

BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 5 to the Operative Hamilton
City District Plan

**STATEMENT OF EVIDENCE OF ARI JOHN CRAVEN
(STORMWATER)**

Dated 2 September 2022

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INTRODUCTION

1. My full name is Ari John Craven.
2. I hold a Bachelor of Environmental Engineering (Hons) and a Bachelor of Science (Hons) from the University of Queensland and have 14 years' experience practicing within the water resources sector specialising in stormwater and flood hazard management. I am currently the sole director of Catchment Engineering Solutions Ltd. I have been in this position since January 2022. Previously I have held senior or principal engineering positions with Stantec New Zealand, Beca Ltd, Engeny Water Management and AECOM Ltd.
3. I am currently engaged by Hamilton City Council (**HCC**) as project manager of the Mangakootukutuku Integrated Catchment Management Plan (**ICMP**) which has been drafted and requires final technical certification from Waikato Regional Council. The Mangakootukutuku ICMP is the key stormwater document used to inform Proposed Plan Change 5.
4. In addition to the Mangakootukutuku ICMP, I have assisted HCC in development of the Te Awa O Katapaki and Te Rapa North ICMPs, in relation to stormwater technical matters.
5. I have been engaged by HCC, as proponent of PC5, to undertake a review of the submissions received on Plan Change 5 relating to stormwater matters and to provide expert advice on the matters raised in submissions.
6. I have prepared a technical report dated 28 August 2022 (**Technical Report**) which is appended as **Attachment 1**. The Technical Report:
 - a) Summarises the relevant elements of the draft Mangakootukutuku ICMP;

- b) Comments on the proposed updates to the notified plan change in response to submissions seeking amendments to align with the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act (**Housing Amendment Act**); and
- c) Summarises submissions made on PC5 in relation to stormwater matters and makes recommendations concerning decisions requested by submitters.

CODE OF CONDUCT

- 7. I have read the Environment Court Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2014 and agree to comply with it. I confirm that the opinions expressed in this statement are within my area of expertise except where I state that I have relied on the evidence of other persons. I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

SCOPE OF EVIDENCE

- 8. The purpose of this statement, presented on behalf of HCC as proponent of Plan Change 5, is to:
 - a) Summarise the relevant technical elements relating to stormwater from the Mangakootukutuku ICMP that have been used to support the plan change;
 - b) Respond to stormwater matters raised in the submission process;
 - c) Provide comment on the updated provisions in response to the Amendment Act; and

- d) Recommend plan provisions relating to stormwater issues within the Peacocke Structure Plan area.

EXECUTIVE SUMMARY

- 9. Stormwater treatment wetland conceptual design undertaken as part of the Mangakootukutuku ICMP was used to inform the feature plan map which appears in the proposed Plan Change 5 material.
- 10. The treatment wetland conceptual design (location and sizing) was reviewed and is considered to be reasonable and in general alignment with the relevant territorial authority design guidance.
- 11. The treatment wetlands proposed in the ICMP do not form a designation or alter land zoning. Wetland sizing and locations are indicative and will need to be refined and confirmed during subdivision design.
- 12. In total 14 submissions were identified that related to stormwater matters. Submissions relating to stormwater generally fell into two categories:
 - a) Minor wording changes to policies or objectives; and
 - b) Objections to the location of or requests to remove indicated proposed wetlands from the feature plan in the proposed plan change.
- 13. Where minor wording changes to policies or objectives were proposed these are generally supported.
- 14. Changes to wetland locations or removal of wetlands from the feature plan have not been supported as they are indicative only, do not form part of a

designation or alter land zoning and will need to be refined as part each subdivision design.

15. The proposed changes to the notified version of PC5 in response to submissions seeking alignment with the Housing Amendment Act are not considered to give rise to any implications for stormwater.

TECHNICAL REPORTS

16. The key piece of technical work undertaken as part of the Mangakootukutuku ICMP, which has been used to support the notified plan change is the conceptual design of stormwater treatment wetlands.
17. Conceptual design of stormwater treatment wetlands was undertaken by Bloxam Burnett & Oliver Ltd (BBO) and is documented in the Mangakootukutuku ICMP Greenfields Stormwater System Report.
18. Comparison of proposed treatment locations against the latest aerial survey information (2019 LiDAR) indicates that the proposed treatment wetlands are located at logical sub-catchment outlet locations based on current ground levels.
19. Wetland catchment areas vary between 3.2 Ha and 23.5 Ha, with an average value of 10.4 Ha. The Regional Infrastructure Technical Specification (**RITS**) identifies that the preferred form of vested stormwater treatment infrastructure is treatment wetlands with contributing catchment areas of 8.0 Ha or greater.
20. Conceptual stormwater treatment wetland footprints as a percentage of the contributing catchment area vary from 3.5% to 13.7%, with an average of 8.6%.

21. While the RITS does not specify a required surface area for treatment, the Waikato Regional Council stormwater management guidelines (TR2020/07) specify a value of 4% of contributing catchment area for wetlands with contributing catchments having greater than 70% impervious cover. Additional area is required above this to allow for stormwater attenuation and operation and maintenance functions.
22. The treatment wetland footprints proposed by BBO may be considered conservative, however this is considered an appropriate approach for the conceptual purposes they are intended for.
23. It is noted that the treatment wetlands proposed in the ICMP do not form a designation or alter land zoning. Wetland sizing and locations are indicative and will need to be refined and confirmed during subdivision design.

RESPONSE TO SUBMISSIONS

24. In total 14 submissions were identified that raised stormwater matters. Submissions relating to stormwater generally fell into two categories:
 - a) Minor wording changes to policies or objectives; and
 - b) Objections to the location of or requests to remove proposed indicated wetlands from the PC5 feature plan.
25. In August 2022, I undertook a review of all relevant submissions and on 28 August 2022, I provided my Technical Report to HCC which summarises the submissions and records my recommendations in respect of each decision requested in Table 2 appended to the report. My response to key submissions is set out below.

26. Submissions 3 (Mangakootukutuku Stream Care Group), 30 (Andrea Graves) and 36 (Waikato Regional Council) have sought the amendment of several policies and objectives. Typically, the intent of these amendments is to enhance the protection of ecology and biodiversity, or to promote stream restoration outcomes. These submissions have generally been supported as proposed or with minor rewording recommendations.
27. Two submission points (36.44, 36.47) from submitter 36 (Waikato Regional Council) were not supported on the basis that they sought to equate stormwater treatment wetlands with natural ecological areas. It is considered that while the constructed wetlands will likely provide ecological benefits, their primary function is to receive contaminated stormwater runoff which is not consistent with the outcomes or values of natural ecological areas.
28. Submissions 28 (Richard and Elizabeth Ward), 40 (AJ and HC Koppens), 41 (Shortbread Ltd), 44 (Cordyline Holdings Ltd), 48 (Gregory Alan Knight), 51 (Ebenezer Property Ltd Partnership) and 52 (Jacky Li and Alex Zheng) have all sought to have treatment wetlands removed from the feature plan included in the plan change or the identified location changed.
29. Removal of, or changes to, the locations of treatment wetlands is not supported for the following reasons:
 - a) The conceptual design undertaken by BBO to support the Mangakootukutuku ICMP is considered reasonable and is generally in alignment with the relevant territorial authority design guidance documents; and
 - b) The sizing and location of treatment wetlands is indicative only and will need to be confirmed through the consenting and subdivision design process. The Mangakootukutuku ICMP clearly states this.

UPDATED PC5 PROVISIONS

30. I have reviewed the proposed amendments to the notified version of PC5 in response to submissions seeking alignment with the Housing Amendment Act by incorporating the Medium Density Residential Standards. I consider that the amendments do not have any stormwater implications.

CONCLUSION

31. In my opinion the provisions relating to stormwater matters in the updated PC5 provisions are reasonable. Where submitters have proposed wording changes to policies and objectives that seek to enhance ecological, biodiversity or stream restoration outcomes these are generally supported. Changes to or removal of treatment wetlands are not supported as these are indicative only and will need to be refined through subdivision design. Changes to the notified plan change in response to the Housing Amendment Act are not considered to be relevant to stormwater.

Ari John Craven

2 September 2022

ATTACHMENT 1



PLAN CHANGE 5 - PEACOCKE STRUCTURE PLAN

Stormwater Report

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Document Revision History

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03	31/08/22	A.Craven	A.Craven	Final

Disclaimers and Limitations

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2. INTRODUCTION

2.1. BACKGROUND

Hamilton City Council publicly notified Plan Change 5 - Peacocke Structure Plan under the Resource Management Act in September 2021. The Peacocke Structure Plan was created in 2007 and reviewed in 2012, in full public consultation processes. The Peacocke Structure Plan now needs to be updated to reflect the outcomes of updated environmental and urban design best practice and will bring the plan in line with the National Policy Statement for Urban Development (NPS-UD) and the National Policy Statement for Freshwater Quality (NPS-FM).

Initial submissions on the notified Plan Change were received by HCC and published in February 2022, with a further round of submissions occurring in March 2022. A hearing is due to be held in late September 2022.

Catchment Engineering Solutions (CES) have been engaged by (HCC) to provide expert technical advice in relation to stormwater matters to support the submission and subsequent hearing process.

2.2. PURPOSE

The purpose of this report is as follows:

- Present a concise summary of the relevant elements of the draft Mangakootukutuku Integrated Catchment Management Plan (ICMP), which is the key stormwater technical document used to inform Plan Change 5.
- Summarise submissions made on the notified Plan Change 5 documents in relation to stormwater matters and provide a recommendation on any proposed changes to the Peacocke Structure Plan.
- Review the proposed updates to Plan Change 5 in response to the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act and comment on any matters relating to stormwater.

3. STORMWATER BACKGROUND

3.1. MANGAKOOTUKUTUKU INTEGRATED CATCHMENT MANAGEMENT PLAN (ICMP)

The draft Mangakootuktuku ICMP is the main stormwater technical document supporting the Peakcocke Structure Plan. Key outcomes of the ICMP are:

- To identify strategic objectives relating to three waters within the Mangakootukutuku catchment. The ICMP strategic objectives are summarised in Appendix A.
- To determine appropriate stormwater design parameters based on various technical investigations. The design parameters provide performance targets for stormwater management infrastructure. Design parameters from the ICMP are provided in Appendix B.
- A Means of Compliance which demonstrates HCC's preferred approach to achieving the adopted design parameters and strategic objectives. The Means of Compliance from the draft ICMP is provided in Appendix C.

