

BEFORE THE CANTERBURY REGIONAL COUNCIL

UNDER THE Resource Management Act 1991

AND

IN THE MATTER of application CRC190445 by the Christchurch City Council for a comprehensive resource consent to discharge stormwater from within the Christchurch City area and Banks Peninsula settlements on or into land, into water and into coastal environments.

**RESPONSE OF THE CHRISTCHURCH CITY COUNCIL TO MATTERS ARISING
AT THE RESUMED HEARING**

26 APRIL 2019

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MAY IT PLEASE THE COMMISSIONERS:

INTRODUCTION

1. This response by counsel for the Christchurch City Council (Council) is limited to matters arising from the resumed hearing on 15 April 2019 and the Commissioners' Minute of 16 April 2019.
2. The matters addressed by this response are:
 - 2.1. Providing, and explaining, the maps requested by the Commissioners in paragraph 3 of their Minute dated 16 April 2019;
 - 2.2. The 120mm depth in Schedule 10 of the proposed conditions (clean version) for the Harbour Rd site;
 - 2.3. Correction to the 8 April closing submissions;
 - 2.4. Filling and Barkers Drain;
 - 2.5. Council's Flood Intervention Policy;
 - 2.6. Contributors to river channel "roughness" in modelling;
 - 2.7. Maintenance of stormwater facilities;
 - 2.8. Updating the flood model;
 - 2.9. Complying with the condition 28 design standard.

THE MAPS

3. The Commissioners requested a map, in the same or similar form to those attached to the second Joint Witness Statement, showing the flood depth across the Lower Styx catchment in a 1 in 10-year rainfall event in the calibrated weed scenario, if possible showing the depths at Existing Development (ED) and at Maximum Probable Development (MPD).
4. Two maps showing the 1 in 10-year event are attached to this memorandum (**the maps**). Mr Thomas Parsons produced those maps. He did so from currently available modelling information held by the Council. They show two modelled scenarios:
 - ED with existing mitigation, with a 1 in 10-year rainfall and a once in 1 year high tide;
 - MPD with facilities for partial mitigation (the same as those assumed for the maps attached to Second Joint Statement), with a 1 in 10-year rainfall with 16% added for climate change adjustment, a once in 1 year high tide, and sea level rise addition of 0.5 m.

5. The ED map shows some areas of spilling from the main channel on to the lower floodplain at Earlham Street and Spencerville. The modelled depth of flooding is typically less than 0.5m and with large areas less than 0.2m. The modelling map predicts some inundation of Lower Styx Road near to Earlham Street. This appears to be consistent with the submissions of the Rodrigues'.
6. The MPD map shows significant climate change effects with overtopping of the Brooklands Lagoon sand dunes, even in the 1 year tide that is combined with the 10 year rainfall. Mr Parsons advises that more notably in this scenario, the Lower Styx River tide gates will also be closed for more prolonged periods due to the elevated, sea level rise adjusted, tide. This will prevent discharges from the river and will cause ponding upstream.
7. The two maps do not enable conclusions to be made about the effect of future development compared to existing development as they do not separate the effects of development from the effects of climate change. This is because the maximum future development model mapped here includes the effects of climate change, both in increased rainfall and in sea level rise. As with the 50 year rainfall maps provided by the experts in the Second Joint Statement, the maps show significant climate change effects with overtopping of the Brooklands Lagoon sand dunes. As a result, the increased depth shown in the MPD model map is the combination of the effects of climate change and the effects of future development. In order to provide maps that differentiate the effects of development from those of climate change the Council's consultants would run the ED model with a hypothetical adjustment for those climate change effects now. Doing that would require an extra 3-4 weeks.
8. If the Commissioners consider that they would be assisted by that, the applicant will place the processing of the application on hold again to enable time to produce those maps.
9. However, the applicant considers that there is no significant benefit in undertaking that further modelling.

CONTEXT OF CONSIDERATION OF THE EFFECTS OF THE 1 IN 10-YEAR EVENT AT THIS STAGE IN THE SMP DEVELOPMENT PROCESS

10. Evidence for the applicant (Mr Harrington, Ms West) is that the effect of stormwater discharge under MPD in the 1 in 50-year event is minor. Appendix A to Mr Harrington's evidence in chief referred to in the Second Joint Statement provides evidence of the results of MPD stormwater discharge for a 5 year rainfall at the time of a 50 year tide at Harbour Rd. It records that at Harbour Road river water level will be 20mm above the existing development water level (Second Joint Statement paragraph 28). It also records that in the non-tidal reaches upstream of the Prestons subdivision outfall, the mitigated MPD water level is modelled to be 10mm lower than the existing development result, due to the effect of the mitigation over-compensating for the effects during the more frequent events.
11. The depth and duration of MPD stormwater discharge flooding effects of the 1 in 10-year event will be somewhere between those of the 1 in 5-year and a 1 in 50-year event and therefore, it is submitted, will be minor.

