



7.2 Future Development

The potential for future development in any catchment is a reflection of several factors including land availability and obtaining planning permissions.

RDC has advised that the Lakes A settlement zoning is around the existing settlement with no or little capacity for growth. The LOCMP RDC (2010) notes that the projected increase in dwellings is to rise from 260 to 275 by 2021. Communications with RDC in March 2011 suggested that the projected dwellings could increase to 288 by 2051. This is on the basis that the capacity for growth in the Lake Okareka catchment was assessed when designing the new wastewater system. Limited growth and capacity for development was designed into the wastewater network with projected dwellings (infilling) based on a growth model and available land. Subdivision within the Lake Okareka Settlement area is a non-complying activity under the current district plan and the topography and positioning of existing houses on sites means the options for future subdivision are limited⁸.

There are no subdivision resource consent applications for the Lake Okareka Settlement area lodged with RDC at this time.

Nevertheless, RDC have indicated that should any future applications for subdivision in the Lake Okareka Settlement area be received then RDC would consider the application. In accordance with the Councils design parameters, any new site is required to contain and dispose at least a 10% AEP storm event by soakage, vegetated swales, ponding and wetlands. Should any new connection to the stormwater network be sought then upgrades to the stormwater network with assistance from the developer will be considered at that time.

Hence, on the basis of growth predictions, likely difficulty in obtaining planning permission; that there are no applications for subdivision pending; and the requirements to meet councils design parameters; substantial increases in stormwater flows into the network are unlikely.

8.0 ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

8.1 Introduction

This Assessment of Environmental Effects considers the current effects of the storm water network and discharges on the stream and lake receiving environments. Future impacts are expected to remain consistent with current impacts as there is no anticipated growth or increase in imperviousness in the Lake Okareka Settlement catchment area and hence the volume and quality of stormwater is expected to remain as currently observed.

8.2 Water Quality

8.2.1 Lake water quality class

Section 6 described the available water quality data for stormwater generated in the Lake Okareka urban settlement area. In this section, the available data is compared to the natural state water quality classification that applies to Lake Okareka.

Table 8 provides a comparative summary of the effects of stormwater discharge on lake water quality as set out in the Natural State (Lake) Water Quality Classification. Following the table, additional discussion is presented in relation to several key aspects of water quality.

⁸ Per comms. Justine Randell and Pers Com Tracey May Planning Manager, march 2011. Email 17 March 2011 and email 18 March 2011.



Table 8: Commentary on effects of stormwater discharge from Lake Okareka Settlement on the Natural State (Lake) Water Quality Classification for Lake Okareka.

Natural State (Lake) Water Quality Classification – Water Quality Requirements	Stormwater Quality	Compliance
a(i) No increase in temperature.	Stormwater from urban surfaces warmer	Following discharge to lake no detectable increase in temperature expected
a(ii) No change in pH.	pH similar to lake pH	No change in lake water pH expected
a(iii) No increase in suspended solids.	Stormwater will result in local increases in TSS concentration close to discharges	TSS discharges from urban area expected to be small compared to overall lake catchment
a(iv) No decrease in dissolved oxygen.	DO concentration expected to be variable	No effect on DO expected
(b) The discharge shall not cause the <i>E. coli</i> level to exceed 126cfu/mL as measured by a single sample.	Stormwater will transport bacteria from surfaces washed by rain into the lake via stormwater system (refer discussion below)	No significant effect on Lake water microbiological quality when compared to agricultural streams discharging to lake
c) Aquatic organisms, fish and other food resources shall not be rendered unsuitable for human consumption by the presence of contaminants as a result of the discharge.	Known contaminants in stormwater at low concentrations compared to more developed urban areas	Lake receives contaminants derived from vehicles by atmospheric deposition
d(i) The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials.		No adverse effects expected
d(ii) Any conspicuous change in the colour or visual clarity. There shall be no (0%) decrease in secchi disc depth or black disk range.	Stormwater will alter local water clarity at discharge point.	The expected changes are not expected to be any worse than occurring from streams entering the lake from remainder of catchment
d(iii) Any emission of objectionable odour (refer to the Operative Bay of Plenty Regional Air Plan).	No odour expected	No effects expected
d(iv) The rendering of fresh water unsuitable for consumption by farm animals (refer to ANZECC Guidelines for Fresh and Marine Water Quality, 2000).	No adverse effects on suitability of lake waters as water source for stock	No effects expected
d(v) Any adverse effects on aquatic life (refer to ANZECC Guidelines for Fresh and Marine Water Quality, 2000).	No adverse effects expected following discharge (refer below for further detail)	No effects expected
(e) There shall be no net increase of nitrogen or phosphorus in the lake as a result of the discharge. This	The nett addition to the lake from stormwater is considered to be a lower proportion of that entering	No effects expected