The extent of the area considered by the ICMP is shown below in Figure 1. The ICMP covers the entire Mangakootukutuku catchment, which encompasses areas of existing brownfield development as well as the Peakcocke Structure Plan area. The structure Plan area covers the Tiireke and Kairokiroki catchments, with the area to the east of Peakcockes Road not considered under the ICMP. This area drains directly to the Waikato River, with stormwater requirements set out by developer-led sub-catchment ICMPs.

Once adopted, the ICMP will set the direction of development of three waters infrastructure within the ICMP area. This is achieved through application of rule 25.13.4.1a in the current operative District Plan which specifies *'Where a full ICMP already applies to an area, development of Three Waters infrastructure shall be undertaken in accordance with it.'*



Figure 1 – Mangakootukutuku ICMP area, including subcatchments (Source HCC, 2020).

3.2. ICMP TECHNICAL REPORTS

The ICMP is supported by several technical reports prepared by multiple external consultancies. A summary of these supporting reports is given below:

- Watercourse Assessment Report Mangakotukutuku Catchment (Morphum, 2020a)
- Mangakotukutuku ICMP - Ecological Information (T&T, 2017)
- Constructed Wetlands Guidance – Bat and Lizards (AECOM, 2019)
- Mangakotukutuku ICMP Hydrogeological & Geotechnical Investigations – Stage 1 (AECOM, 2020a)
- Mangakotukutuku ICMP Stage 2 - Hydrogeological Investigation (AECOM, 2020b)
- Mangakootukutuku ICMP Stormwater Model - Model Build Report (AECOM, 2020c)
- Addendum Report Stage 2 - Setback Assessment (AECOM, 2020d)
- Mangakotukutuku Hydrogeology and Geotechnical Stage 2 - Gully Hazard Setback Assessment (AECOM, 2020e)
- Mangakootukutuku ICMP Greenfields Stormwater System Report (BBO, 2020)

- Memorandum - Mangakootukutuku Water Quality Modelling Report (Morphum, 2020b)

This list is provided for context and completeness. Two of these technical reports (AECOM, 2020a,d) formed part of the notified material for Plan Change 5 to support the Gully Hazard setback.

3.3. INTERACTION WITH PLAN CHANGE 5

It is noted that the draft ICMP document was not submitted as part of the supporting technical documents for Plan Change 5. A December 2020 draft version of the ICMP (HCC, 2020) was however used to inform the development of the material notified as part of Plan Change 5. The draft ICMP was used to inform the following:

- As a part of the overall strategic document framework which has been used to develop the policies and objectives in the Peacocke Structure Plan, i.e. to align these with the strategic objectives of the ICMP.
- Indicative locations of centralized stormwater treatment wetlands developed as part of the technical investigations which support the ICMP have been shown as features on the land use map included as Figure 2-1 in the notified Plan Change 5 material and are referenced within the infrastructure staging section of the Structure Plan.

The proposed centralised stormwater treatment wetland locations are considered to be the key piece of technical analysis undertaken as part of the ICMP which was used to inform Plan Change 5.

3.4. PROPOSED STORMWATER TREATMENT WETLANDS

Concept design of the proposed stormwater treatment wetlands within the Plan Change 5 area was undertaken by BBO as part of the Mangakootukutuku ICMP Greenfields Stormwater System Report (BBO, 2020). The purpose of the treatment wetland design is to demonstrate a preferred Means of Compliance consistent with the ICMP design parameters and other objectives, and to support the Long-Term Plan (LTP) process.

A summary of the key aspects of the conceptual wetland design are as follows:

- The stormwater wetlands were designed to provide a water quality function, extended detention and attenuation of the 2y and 10y ARI storm events.
- Contributing catchment areas for each wetland were determined using existing topographic data, property parcel boundaries and future roading corridor alignments.
- Stormwater attenuation volume requirements were determined
- Wetland footprints were determined through basic 3D earthwork design

Figure 2 shows the strategic stormwater treatment infrastructure and contributing catchments developed by BBO.

Comparison of proposed treatment locations against aerial survey information (2019 LiDAR) indicates that the proposed treatment wetlands are located at logical sub-catchment outlet location based on current ground levels. Wetland catchment areas vary between 3.2 Ha and 23.5 Ha, with an average value of 10.4 Ha. This aligns well with the vested treatment preference hierarchy within the Regional Infrastructure Technical

Specifications (RITS) which identifies treatment wetlands of greater than 8 Ha as the preferred form of vested stormwater management device.

Wetland footprints as a percentage of catchment area vary from 3.5% to 13.7%, with an average of 8.6%. While the RITS does not specify a required surface area, the WRC Waikato stormwater management guidelines (TR2020/07) specify a wetland surface area of 4% of the contributing catchment area for wetlands with contributing catchments with greater than 70% impervious cover. This value represents the area required for treatment only, i.e. it does not account for additional area required for stormwater attenuation or operation and maintenance requirements etc. The treatment wetland footprints proposed by BBO could be considered conservative, however this is an appropriate approach for the conceptual purposes they are intended for.

The ICMP recognises the need for refinement of these designs during the consenting and sub-division design process. Land ownership at the time of development and change in landform associated with sub-division earthworks will have some impact on exact location and area draining to each wetland however, the conceptual arrangements developed for the ICMP provide a reasonable basis for understanding future strategic stormwater infrastructure requirements.

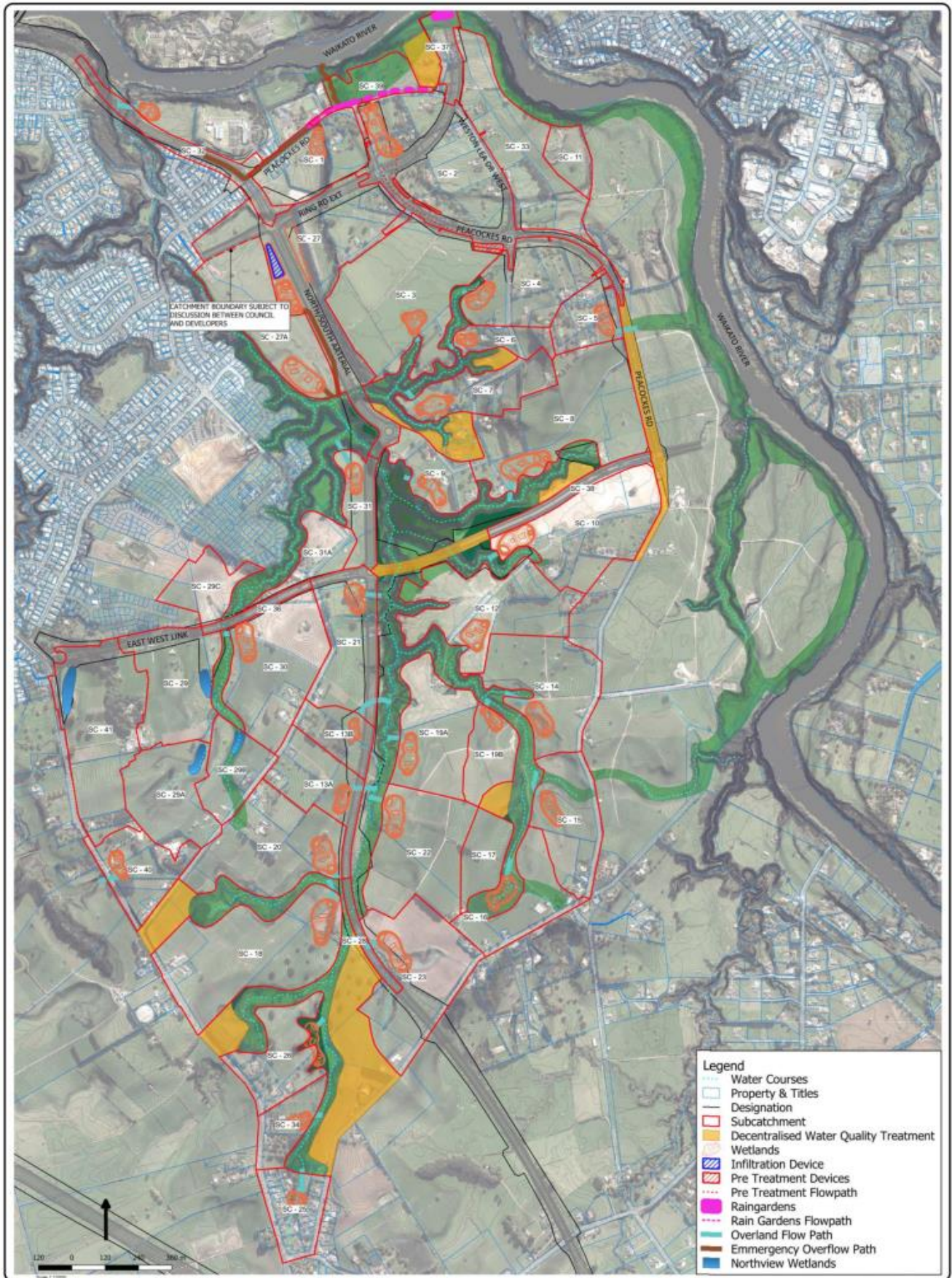


Figure 2 – Proposed stormwater treatment wetlands and associated catchments (source: HCC, 2020)

3.5. CURRENT ICMP STATUS

The ICMP is currently in final draft, requiring final technical certification from Waikato Regional Council (WRC) before it is adopted by HCC. The ICMP was initially released in draft format for consultation in Q4 of 2020 and submitted to WRC for review in late December 2020. Based on review comments received from WRC, subsequent additional technical discussions have been held with WRC on the following matters:

- The preferred MoC (infrastructure) to meet the required design parameters for at-source stormwater management requirements for roading corridors; and
- Agreement on a pathway to gain recognition of the performance of private on-lot stormwater management infrastructure and recognition in the overall catchment treatment train.

Resolution on the above matters has been agreed upon between HCC and WRC. Resubmission of the draft ICMP to WRC for technical certification has been delayed to allow the draft ICMP to be aligned with updated on-lot stormwater-related provisions proposed as part of *Plan Change 12 – Growing up*.

The updates to the draft ICMP document do not have material effect on the elements of the ICMP which have been directly reflected in the notified Plan Change 5 documents, i.e. location of proposed stormwater treatment wetlands and strategic objectives.