12. Consideration of those adverse effects must, it is submitted, be placed in context. It is the nature of this river that it may spill, with existing development, in a 1 in 10-year event. It is possible that it may continue to spill in a 1 in 10-year event with MPD. The evidence is that the effects are on agricultural land in a flood plain. It is submitted that the Commissioners have sufficient evidence to conclude that this is of minor adverse effect *and* that it will be more appropriately managed at the SMP development stage, if the more detailed assessment at that stage shows that this is warranted.
13. None of the water quantity experts assisting the Commissioners – Mr Law, Mr Potts, Mr Parsons, Mr Harrington – are recommending that there be standards set in consent conditions for the Styx catchment, or for any other catchment, for water quantity in events of greater frequency than 1 in 50-year events. They all recommend the following in their First Joint Statement: “SMPs are the appropriate mechanism to set revised or additional targets” (paragraph 46(a)).
14. The applicant accepts that recommendation from the experts and has proposed an addition to condition 7 Schedule 2(s) that requires SMPs to set targets for either 2% AEP events or for “any other relevant return interval”.
15. This is consistent with Mr Harrington’s evidence in that First Joint Statement that (paragraph 42(f)):

Should the Panel determine - in addition to the pre-emptive design approach - that attribute target levels are necessary for the 1 in 5 year ARI storm events, or other events more frequent than 1 in 50 year ARI storm events, then it will be necessary to review the flooding issues that may arise in such events and identify level targets at specific locations aimed at managing such matters. The investigations, modelling and consultation work involved in setting such targets would be time-consuming and would best be done as part of SMP development or SMP review. At present the Applicant does not have sufficient information to generate target levels for a 1 in 5 year ARI storm event and significant investigative effort would be required to do so.

16. It is submitted that the SMP development stage is the appropriate time to set locations and standards for more frequent events if these are warranted. It is pre-empting that process, and the considerable work needed for it, to attempt to set those standards in the conditions now. The consent conditions proposed by the applicant, and supported by the ECan reporting officers, provide sufficient assurance for the decision makers on this application of the outcomes required by the SMPs (purpose condition 6, and achieving the targets and standards referred to in conditions 19, 23). It is submitted that those conditions ensure that the Commissioners’ decision on consent conditions exercises appropriate control over the environmental results of stormwater discharges in the more frequent events, if warranted.
17. Commissioner questions at the resumed hearing on 15 April regarding the adequacy of the flood model and updates to it were, counsel understands, comprehensively answered by Mr Parsons. The model, it is submitted, has been established to be fit for the purposes of assessing the relative effects of the proposed activity. Moreover, the proposed consent conditions provide for adaptive management of the effects of stormwater discharge quantity, not least via review and change to the model if this is useful. Proposed condition 55 (clean

version) requires that updating to occur “...as necessary to reflect changes in development patterns or modelling parameters at least every 5 years...”; and condition 7 Schedule 2 requirements for the content of SMPs require assessment of those matters under the following “content” subjects:

- (h) *identification of areas subject to known flood hazards*
- (j) *results from and interpretation of water quantity and quality modelling, including identification of sub-catchments with high levels of contaminants*
- (o) *an assessment of the effectiveness of water quality or quantity mitigation methods established under previous SMPs and identification of any changes in methods or designs resulting from the assessment*
- (p) *assessment and description of any additional or new modelling, monitoring and mitigation methods being implemented by the Consent Holder*
- (s) *identification of key locations in addition to those identified in Schedule 10 where modelled assessments of water levels and/or volumes shall be made for the critical 2% AEP event and any other relevant return interval. For each additional key location, appropriate water level reductions or tolerances for increases shall be set according to the SMP objectives and shall be reported with the model update results required under Condition 55.*