Natural State (Lake) Water Quality Classification – Water Quality Requirements	Stormwater Quality	Compliance
means the mass of nitrogen or phosphorus being discharged directly to surface water or to groundwater, after taking into account mitigation or offset measures, is not above that entering surface water or groundwater from the activity site prior to the discharge.	the lake from rest of catchment Sewerage reticulation is expected to further reduce discharges over time.	

8.2.2 Contaminants and effects on aquatic organisms

In Section 6, the available information on key contaminants in stormwater discharging from site DP5 was described. The data indicates that the road runoff from within the Okareka settlement is similar or better than that found in established urban areas in New Zealand (Kennedy, 2003). As expected, the concentrations of copper and zinc were higher in the discharge than the ANZECC (2000) trigger values.

- The concentration of dissolved copper which ranged from 0.0010 g/m³ to 0.0046 g/m³ are higher than the ANZECC (2000) hardness modified trigger value (HMTV, calculated at an estimated hardness of 30 g/m³) for copper at a 95% protection level of 0.0014 g/m³.
- The concentration of dissolved zinc in stormwater ranged from 0.031 to 0.11 g/m³ and was higher than the ANZECC (2000) HMTV for zinc of 0.0080 g/m³.

It should be noted that the ANZECC (2000) trigger values for zinc are considered conservative. A re-evaluation of the zinc trigger values (Golder 2008) identified that based on a revised and updated dataset for zinc a more appropriate 95% trigger value for the protection of aquatic life was 0.023 g/m³. This value is similar to the USEPA chronic criteria for zinc of 0.043 g/m³. Although the revised ANZECC trigger value is higher, a similar dilution would still be required to reduce concentrations below the trigger value resulting in 'no effects'. Although the zinc data is limited it is considered to be a reasonable indication of stormwater zinc concentrations, only limited dilution (two to five times) would be required to bring the concentrations below the trigger value. This dilution would reduce copper concentrations to below the copper trigger value.

Trace metals such as copper and zinc are common constituents of road surface runoff (from vehicle emissions and tyre and brake pad wear). Any section of road whether within the settlement or not will discharge similar concentrations to receiving waters.

8.2.3 Nutrients and lake catchment

Nutrients are an important group of contaminants in relation to the well being of Lake Okareka. Due to eutrophication issues, EBoP produced the Proposed Lake Okareka Management Action Plan (EBoP, 2003) which contained a nutrient budget for the lake catchment. The budget showed that the potential nitrogen contribution from stormwater discharged the settlement (2.9%) of the catchment was ~1% (i.e., less than half the discharge of all other areas in the lake catchment). With septic tank discharges no longer occurring, the relative contribution rises slightly to 1.5%.

For phosphorous, the budget indicated that stormwater contributed the greatest contribution per hectare within the catchment (by a factor of two). Consequently, the settlement contributed 7.4% of the catchment load. DRP concentrations in site DP5 stormwater samples ranged from 0.030 g/m³ to 0.22 g/m³ (median 0.04 g/m³). Concentrations were generally similar to DRP concentrations measured in other urban areas (e.g., Rotorua 0.036 g/m³).