4. PLAN CHANGE 5 – SUBMISSIONS

Table 1 summarizes the submissions on the plan change material relating to stormwater matters. Where a submission has proposed a change to the notified version of the plan change, a recommendation has been made as to whether the change should be support by HCC or otherwise.

Table 1 – Summary of stormwater related submission on Plan Change 5

Sub N°	Submitter name(s)	Sub Point	Proposed Chapter / Appendix	Subject	Oppose/Support	Summary of Submission	Relief/Decision Sought	Comment/Recommendation
3	Mangakotukutuku Stream Care Group	3.6	Chapter 3A - Peacocke Structure Plan	DEV01-PSP: 013	Support in Part	We note from DEV01-PSP: P13 that Peacockes now includes high density housing. We are concerned this will compromise hard fought for stormwater mitigation plans in the ICMP	Confirm that changes in housing density meet the stormwater treatment requirements of the ICMP (i.e. the version last provided for public comment). It appears that the ICMP is still in draft form - it is critical that the previous stormwater treatment provisions are not watered down so the version of the ICMP referred to throughout needs to be clearly stated (see also DEV01-PSP: P60)	No changes to the stormwater treatment provisions in the draft ICMP are intended to be made. MDRS will not change overall allowable impermeable surfaces, which should mean that the design basis in the ICMP has remained unchanged.
3	Mangakotukutuku Stream Care Group	3.8	Chapter 3A - Peacocke Structure Plan	DEV01-PSP: P30	Support in Part	DEV01-PSP: P30 Protect the physical integrity and ecological and stormwater function of the Mangakotukutuku Gully and Waikato River margins.	Add underlined - Protect the physical integrity, <u>biodiversity</u> and ecological and stormwater function of the Mangakotukutuku Gully and Waikato River margins.	No opposition. Recommend for inclusion in provisions subject to advice from ecology and planning.
3	Mangakotukutuku Stream Care Group	3.10	Chapter 3A - Peacocke Structure Plan	DEV01- PSP: P70	Support	Strongly support DEV01-PSP: P70 Manage stormwater to minimise the effect of urban development on Mangakotukutuku stream values and functions, maintain the ability of the stream to continue to provide habitat for threatened aquatic species and minimise adverse effects on the stream water quality and habitat	Retain as notified.	N/A
3	Mangakotukutuku Stream Care Group	3.16	Appendix 1.3 Assessment Criteria	Oppose deletion of text under Peacocke Special Character Zone - E17 & E23	Oppose	Oppose deletion of text under Peacocke Special Character Zone. E17 The extent to which provision for effluent and stormwater disposal mitigates any risk of landslip or erosion and avoids adverse effects on water quality as it relates to ground water, the Waikato River, and the Mangakotukutuku gully ecosystem. Sediment in urban streams can become contaminated by heavy metals from roading etc so should be mentioned in addition to water quality. E23 Any cumulative effects from the activity, whether on its own or in combination with other activities in the area.	Reinstate E17 and E23 at appropriate place with underlined addition: E17 The extent to which provision for effluent and stormwater disposal mitigates any risk of landslip or erosion and avoids adverse effects on water quality, sediment quality, aquatic habitat and fish passage as it relates to ground water, the Waikato River, and/or the Mangakotukutuku gully ecosystem.	It is understood that the Peacocke Character Zone has been removed as part of the the proposed Plan Change. No change recommended.
3	Mangakotukutuku Stream Care Group	3.18	Appendix 1.4 Design Guides	1.4.10 Peacocke Local Centre Design Guide	Support in Part	Peacocke Local Centre Design Guide should include showcasing of stormwater mitigation technologies.	Add underlined - Development within the Peacocke Local Centre will be required to: 1) Have a strong emphasis on high quality urban design. 2) Demonstrate how these principles have been applied. 3) Be in general accordance with the Peacocke Town Concept Plan. 4) Be in accordance with the Peacocke Local Centre Design Guide. 5) <u>Showcase stormwater treatment opportunities through the use of rain gardens, pervious pavers, swales, catchpit filters etc</u>	Generally supportive of addition of wording requiring integration of stormwater management/treatment into urban design for the Local Centre. Wide-scale use of streetscape raingardens is generally not supported due to operation and maintenance burdens. It is recommended that the wording of Item 5 is changed to; <i>Showcase best-practice integrated stormwater management practices.</i>
13	Jones Lands Limited	13.8	Appendix 2 – Structure Plans	Location of Wetlands	Support in Part	Support in part the structure plan in particular the location mapping of the stormwater wetlands or any other reference to the same within PC5. Stormwater wetlands are currently mapped on the structure plan. The submitter generally supports the indication of location but exact location needs to be defined as part of detailed design and some stormwater wetlands may not be possible where illustrated. The underlying zoning should be identified as residential and the reference on the structure plan should change to 'indicative location' or similar as a dashed line or hatch over the residential zoning.	The underlying zoning should be identified as residential and the reference on the structure plan should change to 'indicative location' or similar as a dashed line or hatch over the residential zoning.	It is understood that the indicated proposed treatment wetlands do not alter the underlying zoning. No change recommended.
14	Northview Capital Limited (Aurora development)	14.9	Appendix 2 – Structure Plans	location mapping of the Stormwater wetlands	Support in Part	The structure plan in particular the location mapping of the Stormwater wetlands or any other refence to the same within PC5. Stormwater wetlands are currently mapped on the structure plan. The submitter generally supports the indication of location but exact location needs to be defined as part of detailed design and some stormwater wetlands may not be possible where illustrated. The underlying zoning should be identified as residential and the reference on the structure plan should change to 'indicative location' or similar as a dashed line or hatch over the residential zoning.	The underlying zoning should be identified as residential and the reference on the structure plan should change to 'indicative location' or similar as a dashed line or hatch over the residential zoning.	It is understood that the indicated proposed treatment wetlands do not alter the underlying zoning. No change recommended.

28	Richard and Elizabeth Ward	28.1	Chapter 15A: Natural Open Space Zone: Peacocke Precinct	Proposed Stormwater wetland	Oppose	The proposed Peacocke Structure Plan indicates that a significant portion of Lot 1 DP 316288 is intended to become a stormwater wetland. We oppose that change, and any consequential amendments, on the basis that it curtails our ability to develop our land.	Remove the stormwater wetland at Lot 1 DP 316288.	The indicative location of the proposed wetlands do not alter the stormwater requirements for any individual landholder or impact on the ability to develop. The wetland location and associated catchment indicate the areas where it is preferred that developers work together to develop centralized stormwater devices. It is not recommended that the indicated stormwater wetland is removed.
30	Andrea Graves	30.14	General	Bat Protection	Support in Part	Chapter 3 Structure Plans DEV01-PSP:P70: The current wording of DEV01-PSP:P70 directly contradicts cultural value D: 'The natural environment should be protected and enhanced, including the Waikato River and local waterways such as the Mangakotukutuku Gully network. The mauri, mana and quality of these waterways should be enhanced to give effect to Te Ture Whaimana o te Awa Waikato). There is a close ecological link between bats and healthy waterways. To regenerate the stream's health, a regenerated area of land around the stream's banks will be required.	Include provision for a regenerated area of land around the stream's banks and amend DEV01-PSP:P70 as follows: Manage stormwater to <u>protect and enhance the values and functions of the stream</u> to minimise the effect of urban development on Mangakotukutuku stream values and functions, and regenerate the stream's health maintain the ability of the stream to continue to provide habitat for indigenous threatened aquatic species and to have the highest water quality minimise adverse effects on the stream water quality and habitat.	The intent of the proposed changes is generally supported. The policy as notified refers to minimizing effects. The objectives of Te Ture Whaimana require protection and enhancement rather than solely a mitigation or minimization of effects. The use of 'highest water quality' is not supported as this is not a clear performance target due to the ambiguity of the term 'highest'. Recommend updating wording to ' <i>and to have water quality which reflects these outcomes</i> '
36	Waikato Regional Council	36.3	General	Biodiversity and Ecology	Support in Part	Plan Change 5 contains several key biodiversity elements which are supported. They provide for larger and connected ecological areas and identify and protect habitat of threatened species such as bats and fish. The provisions assist to control the design of any subsequent urban development in the Peacocke area to avoid or reduce effects on ecological values and habitats in terrestrial and aquatic environments which give effect to the WRPS. The maintenance of indigenous biodiversity requires active restoration and enhancement back towards key ecological thresholds. Plan Change 5 provides a significant opportunity to align biodiversity (and pending climate strategy) outcomes alongside housing and growth goals to help meet these specified biodiversity targets.	Plan Change 5 should make explicit reference to how these outcomes can be aligned. For example, restoration of the defined ecological network can incentivise permanent native forests that sequester carbon, restore lost habitat, reduce sediment run-off, and enhance natural character. Opportunities also exist to manage adverse effects of stormwater on gully systems and aquatic biodiversity by "making space for nature".	The intent of the submission comment is generally supported. Integration of more explicit outcomes around watercourse restoration will support better outcomes from a stormwater perspective. More detail from the submitter on specific changes is needed. It is recommended that HCC engage with the submitter to further understand proposed changes.
36	Waikato Regional Council	36.15	Chapter 3 - Structure Plans	DEV01-PSP: 020	Support in Part	This objective aligns with WRPS Objective 3.12, and gives effect to WRPS Policy 6.1 for development, including transport and other infrastructure, to occur in an integrated, sustainable, and planned manner. This objective could highlight an intention to regard opportunities to avoid adverse effects of development (including transport) on natural hydrological characteristics and processes, water quality and aquatic ecosystems, as set out under WRPS method 6.1.1 and development principle 6A(m). This is relevant to any stormwater management that is incorporated.	Amend to highlight intention to give effect to WRPS method 6.1.1.	HCC planning to comment – unclear how this might affect the District Plan. No recommendation can be made from a stormwater perspective.
36	Waikato Regional Council	36.18	Chapter 3 - Structure Plans	DEV01-PSP: P13	Support in Part	The submitter acknowledges that high density development along areas of natural open space, in particular the river corridor and gully network, can increase stormwater volumes through increased impervious surfaces and also increase contaminants directly entering waterways. As such, this provision should be amended to consider such effects. The submitter recommends strengthening the alignment of point 2 with DEV01-PSP: 015.	Seeks DEV01-PSP: 015 be re-worded so that any development adjacent to ecological areas will be managed to protect and enhance ecological functions and processes. Amend point 2. to read: May be provided along areas of natural open space including the river corridor and gully network <u>where ecological functions and processes can be protected and enhanced.</u>	It is assumed that the submission refers to changes to DEV01-PSP: P13. The intent and wording of the proposed changes are generally supported as they reflect the objectives of Te Ture Whaimana. It is recommended that HCC consider adopting the proposed changes to DEV01-PSP: P13.
36	Waikato Regional Council	36.24	Chapter 3 - Structure Plans	DEV01-PSP: P30	Support in Part	Protection of the physical integrity of the river and gully system in the Peacocke area and its ecological functioning is supported as giving effect to WRPS Policies 8.3 and 11.1. Reference to "stormwater" as a function of a natural system is not appropriate, natural drainage into the gully system is part of its hydrological functions which are covered more broadly by the term "ecological functions". The policy would also benefit from broader reference to indigenous aquatic biodiversity, in addition to ecological functions, consistent with submissions above seeking addition of an Objective addressing aquatic biodiversity values and functions of the ecological network linked to the Mangakotukutuku Gully.	Amend Policy as follows: Protect the physical integrity, and ecological and stormwater functions <u>and aquatic biodiversity</u> values of the Mangakotukutuku Gully and Waikato River margins.	The intent and wording of the proposed changes are generally supported. However, it is not clear that 'ecological functions' covers 'stormwater' as described. It is recommended that 'stormwater' is replaced by 'hydrologic' in the proposed wording of the provision.
36	Waikato Regional Council	36.29	Chapter 3 - Structure Plans	DEV01-PSP: P70	Support in Part	Policy direction to manage adverse effects of stormwater on ecological functions, habitats, and water quality is supported as giving effect to WRPS Policies 8.3, 8.5, 11.1 and 12.2. The current wording of the policy can be amended to reduce duplication (i.e.	Amend Policy as follows: Manage stormwater to minimise the effect of urban development on the Mangakotukutuku stream values and functions, maintain the ability of the stream to continue to provide habitat for threatened aquatic species and minimise adverse effects on the stream water quality and	The intent and wording of the proposed changes are generally supported as they reflect the objectives of Te Ture Whaimana. It is recommended that HCC consider adopting the proposed changes to DEV01-PSP: P70.