18. As noted in the opening submissions for the applicant (paragraphs 90 to 97), at its core this application seeks an adaptive management approach to managing the effects of stormwater discharges. The key to adaptive management, as recognised by the High Court, is that it allows an activity to be carried out so that its effects can be monitored and assessed and the activity modified, or discontinued, accordingly. Adaptive management uses a set of principles and monitored outcomes rather than a set of prescriptive inputs. This allows flexibility to adapt to monitored outcomes and new technologies. It is an ongoing cyclic process with feedback loops so that management can be improved over time. Counsel here repeats the factors referred to in the opening submissions (paragraph 95) that the Supreme Court has approved as being appropriate for assessing whether an adaptive management approach is appropriate:

- (a) *There will be good baseline information about the receiving environment. The Court does not require the applicant to complete detailed design and research before lodging the application. "Baseline level" knowledge is what is required, which the proposal can build on as the consent is implemented;*
- (b) *The conditions provide for effective monitoring of adverse effects using appropriate indicators;*
- (c) *Thresholds are set to trigger remedial action before the effects become overly damaging; and*
- (d) *Effects that might arise can be remedied before they become irreversible.*

19. It is submitted that the baseline information provided by, and conditions proposed by, the applicant appropriately address those factors without any need for more prescriptive measures for water quantity being set at this stage.

20. The proposed conditions use management plans – stormwater management plans – as an integral part of that adaptive management approach. As also noted in the opening submissions (98-101) use of management plans is common and accepted by the courts. Management plans must not delegate key decisions to a later date, or other decision maker, but if they contain appropriate conditions that specify the objectives of the management plan, the content, and appropriate monitoring and reporting then the management plan approval can be left for a later certifier stage. The Environment Court has supported the use of evaluative, qualitative criteria, not solely quantitative ones.
21. It is submitted that in that framework, provided by the proposed conditions here, there is no need for the Commissioners to impose further standards for more frequent rainfall events. If those targets are needed in order to achieve those outcomes this will be considered through that consultative SMP development process.

WHY USE 120MM DEPTH AS THE STANDARD FOR INCREASED DEPTH AT THE HARBOUR ROAD MEASUREMENT SITE

22. At the resumed hearing on 15 April 2019 Commissioner Christmas rightly noted that the Pūharakekenui / Styx SMP contains modelling that shows an increased depth from maximum possible development of 80mm (Table 7 part B of the Styx SMP and Appendix A to Mr Harrington's evidence in chief). She queried why the condition proposed by the applicant, and supported by the ECan reporting officers and all four water quantity experts, proposes that this be 120mm. Counsel understands that Mr Harrington's evidence on 15 April explained this, but the applicant repeats that here for the avoidance of doubt.
23. That depth was the recommendation of the Council's expert Mr Roy Eastman (now deceased) and accepted by the Commissioners when the Council sought and obtained resource consent for the Styx SMP catchment. As the applicant intends that the existing resource consent for stormwater discharge in the Styx catchment be subsumed within this holistic city-wide consent the applicant simply adopted the standard that was approved by the Commissioners who decided the Styx SMP consent. Their decision on that was CRC131249 decision paragraph 6.44:

".... As to flood water attenuation and management of flood water release we conclude the applicant's proposals to be conservatively based and adequate in that regard. "

24. The decision continued in paragraph 6.45:

"We acknowledge and accept that the proposals would provide a significant level of mitigation in the Styx catchment, offering improved mitigation for more frequent events up to 20% AEP (1 in 5 year). It is proposed (to be conditioned accordingly) that full development according to the most probable development (MPD) would be mitigated in the Styx to the point that increases in flood levels in the lower catchment would be less than 100mm plus 20% tolerance for the 2% AEP design storm. That does not mean flooding of land would be avoided, even under such an event, but we are satisfied insofar as inundation is attributable to the management of stormwater discharge, that it would not cause significant adverse environmental effect. Most

importantly, while accepting that the impact of climatic change will in time have significant impact in some areas, dwellings would be sufficiently protected in terms of the effects attributable to this discharge."

25. It is submitted that the difference between 80mm and 120mm increase in depth of water in the river caused by stormwater discharge in the MPD 1 in 50-year event must be considered in the context of the increased flooding that is going to result from climate change and sea level rise. In that context, that difference between 80mm and 120mm is immaterial.
26. Counsel respectfully agrees with, and adopts, the conclusion of the Commissioners in the CRC131249 decision at 6.39:

6.39 The applicants responses and the very specific interpretation of the modelling results for individual properties, including those of several of the submitters, indicates some changes over time could be expected in the degree to which land is subject to flooding. This is so in the lower catchment particularly and the proposed management of stormwater discharge would be a contributing factor in some storm events. We recognise that, but equally we recognise the limited degree to which that is likely to cause any significant impact on those properties, associated dwellings, use of the land or access to it. The reality is significant areas of the catchment are recognised floodplains, and unfortunately coastal proximity and the predicted outcomes of climate change will progressively exacerbate the implications of flood events, in areas of the lower catchment especially, in the future.