8.3 Sediment Quality

Overall, concentrations of copper, lead and zinc in sediments collected adjacent to the three sampled stormwater discharge points shows low concentrations in sediment. The results displayed some range in concentration, some of which may be attributable to the physical characteristics of the sediments. With roadways and human activity within the catchment some addition of contaminants will occur to sediments. The higher concentration at DP2 may reflect a greater contribution from the catchment at this site however the concentrations at all three sites were low and would not be likely to be having adverse effects on aquatic organisms inhabiting the sediments.

8.4 Water Quantity

The majority of the streams and drains receiving stormwater in the Lake Okareka Settlement catchment are ephemeral and flow irregularly. Residents confirm that flooding is uncommon, and, due to maintenance works undertaken by RDC is now a reflection of lake levels rather than storm water flooding. Adverse environmental effects due to the flow rate and volume of stormwater and the storm water network itself on stream and drains receiving stormwater has also been described and is minor. As there is minimal growth projected for the settlement catchment, limits on impervious cover, and use of land based disposal, then future effects associated with the quantity of storm water in the settlement catchment are likely to remain as present.

8.5 Freshwater Ecology

The examination of freshwater habitat and biota at sites within the Okareka settlement indicated that the invertebrate community composition at the mid- and lower Okareka Loop Road stream sites reflected the highly modified nature of the catchment and the poor instream and riparian habitats observed.

Two minor impediments to fish passage were noted during the site survey.

Receiving environment quality can be improved through riparian planting and instream macrophyte clearance. Benefits of riparian planting include improved water quality, flood control, biodiversity and aesthetic values (Reeves et al., 2006). Establishment of woody riparian margins will increase the proportion of channel shade and woody debris inputs as stable habitats for invertebrates. Riparian planting and stock exclusion along all identified waterways would help to maintain streambank stability and stream flow resulting in improved stream function and higher water quality inputs into Lake Okareka.

Biodiversity values could also be improved through macrophyte clearance in Okareka Loop Road stream. Macrophyte removal, with regular maintenance would improve stream flow and habitat and may result in a higher diversity invertebrate community (NIWA, 2011).

8.6 Public Health Issues

Stormwater contributes a range of natural plant and animal bacteria through biological processes and the presence of common wild birds and animals within the settlement. It is assumed that there are some cats and dogs within the settlement. The catchment contains a range of livestock. All animals will contribute bacteria (and pathogens) through faeces which has the potential to be washed indirectly or directly to waterways and Lake Okareka.

BoPRC monitors one site in Lake Okareka for bacterial indicators. The site has a good health grading and typically shows that water is of recreational quality. EBoP do note however that following rainfall, that it may take 48 hours for water quality to return to suitable quality.



9.0 STATUTORY ASSESSMENT

9.1 Resource Management Act 1991

9.1.1 Overview

An overview of the key provisions of the RMA in relation to the activities for which resource consents are being sought is contained in the following sections of this document.

9.1.2 Part 2 considerations

Part 2 of the RMA sets out the 'purpose and principles' of the Act. Section 5 'Purpose' states:

- "(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.*
- (2) In this Act, "sustainable management" means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –*
 - (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
 - (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
 - (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment."*

The proposed continued discharge of stormwater from the settlement of Lake Okareka to land and Lake Okareka provides an important utility service, thus providing immediate social and cultural benefits to the local community. In relation to the potential effects on the environment associated with the discharges to land and Lake Okareka, an assessment of effects has been provided within this document. This assessment concludes that the discharges are not expected to have any adverse effect on the lake aside from some short-term water clarity effects at the time of discharge, consistent with that which occurs from streams entering the lake throughout the lake catchment. On this basis, the life-supporting capacity of land and water resources is safeguarded. Maintenance of current stormwater mitigation devices and processes assist in avoiding and mitigating adverse effects. Suggested land and riparian management practices, as detailed in Section 12 of this document will also avoid, remedy and mitigate adverse effects on stream and lake health and water quality.

