

**Before the Commissioner / Hearing Panel appointed
by Canterbury Regional Council**

IN THE MATTER OF The Resource Management Act
1991

AND

IN THE MATTER OF Application CRC120223 by
Christchurch City Council for a
discharge permit to discharge
contaminants (being stormwater)
onto and into land and into water
associated with the South-West
Area of the Christchurch City.

Section 42A Officer's Report

Date of Hearing: 14 November 2011

Report of Michele Stevenson

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Attachment 1 – Raymond Ford Memorandum

INTRODUCTION

1. Christchurch City Council (CCC) has applied for consent to discharge all current and future stormwater from the South-West Christchurch area (defined in Figure 1 of the Assessment of Environmental Effects (“the AEE”)), with discharges to both land and surface water. The receiving surface water environment includes the mainstem and tributaries of the upper Heathcote/Ōpāwaho and upper Halswell/Huritini rivers.
2. My report will provide information and advice related to the effects of the proposed discharges on surface water quality and aquatic ecology.
3. My report is supplementary to the Overview Section 42A report prepared by Brent Hamilton for the above application by the CCC. Full details of the consent application are provided in that report.
4. I am employed by Environment Canterbury as a Surface Water Quality Scientist. I hold a Master of Science degree in Environmental Science and a Bachelor of Science in Zoology and Geography. I have over ten years work experience in environmental science with a focus on water quality and ecology, working for government and private consulting organisations in Australia, the United Kingdom and New Zealand. I am a member of the New Zealand Freshwater Sciences Society.
5. I have read the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with that code when giving evidence to the Hearing Panel in this matter. All my evidence is within my expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.
6. I have also read the joint Christchurch City Council and Environment Canterbury Stormwater Management Protocol (“the Protocol”; Environment Canterbury 2010).

SUMMARY

7. The Heathcote/Ōpāwaho and Halswell/Huritini rivers are spring-fed waterways that receive water from groundwater and from runoff from existing urban and rural land use. The location of springs and the baseflow in the upper catchments of these rivers varies over time depending on groundwater levels. Parts of the mainstem of the Heathcote River/Ōpāwaho and some tributaries of both rivers currently flow ephemerally, e.g. Knights Stream and Dry Stream. Other tributaries, particularly in the upper Heathcote/Ōpāwaho catchment, have historically been incorporated either in part or fully into the city’s piped stormwater network, e.g. Haytons Stream and Curletts Road waterway. Modification and construction of drainage channels in the Halswell/Huritini catchment has occurred progressively since European settlement, principally to allow for viable farming activities, while in the Heathcote/Ōpāwaho catchment drainage has facilitated the development of residential and industrial land use. The form of waterways within the South-West Christchurch area has therefore been significantly modified over time, with consequent effects on the aquatic ecosystem.
8. While the Heathcote/Ōpāwaho and Halswell/Huritini river systems are highly modified and water quality and aquatic ecology in this area are largely considered to be in a degraded state, there are areas where high ecological values remain. There is also considerable potential to remedy and mitigate the adverse effects of existing activities

to enhance aquatic ecological values within the South-West Christchurch area and reduce the effects on downstream receiving environments. Beyond the study area the Heathcote River/Ōpāwaho flows through the southern suburbs of Christchurch to the Avon-Heathcote Estuary/Ihutai and the Halswell River/Huritini flows into Lake Ellesmere/Te Waihora. Both of these downstream receiving environments have considerable cultural, recreational, amenity, landscape and ecological values.

9. The CCC manage and maintain the stormwater drainage network within the city of Christchurch and their consent application is for existing and future discharges of water and contaminants from this network within the South-West Christchurch area. The application includes stormwater discharges from construction activities and from industrial areas that discharge into the CCC stormwater network, unless they do not comply with criteria relating to development area, land contamination or any identified pollution risk. Future discharges have been modelled based on a development scenario using 2024 growth predictions. A stormwater management plan (SMP) has been developed to demonstrate at a conceptual level how stormwater in the study area will be managed. Receiving waterways have been classified and assigned receiving environment objectives that state the intent for management.
10. Mitigation is proposed in the form of a preliminary Surface Water Management Scheme (SWMS). This scheme proposes treatment of stormwater via infiltration where soil conditions are suitable or discharge to surface water via sedimentation basins and wetlands where soakage is not feasible. Sedimentation basins and wetlands (or wet ponds) will be designed to provide treatment of the runoff from the first 25 mm of rainfall. Mitigation measures will be adopted for new development areas and retrofitting of mitigation for existing areas is proposed where possible in conjunction with new development. Retrofitting of existing areas will be dependent on new development occurring. The application states that the proposed mitigation will appreciably reduce the loads of key contaminants in catchment stormwater, including sediment, zinc, copper and hydrocarbons. Modelling and selection of mitigation measures has been largely based on achieving compliance with USEPA criteria for zinc and copper.
11. In summary I consider that:
 - (a) The applicant has gathered a considerable amount of information regarding the receiving environment to support the development of the SMP and the consent application. Overall the AEE has summarised the supplementary reports well.
 - (b) The applicant has sufficiently addressed the effects of new development but I do not consider that mitigation of existing and ongoing activities, particularly in industrial areas and on the Port Hills, will be sufficient to achieve the receiving environment objectives within the lifetime of this consent.
 - (c) The receiving environment objective to “Meet USEPA criteria for copper, zinc and lead” is inappropriate. This objective has been amended in Table 1 that is proposed to be attached to the consent (if granted) to also mention improvement of water quality towards the national guidelines for copper, lead and zinc, which is better aligned with the Natural Resources Regional Plan (NRRP; Environment Canterbury 2011). This is a reasonable compromise but I remain opposed to the use of USEPA criteria in place of the national guidelines (ANZECC, 2000) without strong justification.