						maintain habitat and minimise effects on habitat) and improve clarity.	habitat and enhance riparian and aquatic habitat and control adverse effects onstream water quality and habitat.	
36	Waikato Regional Council	36.35	Chapter 4A - Peacocke Medium Density Residential Zone	MRZ - PREC1-PSP: R37	Support in Part	WRC technical staff note that HCC has included the proposed 80% impermeable surface standard into its hydrological assessments and hydraulic models to determine peak flows etc. This stormwater management approach relies on large, constructed wetlands to provide water quality treatment, extended detention (to help mitigate erosion and scour effects in the streams) and to attenuate peak flows to pre-development rates for the 2- and 10-year Annual Return Interval (ARI) events. HCC also proposes a 10mm retention across the catchment to maintain adequate base flow for streams. HCC proposes to over-retain on-lot to achieve the 10mm retention across developed areas. WRC does not support overretention on-lot in lieu of retention in roading corridors.	Amend the approach to require the retention of road runoff volume within the road corridor and not pass on the responsibility to compensate for this volume onto third party lot owners.	It is considered that this submission does not relate to material notified as part of Plan Change 5, it relates to specifics of the Mangakootukutuku ICMP. Subsequent technical discussions since this submission have been held between WRC and HCC on this issue with agreement being reached on appropriate wording of the ICMP. No changes to the notified Plan Change 5 material is recommended.
36	Waikato Regional Council	36.44	Chapter 23A Subdivision: Peacocke Precinct	SUB-PREC1-PSP: P4	Support in Part	To be consistent with subdivision objective O9, this policy needs to protect and restore elements of the natural environment and of the defined ecological network. Part 5 needs to also reflect that the margins of rivers and gullies and lakes need to be protected and managed and that reference to wetlands should be added (noting that wetlands have been identified and are contained on the planning maps in Appendix 17A). Some of these identified wetlands sit outside the defined Natural Open Space Zone. For clarity, those proposed stormwater wetland areas identified on the Peacocke Structure planning maps should also be included as they provide important ecological infrastructure to protect gully systems and aquatic habitat from the adverse effects of urbanisation. The words “where possible” are not necessary. In addition, this policy is heavily reliant on scheduling through the District Plan to protect archaeological, cultural, and built heritage. The submitter considers that this does not appropriately provide for the protection of wāhi tapu and other taonga which can often be kept in iwi private records but should still be protected. The same applies to many items listed by Heritage NZ. This provision could be amended to more accurately reflect WRPS wording, with direction from WRPS method 10.3.1 being to “protect historic and cultural heritage from inappropriate subdivision use and development.”	Amend Policy subject to recommendations provided and to incorporate the following: SUB-PREC1-PSP: P4 Subdivision avoids, remedies or mitigates adverse effects on: , <u>protects and where possible enhances any:</u> 1. Scheduled heritage items. 2. Scheduled archaeological and cultural sites. 3. Scheduled significant trees. 4. Scheduled significant natural areas. 5. The Waikato River, and gullies and river banks, lakes, rivers and streams their margins, lakes, wetlands and their margins, including proposed stormwater wetlands identified on Peacocke Structure plan maps.	It is not recommended to include stormwater wetlands in the proposed wording updates to the policy. It is not considered that protection & enhancement is relevant to stormwater wetlands as these form part of the mechanism to protect and enhance existing natural features.
36	Waikato Regional Council	36.47	Chapter 23A Subdivision: Peacocke Precinct	SUB - PREC1-PSP: P19	Support	The term “ecological areas” could be expanded to include “infrastructure”. This would incorporate elements such as proposed stormwater wetlands that are critical to water management and aquatic biodiversity outcomes for Peacocke.	Retain and amend term as follows: “ecological areas <u>or infrastructure</u> ”. For improved plan interpretation this policy should be moved alongside P4 and P5 as they provide a package of environmental based policy directions that give further direction to Objective O9	It is not recommended that the wording of the policy be expanded to infrastructure. The term ‘infrastructure’ is very generic and encompasses a whole range of things including 3 waters, roading, comms & electricity etc. There is some concern around wording of policies or objectives that equate (or could be interpreted to equate) the constructed wetlands to ecological areas. The primary purpose of the constructed wetlands is to receive and treat contaminated stormwater runoff to protect downstream ecological areas. Constructed wetlands can have secondary benefits that include providing habitat or amenity values, however it needs to be acknowledged that during normal function of the wetland there will be times when water quality in parts of the wetland won't align ecological values.
40	AJ and HC Koppens	40.2	Chapter 3A - Peacocke Structure Plan	Stormwater wetland location	Oppose	The location of the stormwater wetland is opposed. It is considered that a more appropriate location for the wetland (identified in Figure 1 of the submission) is in the Open Space zoned land to the north and for it to be combined with the wetland proposed by Council on the southern side of Peacockes Road. This is because the size of the wetland is disproportionate to the contributing catchment served. The combined wetland is a considerably more efficient use of land, would be more easily accessible for maintenance, and more consistent with Council’s desire to minimise the number of stormwater devices in the network. An additional positive effect would be the potential for the wetland surrounds to be extensively landscaped to improve this entrance to both the Park and the High Density Housing area. The proposed wetland location will make the most of what would otherwise be a surplus area of the park that is	Amend the proposed location of the stormwater wetland identified in Figure 1 of the submission to the north of the proposed sports park access road and amalgamate it into the proposed Council wetland on Peacockes Road.	Placement of centralized treatment wetlands within Open Space zoned land is not supported. The Open Space Zone typically cover the gully system and immediate surrounds which should be restored & enhanced.

