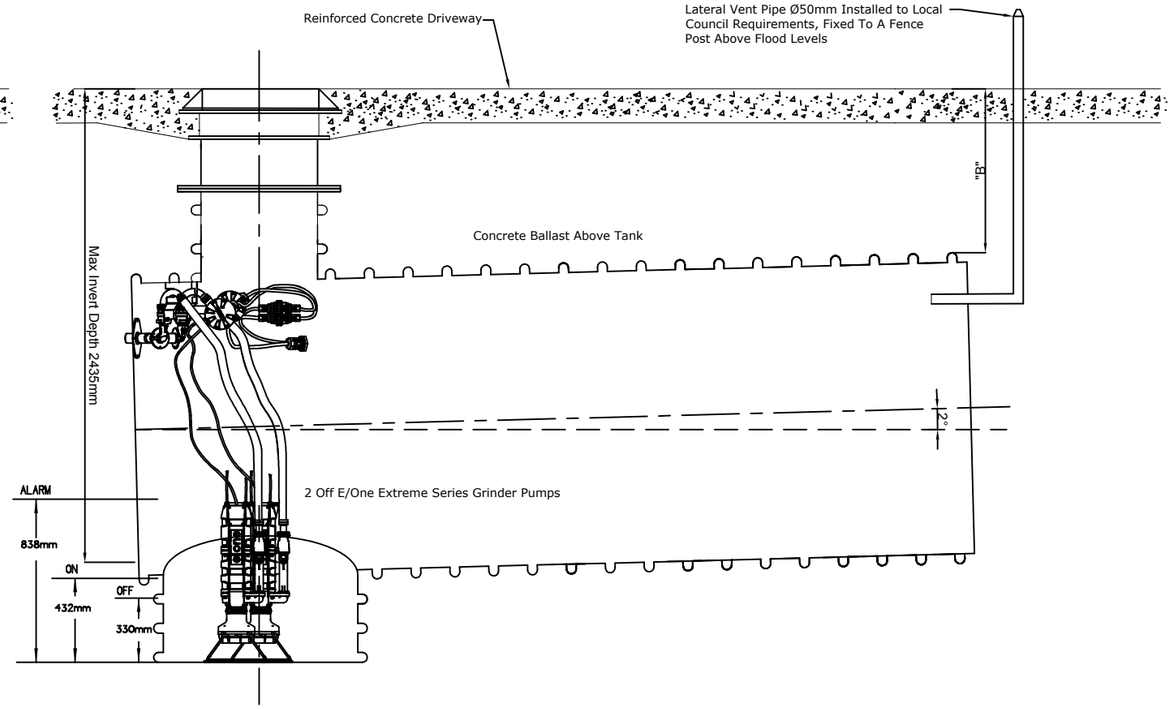
REVISION	SCALE		Dwg No.
1	NTS	AT	1

e|one
ENVIRONMENT ONE

Volume	Dimension "A"	Dimension "B"
4.0m3	2.3m	900mm
5.0m3	2.8m	886mm
6.0m3	3.4m	872mm
7.0m3	4.0m	858mm
8.0m3	4.5m	844mm
9.0m3	5.1m	830mm
10.0m3	5.7m	816mm
11.0m3	6.2m	802mm
12.0m3	6.8m	788mm
13.0m3	7.4m	774mm
14.0m3	8.0m	760mm
15.0m3	8.6m	746mm
16.0m3	9.2m	732mm
17.0m3	9.8m	718mm
18.0m3	10.4m	704mm
19.0m3	11.0m	690mm
20.0m3	11.6m	676mm







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Hornby, Christchurch
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www.ecoflow.co.nz
Email: info@ecoflow.co.nz

DRAWN	MC	14/09/18
CHECKED		
CLIENT APPROVED		
CLIENT		

TITLE

Duplex Custom T Tank

Typical Drawing

Job

REVISION	SCALE		Dwg No.
1	NTS	AT	1

e one SEWER SYSTEMS

From: [redacted]
To:
Subject: FW: [EXTERNAL] RE: RM210328: 106 Mohaka ST - Calculations
Date: Tuesday, April 5, 2022 7:57:29 AM
Attachments: image003.png
image004.png
image006.png
304dc400-a854-48a9-a6d6-febef30e0857.png
image001.png
Untitled attachment 00020.png
P20-156-Clc01-RevG-EPA.pdf

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@arassociates.co.nz>
Sent: Tuesday, 5 April 2022 7:49 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>
Subject: [EXTERNAL] RE: RM210328: 106 Mohaka ST - Detention & WSUD

Good morning [redacted]
Please find attached the latest calculations set we supplied for Engineering Approval review.

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@aprotean.co.nz>
Sent: Tuesday, 5 April 2022 7:41 am
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>
Subject: FW: RM210328: 106 Mohaka ST - Detention & WSUD

Hi [redacted]

See below email from [redacted] Can you please provide the stormwater calculations.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 5 April 2022 7:09 am
To: [redacted]@aprotean.co.nz>
Cc: [redacted]@huttcity.govt.nz>
Subject: RM210328: 106 Mohaka ST - Detention & WSUD

Hi [redacted]

Can you please forward the most up to date stormwater detention calculations and WSUD calculations, I have had difficulties locating them.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

MHV Ltd

106 Mohaka Street, Wainuiomata, Lower Hutt

Engineering Approval Calculations

CONTENTS:

Reason for this Revision: Wellington Water Queries
Updated Sheet 8

Reviewed By:	JL
Calculations By:	CM
Job No.	P20-156
Date:	11-Feb-22
Revision:	G
Approved By	

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	Sheet:	1
Description:	Engineering Approval Calculations	Designed:	CM		
Date:	11-Feb-22	Checked:	JL		

A Objectives

The calculations contained herein seeks to achieve the following objective:

1) To establish the capacity of the existing and proposed public stormwater infrastructure available to service the proposed development.

2) To size and design the required stormwater attenuation tank

B General Description of Proposal

The site in question is located at 106 Mohaka Street in Wainuiomata community. To the south and to the west the site is neighboured by developed residential land; to the north and to the east the site is neighboured by dense bush.

The site has an approximate area of 1.06ha and is legally described as Lot 5 DP 65821.
The site topography consists of a relatively flat platform (4-5% fall to the south).
There is an existing dwelling located on the site. The rest generally is covered in grass and pasture and with a small amount of dense bush on the northern boundary.

C Design Philosophy

C.1 Stormwater

The assessment of stormwater design presented herein has been undertaken in accordance with the requirements under Wellington Water Regional Standard for Water Services (May 2019 Version 2.0) Section 4.

The capacity of primary systems is estimated on the basis of fully meeting flows for the 10 year ARI event, for residential areas as required in WWL CoP Standards Table 4.1. The estimation of stormwater flows for purposes of assessing the infrastructure capacity of existing and proposed stormwater systems Rational Method is used.For the stormwater attenuation the calculations are undertaken using the "SCS Curve Number" method as setout in Auckland Regional Council's TP108, and HEC-HMS modelling package.

Pipe capacities are estimated using the Colebrook-White formula, with roughness coefficients, k, of 1.5mm for concrete and 0.6mm for PVC & other plastic pipe materials.

C.2. Wastewater

The assessment of wastewater flows presented herein has been undertaken in accordance with the requirements under Wellington Water Regional Standard for Water Services (May 2019 Version 2.0) Section 5.

Wastewater flows are estimated as outlines in WWL CoP Section 5.3.1.3

Pipe capacities are estimated using the Colebrook-White formula, with roughness coefficients, k, of 1.5mm for all pipe materials.

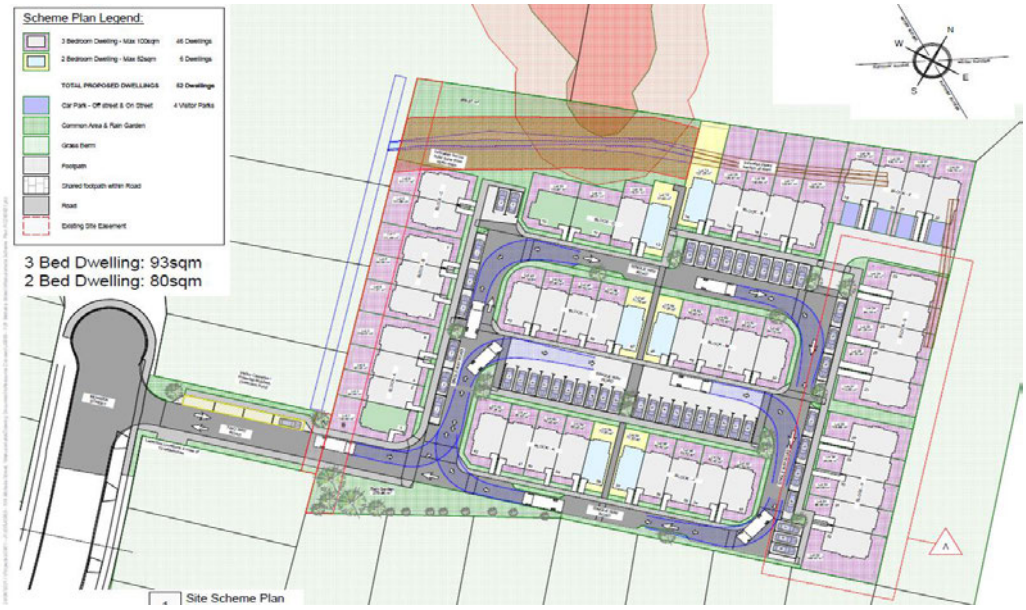
C.3. Water Demand

The assessment of water demand presented herein has been undertaken in accordance with the requirements under Wellington Water Regional Standard for Water Services (Dec 2021 Version 3.0) Section 6.

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	Sheet:	2
Description:	Engineering Approval Calculations	Designed:	CM		
Date:	11-Feb-22	Checked:	JL		

D Proposed Development



Catchment Areas - Site

HEC Inputs for Detention Tank Calculations

	Area (m²)	Area (km²)	Imp % Cover	Impervious	Pervious	
Pre Development						
Site / Grass	10561	0.010561	0%	0	10561	**Consider Green Grass Scenario*
Post Development						
Roads	4480	0.00448	90%	4032	448	
Lots	6081	0.006081	47%	2858	3223	

E Rainfall Data

Wellington Regional Standard for Water Servces (RSFWS) May 2019 V 2.0

Wainuiomata: Wainuiomata Shopping Centre

		Duration									
ARI (y)	AEP	10m	20m	30m	60m	2h	6h	12h	24h	48h	72h
1.58	63%	41.9	28.7	23.4	16.7	12.0	7.1	4.9	3.3	2.2	1.6
2	50%	46.0	31.5	25.6	18.2	13.1	7.7	5.4	3.7	2.4	1.8
5	20%	60.3	41.2	33.4	23.8	17.1	10.0	7.0	4.7	3.0	2.3
10	10%	71.2	48.6	39.4	27.9	20.0	11.7	8.1	5.5	3.5	2.7
20	5%	82.6	56.3	45.6	32.3	23.1	13.5	9.4	6.3	4.1	3.1
30	3.3%	89.5	61.0	49.4	34.9	25.0	14.5	10.1	6.8	4.4	3.3
40	2.5%	94.6	64.4	52.1	36.9	26.3	15.3	10.6	7.1	4.6	3.5
50	2%	98.6	67.1	54.3	38.4	27.4	15.9	11.0	7.4	4.8	3.6
60	1.7%	102.0	69.3	56.1	39.6	28.3	16.4	11.4	7.6	4.9	3.7
80	1.2%	107.0	72.9	58.9	41.6	29.7	17.2	11.9	8.0	5.1	3.9
100	1%	111.0	75.7	61.2	43.2	30.8	17.9	12.4	8.3	5.3	4.0

HIRDS V4 Intensity-Duration-Frequency Results

Historic Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h
1.58	0.633	41.7	28.3	22.9	16	11.3	6.41	4.38	2.89
2	0.5	45.8	31.1	25.1	17.6	12.4	7.02	4.79	3.16
5	0.2	60.3	40.9	32.9	23	16.2	9.12	6.2	4.08
10	0.1	71.4	48.3	38.8	27.1	19	10.7	7.25	4.77
20	0.05	83	56.1	45	31.4	22	12.3	8.34	5.47
30	0.033	90.1	60.8	48.8	33.9	23.7	13.3	8.99	5.9
40	0.025	95.3	64.2	51.6	35.8	25	14	9.47	6.2
50	0.02	99.4	67	53.7	37.3	26.1	14.6	9.84	6.44
60	0.017	103	69.2	55.5	38.5	26.9	15	10.1	6.64
80	0.012	108	72.8	58.4	40.5	28.3	15.8	10.6	6.95
100	0.01	112	75.6	60.6	42	29.3	16.3	11	7.2
250	0.004	130	87.4	70	48.4	33.7	18.7	12.6	8.21

RCP6.0 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h
1.58	0.633	49.7	33.8	27.3	19.1	13.4	7.4	4.95	3.22
2	0.5	54.9	37.3	30.1	21.1	14.8	8.14	5.45	3.53
5	0.2	72.9	49.4	39.8	27.8	19.4	10.7	7.13	4.6
10	0.1	86.6	58.6	47.1	32.9	22.9	12.6	8.37	5.4
20	0.05	101	68.2	54.8	38.2	26.5	14.5	9.65	6.2
30	0.033	110	74.1	59.5	41.4	28.7	15.7	10.4	6.69
40	0.025	116	78.3	62.8	43.7	30.3	16.6	11	7.05
50	0.02	121	81.7	65.6	45.5	31.6	17.2	11.4	7.33
60	0.017	125	84.4	67.7	47	32.6	17.8	11.8	7.56
80	0.012	132	88.9	71.3	49.5	34.3	18.7	12.4	7.92
100	0.01	137	92.4	74.1	51.3	35.6	19.4	12.8	8.21
250	0.004	159	107	85.5	59.2	40.9	22.2	14.7	9.36

F Rainfall Depths - Hydrograph Inputs

2 yr ARI

Duration (min)	Depth (mm)	Depth difference	10 mins values	5mins values	Time interval
10	9.15	9.15	9.1500	4.5750	11.55-12.05
20	12.4	3.25	3.2500	1.6250	11.50-12.20
30	15.1	2.7	2.7000	1.3500	11.45-12.15
60	21.1	6	2.0000	1.0000	11.30-12.30
120	29.5	8.4	1.4000	0.7000	11.00-13.00
360	48.9	19.4	0.8083	0.4042	9.00-15.00
720	65.4	16.5	0.4583	0.2292	6.00-18.00
1440	84.8	19.4	0.2694	0.1347	0.00-24.00
		84.8			

10 yr ARI

Duration (min)	Depth (mm)	Depth diff.	10 mins values	5mins values	Time interval
10	14.4	14.4	14.4000	7.2000	11.55-12.05
20	19.5	5.1	5.1000	2.5500	11.50-12.20
30	23.6	4.1	4.1000	2.0500	11.45-12.15
60	32.9	9.3	3.1000	1.5500	11.30-12.30
120	45.8	12.9	2.1500	1.0750	11.00-13.00
360	75.4	29.6	1.2333	0.6167	9.00-15.00
720	100	24.6	0.6833	0.3417	6.00-18.00
1440	130	30	0.4167	0.2083	0.00-24.00
		130			

100 yr ARI

Duration (min)	Depth (mm)	Depth diff.	10 mins values	5mins values	Time interval
10	22.9	22.9	22.9000	11.4500	11.55-12.05
20	30.8	7.9	7.9000	3.9500	11.50-12.20
30	37	6.2	6.2000	3.1000	11.45-12.15
60	51.3	14.3	4.7667	2.3833	11.30-12.30
120	71.1	19.8	3.3000	1.6500	11.00-13.00
360	116	44.9	1.8708	0.9354	9.00-15.00
720	154	38	1.0556	0.5278	6.00-18.00
1440	197	43	0.5972	0.2986	0.00-24.00
		197			

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	Sheet:	5
Description:	Engineering Approval Calculations	Designed:	CM		
Date:	11-Feb-22	Checked:	JL		

G Existing Catchment Slope Analysis

Refer to wider catchment plan, Appendix A. The total upstream catchment, which extends for 55 hectares approximately.

Catchment A

Average Slope Along Main Drainage Line (equal areas method)

Elevation (m)	h (m)	x (m)	Delta x (m)	h_{avg} (m)	A avg (m^2)	
112	0	0				
120	8	363	363.27	4	1453.08	58
140	28	625	261.73	18	4711.14	261.73
160	48	761	135.6	38	5152.8	135.6
180	68	818	57.05	58	3308.9	57.05
200	88	876	58.71	78	4579.38	58.71
220	108	993	117.03	98	11468.94	117.03
240	128	1064	71.03	118	8381.54	71.03
260	148	1202	137.8	138	19016.4	137.8
280	168	1342	140	158	22145.28	140.16
300	188	1480	138	178	24583.58	138.11
310	198	1590	110	193	21191.4	109.8
320	208	1621	31	203	6242.25	30.75
330	218	1671	50	213	10722.42	50.34
347	235	1748	76	226.5	17261.57	76.21
			1747.59		160218.7	

Slope = $2A/(L^2)$ = 0.104921

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	Sheet:	6
Description:	Engineering Approval Calculations	Designed:	CM		
Date:	P20-156	Checked:	JL		

H Existing Overland Flow Path Calculations

Overland Flow Path (Catchment A): Northern

**For catchment plan refer to drawing 450*

Catchment area =	55.3566	Ha approximately (refer catchment plan, drawing 430, red + green)
Tc=	42	minutes, by calculation
$I_{100\ year\ ARI}$ =	64.8	mm/hr, Wellington RSFWS May 2019 V 2.0
C =	0.35	*Table 7.1 -*

L(km)=	1.754	
S= (m/km)	104.92139	**Refer to Equal Areas Method Calculations on Page 5*
A(km^2)=	0.553566	
Tc (bransby-Williams Formula)=	42	
Interpolate between 30min and 60min intensities for calculated Tc =	54	mm/hr (interpolated for 42m Tc)

From where Q = CIA/360 = **3.5 m3/s**

Overland Flow Path (Catchment B): Eastern

Catchment area =	1.6903	Ha approximately (refer catchment plan attached, blue)
Tc=	10	minutes, by inspection (Short Catchment)
$I_{100\ year\ ARI}$ =	133.2	mm/hr,
C =	0.35	Table 7.1

From where Q = CIA/360 = **0.219 m3/s**

Overland Flow Path (Catchment C): Eastern

Catchment area =	0.196	Ha approximately (refer catchment plan attached, blue)
Tc=	10	minutes, by inspection (Short Catchment)
$I_{100\ year\ ARI}$ =	133.2	mm/hr,
C =	0.35	Table 7.1

From where Q = CIA/360 = **0.025 m3/s**

Rainfall Data

Wainuiomata: Wainuiomata Shopping Centre

		Duration									
ARI (y)	AEP	10m	20m	30m	60m	2h	6h	12h	24h	48h	72h
1.58	63%	41.9	28.7	23.4	16.7	12.0	7.1	4.9	3.3	2.2	1.6
2	50%	46.0	31.5	25.6	18.2	13.1	7.7	5.4	3.7	2.4	1.8
5	20%	60.3	41.2	33.4	23.8	17.1	10.0	7.0	4.7	3.0	2.3
10	10%	71.2	48.6	39.4	27.9	20.0	11.7	8.1	5.5	3.5	2.7
20	5%	82.6	56.3	45.6	32.3	23.1	13.5	9.4	6.3	4.1	3.1
30	3.3%	89.5	61.0	49.4	34.9	25.0	14.5	10.1	6.8	4.4	3.3
40	2.5%	94.6	64.4	52.1	36.9	26.3	15.3	10.6	7.1	4.6	3.5
50	2%	98.6	67.1	54.3	38.4	27.4	15.9	11.0	7.4	4.8	3.6
60	1.7%	102.0	69.3	56.1	39.6	28.3	16.4	11.4	7.6	4.9	3.7
80	1.2%	107.0	72.9	58.9	41.6	29.7	17.2	11.9	8.0	5.1	3.9
100	1%	111.0	75.7	61.2	43.2	30.8	17.9	12.4	8.3	5.3	4.0

Runoff coefficients

Table 7.1 – Runoff Coefficients to be used with Hydrological Design

Area Type	Coefficient C
Fully paved or roofed areas, CBD areas or urban, industrial or commercial areas with greater than 65% coverage permitted by the district plan.	0.95
Industrial/commercial areas with paved plus roof area up to 65% coverage permitted by the district plan.	0.70
Urban areas allowing between 36% and 65% impervious site coverage (inner residential, infill housing, intensive residential development).	0.65
Urban areas allowing coverage up to 35% (residential or outer areas).	0.50
Parks, reserves, green spaces, rural areas.	0.35

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CALCULATION SHEET

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I Existing stormwater channel capacity

Mannings n values

http://www.fsl.orst.edu/geowater/FX3/help/8_Hydraulic_Reference/Mannings_n_Tables.htm

Mannings formula:

$$V = \frac{1}{n}\left(\frac{A^{2/3}}{P^{2/3}}\right)S^{1/2} \qquad Q = \frac{1}{n}\left(\frac{A^{5/3}}{P^{2/3}}\right)S^{1/2}$$

Existing Channel - Section 1

Cross section 1

Design Flow (m^3)= m^3/s 3.49

Channel Slope		1.0%
Flow Depth	(m)	0.5
Mannings (n)		0.035
Channel Area A		1.963
Wetted Perimeter P		4.024

Channel Flow Velocity	m/s	**1.7705**
Fr=		**0.799442688**
Channel Capacity	**m^3/s**	**3.4756**

**For section drawing refer to drawing 431*

Overland Flow Path (Catchme Northern

**For catchment plan refer to drawing 450*

Catchment area =	55.3566	Ha approximately (refer catchment plan, drawing 430, red + green)
Tc=	42	minutes, by inspection
$I_{10\ year\ ARI}$ =	45.6	mm/hr, Wellington RSFWS May 2019 V 2.0
C =	0.35	*Table 7.1 -*

L(km)=	1.754	
S= (m/km)	104.9213886	**Refer to Equal Areas Method Calculations on Page 5*
A(km^2)=	0.553566	
Tc (bransby-Williams Formu	42	

From where Q = CIA/360 = **2.5** **m3/s**

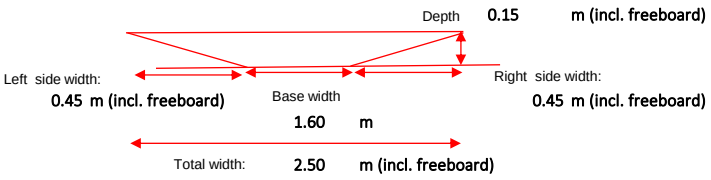
Emergency OLFP channel between lots 27 and 28

Mannings formula:

Channel Slope		1.2%
Channel Freeboard	(m)	0
Base Width	(m)	1.6
Flow Depth	(m)	0.15
LH Side Slope (horizontal to 1 vertical)		3
RH Side Slope (horizontal to 1 vertical)		3
Mannings (n)		0.035
Channel Area A		0.308
Wetted Perimeter P		2.549

Channel Flow Velocity	**m/s**	**0.7737**
Fr=		**0.637808853**

Channel Capacity	**m^3/s**	**0.2379**



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J Site - Road Flow Analysis

Drawing 430 *Drawing 451* *Table 7.1*

AEP	Catchment	Total Area (Ha)	Roof Area (Ha)	Grass Area (Ha)	C (weighted)	I (mm/hr)	Q (m^3/s)
10	B	0.306	0.1012	0.0669	0.72	85.44	**0.0351**
	C	0.4555	0.1503	0.1356	0.64	85.44	**0.0463**
	B - Roof Area		0.1061		0.95	85.44	**0.0239**
	C - Roof Area		0.1549		0.95	85.44	**0.0349**
100							
	B	0.306	0.1012	0.0669	0.80	133.2	**0.0663**
	C	0.4555	0.1503	0.1356	0.74	133.2	**0.0901**

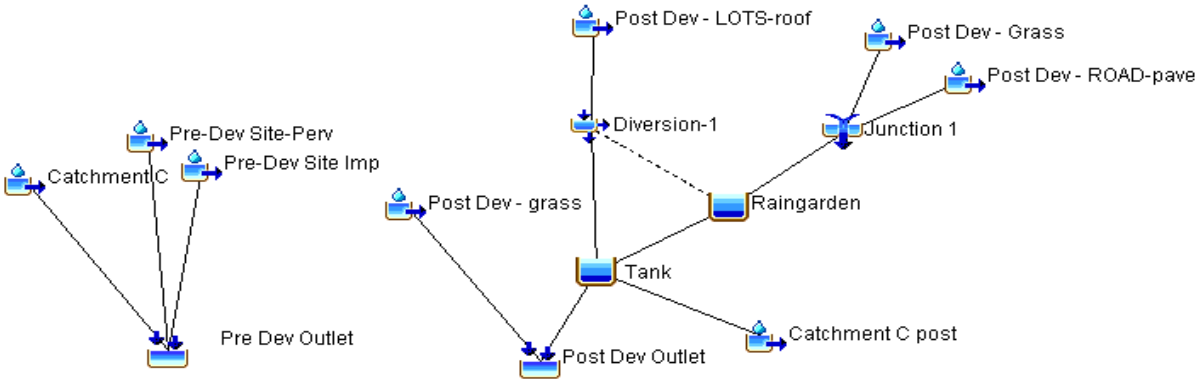
Road flow cross section flow flow capacity calculations

AEP	Channel Section	Slope	Mannings (n)	Channel Area (m^2)	Wetted Perimeter (m)	Flow velocity (m/s)	Channel capacity (m3/s)	Design flow (m3/s)	Flow depth (m)	VxD (m^2/s)
10%	**B**	1.00%	0.015	0.063	2.55	**0.57**	**0.036**	0.035	0.05	0.03
	C	1.00%	0.015	0.081	2.82	**0.63**	**0.051**	0.046	0.085	0.05
1%	**B1**	1.00%	0.015	0.106	3.33	**0.67**	**0.071**	0.066	0.065	0.04
	C1	1.00%	0.015	0.128	3.57	**0.72**	**0.093**	0.090	0.1	0.07

K1 HEC-HMS Attenuation Tank Design

Part of water sensitive design goal is to reduce the peak flow discharges into the existing stormwater network and subsequently into the receiving environment. It is proposed that the overall site discharge will be attenuated to the pre-development levels, 'green grass' scenario to replicate the natural site discharges. The methodology used for this exercise is to first determine the overall site discharge at green grass scenario. Following this, the model is re-run using the post-development areas to acquire the detention volume necessary to achieve hydrological neutrality. Council has issued a statement that due to severe flooding issues in downstream it is required to attenuate the post development flows to pre development rates for both 10yr and 100yr rainfall events.

HEC-HMS model



Catchment Dischare Rates

Global Summary Results for Run "Site - 100yr + CC"

Project: P20-156-Attenuation Calcs Simulation Run: Site - 100yr + CC

Start of Run: 01Jan2000, 00:00 Basin Model: Proposed Site
End of Run: 02Jan2000, 00:00 Meteorologic Model: 100yr + CC
Compute Time: 17Dec2021, 15:22:52 Control Specifications: 24hrs

Show Elements: All Elements Volume Units: (•) MM ( ) 1000 M3 Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Catchment C	0.016900	0.330	01Jan2000, 12:08	103.61
Pre-Dev Site-Perv	0.008711	0.170	01Jan2000, 12:08	103.61
Pre-Dev Site Imp	0.001850	0.060	01Jan2000, 12:08	191.43
Catchment C post	0.016900	0.330	01Jan2000, 12:08	103.61
Post Dev - LOTS-roof	0.002546	0.083	01Jan2000, 12:08	191.43
Post Dev - ROAD-pave	0.003609	0.117	01Jan2000, 12:08	191.43
Post Dev - Grass	0.002478	0.048	01Jan2000, 12:08	103.61
Junction 1	0.006087	0.166	01Jan2000, 12:08	155.68
Raingarden	0.006087	0.195	01Jan2000, 12:08	155.95
Diversion-1	0.002546	0.051	01Jan2000, 12:14	185.18
Tank	0.025533	0.525	01Jan2000, 12:11	124.13
Post Dev - grass	0.001928	0.038	01Jan2000, 12:08	103.61
Post Dev Outlet	0.027461	0.558	01Jan2000, 12:11	122.69
Pre Dev Outlet	0.027461	0.560	01Jan2000, 12:08	109.52

The target overall site discharge rate for the 100-year post-development event is 560 l/s (pre development site discharge. It has been attenuated to 558 l/s by providing on site detention device.

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CALCULATION SHEET

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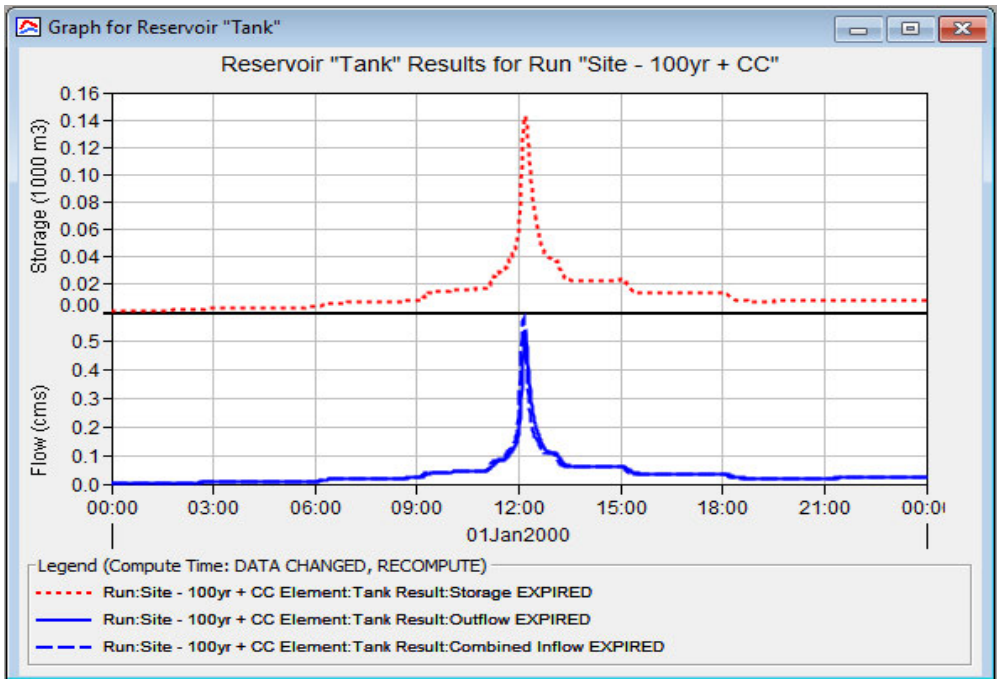
K2 **HEC-HMS Attenuation Tank Design**

It is calculated that overall 145m³ of detention for the site is required to reduce the site peak discharge during a 100-yr ARI storm to pre development levels. This volume will be provided via 1050mm dia oversized SW network.Refer to infrastructure report.

Detention tank peak storage and discharge graph



100 Year Attenuation:

Total Pre-Development discharge (m^3/s)	Total Post-Development un-attenuated discharge (m^3/s)	Total Post-Development attenuated discharge (m^3/s)	Total Attenuation Tank Volume (m^3)
0.560	0.611	0.563	145

Tank peak discharge= **0.531 m^3/s**

Proposed detention tank storage - 145m³ for the 100-Year event.

10 Year Attenuation:

Total Pre-Development discharge (m^3/s)	Total Post-Development un-attenuated discharge (m^3/s)	Total Post-Development attenuated discharge (m^3/s)	Total Attenuation Tank Volume (m^3)
0.284	0.330	0.274	85

Tank peak discharge= **0.269 m^3/s**

Proposed detention tank storage - 85m³ for the 10-Year event.

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L1 Detention tank design and orifice sizing

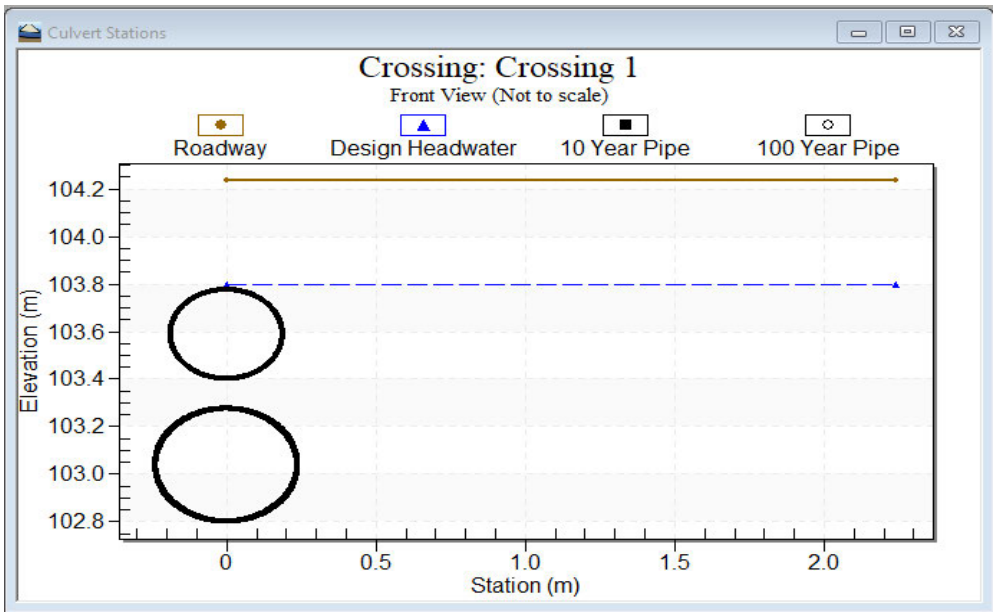
The outlet design for the tanks is to have 2 pipes discharging from manhole 1.2 to 1.1

The 10 Year outlet is to be a 475mm PVC pipe, this is the lower of the 2 pipes.
The 100 Year pipe is a 375mm PVC pipe and has an invert 600mm higher than the 10 year pipe.

These pipes have been considered as culverts for the design, with the height of the water within the 1050mm pipes/tanks to be the headwater. Tail water is also taken into account, where the existing 1050mm pipe is assumed to be fully blocked downstream.

HY-8 has been used to calculate the flows for each outlet. The following results were used in the tank design on page 13, which was then used as a storage discharge function on HEC-HMS.

Headwater Elevation(m)	Storage Tank Depth	Total Discharge (m^3/s)	10 Year Pipe Discharge (m^3/s)	100 Year Pipe Discharge (m^3/s)
102.94	0	0	0	0
103.02	0.22	0.06	0.06	0
103.13	0.33	0.11	0.11	0
103.23	0.43	0.17	0.17	0
103.33	0.53	0.22	0.22	0
103.44	0.64	0.28	0.28	0
103.53	0.73	0.34	0.32	0.02
103.61	0.81	0.39	0.35	0.04
103.69	0.89	0.45	0.37	0.07
103.8	0.99	0.52	0.41	0.12
103.85	1.05	0.56	0.42	0.14
104.24	1.44	0.75	0.52	0.24



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CALCULATION SHEET					
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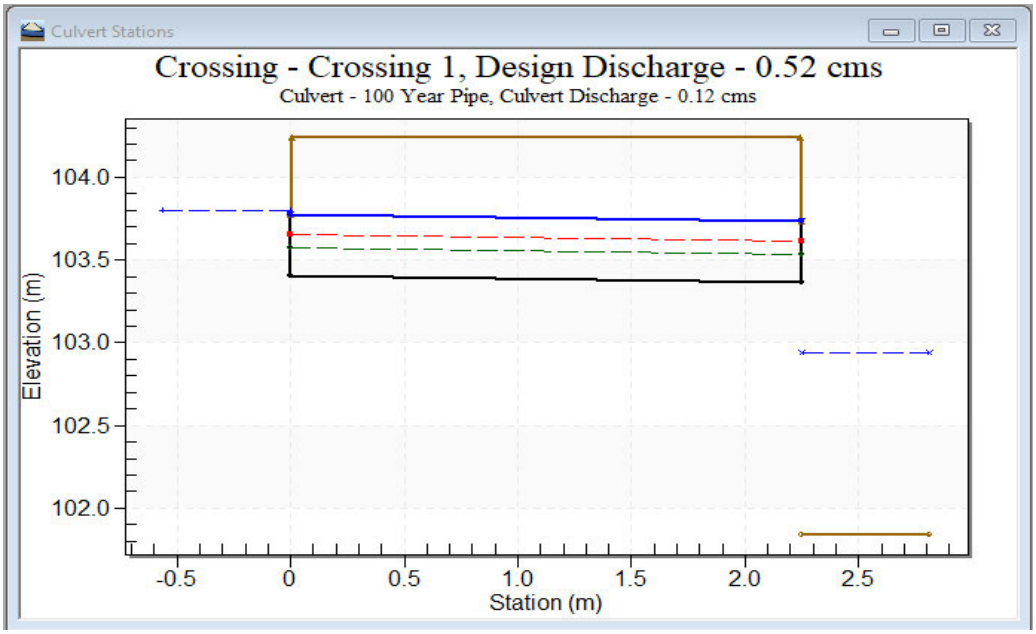
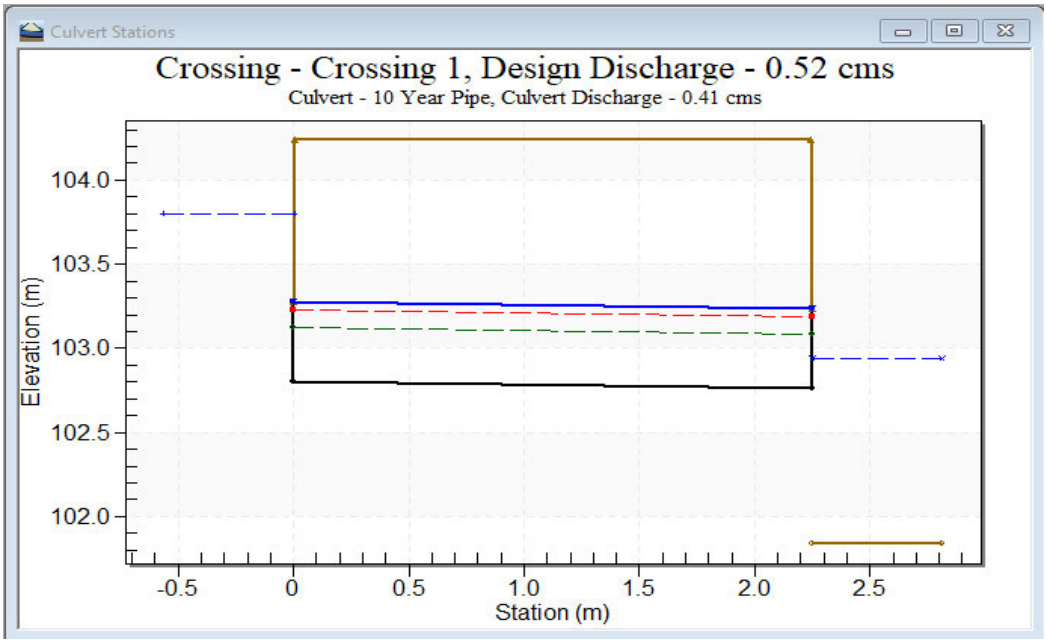
L2 Detention tank design and orifice sizing





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CALCULATION SHEET

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Description:	Engineering Approval Calculations	Designed:	CM		
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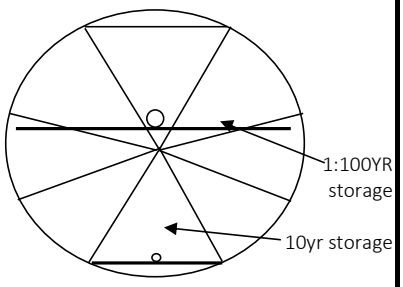
L3 Detention tank design and outlet sizing

Tank Diameter - 1050mm

Tank diameter D =	1050	mm
Tank cross-sectional area = Axs =	0.87	m2
Length L (by iteration, using HEC-HMS)=	165	m
Storage in pipe Sp =	142.87	m3
Riser diameter=	0	mm
Storage in risers (2No.) Sr =	0.00	m3
Total storage (pipe plus risers) St =	142.87	m3
Height of dead storage HDS =	0	mm
Height of 1:10 Yr Storage =	600	mm
Height of 1:100 YR storage H2 =	450	mm
Height of Overflow storage H10 =	0	mm
Angle A=2xAcos((D/2-HDS)/(D/2)) =	0.00	radians
Area of sector A=A1=Axs x A/2/pi =	0.00	m2
Area trian A=A2=(D/2-HDS)^2xtan(A/2)=	0.00	m2
Dead storage vol=VDS=(A1-A2)xL=	**0.00**	**m3**
Similarly, 10yr volume =	**84.39**	***m3 (peak storage)***
Similarly, 100 YR volume =	**58.49**	***m3 (peak storage)***
Similarly, overflow volume =	**0.00**	**m3**
10yr Outlet Orifice diameter (mm):	475	mm
100yr Outlet orifice diameter (mm):	375	mm
Overflow Weir Length (600mm riser)(mm	0	mm
Number of Tanks:	1	
Number of outlets:	1	
Total Tank Volume:	**142.87**	**m3**



Area of arc = 0.00

Orifice discharge:	Q = 0.62A(2g(h-D/2))^0.5
Sharp Edged weir:	Q = CwBH^(3/2), where Cw = 1.9 for concrete riser.

Individual Tank						All Tanks		
Height Above Base (mm)	**Storage m^3**	**Discharge 10yr Outlet (m^3/s)**	**Discharge 1:100YR outlet (m3/s)**	**Discharge Overflow outlet (m3/s)**	**Discharge Single Tank (m3/s)**	**Height Above Base (mm)**	**Storage All Tanks m^3**	**Discharge All Tanks (m3/s)**
0	0.00	0.000	0.00	0.00	0.000	0	0.00	0.00000
0	0.00	0.000	0.00	0.00	0.000	0	0.00	0.00000
220	21.74	0.000	0.00	0.00	0.000	220	21.74	0.00000
330	38.45	0.148	0.00	0.00	0.148	330	38.45	0.14801
430	55.07	0.214	0.00	0.00	0.214	430	55.07	0.21352
530	72.30	0.263	0.00	0.00	0.263	530	72.30	0.26320
640	91.20	0.309	0.00	0.00	0.309	640	91.20	0.30875
730	106.03	0.342	0.00	0.00	0.342	730	106.03	0.34152
810	118.27	0.368	0.05	0.00	0.414	810	118.27	0.41372
890	129.12	0.393	0.10	0.00	0.490	890	129.12	0.49021
990	139.62	0.422	0.14	0.00	0.559	990	139.62	0.55865
1050	142.87	0.439	0.16	0.00	0.594	1050	142.87	0.59406

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M Inlet Flows

Scruffy Dome Manholes are to be used as inlets at MH2-1 and 4-1. The flow into the manhole is to be function as a broad crested wier, with the inlet capcity increasing as the ponding depth increases.

Broad Crested weir: Q = 1.705BH^(3/2)
Sharp Edged weir: Q = CwBH^(3/2), where Cw varies between 1.8 and 2.3
Orifice Plate: Q = 0.62A(2g(h-D/2))^0.5
Culvert Flow, inlet contro Q= Cd*A*v = Cd*A*(2g(h-D/2))^0.5
Trapezoidal Weir: Q = 0.57(2g)^0.5(2/3Lh^1.5+8/15Zh^2.5)

Broad Crested Weir

high flow channel slope = +.7/170 = 0.004117647

Scruffy Dome Manhole 2-1

Weir Length	3.30	m
Cw	1.8	m
IL	104.961	

Design Peak Flow 0.22 **m³/s**

Water Level (m)	Depth to Weir 1 (m)	Inlet Flow Rate, Scruffy Dome Manhole (m3/s)	Inlet Flow Rate, including 50% Blockage (m3/s)
104.961	-	-	**-**
105.011	0.05	0.0664	**0.0332**
105.061	0.10	0.1878	**0.0939**
105.111	0.15	0.3451	**0.1725**
105.161	0.20	0.5313	**0.2656**
105.211	0.25	0.7425	**0.3712**
105.261	0.30	0.9760	**0.4880**
105.311	0.35	1.2300	**0.6150**
106.120	1.16	7.4116	**3.7058**

Scruffy Dome Manhole 4-1

Weir Length	3.30	m
Cw	1.8	m
IL	104.711	

Design Peak Flow 0.20 **m³/s**

Water Level (m)	Depth to Weir 1 (m)	Flow, Scruffy Dome Manhole (m3/s)	Water Surface Area (m^2)	Rain Garden Storage (m^3)
104.561	-	-	76	0
104.611	-	-	87	4
104.661	-	-	97	9
104.711	-	-	109	14
104.761	0.05	0.0664	121	20
104.811	0.10	0.1878	133	26
104.861	0.15	0.3451	145	33
104.911	0.20	0.5313	158	40
104.961	0.25	0.7425	170	49

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CALCULATION SHEET

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O Stormwater Treatment / Bioretention

Effective Impervious Area

Impervious Area (Driveway/Parking Areas/Buildings)	**3717.00**	m²
Perviouse Area	0.00	m²
Effective Impervious Area	3531.15	

Water Quality Volume (WQV)

P50% = 50% AEP 24 hour rainfall depth (m)	0.049	WWL CoP Appendix 2
WQW =	**58.146**	**m³**

Water Quality Flow

i - const	10	mm/hr
C	0.950	
A	**0.3717**	ha
WQF =	**0.0098**	m³/s
WQF =	**9.809**	l/s

Requried Bioretention Surface Area

Raingarden Surface Area Check against 2% of catchment area (WSD Chapter 4.1)	**74.340**	**m²**

Total raingarden surface area provided = 76m²

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N Stormwater Pipe Flow Capacity

**Stormwater pipe capacity calculations supplied below are checks for the capacity of the exisiting 1050 pipe and Eastern OLFP diversion pipe and general 300mm diameter pipe. SW network operates like a large detention tank. Detailed network design will be undertaken during engineering design stage.*

Manhole Reach	*Flow check (Rational Method, Page 6) (m3/s)*	*Pipe Diameter (mm)*	*Colebrook-White 'k'*	*Pipe Gradient*	*Flow Velocity (m/s)*	*Pipe Capacity (m^3/s)*	*Meet Design Flow?*
EXIST SW LINE							
EX 1050 (10% AEP)	**2.454**	**1050**	1.50	1.96%	4.33	**3.750**	Y
EX 1050 (1% AEP)	**3.487**	**1050**	1.50	1.96%	4.33	**3.750**	Y
PROP SW							
2-1 to 1-4	**0.219**	**450**	1.50	1.00%	1.80	**0.287**	Y
4-1 to 1-3	**0.199**	**450**	1.50	1.00%	1.80	**0.287**	Y
1-1 to 1-0	**0.568**	**600**	1.50	1.00%	2.17	**0.613**	Y
50% AEP FLOW VELOCITY CHECK		**1050**	1.50	0.20%	1.38	**1.194**	Y

Indicative Colebrook White coefficients:

Smooth wall (plastic, PE):	0.6	mm
Concrete / Clay Pipe:	1.5	mm
Corrugated Polyelthylene / subsoil drain:	2.6	mm

The following pipes are to be designed solely for the 10-year storm, as they will only be used for the lot connections. The catchments are relatively small because they will only be taking the impervious areas

Manhole Reach	*Contributing Area (m2)*	*Flow check (Rational Method) (m3/s)*	*Pipe Diameter (mm)*	*Colebrook-White 'k'*	*Pipe Gradient*	*Flow Velocity (m/s)*	*Pipe Capacity (m^3/s)*	*Meet Design Flow?*
3-2 to 3-1	**198**	**0.004**	**300**	1.50	1.00%	1.39	**0.098**	Y
3-1 to 1-5	**246**	**0.006**	**300**	1.50	1.00%	1.39	**0.098**	Y
5-2 to 5-1	**914**	**0.021**	**300**	1.50	1.00%	1.39	**0.098**	Y

Rational Method flow check for 10 year pipes :

Rainfall I = 85.44 mm/hr 10 Year ARI [RDC Eng Standards]

C= 0.95 (for roofs)

CALCULATION SHEET

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P Wastewater Demand

Proposed development WW demand

Values are taken from the RSWS V2 Table 5.1

Length of WW pipes **(proposed)**	0.314	km
Catchment Area	1.00	ha
Average Daily Water Flow **ADWG**	0.0023	L/s/person
Peaking factor **PF**	7.23	x Area^-0.2 in Ha
Infiltraton Allowance	0.25	L/s/km
Direct Inflow	0.55	L/s/km
Population	3.5	per dwelling
Population =	**182**	

Calculate amount of residents

Population Equivalent	60	p/p/ha
Number of dwellings	52	
Population per dwelling	3.5	Table 5.1 (HCC)
Total Population	**182**	

Calculate Residential Flows

ADFW	0.42	l/s
Direct Inflow	0.1727	l/s
Infiltration	0.08	l/s
Peaking Factor	7.23	
PWWF (Peak Wet Weather Flow)	3.28	l/s

Total Peak Wastewater Flows from the proposed development **3.28** l/s

WW Pipe GIS ID & Material	***Design Flows*** ***(m^3/s)***	*Pipe Diameter (mm)*	*Colebrook-White 'k'*	*Pipe Gradient*	*Flow Velocity (m/s)*	***Pipe Capacity*** ***(m^3/s)***	*Meet Design Flow?*
PROP WW PVC	**0.003**	150	1.50	1.11%	0.92	**0.016**	Y
HCC_WWP 001914	**0.003**	150	1.50	0.76%	0.76	**0.013**	Y

Pump Station Design

Please refer to the attached wastewater calculations prepared by ECOflow

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	18
Description:	Engineering Approval Calculations	Designed:	CM	
Date:	11-Feb-22	Checked:	JL	

Q Water Demand

Values are taken from the Wellington Water Regional Standard for Water Services v3.0, Chapter 6.3.1

Calculate amount of residents

Min. density	60	p/p/ha
Number of units	52	
Number of occupants per dwelling	3.5	
Number of occupants	182	

Calculate Demand (6.3.1.1 Equation 2)

Peak Instantaneous Residential Demand	2.9484	l/s

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156	Sheet:	19
Description:	Engineering Approval Calculations	Designed:	CM		
Date:	11/02/2022	Checked:	JL		

Road A

CBR, %	7	
No of Lanes	2	
AADT/Lane	610	
Design Period, Yr	25	
HV, %	3	Use 3% for Residential
HV Growth, %	3	
Days/year of traffic	365	
Direction Factor, **DF**	1	
Lane Distribution Factor, **LDF**	1	
Initial Daily Heavy Vehicles in the Design Lanen, **Ni**	18.3	
Cumulative Growth Factor	36.46	
Cumulative number of heavy vehicle, **NHV**	2.44E+05	
Average number of axle groups per heavy vehicle, **NHVAG**	2	
The cumulative heavy vehicle axle groups in the design lane over the design period, **NDT**	4.87E+05	
ESA/HVAG	0.45	
Design **ESA**	2.19E+05	

Traffic Engineer Note:

Assumed 6-10 movements per household per day.

For AADT Calculation for pavement design, I would calculate 9 VM/day x a low over nigh factor 1.3 x 52 units
AADT = 608 use 610vpd
% Heavies will likely be 2-3% max

Figure 8.4: Design chart for granular pavements with thin bituminous surfacing

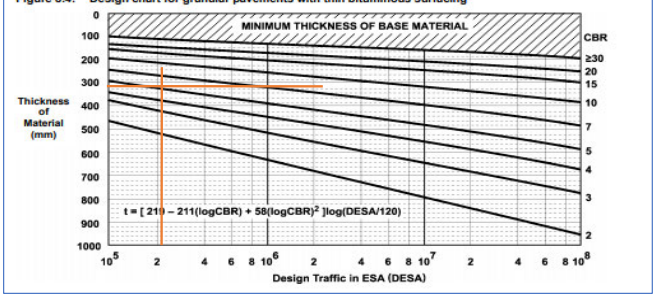

Table 7.3: Typical lane distribution factors

Location	Lanes each direction	Lane distribution factor (LDF)		
		Left lane	Centre lane	Right lane
Rural	2 lane	1.00[1]	N/A	0.50
	3 lane	0.95	0.65	0.30
Urban	2 lane	1.00[1]	N/A	0.50
	3 lane	0.65	0.65	0.50

1 *This value is the suggested limit for a lane. It may be reduced if there is sufficient traffic survey data that indicates a*

Required Thickness, mm 267.80 As per formula shown in Figure 8.4

Proposed pavement design

Basecourse, mm	150	TNZ AP40		
Subbase, mm	150	GAP 65		
Total, mm	300	>	267.80	Ok
			-32.20	

Table O 6: Example traffic load distribution – minor road

Axle group load (kN)	Axle group type		
	SAST %	SADT %	TADT %
44.1	85.8000	0.0000	0.0000
52.9	14.2000	0.0000	0.0000
53.9	0.0000	80.1120	0.0000
83.1	0.0000	19.8880	0.0000
91.1	0.0000	0.0000	100.0000
Total	100.0000	100.0000	100.0000
Proportion of each axle group	0.5	0.357	0.143

Measure	Value
N_{HVAG}	2.00
ESA/HVAG	0.45
ESA/HV	0.89

From: Land Development
To: [redacted]
Cc: [redacted]; collab@collabcube.co.nz
Subject: FW: 106 Mohaka St - LPSS emails
Date: Thursday, February 23, 2023 9:02:47 AM
Attachments: image001.png
image003.png
image004.jpg
image002.jpg
image005.png

Morning [redacted]

Hope you are well

Could yourself or [redacted] assist on this one as well. thanks so much

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 16 February 2023 9:57 am
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: FW: 106 Mohaka St

Please send to relevant LD engineer.

[redacted]

From: [redacted] <collab@collabcube.co.nz>
Sent: Thursday, 16 February 2023 9:52 am
To: [redacted]@e2environmental.com>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka St

Caution: This is an external email. Please take care when clicking links or opening attachments.

Please disregard this email. [redacted] is not engaged on this project.

Kind regards
[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz

From: [redacted]@ecoflow.co.nz>
Sent: Thursday, 16 February 2023 9:33 AM
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@collabcube.co.nz>; [redacted]
[redacted]@e2environmental.com>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: 106 Mohaka St

Hi [redacted]

Hope all is ok with you and the recent cyclone event?

Just wanting to bring this project to your attention from a professional engineering solution application. Ecoflow did the design report and provided a PS1 based on a robust pump station using two pumps per tank. This is essential to being able to provide contingency should one pump fail as we are servicing multiple units. Along with this the system must be operated by an Iota “Onebox” controller in order to meet the Wellington Water specifications.

We have recently supplied 24 (out of 40) Onebox units to 246 Wise Street and Ecoflow have been to site to assist with setup and provide ongoing support. Ecoflow is also supporting the online alarm system until Wellington Water take it over later in the year.

We note that the supply option in the thread below from Aquatec does not include two pumps and does not stipulate the use of Onebox. This leaves no contingency in the pump station should the single pump fail and if support cannot be supplied in a 24hr period then the Residents Association will have to pay for any vacuum truck waste removal. Onebox must be used to be able to talk to the

centralised platform that Wellington Water will be operating.

This is all about providing a reliable engineering solution so that the customer will not have any overflows or ongoing costs.

We are fine with missing out on projects but its crucial that a suitable solution has been quoted for to have a true and fair comparison.

106 Mohaka St – Pump Stations

Ngā Mihi | Kind Regards

[redacted] | [redacted]

Head Office, 5 Ride Way, Albany, Auckland
m: [redacted] | f: [redacted]
Website www.ecoflow.co.nz

From: [redacted] <collab@collabcube.co.nz>
Sent: Tuesday, 14 February 2023 3:56 pm
To: [redacted]@ecoflow.co.nz>
Subject: FYI

LPS1, 2 & 3 - (stock tanks)

Aquatec Model S/PSS/2404e0X41 Simplex Pressure Sewer System incorporating:

1 x OGP 1.5kw, 240v, single phase submersible two stage centrifugal pressure sewer grinder pumps, fitted with stainless steel freestanding bases, marine grade lifting ropes and 15m cables. Pump will be plumbed in PN16 flexible pipework to all required non-return valves and 316 S/S isolation valves.

Pumps and pipework will be all mounted inside a 10,000 litre (2200mm diameter x 3100mm deep with 2400mm max invert) fibreglass chamber with a heavy duty class D cast iron cover. All penetrations, including the discharge, inlet, vent and conduits, will be pre-fitted into the chamber for ease of installation onsite and to ensure a reliable seal.

System will be operated by a Smart single pump control panel with all required starting, operation, and protection equipment and remote communication capability via 4G cellular network (Note: Activated SIM card to be supplied by client).
Panel includes an audible and visual alarm which will be activated via a factory preset float level control

assembly, a USB port for uploading programs or downloading logged data, a backlit LCD screen for system status and operation information, and battery backup for alarm activation during power failure. All control equipment will be mounted inside a remote mounted, lockable, weather proof polycarbonate enclosure.

LPS4 - (custom tank)

Aquatec Model S/PSS/2404e0X41 Simplex Pressure Sewer System incorporating:

1 x OGP 1.5kw, 240v, single phase submersible two stage centrifugal pressure sewer grinder pumps, fitted with stainless steel freestanding bases, marine grade lifting ropes and 15m cables. Pump will be plumbed in PN16 flexible pipework to all required non-return valves and 316 S/S isolation valves.

Pumps and pipework will be all mounted inside a 10,000 litre (1880mm diameter x 4000mm deep with 3400mm max invert) fibreglass chamber with a heavy duty class D cast iron cover. All penetrations, including the discharge, inlet, vent and conduits, will be pre-fitted into the chamber for ease of installation onsite and to ensure a reliable seal.

System will be operated by a Smart single pump control panel with all required starting, operation, and protection equipment and remote communication capability via 4G cellular network (Note: Activated SIM card to be supplied by client).
Panel includes an audible and visual alarm which will be activated via a factory preset float level control assembly, a USB port for uploading programs or downloading logged data, a backlit LCD screen for system status and operation information, and battery backup for alarm activation during power failure. All control equipment will be mounted inside a remote mounted, lockable, weather proof polycarbonate enclosure.

LPS5 - (custom tank)

Aquatec Model D/PSS/2405e0X41 Simplex Pressure Sewer System incorporating:

2 x OGP 1.5kw, 240v, single phase submersible two stage centrifugal pressure sewer grinder pumps, fitted with stainless steel freestanding bases, marine grade lifting ropes and 15m cables. Pump will be plumbed in PN16 flexible pipework to all required non-return valves and 316 S/S isolation valves.

Pumps and pipework will be all mounted inside a 12,500 litre (2200mm diameter x 3500mm deep with 2900mm max invert) fibreglass chamber with a heavy duty class D cast iron cover. All penetrations, including the discharge, inlet, vent and conduits, will be pre-fitted into the chamber for ease of installation onsite and to ensure a reliable seal.

System will be operated by a Smart single pump control panel with all required starting, operation, and protection equipment and remote communication capability via 4G cellular network (Note: Activated SIM card to be supplied by client).
Panel includes an audible and visual alarm which will be activated via a factory preset float level control assembly, a USB port for uploading programs or downloading logged data, a backlit LCD screen for system status and operation information, and battery backup for alarm activation during power failure. All control equipment will be mounted inside a remote mounted, lockable, weather proof polycarbonate enclosure

Kind regards

[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz

From: [redacted]
To: [redacted]
Subject: FW: 106 Mohaka St - Retract Email
Date: Friday, March 3, 2023 10:41:14 AM
Attachments: image001.png
image002.jpg
image003.png

Hi [redacted] hope all is well.

You free for a chat next week?

Ngā Mihi | Kind Regards

[redacted] | [redacted]

Head Office, 5 Ride Way, Albany, Auckland
m: [redacted] | f [redacted]
Website www.ecoflow.co.nz

From: [redacted]
Sent: Thursday, 16 February 2023 10:50 am
To: [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: FW: 106 Mohaka St - Retract Email

Good morning, gentlemen,

I have had a request from the contract to retract my email below.

Happy to talk about future projects and how we can better manage the final output of what ends up in the ground as a responsible solution for the end user.

Ngā Mihi | Kind Regards

[redacted] | [redacted]

Head Office, 5 Ride Way, Albany, Auckland
m: [redacted] | f: [redacted]
Website www.ecoflow.co.nz

From: [redacted]

From: Land Development
To: [redacted]
Subject: FW: 106 Mohaka St
Date: Friday, February 17, 2023 8:44:03 AM
Attachments: image001.png
image003.png
image004.jpg
image002.jpg
image005.png

Hey [redacted]

I see they cc'd you in this one. Is this something you aware/familiar with? Also the latest email below confuses me where they said to disregard the email from [redacted] as hes no longer on the project, so does that mean there is nothing to do on this one? Just wanting to know what I should do with this email? Thanks so much

Kind regards
[redacted]

[redacted] **Team Coordinator - Network Strategy & Planning**

Mob [redacted]
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday, 16 February 2023 9:57 am
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: FW: 106 Mohaka St

Please send to relevant LD engineer.

[redacted]

F om
To
Subject [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment R1 esponse
Date Thursday, May 5, 2022 3:08:13 PM
Attachments
image004.png
image005.png
image007.png
image008.png
image011.png
image012.png
image013.png
image014.png
image015.png
image016.png
image019.png
image020.png
image021.png
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image002.png
image003.png
image027.png
b29c507a-9c6e-4af6-bd44-5b5f01aclale.png
image028.png
image029.png
20-156-D aw ngs updated.pdf
E_mako_a_k.pdf

Just saw you weren't sent this

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

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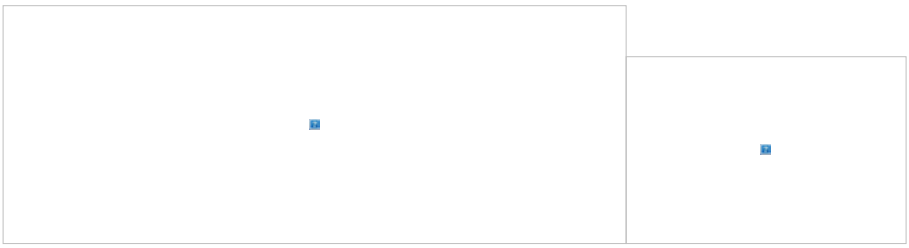
---

From [redacted] @arassociates.co.nz>
Sent: Thursday, 5 May 2022 12:29 pm
To [redacted] @aprotean.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @huttcity.govt.nz>
Cc [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

H[redacted]

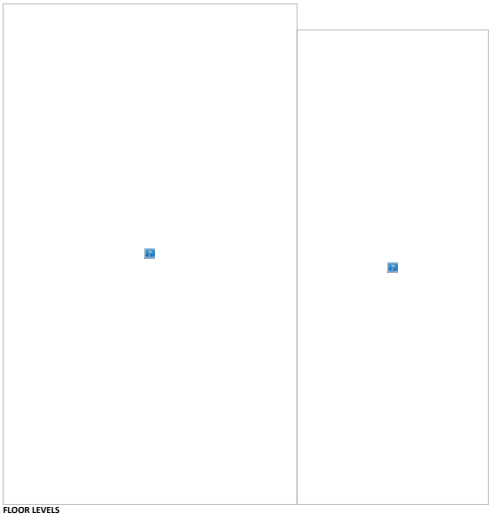
Below are our responses in Red.
Please note that I'm currently still working on the road cross sections with the water levels I should have it ready for before the meeting.

One point before getting into detail. I note that the latest engineering plans have a engineering approval stamp on them. We are still at resource consent stage so stamp needs to reflect this. Also note that in the long sections in the latest plan MH's aren't shown raised to final ground levels –
The manhole issue is an oversight from us and has been updated note that the design levels haven't change as they are showing the correct values.
Complete drawing set wi l be updated to show the Consent stamp.



EASEMENTS

The latest engineering plans show the network installed between units 27 & 28 coming into the MH in the roadway with a 1.1m step. Max under RSWS is 500mm within a suitably sized MH. Note earlier plans had MH in roadway at 3.46m deep current plans have it at 2.75m (other levels have also changed) - not sure how/why this has changed network between 27/28 laid to invert previously. Please review and advise on actual depths of this network so we can confirm easement width requirements. The latest drawings have the correct levels and depths. Part of the reason this pipe has come up is so that it is above the 1050mm pipe which is being used for storage. We want to utilise the full storage inside the 1050mm pipes before it starts to backflow into this pipe.



FLOOR LEVELS

Please confirm the fo lowing:

- Top waterflood level 500mm* = min floor level (MFL) to underside of slab (* where units are adjacent to 1 in 100 flooding or 200mm** where not)
- MFL slab thickness = FFL
- Slab thickness = ???
- Finished GL's = ??

Correct our design is to the underside of the slab. Slab thickness and FFL's to be designed by architect. I confirmed with the architect this morning their new design is to be consistent with our earthworks and includes the slab on top of our minimum floor level.
WWL states 200mm freeboard (screenshot below) I believe NZS4404 is also 200mm.

** my understanding is BC requires FFL to be 225mm above GL where there is a grassed surface – but might be wrong.
Acceptable Solution E /AS1 of the building code requires slabs on ground shall be at least 150mm above the finished above the finished level of the surrounding ground immediately adjacent to the bu ilding. Further building code requires a minimum thickness of 225mm. We have specified the levels under side of the slab (Building platform level) which includes the freeboard above the flood level. Please see the sketch below;

GWRC SIGNOFF

Have checked and appears GWRC sign off from HCC includes Councils review and approval of

- Earthworks & geotech reports
- Infrastructure
- Flood reports & calculations
- Civil calc and architectural plans
- Infiltration trench under bioretention device
- Stormwater detention
- Use of 200mm plant media layer
- Stream works on site

Unfortunately not just the earthworks in principal and stormwater detention as hoped – which we would have been able to sign off today but matters that some of which st ll require further review/clarification – so sign off wont be given today.

FLOOD – site & wider catchment

As I understand it from yesterdays discussions the intention is to do the fo lowing – please review and confirm/amend:

- The intention is for the section of open watercourse upstream of the existing 1050 culvert at the entrance to the site to provide greater storage than it does currently. This is to be achieved by bunding within the site – bringing the side up achieving a deeper channel.

  Earthworks plans doesn't seem to support this. Shows fill only under adjoining units. Can you please provide cross-section(s) to show proposed bunding? Attached is the new S3 223 drawing with EW section at the bund which has been implemented around Block C. Earthworks cross sections 4 5 and 6 also provide some insight of the earthworks of the backs of the lots of blocks A B and C.

- Pipework from Meremere intake will be designed for 1 in 00 year but there is st ll an allowance for overland flow if intake blocked – onto ROW. Correct It flows through the emergency sp llway onto the private road.
- Overland flow from NE corner to flow around block F (units 19-22) onto ROW.
- ROW graded that overland flows ROW & landscaping surface water all grade to raingarden.

- In a 1 in 00 year event raingarden will stop working and "sp ll" overland flow to properties below. Confirmed this is to be no more than pre-development levels

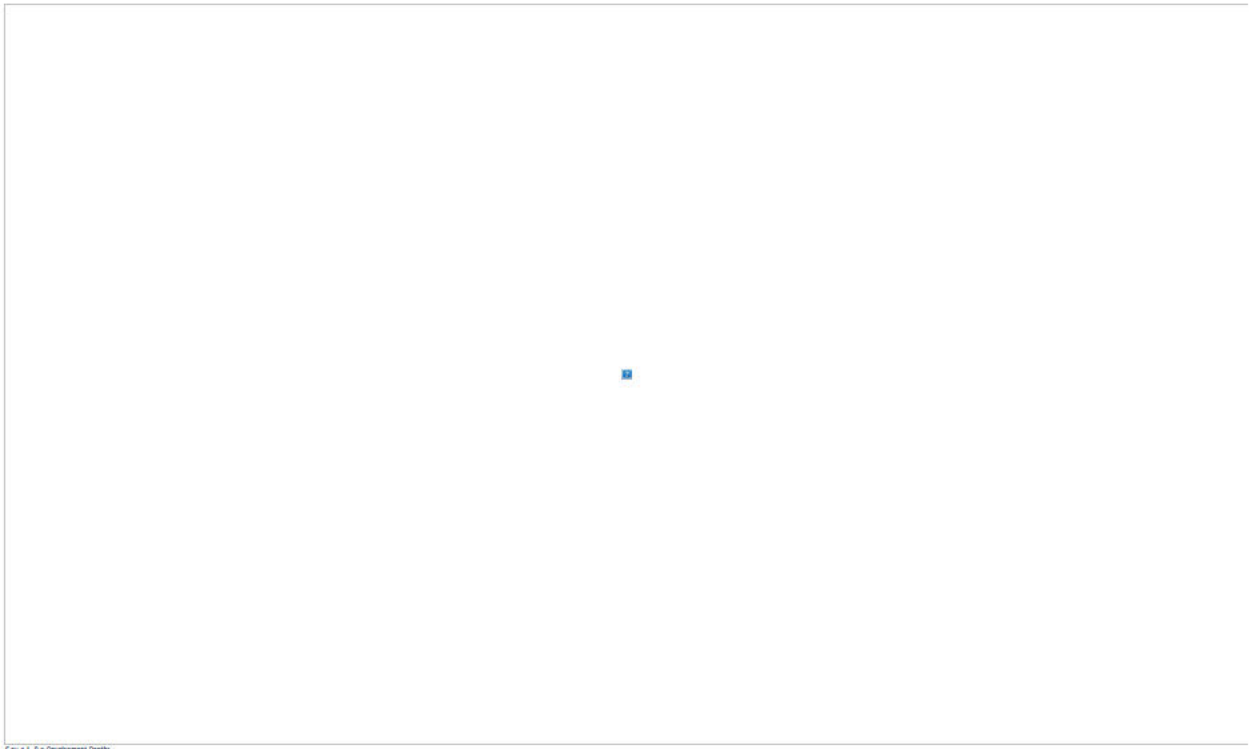
- This is considered to be no worse than currently occurs predevelopment because of holding back flow in watercourse upstream of the culvert. Confirmed

- Modelling includes ponding storage in ROW Confirmed.

As noted we have a meeting with WWL re analysis of flood modelling results this Thursday afternoon but my questions/concerns at this point are:

- Based on the modelling information provided it appears that flows below the raingarden and culvert both increase & decrease post development in some areas.

  Can you please provide enlarged snapshots of the modelling (pre & post) clearing showing levels through 100-104 Mohaka St and 3-7 Rakaia GR – with boundaries and raingarden overlaid.
  The flood report is currently being updated to show the boundaries and the raingarden and will be sent through before the meeting. See Snapshots below:



F gu e 1 P re-Development Depths

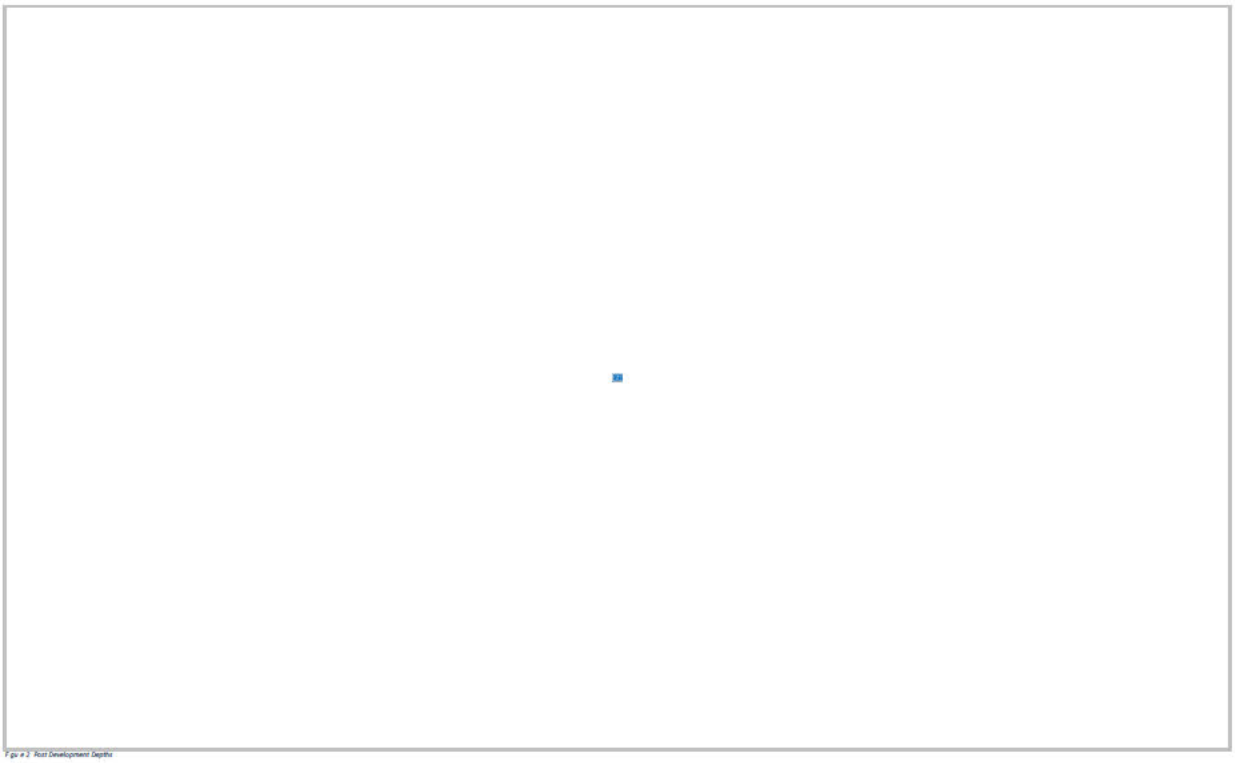


Figure 2 Post Development Depths

- Modelling doesn't show a l overland flows running along ROW to rain garden

  Modelling shows NE & Meremere overland flows running through 11-17 Rakala Gr.

- IT was noted that model ing includes ponding storage in ROW that is a part of WSUD

  Modelling doesnt show ponding along ROW sections except the one along the esat of the site – but this seems mainly to relate to overland flows coming onto the site.

- Flooding shown at rear of units 10-13 14-18 and 19-22

  Have earthworks been designed to grade this water away from units and to flow post event back into channels? How does this work with landscaping/ fencing?
  Correct earthworks have been designed to grade away from the buildings. A couple of cress sections have been added to show the slope away from the building for

- An overland flow path has been shown alongside unit 22

  How will this work with landscaping / fencing? Design solutions are available such as pool fencing that will have minimal obstruction to an overland flow. Will get the architect to spec fy the solution as per your condition.

- Spil ing from raingarden into adjoining properties

  How does this work with landscaping/fencing – open board fences???? Design solutions are available such as pool fencing that w ll have minimal obstruction to an overland flow. Wl l get the architect to specify the solution as per your condition.

WSUD DESIGN

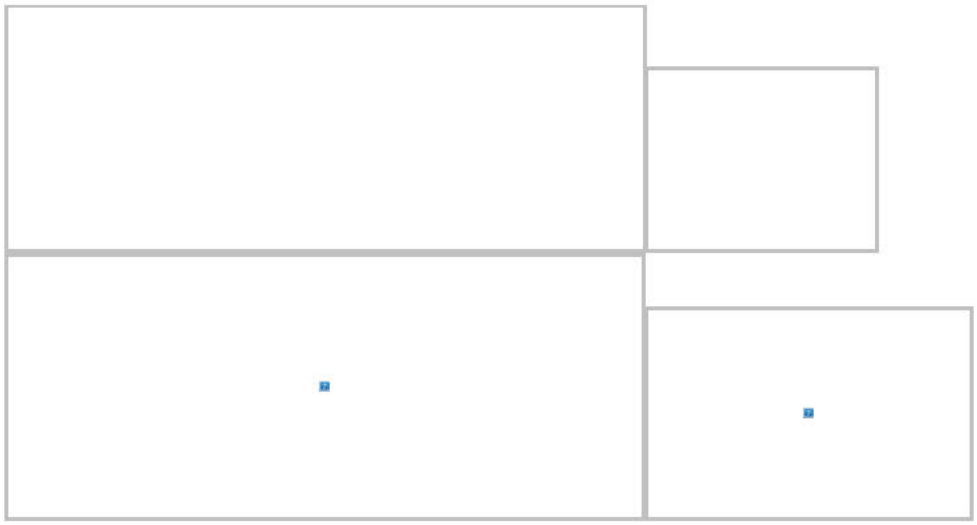
Two cross-sections have been provided showing 1ln 10 and 1ln 100 event ponding of stormwater from ROW & other surfaces which is then directed to the raingarden for treatment before going to existing culvert/network.

- Looking at Roading cross-sections and ponding cross-section outside unit 1

  Flows are away from parking towards landscaping at side of unit 42. Proposed low traffic speed limiting spray of water off ROW Traffic calming measures are proposed to reduce speed.

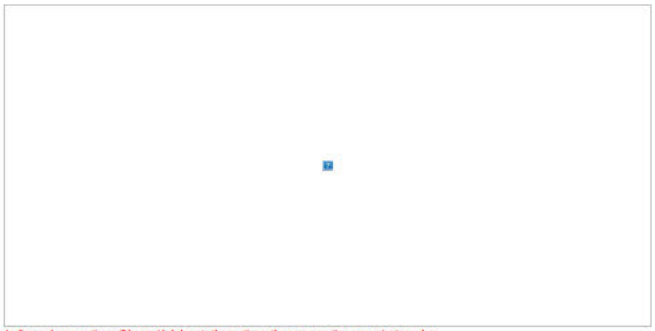
- Looking at Roading cross-sections and ponding cross-section outside unit 42

  Flows are away from parking towards raingarden. Proposed low traffic speed imiting spray of water off ROW Traffic calming measures are proposed to reduce speed.



- Can you please provide cross-sections showing the 1 in 10 and 1 in 100 year ponding at the flowing locations:

- Also at the site entrance where speeds are likely to be higher(?7) and ponding will be against the footpath.



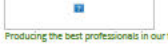
As discussed cross sections will be provided closer to the meeting as these are more time consuming to produce.

- It was discussed that AR will provide photos of similar designs in use including in different rainfall events. Attached are examples of previous subdivisions without catchpits Mt Iti Road and Kirimoko Park.

Hopefu ly these responses clears a few things up.
I'm working on getting the rest of the documents ready for before the meeting this afternoon.

Kind Regards

[redacted]
BEng (Hons)
[redacted]



Producing the best professionals in our field.

To influence and contribute to a more sustainable world.

AR & Associates Ltd
Level 3, Building 8, 5 M le Cent e
36 E ant Road, F ankton
Queenstown 9371
P [redacted]
www.a arc ates.co.nz

From: [redacted] @arcstean.co.nz>
Sent: Wednesday 4 May 2022 1:41 pm
To: [redacted] @huttcity.govt.nz>; [redacted] @huttcity.govt.nz>

Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

H [redacted]

Thanks for detailing out yesterday's discussion and response items.

I have spoken with ARAL and they have assured me that they wi l have everything back to you ahead of tomorrows meeting. The cross sections are ikely to take the longest so I have asked that the balance of the required responses is sent through ASAP ahead of the cross sections so you can start reviewing the information as early as possible. The cross sections would fo low shortly thereafter.

With respect to your comments regarding GWRC sign off. It is my understanding that GWRC requires approval from HCC with respect to stormwater and earthworks elements of the design that pertain directly to the regional consent (correct me if I am wrong on this).

With that in mind I would imagine that providing HCC are happy with the responses from ARAL that will be discussed tomorrow. You would then be able to give GWRC the thumbs up by Friday morning which would in turn allow the regional consent to be approved.

Let me know your thoughts on this.

Any questions please contact.

Regards

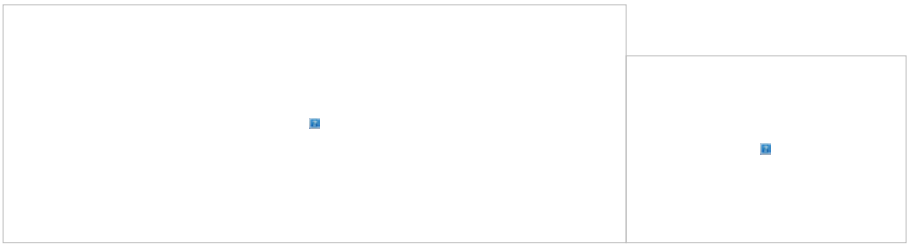
[redacted]
L1 193 195 Ma n Road, Tawa, 5028
M [redacted] E [redacted] @ap ptean.co.nz

From: [redacted] @huttcity.govt.nz>
Sent: Wednesday 4 May 2022 9:32 am
To: [redacted] @aprotean.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

H [redacted]

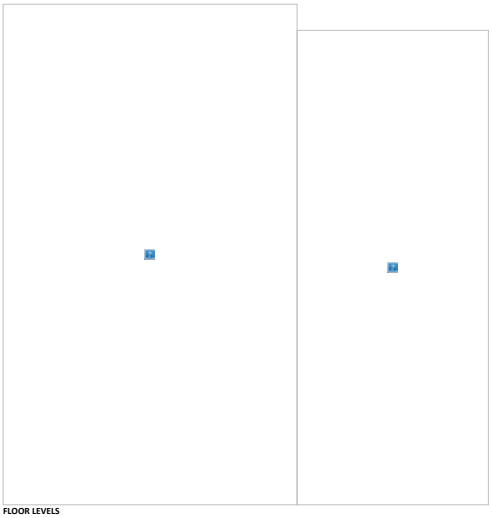
Following on from yesterdays meeting with my questions / responses re the WSUD design easements floor levels GWRC sign off and some comments re flooding/overland flow paths.

One point before getting into detail. I note that the latest engineering plans have a engineering approval stamp on them. We are still at resource consent stage so stamp needs to reflect this. Also note that in the long sections in the latest plan MH's aren't shown raised to final ground levels -



EASEMENTS

The latest engineering plans show the network installed between units 27 & 28 coming into the MH in the roadway with a 1.1m step. Max under RSWS is 500mm within a suitably sized MH. Note earlier plans had MH in roadway at 3.46m deep current plans have it at 2.75m (other levels have also changed) - not sure how/why this has changed network between 27/28 laid to invert previously. Please review and advise on actual depths of this network so we can confirm easement width requirements.



FLOOR LEVELS

Please confirm the fo lowing:

- Top waterflood level 500mm* = min floor level (MFL) to underside of slab (* where units are adjacent to 1 in 100 flooding or 200mm** where not)
- MFL slab thickness = FFL
- Slab thickness = ???
- Finished GL's = ??

** my understanding is BC requires FFL to be 225mm above GL where there is a grassed surface – but might be wrong.

GWRC SIGNOFF

Have checked and appears GWRC sign off from HCC includes Councils review and approval of

- Earthworks & geotech reports
- Infrastructure
- Flood reports & calculations
- Civil calc and architectural plans
- Infiltration trench under bioretention device
- Stormwater detention
- Use of 200mm plant media layer
- Stream works on site

Unfortunately not just the earthworks in principal and stormwater detention as hoped – which we would have been able to sign off today but matters that some of which st ll require further review/clarification – so sign off wont be given today.

FLOOD – site & wider catchment

As I understand it from yesterdays discussions the intention is to do the fo lowing – please review and confirm/amend:

- The intention is for the section of open watercourse upstream of the existing 1050 culvert at the entrance to the site to provide greater storage than it does currently. This is to be achieved by bunding within the site – bringing the side up achieving a deeper channel.

  Earthworks plans doesn't seem to support this. Shows fill only under adjoining units. Can you please provide cross-section(s) to show proposed bunding?

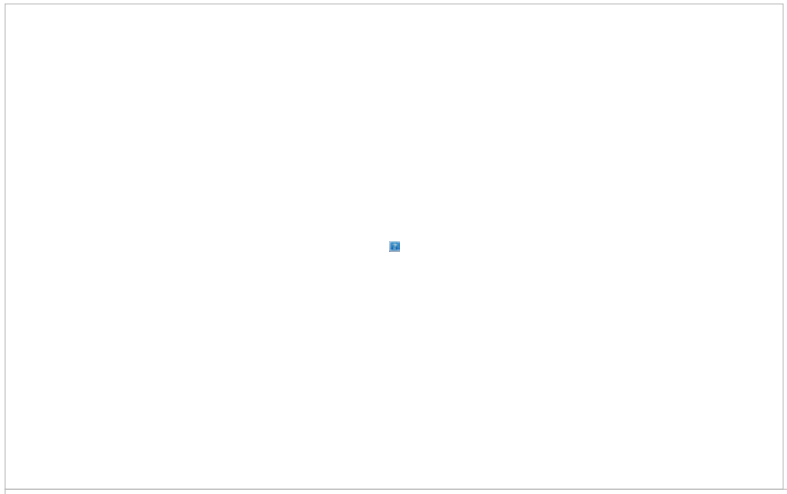
- Pipework from Meremere intake will be designed for 1 in 00 year but there is st ll an allowance for overland flow if intake blocked – onto ROW
- Overland flow from NE corner to flow around block F (units 19-22) onto ROW
- ROW graded that overland flows ROW & landscaping surface water all grade to raingarden.

- In a 1 in 00 year event raingarden will stop working and "sp ll" overland flow to properties below.
- This is considered to be no worse than currently occurs predevelopment because of holding back flow in watercourse upstream of the culvert.
- Modelling includes ponding storage in ROW

As noted we have a meeting with WWL re analysis of flood modelling results this Thursday afternoon but my questions/concerns at this point are:

- Based on the modelling information provided it appears that flows below the raingarden and culvert both increase & decrease post development in some areas.

  Can you please provide enlarged snapshots of the modelling (pre & post) clearing showing levels through 100-104 Mohaka St and 3-7 Rakaia GR – with boundaries and raingarden overlaid.



- Modelling doesn't show a l overland flows running along ROW to rain garden

  Modelling shows NE & Meremere overland flows running through 11-17 Rakaia Gr.

- IT was noted that model ing includes ponding storage in ROW that is a part of WSUD

  Modelling doesnt show ponding along ROW sections except the one along the esat of the site – but this seems mainly to relate to overland flows coming onto the site.

- Flooding shown at rear of units 10-13 14-18 and 19-22

  Have earthworks been designed to grade this water away from units and to flow post event back into channels? How does this work with landscaping/ fencing?

- An overland flow path has been shown alongside unit 22

  How will this work with landscaping / fencing?

- Spil ing from raingarden into adjoining properties

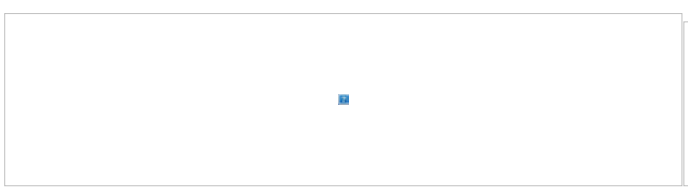
  How does this work with landscaping/fencing – open board fences????

WSUD DESIGN

Two cross-sections have been provided showing 1in 10 and 1in 100 event ponding of stormwater from ROW & other surfaces which is then directed to the raingarden for treatment before going to existing culvert/network.

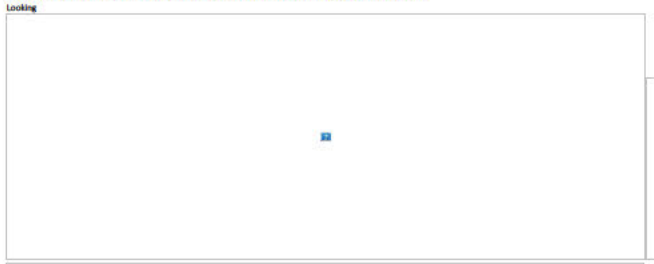
- Looking at Roading cross-sections and ponding cross-section outside unit 1

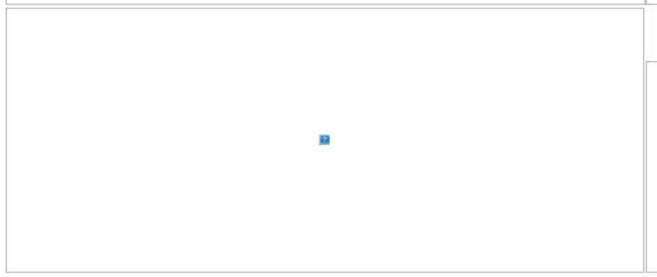
  Flows are away from parking towards landscaping at side of unit 42. Proposed low traffic speed limiting spray of water off ROW

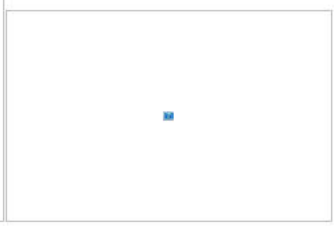


- Looking at Roading cross-sections and ponding cross-section outside unit 42

  Flows are away from parking towards raingarden. Proposed low traffic speed imiting spray of water off ROW
  Looking

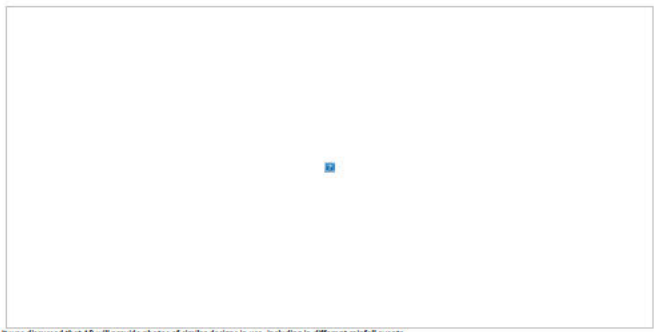






- Can you please provide cross-sections showing the 1 in 10 and 1 in 100 year ponding at the flowing locations:

- Also at the site entrance where speeds are ikely to be higher(?7) and ponding will be against the footpath.



- It was discussed that AR will provide photos of similar designs in use including in different rainfall events.

I think – hope this the list of outstanding matters.

Cheers

[redacted]

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: [redacted] M: [redacted] W: www.huttcity.govt.nz

From: [redacted]@aprotean.co.nz>
Sent: Thursday, 28 April 2022 9:38 am
To: [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>
Subject: [EXTERNAL] RE: RM2 0828 - engineering assessment

H[redacted] A[redacted]

Please see below link which has enclosed a l the updated drawings data and responses to your queries.

Please review our response and get back to us as soon as possible we are eager to get this resolved.

Any questions please contact.

Regards

[redacted]
Ll 193-195 Ma n Road, Tawa, 5028
M[redacted] E[redacted]@[redacted]

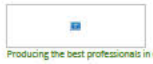
From: [redacted]@arassociates.co.nz>
Sent: Wednesday, 27 Apr l 2022 6:41 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>
Subject: RE: RM210328 - engineering assessment

H[redacted]

Please see the attached sharepoint link to the ARAL responses to the RFIs with supporting documents.
2022.04.07 - RFI Responses

Drawings and Calculations have been updated but there haven't been any major changes.
Attached are the Responses drawings calculations flood report and a Screenshot of the HEC-RAS flood model of the back of block F.

Kind Regards
[redacted]
BEng (Hons)
[redacted]



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Queenstown 9371
P[redacted]
www.a assoc ates.co.nz

-

From: [redacted]@aprotean.co.nz>
Sent: Thursday, 14 April 2022 8:27 am
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>
Subject: FW: RM210328 - engineering assessment

HI All

Please see attached comments back from HCC.

The bulk of the comments and queries relate to finished levels flood modelling and stormwater treatment. They are sti l waiting for advice back from their roading experts with respect to mountable K&C and treatment. They have OK'd the detention tank but st ll want clarification on the calculations.

Following this meeting it is crucial that we all review these notes and start formulating a response to the queries raised. Most of these will require input from ARAL.

Talk soon.

Regards

[redacted]
Ll 193-195 Ma n Road, Tawa, 5028
M[redacted] E[redacted]@ap otean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Wednesday, 13 Apr l 2022 4:38 pm
To: [redacted]@aprotean.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>
Cc: [redacted]@urbanedgeplanning.co.nz>
Subject: FW: RM210328 - engineering assessment

Hi everyone

I received an out-of-office msg fo [redacted] but please see attached for the updated engineering review which outlines the current status of the engineering assessment and matters which are unresolved or require further clar fication. Could you please review and respond where relevant?

Kind regards
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P[redacted] M: [redacted] W: www.huttcity.govt.nz

From [redacted]
Sent: Wednesday 13 Apr l 2022 4:20 PM
To [redacted] @urbanedgeplanning.co.nz>
Cc [redacted] @huttcity.govt.nz>
Subject: RM210328 - eng neering assessment

Hello [redacted]

[redacted] has provided the attached updated review which outlines the current status of the engineering assessment and matters which are unresolved or require further clarification. Could you please arrange for the engineering design team to review and respond where relevant? Let me know if you would like to discuss.

Kind regards

[redacted]

LEGEND

- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- 16.0 PROP MAJ CONTOUR
- 16.2 PROP MIN CONTOUR
- 16.0 EX MAJ CONTOUR
- 16.2 EX MIN CONTOUR
- EXTENT OF EW
- PROP RETAINING WALL
- STG3 STAGE 3
- LANDSCAPING WALL
- NO BUILD ZONE

NOTE:

ANY CONSTRUCTION WITHIN THE NO BUILD ZONE IS SUBJECT TO GWRC APPROVAL.