These points are expanded on further in my report and a list of recommendations is provided.

DESCRIPTION OF THE RECEIVING ENVIRONMENT

12. The applicant commissioned a series of technical reports that provide background information on the state of the receiving environment. The reports of interest to me are the Aquatic Values report (Appendix D of the AEE), the Sediment Quality report (Appendix C of the AEE) and the Water Quality report (Appendix F of the AEE). In general I consider that these reports provide detailed and valuable information about the receiving environment.

Aquatic Values

13. The Aquatic Values report describes surveys of the instream habitat, invertebrate fauna and fish fauna in waterways within the study area that had permanent running water at the time of the study. It states that the study was primarily designed to identify areas of high ecological value that could be potentially sensitive to catchment land use change. Figure 1.1 of the report shows the location of the 27 ecology sampling sites.
14. The study design indicates a focus on assessing areas that may potentially be affected by catchment land use change. However, the application relates to existing discharges as well as those from future development. In my opinion, the distribution of sampling sites shows a notable gap in the headwaters of the Heathcote River/Ōpāwaho and its tributaries. While I acknowledge that these areas are not likely to be considered of high ecological value, it is important that a report providing baseline information includes suitable coverage of the entire catchment. This would ensure that there is sufficient information available for assessing the impacts of all activities over time.
15. I also note that a significant omission from the report is a table describing the location and grid reference of each site. This information is essential for future monitoring programmes, including the proposed SMP monitoring, to ensure that the same sites are visited for comparative purposes.
16. The Aquatic Values report identifies high ecological value sites based on criteria including invertebrate community composition, invertebrate and fish taxa richness, and presence or abundance of koura (freshwater crayfish). There were six localities, incorporating twelve sites, which were categorised as having high ecological values. These were on Paparoa Main Drain, lower Ballentines Drain, Cashmere Stream, Quaifes Road spring-fed drain network, Halswell River/Huritini mainstem and Golf Course drain (outside of the study area). The report recommends methods for protection of these key ecological areas and highlights the need for “catchment protection zones” to provide catchment-wide protection of local ecological values.
17. I agree with the methodology used to identify high ecological value sites and consider that the report provides highly valuable information about the existing (at 2003-04) ecological values of the sites sampled. I have concerns about the coverage of sites in this study and the lack of baseline information provided on the headwaters of the Heathcote River/Ōpāwaho and its tributaries, which will make it difficult to assess changes over time in this area.

Sediment Quality

18. The Sediment Quality report outlines the methods and results of a detailed sediment quality survey of metal and polycyclic aromatic hydrocarbon (PAH) concentrations in bed sediments within the Heathcote/Ōpāwaho and Halswell/Huritini river catchments. Sampling sites were selected based on the locations of sites previously surveyed in 1988, geographical coverage and representation of different land uses. The report compares the survey results to the 1988 results to look at changes over time and to the ANZECC (2000) interim sediment quality guidelines. It concludes that there has been a general increase in zinc concentrations and a general decrease in lead concentrations over time, while results for copper were mixed. Overall, the Sediment Quality Report states that *“sediment quality may be degraded to levels sufficient enough to influence the quality of the aquatic biological community inhabiting the sediments”* (page 82 of the Sediment Quality report).
19. I consider that the sediment quality survey is a detailed and comprehensive piece of work that provides valuable information about the state of stream bed sediments within the study area and therefore the effects of current and historic activities within the catchments. The sample sites provided good coverage of the study area and the report provides thorough explanation of factors that can influence sediment quality results, including physical characteristics of sediments and organic carbon content.

Water Quality

20. In describing the existing water quality of the receiving environment the Water Quality report has utilised long-term monitoring data collected by the CCC from 16 sampling sites on the Heathcote River/Ōpāwaho and 10 sampling sites on the Halswell River/Huritini. The locations of these sampling sites are not provided in the Water Quality report. Not all of the sites are within the SMP study area and therefore the summary of water quality that is provided in the Water Quality report, which is limited to the median and range for all sites on each river, reflects the general quality of each river as a whole. Metals data from an additional study on Cashmere Stream has also been included due to limited metals analyses undertaken in routine CCC monitoring. The summarised data have been compared to contaminant concentrations expected in typical urban stormwater (taken from Williamson, 1993) and to relevant guidelines (note that I will comment further on guidelines and trigger levels below).
21. The use of the long-term CCC monitoring data is very appropriate for describing the state of receiving water quality. I believe, however, that the analysis could have been enhanced to provide more useful information on spatial trends within the study area and trends over time given the length of the data set. Rather than data from all sites being combined to describe the general state of each river, it would be useful to have presented individual site data to show spatial patterns in water quality. This would highlight which areas of the catchments are in most need of remediation and mitigation measures to address current and ongoing issues. An Environment Canterbury Report, U07/42 (prepared by PDP, 2007), presented this type of analysis of the same CCC data and, while I appreciate that this was not available at the time of completion of the original Water Quality report, it provides information that could be of value in assessing the need for remediation and mitigation measures in existing developed areas.
22. I consider that the approach of comparing sampled river and tributary water quality to typical urban stormwater quality as described by Williamson (1993) is inappropriate. Williamson (1993) provides concentration ranges for a variety of contaminants measured in stormwater systems, which is useful for comparing to data from a

particular stormwater discharge, but is not appropriate to compare to contaminant concentrations in natural waterways. This implies that water in the upper Heathcote/Ōpāwaho and Halswell/Huritini rivers is primarily stormwater. These are spring-fed rivers and it is my understanding that CCC sampling is typically undertaken during low flow conditions so comparing the sampled receiving water quality to stormwater quality is misleading. It is appropriate to compare the monitoring data to guidelines relating to instream values.

