

Alissa Sluys

From: Geoff Heaps
Sent: Friday, 22 May 2020 3:42 PM
To: Stuart Savill
Cc: Sher Khan
Subject: FW: Kerikeri Land Ltd - APP.041707.01.01 - flooding effects
Attachments: HW NRC S92 Response.pdf; Revised Section 6.8 Changes Highlighted.pdf

Hi Stuart

Information received from Haigh Workman in response to Sher's comments.

Cheers

Geoff

From: Daniel Shao <daniel.shao@hainesplanning.co.nz>
Sent: Friday, 22 May 2020 2:08 PM
To: Geoff Heaps <Geoffh@nrc.govt.nz>
Cc: Michael Winch <Michael@haighworkman.co.nz>; John Papesch <JohnP@haighworkman.co.nz>
Subject: RE: Kerikeri Land Ltd - APP.041707.01.01 - flooding effects

Hi Geoff,

Please find **attached** Haigh Workman's response to the NRC's query regarding the flooding effects of the KLL development.

Haigh Workman have also identified a few typing errors in Section 6.8 of their Site Suitability Report. A revised Section 6.8 with the changes highlighted is **attached**. We will issue an updated version of the complete report before the application is notified.

Please do not hesitate to contact us if you wish to discuss or clarify anything.

Regards



DANIEL SHAO | PRINCIPAL

📞 Mobile 021 210 5855 | ☎ Phone 09 360 1182
✉ Address Level 12, 17 Albert Street, Auckland 1010
🌐 Website www.hainesplanning.co.nz

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From: Geoff Heaps <Geoffh@nrc.govt.nz>
Sent: Thursday, 23 April 2020 3:27 p.m.
To: Daniel Shao <daniel.shao@hainesplanning.co.nz>; Michael Winch <Michael@haighworkman.co.nz>
Cc: Elisha.O@stellarprojects.co.nz
Subject: Kerikeri Land Ltd - APP.041707.01.01 - flooding effects

Hi Daniel / Michael

Attached for your information are notes prepared by Sher Khan regarding his assessment of flooding effects for this development.

Ngā mihi

Geoff Heaps
Land Management Consents Officer
Northland Regional Council » Te Kaunihera ā rohe o Te Taitokerau

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From: Sher Khan <sherk@nrc.govt.nz>
Sent: Thursday, 23 April 2020 8:16 AM
To: Stuart Savill <Stuarts@nrc.govt.nz>; Joseph Camuso <josephc@nrc.govt.nz>
Cc: Geoff Heaps <Geoffh@nrc.govt.nz>
Subject: RE: Kerikeri assessment

Hi Stuart,
Please see my comments below highlighted in red text. Further explanation attached.

If anything needs clarification, we could discuss these in the afternoon (NZ)

Regards
Sher

From: Stuart Savill
Sent: Wednesday, April 15, 2020 1:56 AM

To: Sher Khan; Joseph Camuso
Cc: Geoff Heaps
Subject: RE: Kerikeri assessment

Hi Sher

Thanks for that. I was going to email you this morning to see how it was going!

If regard to your comments, are you able to provide a bit more clarification from a technical perspective, as we need to make sure that they can comply with the following permitted activated criteria in the Proposed Regional Plan:

the diversion and discharge does not cause or increase flooding of land on another property in a storm event of up to and including a 10 percent annual exceedance probability, or flooding of buildings on another property in a storm event of up to and including a one percent annual exceedance probability

I ask this because there will be a few parties against the development and the FNDC engineers are also not in favour of having no attenuation for stormwater.

So on the information you have, would you be able to say with a high degree of certainty that the discharge of stormwater from this development will not cause or result in:

- (a) flooding of land on another property in a storm event up to and including a 10 percent annual exceedance probability; or
- (b) flooding of buildings on another property in a storm event of up to and including a one percent annual exceedance probability.

Answer: No - The post-development scenario will have very minor effect for a 10yr ARI and larger events like 100year ARI. However, without attenuation, it will have adverse effects on downstream flooding for more frequent flood events like 1 to 2-year ARI.

If the answer is no to either of these questions, then we can seek additional information from the applicant on the potential adverse effects of the discharge and who would be affected by the discharge.

I appreciate you are a busy man, so just need enough so that we can advise applicant either way. Can always get more detail from you at a later date.

If you will struggle doing this in next few days, just let me know so I can advise the applicant of where we are at as they will be asking this question soon no doubt.

Ngā mihi

Stuart Savill
Consents Manager
Northland Regional Council » Te Kaunihera ā rohe o Te Taitokerau
Phone 09 470 1210 ext 9101



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From: Sher Khan <sherk@nrc.govt.nz>
Sent: Wednesday, 15 April 2020 7:20 am
To: Stuart Savill <StuartS@nrc.govt.nz>; Joseph Camuso <josephc@nrc.govt.nz>
Cc: Geoff Heaps <Geoffh@nrc.govt.nz>
Subject: Re: Kerikeri assessment

Hi Stuart,

Haig Workman approach looks quite sensible for this particular site. Attenuation of stormwater will pose a risk of increased downstream flooding by adding the two peaks (stormwater hydrograph peak from the site+ flood hydrograph peak from the stream).

The developed site is small compared to the overall catchment of the Wairoa stream. The site will drain quickly and well before the flood peak in the stream and will only affect the early part of the flood hydrograph. For larger events like 100ye+cc, the effect of stormwater flows from the site on the flood peak will be very minor.

However, a small increase in the discharge from the site could have adverse effects for those properties that are at flood risk in a 1 to 2-year ARI flood events.

Regards
Sher

From: Stuart Savill <StuartS@nrc.govt.nz>
Sent: Monday, 30 March 2020 4:31 PM
To: Joseph Camuso <josephc@nrc.govt.nz>; Sher Khan <sherk@nrc.govt.nz>
Cc: Geoff Heaps <Geoffh@nrc.govt.nz>
Subject: RE: Kerikeri assessment

Thanks Joe and hi Sher. Hope all going well for you over there.

If you have capacity Sher, I would like the Haigh report on flooding for the full development of the retirement village at Hall Road, Kerikeri, assessed. Haigh have not proposed any attenuation and are looking to discharge stormwater straight off site so as to avoid peak flows from upper catchment. In theory sounds sensible, but it will be heavily scrutinised by FNDC and public, and will be push back if assessment not sound. One scenario that does come to mind is storm event (100 year event) during high tides. However, undeveloped site likely to be saturated during such an event with little natural attenuation occurring.

Let me know if all good to look at flood report and I will get it put onto one drive for you to pick up. All chargeable time. Also we need to make a decision on whether we require any additional info by Tuesday 14, April. So, if possible if you could do assessment by end of Thursday next week, that would be appreciated, as Easter here that weekend.

Ngā mihi

Stuart Savill

Consents Manager

Northland Regional Council » Te Kaunihera ā rohe o Te Taitokerau

Phone 09 470 1210 ext 9101



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From: Joseph Camuso <josephc@nrc.govt.nz>

Sent: Monday, 30 March 2020 4:06 pm

To: Stuart Savill <StuartS@nrc.govt.nz>

Cc: Sher Khan <sherk@nrc.govt.nz>

Subject: RE: Kerikeri assessment

Hi Stu;

Yes we are fine and settled at home, have not left the property since Monday after work. Just like being at sea...

