Memo

Date: 22/01/2024

To: Kaipara District Council

Prepared by: Damian Teh - Civil Engineer

Reviewed by: Steven Rankin - Civil Engineer

Subject: Response to AWA Technical Review of Stormwater Management

1 Introduction

The Rise Limited (TRL) have submitted a Private Plan Change, (PPC83) to rezone multiple lots within Mangawhai from Rural to Residential with a permitted impervious threshold of 60% instead of the typical 40% in the current Kaipara District Plan.

Chester Consultants Ltd (Chester) has been engaged by TRL to provide Civil Consulting services to support the proposed plan change including preparing the stormwater management plan and providing input into the proposed stormwater provisions submitted.

Kaipara District Council (KDC) engaged Awa Environmental Ltd (AWA) to undertake a preliminary review of the draft Stormwater Management Plan and Flood Risk Assessment reports. This memo is response to AWA's review seen in their document titled "PPC83 The Rise – Stormwater Review" dated 21st December 2023 and referenced J000813.

It is important to keep in mind that the consent being sought is for zoning only; to this point; the level of information required sits at a higher level where the test is more around any fundamental engineering flaws and ensuring the planning provisions are suitable to enable future development. In simple terms the specific development assessments will be completed at the time of development in line with the associated planning provision at both a local and regional level as required.

2 Stormwater Quality

"NIWA HIRDS Rainfall – please clarify which RCP is proposed in association with the rainfall scenario. In general, we suggest that RCP6.0 is applicable where there is no flooding and RCP8.5 would be used for areas that experience flooding."

NIWA has two methods to obtain climate change adjusted rainfall values. One method is to use the RCP scenario which originates from documents produced by the Intergovernmental Panel on Climate Change. The second method is to obtain adjusted rainfall data based on a specific temperature increase using the percentage change factors seen in HIRDSv4 Technical Report. This process uses the historical rainfall data from NIWA's HIRDS with the process and conversion factors outlined on in HIRDSv4 Technical Report are summarised in https://niwa.co.nz/information-services/hirds/help.

We proposed to use the second method as the KDC Engineering Standards refers to a 2.1 degree increase in climate change, and we recommend using the latest HIRDS data instead of the rainfall data in the KDC Engineering Standards as those rainfall data were based off an older version of HIRDS (HIRDS Version 2).

We have updated the SMP by incorporating the term "historical" for clarity regarding the rainfall scenario to be used. Additionally, the NIWA HIRDS link (provided above) has been included in the SMP as a reference to highlight the recommended way to adjust the historical rainfall scenario for climate change.

"Impermeable areas – please clarify the definition of which coverage areas require mitigation. There is a concern that considering individual private driveways for water quality may result in excessive numbers of small devices that are privately owned and not necessarily maintained (which provide no significant improvement to water quality). Shared driveways and public roads may be more efficient and beneficial to accommodate water quality treatment measures."

As the SMP's offers recommendations regarding the incorporation of regulations governing the proposed permitted 60% impervious threshold into the Kaipara District Plan, through a Precinct Plan, the term "impermeable surface" is to follow the definition of "impermeable surface" under the Kaipara District Plan which is listed below.

> ***Impermeable Surface***
>
> *In relation to a site means any part of that site which does not allow natural percolation of water into the ground and includes:*
>
> *a. Roofs;*
>
> *b. Solid or non-slotted decks less than 1m in height about the ground;*
>
> *c. Any paved surface used for manoeuvring, access, loading of motor vehicles or parking; and*
>
> *d. Any paved area with a continuous surface or with open jointed slabs, bricks, gobi or similar blocks.*

It is noted in the above, that the definition of impermeable surface includes surfaces such as decks that do not require treatment as there is no relevant contaminants from decks that requires treatment.

To ensure no pointless treatment is required, the wording of the recommendation proposed is updated as follow:

i. Treatment of the Water Quality Volume (WQV) or Water Quality Flow (WQF) from contaminant generating impermeable surfaces.