						not large enough for any other purpose and free up additional space at 20 Peacockes Lane for residential development. If the detailed design demonstrates the area within the park is not big enough then the submitters would be open to discussions on potentially shifting the access road south slightly to accommodate the wetland device.		
41	Shortbread Limited	41.32	Appendix 2 – Structure Plans	Figure 2-1: Peacocke Structure Plan – Land Use	Oppose	<p>The submitter opposes the proposed stormwater wetland location in SC-7 and delineation on the identified area due to the following reasons:</p> <ul style="list-style-type: none"> • it is located on the upper terraced area where residential development should occur. • Discharge from upper terraced area into gullies will be a significant drop and likely require significant energy dissipation features to be constructed down the gully banks. • The indicative stormwater device is significantly oversized • Stormwater wetlands will be required to be constructed at a level lower than the surrounding flat terrace to be utilised for residential development, this will enable stormwater to enter the wetland by gravity. Having wetlands on upper terraces will require significant excavation to lower wetlands to enable all residential area with the catchment to drain to the wetland. As such it is considered that the wetland stormwater pond needs to be located at the head of the gully areas that have no major ecological value (such as that photographed below) to enable logical discharge and to allow stormwater from developed terraced areas to be able to discharge by gravity to wetlands 	The submitter seeks that the location and declination of the proposed stormwater wetland is amended as indicated in the attached stormwater assessment.	<p>The location of the proposed stormwater wetland put forward by the submitter is located within the Mangakootukutuku gully system. This is generally not supported as it does not align with the intent of the regional policy or NPS-FM/NES-FM.</p> <p>Locations of the wetlands are indicative and alternative locations can be proposed through the resource consent process however, alignment with the relevant regulatory framework would need to be demonstrated.</p> <p>No changes are recommended.</p>
44	Cordyline Holdings Ltd	44.2	Appendix 2 – Structure Plans	Figure 2-1: Peacocke Structure Plan – Land Use	Support in Part	<p>Cordyline Holdings seeks that the Proposed Neighbourhood Park annotation on the map is deleted from the land held in Computer Freehold Register Identifier 628002 and relocated to the south to the position shown on Figure 2-3: Peacock Structure Plan – Natural Environment and Heritage. The plan in Figure 2-1 makes provision for a substantial area of Proposed Natural Open Space for the Whatukoruru Reserve and 16 Proposed Neighbourhood Parks within the structure plan. Locating the Proposed Neighbourhood Park shown on the land held in Computer Freehold Register Identifier 628002 further to the south will achieve a better distribution of open space within the High Density Overlay Area in the structure plan area. Cordyline Holdings seeks that the Proposed Stormwater Wetland annotation on the map is deleted from the land held in Computer Freehold Register Identifier 628002. The supporting technical assessment does not provide an assessment of the number, size and distribution of Proposed Stormwater Wetlands. Flexibility is provided for in the ICMP in relation to the sizing of stormwater management devices and therefore it is not appropriate to identify fixed locations as part of the Structure Plan. Further information on the supporting technical assessment is requested.</p>	<p>Make amendments to the plan in Figure 2-1 as follows:</p> <p>a) Delete Proposed Neighbourhood Park from the land held in Computer Freehold Register Identifier 628002 and relocate to the south to the position shown on Figure 2-3: Peacock Structure Plan – Natural Environment and Heritage.</p> <p>b) Delete the Proposed Stormwater Wetlands from the land held in Computer Freehold Register Identifier 628002.</p>	<p>Deletion of the proposed stormwater wetland put forward by the submitter is not supported. It is acknowledged that the ICMP does provide for some flexibility around location and size of centralized treatment devices however, the indicated locations and associated catchment show where developers are expected to work together to achieve integrated outcomes.</p> <p>No changes are recommended.</p>
47	Pragma Homes Ltd	47.1	Appendix 2 – Structure Plans	Ecology (Storm Water Wetlands)	Support in Part	<p>The proposed stormwater wetland as seen in the natural environment and heritage plan (Appendix 2) is indicated to be within the southern links designation. Further clarification is sought regarding the intention of this wetland and if it falls under the ‘creation of new wetlands’ to address loss or fragmentation of moderate and low value habitation as referenced in Table 2 (Section 4.2, Appendix J). If so, does the enhancement or construction of this wetland then constitute the key at habitat and bat buffer specifications i.e., 20m buffer and 0.3 lux measures at boundary.</p>	<p>Further clarification from Council is sought regarding the intention of the stormwater wetland that are comprised within the southern links designation.</p>	<p>The proposed stormwater treatment wetlands within the Southern Links have been located (and sized) to treat stormwater runoff from the roading corridor and surrounding land holdings in some cases. Requirements dictated by bat corridors have not necessarily been taken into account and may need to be considered at resource consent.</p>
48	Gregory Alan Knight	48.31	Appendix 2 – Structure Plans	Figure 2-1: Peacocke Structure Plan – Land Use	Oppose	<p>The submitter opposes the proposed stormwater wetland location on 103 and 111 Peacockes Lane and delineation on the identified area. It is located on the upper terraced area where residential development should occur. Discharge from upper terraced area into gullies will be a significant drop and likely require significant energy dissipation features to be constructed down the gully banks. The indicative stormwater device is significantly oversized. Stormwater wetlands will be required to be constructed at a level lower than the surrounding flat terrace to be utilised for residential development, this will enable stormwater to enter the wetland by gravity. Having wetlands on upper terraces will require significant excavation to</p>	<p>The submitter opposes the proposed stormwater wetland location on 103 and 111 Peacockes Lane and delineation on the identified area.</p>	<p>Deletion of the proposed stormwater wetland put forward by the submitter is not supported. Locating constructed wetlands within the gully extent is generally not supported as it does not align with the intent of the regional policy or NPS-FM/NES-FM.</p> <p>Sizing and final location of the wetland will need to be refined through the resource consent process. No changes are recommended.</p>

						lower wetlands to enable all residential area with the catchment to drain to the wetland. As such it is considered that the wetland stormwater pond needs to be located at the head of the gully areas that have no major ecological value to enable logical discharge and to allow stormwater from developed terraced areas to be able to discharge by gravity to wetlands.		
51	Ebenezer Property Limited Partnership	51.32	Appendix 2 – Structure Plans	Figure 2-1: Peacocke Structure Plan – Land Use	Oppose	The submitter opposes the proposed stormwater wetland location in SC-7 and delineation on the identified area due to the following reasons: • it is located on the upper terraced area where residential development should occur. • Discharge from upper terraced area into gullies will be a significant drop and likely require significant energy dissipation features to be constructed down the gully banks. • The indicative stormwater device is significantly oversized • Stormwater wetlands will be required to be constructed at a level lower than the surrounding flat terrace to be utilised for residential development, this will enable stormwater to enter the wetland by gravity. Having wetlands on upper terraces will require significant excavation to lower wetlands to enable all residential area with the catchment to drain to the wetland.	The submitter opposes the proposed stormwater wetland location in SC-7 and delineation on the identified area. The submitter seeks the wetland stormwater pond needs to be located at the head of the gully areas that have no major ecological value (such as that photographed below) to enable logical discharge and to allow stormwater from developed terraced areas to be able to discharge by gravity to wetlands.	Deletion of the proposed stormwater wetland put forward by the submitter is not supported. Locating constructed wetlands within the gully extent is generally not supported as it does not align with the intent of the regional policy or NPS-FM/NES-FM. Sizing and final location of the wetland will need to be refined through the resource consent process. No changes are recommended.
52	Jacky Li and Alex Zheng	52.35	Appendix 2 – Structure Plans	Figure 2-1: Peacocke Structure Plan – Land Use	Oppose	The submitter opposes the proposed stormwater wetland location on the neighbours' land at 103 and 111 Peacockes Lane and delineation on the identified area due to the following reasons: • it is located on the upper terraced area where residential development should occur. • Discharge from upper terraced area into gullies will be a significant drop and likely require significant energy dissipation features to be constructed down the gully banks. • The indicative stormwater device is significantly oversized • Stormwater wetlands will be required to be constructed at a level lower than the surrounding flat terrace to be utilised for residential development, this will enable stormwater to enter the wetland by gravity. Having wetlands on upper terraces will require significant excavation to lower wetlands to enable all residential area with the catchment to drain to the wetland. As such it is considered that the wetland stormwater pond needs to be located at the head of the gully areas that have no major ecological value (such as that photographed below) to enable logical discharge and to allow stormwater from developed terraced areas to be able to discharge by gravity to wetlands.	Amend as sought in the submission.	Deletion of the proposed stormwater wetland put forward by the submitter is not supported. Locating constructed wetlands within the gully extent is generally not supported as it does not align with the intent of the regional policy or NPS-FM/NES-FM. Sizing and final location of the wetland will need to be refined through the resource consent process. No changes are recommended.
53	The Adare Company	53.61	Chapter 15A: Natural Open Space Zone: Peacocke Precinct	NOSZ-PREC1-P: Rules – Activity Status Table	Oppose	Stormwater management devices, ponds, wetlands and wastewater pump stations are all activities which would be appropriately located in the Natural Open Space Zones. The Natural Open Space zoned land is commonly located in areas of low topography where stormwater management devices and pump stations are normally positioned. Enabling this infrastructure to be sited in (or partially in) Natural Open Space Zones will potentially minimise loss of developable land within Medium Density Residential zoned areas	Add new rules in NOSZ-PREC1-P: Rules – Activity Status Table for the following activities: • Stormwater management devices, ponds and wetlands. Activity Status: Permitted • Wastewater pump stations. Activity Status: Permitted	It is not recommended to update the activity status for the Natural Open Space Zone. The Natural Open Space Zone is mostly made up of the Mangakootukutuku gully system, which is generally inappropriate for locating stormwater treatment devices.

5. MEDIUM DENSITY RESIDENTIAL STANDARDS (MDRS)

As part of the submission process for Plan Change 5, HCC are seeking to align Plan Change 5 with the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act and associated Medium Density Residential Standards (MDRS). The MDRS seeks to increase housing density within residential zones.

While the MDRS will increase housing density, maximum site impervious cover limits are not changing as part of the Plan Change 5 MDRS update. As such, the design basis for the stormwater infrastructure remains unchanged. Overall, the proposed changes in the Plan Change 5 MDRS update do not impact the stormwater aspects of the Plan Change.

It is considered that the increased allowable housing density within the MDRS will make it more likely on average that development sites will achieve maximum impervious coverage. This makes it increasingly important that stream enhancement and restoration outcomes are achieved in parallel to adequately designed strategic stormwater management infrastructure to maximize the resilience of the Mangakootukutuku Stream.

6. SUMMARY & CONCLUSIONS

CES were engaged by HCC to provide expert technical advice in relation to stormwater matters to support the submission and subsequent hearing process for Plan Change 5 – Peacocke Structure Plan.

The purpose of this report is to:

- Present a concise summary of the relevant elements Mangakootukutuku Integrated Catchment Management Plan (ICMP) used to inform the notified Plan Change 5 material.
- Summarise submissions made on the notified Plan Change 5 documents in relation to stormwater matters and provide a recommendation on any proposed changes to the Peacocke Structure Plan.
- Review the proposed updates to Plan Change 5 in response to the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act and comment on any matters relating to stormwater.

The draft Mangakootukutuku ICMP was used to inform the following elements of the Plan Change:

- As a part of the overall strategic document framework which has been used to develop the policies and objectives in the Peacocke Structure Plan, i.e. to align these with the strategic objectives of the ICMP.
- Indicative locations of centralized stormwater treatment wetlands developed as part of the technical investigations which support the ICMP have been shown as features on the land use map included as Figure 2-1 in the notified Plan Change 5 material and are referenced within the infrastructure staging section of the Structure Plan.

The proposed centralised stormwater treatment wetland locations are considered to be the key piece of technical analysis undertaken as part of the ICMP which inform Plan Change 5.

The ICMP recognises the need for refinement of these designs during the consenting and sub-division design process. Land ownership at the time of development and change in landform associated with sub-division earthworks will have some impact on exact location and area draining to each wetland however, the conceptual arrangements developed for the ICMP provide a reasonable basis for understanding future strategic stormwater infrastructure requirements.

In total 53 submissions were identified as requiring a response from a stormwater perspective. Specific responses are detailed in Table 1. Submissions generally fall into two categories:

1. Minor wording changes to policies or objectives
2. Objections or requests to remove indicated proposed wetland locations

The intent of the first category has typically been supported as submission have generally sought to strengthen biodiversity and stream restoration outcomes which aligns with the objectives being sought in the Mangakootukutuku ICMP. Some submissions were deemed to add ambiguity and the specific wording has not been supported.

The second category has been ubiquitously not supported. The treatment wetlands mapped as features on the landuse maps in the notified Structure Plan are indicative and intended to demonstrate the preferred Means of Compliance for the catchment. The treatment wetland concept design was undertaken by BBO as

part of the technical investigations to support the Mangakootukutuku ICMP. The methodologies and approaches adopted in the sizing and location of the proposed treatment wetlands have been reviewed, with the following conclusions made;

- The average contributing catchment area size for each treatment wetland is consistent with the preferred vested asset type specified by the RITS.
- Wetland locations align well with available existing topographic data. It is acknowledged that subdivision design will alter existing topography.
- Proposed wetland sizing is somewhat conservative when compared to recently constructed devices within Hamilton. Given that the wetland designs are conceptual and the purpose of the sizing is primarily to inform LTP cost estimates, the conservative nature is considered appropriate.

