

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

**REBUTTAL EVIDENCE OF
GRAHAM JAMES HARRINGTON FOR CHRISTCHURCH CITY COUNCIL**

Dated 30 October 2018

CHRISTCHURCH CITY COUNCIL
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INTRODUCTION

1. My full name is Graham James Harrington. I here provide rebuttal evidence for the Christchurch City Council (**Council**) in relation to the evidence of other experts on the Council's application for a comprehensive stormwater network discharge consent (**Application**).
2. My qualifications and experience are as stated in my evidence in chief dated 15 October 2018.
3. I again confirm that I have read and agree to comply with the Code of Conduct for expert witnesses contained in the Environment Court Practice Note (dated 1 December 2014). I confirm that the issues addressed in the statement of evidence are within my area of expertise. I have not knowingly omitted to consider facts or information that might alter or detract from the opinions expressed. The Council as my employer has agreed to me giving this evidence on its behalf.

ROBERT POTTS FOR ANTONIO AND KERRIE RODRIGUES

PROLONGED FLOODING

4. Mr Potts states at paragraph 17 that although Section 4 of the application infers that the application is consistent with Policy 4.17 of the CLWRP, he does not consider that in this particular case that is correct, due to the special strategic circumstances relevant to this catchment that resulted in the flood ponding areas being created in Hendersons Basin Cranford Basin and the lower Styx floodplain.
5. The matter of the establishment of Flood Ponding Areas has been litigated in the previous Variation 48 to the City Plan and Environment Court decisions (C26/2009) and in the recent decisions on the new District Plan and the hearing on the Styx Stormwater Discharge consent. CRC131249 (June 2013)
6. The CRC131249 decision weighed up the factors and came to the following conclusion in relation to flooding matters in 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. " The decision continues 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."

7. It is important to note that the sizing of the mitigation offers "improved mitigation for the more frequent events" and hence the nature of the groundwater inundation now experienced relatively frequently is unlikely to be as a result of upstream urbanisation either now or into the future.
8. I consider that re-litigation on such matters is unlikely to be helpful to the Rodrigues's. It would not resolve the main issue on the Rodrigues' site which is the "prolonged inundation". These comments also apply to Mr Potts' paragraphs 48 and 55 where he again questions the use of partial detention in the upper catchment and a minor increase in a 2% AEP flooding event in the lower flood plain.
9. The "prolonged inundation" referred to by Mr Potts at his paragraph 17 arises from extended periods of high groundwater levels rather than extended periods of direct inundation from the Styx River. The high groundwater levels and their management are not related to the scope and the objectives of this Application, which is instead about the management of discharges from urbanised surfaces as in proposed consent condition 1.

10. Mr Potts also suggests that river flooding changes with climate change have not been considered in his paragraph 96 where he states that *“Current statistics and modelling show this (dwelling inundation) is not likely to occur in a 50 yr event”* I understand Mr Potts would be relying on the Council modelling for such a statement and I agree with this statement. He continues *“but in future, the current 50 year event will be more frequent, and the new 50 yr event will be larger and could inundate floor levels.”* This requires clarification. The modelling that is currently done already includes an allowance for a 16% increase in rainfall intensity to cater for such foreseeable increases, so I disagree that there is a likely major unforeseen increase in flooding risk from the Styx River (as distinct from the tide) within a time horizon well in excess of the proposed consent duration. This comment also applies to Mr Potts’ paragraph 61 where he again asserts that a 2% AEP event will get bigger even though he acknowledges that a 16% increase in rainfall intensity has already been allowed for.
11. In paragraph 90 Mr Potts asserts that prolonged flooding now occurs that did not occur before the earthquakes. It is easy to demonstrate that if the groundwater level remains at the same absolute level and the land surface drops then groundwater will appear on the surface more frequently and for longer periods. EQC are mandated to address such matters and Council’s Land Drainage Recovery Programme (**LDRP**) are also tasked to assist where they can. Again, this Application is not seeking to manage earthquake effects.
12. Finally, in paragraph 48 Mr Potts suggests that Council and developers buy out the remaining properties in Brooklands village. This is not an action that falls within the scope of this Application.

TIDAL MATTERS AND BROOKLANDS LAGOON

13. Mr Potts at his paragraph 45 asserts that Brooklands Lagoon is part of the Styx River system. I disagree that the Brooklands Lagoon is part of the Styx River system. It is a salt water tidal area which was once part of the Waimakariri River channel before a cut was intentionally formed which allowed the Waimakariri to go straight to the coast. The Lagoon is now predominantly a tidal backwater.

