

To The District Planning Team
From Carey Senior – Awa Environmental

10 April 2024

Subject Private Plan Change 84, Mangawhai Hills – Stormwater

1. INTRODUCTION

- 1.1 I have been engaged by Kaipara District Council to provide a stormwater engineering technical review in relation to Private Plan Change 84 to the Operative Kaipara District Plan 2013, which relates to Mangawhai Hills, Mangawhai.
- 1.2 I have undertaken a technical review of the stormwater elements proposed in the lodged plan change application, including a review of additional reports provided post- lodgement.
- 1.3 In this memorandum I address the following matters:
- (a) Summary;
 - (b) Background;
 - (c) Comments on Land Development Report - Stormwater (Chester);
 - (d) Comments on Stormwater Management Plan (SMP) (Chester); and
 - (e) Comments on Flood Risk Assessment (FRA) (Chester).

2. SUMMARY

- 2.1 Chester have provided a comprehensive and principled approach to the management of stormwater within the proposed PPC area. In my opinion, the provisions outlined within the Stormwater Management Plan will ensure that future development activity will be appropriately managed within the re-zoned area and will not adversely affect the downstream environment. Water quality outcomes are achieved with by adopting an industry best practice approach that is conservative yet flexible.
- 2.2 Flood risks have been appropriately identified and suitable mitigation requirements have been proposed to ensure that future development impact is maintained to the same level as

the existing greenfield scenario. I support the FRA requirement to require stormwater neutrality runoff for the 100-year ARI rainfall event.

2.3 Based on my review of the stormwater documentation that has been submitted in support of the proposed PPC, I consider that the impact of the proposed re-zoning on stormwater runoff and quality has been suitably addressed. I support the proposed stormwater management provisions.

3. BACKGROUND

3.1 This memorandum is prepared on behalf of Kaipara District Council, and should be read in conjunction with and inclusive of the following documents:

(a) Appendix 7 Land Development Report – Mangawhai Hills Engineering Report – Rev 0 PPC84 dated 23rd February 2024.

(b) Appendix 9 Stormwater Management Plan – Mangawhai Hills Stormwater Management Plan (Draft) – Rev 0 PPC84 dated 23rd February 2024.

(c) 15209-C-RPT-PC-FRA-1 – Mangawhai Hills Flood Risk Assessment – Rev 1 PPC84 dated 22nd March 2024.

3.2 Mangawhai Hills Limited (**MHL**) have applied for a Private Plan Change (**the plan change**) to the Kaipara District Plan (**ODP**) to rezone and modify planning provisions on 218.3 hectares of land at Mangawhai Hills, Mangawhai (between Tara Road, Cove Road, Moir Street, and Old Waipu Road). The private plan change application proposes rezoning of Rural zoned land to Residential zoned land.

4. COMMENTS ON LAND DEVELOPMENT REPORT

4.1 The Land Development Report has been prepared by Chester Consultants Ltd.

4.2 The Land Development Report proposed that due to the re-zoning, stormwater management within the PPC area would be governed by the proposed PPC84 Mangawhai Hills

Development Area provisions. The provisions regarding stormwater disposal primarily relate to the increased impervious coverage that is proposed, as well as increased water quality and runoff mitigation measures.

4.3 Permeable surface coverage is proposed to be increased to 50% maximum coverage within the Mangawhai Hills Development Area. It is noted the ODP permits 40% maximum coverage for Residential Areas and 10% for Rural Areas. A detailed assessment of the appropriate mitigation for stormwater impact due to the PPC re-zoning is outlined within the Stormwater Management Plan.

4.4 The Land Development Report proposes the stormwater management should follow the principles and toolbox of options that are outlined in the SMP. The Flood Risk Assessment also proposes a specific requirement in relation to peak flowrate from the proposed PC area. I support this approach. Review of the Stormwater Management Plan and Flood Risk Assessment are included in this memorandum.

5. COMMENTS ON STORMWATER MANAGEMENT PLAN (SMP)

5.1 The SMP has been prepared by Chester Consultants Ltd. It is noted that the SMP is a 'live' document, and it is expected it will be updated to include the provisions as specified in the FRA. We anticipate that this SMP 'Mangawhai Hills Development Area SMP' will be adopted by Kaipara District Council and will guide the future development of this stormwater catchment area. Any proposed 'site-specific' stormwater plans are expected to be conforming sub-catchment plans and should be consistent with the catchment SMP.

5.2 The SMP has noted that the maximum impervious area for the PPC zone is proposed to be raised to 50% site coverage (residential), which is an increase from 10% as currently permitted in the Kaipara District Plan 2013 for a rural zone. Consideration has been given within the SMP to measures to mitigate the expected increase in stormwater peak flowrates (runoff), stormwater volume (runoff), and the degradation of stormwater runoff quality. I agree that these are the primary aspects to focus on and mitigate to ensure a low impact sustainable re-zoning outcome.