23. The Water Quality report also includes details of contaminant load modelling that has been undertaken for existing conditions (as well as development scenarios) to describe estimated loads of key contaminants into the receiving waterways. This is reported under the Modelling Predictions section of the AEE. The overall modelling approach is being assessed by Graham Levy (Beca) and Brett Mongillo (Environment Canterbury) is commenting on industrial stormwater quality from HAIL sites, and I will not provide comment on those topics here.
24. The revised version of the Water Quality report (August 2011) has incorporated relevant aspects of the operative NRRP. There are a few errors and inconsistencies in the information provided, which I briefly summarise here:
 - Table 2 does not include the periphyton or macrophyte indicators in Table WQL5 of the NRRP. These are relevant given that nutrient reduction is one of the SMP objectives.
 - There is a typographical error in Table 3, where the pH range should be 6.5-8.5.
 - Figures 7 and 8 have not been updated with the operative NRRP water quality classification names and the revised SMP receiving environment classification, respectively. Figure 12, along with Figures 4 and 12 of the AEE do include these updates.
 - The Schedule WQL1 standards in the NRRP have been presented in the Water Quality report (Table 3 and section 3.1.3) without regard to their intended purpose in defining discharge status. This point is discussed further in paragraph 27 of this report.
 - The brief discussion of the NRRP water quality standards for toxicants in section 3.1.3 states that ANZECC (2000) trigger values were adopted as absolute values for use against total metals. This is incorrect as Schedule WQL1 of the operative NRRP does not specify whether total or dissolved metals and metalloids should be used for assessment.
 - The Water Quality report does not refer to the Appendix I review of the ANZECC (2000) trigger value for zinc, whereas this is discussed in the AEE (section 6.2.1). The AEE appears to support the use of the revised zinc trigger values but all of the assessments (including those in the Water Quality report) and the receiving water objectives rely on comparison with USEPA criteria. This creates confusion as to the purpose and relevance of the review document and makes it unclear which zinc criteria are being supported. I comment further on guidelines for toxicants in the next section of this report.

Guidelines for toxicants

25. The AEE includes a section entitled 'Water quality guidelines for toxicants' (section 6), which is primarily based on section 3.1.3 of the Water Quality report but also includes

information from a review of the ANZECC (2000) trigger value for zinc (Appendix I of the AEE). This describes the applicant's opposition to the water quality standards for toxicants in the NRRP and rationale for their proposal to use the USEPA criteria for toxicants in the receiving environment objectives for the South-West Christchurch SMP.

26. In brief, the applicant's arguments against the NRRP standards for toxicants are:
- (a) That the ANZECC (2000) trigger values have been applied as fixed standards, which is contrary to their intended use as triggers for further investigation if exceeded;
 - (b) That the standards for metals/metalloids have been stated as total fractions when the ANZECC (2000) trigger values are intended to be applied to the dissolved fraction, which is the best measure of the bioavailable fraction;
 - (c) That there are instances where further analysis has revealed that the ANZECC (2000) trigger values for toxicants are inappropriate due primarily to inappropriate selection of toxicity data (note that the applicant does not disagree with the fundamental approach taken by ANZECC in deriving the trigger values);
 - (d) That the NRRP standards do not provide guidance for hardness dependent metals even though it is well established that the toxicity of certain metals (including copper and zinc) varies with water hardness.

I will respond to these points in the paragraphs below.

27. Firstly, the purpose of the water quality standards in Schedule WQL1 of Chapter Four of the NRRP appears to have been misinterpreted and requires clarification. I have sought advice from Raymond Ford, senior planner at Environment Canterbury, and he has written a memorandum which is appended as Attachment 1 to this report. In summary, the Schedule WQL1 water quality standards guide the applicant and the consent authority in determining the status of a discharge, i.e. whether it is a discretionary or non-complying activity. If an activity is deemed to be non-complying the applicant can make a case for different standards to be applied to their discharge to demonstrate that either the effects will not be contrary to the objectives and policies in the plan or that adverse effects will be no more than minor.
28. Given this explanation it is clear that the use of the ANZECC (2000) trigger values as standards for toxicants in Schedule WQL1 does not apply them as fixed standards. It is also apparent that there is scope for different standards to be applied to a discharge if there is evidence that this is appropriate on a case-by-case basis. In the context of discharge consent conditions, where ANZECC (2000) trigger values are also often applied, the values are always described as trigger levels and exceedance of the values results in further actions rather than immediate non-compliance. The trigger values that are applied to consents are determined on a case-by-case basis.
29. Determining appropriate standards on a case-by-case basis allows for the ANZECC (2000) guidelines to be applied using a risk assessment approach. The toxicants chapter of the guidelines (Chapter 3.4) includes a decision tree for metal speciation guidelines. This decision tree outlines a range of steps that can be applied by users to take into account "both the physical, chemical and biological characteristics of the particular waterbody and the fate and transport of the toxicant once it is in the aquatic environment" (ANZECC, 2000, page 8.3-36). The second step in the decision tree