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

EXISTING WETLAND

10m BUFFER AROUND EXISTING WETLAND

RETAINING WALL 3

RETAINING WALL 2

RETAINING WALL 1

RETAINING WALL 4

PHASE 3 EARTHWORKS

PHASE 2

PHASE 1

LANDSCAPE WALL MAX 0.5m HIGH

LANDSCAPE WALL MAX 0.4m HIGH

LANDSCAPE WALL MAX 0.35m HIGH

PROP. RAINGARDEN

BLOCK - A

BLOCK - B

BLOCK - C

BLOCK - D

BLOCK - E

BLOCK - F

BLOCK - G

BLOCK - H

BLOCK - J

BLOCK - K

BLOCK - L

BLOCK - M

Lot 1 DP 424343

Lot 2 DP 424343

Lot 3 DP 390769

Lot 8 DP 484841

Lot 9 DP 484841

Lot 19 DP 48700

Lot 22 DP 48701

Lot 23 DP 48701

Lot 24 DP 48701

Lot 25 DP 48701

Lot 26 DP 48701

Lot 27 DP 48701

Lot 28 DP 48701

Lot 29 DP 48701

LOT 300 DP 562261

LOT 22 DP 562261

0 25m

A3 SCALE: 1:500

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: D:\Ar Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG Files\Stage 3\P20-156-S3.200.dwg

REV	DATE	AMENDMENT	DRAWN
H	05.05.22	CROSS SECTION LOCATIONS	CM
G	26.04.22	UPDATED CONTOURS	CM
F	11.04.22	UPDATED FFLS	CM
E	11.03.22	UPDATED BUILDING PLATFORMS AND EARTHWORKS	CM
D	17.12.21	UPDATED LOT LEVELS	RM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
RM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: PROPOSED CONTOURS PLAN

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A1 SCALE	A3 SCALE
1:250	1:500

JOB No.	DWG No.	REVISION
P20-156	S3.200	H

PRINTED: 5/05/2022 11:24:53 am

LEGEND

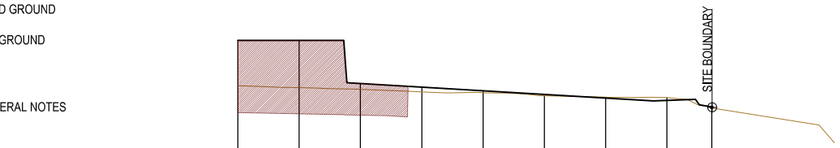
RAFTING PLATFORM (TO BE CUT)

PROPOSED GROUND

EXISTING GROUND

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES



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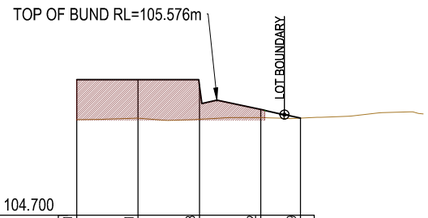
EXISTING SURFACE LEVEL	106.17	106.14	106.11	106.07	106.05	106.01	105.98	105.97	105.82		
CUT / FILL DEPTH	0.74	0.77	0.10	0.08	0.03	0.02	-0.02	-0.05	0.00		
CHAINAGE	0	1	2	3	4	5	6	7	7.7		

13/200 EARTHWORKS LONG SECTION
SCALE: 1:50 @ A1
1:100 @A3



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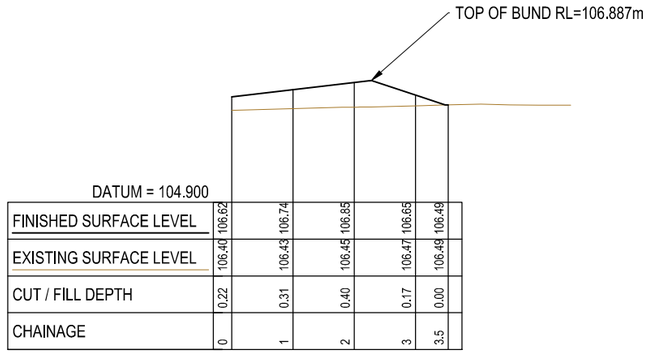
EXISTING SURFACE LEVEL	106.26	106.28	106.26	106.29	106.29	
CUT / FILL DEPTH	0.65	0.63	0.57	0.13	0.00	
CHAINAGE	0	1	2	3	3.6	

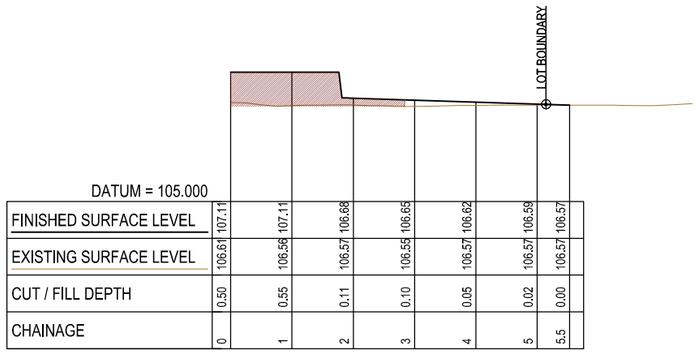
14/200 EARTHWORKS LONG SECTION
SCALE: 1:50 @ A1
1:100 @A3



DATUM = 104.900

FINISHED SURFACE LEVEL	106.62	106.74	106.85	106.65	106.49	
EXISTING SURFACE LEVEL	106.40	106.43	106.45	106.47	106.49	
CUT / FILL DEPTH	0.22	0.31	0.40	0.17	0.00	
CHAINAGE	0	1	2	3	3.5	

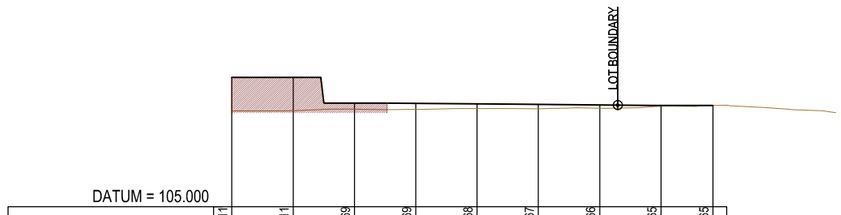
15/200 EARTHWORKS LONG SECTION
SCALE: 1:50 @ A1
1:100 @A3



DATUM = 105.000

FINISHED SURFACE LEVEL	107.11	107.11	106.68	106.65	106.62	106.59	106.57
EXISTING SURFACE LEVEL	106.61	106.56	106.57	106.55	106.57	106.57	106.57
CUT / FILL DEPTH	0.50	0.55	0.11	0.10	0.05	0.02	0.00
CHAINAGE	0	1	2	3	4	5	5.5

16/200 EARTHWORKS LONG SECTION
SCALE: 1:50 @ A1
1:100 @A3



DATUM = 105.000

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CUT / FILL DEPTH	0.55	0.54	0.10	0.10	0.08	0.07	0.05	0.01	0.00	
CHAINAGE	0	1	2	3	4	5	6	7	7.8	

17/200 EARTHWORKS LONG SECTION
SCALE: 1:50 @ A1
1:100 @A3

CONSENT

REV	DATE	AMENDMENT	DRAWN
A	05.05.22	RFI RESPONSES	CM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
RM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: EARTHWORKS LONGITUDINAL SECTIONS - SHEET 4

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ace new zealand

A1 SCALE	A3 SCALE	
AS SHOWN	AS SHOWN	
JOB No.	DWG No.	REVISION
P20-156	S3.223	A

PRINTED: 5/05/2022 12:16:43 pm

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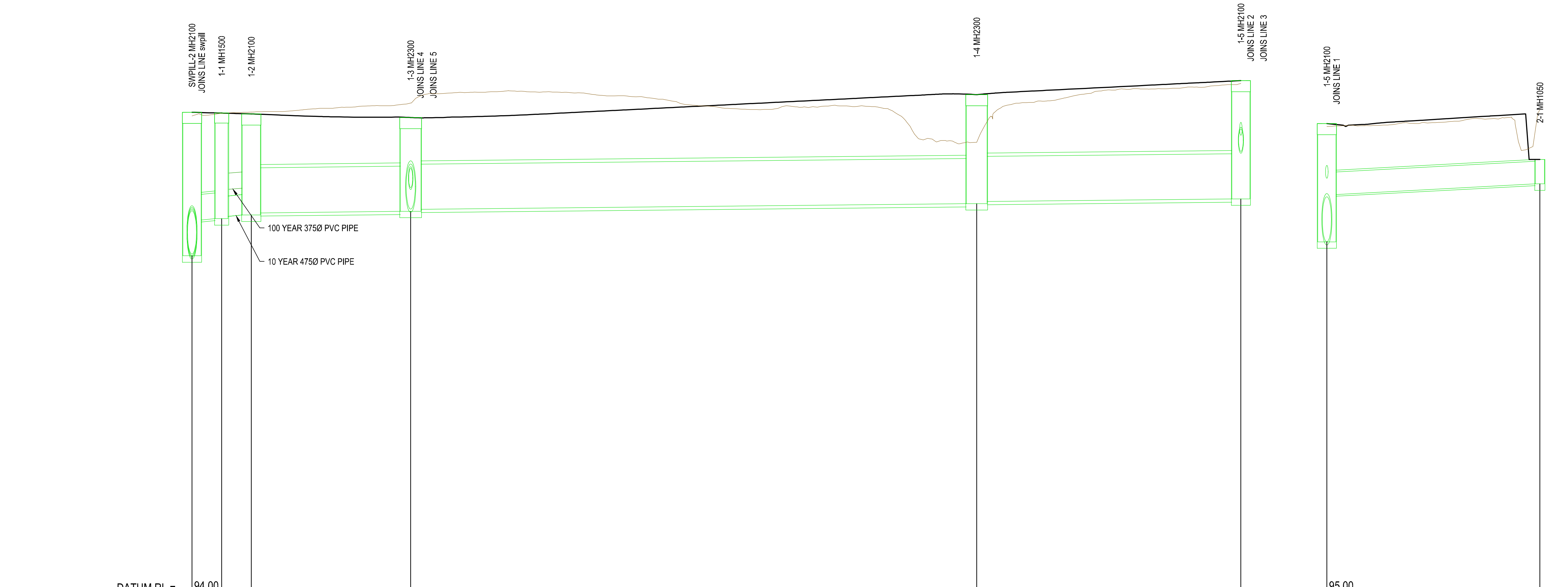

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CUT TO INVERT	2.51	3.34	2.46	2.41	2.35	2.30	2.18	2.13	2.54	2.49	2.75
INVERT LEVEL	102.65	101.82	102.68	102.73	102.77	102.82	102.86	102.90	103.03	103.08	103.14
PIPE GRADE		1.00%		1.00%		0.20%		0.20%		0.20%	
SIZE (mm) & CLASS		600Ø RCRRJ Class 2				1050Ø RCRRJ Class 2		1050Ø RCRRJ Class 2		1050Ø RCRRJ Class 2	
CHAINAGE		0.00	3.45	3.45	3.45	6.90	18.55	25.45	65.86	91.31	30.74 / 122.06

SW LINE 1

95.00

DESIGN LEVEL	105.89		105.06
CUT TO INVERT	2.75	1.65	0.57
INVERT LEVEL	103.14	104.25	104.49
PIPE GRADE		1.00%	
SIZE (mm) & CLASS		525Ø RCRRJ Class 2	
CHAINAGE		0.00	24.79 / 24.79

SW LINE 2

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: D:\Ar Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILE\Stage 3\P20-156-S3.410.dwg

CONSENT

REV	DATE	AMENDMENT	DRAWN
F	04.05.22	UPDATED MANHOLE LIDS	CM
E	22.03.22	UPDATED SWMH1-1 AND 4-1.	CM
D	17.12.21	UPDATED INVERT LEVELS	CM
C	30.11.21	ENGINEERING APPROVAL	CM
B	07.09.21	FOR SECTION 92	RM

DESIGNED	ORIGIN DATE	CLIENT	PROJECT	TITLE
CM	FEB 2021	MHV LTD	106 MOHAKA STREET, WAINUIOMATA	STORMWATER LONGITUDINAL SECTIONS - SHEET 1
DRAWN: CM	CHECKED: JL			

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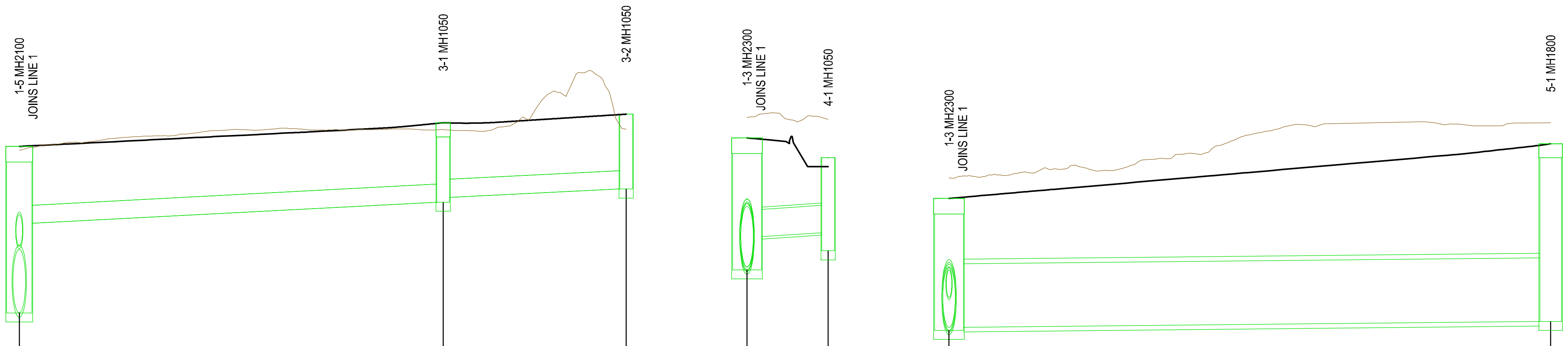
A1 SCALE	A3 SCALE	
1:250H, 1:50V	1:500H, 1:100V	
JOB No.	DWG No.	REVISION
P20-156	S3.410	F

PRINTED: 4/05/2022 2:57:43 pm

EXISTING GROUND

FINISHED GROUND



DATUM RL = 95.00

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INVERT LEVEL	103.14 | 104.62	104.97 | 105.05	105.19
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SIZE (mm) & CLASS	300Ø uPVC SN16	300Ø uPVC SN16	
CHAINAGE	-3.97	35.06 | 31.09	15.13 | 46.22

SW LINE 3

94.00

DESIGN LEVEL	105.04	104.71
CUT TO INVERT	2.18 | 1.63	1.09 | 1.39
INVERT LEVEL	102.86 | 103.40	103.47
PIPE GRADE	1.00%	
SIZE (mm) & CLASS	450Ø RCRRJ Class 4	
CHAINAGE	0.00	6.71 | 6.71

SW LINE 4

95.00

DESIGN LEVEL	105.04	105.94
CUT TO INVERT	2.18 | 2.13	2.93
INVERT LEVEL	102.86 | 102.91	103.01
PIPE GRADE	0.20%	
SIZE (mm) & CLASS	1050Ø RCRRJ Class 2	
CHAINAGE	0.00	49.75 | 49.75

SW LINE 5

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

REV	DATE	AMENDMENT	DRAWN
F	04.05.22	UPDATED MANHOLE LIDS	CM
E	22.03.22	UPDATED SWMH1-1 AND 4-1.	CM
D	17.12.21	UPDATED INVERT LEVELS	CM
C	30.11.21	ENGINEERING APPROVAL	CM
B	07.09.21	FOR SECTION 92	RM

DESIGNED: CM	ORIGIN DATE: FEB 2021	DRAWN: CM	CHECKED: JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: STORMWATER LONGITUDINAL SECTIONS - SHEET 2

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING
PO Box 65 576 Mairangi Bay, Auckland 0754
p. (09) 486 0774 f. (09) 486 0776 m. 0275 427 266
enquiries@arassociates.co.nz www.arassociates.co.nz

A1 SCALE	A3 SCALE	
1:250H, 1:50V	1:500H, 1:100V	
JOB No.	DWG No.	REVISION
P20-156	S3.411	F

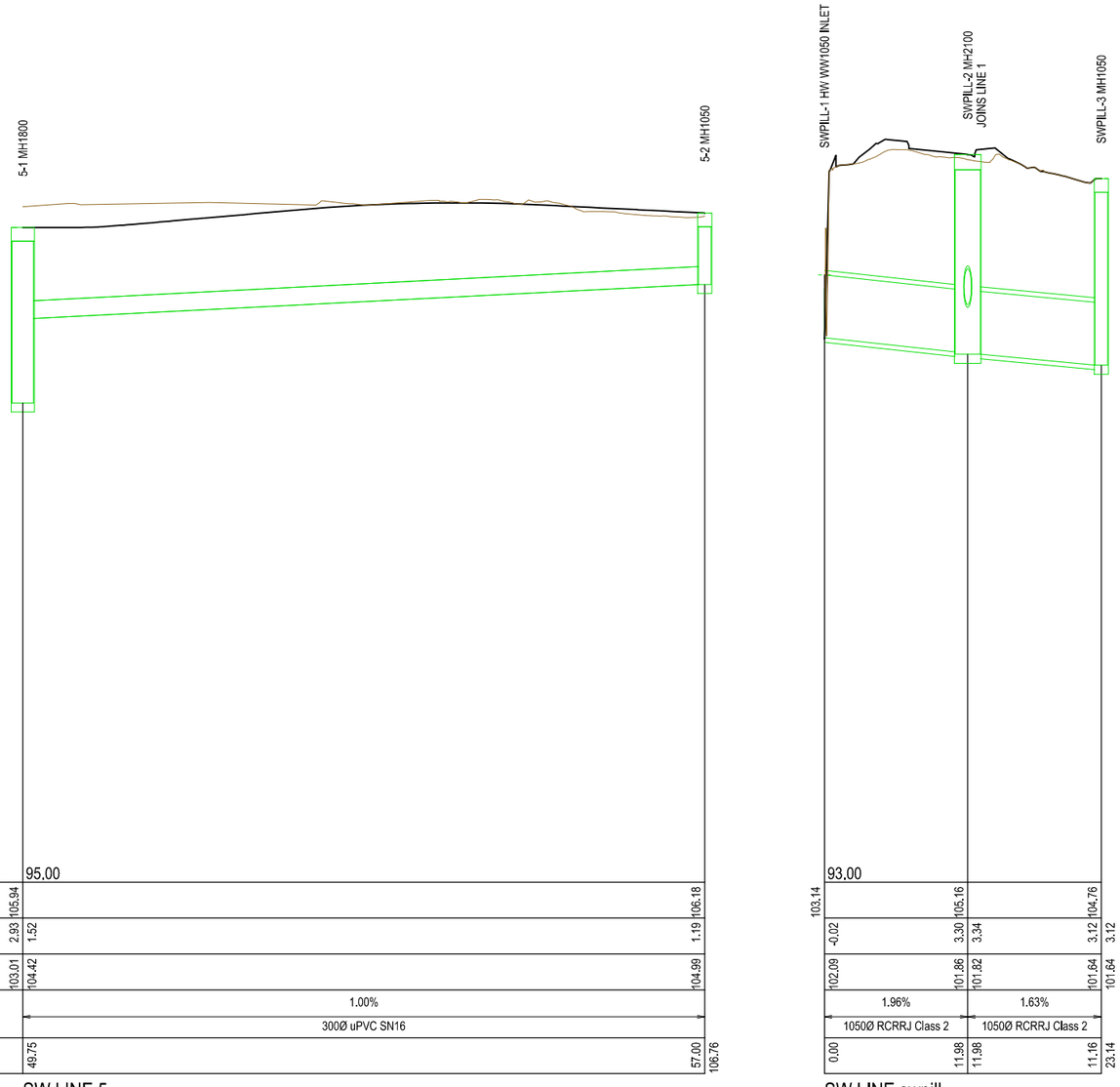
PRINTED: 4/05/2022 2:57:44 pm

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: D:\Ar Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILE\Stage 3\P20-156-S3.410.dwg

EXISTING GROUND

FINISHED GROUND



DATUM RL =	95.00							
DESIGN LEVEL	105.94					106.18		
CUT TO INVERT	2.93	1.52				1.19		
INVERT LEVEL	103.01	104.42				104.99		
PIPE GRADE		1.00%						
SIZE (mm) & CLASS		300Ø uPVC SN16						
CHAINAGE	49.75					57.00		106.76

SW LINE 5

	93.00							
103.14			105.16		104.76			
	-0.02		3.30	3.34	3.12		3.12	
	102.09		101.86	101.82	101.64		101.64	
		1.96%			1.63%			
		1050Ø RCRRJ Class 2			1050Ø RCRRJ Class 2			
	0.00		11.98	11.98	11.16		23.14	

SW LINE swpill

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

REV	DATE	AMENDMENT	DRAWN
D	04.05.22	UPDATED MANHOLE LIDS	CM
C	07.09.21	UPDATED 5-2	CM
B	07.09.21	FOR SECTION 92	RM
A	25.06.21	PHASE 3	CM

DESIGNED	ORIGIN DATE
CM	FEB 2021
DRAWN	CHECKED
RM	AR

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: STORMWATER LONGITUDINAL SECTIONS - SHEET 3

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING
PO Box 65 576 Mairangi Bay, Auckland 0754
p. (09) 486 0774 f. (09) 486 0776 m. 0275 427 266
enquiries@arassociates.co.nz www.arassociates.co.nz

ace new zealand

A1 SCALE	A3 SCALE	
1:250	1:500	
JOB No.	DWG No.	REVISION
P20-156	S3.412	D

PRINTED: 4/05/2022 2:57:45 pm

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: D:\AR Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\dgn 3\P20-156-S3-410.dwg

From: [redacted]
To: [redacted]
Subject: RE: [EXTERNAL] RE: 106 Mohaka easements
Attachments: image002.jpg
image003.jpg
image004.png
image005.jpg
image006.jpg
image007.png
image008.jpg
image009.png
image010.jpg
image011.jpg
image012.png
image013.jpg

[redacted] is better – less chance of blockage and easier to clear – can be cleared from the top during a storm event rather than having to wait for flows to subside to get in and clean out the scruffy dome.

From [redacted]@huttcity.govt.nz>
Sent: Thursday 12 May 2022 1:16 PM
To: [redacted]@e2environmental.com>
Subject: FW: [EXTERNAL] RE: 106 Mohaka easements

Is your preference the scruffy dome or [redacted] design?

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

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From [redacted]@wellingtonwater.co.nz>
Sent: Monday 9 May 2022 5:47 pm
To: [redacted]@huttcity.govt.nz>
Cc: [redacted]@e2environmental.com>
Subject: RE: [EXTERNAL] RE: 106 Mohaka easements

H[redacted]

Thanks for sending the detail. I'm just a bit unclear on how they will finish off the pipe at the top (there is no cover left) with the scruffy dome. Also if there is any significant debris load I'm concerned it wi l be difficult to clear during an event. I think they should get around both issues by getting a screen fabricated. Can we condition it something like:
Proposed scruffy dome to be replaced with intake screen fabricated to WWL requirements and supported on concrete apron. Screen to be rake-able to allow safe cleaning of the intake without channel entry.

Otherwise I'm happy to move forward with proposed approach.

From [redacted]@huttcity.govt.nz>
Sent: Monday 9 May 2022 3:01 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@e2environmental.com>
Subject: RE: [EXTERNAL] RE: 106 Mohaka easements

He[redacted]

Thanks for your email.

So you are happy to move forward with 4m easement / access f ail the consent notices etc are applied?

Re final surfacing should have said Geoblock type product not gabian. Happy that we condition that final surfacing to meet WWL maintenance team requirements.

At this point we have the above detail for the intake – looks like primary scruffy dome and secondary overland – which doubles as the access to the intake. What would you l ke me to be asking for?? This is scheme. But I can ask for stuff to be provided at detailed design – unless we think it needs to be resolved now.

Cheers

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From [redacted]@wellingtonwater.co.nz>
Sent: Monday 9 May 2022 12:17 pm
To: [redacted]@huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: 106 Mohaka easements

H[redacted]

I can't see any issues with the updated easement – it sounds l ke there won't be any need for exceptions.

It might need some operational input around the final surfacing/bollards but the concept seems suitable. Do you have a contact to provide that input? Sorry I'm unsure about gabians for driving over -is this something that you have seen done previously.

Have you covered off the primary/secondary intake design? We do have may issues with these things – just wondering if it needs a more detailed look.

Kind Regards

[redacted]

From [redacted]@huttcity.govt.nz>
Sent: Monday 9 May 2022 11:09 am
To: [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] RE: 106 Mohaka easements

H[redacted]

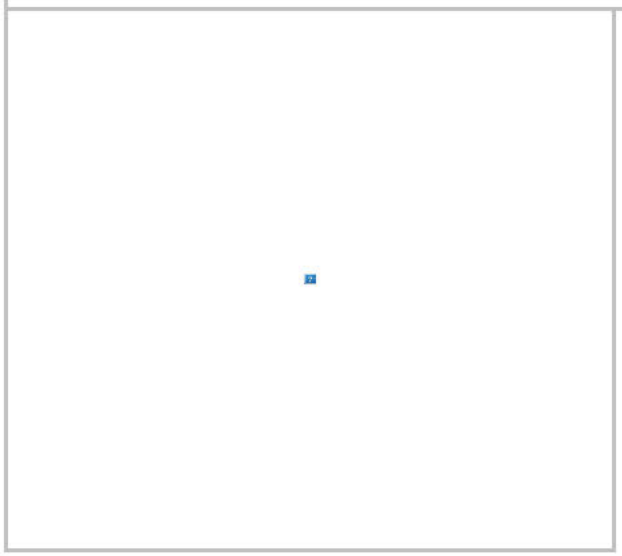
There have been some changes to the design at Meremere. The line between the units is now proposed to be laid shallower to a new MH and then stepper to the 1050. This would see the line between laid at a depth up to 1.65m.

Our easement would then be just under 4m which fits with access requirement of 4m to intake.

App icant is wanting to have the access way fit between the two units. The total distance here is 4.7m which would leave 0.35 for planning against unit for each. Accessway also doubles a overflow path.

For this to work we would need :

- easement shown on each lot
- consent notice for the units 27 & 28 requiring foundation design to RSWS
- condition for accessway to be formed as part of civil works – sealed or possibly gabion blocks?
- Consent notice 27 & 28 that accessway to remain 24/7 and no fencing to obscure
- Condition that residents association maintain accessway
- At the moment car parking obscures entrance to accessway so this will need to be resolve so can access 24/7
- Look at how we can stop people using as a carpark – bollards with WWL padlock?



What do you think?

Cheers

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From [redacted] @wellingtonwater.co.nz>
Sent: Thursday 28 April 2022 3:22 pm
To: [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: 106 Mohaka easements

H [redacted]

As discussed I am comfortable with a 5m easement on the basis that Lots 27 and 28 will be conditioned on their certificate of titles to ensure building foundations comply with the building in close proximity' requirements of the Regional Specification.

Kind Regards
[redacted]

[redacted] Principal Engineer, Des gn

Mob [redacted]
P ivate Bag 39804, Wellington Mail Cent e 5045
Level 4, BM House, 25 Victo ia St eet, Petone, Lowe Hutt
www.wellingtonwater.co.nz

From [redacted] @huttcity.govt.nz>
Sent: Thursday 28 April 2022 1:48 pm
To: [redacted] @wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] RE: 106 Mohaka easements

Hey [redacted]

Just fo lowing up on my query regarding min easements required for a development at 106 Mohaka St – have you had a chance to look yet?

Happy if you want to teams meet to go though.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

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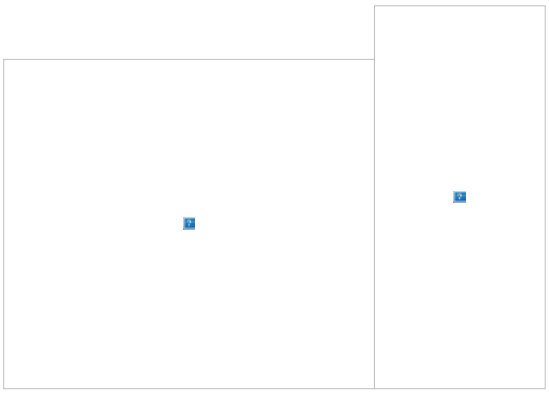
From [redacted]
Sent: Tuesday 12 Apr l 2022 2:11 pm
To: [redacted] @wellingtonwater.co.nz>
Subject: FW: [EXTERNAL] RE: Ownership of detention systems

Hey [redacted]

I forgot to check in about min clearances for the stormwater from Meremere St :

As it is the system starts with an intake MH in a neighbouring property – which I understand they do not yet have consent to undertake. Maintenance will need to be undertaken regularly at the intake and checking orif ce in piped detention system.

At this point I am presum ng that the intention s to access the intake from within the site – my ntention is to condition along this line. Network proposed to be 525 dia. (initially) and approx. 2-3.5m deep between Lots 27 & 28. Easement requirement for public network s min 3m wide or outside diameter of the pipe plus 2 times depth to invert whichever is greater. This wou d equate to 4.6m- 7.6m. Proposal sees something between 2.5-3m depending on how drawings interpreted. From RSWS an access track to an intake shou d be min 4m wide – w th room to work etc at the end. Seems a wider easement is doable as can move block H further south.



Can you please provide guidance one what WWL would like to see for the min. easement?

Cheers
[redacted]

From [redacted]
Sent: Monday 4 Apr l 2022 2:04 pm
To: [redacted] @wellingtonwater.co.nz>; [redacted] @wellingtonwater.co.nz>
Cc [redacted] @e2environmental.com>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: Ownership of detention systems

HI Team

Thanks for your guidance. I pushed back to the applicant and required the stormwater from adjoining property (public) and detention separated (private).

They have already laid the 1050mm dia. stormwater network – with no RC or engineering approval.

They are now asking if they can retain the shared system (effectively as private) with the whole thing being looked after by the residents association in perpetuity.

They have commented that:

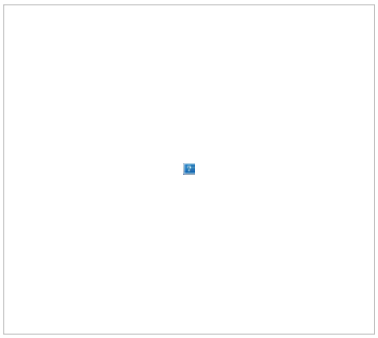
- The capturing of the stream' at the eastern boundary of the site is not dissimilar to the capture of overland flow from other council owned areas on at least two of our other jobs which also employ in line attenuation
- The use of in ine attenuation has ittle or no maintenance burden beyond what could be expected from any other pipe network within the region
- Given that the provision of a tank to attenuate this flow is not required from an engineering perspective The Developer is happy that the maintenance of the pipe network as installed remains the respons bility of the residents and owners association in perpetuity
- This should in principal resolve any issue which may require the addition of tanks or further piping to the site to attenuate the public flow from Meremere St

I'm presuming that the question of if this is suitable or not relates to :

- Risk to neighbouring properties if maintenance does not occur
- Ability of Council to transfer responsibi ity and risk

As it is the system starts with an intake MH in a neighbouring property – which I under stand they do not yet have consent to undertake. Maintenance will need to be undertaken regularly at the intake and checking orifice in piped detention system.

At this point I am presuming that the intention is to access the intake from within the site – my intention is to condition along this line. Network proposed to be 525 dia. (initially) and approx. 2-3.5m deep between Lots 27 & 28. Easement requirement for public network is min 3m wide or outside diameter of the pipe plus 2 times depth to invert whichever is greater. This would equate to 4.6m- 7.6m. Proposal sees something between 2.5-3m depending on how drawings interpreted. Access track to an intake should be min 4m wide – with room to work etc at the end. Seems a wider easement is doable as can move block H further south.



Think it would be good if we can discuss this further. I'm try book a team's meeting Wednesday.

Cheers
[redacted]

From [redacted] @wellingtonwater.co.nz>
Sent: Friday 25 March 2022 4:09 pm
To: [redacted] @huttcity.govt.nz>
Cc [redacted] @wellingtonwater.co.nz>; [redacted] @wellingtonwater.co.nz>
Subject: [EXTERNAL] RE: Ownership of detention systems

H [redacted]

I am planning to respond in more detail but want to check I am consistent with other recent decisions – so I've asked [redacted] to comment. In the interim I'm happy to give my 2c worth:

My thinking is that the piped stream should be pub ic but the rest of the stormwater should be private (as otherwise it's too confusing)

My understanding is that where detention systems have a wider benefit (ie…are sized to accept wider catchment flows) and are accepted in public roadways then public ownership is also accepted.

Kind Regards
[redacted]

From [redacted] @huttcity.govt.nz>
Sent: Wednesday 23 March 2022 5:07 pm
To: [redacted] @wellingtonwater.co.nz>; [redacted] @wellingtonwater.co.nz>
Subject: Ownership of detention systems

H [redacted] &[redacted]

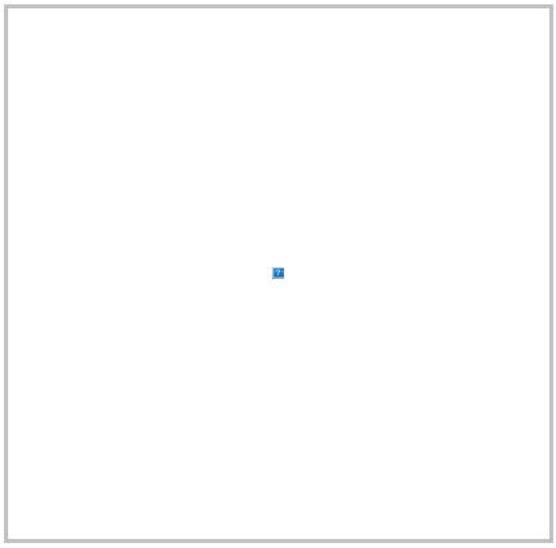
Can you plesse provide some guidance regarding ownership of detention systems .

My understanding was that in the past WWL did not want to take ownership of stormwater detention systems within developments unless you were talking about a pond on land vested to council.

I have a development at 106 Mohaka St that is proposing a combined stormwater network / detention system to be vested to Council. Roading within development is to remain private.

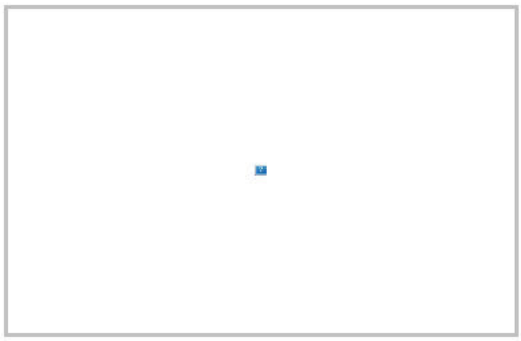
The site has flows from an adjoining site that were within a open channel around the site. They now propose to fi l most of the open channel and pipe through the development which would normally be seen as public network – they have GWRC approval in principal.
They now also want to oversize the piping of the channel flows and other sections of network within the site co lecting roof water to create a detention system. For these multi units developments Counc l normally seldom takes ownership of the networks within the site – leaving this to residents associations.

The RSWS though now seems to offer that WWL/Council will take on oversized piped detention systems



Can you please advise if I push back to the applicant for a separate public system for the flows through the site from Meremere and a private stormwater network & detention system.

Seems to me they could do both by keeping sections highlighted below as private and oversized.



Cheers

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: Land Development
To: [redacted]
Cc: Subdivision
Subject: FW: RM220475 - 106 Mohaka St - HCC RC Assessment Request
Date: Thursday, February 23, 2023 9:01:54 AM
Attachments: image001.png
image002.jpg
image003.png
APPLICATION - 106 Mohaka Street Blocks.pdf
APPLICATION - Appendix B - Subdivision Scheme Plans.pdf
FW 106 Mohaka St.msg

Morning [redacted]

Hope you are well

Could [redacted] kindly assist on this one. Loaded.

Many thanks

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: Subdivision <Subdivision@huttcity.govt.nz>
Sent: Thursday, 16 February 2023 12:19 pm
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RM220475 - 106 Mohaka St - WWL Comments Request

Hi [redacted]

Kindly please assist with three waters comments and flood assessment for the above resource consent.

Many thanks

Ngā Mihi | Kind regards,

[redacted]
Engineering Technician
Hutt City Council, 30 Laings Road, Lower Hutt 5040
W: www.huttcity.govt.nz

URBANEDGE
PLANNING LTD

Resource Consent Application and Assessment of Environmental Effects

Lots 53 and 54 at 106 Mohaka Street, Wainuiomata

DATE – 9 December 2022

APPLICANT – BBV Ltd

PO Box 39071
Wellington Mail Centre
Lower Hutt 5045

Contents

PART A: RESOURCE CONSENT APPLICATION

To: Team Leader – Resource Consents

Address: **Hutt City Council**
Private Bag 31-912
Lower Hutt 5040

Urban Edge Planning on behalf of BBV Ltd applies for land use and subdivision consent under sections 9 and 11 of the Resource Management Act 1991 (RMA) at Lots 53 and 54 at 106 Mohaka Street:

Location of application site	Street Address:	Lots 53 and 54 at 106 Mohaka Street, Wainuiomata
	Legal description:	Lot 53 - approved subdivision of Lot 5 DP 65821 (106 Mohaka Street, RM210328) Lot 54 - approved subdivision of Lot 5 DP 65821 (106 Mohaka Street, RM210328)
	District Plan Zoning:	Operative - General Residential Activity Area PC56 – Medium Density Residential
Type of resource consent	Subdivision and Land use consent and s127 change of conditions of RM210328	
Brief description of the proposal	Subdivision: Fee simple subdivision of two allotments to create 10 residential allotments, with amalgamated parking spaces, access and shared recreation area. Land Use: Development of 10 residential units. S127 change of conditions: Change to conditions of RM210328 Access, services and earthworks were approved in RM210328 and GWRC WGN220073 (37833, 37834, 37835, 37836, 38322]	
Activity Status	Discretionary Activity	
Other consents required	Nil	
Deposit fee	$2,475	

Address for service	Urban Edge Planning Attn: Anna Hanson PO Box 39071 Wellington Mail Centre Lower Hutt 5045 E: anna@uep.co.nz P: 0220966918
Address for invoices	BBV Ltd craig.walton@belgraviacapital.co.nz Attention: Craig Walton

Urban Edge Planning attaches, in accordance with **Schedule 4 of the RMA 1991**, an assessment of environmental effects in the detail that corresponds with the scale and significance of the effects that the proposed activity may have on the environment.

Urban Edge Planning also attaches, in the policy analysis, the relevant information required to be included in this application by the operative District Plan. No additional information requirements apply in this case under the RMA or any regulations made under the RMA. Regional consents WGN220073 (37833, 37834, 37835, 37836, 38322] relate to this proposal.

Signature of applicant:

Anna Hanson

Urban Edge Planning

On behalf of MHV Ltd

Date: December 2022

PART B: ASSESSMENT OF ENVIRONMENTAL EFFECTS

1. Existing Environment

1.1 Location and General Description

The site comprises Lots 53 and 54 of a comprehensive residential development at 106 Mohaka Street, Wainuiomata approved by Hutt City Council as RM210328. The parent site (Figure 1) and the relative location of Lots 53 and 54 (Figure 2) are shown below.

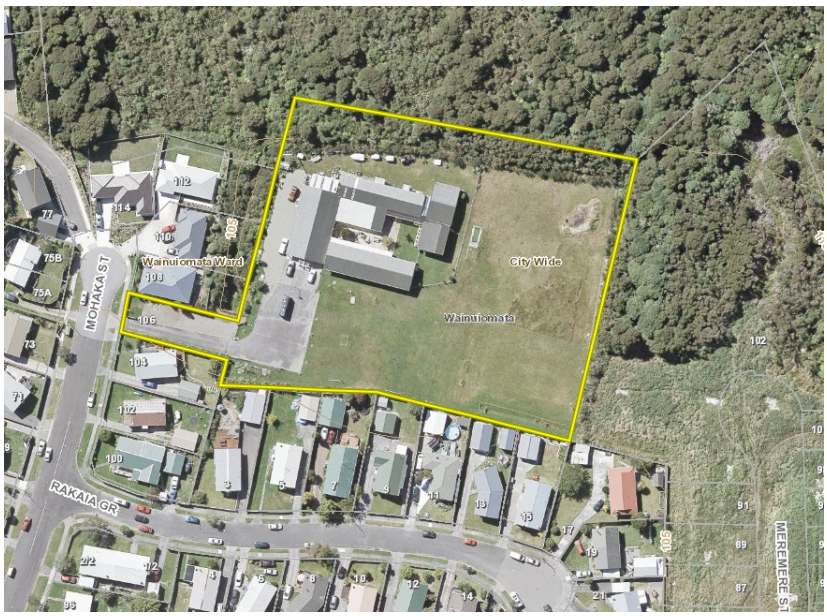


Figure 1: 106 Mohaka Street. Source: HCC GIS.

Figure 2: Lots 53 and 54 of RM210328 at 106 Mohaka Street (red highlights added)
Source: HCC RM210328 Approved Plans.

Lots 53 and 54 are located at the eastern extent of the parent site and are 487m^2 and 535m^2 in area respectively. The parent site was accurately described in the RM210328 decision as follows:

> *The application site is located at 106 Mohaka Street, Wainuiomata. The site has a land area of 1.056ha and is generally square in shape with a 13m wide access leg connecting to Mohaka Street… Most of the southern and eastern parts of the site comprise grassed open-space. Mature vegetation is located along the northern boundary of the site to a depth ranging between 10-15m. The land slopes downward from the north boundary for the extent of the mature bush cover. However, the land topography is otherwise generally flat with a slight decline from the north-east to the south-west. A wetland extends into the northern part of the site.*
>
> *The site is located within the General Residential Activity Area of the Operative District Plan. There are no site-specific notations within the District Plan which relate to the subject site. All the immediately abutting sites are similarly zoned. The land to the south and immediately to the west has been developed for residential purposes. The land abutting the east boundary of the application site is subject to resource consent approval for a residential development which is currently being given effect to. The surrounding and approved residential development typically comprises single detached housing. The land abutting the north of the application site, although residential zoned, is Council owned reserve land, with a steep topography and thick mature bush cover.*

RM210328 also approves the earthworks, access and infrastructure servicing associated with the development of Lots 53 and 54.

1.2 Planning Environment

Lots 53 and 54 are located within the General Residential Activity Area of the Operative City of Lower Hutt District Plan. The site is not subject to any designation, heritage protections, identified natural hazards or significant natural, cultural or archaeological resources under the District Plan.

The site is not identified as contaminated under the Greater Wellington Regional Council (GWRC) Selected Land Use Register (SLUR) or noted as a site being at risk of flooding under the GWRC flood hazard maps.

Lots 53 and 54 are zoned Medium Density Residential in proposed Plan Change 56 and are also subject to a Flood Hazard Overlay (Inundation Area) (Figure 3). This is confirmed in RM210328, which notes, in respect of the parent site:

> *The land is located within the Medium Density Residential Activity Area under Proposed Plan Change 56 (PC56). Much of the application site is located within the Inundation Area Overlay, however this is not a qualifying matter area which would preclude Medium Density Residential Standards (MDRS) introduced by the plan change from taking legal effect.*

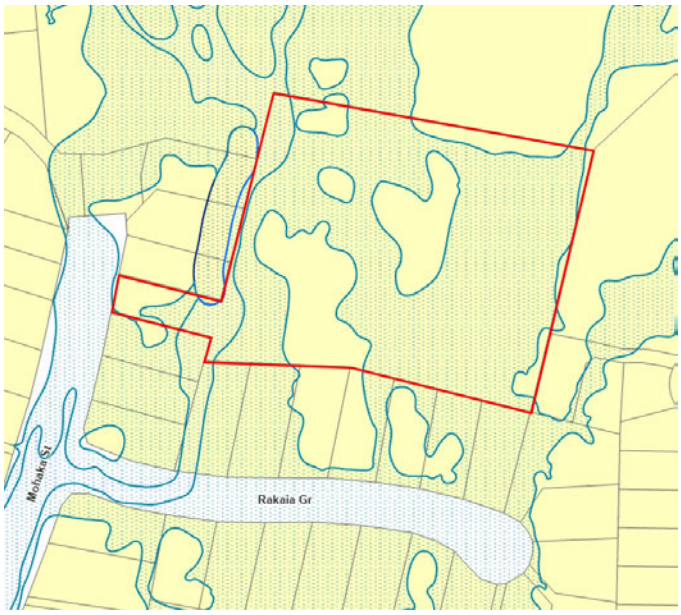


Figure 3: PC56 - Parent Lot Showing Medium Density Residential Zoning (yellow) and Inundation Area (blue dots)

1.3 Legal Description

106 Mohaka Street is legally described as Lot 5 DP 65821, held in Record of Title WN34C/88 (Appendix A).

Lots 53 and 54 are created by approved subdivision RM210328.

Lot 54 is subject to a consent notice to the effect that any buildings other than fences must not have heights exceeding the maximum height standard of the District Plan, as measured from existing site levels (as shown in Earthworks Long-section #P20-156, S3.223 Rev C, dated 05.08.22).

Lots 53 and 54 are amalgamated with the following allotments of approved subdivision RM210328 (Table 1 below):

- Lot 200 – shared accessway;
- Lot 400 – shared recreation area;
- Allocated parking spaces (123-127 for Lot 53 and 128-132 for Lot 54).

The conditions of RM210328 include:

> *11. That the consent holder complies with the following amalgamations (see Land Information New Zealand Request # 1744156):*
>
> *That lot 200 hereon (legal access) must be held as to 42 undivided 1/52nd shared by the owners of lots 1-22 and 33-52 hereon and as to 10 undivided 1/52nd shares by the owners of lots 53 and 54 hereon as tenants in common in the said shares and that*

individual records of title be issued in accordance therewith.
That Lots 53, 123, 124, 125, 126 and 127 hereon be held in one Record of Title.

That Lots 54, 128, 129, 130, 131 and 132 hereon be held in one Record of Title.

12. That lot 400 hereon shall be owned by an Incorporated society established for the purpose of managing lot 200 & 400 hereon used by lots 1 to 22 & 33 to 54 hereon. All owners of lots 1 to 22 & 33 to 54 hereon shall become members of the incorporated society.

Condition 61 of RM210328 requires a consent notice to be registered on the record of title of Lots 53 and 54 to ensure any dwellings built on these lots have foundations designed by a chartered professional structural or geotechnical engineer; and that the design and details of these foundations are submitted as part of any building consent applied for on these lots.

Condition 67 of RM210328 requires a consent notice to be registered on the record of title of Lots 53 and 54 to ensure future owners are aware of shared responsibilities for the maintenance of communal areas within lots 200 and 400, and time restrictions for access to refuse bin enclosures.

RM210328 also includes the following requirements:

68. To facilitate the ongoing maintenance of communal areas and shared infrastructure the consent holder / future owner(s) of all residential lots shall form a Residents Society Incorporated. This includes the private internal access road, lighting, site infrastructure (including private sewer and stormwater drainage, along with the wastewater mitigation and stormwater treatment systems), outdoor recreation areas, landscaping (hard and soft), and refuse storage areas. At the time of the subdivision of the site, the administration of the Residents Society Incorporated shall be the shared responsibility of all lot owners.

69. That, in accordance with section 221 of the Resource Management Act 1991, Council registers a consent notice on the record of title of lot 54. The consent notice shall state that any future buildings (other than fences and retaining walls shown on the approved landscape plan) shall not have heights exceeding the maximum height standard of the District Plan, as measured from existing site levels prior to the earthworks and subdivision (as shown in Earthworks Long-section #P20-156, S3.223 Rev C, dated 05.08.22). Any subsequent application to remove this consent notice under s221(3) of the RMA, will be assessed with respect to the degree of compliance with the relevant District Plan height standard (with respect to site levels prior to the subdivision) for any proposed buildings, and consideration of any related District Plan assessment matters and objectives and policies.

2. Proposal

2.1 Description of the Proposal

The applicant is seeking resource consent to undertake a 10 unit residential development and associated subdivision at Lots 53 and 54 of 106 Mohaka Street, Wainuiomata.

2.1.1 Proposed Subdivision

Each dwelling will be contained within its own allotment. Each allotment will be amalgamated with the following areas created in RM210328:

- A parking space;
- The private road accessway, which includes pedestrian pathways, raingardens, a stormwater attenuation facility and a communal refuse facility (Lot 200);
- The recreation lot (Lot 400);

as set out in the Table 1 below and shown on the Subdivision Scheme Plan (Appendix B). The topographic information for the site, including lots 53 and 54 can be found in the application documents for RM210328.

Table 1: Details of proposed lots and amalgamations

Lot	Residential lot area (m^2)	Amalgamated access lot	Amalgamated parking lot	Amalgamated recreation lot
23	111.34	200	123	400
24	90.76	200	124	400
25	91.23	200	125	400
26	91.70	200	126	400
27	102.18	200	127	400
28	103.15	200	128	400
29	93.58	200	129	400
30	94.06	200	130	400
31	90.46	200	131	400
32	156.47	200	132	400

2.1.2 Proposed Dwellings

The application includes the construction of two blocks (Blocks G and H) that each contain five terraced residential units on Lots 53 and 54 as shown below (Figure 4) and detailed in the Architectural Plans (Appendix C).

Figure 4: Proposed Terraced Residential Units – Blocks G and H.
Source: Architectural Plans, Sheet RC03 – Appendix C

The proposed units will all be two-storey and will each contain three bedrooms. Each unit will have an associated outdoor living area accessed directly from its internal living space.

Each unit will be allocated a single car parking space located nearby, adjacent to the internal accessway (Table 1).

Table 2 below provides additional information on each of the proposed units.

Table 2: Details of proposed units

Unit	Residential lot area (m^2)	Unit Footprint (m^2)	Building Coverage (%)	Outdoor Living Area (m^2)	Permeable Surface Area (m^2)	Permeable Surface Area (%)	Landscaped Area (m^2)	Landscaped Area (%)
Lot 53 Block G								
23	111	49.3	44	26.66 + share	43.50	39	30.5	27

				of Lot 400				
24	91	49.2	54	20.16 + share of Lot 400	22.00	24	9.00	10
25	91	49.0	54	20.16 + share of Lot 400	22.00	24	9.00	10
26	92	49.0	54	20.16 + share of Lot 400	23.50	26	10.50	11
27	102	49.3	48	23.27 + share of Lot 400	34.00	33	21.00	21
Lot 53 Overall	487.17	245.8	50	+ share of Lot 400	145.00	30	80.00 + 10/52 share of Lot 400 = 186 Total 266	55
Lot 54 Block H								
28	103	49.3	48	23.15 + share of Lot 400	35.00	28	22.00	14
29	94	49.2	53	20.13 + share of Lot 400	26.00	28	12.70	14
30	94	49.2	53	20.13	26.00	28	12.60	14

				+ share of Lot 400				
31	91	49.2	55	19.14 + share of Lot 400	26.00	28	13.30	14
32	156	49.2	31	24.01 + share of Lot 400	93.00	60	70.00	45
Lot 54 Overall	538.41	246.1	46	+ share of Lot 400	206.00	38	130.60 + 10/52 share of Lot 400 = 186 Total 316.60	59

Block G:

Block G will be two storeys with a maximum height of approximately 7.7m above existing ground level (prior to earthworks) and 7.081m from the adjusted ground level post earthworks. Block G will comply with the height to boundary requirements from all external boundaries (Sheets RC11 and RC12, Architectural Plans, Appendix C).

Block G will contain Units 23 – 27. The units will each contain open plan kitchen, dining and lounge spaces and laundry facilities at the ground floor, and three bedrooms, family bathroom and storage areas within the upper storey. Primary outdoor living areas will be located to the front (west) of the units, with supplementary outdoor spaces provided at the rear of the units and on the shared reserve area (Lot 400). MDRS 4F 4.2.6 provides that outdoor living space may be located directly adjacent to the unit or grouped cumulatively by area in one communally accessible location.

A single allocated car park for each of the units will be provided alongside the internal accessway.

Block H:

Block H will be two storey with a maximum height of approximately 8.3m above the existing ground floor level (prior to earthworks) and 7.080m from the adjusted ground level post earthworks. Block H will comply with the height to boundary requirements from all external boundaries (Sheets RC11 and RC12, Architectural Plans, Appendix C).

Block H will contain Units 28 – 32. The units will each contain open plan kitchen, dining and lounge spaces and laundry facilities at the ground floor, and three bedrooms, family bathroom and storage areas within the upper storey. Primary outdoor living areas will be located to the front (west) of the units, with supplementary outdoor spaces provided at the rear of the units and on the shared reserve area (Lot 400). MDRS 4F 4.2.6 provides that

outdoor living space may be located directly adjacent to the unit or grouped cumulatively by area in one communally accessible location.

A single allocated car park for each of the units will be provided alongside the internal accessway.

The height of Block H is measured from existing ground level as required by the consent notice on Lot 54.

Access

Access to the site is via the shared accessway approved in RM210328. Each new allotment will have an interest in the accessway (Lot 200) via an amalgamation clause that currently includes Lots 53 and 54 and can therefore be passed on to the new allotments.

2.1.3 Recreation and Landscaped Areas

RM210328 includes a shared reserve area (Lot 400). Each new allotment will have an interest in the shared reserve (Lot 400) via an amalgamation clause that includes Lots 53 and 54 and can therefore be passed on to the new allotments. The MDRS (Schedule 3A(18)(2) provide that "The landscaped area may be located on any part of the development site, and does not need to be associated with each residential unit". The share of Lot 400 allocated to Lots 53 and 54 (10/52 residential units) is included in the assessment of landscaped areas for the proposed allotments (Table 2).

Each new allotment will be attractively landscaped in accordance with a Landscape Design (Appendix D) that references and complements the landscaping approved for the parent site in RM210328.

2.1.4 Earthworks

Minor earthworks are required to establish a level building platform that is suitable for the proposed construction. All required earthworks were approved in RM210328 and RM210168.

2.1.5 Works and Services

The three waters, electricity and telecommunications infrastructure required to service the proposed development were approved in RM210328, including domestic and fire-fighting water supply, stormwater treatment and attenuation and sewerage. Conditions of consent will require detailed engineering drawings to be provided for HCC approval.

Lots 53 and 54 are amalgamated with Lot 200, which is the private road accessway. Lot 200 includes pedestrian pathways, raingardens, a stormwater attenuation facility and a communal refuse facility. The proposed residential units will not be fitted with rainwater tanks. Rather, the stormwater management solution is provided in the shared stormwater attenuation facility that has been sized to accommodate the proposed 10 residential units of Lots 53 and 54 (RM210328 Condition 38.ii). It is noted that the 10 units proposed under this application were initially included in the consent application for RM210328, and as such, these units were incorporated into the stormwater calculations.

Condition 67 of RM210328 requires a consent notice to be registered on the record of title of Lots 53 and 54 to ensure future owners are aware of shared responsibilities for the maintenance of communal areas within lots 200 and 400, and time restrictions for access to refuse bin enclosures. Condition 72 requires there to be a Waste Management Plan.

Financial Contributions

Financial contributions are anticipated for the proposed allotments.

2.1.6 Residents Association

A residents' association will be established to manage the proposed communal property, facilities and servicing onsite. This will include the private internal access road, lighting, shared recreation area, landscaped areas, and site infrastructure.

2.1.7 S127 - Change to Conditions

It is proposed to cancel subdivision condition 69 of RM210328 that requires that dwellings within Lot 54 have a height not exceeding the District Plan height standard (as measured from the ground level existing prior to earthworks commencing). This condition is no longer relevant as this application demonstrates that buildings will comply with the condition. There is therefore no need for a consent notice to dictate heights of future dwellings, as the dwellings within Lot 54 will be constructed.

The condition proposed to be cancelled on RM210328 is as follows:

> *69. That, in accordance with section 221 of the Resource Management Act 1991, Council registers a consent notice on the record of title of lot 54. The consent notice shall state that any future buildings (other than fences and retaining walls shown on the approved landscape plan) shall not have heights exceeding the maximum height standard of the District Plan, as measured from existing site levels prior to the earthworks and subdivision (as shown in Earthworks Long-section #P20-156, S3.223 Rev C, dated 05.08.22). Any subsequent application to remove this consent notice under s221(3) of the RMA, will be assessed with respect to the degree of compliance with the relevant District Plan height standard (with respect to site levels prior to the subdivision) for any proposed buildings, and consideration of any related District Plan assessment matters and objectives and policies.*

3. Resource Consent Requirements

On 18 August 2022 Hutt City Council notified Proposed District Plan Change 56 ('PC56'). PC56 gives effect to the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (the 'Housing Supply Act'), which was enacted in December 2021. The Housing Supply Act prescribes new mandatory Medium Density Residential Standards ('MDRS'), introduces the concept of qualifying matters and makes changes to policies 3 and 4 of the National Policy Statement on Urban Development 2020 ('NPS-UD'). These intensification and qualifying matters must be added to District Plans using the Intensification Streamlined Planning Process (ISPP).

PC56 is processed under the ISPP provisions of the RMA introduced by the Housing Supply Act.

3.1 Density standards

The MDRS have been incorporated into the proposed Medium Density Residential Activity Area (MRAA) and High Density Residential Activity Area (HRAA) chapters of PC56. In accordance with the Housing Supply Act these provisions have immediate legal effect from the date of notification and the corresponding ODP provisions cease to apply. These are referred to collectively as the 'density standards'.

However, where a site was not previously zoned residential or where a qualifying matter applies to a site (as identified in Table 1 below), then the MDRS do not have immediate legal effect and the ODP provisions continue to apply (until such time that the PC56 decisions are notified by the Council). Therefore, an assessment of every proposal is required to determine whether the MDRS apply and whether a qualifying matter is applicable.

Where the MDRS do apply (i.e. no qualifying matter removes the legal effect of those provisions), the proposal must be assessed against the MDRS:

- If the proposal does not meet any of the MDRS then all MDRS cease to be relevant and the proposal must be assessed against the density standards and other relevant provisions of the ODP. The proposal must also be assessed against any PC56 provisions that have legal effect under s86B of the RMA (if any).
- If the proposal meets all the MDRS then the proposal is permitted under these standards and must only be assessed against all other relevant (non-density) rules and standards of the ODP and those provisions of PC56 with immediate legal effect (if any).

3.2 Immediate Legal Effect of PC56 Provisions

Notwithstanding the density standards, there are provisions within PC56 relating to Historic Heritage that have immediate legal effect in accordance with s86B (3) the RMA. These provisions with immediate legal effect must be considered in addition to the ODP provisions.

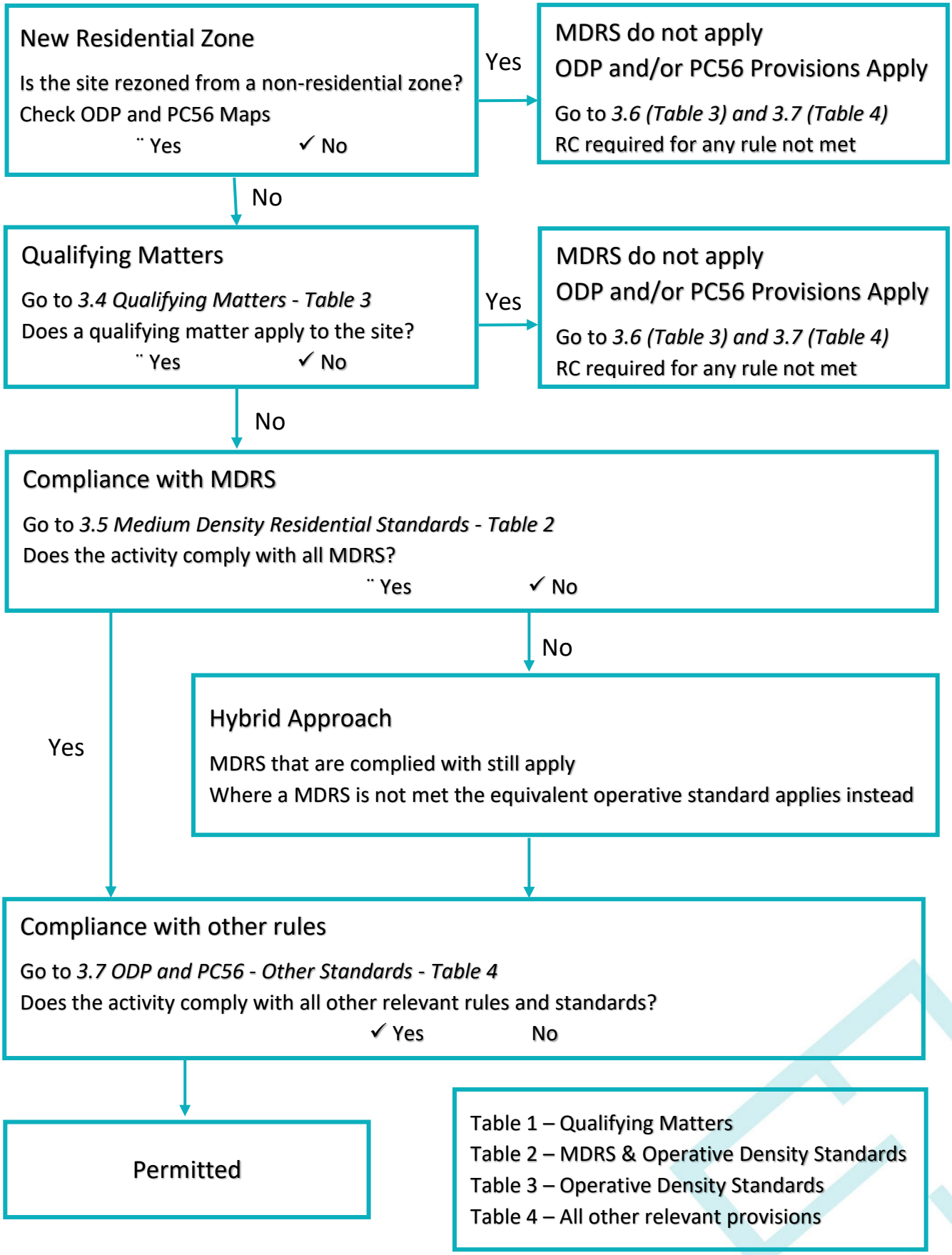
As such, all proposals must be assessed using the following steps:

- Firstly, determine whether the site is in a new residential zone (i.e. was previously not zoned residential);
- Secondly, determine whether qualifying matters are applicable and if so whether the proposal complies with those provisions;

- Thirdly, determine whether the proposal complies with the MDRS; and
- Finally, undertake an assessment against the relevant provisions of the ODP and those provisions of PC56 with legal effect.

This is summarised in the following flow chart to determine which provisions the proposal must be assessed against. The corresponding tables 1 to 4 below can be used where applicable to determine and confirm the overall status of the proposal.

3.3 Flowchart – relevant provisions



3.4 Qualifying Matters

Table 3: Qualifying Matters

Qualifying Matter	Details	Chapter / Schedule / Planning Maps	Assessment
Natural hazard risk	▪ Wellington Fault Overlay ▪ Overland Flow Path or Stream Corridor Flood Hazard Overlays ▪ Medium and High Coastal Hazard Area	Chapter 14H ▪ 14H 2.1 to 2.2 ▪ 14H 2.4 to 2.6 ▪ 14H 2.8 to 2.9 Maps ▪ Flood Hazard Overlay – Overland Flow Path and Stream Corridor ▪ Wellington Fault Overlay ▪ Coastal Hazard Overlay – Tsunami – Medium and High ▪ Coastal Hazard Overlay - Inundation – Medium and High	**N/A**
Historic heritage	▪ Residential Heritage Precincts only – NOT Heritage Buildings and Strictures in 14F ▪ Includes three areas currently identified in the District Plan and five additional residential areas ▪ Zone chapters include rules that manage building heights and density in the areas identified.	Chapters 4F and 4G ▪ 4F 5.1 Residential Heritage Precinct ▪ 4G 5.2 Residential Heritage Precinct ▪ 4G 5.3 Heretaunga Settlement and Riddlers Crescent Heritage Precincts Maps ▪ Heretaunga Settlement and Riddlers Crescent Heritage Precincts Overlay ▪ Residential Heritage Precinct Overlay	**N/A**
Sites of Significance to Māori	▪ Current District Plan approach for identified sites	Chapter 14E ▪ 14E2.2 Maps ▪ SCR site	**N/A**
Sites abutting marae in the Community Iwi Activity Area	▪ New recession plane and setback requirements for sites adjoining marae	Chapter 4F and 4G ▪ 4F 4.2.4A ▪ 4G 4.2.6 Maps ▪ Community Iwi Activity Area	**N/A**
The National Grid	▪ Current District Plan approach to protecting this infrastructure.	Chapter 13 ▪ 13.4 Rules National Grid Maps	**N/A**

		▪ National Grid Yard ▪ National Grid Corridor	
Public open space	▪ Current District Plan approach to protecting public open space.	▪ Only relevant for Policy 3 NPS-UD implementation, not MDRS	**N/A**

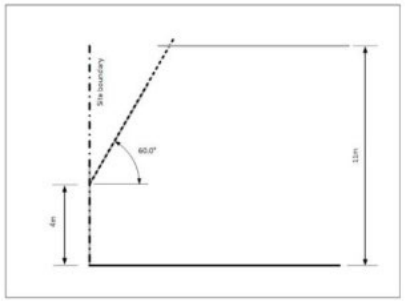
3.5 Medium Density Residential Standards – PC56

The proposal is not located in a new residential zone and no qualifying matters apply. Therefore, the MDRS apply. Where a MDRS is not met the equivalent density standard of the ODP applies.

Table 4: Medium Density Residential Standards (with immediate legal effect)

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
4G High Density Residential Activity Area (HRAA) – MDRS			
Number of Residential Units			
4F 4.2.1AA *(PC56)*  **Number of residential units per site** (a) Up to three residential units per site are a permitted activity.	**Does not comply** 5 residential units are proposed on each of Lots 53 and 54	**GRAA** **4A 4.2.1 Number of Dwellings per Site** Up to two dwellings per site are a permitted activity.	**Does not comply**
Building Coverage			
4F 4.2.1 *(PC56)* 	**Does not comply** Proposed lots 24, 25, 26, 29, 30 and 31 will have building coverage greater than 50% of the net site area (Table 2). The overall	**GRAA** **4A 4.2.2 Site Coverage** Permitted site coverage is up to 40%.	**Does not comply**

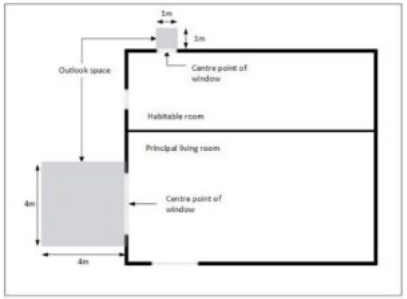
Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
Building Coverage (a) Construction or alteration of a building is a permitted activity if: (i) The building coverage does not exceed 50%.	proportions of building coverage are: • Lot 53 - 50% • Lot 54 - 46%		
Building Height			
4F 4.2.2 *(PC56)* **Building Height** (a) Construction or alteration of a building is a permitted activity if: (i) The building does not exceed a maximum height of 11m except that 50% of a building's roof in elevation, measured vertically from the junction between wall and roof, may exceed this height by 1m where the entire roof slopes 15 degrees or more.	**Complies**	**GRAA** **4A 4.2.3 Building Height** (a) Construction or alteration of a building is a permitted activity if: (i) The building does not exceed a maximum height of 8m.	**N/A**
Height in Relation to Boundary			
4F 4.2.3 *(PC56)*	**Complies** As shown on the Architectural Plans (Appendix C).	**GRAA** **4A 4.2.4 Recession Plane** 2.5m +45° from all side and rear boundaries. No recession planes are required from road boundaries and existing or proposed internal boundaries within a site.	**N/A**

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
Height in relation to boundary (a) Construction or alteration of a building is a permitted activity if the following height in relation to boundary requirements are being met: (i) 4m +60° from all side and rear boundaries.  Where the boundary forms part of a legal right of way, entrance strip, access site, or pedestrian access way, the height in relation to boundary applies from the farthest boundary of that legal right of way, entrance strip, access site, or pedestrian access way. This standard does not apply to: a. A boundary with a road; b. Existing or proposed internal boundaries within a site; and c. Site boundaries where there is an existing common wall between 2 buildings on adjacent sites or where a common wall is proposed.			
Setbacks			

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
4F 4.2.4 (PC56) (a) Construction or alteration of a building is a permitted activity if: (i) Buildings are set back from the relevant boundary by the minimum depth listed below Front yard: 1.5m Side yard: 1m Rear yard: 1m This standard does not apply to site boundaries where there is an existing common wall between 2 buildings on adjacent sites or where a common wall is proposed. Eaves may encroach into any yard by up to 0.6m.	This rule is more enabling than the MDRS therefore the GRAA rule applies	**GRAA** **4A 4.2.5 Yards** The building is not located within the following yard setbacks: Front yards 3m Side yards 1m Rear yards 1m One accessory building may be located in a side and/or rear yard, provided that the building does not extend more than 6m along the length of any boundary and is not located in a yard that is directly adjoining the rail corridor. No yards are required along existing or proposed internal boundaries within a site. Eaves may encroach into any yard by up to 0.6m.	**Complies** – All proposed dwellings will be located more than 1m from the site's external boundaries.
Outdoor Living Space			
4F 4.2.6 *(PC56)* **Outdoor Living Space** (a) Construction or alteration of a building is a permitted activity if: (iii) Each residential unit at ground floor level has an outdoor living space that is at least 20m2 and	**Does not comply** – The outdoor living space for Lot 31 will be 19.14m^2. The outdoor living spaces for all other lots will be at least 20m^2 in area and have a width of at least 3m.	**GRAA** **4A 4.2.7 Outdoor Living Space** (i) Each dwelling has a private outdoor living space that: 1. Has a minimum area of 50m^2 2. Has a minimum dimension of 4m. 3. Has direct access from and is adjoining to the dwelling to which it relates. 4. Is not occupied by any buildings, parking areas, or accessways.	**Does not comply**

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
comprises ground floor, balcony, patio, or roof terrace space that: 1. Where located at ground level, has no dimension less than 3m; 2. Where provided in the form of a balcony, patio, or roof terrace, is at least 8m2 and has a minimum dimension of 1.8m; 3. Is accessible from the residential unit; and 4. May be: i. Grouped cumulatively by area in one communally accessible location, or ii. Located directly adjacent to the unit; and 5. Is free of buildings, parking spaces, and servicing and manoeuvring areas. (iv) Each residential unit located above ground floor level must have an outdoor living space in the form of a balcony, patio, or roof terrace that: 1. Is at least 8m and has a minimum dimension of 1.8m; and 2. Is accessible from the residential unit; and 3. May be: i. Grouped cumulatively by area in one communally accessible location, in which case it may be located at ground level; or ii. Located directly adjacent to the unit.		(ii) For a dwelling located entirely above ground floor the outdoor living space requirement can be satisfied by providing a balcony or roof terrace with a minimum area of 10m^2 with a minimum dimension of 2m.	
Accessory Building			

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
4F 4.2.7 (PC56) (a) Construction or alteration of an accessory building is a permitted activity if: (i) Development Standards 4G 4.2.1 (Building Coverage), 4G 4.2.2 (Building Height), 4G 4.2.3 (Height in Relation to Boundary), 4G 4.2.4 (Setbacks) and 4G 4.2.5 (Permeable Surface) are complied with.	**N/A –** No accessory buildings are proposed for Lots 23 – 32.	4A 4.2.8 Accessory Buildings Construction or alteration of an accessory building is a permitted activity if: (i) Development Standards 4A 4.2.2 (Site Coverage), 4A 4.2.3 (Building Height), 4A 4.2.4 (Recession Planes), 4A 4.2.5 (Yards) and 4A 4.2.6 (Permeable Surface) are complied with.	**N/A**
Outlook Space			
4F 4.2.11 *(PC56)* **Outlook Space (per unit)** (a) Construction or alteration of a building is a permitted activity if: (i) Outlook space is provided for each residential unit as specified in this rule.	**Complies** Compliant outlook spaces are provided (See Sheets RC03.2 – RC03.5 of the architectural plans).	**GRAA** **No equivalent standard and no catch-all rule –** **Therefore permitted**	**N/A**

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
(ii) Outlook space is provided from habitable room windows as shown in the diagram below:  (ii) The minimum dimensions for a required outlook space are: (a) A principal living room must have an outlook space with a minimum dimension of 4 metres in depth and 4 metres in width; and (b) All other habitable rooms must have an outlook space with a minimum dimension of 1 metre in depth and 1 metre in width. (iii) The width of the outlook space is measured from the centre point of the largest window on the building face to which it applies. (iv) Outlook spaces may be over driveways and footpaths within the site or over a public street or other public open space. (v) Outlook spaces may overlap where they are on the same wall plane in the case of a multi-storey building.			

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
(vi) Outlook spaces may be under or over a balcony. (vii) Outlook spaces required from different rooms within the same building may overlap. (viii) Outlook spaces must: (a) Be clear and unobstructed by buildings; and (b) Not extend over an outlook space or outdoor living space required by another dwelling.			
Windows to Street			
4F 4.2.12 *(PC56)* **Windows to street** (a) Construction or alteration of a building is a permitted activity if: (i) Residential units facing the street have a minimum of 20% of the street-facing façade in glazing. This can be in the form of windows or doors.	**N/A –** The proposal does not face a public street.	**GRAA** **No equivalent standard and no catch-all rule –** **Therefore permitted**	**N/A**
Landscaped Area			
4F 4.2.13 *(PC56)*	**Does Not Comply** Of the proposed lots, only Lots 23, 27 and 32 have	**GRAA** **No equivalent standard and no catch-all rule –** **Therefore permitted**	**N/A**

Proposed District Plan - MDRS	Compliance	ODP -Equivalent Density Standard	Compliance
Landscaped area (a) Construction or alteration of a building is a permitted activity if the following landscaped area standards are met: (i) A residential unit at ground floor level has a landscaped area of a minimum of 20% of a developed site with grass or plants, and can include the canopy of trees regardless of the ground treatment below them. (ii) The landscaped area may be located on any part of the development site and does not need to be associated with each residential unit.	landscape areas exceeding 20% of the lot area. Lot 24: 10% Lot 25: 10% Lot 26: 11% Lot 28: 14% Lot 29: 14% Lot 30: 14% Lot 31: 14% Lots 53 and 54 each have more than 20% landscaped area (Table 2). The landscaped areas include the share of Lot 400.		

3.6 Operative District Plan – Density Standards

Table 3: Operative District Plan Density Standards – this table is not relevant because the operative density standards do not apply except as set out above.

3.7 Operative District Plan – Other Standards

Table 4: Relevant Operative District Plan Standards

Chapter 4A – General Residential Activity Area – Non-Density Rules		
District Plan Rule No.	District Plan Standard	Compliance
4A 4.1.10 Vibration	Activities that would cause vibration are permitted activities if: (i) The activity is managed and controlled in such a way that no vibration from the activity is discernible beyond the boundary of the site.	**May not comply** during the construction period. Following completion of the earthworks and residential units, there will be no activities on the site that will generate vibration.
4A 4.2.6 – Permeable Surface	Construction or alteration of a building, or new impermeable surfaces, is a permitted activity if: (i) A minimum of 30% of the site area is a permeable surface.	**Does not comply** Some of the allotments will have permeable surfaces of less than 30% of the site area (Table 2). Lot 24: 24% Lot 25: 24% Lot 26: 26% Lot 28: 28% Lot 29: 28% Lot 30: 28% Lot 31: 28% The overall proportions of permeable surfaces are: • Lot 53 – 30% permeable. • Lot 54 – 38% permeable.
4A 4.2.12 – Stormwater Retention	Construction of a roofed building, excluding accessory buildings or additions to an existing building, is a permitted activity if: (i) A rainwater tank is provided for the building that collects all rainwater from the roof of the building. The rainwater tank must have the following volumes:	**Does not comply** A rainwater tank is not provided for each building. The site's stormwater management is authorised by RM210328.

	• Roof area of 100m^2 or less - 2,000 litre capacity. • Roof area of 100m2 to 200m^2 - 3,000 litre capacity • Roof area of more than 200m^2 - 5,000 litre capacity.	
4A 4.3 General Rules	All activities must comply with the General Rules in Chapter 14.	Complies or has been approved by RM210328 – see below.
Chapter 11 – Subdivision		
11.2.2.1(a) – Allotment Design	Minimum size of allotment - 400m² No minimum size is required if: (i) Existing dwelling: There is no increase in non-compliance with General Residential Development Standards. (ii) Where there is no existing dwelling, or for which no existing land use consent for a dwelling has been granted or is being concurrently granted (in the case of joint land use and subdivision applications): It can be demonstrated that it is practicable to construct on all allotments, as a permitted activity, a dwelling which complies with all relevant General Residential Development Standards specified in 4A 4.2 and 4A 5.	**Does not comply** The proposed allotments are smaller than 400m^2. The proposed allotments cannot contain dwellings that comply with all relevant General Residential Development Standards specified in 4A 4.2 and 4A 5.
	Minimum frontage – 3m to ensure there is drive on access (for rear allotments the 3m frontage may be satisfied through a registered Right of Way outside the title (outside legal boundaries of the allotment)).	Complies.
	Shape Factor – to maintain a rectangle of 10m x 15m clear of the required yard setbacks or right of way and have a suitable building platform. No minimum size or shape factor is required if: (i) Existing dwelling: There is no increase in non-compliance with General Residential Development Standards.	**Does not comply** Each proposed allotment cannot contain a rectangle of 10m x 15m. The proposed allotments cannot contain dwellings that comply with all relevant General Residential Development Standards specified in 4A 4.2 and 4A 5.

	(ii) Where there is no existing dwelling, or for which no existing land use consent for a dwelling has been granted or is being concurrently granted (in the case of joint land use and subdivision applications): It can be demonstrated that it is practicable to construct on all allotments, as a permitted activity, a dwelling which complies with all relevant General Residential Development Standards specified in 4A 4.2 and 4A 5.	
Engineering Design 11.2.2.1 (b)	Compliance with Engineering Standards pertaining to access, street lighting, stormwater, wastewater, water supply, telecommunications and electricity.	Complies The site's engineering design is authorised by RM210328.
Contamination 11.2.2.1(c)	Compliance with Ministry for the Environment Contaminated Land Management Guidelines.	Complies
Esplanade reserves, strips and access strips 11.2.2.1 (d)	An esplanade strip of 20m for lots along the bank of any river whose bed has an average width of 3m or more where the river flows through or adjoins the lot concerned.	N/A – the proposal site is not adjacent to a water body that exceeds 3m in width.
Earthworks 11.2.2.1(e)	Ground Level: the natural ground level may not be altered by more than 1.2m measured vertically Quantity: maximum volume of $50m^3$ (solid measure) per site. Trenching associated with subdivision is exempt from compliance with earthworks requirements.	Complies The proposal does not involve earthworks additional to those authorised by RM210328.
Other Provisions	Financial Contributions	Can comply
General rules	Refer to general rules discussed below.	Complies – see below

Chapter 14 – General Rules

14A Transport	Standard 1 – Road Formation (a) Road classification (b) Engineering Standards (c) Private ways 2 dwellings – 3m legal width, no specific formation width	Complies – The site's access is authorised by RM210328
	Standard 2 – Site Access and Maneuvering Areas (a) Vehicle access No more than two separate crossings for any front site and must not exceed 50% Minimum separation of 1m between crossings (b) Separation distance from intersections (c) Maneuvering area	Complies - The site's access is authorised by RM210328
	Standard 3 - Minimum sight distances at Railway Level Crossings	N/A – there are no railway level crossings.
	Standard 4 – Car and Cycle Parking and End of Trip Facilities	Will comply.
	Standard 5 - Loading and Unloading	N/A – the design requirements for loading and unloading do not apply to residential developments of less than 20 dwellings.
	Standard 6 Development within the State Highway and Railway Corridor Buffer Overlays	N/A – the site is not within the 40m wide State Highway and Railway Corridor Buffer Overlays.
14B Signs		N/A – no signage is proposed.
14C Noise	Maximum 50dBA 7am – 10pm Maximum 40dBA 10pm – 7am	Will Comply
14E Significant Natural, Cultural and		N/A – the subject site is not listed as containing any Significant Natural, Cultural or Archaeological Resources.

Archaeological Resources		
14F Heritage Buildings and Structures		N/A – the subject site does not contain a Heritage Building or Structure.
14G Trees		N/A – no Notable Trees are identified on the site.
14H Natural Hazards		N/A – the site is not within the Wellington Fault Special Study Area.
14I Earthworks	(a) The natural ground level may not be altered by more than 1.2m, measured vertically. (b) Maximum volume $50m^3$	Complies The proposal does not involve earthworks additional to those authorised by RM210328.
14J Temporary Activities		N/A – no temporary activities are proposed.
14K Filming		N/A – no filming is proposed.
14L Renewable Energy Generation		N/A – no renewable energy generation is proposed

3.8 Operative District Plan - Activity Status

Table 5: Operative District Plan - Activity Status

Activity	Rule	Activity Status
Land Use	**GRAA** **4A 4.2.1 Number of Dwellings per Site** (b) Three or more dwellings per site are a restricted discretionary activity. **4A 4.2.2 Site Coverage** (b) Construction or alteration of a building that exceeds 40% site coverage is a restricted discretionary activity:	**Restricted Discretionary Activity** **Restricted Discretionary Activity**

	4A 4.2.6 Permeable Surface (b) Construction or alteration of a building, or new impermeable surfaces, that do not meet the above permitted permeable surface requirements is a restricted discretionary activity. **4A 4.2.7 Outdoor Living Space** (b) Construction or alteration of a building that does not meet the outdoor living space requirements is a restricted discretionary activity. **4A 4.2.12 Stormwater Retention** (b) Construction of a roofed building, excluding accessory buildings or additions to an existing building, that does not meet the rainwater tank requirements is a restricted discretionary activity.	**Restricted Discretionary Activity** **Restricted Discretionary Activity** **Restricted Discretionary Activity**
Subdivision	11.2.4 (i) Any subdivision which is not a Permitted, Controlled or Restricted Discretionary Activity.	**Discretionary Activity**

3.9 Proposed District Plan - Activity Status

Table 6: Proposed District Plan – Activity Status

Activity	Rule	Activity Status
Land Use	The proposed development is a Permitted Activity with regards to all standards of the Plan Change 56 that have immediate legal weight with the exception of number of dwellings, building coverage, outdoor living space and landscape area. The proposal is therefore required to be assessed under the corresponding Operative Plan rules, Rules 4A 4.2.1 (b), 4A 2.2(b), and 4A 4.2.7(b) respectively. While the development doesn't meet the landscape area requirements of Plan Change 56, as there is no corresponding rule under the Operative District Plan, this element of the development is permitted.	**N/A**
Subdivision	**The subdivision rules and standards under the proposed District Plan do not currently have legal effect.**	

3.10 Cancellation of Condition

The cancellation of subdivision condition 69 is assessed as a Discretionary Activity.

3.11 Overall Activity Status

Table 7: Overall Activity Status

Overall	The land use component of the proposal is a Restricted Discretionary Activity and the subdivision is a Discretionary Activity.	**Land Use – Restricted Discretionary Activity** **Subdivision – Discretionary Activity**

3.12 Assessment Criteria

Land Use

The matters of discretion for Rule 4A 4.2.1(b) Number of Dwellings Per Site are as follows:

Discretion is restricted to:

(i) The effects on the amenity of adjoining sites.

(ii) The effects on the amenity of the surrounding residential area, the streetscape and adjoining public space.

(iii) Whether the site is subject to any hazards, including being within any natural hazard overlay area.

(iv) The capacity of the network infrastructure for water supply, wastewater, stormwater and land transport to service the proposed development.

(v) Any positive effects, including positive effects of increasing housing capacity and variety.

(vi) The following mixed use and medium density residential development design elements:

1. *Building height*
2. *Recession planes and setbacks*
3. *Indoor and outdoor living spaces*
4. *Open space and boundary treatments*
5. *Entrances, carparking and garages*
6. *On-site stormwater management*
7. *End / side wall treatment*
8. *Building materials*
9. *Bike parking, storage and service areas*
10. *Privacy and safety*
11. *Landscaping*
12. *Historic character in Petone-Moera*

When considering the matters in (vi), the Council will be principally guided by its Medium Density Design Guide.

The matters of discretion for Rule 4A 4.2.2(b) Site Coverage are as follows:

Discretion is restricted to:

(i) The effects on the amenity of adjoining sites.

(ii) The effects on the amenity of the surrounding residential area, the streetscape and adjoining public space.

Note: For proposals of two or more dwellings on a site, when addressing or assessing potential effects in relation to matters (i) and (ii) above, applicants and the Council can be informed by the relevant outcomes identified in the Medium Density Design Guide.

The matters of discretion for Rule 4A 4.2.6(b) Permeable Surface are as follows:

Discretion is restricted to:

(i) *The effects on the stormwater system.*

(ii) The potential for increased surface ponding and flooding.

iii) The mitigation of additional stormwater runoff through means such as onsite stormwater retention.

(vi) Where the proposal is for two or more dwellings, the following mixed use and medium density residential development design elements:

1. *Building height*
2. *Recession planes and setbacks*
3. *Indoor and outdoor living spaces*
4. *Open space and boundary treatments*
5. *Entrances, carparking and garages*
6. *On-site stormwater management*
7. *End / side wall treatment*
8. *Building materials*
9. *Bike parking, storage and service areas*
10. *Privacy and safety*
11. *Landscaping*
12. *Historic character in Petone-Moera*

When considering the matters in (vi), the Council will be principally guided by its Medium Density Design Guide.

The matters of discretion for Rule 4A 4.2.7(b) Outdoor Living Space are as follows:

(i) The effects on the amenity of adjoining sites, including access to sunlight and open space and the usability, orientation and accessibility of the outdoor living space proposed.

(ii) The proximity of the site to communal or public open space that has the potential to mitigate any lack of private outdoor living space.

(iii) Any positive effects that not meeting the standard has on the retention of existing vegetation or other site features that add to the amenity of the site and surrounding residential area.

(vi) Where the proposal is for two or more dwellings, the following mixed use and medium density residential development design elements:

1. *Building height*
2. *Recession planes and setbacks*
3. *Indoor and outdoor living spaces*
4. *Open space and boundary treatments*
5. *Entrances, carparking and garages*
6. *On-site stormwater management*
7. *End / side wall treatment*
8. *Building materials*
9. *Bike parking, storage and service areas*
10. *Privacy and safety*
11. *Landscaping*
12. *Historic character in Petone-Moera*

When considering the matters in (vi), the Council will be principally guided by its Medium Density Design Guide.

The matters of discretion for Rule 4A 4.2.12(b) Stormwater Retention are as follows:

Discretion is restricted to:

(i) The effects on the stormwater system.

(ii) The potential for increased surface ponding and flooding.

(iii) The mitigation of additional stormwater runoff through other means.

Subdivision

The Operative District Plan identifies the assessment criteria for Discretionary Activity subdivisions as follows:

11.2.4.1 Assessment Criteria for Discretionary Activities

(a) The matters contained in sections 104 and 105, and in Part II of the Act shall apply.

(b) Compliance with the engineering design standards.

(c) The degree of compliance or non-compliance with any relevant Permitted and Controlled Activity Standards and Terms.

(d) Those matters listed in the Assessment Criteria for Controlled Activities.

(e) For the sites identified in Appendix Subdivision 7 and Appendix Subdivision 8, those matters to which Council has restricted its discretion under Rule 11.2.3.1 (c).

(f) For the land identified in Appendix Subdivision 9, where the subdivision does not comply with the maximum Number of Allotments, the effects on the existing roading network

The matters listed in the Assessment Criteria for Controlled Activities are as follows:

Rule 11.2.2.3 Assessment Criteria

The following assessment criteria will be used:

(a) Allotment Design:

- *Allotments to have the appropriate net site area and dimensions to enable activities, buildings or structures to be sited to comply with the specified activity area requirements.*
- *Subdivisions should be designed so as to give areas a strong and positive identity by taking into account characteristics of the area and ensuring that roading patterns, public open space/reserves and community facilities are well integrated.*
- *Account must be taken of the future development potential of adjoining or adjacent land and any potential reverse sensitivity effects on regionally significant network utilities (excluding the National Grid).*
- *The roading pattern must take into account the future development pattern of adjacent land.*
- *Subdivisions should be designed in a manner which recognises and gives due regard to the natural and physical characteristics of the land and adverse effects are avoided, remedied or mitigated.*
- *For the land identified in Appendix Subdivision 9, in addition to the above, subdivisions should be designed to give priority to avoiding where possible the need for indigenous vegetation clearance and earthworks within the identified no-development areas. Where avoidance is not possible the design must demonstrate how the effects will be minimised and remedied.*

  Subdivision shall also be designed to ensure that motor vehicle access to all new allotments is provided from Stratton Street only.

(b) Engineering Design

(i) Access

- *The legal road must be of sufficient width to cater for all functions the road is expected to fulfil, including the safe and efficient movement of all users, provision for parked vehicles, the provision of public utilities, landscaping and public transport facilities.*
- *The carriageway width should allow vehicles to proceed safely at the operating speed intended for that type of road in the network, with acceptable minor delays in the peak period.*
- *The carriageway should be designed to discourage motorists from travelling above the intended speed by reflecting the functions of the road in the network. In particular, the width, the horizontal and vertical alignments and superelevation should not be conducive to excessive speed.*
- *Intersections or junctions should be designed to allow all desired movements to occur safely without undue delay. Projected traffic volumes should be used in designing all intersections or junctions on traffic routes.*
- *Footpaths shall be provided on both sides of roads and shall be designed and located taking into account pedestrian amenity and likely use patterns. Footpaths may be reduced to only one side where:*
  - *there is no development fronting that part or side of the road,*
  - *topography or vegetation precludes provision, or*
  - *vehicle volumes and speeds are low and use of the carriageway is considered to be safe and comfortable for pedestrian use, and*
  - *pedestrian use will not be deterred by the lack of a footpath.*
- *Materials used in the construction of roads must be durable, maintainable, cost effective and compatible with Council's engineering standards.*

- *Allotments must have drive on access, except those in the Suburban Mixed Use and Medium Density Residential Activity Areas, and those Comprehensive Residential Developments in the General Residential Activity Area provided with access to communal parking areas. In cases where it can be shown that it is physically not possible to provide drive on access, alternative arrangement for off-street parking must be provided.*
- *Where appropriate, when designing the roading network, account must be given to the provision of public transport facilities and the provision for safe, convenient and efficient access for cyclists and pedestrians.*

(ii) Service Lanes, Private Ways, Pedestrian Accessways and Walkways
- *Service lanes must be of sufficient width and of appropriate design to cater for vehicular traffic which services the allotments.*
- *All private ways and pedestrian accessways must be of sufficient width and of appropriate design for the use of land they serve.*
- *Walkways must be taken into account the existing topography, link open space network with community facilities and public services.*

(iii) Street Lighting
- *Public lighting to be provided to roads, footpaths, pedestrian accessways and to major pedestrian and bicycle links likely to be used at night to provide safe passage for pedestrians, cyclists and vehicles.*

(iv) Stormwater
- *The stormwater system to provide a level of protection defined in terms of Average Recurrence Interval (ARI) based on the type and intensity of development.*
- *The environment downstream of the proposed subdivision is not degraded by drainage flows or floodwaters.*
- *The roading system retains access to allotments and minimises the occurrence of traffic accidents during and after storm events.*
- *The stormwater system is designed to ensure that the land form of watercourses is stabilised and that erosion is minimised.*
- *Floodways and ponding areas to be restricted to areas where there is no damage to property, and to discharge or contain all gap flow (gap flow being the difference between the pipe flow and the total flow, i.e. the amount flowing on the surface for any given ARI).*
- *Materials used in stormwater systems to be durable, maintainable, cost-effective and compatible with Council's engineering performance standards.*

(v) Wastewater
- *The wastewater system is adequate for the maintenance of public health and the disposal of effluent in an environmentally appropriate manner.*
- *All wastewater systems shall be designed so that they have sufficient capacity for the ultimate design flow.*
- *All wastewater systems shall be designed so that they are self cleansing with the current or expected peak dry weather flow.*
- *Materials used in the wastewater system must be durable, maintainable, cost efficient and compatible with Council's engineering performance standards.*
- *Connection to a community sewerage system where one is available, and has the capacity to accept the additional sewerage load that the occupancy of the subdivision will create; or the installation of a sewerage system and community treatment plant when there is no community sewerage system available and the number of residential allotments and the soil/groundwater conditions indicate that the cumulative effects of the sewerage effluents have the potential to adversely affect public health.*

(vi) Water Supply

- *In urban areas reticulated water supply must be provided to each allotment for domestic, commercial or industrial consumption and provision for fire fighting purposes.*
- *Materials used in the water supply system must be durable, maintainable, cost-effective and compatible with Council's engineering performance standards.*
- *Reservoir storage, pumping and pipe flow capacity shall meet required volume, flow and pressure criteria according to Council's engineering performance standards.*
- *The provision and protection of access for maintenance of components of water supply system.*
- *All water supply mains shall be designed so they have sufficient capacity for the ultimate design flow.*
- *Adequate and suitable water supply shall be provided in the General Rural and Rural Residential Activity Areas.*
- *In all areas, the provision of a reticulated drinking water supply to all residential allotments if it is practicable to do so.*

(vii) Telecommunication and Electricity

- *Electricity supply must be provided to each allotment. The Council may exempt subdivisions or particular allotments from this requirement in appropriate circumstances but may require that provision, such as the registration of easements, be made for the provision of electricity supply in the future. In urban areas where practicable this should be by means of an underground system.*
- *Provision should be made to ensure that telephone connections can be made to each allotment. In urban areas where practicable, such provision should be made by means of an underground system.*

(viii) Earthworks

- *Before any earthworks are carried out a thorough investigation be undertaken to determine the suitability of the land. Particular attention must be given to drainage, slope and foundation stability matters, topography, significant existing natural, cultural and archaeological resources, post construction settlement, shrinkage and expansion of material plus compaction.*
- *Appropriate design and construction methods must be used to control and manage soil erosion, surface runoff and siltation.*
- *For the land identified in Appendix Subdivision 9, in addition to the above, a sediment and erosion control plan must be prepared to manage the potential effects of earthworks on streams and identified wetlands on the site.*

(c) Contamination

Where a site for subdivision has been identified as a potential or confirmed contaminated site the applicant shall undertake an assessment of the site, which shall include:

- *The nature of contamination and the extent to which the occupants of the site, the immediate neighbours, the wider community and the surrounding environment will be exposed to the contaminants.*
- *Any potential long-term or cumulative effects of discharges from the site.*
- *Any remedial action planned or required in relation to the site, and the potential adverse effects of any remedial action on the matters listed in the two matters above, whether at the site or at another location.*
- *Proposed validation to demonstrate that remediation has been carried out to an acceptable standard.*
- *The management of the decontamination risk and any risk due to residual contamination remaining on the site (eg. risks involved are maintenance of underground services, risks associated with earth working and soil disturbance, and compliance with management regimes).*

The site assessment, proposed remediation, validation and future site management shall be to the satisfaction of the Hutt City Council, Wellington Regional Council, and the Medical Officer of Health.

(d) Esplanade Reserves, Strips and Access Strips

Whether provision has been made for esplanade reserves and/or strips along the margins of any water body.

If a reduction in the width or waiver of an esplanade reserve is sought, Council would have regard to the following:

- *The purpose for the creation of the esplanade reserve set out in Section 229 of the Resource Management Act 1991;*
- *Whether the reduction in size or width of an esplanade reserve would adversely effect:*
  - *Natural character, amenity values, and ecological values of the adjacent waterbody;*
  - *Access to an existing or potential future reserve or feature of public significance;*
  - *The public's ability to gain access to and along the edge of the water body; and*
  - *The protection of significant sites, including natural, cultural and archaeological sites.*
- *Whether a waiver or reduction of the width of an esplanade reserve would ensure the security of private property or the safety of people; and*
- *Whether the land is within a natural hazard area or in an identified risk from one or more natural hazards.*

4. Notification Considerations

4.1 Public Notification

The matters to be considered by the consent authority when deciding whether or not to publicly notify an application are set out in Section 95A of the RMA. On 18 October 2017, Section 95A was replaced with a four-step process to determine whether to publicly notify an application for a resource consent. This four step process was altered further by the Resource Management Amendment Act 2020, which took effect with respect to Section 95A on 20 September 2020.

Step 1: Mandatory public notification in certain circumstances (sections 95A(2) and (3)

Determine whether the application meets any of the following criteria –

(a) The applicant has requested that the application be publicly notified;
(b) Public notification is required under Section 95C; or
(c) The application is made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977

The applicant has not requested that the application be publicly notified, nor has the applicant jointly made an application to exchange recreational reserve land. Therefore, public notification is not required under Step 1, and the test for public notification continues at Step 2.

Step 2: If not required by step 1, public notification precluded in certain circumstances (sections 95A(4), (5) and (6)

Determine whether the application meets any of the following criteria –

(a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes public notification:

(b) the application is for a resource consent for 1 or more of the following, but no other, activities:

(i) a controlled activity;
~~(ii)~~ [Repealed by Resource Management Amendment Act 2020]
(iii) a restricted discretionary, discretionary, or non-complying activity, but only if the activity is a boundary activity;
~~(iv)~~ [Repealed by Resource Management Amendment Act 2020]

The application is a for a Discretionary Activity that is not a boundary activity and is not precluded from public notification under the District Plan or any NES. Therefore, the application must be tested for public notification under Step 3.

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

Determine whether the application meets any of the following criteria –

- *the application is for a resource consent for 1 or more activities, and any of those activities is subject to a rule or NES that requires public notification;*
- *the consent authority decides, in accordance with section 95D, that the activity will have or is likely to have adverse effects on the environment that are more than minor.*

The application is for a resource consent that does not require public notification under an NES or any of the rules that consent is required under.

The effects on the environment are less than minor for the reasons set out in Section 5 of this application. Therefore, public notification is not required under Step 3 and the test for public notification continues at Step 4.