Sher is back on deck, but working from Pakistan, he did not get out before the lockdown.

He should have access to most files, Ian P. is working on any software he needs.

Ngā mihi

Joseph Camuso

Rivers and Natural Hazards Manager

M: 0274-384-639



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From: Stuart Savill <StuartS@nrc.govt.nz>
Sent: Monday, 30 March 2020 3:54 PM
To: Joseph Camuso <josephc@nrc.govt.nz>
Subject: Sher Khan

Hi Joe

How's lockdown going for you? All sorted and got routine in place. You bound to have plenty of stuff to keep you busy in the short term, like myself.

Reason for email is Sher Khan and availability to do some work re assessing effects on flooding at Kerikeri? Did Sher come back early or is stuck in Pakistan?

Ngā mihi

Stuart Savill
Consents Manager
Northland Regional Council » Te Kaunihera ā rohe o Te Taitokerau
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18 282

22 May 2020

Northland Regional Council

Attention Geoff Heaps

Email: GeoffH@nrc.govt.nz

RESOURCE CONSENT APP.041707.01.01 KERIKERI LAND LTD

KERIKERI RETIREMENT VILLAGE, STORMWATER DISCHARGE

Reference your email of 23 April 2020 enclosing comments by NRC hydrologist Sher Khan (refer Appendix A).

We note that the NRC hydrologist generally agrees with our policy of avoiding adding to peak flows in the Wairoa Stream and tributary. It seems that he is concerned about the effects of increased flows from the site when there is low to moderate flow in the Wairoa Stream or tributary.

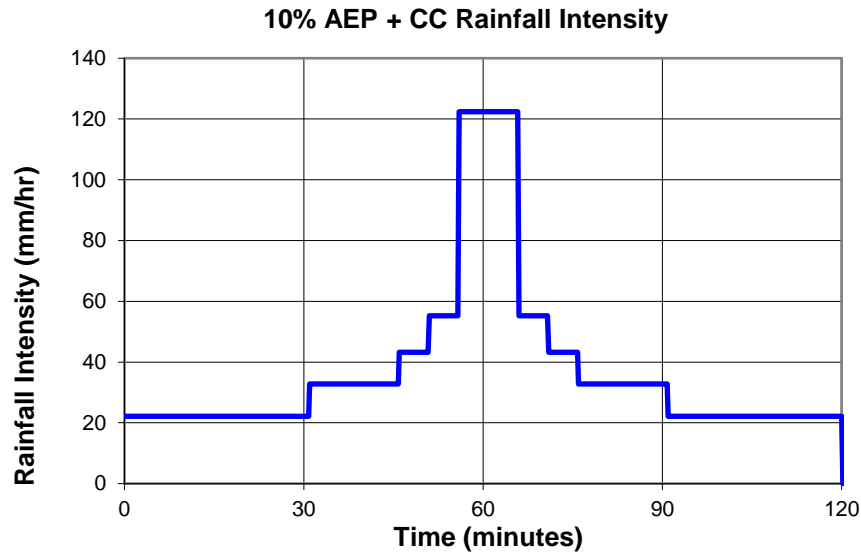
Attenuation

As discussed in 6.7 of the Haigh Workman Site Suitability Report Arvida Retirement Village – Masterplan dated March 2020 (the Report), stormwater runoff from the majority of the built environment will drain to five stormwater treatment wetlands (ponds) before discharging to the Wairoa Stream. As discussed in Section 6.7.3, the ponds provide only minor attenuation, and to avoid adding to peak flows in the Wairoa Stream, have been designed deliberately not to prolong the discharge.

The ponds have been designed as bioretention wetlands in accordance with Auckland Council GD01 Section C3. Some stormwater attenuation is achieved through a combination of soakage and detention. In low intensity rainfall events, most stormwater soaks into the subsoil. In higher intensity rainfall events, stormwater discharges into the Wairoa Stream.

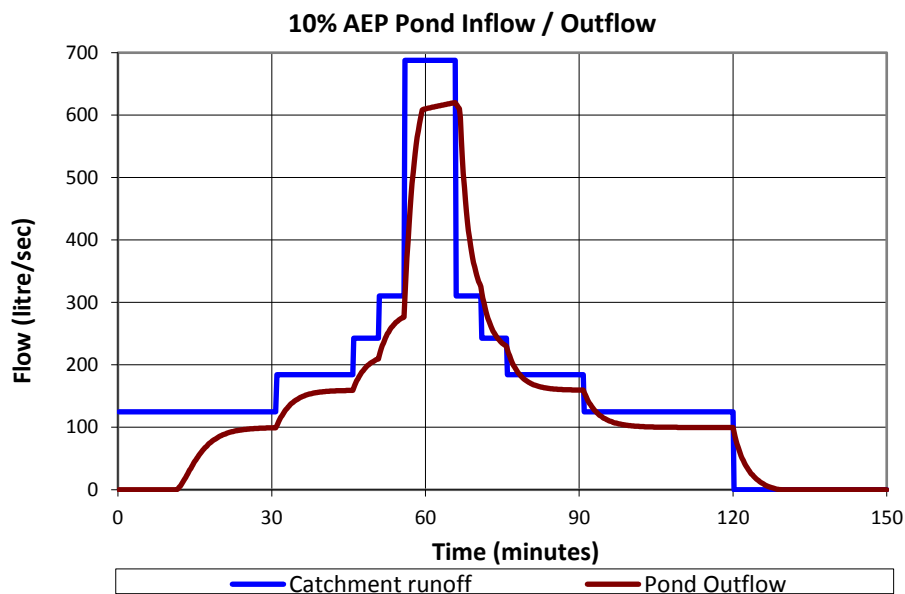
The stormwater treatment wetlands (ponds) will be located in the 10% and 1% AEP MPD +CC flood hazard zones as mapped by NRC. At peak stream flood level, the ponds will be submerged by flood water and therefore will provide no attenuation at that stage. This is not critical because peak discharge from the Retirement Village site does not occur at times of peak stream flow.