involves correcting the trigger value for hardness. The guidelines specify hardness algorithms for selected metals and where there are data available for the hardness of receiving waters an applicant may choose to undertake this step. Application of the ANZECC (2000) trigger values in the NRRP standards has been undertaken at a broad level to ensure that they are applicable across the region and not overly onerous with regard to information needs (e.g. costly additional analyses for hardness, direct toxicity etc.). On a case-by-case basis consent applicants may apply appropriate aspects of the ANZECC (2000) decision tree and it would therefore be acceptable for CCC in this instance to have adjusted the trigger values for the relevant hardness of the receiving waters if that information were available.

30. The second point made by the applicant regarding toxicants in Table WQL17 of the NRRP being measured as the total fraction is not correct. The notified version of the NRRP (2004) specified that standards applied to total metals in Schedule WQL1 but amendments to the plan following submissions, including the insertion of Table WQL17, removed reference to total metals. It is therefore at the discretion of the applicant when applying the decision tree described above whether data for total or dissolved metal and metalloid concentrations are used.
31. In response to the third point made by the applicant, the ANZECC (2000) guidelines are the accepted water quality guidelines for use in New Zealand and while deficiencies have been noted within them in recent years they represent the best information currently available in terms of nationally-derived and adopted guidelines. Environmental guidelines are constantly being developed and reviewed, reflecting improvements in our understanding of the toxicity and risk posed by hazardous substances (MfE 2007). The Ministry for the Environment (MfE) is currently undertaking a review of the ANZECC (2000) guidelines in collaboration with the Australian government. The revision work is expected to take three years and the current guidelines are effective until the revision is complete¹.
32. Use of the ANZECC (2000) guidelines in preference to other environmental guidelines is supported by MfE guidance in MfE (2007) – “Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values”. Note that while this guidance relates to contaminated land it covers the full range of contaminant receptors, including water. These guidelines specifically state that New Zealand guideline values should be used in preference to guideline values from other nations or jurisdictions, and that the ANZECC (2000) guidelines are the New Zealand risk-based reference document for aquatic ecosystem protection (MfE 2007).
33. It is my opinion that strong justification is required for the use of USEPA criteria in place of the nationally accepted guidelines. While the applicant has provided discussion of some perceived deficiencies with the ANZECC (2000) guidelines and the use of them in the NRRP, which I have responded to above, they have not given evidence to demonstrate that the USEPA criteria are an appropriate alternative for use in Christchurch waterways.
34. It is beyond my expertise to provide comment on whether the review of the ANZECC (2000) zinc trigger value (Appendix I of the AEE; Golder Kingett Mitchell 2007) is scientifically valid and acceptable. Given that a formal review of the ANZECC (2000) guidelines is underway it would be appropriate for the information contained in

¹ <http://www.mfe.govt.nz/publications/water/anzecc-water-quality-guide-02/index.html> (accessed 18/10/11)

Appendix I of the AEE to be made available to feed into the revision process. In my opinion, incorporating this information into the formal review at a national level is preferable to considering such matters at a local or regional scale.

35. Given the above, I do not agree with the inclusion of the USEPA criteria as part of the receiving environment objectives and the basis of cost-compliance analysis (presented in section 7.3.3 of the AEE). I provide further comment on the receiving environment objectives below.
36. An important factor to consider when selecting appropriate targets for metals in the Heathcote/Ōpāwaho and Halswell/Huritini rivers is the ultimate receiving environments for these metals. Metals do not typically remain suspended in the water column for long as they readily adsorb to particles and settle out in low energy depositional areas downstream. Overall metal loadings and sediment quality are therefore the principle concerns regarding potential long-term effects on aquatic ecosystems in downstream reaches of the rivers and in the Avon-Heathcote Estuary/Ihutai and Lake Ellesmere/Te Waihora. The Avon-Heathcote Estuary/Ihutai and Lake Ellesmere/Te Waihora are highly valued natural waterbodies that have management plans with goals relating to biodiversity and mahinga kai values (AHEIT 2004; DoC & TRONT 2005). Reduction of contaminant inputs via discharges to tributary streams and rivers will be a key part of achieving improved water quality and sediment quality to support aquatic ecosystems and these values.

Summary comments

37. The supplementary reports on aquatic values, sediment quality and water quality are a valuable information resource and these have been used appropriately in the AEE to describe the receiving environment and to identify key issues. I have the following minor concerns about these reports:
 - The Aquatic Ecology report does not provide sufficient coverage of sites in the headwaters of the Heathcote River/Ōpāwaho and its tributaries, which will be a gap in information for future assessment of changes over time.
 - The Water Quality report provides only a broad overview of existing water quality and the summarised data includes sites on the Heathcote/Ōpāwaho and Halswell/Huritini rivers that are outside of the study area, so represents the general quality of each river as a whole. More detailed analysis of the data was warranted for this study, particularly given the length of the available data set, and could have included analysis of spatial and temporal trends.
38. The Water Quality report and the AEE have incorrectly interpreted the intended use of the Schedule WQL1 standards in the NRRP and as a result have dismissed the standards related to toxicants as overly conservative and inappropriate. As described above, once discharge status has been assessed using the standards there is flexibility in how trigger values are further used to determine the scale of effects on the environment. This includes adjustment of trigger values for factors such as hardness if the applicant chooses to do so.
39. I disagree with the conclusion that the USEPA criteria are the appropriate water quality guidelines for use in the receiving water objectives for the South West Christchurch SMP. The ANZECC (2000) guidelines, which have been incorporated into the NRRP for toxicants, are nationally-derived and accepted guidelines and there is clear guidance from central government that these are the preferred guidelines for use in New Zealand for aquatic ecosystem protection. Strong justification is required

for the use of alternative water quality criteria and I do not believe that sufficient rationale has been provided by the applicant to demonstrate that USEPA criteria are appropriate for use in Christchurch waterways.