- The access, infrastructure servicing and earthworks have been approved in RM210328.
- The residential units will comply with all MDRS requirements except the number of units on a site, building coverage, outdoor living space and landscaping area. These breaches are largely technical in nature, and with respect to building coverage and landscaping area cumulatively meet these standards over the underlying lot.
- The residential units within Block G are less than 8m in height, and the units within Block H have a maximum height of 8.3m (measured from the original ground level) and comply with the MDRS height and height in relation to boundary requirements. While the building coverage for a number of the lots exceeds 50%, the overall coverage of buildings on the site will be 50% for Lot 53 and 46% for Lot 54. The scale and form of the development is anticipated by the MDRS and PC56 and is compatible and integrated with the comprehensive residential development of the parent lot, which was approved in terms of the GRAA. Being a rear site, the setback of the development from the road frontage and wider area will minimise the development's visual impact. Overall, the development is consistent with the intentions of the Medium Density Design Guide guidelines, as discussed in the Urban Design Assessment (Appendix E).
- The application site is a rear site, with much of the development screened from view from Mohaka Street and further afield as a result of the layout of dwellings on the site, their setback from the site's frontage, the screening provided by the parent lot development and the variable topography of the area. As such, the effects of the development the streetscape of Mohaka Street will be less than minor. The proposed development will therefore integrate well into its neighbourhood context, with streetscape and character effects being less than minor.
- Any visual amenity effects (bulk, dominance, shading) of the proposal on the wider environment will be less than minor, given the separation of the proposal from the street and properties not adjacent to the site, compliance with combined site coverage requirements and compliance with height requirements.
- Noise generated by the proposed activity will be restricted to people and vehicle noise. The proposed units will be set back from the street and wider environment, due to the layout of the development. The noise generated by occupants of the dwellings and their vehicles will be of a level anticipated within a residential area.
- While the proposed size and shape of the allotments will be smaller than those in the near vicinity, given that the site is a rear site, the smaller lot sizes will not be overly apparent when viewed from outside the site. The allotments' size and shape are consistent with the design of the proposed units and their associated outdoor living areas. The proposed allotments are therefore appropriate for the intended use. Effects on the streetscape and wider character of Mohaka Street as a result of the proposed lot size and layout are therefore less than minor.
- Each proposed residential allotment will be provided with water, wastewater and stormwater connections approved in RM210328.
- All works and structures (with the exception of a proposed boardwalk and associated permeable fencing approved by GWRC) will be located more than 10m away from the unregistered wetland that extends

into the site. Given this and the location of the northern stormwater drain to the south of the wetland which provides further separation, the proposal will have less than minor effects

- The site does not contain any significant natural, cultural or archaeological features. Regardless, if any historic or cultural items are disinterred during earthworks or construction, the process will be guided by the requirements of Heritage New Zealand.
- Construction effects will be short in duration, limited to the time required to undertake earthworks, install services and construct the units and hard surfacing, and undertake landscaping. Works will undertaken accordance with a Construction and Traffic Management Plan (CMP) required by RM210328 (Condition 4). The CMP will include measures to ensure compliance with the New Zealand standards with respect to construction noise, as well as stipulating hours of work, earthworks controls and traffic management processes. Construction effects will therefore be mitigated to an extent that is less than minor on all persons in the wider area.
- The cancellation of Condition 69 on RM210328 will have negligible effects on the wider environment The dwellings on Lots 23 – 32 will be constructed in accordance with the architectural plans submitted with this application, the effects of which have been assessed above and found to be less than minor.

Step 4: Public notification in special circumstances (section 95A(9))

Determine whether special circumstances exist in relation to the application that warrant the application being publicly notified.

No special circumstances exist in relation to the application that could warrant the application being publicly notified.

Section 95A Conclusion

Having regard to the four steps outlined within Section 95A, public notification of this application is not required.

4.2 Potentially Affected Persons

Section 95B relates to limited notification of consent applications and (in summary) directs that, where notification of an application for resource consent is not required under Section 95A, the consent authority must give limited notification of the application to any affected person. Section 95B is a four-step process to determine whether to limited notify an application for a resource consent. Section 95B was altered further by the Resource Management Amendment Act 2020, which took effect with respect to Section 95B on 20 September 2020.

Step 1: Certain affected groups and affected persons must be notified (Sections 95B (2) and 95B (3))

Determine whether there are any—

(a) affected protected customary rights groups; or
(b) affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity).

Determine—

(a) whether the proposed activity is on or adjacent to, or may affect, land that is the subject of a statutory acknowledgement made in accordance with an Act specified inSchedule 11; and

(b) *whether the person to whom the statutory acknowledgement is made is an affected person undersection 95E.*

Notify the application to each affected group identified under subsection (2) and each affected person identified under subsection (3).

The application does not affect any of the parties outlined within Step 1, nor is it located on, adjacent to, or may affect land that is subject of a statutory acknowledgement. Therefore, limited notification is not required at Step 1, and the test for limited notification continues at Step 2.

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

(a) *the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes limited notification:*
(b) *the application is for a controlled activity (but no other activities) that requires a resource consent under a district plan (other than a subdivision of land).*

The application is not precluded from limited notification under Step 2. Therefore, the test for limited notification continues at Step 3.

Step 3: If not precluded by step 2, certain other affected persons must be notified (Sections 95B (7) and 95B(8))

Step 3: If not precluded by step 2, certain other affected persons must be notified (Sections 95B (7) and 95B(8))

Determine whether, in accordance with section 95E, the following persons are affected persons:

(a) *In the case of a boundary activity, determine in accordance with section 95E whether an owner of an allotment with an infringed boundary is an affected person; and*
(b) *In the case of any other activity determine whether a person is an affected person in accordance with section 95E.*

The application is not for a boundary activity only.

The parties assessed as potentially affected are identified in Figure 5 and discussed below.

Figure 5: Approximate Location of Lots 53 and 54 and Potentially Affected Parties, including sketched location of RM180505 on 99 and 102 Meremere Street

15 Rakaia Grove (located to the south of the application site):

15 Rakaia Grove is located to the south of the application site and accommodates a single storey dwelling located in the southern part of the site and an accessory building, located in the north-western corner of the site (Figure 6). The primary outdoor living area appears to be located to the north of the dwelling. The dwelling is set back approximately 14.5m from its northern boundary.

Figure 6. 15 Rakaia Grove viewed from the application site

15 Rakaia Grove is located to the south of Lot 54's Block H. The Block H units will comply with the height in relation to boundary requirements of the site's southern boundary. The height of Block H is measured from existing ground level as required by the consent notice on Lot 54.

The earthworks associated with the proposal are authorised by RM210328.

As shown in the Sheet RC03 of the Architectural Plans (Appendix C), the proposed southernmost unit of Block H (Unit 32) will be set back further from the boundary with 15 Rakaia Grove than a permitted dwelling would be able to be (Sheet RC14). Overall, the proposal will have a similar (and lesser) bulk to a permitted baseline development of three dwellings constructed on each of Lots 53 and 54.

Accordingly, the visual amenity effects of the development on 15 Rakaia Grove, including bulk, dominance and shading effects will be less than minor.

Unit 32's upper storey windows that will face south will be associated with a bedroom and a bathroom; which are less frequently used rooms during the day and will be set back a compliant distance from the southern boundary. The outdoor areas of Unit 32 will be screened by fencing and landscaping. Acoustic fencing is proposed around the part of the southern boundary of the subject site adjacent to the proposed access roads. This will provide screening of activities within the vehicle and pedestrian areas of the site and adjacent properties to the south, including 15 Rakaia Grove. As such, any privacy, overlooking, acoustic and lightspill effects of the development on 15 Rakaia Grove will be less than minor.

The Urban Design Assessment (Appendix E) notes, in relation to 15 Rakaia Grove:

> *The façade is not overly bulky, and includes modest windows, with modulation and detailing with varied façade colour and pergola form adjacent the central window to provide visual interest. A good set back is provided to the boundary, with a pre-consented boundary treatment and retaining wall with planting provided to visually mitigate perceived bulk due to the raised topography.*

Overall, the effects of the proposal on the residential amenity of 15 Rakaia Grove will be less than minor.

17 Rakaia Grove (located to the south-east of the application site):

17 Rakaia Grove is located to the south-east of the application site and contains a single storey dwelling located in the eastern part of the property and an accessory building located in the north-western part of the property (Figure 7). Outdoor living areas are located to the east and north of the property.

Figure 7 - 17 Rakaia Grove viewed from the application site

The north-western corner of 17 Rakaia Grove will adjoin the south-eastern corner of the subject site. Given this orientation, the proposed eastern blocks of units will be visible from 17 Rakaia. The northern units of the Blocks G and H will be largely obscured from view from this property when the dwellings approved under RM180505 are constructed, noting that preparatory works for the dwelling on approved Lot 22 have commenced.

Blocks G and H comply with the height and height to boundary requirements of the MDRS. The height of Block H is measured from existing ground level as required by the consent notice on Lot 54.

The shading, bulk and dominance effects of the proposal on 17 Rakaia Grove are as anticipated by the MDRS, noting the compliant height, height in relation to boundary and cumulative building coverage, and therefore comparable to those of a permitted baseline development. Accordingly, any adverse visual amenity effects will be less than minor.

The earthworks associated with the proposal are authorised by RM210328.

As shown in the Sheet RC03 of the Architectural Plans (Appendix C), the proposed southernmost unit of Block H (Unit 32) will be set back further from the boundary with 17 Rakaia Grove than a permitted dwelling would be able to be (Sheet RC14).

Unit 32's upper storey windows that will face south will be associated with a bedroom and a bathroom; which are less frequently used rooms during the day and will be set back a compliant distance from the southern boundary. The outdoor areas of Unit 32 will be screened by fencing and landscaping. As such, any privacy, overlooking, acoustic and lightspill effects of the development on 17 Rakaia Grove will be less than minor.

Overall, the effects of the proposal on the residential amenity of 17 Rakaia Grove will be less than minor.

99 and 102 Meremere Street (located to the east of the application site):

A recently issued resource consent (RM180505) approved a subdivision to create nine residential lots, each with a single dwelling. Lots 53 and 54 adjoin four of the approved lots, with the approved dwellings to be constructed close to the eastern boundaries of Lots 53 and 54. The outdoor living spaces for the approved dwellings will be located to the north or west of each dwelling.

The approved dwellings on 99 and 102 Meremere Street will see the rear, eastern elevations of Blocks G and H, which contain a rear entrance door and kitchen window at ground level and a stairwell and bedroom windows at the upper level. The primary living spaces of Blocks G and H are oriented to the west, on the opposite side of each block to the boundary with 99 and 102 Meremere Street. The boundary will be fenced with a 1.8m high close-boarded fence. Any privacy effects on 99 and 102 Meremere Street will be less than minor.

Blocks G and H comply with the cumulative building coverage, height and height to boundary requirements of the MDRS. The bulk and scale of the development is therefore comparable to a permitted baseline under the MDRS. The height of Block H is measured from existing ground level as required by the consent notice on Lot 54. The Decision Report of RM210328 notes that, at the completion of earthworks, the finished ground level of Lots 53 and 54 will be lower than the adjacent site levels at Numbers 99 and 102 Meremere Street, which reduces potential bulk and dominance effects on Numbers 99 and 102 Meremere Street. The bulk and dominance effects of the proposal on 99 and 102 Meremere Street are as anticipated by the MDRS and any adverse effects will be less than minor.

The Urban Design Assessment (Appendix E) notes, in relation to 102 Meremere Street:

> *The bulk of the dwellings along this boundary is relatively non-obtrusive, as the topography of the adjacent site slopes upwards, limiting the impact of bulk, shading and dominance along this boundary.*

The earthworks associated with the proposal are authorised by RM210328.

Overall, the effects of the proposal on 99 and 102 Meremere Street will be less than minor.

All Other Persons and Properties:

All other persons and associated properties will be suitably separated from the application site, with screening provided by properties on adjoining sites and/or topography to render any adverse visual amenity, privacy or shading effects of the proposed development less than minor.

General Effects (on persons associated with the properties listed above and any person):

- Potential adverse effects have been assessed in Section 5 of this report and found to be less than minor. Those conclusions are valid for the s95E assessment.
- The site will be attractively landscaped in accordance with the Landscape Design (Appendix D).
- The Urban Design Assessment (Appendix E) has assessed the proposal and concluded that the design is consistent with the outcomes sought by the Council's Medium Density Design Guide, for both fitting in with the existing neighbourhood character and achieving internal amenity for future occupants of the site.
- The application site is a rear allotment, with the layout of the proposed units into blocks and their distribution around the site limiting the number of units discernible from different vantage points. Hard

and soft landscaping will integrate the development into its surrounding residential context, while softening the appearance of the units and hard surfacing.

- Each adjoining residential property will be located adjacent to a low number of units.
- Lighting will be designed to comply with the lux requirements of the District Plan.
- Dwellings at neighbouring properties are generally well setback from their respective boundaries to the application site, reducing their sensitivity to potential vibration effects. Accordingly potential adverse vibration effects will be less than minor for all persons.
- Construction effects will be managed in accordance with an approved Construction and Traffic Management Plan (CMP), to ensure that noise, vibration, construction traffic, dust and runoff are appropriately controlled within the site to minimise the adverse effects on surrounding properties and the wider area. The site is large enough to contain construction vehicles on site, minimising traffic and access disturbance on Mohaka Street. Erosion, dust and sediment controls have been stipulated in the approved earthworks consent RM210328 to manage the effects of earthworks construction, including the CMP. The construction works will be using the same sorts of equipment than is used for road maintenance, with low levels of resulting vibration. Given this and the temporary nature of construction, effects of vibration on any person will be less than minor. Given the utilisation of best practice construction methodology on-site and the limited duration of construction, the adverse construction effects of the proposal on any person will be less than minor.
- Each of the allotments will be serviced with a parking space and pedestrian access and for water supply, stormwater, wastewater, telecommunications and power, as approved in RM210328. Stormwater attenuation and stormwater treatment systems will be provided within the parent site to minimise the effects of the development on the stormwater network while ensuring water quality. The engineering effects of the proposal on any person will therefore be less than minor.
- The design and layout of the proposed subdivision will align with the layout of the proposed units, their outdoor areas, the access road and pedestrian network, and areas of shared recreation space. The subdivision will not in and of itself generate any further density or residential amenity effects.
- The cancellation of Condition 69 on RM210328 will not impact adjacent properties to a degree greater than assessed above. The dwellings on Lots 23 – 32 will be constructed in accordance with the architectural plans submitted with this application (Appendix C), the effects of which have been assessed above and found to be less than minor.

Step 4: further notification in special circumstances (Section 95 (10))

Determine whether special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined to be eligible for limited notification under this section (excluding persons assessed under section 95E as not being affected persons), and,—

(a) if the answer is yes, notify those persons; and
(b) if the answer is no, do not notify anyone else.

No special circumstances exist in relation to the application that could warrant the application being limited notified.

Section 95B Conclusion

Having regard to the four steps outlined within Section 95B, limited notification of this application is not required.

5. Assessment of Environmental Effects

5.1 Scope

The following section presents an assessment of environmental effects (AEE) in accordance with Schedule Four of the RMA, with regard to the assessment criteria outlined in Section 3.2 above. The AEE is comprised of the following components:

- Permitted Baseline
- Effects on Character and Amenity Values
- Subdivision Design and Layout Effects
- Engineering and Infrastructure
- Traffic Effects
- Earthworks Effects
- Construction Effects
- Natural Hazards
- Effects on Significant Natural, Cultural and Archaeological Sites
- Esplanade Strips and Reserves
- Effects of Cancellation of Condition
- Positive Effects

5.2 Permitted Baseline

The Enabling Housing Supply Act allows up to three dwellings per residentially zoned site as a permitted activity, provided the MDRS requirements are met. The Architectural Plans (Sheets RC14-RC17, Appendix C) show three complying dwellings on each of Lots 53 and 54.

The Urban Design Assessment (Appendix E) notes that:

> *Given the dwellings are only two-storey (when a permitted development under MDRS allows for three-three storey dwellings per site), any negative bulk, dominance, and shading effects along these boundaries is considered acceptable.*

The earthworks, access and infrastructure associated with the proposal are authorised by RM210328.

5.3 Effects on Character and Amenity Values

The applicant is seeking resource consent to construct a total of 10 residential units on Lots 53 and 54, which is four more units than would be permitted by the MDRS. However, the design of the development ensures that the terraced units in two Blocks G and H comply with the MDRS in most respects, noting that the dwellings meet the height, height in relation to boundary and cumulative building coverage requirements. As a result, the effects of the buildings are no greater than those of a permitted development, as shown in the Architectural Plans (Appendix C) and confirmed by the Urban Design Assessment (Appendix E). The Urban Design Assessment concludes that the design is consistent with the outcomes sought by the Council's Medium Density Design Guide,

both for fitting in with the existing neighbourhood character and achieving internal amenity for future occupants of the site.

An assessment of the proposal on specific properties (Section 4.2 above) concludes that, the effects of the proposal (bulk, dominance, shading, privacy and intensity of use) on the amenity of nearby residential properties will be no more than minor.

The medium density of the proposed development, as well as the height and townhouse typology of the units, is new for this part of Wainuiomata but has been approved in RM210328 as a comprehensive residential development for the remainder of the parent site (106 Mohaka Street). The outcomes of the proposal are also anticipated by PC56 and the MDRS. The proposal's high quality urban design ensures suitable levels of amenity are maintained by neighbouring properties and that streetscape and wider character effects are acceptable.

The surrounding area is predominantly residential in character. The RM210328 Decision Report notes that:

> *The application site is located on the periphery of Wainuiomata's urban footprint, and the surrounding residential sites are generally of lower density typologies. However the District Plan provides for residential development in the General Residential Activity Area at more intensive scale than the established typologies in the surrounding area, and it is expected that residential character and amenity values will change over time. Residential bulk and density has been further enabled by the notification of Proposed Plan Change 56 which introduces medium density residential development standards, some of which have taken effect at the time of this decision.*

While most nearby properties contain only a single dwelling, a degree of intensification in the area is emerging, evident by the recent subdivisions at the ends of both Mohaka Street and Meremere Street and RM210328. Lots 53 and 54 are at the rear of 106 Mohaka Street. Therefore, the density and scale of the development will not be fully visible from the street or wider area. Furthermore, while the units will be taller than most other dwellings in the wider area, due to the layout of dwellings on the site, the screening nature of the outer dwellings and the topography of the area, from most vantage points, the full development will not be discernible.

The proposed development has been designed to ensure that future occupants of the units are afforded suitable levels of amenity. Each of the units will have at least the required outdoor living space, accessed directly from the dwellings. The outdoor living spaces have been oriented for optimal receipt of sun, with proposed fencing ensuring privacy between outdoor areas and between the units and properties on adjoining properties. Additionally, a recreation area (Lot 400) that is shared with Lots 53 and 54 is located in the north-western corner of the parent site that will feature a boardwalk, extensive landscaping, picnic tables and bike racks. This will provide supplementary space for residents to enjoy the outdoors. The internal spaces within the units have been efficiently and logically designed, with sufficient space for furniture, joinery and storage. The Urban Design Assessment (Appendix E), discusses the internal amenity of the development in greater detail. Overall, the internal amenity for residents of the development will be acceptable.

The proposed development would result in more than the six dwellings that could arise from a permitted development on the site. However, a permitted development could be constructed with less regard to privacy than shown in the proposal's design. For example, permitted residential units could be built closer to the boundaries with no controls over the size of windows or use of the upstairs areas. This contrasts with the proposal, where the potential privacy effects are managed through the design of the dwellings. These design and layout features include:

- A building layout where each adjoining residential property adjoins a maximum of four proposed units.
- Building typology of blocks of terraced townhouses, which will read as similar to stand-alone dwellings, limiting the perception of a greater number of units.
- The use of the upper storey of the units for bedrooms and bathrooms, as opposed to internal living spaces, which generate greater privacy and overlooking effects.
- Fencing on the external boundaries of the site of a suitable height to screen activities at the ground floor of proposed dwellings and the outdoor living spaces
- Attractive landscaping in accordance with the Landscape Design (Appendix D).

Given these factors, any potential privacy effects associated with the proposal on properties to the south and west, as well as the wider environment are less than minor.

Overall, the effects of the development on character and amenity are less than minor, for the reasons outlined above.

5.4 Subdivision Design and Layout Effects

The development has been designed to make efficient use of a residentially zoned site, providing for the development of 10 residential units with allocated car parking spaces and access roads and a recreation area, shared with the neighbouring development RM210328.

The proposed lots are of a shape and size suitable to provide for their intended uses and provide suitably sized and located outdoor living, access and on-site parking.

While the proposed subdivision results in 10 allotments that do not meet the minimum lot size or shape factor requirements for the General Residential Activity Area, that is a technical breach for a joint land use and subdivision application to be superseded by the provisions of PC56. Each of the lots are of a size suitable to contain a proposed dwelling unit and landscaped outdoor living spaces.

It is further noted that the policy guidance (Policy 11.1.1(b)) states that there should be *'flexibility in lot size, shape and frontage within Commercial, Mixed Use, General Residential and Medium Density Residential Activity Areas to enable diversity of commercial and residential development size and density'.* A subdivision around a multi-unit development is a good example of where this flexibility in lot size and shape should be considered.

Given the above factors, any potential effects associated with the design and layout of the proposed subdivision are considered to be less than minor.

5.5 Engineering and Infrastructure

Each proposed unit and allotment will be serviced with stormwater, wastewater, and water connections, and power and telecommunications will also be provided. The servicing has been approved in RM210328. Stormwater neutrality is achieved across the site, despite the absence of above ground stormwater tanks, and non-compliance with permeable surface requirements. This was assessed and approved (incorporating the dwellings/lots on Lots 53 and 54 in the calculations) under RM210328.

The new allotments will be subject to membership of the Residents' Association and the consent notices on the Records of Title of Lots 53 and 54 will flow on to the new allotments in respect of:

- Refuse storage and collection;
- Lighting management;
- Management of the internal accessway and shared recreation area.

5.6 Traffic Effects

The traffic effects of the proposal have been approved in RM210328.

Access will be by way of the private accessway (Lot 200), which is shared by Lots 53 and 54 in conjunction with the remainder of the development approved by RM210328.

Each new lot/unit will have an allocated car parking space nearby, adjacent to the shared accessway.

5.7 Site Contamination

The site is not identified as being contaminated within the Greater Wellington Regional Council's Selected Land Use Register and the site has accommodated long-standing residential and school uses, with no known HAIL activities having been undertaken on the site. The parent site operated as a school between 1989 and 2012, with the eastern part of the site being used as school fields. The period of time that the site was used for school activities is relatively short, with residential use occurring after that time. Given the uneven nature of the former field area and the variable vegetation in this area, persistent pesticide use on the site is unlikely to have occurred and the site is not likely to be a HAIL site. As such, any potential contamination effects arising from the proposal are less than minor. This assessment is confirmed in the RM210328 Decision Report.

5.8 Construction Effects

The proposal will involve constructing 10 residential units. The associated earthworks and other works have been approved in RM210328. The construction management requirements of RM210328 apply to Lots 53 and 54, including appropriate management of erosion and sediment, dust, noise and vibration. Erosion and sediment control will be in accordance with Greater Wellington Regional Council's Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region.

The works will generate some temporary effects including noise and additional traffic, in addition for potential vibration, dust and sedimentation effects. Construction effects associated with residential development are anticipated within the General Residential Activity Area and PC56 and are a necessary element of development. Construction effects are therefore acceptable.

5.9 Earthworks Effects

The associated earthworks have been approved by RM210328.

The construction management requirements of RM210328 apply to Lots 53 and 54, including compliance with geotechnical recommendations and appropriate management of dust. Erosion and sediment control will be in

accordance with Greater Wellington Regional Council's Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region.

5.10 Natural Hazards

There is no evidence that the subject site is subject to erosion or flooding and the proposed development will not increase the vulnerability of people or their property to such natural hazards. The application site is not located within a natural hazards zone identified in the District Plan or located within a modelled flood hazard area.

RM210328 was informed by a geotechnical assessment by ENGEO that confirmed that, subject to the development proceeding in accordance with the recommendations of the report, the site (including Lots 53 and 54) is suitable for the proposed development.

The design of the dwellings has taken into account the risk of inundation through the proposed site levels and floor levels of the proposed units.

The Decision Report of RM210328 notes:

> *Proposed earthworks within the balance lots 53 and 54 will also enable suitable site levels for future development. The suitability of these floor and site levels have been determined by additional modelling undertaken by the applicant using Wellington Water's Wainuiomata base model. The modelling also demonstrated that any displacement of flood effects beyond the site will be less than minor. The additional modelling and conclusions have been reviewed and supported by Wellington Water. The applicant has supplied a report from a geotechnical engineer supporting that the site is suitable for the proposed development. Conditions of consent will ensure the earthworks are undertaken in accordance with this report and are engineer designed and certified to ensure stability.*

The minimum floor levels for Lots 53 and 54 are set in Condition 39 of RM210328.

The development has been designed for stormwater neutrality to ensure that there is no net increase in peak discharge rates from the site. The earthworks and stormwater systems proposed for the site have been designed to ensure that there will be no increase in stormwater flows to neighbouring sites as a result of the proposal.

Condition 61 of RM210328 requires a consent notice to be registered on the record of title of Lots 53 and 54 to ensure any dwellings built on these lots have foundations designed by a chartered professional structural or geotechnical engineer; and that the design and details of these foundations are submitted as part of any building consent applied for on these lots.

Accordingly, the effects of natural hazards on the future occupants of the site as a result of the design and layout of the development are considered to be less than minor. Additionally, the risk and vulnerability of any other person to natural hazards is not considered to be worsened as a result of the proposal, for the reasons outlined above. Overall, the effects of the development with respect to natural hazards will be less than minor.

5.11 Effects on Significant Natural, Cultural and Archaeological Sites

The subject site is not situated in a Significant Natural, Cultural or Archaeological Resource as identified within the District Plan. The drains in the northern and eastern parts of the site were constructed relatively recently, so are not considered to be of value to Tangata Whenua. As such, any potential effects on significant cultural, natural or archaeological sites arising from the proposal are considered to be less than minor.

5.12 Effects of Cancellation of Condition

The cancellation of Condition 69 on RM210328 will not impact adjacent properties or the wider environment to a degree greater than assessed above under section 4 of this application. The dwellings on Lots 23 – 32 will be constructed in accordance with the architectural plans submitted with this application, the effects of which have been assessed above and found to be less than minor. Condition 69 is therefore redundant.

5.13 Positive Effects

The proposed development will have positive effects in that it will result in an efficient use of a site that is zoned for residential purposes and assists in increasing the City's supply of housing stock during a time of housing pressure, as well as complementing the City's consolidated urban form.

The site can be comprehensively designed to allow for the proposed number of units, while maintaining appropriate levels of amenity both for future occupants of the units as well as owners and occupiers of nearby properties.

The site is located in proximity to public transport, with a bus route that connects with the Wainuiomata shopping centre and the Lower Hutt CBD. Bike racks are provided within the development. Therefore, the location of the development allows for the uptake of more sustainable modes of transport and lessens the reliance on cars. The site is within walking distance of public parks, which provide supplementary recreation opportunities for future residents.

5.14 Conclusion

Overall, on the basis of the above assessment, the actual and potential effects of the proposal are less than minor.

6. Statutory Assessment

The following assessment is provided in accordance with the relevant sections of the Resource Management Act 1991 (RMA).

6.1 Part 2 (Purposes and Principles) – Sections 5, 6, 7 and 8

6.1.1 Section 5 (Purpose and Principles)

The RMA has a single overarching purpose: to promote the sustainable management of natural and physical resources. Sustainable management is defined in section 5 as:

...managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –

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

(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

The proposal is in keeping with the sustainable management purpose of the Resource Management Act in that it will provide for an efficient use of an under-utilised residential site and provide for social wellbeing through the provision of 10 residential units at a time where there is a significant need for additional housing. The proposal will provide for the social and economic wellbeing of future occupants and any adverse environmental effects associated with the development are largely avoided by the design, location and scale of the proposal.

6.1.2 Section 6 (Matters of National Importance)

In achieving the purpose of the RMA, section 6 provides that all persons exercising functions and powers under the RMA, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for a range of matters of national importance.

No other relevant section 6 matters have been identified that require consideration as part of this proposal.

6.1.3 Section 7 (Other Matters)

Section 7 outlines other matters that shall have particular regard to when managing the use, development and protection of natural and physical resources. The following are generally relevant:

(b) the efficient use and development of natural and physical resources;

(c) the maintenance and enhancement of amenity values;

(f) maintenance and enhancement of the quality of the environment;

Particular regard has been given to the above aspects of Section 7 in the assessment set out in **sections 4 and 5** of this report. The proposal is an efficient use of a finite (land) resource, and will maintain the existing amenity values of the site and surrounding area, and will maintain the existing quality of the wider environment.

6.1.4 Section 8 (Principles of the Treaty of Waitangi)

The principles of the Treaty of Waitangi shall be taken into account when managing the use, development, and protection of natural and physical resources.

The application site is not identified as having any particular cultural or historic significance. It is therefore considered that this section of the Act is not applicable to this proposal.

6.2 Section 104(1)

This section of the RMA requires that, when considering an application for resource consent, the consent authority must have regard to a number of factors, as considered follows:

- Section 104(a) of the Act – Potential or Actual Effects;
- National Environmental Standards;
- Other Regulations;
- National Policy Statements;
- Objectives and Policies of the Greater Wellington Regional Policy Statement;
- Objectives and Policies of the City of Lower Hutt Operative District Plan;
- Other Matters.

6.2.1 Section 104(1)(a) – AEE

This section of the RMA requires that regard is given to any actual and potential effects on the environment of allowing the activity.

An assessment of the actual and potential effects of the proposed structure is included in **Section 5** of this report. The adverse effects on the environment will be no more than minor. On the basis of the assessment above, the effects of the proposal will be acceptable.

6.2.2 Section 104(1)(b)(i) – NES's

Section 104(1)(b)(i) of the RMA requires that regard is given to any relevant provisions of a national environmental standard. The following national environmental standards are currently in force through regulations:

- National Environmental Standards for Air Quality
- National Environmental Standard for Sources of Drinking Water
- National Environmental Standards for Telecommunication Facilities
- National Environmental Standards for Electricity Transmission Activities
- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
- National Environmental Standards for Freshwater
- National Environmental Standards for Storing Tyres Outdoors

With respect to the NES Freshwater, consent has been granted by Greater Wellington Regional Council for earthworks, construction related discharge to land, operational stormwater discharge to land, potential

discharge to watercourses, stormwater discharge within 100m of a wetland and structures within a wetland buffer area.

The parent site operated as a school between 1989 and 2012, with the eastern part of the site being used as school fields. As discussed above, the period of time that the site was used for school activities is relatively short, with residential use occurring after that time. Given the uneven nature of the former field area and the variable vegetation in this area, persistent pesticide use on the site is unlikely to have occurred. Accordingly, it is considered more likely that not that a HAIL activity did not take place on the site. This assessment is confirmed in the RM210328 Decision Report. The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health therefore does not apply to the application site.

None of the other national environmental standards are relevant to this proposal.

6.2.3 Section 104(1)(b)(ii) – Other Regulations

Under section 104(1)(a)(ii), consideration must be given to any other relevant regulations.

No other regulations are relevant to this proposal.

6.2.4 Section 104(1)(b)(iii) and (iv) – National Policy Statements

Under section 104(1)(b)(iii), consideration must be given to any relevant provisions of a National Policy Statement (NPS). The following national policy statements are currently in place:

- National Policy Statement for Highly Productive Land
- National Policy Statement on Urban Development (NPS-UD)
- National Policy Statement for Freshwater Management (NPS-FM)
- National Policy Statement for Renewable Electricity Generation
- National Policy Statement on Electricity Transmission
- New Zealand Coastal Policy Statement

The National Policy Statement on Urban Development (NPS:UD) seeks to create well-functioning urban environments through the Resource Management Act planning process. The proposal is consistent with the relevant objectives and policies of the NPS-UD in the following ways:

Objective and Policies	Assessment
Objective 1: New Zealand has well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future. **Policy 1:** Planning decisions contribute to well-functioning urban environments […]	The proposal supports a well-functioning urban system through provision of medium density housing in a townhouse-style typology. This type of development is currently not common-place within Wainuiomata, with stand-alone dwellings making up most of the housing stock within the suburb, but is typical of new developments. The different housing typology provided in the proposed development will generate variety and enhance housing choice within Wainuiomata.

	The development has good accessibility between housing, public transport (with nearby bus stops) and community facilities (being the Wainuiomata shopping centre and education facilities) and jobs (with nearby commercial activities and transport links to the Lower Hutt CBD). The proposal allows for the efficient redevelopment of an existing, underutilised site zoned specifically for residential activities and development.
Objective 2: Planning decisions improve housing affordability by supporting competitive land and development markets. **Policy 2:** Local authorities provide sufficient development capacity to meet expected demand for housing and business land.	The proposal will result in the realisation of development capacity on a currently underutilised parcel of residentially zoned land. The subject site is currently vacant. The site is zoned for residential use, and the proposal will increase housing supply during a time of severe housing shortage.
Objective 4: New Zealand's urban environments, including their amenity values, develop and change over time in response to the diverse and changing needs of people, communities, and future generations. **Policy 6:** Have particular regard to the planned built form anticipated by RMA documents that have given effect to the NPS:UD; recognise that change may alter amenity values but is not in itself, adverse; acknowledge the benefits of well-functioning urban environments; consider realisation of development capacity and effects of climate change.	The proposal is generally consistent with the intent of this Objective and Policy in that it is realising the development capacity of urban land while still maintaining the residential amenity of the area. The site can be sufficiently serviced and has given effect to the potential effects of climate change through compliance with the requirements of the District Plan. Being a multi-unit development, the site has been designed to make efficient use of a residential site while also providing suitable amenity for the occupants of the proposed units, with the proposal aligning with the Medium Density Design Guide. The development has also been designed to minimise effects on nearby properties, through the utilisation of a townhouse typology, separation between building blocks, compliant building heights, and the provision of car parking, and minimising earthworks heights. The outcome will be a well-functioning residential development that ensure efficient delivery of residential dwellings from an underutilised site.
Objective 5: Planning decisions relating to urban environments, and FDSs, take into account the principles of the Treaty of Waitangi (TeTiritio Waitangi) **Policy 9:** Provide opportunities in appropriate circumstances for Maori involvement and operate in accordance with iwi participation legislation.	The subject site is not recognised as having particular significance to iwi.

Objective 6: Local authority decisions on urban development that affect urban environments are: a. integrated with infrastructure planning and funding decisions; and b. strategic over the medium term and long term; and c. responsive, particularly in relation to proposals that would supply significant development capacity. **Policy 6:**When making planning decisions that affect urban environments, decision-makers have regard to: the planned built form anticipated by RMA planning documents that have given effect to theNPS:UD, recognise that urban environments evolve and that change may alter amenity values, are consistent with well-functioning urban environments, contribute to the realisation of development capacity, and account for climate change.	The proposal represents an increase in housing supply within the suburb of Wainuiomata through the establishment of 10 residential units on an under-utilised residential site. The proposal will comply with Council requirements pertaining to stormwater, wastewater, and water. Stormwater attenuation is proposed onsite to minimise effects of the development on the stormwater network. It is expected that appropriate conditions will be imposed on the consent which will require the applicant to install services to the standards of the Council. As detailed above (Objective 1) the proposal is considered to contribute to a well-functioning urban environment. As detailed below (Objective 8) the proposal also accounts for climate change.
Objective 8: New Zealand's urban environments: a. support reductions in greenhouse gas emissions; and b. are resilient to the current and future effects of climate change. **Policy 11:** Do not set minimum car parking standards	The subject site has close links to existing public transportation, with bus stops located nearby on Manutuke Street that provide transport links to the Wainuiomata shopping centre and the Lower Hutt CBD. The development fosters public and active transport with provision of bike racks adjacent to the shared recreation area within the development site. Additionally, one car park is provided per dwelling. Through proximity to public transport and limitations on vehicle parking, the site is supporting a reduction in greenhouse gas emissions and associated benefits for climate change.

None of the other national policy statements are considered relevant to this proposal.

6.2.5 Section 104(1)(b)(v) – Regional Policy Statement

Section 104(1)(b)(v) of the RMA requires that regard is given to any relevant provisions of a regional policy statement or proposed regional policy statement. The Regional Policy Statement for the Wellington Region, including Proposed Change 1, is relevant to this proposal.

The proposal is generally consistent with the objectives and policies of the RPS as it:

- Will not impact on air quality, fresh water, or soils and minerals;
- Will not result in any substantial modifications to the natural landforms, noting the general slope of the topography of the site will be retained;
- Will not adversely affect the potential for rural productivity;

- Will maintain ecosystems on the site, as proposed earthworks will be located in parts of the site that are separated from the wetland and the part of the northern stormwater drain determined by GWRC to be a watercourse, with substantial areas of established vegetation being retained;
- Will not impact on natural hazards or unnecessarily increase risk to people from natural hazards;
- Is not on a site in the coastal environment;
- Erosion, dust and sediment controls will be employed across the earthworks area, and on completion of the various stages, will be progressively stabilised.
- The proposal will allow for intensification within an established urban/residential area;
- The proposal is consistent with the Medium Density Design Guide, with the proposal being distinctly residential in nature, therefore being consistent with the residential character of the area;
- The proposed development is located close to public transport, with links to the Wainuiomata shopping centre and the Lower Hutt CBD.

6.2.6 Section 104(1)(b)(vi) – Plans or Proposed Plans

Under section 104(1)(b)(vi), regard must be given to any relevant provisions of a plan or proposed plan. There is no proposed plan pertaining to the subject site. The following table provides an assessment of the relevant objectives and policies in the operative District Plan.

6.2.6.1 Operative District Plan

Relevant Objectives and Policies of the Operative District Plan

Policy/Objectives	Consistent?	Assessment
General Residential Activity Area		
Objective 4A 2.1 Residential Activities are the dominant activities in the General Residential Activity Area. Any non-residential activities that locate in the General Residential Activity Area are compatible with the low to medium density residential development and high levels of amenity anticipated for the zone.	Yes	The proposed development consists of a residential development.
Objective 4A 2.2 Housing capacity and variety are increased.	Yes	The proposal results in 10 residential units being introduced to the local housing market. The townhouse typology will provide for variety and choice within the market, as the typology is relatively new in Wainuiomata, particularly in the area where the subject site is located.
Objective 4A 2.3 Built development is consistent with the planned low to medium density built environment and is compatible with the	Yes	The proposed development will consist of a multi-unit development which is medium density in scale. While 10 units are proposed, the arrangement of the units across two blocks separated appropriately

amenity levels associated with low to medium density residential development.		from neighbouring properties will ensure that the amenity effects on adjacent properties and the character of the area are acceptable. Amenity for the dwellings on the application site and adjoining properties will be maintained through the design, scale and location of the development on the site.
Objective 4A 2.4 Built development provides high quality on-site amenity for residents as well as high quality residential amenity for adjoining properties and the street.	Yes	The proposed dwellings will have sufficient outdoor amenity areas associated with the respective units. These will consist of open, grassed and landscaped yard areas accessed directly from the units. These spaces will be supplemented by the shared recreation facilities situated in the north-western part of the site (Lot 400). The units will be sufficiently separated from each other, with fenestration designed to ensure privacy will be maintained within the site. Separation and screening provided by boundary fences will ensure that privacy is maintained within the site and by adjoining residential sites.
Objective 4A 2.5 Built development is adequately serviced by network infrastructure or addresses any network infrastructure constraints on the site.	Yes	The proposed dwelling will be served by infrastructure approved in RM210328.
Objective 4A 2.6 Built development is located and designed to manage significant risk from natural hazards.	Yes	RM210328 was informed by a geotechnical assessment by ENGEO that confirmed that, subject to the development proceeding in accordance with the recommendations of the report, the site (including Lots 53 and 54) is suitable for the proposed development. RM210328 requires suitable minimum floor levels and foundation design by a chartered professional structural or geotechnical engineer. Accordingly, the risk of natural hazards will be appropriately managed.
Policy 4A 3.1 Provide for residential activities and those non-residential activities that support the community's social,economicand cultural well-being and manage any adverse effects on residential amenity.	Yes	The proposal will provide 10 additional residential lots and a total of 10 units to the local housing market during a time of housing pressure, thereby providing for the community's social, cultural and economic wellbeing. The effects of the proposal on the surrounding environment will be acceptable as discussed above, largely as a result of the design, scale and location of the proposed development.
Policy 4A 3.2	Yes	The proposal will result in the provision of 10 two-storey units, laid out in townhouse blocks. This is a

Enable a diverse range of housing types and densities		relatively new type of development for Wainuiomata, providing diversity of housing in the suburb and choice within the housing market.
Policy 4A 3.3 Enable the efficient use of larger sites and combined sites by providing for comprehensive residential developments.	Yes	The proposal is compatible and integrates with the approved comprehensive residential development on the parent site.
Policy 4A 3.4 Manage the effects of built development on adjoining sites and the streetscape and minimise visual dominance on adjoining sites by controlling height, bulk and form of development and requiring sufficient setbacks.	Yes	The units comply with the MDRS.
Policy 4A 3.5 Require built development to maintain a reasonable level of privacy and sunlight access for adjoining sites.	Yes	The proposed units will be two storey in height, with the units complying with the 8m height of the GRAA and well within the 11m height limit of the MDRS. The units will comply with MDRS height to boundary requirements. Fences on external boundaries will ensure that neighbouring properties retain privacy and separation from the site. Building blocks are pulled away from the southern boundary, and the difference in topography and orientation between the application site and neighbouring properties to east will ensure that adjoining properties will maintain a reasonable level of sunlight.
Policy 4A 3.6 Require built development to provide useable and accessible outdoor living space to provide for outdoor amenity.	Yes	Each of the units will have the required area of outdoor living space, accessed directly from their internal living spaces. The outdoor living areas will be fenced with fences striking a balance between privacy, receipt of sunlight and ensuring a relationship between dwellings and the street. In addition to these private outdoor living areas, a shared recreation area (Lot 400) is located in the north-western part of the application site, which will provide space for other types of recreational opportunities that the more constrained outdoor living areas will not. Picnic tables and further landscaping of the area will improve this area to the benefit of the amenity of future occupants.

Policy 4A 3.7 Encourage high quality built development to contribute to attractive and safe streets and public open spaces by providing for buildings that address the streets and public open spaces, minimise visual dominance and encourage passive surveillance.	Yes	The application site is a rear site and as such, the units do not address the Mohaka Street carriageway. They instead address the internal access road, with fenestration and front doors facing the internal road frontage. This will allow for passive surveillance of the internal road. The units are all two storey in height and arranged in building blocks that are of a similar scale to large dwellings. They are arranged on the site to provide separation between the development and dwellings on adjoining sites and minimise visual dominance.
Policy 4A 3.8 Require medium density built development and comprehensive residential development to be of a high quality design and to maintain the historic character of Petone-Moera.	Yes	The proposal is not located in Petone or Moera.
Policy 4A 3.9 Require rainwater tanks and a minimum area of permeable surface in order to assist with the management of stormwater runoff created by development.	Yes	While rainwater tanks are not proposed for the units, the proposal is part of the bespoke stormwater management system that has been designed for the site (and approved in RM210328), which will manage the effects of operational stormwater, while minimising the impact of the development on the public stormwater network and protecting the wetland and watercourse on the site.
Policy 4A 3.10 Require comprehensive residential development to be stormwater neutral and encourage comprehensive residential development to contribute to the maintenance or improvement of water quality.	Yes	The proposed development has been designed to be stormwater neutral as approved in RM210328.
Policy 4A 3.11 Discourage medium density residential development in areas of high risk from natural hazards unless the development mitigates the risk from the natural hazard.	Yes	RM210328 was informed by a geotechnical assessment by ENGEO that confirmed that, subject to the development proceeding in accordance with the recommendations of the report, the site (including Lots 53 and 54) is suitable for the proposed development. RM210328 requires suitable minimum floor levels and foundation design by a chartered professional structural or geotechnical engineer. Accordingly, the risk of natural hazards will be appropriately managed.
Policy 4A 3.12	Yes	The proposed units will have floor levels suitable for

Promote new development to have raised floor levels for new development to be above the100 year (ARI) flood extent, where sufficient information is available.		the low risk of flooding.
Subdivision		
Objective 11.1.1 To ensure that land which is subdivided can be used for the proposed use or development. Policies (a) To ensure that allotments in lower density residential areas and rural zones have minimum design standards such as, minimum size, shape and frontage, which are suitable for the proposed use or development. (b) To provide flexibility in lot size, shape and frontage within Commercial, Mixed Use, General Residential and Medium Density Residential Activity Areas to enable diversity of commercial and residential development size and density.	Yes	The proposal will consist of a medium density development, being development accommodating 10 semi-detached townhouse units across building blocks that will be comparable in scale to two storey dwellings. The required frontage width will be met. While the lots are smaller than 400m^2 and will not be able to contain the specified shape factor, the lots are of a size and shape that they will comfortably accommodate the proposed units and outdoor living spaces. The development has been assessed as aligning with the Medium Density Design Guide, thereby ensuring that the subdivision will facilitate a quality medium density development that integrates into the surrounding neighbourhood. This objective and associated policies will be met.
Objective 11.1.2 To ensure that utilities provided to service the subdivision protect the environment and that there are no adverse effects on the health and safety of residents and occupiers. Policies (a) To ensure that utilities provided comply with specified performance standards relating to such matters as access, street lighting, stormwater, water supply, wastewater, gas, telephone, electricity and earthworks. (b) The engineering practices to maintain the ecological values of Speedy's Stream and the onsite wetland from stormwater runoff resulting from the subdivision of the land identified in Appendix Subdivision 7.	Yes	The proposed subdivision will be appropriately serviced by infrastructure, as approved in RM210328.
Objective 11.1.3 To ensure that land subject to natural hazards is subdivided in a manner that the adverse effects are avoided, remedied or mitigated.	Yes	The application site is not within the Wellington Fault Special Study Area. The application site is gently sloping, though appears generally flat, with

Policies (a) Subdivision of land within the Wellington Fault Special Study Area should be managed to ensure that the allotments are of sufficient size and shape so that buildings and structures are not sited within twenty metres of a faultline. (b) Subdivision of land subject to flooding is discouraged as this can lead to greater intensity of use and development and have adverse effects on the environment. Subdivision of land should be managed to ensure that within each allotment there is a suitable building platform so that buildings and associated structures will not be adversely affected by slope instability, including the deposition of debris.		proposed works not adversely affecting or being affected by ground instability. The application site is not within a flooding area on the GWRC maps. RM210328 was informed by a geotechnical assessment by ENGEO that confirmed that, subject to the development proceeding in accordance with the recommendations of the report, the site (including Lots 53 and 54) is suitable for the proposed development. RM210328 requires suitable minimum floor levels and foundation design by a chartered professional structural or geotechnical engineer. The proposal is consistent with this objective and associated policies.
Objective 11.1.4 To ensure that land in the coastal environment, areas adjoining lakes and rivers and other environmentally sensitive areas are protected from inappropriate subdivision. Policy (a) To ensure that land in the coastal environment, areas adjoining rivers and lakes and other environmentally sensitive areas are not subdivided to an extent or manner where amenity values, ecological, social, cultural and recreational conditions are adversely affected.	Yes	The wetland on the parent site has been addressed appropriately through RM210328 and the GWRC consent.
Objective 11.1.5 To ensure that the amenity values and the efficient use of land in General Rural and Rural Residential Activity Areas are maintained by restricting subdivision of lands which could	N/A	The application site is not in a Rural or Rural Residential Activity Area.

lead to greater intensity of use and development for urban related purposes, such as more intense residential development. Policy a. The minimum size of allotments should be large so as to ensure that rural amenity values and an efficient land use pattern are maintained.		
Transport		
Objective 14A 3.1 A safe, efficient, resilient and well-connected transport network that is integrated with land use patterns, meets local, regional and national transport needs, facilitates and enables urban growth and economic development, and provides for all modes of transport. Objective 14A 3.2 Adverse effects from the construction, maintenance and development of the transport network on the adjacent environment are managed. Objective 14A 3.3 Reverse sensitivity effects on the transport network from sensitive activities are managed. Objective 14A 3.4 Adverse effects on the safety and efficiency of the transport network from land use and development that generate high volumes of traffic are managed. Objective 14A 3.5 Adverse effects on the safety and efficiency of the transport network from on-site transport facilities (vehicle access, parking, manoeuvring and loading facilities) are managed. Policy 14A 4.1 Additions and upgrades to the transport network should seek to improve connectivity across all modes and be designed to meet	Yes	Access to the site is via the shared accessway approved in RM210328. Each new allotment will have an interest in the accessway (Lot 200) via an amalgamation clause that currently includes Lots 53 and 54 and can therefore be passed on to the new allotments. Overall, the proposal is consistent with the objectives and policies related to transport.

industry standards that ensure that the safety, efficiency and resilience of the transport network are maintained. Policy 14A 4.2 Land use, subdivision and development should not cause significant adverse effects on the connectivity, accessibility and safety of the transport network, and, where appropriate, should: • seek to improve connectivity within and between communities; and • enable walking, cycling and access to public transport. Policy 14A 4.3 The transport network should be located and designed to avoid, remedy or mitigate adverse effects on the adjacent environment. Policy 14A 4.4 Land use, subdivision or development containing noise sensitive activities should be designed and located to avoid, remedy or mitigate adverse effects which may arise from the transport network. Policy 14A 4.5 Any activity that is a High Trip Generator must be assessed on a case by case basis. Adverse effects of High Trip Generators on the safety and efficiency of the transport network should be managed through the design and location of the land use, subdivision or development. Policy 14A 4.6 Vehicle access, parking, manoeuvring and loading facilities should be designed to standards that ensure they do not compromise the safety and efficiency of the transport network. Policy 14A 4.7		

The transport network, land use, subdivision and development should provide for all transport modes.		
Earthworks		
Objective 14 I 1.1 To ensure that earthworks are designed to maintain the natural features that contribute to the City's landscape. Policy (a) To ensure that earthworks are designed to be sympathetic to the natural topography.	Yes	The earthworks have been approved by RM210328.
Objective 14I 1.2 Amenity, Cultural and Historical Values To ensure earthworks do not affect adversely the visual amenity values, cultural values or historical significance of an area, natural feature or site. Policies (b) That rehabilitation measures be undertaken to mitigate adverse effects of earthworks upon the visual amenity values. (c) To protect any sites with historical significance from inappropriate earthworks. (d) To recognise the importance of cultural and spiritual values to the mana whenua associated with any cultural material that may be disinterred through earthworks and to ensure that these values are protected from inappropriate earthworks.	Yes	The earthworks have been approved by RM210328. The proposal is consistent with this objective and these policies.

6.2.6.2 Plan Change 56

Policy/Objectives	Consistent?	Assessment
4F Medium Density Residential		
Objective 4F 2.1AA A well-functioning urban environment that enables all people and communities to provide for their social, economic, and cultural	Yes	The proposed development provides for well-functioning urban environments, through providing additional housing supply and variety in an existing urbanised area. Although a relatively intensive typology for its location, the proposal is for a high

wellbeing, and for their health and safety, now and into the future. Objective 4F 2.3 The Medium Density Residential Activity Area provides for a variety of housing types and sizes that respond to: i. Housing needs and demand, and ii. The neighbourhood's planned urban built character, including three-storey buildings. Objective 4F 2.3A Recognise that the neighbourhood's planned urban built character is defined through the flexibility of individual developments to take any low to medium density form of up to three storeys. Objective 4F 2.5 Built development is of high quality and provides: i. appropriate on-site amenity for residents, ii. appropriate residential amenity for adjoining sites, and iii. a high level of amenity for the street. Policy 4F 3.2 Enable a variety of housing types with a mix of densities within the Medium Density Residential Activity Area, including three-storey attached and detached dwellings and low-rise apartments. Policy 4F 3.2A Provide for developments not meeting permitted activity status, while encouraging high-quality developments. Policy 4F 3.2B Enable housing to be designed to meet the day-to-day needs of residents. Policy 4F 3.2C		quality development which will suitably provide for amenity outcomes both within the site and the surrounding area. The proposal will result in the provision of 10 two-storey units, laid out in townhouse blocks. This is a relatively new type of development for Wainuiomata, providing diversity of housing in the suburb and choice within the housing market. The proposal is consistent with the outcomes sought by the Council's Medium Density Design Guide, the MDRS and Plan Change 56. The proposed dwellings will have sufficient outdoor amenity areas associated with the respective units. These will consist of open, grassed and landscaped yard areas accessed directly from the units. These spaces will be supplemented by the shared recreation facilities (Lot 400) situated in the north-western part of the site. The proposed dwellings address the street and provide for passive surveillance.

Require built development to provide occupants with adequate opportunities for outdoor living through having useable and accessible on-site private outdoor living space, or through access to appropriate communal or nearby public open space of comparable utility. Policy 4F 3.2D Encourage development to contribute to an attractive setting for occupants and the surrounding area, which can be achieved through: i. landscaped areas that contribute to amenity, ii. adequate outlook areas from habitable rooms, and iii. other means that would adequately mitigate a lack of landscaping or outlook areas. Policy 4F 3.3 Manage the effects of built development on adjoining sites and the street by controlling height, bulk and form of built development. Policy 4F 3.3 Encourage development to achieve attractive and safe streets and public open spaces, including by providing for passive surveillance. Policy 4F 3.10 Require development to be stormwater neutral.		
Objective 4F 2.8 To protect the cultural safety and tikanga associated with activities at marae in the Community Iwi Activity Area. Policy 4F 3.10 Manage development on sites neighbouring marae in the Community Iwi Activity Area to ensure that risks to cultural safety and tikanga from overlooking, visual dominance, and noise are adequately addressed.	Yes	The site is not adjacent to the Community Iwi Activity Area.

6.2.7 Section 104(c) – Other Matters

Section 104(1)(c) of the RMA requires that regard is given to any other matters the consent authority considers necessary to determine the application.

There are no other matters or non-statutory documents of particular relevance to the consideration of this application.

6.2.8 Section 106 of the Act

Under section 106 a Territorial Authority may refuse to grant a subdivision consent if it considers that:

(a) there is a significant risk from natural hazards; or

(b) sufficient provision has not been made for legal and physical access to each allotment to be created by the subdivision.

(1A) For the purpose of subsection (1)(a), an assessment of the risk from natural hazards requires a combined assessment of—

(a) the likelihood of natural hazards occurring (whether individually or in combination); and

(b) the material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and

(c) any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

The property is not known to be at risk from any natural hazards and is not located in a natural hazards zone. The building platforms will be constructed through earthworks approved by RM210328, informed by geotechnical advice. The Decision Report of RM210328 notes:

> *Proposed earthworks within the balance lots 53 and 54 will also enable suitable site levels for future development. The suitability of these floor and site levels have been determined by additional modelling undertaken by the applicant using Wellington Water's Wainuiomata base model. The modelling also demonstrated that any displacement of flood effects beyond the site will be less than minor. The additional modelling and conclusions have been reviewed and supported by Wellington Water. The applicant has supplied a report from a geotechnical engineer supporting that the site is suitable for the proposed development. Conditions of consent will ensure the earthworks are undertaken in accordance with this report and are engineer designed and certified to ensure stability.*

The matters raised under Section 106 have been met and therefore consent can be granted in terms of this Section.

7. Conclusion

Resource consent is sought for a 10 residential units at Lots 53 and 54 of 106 Mohaka Street, Wainuiomata. A fee simple subdivision to create 10 residential allotments, is also proposed.

This application has analysed the proposal in terms of the actual and potential effects on the environment with the conclusion that there are no affected persons and the adverse effects will be less than minor.

The proposal is consistent with the relevant objectives and policies of the Regional Policy Statement for the Wellington Region, the District Plan, as well as Part 2 of the Resource Management Act 1991. Council can therefore grant the consent, subject to the imposition of appropriate conditions. We request that draft conditions be circulated to us prior to the release of the resource consent decision.

Appendix A. Record of Title

Appendix B. Subdivision Scheme Plans

Appendix C. Architectural Plans

Appendix D. Landscaping Plans

Appendix E. Urban Design Assessment

NOTES/AMALGAMATION CONDITIONS:
1. REFER TO HCC STAGE 1 APPROVED SCHEME PLAN (AR & ASSOCIATES P20-156-050 - P20-156-53) FOR APPROVED AMALGAMATION CONDITIONS. EXISTING EASEMENTS, PROPSOED EASEMENTS IN GROSS, PROPOSED MEMORANDUM OF EASEMENTS IN GROSS, AND PROPOSED MEMORANDUM OF EASEMENTS UNLESS NOTED OTHERWISE.
2. THAT LOT 400 HEREON SHALL BE OWNED BY AN INCORPORATED SOCIETY ESTABLISHED FOR THE PURPOSE OF MANAGING LOT 400 HEREON USED BY BY LOTS 1 - 52 HEREON. ALL OWNERS OF LOTS 1- 52 SHALL BECOME MEMBERS OF THE INCORPORATED SOCIETY.
3. THAT LOT 200 HEREON (LEGAL ACCESS) BE HELD AS TO EQUAL UNDIVIDED SHARES BY LOTS 1 - 52 AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.
4. THAT LOT 23 AND LOT 123 HEREON BE HELD IN THE SAME RECORD OF TITLE
5. THAT LOT 24 AND LOT 124 HEREON BE HELD IN THE SAME RECORD OF TITLE
6. THAT LOT 25 AND LOT 125 HEREON BE HELD IN THE SAME RECORD OF TITLE
7. THAT LOT 26 AND LOT 126 HEREON BE HELD IN THE SAME RECORD OF TITLE
8. THAT LOT 27 AND LOT 127 HEREON BE HELD IN THE SAME RECORD OF TITLE
9. THAT LOT 28 AND LOT 128 HEREON BE HELD IN THE SAME RECORD OF TITLE
10. THAT LOT 29 AND LOT 129 HEREON BE HELD IN THE SAME RECORD OF TITLE
11. THAT LOT 30 AND LOT 130 HEREON BE HELD IN THE SAME RECORD OF TITLE
12. THAT LOT 31 AND LOT 131 HEREON BE HELD IN THE SAME RECORD OF TITLE
13. THAT LOT 32 AND LOT 132 HEREON BE HELD IN THE SAME RECORD OF TITLE

LOT 301
DP 502921
CT: 754240

LOT 400

LOT 9
DP 484841
CT: 688430

LOT 2
DP 424343
CT: 538546

LOT 1
DP 424343
CT: 538545

MOHAKA STREET
(LEGAL ROAD)

LOT 9
LOT 8
LOT 7
LOT 6
LOT 5
LOT 4
LOT 3
LOT 2
LOT 1

LOT 108
LOT 109
LOT 10
LOT 11
LOT 12
LOT 13
LOT 14
LOT 15
LOT 16
LOT 17
LOT 18
LOT 19
LOT 20
LOT 21
LOT 22

LOT 107
LOT 106
LOT 105
LOT 103
LOT 102
LOT 101

LOT 110
LOT 111
LOT 112
LOT 113
LOT 114
LOT 115
LOT 116
LOT 117
LOT 118
LOT 123

LOT 300

LOT 43
LOT 44
LOT 45
LOT 46
LOT 47
LOT 48
LOT 49
LOT 50
LOT 51
LOT 52

LOTS 1 - 52, LOTS 101 - 118 & 133 - 152,
LOT 200, LOT 300, & LOT 400 BEING A
SUBDIVISION OF LOT 5 DP 65281
(STAGE 1 CONSENT APPROVED BY HCC)

LOT 104
LOT 142
LOT 143
LOT 141
LOT 144
LOT 140
LOT 145
LOT 139
LOT 146
LOT 138
LOT 147
LOT 137
LOT 148
LOT 136
LOT 149
LOT 135
LOT 150
LOT 134
LOT 151
LOT 152

LOT 42
LOT 41
LOT 40
LOT 39
LOT 38
LOT 37
LOT 36
LOT 35
LOT 34
LOT 33

LOT 200

LOT 124
LOT 125
LOT 126

LOT 53
(STAGE 1)

LOT 23
LOT 24
LOT 25
LOT 26
LOT 27

LOT 127
LOT 128
LOT 129
LOT 130

LOT 54
(STAGE 1)

LOT 28
LOT 29
LOT 30
LOT 31
LOT 32

LOT 131
LOT 132
LOT 133

LOT 300
DP 562261
CT: 996862

LOT 22
DP 562261
CT: 996858

REFER DRAWING J2100166-021

LOT 19
DP 48700
CT: WN19B/805

LOT 20
DP 48700
CT: WN19B/806

LOT 22
DP 48701
CT: WN19B/808

LOT 23
DP 48701
CT: WN19B/809

LOT 24
DP 48701
CT: WN19B/810

LOT 25
DP 48701
CT: WN19B/811

LOT 26
DP 48701
CT: WN19B/812

LOT 27
DP 48701
CT: WN19B/813

LOT 28
DP 48701
CT: WN19B/814

LOT 29
DP 48701
CT: WN19B/815

Issue	Description	Approved	Date
00	FOR CONSENT		19/12/2022

Scale on A3
HORZ 1:500
VERT 1:500
Chainage
Ch to Ch

Drawn: KGM
Designed:
Modelled:
Project: MOHAKA SCHEME

REALTIME SURVEY TUKUTAHI
CONSTRUCTION
LAND DEVELOPMENT
SURVEY

Title
LOTS 23 - 32 BEING A PROPOSED SUBDIVISION OF LOTS 53 AND 54 (STAGE 1 PREVIOUSLY APPROVED BY HCC)
106 MOHAKA STREET,
WAINUIOMATA

Dwg. No. J2100166-20
Client MHV LTD
Issue 00

Date plotted: Mon Dec 19 07:23:54 2022

NOTES/AMALGAMATION CONDITIONS:

1. REFER TO HCC STAGE 1 APPROVED SCHEME PLAN (AR & ASSOCIATES P20-156-050 - P20-156-53) FOR APPROVED AMALGAMATION CONDITIONS. EXISTING EASEMENTS, PROPSOED EASEMENTS IN GROSS, PROPOSED MEMORANDUM OF EASEMENTS IN GROSS, AND PROPOSED MEMORANDUM OF EASEMENTS UNLESS NOTED OTHERWISE.
2. THAT LOT 400 HEREON SHALL BE OWNED BY AN INCORPORATED SOCIETY ESTABLISHED FOR THE PURPOSE OF MANAGING LOT 400 HEREON USED BY BY LOTS 1 - 52 HEREON. ALL OWNERS OF LOTS 1- 52 SHALL BECOME MEMBERS OF THE INCORPORATED SOCIETY.
3. THAT LOT 200 HEREON (LEGAL ACCESS) BE HELD AS TO EQUAL UNDIVIDED SHARES BY LOTS 1 - 52 AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.
4. THAT LOT 23 AND LOT 123 HEREON BE HELD IN THE SAME RECORD OF TITLE
5. THAT LOT 24 AND LOT 124 HEREON BE HELD IN THE SAME RECORD OF TITLE
6. THAT LOT 25 AND LOT 125 HEREON BE HELD IN THE SAME RECORD OF TITLE
7. THAT LOT 26 AND LOT 126 HEREON BE HELD IN THE SAME RECORD OF TITLE
8. THAT LOT 27 AND LOT 127 HEREON BE HELD IN THE SAME RECORD OF TITLE
9. THAT LOT 28 AND LOT 128 HEREON BE HELD IN THE SAME RECORD OF TITLE
10. THAT LOT 29 AND LOT 129 HEREON BE HELD IN THE SAME RECORD OF TITLE
11. THAT LOT 30 AND LOT 130 HEREON BE HELD IN THE SAME RECORD OF TITLE
12. THAT LOT 31 AND LOT 131 HEREON BE HELD IN THE SAME RECORD OF TITLE
13. THAT LOT 32 AND LOT 132 HEREON BE HELD IN THE SAME RECORD OF TITLE

LOT 301 DP 502921 CT: 754240
LOT 400
LOT 9 DP 484841 CT: 688430
LOT 2 DP 424343 CT: 538546
LOT 1 DP 424343 CT: 538545
MOHAKA STREET (LEGAL ROAD)
LOT 19 DP 48700 CT: WN19B/805
LOT 20 DP 48700 CT: WN19B/806
LOT 22 DP 48701 CT: WN19B/808
LOT 23 DP 48701 CT: WN19B/809
LOT 24 DP 48701 CT: WN19B/810
LOT 25 DP 48701 CT: WN19B/811
LOT 26 DP 48701 CT: WN19B/812
LOT 27 DP 48701 CT: WN19B/813
LOT 28 DP 48701 CT: WN19B/814
LOT 29 DP 48701 CT: WN19B/815
LOT 22 DP 562261 CT: 996858
LOT 300 DP 562261 CT: 996862
LOT 200
LOT 300
LOTS 1 - 52, LOTS 101 - 118 & 133 - 152, LOT 200, LOT 300, & LOT 400 BEING A SUBDIVISION OF LOT 5 DP 65281 (STAGE 1 CONSENT APPROVED BY HCC)
LOT 53 (STAGE 1)
LOT 54 (STAGE 1)
REFER DRAWING J2100166-021

Issue	Description	Approved	Date
00	FOR CONSENT		19/12/2022

Scale on A3
HORZ 1:500
VERT 1:500
Chainage
Ch to Ch

Drawn: KGM
Designed:
Modelled:
Project: MOHAKA SCHEME

REALTIME SURVEY TUKUTAHI
CONSTRUCTION LAND DEVELOPMENT SURVEY

Title: LOTS 23 - 32 BEING A PROPOSED SUBDIVISION OF LOTS 53 AND 54 (STAGE 1 PREVIOUSLY APPROVED BY HCC)
106 MOHAKA STREET, WAINUIOMATA

Dwg. No.: J2100166-20
Client: MHV LTD
Issue: 00

Date plotted: Mon Dec 19 07:35:32 2022

PROPOSED MEMORANDUM OF EASEMENTS			
PURPOSE:	SHOWN:	SERVIENT TEN:	DOMINANT TEN:
PARTY WALL	BG	LOT 123 HEREON	LOT 124 HEREON
	BH	LOT 124 HEREON	LOT 123 HEREON
	BI	LOT 124 HEREON	LOT 125 HEREON
	BJ	LOT 125 HEREON	LOT 124 HEREON
	BK	LOT 125 HEREON	LOT 126 HEREON
	BL	LOT 126 HEREON	LOT 125 HEREON
	BM	LOT 126 HEREON	LOT 127 HEREON
	BN	LOT 127 HEREON	LOT 126 HEREON
	BO	LOT 128 HEREON	LOT 129 HEREON
	BP	LOT 129 HEREON	LOT 128 HEREON
	BQ	LOT 129 HEREON	LOT 130 HEREON
	BR	LOT 130 HEREON	LOT 129 HEREON
	BS	LOT 131 HEREON	LOT 132 HEREON
	BT	LOT 132 HEREON	LOT 131 HEREON
	BU	LOT 131 HEREON	LOT 132 HEREON
	BV	LOT 132 HEREON	LOT 131 HEREON

NOTES/AMALGAMATION CONDITIONS:
1. REFER TO HCC STAGE 1 APPROVED SCHEME PLAN (AR & ASSOCIATES P20-156-050 - P20-156-53) FOR APPROVED AMALGAMATION CONDITIONS, EXISTING EASEMENTS, PROPSOED EASEMENTS IN GROSS, PROPOSED MEMORANDUM OF EASEMENTS IN GROSS, AND PROPOSED MEMORANDUM OF EASEMENTS UNLESS NOTED OTHERWISE.
2. THAT LOT 400 HEREON SHALL BE OWNED BY AN INCORPORATED SOCIETY ESTABLISHED FOR THE PURPOSE OF MANAGING LOT 400 HEREON USED BY BY LOTS 1 - 52 HEREON. ALL OWNERS OF LOTS 1- 52 SHALL BECOME MEMBERS OF THE INCORPORATED SOCIETY.
3. THAT LOT 200 HEREON (LEGAL ACCESS) BE HELD AS TO EQUAL UNDIVIDED SHARES BY LOTS 1 - 52 AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.
4. THAT LOT 23 AND LOT 123 HEREON BE HELD IN THE SAME RECORD OF TITLE
5. THAT LOT 24 AND LOT 124 HEREON BE HELD IN THE SAME RECORD OF TITLE
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13. THAT LOT 32 AND LOT 132 HEREON BE HELD IN THE SAME RECORD OF TITLE

issue	Description	Approved	Date
00	FOR CONSENT		19/12/2022

Scale on A3
HORZ 1:200
VERT 1:200
Chainage
Ch to Ch

Drawn: KGM
Designed:
Modelled:
Project: MOHAKA SCHEME

REALTIME SURVEY TUKUTAHI
CONSTRUCTION LAND DEVELOPMENT SURVEY

Title: LOTS 23 - 32 BEING A PROPOSED SUBDIVISION OF LOTS 53 AND 54 (STAGE 1 PREVIOUSLY APPROVED)
106 MOHAKA STREET, WAINUIOMATA

Dwg. No. J2100166-21
Client: MHV LTD
Issue: 00

Date plotted: Mon Dec 19 07:23:45 2022

From: [redacted]
To: Land Development
Subject: FW: 106 Mohaka St
Date: Thursday, February 16, 2023 9:57:02 AM
Attachments: image001.png
image003.png
image004.jpg

Please send to relevant LD engineer.

[redacted]

From: [redacted]<collab@collabcube.co.nz>
Sent: Thursday, 16 February 2023 9:52 am
To: [redacted]@e2environmental.com>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: RE: 106 Mohaka St

Caution: This is an external email. Please take care when clicking links or opening attachments.

Please disregard this email. [redacted] is not engaged on this project.

Kind regards
[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz

From: [redacted]@ecoflow.co.nz>
Sent: Thursday, 16 February 2023 9:33 AM
To: [redacted]@arassociates.co.nz>
Cc: [redacted] <collab@collabcube.co.nz>; [redacted]
[redacted]@e2environmental.com>; [redacted]
[redacted]@wellingtonwater.co.nz>
Subject: 106 Mohaka St

Hi [redacted]

Hope all is ok with you and the recent cyclone event?

Just wanting to bring this project to your attention from a professional engineering solution application. Ecoflow did the design report and provided a PS1 based on a robust pump station using two pumps per tank. This is essential to being able to provide contingency should one pump fail as

we are servicing multiple units. Along with this the system must be operated by an Iota "Onebox" controller in order to meet the Wellington Water specifications.

We have recently supplied 24 (out of 40) Onebox units to 246 Wise Street and Ecoflow have been to site to assist with setup and provide ongoing support. Ecoflow is also supporting the online alarm system until Wellington Water take it over later in the year.

We note that the supply option in the thread below from Aquatec does not include two pumps and does not stipulate the use of Onebox. This leaves no contingency in the pump station should the single pump fail and if support cannot be supplied in a 24hr period then the Residents Association will have to pay for any vacuum truck waste removal. Onebox must be used to be able to talk to the centralised platform that Wellington Water will be operating.

This is all about providing a reliable engineering solution so that the customer will not have any overflows or ongoing costs.

We are fine with missing out on projects but its crucial that a suitable solution has been quoted for to have a true and fair comparison.

106 Mohaka St – Pump Stations

Ngā Mihi | Kind Regards

[redacted] | [redacted]

Head Office, 5 Ride Way, Albany, Auckland
m: [redacted] | f: [redacted]
Website www.ecoflow.co.nz

From: [redacted] <collab@collabcube.co.nz>
Sent: Tuesday, 14 February 2023 3:56 pm
To: [redacted]@ecoflow.co.nz>
Subject: FYI

LPS1, 2 & 3 - (stock tanks)

Aquatec Model S/PSS/2404e0X41 Simplex Pressure Sewer System incorporating:

1 x OGP 1.5kw, 240v, single phase submersible two stage centrifugal pressure sewer grinder pumps, fitted with stainless steel freestanding bases, marine grade lifting ropes and 15m cables. Pump will be plumbed in PN16 flexible pipework to all required non-return valves and 316 S/S isolation valves.

Pumps and pipework will be all mounted inside a 10,000 litre (2200mm diameter x 3100mm deep with 2400mm max invert) fibreglass chamber with a heavy duty class D cast iron cover. All penetrations, including the discharge, inlet, vent and conduits, will be pre-fitted into the chamber for ease of installation onsite and to ensure a reliable seal.

System will be operated by a Smart single pump control panel with all required starting, operation, and protection equipment and remote communication capability via 4G cellular network (Note: Activated SIM card to be supplied by client).
Panel includes an audible and visual alarm which will be activated via a factory preset float level control assembly, a USB port for uploading programs or downloading logged data, a backlit LCD screen for system status and operation information, and battery backup for alarm activation during power failure.
All control equipment will be mounted inside a remote mounted, lockable, weather proof polycarbonate enclosure.

LPS4 - (custom tank)

Aquatec Model S/PSS/2404e0X41 Simplex Pressure Sewer System incorporating:

1 x OGP 1.5kw, 240v, single phase submersible two stage centrifugal pressure sewer grinder pumps, fitted with stainless steel freestanding bases, marine grade lifting ropes and 15m cables. Pump will be plumbed in PN16 flexible pipework to all required non-return valves and 316 S/S isolation valves.

Pumps and pipework will be all mounted inside a 10,000 litre (1880mm diameter x 4000mm deep with 3400mm max invert) fibreglass chamber with a heavy duty class D cast iron cover. All penetrations, including the discharge, inlet, vent and conduits, will be pre-fitted into the chamber for ease of installation onsite and to ensure a reliable seal.

System will be operated by a Smart single pump control panel with all required starting, operation, and protection equipment and remote communication capability via 4G cellular network (Note: Activated SIM card to be supplied by client).
Panel includes an audible and visual alarm which will be activated via a factory preset float level control assembly, a USB port for uploading programs or downloading logged data, a backlit LCD screen for system status and operation information, and battery backup for alarm activation during power failure.
All control equipment will be mounted inside a remote mounted, lockable, weather proof polycarbonate enclosure.

LPS5 - (custom tank)

Aquatec Model D/PSS/2405e0X41 Simplex Pressure Sewer System incorporating:

2 x OGP 1.5kw, 240v, single phase submersible two stage centrifugal pressure sewer grinder pumps, fitted with stainless steel freestanding bases, marine grade lifting ropes and 15m cables. Pump will be plumbed in PN16 flexible pipework to all required non-return valves and 316 S/S isolation valves.

Pumps and pipework will be all mounted inside a 12,500 litre (2200mm diameter x 3500mm deep with 2900mm max invert) fibreglass chamber with a heavy duty class D cast iron cover. All penetrations, including the discharge, inlet, vent and conduits, will be pre-fitted into the chamber for ease of installation onsite and to ensure a reliable seal.

System will be operated by a Smart single pump control panel with all required starting, operation, and

protection equipment and remote communication capability via 4G cellular network (Note: Activated SIM card to be supplied by client).
Panel includes an audible and visual alarm which will be activated via a factory preset float level control assembly, a USB port for uploading programs or downloading logged data, a backlit LCD screen for system status and operation information, and battery backup for alarm activation during power failure.
All control equipment will be mounted inside a remote mounted, lockable, weather proof polycarbonate enclosure

Kind regards

[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz

From: [redacted]
To: [redacted] ssan
Cc: [redacted]
Subject: Ownersh p of detention systems
Date: Monday, April 4, 2022 2:03:46 PM
Attachments: image001.png
image002.png
image003.jpg
image004.png
image005.png
Untitled attachment 00008.png

HI Team

Thanks for your guidance I pushed back to the applicant and required the stormwater from adjoining property (public) and detention separated (private)

They have already laid the 1050mm dia stormwater network – with no RC or engineering approval

They are now asking if they can retain the shared system (effectively as private), with the whole thing being looked after by the residents association in perpetuity

They have commented that:

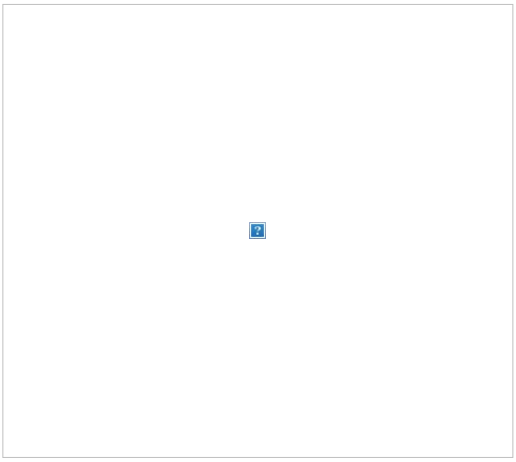
- The capturing of the stream at the eastern boundary of the site is not dissimilar to the capture of overland flow from other council owned areas on at least two of our other jobs which also employ in line attenuation
- The use of inline attenuation has little or no maintenance burden beyond what could be expected from any other pipe network within the region
- Given that the provision of a tank to attenuate this flow is not required from an engineering perspective The Developer is happy that the maintenance of the pipe network as installed remains the responsibility of the residents and owners association in perpetuity
- This should in principal resolve any issue which may require the addition of tanks or further piping to the site to attenuate the public flow from Meremere St

I m presuming that the question of if this is suitable or not relates to :

- Risk to neighbouring properties if maintenance does not occur
- Ability of Council to transfer responsibility and risk

As it is the system starts with an intake MH in a neighbouring property – which I under stand they do not yet have consent to undertake Maintenance will need to be undertaken regularly at the intake and checking orifice in piped detention system

At this point I am presuming that the intention is to access the intake from within the site – my intention is to condition along this line Network proposed to be 525 dia (initially) and approx 2-3 5m deep between Lots 27 & 28 Easement requirement for public network is min 3m wide or outside diameter of the pipe plus 2 times depth to invert, whichever is greater This would equate to 4 6m- 7 6m Proposal sees something between 2 5-3m depending on how drawings interpreted Access track to an intake should be min 4m wide – with room to work etc at the end Seems a wider easement is doable as can move block H further south



Think it would be good if we can discuss this further I m try book a team s meeting Wednesday

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www huttcity govt nz

From: [redacted] @wellingtonwater co nz>
Sent: Friday, 25 March 2022 4 09 pm
To: [redacted] @huttcity govt nz>
Cc: [redacted] @wellingtonwater co nz>; [redacted] @wellingtonwater co nz>
Subject: [EXTERNAL] RE: Ownership of detention systems

Hi [redacted]

I am planning to respond in more detail, but want to check I am consistent with other recent decisions – so I ve asked [redacted] to comment In the interim I m happy to give my 2c worth:

My thinking is that the piped stream should be public, but the rest of the stormwater should be private (as otherwise it s too confusing)

My understanding is that where detention systems have a wider benefit (ie are sized to accept wider catchment flows) and are accepted in public roadways, then public ownership is also accepted

Kind Regards,
[redacted]

From: [redacted] @huttcity govt nz>
Sent: Wednesday, 23 March 2022 5 07 pm
To: [redacted] @wellingtonwater co nz>; [redacted] @wellingtonwater co nz>
Subject: Ownership of detention systems

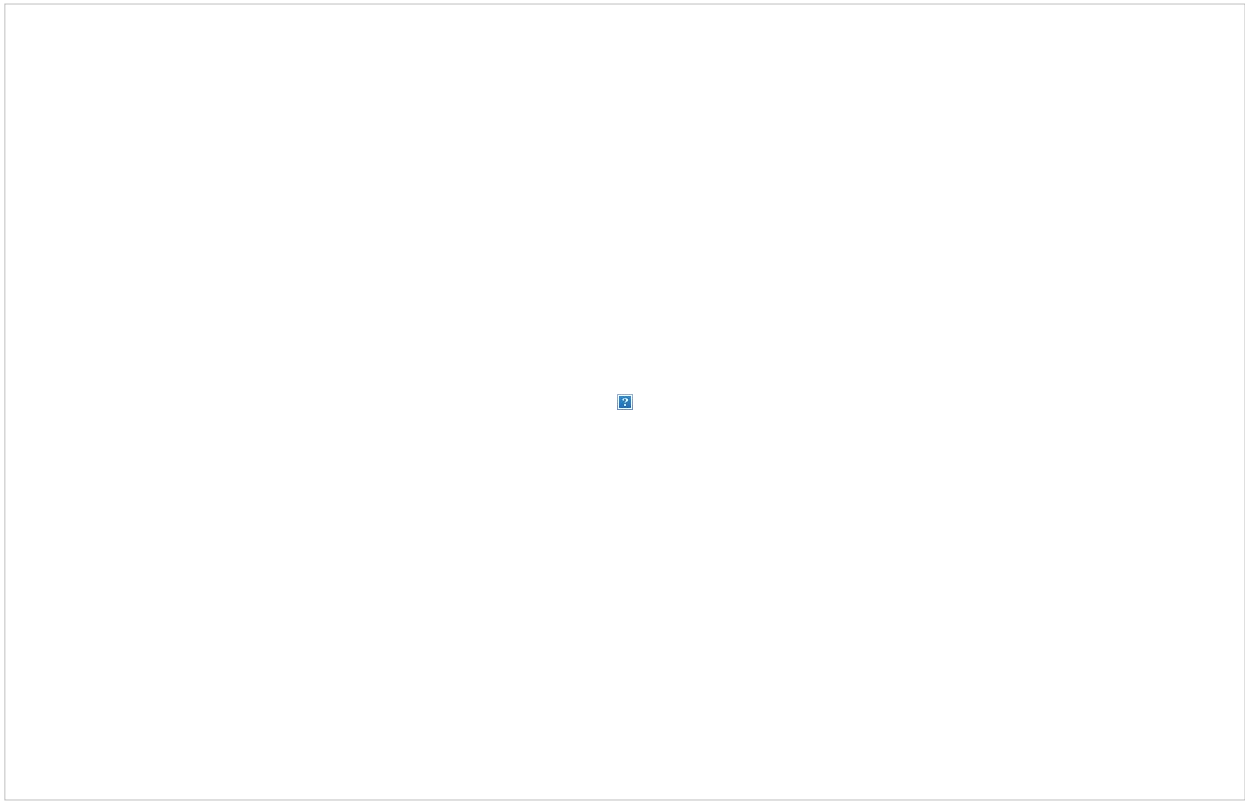
H [redacted] &[redacted]

Can you plesse provide some guidance regarding ownership of detention systems

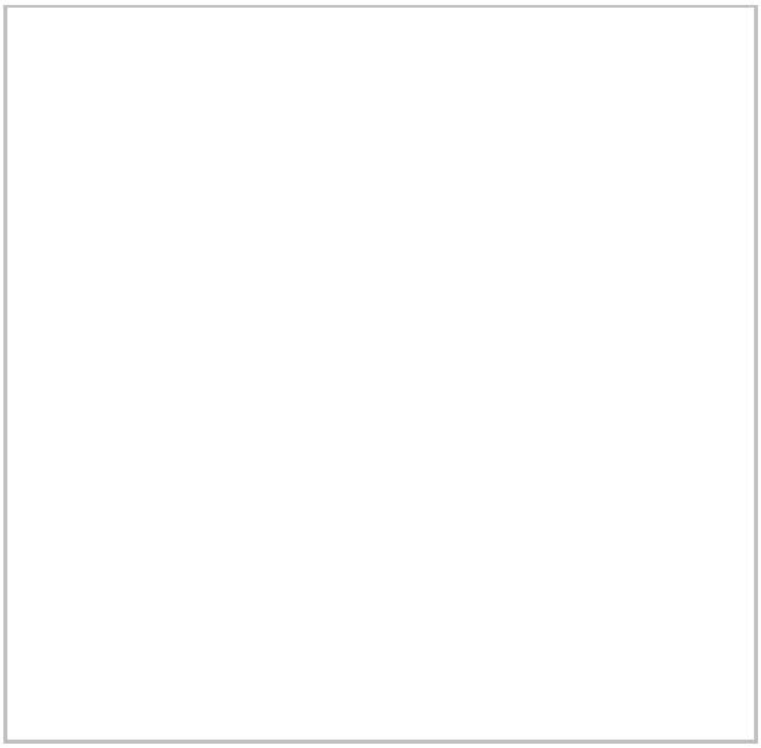
My understanding was that in the past WWL did not want to take ownership of stormwater detention systems within developments, unless you were talking about a pond on land vested to council

I have a development at 106 Mohaka St that is proposing a combined stormwater network / detention system to be vested to Council Roading within development is to remain private

The site has flows from an adjoining site that were within a open channel around the site They now propose to fill most of the open channel and pipe through the development, which would normally be seen as public network – they have GWRC approval in principal
They now also want to oversize the piping of the channel flows and other sections of network within the site collecting roof water, to create a detention system For these multi units developments Council normally seldom takes ownership of the networks within the site – leaving this to residents associations

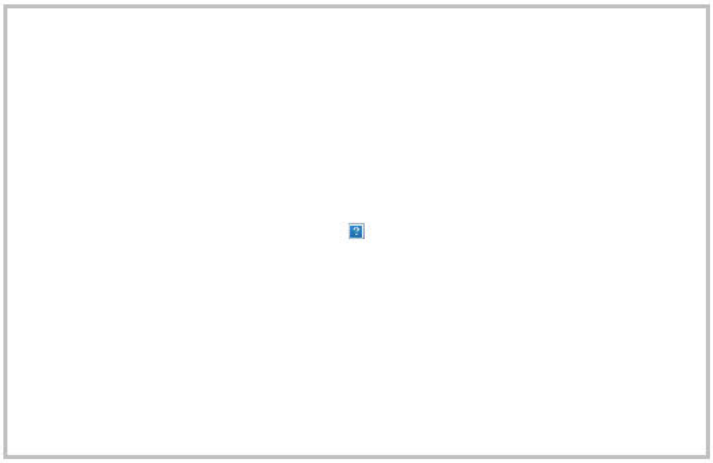


The RSWS though now seems to offer that WWL/Council will take on oversized piped detention systems



Can you please advise if I push back to the applicant for a separate public system for the flows through the site from Meremere and a private stormwater network & detention system

Seems to me they could do both by keeping sections highlighted below as private and oversized



Cheers

[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]
To: [redacted]
Cc: [redacted]
Subject: RE: [EXTERNAL] 106 Mohaka Street - initial RFI response
Date: Monday, May 2, 2022 1:49:03 PM

HI [redacted]

To be completely honest I haven't had a chance yet to go through in detail. My log in to HCC expired over the weekend, so I have lost half a day while this was getting resolved.

My particular concern relates to the WUSD design with surface water spilling and ponding around the roads. I want an understand extent areas of ponding, of what happens during larger events, how this fits with overland flows from outside the site.

I'm still waiting GWRC feedback on fish passage and consents - these don't seem to be engineering roadblocks (at this point) I'm thinking more about being able to suitably condition.

I have provided feedback regarding easements/access way to intake, so presume you will provide feedback on that in regard to achieving.

Depending on how much time I can make before tomorrows meeting I thought we will just work through the RFI & responses and confirm what is unresolved or needs anything more.

Cheers
[redacted]

[redacted]

Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040

P: M: W: www huttcity.govt nzIMPORTANT: The information contained in this e-mail message may be legally privileged or confidential. The information is intended only for the recipient named in the e-mail message. If the reader of this e-mail message is not the intended recipient, you are notified that any use, copying or distribution of this e-mail message is prohibited. If you have received this e-mail message in error, please notify the sender immediately. Thank you

-----Original Message-----
From: [redacted]@aprotean.co nz>
Sent: Monday, 2 May 2022 1:06 pm
To: [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co nz>; [redacted]@belgraviacapital.co nz>; [redacted]@huttcity.govt.nz>; [redacted]@arassociates.co nz>; [redacted]@arassociates.co.nz>; [redacted]

[redacted]@e2environmental.com>
Subject: Re: [EXTERNAL] 106 Mohaka Street

Hi [redacted]

Based on the responses we submitted last week. Can you please advise what issues are still outstanding and will likely require discussion at tomorrow's meeting to ensure we come prepared ready to discuss the relevant items.

Regards

[redacted]

Sent from my iPhone

> On 2/05/2022, at 11:38 AM, [redacted]@huttcity.govt nz>
> wrote:
>
> 2pm tomorrow should be fine - are you going to resend an invite??
> [redacted]
>
> Senior Engineer
>
>
> Hutt City Council, 30 Laings Road, Lower Hutt 5040
>
> P: M: W: www huttcity.govt nzIMPORTANT: The information contained in
> this e-mail message may be legally privileged or confidential. The
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> message. If the reader of this e-mail message is not the intended
> recipient, you are notified that any use, copying or distribution of this
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> error, please notify the sender immediately. Thank you
> -----Original Message-----
> From: [redacted]@aprotean.co nz>
> Sent: Monday, 2 May 2022 10:48 am
> To: [redacted]@huttcity.govt.nz>; [redacted]
> [redacted]@belgraviacapital.co nz>
> Cc: [redacted]@huttcity.govt nz>; [redacted]
> [redacted]@arassociates.co nz>; [redacted]@aprotean.co.nz>;
> [redacted]@arassociates.co.nz>
> Subject: RE: [EXTERNAL] 106 Mohaka Street
>
> Thanks [redacted]
>
> Can we move to 2pm?
>
> Kind regards
>
> [redacted]
> [redacted]
> L1 193-195 Main Road, Tawa, 5028
> M: 027 404 7468 E: [redacted]@aprotean.co nz
>
> -----Original Message-----
> From: [redacted]@huttcity.govt nz>
> Sent: Monday, 2 May 2022 9:08 am

> To: [redacted]@belgraviacapital.co nz>
> Cc: [redacted]@huttcity.govt nz>; [redacted]
> [redacted]@aprotean.co nz>; [redacted]@arassociates.co nz>;
> [redacted]@aprotean.co.nz>; [redacted]
> [redacted]@arassociates.co.nz>
> Subject: Re: [EXTERNAL] 106 Mohaka Street
>
> Hi [redacted]
>
> Sorry my external advisor won't be able to attend a meeting today. Have
> proposed same time tomorrow instead.
>
> Cheers
> [redacted]
>
> Get Outlook for iOS<https://aka ms/o0ukef>
> _____ [redacted]
>
> Senior Engineer
>
>
> Hutt City Council, 30 Laings Road, Lower Hutt 5040
>
> P: M: W: www huttcity.govt nzIMPORTANT: The information contained in
> this e-mail message may be legally privileged or confidential. The
> information is intended only for the recipient named in the e-mail
> message. If the reader of this e-mail message is not the intended
> recipient, you are notified that any use, copying or distribution of this
> e-mail message is prohibited. If you have received this e-mail message in
> error, please notify the sender immediately. Thank youFrom: [redacted]
> Sent: Thursday, April 28, 2022 4:01:00 PM
> To: [redacted]@belgraviacapital.co nz>
> Cc: [redacted]@huttcity.govt nz>; [redacted]
> [redacted]@aprotean.co nz>; [redacted]@arassociates.co nz>;
> [redacted]@aprotean.co.nz>; [redacted]
> [redacted]@arassociates.co.nz>
> Subject: RE: [EXTERNAL] 106 Mohaka Street
>
>
> Hi [redacted]
>
>
>
> I have just met with WWL to discuss the requirement for the easement and
> access between units 27 and 28. Under the RSWS the expectation could be
> up to 7.6m based on pipe size and depth.
>
>
>
> It has instead been agreed that a dispensation will be granted allowing
> for the easement to be 5m boundary to boundary. The area between will is
> to be designed as an access track to the proposed intake in Mememere St.
> Currently the proposed easement/access is less than 3m. It looks though
> that Bock H could shuffle south to achieve this requirement. There will be
> a consent notice on units 27 & 28 requiring that their foundation are
> designed to meet WWL's RSWS for building alongside public network.
> Appropriate gating will be required at the end of the accessway to allow

> for equipment to clean out the intake as required, and meet SID & H&S
> expectations. Gate will be expected to be locked with a WWL padlock.
>
>
>
> Cheers
>
> [redacted]
>
>
>
> From: [redacted]@belgraviacapital.co.nz>
> Sent: Thursday, 28 April 2022 2:36 pm
> To: [redacted]@huttcity.govt.nz>
> Cc: [redacted]@huttcity.govt nz>; [redacted]
> [redacted]@huttcity.govt.nz>; [redacted]
> [redacted]@aprotean.co nz>; [redacted]@arassociates.co nz>;
> [redacted]@aprotean.co.nz>; [redacted]
> [redacted]@arassociates.co.nz>
> Subject: RE: [EXTERNAL] 106 Mohaka Street
>
>
>
> Hi [redacted]
>
>
>
> Many thanks for your update.
>
>
>
> The area of your feed back that most concerns me is re the surface water.
> I have copied [redacted] and [redacted] who have developed this. Clearly keen to
> resolve this matter.
>
>
>
> Anything further we can do please let me know.
>
>
>
> Kind Regards
>
>
>
> On 28/04/2022 13:59 [redacted]
> [redacted]@huttcity.govt.nz<mailto:[redacted]@huttcity.govt nz>>
> wrote:
>
>
>
>
>
> HI [redacted]
>
>
>

> Just a quick update. Your engineers have sent through RFI responses and
> new docs.
>
>
>
> I have stared to go through but wont be able to go into depth until next
> week (don't work for HCC on a Friday).
>
>
>
> I have forward to externals who had provided feedback for some aspects -
> for them to review and comment on their items.
>
>
>
> I have also chased up GWRC and WWL regarding their aspects - fish passage
> & min easements .
>
>
>
> From my prelim review, I am still very concerned with the idea of all of
> the surface water spilling and ponding around the roads as part if the
> WSUD design. This is an aspect that has been highlighted as a concern
> even before my involvement. I will try and better understand the approach
> (re-review the infrastructure report) and look to liaise directly with the
> engineer.
>
>
>
> This is possibly the one item that would most affect services layout as if
> not accepted a supplementary stormwater system may be required. Easement
> width requirements from the Meremere intake drain may see units needing to
> move.
>
>
>
> Cheers
>
> [redacted]
>
>
>
>
>
>
>
>
>
> [redacted]
> Senior Engineer
>
> Hutt City Council, 30 Laings Road, Lower Hutt 5040
> P: M: W: www huttcity.govt nz
>
> [cid:image001.png@01D85B19.26F5C2A0]
>
>
>

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> immediately. Thank you
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>
> From: [redacted]
> [redacted]@belgraviacapital.co nz<mailto[redacted]@belgraviacapital.co nz>>
> Sent: Thursday, 28 April 2022 9:10 am
> To: [redacted]
> <[redacted]@huttcity.govt.nz<mailto:[redacted]@huttcity.govt.nz>>
> Subject: RE: [EXTERNAL] 106 Mohaka Street
>
>
>
> Many Thanks [redacted] Look forward to talking
>
> On 28/04/2022 09:08 [redacted]
> [redacted]@huttcity.govt.nz<mailto[redacted]@huttcity.govt nz>>
> wrote:
>
>
>
>
>
> HI [redacted]
>
>
>
> I had time booked later this morning to return your call. I fully
> understand your concerns and understand the difficulties around keeping
> contractors available. I'm having issues in my role on the side of the
> fence even getting prices from contractors for work starting end of year /
> 2023.
>
>
>
> I would like to hold off providing comment on what works could proceed
> until I have received the information back from your engineers in response
> to the issues raised.
>
>
>
> Cheers
>
> [redacted]
>
>
>

> [redacted]
> Senior Engineer
>
> Hutt City Council, 30 Laings Road, Lower Hutt 5040
> P: M: W: www huttcity.govt nz
>
> [cid:image001.png@01D85B19.26F5C2A0]
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>
> From: [redacted]
> [redacted]@belgraviacapital.co nz<mailto:[redacted]@belgraviacapital.co nz>>
> Sent: Thursday, 28 April 2022 9:01 am
> To: [redacted]
> <[redacted]@huttcity.govt.nz<mailto:[redacted]@huttcity.govt.nz>>;
> [redacted]
> [redacted]@huttcity.govt.nz<mailto:[redacted]@huttcity.govt nz>>
> Cc: [redacted]
> <[redacted]@huttcity.govt.nz<mailto:[redacted]@huttcity.govt nz>>
> Subject: [EXTERNAL] 106 Mohaka Street
>
>
>
> Hi [redacted]
>
> I have spoken to [redacted] about this. However I was keen to reach out to you
> Sheryl as well as somebody who is on both sides of the consenting process
> and the person reviewing the engineering. Further whilst I have been
> involved in property development I have not been near the Engineering part
> of the process before.
>
>
>
> I am keen to understand how the process works from here or if we can work
> with the HCC to be able to progress the project at 106 Mohaka Street.
>
>
>
> The team onsite have just come to the end of the work they have at this
> point until they have the GWRC consent and or they have approval on the

> engineer set of plans. I am paying for them to stay on site as I cant
> afford for this project to stop .
>
>
>
> Further I am told that to get a winter earthworks consent we require the
> GWRC consent issued. Without this it could delay the project until
> October.
>
>
>
> I realise our engineers are just getting back the questions you had for us
> today and that the answers have to be acceptable.
>
>
>
> The question I have is:
>
> 1. Are you able to signoff the stormwater for the GWRC so we can get there
> consent?
>
> 2. IF the Engineering plan set is acceptable the HCC would sign off and
> allow us to progress the civil works?
>
>
>
> I appreciate the Resource Consent may not be complete and I take risk
> about what housing can go on the site however I can accept this risk.
>
>
>
> Sorry about the wordy email however I have invested heavily in this
> project and I have a lot to lose.
>
>
>
> I am happy to meet to discuss if this is helpful.
>
>
>
> Kind Regards
>
> [redacted]
>
> Belgravia Capital Limited
>
> [redacted]@belgraviacapital.co.nz<mailto[redacted]@belgraviacapital.co.nz>
>
> [redacted]
>
>
>
> [redacted]
>
> Belgravia Capital Limited
>
> [redacted]@belgraviacapital.co.nz<mailto:[redacted]@belgraviacapital.co.nz>

>
> [redacted]
>
>
>
> [redacted]
>
> Belgravia Capital Limited
>
> [redacted] @belgraviacapital.co.nz<mailto[redacted]@belgraviacapital.co.nz>
>
> [redacted]
>

From: [redacted]
To: [redacted]
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment
Attachments: image001.jpg
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image005.jpg
image007.jpg
image008.jpg
image010.png
image012.png
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image030.jpg
image031.jpg
image032.jpg

Hi [redacted]
As discussed the change will not impact an outlet with an above ground tank but will impact on the aquapod systems.