27. Despite the above rationale, the applicant has reviewed the basis for the 120mm standard for increased depth at Harbour Road in light of the experts' answers to Commissioners' questions at the re-convened hearing. As a result, counsel is instructed that the applicant does not oppose that standard in Schedule 10 for Harbour Road being set at 100mm instead of 120mm.

CORRECTION OF A MIS-QUOTE FROM JOINT STATEMENT IN SUBMISSIONS OF 8 APRIL 2019

28. Counsel and the applicant regret that paragraph 187 of the closing submissions of 8 April 2019 mis-quoted paragraph 4 on page 2 of the Second Joint Statement. That paragraph is in a part of the Second Joint Statement headed "*Infilling of land and reinstatement of Barkers Drain*". The corrected passage, in full, is:

Experts agree that this issue is **predominantly** a local flooding or drainage issue and is not directly related to the stormwater effects of urbanisation being addressed in this CRC190445 application. **The filling that has been undertaken on properties adjoining the Rodrigues' properties will have an immeasurably small effect on flood levels in the river as the fill is a very small percentage of the total floodplain storage in the lower Pūharakekenui / Styx. However they will have more significant local effects, as discussed in the first joint statement. If this type of filling were undertaken more broadly then catchment / river level effects could be significant.**

29. Paragraph 187 of the closing submissions mistakenly implied that the above agreement applied to considerations wider than the effects of the filling.
30. It is clearly correct of Mr Potts to identify that a small increase in depth of ponded water is likely to increase the size of the flood pond and increase the time taken for the pond to drain. However, it is the applicant's position that the effect of that increase is insignificant when assessed in the context of the effects of climate change and river weeds.

FILLING AND BARKERS DRAIN

31. Counsel understands that at the resumed hearing on 15 April the Commissioners queried the effects of the fill and the Council's proposed enforcement action.
32. It is submitted that the evidence of the experts (First Joint Statement at 45-62, and Second Joint Statement at pages 2-3 paragraphs 1-7 including paragraph 4 quoted above) has established that the presence, or absence, of that fill is of little significance for the purposes of a decision on this resource consent application for stormwater discharge, as the effect of the fill relates predominantly to local drainage of ponded water from rainfall, not ponded water from river overflows. The effect of the fill will be one of the considerations in the enforcement investigation being undertaken by the Council's regulatory compliance unit.

COUNCIL'S "FLOOD INTERVENTION POLICY"

33. Counsel understands that at the resumed hearing on 15 April 2019 the Commissioners sought more information regarding the Council's Flood Intervention Policy which Mr Harrington referred to in his explanation concerning levels and attributes for a 1 in 5 year ARI storm event at paragraph 42(g) of the First Joint Statement.
34. Mr Harrington's paragraph 42(g) is explaining why he considers that, at SMP development stage, the experts may consider that setting a standard in some locations for a 1 in 10 year event may be more appropriate than for a 1 in 5 year event. He there states that "...the 10 year ARI storm event relates to the Council's Flood Intervention Policy".
35. Mr Parsons referred to the Flood Intervention Policy in his evidence in chief at paragraph 29, where he stated that

The Flood Intervention Policy (FIP) is an earthquake related policy adopted by the Council under the Local Government Act that benefits homeowners with properties at extreme flood risk that has been increased by the CES (Christchurch City Council, 2017b). This policy includes three forms of assistance, house raising, on property defence and voluntary property purchase. The policy is typically applied once LDRP investigations into potential flood management schemes are complete and agreed by Council. The effect of the policy will be to reduce the number of properties at risk of above floor flooding. This policy and the LDRP are delivered independent of, and in parallel with, the SMP infrastructure programmes.

36. Information regarding the policy can be viewed on the Council's webpage at <https://ccc.govt.nz/the-council/plans-strategies-policies-and-bylaws/policies/sustainability-policies/flooding-intervention-policy/>. It states that

to be eligible for assistance, the residential property must have a habitable floor that is at risk from a 1 in 10-year flood event.

37. As a result of that being the criteria for the Council's Flood Intervention Policy, modelling information is much more readily and efficiently available to the Council for a 1 in 10-year event than for a 1 in 5 year event.