The table in Section 6.7.3 summarises the results of modelling a local, high intensity rainfall event when the water level in the Wairoa Stream is below the pond outlet level. A hyetograph was developed to include peak 10, 20, 30, 60 and 120 minute duration rainfall depths for the 10% AEP + CC rainfall event as illustrated below:



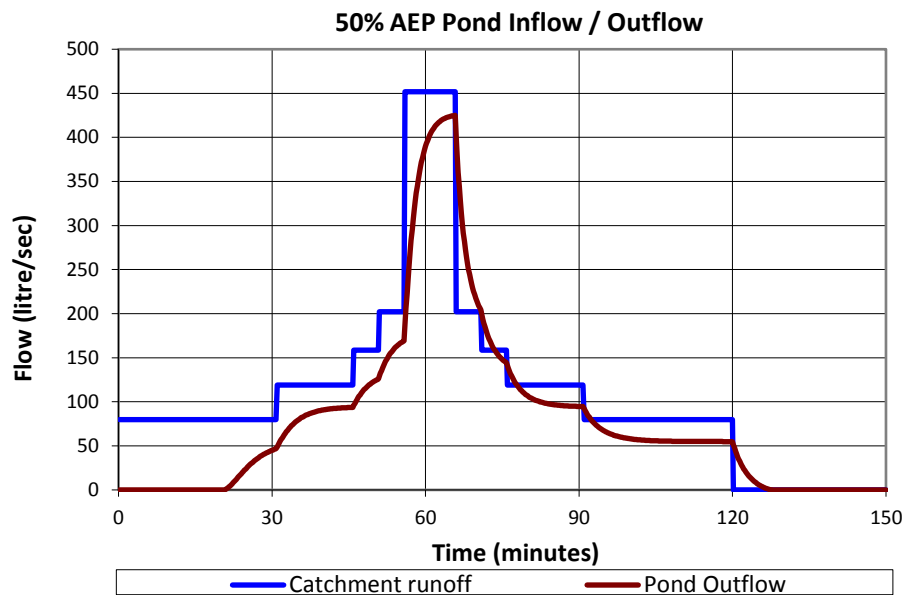
Stormwater runoff has been calculated using the Rational method. A soakage rate of 200mm/h has been assumed in the model.

Stormwater attenuation achieved through soakage and detention in a 10% AEP + CC rainfall event for a typical pond (Pond 3) is shown graphically below:



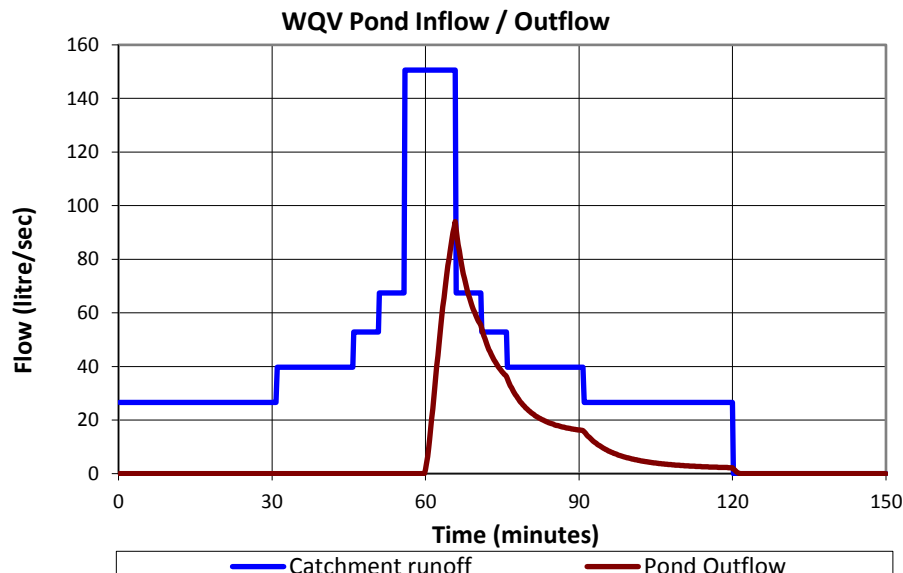
It can be seen that in a 10% AEP rainfall event, peak runoff is reduced by around 10%, but there is little delay in the discharge.

Attenuation provided by the ponds during a 50% AEP (2 year ARI) rainfall event is also minor.



Attenuation provided by the ponds will be much greater in frequent, lower intensity rainfall events because a larger proportion of runoff is able to soak into the subsoil below the pond. One third of the existing 2 year ARI flow is the flow adopted by Auckland Council GD01 and TP10 for controlling erosion and sedimentation and is termed the water quality volume (WQV). It accommodates 95% of rainfall events, but excludes extreme rainfall events (10 and 100 year ARI).

In the modelled WQV rainfall event, peak discharge is reduced by almost 40% and the total quantity of stormwater discharged is reduced considerably as illustrated below:



As noted in Section 6.7.3 of the Report, the existing pond upstream of the new 1800mm diameter culvert on the Hall Road access provides only minor attenuation of stormwater runoff from the site. However, and more importantly, it does not delay the release of stormwater to the stage where it may affect peak flows in the tributary.

Effect on Wairoa Stream and Tributary

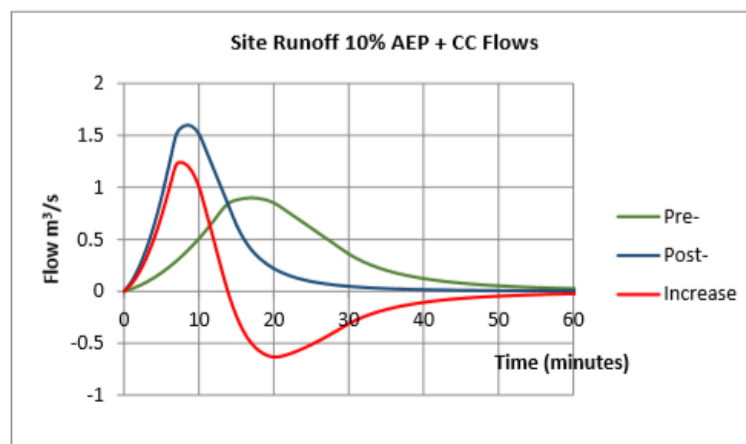
In Section 6.7.3 of the Report, increases in stormwater runoff from the site have been calculated for the 10% AEP + CC rainfall intensity of 122mm/hr. Peak flood flows in the Wairoa Stream and tributary for the 10% AEP + CC rainfall event are identified in Section 6.8 of the Report. These can be compared as follows.