The treatment wetlands will be subject to further design as part of the resource consent process which will refine the size and location of each device.

While the MDRS will increase housing density, maximum site impervious cover limits are not changing as part of the Plan Change 5 MDRS update. As such, the design basis for the stormwater infrastructure remains unchanged. Overall, the proposed changes in the Plan Change 5 MDRS update do not impact the stormwater aspects of the Plan Change.

7. REFERENCES

- AECOM (2019). *Constructed Wetlands Guidance – Bat and Lizards (memorandum)*. AECOM NZ Ltd Nov 2019.
- AECOM (2020a). *Mangakotukutuku ICMP Hydrogeological & Geotechnical Investigations – Stage 1*. AECOM NZ Ltd May 2020.
- AECOM (2020b). *Mangakotukutuku ICMP Stage 2 - Hydrogeological Investigation*. AECOM NZ Ltd May 2020.
- AECOM (2020c). *Mangakotukutuku ICMP Stormwater Model - Model Build Report*. AECOM NZ Ltd Oct 2020.
- AECOM (2020d). *Addendum Report Stage 2 - Setback Assessment*. AECOM NZ Ltd Oct 2020.
- AECOM (2020e). *Mangakotukutuku Hydrogeology and Geotechnical Stage 2 - Gully Hazard Setback Assessment*. AECOM NZ Ltd Oct 2020.
- BBO (2020). *Mangakotukutuku ICMP Greenfields Stormwater System Report*. Bloxam Burnett & Oliver Ltd Dec 2020.
- HCC (2020). *Mangakotukutuku Integrated Catchment Management Plan Final Draft*. Hamilton City Council Dec 2020.
- Morphum (2020a). *Watercourse Assessment Report Mangakotukutuku Catchment*. Morphum Environmental Ltd May 2020.
- Morphum (2020b). *Mangakotukutuku Water Quality Modelling Report (memorandum)*. Morphum Environmental Ltd Nov 2020.
- T&T (2017). *Mangakotukutuku ICMP - Ecological Information*. Tokin + Taylor Ltd Sep 2017.

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APPENDICES

Appendix A. ICMP Objectives

The table below summarizes the strategic objectives as documented in the draft Mangakootukutuku ICMP (as of Dec 2020).

Ref no.	Strategic Objective
01	<p>Protect freshwater systems</p> <p>Maintain, protect, and restore freshwater ecosystems, habitats, natural drainage systems and amenity by safe guarding the life-supporting capacity, improving water quality where degraded and protecting significant values of, wetlands and freshwater bodies. Provide for connectivity, buffering and enhancement of, and between, terrestrial and aquatic habitats and ecosystems.</p>
02	<p>Protect terrestrial systems</p> <p>Maintain, protect, and restore indigenous biodiversity values, functions and amenity for terrestrial ecosystems and habitat of indigenous fauna. Provide for connectivity, buffering and enhancement of, and between, terrestrial and aquatic habitats and ecosystems.</p>
03	<p>Kaitiakitanga</p> <p>Give effect to the relationship of tangata whenua as kaitiaki of receiving water bodies, including the relationship of Waikato-Tainui with the Waikato River.</p>
04	<p>Stormwater Management</p> <p>Stormwater management related to land use and development shall encourage and enable low impact design and incorporate best practicable mitigation measures to minimise actual and potential adverse effects on:</p> <ul style="list-style-type: none"> • Receiving water bodies in terms of quantity and quality of stormwater discharges; • Locations and communities subject to flood hazards; • Natural groundwater levels; and • Baseflows for freshwater systems.
05	<p>Wastewater Management</p> <p>Wastewater management shall incorporate best practicable options and be managed so that:</p> <ul style="list-style-type: none"> • Conveyed network volumes are minimised, (e.g. by demand management and management of stormwater infiltration); and • Dry weather overflows are prevented, and wet weather overflows are minimised.
06	<p>Potable Water Management</p>

	<p>Water supply is planned and provided for in a way that meets existing and future requirements to:</p> <ul style="list-style-type: none"> • Provide firefighting water supply (flow and pressure) by conforming to the Code of Practice for Fire Fighting Water Supplies; • Meet domestic, commercial, and industrial water demand; and • Ensure water consumption is managed to minimise peak and total demand.
07	<p>Three Waters Management</p> <p>Three waters networks are planned, managed, and operated in an integrated manner to:</p> <ul style="list-style-type: none"> • Meet existing and future development requirements whilst maintaining human and ecosystem health; • Meet design standards, consent conditions and regulatory levels of service; • Ensure assets, technology and resources have capacity, redundancy (n+1), knowledge and plans to prevent or cope with unplanned events; • Minimise the need for new infrastructure including by optimising the use, operation, and maintenance of existing assets; and • Protect people and property
09	<p>Enabling Development</p> <p>Provide enough urban development capacity to meet long term demand.</p>
010	<p>Catchment Specific Objectives</p> <ul style="list-style-type: none"> • Provide access to waterways for maintenance, cultural and recreational purposes; • Maximise housing yield without compromising environmental outcomes; • Integrate stormwater devices and controls into the urban landscape as amenity features; • Provide expression of cultural values unique to the Catchment; • Protect and enhance biodiversity values unique to, or prevalent in, the Catchment; and • Maintain baseflow to the Mangakootukutuku Stream.

Appendix B. ICMP Design Parameters

The table below summarizes the design parameters as documented in the draft Mangakootukutuku ICMP (as of Dec 2020).

REF	Design Parameter	Sub-catchment			
		Tiireke	Te Horanganui	Hahawaru	Kairokiroki
Devices					
1	Gross Pollutant removal	√	√	√	√
2	Water Quality - contaminant removal that complies with RITS and Waikato Stormwater Management Guideline.	√	√	√	√
3	Water Quality – High contaminant load surfaces (as defined by the RITS) to provide two phase treatment where reasonably practicable.	√	√	√	√
4	Extended Detention.	√	√	√	Optional to reduce outfall size
5	2 Year Attenuation.	√	√	√	Optional to reduce outfall size
6	10 Year Attenuation.	√	√	√	Optional to reduce outfall size
7	100 Year Event Attenuation (Flood Control) Error! Reference source not found. shows locations where 100 year event attenuation is required. For Te Horanganui Sub-catchment, 100 year event attenuation only applies in some circumstances and locations.	X	√	√	Optional to reduce outfall size
8	Retention to ground of initial 10 mm of rainfall on average across the site except within the primary geotechnical hazard line. Retention to ground devices should be located on sites as far back from gully edges as is practicable.	√	Optional	Optional	Optional

REF	Design Parameter	Sub-catchment			
		Tiireke	Te Horanganui	Hahawaru	Kairokiroki
9	Retain a minimum of the initial abstraction volume on average across the site. Match pre-development runoff volume through reduced runoff practices & sub-catchment management including soakage and reuse. Where this cannot be achieved, mitigation within the receiving environment will be required.	√	√	√	
10	Soakage of the 10 year event to be provided where soakage rates meet RITS thresholds. Soakage devices should be as far back from gully edges as is practical. If 10 year soakage devices are within 20 m of the secondary gully setback line, consideration shall be given to the effects on bank stability and risk of piping.	√	√	√	√
11	<23°C at the point of discharge to a waterway and water temperature change of no more than 3°C. Achieved via wetland planting over 80% of the device area or vegetated swale as per the RITS.	√	√	√	√
12	Stabilised outfall to receiving environment for primary and secondary discharges	√	√	√	√
13	Lots with High Risk activities require a Pollution Control Plan as per the Hamilton Stormwater Bylaw 2015, and on-lot source control and treatment.	√	√	√	√
14	Sub-catchment devices within or partly within the secondary geotechnical hazard line are required to have impermeable liners extended to the top of the 10 year flood level, unless it is demonstrated that risk of geotechnical failure or piping as a result of concentrated stormwater discharge to ground adjacent the gully is acceptably managed.	√	√		√
15	Prior to construction of sub-catchment stormwater devices, groundwater (depth) monitoring at the location of each stormwater device is required from a groundwater monitoring well. For devices with an impermeable (lined) layer, a minimum of monthly readings over July - November is	√	√	√	√

REF	Design Parameter	Sub-catchment			
		Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	required. For devices with a permeable (unlined) layer, a minimum of monthly readings for a 12 month period is required. If the year is unseasonably wet or dry, then the monitoring should be repeated for another complete cycle.				
16	Flooding freeboards (as defined by the ODP) shall be provided above 100 year MPD mitigated flood levels.	√	√	√	√
17	Sub-catchment stormwater devices to provide demonstrated amenity and ecological function in line with ICMP guidance (Appendix A), and educational signage in line with RITS drawing 4-34.	√	√	√	√
In Receiving Watercourse (achieved after reasonable mixing)					
18	Avoid as far as practicable, and otherwise minimise: Turbidity greater than 25 NTU in the stormwater discharge. Dissolved oxygen levels not to fall below 80%. pH to outside 6 to 9. Water temperature changing by 3 °C or exceeding 25 °C. Ammoniacal nitrogen concentrations above 0.88 mg/L	√	√	√	√
19	No conspicuous changes in colour downstream of the discharge point	√	√	√	√
20	Greater than 80% of saturation concentration. If the concentration of dissolved oxygen in the receiving environment is below 80 percent saturation concentration, any discharge into the water shall not lower it further. (WRC Regional Plan).	√	√	√	√
21	No increase in water levels and peak flows downstream unless it can be demonstrated to Council's satisfaction that there is no significant adverse cumulative effect. Location	√	√	√	

REF	Design Parameter	Sub-catchment			
		Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	of compliance achievement is downstream from any sub-catchment device.				
22	Mitigation of residual effects of hydrology changes through financial contribution to Council's erosion programme of works, or through erosion prevention works.	√	√	√	

Appendix C. ICMP Means of Compliance

The table below summarizes the design parameters as documented in the draft Mangakootukutuku ICMP (as of Dec 2020).