For clarification, the proposed provisions rely on the existing definitions in the Kaipara District Plan for **contaminant** which is:

> ***Contaminant****
>
> *Includes any substance (including gases, odorous compounds, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat –*
>
> *e. When discharged into water, changes or is likely to change the physical, chemical, or biological condition of water; or*
>
> *f. When discharged onto or into land or into air, changes or is likely to change the physical, chemical, or biological condition of the land or air onto or into which it is discharged.*
>
> *(*as being from the Resource Management Act 1991)*

Given the above, there is scope at Land Use or Subdivision stage, for further site-specific analysis to be done to determine what land use will bring about contaminant generating impermeable surfaces, if any, and that treatment of the WQV or WQF will be required only for surfaces deemed to be contaminant generating.

"Gross Pollutants – catchpits are proposed as a standard practice for managing gross pollutants, however, separately in the Stormwater Management Plan it is noted that where possible kerb and channel are to be avoided. Catchpits are not a practical solution in areas without kerb and channel. Therefore, how is it proposed to manage gross pollutants in areas without kerb and channel?"

Catchpits are not mutually exclusive with swales/open channels as catchpits can be found as collection points from runoff along swales/open channels. It is noted that there are alternatives to catchpits that can be used such as scruffy dome manholes and so Section 7.7 of the SMP has been adjusted to also include scruffy dome manholes with an internal sump or other similar products to ensure that gross pollutant devices are still considered by future designers when proposed swales/open channels.

We understand through that there could be scenarios where the swales/open channel may not feature collection points and so the section has also been updated to added additional detail on how to manage gross pollutants in scenarios where the swales/open channel discharge directly into the receiving environment without the use of any piped infrastructure (by incorporating planting at the end of the swale/open channel).

3 Stormwater Quantity

"The applicant proposes to use NIWA's High Intensity Rainfall Design System (HIRDS) adjusted for 2.1°C climate change as per the HIRDS climate change percentage change factors in Table 6 of the HIRDSv4 Technical Report. Please clarify which RCP scenario should be designed for to ensure consistency in the catchment development."

NIWA has two methods to obtain climate change adjusted rainfall values. One method is to use the RCP scenario which originates from documents produced by the Intergovernmental Panel on Climate Change. The second method is to obtain adjusted rainfall data based on a specific temperature increase using the percentage change factors seen in HIRDSv4 Technical Report. This process uses the historical rainfall data from NIWA's HIRDS with the process and conversion factors outlined on in HIRDSv4 Technical Report are summarised in https://niwa.co.nz/information-services/hirds/help.

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We have updated the SMP by incorporating the term "historical" for clarity regarding the rainfall scenario to be used. Additionally, the NIWA HIRDS link (provided above) has been included in the SMP as a reference to highlight the recommended way to adjust the historical rainfall scenario for climate change.

"It appears that the proposal is to attenuate multiple design events, 1/3rd of the 2 Year ARI, 5%, 10%, and 1% AEP. Please expand on the reason for attenuating all the above events. Selection of attenuation devices should be assessed in further detail at future resource consent stages and should be based on site-specific assessment, including consideration of whole-of-life costs. Consideration should also be given to the size and number of devices across the plan change area."

Currently, under the Kaipara District Plan only allows development to develop to a maximum permitted threshold of 40%. This PPC is also seeking to increase the permitted impervious threshold to 60%. Therefore, the recommendation for attenuation of multiple design events at this stage is to allow developments within the PPC area to develop to a maximum permitted threshold of 60%. A number of different stormwater events were assessed in Section 7.0 of the SMP to see if any stormwater mitigation is required to offset the effects from the proposed increased in permitted impervious threshold.

Detention of the 1/3rd of the 2 Year ARI/50% AEP was recommended to protect the downstream environment form erosion, please refer to Section 7.1 of the SMP.