Table 1

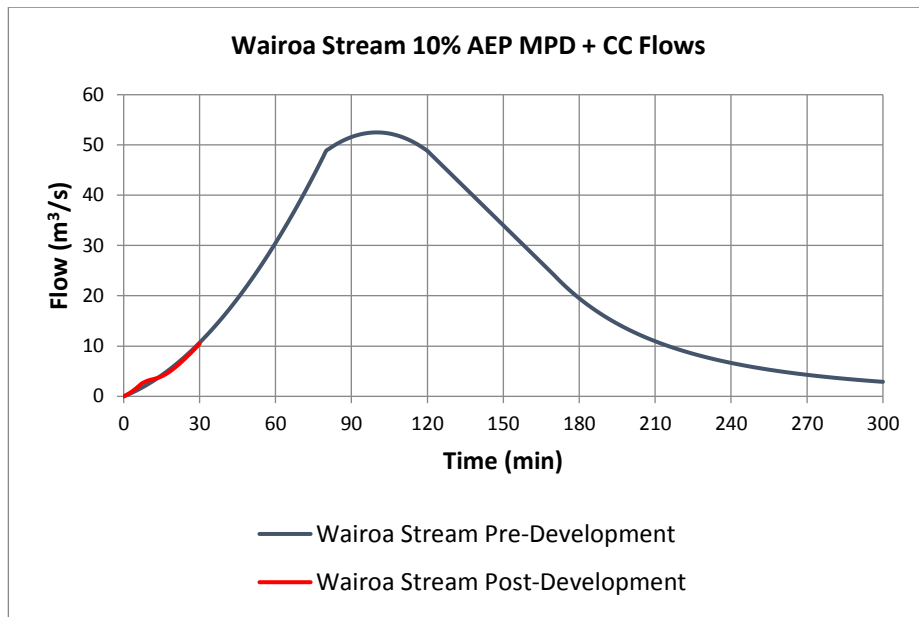
Stream	Wairoa Stream upstream of Tributary	Access Tributary	Combined Tributary	Wairoa Stream downstream of Tributary
Site Catchment	1 to 4	6 to 14	5 to 14	Total
Site Pre-development Runoff	0.68 m ³ /s	0.28 m ³ /s	0.37 m ³ /s	1.05 m ³ /s
Site Post Development Runoff	1.60 m ³ /s	0.68 m ³ /s	0.90 m ³ /s	2.69 m ³ /s
Increased Runoff	0.92 m ³ /s	0.40 m ³ /s	0.53 m ³ /s	1.64 m ³ /s
Peak Flood Flow in Stream (10% AEP MPD + CC)	52.5 m ³ /s	6.0 m ³ /s	10.7 m ³ /s	63 m ³ /s

Note: Wairoa Stream flows in the table in Section 6.8.1 of the Report are incorrect and the table headings in 6.8.2 and 6.8.3 of the Report are also incorrect. A revised Report will be issued prior to notification of the application; the amended text for Section 6.8 of the Report is included in Appendix B of this letter for your information.

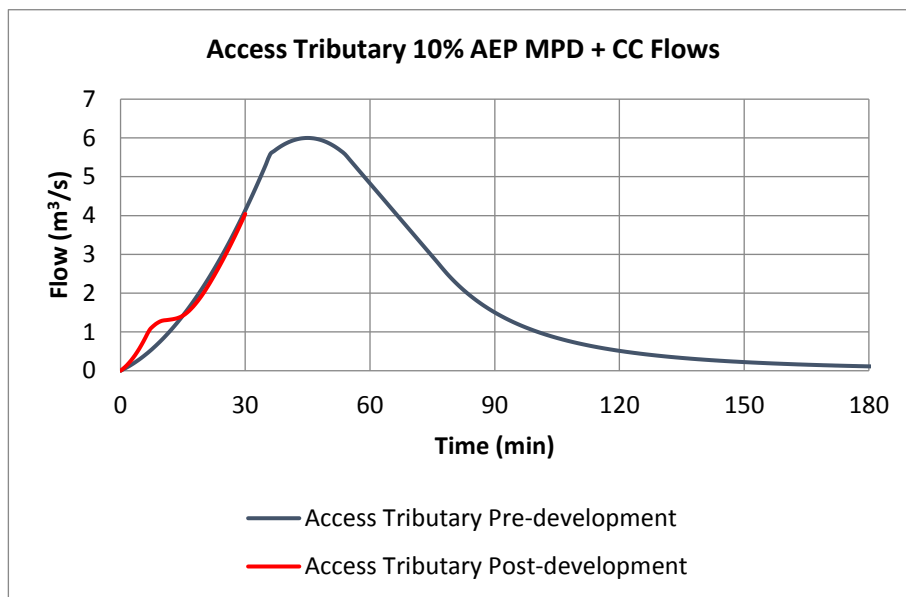
As discussed in Section 6.8 of the Report, changes to site runoff occur well before peak stream flows and does not add to peak flows. Increased stormwater runoff from the site as a result of the proposed development has been plotted against time (following commencement of peak rainfall) in Section 6.8.1 of the Report.



The effect of the increased site runoff to the Wairoa Stream upstream of the tributary junction for the 10% AEP + CC rainfall event is illustrated below:



Similarly, the effect of the increased site runoff to the Access Tributary for the 10% AEP + CC rainfall event is illustrated below:



In each case, the changes to stream flow are minor and occur at the early stages of a flood event so do not add to peak flow.

The above analysis has been carried out for a spatially uniform 10% AEP + CC rainfall event. The same effects occur with a 50% AEP or 1% AEP rainfall event: if the rainfall event is spatially uniform or tracks from east to west, the changes to stream flow are minor and occur at the early stages of a flood event so do not add to peak flow.

While the increase is a greater percentage of the stream flow at the early stages of a major rainfall event, the total stream flow including the increased site runoff is still low. The percentage increase is greatest in the Access Tributary upstream of Mill Lane.

Flood flows in the Access Tributary for the MPD + CC scenario are calculated as follows:

Table 2

Frequency	50% AEP	10% AEP	1% AEP
Peak Flow	2.8 m ³ /s	6.0 m ³ /s	11.0 m ³ /s

As shown in Table 1, a local 10% AEP storm event would increase runoff from the site to the Access Tributary by 0.4 m³/s. If this occurred at the same time as the peak 50% AEP flow in the Access Tributary, the stream flow would increase from 2.8 m³/s to 3.2 m³/s. The probability of the two peaks coinciding is low (less than 10% AEP), but the effect in the tributary is similar to a common (40% AEP) flood flow and can therefore be considered minor.

Flood flows in the Wairoa Stream upstream of the tributary for the MPD + CC scenario are calculated as follows:

Table 3

Frequency	50% AEP	10% AEP	1% AEP
Peak Flow	24 m ³ /s	52.5 m ³ /s	99 m ³ /s

As shown in Table 1, a local 10% AEP storm event would increase runoff from the site to the Wairoa Stream by 1.1 m³/s. If this occurred at the same time as the peak 50% AEP flow in the Wairoa Stream, the stream flow would increase from 24 m³/s to 25 m³/s. The probability of the two peaks coinciding is low (less than 10% AEP), but the effect in the stream is negligible.

Adversely Affected Properties

NRC flood maps show the extent of flooding for the 10% AEP and 1% AEP for the maximum probable development + climate change scenario (MPD + CC). Properties affected by flooding during these events have been identified in Section 6.1.3 of the Report. It is understood that all buildings on properties affected by flooding have floor levels above the 1% AEP flood level.

The extent of flooding during a 50% AEP (2 year ARI) flood event has not been mapped. The 50% AEP stream flows are less than half the 10% AEP flows and the extent of flooding would be correspondingly reduced.

Two properties on the Tributary downstream of the new 1800 culvert on the Hall Road access are subject to frequent flooding (refer letter of 2 September 2019 in relation to the resource consent for the 1800 culvert). These are:

- Lot 1 DP 435929 owned by the Applicant, Kerikeri Land Ltd
- Lot 2 DP 164771 owned by Leslie Franks and Josephine Johns (Franks' property)

Access to the Frank's property is restricted by flooding of the Tributary. As part of the approval for the 1800 culvert, Kerikeri Land Ltd offered to duplicate the culvert on the Frank's property access. This work has been completed and the culvert capacity before overtopping the access is now more than doubled. The culvert duplication more than compensates for any increase in flows in the tributary resulting from the development.