PROPOSED MITIGATION

40. The applicant has proposed to mitigate the effects of stormwater discharges to surface water within the study area by classifying the receiving waterways, defining a set of receiving water objectives and designing a preliminary surface water management scheme to treat runoff from sub-catchments to a sufficient level to meet these objectives.

Receiving Waterway Classification

41. The Water Quality report provides some information of how the waterways within the study area have been classified and lists the receiving water objectives for each of the four classes of waterways that have been developed. It describes how the NRRP classifications have been refined based on the knowledge gained from the investigations and assessments undertaken to develop the SMP. The SMP provides some additional information on revisions that have been made to the classification.
42. I agree with the receiving waterway classification that is shown in Figure 12 of the AEE and Figure 23 of the SMP. Adjustments have been made by CCC following consultation with Environment Canterbury and this has been appreciated.
43. However, I do not consider that sufficient explanation has been provided in any of the reports to present a clear rationale behind the resulting four classes of waterways. A clear set of criteria would provide a consistent approach and methodology for waterway classification across other catchments as SMPs are developed for the whole Christchurch City area. Classification of the waterways is integral to their future management and it is therefore important that there is clear rationale for their classification.

Receiving Water Objectives

44. The receiving water objectives for each waterway class are listed in section 7.3.1 of the AEE and section 4.2.3 of the SMP, along with brief rationale. Section 4 of the revised Water Quality report also discusses receiving water objectives, but the list of objectives in this document is different to that in the AEE and SMP. None of the documents explain why these differences have arisen.
45. Further discussion has occurred between CCC and Environment Canterbury to ensure alignment of SMP objectives with NRRP Table WQL5 receiving water objectives. The resulting table has been provided by CCC as Table 1 in the draft consent conditions attached to the further information letter dated 17 October 2011.
46. I agree in general with the intent of the objectives and measures listed in Table 1. The measures/targets provided include a range of important aspects of the aquatic environment that contribute to healthy, functioning waterways. The numeric targets for QMCI and percent cover of filamentous algae, periphyton and fine sediment align with NRRP objectives for these river types. There is recognition within the SMP that these targets are not currently being met at many of the monitored sites within the South-West Christchurch area. The intent is that these are long-term targets that may take some time to achieve and monitoring will measure progress as stormwater mitigation measures are implemented. Monitoring reports should demonstrate improvement towards the targets to ensure compliance with the consent conditions.

47. I have some minor concerns with the objectives and targets as described in the following sections.

Metals

48. The applicant has adopted an objective of “Meet USEPA criteria for copper, zinc and lead” in the SMP. As described previously, I do not agree with the use of USEPA criteria and believe that the relevant guidelines for use in New Zealand are the ANZECC (2000) guidelines. These should be the point of reference for setting specific objectives and targets for metals in the SMP. In Table 1 of the draft consent conditions this objective has been refined to “Meet USEPA water quality criteria for metals *and improve water quality towards the national guidelines for copper, lead and zinc*”. I consider this to be a reasonable compromise but fundamentally do not agree with the use of USEPA criteria in place of the national guidelines without strong justification.

Sediment quality

49. In the Water Quality report (section 4.4) there is an objective for Class 1 and 2 receiving waterways to improve sediment quality. This has not been included in the SMP, AEE or Table 1. The Sediment Quality report concluded that metal and PAH concentrations in sediments in the Heathcote/Ōpāwaho are currently at levels that may be contributing to adverse environmental effects. Sediment in the rivers and downstream in the receiving estuary and lake environments is the likely receptor for metals and hydrocarbons discharged in stormwater from the South West Christchurch area. Reduction in concentrations of these contaminants in sediments is necessary to minimise potential effects on aquatic ecosystems. I therefore consider it desirable that an objective to improve sediment quality is included in the SMP and Table 1 of the consent conditions.

Faecal contamination

50. The Water Quality Report and AEE do not address faecal contamination adequately. While faecal contaminants can arise from a number of sources, high concentrations of indicator bacteria are detected following rainfall events (not just related to sewer overflows) so I believe that this is an urban stormwater issue. A report prepared for Environment Canterbury (Moriarty & Gilpin 2009) used faecal source tracking techniques on samples from two sites on the Avon River. This study found that during dry weather the major source of *E. coli* is birds and following rainfall dog markers were more dominant. The report recommends that better control of dog defecation and disposal could contribute to significant improvements in microbial water quality. Regulatory (e.g. rules in the NRRP) and non-regulatory (e.g. education about best practice farm management practices) methods are undertaken in rural areas to reduce faecal contaminant loads to waterways. Similar measures are required in urban areas to reduce loads of faecal contaminants in urban waterways and in my opinion the SMP should contribute to this goal.
51. Faecal contaminants are not relevant to the ecological health of waterways. However they are an issue of public health concern, which should be given consideration when managing discharges to waterways. I concur that Environment Canterbury do not routinely monitor any “swimming spots” in the study area for recreational water quality. Informal recreational activities may occur and there have been concerns raised about the current status of downstream areas that are used for contact recreation but have poor microbial quality.