In the worst case (if the peak of the Meremere catchment and the attenuated house drainage coincide) the aquapod systems will have a restricted outflow. The volume of stormwater detained will not be decreased (the aquapod systems will still fill up) however at some point there may be a spill from the stream.

As I understand it the overflows are located so that water would spill down the driveway (ie would not flood a building) which in a 100 year event would be acceptable.

What you could do is ask the design team to provide the tail water level vs time boundary condition for the Meremere Channel at the point of the outflow. This would give you an idea of how long the increased water level was likely to be experienced – hours / minutes.

You could condition a stormwater / detention tank design that minimises effect on the Meremere channel demonstrating less than minor effect on any existing stormwater outfall.

Cheers

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team

m [redacted]
e2Environmental Ltd
181 High St, Blenheim
PO Box 380, Blenheim 7201
www.e2Environmental.com

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday 17 May 2022 2 57 PM
To: [redacted]@e2environmental.com>
Subject: FW [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hey [redacted]

Given we are talking about a 1 in 100 year event – when most people will have issues with their stormwater discharge do you think this is a big issue?

If they tweak their detention design – which they need to anyway to take into account landscaping (paving etc) do you this they could improve on current flooding levels?

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Tuesday 17 May 2022 2 24 pm
To: [redacted]@huttcity.govt.nz>
Cc: [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora [redacted]

Thanks for your email. I think it would be reasonable to ask the 106 Mohaka folk to confirm their modelled water levels do not have an adverse impact of the SW drainage system of the Meremere development. I m not sure how the network and outlets for the Meremere development were designed but a specific downstream condition may have been assumed/applied. If it is different to the currently modelled post

106 Mohaka development levels then an assessment of the future performance of the outlets may be needed.

I do need to caveat the comments above by saying I m not a drainage engineer and I m not entirely up to speed on subdivision development rules so feel free to discard my comments if you don t think they apply.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

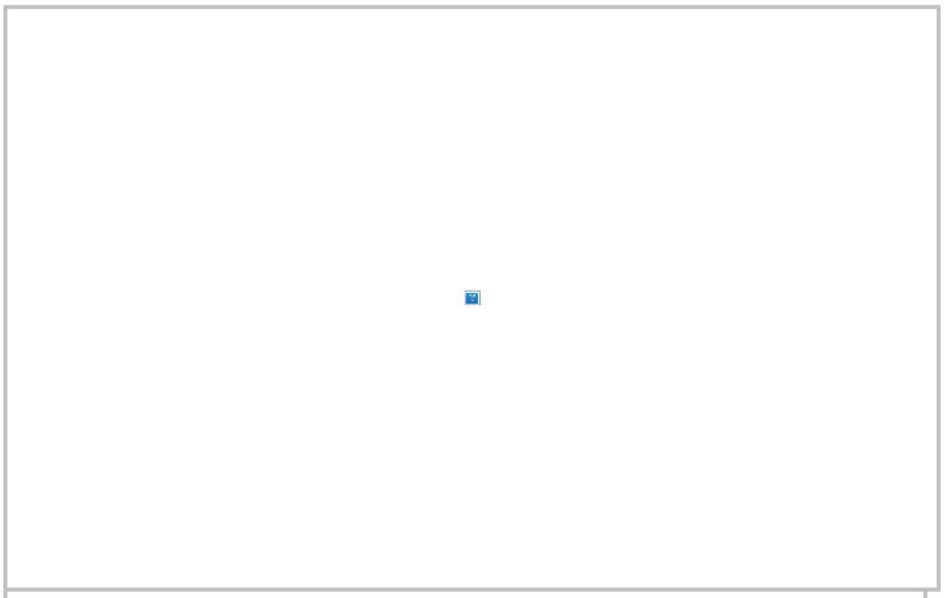
Tel 04 912 4400 Mob[redacted]

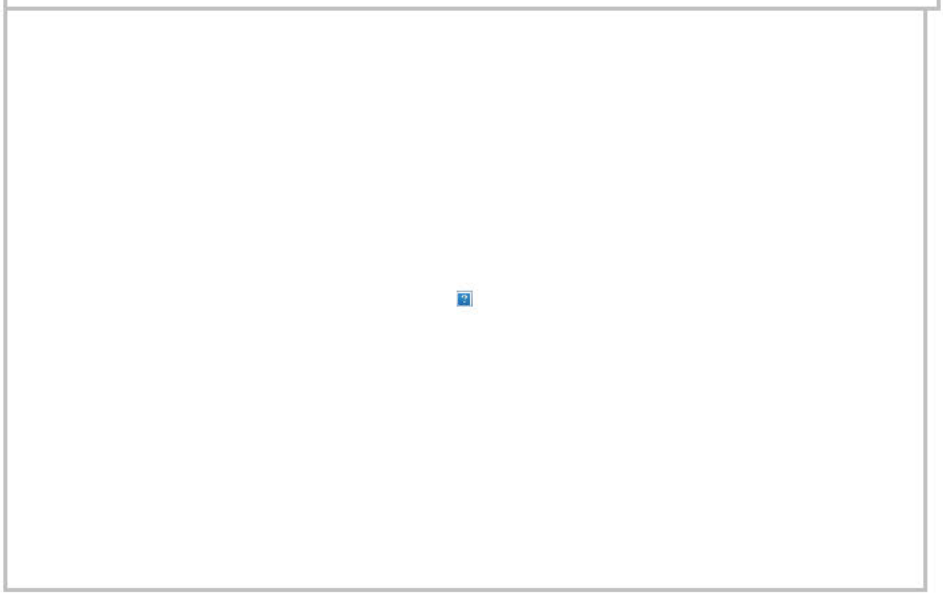
Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday 17 May 2022 2 00 pm
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@e2environmental.com>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi[redacted]

Thanks for all your efforts – just one bit I am concerned with I sthe back up within the Meremere St channel.





Looks like water level increases about 200mm – from an average of 106.1 to 106.3.

Looking at outfalls of the adjoining lots in Meremere – which were supposed to be at 100 year level (or as close as possible) – the additional 200mm would flood 2 of the outfalls (already constructed).

Should we be worried out these??

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www huttcity govt nz

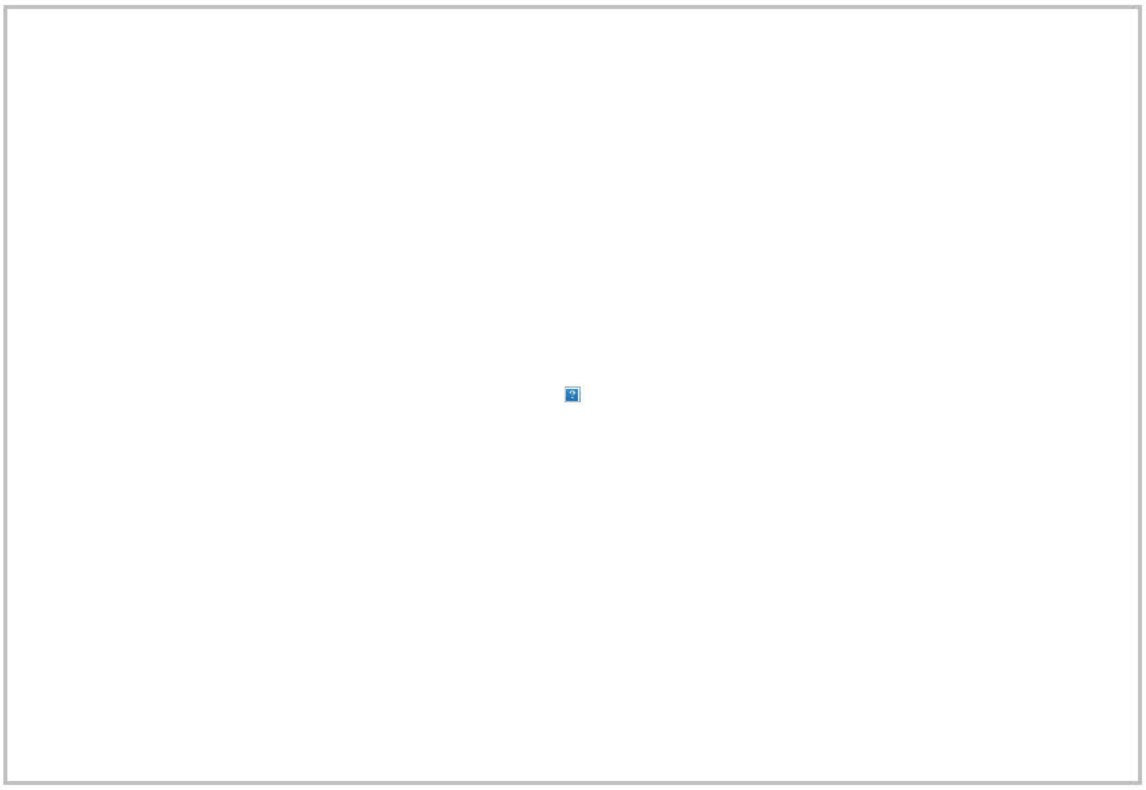
From: [redacted] @wellingtonwater.co.nz>
Sent: Friday 13 May 2022 4 15 pm
To: [redacted] @huttcity.govt.nz>
Cc: [redacted] @e2environmental.com>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: FW [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora [redacted]

How are things? I think I may be happy with the hydraulic modelling and hydrology both methodology and output.

In terms of offsite effects I think the increase backyard channel in through 108 to 112 Mohaka St is acceptable. Downstream of the site the water level difference are also acceptable. There wide areas of increased water level except perhaps in 3 Rakaia Gr in the vicinity of the existing garage. However I think this increase is likely to be a result of an issue in the ground model (where the building has been removed from the LiDAR data) and probably wouldn t exist in reality – that is the extra volume of water we are seeing collecting there would be distributed across the site resulting a negligible difference in pre and post water levels.

With regard to onsite runoff I haven t gone over the calcs sorry. I m in two minds about including it in the model [redacted] point about the shorter time of concentration is valid and theoretically local runoff will have disappeared by the time the upstream flows arrive. But that potentially depends on how fast runoff/ponding from the roads will clear. Keen to hear what you think.



Hope you have a good weekend.

Cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob[redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Friday 13 May 2022 8 28 am
To: [redacted]@wellingtonwater.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@arassociates co nz>; [redacted]@arassociates co nz>; [redacted]@e2environmental com>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Morena[redacted]

Yes that is correct. n HEC-RAS modelling we used a Manning's coef. 0.07 on entire 2D flow area like below picture.

Kind regards

[redacted]
ME CPEng
[redacted]

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Level 3 Takapuna Finance Centre
159 Hurstmere Rd Takapuna Auckland 0622
PO Box 65 576 Mairangi Bay Auckland 0754
ph [redacted] m [redacted]
www.arassociates.co.nz

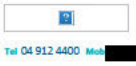
From: [redacted]@wellingtonwater.co.nz>
Sent: Thursday 12 May 2022 12 05 pm
To: [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora[redacted]

Thanks for that (and for your second email with the cross-sections). One quick follow up query with regard to the roughness. Is the Manning's coefficient of 0.07 of applied across the whole model in particular downstream of 106 Mohaka St where there are residential properties?

cheers

[redacted] (he, him) Senior Hydraulic Modeller



Tel 04 912 4400 Mob[redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Wednesday 11 May 2022 5 10 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted].@huttcity.govt.nz>; [redacted].@aprotean.co.nz>; [redacted]
[redacted].@huttcity.govt.nz>; [redacted].@aprotean.co.nz>
Cc: [redacted].@arassociates.co.nz>; [redacted].@arassociates.co.nz>; [redacted].@belgraviacapital.co.nz>; [redacted]
[redacted].@urbanedgeplanning.co.nz>; [redacted].@arassociates.co.nz>; [redacted].@huttcity.govt.nz>; [redacted].@e2environmental.com>; [redacted]
[redacted].@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora[redacted]

Thank you for your prompt follow up appreciate it.

Based on the ariel the surface roughness appears to be minor natural streams with medium to dense shrubs and trees – natural vegetation. Hence Manning's coefficient of 0.07 is adopted in our calculations.

The site is very small are with very small time of concentration when compared to other catchments. Therefore runoff from the site is not expected to alter the flood surface modelling. However happy to include if required.

With regards to the cross sections we are working on it and hope to provide it to you by tomorrow.

Kind regards

[redacted]
ME CPEng
[redacted]

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159 Hurstmere Rd Takapuna Auckland 0622
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ph. [redacted] m [redacted]
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From: [redacted]@wellingtonwater.co.nz>
Sent: Wednesday 11 May 2022 11 53 am
To: [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>; [redacted]
[redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]
[redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]
[redacted]@wellingtonwater co nz>; Land Development <Land Development@wellingtonwater co nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Kia ora[redacted]

Apologies for the quick follow up email. Could you please provide some cross-sections showing water level and width/extent for the lines (or similar) shown below (yellow lines) – I note on some of the report figures there are section lines already drawn – these existing line positions are fine to use. We are keen to confirm that the increased water levels shown in 108 to 112 Mohaka St and in the upstream Meremere development are contained within the existing channels or if there are any new wet areas.

cheers

[redacted] (he, him) Senior Hydraulic Modeller

Tel 04 912 4400 Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

From: [redacted]@arassociates.co.nz>
Sent: Tuesday 10 May 2022 8 25 pm
To: [redacted]@huttcity govt nz>; [redacted]@wellingtonwater co nz>; [redacted]@aprotean co nz>; [redacted]@huttcity.govt.nz>; [redacted]@aprotean.co.nz>
Cc: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted] and [redacted]

Thank you for your comments and your assistance in resolving issues. This SharePoint link 2022.05.10 - RFI RESPONSE 3 Contains

1. Technical Memo - Flood Risk Management and Fish Passage;
2. Revised Calculations; and
3. RFI tracking spreadsheet.

I hope the above information provided will address all of your information request. Should you have any queries please feel free to contact me.

Kind regards

[redacted]
ME CPEng
[redacted]

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Level 3 Takapuna Finance Centre
159 Hurstmere Rd Takapuna Auckland 0622
PO Box 65 576 Mairangi Bay Auckland 0754
ph [redacted] m [redacted]
www.arassociates.co.nz

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From: [redacted] @arassociates.co.nz>
Sent: Tuesday 10 May 2022 9 29 am
To: [redacted] @huttcity.govt.nz>; [redacted] @aprotean.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Good morning [redacted]

Confirming we will incorporate the fish passage pipe into the model we hope to be able to provide the results of the revised model today.

Regards

[redacted]
CPEng CMEngNZ IntPE (NZ) DipGeothermTech
[redacted]

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AR & Associates Ltd
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m [redacted]
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From: [redacted] @huttcity.govt.nz>
Sent: Tuesday 10 May 2022 6 17 AM
To: [redacted] @aprotean co nz>; [redacted] @arassociates co nz>; [redacted] @arassociates co nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

HI Team

I am presuming with the change in design there will be a new version of the model being run? Please confirm ASAP.

I don t want [redacted] reviewing the existing modelling results further if they are going to be updated and a new version coming out.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www huttcity govt nz

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---

From: [redacted] @aprotean co nz>
Sent: Monday 9 May 2022 3 13 pm
To: [redacted] @huttcity.govt.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean co nz>; [redacted] @belgraviacapital co nz>; [redacted] @urbanedgeplanning co nz>; [redacted] @arassociates co nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted]

No the 525 would be scrapped all together. Only the overland flow path would remain effectively.

We will investigate the pipe type selection.

Regards

[redacted]
L1 193-195 Main Road Tawa 5028
M: [redacted] E: [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Monday 9 May 2022 3 10 pm
To: [redacted]@aprotean.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted]

So low flows to 375 but higher flows to 525 between units 27 & 28? Do you have a sketch for how this looks at intake? Will this require modelling to be updated??

Presume this pipe is to be public as taking Meremere flows – please check but don t think stormboss pipe is on WWL approved product list?

Cheers
[redacted]

[redacted]
Senior Engineer

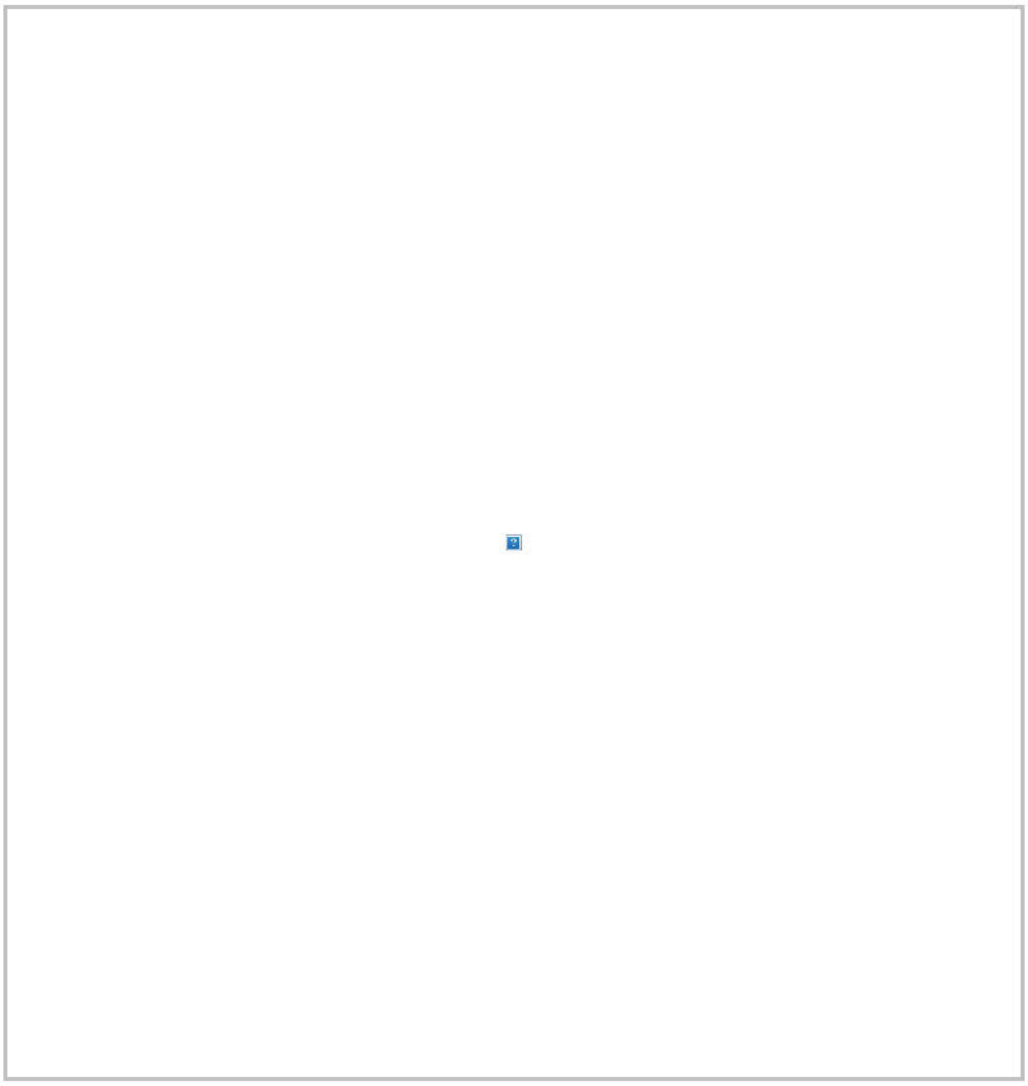
Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www huttcity govt nz

From: [redacted]@aprotean.co.nz>
Sent: Monday 9 May 2022 3 01 pm
To: [redacted]@huttcity.govt.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted]

Currently we are looking at an alternative to promote fish passage from the Meremere intake.

Please see below sketch showing the proposed pipe work to manage the ephemeral flows and fish passage. Note that the pipe work will maintain current watercourse inverts and grades. The overland flow path between lots 27 & 28 will still be used as such to convey stormwater from Meremere during periods of high rainfall/flow.



This is being sent to [redacted] for comments.

If this is considered an acceptable solution we will update the drawings properly.

Regards

[redacted]
L1 193-195 Main Road Tawa 5028
M: [redacted] E: [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Monday 9 May 2022 2 51 pm
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hey Team

Understand after all of the others matters noted today – we (if I haven t missed something) – only have fish passage to go. Just need to know there is a solution that can be finalised under detailed design that will fit with everything currently in play then I can condition around it.

I will stop looking at engineering stuff for now and get back in GWRC docs.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www huttcity govt nz

From: [redacted]
Sent: Monday 9 May 2022 2 48 pm
To: [redacted] @arassociates co nz>; [redacted] @arassociates co nz>; [redacted] @aprotean co nz>; [redacted] @huttcity govt nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

HI team

Not an issue really now but for detailed design please note

- Two line 5 long sections– either line 5 & continued Line 5 or 5a & b
- Line 5a – detention understand you cant lay flatter than 1 in 200 (maybe 300 at a push) 1 in 500 shown.
- Presume SWLine swpill existing culver under entrance

Cheers
[redacted]

From: [redacted]
Sent: Monday 9 May 2022 11 18 am
To: [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @aprotean.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi Team

Notes on Services

- Resolved 1.1m fall at MH downstream of Meremere intake by adding new MH in between to step main – max 0.5m. Note haven t checked MH sizes this will be a detailed design aspect.
- Pte shared SW in front of 23-27 moved to be under carparks to connect to new MH above
- I have sent off to WWL for confirmation re 4m access/easement between units 27 & 28 – but note will likely need the following
  - Access is required 24/7 this will see need to remove carparks/ landscaping to achieve – this is a big one!
  - easements shown on lot 27 28 and ROW
  - consent notice for the units 27 & 28 requiring foundation design to RSWS
  - condition for accessway to be formed as part of civil works – sealed or possibly gabion blocks?
  - Consent notice 27 & 28 that accessway to remain 24/7 and no fencing to obscure
  - Condition that residents association maintain accessway
  - Look at how we can stop people using as a carpark – bollards with WWL padlock?
- Detail D-421 to be updated to show accessway & overland flow path
- As previously noted services seem close to water ridermain – this is a detailed design aspect and will be conditioned to confirm clearances met at detailed design stage.

Cheers
[redacted]

From: [redacted]
Sent: Monday 9 May 2022 10 05 am
To: [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @aprotean.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @e2environmental.com>; [redacted] @wellingtonwater.co.nz>
Subject: RE [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

HI [redacted]

Thank you for the link and updated information. I have started looking through and have the following comments/queries on the WSUD ponding info

Ponding cross-sections – see attached marked-up (scribbled on) plans

- Section C depth of ponding most of mountable kerb depth. Understood plan was to have full F&C here based on DWGS3.300. Presume k&c will have gaps for raingarden intake?? – please confirm
- Section D3 – dish channel at edge of carparking? Please confirm depth of flow being stepped into.
- Section D4 – as above
- Section D5 – raised chicane removed – noted in roading section H "traffic calming chicane enclosed by edge beams tree pit or similar planting". If planting in place then detail will ned to be updated to allow for pit(?) – will this be flooded during events?? Has this been agreed with traffic engineer??
- Section E1 – as above
- Section E2 – what is the break in roadway indicated?
- Section E4 – should this not show a dish channel ??
- DWG S3-433 – seems double up of S3-432

Cheers
[redacted]

From: [redacted]@arassociates.co.nz>
Sent: Friday 6 May 2022 5 45 pm
To: [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>
Subject: [EXTERNAL] RE RM210328 106 Mohaka - engineering assessment

Hi [redacted]

Thank you for your assistance in getting this project over the line.

As per your request [redacted] has provided HEC-RAS modelling data and the out puts to [redacted] [redacted] is following it up with [redacted]

Please also find enclosed SharePoint link 2022.05.06 -RFI RESPONSE 2 containing the documents you have requested at the meeting as below.

1. Cross-sections showing the 1 in 10 and 1 in 100 year ponding at the locations identified in your email. The ponding will expected to last for a short duration when the street activities are minimum.
2. Updated set of drawings showing the new pump stations are now located in the parking areas. An additional manhole is added in line 2 (Meremere street intake) as suggested. Line 5 is realigned to get the 90 degree connection.
3. Updated calculations.

Thank you again and hope to get all the queries resolved by Monday.

Kind regards

[redacted]
ME CPEng
[redacted]

Producing the best professionals in our field

To influence and contribute to a more sustainable world.

AR & Associates Ltd
Level 3 Takapuna Finance Centre
159 Hurstmere Rd Takapuna Auckland 0622
PO Box 65 576 Mairangi Bay Auckland 0754
ph. [redacted] m [redacted]
www.arassociates.co.nz

From: [redacted]
To: [redacted]
Cc: [redacted]

Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - sw detention calc resposne
Date: Monday, May 9, 2022 11:27:47 AM
Attachments: image001.png
image002.png
image003.jpg
Untitled attachment 00212.png

HI Team

Stormwater detention:

- Presume have been sent new calcs to account for changes to main from Meremere lines – please confirm
- I have noted that a 47% permeability has been associated to the lots, does this take into account all landscaping – paving etc as seems low to what I can see.
- Also noted is that the model seems based on a 24 hour nested storm whereas the WWL Hydrology requires a 12 hour nested storm. If not undertaken can you please run model based on a 12 hour nested storm in accordance with the WWL Reference Guide for Design Storm Hydrology.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]
Sent: Monday, 9 May 2022 11:17 am
To: [redacted]@arassociates.co.nz>; [redacted]' [redacted]@arassociates.co.nz>; [redacted]' <[redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]' <[redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]' [redacted]@e2environmental.com>; [redacted]' <[redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

Hi Team

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- Resolved 1.1m fall at MH downstream of Meremere intake by adding new MH in between to step main – max 0.5m. Note haven't checked MH sizes this will be a detailed design aspect.
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Cheers
[redacted]

From: [redacted]
Sent: Monday, 9 May 2022 10:05 am
To: [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]

[redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>

Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

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- Section D4 – as above
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- Section E1 – as above
- Section E2 – what is the break in roadway indicated?
- Section E4 – should this not show a dish channel ??
- DWG S3-433 – seems double up of S3-432

Cheers
[redacted]

From: [redacted]@arassociates.co.nz>
Sent: Friday, 6 May 2022 5:45 pm
To: [redacted]@arassociates.co.nz>; [redacted] <[redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted]@huttcity.govt.nz>
Subject: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

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3. Updated calculations.

Thank you again and hope to get all the queries resolved by Monday.

Kind regards,

[redacted]
ME, CPEng,
[redacted]

Producing the best professionals in our field.

To influence and contribute to a more sustainable world.

AR & Associates Ltd
Level 3, Takapuna Finance Centre
159 Hurstmere Rd, Takapuna, Auckland 0622
PO Box 65 576 Mairangi Bay, Auckland 0754
ph. [redacted] m. [redacted]
www.arassociates.co.nz

attachments, please check them for viruses and defects. AR & Associates Limited and/or its employees shall not be liable for the incorrect or incomplete transmission of this e-mail or any attachments, nor be responsible for any delay in receipt.

From: [redacted]
To: Land Development
Subject: RE: 106 Mohaka St
Attachments: image002.jpg
image011.jpg
image005.png
image006.png
image007.png
image008.png

Greetings

This one is allocated to [redacted]

I don't see any action for WWL so I think you can file it and move on.

[redacted]

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Friday, 17 February 2023 8:44 a.m.
To: [redacted]@e2environmental.com>
Subject: FW: 106 Mohaka St

Hey [redacted]

I see they cc'd you in this one. Is this something you aware/familiar with? Also the latest email below confuses me where they said to disregard the email from [redacted] as hes no longer on the project, so does that mean there is nothing to do on this one? Just wanting to know what I should do with this email? Thanks so much

Kind regards

[redacted]

[redacted] **Team Coordinator - Network Strategy & Planning**

Mob [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

F om [redacted]
To [redacted]
Subject RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment ZB comments
Attachments image004.png
image007.png
image008.png
image010.png
image021.png
image022.png
image025.png
image027.png
image046.png
image049.png
image050.png
image051.png
image062.png
image063.png
image065.jpg
image001.jpg
image002.jpg
image003.jpg
image005.jpg
image011.jpg
image012.jpg
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image018.jpg
image019.jpg
image020.jpg
image023.jpg
image024.jpg
image026.jpg
image029.jpg
image064.jpg
image067.jpg
image068.jpg
image069.jpg
image070.jpg
image075.png

[redacted]
Lot to take in here.

A few comment to add to yours:

1. The non-pipe examples provided comply with WSUD principles and use swales etc to co lect and convey stormwater through the subdivision. The use of swales to convey stormwater is in line with the WWL WSUD guide and f swales were introduced to the Mohaka design this would be acceptable to WWL.

2. The design approach presented for Mohaka Street does not include for swales and is not considered to be comparable to the examples presented. In the case of Mohaka St the design storm and exceedance flows will be contained / conveyed on the road carriageway.

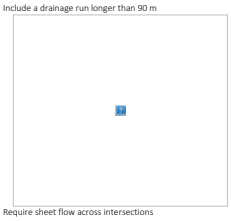
3. I have checked the RSWS NZS 4404 (which I understand is the Code for HCC) as well as had a look at the WCC code of practice to get some guidance on this matter and note that

    a. Clause 3.3.19.7.1 of NZS4404 requires sumps:
        i. So that surface flows across an intersection are minimised
        ii. At points where there is a change in gradient or bend where there may be a tendency for water to leave the k&c
        i i. Max 90 m spacing

    b. The WCC code of practice requires sumps:
        i. At intersections at the upstream tangent point.
        ii. At points where there could be a tendency for water to leave the channel.
        i i. Max. 00 m spacing

    c. The RSWS requires spec fic approval from the Roading Authority if sumps are not compliant with the relevant code of practice and requires a max 90 m spacing.

4. The proposed design appears to:
    a. Require water to leave the k&c.
    b. Include a drainage run longer than 90 m



    c. Require sheet flow across intersections

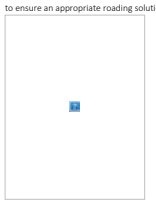
5. The design as presented does not appear to comply with the RSWS NZS4404 or the WCC Code (uses as a comparison)

You may want to seeking a second opinion from a roading engineer. If you are mindful to grant this subdivision I would recommend:

A. Obtaining significantly more cross sections showing the extent of water within the carriageway during the 10% and 1% AEP events in particular the sections should:
    a. Be provided for the dish channels – these will operate differently to the K&C.
    b. Be provided for the 90 deg dish channel bend.

B. Calculations should be provided to support the sections.
C. Calculations should be provided to demonstrate the flow across the intersections.
D. Details of how flow will be managed past the traffic calming strutures.

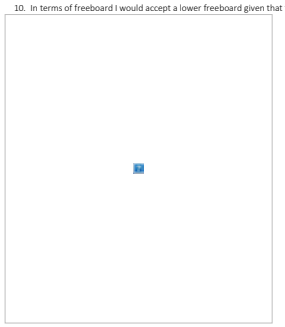
As a minimum I would recommend that sumps and pipes (potentially a bubble up system) is considered to remove flows across the intersections – see below (not checked for levels). It may be that the RG is made s ightly deeper (smaller area) to get such a system to work – which may require a compromise on treatment to ensure an appropriate roading solution is achieved.



6. In terms of the mountable kerbs whilst I appreciate the interior of the site will likely be low speed the site entrance would not appear to be constrained / restricted. My particular concern is protecting the rain garden from vehicles accidentally driving into it. I would therefore recommend standard K&C for the site entrance / past the rain garden.

In terms of the meremere pipe
7. This should be lowered to be compliant with the code.

In terms of FFL's
8. If there is an overland flow path between Lots 27 and 28 this needs to be understood and FFL's set appropriately – freeboard for lots adjacent the SFP should be 500 mm – however f this has been accurately modelled you may be able to provide dispensation to accept a lower freeboard.
9. The SFP past Lots 27 and 28 needs to be understood as it may also impact on the FFL's of the Lots 29 to 31 and 33
10. In terms of freeboard I would accept a lower freeboard given that the area has been modelled however where flooding is > 100 mm deep on a road wave action needs to be considered and either mitigated or 500 mm freeboard required.



Cheers

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team

From: [redacted]
To: [redacted]
Cc: [redacted]; Land Development
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata - WW and New RC Application
Date: Saturday, March 4, 2023 12:00:10 AM
Attachments: image001.png
image002.jpg
image003.png
image004.png
image005.png

Hi [redacted]

Thanks.

Yes, this was a bit messy. They obtained earthworks consent and started work on drainage before getting subdivision consent or EA. But, that has been resolved now. They are altering some of the wastewater (mostly just adding manholes) to match the approved plans.

Regarding the 10 lots. The Engineering Approval (which has now been issued) includes water/wastewater/stormwater supply and laterals for these 10 lots, so this does not need to be re-assessed. As you've noted the flooding and lot levels have also already been agreed with the earlier resource consent – for these two blocks of houses the levels I have are platform level of 106.77, with FFL being 200mm above this. If the levels are unchanged then this doesn't need to be re-visited.

Many thanks

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro,
Wellington

From: [redacted]@e2environmental.com>
Sent: Thursday, March 2, 2023 10:52 PM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata - WW and New RC Application

Hi [redacted]
We made some comments on the PS locations but I did not look at sizing [redacted] may have).

On another note on this one – I have a RC application on my design from HCC for fee simply subdivision of Lots 53 and 54 into 10 residential lots (with amalgamated parking), Land Use to construct the dwellings and S127 CoC request to remove the consent notice restricting the building heights.

HCC have asked for 3 waters comments and a flood assessment. From WWL perspective – in terms of network capacity – these would have been addressed under the wider subdivision, and in terms of flooding – there is a post development site specific flood model signed off under the wider subdivision. I could go into detail of the conditions etc – status of the wider works / EA / servicing – but if you are also looking at this for HCC I will happily leave it with you ?

Let me know if you need anything else or if you need WWL to pick up the RC assessment in more detail, otherwise I will go back to HCC and close this enquiry from WWL perspective.

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team

m [redacted]

From: [redacted]@envelope-eng.co.nz>
Sent: Thursday, 2 March 2023 11:53 pm
To: [redacted]@e2environmental.com>
Cc: [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata - WWL Response

Thanks [redacted]

That matches my records which are that the position and sizing of the pump stations has been reviewed and agreed at RC stage. The applicant has stated that the pump stations had been 'approved' but I didn't have any record of this at the HCC end. I suspected that the detailed plans had not been reviewed but needed to check.

Having looked at the Aquatec report there are a number of shortcomings and I've gone back to applicant to have these addressed.

Thanks

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro,
Wellington

From: [redacted]@e2environmental.com>

Sent: Thursday, March 2, 2023 9:03 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata - WWL Response

Hi [redacted]
I provided some support to [redacted] [redacted] last year around the stormwater design for this site. [redacted] was seconded into HCC at the time and was completing a review of the project.

The key focus was the stormwater system however I did make some generic comments on the proposed wastewater system.

The WWL flood modelling team were also involved looking at the flood modelling for the site.

Our advice to [redacted] did not cover the LPSS in detail – just some general comments on location of the 'shared pump stations'.

You might want to contact [redacted] to see if she completed this assessment for HCC.

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team

m [redacted]

From: [redacted]@envelope-eng.co.nz>
Sent: Thursday, 2 March 2023 1:09 am
To: [redacted]@e2environmental.com>
Cc: [redacted]@wellingtonwater.co.nz>; Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata - GE

I'm assuming, this hasn't been reviewed previously by WWL. I'll review submitted plans.

Thanks

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro, Wellington

From: [redacted]
Sent: Tuesday, February 28, 2023 3:49 PM
To: Land Development <Land.Development@wellingtonwater.co.nz>; [redacted]
[redacted]@e2environmental.com>
Cc: [redacted]@wellingtonwater.co.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata - GE

Hi [redacted]

Just checking in on this – have you been able to check the file to see if this has been reviewed previously by WWL?

Thanks

[redacted]
A James Smith Building - Level 1, 65 Cuba Street, Te Aro,
Wellington

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Wednesday, February 22, 2023 7:59 PM
To: [redacted]@e2environmental.com>
Cc: [redacted]@wellingtonwater.co.nz>; [redacted]
[redacted]@envelope-eng.co.nz>
Subject: FW: RM210168 - P20-156 - Mohaka St Wainuiomata - GE

Hi [redacted]

Hope you are well

Could you kindly assist on this one below. Many thanks

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@envelope-eng.co.nz>
Sent: Wednesday, 22 February 2023 10:32 pm
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: FW: RM210168 - P20-156 - Mohaka St Wainuiomata

Forwarding in [redacted] absence, please advise.

Thanks

[redacted]
A James Smith Building - Level 1, 65 Cuba Street, Te Aro,
Wellington

From: [redacted]
Sent: Wednesday, February 22, 2023 9:23 AM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]
<collabcubeconsulting@gmail.com>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: FW: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi [redacted]

Can you advise if you have approval for this low-pressure network on your file. For reference, I've attached the resource consent decision and the approved engineering plans are on the link below:

P20-156-COMBINED EPA REV L - Approved.pdf

Thanks

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro,
Wellington

From: [redacted] <collab@collabcube.co.nz>
Sent: Wednesday, February 22, 2023 1:18 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted] <Subdivision@huttcity.govt.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi [redacted] FYI this is the design summary and PS1 from aquatec that was approved July last year I believe. Thought id send to you for clarity sake.

They have been made and will be sent to us very soon

Kind regards
[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz

From: [redacted] <collabcubeconsulting@gmail.com>
Sent: Friday, 17 February 2023 7:14 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted]@belgraviacapital.co.nz>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: Re: RM210168 - P20-156 - Mohaka St Wainuiomata

Thanks for your help [redacted] Ill get this cleared up today.

Sent from my iPhone

> On 17/02/2023, at 12:23 AM, [redacted]@envelope-eng.co.nz> wrote:

No problem, the tank sizes are approved, and Aquatec control system is approved by Wellington Water so its really just final details and PS1.

[redacted] – [redacted] at Aquatec is the guy I normally deal with. I haven't discussed this job with him but he should be able to help.

[redacted]

0800 756 543
[redacted]@aquatecenviro.com
aquatecenviro.com

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro, Wellington

---

From: [redacted]@belgraviacapital.co.nz>
Sent: Thursday, February 16, 2023 11:16 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted] <collabcubeconsulting@gmail.com>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi Yes it was Aquatech. I had assumed [redacted] would have had this signed off. I will ask [redacted] to followup. Many thanks

> On 17/02/2023 12:07 AM NZDT [redacted]
> <[redacted]@envelope-eng.co.nz> wrote:
>
> Hi [redacted]
>
> I don't think that was sent to me. Is it Aquatech? If so, no problem, the same comments apply and [redacted] will just need to follow up with them and get detailed design/PS1.
>
> Cheers

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro, Wellington

---

From: [redacted]@belgraviacapital.co.nz>
Sent: Thursday, February 16, 2023 11:03 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted] <collabcubeconsulting@gmail.com>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: Re: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi [redacted] had changed the supplier perhaps 6 months ago and had me pay them a deposit.?
I would have assumed they had that option approved?

Kind Regards

Sent from my iPhone

> On 16/02/2023, at 10:33 PM, [redacted]@envelope-eng.co.nz> wrote:
>
> Hi [redacted] / [redacted]
>
> The Engineering Approval was based on using the EOne system by Ecoflow. On behalf of HCC I'm happy with the general design, sizing of tanks, and control system proposed. Ecoflow will need to check the approved plans and then finalise their detailed design. They will arrange a PS1 once they have completed their design.
>
> You are best to contact AR associates to get a full set of latest documents as I don't necessarily have the final version – particularly for items where the general arrangement is shown on the EA plans (such as retaining walls) but the specifications/calcs/PS1 is a building consent matter.
>
> I understand you've got the stamped EA plans, I've attached the approval letter which also has a number of notes to follow during construction – please read carefully to ensure the 224c process is smooth at the back end of

the project.

Regards

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro, Wellington

_

From: [redacted] <collabcubeconsulting@gmail.com>
Sent: Thursday, February 16, 2023 3:34 AM
To: Subdivision <Subdivision@huttcity.govt.nz>
Cc: [redacted]@envelope-eng.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: Re: RM210168 - P20-156 - Mohaka St Wainuiomata

Thanks [redacted]

Im specifically after the EPA application and supporting documentation. I only have the drawings that has been approved but non of the specifications. Also need copies of ps1's etc… from all consultants.

Looking for something that tells me what the designs are for the sewer pump stations so i can order them.

Ta
[redacted]

Sent from my iPhone

> On 16/02/2023, at 2:03 PM, Subdivision <Subdivision@huttcity.govt.nz> wrote:
>
> Hi [redacted]
>
> Please see attached requested resource. Note

that this is for Stage 1 of 106 Mohaka.

Please let us know if there is anything else that you may need.

Ngā Mihi | Kind regards,
[redacted]
Engineering Technician
Hutt City Council, 30 Laings Road, Lower Hutt 5040
W: www.huttcity.govt.nz

<image002.png>

From: collabcubeconsulting@gmail.com <collabcubeconsulting@gmail.com>
Sent: Thursday, 16 February 2023 11:32 am
To: a[redacted]@envelope-eng.co.nz; Subdivision <Subdivision@huttcity.govt.nz>
Cc: [redacted]@belgraviacapital.co.nz>
Subject: [EXTERNAL] P20-156 - Mohaka St Wainuiomata

Hi [redacted] et al. ,

Would you be able to link me to the entire EPA application docs for 106 Mohaka street please. I am after the specs/PS1's etc for this job. All I have is the approved EPA drawing.
It would be good for completeness that I have on file a copy of everything relating to this project so far.

Many thanks

Kind regards
[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz
<image003.png>

<RM210168.zip>

<Appendix C - Ecoflow LPS design report.pdf>
<106 Mohaka st - Engineering Approval Letter.pdf>

Craig Walton

Belgravia Capital Limited

[redacted]@belgraviacapital.co.nz

[redacted]

From: [redacted]
To: "[redacted]"
Subject: RE: RM210328: 106 Mohaka ST - Detention & WSUD Review Comments
Attachments: image001.jpg
image002.png
image003.png
image004.png
image006.jpg
image007.png

Sorry [redacted]
I realised when I woke up this morning the calcs don't include the 10% HEC HMS results – I've add this to the list below.

From: [redacted]@e2environmental.com>
Sent: Wednesday, 6 April 2022 9:16 PM
To: [redacted]@huttcity.govt.nz>
Subject: RM210328: 106 Mohaka ST - Detention & WSUD Review Comments

Hi [redacted]

Thanks for sourcing the calcs for this site.

SW Detention Calcs:

- The calcs are based:
  - the Auckland Regional Council TP108 SCS method which creates a nested storm as per the WWL methodology.
  - Hirds V4 RCP6.0 which is approximately equivalent to 20% CC.
  - HEC HMS modelling.
  - The stormwater detention outlet flows have been assessed using they HY-8 programme and the outflows have been included in the HEC HMS model as a storage – elevation relationship.
  - The Colebrook white parameters are acceptable,
  - I have not checked the areas however I assume these are correct.

The methodology used is acceptable. I have a couple of questions for the design team:

- Results for the 10 year HEC HMS simulation.
- Can the applicant confirm how the 'tank' has been modelled in HEC HMS.
- Can the applicant confirm how the 'tank' gradient has been allowed for within the calculations.

Rain Garden Design:

- The Rain Garden has been sized to treat only road runoff. The WWL WSUD guide requires all areas to be treated. Can the applicant advise why only the vehicle areas are being treated ?
- The design does not include any sumps within the road network and the calculations suggest

that the 10% AEP flows will spill over the road – ie will not be contained within the kerb and channel. The roading team will need to sign off on the acceptability of the area of road network with no sumps and acceptability of flows across the road in the 10% AEP event.

- The rain garden is triangular in shape. At detailed design the minimum rain garden width should be 0.5 m (shovel width) to allow materials to excavated in the future.

General Comments:

- There are a number of SW laterals passing the WW pump stations – these need to be shifted clear.
- It doesn't look like access between 27 and 28 is wide enough to allow access to the inlet.
- The applicant has suggested that the inlet on Lot 300 DP562261 will only block 20% - with you knowledge of Mermere St what is the potential for debris from the uphill catchment coming through Meremere and blocking this inlet ? If there is potential for debris then the design should include a secondary inlet as well as an assessment showing what would happen if the inlet were to block.
- How will power supply to the PS's be managed ?
- It would appear that most of the lots could be provided with individual PS's however the proposed PSs appear to be in reasonable locations. I would suggest the PS outside Lot 1 and 2 is moved out of the road and into the car park area (avoiding traffic management issues). I would suggest either moving or removing the PS outside Lot 32 – there does not appear to be any parking in this area – I would suggest it could go outside #23 or removed with Lot 23 to 32 connected through to the existing PSs.
- Further to our discussion with regard the WW discharge. I would be happy with a pressure main connection direct to the public manhole. I did wonder however if the site should not be connected to the existing WW main in the road such that the public main through Lot 22 DP48701 (ie public WW main through private property) could be abandoned.

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team
m [redacted]
e2Environmental Ltd
181 High St, Blenheim
PO Box 380, Blenheim 7201
www.e2Envronmental.com

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 5 April 2022 7:57 AM

To: [redacted]@e2environmental.com>
Subject: FW: [EXTERNAL] RE: RM210328: 106 Mohaka ST - Detention & WSUD

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@arassociates.co.nz>
Sent: Tuesday, 5 April 2022 7:49 am
To: [redacted] <[redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>
Subject: [EXTERNAL] RE: RM210328: 106 Mohaka ST - Detention & WSUD

Good morning [redacted]
Please find attached the latest calculations set we supplied for Engineering Approval review.

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@aprotean.co.nz>
Sent: Tuesday, 5 April 2022 7:41 am
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>
Subject: FW: RM210328: 106 Mohaka ST - Detention & WSUD

Hi [redacted]

See below email from [redacted] Can you please provide the stormwater calculations.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 5 April 2022 7:09 am
To: [redacted]@aprotean.co.nz>
Cc: [redacted]@huttcity.govt.nz>
Subject: RM210328: 106 Mohaka ST - Detention & WSUD

Hi [redacted]

Can you please forward the most up to date stormwater detention calculations and WSUD calculations, I have had difficulties locating them.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]
To:
Subject: RE: RM210328: 106 Mohaka Street - Infrastructure Rpt
Date: Wednesday, March 23, 2022 3:19:46 PM
Attachments: Untitled attachment 00049.png
UPDATED APPLICATION-Infrastructure Report.PDF

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]
Sent: Wednesday, 23 March 2022 3:19 pm
To: [redacted]' <[redacted]@e2environmental.com>
Subject: RM210328: 106 Mohaka Street - WSUD review

Hi [redacted]

Can you please fit into your busy schedule a high level review of the proposed stormwater treatment for this site? This is RC stage so I really just want to be comfortable that the amount of land they have allocated seems realistic.

Plans etc to follow :

As I understand it they are proposing to have bioretention feed off the roadway only – no roof water treatment. Seems GWRC are ok with this from the draft report attached.

If you could please indicate when you will be able to undertake this review for HCC?

I may also have a few questions for you regarding the proposed detention, once I have finished getting my head around a couple of aspects.

Cheers

MHV Ltd

106 Mohaka St, Wainuiomata, Lower Hutt

Flood Report

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

Reference P20-156-R03-RevF
6th April 2022

AR & Associates Ltd // Level 2, The Nielsen Centre
129 Hurstmere Road, Takapuna
p. (09) 486 0774

ACENZ

PO Box 65 576, Mairangi Bay, Auckland 0754
www.arassociates.co.nz
e. enquiries@arassociates.co.nz

Document Control Sheet

Client		MHV Ltd				
Project address		106 Mohaka St, Wainuiomata, Lower Hutt				
Report title		Flood Report				
Reference		P20-156-R03				
Revision	Author	Reviewer	Approver	Purpose	Issued to	Date
D	AR	JL	AR	Council RFI	Client	29.03.2022
E	AR	JL	AR	Council RFI	Client	06.04.2022
F	CM	AR	AR	Updated Table 2	Client	22.04.2022

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Appendices

1 // Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to undertake a flood assessment, to understand the flood risks at the site and downstream areas, for both the existing and post development conditions.

This document presents the results of our assessment, including associated recommendations around flood management and proposed minimum floor levels.

2 // Site Description

The site is located adjacent to the north-eastern corner of the Mohaka Street cul-de-sac, in Wainuiomata, Lower Hutt (Lot 5 DP 65821).

In its existing condition, about one third of the site is covered by a number of buildings and associated driveway and parking areas, with the remaining areas being predominately covered in grass and low vegetation.

Topography within the site is relatively flat, however beyond the northern and north-eastern boundaries the land rises steeply and is covered by a densely vegetated bush reserve.

There are a series of bush clad open streams / drains immediately adjacent to the western and northern boundaries, which collect most of the runoff generated from the bush-clad catchments to the north. These streams discharge to an existing 1050 mm diameter culvert that passes under the access road to the site, and which discharges some 300 m downstream.

An aerial photo of the existing site with associated existing 3-water services (obtained from the Wellington Water GIS maps) is shown in **Figure 1** below.

Figure 1:- Existing site layout showing surrounding areas and 3-waters services

There is a new residential subdivision of 75 to 102 Meremere St currently under development adjacent to the eastern site boundary. This development drains stormwater runoff from the contributing eastern catchment onto the subject site, which is captured by a 1050 mm diameter scruffy dome and 525 mm RC pipe at the eastern boundary, as shown in the AR & Associates design drawings.

There are established residential areas to the south of the site boundary, and west of the western stream.

3 // Proposed Development

The development comprises a 52-lot residential subdivision, accessed from the eastern side of Mokaka St. A number of internal local roads are proposed to provide access to the various lots.

The proposed stormwater network will consist of the main primary piped network in addition to a 1050 mm dia. concrete pipe which will act as a detention tank to attenuate 10% and 1% AEP flows on the site, to ensure that post-development peak flows do not exceed pre-development levels.

Stormwater from the northern bush clad mountain catchment will be conveyed along the northern and eastern open drainage channels, while runoff from the eastern catchment will be captured by a 1050 mm scruffy dome and 525 mm pipe and conveyed into the detention system prior to discharge into the existing 1050 mm culvert that services the site.

The proposed subdivision layout showing the various stormwater components is illustrated in **Figure 2**.

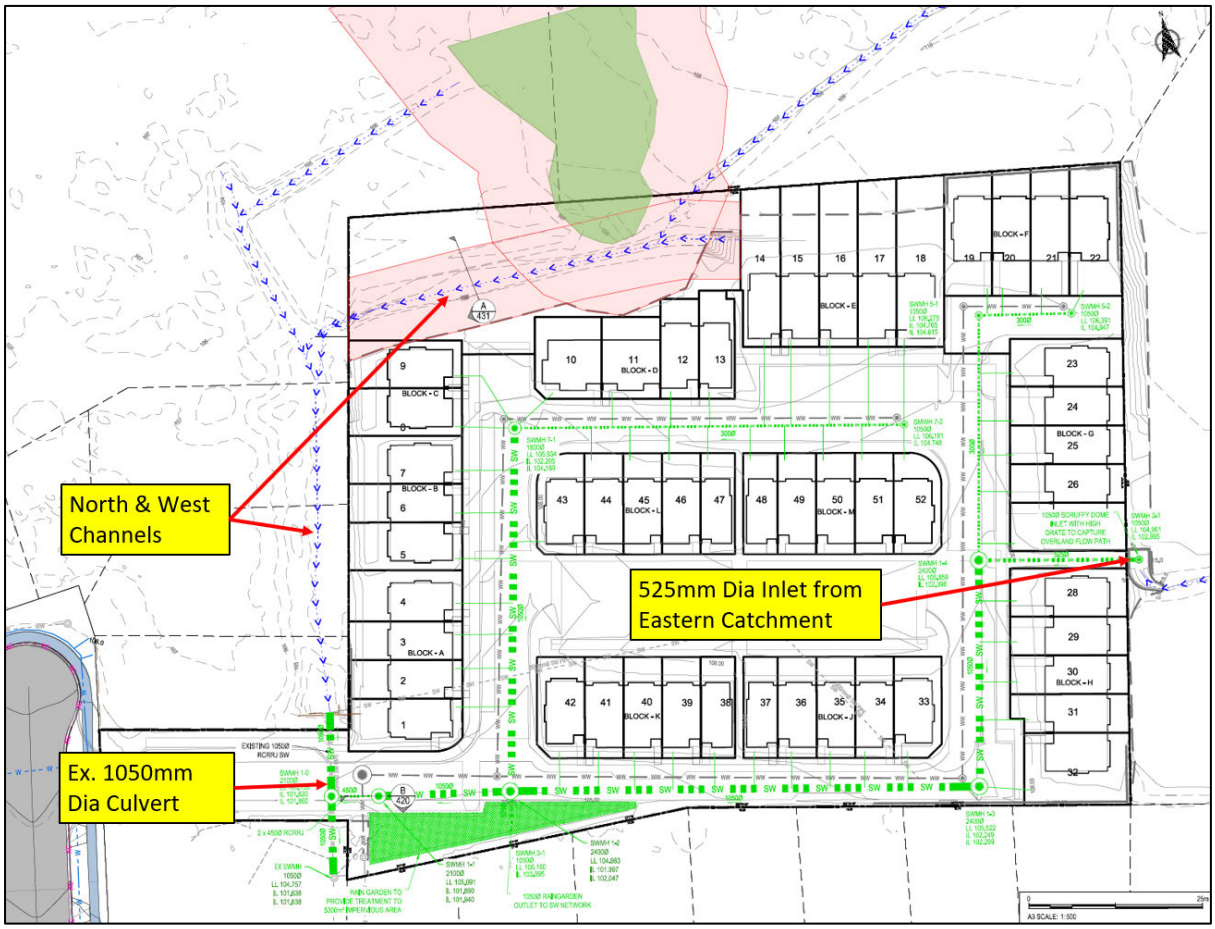

Figure 2:- Proposed development showing key stormwater components

4 // Basis of Design

4.1 Design Parameters

The assessment presented herein is based on Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0) and reference guide for design storm hydrology-standardised parameters for hydrological modelling (Wellington Water Ltd, 9 April 2019). The primary and secondary stormwater infrastructure design requirements under this standard include the following key criteria:

- Primary piped systems in residential areas to be designed to accommodate runoff from the 10-year ARI (10% AEP) rainfall event, or the 100-year ARI (1% AEP) rainfall event where no secondary flow path is available.
- Secondary systems shall consist of overland flow paths capable to conveying runoff from the 100-year ARI (1% AEP) rainfall event.
- Maximum acceptable flood depths during the 100-year ARI event in local / minor roads, which apply to the site, shall be 200 mm, with a flow velocity of no more than 2 m/s.
- Minimum freeboard of habitable floor levels shall be 500 mm above the water level during secondary flood protection events. Commercial and industrial buildings shall have a freeboard of 300 mm and all other building freeboards shall be 200 mm.
- The minimum freeboard shall be measured from the water surface level to the building platform level or underside of the floor joists or structural concrete slab of the building.
- Rainfall depths are taken from NIWA's HIRDS Version 4, with allowance for Climate Change. An RCP6.0 for the year 2081-2100 was used for purposes of this assessment.

The following additional parameters were used in this assessment:

- The SCS Curve Number method was used with HEC-HMS modelling software to determine hydrology and flows generated within the contributing catchments.
- Curve numbers were obtained from the appendix A of reference guide design storm report. For the contributing upstream catchments, which are heavily vegetated in bush, a CN of 61 has been assumed (mountain brush with good hydrological condition). Impervious areas are assumed to have a CN=98.
- Time of Concentration parameters were calculated using the empirical equations of Ramser Kirpich and Bransby Williams, and the answers averaged.
- Initial Abstraction parameters were obtained using Wellington Water Ltd CN layer extract.
- A Manning's Coefficient of 0.07 (Excavated or dredged channels / streams with clean bottom, brush on side, highest stage) was used for purposes of assessing capacity of the upstream watercourses.
- Used Nested storm rainfall profile that 12-hour storm duration is recommended for model runs by the reference guide storm report.
- Wellington Water Standards do not specifically require blockage to be allowed for culverts or pipes during the secondary (100-year ARI storm) event. However, for purposes of our analysis,

culverts have been assumed to be 20% (1050 mm and 525 mm) and 50% (225 mm) blocked during secondary flow conditions.

- Our analysis has assumed that appropriate maintenance of these structures will be undertaken by Council (or appropriate party responsible), in order to prevent blockage from exceeding the assumed 20% during the 100-year ARI event.

4.2 Catchments

There are three main catchments contributing flow to the site, as shown on **Figure 3** below.

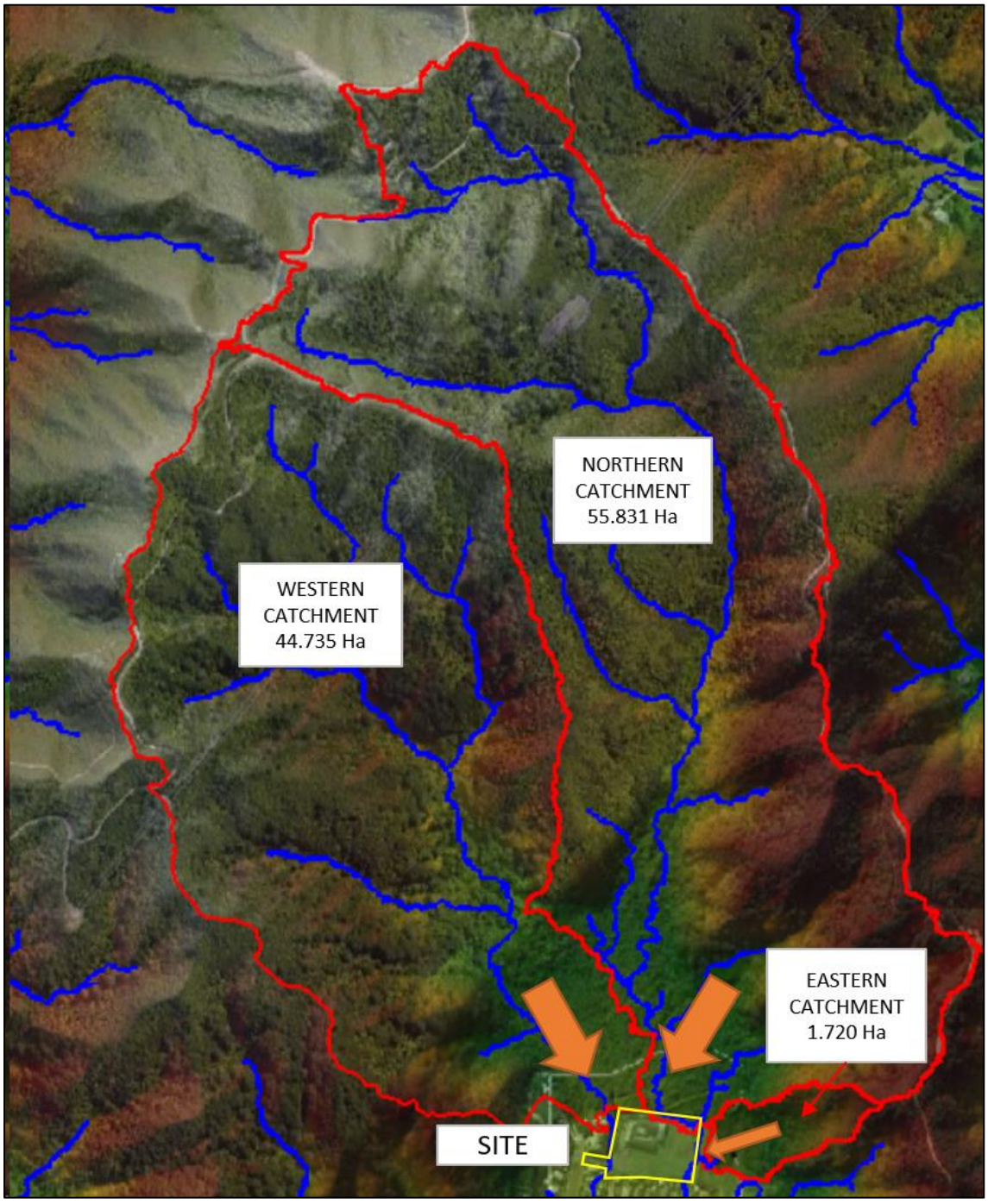

Figure 3:- Contributing stormwater catchments

These catchments have been assessed and measured using council LiDAR data and SCS methodology. The main catchment parameters are summarised in **Table 1** below.

Catchment	Catchment Area (Ha)	Curve Number (CN)	Longest Drainage Path (m)	Catchment Slope (%)	Time of Concentration Tc (min)	Initial Abstraction Ia (mm)
Western	44.73	61	1,133	10.8	19.25	16.24
Northern	55.83	61	1,666	10.0	27.74	16.24
Eastern	1.72	61	234	11.3	5.50	16.24

Table 1 – Summary Catchment Design Parameters

All of the contributing catchments are covered by undeveloped bush reserve land, with exception of a small portion of the eastern catchment, which will be covered by the adjacent 9-lot subdivision that is currently under development at the end of Meremere St.

However, we understand that peak flow attenuation will be provided within the Meremere St subdivision. As such, for purposes of this analysis, all contributing catchments are assumed to be in a greenfields in terms of peak flows generated for both the pre and post development condition.

5 // Results

5.1 Modelling Results, Pre-Development (Existing) Condition

The pre-development (existing) condition has been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development (existing) 100-year ARI flood levels, flood depths and flow velocities are shown in **Figures 4, 5** and **6** below, respectively.

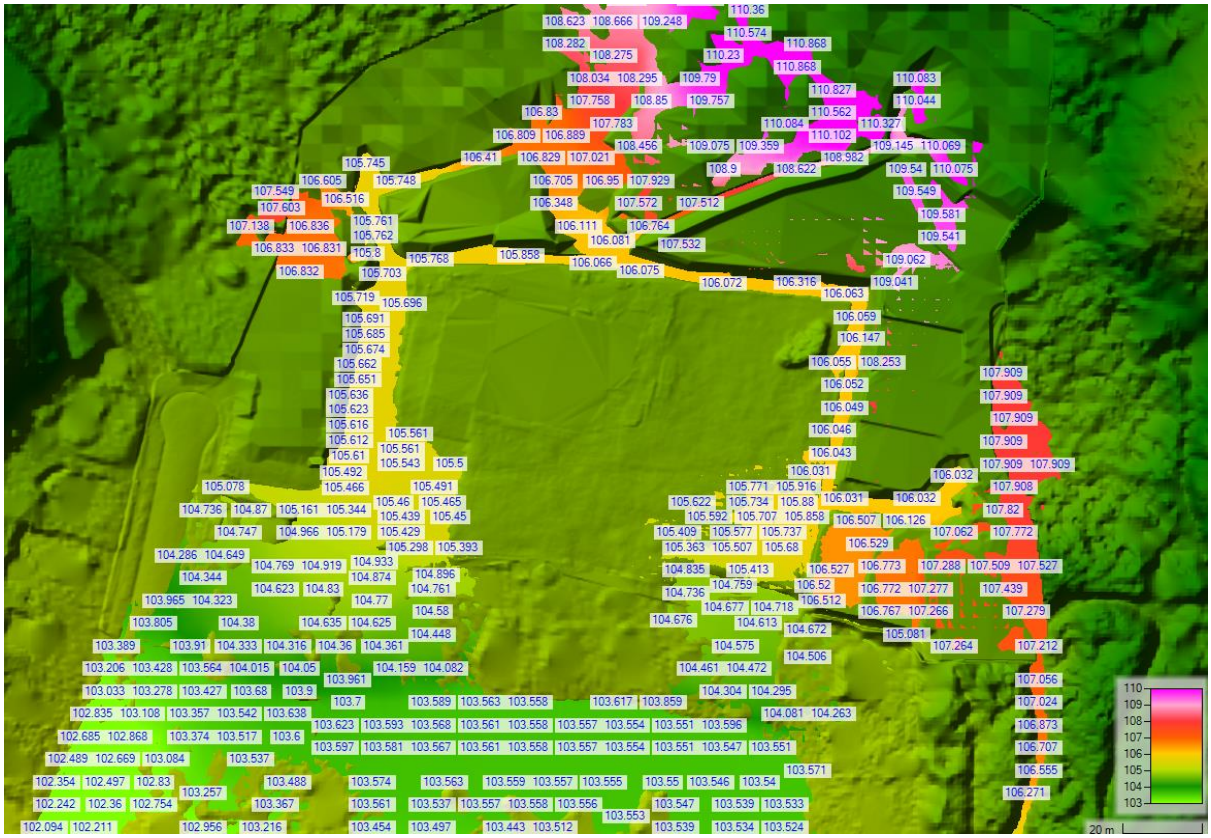

Figure 4: Pre-Development 100-year ARI Flood Map showing Flood Levels

The pre-development results show that stormwater runoff from the northern and eastern catchments is directed along the existing perimeter channels around the eastern, northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance.

The results show that in the existing condition, and assuming a 20% blockage scenario for the culvert, there is some spillage of flows across the entrance to the site. The peak flow estimated to spill across the culvert embankment under this scenario is estimated to be 3.45 m^3/s, approximately.

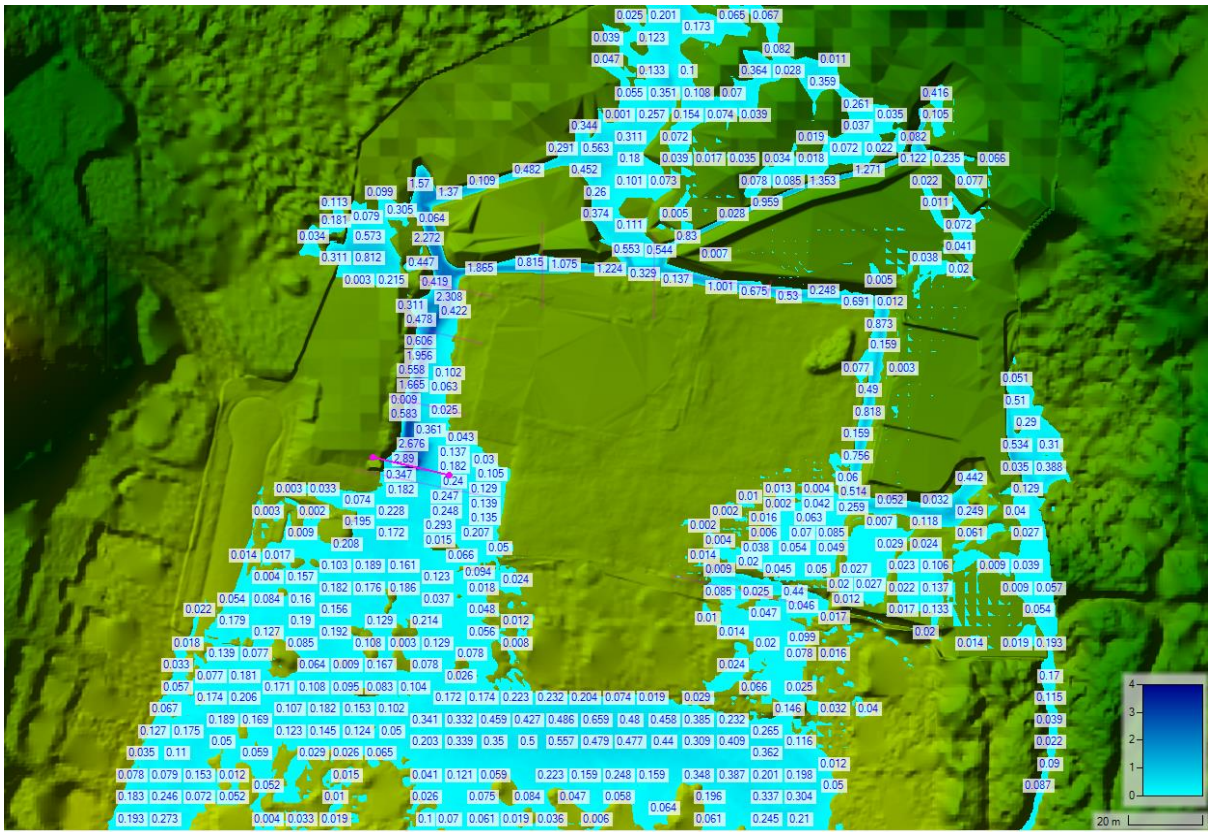

Figure 5: Pre-Development 100-year ARI Flood Map showing Flood Depths

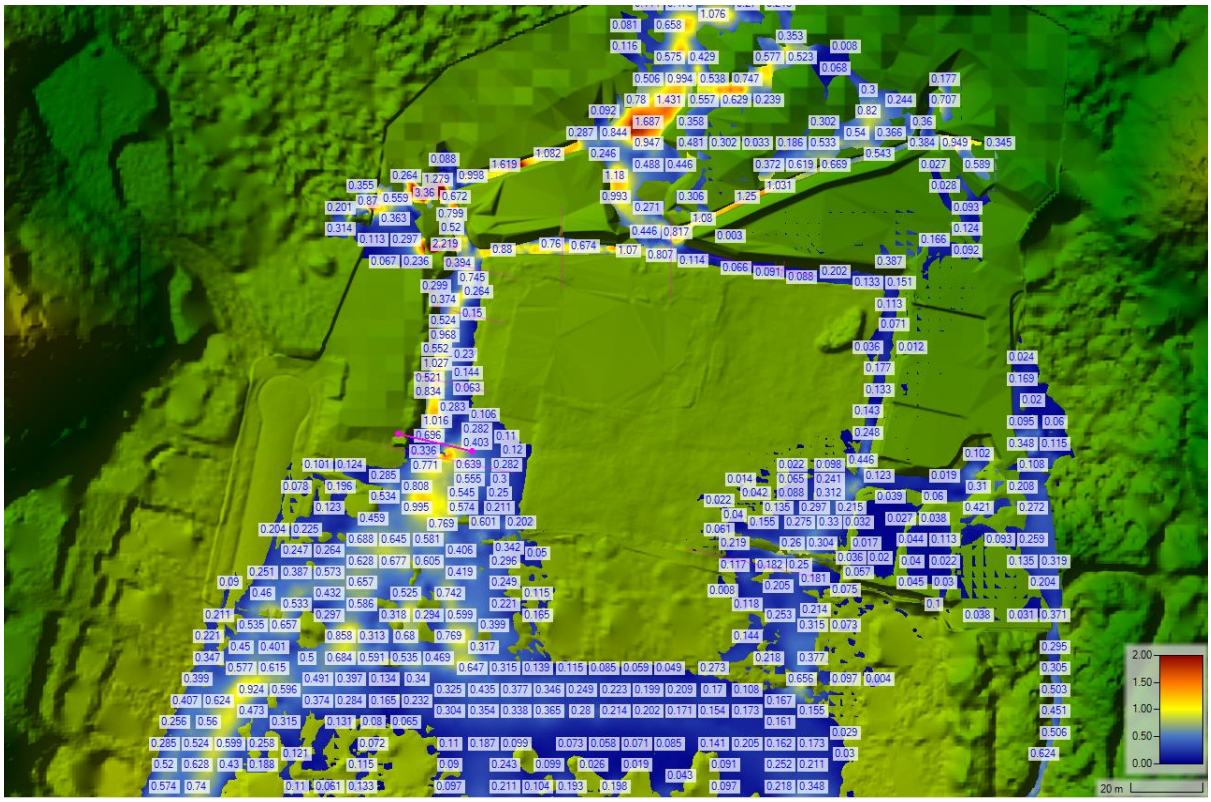

Figure 6: Pre-Development 100-year ARI Flood Map showing Flow Velocities

5.2 Modelling Results, Post-Development Condition

The post-development condition has also been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development 100-year ARI flood levels, flood depths and flow velocities are shown in Figures 7, 8 and 9 below, respectively.

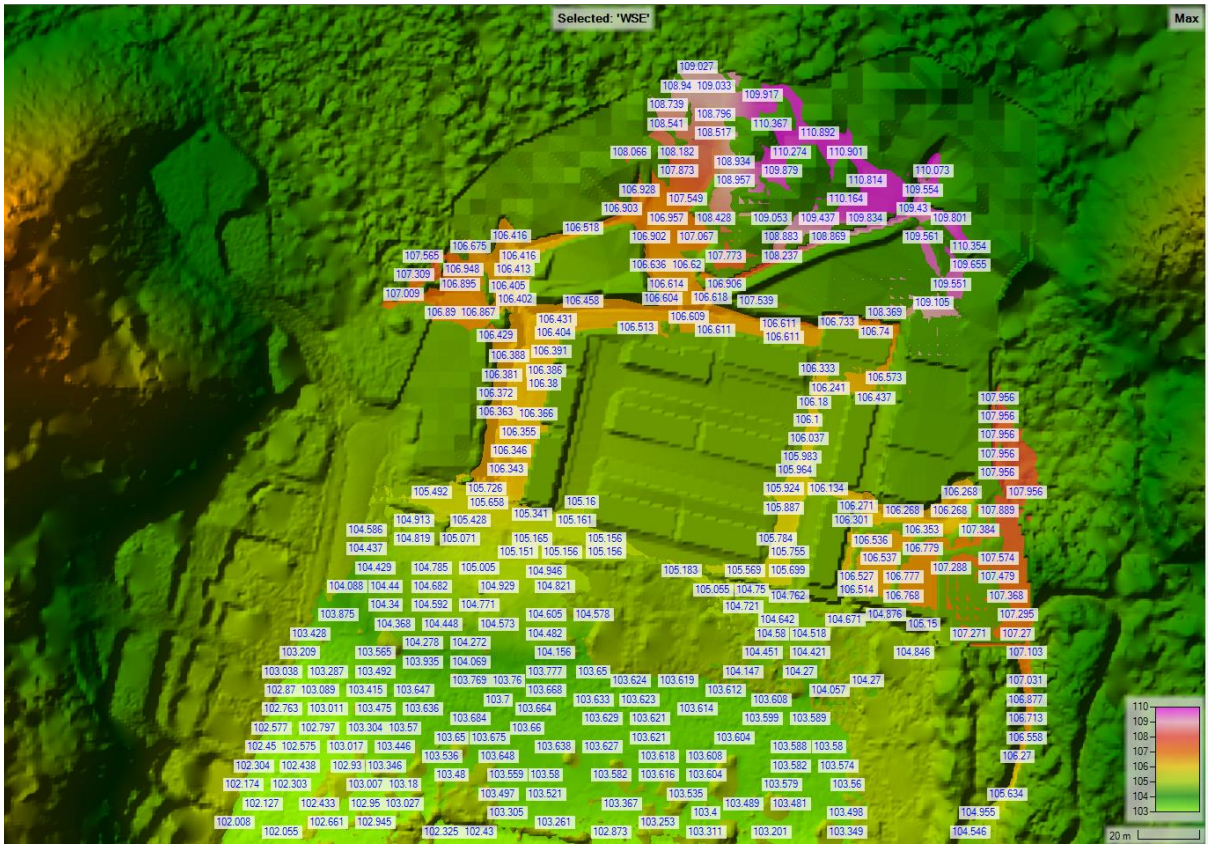

Figure 7: Post-Development 100-year ARI Flood Map showing Flood Levels

The results for the post-development scenario show that stormwater runoff from the northern catchment is directed along the channels adjacent to northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance. For this scenario, runoff from the eastern catchment is connected within the proposed pipe network, which ultimately discharges into the 1050 mm culvert.

Apart from the spillage across the culvert embankment, the post-development scenario also shows a very small amount of flow spilling across the south-eastern corner, of maximum 3.52 m^3/s. This flow is insignificant in the context of the 100-year ARI event, and it is expected that it will be fully contained within the kerb and channel in the proposed southern road (the design of this will be finalised during detailed design stage). The impact on downstream properties is thus expected to be negligible.

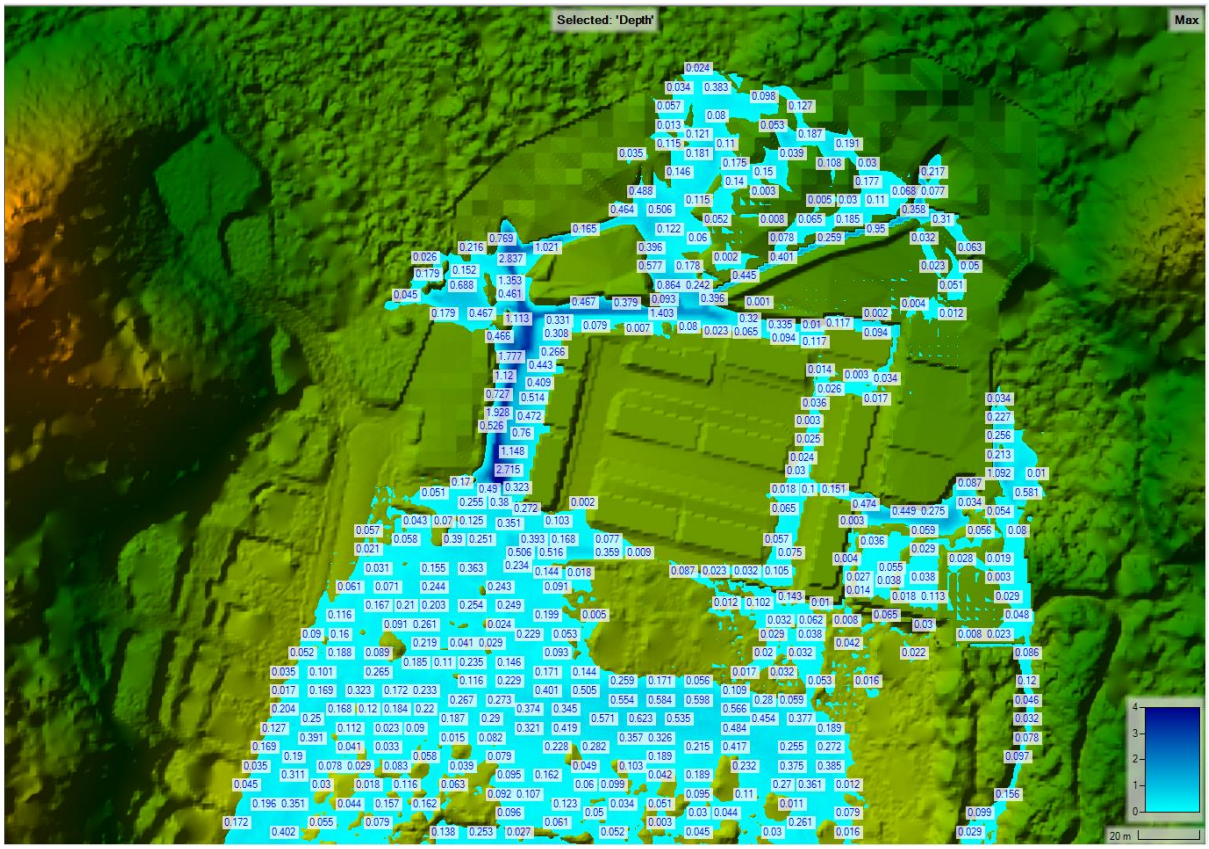

Figure 8: Post-Development 100-year ARI Flood Map showing Flood Depths

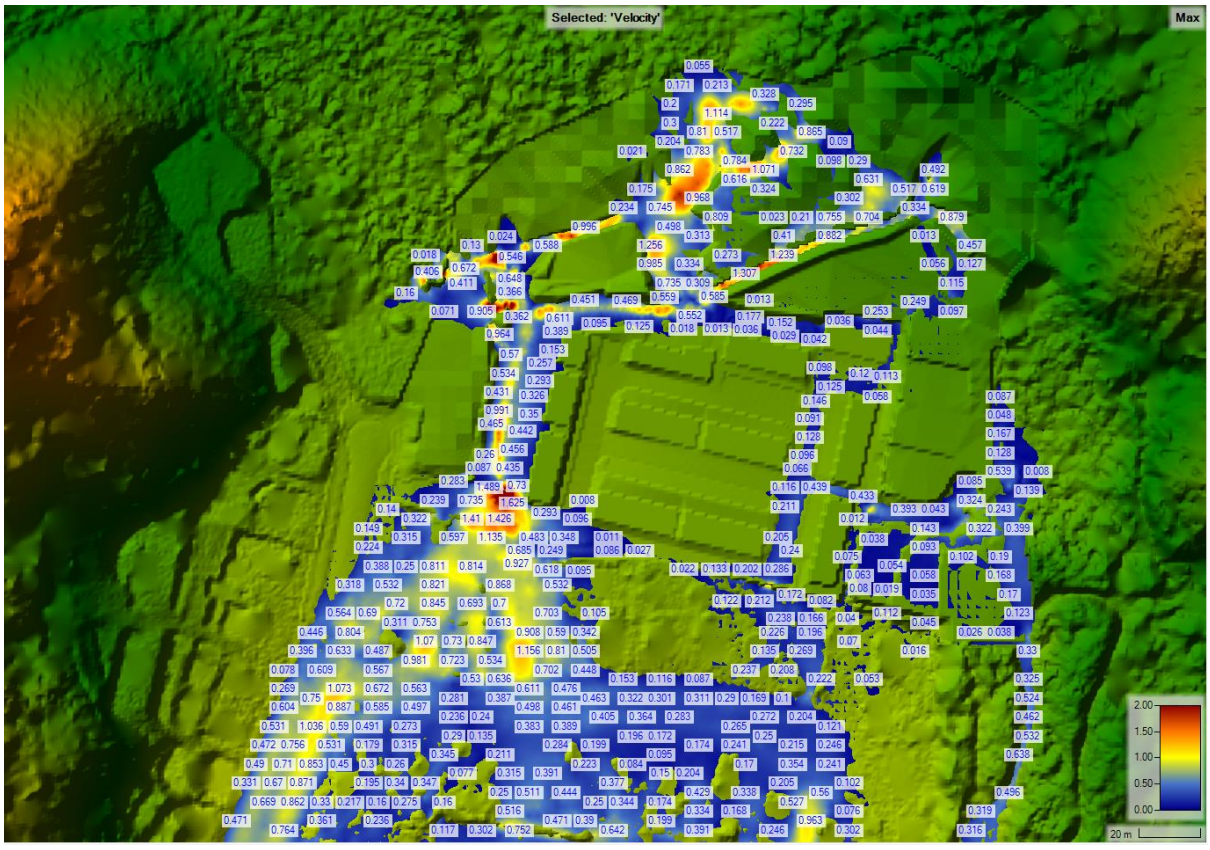

Figure 9: Post-Development 100-year ARI Flood Map showing Flow Velocities

5.3 Impact on Downstream Properties

As part of the proposed works, the existing crossing over the stream will be raised in level, and this will result in additional storage within the existing channels during the 100-year ARI event. While this causes water levels to rise behind the culvert, the flows will remain fully contained within the channels, thereby avoiding any adverse impacts on adjacent properties.

Downstream of the development, the revised 100yr ARI flood levels are predicted to decrease at west-southern and east-southern location, typically up to 370 mm by each location (green), as shown in Figure 10 below.

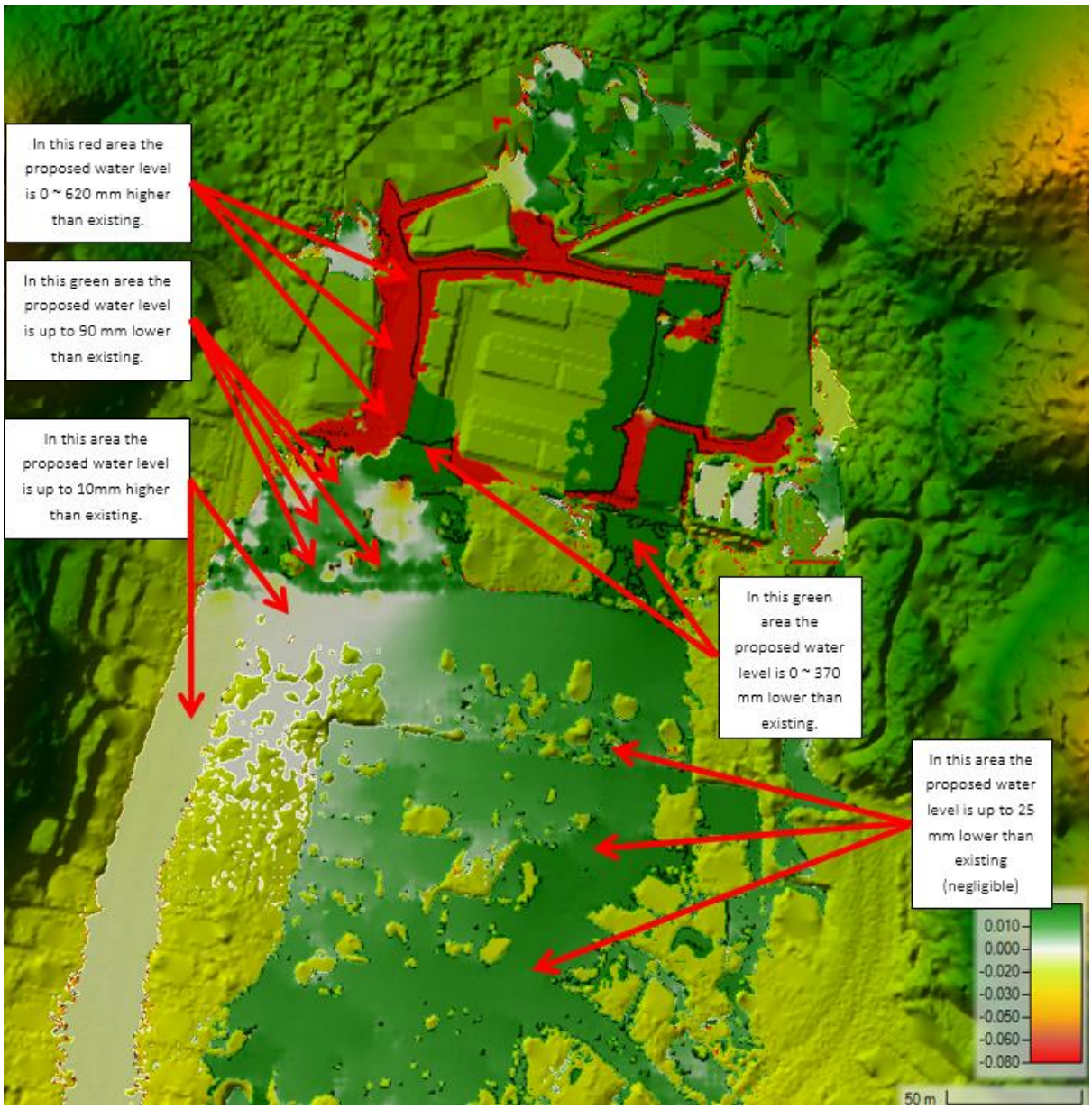

Figure 10: Comparison existing WSL and proposed WSL

In case of west-southern downstream impact, particularly on properties 100-104 Mohaka and 3-5 Rakaia Grove's proposed flood level is reduced up to 90 mm. as shown in Figure 11, 12, 13, 14 and 15 below, respectively.

Figure 11: Cross-sections for Pre-Development and Post-Development flood levels on west-southern properties.

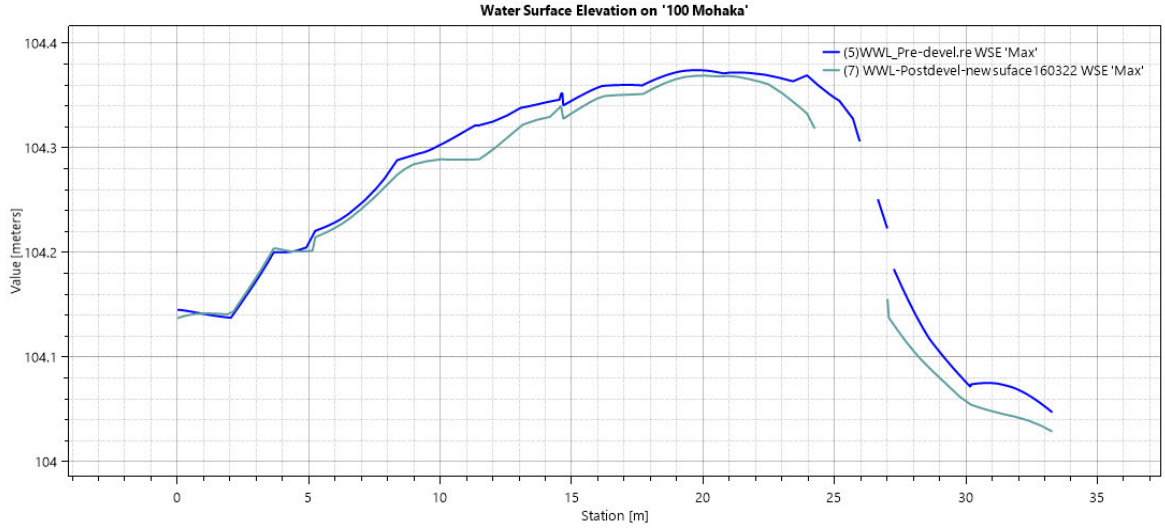

Figure 12: Pre-Development and Post-Development flood levels on 100 Mohaka St.

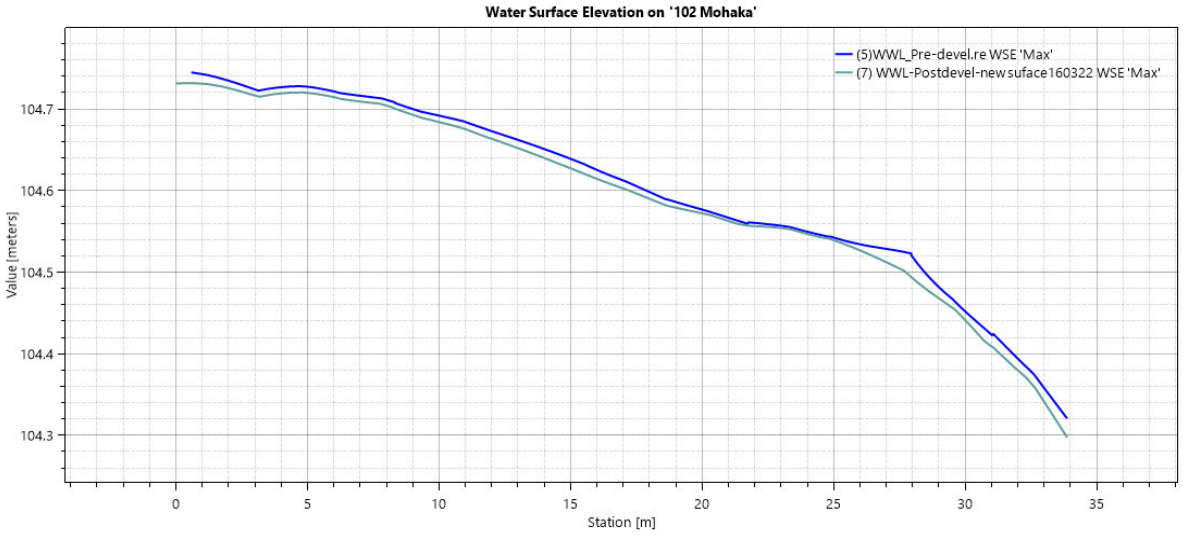

Figure 13: Pre-Development and Post-Development flood levels on 102 Mohaka St.

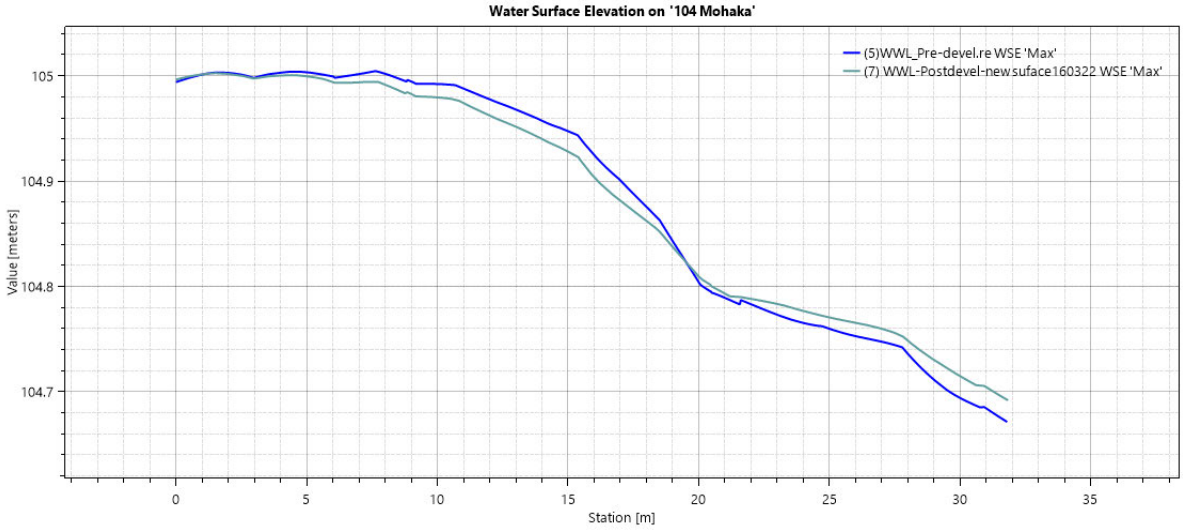

Figure 14: Pre-Development and Post-Development flood levels on 104 Mohaka St.

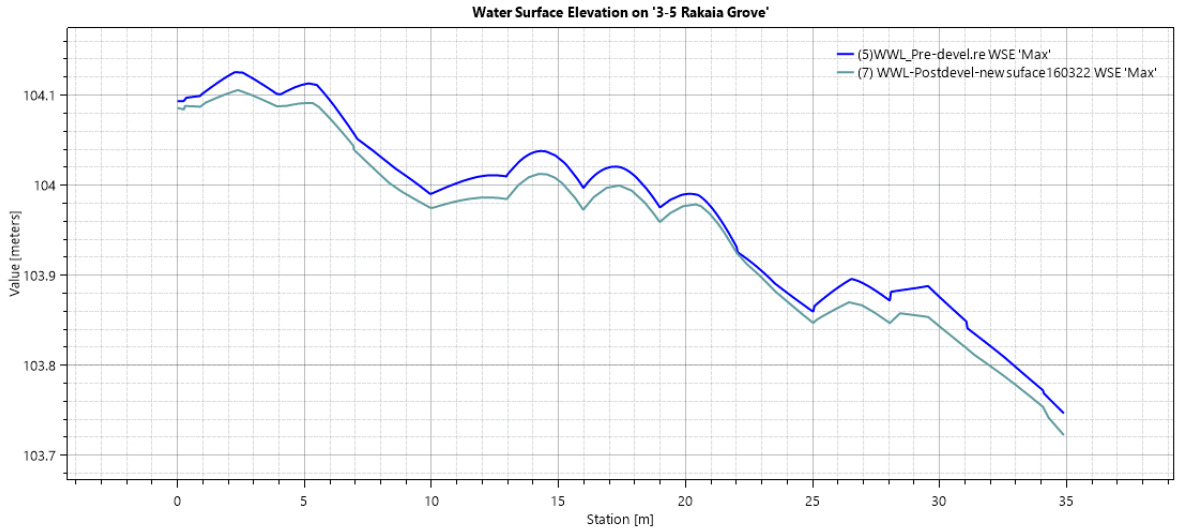

Figure 15: Pre-Development and Post-Development flood levels on 3-5 Rakaia Grove

In conclusion, the analysis shows that the proposed development will result in "no more than minor" effects with regards to flooding (in fact likely to result in net positive results given the predicted reduced flow depth downstream), and especially considering that any benefits likely to arise from the proposed on-site attenuation is ignored in the analysis.