Section 6 of the RMA identifies 'matters of national importance'. In exercising their functions and powers under the RMA, consent authorities must 'recognised and provide for' the matters listed in section 6 of the Act. With regard to land use activities and stormwater management within the Lake Okareka catchment the following section 6 matters are of particular relevance:

"Section 6 Matters of national importance

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

- (a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:*
- (b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:*
- (c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:*



- (d) *The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:*
- (e) *The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.*
- [(f) *The protection of historic heritage from inappropriate subdivision, use, and development.*]
- (g) *The protection of protected customary rights.”*

In addition section 7 of the RMA identifies ‘other matters’ which consent authorities ‘shall have particular regard to’ when exercising their functions under the RMA. With regard to the continued discharge of stormwater to land and water in the Lake Okareka catchment, the following matters are considered to be relevant:

“In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—

- (a) *Kaitiakitanga:*
 - [(aa) *The ethic of stewardship:*]
 - (b) *The efficient use and development of natural and physical resources:*
 - [(ba) *the efficiency of the end use of energy:*]
 - (c) *The maintenance and enhancement of amenity values:*
 - (d) *Intrinsic values of ecosystems:*
 - (f) *Maintenance and enhancement of the quality of the environment:*
 - (g) *Any finite characteristics of natural and physical resources:*
 - (h) *The protection of the habitat of trout and salmon:*
 - [(i) *the effects of climate change:*”]

In addition, section 8 of the RMA ‘Treaty of Waitangi’ requires “*all persons exercising functions and powers*” under the RMA to have regard to the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

In relation to growth and stormwater management in the Lake Okareka Settlement sections 6 to 8 of the RMA have been considered and are provided for through the current and proposed future restrictions on development and the current and proposed ongoing mitigation and maintenance mechanisms and processes.

With regards to sections 7(b) and (c), the proposed continued discharge of water to land and water is an efficient use of existing natural and physical resources within the catchment. Improved maintenance and management of the stormwater network and receiving environment will assist in ensuring the amenity values of the receiving environments are maintained.

With regard to sections 7(d) and (f) the quality of the lake environment will be maintained through the suggested mitigation measures and controls on development in the lake catchment as a whole.

Finally with regard to section 7(i), the improvements being undertaken to the lake outlet control and mitigation measures associated with stormwater discharges (including the use of land disposal on sites) aim to reduce flood levels in the catchment and hence counteract the potential effects of climate change.

Given the above assessment, the continued discharge of stormwater to land and water, promotes sustainable management and is consistent with Part 2 of the RMA.



9.1.3 Part 3, Section 15 considerations

Section 15 of the RMA places restrictions on the discharge of contaminants into the environment. Section 15(1)(a) and (b) states *“No person may discharge any contaminant or water into water, or onto land in a manner where it may enter water, unless expressly allowed by a national environmental standard or other regulations, a rule in a regional plan or proposed regional plan, or by a resource consent.”*

The discharge of stormwater from the RDC network at Lake Okareka to water is not expressly permitted by the RWLP and therefore resource consent is required pursuant to Rule 37 of the RLWP for a discretionary activity. This CSCA and the accompanying LOCMP has assessed the effects of the continual stormwater discharge activity.

Given the small size of the Lake Okareka Settlement, minimal growth predictions and restrictions on development, and minor adverse effects, the continual operation of the existing stormwater network and level of service is considered the best practicable option for the discharge of stormwater at the Lake Okareka Settlement.

9.1.4 Part 6, Sections 104 to 107 considerations

For any resource consent application, section 104 of the RMA ‘considerations of applications’ requires the consent authority, in making a decision on a resource consent application, to have regard to:

- The actual and potential effects on the environment of allowing the activity (section 104(1)(a)).
- The relevant provisions of any national environmental standard, other regulation, national policy statement, coastal policy statement, regional policy statement or proposed regional policy statement, plan or proposed plan (section 104(1)(b)).
- Any other matters considered relevant or necessary to consider (section 104(1)(c)).