52. Monitoring of microbiological contamination is proposed and this will allow evaluation of trends in faecal contamination. Improvements in microbiological water quality may occur through methods such as education, source control and riparian buffer planting. Some of these methods are part of the proposed management approach in the SMP for reducing other contaminants, such as those relating to specific industrial activities. There is a section in the SMP about environmental education and I see no reason why an educational programme could not be developed to help reduce faecal contamination in urban waterways.
53. While I consider that faecal coliforms and bacteria can be difficult contaminants to remove from stormwater by treatment, other methods for controlling inputs at source (e.g. filtering through swales, riparian buffer strips, and educating the community about disposal of dog faeces) can be used to reduce inputs. In my opinion it is therefore reasonable to expect that appropriate stormwater mitigation could reduce faecal indicator bacteria concentrations in receiving waters and an objective relating to this issue should be included in the SMP and Table 1 of the consent conditions.

ASSESSMENT OF EFFECTS

54. The applicant states that with the mitigation measures proposed the effects of development in the South-West Christchurch area will be no more than minor and that possible retrofitting of treatment to significant areas that are currently unmitigated will result in improvements in existing water quality in receiving waterways. In the event that “unexpected” water quality outcomes occur, additional mitigation may also be included in high risk industrial sites.
55. Based on the information provided in the supporting documents I agree that the effects of new development are likely to be sufficiently mitigated by the proposed measures. This will of course depend on the accuracy of modelled contaminant loads and treatment efficiencies. To date there is a lack of local information collated on treatment efficiency of stormwater devices and therefore significant reliance on performance estimates from other parts of the country, particularly Auckland. Monitoring of actual treatment device performance, as well as the quality of receiving water environment, is therefore crucial to determining the long-term effectiveness of the mitigation measures and for providing essential local information for designing effective stormwater treatment facilities into the future.
56. I have less confidence that the mitigation measures proposed will adequately address *current* degraded water quality and aquatic ecosystems related to existing activities within the South-West Christchurch area. The focus on the mitigation of effects in new urban areas and no clear proposals to remedy existing adverse effects unless development takes place, is of concern. Two key issues that are inadequately addressed and, in my opinion, are not likely to be resolved by the proposed mitigation are discharges from industrial areas and sedimentation of streambeds.

Industrial areas

57. Analysis of long-term water quality monitoring data collected by CCC has shown that tributaries receiving discharges from industrial areas contribute to poor water quality in the Heathcote River/Ōpāwaho (PDP 2007). Results of the sediment quality survey described in the Sediment Quality report also show that metal concentrations are highest in the tributaries draining the industrial areas of Sockburn and Hornby (Haytons Stream and Curletts Road waterway).

58. Section 5.3.6 of the SMP describes contingency mitigation consisting of alternative mitigation measures (use of filtration systems) if receiving water objectives are not met, which the CCC acknowledge is likely in industrial areas. The SMP also includes the potential for retrofitting existing areas to future stormwater mitigation measures where new development occurs. Graham Levy and Brett Mongillo provide further comment on additional proposals for industrial stormwater management including the proposed industrial site auditing programme.
59. An investigation undertaken in 2009 by NIWA for Environment Canterbury (Moore et al. 2009) looked at contaminant sources in the Haytons Stream catchment. This study found key areas within the catchment where contamination of the stream occurred, particularly during wet weather events when stormwater runoff was entering streams. In response to the results of the investigation the Environment Canterbury Pollution Prevention Team are currently working with industry in the Haytons Stream catchment to improve site management practices and reduce their environmental liabilities. They have a well-defined system of assessing risk levels of sites while working with them to reduce the likelihood of a pollution event, and are working through the catchment on a sub-catchment basis to target the key areas of concern. This information will assist with the proposed industrial site auditing programme.
60. In my opinion there is sufficient evidence available now to show that mitigation is required for discharges from known high risk industrial sites and the CCC should not wait for the results of further monitoring and auditing before developing a plan of action. Without more immediate actions to mitigate the existing effects I consider it will be difficult to meet receiving water objectives within a reasonable timeframe (i.e. the “unexpected” water quality outcomes should be expected).

Sediment and the Port Hills

61. One of the adopted receiving water objectives in the SMP is “No ecological impacts from construction activities” and strict adherence to Environment Canterbury’s Erosion and Sediment Control Guidelines (Environment Canterbury 2007) is proposed in order to achieve this. Brent Hamilton’s report covers this aspect of the application in detail. I do agree with the applicant that sediment inputs to receiving waters during construction are a significant issue that has caused damage to receiving waters and their instream values both within and beyond the study area. Development on the Port Hills has had particularly disastrous consequences in the past, due to the high risk of erosion, fine soils and issues with stabilising sites on steep slopes. Sedimentation is a major issue for both the Heathcote/Ōpāwaho and Halswell/Huritini rivers that has been identified as a primary cause of degraded ecological habitat in Cashmere Stream and the Heathcote River/Ōpāwaho in particular (Taylor 2003).
62. Section 6.3 of the Aquatic Values report discusses catchment development considerations and suggests that a requirement for monitoring of deposited fine sediment (as well as suspended sediment) should be included for large developments, coupled with biological monitoring. I agree with this suggestion as sediment deposition can have longer lasting effects on aquatic ecosystems than suspended sediment and should be monitored in areas of high risk such as downstream of large development areas. I note that no actual monitoring relating to water clarity or fine sediment deposition is required in the monitoring programme it would be sensible for CCC to consider such monitoring on a case-by-case basis as developments occur to ensure that achievement of receiving water objectives is not compromised.