5.4 Minimum Recommended Floor Levels

Based on the flood assessment, minimum floor levels have been determined based on council's criteria for a minimum freeboard of 500 mm above the predicted 100-year ARI flood levels, for habitable floors that are adjacent to a 100-year floodplain or overland flow path.

For all other lots, a 200 mm freeboard to the adjacent ground is required in accordance with the requirements of the building code.

Refer **Table 2** below for the minimum recommended level for the underside of the structural concrete slab (or underside of floor joists).

Lot #	Adjacent to 100yr ARI OLFP or Flood Plain?	100-year ARI Flood Level (RL. m)	Recommended Minimum Underside of Slab Level (m)	Freeboard (mm)
1	Yes	106.36	106.86	500 above Flood Level
2	Yes	106.36	106.86	500 above Flood Level
3	Yes	106.36	106.86	500 above Flood Level
4	Yes	106.36	106.86	500 above Flood Level
5	Yes	106.39	106.89	500 above Flood Level
6	Yes	106.39	106.89	500 above Flood Level
7	Yes	106.39	106.89	500 above Flood Level
8	Yes	106.41	106.91	500 above Flood Level
9	Yes	106.41	106.91	500 above Flood Level
10	Yes	106.61	107.11	500 above Flood Level
11	Yes	106.61	107.11	500 above Flood Level
12	Yes	106.61	107.11	500 above Flood Level
13	Yes	106.61	107.11	500 above Flood Level
14	Yes	106.61	107.11	500 above Flood Level
15	Yes	106.61	107.11	500 above Flood Level
16	Yes	106.61	107.11	500 above Flood Level
17	Yes	106.61	107.11	500 above Flood Level
18	Yes	106.61	107.11	500 above Flood Level
19	Yes	106.74	107.24	500 above Flood Level
20	Yes	106.74	107.24	500 above Flood Level
21	Yes	106.74	107.24	500 above Flood Level
22	Yes	106.74	107.24	500 above Flood Level
23	Yes	106.27	106.77	500 above Flood Level
24	Yes	106.27	106.77	500 above Flood Level

25	Yes	106.27	106.77	500 above Flood Level
26	Yes	106.27	106.77	500 above Flood Level
27	Yes	106.27	106.77	500 above Flood Level
28	Yes	106.27	106.77	500 above Flood Level
29	Yes	106.27	106.77	500 above Flood Level
30	Yes	106.27	106.77	500 above Flood Level
31	Yes	106.27	106.77	500 above Flood Level
32	Yes	106.27	106.77	500 above Flood Level
33	Yes	105.80	106.30	500 above Flood Level
34	No	N/A	106.10	200 above Ground Level
35	No	N/A	106.10	200 above Ground Level
36	No	N/A	106.10	200 above Ground Level
37	No	N/A	106.10	200 above Ground Level
38	No	N/A	105.87	200 above Ground Level
39	No	N/A	105.87	200 above Ground Level
40	No	N/A	105.87	200 above Ground Level
41	No	N/A	105.87	200 above Ground Level
42	No	N/A	105.87	200 above Ground Level
43	No	N/A	106.23	200 above Ground Level
44	No	N/A	106.23	200 above Ground Level
45	No	N/A	106.23	200 above Ground Level
46	No	N/A	106.23	200 above Ground Level
47	No	N/A	106.23	200 above Ground Level
48	No	N/A	106.39	200 above Ground Level
49	No	N/A	106.39	200 above Ground Level
50	No	N/A	106.39	200 above Ground Level
51	No	N/A	106.39	200 above Ground Level
52	Yes	106.00	106.50	500 above Flood Level

Table 2 – 100-year ARI Flood Level and Minimum Habitable Floor Freeboard Requirements

5.5 Internal Overland Flow Paths

As discussed in the previous sections, 100-year ARI overland flows arising from the upstream catchments will be managed via the perimeter drainage channels, 1050mm culvert and internal reticulation that accepts flows from the eastern catchment, which is designed to convey 100-year ARI flows.

Overland flows within the subdivision itself are small, as any runoff generated within the site originates only from the site itself. Any excess flows in addition to the capacity of the underground piped network will be conveyed along the internal local roads toward the southwestern part of the site, where the 1050mm culvert breach point is located.

6 // Conclusion

This report has been prepared to assess the flood risk both within the site and at the adjacent residential properties west and south (downstream) of the site.

Our analysis concludes that the 100-year flows are adequately controlled in the post-development condition, and such that any impact on downstream properties to the south and properties to the west of the site no more than minor.

Minimum recommended floor levels have been identified through this work to ensure that the 100-year ARI freeboard requirements are achieved in accordance with Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0).

All other aspects of the stormwater system will be designed to conform with the relevant council standards and building code requirements.

As such we consider that Wellington Water and Hutt City Council should give favourable consideration to the proposed development, from a flood risk perspective.

Appendix A – Engineering Calculations

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106 Mohaka Street, Wainuiomata, Lower Hutt

Flood Assessment

CONTENTS:

Reason for this Revision: Wellington Water Queries

Calculations By:	PP
Checked By:	AR
Ref:	P20-156-Clc02
Date:	06.04.2022
Revision:	D

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	1
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

A Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to assist in the flood modelling and report.

This document presents the flood modelling for the post development scenario.

B Basis of Design

The design presented herein is based on Wellington's Land Development and Subdivision Code of Practice and associated documents, for the contributing catchment assuming maximum probable development (MPD) conditions. The hydrology parameters are selected based on guidance from Wellington Water's Reference Guide for Design Storm Hydrology.

C Stormwater

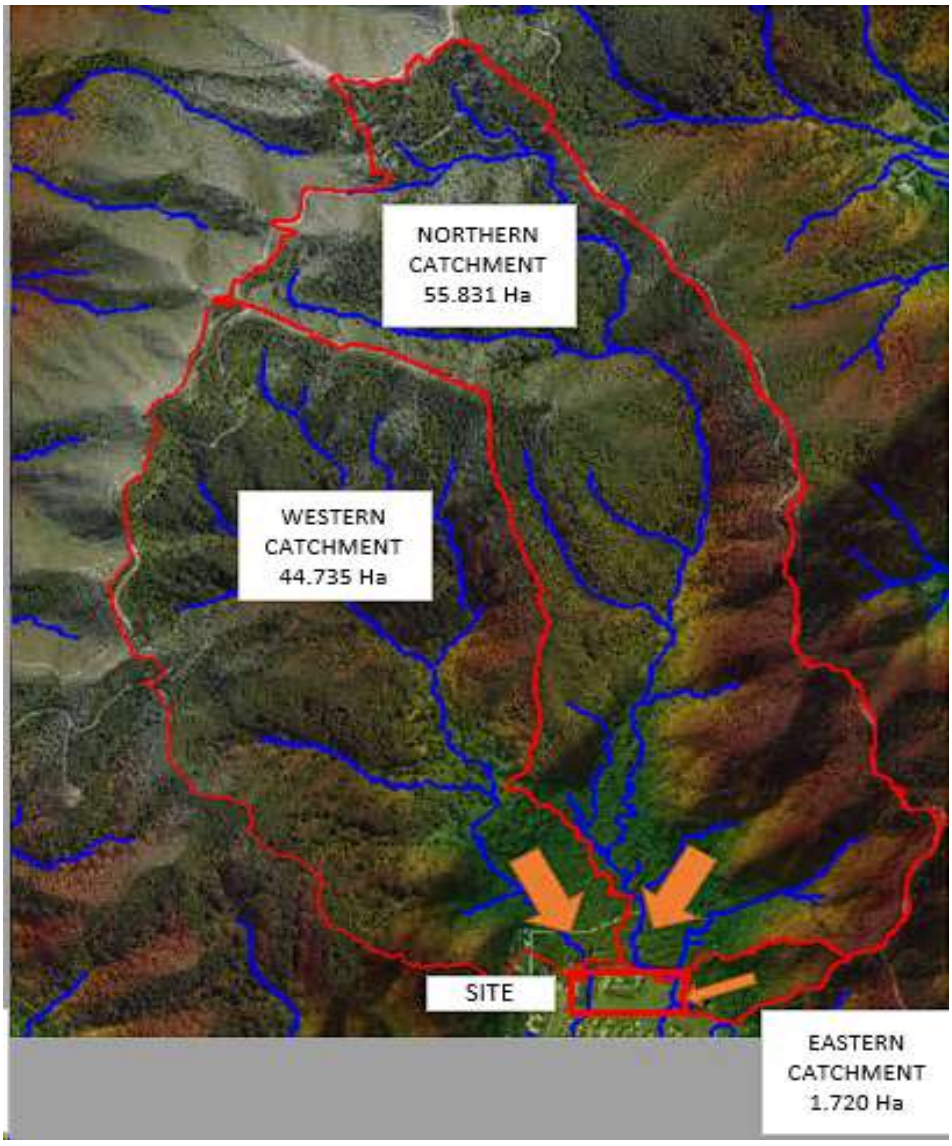
C.1 Flood Management Design Philosophy

The area is under the influence of the unnamed catchments as shown below. ARAL has undertaken an independent hydrology and hydraulics analysis using HEC-HMS and HEC-RAS to determine the peak flows and flooding extents.

The design philosophy focuses on retaining the existing topography as much as possible and applying a low impact design (LID) approach to maintain pre-development hydrology and flows, and minimise adverse effects on the environment and neighbouring properties which may result from the development.

This calculation sheet will cover the 100-year peak flows and flood mapping regarding max. water depth, max. water surface level, and max. water velocity for an MPD condition.

The 100yr Catchments showing the site location are shown below.



C.2 Design Assumptions and Parameters

Climate Change:

The SCS Curve Number method was used with the HEC-HMS modelling software to calculate the amount of runoff from a rainfall event. The 1% Annual Exceedance Probability (AEP) or 100-year Average Recurrence Interval (ARI) event was assessed for the flood analysis. An RCP6.0 for the year 2081-2100 was used for the climate change factor from HIRDS v4.

**** Nested Storm rainfall profile (12-hour storm duration is used for this assessment)**

RCP6.0 for the period 2081-2100(Depth, mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	
1.58	0.633	8.29	11.3	13.6	19.1	26.7	44.4	59.4	77.4	
2	0.5	9.16	12.4	15	21.1	29.5	48.9	65.4	84.8	
5	0.2	12.2	16.5	19.9	27.8	38.8	64.1	85.5	110	
10	0.1	14.5	19.5	23.6	32.9	45.8	75.4	101	130	
20	0.05	16.9	22.7	27.4	38.1	53.1	87.2	116	149	
30	0.033	18.3	24.7	29.7	41.4	57.5	94.3	125	161	
40	0.025	19.4	26.1	31.4	43.7	60.6	99.5	132	169	
50	0.02	20.2	27.2	32.8	45.5	63.2	103	137	176	
60	0.017	20.9	28.2	33.9	47	65.2	107	142	182	
80	0.012	22.1	29.7	35.7	49.5	68.6	112	148	190	
100	0.01	22.9	30.8	37	51.4	71.1	116	154	197	
250	0.004	26.6	35.6	42.8	59.2	81.8	133	176	225	

Curve Numbers:

	CN	
Upstream undeveloped catchments	61	Based on Appendix B or Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	98	

Initial Abstraction:

The Initial Abstraction parameter is estimated as 0.1 x S, as per Wellington Water's Reference Guide for Design Storm Hydrology, as follows:

	Ia	
Upstream undeveloped catchments	16.24	Based on Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	0	

Terrain Data:

- Wellington Lidar 1m DEM (2013-2014, LINZ), Projection: NZGD / Wellington 2000, Vertical Datum: NZVD2016
- Existing survey completed by Cuttriss, Surveyors, Engineers, Planners Ltd, 11.2020
- Proposed Terrain design for project site by AR Associates Ltd.
- Site scheme plan, Moore Design, 23.12.20

Proposed Plan:

	Max Coverage	Average MPD Impervious	
Pre-Development	0%	0%	
Post-Development	65%	70%	<- Assumed

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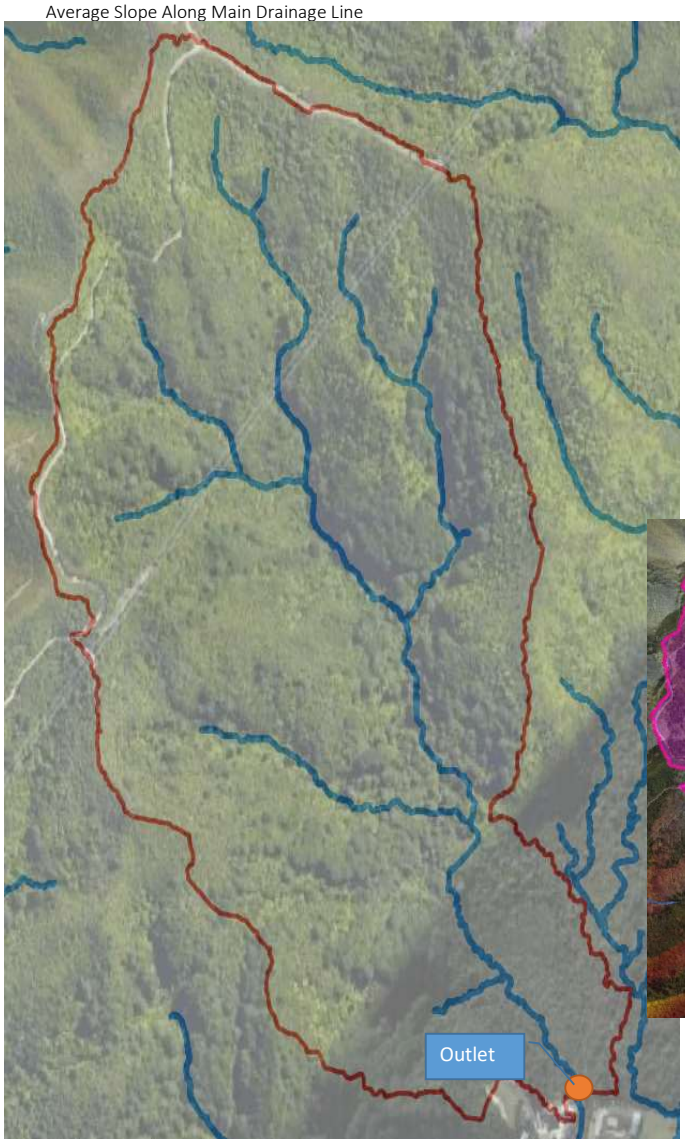
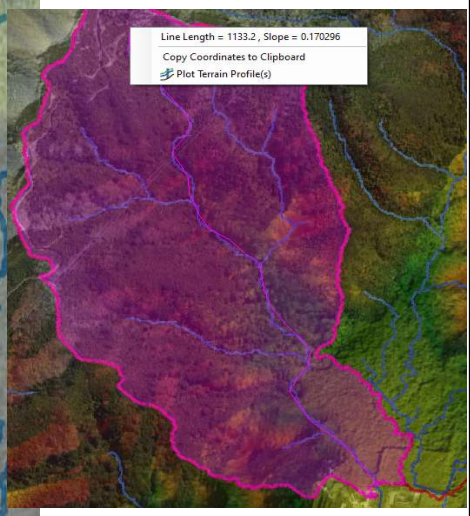
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	3
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

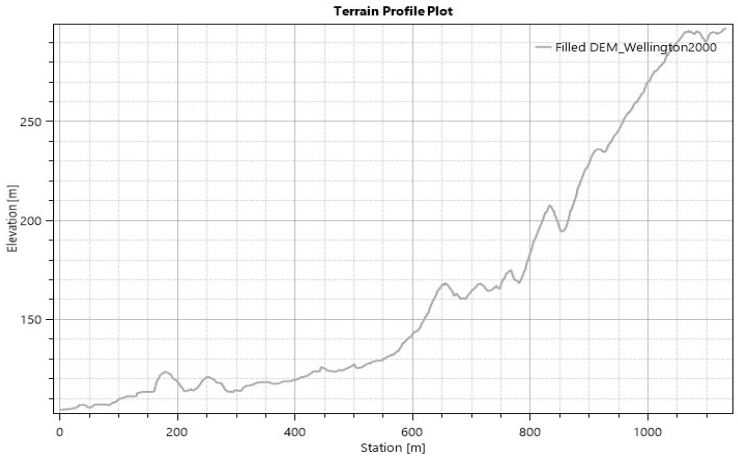
C.3 Catchment Analysis - Western Catchment

Average Slope Along Main Drainage Line





Slope =	0.108



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	4
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

Catchment Area

Total	444783	m2
	0.444783	km2
	44.4783	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.13	From above
Catchment slope Sc (equal area method)	0.108	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.47	(TP108)
Tc (min)	27.97	
Lag time (min)	18.65	
Tc (min)	10.32	(Ramser Kirpich Tc) - Suited to catchments with well-defined drainage channels.
Lag time (min)	6.88	
Tc (min)	28.17	(Bransby Williams Tc) - Suited to catchments without well-defined drainage channels.
Lag time (min)	18.78	
Average(min)	**19.25**	
Lag time (min)	**12.83**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		44478	10.0%
CN (Mountainous)	61		400305	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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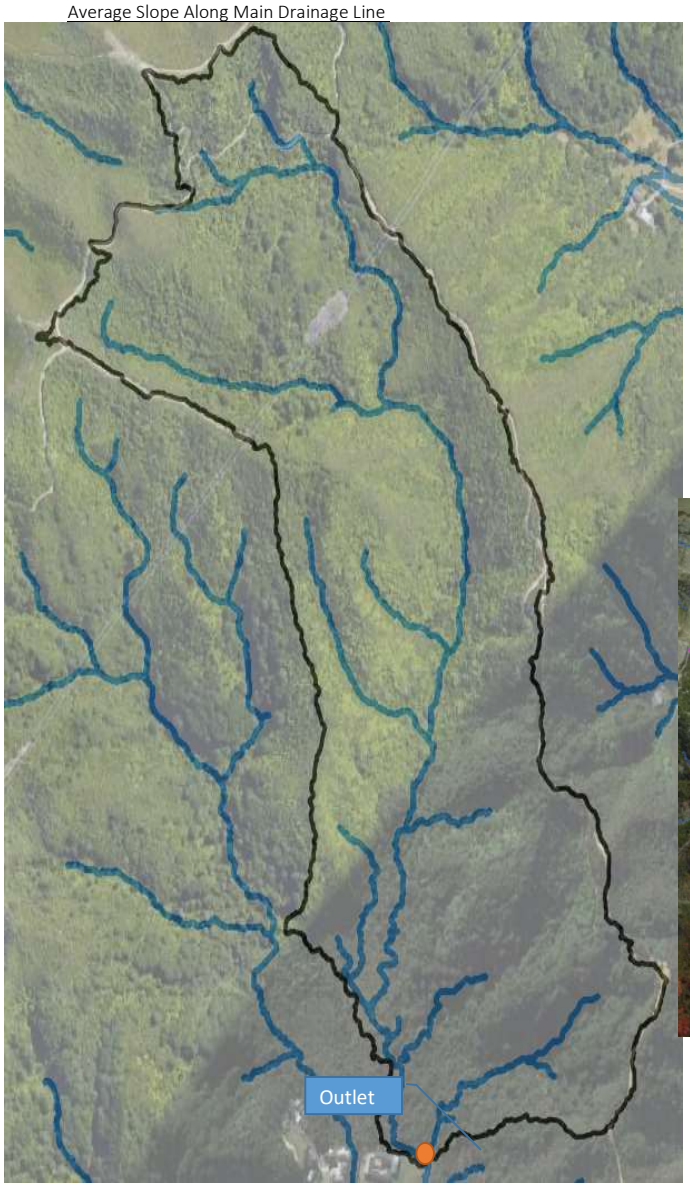
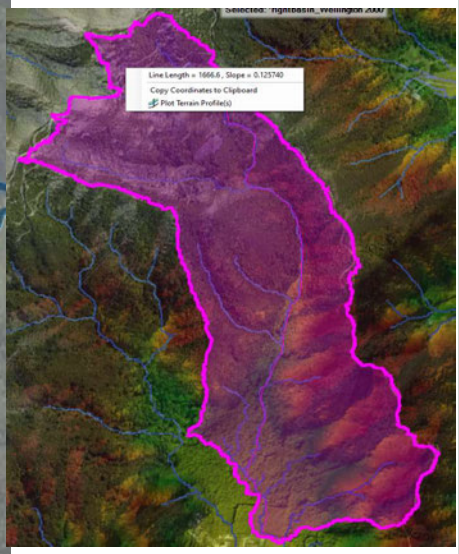
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	5
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

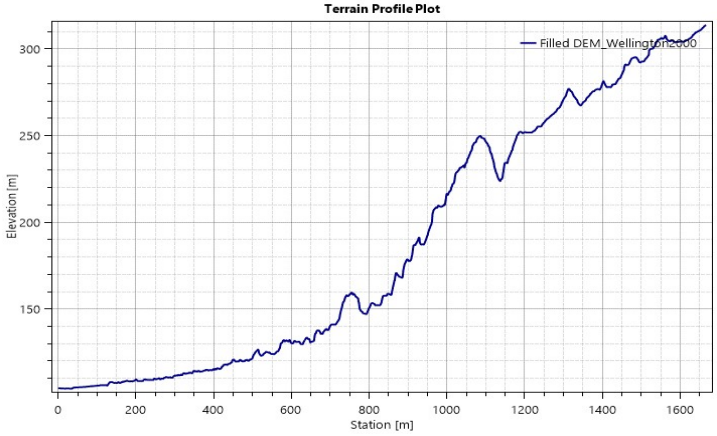
C.4 Catchment Analysis - Northern Catchment

Average Slope Along Main Drainage Line





Slope = 0.0998



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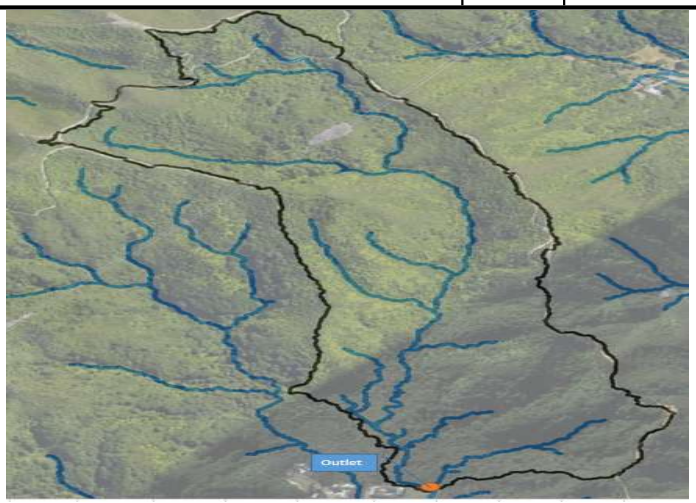
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	6
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		



Catchment Area

Total	558312	m2
	0.558312	km2
	55.8312	ha

Pre-Development

Impervious Area

	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.67	From above
Catchment slope Sc (equal area method)	0.0998	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.62	
Tc (min)	36.96	
Lag time (min)	24.64	
Tc (min)	14.33	**(Ramser Kirpich Tc)**
Lag time (min)	9.55	
Tc (min)	41.16	(Bransby Williams Tc)
Lag time (min)	27.44	
Average(min)	**27.74**	
Lag time (min)	**18.50**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		55831.2	10.0%
CN (Mountainous)	61		502480.8	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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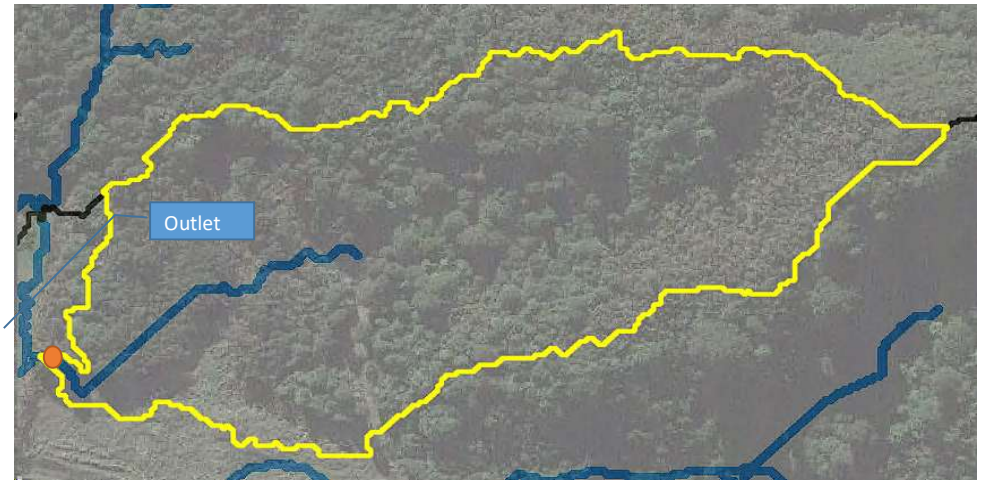
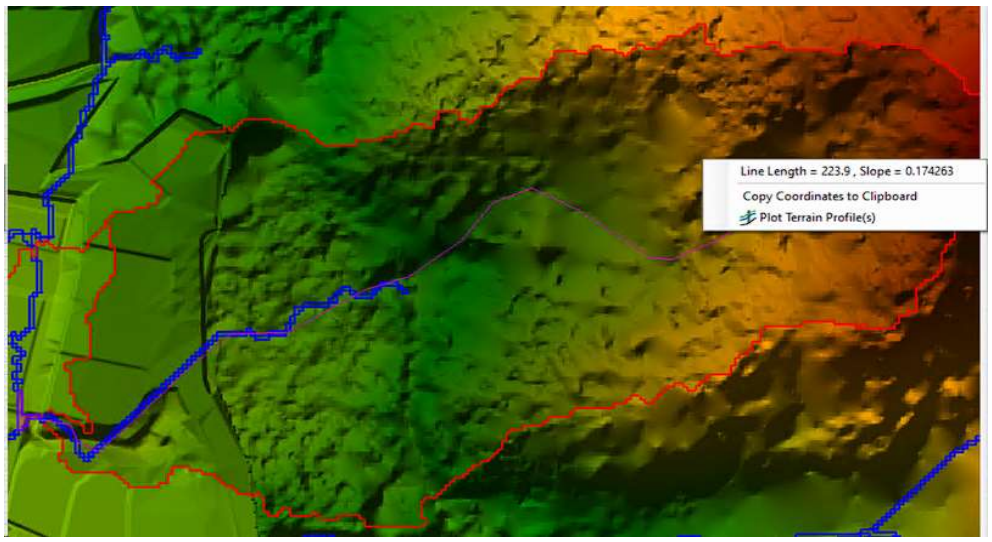
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	7
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.5 Catchment Analysis - Eastern Catchment

Average Slope Along Main Drainage Line





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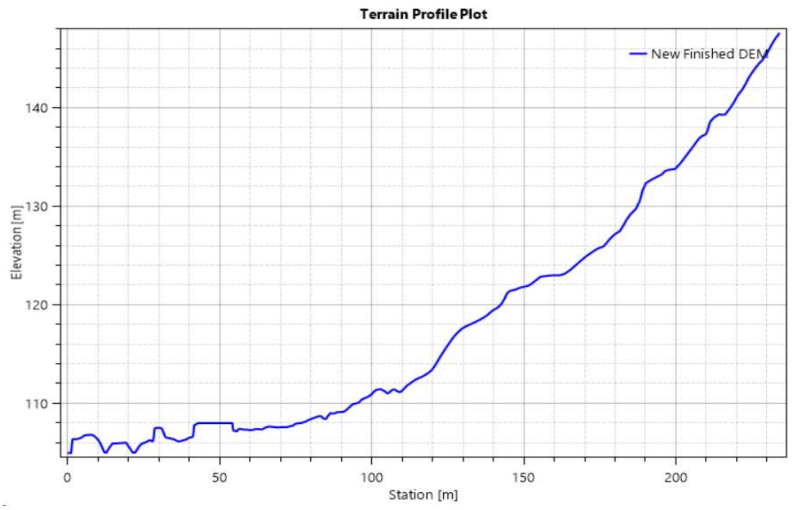

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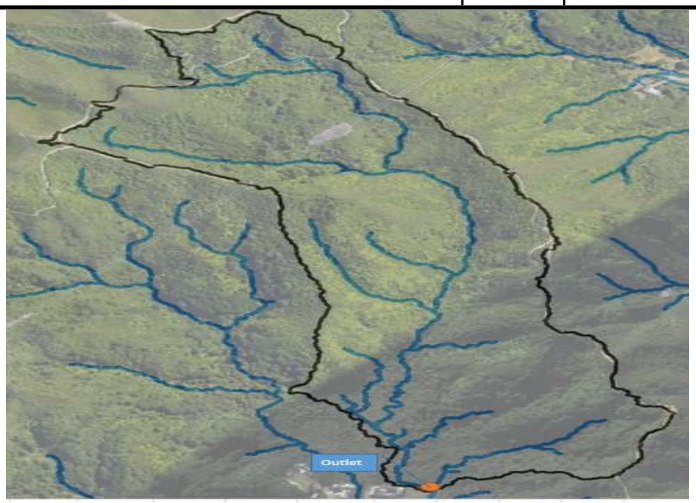
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	8
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		



Catchment Area

Total	17206	m2
	0.017206	km2
	1.7206	ha

Pre-Development

Impervious Area 0 m2

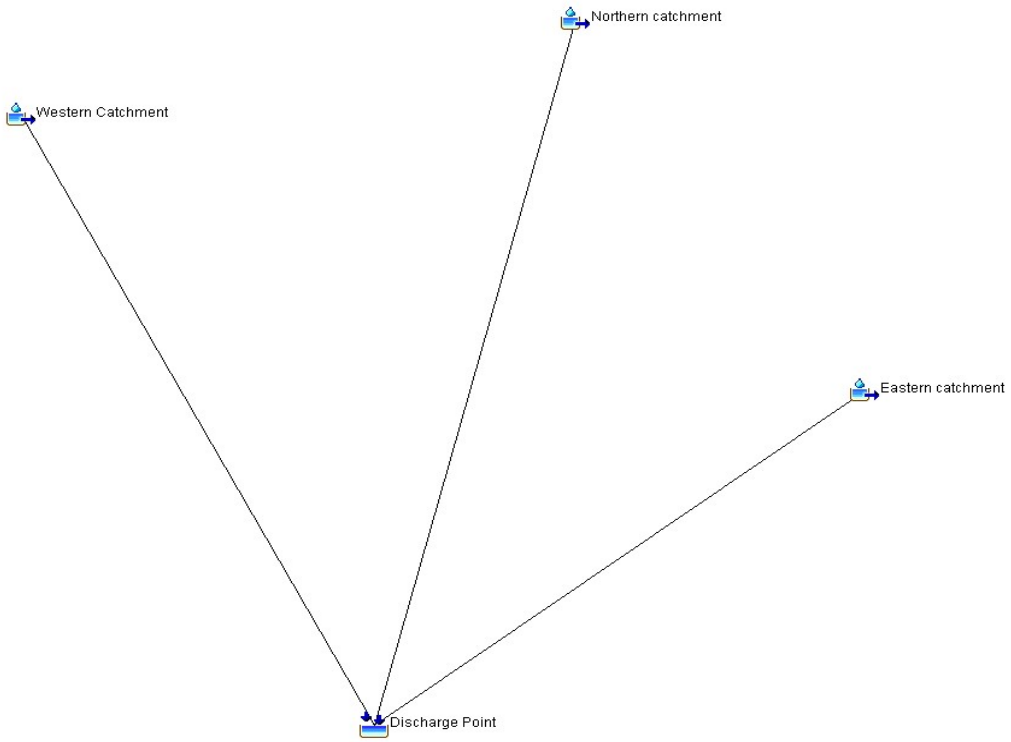
Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	0.23	From above
Catchment slope Sc (equal area method)	0.1127	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.17	
Tc (min)	10.20	
Lag time (min)	6.80	
Tc (min)	3.02	**(Ramser Kirpich Tc)**
Lag time (min)	2.01	
Tc (min)	7.99	(Bransby Williams Tc)
Lag time (min)	5.32	
Average(min)	**5.50**	
Lag time (min)	**3.67**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		1720.6	10.0%
CN (Mountainous)	61		15485.4	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

C.6 HEC-HMS Model & Results



Average Tc (Ramser and Bransby)

Global Summary Results for Run "100yr Proposed"

Project: P20-156-WWL Simulation Run: 100yr Proposed

Start of Run: 01Jan2020, 00:00
End of Run: 01Jan2020, 12:00
Compute Time: 25Mar2022, 13:10:54

Basin Model: 100yr Proposed
Meteorologic Model: 100yr +CC
Control Specifications: 24hr

Show Elements: All Elem... Volume Units: MM 1000 M3 Sorting: Hydrol...

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Western Catchment	0.444783	5.9	01Jan2020, 08:14	62.23
Northern catchment	0.558312	6.1	01Jan2020, 08:20	61.68
Eastern catchment	0.017206	0.3	01Jan2020, 08:06	63.12
Discharge Point	1.020301	11.7	01Jan2020, 08:16	61.94

CALCULATION SHEET

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Description:	Flood Assessment	Designed:	PP		
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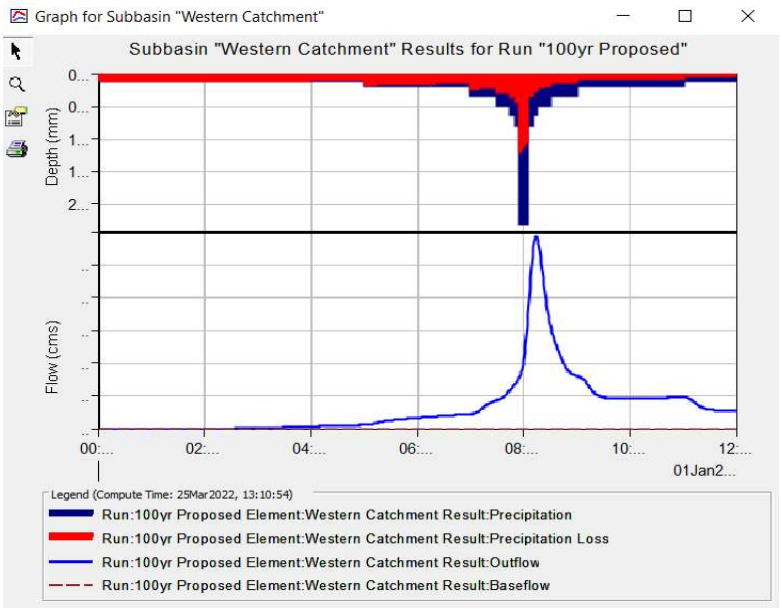
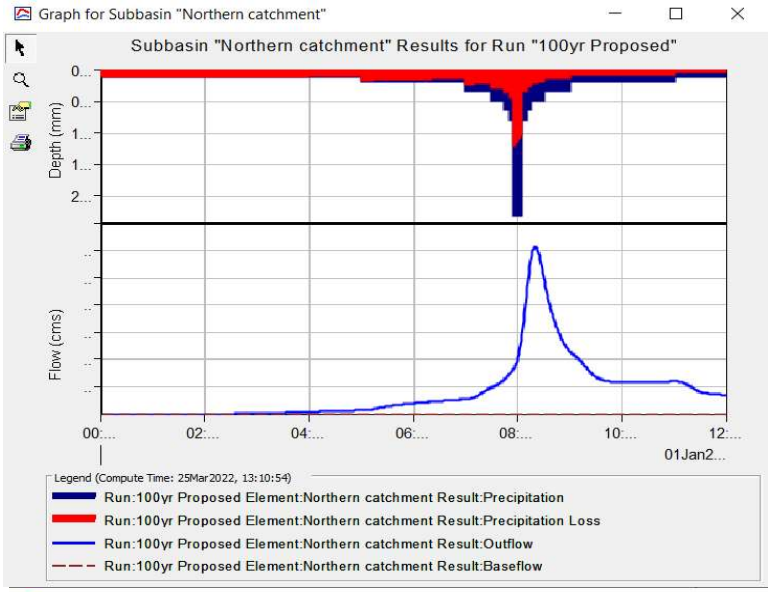
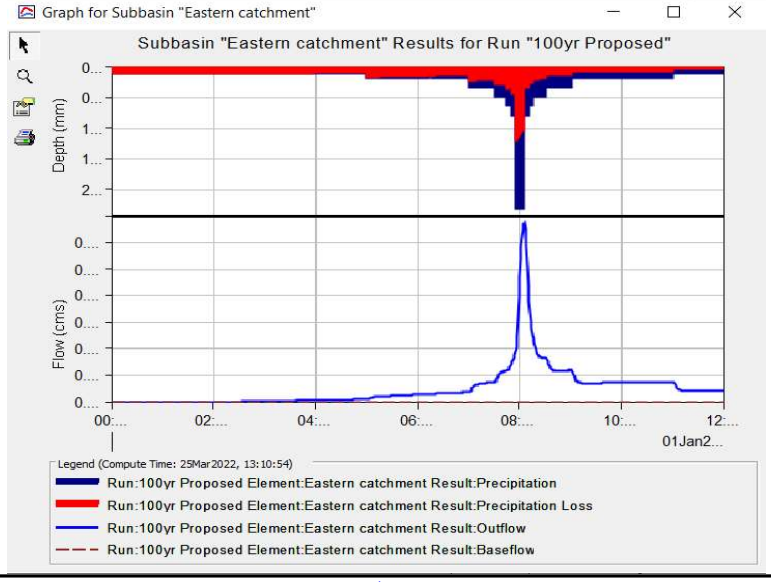
C.6 HEC-HMS Model & Results







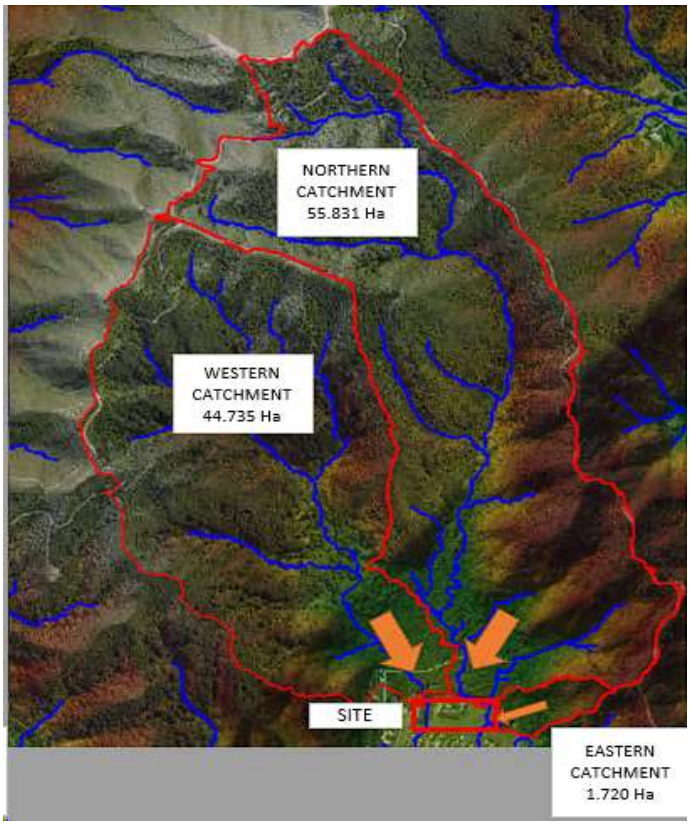
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	11
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

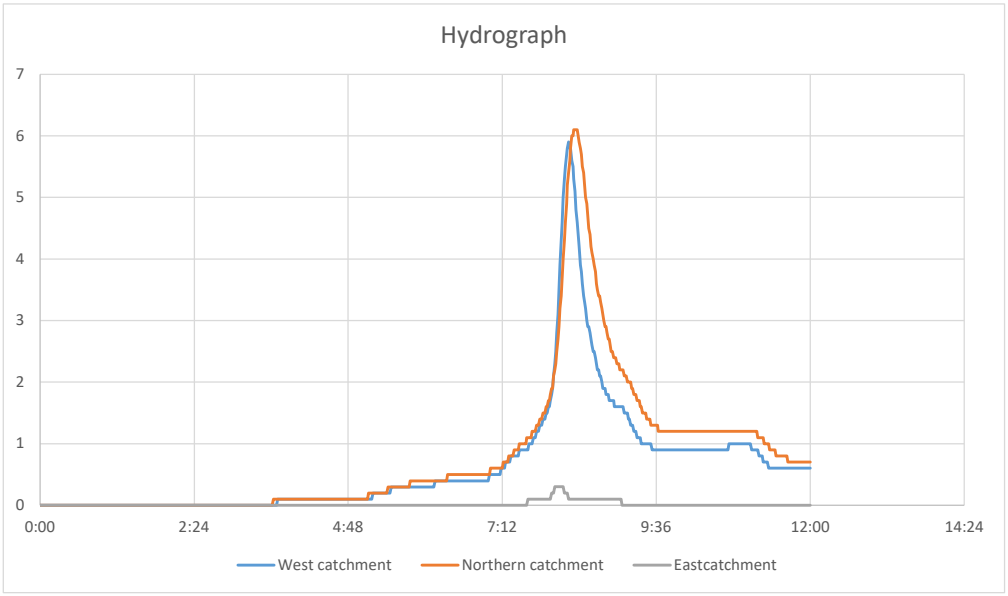
C.7 HEC-RAS Setup

Grid Size: 3m x 3m
Computation Interval: 0.5 sec
Manning: 0.07
Culvert blockage: Ex. Culvet 1050 (20%), Ex. Culvert 225 (50%), Prop. Culvert 525 (20%)

HEC-RAS Model Build:



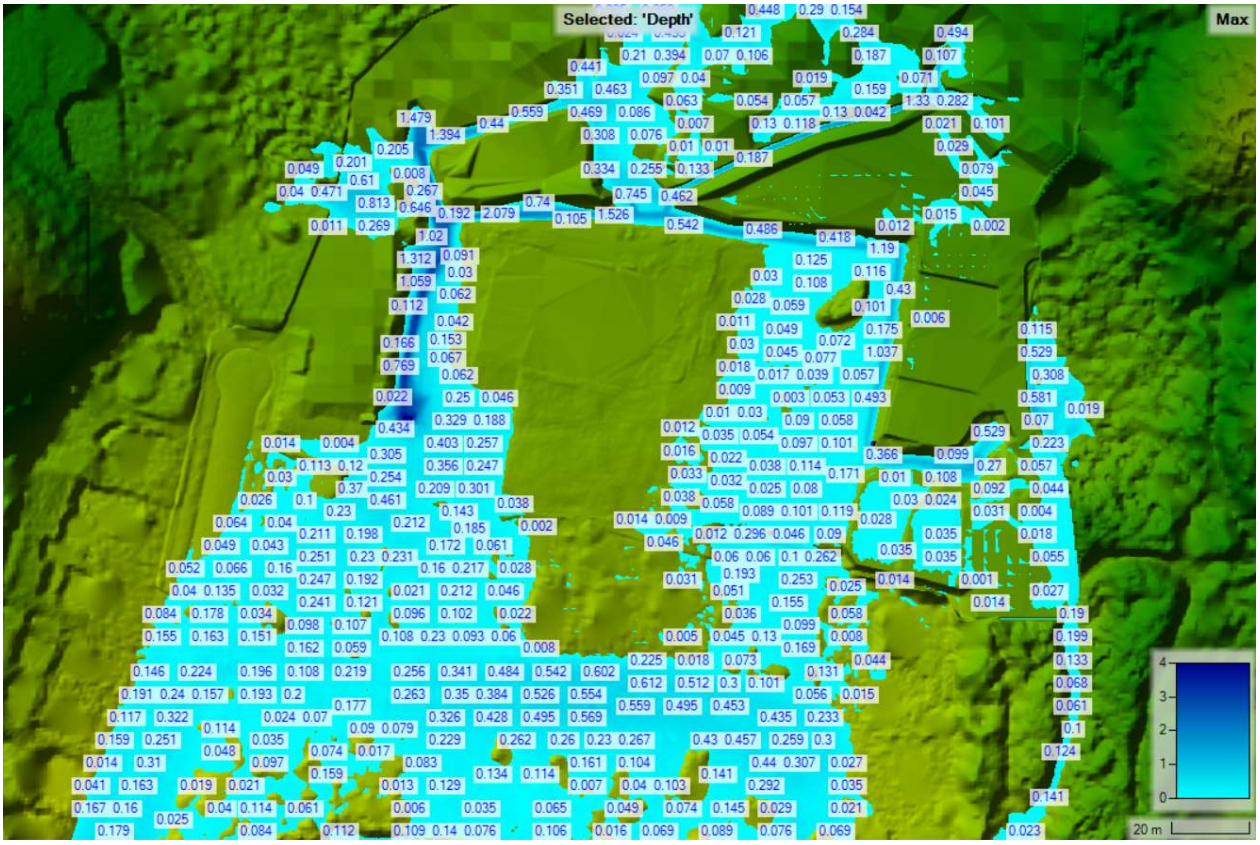
100-yr Hydrograph to be used for HEC-RAS



CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 12
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

C.8 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Depth

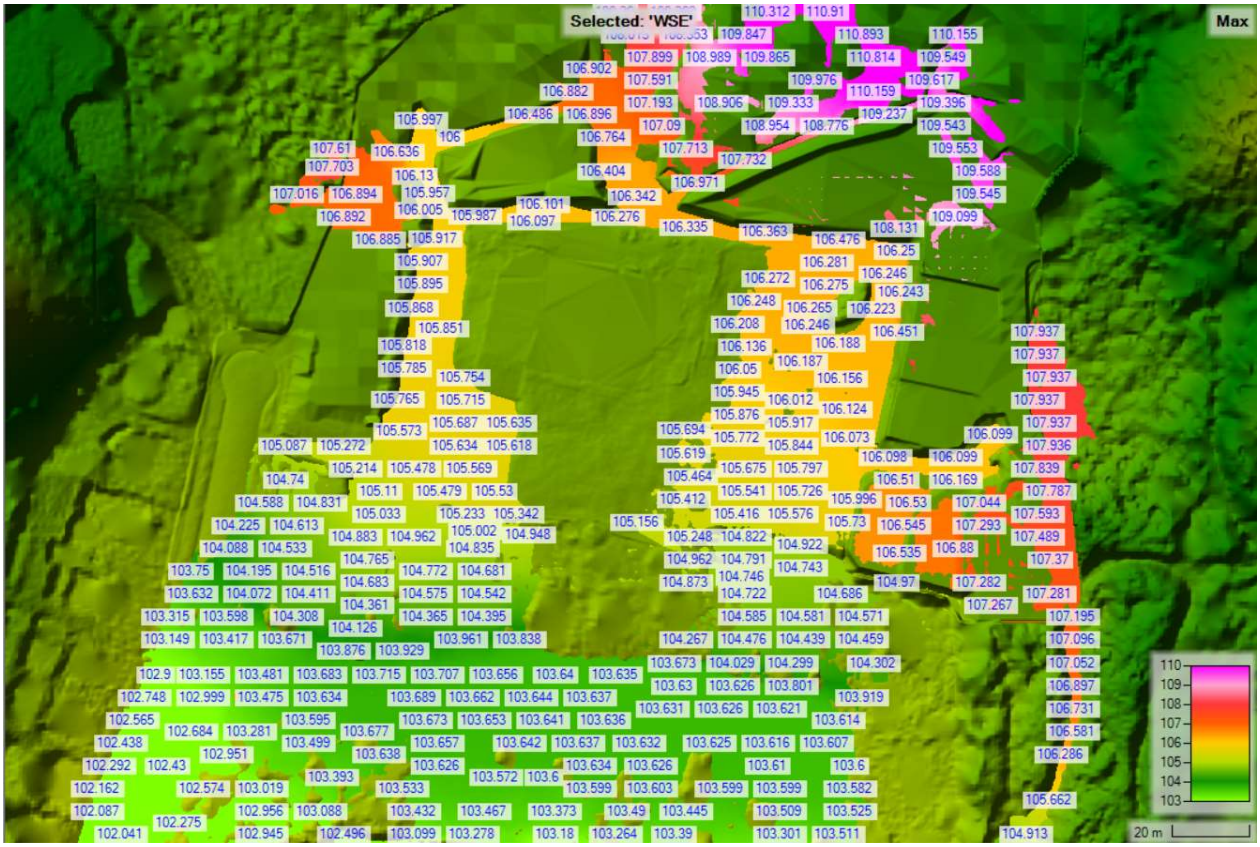


AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

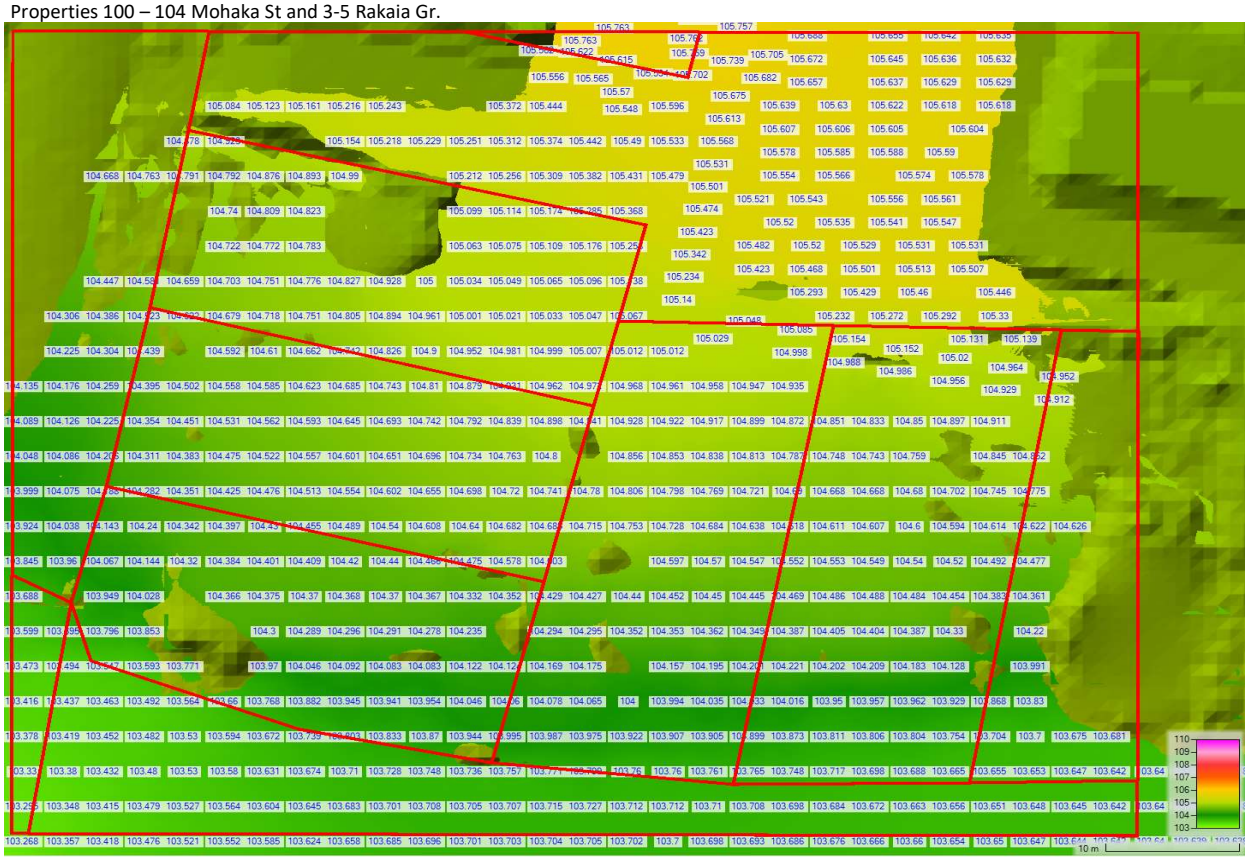
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	13
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.9 HEC-RAS Results: 100-yr, Pre-Dev - Water Surface Elevation



Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.

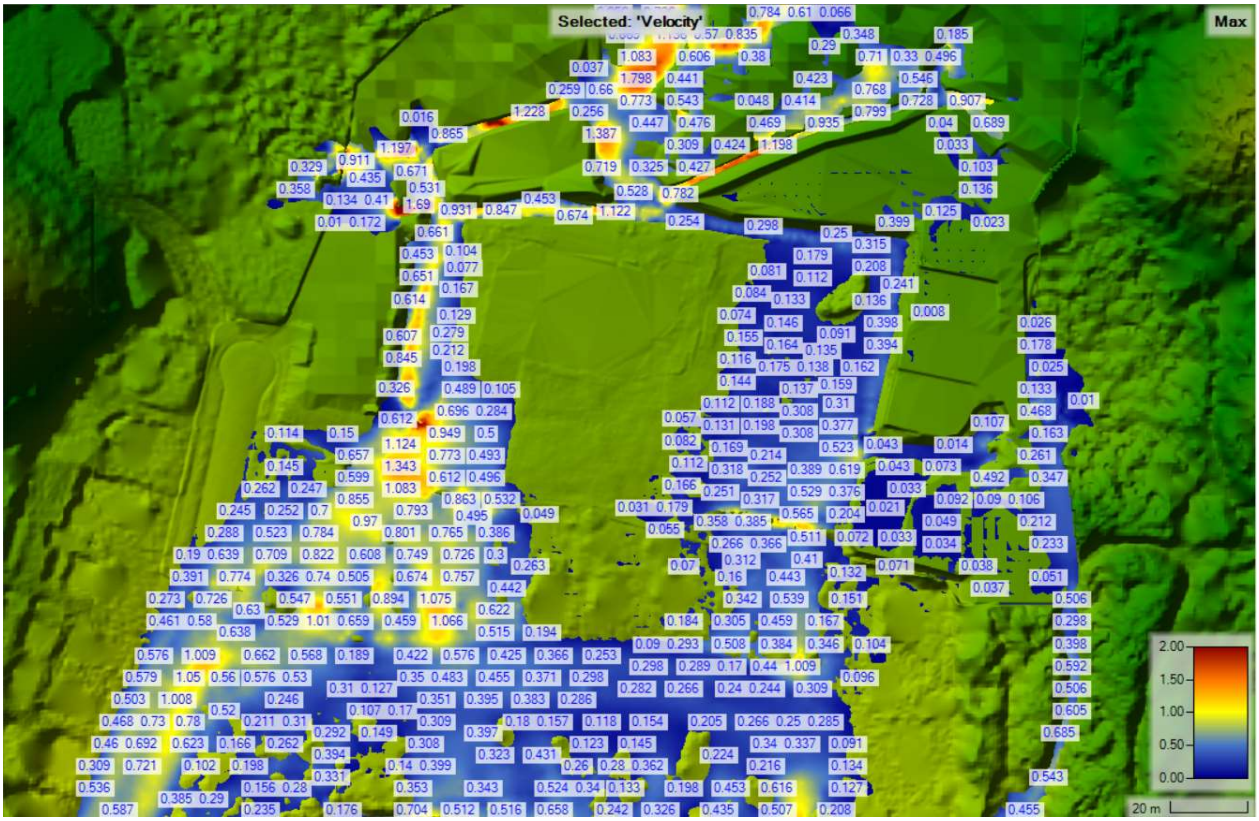


AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	14
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.10 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Velocity

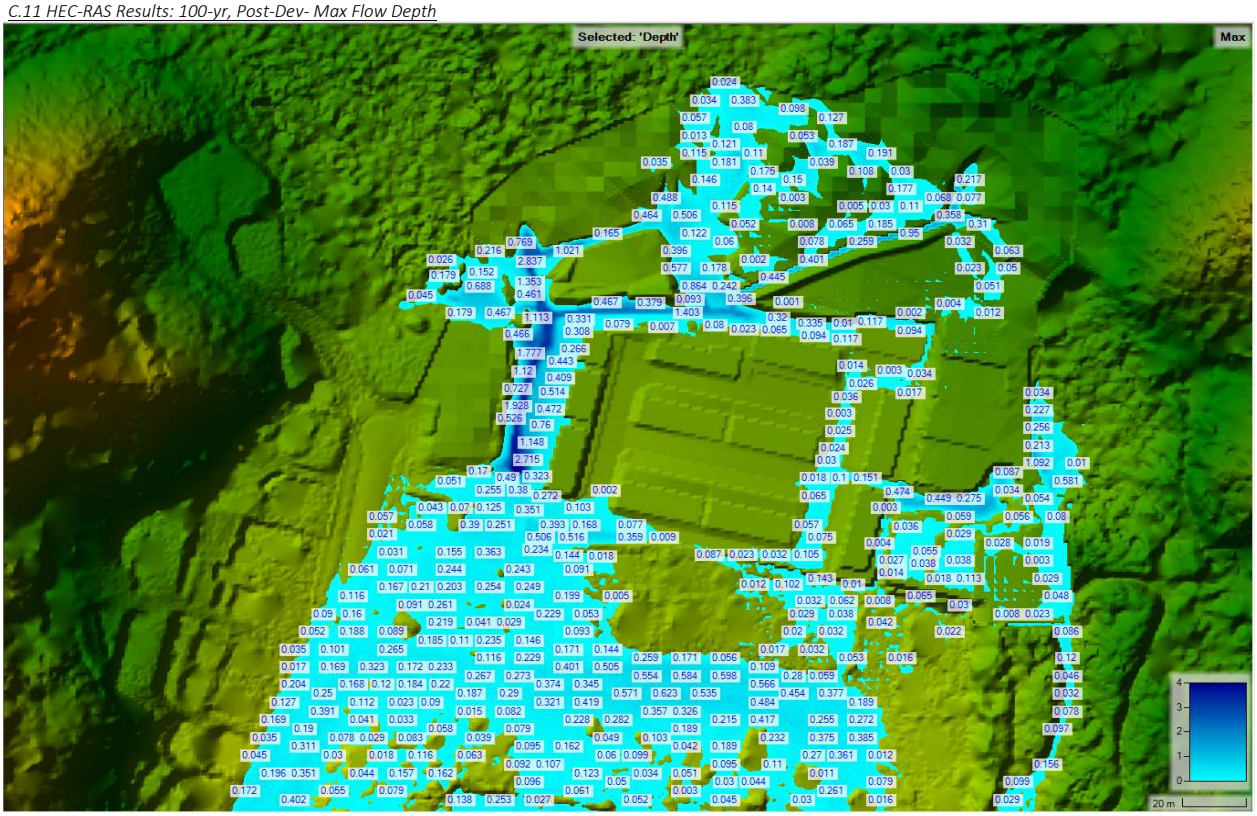


AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	15
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

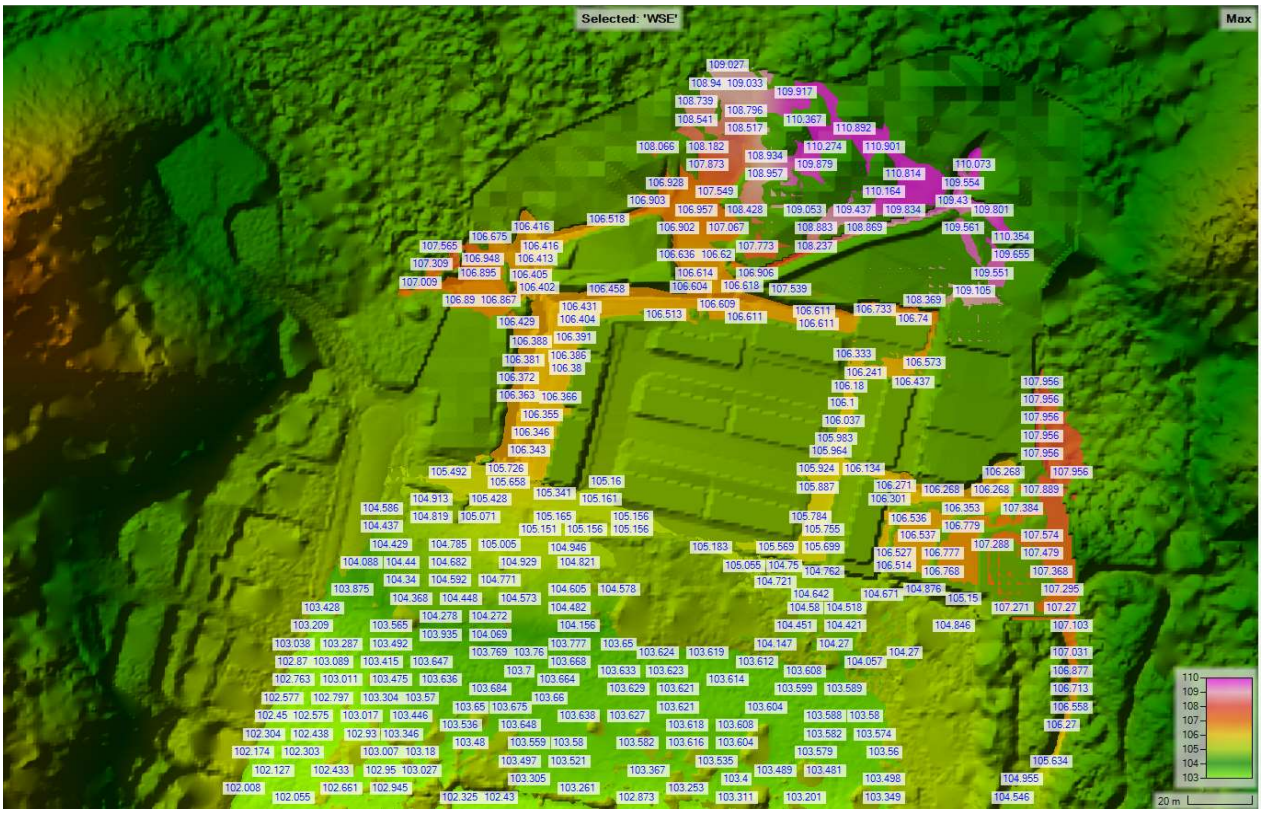
C.11 HEC-RAS Results: 100-yr, Post-Dev- Max Flow Depth



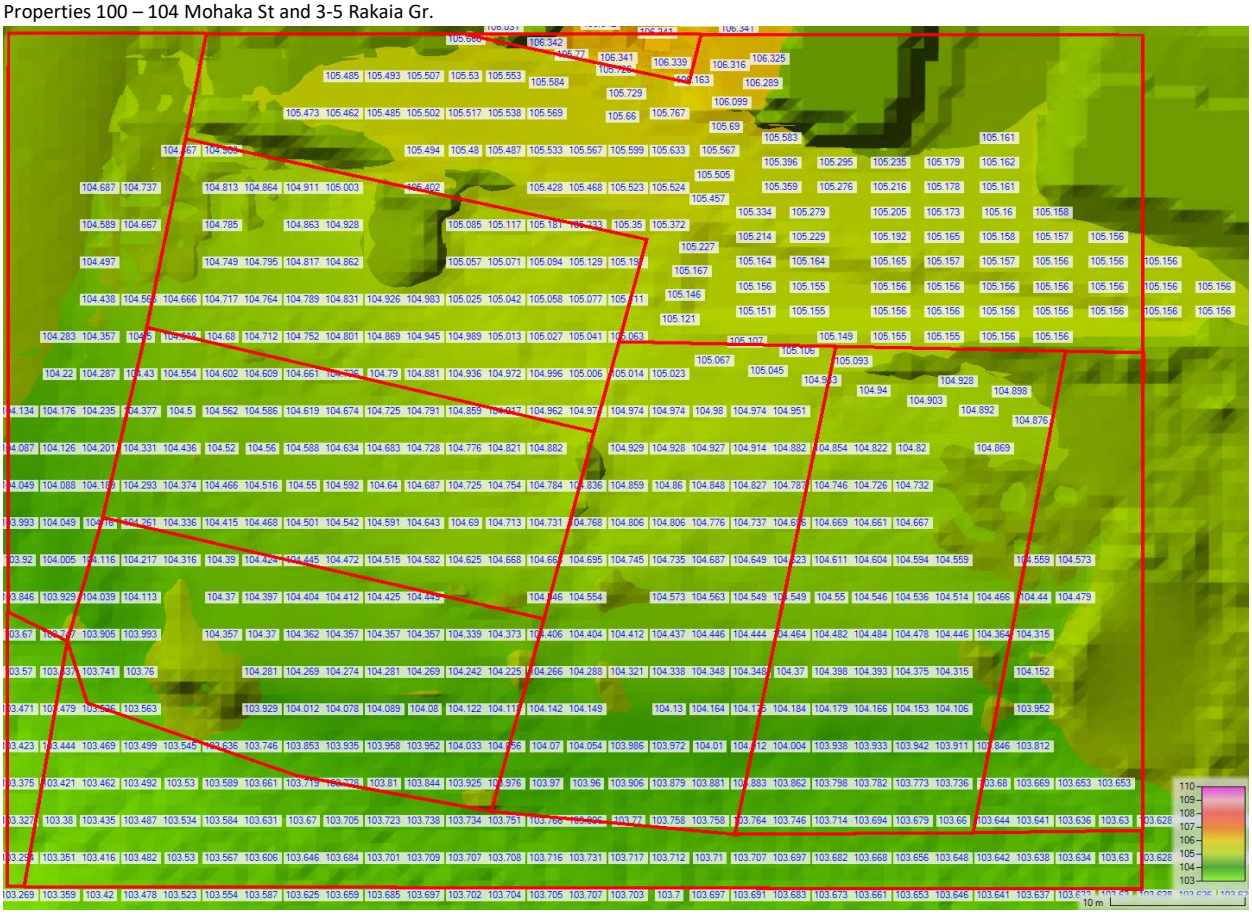
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	16
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.12 HEC-RAS Results: 100-yr, Post-Dev - Water Surface Elevation



Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.



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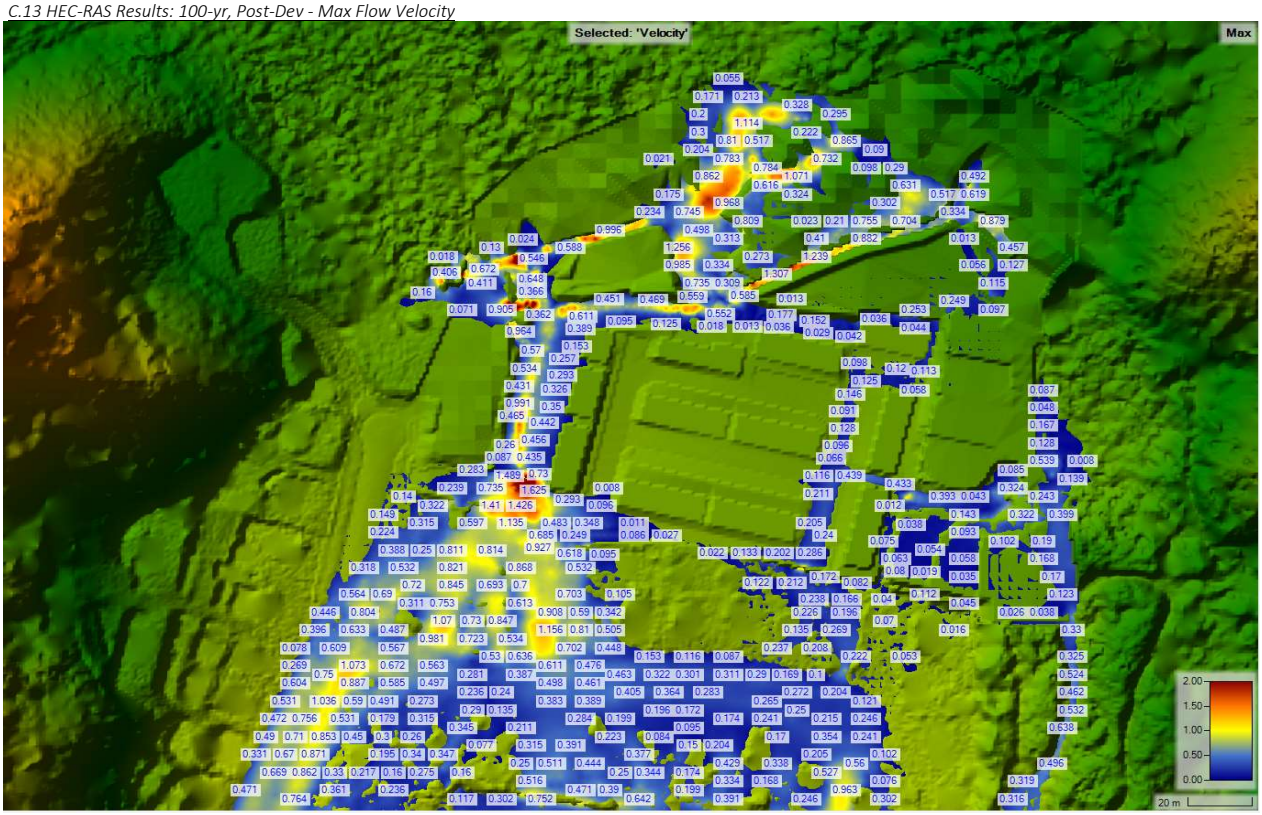
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 17
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

C.13 HEC-RAS Results: 100-yr, Post-Dev - Max Flow Velocity

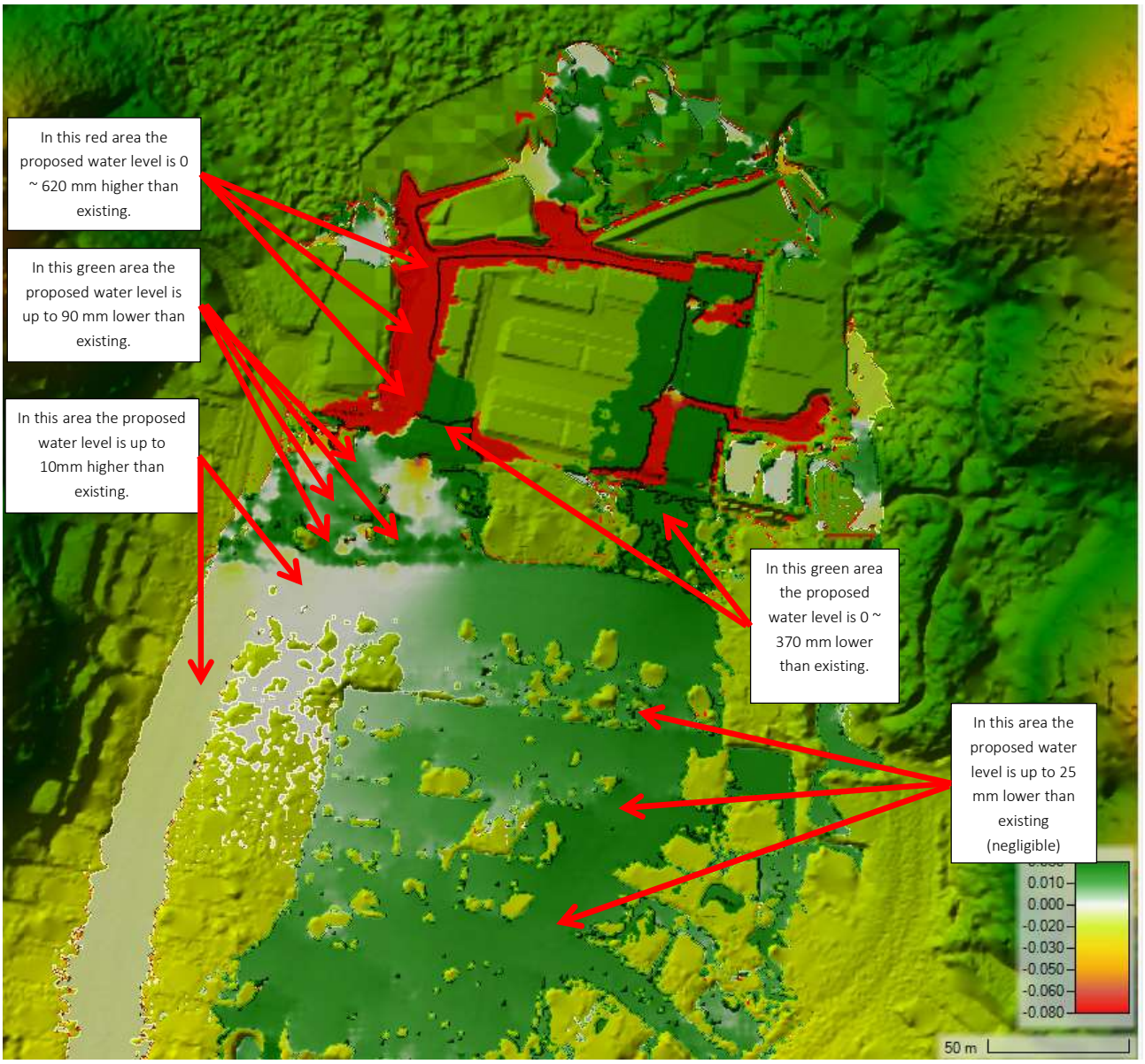


AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

CALCULATION SHEET

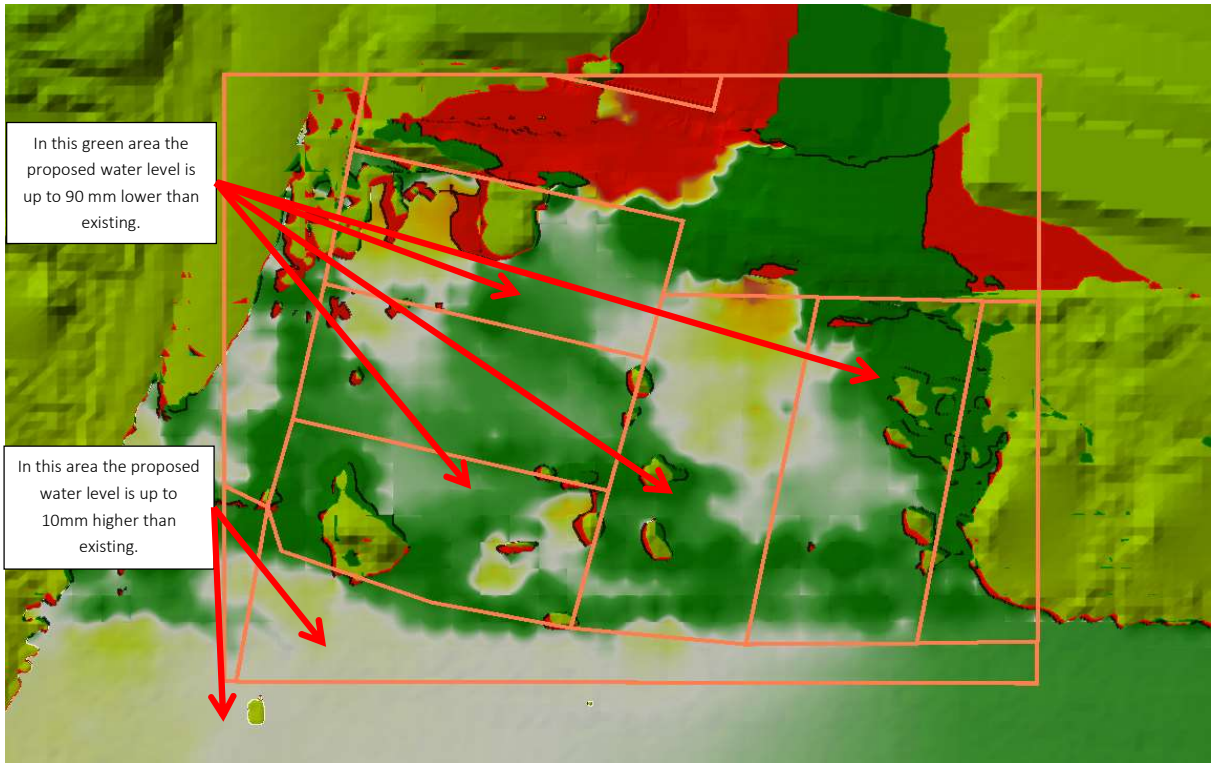
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 18
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

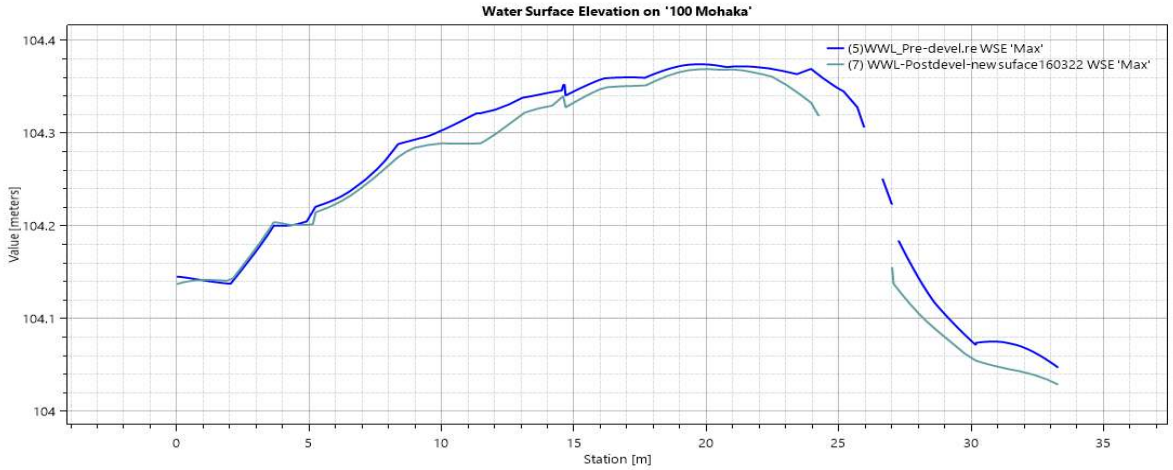
C.14 Flood Level Comparison Map (Existing Minus Post-Development)

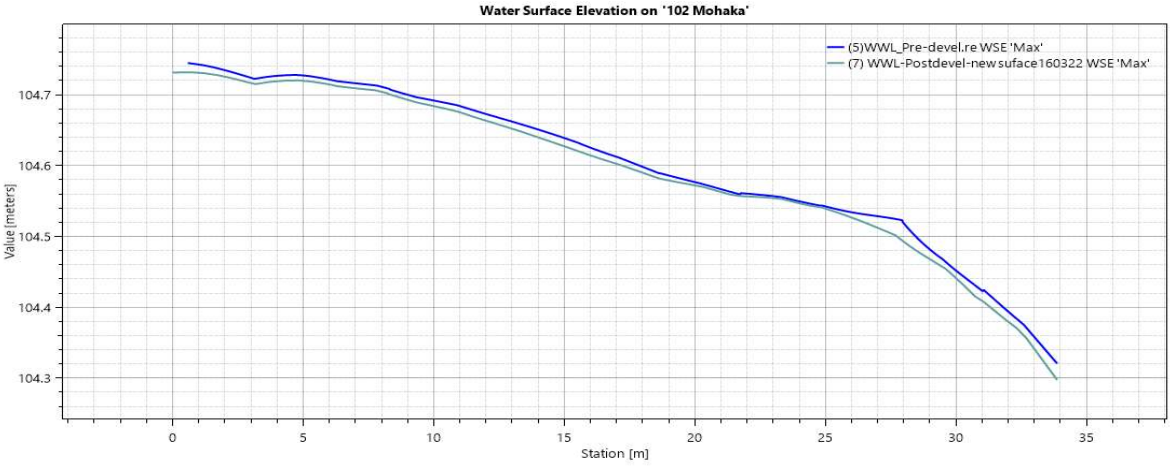


C.14 Flood Level Comparison Map (Existing Minus Post-Development)

Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.

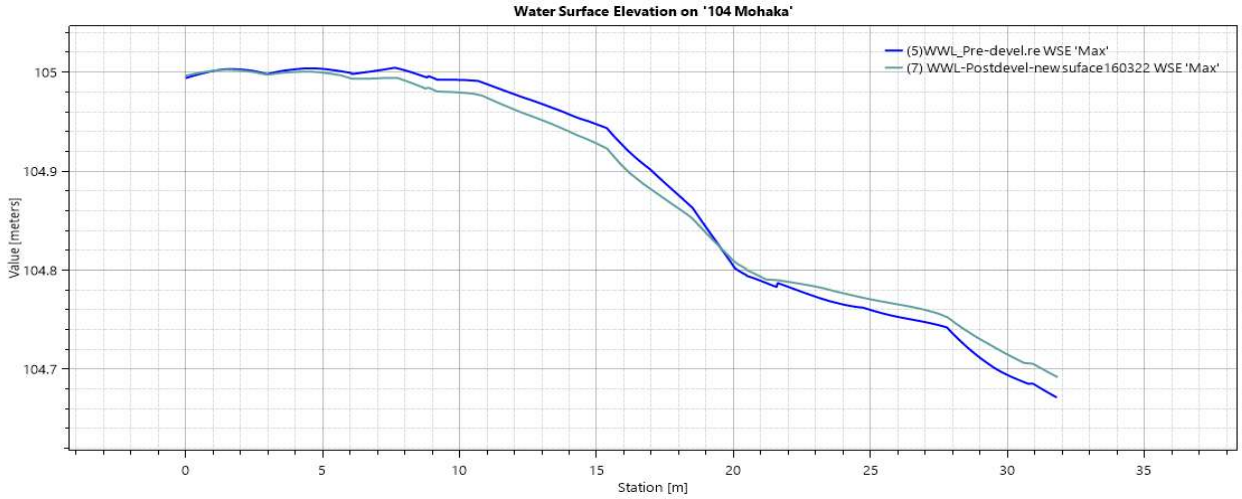


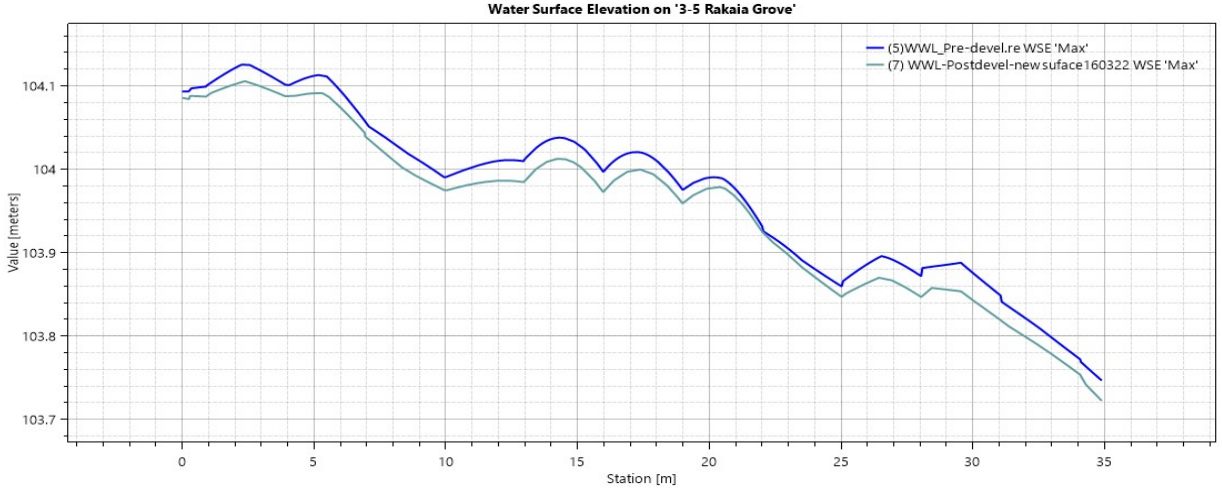




C.14 Flood Level Comparison Map (Existing Minus Post-Development)

Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.





S

From: [redacted]
To: [redacted]
Cc: [redacted]
Subject: RE: Ownership of detention systems
Attachments: image001.png
image002.png
image003.jpg
image004.png
image005.jpg

Hi [redacted]

The RSWS 4 4 2 allows for stormwater detention to take the form of oversized pipes, defined ponds, large channels / swales or ponding areas, so in that respect oversized pipes as part of the public stormwater network would comply with the RSWS

We have recently approved a below ground pipe detention for Niger St in Eastern Porirua and have piped detention for the road extension at wise street

My personnel feeling is that we should be moving away from large pipes in the ground and should be looking to promote WSUDs which integrate / make space for water and increase connectivity to water I also believe an above ground basin (if appropriately planted to be low maintenance – ie doesn t require mowing) will be a more resilient structure than a large below ground pipe However at present I don t believe there is nothing in the code to require a developer to go down this route

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team
m [redacted]
e2Environmental Ltd
181 High St, Blenheim
PO Box 380, Blenheim 7201
www e2Environmental com

From: [redacted] @wellingtonwater co nz>
Sent: Friday, 25 March 2022 3 56 PM
To: [redacted] @e2environmental com>
Cc: [redacted] @wellingtonwater co nz>; [redacted] @wellingtonwater co nz>
Subject: RE: Ownership of detention systems

Hi [redacted]

I d like to provide a bit more guidance to [redacted] but would like to get the benefit of your experience first, as I ve only been involved with a handful of these My understanding is that it is only where detention systems are in the public roadway that we have allowed them to be accepted as public assets Presumably they have been allowed in the public roadway because they have had a wider benefit for the area?

I would have thought the piped stream should be public, but everything else should be private

Have you been involved with enough of these to be able to advise on a consistent approach?

Kind Regards,

[redacted]

From: [redacted] @wellingtonwater co nz>
Sent: Wednesday, 23 March 2022 5:33 pm
To: [redacted] @huttcity govt nz>; [redacted] @wellingtonwater co nz>
Subject: RE: Ownership of detention systems

Hi [redacted]

Looks complicated
In short, there hasn t been any change in reference to public and private ownership of stormwater detention in the RSWS between the last and this version

Cheers

[redacted]
Senior Project Manager, Standards
[redacted]

From: [redacted] @huttcity govt nz>
Sent: Wednesday, 23 March 2022 5:07 pm
To: [redacted] @wellingtonwater co nz>; [redacted] @wellingtonwater co nz>
Subject: Ownership of detention systems

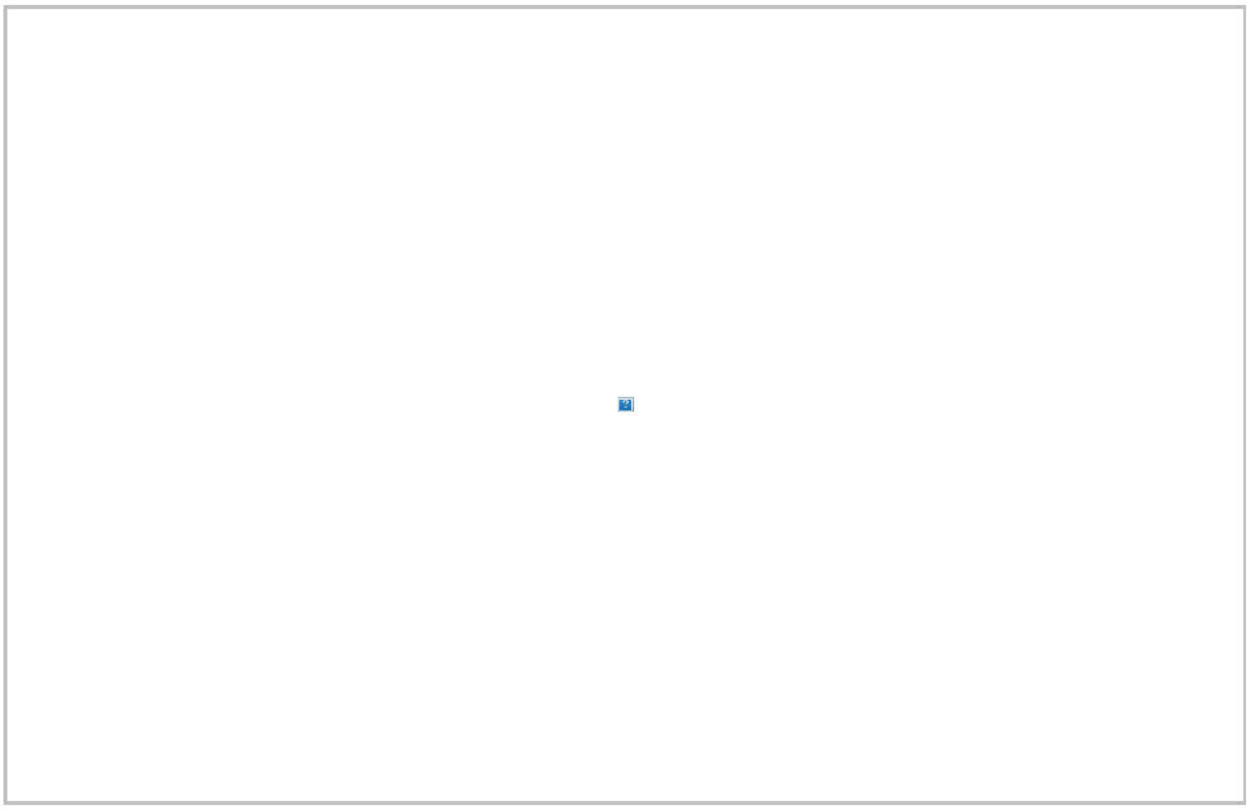
H [redacted] &[redacted]

Can you plesse provide some guidance regarding ownership of detention systems

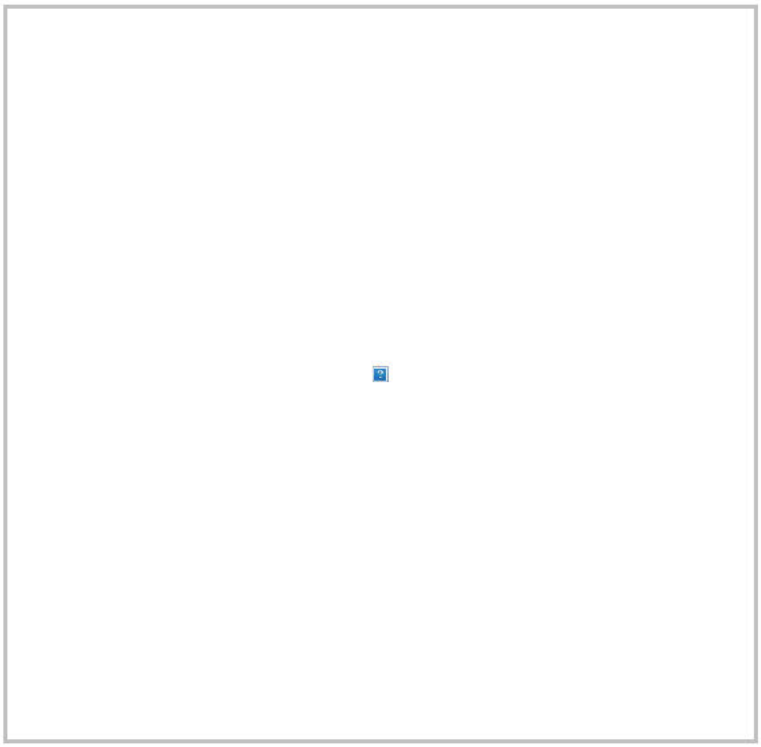
My understanding was that in the past WWL did not want to take ownership of stormwater detention systems within developments, unless you were talking about a pond on land vested to council

I have a development at 106 Mohaka St that is proposing a combined stormwater network / detention system to be vested to Council Roading within development is to remain private

The site has flows from an adjoining site that were within a open channel around the site They now propose to fill most of the open channel and pipe through the development, which would normally be seen as public network – they have GWRC approval in principal
They now also want to oversize the piping of the channel flows and other sections of network within the site collecting roof water, to create a detention system For these multi units developments Council normally seldom takes ownership of the networks within the site – leaving this to residents associations

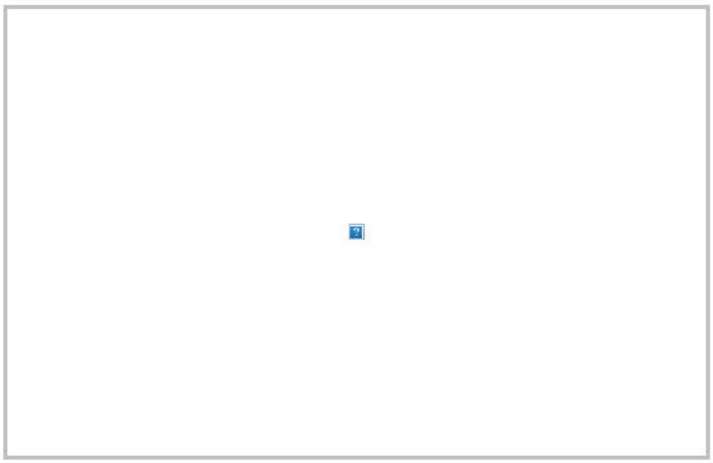


The RSWS though now seems to offer that WWL/Council will take on oversized piped detention systems



Can you please advise if I push back to the applicant for a separate public system for the flows through the site from Meremere and a private stormwater network & detention system

Seems to me they could do both by keeping sections highlighted below as private and oversized



Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]
To: Land Development
Cc: [redacted]
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata - LPSS Design
Attachments: image004.jpg
image005.png
image006.png
image007.png
image008.png

[redacted]
This is a HCC EA and will be reviewed by [redacted] [redacted] of Envelope (seconded to HCC).

No further action for WWL.

Sincerely
[redacted]

From: Land Development <Land.Development@wellingtonwater.co.nz>
Sent: Thursday, 23 February 2023 8:59 am
To: [redacted]@e2environmental.com>
Cc: [redacted]@wellingtonwater.co.nz>; [redacted]@envelope-eng.co.nz
Subject: RM210168 - P20-156 - Mohaka St Wainuiomata - LPSS Design

Hi [redacted]

Hope you are well

Could you kindly assist on this one below. Many thanks

Kind regards
[redacted]

Team Coordinator- Network Strategy & Planning

Private Bag 39804, Wellington Mail Centre 5045
Level 4, 25 Victoria Street, Petone, Lower Hutt

From: [redacted]@envelope-eng.co.nz>
Sent: Wednesday, 22 February 2023 10:32 pm
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: FW: RM210168 - P20-156 - Mohaka St Wainuiomata

Forwarding in [redacted] absence, please advise.

Thanks

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro,
Wellington

From: [redacted]
Sent: Wednesday, February 22, 2023 9:23 AM
To: [redacted]@wellingtonwater.co.nz>
Cc: [redacted]@belgraviacapital.co.nz>; [redacted]
<collabcubeconsulting@gmail.com>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: FW: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi [redacted]

Can you advise if you have approval for this low-pressure network on your file. For reference, I've attached the resource consent decision and the approved engineering plans are on the link below:

P20-156-COMBINED EPA REV L - Approved.pdf

Thanks

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro,
Wellington

From: [redacted] <collab@collabcube.co.nz>
Sent: Wednesday, February 22, 2023 1:18 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted]@belgraviacapital.co.nz>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi [redacted] FYI this is the design summary and PS1 from aquatec that was approved July last year I believe. Thought id send to you for clarity sake.

They have been made and will be sent to us very soon

Kind regards

[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz

From: [redacted] <collabcubeconsulting@gmail.com>
Sent: Friday, 17 February 2023 7:14 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted]@belgraviacapital.co.nz>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: Re: RM210168 - P20-156 - Mohaka St Wainuiomata

Thanks for your help [redacted] Ill get this cleared up today.

Sent from my iPhone

On 17/02/2023, at 12:23 AM, [redacted]@envelope-eng.co.nz> wrote:

No problem, the tank sizes are approved, and Aquatec control system is approved by Wellington Water so its really just final details and PS1.

[redacted] – [redacted] at Aquatec is the guy I normally deal with. I haven't discussed this job with him but he should be able to help.

[redacted]

0800 756 543
[redacted]@aquatecenviro.com
aquatecenviro.com

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro, Wellington

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From: [redacted]@belgraviacapital.co.nz>
Sent: Thursday, February 16, 2023 11:16 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted] <collabcubeconsulting@gmail.com>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: RE: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi Yes it was Aquatech. I had assumed [redacted] would have had this signed off. I will ask [redacted] to followup. Many thanks

> On 17/02/2023 12:07 AM NZDT [redacted]
> [redacted]@envelope-eng.co.nz> wrote:
>
> Hi [redacted]
>
> I don't think that was sent to me. Is it Aquatech? If so, no problem, the

same comments apply and [redacted] will just need to follow up with them and get detailed design/PS1.

Cheers

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro, Wellington

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From: [redacted]@belgraviacapital.co.nz>
Sent: Thursday, February 16, 2023 11:03 AM
To: [redacted]@envelope-eng.co.nz>
Cc: [redacted] <collabcubeconsulting@gmail.com>; Subdivision <Subdivision@huttcity.govt.nz>
Subject: Re: RM210168 - P20-156 - Mohaka St Wainuiomata

Hi [redacted]
Hamish had changed the supplier perhaps 6 months ago and had me pay them a deposit.?
I would have assumed they had that option approved?