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
1	<p>Accidental Discovery Protocol</p> <p>During development works; in the event of discovery of artefacts that may have potential cultural or historical significance, the appropriate iwi representatives and authorities shall be notified.</p>	During physical works or investigation	√	√	√	√
2	<p>Standard requirements for all Lots include</p> <ul style="list-style-type: none"> No exposed zinc or copper building products. High Contaminant Load areas to drain to stormwater treatment device (e.g. swale etc.) prior to treatment in sub-catchment device where reasonably practicable. Catchpits designed for capture of gross pollutants (as per RITS). Retain a minimum of the initial abstraction volume on average across the site for new impervious areas if there is a discharge to a stream prior to the River. Pervious areas are to be remediated. Retaining more where soil conditions allow is supported. Match pre-development runoff volume through reduced runoff practices & sub-catchment management including soakage, reuse and/or reduced impervious areas. Where this cannot be fully achieved, mitigation within the receiving environment will be 	At time of resource consent and building consent	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>required such as channel stabilisation and/or a financial contribution for a third party to undertake downstream erosion prevention (such as via Hamilton City Council's erosion programme).</p> <ul style="list-style-type: none"> At the time of writing, the Waikato Regional Council does not accept oversized on-lot-devices as offsetting the initial abstraction volume for adjacent roads. This may be the subject of further discussion between Hamilton City Council and Waikato Regional Council. 					
3	<p>Lots with High Risk activities require a Pollution Control Plan and site-specific on-lot source control and treatment design.</p>	<p>At the time of building consent and/or Hamilton City Council resource consent and/or as required by the Hamilton City Council Stormwater Bylaw.</p>	√	√	√	√
4	<p>Centralised devices (e.g. Wetlands)</p> <ul style="list-style-type: none"> To be located and sized to ensure design flows are captured and managed and operation and maintenance costs are kept to a practical minimum. Devices are to be consolidated where reasonably possible. Devices to be off-line from watercourses. 	<p>At time of building consent and/or Hamilton City Council resource consent</p>	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<ul style="list-style-type: none"> • Devices to have high flow bypasses, or to demonstrate through modelling that peak velocities do not exceed 0.25m/s in the device or forebay in any event up to the 100 year ARI. • Where linear wetlands are installed, high flow bypasses are generally required. • New greenfields centralised devices and device sub-catchments located within the Hamilton City boundary to be in accordance with Error! Reference source not found. and Error! Reference source not found.. Devices may be reshaped or shifted slightly to integrate into development planning. Devices are shown in Council's preferred locations. If strong justification is provided for moving a stormwater device (aside from minor shifts) these changes may be considered by Council provided devices meet ICMP objectives, are able to service their entire sub-catchment and do not result in splitting up of devices. Consultation with effected landowners would be required. In most cases, stormwater devices will cater for multiple developments. • Developers shall endeavour to design subdivisions so that all stormwater within sub-catchments is treated by that sub-catchment device. Where a thorough attempt has been made and it is demonstrated that minor areas are unable to be drained to their respective sub- 					

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>catchment device (e.g. due to restrictive topography in the extremities of a sub-catchment), developers may propose decentralised solutions for consideration that meet all design parameters. The number of outfalls from any decentralised devices shall be minimised/consolidated.</p> <ul style="list-style-type: none"> • Minor changes to rationalise device sub-catchment boundaries are permissible by agreement between parties provided they do not result in splitting up of device sub-catchments. • Water Quality - Water quality treatment is required as per the design parameters table. • Submerged Outlets must comply with the RITS. • Groundwater (depth) monitoring is required as per the design parameters. • Vesting - Devices must be compliant with design parameters prior to vesting to Hamilton City Council and for the duration of the defects liability period and planting maintenance period. If the entire contributing catchment has not been developed at the time of vesting, alternative methods for demonstrating compliance will be required. Detailed operations and maintenance plans shall be provided to Hamilton City Council prior to vesting. • Biodiversity. Devices must be designed to provide terrestrial biodiversity function, and be 					

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>sized and located at consent and detailed design stages with consideration of provision of ecological buffering to green corridors. Guidance on biodiversity enhancement for wetlands is provided in Appendix A. Resource consent applications must demonstrate how this guidance has been followed.</p> <ul style="list-style-type: none"> • Amenity and Access. Stormwater wetlands shall have walkways around part of the extent for safe public access in addition to standard maintenance requirements, and shall be designed to maximise their amenity value. Resource consent applications must demonstrate how this will be achieved. • On-lot Devices. At the time of writing, the Waikato Regional Council does not accept on-lot-devices as offsetting part of the sub-catchment stormwater device size. This may be the subject of further discussion between Hamilton City Council and Waikato Regional Council. 					
5	<p>Residual Water Quality Effects</p> <p>Developers are required to identify stormwater discharges that may have a post-treatment negative impact on water quality. Where it is identified that treated stormwater will have a residual contaminant load (for contaminants including at a minimum TN, copper, zinc and TSS) above background concentrations, offsets shall be carried out. Offsets shall be additional to, not instead of, providing best practice stormwater</p>	At time of resource consent	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	management as set out in this ICMP. Offsets may include additional restoration planting. The ICMP has proposed as a future action, developing a strategic framework for water quality offsets.					
6	Developers and Key Stakeholders shall work together and collaborate with Hamilton City Council to effectively implement the Mangakootukutuku ICMP to implement the solutions and meet the requirements of the ICMP.	At time of resource consent	√	√	√	√
7	Overland Flow Paths (OLFP's): Developments must allow for, and protect via an easement, existing overland flow paths discharging onto any lot. Detailed design is required to accommodate up to the 100 year post-developed flows from neighbouring catchments.	At time of building consent and/or resource consent	√	√	√	√
8	Stabilised outlet to the Stream/River All discharges points from development to the stream or river should where practical be via a vegetated surface outlet in preference to piped outfalls. Outfalls should be located as shown in Error! Reference source not found. unless a better outcome is demonstrated by the developer to the satisfaction of Council, considering environmental outcomes, growth, and whole of life costs. Outfall design must adhere to the following principles: <ul style="list-style-type: none">All outlets must be designed to convey the 100 year maximum probable development flows to the stream or river without causing erosion;	At time of resource consent	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<ul style="list-style-type: none"> • Outfalls should not restrict terrestrial habitat and should be blended into the ecological landscape. • Consider potential impacts on cultural and historical sites; • Minimise the habitat impact on river/stream banks, floodplains, gullies, riparian margins and aquatic habitat; • Avoid, as much as practical, placing outfalls in locations that provide unique spawning opportunities; • Avoid damaging point bars in the Waikato River; • Avoid placing outfalls in locations that are already exhibiting failures or poor stability, unless the stability issue can be stabilised by the new outfall; • In small streams, avoid placing the outfall in a manner that will result in scour on the opposite bank. When the outfall cross-sectional area is more than 30% of the bank full stream cross-sectional area, a confluence angle of 12° should be maintained; • To the extent that is practical, the distance from the final treatment device to the receiving environment should be minimised; and • The number of outfalls should be minimised. This may require that outfalls be located to serve more than one sub-catchment. <p>Acceptable example designs that can be followed are shown in Appendix I.</p>					

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
9	Freeboards shall be set above Council's 100 year MPD mitigated flood level within Mangakootukutuku (except within Kairokiroki Sub-catchment where modelling is indicative and more detailed studies by developers are required to set freeboards), unless development design and asbuilts demonstrate to the satisfaction of Council that flood levels have been or will be altered by development. In this case, developers are to use their revised MPD flood levels (once agreed with Council) to set freeboards. Freeboard depths will comply with the ODP.	At time of resource consent and/or building consent	√	√	√	√
10	All infrastructure sizing , locations and alignments are concept or preliminary and shall be confirmed by detailed design and integrated with other infrastructure (e.g. roads, wastewater pump stations) to implement the solutions and meet the requirements of the ICMP.	At time of resource consent	√	√	√	√
11	Networks and infrastructure shall be designed and constructed to RITS standards (unless specified otherwise within this ICMP) and sized to service the fully developed catchment to meet the design parameters and requirements to achieve minimum levels of service.	At time of resource consent and building consent	√	√	√	√
12	Water Impact Assessments shall include a table showing all relevant ICMP means of compliance and design parameters, and demonstrate that they have been met.	Submission of Water Impact Assessment	√	√	√	√
13	Development proposals which are lodged with Hamilton City Council and/or WRC shall demonstrate how the solutions and requirements of	At time of resource consent	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>the Mangakootukutuku ICMP will be met.</p> <p>This includes showing that development proposals:</p> <ul style="list-style-type: none"> • Are consistent with the solutions and requirements of the ICMP; • Will not compromise future development or implementation of major infrastructure; • Can establish stormwater management solutions in the catchment which meet the design parameters in Error! Reference source not found. of this ICMP; and • Have carried out any required site/activity specific technical investigations, and that assessments have been undertaken as part of development planning (e.g. hydrological, hydrogeological, geotechnical and ecological investigations/assessments) 					
14	<p>Erosion and Sediment Control:</p> <p>Erosion and sediment controls shall be in accordance with Hamilton City Council and WRC requirements, and shall be established on site and approved by Hamilton City Council and WRC (as required) prior to any soil disturbance activities taking place.</p> <p>Note 1: This applies to all catchment development and physical works activities where soil disturbance activities are undertaken, e.g. bulk earthworks and development of major infrastructure/services where best practice guidelines, standards</p>	At time of resource consent and during construction	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>and relevant City bylaws shall be applied</p> <p>Note 2: Flocculation treatment systems shall be established on all development sites to treat sediment laden runoff prior to discharge from the site (e.g. to the stormwater network or directly to the receiving environment). In this regard flocculent bench testing to determine the reactivity of soils to treatment shall be undertaken, and the most efficient flocculent type applied via conditions of resource consent or associated management plans.</p>					
15	<p>Resource consent applications for development activities should be lodged with Hamilton City Council and WRC contemporaneously, and both Councils shall work together to ensure that decision outcomes are consistent with the solutions and requirements of the Mangakootukutuku ICMP</p> <p>Note 1: WRC has jurisdiction over earthworks sites and HCC has jurisdiction over building sites. Small scale development sites may not trigger WRC requirements for soil disturbance activities. In these instances, Hamilton City Council will ensure that site specific erosion and sediment controls (including flocculation treatment systems) are required via Hamilton City Council land use and/or building consents. Hamilton City Council may also seek advice and specific input from WRC as required.</p> <p>Note 2: Developers must include a monitoring plan as part of the discharge consent applications. The developer will be responsible for carrying out the conditions of that</p>	At time of resource consent	v	v	v	v