Detention of the 20% AEP (5 Year ARI) and the 10% AEP (10 Year ARI) were recommended as there are existing downstream infrastructure that were determined to be under capacity. The 20% AEP is the design ARI for residential zoning and 10% AEP for road culverts. Please refer to Section 7.2 of the SMP. Please note the 5% AEP in the draft SMP was a typographical error.

Detention of the 1% AEP (100 Year ARI) was recommended as the FRA concluded that the PPC developed to a 60% impervious ratio, and without any form of detention, will exacerbate the flooding hazard downstream.

"We note that the rainfall design events are noted 5%, 10% and 1% AEP and we would request clarification as to whether the intention of 5% AEP is intended to denote a 2-year ARI event, which is actually a 50% AEP."

The 5% AEP event is a typographical error and should have been 20% AEP (5 Year ARI) as that is the design ARI for primary stormwater systems for residential land use as per Table 6.2 of the KDC Engineering Standards. The SMP has been adjusted for this.

"It is noted that there is a recommendation that "buildings and infrastructure to be located outside the 1% AEP flood and coastal hazards". Please provide clarification on these setbacks and the definition of infrastructure relating to these setbacks, i.e., would this require roads to be outside of the 1% AEP floodplain. It is noted that these are not written into the precinct rules."

Section 8.7 of the SMP has been updated with the "buildings and infrastructure…" statement removed as we believe it is redundant with the other statement. The other statement regarding the NES have been kept and is not written into the precinct rules as the precinct rules are only meant to provide rules to offset the stormwater effects from a 60% permitted impervious threshold.

The precinct rules do not supplant all existing stormwater requirements from other applicable documents, in this case the NES-F. The mention of this in the SMP was to provide a summary of what we believe are the existing stormwater requirements that should all be considered from all applicable relevant documents/standards and inclusive of the proposed precinct rules to provide an ease of use for future developers to work off from by considering all stormwater requirements into one source.

4 Flood Hazard

"The flood risk assessment provided by the applicant concludes that flood hazard is not significantly worsened by the proposed plan change. This is not clearly conveyed by the FRA results and as such, we request that the following information be reviewed and provided/updated.

- Provide clear Flood Maps outlining properties affected by the future extended flood plains. Clearly show the difference between the pre- and post- flood inundation extents. A depth-difference map would be valuable in this instance (note figure inserts in the body of the report are not suitable for reviewing extent of flood hazard as the detail is difficult to maintain). The flood maps should allow for ready identification of downstream properties that may be negatively impacted by the future PPC area development.

- Further detail on the TP108 assessment, including initial abstraction and soil types i.e., detail behind the assumptions made to determine key factors, such as CN.

- Review Table 4-2, the rainfall depths appear to be in the wrong order (the 1% AEP is smaller than 10% AEP).

- Further detail on the development of the Flood Model. A model build report would be useful in understanding the assumptions made and whether these are appropriate to the catchment/ plan change area."

The FRA has been updated to include the following:

- Flood Maps in the appendix showing pre- and post- flood extents and depth-difference maps.

- The FRA has been updated to provide mode detail on the TP108 assessment and the flood model.

- Table 4-2 has been corrected as the table headings were in the wrong columns.

"It is noted that the Flood Risk Assessment provided by the applicant indicates that upgrading the existing twin culverts is not likely to improve flooding locally. Further investigation to verify this assumption is likely necessary as there is still a concern that development upstream of the culvert is going to worsen flooding. Mechanisms for upgrading critical assets should be explored."

Section 4.5.3 provides an assessment on whether or not upgrading the twin culvert under Mangawhai Heads Road (West) can improve flooding in the area. Section 4.5.3 concludes that upgrading the culvert does not improve flooding in the area. As such, this is one of the reasons for recommending 10% and 1% AEP attenuation for the PPC area to ensure that future development does not worsen flooding in this area.

"Implications on flood hazards related to 1% AEP mitigation (as proposed in the Stormwater Management Plan). If 1% AEP attenuation is proposed for all future runoff (above green field scenario), has this been included in the flood modelling? We would anticipate that the flood modelling of future scenario's would match the stormwater catchment management approach."