Kind Regards

Sent from my iPhone

> On 16/02/2023, at 10:33 PM, [redacted]@envelope-eng.co.nz> wrote:
>
> Hi [redacted]/[redacted]
>
> The Engineering Approval was based on using the EOne system by Ecoflow. On behalf of HCC I'm happy with the general design, sizing of tanks, and control system proposed. Ecoflow will need to check the approved plans and then finalise their detailed design. They will arrange a PS1 once they have completed their design.
>
> You are best to contact AR associates to get a full set of latest documents as I don't necessarily have the final version – particularly for items where the general arrangement is shown on the EA plans (such as retaining

walls) but the specifications/calcs/PS1 is a building consent matter.

I understand you've got the stamped EA plans, I've attached the approval letter which also has a number of notes to follow during construction – please read carefully to ensure the 224c process is smooth at the back end of the project.

Regards

[redacted]

A James Smith Building - Level 1, 65 Cuba Street, Te Aro, Wellington

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From: [redacted] <collabcubeconsulting@gmail.com>
Sent: Thursday, February 16, 2023 3:34 AM
To: Subdivision <Subdivision@huttcity.govt.nz>
Cc: [redacted]@envelope-eng.co.nz>; [redacted]@belgraviacapital.co.nz>
Subject: Re: RM210168 - P20-156 - Mohaka St Wainuiomata

Thanks [redacted]

Im specifically after the EPA application and supporting documentation. I only have the drawings that has been approved but non of the specifications. Also need copies of ps1's etc… from all consultants.

Looking for something that tells me what the designs are for the sewer pump stations so i can order them.

Ta
[redacted]

Sent from my iPhone

On 16/02/2023, at 2:03 PM, Subdivision <Subdivision@huttcity.govt.nz> wrote:

Hi [redacted]

Please see attached requested resource. Note that this is for Stage 1 of 106 Mohaka.

Please let us know if there is anything else that you may need.

Ngā Mihi | Kind regards,
[redacted]
Engineering Technician
Hutt City Council, 30 Laings Road, Lower Hutt 5040
W: www.huttcity.govt.nz

<image002.png>

From: collabcubeconsulting@gmail.com <collabcubeconsulting@gmail.com>
Sent: Thursday, 16 February 2023 11:32 am
To: [redacted]@envelope-eng.co.nz; Subdivision <Subdivision@huttcity.govt.nz>
Cc: [redacted] [redacted]@belgraviacapital.co.nz>
Subject: [EXTERNAL] P20-156 - Mohaka St Wainuiomata

Hi [redacted] et al. ,

Would you be able to link me to the entire EPA application docs for 106 Mohaka street please. I am after the specs/PS1's etc for this job. All I have is the approved EPA drawing.
It would be good for completeness that I have on file a copy of everything relating to this project so far.

Many thanks

Kind regards

[redacted]
T: [redacted]
E: collab@collabcube.co.nz
Web: collabcube.co.nz
<image003.png>

<RM210168.zip>

<Appendix C - Ecoflow LPS design report.pdf>
<106 Mohaka st - Engineering Approval Letter.pdf>

[redacted]

Belgravia Capital Limited

[redacted]@belgraviacapital.co.nz

[redacted]

From: [redacted]
To: [redacted]
Subject: RE: WW Pump Controller re: 106 Mohaka Str, Wainuiomata - EOne/OneBox LPS system
Attachments: image005.jpg
image006.jpg
image007.jpg
image008.jpg
image009.jpg
image010.png
image011.png
image002.jpg
image004.jpg
Layout.pdf

Hi [redacted]

I have just sighted the WWL DRAFT pressure sewer guidelines and have the following additional comments for your consideration:

- As written the guide requires individual PS's on each residential lot, on this basis a communal private shared WWPS would not be accepted. The options are therefore a LPS with individual units on each lot or a public WWPS built to adoptable standards.

- For the LPS - WWL have identified 36 hours (24 hours emergency + 12 hours) storage this is being assessed on 140 L/person/day and 3.0 persons / dwelling – so the storage actually ends up at around 630 L/lot.

  For a public WWPS system – storage can be reduced to 24 hours total (12 hours emergency + 12 hours), however this needs to be assessed based on ADWF as calculated by the RSWS.

- The overflow would only be appropriate for the public WWPS.

Please feel free to contact to me if you have any further questions.

[redacted]

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team
m [redacted]
e2Environmental Ltd
181 High St, Blenheim
PO Box 380, Blenheim 7201
www.e2Envronmental.com

From: [redacted]@ecoflow.co.nz>
Sent: Monday, 13 September 2021 1:03 PM
To: [redacted]@e2environmental.com>
Subject: RE: WW Pump Controller re: 106 Mohaka Str, Wainuiomata - EOne/OneBox LPS system

Hi [redacted]

Really appreciate you getting in touch. See my reply in red below:

Regards,

[redacted]

[redacted] | [redacted]

Low Pressure Sewer, Wastewater & Stormwater Specialist
5 Ride Way, Albany, Auckland
p: [redacted] | m: [redacted] | w: www.ecoflow.co.nz

From: [redacted]@e2environmental.com>
Sent: Thursday, 9 September 2021 2:58 PM
To: [redacted]@ecoflow.co.nz>
Cc: [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>; [redacted]@wellingtonwater.co.nz>
Subject: WW Pump Controller re: 106 Mohaka Str, Wainuiomata - EOne/OneBox LPS system

Hi [redacted]

I'm currently seconded helping out the Wellington Water Land Development Team and have been passed your enquiry below (to avoid confusion / overlap WWL appoint different teams to cover different areas / councils, [redacted] covers Porirua and I help out [redacted] cover Wainuiomata). Cool.

Looking at your query I expect we may need a couple of goes at firming up a response and it may be better to have a chat.

Things are still evolving in this space so I expect there is room for discussion – my initial thoughts are as follows: Yes they are and that's why I got in touch as we're working with a bunch of engineers whom are recommending LPS solutions to their clients, they're coming to us as advisors and we're just wanting to steer them in the right direction.

1. Do you have a consent for this site – or is this pre planning ? For this project I'm assisting [redacted] from AR & Associates. I'm pretty sure they're working through the RC. I think WWL are leading towards a larger PS for this project but [redacted] is keen to put forth an LPS

solution forward where there are two options available.

2. From what I understand of the Wainuiomata requirements are that WWL are seeking Iota OneBox Controllers within the Wainuiomata area so that they have the ability to over-ride pump operation during wet weather events. Yes and both options below can be matched up with the Iota OneBox controllers where council would have full visibility of levels inside the EOne systems and able to remote control the pumps. Amongst other great features and benefits.

3. WWL are also looking at 36 hours storage (24 hours as required under BC and 12 hours for WW mitigation). Wow! That's a lot of storage.

   This is still being worked through but at the moment and depending on the approaches you typically get around 700 – 900 Litres / lot. Personally I think 900 L / Lot would be more realistic for 36 hrs storage. Yes I agree with that. For this project if they go a single large PS then that would require (61 lots x 0.9) = 54.9m3 of storage. That's a big tank!

4. Where a municipal pump station is being proposed for WW mitigation WWL have (on a recent project) advised 24 hours storage. There might be options to review this if a high level overflow could be achieved. We don't consider overflows for LPS solution/system. With 24hr emergency storage factored into the size of the tank that's normally all that's required. If a system fails or requires servicing we have 24hrs of normal use to respond. In a power cut situation tenants/home owners normally have very short showers as there is no hot water and they don't use their washing machines or dishwashers. Therefore we can get up to three days before a system over flows.
5.
5. In terms of Option 2 why would the pump unit need to be vested in Council ? I understand the Christchurch model requires Iota controllers but (for commercial units) does not pick up ownership of them or the pump station ? I'm not sure why a private body corporate pump station couldn't be managed in this way? It would be good to understand this a bit more as it probably hasn't been fully understood / sorted within the region yet. For option 2 if they were to use our 'standard' EOne Duplex controller then these don't need to be vested to council. Note: Can come with a timer to hold back pumping during peak periods.

   In the above case service and maintenance of the EOne systems would be managed by the body corp. Ecoflow would receive any service calls and if a site visit is required we would engage or wellington service provider.

   Yes in Christchurch for commercial units the systems are privately owned and maintained.

   Yes it's our opinion that if the EOne systems were to go privately owned using OneBox where the systems are monitored and controlled by council that there can be some issues here. If there's a fault with the EOne system i.e. burnt our stator or something electrical. Who caused it? Was it something council did remotely or is it something one of the tenants did? Can be some grey areas which would be hard to resolve and who then pays for the

service?

That's why we recommend if councils want to use some the great features which OneBox offer to make the system council owned. With this project the systems would highly likely be installed under the ROW for easy access and they could be powered/connected to the councils lighting circuit. The EOne pumps are 1kW each, single phase and in this case only be pumping approximately 2hr/day. They're very cheap to run. If there's on going abuse from one of the tenants (wipes) council can Identify which EOne system it is and narrow it down to less then 15 units/town houses and get the bodycorp to speak with them all. If you went 1 x large PS then you'll be looking at all 61 homes/units to try and find the perpetrators.

6. If Option 2 could not be progressed with a One Box (for Council control) with a private pump station unit then some of the rules for Council vested pump station would likely come into play – in particular the pump station would need to be on public land, a separate valve chamber may be required, a water supply for washdown would be required, etc. Would it? Because these would come under low pressure sewer (LPS) engineering standards/policy? As above Ecoflow would receive any service calls and if a site visit is required we would engage or wellington service provider. Right now while our privately owned EOne system numbers are very low in Wellington our EOne service provider is Plumbing Express. [redacted] is set up with swapper pumps, a lifting trolley and looks after all our Wellington Ryman Healthcare sites. Once these numbers increase I envisage us turning to Fulton Hogan and using them. As you know FH are WWL's service provider, they are now set up to deal with LPS and it just makes good sense.

Again many thanks for getting back to me. I look forward to your response after reading the above.

Regards,

[redacted]

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team
m [redacted]
e2Environmental Ltd
181 High St, Blenheim
PO Box 380, Blenheim 7201
www.e2Envronmental.com

From: [redacted]@ecoflow.co.nz>
Sent: Thursday, 26 August 2021 1:48 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]@ecoflow.co.nz>
Subject: RE: 2021-07-30 WWL WW Pump Controller re: 106 Mohaka Str, Wainuiomata - EOne/OneBox LPS system

Hi [redacted]

I hope this email finds you and your family well?... Looks like Wellington might come through this lightly – fingers crossed!

Can I ask a favour? Could I quickly grab your thoughts regarding a project I'm assisting an engineer with – 106 Mohaka Str, Wainuiomata. See layout attached.

Note: Receiving manhole/discharge point is to the left before you exit the ROW onto Mohaka Str.

The engineer and I are looking at wastewater reticulation options. Discussed to date is a single municipal pump station (12hr storage) or go an LPS solution?

For LPS we have two options:

Option 1 –

1 x EOne System/Lot - can be done with our standard EOne controller or with OneBox where council/downstream infrastructure benefit from all its functionality.

- Negatives - finding space to squeeze in the EOne systems - high density development.

Option 2 –

1 x EOne 'custom' Duplex Systems/15 Lots - can be done with standard EOne Duplex (timer) controller or with OneBox where council/downstream infrastructure benefit from all its functionality.

- Positives - easier to install, less space required.

For option two if standard EOne Duplex (timer) controllers are used it would go private ownership and the body corp could manage the service and maintenance. If OneBox controllers are used the systems would need to be vested to council.

When you get a moment it would be great to hear from you… so we start as we mean to go on?

Warm regards,

[redacted]

[redacted] | [redacted]

Low Pressure Sewer, Wastewater & Stormwater Specialist
5 Ride Way, Albany, Auckland
p:[redacted] | m:[redacted] | w: www.ecoflow.co.nz

From: [redacted]@wellingtonwater.co.nz>
Sent: Monday, 2 August 2021 3:57 PM
To: [redacted]@ecoflow.co.nz>
Subject: RE: 2021-07-30 WWL WW Pump Controller re: 31 Adventure Drive - EOne/OneBox LPS system

Thanks [redacted]

[redacted] **Senior Engineer – Land Development**

Email: [redacted]@wellingtonwater.co.nz

Mob 04 912 4400 **Mob** [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, Petone Office, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water, wastewater and stormwater services.

From: [redacted]@ecoflow.co.nz>
Sent: Monday, 2 August 2021 12:59 pm
To: [redacted]@wellingtonwater.co.nz>; [redacted]

[redacted]@orogen.nz>; [redacted]@ecoflow.co.nz>; [redacted] | Ecoflow <loren@ecoflow.co.nz>
Subject: 2021-07-30 WWL WW Pump Controller re: 31 Adventure Drive - EOne/OneBox LPS system

Hi [redacted]

Great chatting with you on the phone on Friday… I'm now super clear what Wellington Water (WW) is trying to achieve and this can only be done using our 'proven' OneBox/EOne technology. The Iota OneBox allows water authorities to mitigate wastewater flows downstream from their pressure sewer catchments during storm events or when maintenance is required. It also allows councils to run infiltration reports and even out the catchments peak flows using the 'peak flow smoothing' function. To see more OneBox features see brochure attached.

31 Adventure Drive Project –

We see two options which Wellington Water could proceed with to insure the use of OneBox:

- Install the OneBox - *giving all smart functionality straight away*
- Install standard EOne equipment including a 40mm conduit – *future proofing the network so OneBox controllers can be added at a later date*

Considerations:

Installing OneBox –

- Ownership arrangements System must be vested to council once homes receive final CCC.
- 3G – 4G signal strength Ecoflow has a signal strength test unit and we recommend checking this beforehand.
- Equipment difference and costs The EOne system using a OneBox controller uses the same pump minus the pressure switches due to the pump now being controlled by the OneBox and on-line portal. In addition to this we need to add a level transducer and high level float. Estimated cost increase is approximately $1200/system more expensive.
- Installation and Commissioning Differences Training will be required for the on-site electrician and drainlayer at the front end of the project. We also recommend that a trained council opps member be responsible for commissioning each system as they're livened up. This person would check the installation, plug in a laptop, create a new site, and connect the OneBox to the on-line portal.
- Annual Portal Fee $70/system/year. Ecoflow to invoice council for this.
- Ongoing Monitoring, Service and Maintenance A council ops member will require a user profile, access rights and training on how to monitor the portal and integrate the information. Also confirm what emails are getting the portal alarm notifications (by

email and/or text). Op's members attending call outs will require a window's based laptop and training.

Note: All OneBox training will come from Ecoflow Ltd. Cost TBC.

Install standard EOne equipment including a 40mm conduit -

- Standard EOne System In the rare event of a pump fault, the standard EOne controller will alert the homeowner to call the service provider by audible and visual alarm. It is typical to have a mean time between service calls of around 10 years. Houses can change hands many times before an alarm sounds, therefore we recommend a label is attached to the controller with the service providers phone number. In order to upgrade to the OneBox at a later date we would recommend installing a 40mm conduit for the additional level transducer and float switch required.

- Standard EOne System $5956/system.
  - Install OneBox Swap out standard EOne controller for OneBox $2200/system

We're entering a really exciting new age of wastewater and we would be happy to set up a meeting with South East Water to discuss how they use Onebox, operationally, policy etc. They have a major project on the go at the moment, Mornington Peninsula which consists of 15,000 additional properties to add to their existing LPS network.

I hope the above adds value with your discussions regarding 31 Adventure project tomorrow.

Let me know if you have any further questions?

Kind regards,

[redacted]

[redacted] | [redacted]

Low Pressure Sewer, Wastewater & Stormwater Specialist
5 Ride Way, Albany, Auckland
p: [redacted] | m: [redacted] | w: www.ecoflow.co.nz

From: [redacted]@wellingtonwater.co.nz>

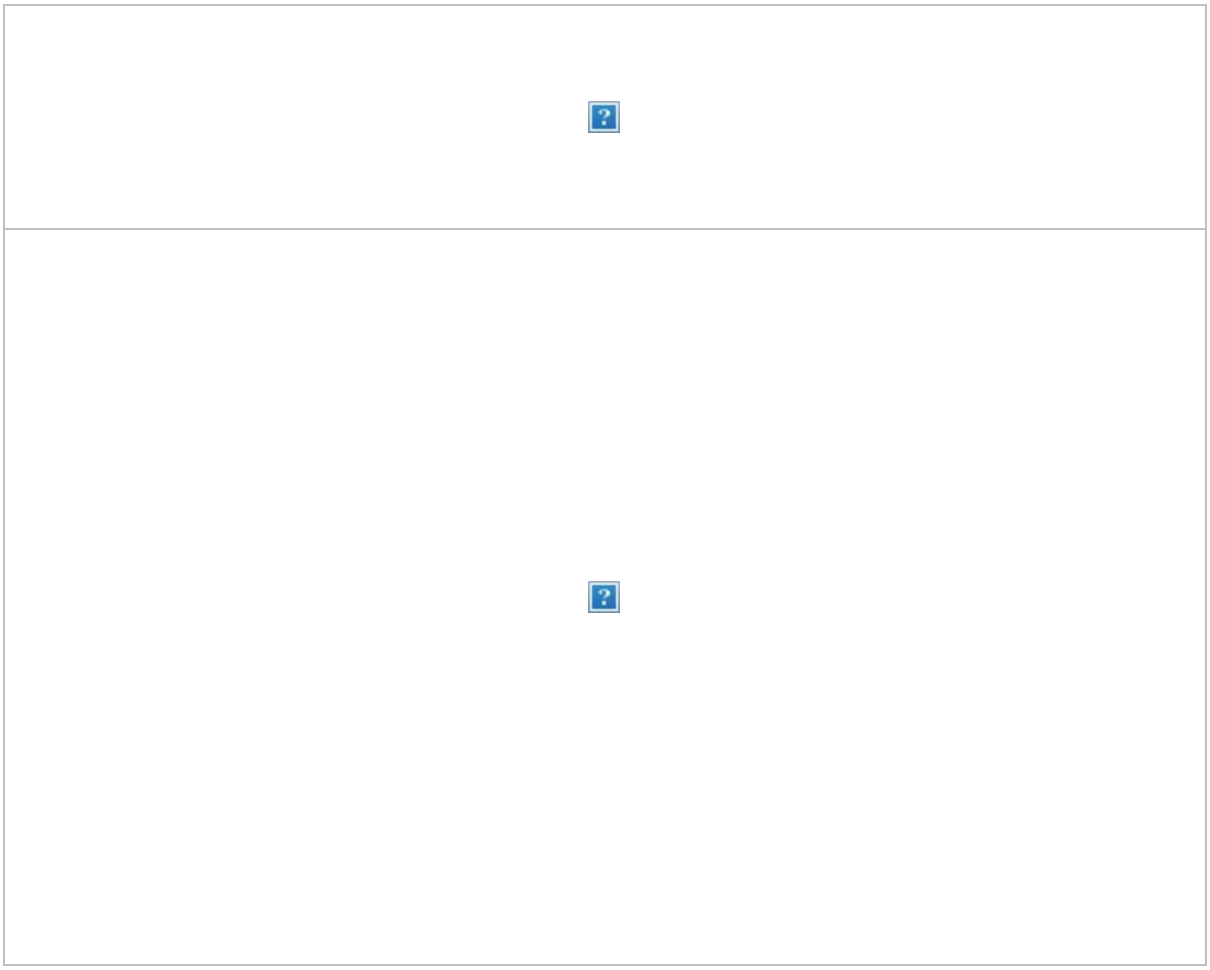
Sent: Friday, 30 July 2021 9:43 AM
To: [redacted]@ecoflow.co.nz>
Cc: [redacted]@orogen.nz>
Subject: 2021-07-30 WWL WW Pump Controller re: 31 Adventure Drive - EOne/OneBox LPS system

Greetings [redacted]

2021-07-30 - 31 Adventure Drive (RC8077) EOne&OneBox Smart Controller LPS system Building Consent & Engineering Approval

I was checking the consent conditions and the smart controller will be required for the development to meet condition 75(ii) *"… operates in accordance with the overall sewer system objectives for the subdivision*". The planners report '*Report and Decision RC8077 SL0003-20'* clearly states the low pressure sewer system is to mitigate effects from the development on wet weather peak flows in the downstream network.

I am keen to get this sorted early, so when we get to the building consent approvals we have the details sorted, avoiding delays at that stage.



I would really appreciate the additional details for the proposed controller (OneBox). [redacted] has

already provided the attached pump specification and LPS sewer design.
Internally we are assuming the web based app will be an interface that WWL operators will be able to log into with a username and password in order to switch between the 3 operational modes either manually of via a batch script.

I have a meeting midday Tuesday to address internal stakeholders on

- budget (annual operational cost of $70/unit ($2170 pa for the 31 units)),
- ownership arrangements (Potentially council having a side agreement with residents to maintain and operate their pumps) and the
- internal operational interface setup.

Kind regards

[redacted] **Senior Engineer – Land Development**

Email: [redacted]@wellingtonwater.co.nz

Mob 04 912 4400 **Mob** [redacted]

Private Bag 39804, Wellington Mail Centre 5045
Level 4, Petone Office, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water, wastewater and stormwater services.

From: [redacted]@ecoflow.co.nz>
Sent: Thursday, 29 July 2021 3:57 pm
To: [redacted]@wellingtonwater.co.nz>
Subject: 31 Adventure Drive - EOne/OneBox LPS system

Hi [redacted]

Great chatting with you earlier on the phone.

I mentioned I would get an email to you with confirming the three controller options for 31 Adventure Drive project.

I've unfortunately had to get away early, but will get onto this first thing in the morning.

Talk to you tomorrow as well.

Regards,

[redacted] | [redacted]

Low Pressure Sewer, Wastewater & Stormwater Specialist
5 Ride Way, Albany, Auckland
p: [redacted] | m: [redacted] | w: www.ecoflow.co.nz

LEGEND

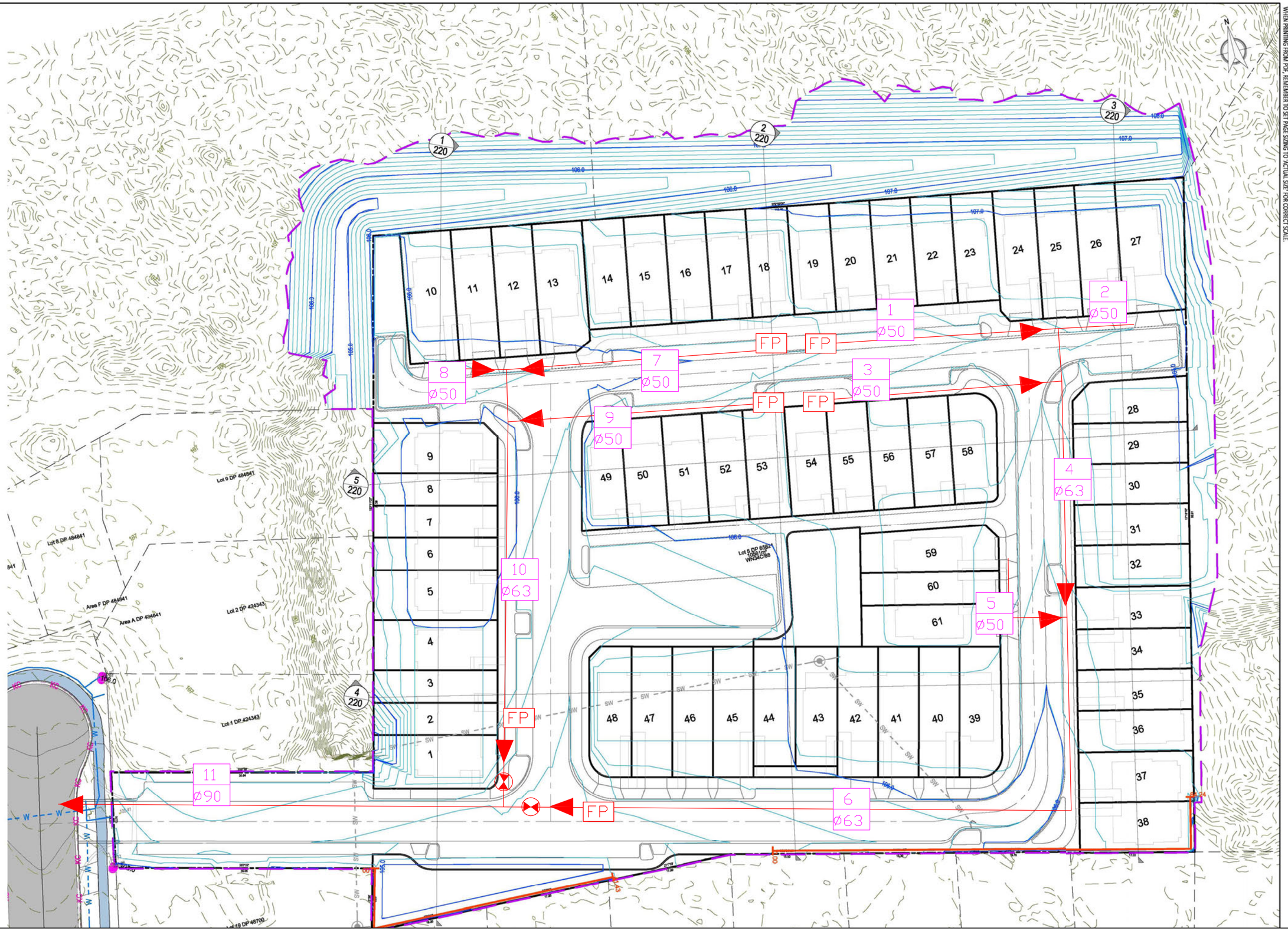
- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- PROP BOUNDARY
- PROP MAJ CONTOUR (16.0)
- PROP MIN CONTOUR (16.2)
- EX MAJ CONTOUR (16.0)
- EX MIN CONTOUR (16.2)
- EXTENT OF EW

Key:

- ► Zone End Indicator
- Isolation Valve
- FP Flushing Point
- AV Combination Air Valve
- 172 Zone Number
- ø180 Pipe Diameter

Notes:

- All LPS Pipes Shall Be PE100 SRD11 PN16
- All LPS Pipe Sizes Are OD
- LPS Laterals from LPS Tank to Main Shall Be 40mm OD
- This Plan is a Preliminary Design Only
- Locations Are Indicative Only



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ecoflow
Sewer Made Simple

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www.ecoflow.co.nz
Email: info@ecoflow.co.nz

DRAWN	JM	10/03/2021
CHECKED		
CLIENT APPROVED		
CLIENT		

TITLE

106 Mohaka Street
Low Pressure Sewer
Preliminary Design

Job

REVISION	SCALE		Dwg No.
1	NTS	AT	1

e|one
ENVIRONMENT ONE

From: [redacted]
To:
Subject: RE: RM210328: 106 Mohaka Street - Updated Infrastructure Rpt
Date: Tuesday, March 29, 2022 10:23:45 AM
Attachments: Untitled attachment 00032.png
UPDATED APPLICATION-Infrastructure Report.zip

Updated Infrastructure report

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]
Sent: Wednesday, 23 March 2022 3:19 pm
To: [redacted]@e2environmental.com>
Subject: RM210328: 106 Mohaka Street - WSUD review

Hi [redacted]

Can you please fit into your busy schedule a high level review of the proposed stormwater treatment for this site? This is RC stage so I really just want to be comfortable that the amount of land they have allocated seems realistic.

Plans etc to follow :

As I understand it they are proposing to have bioretention feed off the roadway only – no roof water treatment. Seems GWRC are ok with this from the draft report attached.

If you could please indicate when you will be able to undertake this review for HCC?

I may also have a few questions for you regarding the proposed detention, once I have finished getting my head around a couple of aspects.

Cheers

MHV Ltd

106 Mohaka St, Wainuiomata, Lower Hutt

Flood Report

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING

Reference P20-156-R03-RevF
6th April 2022

AR & Associates Ltd // Level 2, The Nielsen Centre
129 Hurstmere Road, Takapuna
p. (09) 486 0774

ACENZ

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e. enquiries@arassociates.co.nz

Document Control Sheet

Client		MHV Ltd				
Project address		106 Mohaka St, Wainuiomata, Lower Hutt				
Report title		Flood Report				
Reference		P20-156-R03				
Revision	Author	Reviewer	Approver	Purpose	Issued to	Date
D	AR	JL	AR	Council RFI	Client	29.03.2022
E	AR	JL	AR	Council RFI	Client	06.04.2022
F	CM	AR	AR	Updated Table 2	Client	22.04.2022

Limitation

This report has been prepared for **MHV Ltd**, according to their instructions, for the particular objectives described herein. AR & Associates Ltd accepts no responsibility for the content of this report if it is used by any other party or for any other objective. Any use of or reliance on the information contained in this report for decisions made by third parties is the responsibility of these third parties. AR & Associates Ltd accepts no responsibility for damage incurred by third parties resulting from the use of or reliance on this report, or if the report is used by any party for purposes other than the objectives described herein.

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Appendices

1 // Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to undertake a flood assessment, to understand the flood risks at the site and downstream areas, for both the existing and post development conditions.

This document presents the results of our assessment, including associated recommendations around flood management and proposed minimum floor levels.

2 // Site Description

The site is located adjacent to the north-eastern corner of the Mohaka Street cul-de-sac, in Wainuiomata, Lower Hutt (Lot 5 DP 65821).

In its existing condition, about one third of the site is covered by a number of buildings and associated driveway and parking areas, with the remaining areas being predominately covered in grass and low vegetation.

Topography within the site is relatively flat, however beyond the northern and north-eastern boundaries the land rises steeply and is covered by a densely vegetated bush reserve.

There are a series of bush clad open streams / drains immediately adjacent to the western and northern boundaries, which collect most of the runoff generated from the bush-clad catchments to the north. These streams discharge to an existing 1050 mm diameter culvert that passes under the access road to the site, and which discharges some 300 m downstream.

An aerial photo of the existing site with associated existing 3-water services (obtained from the Wellington Water GIS maps) is shown in **Figure 1** below.

Figure 1:- Existing site layout showing surrounding areas and 3-waters services

There is a new residential subdivision of 75 to 102 Meremere St currently under development adjacent to the eastern site boundary. This development drains stormwater runoff from the contributing eastern catchment onto the subject site, which is captured by a 1050 mm diameter scruffy dome and 525 mm RC pipe at the eastern boundary, as shown in the AR & Associates design drawings.

There are established residential areas to the south of the site boundary, and west of the western stream.

3 // Proposed Development

The development comprises a 52-lot residential subdivision, accessed from the eastern side of Mokaka St. A number of internal local roads are proposed to provide access to the various lots.

The proposed stormwater network will consist of the main primary piped network in addition to a 1050 mm dia. concrete pipe which will act as a detention tank to attenuate 10% and 1% AEP flows on the site, to ensure that post-development peak flows do not exceed pre-development levels.

Stormwater from the northern bush clad mountain catchment will be conveyed along the northern and eastern open drainage channels, while runoff from the eastern catchment will be captured by a 1050 mm scruffy dome and 525 mm pipe and conveyed into the detention system prior to discharge into the existing 1050 mm culvert that services the site.

The proposed subdivision layout showing the various stormwater components is illustrated in **Figure 2**.

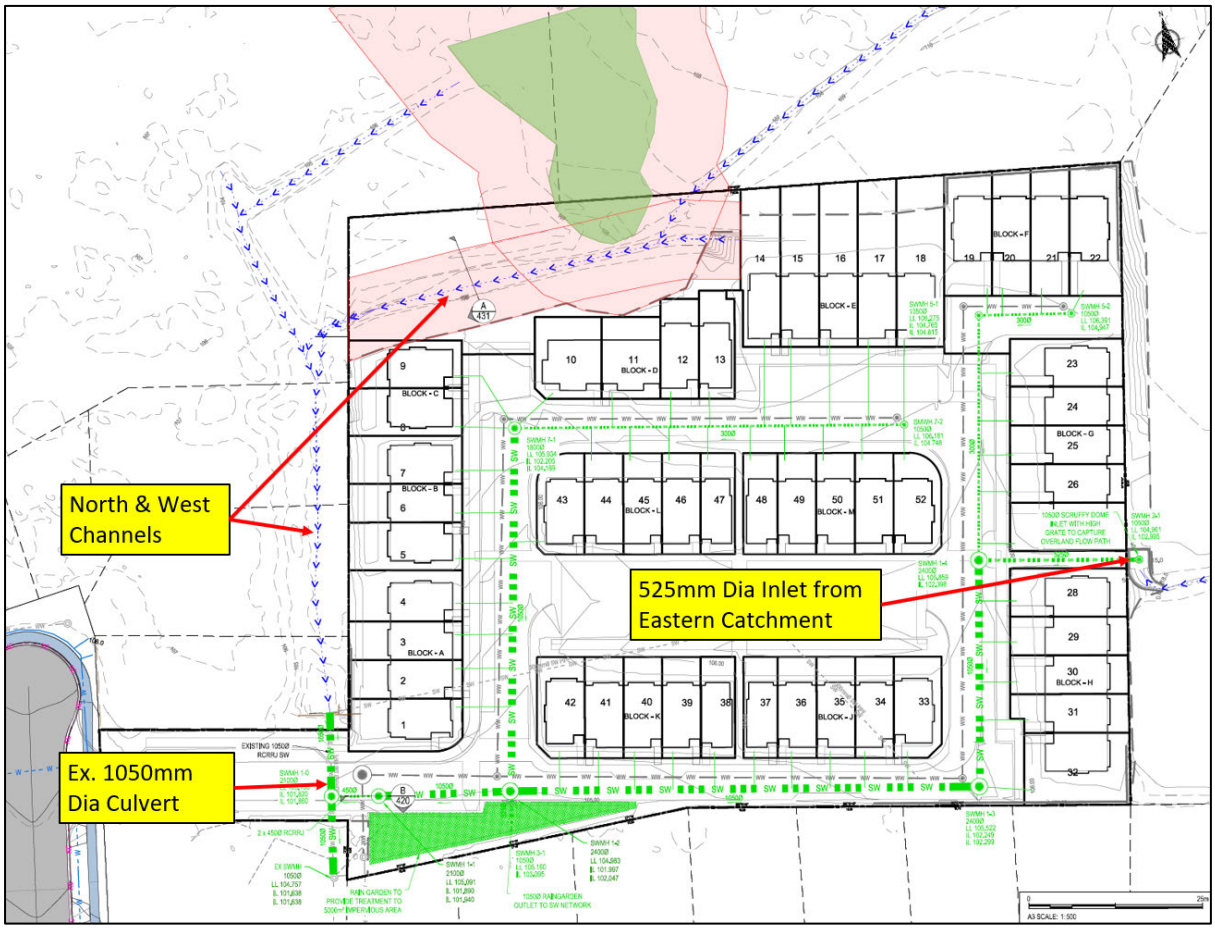

Figure 2:- Proposed development showing key stormwater components

4 // Basis of Design

4.1 Design Parameters

The assessment presented herein is based on Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0) and reference guide for design storm hydrology-standardised parameters for hydrological modelling (Wellington Water Ltd, 9 April 2019). The primary and secondary stormwater infrastructure design requirements under this standard include the following key criteria:

- Primary piped systems in residential areas to be designed to accommodate runoff from the 10-year ARI (10% AEP) rainfall event, or the 100-year ARI (1% AEP) rainfall event where no secondary flow path is available.
- Secondary systems shall consist of overland flow paths capable to conveying runoff from the 100-year ARI (1% AEP) rainfall event.
- Maximum acceptable flood depths during the 100-year ARI event in local / minor roads, which apply to the site, shall be 200 mm, with a flow velocity of no more than 2 m/s.
- Minimum freeboard of habitable floor levels shall be 500 mm above the water level during secondary flood protection events. Commercial and industrial buildings shall have a freeboard of 300 mm and all other building freeboards shall be 200 mm.
- The minimum freeboard shall be measured from the water surface level to the building platform level or underside of the floor joists or structural concrete slab of the building.
- Rainfall depths are taken from NIWA's HIRDS Version 4, with allowance for Climate Change. An RCP6.0 for the year 2081-2100 was used for purposes of this assessment.

The following additional parameters were used in this assessment:

- The SCS Curve Number method was used with HEC-HMS modelling software to determine hydrology and flows generated within the contributing catchments.
- Curve numbers were obtained from the appendix A of reference guide design storm report. For the contributing upstream catchments, which are heavily vegetated in bush, a CN of 61 has been assumed (mountain brush with good hydrological condition). Impervious areas are assumed to have a CN=98.
- Time of Concentration parameters were calculated using the empirical equations of Ramser Kirpich and Bransby Williams, and the answers averaged.
- Initial Abstraction parameters were obtained using Wellington Water Ltd CN layer extract.
- A Manning's Coefficient of 0.07 (Excavated or dredged channels / streams with clean bottom, brush on side, highest stage) was used for purposes of assessing capacity of the upstream watercourses.
- Used Nested storm rainfall profile that 12-hour storm duration is recommended for model runs by the reference guide storm report.
- Wellington Water Standards do not specifically require blockage to be allowed for culverts or pipes during the secondary (100-year ARI storm) event. However, for purposes of our analysis,

culverts have been assumed to be 20% (1050 mm and 525 mm) and 50% (225 mm) blocked during secondary flow conditions.

- Our analysis has assumed that appropriate maintenance of these structures will be undertaken by Council (or appropriate party responsible), in order to prevent blockage from exceeding the assumed 20% during the 100-year ARI event.

4.2 Catchments

There are three main catchments contributing flow to the site, as shown on **Figure 3** below.

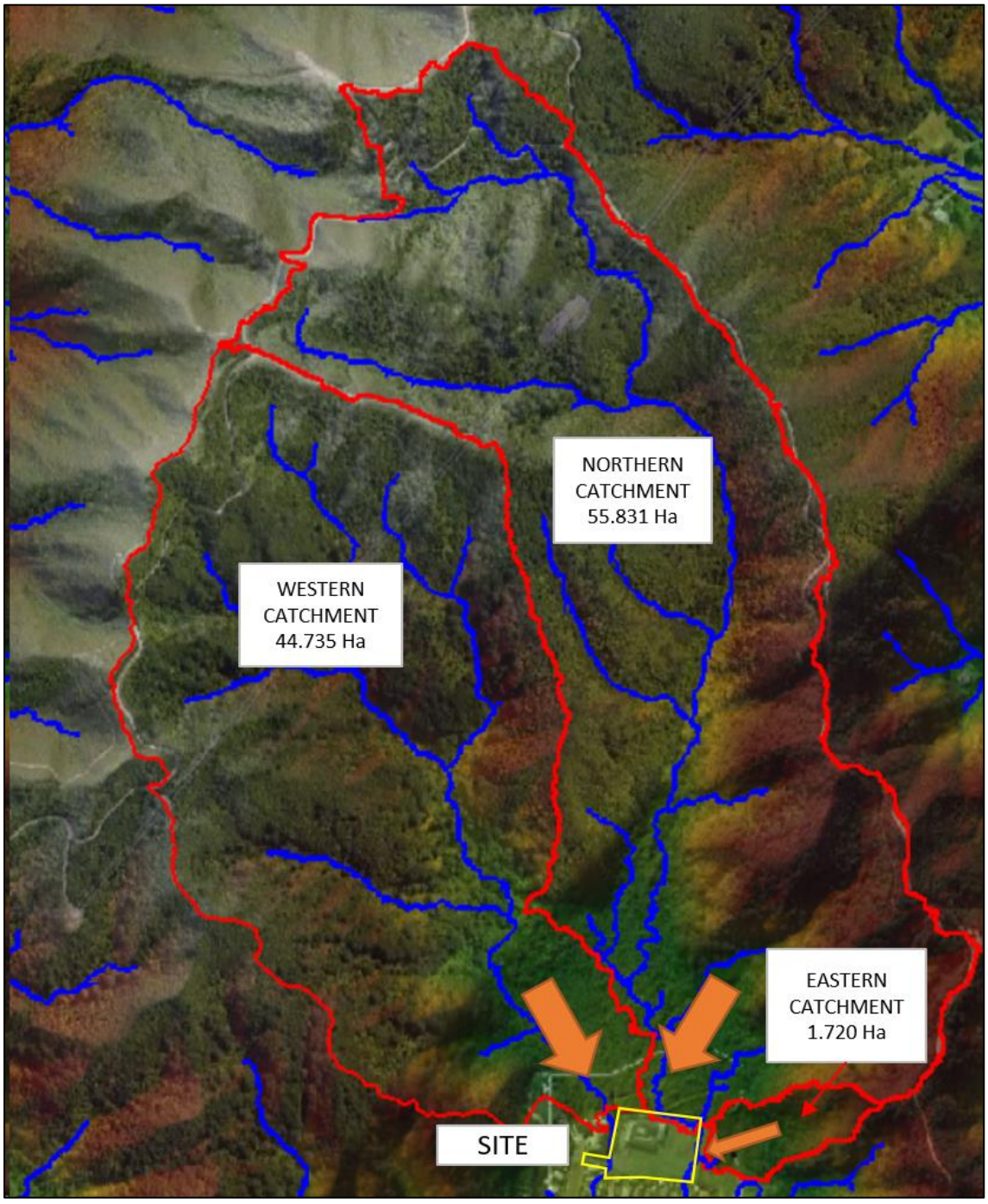

Figure 3:- Contributing stormwater catchments

These catchments have been assessed and measured using council LiDAR data and SCS methodology. The main catchment parameters are summarised in **Table 1** below.

Catchment	Catchment Area (Ha)	Curve Number (CN)	Longest Drainage Path (m)	Catchment Slope (%)	Time of Concentration Tc (min)	Initial Abstraction Ia (mm)
Western	44.73	61	1,133	10.8	19.25	16.24
Northern	55.83	61	1,666	10.0	27.74	16.24
Eastern	1.72	61	234	11.3	5.50	16.24

Table 1 – Summary Catchment Design Parameters

All of the contributing catchments are covered by undeveloped bush reserve land, with exception of a small portion of the eastern catchment, which will be covered by the adjacent 9-lot subdivision that is currently under development at the end of Meremere St.

However, we understand that peak flow attenuation will be provided within the Meremere St subdivision. As such, for purposes of this analysis, all contributing catchments are assumed to be in a greenfields in terms of peak flows generated for both the pre and post development condition.

5 // Results

5.1 Modelling Results, Pre-Development (Existing) Condition

The pre-development (existing) condition has been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development (existing) 100-year ARI flood levels, flood depths and flow velocities are shown in **Figures 4, 5** and **6** below, respectively.

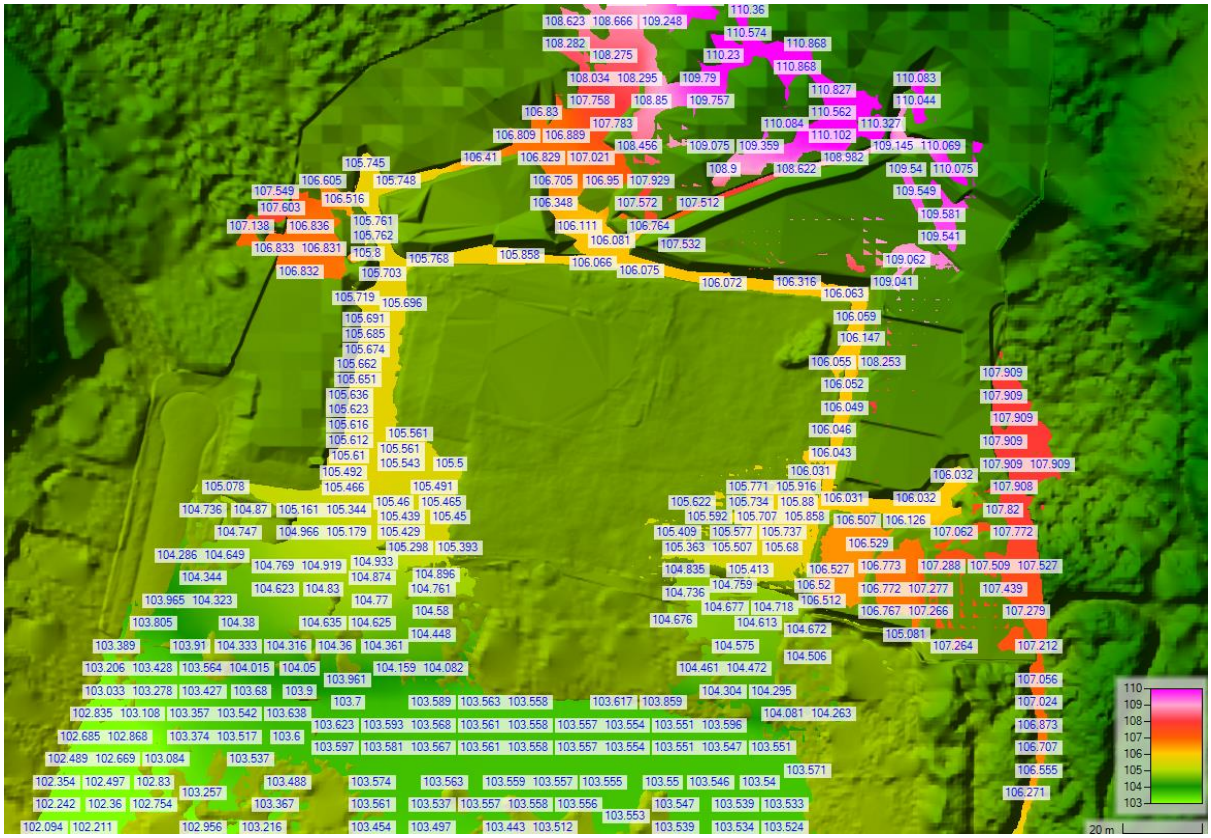

Figure 4: Pre-Development 100-year ARI Flood Map showing Flood Levels

The pre-development results show that stormwater runoff from the northern and eastern catchments is directed along the existing perimeter channels around the eastern, northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance.

The results show that in the existing condition, and assuming a 20% blockage scenario for the culvert, there is some spillage of flows across the entrance to the site. The peak flow estimated to spill across the culvert embankment under this scenario is estimated to be 3.45 m^3/s, approximately.

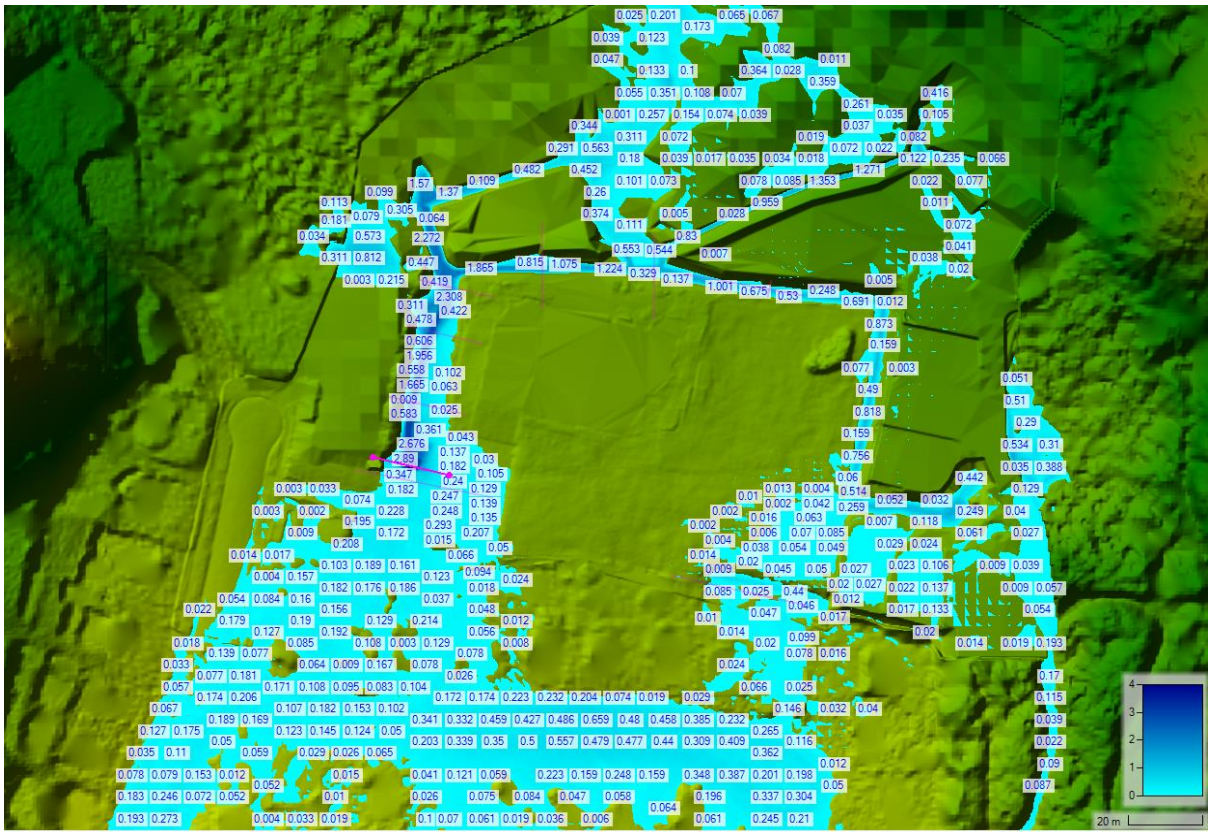

Figure 5: Pre-Development 100-year ARI Flood Map showing Flood Depths

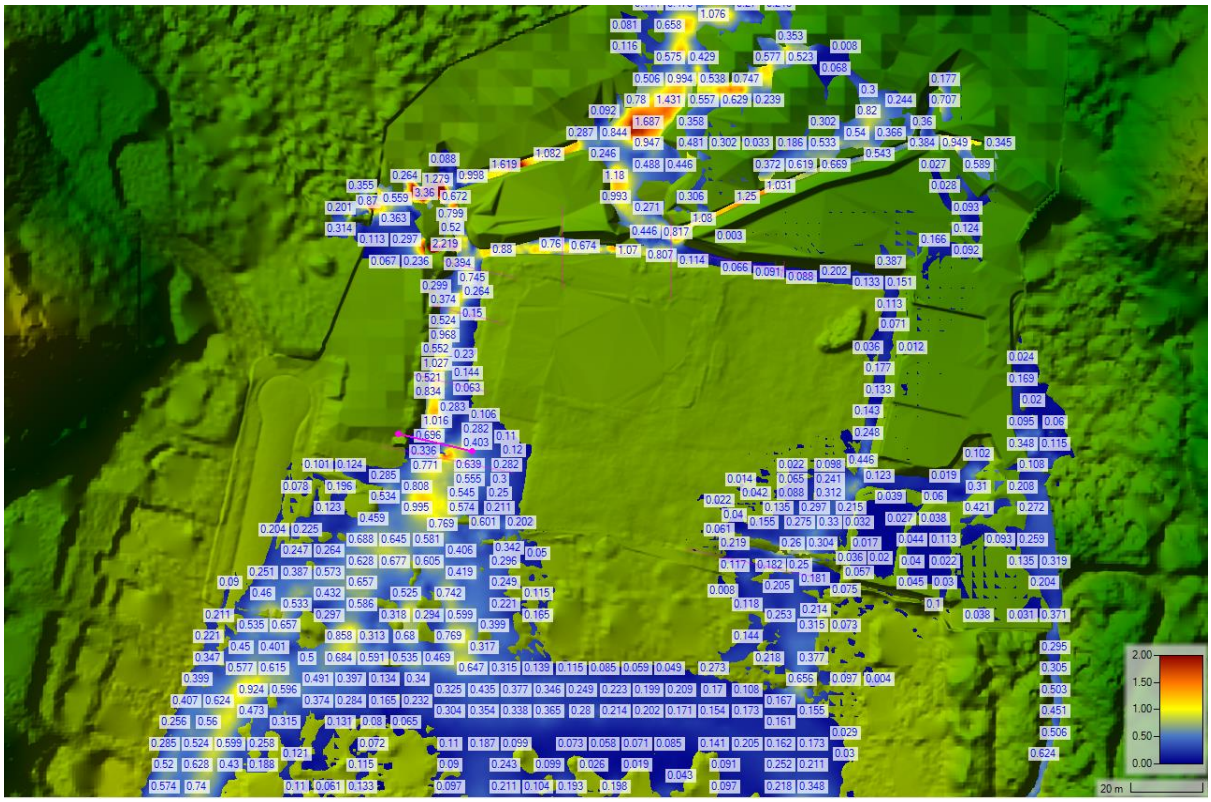

Figure 6: Pre-Development 100-year ARI Flood Map showing Flow Velocities

5.2 Modelling Results, Post-Development Condition

The post-development condition has also been modelled using HEC-HMS and HEC-RAS hydrological and hydraulic modelling packages, for the 100-year ARI (climate change) rainfall conditions.

Results showing the pre-development 100-year ARI flood levels, flood depths and flow velocities are shown in Figures 7, 8 and 9 below, respectively.

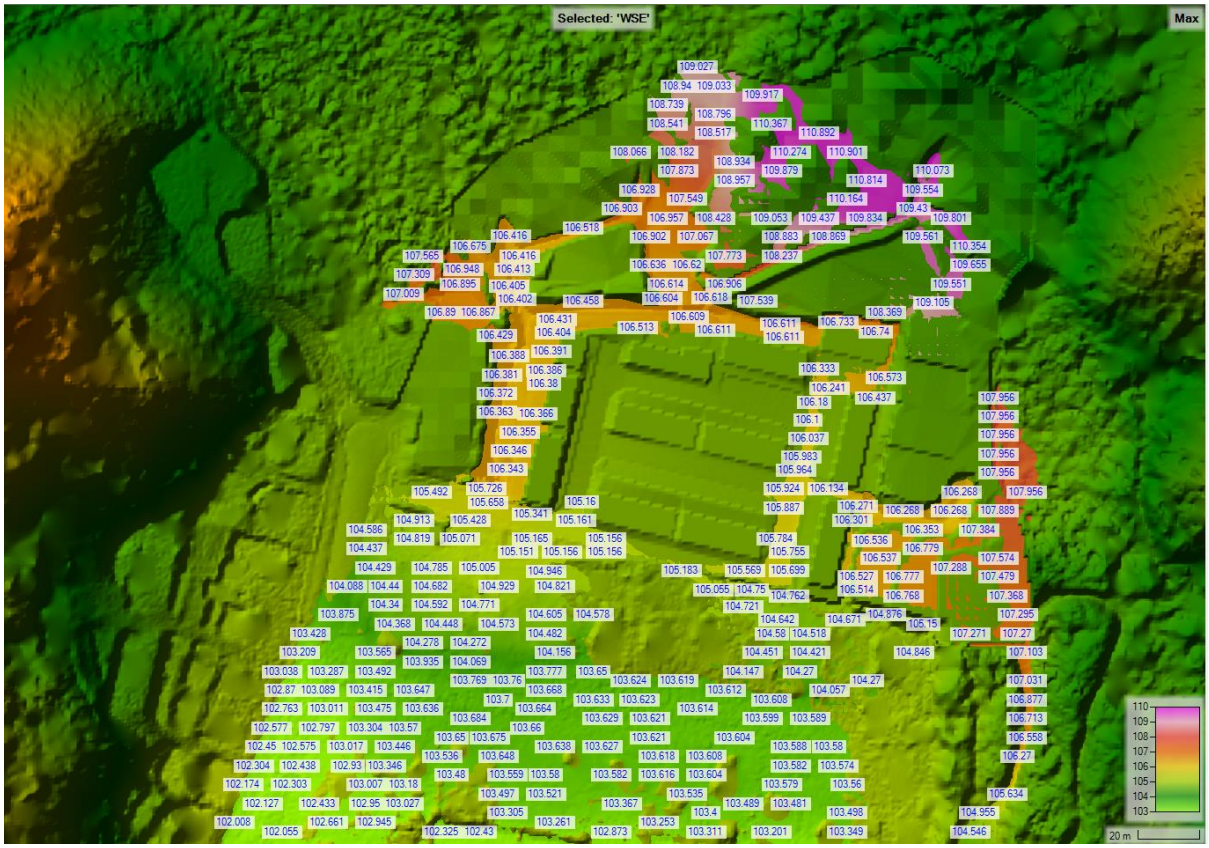

Figure 7: Post-Development 100-year ARI Flood Map showing Flood Levels

The results for the post-development scenario show that stormwater runoff from the northern catchment is directed along the channels adjacent to northern and western boundaries, and eventually discharge down the 1050 mm diameter culvert that passes under the site entrance. For this scenario, runoff from the eastern catchment is connected within the proposed pipe network, which ultimately discharges into the 1050 mm culvert.

Apart from the spillage across the culvert embankment, the post-development scenario also shows a very small amount of flow spilling across the south-eastern corner, of maximum 3.52 m^3/s. This flow is insignificant in the context of the 100-year ARI event, and it is expected that it will be fully contained within the kerb and channel in the proposed southern road (the design of this will be finalised during detailed design stage). The impact on downstream properties is thus expected to be negligible.

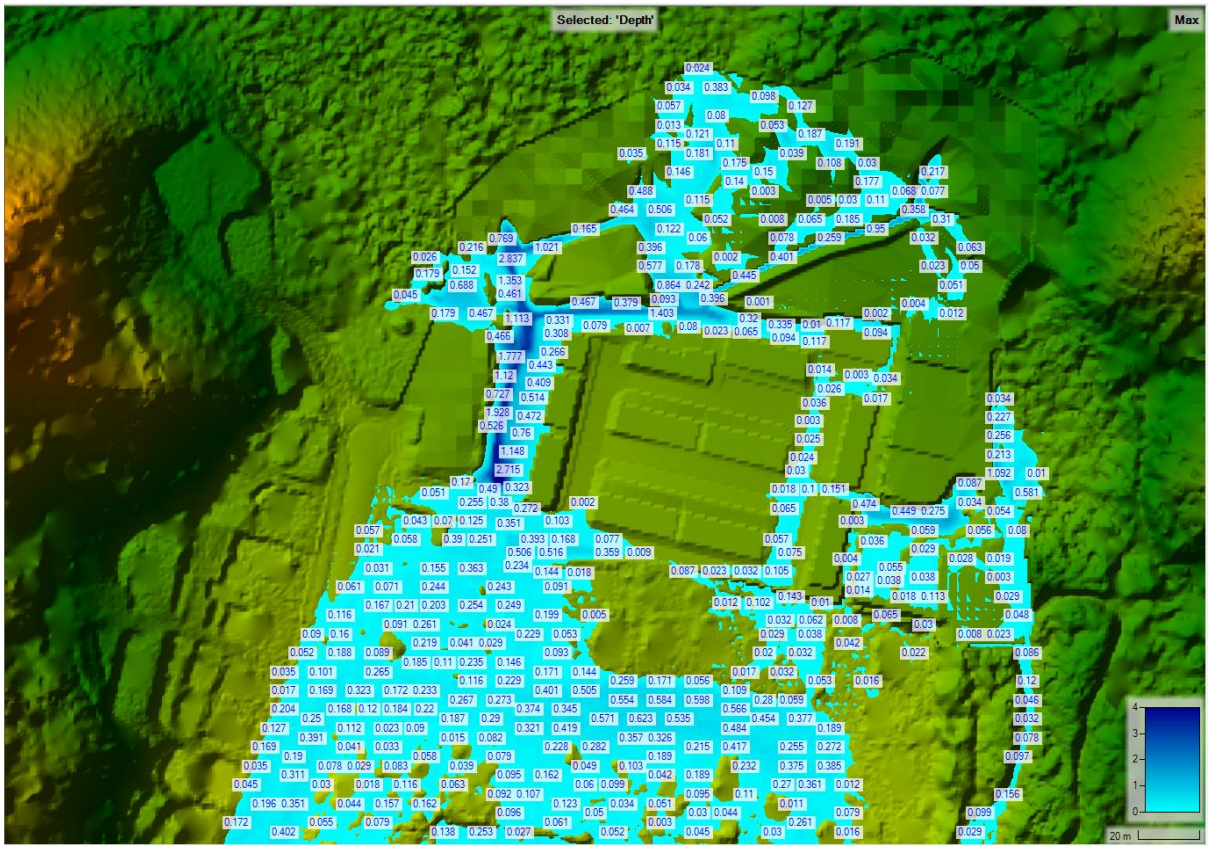

Figure 8: Post-Development 100-year ARI Flood Map showing Flood Depths

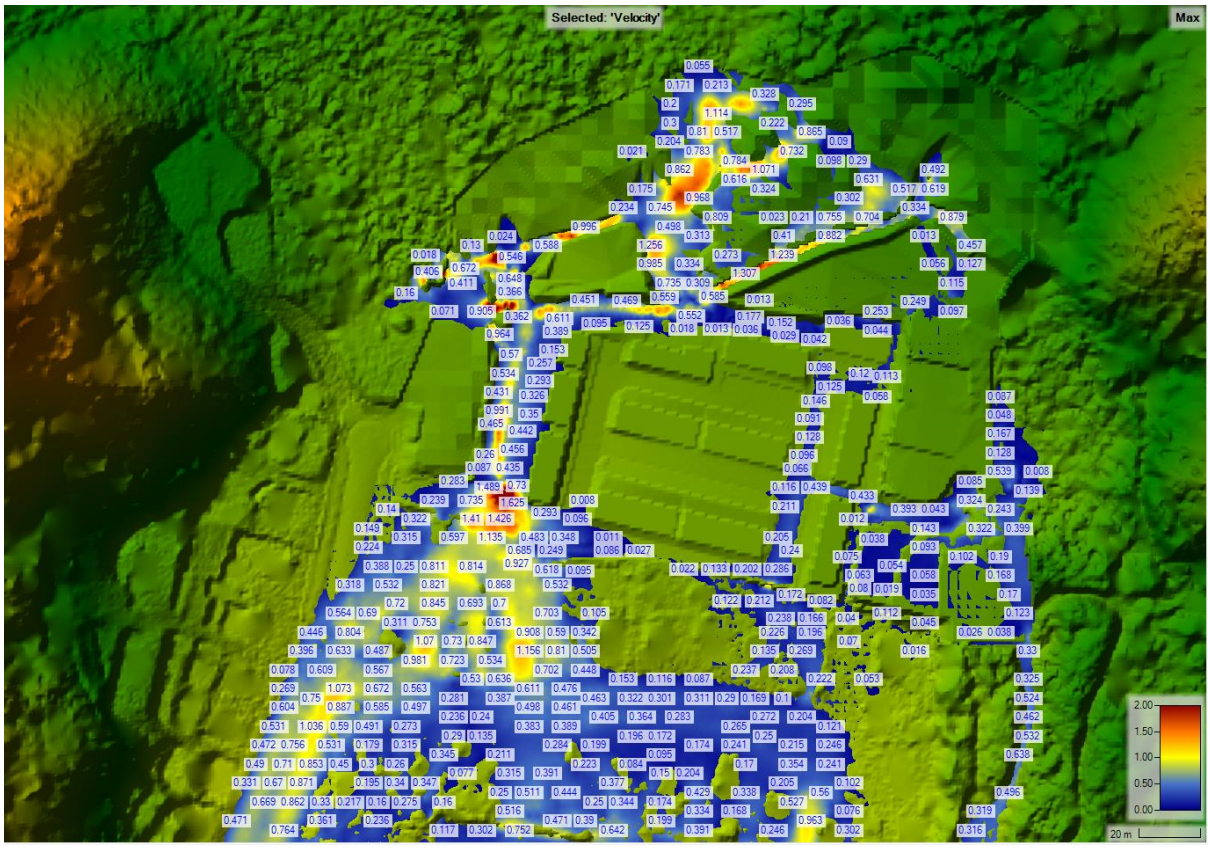

Figure 9: Post-Development 100-year ARI Flood Map showing Flow Velocities

5.3 Impact on Downstream Properties

As part of the proposed works, the existing crossing over the stream will be raised in level, and this will result in additional storage within the existing channels during the 100-year ARI event. While this causes water levels to rise behind the culvert, the flows will remain fully contained within the channels, thereby avoiding any adverse impacts on adjacent properties.

Downstream of the development, the revised 100yr ARI flood levels are predicted to decrease at west-southern and east-southern location, typically up to 370 mm by each location (green), as shown in Figure 10 below.

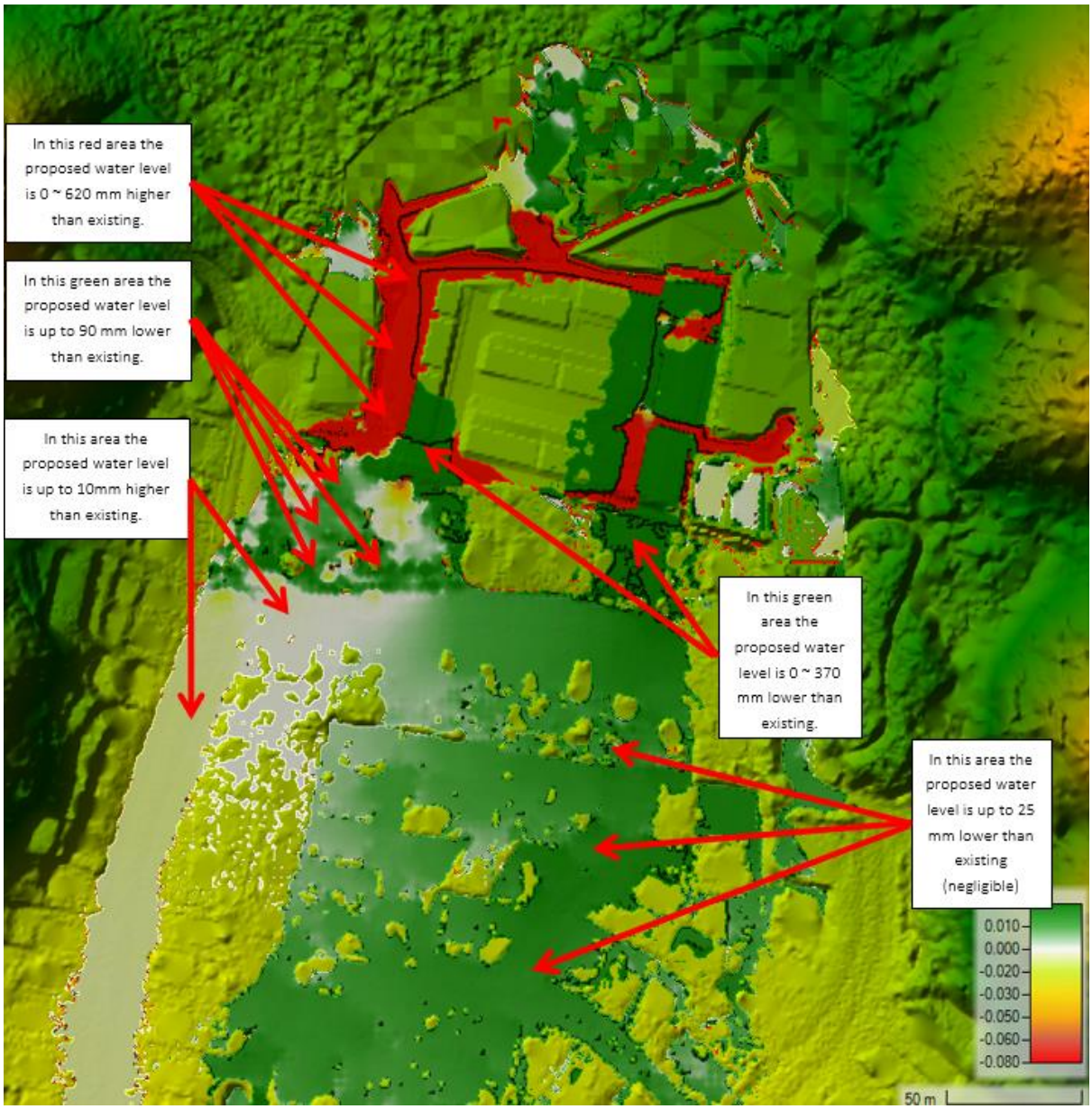

Figure 10: Comparison existing WSL and proposed WSL

In case of west-southern downstream impact, particularly on properties 100-104 Mohaka and 3-5 Rakaia Grove's proposed flood level is reduced up to 90 mm. as shown in Figure 11, 12, 13, 14 and 15 below, respectively.

Figure 11: Cross-sections for Pre-Development and Post-Development flood levels on west-southern properties.

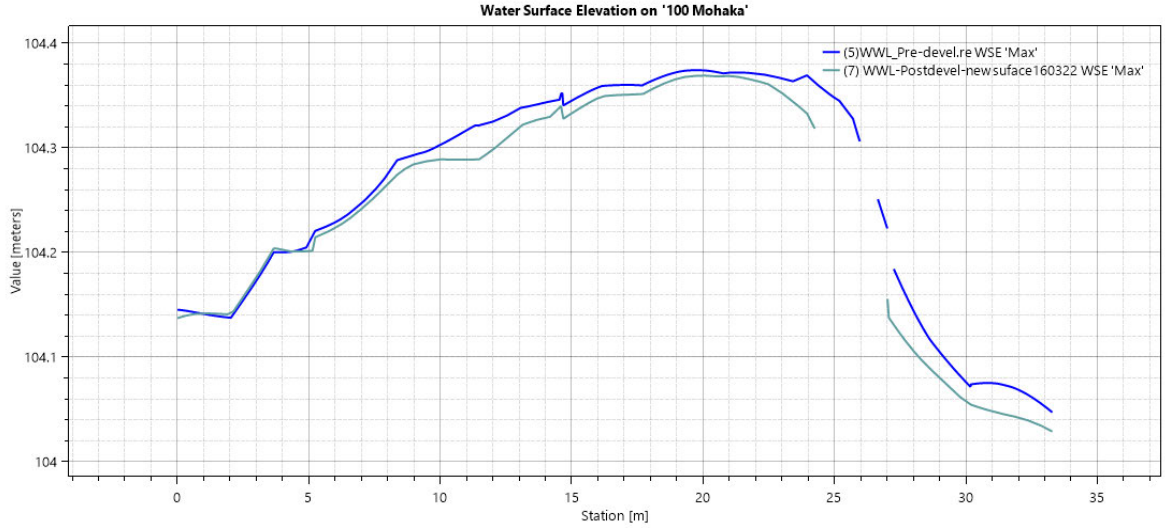

Figure 12: Pre-Development and Post-Development flood levels on 100 Mohaka St.

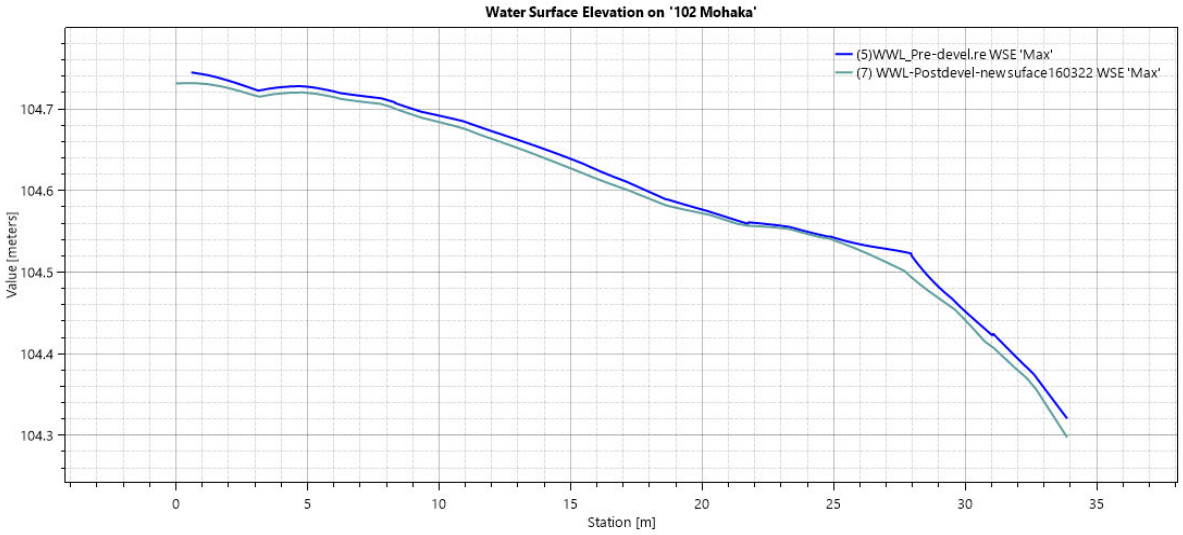

Figure 13: Pre-Development and Post-Development flood levels on 102 Mohaka St.

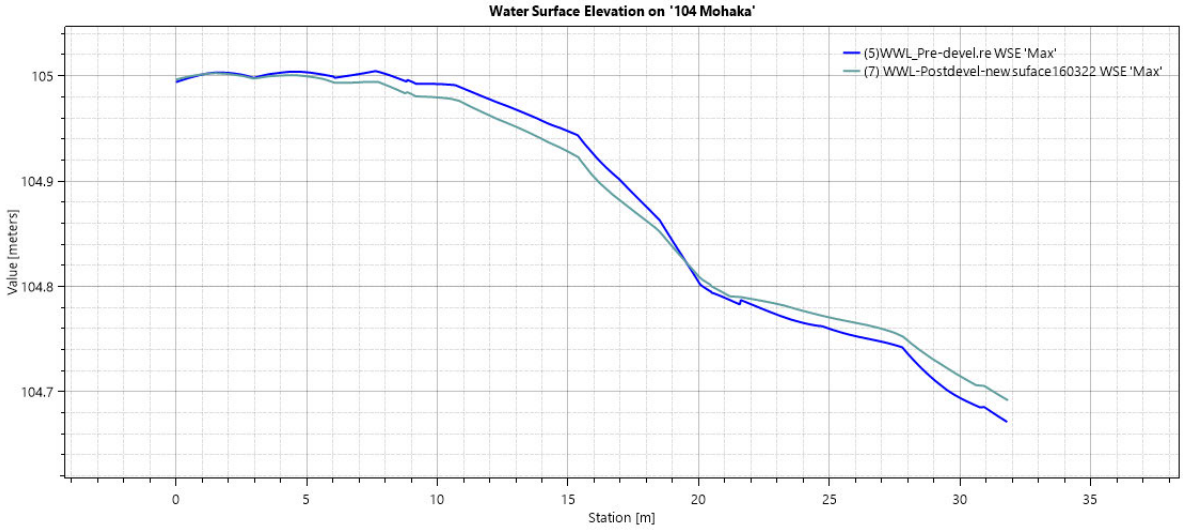

Figure 14: Pre-Development and Post-Development flood levels on 104 Mohaka St.

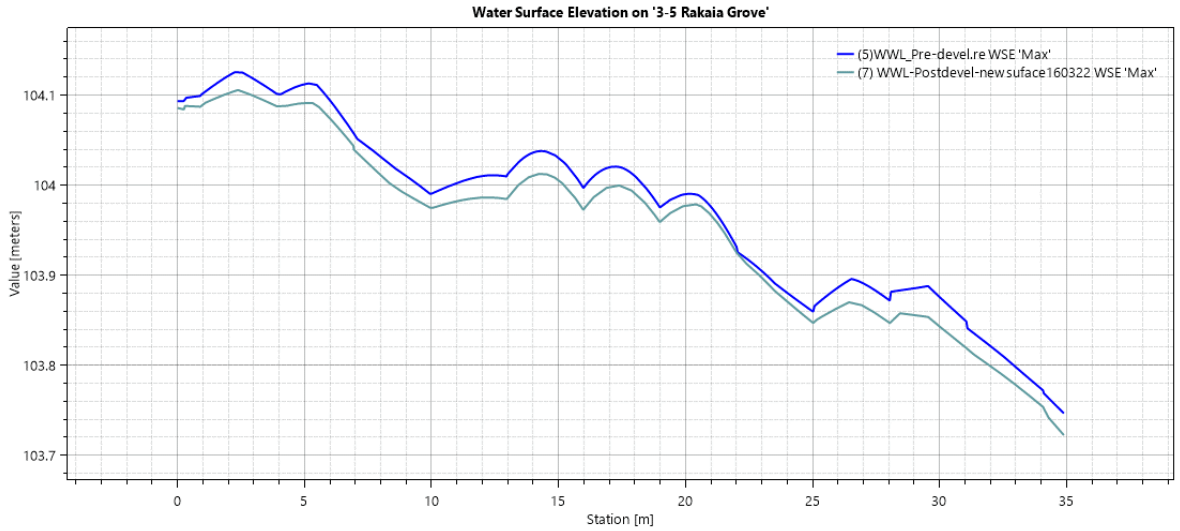

Figure 15: Pre-Development and Post-Development flood levels on 3-5 Rakaia Grove

In conclusion, the analysis shows that the proposed development will result in "no more than minor" effects with regards to flooding (in fact likely to result in net positive results given the predicted reduced flow depth downstream), and especially considering that any benefits likely to arise from the proposed on-site attenuation is ignored in the analysis.

5.4 Minimum Recommended Floor Levels

Based on the flood assessment, minimum floor levels have been determined based on council's criteria for a minimum freeboard of 500 mm above the predicted 100-year ARI flood levels, for habitable floors that are adjacent to a 100-year floodplain or overland flow path.

For all other lots, a 200 mm freeboard to the adjacent ground is required in accordance with the requirements of the building code.

Refer **Table 2** below for the minimum recommended level for the underside of the structural concrete slab (or underside of floor joists).

Lot #	Adjacent to 100yr ARI OLFP or Flood Plain?	100-year ARI Flood Level (RL. m)	Recommended Minimum Underside of Slab Level (m)	Freeboard (mm)
1	Yes	106.36	106.86	500 above Flood Level
2	Yes	106.36	106.86	500 above Flood Level
3	Yes	106.36	106.86	500 above Flood Level
4	Yes	106.36	106.86	500 above Flood Level
5	Yes	106.39	106.89	500 above Flood Level
6	Yes	106.39	106.89	500 above Flood Level
7	Yes	106.39	106.89	500 above Flood Level
8	Yes	106.41	106.91	500 above Flood Level
9	Yes	106.41	106.91	500 above Flood Level
10	Yes	106.61	107.11	500 above Flood Level
11	Yes	106.61	107.11	500 above Flood Level
12	Yes	106.61	107.11	500 above Flood Level
13	Yes	106.61	107.11	500 above Flood Level
14	Yes	106.61	107.11	500 above Flood Level
15	Yes	106.61	107.11	500 above Flood Level
16	Yes	106.61	107.11	500 above Flood Level
17	Yes	106.61	107.11	500 above Flood Level
18	Yes	106.61	107.11	500 above Flood Level
19	Yes	106.74	107.24	500 above Flood Level
20	Yes	106.74	107.24	500 above Flood Level
21	Yes	106.74	107.24	500 above Flood Level
22	Yes	106.74	107.24	500 above Flood Level
23	Yes	106.27	106.77	500 above Flood Level
24	Yes	106.27	106.77	500 above Flood Level

25	Yes	106.27	106.77	500 above Flood Level
26	Yes	106.27	106.77	500 above Flood Level
27	Yes	106.27	106.77	500 above Flood Level
28	Yes	106.27	106.77	500 above Flood Level
29	Yes	106.27	106.77	500 above Flood Level
30	Yes	106.27	106.77	500 above Flood Level
31	Yes	106.27	106.77	500 above Flood Level
32	Yes	106.27	106.77	500 above Flood Level
33	Yes	105.80	106.30	500 above Flood Level
34	No	N/A	106.10	200 above Ground Level
35	No	N/A	106.10	200 above Ground Level
36	No	N/A	106.10	200 above Ground Level
37	No	N/A	106.10	200 above Ground Level
38	No	N/A	105.87	200 above Ground Level
39	No	N/A	105.87	200 above Ground Level
40	No	N/A	105.87	200 above Ground Level
41	No	N/A	105.87	200 above Ground Level
42	No	N/A	105.87	200 above Ground Level
43	No	N/A	106.23	200 above Ground Level
44	No	N/A	106.23	200 above Ground Level
45	No	N/A	106.23	200 above Ground Level
46	No	N/A	106.23	200 above Ground Level
47	No	N/A	106.23	200 above Ground Level
48	No	N/A	106.39	200 above Ground Level
49	No	N/A	106.39	200 above Ground Level
50	No	N/A	106.39	200 above Ground Level
51	No	N/A	106.39	200 above Ground Level
52	Yes	106.00	106.50	500 above Flood Level

Table 2 – 100-year ARI Flood Level and Minimum Habitable Floor Freeboard Requirements

5.5 Internal Overland Flow Paths

As discussed in the previous sections, 100-year ARI overland flows arising from the upstream catchments will be managed via the perimeter drainage channels, 1050mm culvert and internal reticulation that accepts flows from the eastern catchment, which is designed to convey 100-year ARI flows.

Overland flows within the subdivision itself are small, as any runoff generated within the site originates only from the site itself. Any excess flows in addition to the capacity of the underground piped network will be conveyed along the internal local roads toward the southwestern part of the site, where the 1050mm culvert breach point is located.

6 // Conclusion

This report has been prepared to assess the flood risk both within the site and at the adjacent residential properties west and south (downstream) of the site.

Our analysis concludes that the 100-year flows are adequately controlled in the post-development condition, and such that any impact on downstream properties to the south and properties to the west of the site no more than minor.

Minimum recommended floor levels have been identified through this work to ensure that the 100-year ARI freeboard requirements are achieved in accordance with Wellington Water's Regional Standard for Water Services, December 2021 (Version 3.0).

All other aspects of the stormwater system will be designed to conform with the relevant council standards and building code requirements.

As such we consider that Wellington Water and Hutt City Council should give favourable consideration to the proposed development, from a flood risk perspective.

Appendix A – Engineering Calculations

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106 Mohaka Street, Wainuiomata, Lower Hutt

Flood Assessment

CONTENTS:

Reason for this Revision: Wellington Water Queries

Calculations By:	PP
Checked By:	AR
Ref:	P20-156-Clc02
Date:	06.04.2022
Revision:	D

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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	1
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

A Introduction

MVH Ltd proposes to develop a 52 lot (approximate) residential subdivision across a 1.06ha block on the corner of 106 Mohaka Street Wainuiomata, Lower Hutt (Lot 5 DP 65821). AR & Associates Ltd (ARAL) has been requested to assist in the flood modelling and report.

This document presents the flood modelling for the post development scenario.

B Basis of Design

The design presented herein is based on Wellington's Land Development and Subdivision Code of Practice and associated documents, for the contributing catchment assuming maximum probable development (MPD) conditions. The hydrology parameters are selected based on guidance from Wellington Water's Reference Guide for Design Storm Hydrology.

C Stormwater

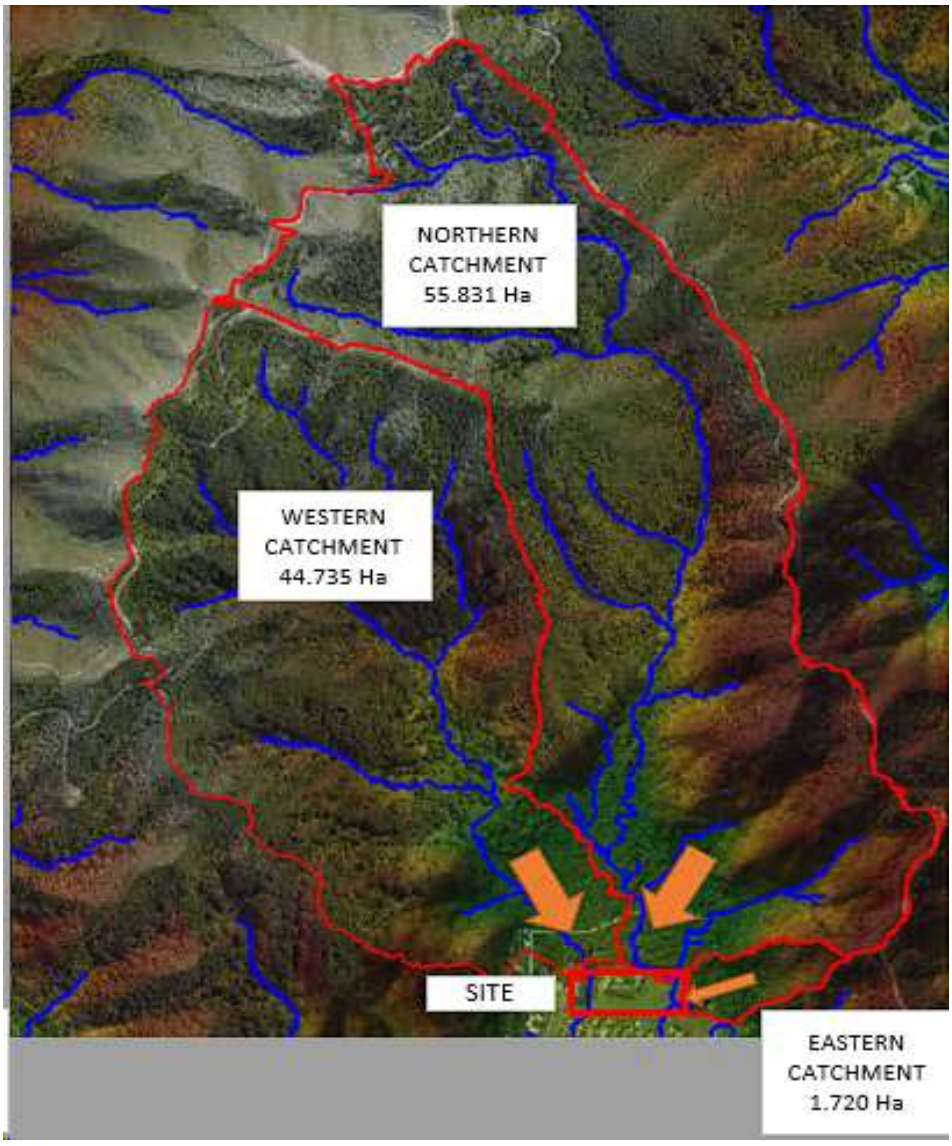
C.1 Flood Management Design Philosophy

The area is under the influence of the unnamed catchments as shown below. ARAL has undertaken an independent hydrology and hydraulics analysis using HEC-HMS and HEC-RAS to determine the peak flows and flooding extents.

The design philosophy focuses on retaining the existing topography as much as possible and applying a low impact design (LID) approach to maintain pre-development hydrology and flows, and minimise adverse effects on the environment and neighbouring properties which may result from the development.

This calculation sheet will cover the 100-year peak flows and flood mapping regarding max. water depth, max. water surface level, and max. water velocity for an MPD condition.

The 100yr Catchments showing the site location are shown below.



C.2 Design Assumptions and Parameters

Climate Change:

The SCS Curve Number method was used with the HEC-HMS modelling software to calculate the amount of runoff from a rainfall event. The 1% Annual Exceedance Probability (AEP) or 100-year Average Recurrence Interval (ARI) event was assessed for the flood analysis. An RCP6.0 for the year 2081-2100 was used for the climate change factor from HIRDS v4.