- 5.3 Stormwater runoff volume increase generated by low intensity / high frequency rainfall events has a known impact on stream erosion and poor ecological outcomes, and therefore the applicant has proposed the stormwater strategy of adopting an Auckland Council 'SMAF' approach, which is outlined in Guidance Document 01. This requires retention of rainfall within a site (which may include re-use and/or infiltration to ground), as well as detention of runoff. A 1/3 of the 2- year ARI rainfall is proposed as the design rainfall event that should be utilised to reduce stormwater runoff volumes within the PPC area. I believe this approach is consistent with industry best practice, and the applicant has adopted similar performance requirements to those outlined by local Council stormwater codes of practice, as well as other governing planning documents, such as District & Regional Plans. The approach is similar to the strategy and specified parameters outlined within the Auckland Unitary Plan as one example.
- 5.4 Stormwater peak flowrates have been identified as a key metric that impacts downstream public infrastructure, as well as overland flow paths and areas of flooding. In order to ensure the zone complies with the Kaipara District Plan, it is expected that the SMP will be updated to reflect the FRA provisions outlining a requirement for all developed areas within the PPC to attenuate peak runoff flows for the 100-year ARI rainfall event to pre-development rates (predevelopment is noted to be a greenfield scenario).
- 5.5 Water quality has been considered as part of the SMP and the plan generally follows the principles of Auckland Council's GD-04 Water Sensitive Design, and the toolbox of devices outlined in Auckland Council's GD-01 Stormwater Management Devices publication. The SMP requires water quality treatment to be considered for all potential contaminated surface runoff but allows for a wide range of treatment options to promote a design that is appropriate to the development impact. This provides overarching principles for consideration at the resource consent stage, and thereby protects water quality outcomes, while still allowing flexibility to ensure efficient and practical future solutions.
- 5.6 In my opinion, the SMP proposes suitable measures to manage stormwater runoff within the PPC area and will achieve the purpose of minimising or eliminating the impact of future development activities on people and the environment.

6. COMMENTS ON DEV1-S16 STORMWATER DISPOSAL

- 6.1 The Standards proposed in the PPC DEV1-S16 text currently outline provisions that do not correctly reflect the updated Flood Risk Assessment by Chesters. The text in 1.b should therefore be amended to require temporary storage (detention) to mitigate the 100-year ARI storm event, rather than 1/3 of the 2-year ARI storm event.
- 6.2 The FRA proposes that “on-site or detention measures be provided by future developments within the plan change area to mitigate the peak flowrate for the 1% AEP storm event as it leaves the individual developments”. They support this by referencing Kairapa District Council Engineering Standards Chapter 6.1.1(b) which outlines a requirement for the same mitigation. This outcome mitigates the flood risk demonstrated by the modelling in the FRA which showed increased flood flows due to future impervious ground coverage.
- 6.3 We would anticipate that the reference 2.g provision should be amended to read ‘meets the relevant performance standards of the Kaipara District Council Engineering Standards 2011 and the Mangawhai Hills Development Area SMP’ in the DEV1-S16 text. We also anticipate that the SMP will be updated to reflect the current FRA (as noted in 5.4 above).

7. COMMENTS ON FLOOD RISK ASSESSMENT (FRA)

- 7.1 The FRA has been prepared by Chester Consultants Ltd.
- 7.2 The FRA has considered all contributing catchments that would contribute flow into the PPC area and has considered the flows through the PPC area and the consequent downstream flood impacts. A detailed hydrological model has been developed, utilising unsteady flow analysis for the 100-year ARI rainfall event (using HEC-HMS hydrograph to produce flowrates for the design storm). The design hydrographs have been incorporated into a 2D overland flow model using HEC-RAS with appropriate parameters for site coverage, roughness, and boundary values. I am familiar with the modelling approach taken and support this methodology and basis of analysis. While a sensitivity analysis was not included, nor any clear validation of model results based on historic flood data (which may not be available in the

modelled catchment), I have confidence that the flooding extent and reported outcomes are accurate.

- 7.3 The FRA outlines the flood inundation that occurs within and downstream of the PPC area for the current catchment scenario during a 100- year ARI event. The results demonstrate existing scenario flooding occurs within the PPC area as well as downstream of the zone. The flooding is primarily in close proximity to the existing natural gullies and watercourses, and underneath the Moir St Bridge (near the intersection with Tara Rd).
- 7.4 The FRA has assessed the maximum probable development (**MPD**) scenario, comprising 50% maximum impervious coverage for residential zoning. The resultant flooding is increased in extent and depth when compared to the pre-development flood results. Therefore, the FRA concludes that flood mitigation measures are required to ensure that the downstream environment is not adversely affected by the PPC re-zoning.
- 7.5 Due to the presence of flooding downstream of the PPC area, Chester Consultants have proposed that mitigation of the 100-year ARI rainfall event be managed at source. This approach provides flexibility of design to future developers and allows for suitable management of costs associated with the progress of development activity. Flood risk mitigation implementation and associated costs are proposed to be the responsibility of each developer and would be assessed in detail at the land use consent stage.

Attachment A – Qualifications and Experience of Carey Senior

My full name is Carey Henry Douglas Senior.

I have been a Director and Principal Civil Engineer at Flowpath Engineering Consultants since establishing the consultancy in 2019. I am currently engaged by Awa Environmental to lead the Three Waters Engineering Team in Auckland.

I hold the qualifications of Bachelor of Engineering with Honours (Natural Resources) from the University of Canterbury. I have been a Chartered Professional Engineer for 13 years and am a member of Engineering New Zealand.

I have twenty-two years of consulting experience as a professional civil and environmental engineer, with the last 14 years of my work experience being based in Auckland.

I have worked on major infrastructure projects for Auckland Council, Wanganui District Council, and Tauranga City Council as well as other local councils and regulatory bodies. My practice experience in the last decade has primarily involved the civil engineering design and construction observation of residential developments in both green and brownfield locations. Project works have included many flood risk investigations and stormwater management plans. I also have consulting experience in master-plan projects in Auckland.