Given the requirements of section 104(1)(b), relevant statutory planning documents need to be assessed in relation to the activities for which resource consent are being sought. On this basis, the planning documents of relevance to this application, which are assessed below, are:

- BoPRC Regional Policy Statement (RPS).
- BoPRC Proposed Regional Policy Statement (PRPS).
- Regional Land and Water Plan (RLWP).

The actual and potential effects associated with the discharges have been assessed in Section 8 of this document. There are no other matters considered relevant or necessary under section 104(1)(c).

Section 105 ‘matters relevant to certain applications’ requires that where an application is for a discharge, regard must be had to the nature of the discharge and the sensitivity of the receiving environment to adverse effects (section 105(1)(a)), the reasons for the proposed choice in relation to the discharge (section 105(1)(b)) and possible alternative methods of discharge and discharge locations (section 105(1)(c)).

The potential effects on the environment in relation to the discharges have been assessed in Section 8 of this document. As the potential effects of the discharge of stormwater from the Lake Okareka settlement area have been found to be less than minor, and given that stormwater infrastructure exists and mitigation mechanisms are in place, then the continued discharge of stormwater to the streams within the Lake Okareka settlement and the lake itself is considered an efficient use of resources.

In addition, section 107 of the RMA sets out restrictions on the grant of certain discharge permits. This includes provision for an application to be declined, if after reasonable mixing, the discharge gives is likely to give rise to a range of effects (i.e., section 107(2)(c) to (g)) on the receiving water.



As outlined in the AEE and Table 8 the discharge is not expected to result in any of the effects identified in sections 107(c) to (g) of the RMA after reasonable mixing.

9.2 Operative and Proposed RPS Relevant Objectives and Policies

Relevant objectives and policies in the Operative Regional Policy Statement (RPS) are Objectives 8.3.1(a) and 8.3.3(a) and Policies 8.3.1(b)(i)(ii) and 8.3.3(b)(iv). Relevant objectives and policies in the proposed RPS are Objectives 17, 27 and 28 and Policy WL4B.

As Regional Plans must give effect to Regional Policy Statements then analysis of the relevant objectives and policies (or part thereof) in the RLWP is sufficient for this application, and is presented in Table 9 below.

10.0 CONSULTATION

10.1 Consultation Undertaken and Outcomes

Consultation was undertaken when the Lakes A section of the RDP was proposed and first drafted to develop a chapter that deals specifically with impacts on the lakes in the District.

As part of development of the Draft LOCMP consultation was undertaken with interested and potentially affected parties.

Consultation included sending the Draft Lake Okareka CMP, June 2010 to Rod Stace of the Lake Okareka Rate Payers Association, the Forest and Bird Protection Society and Sandra Goodwin, secretary of the Lake Okareka Residents Association, both of which have provided written reviews of the CMP.

Mr Stace's comments focused on technical inaccuracies in the Draft CMP while The Lake Okareka Residents and Ratepayers' Association comments were raising issues associated with the lake outlet structure, matters under the jurisdiction of BoPRC. Comments from both parties have been included in the CSCA and the CMP where they correct technical errors, improve readability and are consistent with RDC's intent for future stormwater management at Lake Okareka. Copies of the reviewer's comments are provided in Appendix F of this application.

Further consultation currently being undertaken...



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10.2 RLWP Relevant Objectives and Policies

Table 9: Analysis of the effect of the stormwater discharge from the Lake Okareka Settlement compared to relevant objectives and policies in the Regional Land and Water Plan.