**** Nested Storm rainfall profile (12-hour storm duration is used for this assessment)**

RCP6.0 for the period 2081-2100(Depth, mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	
1.58	0.633	8.29	11.3	13.6	19.1	26.7	44.4	59.4	77.4	
2	0.5	9.16	12.4	15	21.1	29.5	48.9	65.4	84.8	
5	0.2	12.2	16.5	19.9	27.8	38.8	64.1	85.5	110	
10	0.1	14.5	19.5	23.6	32.9	45.8	75.4	101	130	
20	0.05	16.9	22.7	27.4	38.1	53.1	87.2	116	149	
30	0.033	18.3	24.7	29.7	41.4	57.5	94.3	125	161	
40	0.025	19.4	26.1	31.4	43.7	60.6	99.5	132	169	
50	0.02	20.2	27.2	32.8	45.5	63.2	103	137	176	
60	0.017	20.9	28.2	33.9	47	65.2	107	142	182	
80	0.012	22.1	29.7	35.7	49.5	68.6	112	148	190	
100	0.01	22.9	30.8	37	51.4	71.1	116	154	197	
250	0.004	26.6	35.6	42.8	59.2	81.8	133	176	225	

Curve Numbers:

	CN	
Upstream undeveloped catchments	61	Based on Appendix B or Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	98	

Initial Abstraction:

The Initial Abstraction parameter is estimated as 0.1 x S, as per Wellington Water's Reference Guide for Design Storm Hydrology, as follows:

	Ia	
Upstream undeveloped catchments	16.24	Based on Wellington Water's Reference Guide for Design Storm Hydrology
Impervious surface	0	

Terrain Data:

- Wellington Lidar 1m DEM (2013-2014, LINZ), Projection: NZGD / Wellington 2000, Vertical Datum: NZVD2016
- Existing survey completed by Cuttriss, Surveyors, Engineers, Planners Ltd, 11.2020
- Proposed Terrain design for project site by AR Associates Ltd.
- Site scheme plan, Moore Design, 23.12.20

Proposed Plan:

	Max Coverage	Average MPD Impervious	
Pre-Development	0%	0%	
Post-Development	65%	70%	<- Assumed

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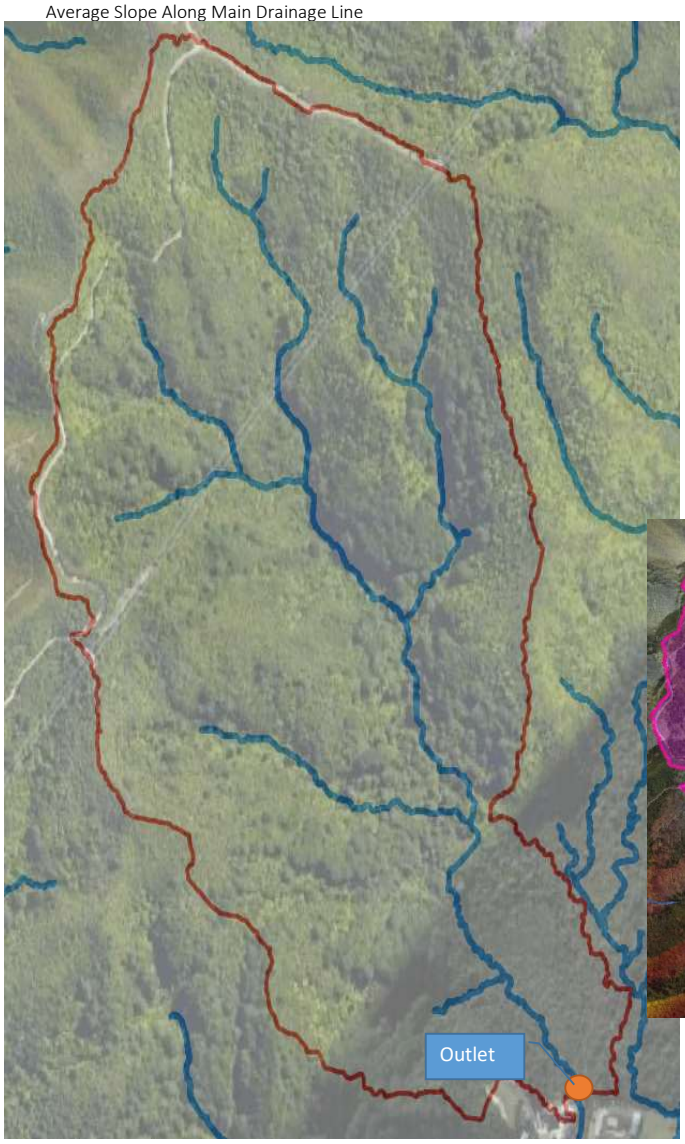
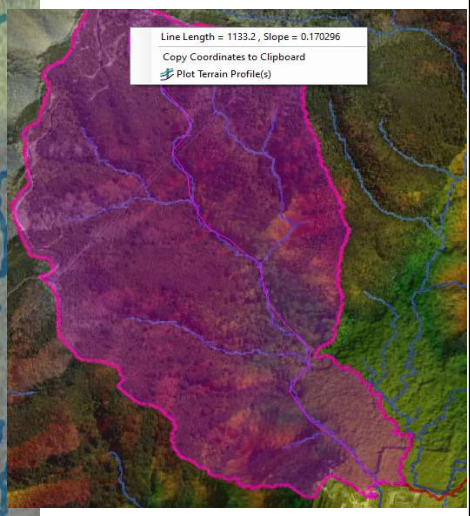
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	3
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

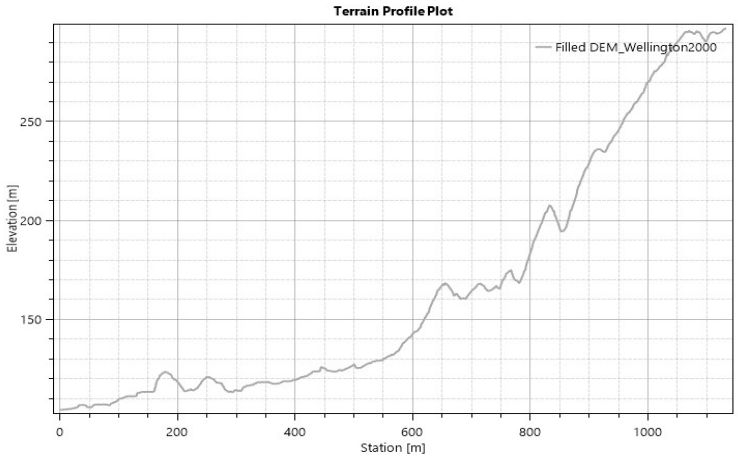
C.3 Catchment Analysis - Western Catchment

Average Slope Along Main Drainage Line





Slope =	0.108



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CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	4
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

Catchment Area

Total	444783	m2
	0.444783	km2
	44.4783	ha

Pre-Development

Impervious Area	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.13	From above
Catchment slope Sc (equal area method)	0.108	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.47	(TP108)
Tc (min)	27.97	
Lag time (min)	18.65	
Tc (min)	10.32	(Ramser Kirpich Tc) - Suited to catchments with well-defined drainage channels.
Lag time (min)	6.88	
Tc (min)	28.17	(Bransby Williams Tc) - Suited to catchments without well-defined drainage channels.
Lag time (min)	18.78	
Average(min)	**19.25**	
Lag time (min)	**12.83**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		44478	10.0%
CN (Mountainous)	61		400305	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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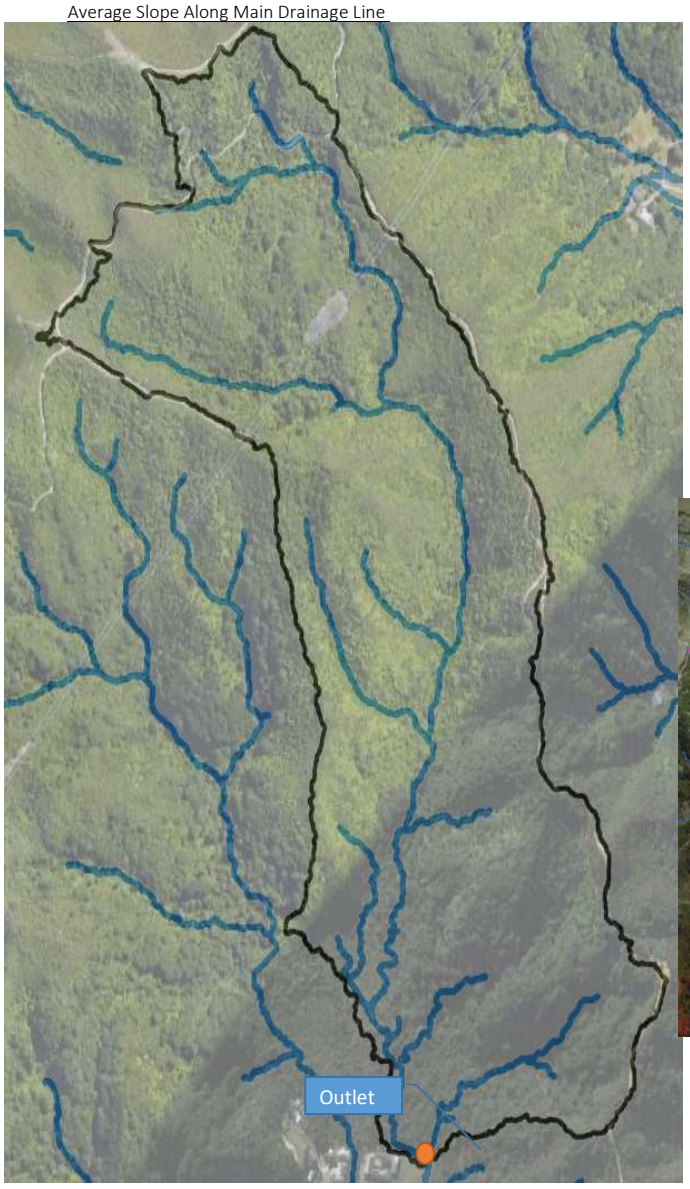
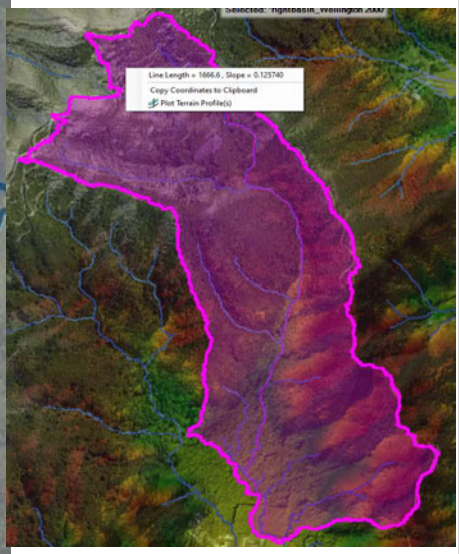
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	5
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

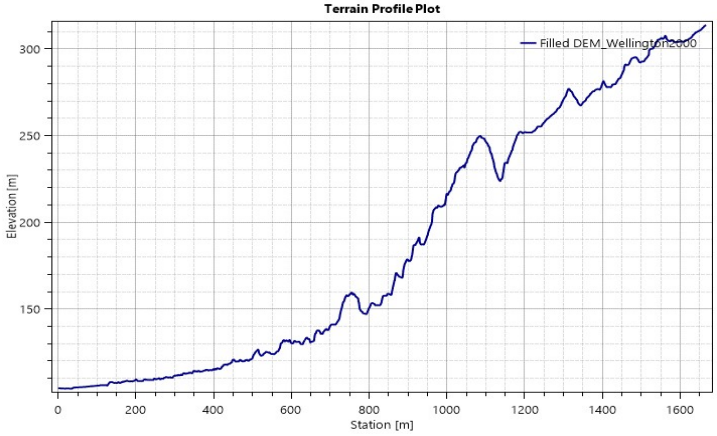
C.4 Catchment Analysis - Northern Catchment

Average Slope Along Main Drainage Line





Slope = 0.0998



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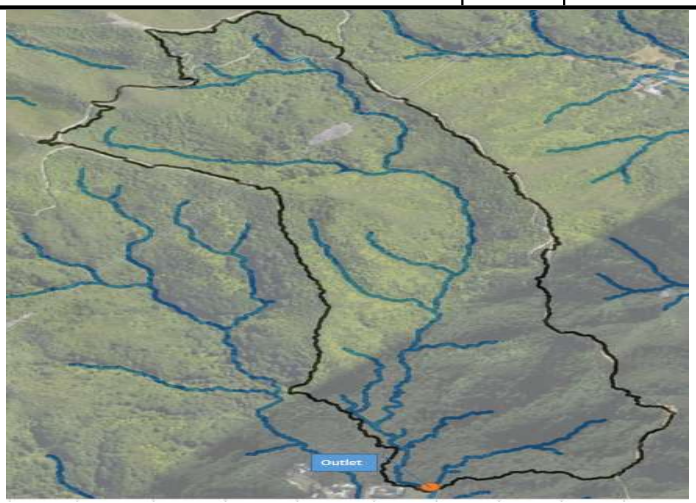
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	6
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		



Catchment Area

Total	558312	m2
	0.558312	km2
	55.8312	ha

Pre-Development

Impervious Area

	0	m2

Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	1.67	From above
Catchment slope Sc (equal area method)	0.0998	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.62	
Tc (min)	36.96	
Lag time (min)	24.64	
Tc (min)	14.33	**(Ramser Kirpich Tc)**
Lag time (min)	9.55	
Tc (min)	41.16	(Bransby Williams Tc)
Lag time (min)	27.44	
Average(min)	**27.74**	
Lag time (min)	**18.50**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		55831.2	10.0%
CN (Mountainous)	61		502480.8	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

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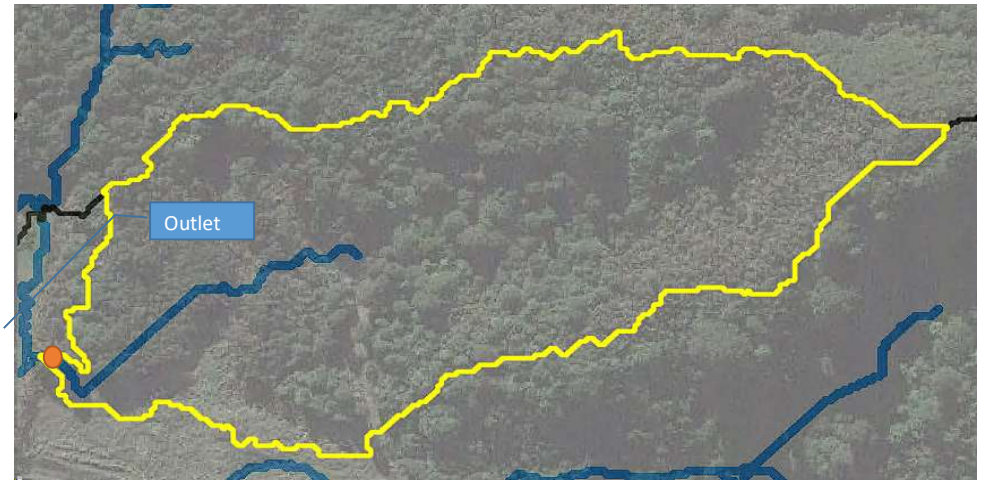
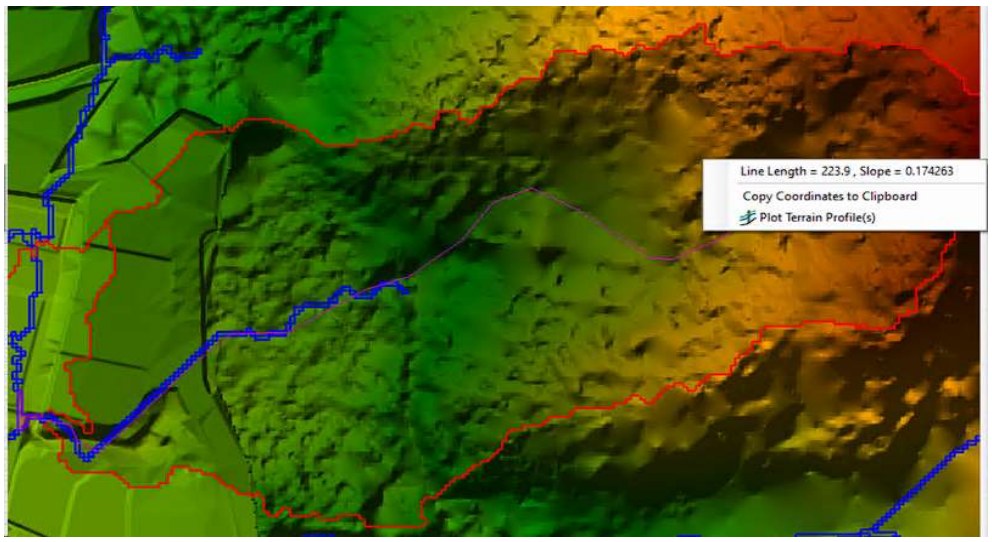
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	7
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.5 Catchment Analysis - Eastern Catchment

Average Slope Along Main Drainage Line





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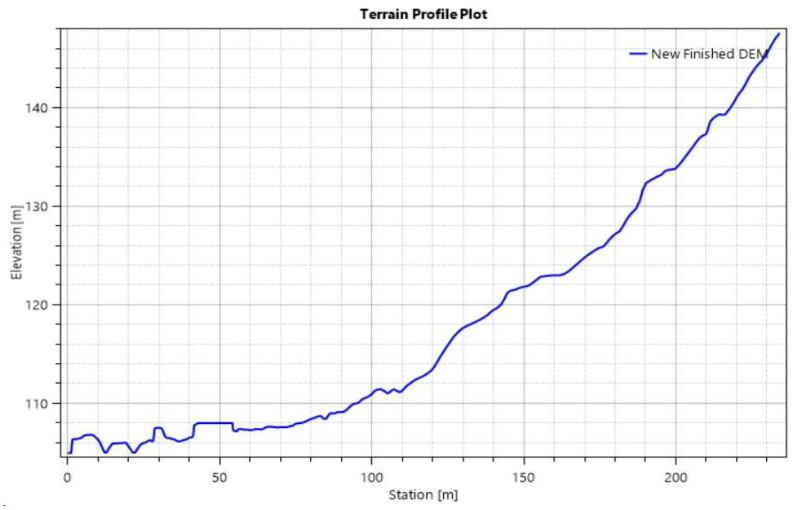

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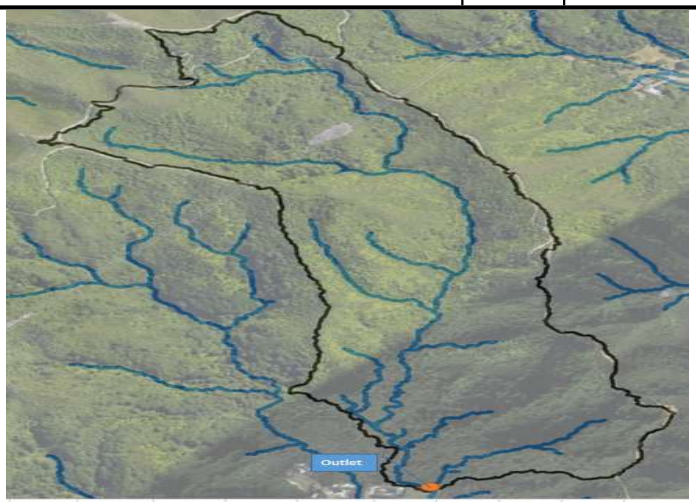
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	8
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		



Catchment Area

Total	17206	m2
	0.017206	km2
	1.7206	ha

Pre-Development

Impervious Area 0 m2

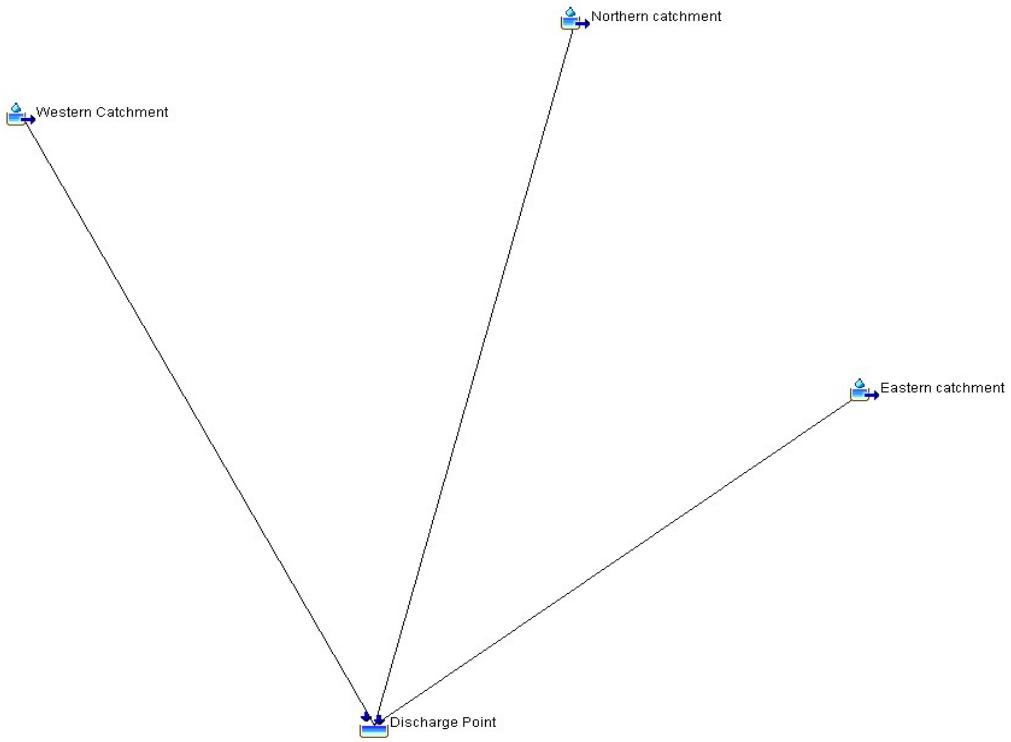
Time of Concentration (Tc)

Channelisation Factor "C" (table 4.2)	1.00	Assuming Engineered grassed channel
Catchment length (km)	0.23	From above
Catchment slope Sc (equal area method)	0.1127	From above
Runoff factor (CN/(200-CN))	0.44	From below
Tc (hr)	0.17	
Tc (min)	10.20	
Lag time (min)	6.80	
Tc (min)	3.02	**(Ramser Kirpich Tc)**
Lag time (min)	2.01	
Tc (min)	7.99	(Bransby Williams Tc)
Lag time (min)	5.32	
Average(min)	**5.50**	
Lag time (min)	**3.67**	

Initial Abstraction (Ia)

			Pre-Dev Areas(m2)	
CN (Pervious)	61		1720.6	10.0%
CN (Mountainous)	61		15485.4	90.0%
CN (Impervious)	98		0	0.0%
CN (Weighed)	**61.0**	Assuming	100%	mountainous
Storage (mm)	162			
Ia (mm) (=0.1S)	**16.24**			

C.6 HEC-HMS Model & Results



Average Tc (Ramser and Bransby)

Global Summary Results for Run "100yr Proposed"

Project: P20-156-WWL Simulation Run: 100yr Proposed

Start of Run: 01Jan2020, 00:00
End of Run: 01Jan2020, 12:00
Compute Time: 25Mar2022, 13:10:54

Basin Model: 100yr Proposed
Meteorologic Model: 100yr +CC
Control Specifications: 24hr

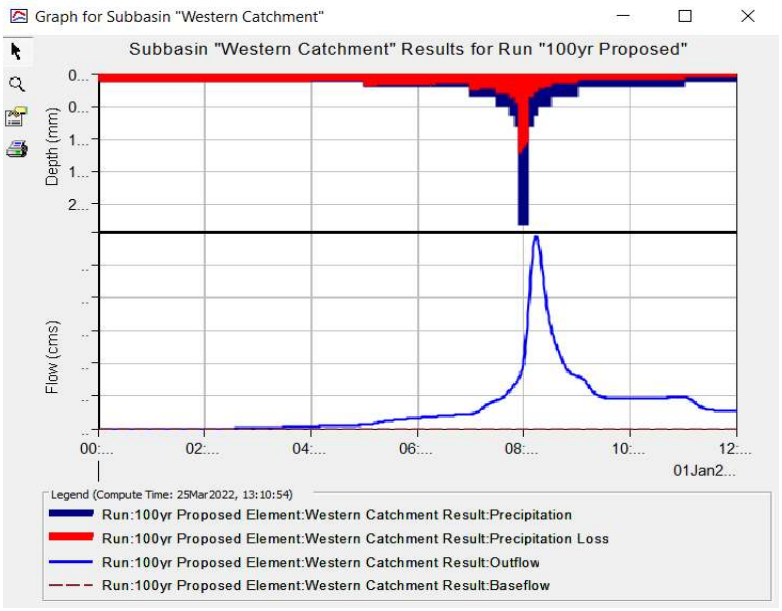
Show Elements: All Elem... Volume Units: MM 1000 M3 Sorting: Hydrol...

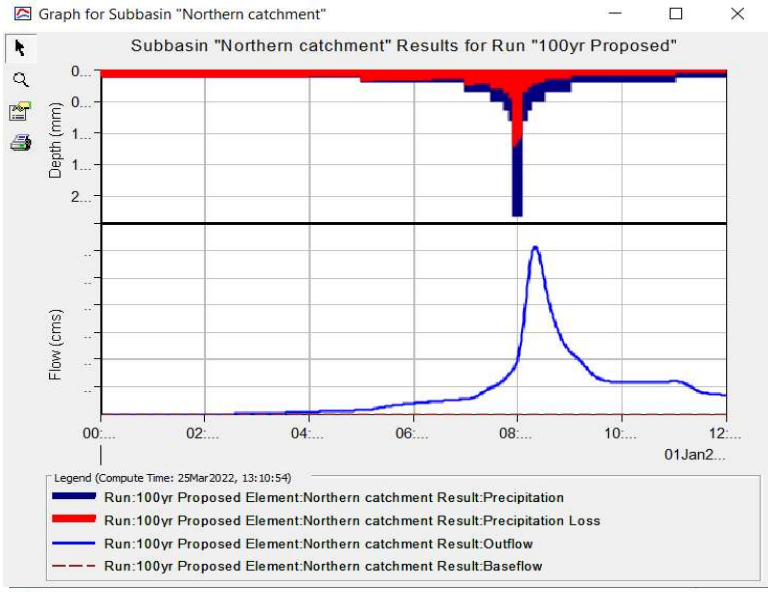
Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Western Catchment	0.444783	5.9	01Jan2020, 08:14	62.23
Northern catchment	0.558312	6.1	01Jan2020, 08:20	61.68
Eastern catchment	0.017206	0.3	01Jan2020, 08:06	63.12
Discharge Point	1.020301	11.7	01Jan2020, 08:16	61.94

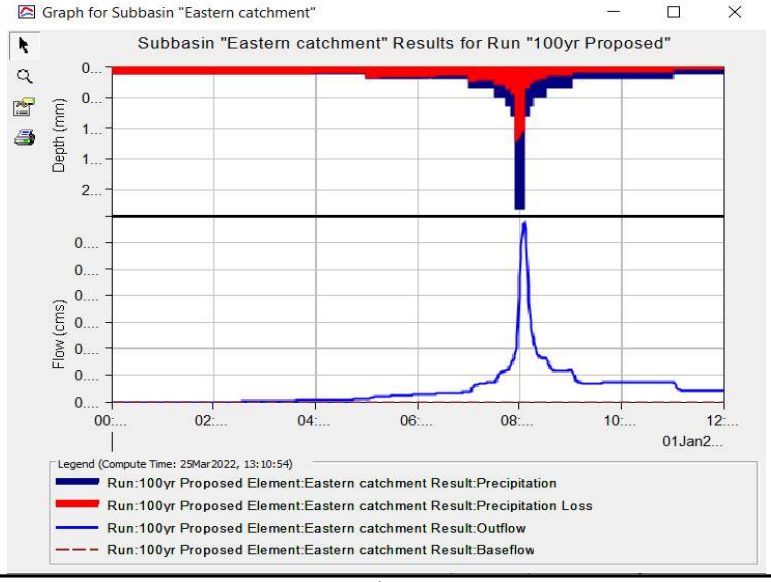
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	10
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.6 HEC-HMS Model & Results







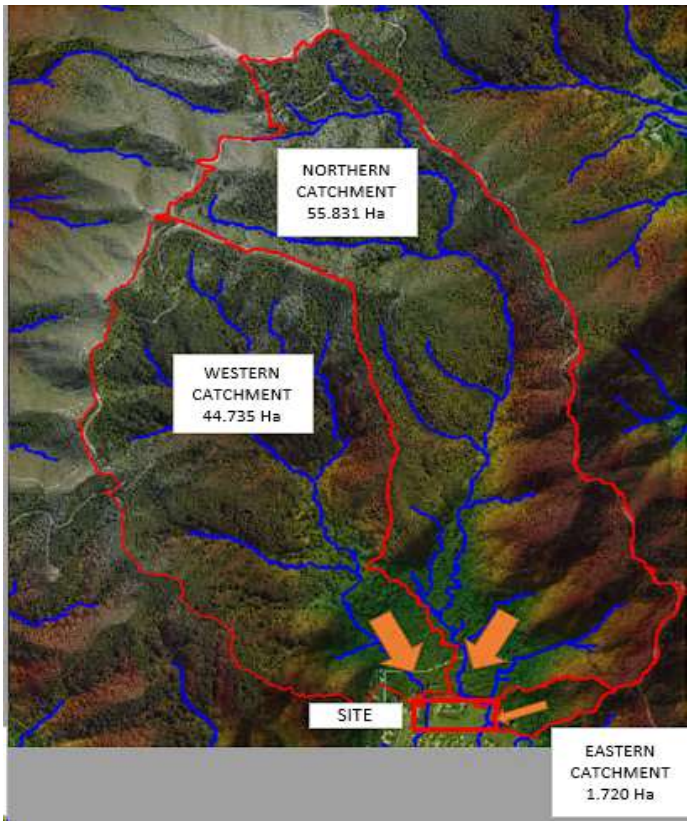
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	11
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

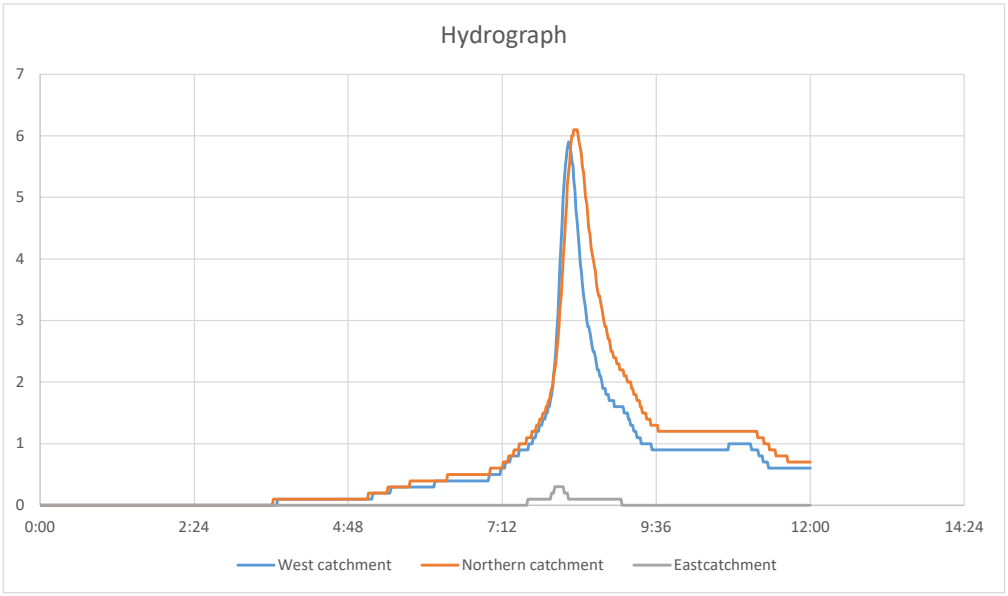
C.7 HEC-RAS Setup

Grid Size: 3m x 3m
Computation Interval: 0.5 sec
Manning: 0.07
Culvert blockage: Ex. Culvet 1050 (20%), Ex. Culvert 225 (50%), Prop. Culvert 525 (20%)

HEC-RAS Model Build:



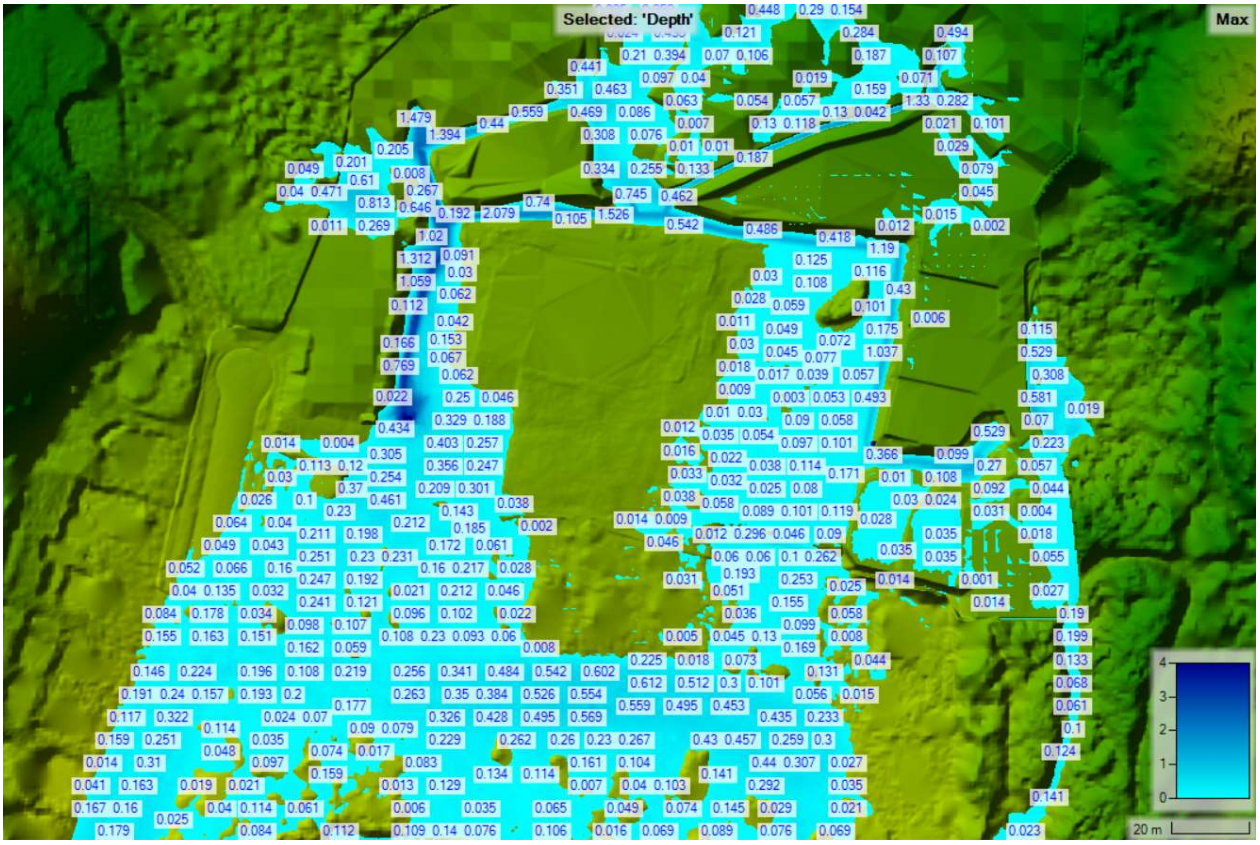
100-yr Hydrograph to be used for HEC-RAS



CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 12
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

C.8 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Depth



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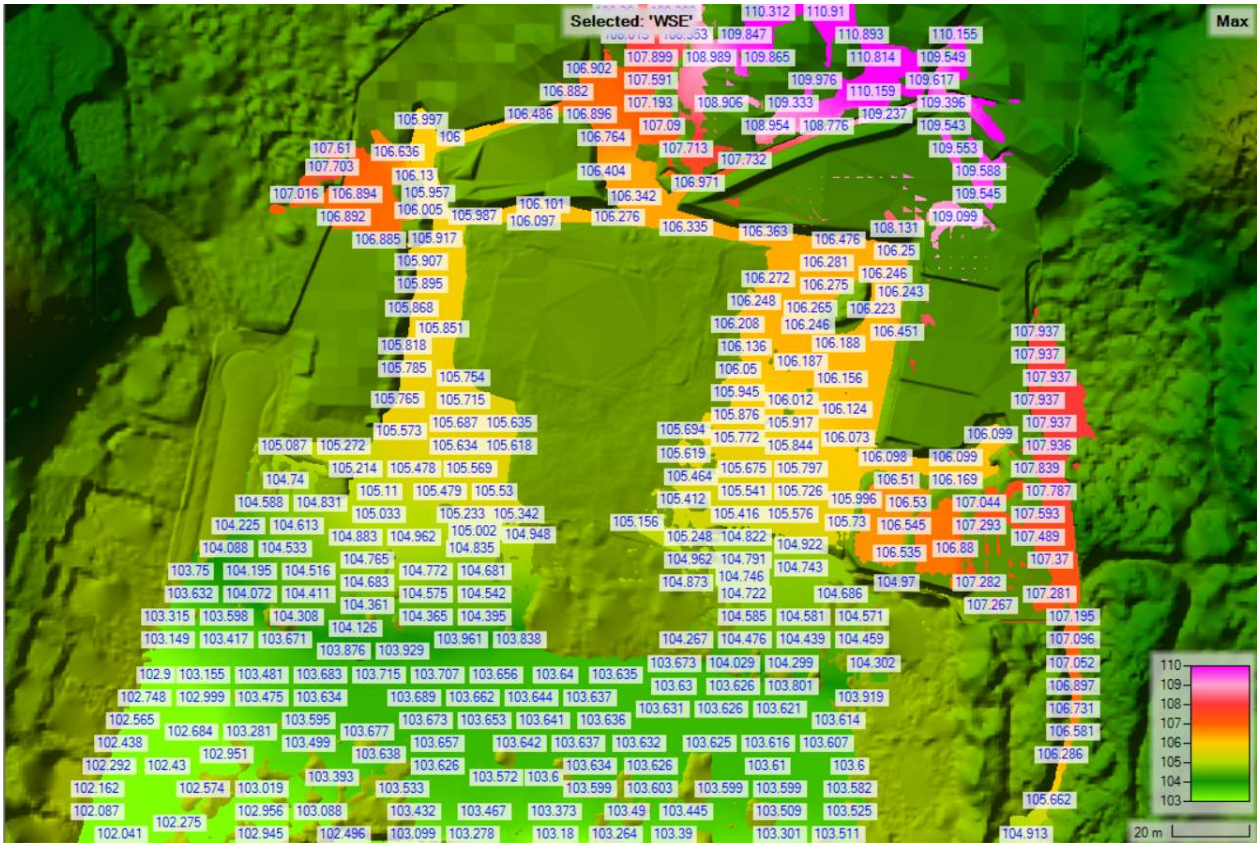
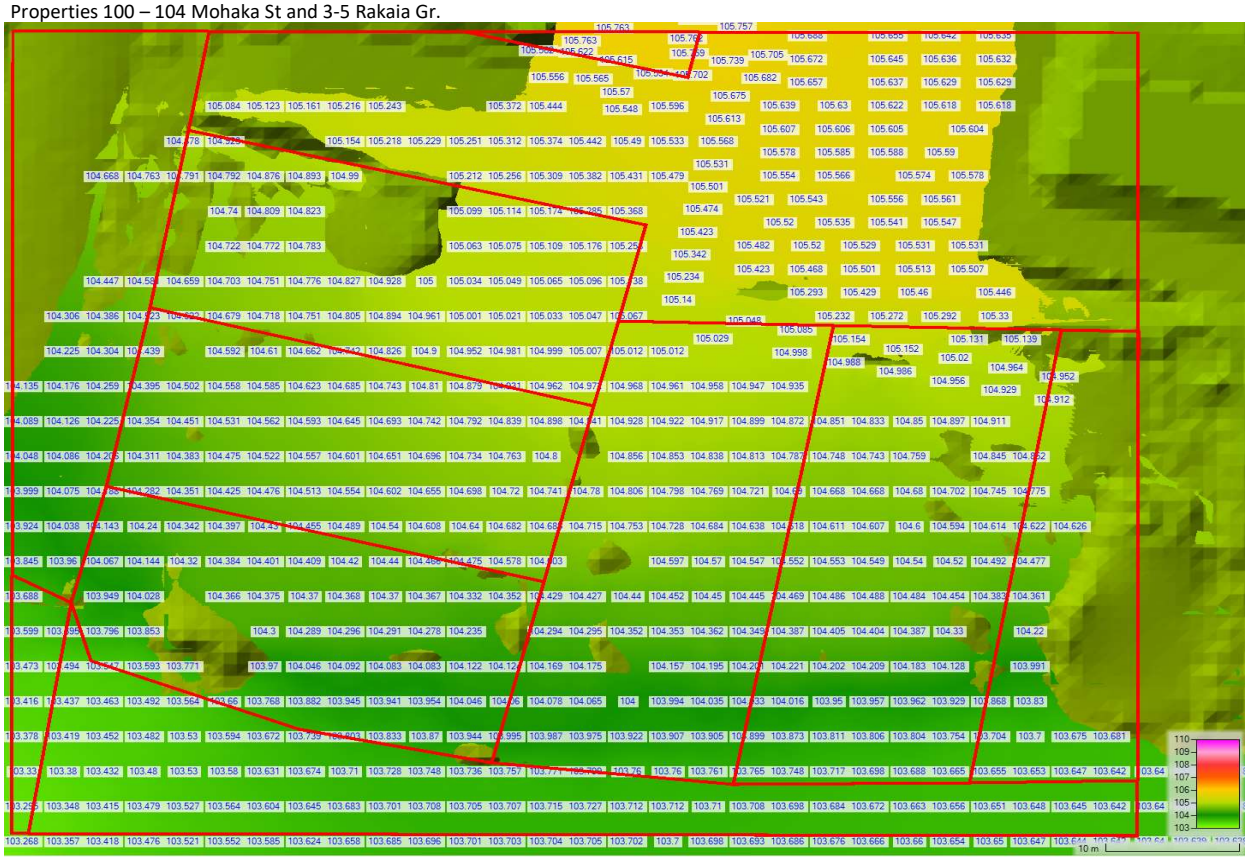
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	13
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.9 HEC-RAS Results: 100-yr, Pre-Dev - Water Surface Elevation



Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.



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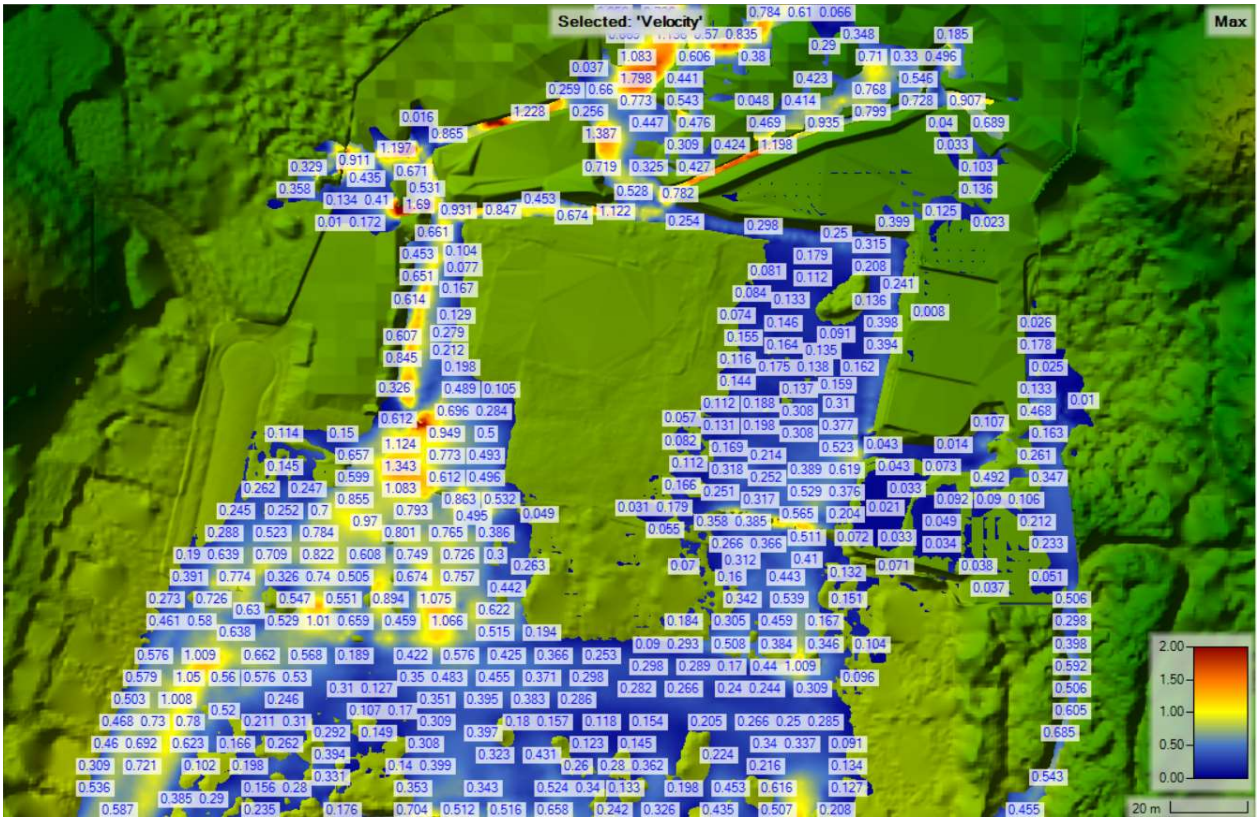
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	14
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.10 HEC-RAS Results: 100-yr, Pre-Dev - Max Flow Velocity



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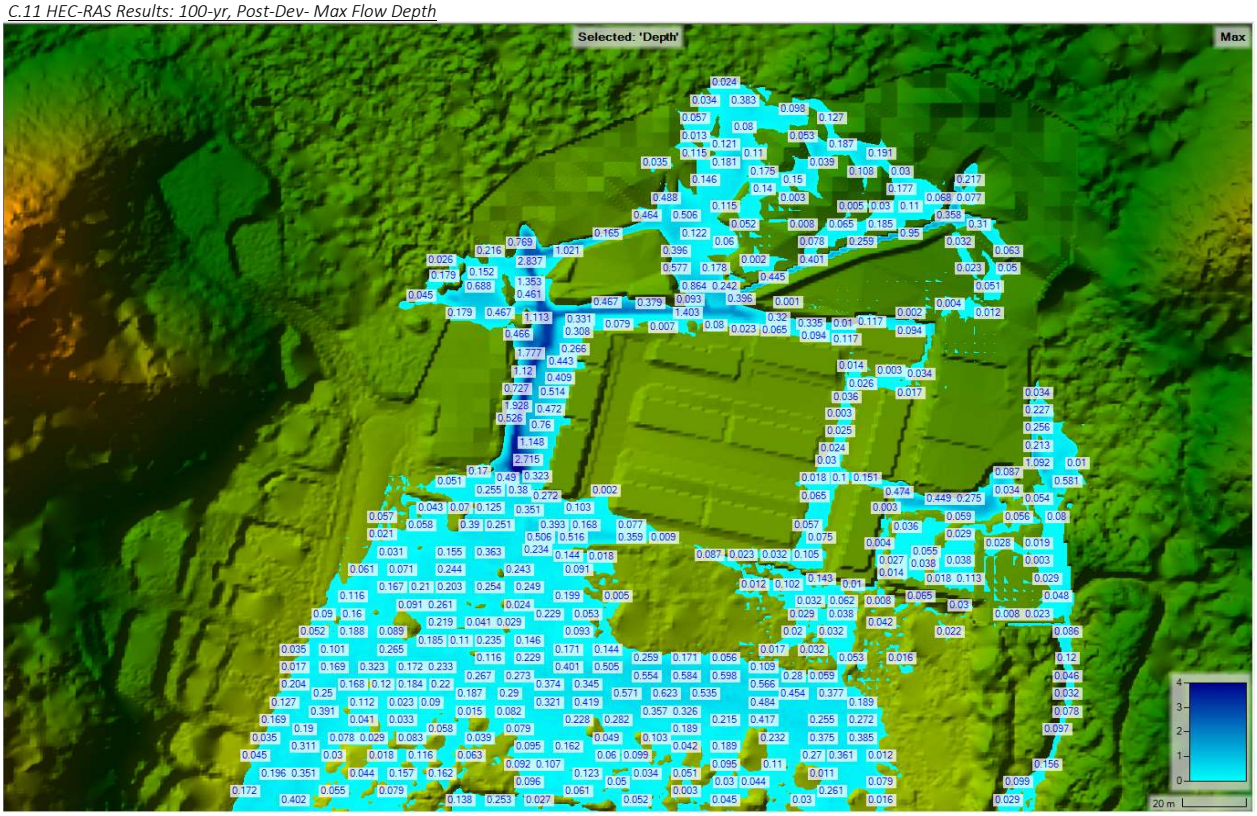
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	15
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

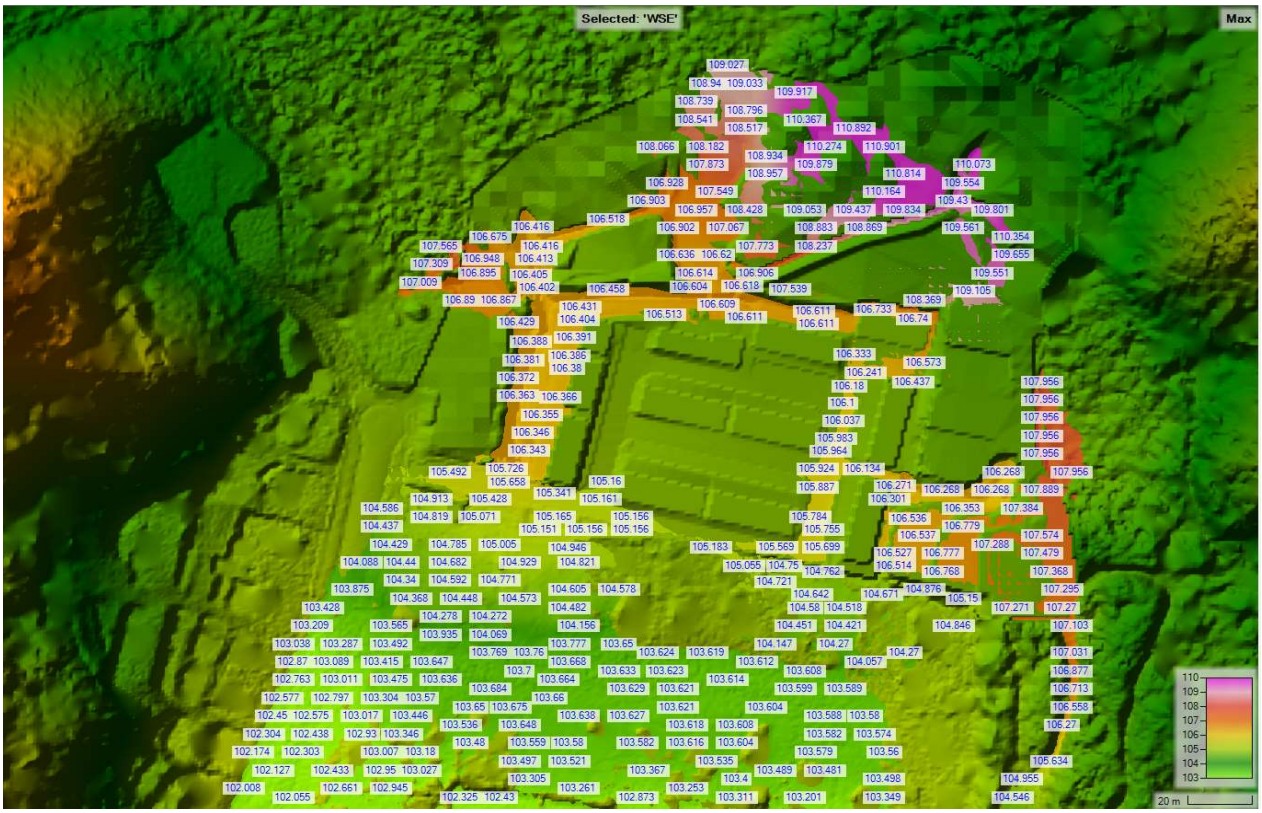
C.11 HEC-RAS Results: 100-yr, Post-Dev- Max Flow Depth



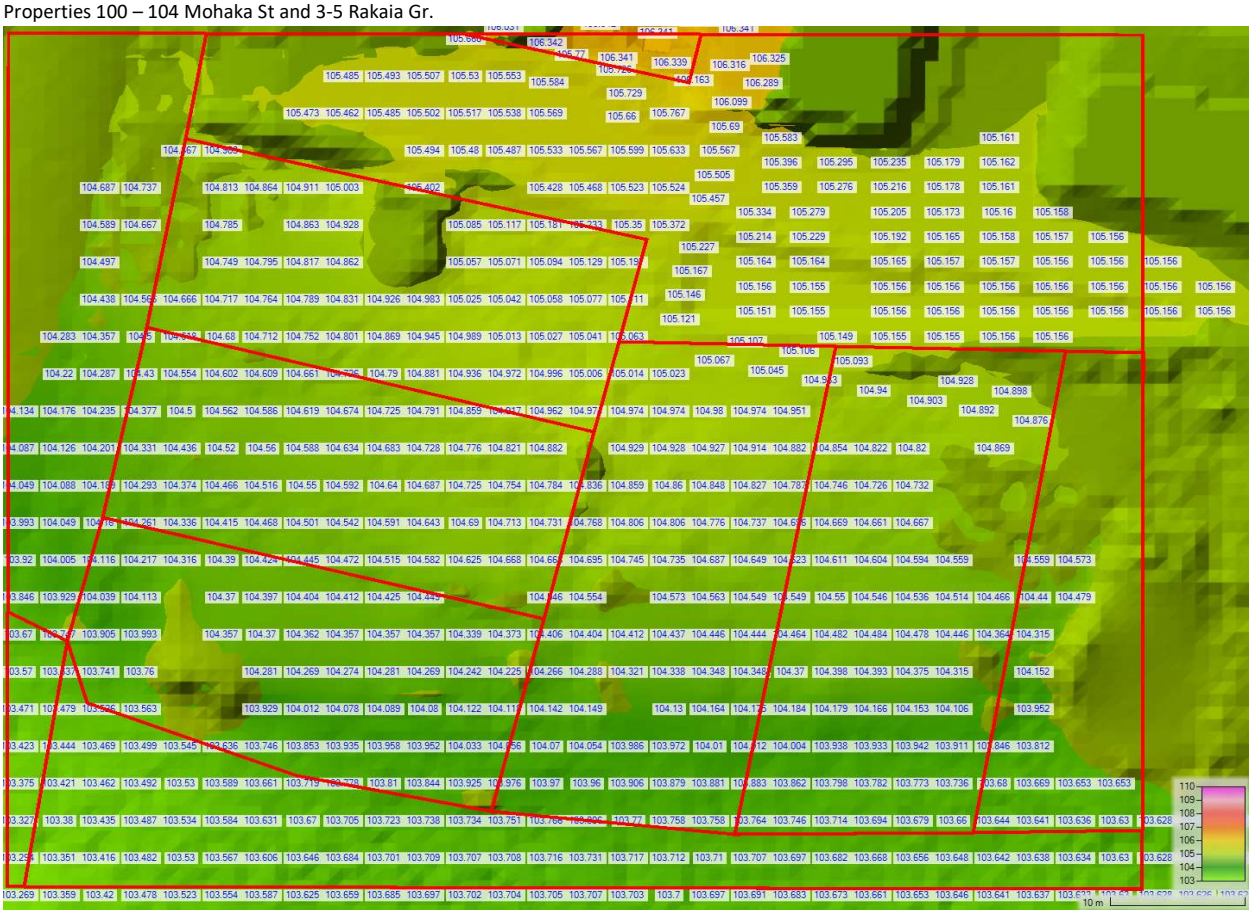
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet:	16
Description:	Flood Assessment	Designed:	PP		
Date:	06.04.2022	Checked:	AR		

C.12 HEC-RAS Results: 100-yr, Post-Dev - Water Surface Elevation



Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.



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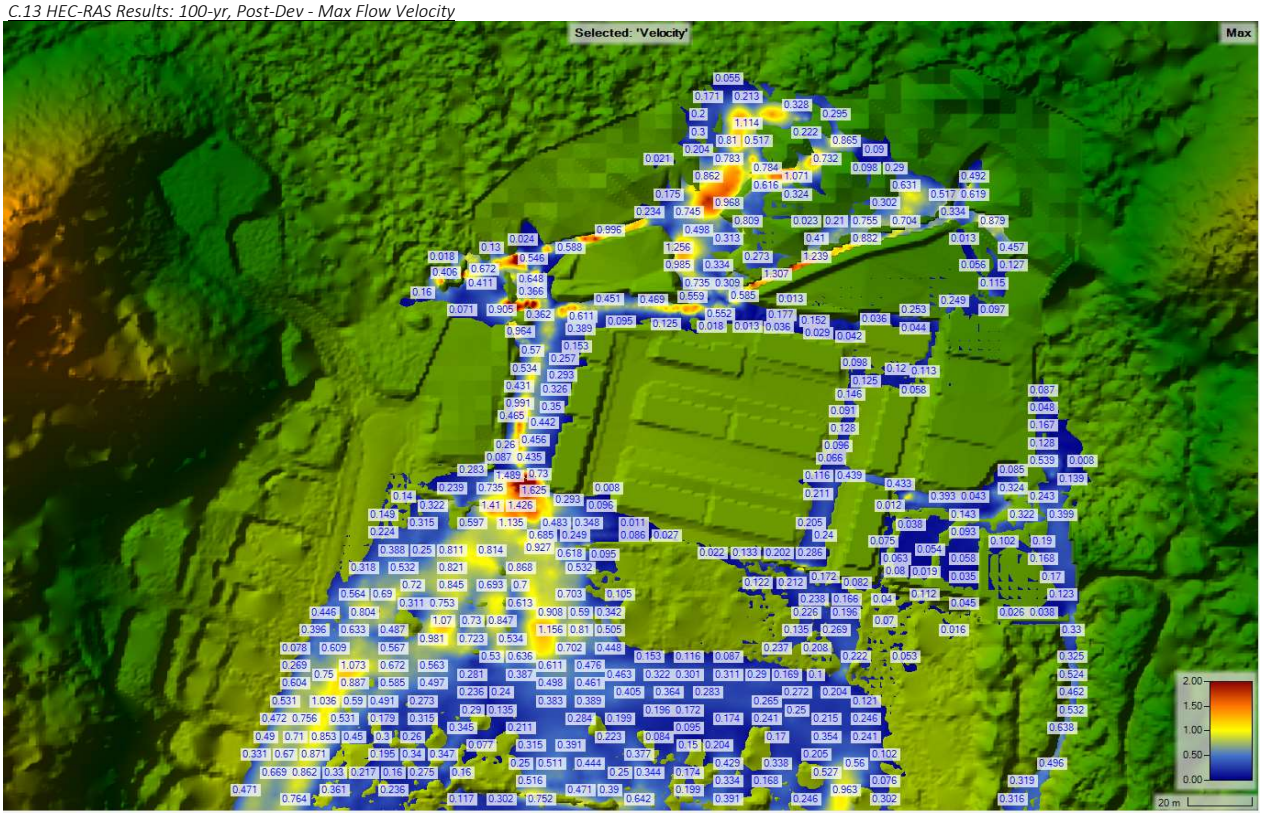
CALCULATION SHEET

Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 17
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

C.13 HEC-RAS Results: 100-yr, Post-Dev - Max Flow Velocity



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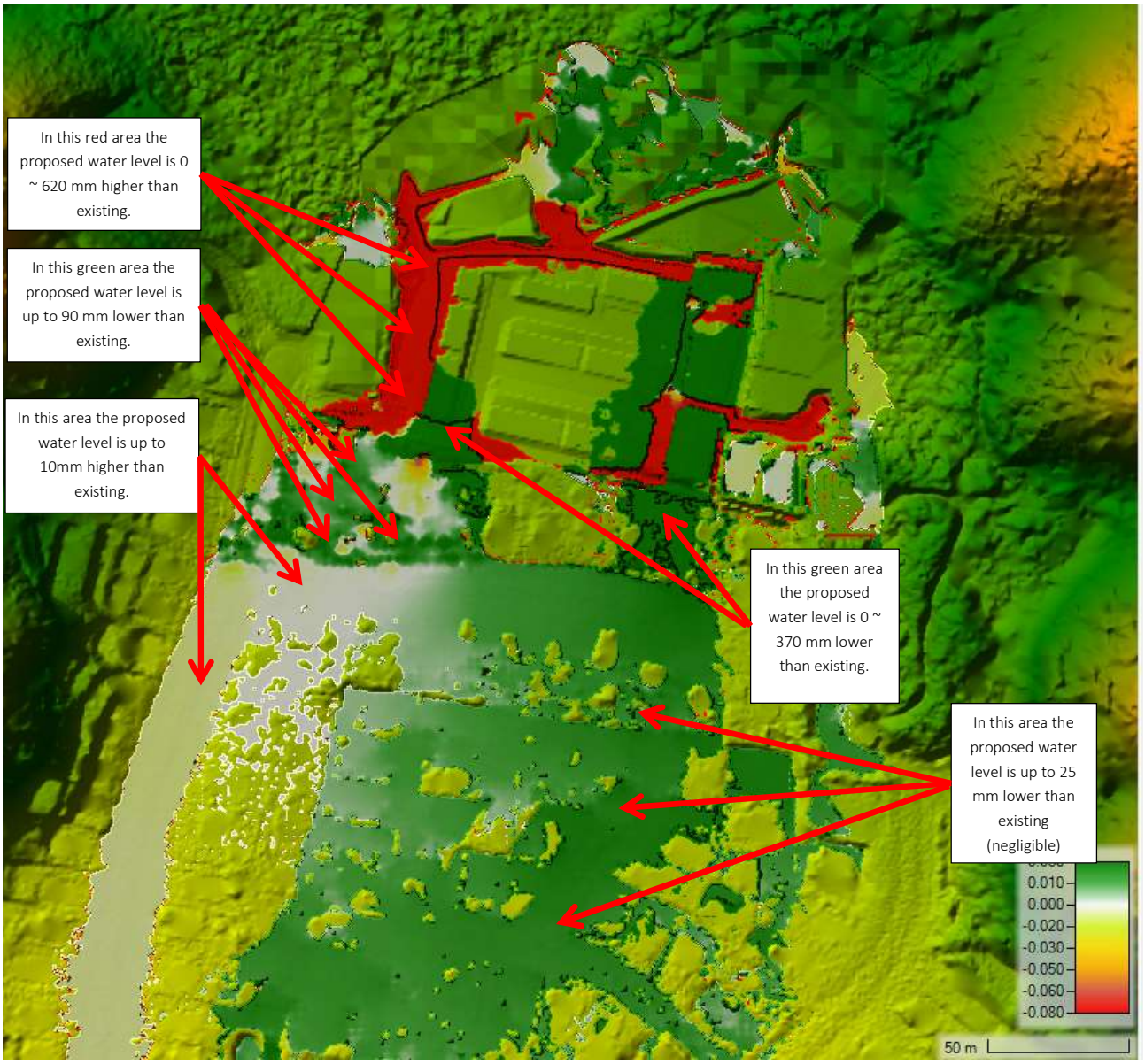
CALCULATION SHEET

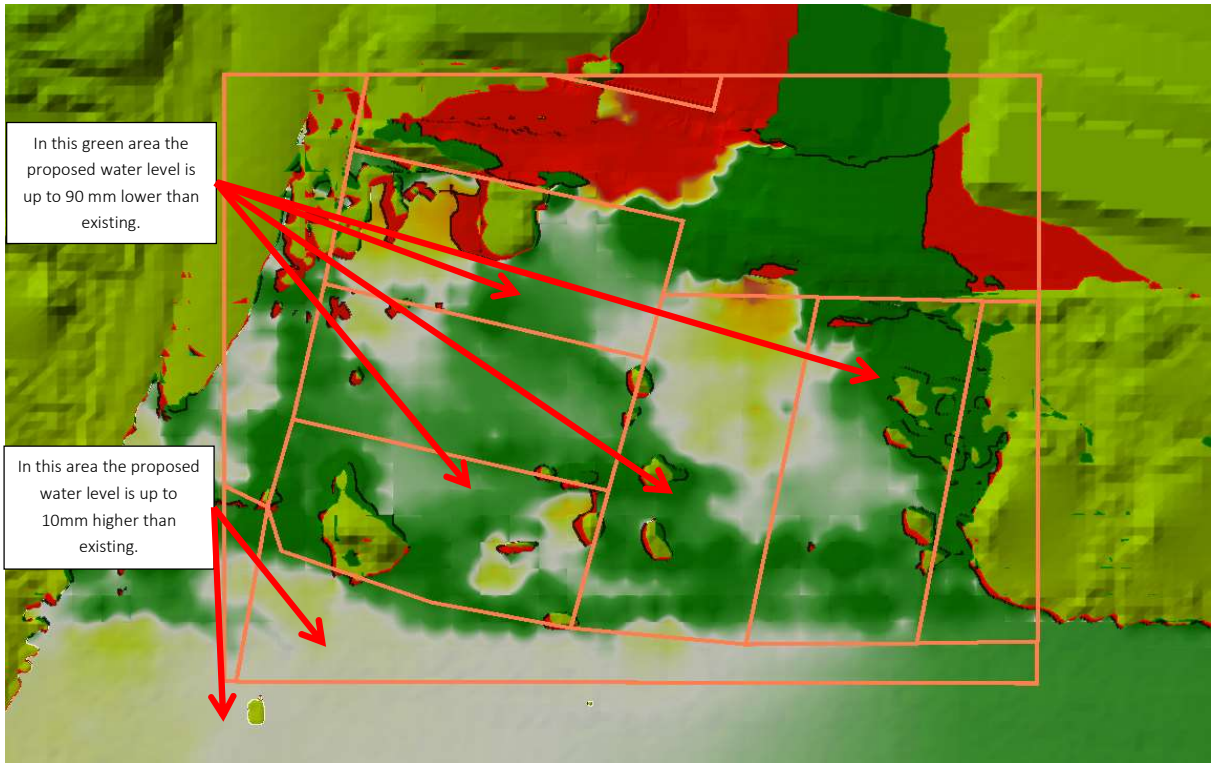
Project:	106 Mohaka Street, Wainuiomata, Lower Hutt	Job No:	P20-156-Clc02	Sheet: 18
Description:	Flood Assessment	Designed:	PP	
Date:	06.04.2022	Checked:	AR	

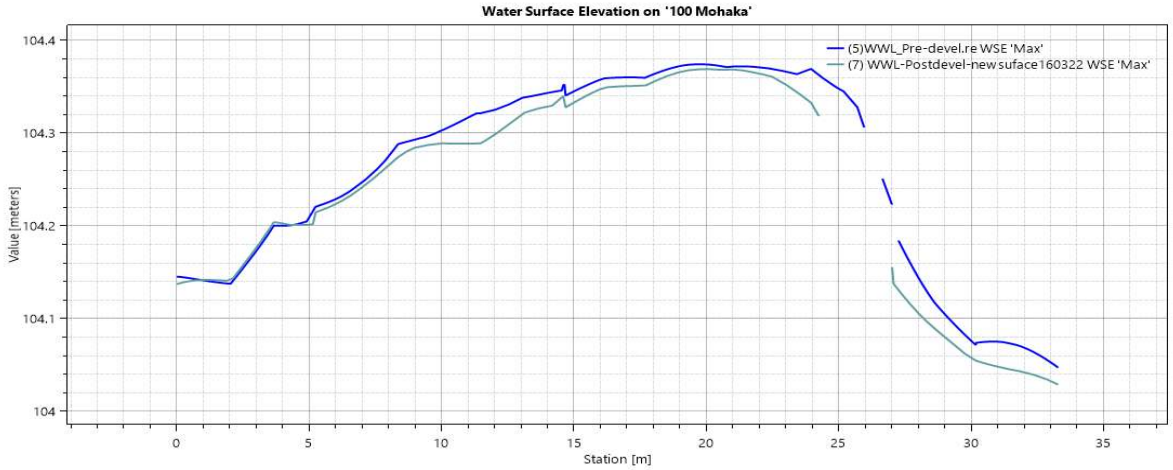
C.14 Flood Level Comparison Map (Existing Minus Post-Development)

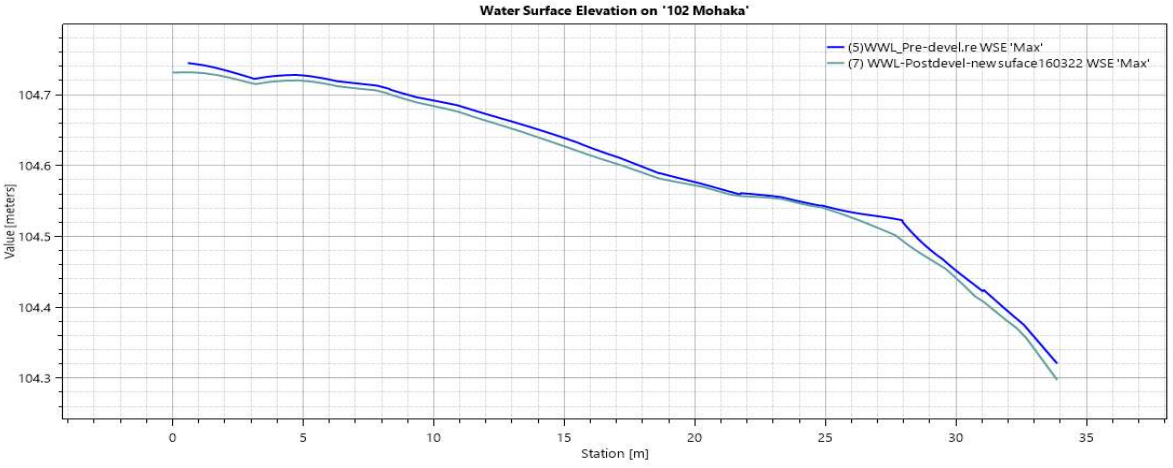


C.14 Flood Level Comparison Map (Existing Minus Post-Development)

Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.

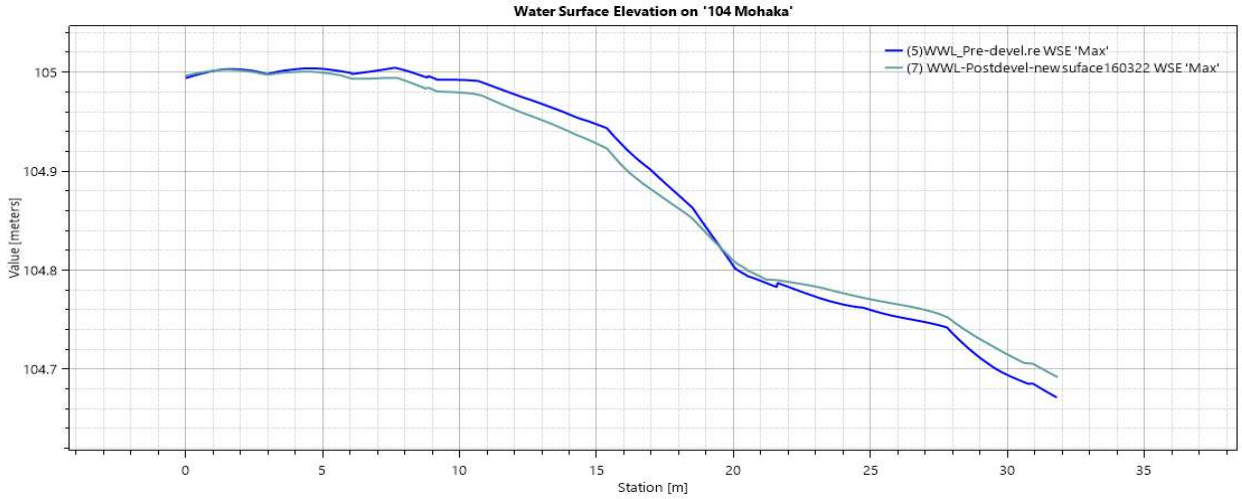


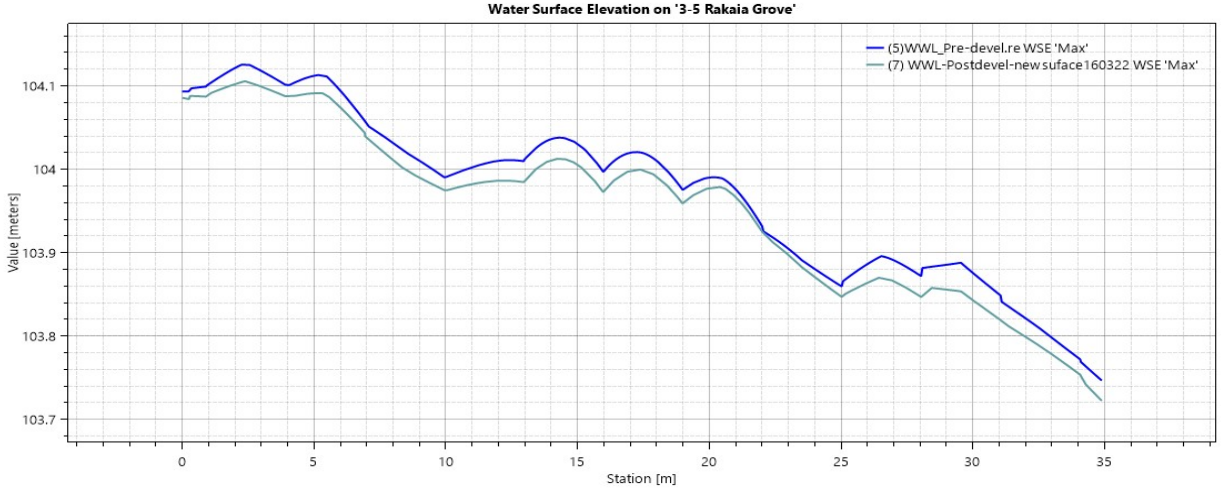




C.14 Flood Level Comparison Map (Existing Minus Post-Development)

Properties 100 – 104 Mohaka St and 3-5 Rakaia Gr.





S

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Date day May 6 2022 1 46 35 M
Attachments

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image058.png

H

Yesterday we had a meeting with regarding the stormwater design for 106 Mohaka Street and she has asked we provide the Model ing data for you to look at.
Please follow the SharePoint link to access the files. 2022.05.06 - HEC-RAS Model

We've tried to strip down the results and terrains as much as we can to make it easier to read the correct results.

If you have any issues please don't hesitate to ask.

Regards

BEng (Hons)

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To influence and contribute to a more sustainable world.

AR & Associates Ltd
Level 3, Building B, 5 M le Cant e
36 G ant Road, P ankton
Queenstown 9171
P
www a assoc ates.co.nz

From @hutticity.govt.nz>
Sent: Thursday 5 May 2022 3:03 pm
To @arassociates.co.nz> @aprotean.co.nz> @hutticity.govt.nz>
Cc @aprotean.co.nz> @beigraviacapital.co.nz> @urbandgep anning.co.nz> @arassociates co.nz> @arassociates.co.nz>
@arassociates.co.nz> @hutticity.govt.nz> @e2environmental.com>
Subject: RE: [EXTERNAL] RE: RM210528 106 Mohaka - engineering assessment

H

Have just had a quick look at the pre and post development flood levels just below the raingarden and tried to compare (pre on left and post on right). I added a cross for each level that was higher than pre – there are more 's than – s. I do note the increases seem to be in the order overall of maybe 50mm but this doesn't quite support the comment that the situation is no worse then predevelopment for if Council was challenged by property owners below.

Would be good to understand what additional volume of water this actually represents and how fits with existing house entrance levels.

Cheers

Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From
Sent: Thursday 5 May 2022 1:13 pm

To [redacted] @arassociates.co.nz>; [redacted] aprotean.co.nz>; [redacted] @huttcity.govt.nz>
Cc [redacted] @aprotean.co.nz>; [redacted] @belgraviacap tal.co.nz>; [redacted] @urbanedgeplann ng.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

H [redacted]

Thank you for your responses. I will endeavour to look though in detail before this afternoons meetings.

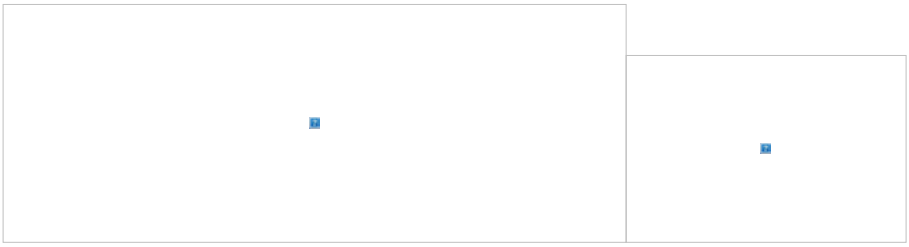
Cheers
[redacted]

From [redacted] @arassociates.co.nz>
Sent: Thursday 5 May 2022 12:29 pm
To [redacted] @aprotean.co.nz>; [redacted] @huttcity.govt.nz>; [redacted] @huttcity.govt.nz>
Cc [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

H [redacted]

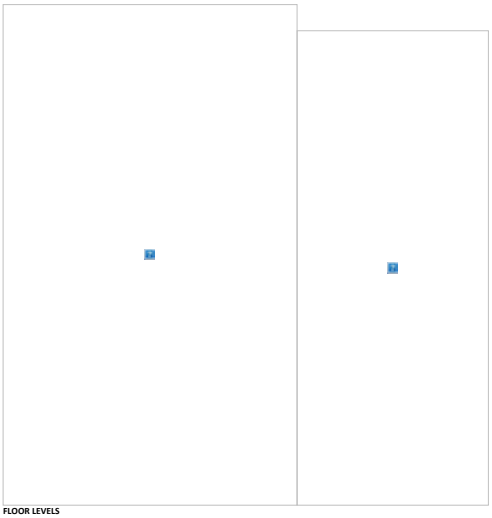
Below are our responses in Red.
Please note that I'm currently still working on the road cross sections with the water levels I should have it ready for before the meeting.

One point before getting into detail. I note that the latest engineering plans have a engineering approval stamp on them. We are still at resource consent stage so stamp needs to reflect this. Also note that in the long sections in the latest plan MH's aren't shown raised to final ground levels –
The manhole issue is an oversight from us and has been updated note that the design levels haven't change as they are showing the correct values.
Complete drawing set wi l be updated to show the Consent stamp.



EASEMENTS

The latest engineering plans show the network installed between units 27 & 28 coming into the MH in the roadway with a 1.1m step. Max under RSWS is 500mm within a suitably sized MH. Note earlier plans had MH in roadway at 3.46m deep current plans have it at 2.75m (other levels have also changed) - not sure how/why this has changed network between 27/28 laid to invert previously. Please review and advise on actual depths of this network so we can confirm easement width requirements. The latest drawings have the correct levels and depths. Part of the reason this pipe has come up is so that it is above the 1050mm pipe which is being used for storage. We want to utilise the full storage inside the 1050mm pipes before it starts to backflow into this pipe.

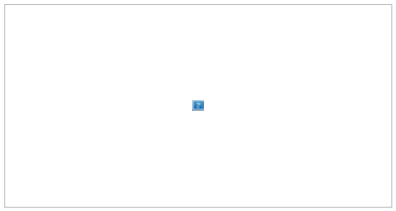


FLOOR LEVELS

Please confirm the fo lowing:

- Top waterflood level 500mm* = min floor level (MFL) to underside of slab (* where units are adjacent to 1 in 100 flooding or 200mm** where not)
- MFL slab thickness = FFL
- Slab thickness = ???
- Finished GL's = ??

Correct our design is to the underside of the slab. Slab thickness and FFL's to be designed by architect. I confirmed with the architect this morning their new design is to be consistent with our earthworks and includes the slab on top of our minimum floor level.
WWL states 200mm freeboard (screenshot below) I believe NZS4404 is also 200mm.



** my understanding is BC requires FFL to be 225mm above GL where there is a grassed surface – but might be wrong.
Acceptable Solution E /AS1 of the building code requires slabs on ground shall be at least 150mm above the finished above the finished level of the surrounding ground immediately adjacent to the bu lding. Further building code requires a minimum thickness of 225mm. We have specified the levels under side of the slab (Building platform level) which includes the freeboard above the flood level. Please see the sketch below;

GWRC SIGNOFF

Have checked and appears GWRC sign off from HCC includes Councils review and approval of

- Earthworks & geotech reports
- Infrastructure
- Flood reports & calculations
- Civil calc and architectural plans
- Infiltration trench under bioretention device
- Stormwater detention
- Use of 200mm plant media layer

- Stream works on site

Unfortunately not just the earthworks in principal and stormwater detention as hoped – which we would have been able to sign off today but matters that some of which st ll require further review/clarification – so sign off wont be given today.

FLOOD – site & wider catchment

As I understand it from yesterdays discussions the intention is to do the fo lowing – please review and confirm/amend:

- The intention is for the section of open watercourse upstream of the existing 1050 culvert at the entrance to the site to provide greater storage than it does currently. This is to be achieved by bunding within the site – bringing the side up achieving a deeper channel.

  Earthworks plans doesn't seem to support this. Shows fill only under adjoining units. Can you please provide cross-section(s) to show proposed bunding? Attached is the new S3 223 drawing with EW section at the bund which has been implemented around Block C. Earthworks cross sections 4 5 and 6 also provide some insight of the earthworks of the backs of the lots of blocks A B and C.

- Pipework from Meremere intake will be designed for 1 in 00 year but there is st ll an allowance for overland flow if intake blocked – onto ROW. Correct it flows through the emergency sp llway onto the private road.
- Overland flow from NE corner to flow around block F (units 19-22) onto ROW.
- ROW graded that overland flows ROW & landscaping surface water all grade to raingarden.

- In a 1 in 00 year event raingarden will stop working and "sp ll" overland flow to properties below. Confirmed this is to be no more than pre-development levels

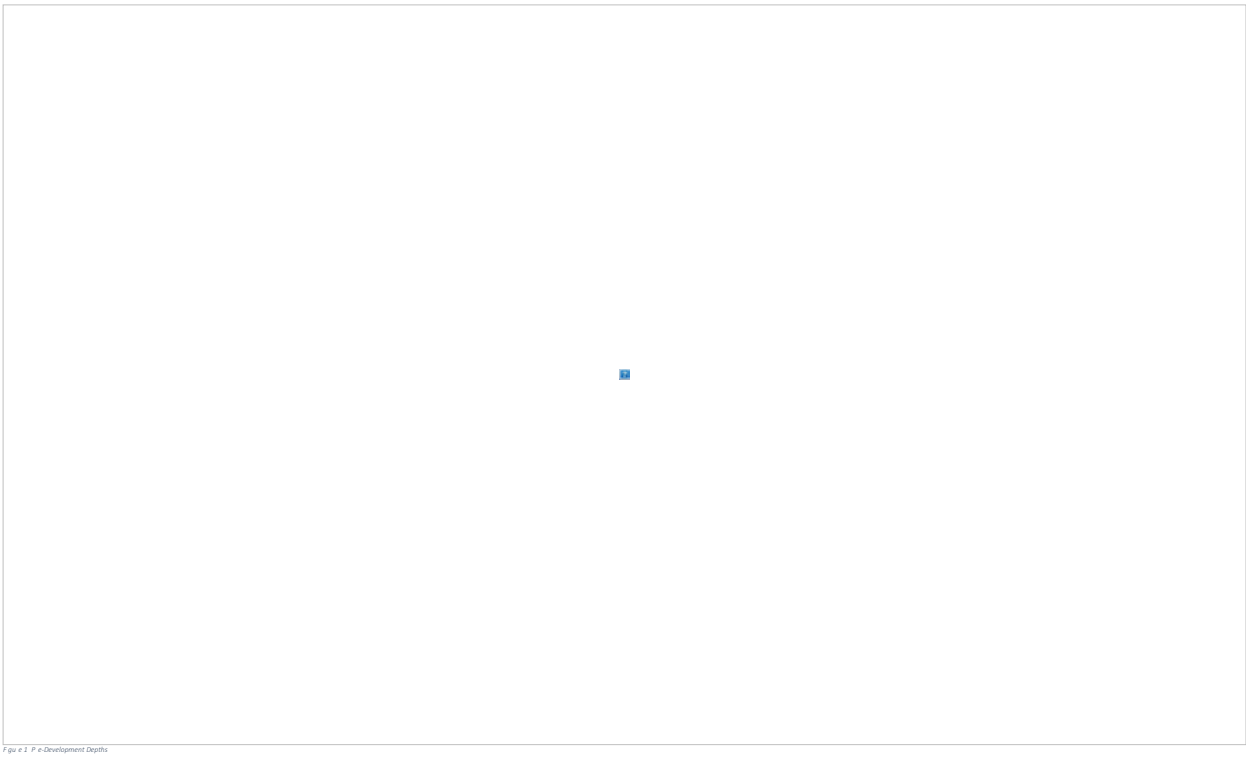
- This is considered to be no worse than currently occurs predevelopment because of holding back flow in watercourse upstream of the culvert. Confirmed

- Modelling includes ponding storage in ROW Confirmed.

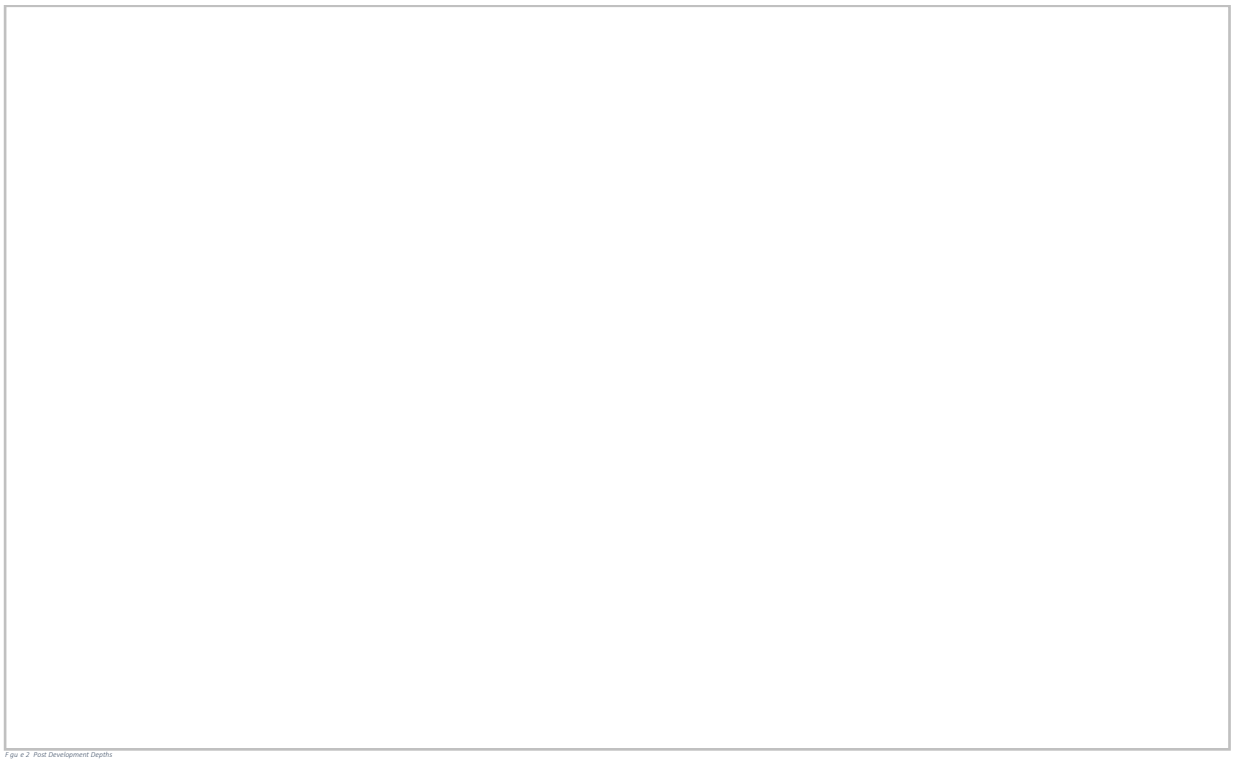
As noted we have a meeting with WWL re analysis of flood modelling results this Thursday afternoon but my questions/concerns at this point are:

- Based on the modelling information provided it appears that flows below the raingarden and culvert both increase & decrease post development in some areas.

  Can you please provide enlarged snapshots of the modelling (pre & post) clearing showing levels through 100-104 Mohaka St and 3-7 Rakaia GR – with boundaries and raingarden overlaid.
  The flood report is currently being updated to show the boundaries and the raingarden and will be sent through before the meeting. See Snapshots below:



F gu e 1 P e-Development Depths



F gu e 2 Post Development Depths

- Modelling doesn't show a l overland flows running along ROW to rain garden

  Modelling shows NE & Meremere overland flows running through 11-17 Rakaia Gr.

- IT was noted that model ing includes ponding storage in ROW that is a part of WSUD

  Modelling doesnt show ponding along ROW sections except the one along the esat of the site – but this seems mainly to relate to overland flows coming onto the site.

- Flooding shown at rear of units 10-13 14-18 and 19-22

  Have earthworks been designed to grade this water away from units and to flow post event back into channels? How does this work with landscaping/ fencing?
  Correct earthworks have been designed to grade away from the buildings. A couple of cress sections have been added to show the slope away from the building for

- An overland flow path has been shown alongside unit 22

  How will this work with landscaping / fencing? Design solutions are available such as pool fencing that will have minimal obstruction to an overland flow. Will get the architect to spec fy the solution as per your condition.

- Spil ing from raingarden into adjoining properties

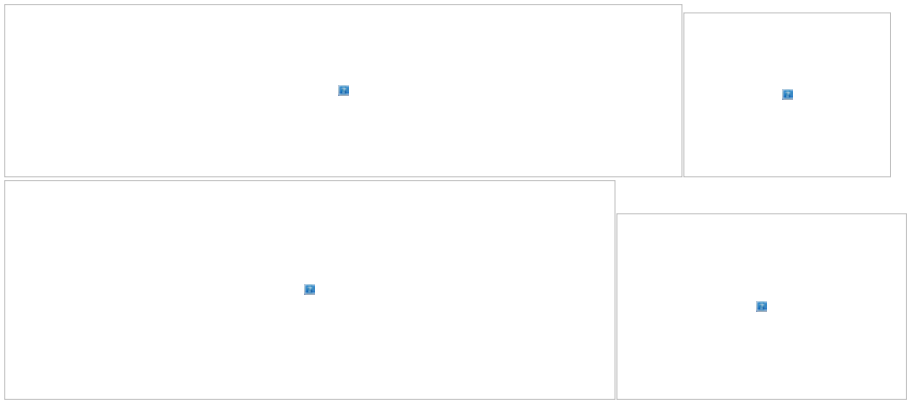
  How does this work with landscaping/fencing – open board fences???? Design solutions are available such as pool fencing that w ll have minimal obstruction to an overland flow. Wi l get the architect to specify the solution as per your condition.

WSUD DESIGN

Two cross-sections have been provided showing 1in 10 and 1in 100 event ponding of stormwater from ROW & other surfaces which is then directed to the raingarden for treatment before going to existing culvert/network.

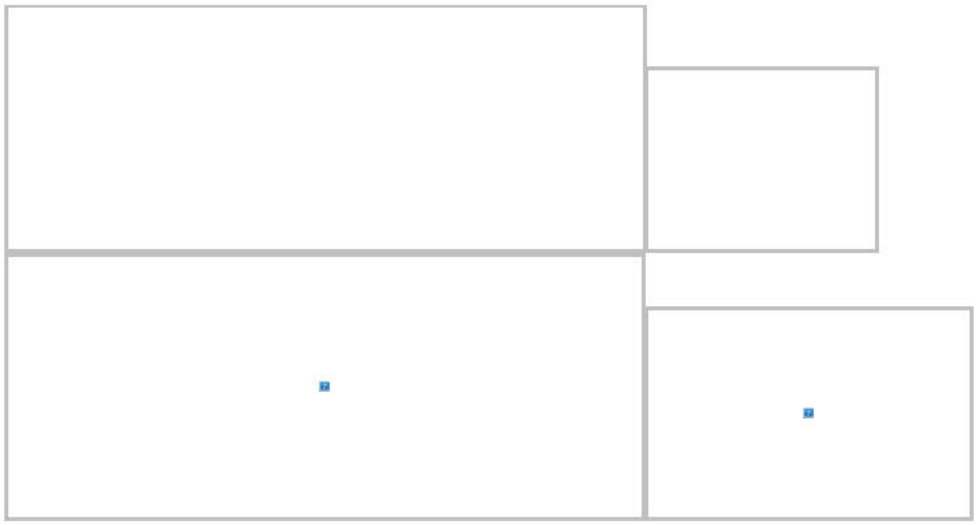
- Looking at Roading cross-sections and ponding cross-section outside unit 1

  Flows are away from parking towards landscaping at side of unit 42. Proposed low traffic speed limiting spray of water off ROW Traffic calming measures are proposed to reduce speed.



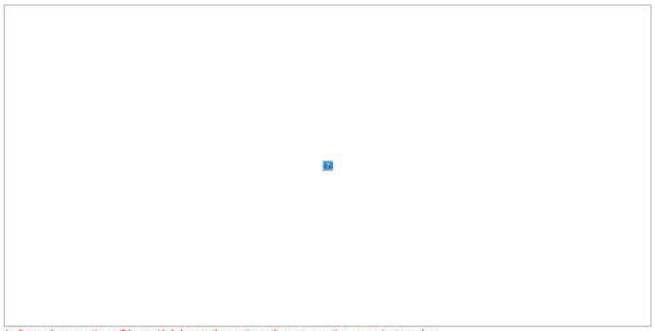
- Looking at Roading cross-sections and ponding cross-section outside unit 42

  Flows are away from parking towards raingarden. Proposed low traffic speed imiting spray of water off ROW Traffic calming measures are proposed to reduce speed.



- Can you please provide cross-sections showing the 1 in 10 and 1 in 100 year ponding at the flowing locations:

- Also at the site entrance where speeds are likely to be higher(?7) and ponding will be against the footpath.



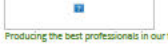
As discussed cross sections will be provided closer to the meeting as these are more time consuming to produce.

- It was discussed that AR will provide photos of similar designs in use including in different rainfall events. Attached are examples of previous subdivisions without catchpits Mt Iti Road and Kirimoko Park.

Hopefu ly these responses clears a few things up.
I'm working on getting the rest of the documents ready for before the meeting this afternoon.

Kind Regards

[redacted]
BEng (Hons)
[redacted]



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AR & Associates Ltd
Level 3, Building 8, 5 M le Cent e
36 E ant Road, F ankton
Queenstown 9371
P [redacted]
www.a arc ates.co.nz

From: [redacted] @arcstean.co.nz>
Sent: Wednesday 4 May 2022 1:41 pm
To: [redacted] @huttcity.govt.nz>; [redacted] @huttcity.govt.nz>

Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

H [redacted]

Thanks for detailing out yesterday's discussion and response items.

I have spoken with ARAL and they have assured me that they wi l have everything back to you ahead of tomorrows meeting. The cross sections are ikely to take the longest so I have asked that the balance of the required responses is sent through ASAP ahead of the cross sections so you can start reviewing the information as early as possible. The cross sections would fo low shortly thereafter.

With respect to your comments regarding GWRC sign off. It is my understanding that GWRC requires approval from HCC with respect to stormwater and earthworks elements of the design that pertain directly to the regional consent (correct me if I am wrong on this).

With that in mind I would imagine that providing HCC are happy with the responses from ARAL that will be discussed tomorrow. You would then be able to give GWRC the thumbs up by Friday morning which would in turn allow the regional consent to be approved.

Let me know your thoughts on this.

Any questions please contact.

Regards

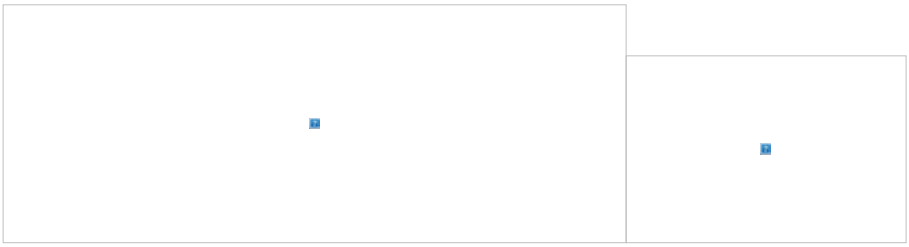
[redacted]
L1 193 195 Ma n Road, Tawa, 5028
M [redacted] E [redacted] @ap ptean.co.nz

From: [redacted] @huttcity.govt.nz>
Sent: Wednesday 4 May 2022 9:32 am
To: [redacted] @aprotean.co.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

H [redacted]

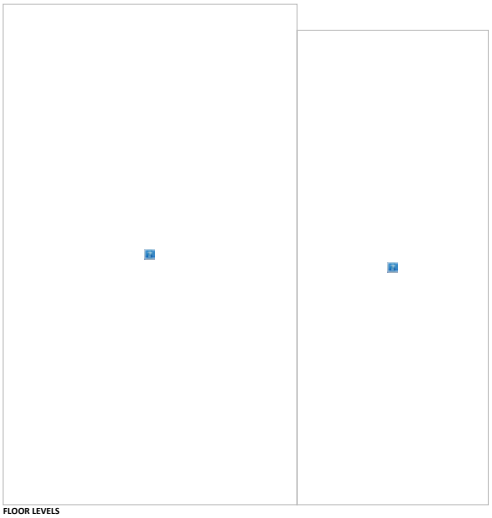
Following on from yesterdays meeting with my questions / responses re the WSUD design easements floor levels GWRC sign off and some comments re flooding/overland flow paths.

One point before getting into detail. I note that the latest engineering plans have a engineering approval stamp on them. We are still at resource consent stage so stamp needs to reflect this. Also note that in the long sections in the latest plan MH's aren't shown raised to final ground levels -



EASEMENTS

The latest engineering plans show the network installed between units 27 & 28 coming into the MH in the roadway with a 1.1m step. Max under RSWS is 500mm within a suitably sized MH. Note earlier plans had MH in roadway at 3.46m deep current plans have it at 2.75m (other levels have also changed) - not sure how/why this has changed network between 27/28 laid to invert previously. Please review and advise on actual depths of this network so we can confirm easement width requirements.



FLOOR LEVELS

Please confirm the fo lowing:

- Top waterflood level 500mm* = min floor level (MFL) to underside of slab (* where units are adjacent to 1 in 100 flooding or 200mm** where not)
- MFL slab thickness = FFL
- Slab thickness = ???
- Finished GL's = ??

** my understanding is BC requires FFL to be 225mm above GL where there is a grassed surface – but might be wrong.

GWRC SIGNOFF

Have checked and appears GWRC sign off from HCC includes Councils review and approval of

- Earthworks & geotech reports
- Infrastructure
- Flood reports & calculations
- Civil calc and architectural plans
- Infiltration trench under bioretention device
- Stormwater detention
- Use of 200mm plant media layer
- Stream works on site

Unfortunately not just the earthworks in principal and stormwater detention as hoped – which we would have been able to sign off today but matters that some of which st ll require further review/clarification – so sign off wont be given today.

FLOOD – site & wider catchment

As I understand it from yesterdays discussions the intention is to do the fo lowing – please review and confirm/amend:

- The intention is for the section of open watercourse upstream of the existing 1050 culvert at the entrance to the site to provide greater storage than it does currently. This is to be achieved by bunding within the site – bringing the side up achieving a deeper channel.

  Earthworks plans doesn't seem to support this. Shows fill only under adjoining units. Can you please provide cross-section(s) to show proposed bunding?

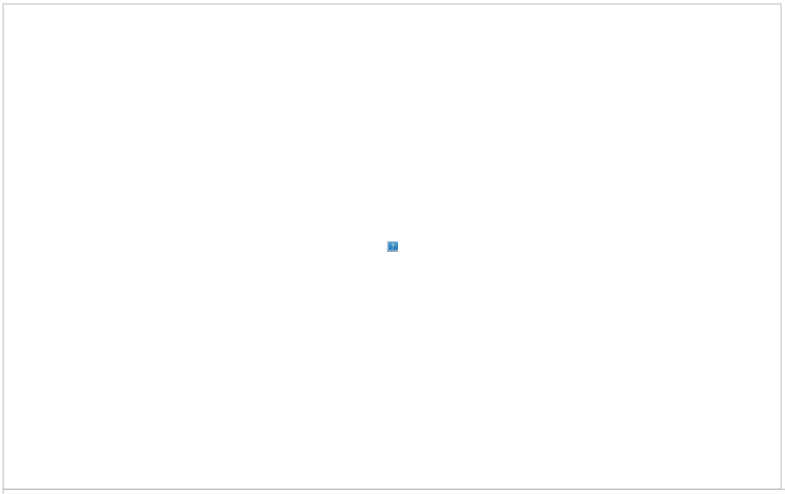
- Pipework from Meremere intake will be designed for 1 in 00 year but there is st ll an allowance for overland flow if intake blocked – onto ROW
- Overland flow from NE corner to flow around block F (units 19-22) onto ROW
- ROW graded that overland flows ROW & landscaping surface water all grade to raingarden.

- In a 1 in 00 year event raingarden will stop working and "sp ll" overland flow to properties below.
- This is considered to be no worse than currently occurs predevelopment because of holding back flow in watercourse upstream of the culvert.
- Modelling includes ponding storage in ROW

As noted we have a meeting with WWL re analysis of flood modelling results this Thursday afternoon but my questions/concerns at this point are:

- Based on the modelling information provided it appears that flows below the raingarden and culvert both increase & decrease post development in some areas.

  Can you please provide enlarged snapshots of the modelling (pre & post) clearing showing levels through 100-104 Mohaka St and 3-7 Rakaia GR – with boundaries and raingarden overlaid.



- Modelling doesn't show a l overland flows running along ROW to rain garden

  Modelling shows NE & Meremere overland flows running through 11-17 Rakaia Gr.

- IT was noted that model ing includes ponding storage in ROW that is a part of WSUD

  Modelling doesnt show ponding along ROW sections except the one along the esat of the site – but this seems mainly to relate to overland flows coming onto the site.

- Flooding shown at rear of units 10-13 14-18 and 19-22

  Have earthworks been designed to grade this water away from units and to flow post event back into channels? How does this work with landscaping/ fencing?

- An overland flow path has been shown alongside unit 22

  How will this work with landscaping / fencing?

- Spil ing from raingarden into adjoining properties

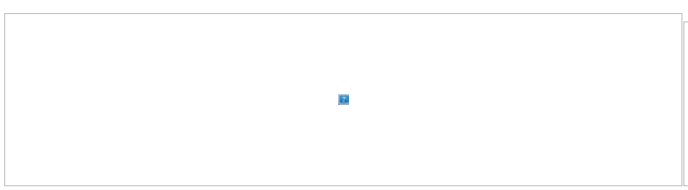
  How does this work with landscaping/fencing – open board fences????

WSUD DESIGN

Two cross-sections have been provided showing 1in 10 and 1in 100 event ponding of stormwater from ROW & other surfaces which is then directed to the raingarden for treatment before going to existing culvert/network.

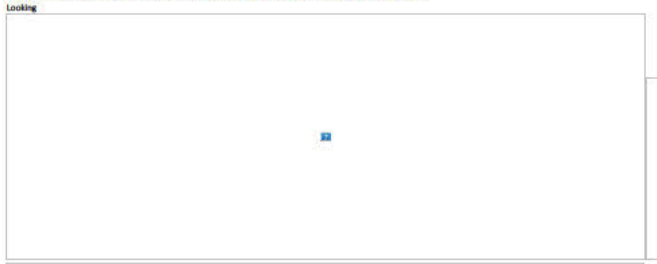
- Looking at Roading cross-sections and ponding cross-section outside unit 1

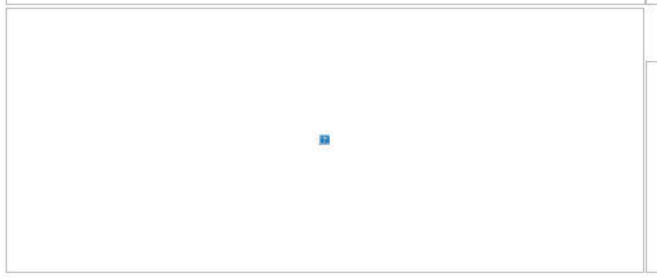
  Flows are away from parking towards landscaping at side of unit 42. Proposed low traffic speed limiting spray of water off ROW

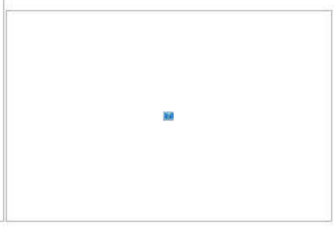


- Looking at Roading cross-sections and ponding cross-section outside unit 42

  Flows are away from parking towards raingarden. Proposed low traffic speed imiting spray of water off ROW
  Looking

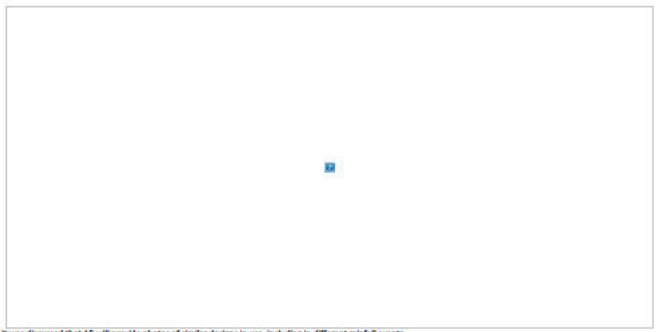






- Can you please provide cross-sections showing the 1 in 10 and 1 in 100 year ponding at the flowing locations:

- Also at the site entrance where speeds are ikely to be higher(?7) and ponding will be against the footpath.