The FRA was prepared to assess the PPC area without any form of mitigation to see if 1% AEP mitigation is warranted or not hence why the Proposed scenario does not include 1% AEP attenuation as recommended in the SMP, and to also to assess the road culverts under Mangawhai Heads Road (West).

The FRA concluded the flood hazard will increase at the location of the existing twin 1.2m diameter culverts under Mangawhai Heads Road (West) and so this assessment was used to justify the 1% AEP mitigation recommendation put forth in the SMP.

5 Conclusion

Thank you for providing us with an opportunity to address the questions raised by AWA. We trust the above provides further technical basis and justification for the recommend stormwater mitigation. If you have any questions, please do not hesitate to contact the undersigned.

Yours Sincerely,
Damian Teh

Civil Engineer
M +64 (0) 21 820 495
damian@chester.co.nz

Attachment 1

AWA Memo

MEMO

TO:	Paul Waanders	**DATE:**	21st December 2023
FROM:	Ally Bodmer	**PROJECT NO.:**	J000813
COPY:	Carey Senior		
SUBJECT:	PPC83 The Rise – Stormwater Review		

INTRODUCTION

The Rise Limited (TRL) have applied for a Private Plan Change (the plan change) to the Kaipara District Plan (ODP) to rezone and modify planning provisions on 56.9 hectares of land at The Rise/Cove Road, Mangawhai.

Kaipara District Council (KDC) have engaged Awa Environmental Ltd (Awa), to undertake a preliminary review of the proposed stormwater management submitted as a part of PPC83 by JAS Civil Ltd and Chester. The scope of work is to complete a preliminary review of the proposed stormwater management strategy to identify potential effects, how they are managed and to provide a list of recommended further information requests, if any, to KDC.

DOCUMENTS REVIEWED

DOCUMENT NAME	AUTHOR	DATE	REV
Appendix 3 - Land Development Report	JAS Civil Ltd.	20/6/22	1
Cove Road & Mangawhai Heads Road, Mangawhai Flood Assessment Report – The Rise Private Plan Change – PPC83	Chester	7/12/23	0
Cove Road and Mangawhai Heads Road (West), Mangawhai Stormwater Management Plan - The Rise Private Plan Change – PPC83	Chester	7/12/23	0

LIMITATIONS

The review memorandum has been prepared for Kaipara District Council only and should not be used or relied on by any other person or entity. We note that this review has been undertaken purely from an alignment with regulatory requirements and 'assessment of effects' perspective only.

TECHNICAL REVIEW OF STORMWATER MANAGEMENT

Awa issued a memo on 28th November 2023 to the Applicant's Principal Planner requesting that a robust flood risk assessment be provided as well as an accompanying Stormwater Management Plan in order to ensure that the plan change can be reviewed against the potential stormwater impacts that this re-zoning may have on the wider environment and community.

Chester has provided draft copies of the Flood Assessment Report and Stormwater Management Plan for feedback (December, 2023). Overall, Awa believe that the provisions of the stormwater management plan and the flood risk assessment are on the right track to managing the effects of the plan change, however there are some specific questions to be clarified, which are outlined below.

WATER QUALITY

The applicant proposes to manage water quality via treatment devices for water quality flow (WQF), the rainfall intensity of 10mm/hour or water quality volume (WQV), with 1/3 of the 50% AEP/2 Year ARI 24-hour rainfall depth. Please clarify the following:

- NIWA HIRDS Rainfall – please clarify which RCP is proposed in association with the rainfall scenario. In general, we suggest that RCP6.0 is applicable where there is no flooding and RCP8.5 would be used for areas that experience flooding.
- Impermeable areas – please clarify the definition of which coverage areas require mitigation. There is a concern that considering individual private driveways for water quality may result in excessive numbers of small devices that are privately owned and not necessarily maintained (which provide no significant improvement to water quality). Shared driveways and public roads may be more efficient and beneficial to accommodate water quality treatment measures.
- Gross Pollutants – catchpits are proposed as a standard practice for managing gross pollutants, however, separately in the Stormwater Management Plan it is noted that where possible kerb and channel are to be avoided. Catchpits are not a practical solution in areas without kerb and channel. Therefore, how is it proposed to manage gross pollutants in areas without kerb and channel?