The proposed stormwater management has been designed to ensure that peak flows in the Wairoa Stream or tributary do not increase. As such, no properties will be adversely affected by changes to stormwater runoff from the site.

Haigh Workman Ltd

Per

A handwritten signature in blue ink, appearing to read 'M Winch', is positioned above the name Michael Winch.

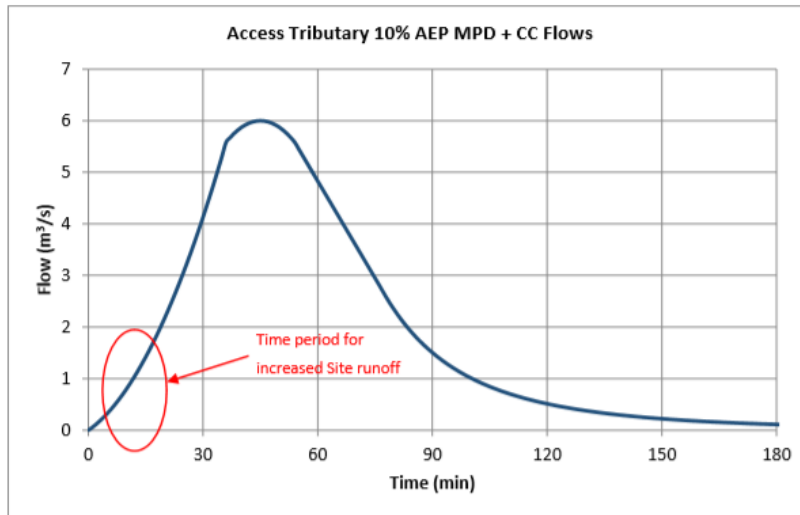
Michael Winch

Enclosed: Appendix A: NRC Hydrologist Comments on Haigh Workman report
 Appendix B: Revised Haigh Workman Site Suitability Report Arvida Retirement Village –
 Masterplan dated May 2020 Section 6.8

Appendix A: NRC Hydrologist Comments on Haigh Workman report

The post-development scenario will have very minor effect on the flood peaks in the streams for a 10yr ARI and larger events (100year ARI). However, without attenuation, it could have adverse effects on downstream flooding for more frequent events (1 to 2-year ARI). There is no evidence in the report to justify that the more frequent events will not exacerbate the downstream flooding. Without attenuation, it could result in increased flood depth and duration for those properties that are at flood risk for more frequent events.

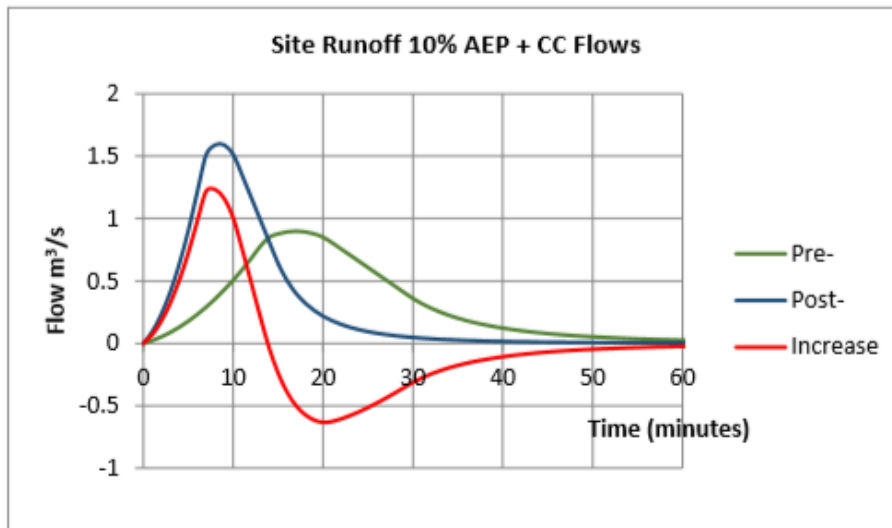
For example, Looking at the following hydrograph from the report, it suggests that the discharge from the site will only affect the early part of the flood hydrograph with very minor effects on the river flood peak but for smaller events where the river flood peak will be low enough, the effect of the storm water discharge from the site will be more obvious.



Suggestions:

1. Provide some attenuation to bring the post-development discharge hydrographs from the site to be closer to pre-development scenario but also make sure the peaks do not coincide with the flood peak in the river.

Some attenuation (approximately 10 minutes) could bring the post-development discharge hydrograph to match pre-development discharge hydrograph from the site as per the below graphs from the report.



2. Provide evidence in the report that the discharge from the site get reasonable attenuation for more frequent events where river flood peaks are lower enough to be effected by the discharge from the site.
3. Identify properties that could be adversely affected if any, and get property owners consent or mitigate the flooding on those properties.

Appendix B:

**Revised Haigh Workman Site Suitability Report
Arvida Retirement Village – Masterplan
May 2020**

Section 6.8

6.8 Downstream Effects

6.8.1 Wairoa Stream

As noted in Section 6.1.2 above, the Wairoa Stream has a catchment area of 6.0 km² upstream of the Arvida Site.

Peak flood flows in the Wairoa Stream upstream of the tributaries have been modelled by Northland Regional Council for both 10% and 1% Maximum Probable Development (MPD) + Climate Change (CC) events. Catchments 1 to 4 drain directly to the Wairoa Stream. Peak runoff from Catchments 1 to 4 for the 10% AEP + CC rainfall event has been calculated in Section 6.6 above. Using the Rational method, peak site runoff for the 1% AEP + CC rainfall event is 1.5 times the 10% AEP + CC runoff.

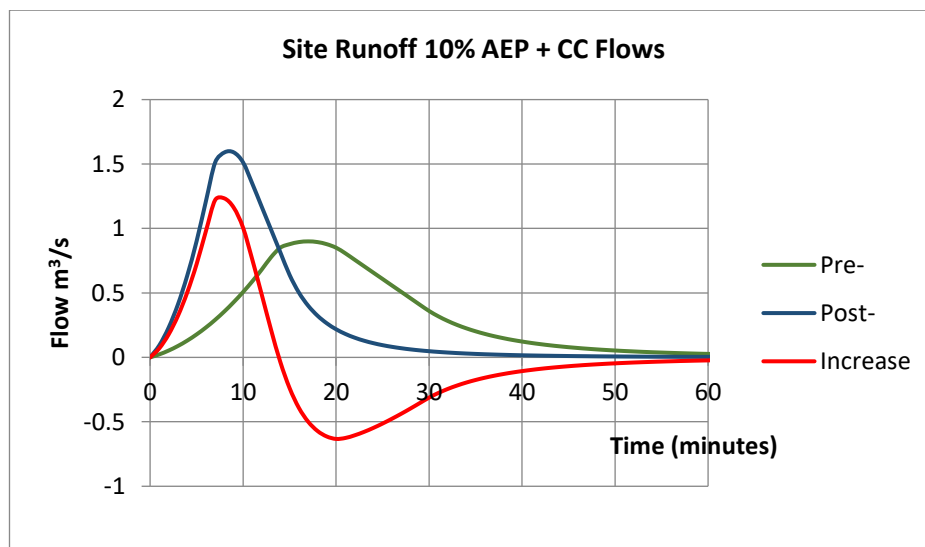
The following table compares increased peak runoff from the site with peak flows in the Wairoa Stream upstream of the tributary junction:

Rainfall Event	Wairoa Stream Peak Flood Flow	Post-development Site Runoff	Increased Site Runoff
10% AEP MPD + CC	52.5 m ³ /s	1.6 m ³ /s	0.9 m ³ /s
1% AEP MPD + CC	99 m ³ /s	2.4 m ³ /s	1.4 m ³ /s

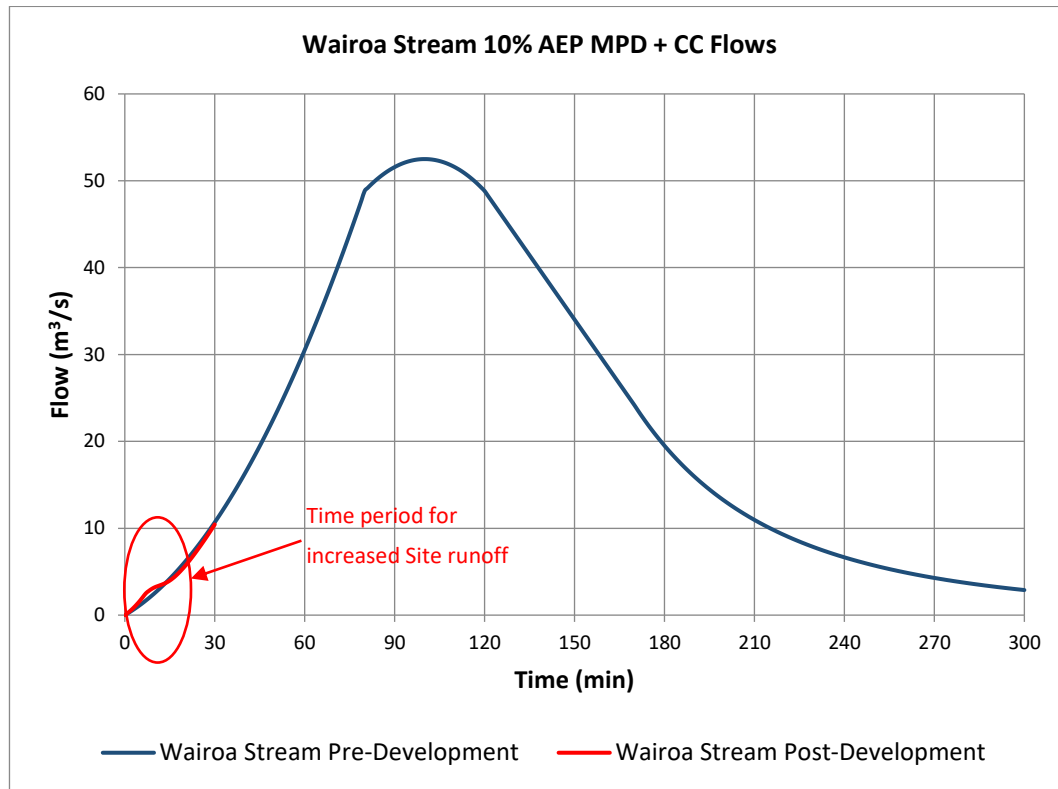
The increases in peak runoff from the Site as a result of the development are very small in comparison to the peak flood flows in the Wairoa Stream.

In a spatially uniform rainfall event with a single peak, the increase in runoff from the Site will not coincide with the peak tributary flow because the two catchments have considerably different times of concentration (time to peak flow at the Site after a rainfall burst in the catchment = 10 minutes for the Site, compared with approximately 1.5 hour in the Wairoa Stream).

Typical Pre- and Post-development runoff hydrographs for the Site can be illustrated as follows:



In comparison, flood flows in the Wairoa Stream for the 10% AEP flood event can be modelled as a TP108 hydrograph as follows:



It can be seen from the graph that the increase in runoff from the site at the early stage of flood flows in the Wairoa Stream will have no effect on peak flows in the stream.

6.8.2 Access Tributary

The 'Access Tributary' has a catchment area of 80.8ha upstream of the Retirement Village access road. Catchments 6 to 14 drain to the 'Access Tributary'.

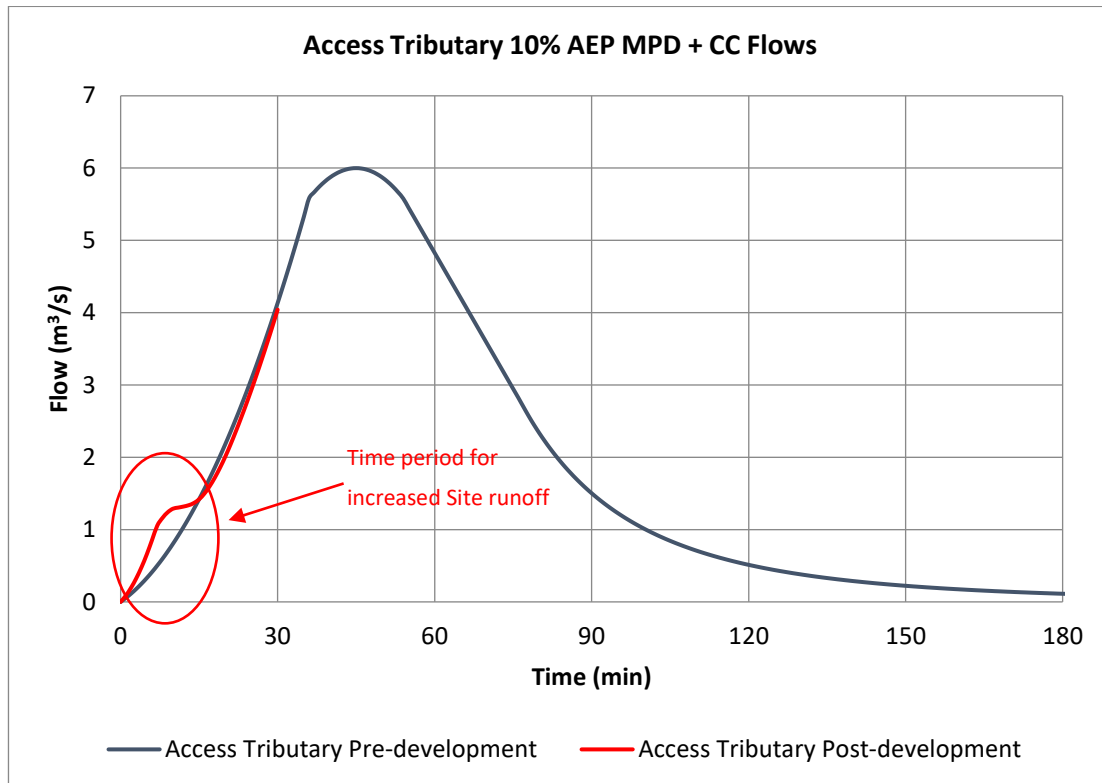
The following table compares increased peak runoff from the site with peak flows in the 'Access Tributary' upstream of the site access:

Rainfall Event	Access Tributary Peak Flood Flow	Post-development Site Runoff	Increased Site Runoff
10% AEP MPD + CC	6.0 m ³ /s	0.7 m ³ /s	0.4 m ³ /s
1% AEP MPD + CC	11.0 m ³ /s	1.0 m ³ /s	0.6 m ³ /s

The increases in peak runoff from the Site as a result of the development are small in comparison to the peak flood flows in the tributary.