63. Runoff from the Port Hills associated with activities other than construction can also contain high sediment loads and this is an issue that has not been addressed by the SMP. A report prepared for CCC (Trangmar 2003) identified areas that are particularly prone to erosion and recommended measures for preventing the various types of erosion that are prevalent on Port Hills slopes. A recent study of sediment sources to Cashmere Stream (James & McMurtrie 2010) identified key tributaries that contribute significant amounts of sediment, which included some hill catchments and some draining flat land. Strategies are needed to control sediment loss from the hill slopes within the South-West Christchurch area that are contributing to the significant sedimentation issues that are experienced in Cashmere Stream and the lower Heathcote/Ōpāwaho, as well as the Halswell River/Huritini. In my opinion the SMP should acknowledge this issue and provide clear linkage to other management tools, i.e. strategies and plans, that are available to address it.

Freshwater Ecology

64. With regard to effects on freshwater ecology, the CCC state that predictions that zinc and copper will meet USEPA criteria in receiving waterways indicate that effects of those contaminants on ecosystems are expected to be less than minor. I have previously stated my disagreement with the use of USEPA criteria. The health of freshwater ecosystems is influenced by a wide range of factors and I therefore consider it inappropriate to conclude that effects will be less than minor based solely on predictions of metal concentrations in the water column. Further consideration should be given to concentrations and/or loads of other contaminants that can influence ecosystems, such as nutrients and sediment, as well as potential changes to habitat through channel modification, riparian vegetation and buffering, and stream flows.
65. The AEE does recognise that additional mitigation measures may be required to protect high ecological value sites. It refers to the Aquatic Values report regarding the importance of considering catchment-scale protection and restoration in maintaining high ecological values. Table 5.3 of the Aquatic Values report outlines measures for ensuring adequate protection for areas of ecological importance and this is referred to in section 7.4 of the AEE but is not included explicitly in the SMP. The further information letter dated 17 October 2011 includes explanation of how the protection measures have been incorporated into the SMP. It also proposes additional wording to be inserted into section 5.8 of the SMP to recognise the importance of the catchment protection areas identified in the Aquatic Values report. I support this wording and would like to see the SMP amended to include it.
66. The URS peer review (Appendix H) commented that there was little discussion of stream protection measures and specific works or priorities associated with individual streams have not been identified in the SMP. While I understand that this is likely to be something that is considered during the implementation of the SMP rather than at the high level concept stage, I agree that the matrix approach that was provided as an example by the reviewers would be a highly useful tool for the catchment-scale management that has been proposed for sites with high ecological values. As well as listing the potential management options, ranging from removal of fish barriers to minimising impervious area, it would also be very useful to include the primary regulation tool to indicate the likely mechanism for making things happen.

PROPOSED MONITORING

67. Monitoring of receiving environments is required to determine whether receiving environment objectives are being achieved or at least whether progress is being made towards achievement of the objectives. The proposed monitoring programme for surface water quality, stream sediment quality and aquatic ecology was developed following discussions between CCC and Environment Canterbury.
68. I am satisfied that the monitoring programme (Golder Associates, 17 October 2011) will provide adequate information to measure compliance with the objectives for Class 1 and 2 surface water receiving environments.
69. In addition to the monitoring required by the monitoring programme, it is likely that the CCC will need to undertake further monitoring to ensure that site practices and mitigation measures are operating in a way that will support compliance with the receiving environment objectives. This may include monitoring the performance of selected treatment devices to determine whether predictions regarding contaminant loads are accurate over time. Additional monitoring of high risk areas, such as sediment deposition downstream of large development areas or specific industrial contaminants downstream of industrial sites, would also be beneficial to ensure minimal effect.

RECOMMENDATIONS

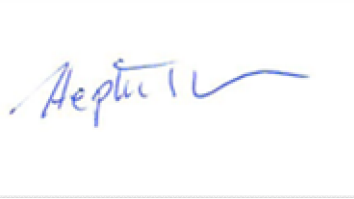
70. In general I consider that the South-West SMP signals a positive step forward for stormwater management and should result in improved outcomes for the receiving aquatic environments. I suggest the following recommendations to improve the certainty of those outcomes and to provide sufficient information over time to determine whether desired objectives are being achieved.
71. The receiving waterway classification requires further explanation as there is no clear procedure provided to show how the four classes of waterways have been derived and applied. A clear rationale or series of steps for waterway classification would be very useful to ensure consistency in the classification of waterways across the city as further SMPs are developed.
72. Reference to USEPA criteria for metals should be removed from the receiving environment objectives and additional objectives relating to improvement in sediment quality and reduction in faecal indicator bacteria concentrations should be included in the SMP and Table 1 of the consent conditions.
73. In my opinion greater consideration should be given to implementing mitigation measures in the short to medium term to mitigate and remedy effects of discharges from existing areas. There is sufficient information now available to show that stormwater discharges are resulting in degradation of the receiving waterways and mitigation and remediation of these effects, including contamination of sediments, should be included in the SMP.