The applicant proposes several indicative options for stormwater treatment which are considered to be appropriate for mitigating effects in terms of water quality within the catchment. A toolbox of options (with a hierarchy linked to preference on site) may be valuable in guiding developers to follow the approved stormwater management approach in this catchment.

WATER QUANTITY

The applicant proposes the following stormwater management requirements as part of the Cove Road Precinct Rules.

- Retention of a minimum of 5mm runoff depth for all impermeable surfaces
- Detention (temporary storage) with a drain down period of 24 hours for the difference between the pre-development (grassed state) and post-development runoff volumes from the 1/3 of the 2 Year ARI, 24-hour rainfall event minus any retention volume provided for all impermeable surfaces.
- Detention and Attenuation of the post-development runoff peak flow rates to at or below the pre-development (grassed state) peak flow rates from the 5%, 10% and 1% AEP events for all impermeable surfaces.

The applicant proposes to use NIWA's High Intensity Rainfall Design System (HIRDS) adjusted for 2.1°C climate change as per the HIRDS climate change percentage change factors in Table 6 of the HIRDSv4 Technical Report. Please clarify which RCP scenario should be designed for to ensure consistency in the catchment development.

It appears that the proposal is to attenuate multiple design events, 1/3rd of the 2 Year ARI, 5%, 10%, and 1% AEP. Please expand on the reason for attenuating all the above events. Selection of attenuation devices should be assessed in further detail at future resource consent stages and should be based on site-specific assessment, including consideration of whole-of-life costs. Consideration should also be given to the size and number of devices across the plan change area. We note that the rainfall design events are noted 5%, 10% and 1% AEP and we would request clarification as to whether the intention of 5% AEP is intended to denote a 2-year ARI event, which is actually a 50% AEP.

It is noted that there is a recommendation that "*buildings and infrastructure to be located outside the 1% AEP flood and coastal hazards".* Please provide clarification on these setbacks and the definition of infrastructure relating to these setbacks, i.e., would this require roads to be outside of the 1% AEP floodplain. It is noted that these are not written into the precinct rules.

FLOOD HAZARD

The flood risk assessment provided by the applicant concludes that flood hazard is not significantly worsened by the proposed plan change. This is not clearly conveyed by the FRA results and as such, we request that the following information be reviewed and provided/updated.

- Provide clear Flood Maps outlining properties affected by the future extended flood plains. Clearly show the difference between the pre- and post- flood inundation extents. A depth-difference map would be valuable in this instance (note figure inserts in the body of the report are not suitable for reviewing extent of flood hazard as the detail is difficult to maintain). The flood maps should allow for ready identification of downstream properties that may be negatively impacted by the future PPC area development.
- Further detail on the TP108 assessment, including initial abstraction and soil types i.e., detail behind the assumptions made to determine key factors, such as CN.
- Review Table 4-2, the rainfall depths appear to be in the wrong order (the 1% AEP is smaller than 10% AEP)
- Further detail on the development of the Flood Model. A model build report would be useful in understanding the assumptions made and whether these are appropriate to the catchment/ plan change area.
- It is noted that the Flood Risk Assessment provided by the applicant indicates that upgrading the existing twin culverts is not likely to improve flooding locally. Further investigation to verify this assumption is likely necessary as there is still a concern that development upstream of the culvert is going to worsen flooding. Mechanisms for upgrading critical assets should be explored.
- Implications on flood hazards related to 1% AEP mitigation (as proposed in the Stormwater Management Plan). If 1% AEP attenuation is proposed for all future runoff (above green field scenario), has this been included in the flood modelling? We would anticipate that the flood modelling of future scenario's would match the stormwater catchment management approach.