In a spatially uniform rainfall event with a single peak, the increase in runoff from the Site will not coincide with the peak tributary flow because the two catchments have considerably different times of concentration (time to peak flow at the Site after a rainfall burst in the catchment = 10 minutes for the Site, compared with approximately 45 minutes in the Tributary).

Flood flows in the 'Access Tributary' for the 10% AEP flood event can be modelled as a TP108 hydrograph as follows:



It can be seen from the graph that the increase in runoff from the site at the early stage of flood flows in the Tributary will have no effect on peak flows in the stream.

6.8.3 Combined Tributary

The 'Access Tributary' and 'Hall Road Tributary' combine at Mill Lane, 255m upstream of the Wairoa Stream junction. The combined catchment area is 110 ha. Catchments 5 to 14 drain to the combined tributary.

The following table compares increased peak runoff from the site with peak flows in the 'Combined Tributary' upstream of the Wairoa Stream junction:

Rainfall Event	Combined Tributary Peak Flood Flow	Post-development Site Runoff	Increased Site Runoff
10% AEP MPD + CC	10.7 m ³ /s	0.9 m ³ /s	0.5 m ³ /s
1% AEP MPD + CC	18.8 m ³ /s	1.3 m ³ /s	0.8 m ³ /s

The 'Combined Tributary' has a similar time of concentration to the 'Access tributary'. It can be seen from the graph in Section 6.8.2 that the increase in runoff from the site at the early stage of flood flows in the Tributary will have no effect on peak flows in the stream.

6.8.4 Other Rainfall Distributions

Stormwater attenuation is often implemented to avoid an increase in peak flows from a site. Peak stormwater runoff is detained and released slowly over a period of time, typically up to 1 to 2 hours. It can be seen from the graphs that the increase in peak flows from the Retirement Village Site in a spatially uniform rainfall event with a single peak occurs well before the peak flow in the Wairoa Stream and tributary and will not add to the Wairoa Stream or tributary peak flows. In this case, detaining stormwater and releasing it later is likely to result in

increased flows downstream closer to the time of the peak flow in the Wairoa Stream, and thus increase peak flooding in a spatially uniform rainfall event.

If a second peak in rainfall occurs at the Site coinciding with the peak stream flow, the peaks would be additive. However, the probability of two independent 10% AEP events occurring at the same time is low (1% AEP) and the combined 10% AEP flood flows are considerably lower than the modelled 1% AEP flood flow. In addition, high rainfall intensities in Northland are generally associated with ex tropical cyclones which track from east to west. As such, peak flows in the river will tend to be later than the calculated time of concentration as the weather system moves upstream.

In the extremely unlikely event that peak flows were additive, an increase of 1.4% in Wairoa Stream flood flows would have no observable effect on flood levels.

The above analysis has been carried out for a spatially uniform 10% AEP + CC rainfall event. The same effects occur with a 50% AEP or 1% AEP rainfall event: if the rainfall event is spatially uniform or tracks from east to west, the changes to stream flow are minor and occur at the early stages of a flood event so do not add to peak flow. Stormwater attenuation is not necessary and could increase downstream flooding.

We recommend that stormwater from the site be discharged with only minor attenuation to avoid exacerbating downstream flooding.

Alissa Sluys

From: Sher Khan
Sent: Thursday, 23 April 2020 8:16 AM
To: Stuart Savill; Joseph Camuso
Cc: Geoff Heaps
Subject: RE: Kerikeri assessment
Attachments: Note 02.docx

Hi Stuart,

Please see my comments below highlighted in red text. Further explanation attached.

If anything needs clarification, we could discuss these in the afternoon (NZ)

Regards

Sher

From: Stuart Savill
Sent: Wednesday, April 15, 2020 1:56 AM
To: Sher Khan; Joseph Camuso
Cc: Geoff Heaps
Subject: RE: Kerikeri assessment

Hi Sher

Thanks for that. I was going to email you this morning to see how it was going!

If regard to your comments, are you able to provide a bit more clarification from a technical perspective, as we need to make sure that they can comply with the following permitted activated criteria in the Proposed Regional Plan:

the diversion and discharge does not cause or increase flooding of land on another property in a storm event of up to and including a 10 percent annual exceedance probability, or flooding of buildings on another property in a storm event of up to and including a one percent annual exceedance probability

I ask this because there will be a few parties against the development and the FNDC engineers are also not in favour of having no attenuation for stormwater.

So on the information you have, would you be able to say with a high degree of certainty that the discharge of stormwater from this development will not cause or result in:

- (a) flooding of land on another property in a storm event up to and including a 10 percent annual exceedance probability; or
- (b) flooding of buildings on another property in a storm event of up to and including a one percent annual exceedance probability.

Answer: No - The post-development scenario will have very minor effect for a 10yr ARI and larger events like 100year ARI. However, without attenuation, it will have adverse effects on downstream flooding for more frequent flood events like 1 to 2-year ARI.

If the answer is no to either of these questions, then we can seek additional information from the applicant on the potential adverse effects of the discharge and who would be affected by the discharge.

I appreciate you are a busy man, so just need enough so that we can advise applicant either way. Can always get more detail from you at a later date.

If you will struggle doing this in next few days, just let me know so I can advise the applicant of where we are at as they will be asking this question soon no doubt.

Ngā mihi

Stuart Savill

Consents Manager

Northland Regional Council » Te Kaunihera ā rohe o Te Taitokerau

Phone 09 470 1210 ext 9101



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From: Sher Khan <sherk@nrc.govt.nz>

Sent: Wednesday, 15 April 2020 7:20 am

To: Stuart Savill <StuartS@nrc.govt.nz>; Joseph Camuso <josephc@nrc.govt.nz>

Cc: Geoff Heaps <Geoffh@nrc.govt.nz>

Subject: Re: Kerikeri assessment

Hi Stuart,

Haig Workman approach looks quite sensible for this particular site. Attenuation of stormwater will pose a risk of increased downstream flooding by adding the two peaks (stormwater hydrograph peak from the site+ flood hydrograph peak from the stream).

The developed site is small compared to the overall catchment of the Wairoa stream. The site will drain quickly and well before the flood peak in the stream and will only affect the early part of the flood hydrograph. For larger events like 100ye+cc, the effect of stormwater flows from the site on the flood peak will be very minor.