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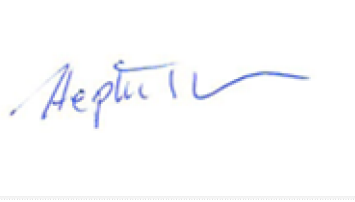
Signed:

Date:

1 November 2011

Michele Stevenson
Surface Water Quality Scientist

Reviewed by:



Signed:

Date:

1 November 2011

Stephen Timms
Principal Consents Planner

Attachment 1

Memo from Raymond Ford

20 October 2011

Ref :

MEMORANDUM

FROM : R FORD

TO : M STEVENSON
CC

SUBJECT : NRRP – WATER QUALITY STANDARDS

In response to your request, I will briefly describe the background to the water quality standards in Schedule WQL1 of the Natural Resources Regional Plan and how they are intended to apply in the framework of the plan.

1. Background

At the request of Environment Canterbury and Ministry for the Environment, the National Institute Water Atmospheric Research (NIWA) undertook a review of water quality standards and objectives (Norton & Snelder 2003). The work was prompted by concern that the largely narrative standards in Schedule 3 of the RMA did not reflect the range of river and lake types in the Canterbury Region, and that standards did not provide much certainty for resource consent applicants.

The recommended standards are based on a consideration of various national guidelines, ANZECC guidelines, published information and expert advice from researchers. Norton & Snelder (2003) based the toxicant values on the 'trigger values' provided in Table 3.4.1 of the ANZECC (2000) guidelines. They cautioned that:

".. While this is necessary for clarity and certainty of the numbers used in the framework (as discussed in the report), it is very important that plan-users are educated about the source of these numbers. While these 'rule standards' will determine whether a discharge falls into the 'permitted', 'discretionary' or 'non-complying' activity categories in the NRRP, the source of these numbers (ANZECC & ARMCANZ 2000 Guidelines) and the appropriate qualifications contained in the guidelines, will be used by ECan during case-by-case considerations, to assess the likely effects of a discharge on attainment of the related 'objective'. Therefore a discharge that does not meet the standards in this table may or may not be granted consent as a 'non-complying' activity, depending on site-specific characteristics and reference to the guidelines". (Table 11 of Norton & Snelder, 2003)

Norton & Snelder's (2003) recommendations were incorporated into Schedule WQL1 of the notified NRRP with some amendments based on the advice of Environment Canterbury surface water quality scientists.

2. NRRP Chapter 4 Rules

The hierarchical system of types of activities defined in Section 87A of the RMA, is used to control discharges in the NRRP. Permitted and controlled activity status is used for those discharges where the adverse effects are likely to be minor and/or very well understood.

Discretionary activity status applies to those discharges where the effects on the receiving water quality can be managed within the limits and policy framework (Policy WQL1) set by the plan provisions. For discretionary activities, there is a reasonable level of confidence that the discharge will not have unacceptable effects on the receiving water body, but there is sufficient uncertainty to justify the consent authority retaining discretion to grant or decline the application and set conditions to manage the effects of the activity. Non-complying activity status is reserved for those activities where the effects of the proposed discharge are likely to exceed the limits set by the plan, but it provides an opportunity for an applicant to make a case to the consent authority that their proposed activity would be acceptable.

Under the NRRP Rule WQL48, for a discharge to surface water to be considered as a discretionary activity, it must meet the conditions of the rule. Those conditions include a requirement to comply with the water quality standards in Schedule WQL1 and the other conditions of the rule, particularly Condition 1. The conditions are both precedent or an entry condition, i.e. the application must demonstrate that the water quality standards will be achieved, and subsequent conditions, i.e. consent conditions will be imposed to ensure the discharge will comply with the water quality standards once the activity commences. By having specific conditions in the rule, an applicant, and the consent authority, can determine the activity status at the outset of the process, and not rely on the consent authority to determine the activity status during decision-making, i.e. reserve discretion over activity status of the proposed discharge.

Once an application is made for a discharge permit, the consent authority can make a detailed assessment of the specific effects of the activity, including compliance with NRRP Policy WQL1, and devise conditions to manage the effects of the activity.

If a proposed discharge will not meet the water quality standards, and therefore is a non-complying activity, the activity still may be acceptable if an applicant can demonstrate either, that the adverse effects will not be contrary to the objectives and policies of the plan, or the adverse effects will be no more than minor (s 104D RMA). If an applicant has information that shows one or more of the standards in Schedule WQL1 are not appropriate for the circumstances, and should be reviewed, the applicant can make a case to the consent authority to have a different standard applied to their discharge.

In conclusion, it is recognised that there is a tension between scientific uncertainty and the legal need to provide clarity and certainty. Rule WQL48 and the associated water quality standards in Schedule WQL1 are designed to act as a threshold beyond which the adverse effects of the proposed activity are likely to exceed the level of effects anticipated by the plan and require a more detailed examination by the consent authority.

Reference:

Norton, N., Snelder, T. (2003) *Options for numeric water quality objectives and standards for lakes and rivers in Canterbury*. A report prepared by National Institute of Water And Atmospheric Research Ltd for Environment Canterbury and Ministry for the Environment. Environment Canterbury unpublished report U03/25, May 2003.