- It was discussed that AR will provide photos of similar designs in use including in different rainfall events.

I think – hope this the list of outstanding matters.

Cheers

[redacted]

[redacted]

Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

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From: [redacted] @aprotean.co.nz>
Sent: Thursday 28 April 2022 9:38 am
To: [redacted] @huttcity.govt.nz>; [redacted] @huttcity.govt.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>
Subject: [EXTERNAL] RE: RM2 0828 - engineering assessment

H [redacted] A [redacted]

Please see below link which has enclosed a l the updated drawings data and responses to your queries.

Please review our response and get back to us as soon as possible we are eager to get this resolved.

Any questions please contact.

Regards

[redacted]
Ll 193-195 Ma n Road, Tawa, 5028
M [redacted] E [redacted] @_____

From: [redacted] @arassociates.co.nz>
Sent: Wednesday 27 Apr l 2022 6:41 pm
To: [redacted] @aprotean.co.nz>; [redacted] @arassociates.co.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>
Subject: RE: RM210328 - engineering assessment

H [redacted]

Please see the attached sharepoint link to the ARAL responses to the RFIs with supporting documents.
2022 04.07 - RFI Responses

Drawings and Calculations have been updated but there haven't been any major changes.
Attached are the Responses drawings calculations flood report and a Screenshot of the HEC-RAS flood model of the back of block F.

Kind Regards
[redacted]
BEng (Hons)
[redacted]

Producing the best professionals in our field.

To influence and contribute to a more sustainable world.

AR & Associates Ltd
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3G G ant Road, F ankton
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-
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From: [redacted] @aprotean.co.nz>
Sent: Thursday 14 April 2022 8:27 am
To: [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>; [redacted] @arassociates.co.nz>
Cc: [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>; [redacted] @urbanedgeplanning.co.nz>
Subject: FW: RM210328 - engineering assessment

HI All

Please see attached comments back from HCC.

The bulk of the comments and queries relate to finished levels flood modelling and stormwater treatment. They are sti l waiting for advice back from their roading experts with respect to mountable K&C and treatment. They have OK'd the detention tank but st ll want clarification on the calculations.

Following this meeting it is crucial that we all review these notes and start formulating a response to the queries raised. Most of these will require input from ARAL.

Talk soon.

Regards

[redacted]
Ll 193-195 Ma n Road, Tawa, 5028
M [redacted] E [redacted] @ap otean.co.nz

From: [redacted] @huttcity.govt.nz>
Sent: Wednesday 13 Apr l 2022 4:38 pm
To: [redacted] @aprotean.co.nz>; [redacted] @aprotean.co.nz>; [redacted] @belgraviacapital.co.nz>
Cc: [redacted] @urbanedgeplanning.co.nz>
Subject: FW: RM210328 - engineering assessment

Hi everyone

I received an out-of-office msg fo [redacted] but please see attached for the updated engineering review which outlines the current status of the engineering assessment and matters which are unresolved or require further clar fication. Could you please review and respond where relevant?

Kind regards
[redacted]

[redacted]
Senior Resource Consents Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P [redacted] M: W: www.huttcity.govt.nz

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From: [redacted]
Sent: Wednesday, 13 April 2022 4:20 PM
To: [redacted]@urbanedgeplanning.co.nz>
Cc: [redacted]@huttcity.govt.nz>
Subject: RM210328 - engineering assessment

Hello [redacted]

[redacted] has provided the attached updated review which outlines the current status of the engineering assessment and matters which are unresolved or require further clarification. Could you please arrange for the engineering design team to review and respond where relevant? Let me know if you would like to discuss.

Kind regards
[redacted]

From: [redacted]
To: "[redacted]"
Subject: RM210328: 106 Mohaka ST - Detention & WSUD Review Comments
Attachments: image002.png
image003.png
image004.png
image006.jpg
image001.jpg
image007.png
P20-156-S3.800-S3.800-A WWL Review.pdf

Hi [redacted]

Thanks for sourcing the calcs for this site.

SW Detention Calcs:

- The calcs are based:
  - the Auckland Regional Council TP108 SCS method which creates a nested storm as per the WWL methodology.
  - Hirds V4 RCP6.0 which is approximately equivalent to 20% CC.
  - HEC HMS modelling.
  - The stormwater detention outlet flows have been assessed using they HY-8 programme and the outflows have been included in the HEC HMS model as a storage – elevation relationship.
  - The Colebrook white parameters are acceptable,
  - I have not checked the areas however I assume these are correct.

The methodology used is acceptable. I have a couple of questions for the design team:

- Can the applicant confirm how the 'tank' has been modelled in HEC HMS.
- Can the applicant confirm how the 'tank' gradient has been allowed for within the calculations.

Rain Garden Design:

- The Rain Garden has been sized to treat only road runoff. The WWL WSUD guide requires all areas to be treated. Can the applicant advise why only the vehicle areas are being treated ?
- The design does not include any sumps within the road network and the calculations suggest that the 10% AEP flows will spill over the road – ie will not be contained within the kerb and channel. The roading team will need to sign off on the acceptability of the area of road network with no sumps and acceptability of flows across the road in the 10% AEP event.
- The rain garden is triangular in shape. At detailed design the minimum rain garden width should be 0.5 m (shovel width) to allow materials to excavated in the future.

General Comments:

- There are a number of SW laterals passing the WW pump stations – these need to be shifted clear.
- It doesn't look like access between 27 and 28 is wide enough to allow access to the inlet.
- The applicant has suggested that the inlet on Lot 300 DP562261 will only block 20% - with

you knowledge of Mermere St what is the potential for debris from the uphill catchment coming through Meremere and blocking this inlet ? If there is potential for debris then the design should include a secondary inlet as well as an assessment showing what would happen if the inlet were to block.

- How will power supply to the PS's be managed ?
- It would appear that most of the lots could be provided with individual PS's however the proposed PSs appear to be in reasonable locations. I would suggest the PS outside Lot 1 and 2 is moved out of the road and into the car park area (avoiding traffic management issues). I would suggest either moving or removing the PS outside Lot 32 – there does not appear to be any parking in this area – I would suggest it could go outside #23 or removed with Lot 23 to 32 connected through to the existing PSs.
- Further to our discussion with regard the WW discharge. I would be happy with a pressure main connection direct to the public manhole. I did wonder however if the site should not be connected to the existing WW main in the road such that the public main through Lot 22 DP48701 (ie public WW main through private property) could be abandoned.

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team
m [redacted]
e2Environmental Ltd
181 High St, Blenheim
PO Box 380, Blenheim 7201
www.e2Environmental.com

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 5 April 2022 7:57 AM
To: [redacted]@e2environmental.com>
Subject: FW: [EXTERNAL] RE: RM210328: 106 Mohaka ST - Detention & WSUD

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040

P: **M:** **W:** www.huttcity.govt.nz

From: [redacted]@arassociates.co.nz>
Sent: Tuesday, 5 April 2022 7:49 am
To: [redacted]@aprotean.co.nz>; [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>
Subject: [EXTERNAL] RE: RM210328: 106 Mohaka ST - Detention & WSUD

Good morning [redacted]
Please find attached the latest calculations set we supplied for Engineering Approval review.

[redacted]

AR & Associates Ltd
Building 6, Level 2
1A Walters Road, Takanini
M: [redacted]
www.arassociates.co.nz

From: [redacted]@aprotean.co.nz>
Sent: Tuesday, 5 April 2022 7:41 am
To: [redacted]@arassociates.co.nz>
Cc: [redacted]@aprotean.co.nz>
Subject: FW: RM210328: 106 Mohaka ST - Detention & WSUD

Hi [redacted]

See below email from [redacted] Can you please provide the stormwater calculations.

Regards,

[redacted]
L1 193-195 Main Road, Tawa, 5028
M: [redacted] **E:** [redacted]@aprotean.co.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 5 April 2022 7:09 am
To: [redacted]rr@aprotean.co.nz>
Cc: [redacted]@huttcity.govt.nz>
Subject: RM210328: 106 Mohaka ST - Detention & WSUD

Hi [redacted]

Can you please forward the most up to date stormwater detention calculations and WSUD calculations, I have had difficulties locating them.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

LEGEND

- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- PROP.POWER
- PROP.OVERHEAD POWER
- PROP. PWR / PWR POLE
- PROP. LIGHTING POLE
- PROP. POWER DUCTING
- PROP. TELECOM
- PROP. TELECOM DUCTING
- PROP PUBLIC PE WTR PIPE
- PROP PRIVATE WTR PIPE
- PROP SLUICE VALVE
- PROP FIRE HYDRANT
- PROP WATER METER
- PROP WWMH
- PROP RODDING EYE
- PROP PUB WWPIPE
- PROP PRIV WWPIPE
- EX WWMH
- EX PUB WWPIPE
- PROP LPS WWPIPE
- PROP SWMH
- PROP SW CP
- PROP PUB SW PIPE
- PROP PRIV SW PIPE
- PROPOSED RAINGARDEN
- NO BUILD ZONE

Lot 3 DP 390769

LOT 301 DP 502921

Lot 9 DP 484841

Lot 8 DP 484841

LOT 300 DP562261

LOT 5 DP 65821
WN34C/88

LOT 300 DP 562261

LOT 22 DP 562261

BLOCK - A
BLOCK - B
BLOCK - C
BLOCK - D
BLOCK - E
BLOCK - F
BLOCK - G
BLOCK - J
BLOCK - K
BLOCK - L
BLOCK - M

Power Supply for these?

Move SW lateral clear of WWPS

Debris arrestor ?

Access

Can this not be moved to the parking area out front of Block C - Maintenance here will require traffic management

Since you are pumping WW would it not be possible to discharge to the WW in the road - removed the need for a public main through Lot 22 ?

This should be a gravity manhole within the site and an off site gravity connection.

Shift SW lateral clear of WW pump station

how is the gradient taken into account in the sw detention design.

minimum 0.5m (spade width)

WWL Initial Comments

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

ENGINEERING APPROVAL

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: D:\Ar Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\stage 3\P20-156-S3.800.dwg

REV	DATE	AMENDMENT	DRAWN
A	01.04.22	INITIAL ISSUE	CM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
CM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: PROPOSED SERVICES PLAN

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING
PO Box 65 576 Mairangi Bay, Auckland 0754
p. (09) 486 0774 f. (09) 486 0776 m. 0275 427 266
enquiries@arassociates.co.nz www.arassociates.co.nz

ace new zealand

A1 SCALE	A3 SCALE
1:250	1:500
JOB No.	DWG No. / REVISION
P20-156	S3.800 / A

PRINTED: 1/04/2022 9:38:57 am

From: [redacted]
To: [redacted]
Subject: RM210328: 106 Mohaka Street - WSUD review
Date: Wednesday, March 23, 2022 3:18:54 PM
Attachments: Untitled attachment 00044.png
WGN220073 Officers report.docx

Hi [redacted]

Can you please fit into your busy schedule a high level review of the proposed stormwater treatment for this site? This is RC stage so I really just want to be comfortable that the amount of land they have allocated seems realistic.

Plans etc to follow :

As I understand it they are proposing to have bioretention feed off the roadway only – no roof water treatment. Seems GWRC are ok with this from the draft report attached.

If you could please indicate when you will be able to undertake this review for HCC?

I may also have a few questions for you regarding the proposed detention, once I have finished getting my head around a couple of aspects.

Cheers
[redacted]

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: **M:** **W:** www.huttcity.govt.nz

Resource Consent

RESOURCE MANAGEMENT ACT 1991

Summary of decision

Consent No.	WGN220073	
Consent ID(s)	[37833] – Discharge permit – (operational-phase stormwater into land)	
	[37834] - Land use consent – (soil disturbance)	
	[37835] – Discharge permit – (sediment-laden runoff to land/water)	
	[37836] – Water permit – (to divert surface water)	
Name	MHV Limited	
Address	3/130 Oriental Parade, Oriental Bay, Wellington 6011	
Decision made under	Sections 104D, 105, 107 and 108 of the Resource Management Act 1991	
Duration of consent	Granted/Commences:	Expires [37833] and [37836]: 35 years
		Expires [37834] and [37835]: 10 years
Purpose for which consent(s) is granted	[37833] - to discharge operational-phase stormwater to land where it may enter water from a new urban subdivision associated with earthworks exceeding 3,000m^2; [37834] and [37835] to undertake earthworks exceeding 3,000m^2, including the discharge of sediment-laden water to land where it may enter water; and [37836] – to divert surface water from an artificial water course into stormwater network.	
Location	106 Mohaka Street, Wainuiomata at or about map reference NZTM 1762225.5432399 Also, 102 Meremere Street, Wainuiomata at or about map reference NZTM 1762276.5432361	
Legal description of land	Lot 5 DP 65821 Lot 300 DP 562261 (102 Meremere Street) – previously Lot 101 DP 532377	
Conditions	See below	

Decision recommended by:	[redacted]	Resource Management Consultant for Environmental Regulation	
Decision peer reviewed by:	[redacted]	Resource Management Consultant for Environmental Regulation	

Decision approved by:	[redacted]	Team Leader, Environmental Regulation	

Processing timeframes:

Application lodged:	17/09/21	**Application officially received:**	20/09/21
Application stopped (s95E):	23/09/21	**Application started (s95E):**	<date>
Application stopped (s92):	02/11/21	**Application started (s92):**	07/12/21
Applicant to be notified of decision by:	<date>	**Applicant notified of decision on:**	<date>
Time taken to process application:	<no.> working days		

Consent conditions WGN220073

[37834] and [37835] – to undertake earthworks exceeding 3,000m², including the discharge of sediment-laden water to land where it may enter water.

Interpretation: Wherever used in the conditions below, the following terms shall have the prescribed meaning:

Earthworks means the disturbance of a land surface from the time soil is first disturbed on a site until the time the site is stabilised. Earthworks includes blading, contouring, ripping, moving, removing, placing or replacing soil or earth, by excavation, or by cutting or filling operations, or by root raking.

Earthworks do not include:

a) cultivation of the soil for the establishment of crops or pasture, and
b) the harvesting of crops, and
c) thrusting, boring, trenching or mole ploughing associated with cable or pipe laying and maintenance, and
d) the construction, repair, upgrade or maintenance of:
   - pipelines, and
   - electricity lines and their support structures, including the National grid, and
   - telecommunication structures or lines, and
   - radio communication structures, and
   - firebreaks or fence lines, and
   - a bore or geotechnical investigation bore, and
e) repair or maintenance of existing roads and tracks, and airfield runways, and
f) maintenance of orchards and shelterbelts, and
g) domestic gardening, and
h) repair, sealing or resealing of a road, footpath, driveway, and
i) any earthworks or soil disturbances covered by the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017, and
j) discharge of cleanfill material to a cleanfill area.

ESC Guidelines for Wellington Region means the current revision of the *Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region*, available on the Wellington Regional Council's website at the following link: http://www.gw.govt.nz/assets/Resource-Consents/Erosion-and-Sediment-Control-Guide-for-Land-Disturbing-Activities-in-the-Wellington-Region.pdf

Manager means the Manager, Environmental Regulation, Wellington Regional Council.

Stabilised means inherently resistant to erosion, or rendered resistant to erosion through the application of the proven methods of stabilisation, specified in Section E3 of the *ESC Guidelines for Wellington Region*, or alternative methods with the prior agreement of Wellington Regional Council. Where seeding, grassing or hydroseeding is used, the surface is considered stabilised once a minimum of 80% vegetative cover has been established over the entire surface.

General conditions

1. The location, design, implementation and operation of the works shall be in general accordance with the consent application and its associated plans and documents lodged with the Wellington Regional Council on 17 September 2021 and the further information received on:
    - 18 October 2021 – updated application documents
    - 24 November 2021 – response to s92 request;
    - 2 December 2021 – information relating to the infiltration trench under the bioretention devices;
    - 6 December 2021 – rationale behind not providing rainwater tanks on-site;
    - 7 December 2021 – clarification regarding the purpose of the 200mm plant media layer;
    - 9 December 2021 – clarification regarding streamworks on site; and
    - 14 December 2021 - Rule assessment for Rule R117;
    - 27 January 2022 – correspondence re WWL approval of design.

    Where there may be contradiction or inconsistencies between the application and further information provided by the applicant, the most recent information applies. In addition, where there may be inconsistencies between information provided by the applicant and conditions of the consent, the conditions apply.

    Note: Any change from the location, design concepts and parameters, implementation and/or operation may require a new resource consent or a change of consent conditions pursuant to section 127 of the Resource Management Act 1991.

2. The Manager shall be given a minimum of five working days' notice prior to the works commencing.

    Note. Notifications must be emailed to notifications@gw.govt.nz. Please include the consent reference WGN220073 and the name and phone number of a contact person responsible for the proposed works.

3. The consent holder shall ensure that a copy of this consent, and all documents and plans referred to in this consent, is:

    - provided to each operator or contractor undertaking the works authorised by this consent, prior to works commencing; and
    - kept on site at all times and presented to any Wellington Regional Council Compliance Officer upon request

    Note: It is recommended that the contractors be verbally briefed on the requirements of the conditions of this consent prior to works commencing.

4. No works shall be undertaken within 10 metres of the wetland on site.

Pre-construction meeting

5. The consent holder shall arrange and conduct a pre-construction site meeting prior to any work authorised by this consent commencing on site and invite, with a minimum of **5 working days'** notice, the Greater Wellington Regional Council and the contractor undertaking the works.

Note: In the case that any of the invited parties, other than the representative of the consent holder, does not attend this meeting, the consent holder will have complied with this condition, provided the invitation requirement is met.

Stormwater System Inspection

6. The Consent Holder shall submit a Construction Management Plan (CMP) to the Manager for certification. The CMP shall:

   a) Be prepared in consultation with Wellington Water Limited (WWL);
   b) Be submitted to the Manager at least 20 working days prior to the proposed date of the commencement of works;
   c) Describe the methodology that will be used to inspect the stormwater system prior to the commencement of works and following the completion of works; and
   d) Describe the method that will be used, if required, to remove any sediment and/or siltation of the pipes following the completion of works.

7. Unless otherwise agreed in writing by the Manager, the consent holder shall undertake all works, in accordance with the CMP certified by the Manager in accordance with Condition 6.

Erosion and Sediment Control Plan

8. The Consent Holder shall submit a final Erosion and Sediment Control Plan (ESCP) to the Manager for certification. The ESCP shall be in general accordance with the ESC Guidelines and:

   a) Be prepared in consultation with the contractor undertaking the works and a suitably qualified and experienced person;
   b) Be submitted to the Manager at least 20 working days prior to the proposed date of commencement of works;
   c) Shall include:
      i. the methodology to be used so that the wetland is separated from the works;
      ii. the construction methodology to be used when infilling the drains and installing the scruffy dome inlet;
      iii. contributing catchments, dimensions and storage volumes of sediment retention ponds, decanting earth bunds, silt fences and diversion channels/bunds as applicable.

   Earthworks shall not commence until the consent holder has received notice in writing that the ESCP has been certified by the manager.

9 Unless otherwise agreed in writing by the Manager, the consent holder shall undertake all works, including staging of earthworks in accordance with the ESCP certified by the Manager in accordance with Condition 8.

As-builts

10. Prior to earthworks commencing, the consent holder shall provide the Manager with "As-builts" signed by a suitably qualified and experienced person, to confirm that the erosion and sediment controls have been constructed in general accordance with the ESCP.

    Note. As-built check sheets are available on the Greater Wellington Regional Council's website at the following link: http://www.gw.govt.nz/earthworks

Flocculation Management Plan

11. If flocculation is to be used on site, the consent holder shall prepare, in consultation with a suitably qualified and experienced person, a Flocculation Management Plan (FMP). The FMP shall be submitted to the Manager for certification at least 1**0 working days** prior to the proposed use of flocculant. The FMP must include as a minimum:

    a) Specific design details of the chemical treatment dosing system, based on a rainfall activated methodology for the decanting earth bunds (DEBs) or sediment retention ponds (SRPs);
    b) Monitoring, maintenance (including post-storm) and contingency programme (including a record sheet);
    c) Details of optimum dosage (including assumptions);
    d) Results of initial chemical treatment trial;
    e) A spill contingency plan; and
    f) Details of the person or bodies that are responsible for long-term operation and maintenance of the chemical treatment system and the organisational structure that will support this system.

    The use of flocculant shall not commence until the consent holder has received notice in writing that the FMP has been certified by the Manager. All DEBs/SRPs must be treated in accordance with the certified FMP.

Amendments to Management Plans

12. The consent holder may request amendments to the certified management plans (ESCP, CMP or FMP) by submitting the amendments in writing for the certification of the Manager. The amendments sought shall not be implemented until the consent holder has received notice in writing that the amended management plan has been certified by the Manager.

Progressive stabilisation

13. The consent holder shall progressively stabilise all disturbed or unstabilised areas in accordance with the ESCP and to the satisfaction of the Manager.

14. The maximum area of disturbance at any one time shall not exceed the calculated capacity of the sediment treatment devices required by the final approved ESCP for that area of works.

Decommissioning

15. All erosion and sediment control measures shall remain the responsibility of the consent holder and no erosion and sediment control measures shall be removed or decommissioned prior to receiving written confirmation that the catchment is stabilised to the satisfaction of the Manager.

Site auditing requirements

16. The consent holder shall have the site audited by a suitably qualified and experienced person on a minimum of a **weekly basis** (unless a reduced frequency is agreed in writing by the Manager) to ensure that all erosion and sediment controls are operating effectively in accordance with the ESCP. The audits shall be recorded in writing and submitted to the Manager upon request.

    Note: Any site audits carried out by Wellington Regional Council or its contractors do not constitute the audits required by this condition.

Rainfall triggered monitoring

17. The consent holder shall sample and record the following parameters as soon as practicable within daylight hours after a rainfall event greater than 7mm in 1 hour, or 20mm in 24 hours, as measured at the Wellington Regional Council rainfall monitoring site: Wainuiomata River at Wainui Reservoir.

Parameter	Location (sediment retention device)				Location (stream)	
	Inflow	Forebay (SRPs only)	Pond	Outflow	Downstream (at the reasonable mixing zone)	Upstream
pH	✓	-	-	✓	✓	-
Turbidity (NTU)	✓	-	-	✓	✓	✓

Note: The consent holder is only required to undertake outflow and downstream (reasonable mixing zone) monitoring if the device is discharging.

The consent holder shall submit all monitoring data and information to the Manager within **5 working days** of the date the sampling is undertaken. Unless otherwise agreed in writing by the Manager, the monitoring requirement shall only cease once the catchment has been completely stabilised and the device decommissioned.

Exceedances and failures

18. In the event that:

a) the rainfall triggered monitoring required under Condition 16 indicates that, at the outflow of the device, the NTU value is 170 NTU or greater, and/or (for any chemically-treated device) the pH is at or below 5.5 or above 8.5 or
b) there is a failure of any erosion and sediment control measure, or discharge from any non-stabilised area that is not treated by an erosion and sediment control measure, where any contaminants (including sediment) or material are released and enter any water body;

the consent holder shall:

i. Immediately notify the Manager of the issue;
ii. Immediately undertake onsite investigations to determine the cause of the issue, and what changes can be made to onsite management to prevent reoccurrence;
iii. Re-establish control measures as soon as practicable where these have failed or have not been implemented in accordance with the ESCP;
iv. Liaise with the Manager to establish whether any additional remediation and/or mitigation is required, and carry out any such action as required by and to the satisfaction of the Manager;
v. Record the date, time and weather conditions, details of investigations, probable cause of the issue, lessons learnt and actions taken or to be taken to prevent re-occurrence; and
vi. Within 5 working days of the issue being recorded, provide the information required by (e) above to the Manager.

All measures to prevent a reoccurrence of the exceedance or failure shall be to the satisfaction of the Manager.

Unless otherwise agreed in writing by the Manager, the consent holder shall engage a suitably qualified ecologist to inspect the affected water body within 3 days of the Consent Holder becoming

aware of the discharge and advise on any remediation and/or mitigation required. The ecologist's report shall be provided to the Manager upon request.

Winter Works

19. All earthworked areas shall be stabilised during the period between 1 June to 30 September inclusive each year, unless otherwise approved in writing by the Manager. The stabilised surface shall be maintained to the satisfaction of the Manager.

20. No earthworks authorised by this consent, other than those necessary for the maintenance of erosion and sediment controls, shall take place during the period of 1 June to 30 September inclusive each year, unless otherwise approved in writing by the Manager.

*Note 1: Requests to undertake earthworks during the period 1 June to 30 September inclusive must be submitted in writing to the Wellington Regional Council no later than **1 May** and shall be in the form of an amendment to the certified ESCP in accordance with Condition 6.*

In considering a request for winter earthworks, the Wellington Regional Council will consider a number of factors; including:

a) Scale and duration of proposed works;
b) Methods of stabilisation to be used;
c) Quality of the existing/proposed erosion and sediment controls
d) Compliance history of the site/contractor/consent holder;
e) Sensitivity of the receiving environment; and
f) Any other relevant factor.

Fill material

21. All fill material used on site shall be restricted to natural material such as clay, soil and rock, and inert material such as concrete and brick, which, when buried, will have no adverse effect on people or the environment.

Note: Rule R55 (Discharges from contaminated land) of the Proposed Natural Resources Plan will apply to any imported or insitu material worked on the site. If the activity does not meet the permitted standards under Rule R55, consent will be required under Rule R56 (Investigation of, or discharges from contaminated land – discretionary activity).

22. All fill material shall be placed and compacted so as to avoid erosion and instability. Any erosion of soil including failure of cut and fill batters that is attributable to the works shall be contained, remedied and mitigated by the consent holder to the satisfaction of the Manager.

Freshwater fish rescue

23. The consent holder shall engage a suitably qualified and qualified person to undertake fish rescue prior to the infilling of the drains and installing the scruffy dome inlet. The purpose of the fish rescue and relocation activities is to identify and rescue any native fish species that may be affected by the proposed activity. All native fish species captured during fish rescue shall be relocated to the affected tributary upstream of the works site within 1 hour.

Note: It is the responsibility of the Consent holder to ensure that they secure any necessary authorisations from the Department of Conservation, the Ministry of Primary Industry and Fish and Game New Zealand, prior to the commencement of any fish rescue.

Management plan review

24. The consent holder shall, if requested by the Manager in response to a complaint, incident or other reasonable request that relates to managing an adverse environmental effect that is directly related to the exercise of this consent, carry out a review of any management plan required by these conditions. The consent holder shall submit the reviewed management plan to the Manager for certification that:

- The reason(s) for requiring the review have been appropriately addressed; and
- Appropriate actions and a programme for implementation are provided for if required.

Discovery of artefacts

25. If koiwi, taonga, waahi tapu or other archaeological material is discovered in any area during the works, work shall immediately cease and the consent holder shall notify Greater Wellington Regional Council, Te Rūnanga o Toa Rangatira Inc, Port Nicholson Block Settlement Trust and Heritage New Zealand as soon as possible but within twenty-four hours. If human remains are found, the New Zealand Police shall also be contacted. The consent holder shall allow the above parties to inspect the site and in consultation with them, identify what needs to occur before work can resume.

Notification must be emailed to;

- Greater Wellington Regional Council, notifications@gw.govt.nz.
- Heritage New Zealand, information@heritage.org.nz
- Te Rūnanga o Toa Rangatira Inc, resourcemanagement@ngatitoa.iwi.nz
- Port Nicholson Block Settlement Trust, taiao@portnicholson.org.nz

Heritage New Zealand must also be contacted by phone on 04 472 4341 (National Office).

No works may resume on site until the consent holder has received written notification that consultation with the parties identified above has been undertaken to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

Note: Evidence of archaeological material may include burnt stones, charcoal, rubbish heaps, shell, bone, old building foundations, artefacts and human burials.

Completion of Works

26. All works affecting the site, including tidy up on completion of the works, shall be to the satisfaction of the Manager.

Review condition

27. Wellington Regional Council may review any or all conditions of this consent by giving notice of its intention to do so pursuant to section 128 of the Resource Management Act 1991, within one month of each anniversary of the commencement of this consent, for any of the following reasons:

a) To review the adequacy of any plan and/or monitoring requirements, and if necessary, amend these requirements outlined in this consent

b) To deal with any adverse effects on the environment that may arise from the exercise of this consent; and which are appropriate to deal with at a later stage

c) To require the implementation of Best Practicable Options, in respect to new methodologies for the undertaking of the works to avoid, remedy or mitigate any significant adverse effect on the environment arising from the works

d) To enable consistency with any relevant Regional Plans or any National Environmental Standards or Regulations

The review of conditions shall allow for the deletion or amendment of conditions of this consent; and the addition of such new conditions as are shown to be necessary to avoid, remedy or mitigate any significant adverse effects on the environment.

Note: For the purposes of this condition the "exercise of the consent" is deemed to be once the works authorised by this consent have commenced.

Notes:

a. Where conditions require the submission of information to the **Manager**, information can be emailed to notifications@gw.govt.nz. Please include the consent reference WGN220073 and the name and phone number of a contact person responsible for the information submitted

b. A resource management charge, set in accordance with section 36(2) of the Resource Management Act 1991, shall be paid to the Wellington Regional Council for the carrying out of its functions in relation to the administration, monitoring, and supervision of resource consents and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

c. The Wellington Regional Council shall be entitled to recover from the consent holder the costs of any review, calculated in accordance with and limited to the Council's scale of charges in force and applicable at that time pursuant to section 36 of the Resource Management Act 1991.

d. The granting of this resource consent does not provide you with the right to access private properties. Landowner entry requirements need to be gained and be in place before you may exercise this consent.

e. Additional resource consents from your local city or district council may be required to undertake this proposal. We advise you to contact your local city or district council prior to commencing works.

f. Section 322 of the Resource Management Act allows any Enforcement Officer to go onto the property at all reasonable times for the purpose of carrying out inspections to determine whether or not this consent is being complied with, or to take samples.

Consent Duration

Pursuant to section 123(d) of the Act, consent WGN220073 [37834] and [37835] shall expire on [years]

Consent conditions [37836]

[37836] - To permanently divert water from an artificial watercourse into a stormwater network.

Interpretation

Wellington Regional Council Officer means any Enforcement, Compliance or Duty Officer, Environmental Regulation, Greater Wellington Regional Council.

Notification or notice means email of notification to notifications@gw.govt.nz. Please include the consent reference number (WGN220051) and the name and phone number of a contact person responsible for the proposed works.

Stabilised means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, hydroseeding, grassing, mulch, or another method to the reasonable satisfaction of the Manager and as specified in Wellington Regional Council's *Erosion and Sediment Control Guidelines for the Wellington Region*, September 2002. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by the Manager an 80% vegetative cover has been established.

The Manager means the Manager, Environmental Regulation, Greater Wellington Regional Council.

ESC Guidelines for Wellington Region means the current revision of the *Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region*, available on the Wellington Regional Council's website at the following link: http://www.gw.govt.nz/assets/Resource-Consents/Erosion-and-Sediment-Control-Guide-for-Land-Disturbing-Activities-in-the-Wellington-Region.pdf

General Conditions

1. The location, design, implementation and operation of the works shall be in general accordance with the consent application and its associated plans and documents lodged with the Wellington Regional Council on 17 September 2021 and the further information received:
    - 18 October 2021 – updated application documents
    - 24 November 2021 – response to s92 request;
    - 2 December 2021 – information relating to the infiltration trench under the bioretention devices;
    - 6 December 2021 – rationale behind not providing rainwater tanks on-site;
    - 7 December 2021 – clarification regarding the purpose of the 200mm plant media layer;
    - 9 December 2021 – clarification regarding streamworks on site; and
    - 14 December 2021 - Rule assessment for Rule R117.

    Where there may be contradiction or inconsistencies between the application and further information provided by the applicant, the most recent information applies. In addition, where there may be inconsistencies between information provided by the applicant and conditions of the consent, the conditions apply.

    Note: Any change from the location, design concepts and parameters, implementation and/or operation may require a new resource consent or a change of consent conditions pursuant to section 127 of the Resource Management Act 1991.

2. The Manager shall be given a minimum of five working days' notice prior to the works commencing.

Note. Notifications must be emailed to notifications@gw.govt.nz. Please include the consent reference WGN220073 and the name and phone number of a contact person responsible for the proposed works.

3. The consent holder shall ensure that a copy of this consent, and all documents and plans referred to in this consent, is:

   - provided to each operator or contractor undertaking the works authorised by this consent, prior to works commencing; and
   - kept on site at all times and presented to any Wellington Regional Council Compliance Officer upon request

   Note: It is recommended that the contractors be verbally briefed on the requirements of the conditions of this consent prior to works commencing.

Erosion and Sediment Control Plan

4. The Consent Holder shall submit a final Erosion and Sediment Control Plan (ESCP) to the Manager for certification. The ESCP shall be in general accordance with the ESC Guidelines and:

   a) Be prepared in consultation with the contractor undertaking the works and a suitably qualified and experienced person;
   b) Be submitted to the Manager at least 20 working days prior to the proposed date of commencement of works;
   c) Shall include:
      i. the methodology to be used so that the wetland is separated from the works;
      ii. the construction methodology to be used when infilling the drains;
      iii. the construction methodology to be used when installing the outlet; and
      iv. contributing catchments, dimensions and storage volumes of sediment retention ponds, decanting earth bunds, silt fences and diversion channels/bunds as applicable.

   Earthworks shall not commence until the consent holder has received notice in writing that the ESCP has been certified by the manager.

5. Unless otherwise agreed in writing by the Manager, the consent holder shall undertake all works, including staging of earthworks in accordance with the ESCP certified by the Manager in accordance with Condition 4.

Amendments to Management Plans

6. The consent holder may request amendments to the certified management plans (ESCP) by submitting the amendments in writing for the certification of the Manager. The amendments sought shall not be implemented until the consent holder has received notice in writing that the amended management plan has been certified by the Manager.

Reducing effects on water quality

7. The consent holder shall minimise sediment discharges and impacts on instream habitats and ecology during the works, including but not limited to:

   a) Completing all works in the minimum time practicable;
   b) Undertaking works in dry weather conditions, as far as practicable;
   c) Avoiding the placement of construction or excavated material in the wetted channel;
   d) Separating all construction activities from flowing water;

e) Installing appropriate sediment control and treatment measures;
f) Minimising crossing of the streambed and keeping crossings to one path only; and
g) Minimising machinery in the streambed and undertake works from the banks where practicable.

8. The consent holder shall ensure that prior to entering a water body that all vehicles and equipment are inspected for the presence of invasive or pest aquatic species including *Didymosphenia geminata* (didymo). In the event that an invasive or pest aquatic species is discovered upon any vehicle or equipment it shall be cleaned, to the satisfaction of the Manager.

Note: The machinery shall be cleaned in accordance with the Ministry for Primary Industries cleaning methods which can be found at http://www.mpi.govt.nz/travel-and-recreation/outdoor-activities/check-clean-dry/

Freshwater fish rescue

9. The consent holder shall ensure that the scruffy dome inlet structure is designed, constructed and maintained in accordance with the New Zealand Fish Passage Guidelines (NIWA and DOC, 2018) or to the satisfaction of the Manager.

10. The consent holder shall engage a suitably qualified and qualified person to undertake fish rescue prior to undertaking works within the streambed to install the outlet structure. The purpose of the fish rescue and relocation activities is to identify and rescue any native fish species that may be affected by the proposed activity. All native fish species captured during fish rescue shall be relocated to the affected tributary upstream of the works site within 1 hour.

Note: It is the responsibility of the Consent holder to ensure that they secure any necessary authorisations from the Department of Conservation, the Ministry of Primary Industry and Fish and Game New Zealand, prior to the commencement of any fish rescue.

Erosion/scour and revegetation

11. The consent holder shall ensure that any areas of the stream/drain banks that are cut or disturbed as a result of the works are stabilised and grassed or replanted with native vegetation as soon as practicable following completion of the works, to prevent erosion and scour and to enhance riparian habitat qualities/reinstate shade habitat.

Maintenance

12. The consent holder shall remain responsible for the structure and shall ensure that it is maintained at all times to the satisfaction of the Manager, so that:

a) Any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder; and
b) Any adverse effects caused by the presence of the structure that limit, restrict or prevent fish passage shall be rectified by the consent holder; and
c) The structural integrity of the outlet remains sound in the opinion of a Professional Chartered Engineer
d) The waterway within or around the structure remains clear of debris.

Note: Maintenance does not include any works outside of the scope of the application. Further resource consents may be required for any additional works (including structures, reshaping or disturbance to the bed of the watercourse).

13. If the structure is no longer required, and/or the structure is not being maintained in accordance with condition 12 of this consent, or sustains irreparable damage then the consent holder shall remove the structure within a timeframe that is to the satisfaction of the Manager.

Discovery of artefacts

14. If koiwi, taonga, waahi tapu or other archaeological material is discovered in any area during the works, work shall immediately cease and the consent holder shall notify Greater Wellington Regional Council, Te Rūnanga o Toa Rangatira Inc, Port Nicholson Block Settlement Trust and Heritage New Zealand as soon as possible but within twenty-four hours. If human remains are found, the New Zealand Police shall also be contacted. The consent holder shall allow the above parties to inspect the site and in consultation with them, identify what needs to occur before work can resume.

    Notification must be emailed to;

    - Greater Wellington Regional Council, notifications@gw.govt.nz.
    - Heritage New Zealand, information@heritage.org.nz
    - Te Rūnanga o Toa Rangatira Inc, resourcemanagement@ngatitoa.iwi.nz
    - Port Nicholson Block Settlement Trust, taiao@portnicholson.org.nz

    Heritage New Zealand must also be contacted by phone on 04 472 4341 (National Office).

    No works may resume on site until the consent holder has received written notification that consultation with the parties identified above has been undertaken to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

    Note: Evidence of archaeological material may include burnt stones, charcoal, rubbish heaps, shell, bone, old building foundations, artefacts and human burials.

Review condition

15. The Wellington Regional Council may review any or all conditions of this consent by giving notice of its intention to do so pursuant to section 128 of the Resource Management Act 1991, at any time for the duration of this consent, for the following purposes:

    a) To review the adequacy of any report and/or monitoring requirements, and if necessary, amend these requirements outlined in this consent

    b) To deal with any adverse effects on the environment that may arise from the exercise of this consent; and which are appropriate to deal with at a later stage

    c) To enable consistency with any relevant Regional Plans or any National Environmental Standards or Regulations

    The review of conditions shall allow for the deletion or amendment of conditions of this consent; and the addition of such new conditions as are shown to be necessary to avoid, remedy or mitigate any significant adverse effects on the environment.

Notes:

a. A resource management charge, set in accordance with section 36(2) of the Resource Management Act 1991 shall be paid to the Wellington Regional Council for the carrying out of its functions in relation to the administration, monitoring, and supervision of resource consents and for

the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

b. The Wellington Regional Council shall be entitled to recover from the consent holder the costs of any review, calculated in accordance with and limited to the Council's scale of charges in force and applicable at that time pursuant to section 36 of the Resource Management Act 1991.

c. The granting of this resource consent does not provide you with the right to access private properties. Landowner entry requirements need to be gained and be in place before you may exercise this consent.

d. Additional permits may be requiring for the handling of fish or temporary blockage of fish passage from the Ministry for Primary Industries, Department of Conservation or Fish and Game.

Consent Duration

Pursuant to section 123(d) of the Act, consent WGN220073 [37836] shall expire on [years]

Consent conditions [37833]

[37833] - To discharge operational stormwater to land where it may enter water from a new urban development associated with earthworks exceeding 3,000m^2 and to discharge operational stormwater to land within 100m of inland natural wetlands.

INTERPRETATION

Wherever used in the conditions above, the following terms shall have the prescribed meaning:

Notification or notice means email of notification to notifications@gw.govt.nz. Please include the consent reference number (WGN220073) and the name and phone number of a contact person responsible for the proposed works.

Manager means the Manager, Environmental Regulation, Wellington Regional Council.

General conditions

1. The location, design, implementation, and operation of the activity shall be in general accordance with the consent application and its associated plans and documents lodged with the Wellington Regional Council on 17 September and further information received on:
    - 18 October 2021 – updated application documents
    - 24 November 2021 – response to s92 request;
    - 2 December 2021 – information relating to the infiltration trench under the bioretention devices;
    - 6 December 2021 – rationale behind not providing rainwater tanks on-site;
    - 7 December 2021 – clarification regarding the purpose of the 200mm plant media layer;
    - 9 December 2021 – clarification regarding streamworks on site;
    - 14 December 2021 - Rule assessment for Rule R117; and
    - 27 January 2022 – correspondence re WWL approval of design.

    Where there may be contradiction or inconsistencies between the application and further information provided by the applicant, the most recent information applies. In addition, where there may be inconsistencies between information provided by the applicant and conditions of the consent, the conditions apply.

    Note: Any change from the location, design concepts and parameters, implementation and/or operation may require a new resource consent or a change of consent conditions pursuant to section 127 of the Resource Management Act 1991.

2. The consent holder shall ensure that a copy of this consent, and all documents and plans referred to in this consent, is kept on site at all times and presented to any Wellington Regional Council Compliance Officer upon request

    Note: It is recommended that the contractors be verbally briefed on the requirements of the conditions of this consent prior to works commencing.

Stormwater Design

3. The Consent Holder shall design the stormwater management devices and systems in general accordance with AR & Associates stormwater drawings P20-156 S3.400 Rev D and P20-156 S3.422 Rev C.

4. The stormwater management devices shall be designed and constructed to achieve the design requirements as set out in Table SW 1 (below):

Table SW1: Design requirements

Project Catchment	Treatment Device	Minimum Design Requirements
Hardstand surfaces (including roads, footpaths and parking areas)	Bioretention Device (planted raingarden) including retention storage	i WWL's *Water Sensitive Design for Stormwater: Treatment Device Design Guideline* The invert of the bioretention device shall be permeable and provide a 500mm deep internal water storage zone below the invert of the outlet pipe.

5. The Consent Holder may make modifications to the stormwater management devices and systems shown on the stormwater drawings, including the use of alternative stormwater management devices, provided that the equivalent performance and compliance as set out in Table SW.1 is achieved.

Note: All proposed modifications must be discussed with the Manager prior to implementation. Any changes to the proposal which will affect the treatment capacity or performance of the stormwater management system may require an application to the Council under section 127 of the RMA

Detailed Design

6. The Consent Holder shall ensure that the detailed design, including drawings, specification, design report and calculations for the stormwater management devices are submitted to the Manager for certification at least 30 days prior to initiation of construction of the proposed stormwater management devices. The purpose of the certification is to confirm that the final design meets the conditions set out in conditions 3-5, and should address the following:

a. Contributing catchment size and impervious percentage;
b. Specific design and location of stormwater systems;
c. Specific inlet erosion protection design;
d. Supporting calculations, including sizing capacity of stormwater system(s);
e. Catchment boundaries for the stormwater treatment devices;
f. Details of construction method of stormwater system(s) including timing and duration;
g. Proposed planting within stormwater management devices; and
h. Monitoring and maintenance schedules.

7. The design report prepared under Condition 6 shall be submitted to the Manager, and written certification from the Manager shall be obtained prior to the construction of the stormwater management devices.

8. Stormwater runoff from all buildings and structures with exposed copper or zinc cladding, roofing, guttering or spouting shall be treated by a water quality device designed in accordance with WWL's *Water Sensitive Design for Stormwater: Treatment Device Design Guideline*, for the treatment of metals in the runoff.

9. Any amendments that may affect the performance of the stormwater systems approved under Condition 6 shall be certified by the Manager prior to the planned implementation of the amendments.

10. Stormwater management devices or systems must be fully operational prior to the discharge of water from the contributing impervious area.

Planting

11. The Consent Holder shall submit planting plan(s) for all planted stormwater management devices to the Manager for certification at least 30 working days prior to construction of the stormwater devices.

12. Planting for stormwater management devices shall be provided in accordance with WWL's Water Sensitive Design for Stormwater: Treatment Device Design Guideline. The planting plan(s) required by Condition 11 shall include, but not be limited to, the following:

    a. Location, planting methodology and maintenance details;
    b. Details of plant species, plant numbers, density and distribution; and
    c. Details of proposed pest plant management.

13. All planting of stormwater management devices shall be undertaken in accordance with the approved planting plan(s).

As-built plan and validation report

14. The Consent Holder shall supply As-Built Plans and a Validation Report for the stormwater management devices to the Manager within 30 working days of the practical completion of the stormwater management devices.

15. The As-Built Plans shall be signed off by a Chartered Professional Engineer and include but not be limited to:

    a. The surveyed locations and elevations of all stormwater structures, the level datum is to be LINZ's Wellington Vertical Datum 1953 or New Zealand Vertical Datum 2016(NZVD2016), with coordinates to New Zealand Geodetic Datum 2000 (NZGD2000) and projection to New Zealand Transverse Mercator 2000 (NZTM2000);
    b. The level of accuracy is to be ± 0.3m in the horizontal direction and ± 0.1m in the vertical direction;
    c. Stormwater management device details including locations, dimensions, volumes, flood levels, sections, treatment efficiencies, inlet, discharge rates and outlet structures; and
    d. Documentation of any discrepancies between the approved design plans under Condition 6 and the As-Built Plans.

16. The Validation Report shall be signed off by a Chartered Professional Engineer and shall include details of:

    a. The type and performance of the constructed stormwater management devices in relation to the design requirements of conditions 3 to 5 above;
    b. The contributing catchment areas serviced by each stormwater management device; and
    c. The provision of access to each stormwater management device.

Stormwater Operation and Management Plan

17. A Stormwater Operation and Maintenance Plan shall be submitted to the Manager for certification 20 working days prior to commencement of the operation of the stormwater management system.

    The Stormwater Operation and Maintenance Plan shall include, but not be limited to:

    a. Details of the person or organisation that will hold responsibility for long-term maintenance of the stormwater management system;
    b. A programme for regular maintenance and inspection of the stormwater management system and how this will be funded;
    c. A programme for the collection and disposal of debris and sediment collected by the stormwater management devices or practices;
    d. Procedures for post storm inspection and maintenance;
    e. A programme for inspection and maintenance of the outfalls;
    f. General inspection checklists for all aspects of the stormwater management system, including visual checks;
    g. A programme for inspection and maintenance of vegetation associated with the stormwater management devices; and
    h. A requirement to retain records of all inspections and maintenance for the stormwater management system, for the preceding three years.

18. The Consent Holder shall ensure that the stormwater systems are managed in accordance with the Stormwater Operation and Maintenance Plan.

19. Any material amendments or alterations to the approved Stormwater Operation and Maintenance Plan shall be submitted to the Manager in writing for certification at least 20 working days prior to implementation.

20. A written maintenance contract for the on-going maintenance of the stormwater treatment device(s) shall be entered into with an appropriate stormwater management system operator, prior to the operation of the stormwater management device(s). A written maintenance contract shall be in place and maintained for the duration of the consent.

    Within 20 working days of completion of the stormwater management works, a signed copy of the maintenance contract shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council.

    A copy of the current maintenance contract shall be provided to the council upon request throughout the duration of the consent.

21. The consent holder shall ensure that the stormwater treatment devices are constructed and maintained in general accordance with the Wellington Water Limited 'Water Sensitive Design for Stormwater Treatment Device Design Guideline,' December 2019.

22. The materials used on all exterior building surfaces (including gutters and downpipes) shall not comprise of bare galvanised, zinc aluminium or unpainted metal (including copper) where practicable.

Review conditions

23. Wellington Regional Council may review any or all conditions of this consent by giving notice of its intention to do so pursuant to section 128 of the Resource Management Act 1991, within one month of each anniversary of the commencement of this consent, for any of the following reasons:

a. To review the adequacy of any plan and/or monitoring requirements, and if necessary, amend these requirements outlined in this consent;
b. To deal with any adverse effects on the environment that may arise from the exercise of this consent; and which are appropriate to deal with at a later;
c. To require the implementation of Best Practicable Options, in respect to new methodologies for the undertaking of the works to avoid, remedy or mitigate any significant adverse effect on the environment arising from the works
d. To enable consistency with any relevant Regional Plans or any National Environmental Standards or Regulations

The review of conditions shall allow for the deletion or amendment of conditions of this consent; and the addition of such new conditions as are shown to be necessary to avoid, remedy or mitigate any significant adverse effects on the environment.

Note: For the purposes of this condition the "exercise of the consent" is deemed to be once the works authorised by this consent have commenced.

General Notes

a) Where conditions require the submission of information to the Manager, information can be emailed to notifications@gw.govt.nz. Please include the consent reference WGN220073 and the name and phone number of a contact person responsible for the information submitted

b) A resource management charge, set in accordance with section 36(2) of the Resource Management Act 1991 shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring, and supervision of resource consents and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

c) The Wellington Regional Council shall be entitled to recover from the consent holder the costs of any review, calculated in accordance with and limited to the Council's scale of charges in force and applicable at that time pursuant to section 36 of the Resource Management Act 1991.

d) The granting of this resource consent does not provide you with the right to access private properties. Landowner entry requirements need to be gained and be in place before you may exercise this consent.

e) Additional resource consents from your local council may be required to undertake this proposal. We advise you to contact the Wellington City Council prior to commencing works.

f) Section 322 of the Resource Management Act allows any Enforcement Officer to go onto the property at all reasonable times for the purpose of carrying out inspections to determine whether or not this consent is being complied with, or to take samples.

Consent Duration

Pursuant to section 123(d) of the Act, consent WGN220073 [37833] shall expire on [years]

Reasons for decision report

1. Background and proposal

MHV Limited 'the applicant' has applied for resource consents associated with the development of a residential subdivision. The application and associated Assessment of Environmental Effects (AEE) has been prepared by Urban Edge

Planning Limited on behalf of the applicant. The resource consents applied for are:

- To undertake earthworks exceeding 3,000m^2;
- To discharge of sediment-laden water to land where it may enter water;
- To discharge operational-phase stormwater; and
- To divert water from an artificial watercourse into the stormwater network[1].

It is noted that the consents for earthworks and discharge of sediment-laden water only relate to Stage 3 of the proposed subdivision, as shown on Figure 1. The applicant has obtained resource consents for earthworks and the discharge of sediment laden water associated with Phase 1 and 2, as shown below.

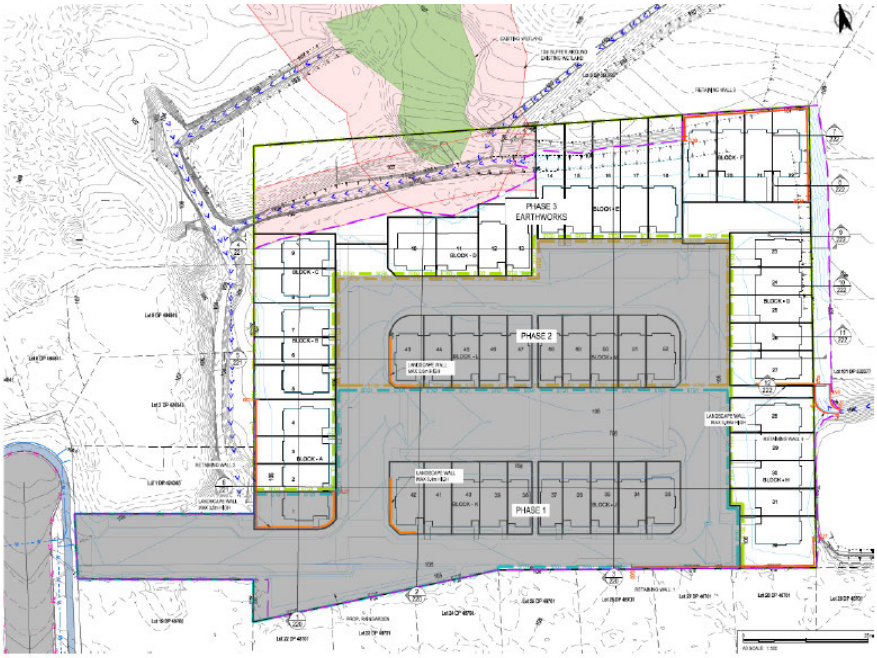

Figure 1. Stage three of the earthworks

1.1 Construction-related activities

Earthworks are required to facilitate the proposed development including for the formation of suitable access and building platforms. Earthworks will occur over 3,845m^2 and include a cut volume of 639m^3 and fill volume of 689m^3. The maximum depth of earthworks will be 1.75 m below ground level (bgl).

[1] I note that originally the applicant applied to construct an inlet structure within the eastern drain. However this is an artificial watercourse, and as such, consent is not required for the structure as it is not within the bed of a river. The inlet structure is a scruffy dome structure and will essentially take the water from the stream on Meremere Street, and divert it into the proposed stormwater system. As such, I consider consent is only required for the diversion of water.

As part of the construction-related activities, the applicant proposes to fill in the eastern part of the northern drain and the eastern drain. The applicant has described that filling will start from the northern junction and will be undertaken during dry weather. In addition to this, the overland flows from 102 Meremere Street, will be captured by a scruffy dome inlet structure and flows will be diverted to the proposed stormwater network within the site.

A small amount of earth disturbance will occur within proximity to the wetland; these works are associated with constructing foundations for a new boardwalk. However, it is noted that no earthworks will occur within 10 m of the wetland.

The applicant anticipates that earthworks will occur over a two to three month period. The applicant proposes to utilise an Erosion and Sediment Control Plan (ESCP) prepared in accordance with the GWRC 'Erosion and Sediment Control Guidelines for Wellington Region'. This will include:

- Silt fences;
- Dirty water bund against the northern and western boundary;
- Decanting earth bund is proposed on the west which will discharge clean water to the stream on the western boundary; and
- A stabilised entrance point.

1.2 Operational-phase Stormwater

The proposed stormwater reticulation system has been developed in accordance with the Wellington Water Regional Standard for Water Services May 2019 Version 2.0. Stormwater from the site will ultimately discharge to the stormwater network, owned by Hutt City Council (HCC) and managed by Wellington Water Limited (WWL), on Mohaka Street. The main features of the network are described below:

- The network will consist of the main pipe network and 1050 mm diameter concrete pipes which will act as a detention tank to attenuate 10% and 1% annual exceedance probability (AEP) rainfall events and 300 mm diameter branch lines feeding the main;
- Each lot will have a dedicated stormwater connection to the network;
- The eastern overland flow path will be collected via scruffy dome inlet and connected to the main stormwater network;
- Surface runoff from roads and hardstand areas during both 10% and 1% AEP rainfall events will be conveyed via kerb and channel to the bioretention device (rain garden);

- The bioretention device is equipped with a spillway manhole which activates once the incoming storm volume exceeds the bioretention storage for water quality; and

- The outlet pipe from the detention tank will be connected to the existing stormwater network.

The applicant has described that the bio-retention device will be in private ownership and will be maintained by a residents association. Further details regarding the proposed stormwater system are available at file reference: WGN220073-437512057-43.

2. Reasons for resource consent

2.1 Operative Regional Plans

RMA section	Plan	Rule	Status	Comments
15	Regional Plan for Discharges to Land (RDLP)	1	Permitted	The discharge of treated sediment-laden water to land where it may enter water is a discretionary activity pursuant to Rule 2 of the RDLP.
		2	Discretionary	
		3	Permitted	The applicant has stated that the discharge of stormwater will comply with Condition 3. I agree with this assessment.

There are no rules of relevance to the proposal in the Regional Soil Plan or Regional Freshwater Plan.

2.2 Proposed Natural Resources Plan

The Council's decision on the Proposed Natural Resources Plan (PNRP) was publicly notified on 31 July 2019. All rules in the PNRP (decisions version) have immediate legal effect under section 86B(1) of the Act. As the application was lodged after 31 July 2019, the PNRP (decisions version) is relevant to determining the resource consents required, their activity status, and the substantive assessment of the proposal under section 104(1)(b). The provisions of the PNRP as notified on 31 July 2015 have been superseded by the decisions version of the PNRP for assessing this proposal.

This is in addition to any consents required under the operative plans. Noting that under section 86F if there are no appeals on a relevant rule, the rule in the PNRP is treated as operative and the rule in the operative plan is treated as inoperative.

RMA section	Rule	Status	Comments
9	Rule R99	Permitted	Rule R99 relates to the use of land, and the associated discharge of sediment-laden runoff, from earthworks up to a total area of 3,000m^2 per property per 12 month period. As the area of earthworks exceeds 3,000m^2, this rule is not relevant to the proposal. Therefore, a resource consent is required pursuant to Rule R101 of the PNRP as a discretionary activity.
	Rule R101	Discretionary	
14	Rule 135	Discretionary	The overland flows from Meremere Street currently flow into the eastern drain. The eastern drain is an artificial watercourse. This is to have a scruffy dome inlet installed to divert the overland flows into the proposed stormwater network. As the diversion will be from an artificial watercourse, Rule R135 applies and the activity is deemed a discretionary activity.
15	Rule 48A	Permitted	Rule R48A relates to the discharge of stormwater from new subdivisions and developments. As the area of earthworks exceeds 3,000m^2 in a 12 month period, Rule R48A is not relevant to the proposal. Therefore, a resource consent is required pursuant to Rule R52A of the PNRP as a restricted discretionary activity. The matters for discretion are restricted to: • Measures to minimise the adverse effects of stormwater discharges in accordance with Policy P73, including the extent to which water sensitive urban design measures are employed; • Measures to manage runoff volumes and peak flows in accordance with Policy P79; • Requirements of any relevant local authority stormwater network discharge consent, including those set out in any relevant stormwater management strategy developed in accordance with Schedule N (stormwater strategy).
	Rule R52A	Restricted discretionary	

The proposed activity is not located within or near a scheduled site in the PNRP.

2.3 National Environmental Standard for Freshwater

The Resource Management (National Environment Standards for Freshwater) Regulations (NES-F) seek to regulate activities that pose risks to the health of freshwater and freshwater ecosystems. These regulations came into force on 3 September 2020. The NES-F sets requirements to protect existing inland and coastal wetlands. All regulations in the NES-F prevail over Regional Plans in accordance with section 43B of the Act.

RMA section	Regulation	Status	Comments
13	52	Non-complying	Regulation 52 of the NES-F relates to earthworks and discharges within a 100m setback of a natural wetland. This is a non-complying activity if the activity results in or is likely to result in the complete or partial drainage of a wetland. As the wetland is located up-gradient of the earthworks area and the location of the discharge, the proposed activity will not result in the partial or full drainage of a natural wetland. Therefore, Regulation 52(1) & (2) are not applicable in this instance.
15	54	Non-complying	Regulation 54 relates to certain activities not otherwise classified. This includes (c) *the taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland*. As the discharge of sediment-laden water and operational-phase stormwater will be within 100 m of a natural wetland, the discharge of discharges are considered a non-complying activity pursuant to Regulation 54(c) of the NES-F. I note that there will be no earthworks within 10m of the wetland – as such, Regulations 54(a)(b) do not apply.

2.4 Overall activity status

Overall, the activity must be assessed as a non-complying activity pursuant to the National Environmental Standards for Freshwater, a discretionary activity under the operative Regional Discharges to Land Plan, and a discretionary under the Proposed Natural Resources Plan (decisions version),

3. Consultation

Iwi authority	Comments
Port Nicholson Block Settlement Trust	Port Nicholson Block Settlement Trust were informed of the application via Te Wāhi. No comments have been received.
Ngāti Toa Rangatira	Ngāti Toa Rangatira were informed of the application via Te Wāhi. No comments have been received.
Other parties or persons	**Comments**
Yus Development NZ Limited	The applicant has provided written approval from the owner of 102 Meremere Street in regards to the proposed works – specifically the scruffy dome inlet and minor associated earthworks on the boundary between 102 Meremere Street and the application site.
Wellington Water Limited (WWL) Hutt City Council (HCC)	The proposal involves the discharge of sediment laden runoff and operational stormwater to the existing piped local authority stormwater network. The proposal may increase the volume of stormwater discharging to the network and have implications on the networks capacity to convey increased stormwater flows. I note that WWL own the stormwater network, but HCC manage it.

	The effects of discharge quantity on capacities of existing networks from the new development and approval of any assets being vested in Council is provided through design approvals made by HCC. WWL has no input into these approvals and makes no determinations on effects – as such, it is not able to provide affected party approval. As such, HCC was considered an affected party to the application. The affected party approval was provided on date.
[redacted] at Southern Skies Environmental	Advice was sought from [redacted] regarding the adequacy of the ESCP (file reference: WGN220073-437512057-24). [redacted] comments are discussed in full in Section 5.2 of this report.
[redacted], [redacted] at Aquanet Consulting	Advice was sought from [redacted] (file reference: WGN220073-437512057-34). In summary [redacted] has stated: • Following the site visit and review of information provided by the applicant, [redacted] has provided a summary of how the watercourses surrounding the site can be categorised. This is discussed in detail in Section 5.1 of this report. • He agrees with the conclusions made by the applicant that the actual and potential effects will be no more than minor; • He does not believe any offsetting is required in relation to the reclamation of the drains; • An ESCP will be essential for protecting the wetland and streams/rivers from mobilised sediment; • He endorses the use of an ecologist being on-site during the in-filling of the drain. However notes that it is unlikely that fish will be present.
[redacted], Senior Environmental Monitoring Officer, Greater Wellington Regional Council	As a wetland is located on the northern boundary of the site, advice was sought from [redacted] (file reference: WGN220073-437512057-53). [redacted] attended a site visit with myself, [redacted] and the applicant. During this site visit [redacted] delineated the extent of the wetland. In summary he notes: • He agrees with the comments made in the ecological assessment of [redacted] of RMA Ecology Limited; • He agrees with the recommendations of [redacted] and specifically the recommendation relating to marking out the physical boundary of the wetland and a 10 m buffer around the wetland to clearly delineate these and prevent vegetation clearance, earthworks or vehicle movements within these areas. I have recommended a condition stating that no works shall occur within 10 m of the wetland and that the ESCP shall define how the applicant will separate the area of works from the wetland.
[redacted], at the Urban Engineers	Advice was sought from [redacted]. In summary, his advice is available in full at file reference: WGN220073-437512057-70 and discussed in Section 5.5.

4. Notification decision

A decision was made to process the application on a non-notified basis on <insert date>. Further information on the notification decision is provided in document WGN220073-437512057-12.

5. Environmental effects

This section provides an assessment of the effects of the proposed activity on the environment. Information has been drawn from the application provided by the applicant and other information sourced during the processing of the application.

5.1 Existing Environment

A wetland is located on the northern boundary of the site as shown on Figure 2. The applicant has stated that no earthworks will occur within 10 m of the wetland. The wetland has also been delineated by [redacted], and he is in agreement with the extent mapped on the site as shown on Figure 1.

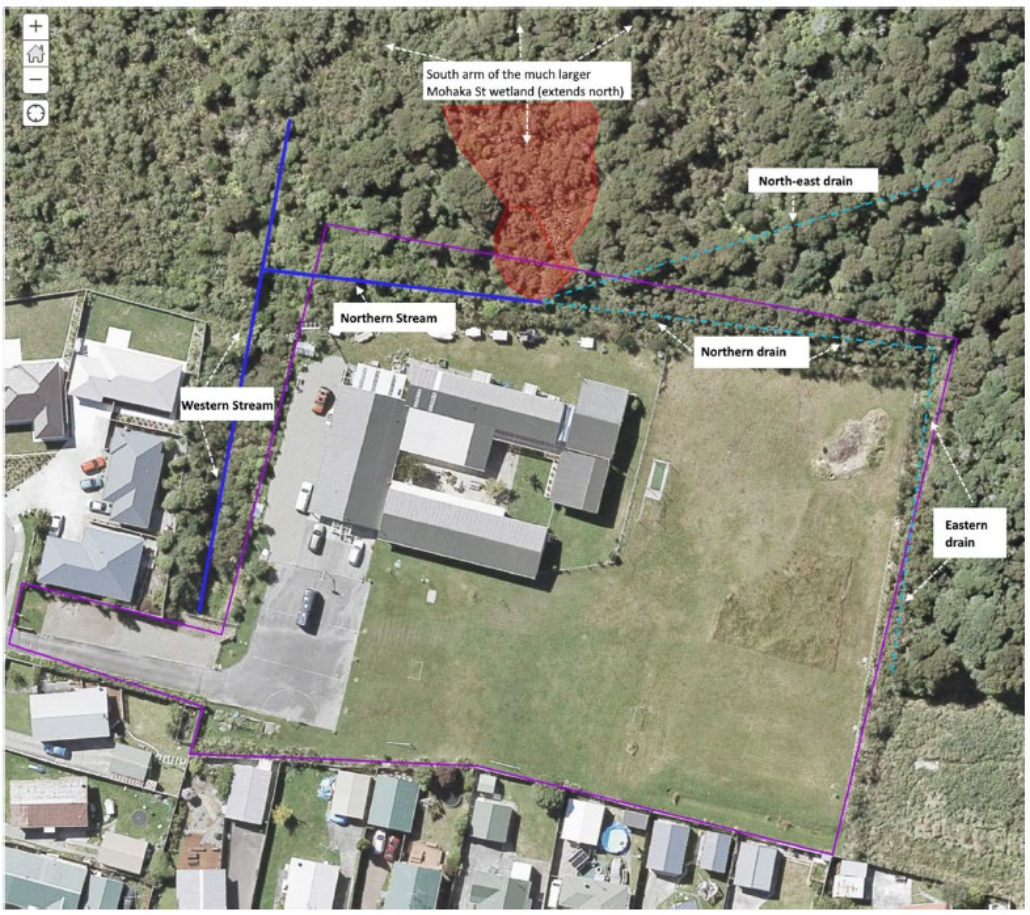

Figure 2. Extent of Wetland (shown in red) and watercourses surrounding site

[redacted] also provided advice to GWRC on the watercourses surrounding the site and these are also shown on Figure 2. In summary:

- The eastern drain is an artificial watercourse with an ephemeral flow pathway, and does not meet the RMA definition of a river;

- The eastern reach of the northern drain is an artificial watercourse with an ephemeral flow pathway - does not meet the RMA definition of a river; and

- The western reach of the northern drain is a highly modified watercourse/wetland and meets the RMA definition of a river.

5.2 Effects of the earthworks and discharges

Earthworks and the discharge of sediment-laden water has the potential to result in adverse effects on receiving waterbodies if poorly managed or if contaminants are entrained in the discharge.

The applicant has submitted an ESCP with the application and this details the erosion and sediment control measures that will be adhered to during works. [redacted] has stated that an ESCP will be critical for protecting the wetland and streams from mobilised sediment. The ESCP has been reviewed by [redacted] and he has noted:

- The applicant has requested that flexibility be incorporated into any approval to accommodate the constructor's construction methodology. [redacted] agrees with this approach and notes that a condition of consent can require a final ESCP to be submitted for certification;

- Additional details for the proposed ESC would be required such as the sizing of the sediment-laden diversions and further details on the DEB, in terms of length, width and depth. This information can be incorporated within a final ESCP;

- No consideration has been given to the use of chemical treatment. [redacted] recommends that the use of this should not be discounted and conditions should be imposed to give effect to this; and

- If resource consent is granted, a condition should be included that requires a final ESCP to be submitted and this should detail the specific methodology for the in-filling of the drain.

Based on the advice of [redacted] I have recommended the following conditions:

- That the applicant shall submit a final ESCP for certification at least 20 working days prior to works commencing. I have also recommended that the ESCP detail the in-filling methodology to be utilised;

- That ‘As builts’ signed by a suitably qualified and experienced person to confirm that the controls have been constructed in accordance with the ESCP and are suitably sized;

- Allowing the applicant the use of flocculants (chemical treatment). These conditions require the applicant to submit a plan for certification prior to use. Although they have not been proposed to be used, I consider that the conditions will ensure that if they are used, that they are dosed correctly, and thus the potential effect will be negligible; and

- The requirement for weekly site audits. Due to the proximity to the wetland and sensitivity of the receiving environment, I consider that it essential that the applicant report to GWRC to ensure that ESC measures are operating effectively and in accordance with the ESCP.

Based on the advice received from [redacted] and provided the recommended conditions are adhered to, the potential effect from earthworks and discharge of sediment laden water will be appropriately managed and thus will be no more than minor.

5.3 Effect on aquatic ecosystems and fish passage

The earthworks proposed also include the in-filling of the drain on the eastern and north-eastern sections of the site. As noted in Section 5.1 of this report, these watercourses are considered to be artificial watercourses.

The applicant notes that fish passage will not be possible when the inlet structure is being installed; however, fish salvage will be undertaken when fish passage is not possible. In addition to this, the applicant proposes to undertake fish salvage when the drains are being in-filled. [redacted] supports the use of fish relocation albeit minimal fish species being present in this area. I have recommended conditions relating to fish rescue within the watercourses and that this is supervised by an ecologist. This will ensure that the potential effect on aquatic ecosystems and fish passage is managed.

I have also recommended a condition stating that fish passage shall be maintained at all times following construction.

Based on the technical advice received and provided the recommended conditions are adhered to, I consider the potential effect on surface waterbodies and fish passage from in-filling of the drain will be appropriately managed and no more than minor.

5.4 Effect of proposed diversion

There is a wetland at 80 Meremere Street to the east of the application site. Overland flows from this wetland discharge towards the application site in an unnamed tributary of Black Creek. It then flows into the eastern drain along the application site boundary. The eastern drain is deemed to be an artificial watercourse and only flows during heavy rains.

The applicant is proposed to fill in the eastern drain, however to capture the flows from the tributary of Black Creek, an inlet structure is proposed which will divert the water into the proposed piped stormwater system.

I note that the proposed stormwater infrastructure has the capacity to accommodate the additional water from the Meremere Street overland flows. Fish passage and infilling of the drain has been discussed above.

As such, I do not consider there to be more than minor effects from the diversion of surface water.

5.5 Effect on the wetland

As noted in Section 5.1 of this report, there is a wetland within 100 m of the proposed discharge of sediment-laden water and operational-phase stormwater. In addition, earthworks will be undertaken approximately 10 m from this wetland.

I note that the wetland is located hydraulically up-gradient of the discharges arising from the development on site. Therefore, I consider that it is unlikely that the proposed activity including earthworks will affect the hydrological processes of the wetland. Based on this, the proposal is unlikely to affect the ecology and water quality of the wetland.

As noted in Section 4 of this report, [redacted] supports the recommendation made in the ecology report that a 10 metre setback from the wetland is marked out during works. I have recommended a condition stating that the applicant should not undertake works within 10 m of the wetland and that the ESCP shall define how the applicant proposes to separate the wetland from the area of works. I consider that it will ensure that no earthworks, vegetation clearance and vehicle movements occur within this area. This will ensure that the effects on the wetland are adequately managed.

Based on the expert advice received and provided the recommended conditions are adhered to, I consider the potential effect on the wetland from discharges during construction will be adequately mitigated.

5.6 Effects of operational-phase stormwater

With regards to existing onsite operational stormwater, there is a mixture of open channel and piped networks which ultimately drain to the Hutt City Council piped network at a culvert connection in the south-west corner of the site.

The proposed development will lead to urban intensification and increased imperviousness – if not managed properly, these changes could lead to an increase in contaminants becoming entrained in stormwater runoff and resultant adverse effects on the environment, as well as increased runoff from the site.

The applicant proposes to manage operational stormwater from the site in a number of ways, however this will ultimately discharge into the public stormwater system. The proposed design is as follows:

- It is proposed to fill in some of the sections of the open channels in the north-east and eastern parts of the site (to allow for residential use). Flow from these sections of open channel will be diverted to a new extensive piped stormwater network servicing the redeveloped site.

- Runoff from residential buildings will be directed to the piped network via individual lot connections.

- The new onsite network will discharge to the existing Hutt City Council piped network in the south-west corner of the site near the current connection.

- Downstream sections of the new piped network will be significantly oversized to provide detention and the controlled release of stormwater flows into the HCC network to match pre-development levels (up to 1% AEP peak runoff).

HCC consider the onsite detention system mitigates the effects of development (increased imperviousness) on peak flow for larger events. As such, affected party approval has been given?

Runoff from roads/carparks contain sediment, copper and zinc and a range of hydrocarbon compounds. Runoff from buildings can also contain copper and zinc originating from exposed materials used for building roofing, cladding etc. These contaminants can be harmful when discharged to aquatic receiving environments. Ideally, all stormwater runoff from these areas would receive treatment for contaminants before discharge.

The applicant proposes a raingarden (bio-retention device) as the primary stormwater treatment mitigation for the site. Stormwater flows from hardstanding areas is proposed to be conveyed via kerb and channel to the raingarden located in the south-west corner of the site. The raingarden will then discharge to the new piped network just upstream of the connection to the HCC network. The proposed raingarden will be used to provide an internal water storage volume to mitigate effects of changes in hydrology for low flow, high frequency events.

The applicant does not propose any treatment for stormwater runoff from buildings. However the applicant has stated that the buildings will not contain contaminant-generating materials.

[redacted] (the Urban Engineers) has assessed the applicant's proposal for operational stormwater discharge. He considers that:

- the adverse effects of stormwater discharges have been minimised to the smallest amount reasonably practicable; and

- the adverse effects of stormwater discharges are being managed at source and via the adoption of water sensitive urban design measures where reasonably practicable.

However he has also recommended a suite of conditions (as indicated above), to ensure there will be no more than minor effects on the environment from operational stormwater discharges.

I note that a residents association is proposed to own and maintain the private road and other common private infrastructure. Once works are completed, the operational stormwater consent should therefore be transferred to them.

Based on the expert advice received and provided the recommended conditions are adhered to, I consider the potential effect on the environment from operational stormwater discharges will be adequately mitigated.

5.7 Summary of effects

Given the assessment above, it is considered that the effects of the activity are, or will likely be no more than minor when undertaken in accordance with the recommended consent conditions.

6. Statutory assessment

6.1 Part 2

Part 2 of the Act outlines the purposes and principles of the Act. Section 5 defines its purpose as the promotion of the sustainable management of natural and physical resources. Sections 6, 7 and 8 of Part 2 define the matters a consent authority shall consider when achieving this purpose.

I am satisfied that the granting of the application is consistent with the purpose and principles in Part 2 of the Act.

6.2 Matters to be considered – Section 104-108AA

Section 104-108AA of the Act provides a statutory framework in which to consider resource consent applications. All relevant matters to be considered for this application are summarised in the table below:

As the application falls for consideration as a non-complying activity (under either operative plans or PNRP or both), pursuant to section 104D of the Act a 'gateway test' is required to be met before a decision on whether consent can be granted can be made. Section 104D prescribes that the consent authority may only proceed to the substantive assessment (s104), and make a decision on whether to grant a resource consent application for a non-complying activity, only if it is satisfied that either:

(a) the adverse effects of the activity on the environment will be minor; or

(b) the application is for an activity that will not be contrary to the objectives and policies of the operative Regional Freshwater Plan and the Proposed Natural Resources Plan (decisions version)

If the application cannot meet either of the gateway tests outlined above the consent application must be declined.

As per Section 5 of this report, the effects of the proposed activity have been assess as being no more than minor. The discharge of operational-phase stormwater and sediment-laden water will occur down-gradient to the wetland, and therefore, is unlikely to affect the hydraulics of the wetland.

The second gateway test under section 104D(b) of the Act is that a consent authority may only grant a resource consent for a non-complying activity only if it is satisfied that the application is for an activity that will not be contrary to the objectives and policies of both the relevant operative plans and proposed plan. I have undertaken an assessment of the proposal against the relevant provisions and policies in the relevant regional plans and PNRP. Overall, as discussed below, I consider the proposal to be generally consistent with the provisions and direction set out in these documents. Therefore, the activity also meets the second gateway test.

RMA section	Matter to consider	Comment
104(1)(a)	Actual or potential effects on environment	See Section 5 of this report.
104(1)(ab)	Measures to offset or compensate for adverse effects on the environment	The applicant has not proposed any measures to offset or compensate for adverse effects on the environment.
104(1)(b)(iii)	National Policy Statement for Freshwater Management 2014	The NPS-FM sets out objectives and policies that direct local government to manage fresh water through regional policy statements, regional plans and in the consideration of resource consent applications. The NPS-FM prioritises the concept of Te Mana o te Wai (the integrated and holistic well-being of a freshwater body). Te Mana o te Wai is a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It protects the mauri of the water and restores and preserves the balance between the water, the wider environment, and the community. The NPS-FM 2020 also sets out a hierarchy ('the objective') that prioritises:

RMA section	Matter to consider	Comment
		a. first, the health and well-being of water bodies and freshwater ecosystems; b. second, the health needs of people (such as drinking water); and c. third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future. The proposal is unlikely to affect the health and well-being of waterbodies and freshwater ecosystems. Further to this, it is unlikely to affect the health needs of people. Finally, the proposal will allow people and communities to provide for their social, economic and cultural well-being. Therefore, I consider that the proposal gives effect to the Objective and Policy 1 of the NPS-FM as freshwater will be managed in a way that gives effect to Te Mana o te Wai. In addition, the proposal is also consistent with Policy 15. I also note that the proposal will not result in any further loss to natural wetlands, and the setback to the wetland for this proposal will ensure it is consistent with Policy 6. Overall, I conclude that the proposal is consistent with the NPS-FM
104(1)(b)(v)	Regional Policy Statement	I consider that, with the application of the recommended conditions of consent, the proposed activity is consistent with the RPS.
	Objective/Policy	*Comment*
	Objective 12	This objective aims to ensure that the quality and quantity of freshwater meets a range of uses and values, supports the life supporting capacity of water bodies, and meets reasonable foreseeable needs of future generations. Given the nature of the proposed activities, the risk of any discharges to surface water are considered to be no more than minor.
	Policy 40	Policy 40 requires that aquatic ecosystem health in water bodies be maintained or enhanced. Given the proposed sediment controls and operational-phase stormwater system, the activity should not adversely affect aquatic ecosystem health.

RMA section	Matter to consider	Comment
	Policy 41	This policy aims to minimise the effects of earthworks and vegetation disturbance. The information provided by the applicant, coupled with the condition requiring the applicant to submit a final ECP will sufficiently mitigate the effect of sediment-laden runoff from site.
	Policy 48 and 49	The principles of the Treaty of Waitangi and matters of significance to tangata whenua have been recognised and provided for.
104(1)(b)(vi)	**Operative Regional Discharges to Land Plan**	I consider that, with the application of the recommended conditions of consent, the proposed activity is consistent with the Regional Discharges to Land Plan.
	Objective/Policy	*Comment*
	Objective 4.1.3	The adverse effects of discharges will be managed via appropriate works methodology and erosion and sediment control measures which in turn will ensure effects from the proposed discharges to land will be no more than minor.
	Policy 4.2.24A	I consider that, with the application of the recommended conditions of consent, the proposed activity is consistent with all aspects of this policy.
	Proposed Natural Resources Plan (decisions version)	I consider that, with the application of the recommended conditions of consent, the proposed activity is consistent with the Proposed Natural Resources Plan (decisions version).
	Objective/Policy	*Comment*
	Objective O3 & O4	The proposal recognises the mauri and intrinsic values of nearby freshwater. The life supporting capacity of freshwater will be safeguarded through the implementation of erosion and sediment controls to prevent discharges of sediment-laden water to the wetland.
	Objective O15	This objective relates to recognising kaitiakitanga. I consider that as the effects of the activity has been assessed as no more than minor that kaitiakitanga has been recognised.
	Objective O23 and O25	The proposal maintains the quality of water within, and safeguards the biodiversity, aquatic ecosystem health and mahinga kai associated with adjacent or nearby surface waterbodies.
	Objective O47	Erosion and sediment controls will be implemented on site to minimise soil erosion and sediment laden run-off

RMA section	Matter to consider	Comment
		entering adjacent or nearby surface waterbodies from earthworks.
	Objective 48	This objective relates to reducing the adverse quality and quantity effects of stormwater discharges over time. All the proposal does not necessarily reduce effects over time, it will not result in reduced discharge quality being discharged to the network. Therefore, is somewhat consistent with this policy.
	Policy P17 and P19	The mauri of freshwater and cultural relationship of Maori with water has been recognised.
	Policy P31	Policy P31 Aquatic ecosystem health will be maintained.
	Policy P67	The proposal seeks to minimise the discharges through the implementation of erosion and sediment controls.
	Policy P73	This policy relates to minimising adverse effects of stormwater discharges. I consider that the applicant has implementing water sensitive urban design in this development and by using good management practices. Therefore, I consider the proposal is consistent with this policy.
	Policy P79	Policy P73 relates to managing land use impacts on stormwater so that runoff volumes and peak flows do not increase the risk of inundation to property. Provided the recommended conditions are adhered to, I consider the proposal is consistent with these provisions.
104(1)(c)	Any other matter	There are no other matters relevant to this application.
105(1)	Matters relevant to discharge permits	I consider that the matters in s105 of the RMA have been given regard to. The method of discharge is most practical and the sensitivity of the environment has been considered.
107	Restrictions on grant of certain discharge permits	The discharge from the site should meet the requirements of section 107(1) and as such, should not result in any of the effects listed in this section of the Act after reasonable mixing. The proposed discharge will meet the requirements of section 107(2).
108 – 108AA	Conditions on resource consents	Standard conditions of consent for this activity type are recommended. All standard conditions of consent meet s108AA. Any additional conditions are outlined in Section 5 of this report

6.3 Weighting of the Proposed Natural Resources Plan

As the conclusion reached under the operative Regional Freshwater Plan assessment is consistent with that reached under the Proposed Natural Resources Plan there is no need to undertake a weighting exercise between the two Plans.

7. Main findings

In conclusion:

1. The proposed activity is consistent with the Purposes and Principles of the Resource Management Act 1991.

2. The proposed activity is consistent with the relevant objectives and policies of the National Policy Statement for Freshwater Management, the Regional Policy Statement and the Proposed Natural Resources Plan (decisions version).

3. The proposed activity is not contrary to the objectives and policies of the Operative Regional Discharges to Land Plan and the Proposed Natural Resources Plan (decisions version).

4. The actual or potential adverse effects of the proposed activity on the environment will be or are likely to be no more than minor.

5. Conditions of the consent(s) will ensure that the effects of the activity on the environment will be appropriately avoided, remedied or mitigated.

6. The proposal incorporates appropriate mitigation measures, to ensure the adverse effects are or are likely to be no more than minor.

8. Duration of consent

I have recommended a duration of 5 years for the construction-related works including earthworks and sediment-laden discharges and a duration of 35 years for the operational-phase stormwater consent and the diversion of water.

9. Monitoring

9.1 Monitoring schedule

The following compliance monitoring programme will be undertaken during the consent term:

Monitoring assessment:	☑ Annual	☐ Three-yearly	☐ Other:
Monitoring input:	☑ Audit	☑ Site inspection	☐ Other:

Other notes	Earthworks will be monitored. Management plans require approval for the operational-phase stormwater.
Compliance group	**Large earthworks**

9.2 Monitoring charges

Consent monitoring charges apply for the consent(s) approved. Charges are normally invoiced on an annual basis. Your consent monitoring charge is made up of three components:

1. **Customer service charge** – every consent incurs an annual charge of $70. This covers costs associated with the administration of your consent.

2. **Compliance monitoring charge** – the cost associated with our staff monitoring the compliance of your consent.

3. **State of the environment (SOE) charge** – a proportion of our science monitoring is paid by consent holders.

An estimate of your annual consent monitoring charge is provided below:

		Amount	Charge code(s)
Customer service charge	4 consent(s)	$280	
Monitoring charge	Variable	$-*	DL1
SOE charge	Earthworks	$900	5.3.5.1
	Operational stormwater	$500	4.3.4.3
Further notes (if applicable)			

*Variable charges will alter from year to year and are based on the actual and reasonable amount of time required to monitor your consent

The GWRC Resource Management Charging Policy is reviewed on an annual basis, and may alter these charges.

From: [redacted]
To: [redacted]@huttcity.govt.nz
Cc: Subdivision; Land Development; [redacted]
Subject: RM220475 - 106 Mohaka St - Resource Consent - WWL Assessment.
Attachments: image001.png

Hi [redacted]

Understanding and Background.
I understand the request below to relate to:

- Subdivision of Lot 53 and 54 (to be created under RM210328) to create 10 residential allotments with amalgamated parking spaces, access and shared recreation areas.
- Land Use for the construction of 10 residential units,
- S127 change of condition associated with RM210328.

I understand that Lots 53 and 54 have not yet been created – ie s224 for RM210328 has not yet been achieved.

WWL Assessment
RM210328 assumed 10 residential units would be constructed on Lots 53 and 54.

I do not have access to the final approved plans under RM210328 however overlay of the scheme plan for the 10 residential lots appears to match the previous approved scheme plan – does not change any boundaries. I would recommend checking this.

The servicing for these 10 residential lots was assessed under RM210328.

A site specific flood assessment was prepared for the site and FFL requirements for Lots 53 and 54 were assessed under RM210328. Condition 39 of RM210328 sets Finished Floor Levels (to the underside of the floor construction and / or timber joists) of 106.77. There is no information in the AEE or scheme plan provided to WWL regarding the site levels, finished floor levels. The applicant should be asked to confirm that there are no GL changes over those approved under RM210328 and that FFL's for the new buildings comply with condition 39 of RM210328.

As RM210328 has not been enacted all servicing conditions on RM210328 need to be transferred to RM220475 or a condition provided stating that s224 for RM220475 and Code of Compliance or Occupation of the LU cannot be achieved until s224 for RM210328 has been achieved.

Please let me know if you would like me to review the exact conditions.

Change of Conditions
The applicant is seeking to change condition 69 relating to building heights – WWL have no comment regarding this proposed change.

Sincerely

[redacted] | Associate Engineer
On Behalf of the Wellington Water Land Development Team

m [redacted]

From: Subdivision <Subdivision@huttcity.govt.nz>
Sent: Thursday, 16 February 2023 12:19 pm
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: RM220475 - 106 Mohaka St - WWL Comments Request

Hi [redacted]

Kindly please assist with three waters comments and flood assessment for the above resource consent.

Many thanks

Ngā Mihi | Kind regards,
[redacted]
Engineering Technician
Hutt City Council, 30 Laings Road, Lower Hutt 5040
W: www.huttcity.govt.nz

From: [redacted]
To:
Subject: RM210328 - 106 Mohaka Street - updated rpt & plans
Date: Tuesday, March 29, 2022 10:50:19 AM
Attachments: Untitled attachment 00025.png

Hopefully this works for you – updated report and plans

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]@huttcity.govt.nz>
Sent: Tuesday, 29 March 2022 10:48 am
To: [redacted]@huttcity.govt.nz>
Subject: [EXTERNAL] RM210328 - 106 Mohaka Street

[redacted] sent you a secure message

Access message

Hi [redacted]

Updated Infrastructure Report and Plans below. You should be able to simply forward this email to [redacted] and she'll be able to access the links.

Cheers,
[redacted]

Attachments expire on Sep 24, 2022

2 files

APPLICATION-Infrastructure Report.PDF, PLANS-Subdivision Civils Earthworks Plans.PDF

This message requires that you sign in to access the message and any file attachments.

From: [redacted]
To: [redacted]
Cc: [redacted]

Subject: RM210328 106 Mohaka - engineering assessment services comments
Date: Monday, May 9, 2022 11:17:35 AM
Attachments: image001.png
image002.png
image003.jpg
Untitled attachment 00176.png
EXTERNAL Your scan (Scan to My Email).msg

Hi Team

Notes on : Services

- Resolved 1.1m fall at MH downstream of Meremere intake by adding new MH in between to step main – max 0.5m. Note haven't checked MH sizes this will be a detailed design aspect.
- Pte shared SW in front of 23-27 moved to be under carparks to connect to new MH above
- I have sent off to WWL for confirmation re 4m access/easement between units 27 & 28 – but note will likely need the following:
  - Access is required 24/7, this will see need to remove carparks/ landscaping to achieve – this is a big one!
  - easements shown on lot 27, 28 and ROW
  - consent notice for the units 27 & 28 requiring, foundation design to RSWS
  - condition for accessway to be formed as part of civil works – sealed or possibly gabion blocks?
  - Consent notice 27 & 28 that accessway to remain 24/7 and no fencing to obscure
  - Condition that residents association, maintain accessway
  - Look at how we can stop people using as a carpark – bollards with WWL padlock?
- Detail D-421 to be updated to show accessway & overland flow path
- As previously noted services seem close to water ridermain – this is a detailed design aspect and will be conditioned to confirm clearances met at detailed design stage.

Cheers

[redacted]
Senior Engineer

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: M: W: www.huttcity.govt.nz

From: [redacted]
Sent: Monday, 9 May 2022 10:05 am
To: [redacted]@arassociates.co.nz>; [redacted]h [redacted]@arassociates.co.nz>; [redacted]@aprotean.co.nz>; [redacted] [redacted]@huttcity.govt.nz>
Cc: [redacted]@aprotean.co.nz>; [redacted] [redacted]@belgraviacapital.co.nz>; [redacted]@urbanedgeplanning.co.nz>; [redacted] [redacted]@arassociates.co.nz>; [redacted]@arassociates.co.nz>; [redacted] [redacted]@huttcity.govt.nz>; [redacted]@e2environmental.com>; [redacted]@wellingtonwater.co.nz>
Subject: RE: [EXTERNAL] RE: RM210328 106 Mohaka - engineering assessment

HI [redacted]

Thank you for the link and updated information. I have started looking through and have the following comments/queries on the WSUD ponding info:

Ponding cross-sections – see attached marked-up (scribbled on) plans

- Section C depth of ponding most of mountable kerb depth. Understood plan was to have full F&C here based on DWGS3.300. Presume k&c will have gaps for raingarden intake?? – please confirm
- Section D3 – dish channel at edge of carparking? Please confirm depth of flow being stepped into.
- Section D4 – as above
- Section D5 – raised chicane removed – noted in roading section H "traffic calming chicane enclosed by edge beams, tree pit or similar planting". If planting in place then detail will ned to be updated to allow for pit(?) – will this be flooded during events?? Has this been agreed with traffic engineer??
- Section E1 – as above
- Section E2 – what is the break in roadway indicated?
- Section E4 – should this not show a dish channel ??
- DWG S3-433 – seems double up of S3-432

Cheers
[redacted]

LEGEND

- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- NO BUILD ZONE
- AT GRADE FOOTPATH (PAVERS)
- PARKING BAY (EXPOSED AGGREGATE CONCRETE)
- FOOTPATH (COLORED CONCRETE)
- BRUSHED CONCRETE ROAD
- ASPHALT ROAD
- PROP. LIGHTING POLE
- KC — KC — STD. MOUNTABLE KERB AND CHANNEL
- MK — MK — STD. MOUNTABLE KERB
- DC — DC — STD. CARRIAGEWAY DISH CHANNEL
- TRAFFIC FLOW DIRECTION

NOTE:

1. ANY CONSTRUCTION WITHIN THE NO BUILD ZONE IS SUBJECT TO GWRC APPROVAL.
2. FOR PAVEMENT TREATMENT SPECIFICATIONS REFER TO LANDSCAPE PLANS BY URBAN EDGE PLANNING.

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: G:\Ar Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\Stage 3\P20-156-S3.300.dwg

Lot 3 DP 390769
Lot 9 DP 484841
Lot 8 DP 484841
Lot 2 DP 424343
Lot 1 DP 424343
LOT 300 DP562261
JOAL A
LOT 300 DP 562261
LOT 22 DP 562261
4 GUEST CARPARKS
ROAD A
ROAD B
ROAD C
ROAD D
ROAD E
Lot 19 DP 48700
Lot 22 DP 48701
Lot 23 DP 48701
Lot 24 DP 48701
Lot 25 DP 48701
Lot 26 DP 48701
Lot 27 DP 48701
Lot 28 DP 48701
Lot 29 DP 48701

access to 4m path

0 25m
A3 SCALE: 1:500

REV	DATE	AMENDMENT	DRAWN
D	26.04.22	ADDED SURFACE TREATMENTS	CM
C	17.12.21	ENGINEERING APPROVAL	CM
B	07.09.21	S92	CM
A	21.06.21	INITIAL ISSUE	CM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
CM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: PROPOSED ROADING PLAN

AR & ASSOCIATES
CIVIL | ENVIRONMENT | PLANNING
PO Box 65 576 Mairangi Bay, Auckland 0754
p. (09) 486 0774 f. (09) 486 0776 m. 0275 427 266
enquiries@arassociates.co.nz www.arassociates.co.nz

A1 SCALE	A3 SCALE
1:250	1:500
JOB No.	DWG No.	REVISION
P20-156	S3.300	D

PRINTED: 6/05/2022 5:08:09 pm

LEGEND

- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- NO BUILD ZONE
- 16.0 PROP MAJ CONTOUR
- 16.2 PROP MIN CONTOUR
- 16.0 EX MAJ CONTOUR
- 16.2 EX MIN CONTOUR
- EXTENT OF EW
- PROP SWMH
- PROP SW CP
- SW PROP PUB SW PIPE
- PROP PRIV SW PIPE
- PROP OLFP
- PROPOSED RAINGARDEN
- NO BUILD ZONE

NOTE:

ANY CONSTRUCTION WITHIN THE NO BUILD ZONE IS SUBJECT TO GWRC APPROVAL.

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: G:\Air Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG FILES\Stage 3\P20-156-S3.400.dwg

REV	DATE	AMENDMENT	DRAWN
H	06.05.22	NEW SWMH 2-1	CM
G	27.04.22	UPDATED RAIN GARDEN AREA.	CM
F	22.03.22	UPDATED SWMH1-1	CM
E	17.12.21	ENGINEERING APPROVAL	RM
D	2.12.21	RAINGARDEN UPDATE	RM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
CM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: PROPOSED DRAINAGE PLAN

AR & ASSOCIATES
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PO Box 65 576 Mairangi Bay, Auckland 0754
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ace

A1 SCALE	A3 SCALE
1:250	1:500

JOB No.	DWG No.	REVISION
P20-156	S3.400	H

A3 SCALE: 1:500

PRINTED: 6/05/2022 5:14:05 pm

LEGEND

- ABBUTALS
- ROAD RESERVE
- EX SITE BOUNDARY
- PROP.POWER
- PROP.OVERHEAD POWER
- PROP. PWR / PWR POLE
- PROP. LIGHTING POLE
- PROP. POWER DUCTING
- PROP. TELECOM
- PROP. TELECOM DUCTING
- PROP PUBLIC PE WTR PIPE
- PROP PRIVATE WTR PIPE
- PROP SLUICE VALVE
- PROP FIRE HYDRANT
- PROP WATER METER
- PROP WWMH
- PROP RODDING EYE
- PROP PUB WWPIPE
- PROP PRIV WWPIPE
- EX WWMH
- EX PUB WWPIPE
- PROP LPS WWPIPE
- PROP SWMH
- PROP SW CP
- PROP PUB SW PIPE
- PROP PRIV SW PIPE
- PROPOSED RAINGARDEN
- NO BUILD ZONE

NOTE:

REFER DRAWING 010 FOR GENERAL NOTES

CONSENT

WHEN PRINTING FROM PDF, REMEMBER TO SET PAGE SIZING TO 'ACTUAL SIZE' FOR CORRECT SCALE.

FILE PATH: G:\Av Civil Jobs Directory\2020\P20-156 - Mohaka Street, Wainuiomata\2 - CAD\01 Current DWG File\Stage 3\P20-156-S3.800.dwg

REV	DATE	AMENDMENT	DRAWN
B	26.04.22	ADDED MANIFOLD IN JOAL	RM
A	01.04.22	INITIAL ISSUE	CM

DESIGNED	ORIGIN DATE
CM	JUN 2021
DRAWN	CHECKED
CM	JL

CLIENT: MHV LTD

PROJECT: 106 MOHAKA STREET, WAINUIOMATA

TITLE: PROPOSED COORDINATION PLAN

AR & ASSOCIATES
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ace

A1 SCALE	A3 SCALE
1:250	1:500
JOB No.	DWG No.	REVISION
P20-156	S3.800	B

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