However, a small increase in the discharge from the site could have adverse effects for those properties that are at flood risk in a 1 to 2-year ARI flood events.

Regards

Sher

From: Stuart Savill <StuartS@nrc.govt.nz>

Sent: Monday, 30 March 2020 4:31 PM

To: Joseph Camuso <josephc@nrc.govt.nz>; Sher Khan <sherk@nrc.govt.nz>

Cc: Geoff Heaps <Geoffh@nrc.govt.nz>

Subject: RE: Kerikeri assessment

Thanks Joe and hi Sher. Hope all going well for you over there.

If you have capacity Sher, I would like the Haigh report on flooding for the full development of the retirement village at Hall Road, Kerikeri, assessed. Haigh have not proposed any attenuation and are looking to discharge stormwater straight off site so as to avoid peak flows from upper catchment. In theory sounds sensible, but it will be heavily scrutinised by FNDC and public, and will be push back if assessment not sound. One scenario that does come to mind is storm event (100 year event) during high tides. However, undeveloped site likely to be saturated during such an event with little natural attenuation occurring.

Let me know if all good to look at flood report and I will get it put onto one drive for you to pick up. All chargeable time. Also we need to make a decision on whether we require any additional info by Tuesday 14, April. So, if possible if you could do assessment by end of Thursday next week, that would be appreciated, as Easter here that weekend.

Ngā mihi

Stuart Savill

Consents Manager

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From: Joseph Camuso <josephc@nrc.govt.nz>

Sent: Monday, 30 March 2020 4:06 pm

To: Stuart Savill <StuartS@nrc.govt.nz>

Cc: Sher Khan <sherk@nrc.govt.nz>

Subject: RE: Kerikeri assessment

Hi Stu;

Yes we are fine and settled at home, have not left the property since Monday after work. Just like being at sea...

Sher is back on deck, but working from Pakistan, he did not get out before the lockdown.

He should have access to most files, Ian P. is working on any software he needs.

Ngā mihi

Joseph Camuso

Rivers and Natural Hazards Manager

M: 0274-384-639



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From: Stuart Savill <StuartS@nrc.govt.nz>

Sent: Monday, 30 March 2020 3:54 PM

To: Joseph Camuso <josephc@nrc.govt.nz>

Subject: Sher Khan

Hi Joe

How's lockdown going for you? All sorted and got routine in place. You bound to have plenty of stuff to keep you busy in the short term, like myself.

Reason for email is Sher Khan and availability to do some work re assessing effects on flooding at Kerikeri? Did Sher come back early or is stuck in Pakistan?

Ngā mihi

Stuart Savill

Consents Manager

Northland Regional Council » Te Kaunihera ā rohe o Te Taitokerau

Phone 09 470 1210 ext 9101



Te Kaunihera ā rohe o Te Taitokerau



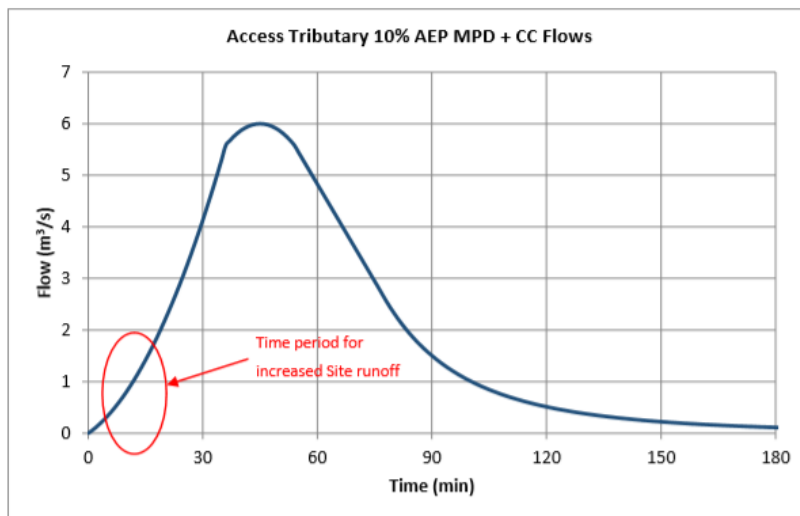
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Comments on Haigh workman report

The post-development scenario will have very minor effect on the flood peaks in the streams for a 10yr ARI and larger events (100year ARI). However, without attenuation, it could have adverse effects on downstream flooding for more frequent events (1 to 2-year ARI). There is no evidence in the report to justify that the more frequent events will not exacerbate the downstream flooding. Without attenuation, it could results in increased flood depth and duration for those properties that are at flood risk for more frequent events.

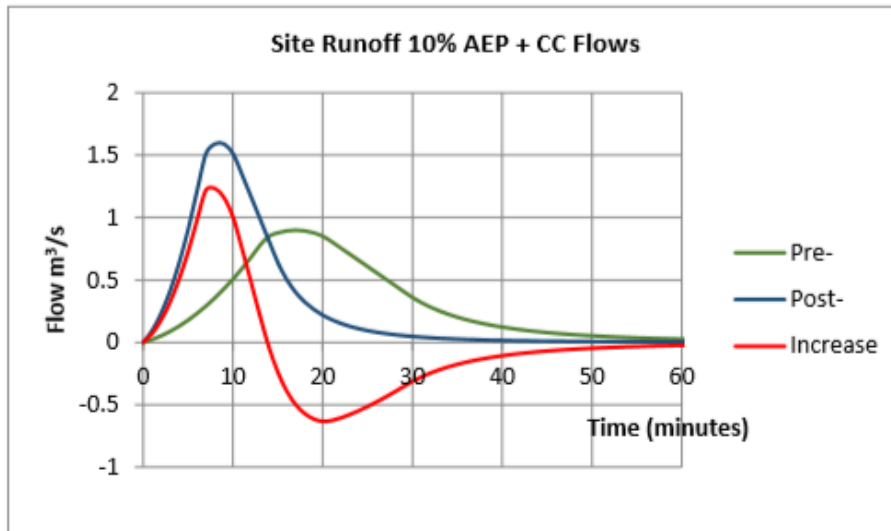
For example, Looking at the following hydrograph from the report, it suggests that the discharge from the site will only affect the early part of the flood hydrograph with very minor effects on the river flood peak but for smaller events where the river flood peak will be low enough, the effect of the storm water discharge from the site will be more obvious.



Suggestions:

1. Provide some attenuation to bring the post-development discharge hydrographs from the site to be closer to pre-development scenario but also make sure the peaks do not coincide with the flood peak in the river.

Some attenuation (approximately 10 minutes) could bring the post-development discharge hydrograph to match pre-development discharge hydrograph from the site as per the below graphs from the report.



2. Provide evidence in the report that the discharge from the site get reasonable attenuation for more frequent events where river flood peaks are lower enough to be effected by the discharge from the site.
3. Identify properties that could be adversely affected if any, and get property owners consent or mitigate the flooding on those properties.