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	consent until the time of vesting of stormwater infrastructure.					
16	Developments of less than four lots/1 ha which therefore do not trigger the requirement under Section 25.13.4.6 of the ODP for a Water Impact Assessment are still required to install a device or devices that meets all design parameters for the sub-catchment.	At time of resource consent, or during assessment of permitted activity rules if a resource consent is not triggered.	√	√	√	√
17	Suitable energy dissipation and erosion protection measures shall be provided at all points of discharge to streams, in order to minimise erosion of stream beds and banks. Solutions shall enhance the amenity, biodiversity, and ecological function of their environments.	At time of resource consent	√	√	√	√
18	Modified and natural stream channels shall generally be avoided as locations for stormwater treatment devices, and appropriate offsets will be provided where a stormwater treatment device footprint impacts upon a watercourse or reduces existing ecological value. Stormwater devices shall not be located online to stream courses.	At time of resource consent	√	√	√	√
19	Ecological Requirements: <ul style="list-style-type: none"> Ecological assessments are required for all watercourses in the catchment (including farm drains). All waterways and areas of aquatic or terrestrial ecological value are subject to a hierarchy 	At time of resource consent	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>of avoid, remedy, mitigate, offset. Any development shall result in a net increase to biodiversity value. Any new offsetting in Peacocke should comply with the biodiversity offsetting framework for Peacocke once finalised.</p> <ul style="list-style-type: none"> Riparian vegetation, where present, should be retained and any new riparian planting carried out using indigenous eco-sourced vegetation selected from the Plant Selection Tool for Waikato Waterways, Waikato River Authority, the Local Indigenous Biodiversity Strategy and/or the Hamilton City Gully Restoration Guide. In particular, opportunities to introduce mahinga kai species such as harakeke (flax) into the natural environment in areas where they can be accessed for harvest and cultural use should be included. Consideration must be given to species with robust root structure directly on unstable banks. Restoration planting should be carried out with a view towards ultimately complete restoration of the gully extent. In the event of any discovery of threatened native aquatic species, the authorities shall be notified, and an appropriate translocation programme shall be developed in line with a WRC consent. 					
20	<p>Gully Access:</p> <p>Access for cultural purposes, maintenance, and low impact</p>					

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	recreation (such as walking) should be provided to the gullies where practicable and appropriate. Mana whenua and Waikato-Tainui should be consulted on proposed access.					
21	<p>Beach Access:</p> <p>The beach adjacent the proposed river bridge shall have its amenity and access enhanced, and shall not have either compromised by three waters infrastructure.</p>					√
22	<p>Peat in the development area:</p> <p>It is encouraged that where peat is outside of the development footprint, it should be maintained.</p> <p>When in the development footprint the developer is required to:</p> <ul style="list-style-type: none"> • Identify if peat is to be removed (and over what extent and depth); • Advise if being replaced (and if so, with what); and • Provide an assessment that this does not change shallow groundwater flows sufficiently to cause any adverse effects (including but not limited to consolidation settlement, drawdown of surface water bodies etc.) <p>Inconsistent approaches to peat in adjacent areas (removing or retaining) can reduce the effectiveness of either. Approaches to peat management should be co-ordinated with adjoining developments, and managed strategically for local areas of peat.</p>	At time of resource consent	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
23	<p>Geotechnical Setback</p> <p><u>Primary setback line</u></p> <p>New land-use and development which is vulnerable to the adverse effects of land instability shall avoid the Primary Setback area, where the adverse effects and risks have not been minimised to an acceptable or tolerable level. New land-use and development which is resilient to the adverse effects of land instability shall otherwise be provided for in the Primary setback area. No soakage is to occur within the primary gully hazard line.</p> <p><u>Secondary setback line</u></p> <p>New land-use and development which within the Secondary Setback area, shall be resilient to the adverse effects of land instability resulting from potential lateral land movement caused by an ultimate limit state (ULS) seismic event. Development shall not occur within the Secondary Setback where the adverse effects and risks have not been minimised to an acceptable or tolerable level.</p> <p>No soakage of more than the 10 mm retention volume is to occur within the secondary gully hazard line.</p> <p>Design and consenting of 10-year soakage devices within 20m of the secondary gully hazard line must identify and address geotechnical risks associated with the discharge (e.g. piping, stability).</p> <p>Means of Compliance relating to geotechnical setbacks, and the setback extents shown in the ICMP may be superceded by the requirements of the Peacocke Structure Plan following the</p>	At time of resource consent				
			v			v

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	Peacocke Structure Plan Change process.					
24	<p>Retention to maintain stream baseflow:</p> <p>Within Tiireke Sub-catchment, retain a minimum of the first 10 mm of stormwater on average across a development site and discharge to ground by soakage to provide groundwater recharge. The water efficiency measure required to meet this is mandatory on-lot retention to ground that complies with Council's on-lot soakage detail, along with supplementary retention devices elsewhere in the catchment where appropriate, and with water quality treatment to prevent retention device failure and groundwater contamination. On-lot soakage devices designed to meet this requirement are required irrespective of soakage rate, and are required to be sized to store the entire first 10mm of rainfall. For houses adjacent gullies, devices are to be sited outside of the primary geotechnical setback line, and as far set back from the gully as is reasonably practicable.</p> <p>It is acceptable to provide the 10 mm retention requirement by oversizing on-lot stormwater retention devices to reduce the size of on-road stormwater retention devices. On-road stormwater retention devices may still be required to meeting the Waikato Regional Council requirement to retain the initial abstraction.</p>	At time of resource consent, and building consent.	√	Optiona l	Optiona l	Optiona l
25	<p>Rainfall Reuse:</p> <p>Rainfall re-use is the preferred onlot measure across the catchment,</p>	At time of resource consent, and	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	except where onlot soakage is mandatory to meet baseflow recharge objectives. Re-use tanks must be as per Council's onlot practice notes. Alternative on-lot measures may be accepted with strong justification, at Council's discretion.	building consent.				
26	<p>Low impact design principles shall be adhered to including, to the extent possible:</p> <ul style="list-style-type: none"> • Minimising changes to the land that alter natural drainage patterns • Minimising earthworks • Minimising impervious surfaces. Permissible maximum imperviousness under the ODP should not be viewed as a target. 	At time of resource consent	√	√	√	√
27	<p>General Water Efficiency Measures</p> <p>In Hahawaru and Te Horanganui sub-catchments, other water efficiency measures are acceptable if they can be demonstrated by technical assessment to be appropriate. They may also be considered to meet part or all of the design parameters if demonstrated by technical assessment.</p> <p>Constraints within the already developed areas of Te Horanganui make it difficult to prescribe treatment. However, where a sub-catchment device is not able to be provided:</p> <ul style="list-style-type: none"> • Quantity control is recommended by either raintanks and/or onlot soakage that provide reuse and control of 	At time of resource consent, and building consent.		√	√	

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>the EDV, 2, and 10 year events; and</p> <ul style="list-style-type: none"> Quality control is recommended by raingardens to provide treatment for hardstand surfaces. 					
28	<p>Archaeological Sites</p> <p>An authority may be required under the Heritage New Zealand Pouhere Taonga Act 2014 for any works near an archaeological site. Subdivision, development and use, including the construction and operation of stormwater devices, shall be managed to avoid damage to archaeological sites. Wherever practicable, archaeological sites shall be incorporated into reserves to protect and manage the sites. The significance of archaeological and cultural sites shall inform the sites' protection and management. Where appropriate, the relationship of mana whenua with sites of spiritual, cultural or historical significance shall be recognised and provided for, including through on-site marking.</p>		√	√	√	√
29	<p>Subdivisions Already Consented</p> <p>Parts of Tiireke and Te Horanganui sub-catchments have been recently consented for stormwater. Error! Reference source not found. shows where existing consents are. Consent 2012.5590.001 (Carbourne Device Sub-catchment) requires that on-lot stormwater devices be installed that provide flood attenuation. Installing these in compliance with HCC's on-lot practice notes, and the specific requirements of the consent, is a means of compliance for this ICMP.</p>	Construction	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	Compliance with all other existing consent conditions (whether identified in the ICMP or not) with respect to three waters management are also a means of compliance for this ICMP.					
30	<p>Houchens Large Lot Structure Plan Area</p> <p>Sections 15.4.2.83 to 15.4.2.86 of the Waipa District Plan pertain to the area and must be complied with.</p> <p>Hamilton City Council is to be consulted as an affected person in relation to subdivision consent applications within the area.</p>	At time of resource consent			√	
31	<p>Within Hamilton City Council Boundary all sub-catchments shall be served for wastewater by the existing and proposed wastewater network.</p> <p>Gravity mains to access the network shall be extended as development occurs and capacity shall be assessed during the engineering phase for suitability to serve the surrounding areas draining to the nearest pump station. Strategic Wastewater infrastructure shall be located as shown in Error! Reference source not found., along with any updates to that figure made by Hamilton City Council. Developers should consult with Hamilton City Council on any changes to that figure before design.</p> <p>Levels of service are to be achieved in accordance with Hamilton City Council's requirements.</p> <p>Best practice design, construction and inspection are required to ensure that inflow and infiltration is minimised.</p>	At time of resource consent	√	√	√	√

REF	Means of Compliance	Assessment Timing	Sub-catchment			
			Tiireke	Te Horanganui	Hahawaru	Kairokiroki
	<p>Within Waipa District Council Boundary</p> <p>No change to existing on-lot wastewater disposal requirements unless land is rezoned.</p>					
32	<p>Low flow fixtures and other water efficient fittings are to be installed into businesses in accordance with Rule 25.13.4.5a and c of the ODP.</p> <p>Low flow fixtures will promote wastewater conservation, reduce costs associated with water consumption and ensure the size of infrastructure is minimised by promoting sustainable water use.</p> <p>Future infrastructure upgrades can be avoided or minimised by identifying and managing inefficiencies such as leakage, inflow & infiltration and unauthorised use.</p>	At time of building consent	√	√	√	√
33	<p>Strategic water mains shall be required in specified locations as per the Water Master Plan and indicatively shown in Error! Reference source not found. along with any changes made to that plan required by the Hamilton City Council Strategic Development team. Developers should consult with Hamilton City Council on any changes to that figure before design.</p> <p>Trunk mains shall be extended along road corridors as the sub-catchments develop.</p> <p>Levels of service to be achieved in accordance with Hamilton City Council's requirements.</p> <p>Minimum pressure and flows to be achieved, including consideration of adverse effects on the existing built and consented environment.</p>	At time of resource consent	√	√	√	√