14. Again in paragraph 76 Mr Potts asserts that sea level rise cannot be ignored by this Application. My point is that this Application seeks a consent to discharge stormwater from urbanised surfaces and is not seeking to manage the effects of sea level rise. While sea level rise is recognised by the Application, sea level rise is dealt with by policies in the District Plan by establishing flood hazard zones and policies for setting floor levels. There is also Guidance for Local Government from the Ministry for the Environment (2017) on how to manage such circumstances.
15. I have mentioned in paragraph 83 of my evidence-in-chief that the main issue of concern in the medium term is sea level rise and direct inundation from Brooklands Lagoon. The tidal events of July 2017 and February 2018 have demonstrated that this can now happen and it is reasonable to expect that these occurrences will be more frequent and of a greater significance in perhaps 20 to 30 years. Again these are matters unrelated to urbanisation within the Styx catchment and are therefore not a matter to be addressed in this Application.
16. Mt Potts in his paragraph 28 suggests that there has been a sea level rise of 200 – 300mm in 7 years. I consider that this statement is misleading. This may be the difference in the maximum level recorded in years that were 7 years apart and it reflects variability from year to year and which may also include some sea level rise. However, to get a plausible sea level rise estimate you need at least a 20 year tide record to span a tidal epoch, which is the period over which the astronomical tide goes through a full cycle of alignments of the moon and the sun. Therefore, I do not consider Mr Potts' statement to be correct.

RODRIGUES DRAINAGE OPTIONS

17. In paragraph 95, Mt Potts has suggested a number of possible mitigation measures for the Rodrigues' dwelling that are rather major undertakings and are probably technically feasible but unlikely to be adopted in my view.
18. The Council has investigated improving communal stormwater channels along Earlham St and across Lower Styx Rd to the Styx River – or alternatively to upgrade Barkers drain which discharges directly into Brooklands Lagoon.

However both of these options are regarded by the Council as uneconomic – being \$1.3 million and \$0.65 million respectively.

19. The Rodrigues could also investigate the installation of a private field drain around their house and lead this to a sump with a pump – which would deliver a small flow of up to say 1 litre per second through a small pipeline to Barkers drain and thereby draw down the groundwater level around and underneath the house in the same way as is done for some properties in Christchurch or is done to de-water excavations for roadworks and the like. The Council would likely accept a small flow such as this into Barkers Drain because it would not necessitate a major upgrade of the drain.
20. My comments above on draining options for “prolonged inundation by groundwater” are given in an effort to find a solution however I do not see it as a matter that should be addressed by this Application.

SIZING OF STYX SMP FLOODING MITIGATION

21. At paragraph 23 Mr Potts states that although there is some quantification of wetland depth and drainage period, what is required by Developers to provide for partial detention is not quantified.
22. This statement is incorrect. Chapter 6 of the Waterways, Wetlands and Drainage Guide (WWDG) provides the equations (Eqns 6-22 to 6-24) that determine the sizing of wetlands, and the requirement for back-flooding to a depth of 500mm over wetlands (as described in the definition of Partial Detention in CRC131249 and this application) sets the specific detention volume requirements for a development. While the design does not produce hydraulic neutrality for all storms and durations, the flood mitigation benefits of the partial detention strategy in the context of the Styx Stormwater Management Plan (SMP) Blueprint have been modelled and are well understood on a catchment-wide basis for the Maximum Probable Development (MPD).

REVIEW PERIOD OF SMPS

23. Mr Potts has suggested in his paragraph 25 that the SMPs need to be reviewed on a 5 yearly interval, and not the 10 yearly interval proposed by Council in conditions. I have proposed in my evidence in chief (paragraph 22) that the next review of the Styx SMP be brought forward to 2023 and consequently the modelling for the Styx catchment would be reviewed at that time. However, in my view, subsequent SMP reviews should remain at the 10 year maximum interval as significant unplanned changes such as an unexpected new major subdivision are unlikely to occur in a 5 year timeframe but would be possible within a 10 year timeframe.

CRANFORD BASIN

24. Mr Potts in his paragraph 32 questions whether Cranford Basin will assist Styx mitigation or not. Currently Cranford Basin provides detention storage to manage flows into the Dudley Creek Diversion pipeline, which goes to the Avon catchment and it has a neutral effect on flows into the Styx River. I therefore do not consider that Cranford Basin assists Styx mitigation.

MAPPING DISCREPENCIES

25. Mr Potts' paragraph 33 identifies some mapping discrepancies. These are minor matters which are noted and will be addressed in the next SMP review. I agree that Earlham St should be within the Styx SMP area because the natural drainage of rainfall from that area is toward the Styx River.

RIVER MAINTENANCE

26. In paragraph 67 Mr Potts asserts that management of weed growth and sedimentation "needs to be locked into the SMP or conditions". (The matter is also discussed in Mr Potts' paragraph 83.) These matters are not directly related to urbanisation. Maintenance, dredging and weed clearance is an operational and maintenance power of both the CRC and the Council under other legislation. The manner in which the two councils exercise that power is not the subject of this Application. Any submitters' concerns regarding those matters must be raised and responded to in other forums.

27. The Rodrigues' property is well within the ponding area behind the tidegates so the management (or reduction) of weed over the length of the main channel has a very minor effect on the peak levels of ponding near that property location. It could be argued that the in-channel storage over the length of the river would be less when the weed is not restricting flow so the volume of ponded water behind the tidegates would be correspondingly greater and the ponded level correspondingly higher when there is less weed in the river. The main point however is that even if it was a matter for this Application, the management of weed has a negligible effect on peak river water levels near the Rodrigues property.

GRAHAM JAMES HARRINGTON

30 October 2018