CONTRIBUTORS TO RIVER CHANNEL "ROUGHNESS" IN MODELLING

38. Counsel understands that the Commissioners' questions on 15 April included the extent to which the evidence establishes that weed growth, rather than any other contributor to river channel "roughness" (being resistance to river water flow), is the most important cause of loss of capacity (or increase in water level) in the Pūharakekenui / Styx River.
39. It is submitted that the experts have addressed this in the First Joint Statement at figures 1 and 2 and paragraphs 29, 30 and 31.
40. Figures 1 and 2 in the First Joint Statement show the 2018 base flow level (red graph) changing between winter/spring (low) and summer (high) by about 710mm at Lower Styx and by about 970mm at Radcliffe Rd. Figure 6 (red graph) shows the 2018 base flow of the Styx River at Radcliffe Rd as about 1.4 m³/s in Winter/Spring and the same in Summer. The variability in water level is therefore not related to varying flow but to the seasonally changing resistance to the flow of river water by weed growth.
41. The First Joint Statement records the "*overwhelming significance of weed management*" and that "*The flow record at Radcliffe Road (Figure 6) indicates that the variability in water levels at low flow is dominated by the weed condition rather than the flow rate*" (paragraph 29). It records the "*observed significance of weed growth on water levels*", with inspection of the water level record at the Lower Styx site showing that weed harvesting on average drops low water levels by 300mm, but with significant variability (paragraph 30).
42. It records that "*The model results show the importance of weed in the system with regard to water levels and, depending on management, could have a greater impact than urbanisation*" (paragraph 30).
43. Counsel understands that this matter was answered by the experts on 15 April. The graphs referred to above show that variations are seasonal. Weed growth is the sole roughness factor that has that degree of seasonal variation.

MAINTENANCE OF STORMWATER FACILITIES

44. Commissioners' questions of the experts on 15 April 2019 included whether they think that there may be benefit in additional conditions that require maintenance of stormwater facilities.
45. Counsel understands that the experts' replies were uniformly that the current proposed conditions appropriately provide for that maintenance.
46. Proposed condition 36 is:

“All Christchurch City Council stormwater mitigation facilities and devices constructed after commencement of this resource consent shall have an Operations and Maintenance Manual which shall be made available on request.”

47. Although this proposed condition does not address *existing* facilities and devices, it recognises that all new facilities and devices will have an operations and maintenance manual, and that the manual can be inspected by the consent authority.
48. Chapter 19 of the WWDG is devoted to operations and maintenance. Maintenance is also referred to throughout the document. The WWDG is intended to provide sufficient direction on operation and maintenance factors to ensure that the performance of facilities will be sustained at the as-designed level throughout their operational life.
49. The WWDG can be viewed on the Council's webpage at <https://ccc.govt.nz/environment/water/water-policy-and-strategy/waterways-wetlands-and-drainage-guide/>.
50. Condition 27 of the proposed conditions currently refers to the WWDG as follows:

Water quality and quantity mitigation facilities and devices shall be designed in general accordance with:

- (a) *The Christchurch City Council's Waterways, Wetlands and Drainage Guide, Infrastructure Design Standard, Construction Standard Specifications, Christchurch Rain Garden Design Criteria, Christchurch Stormwater Tree Pit Design Criteria and Stormfilter™ Design Rainfall Intensity Criterion Report or their respective successor document(s); and*
 - (b) *Other national and international best practice design criteria adopted by the Christchurch City Council over the duration of this resource consent.*
51. As maintenance of facilities is an integral part of the WWDG, the applicant would have no concerns if the Commissioners were to add reference to “maintenance” to proposed condition 27 as follows:

*“Water quality and quantity mitigation facilities and devices shall be designed **and maintained** in general accordance with...”*

COMPLYING WITH THE CONDITION 28 DESIGN STANDARD

52. On 15 April the Commissioners queried whether the experts were satisfied that stormwater facilities could be designed to drain at the pace required by condition 28. Counsel understands that Mr Harrington answered that affirmatively.
53. There are no stormwater facilities planned under the current Styx SMP within 3km of the airport. There may be future facilities under the Avon or Outer Christchurch SMPs to be constructed within 3km of the airport runway. The applicant is satisfied that design of these facilities can and will comply with the proposed consent conditions.

54. The flood models represent each stormwater facility individually. It is therefore possible to model a different design for areas within 3km of the airport if necessary.

BK Pizzey

26 April 2019