Objective or Policy	Comment
Chapter 2 – Kaitiakitanga	
Objective 4: The water, land and geothermal concerns of tangata whenua are taken into account and addressed as part of resource management processes, while recognising that different iwi and hapu may have different concerns or practices.	Consultation undertaken during development of the Lakes A section of the Rotorua District Plan and the LOCMP identified concerns of tangata whenua that have been incorporated in the LOCMP.
Objective 5: Water, land and geothermal resource management decisions have regard to iwi resource management planning documents.	RDC is currently assisting in the preparation of Iwi Management Plans.
Objective 6: Maintain the biological and physical aspects of the mauri of water, land and geothermal resources; and where practicable achieve the ongoing improvement of the biological and physical aspects of the mauri where it has been degraded, as it relates to: <ul style="list-style-type: none"> (a) Water quality meeting the specified water quality classifications. (b) Water flows not breaching the instream minimum flow requirements. (c) The life-supporting capacity of soils is sustained. (d) Protection of geothermal surface features identified by, and of special value to tangata whenua. 	Assessments of biological resources, water quality and quantity have been undertaken and recommendations made to improve water quality and biological outcomes.
Policy 5: To ensure that resource management issues of concern to tangata whenua are taken into account and addressed, where these concerns are relevant and within the functions of Environment Bay of Plenty.	EBoP will consider this application relative to tangata whenua's concerns.
Policy 11: To recognise and provide for the mauri of water, land and geothermal resources when assessing resource consent applications.	Assessment undertaken does not envisage a decline in water or biological quality below the levels currently associated with Lake Okareka..
Policy 14: To consult tangata whenua on water, land and geothermal resource management issues according to the requirements of the Act, tikanga Maori methods of consultation, and in a manner consistent with case law.	RDC operate a protocol for consultation with Iwi (the Tuhourangi Protocol) and consultation on the Lake Okareka CMP and CSCA will be undertaken in accordance with the Tuhourangi Protocol.
Policy 17: To: <ul style="list-style-type: none"> (b) Have regard to iwi resource management planning documents when considering resource consent applications, where such documents exist. 	Refer Tuhourangi Protocol above.
Policy 18: To avoid, remedy or mitigate adverse effects on water, land and geothermal resources or sites of spiritual, cultural or historical significance to tangata whenua, where these resources and sites have been identified by tangata whenua.	Refer Tuhourangi Protocol above.



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Objective or Policy	Comment
<p>Policy 19: To encourage tangata whenua to recommend appropriate measures to avoid, remedy or mitigate the adverse environmental effects of the use and development of water, land and geothermal resources</p>	<p>RDC is currently assisting in the preparation of Iwi Management Plans.</p>
<p>Policy 20: To assess effects of proposed development activities on the cultural and historic values and sites of water, land and geothermal resources in consultation with tangata whenua.</p>	<p>No new development activities are proposed in this application. Application addresses existing level of development and an existing discharge.</p>
<p>Chapter 3 – Integrated management of land use and water</p>	
<p>Objective 8: Integrated management of land and water resources.</p>	<p>Stormwater is managed using land soakage in the first instance to reduce land use effects on water. Riparian management is promoted as a means of reducing non point source pollution in the catchment. There is no new development or proposed development in the settlement catchment.</p>
<p>Objective 9: Land use and land management practices are appropriate to the environmental characteristics and limitations of the site, and avoid, remedy or mitigate adverse effects on the life-supporting capacity of soil resources, the receiving environment and heritage values.</p>	<p>Residential land use is associated with better quality stormwater than some of the surrounding land uses. Planning provisions do not support additional development in the area. Soakage of stormwater to groundwater will limit stormwater qualities and lot and size coverage rules minimise stormwater generation.</p>
<p>Objective 10: Stewardship of natural resources which:</p> <ul style="list-style-type: none"> (a) Sustains the life-supporting capacity of soil, water and ecosystems. (b) Maintains, and where appropriate, protects cultural, ecological, amenity, natural character and landscape values through management practices that avoid, remedy or mitigate adverse effects. 	<p>Recommendations on mitigation options to maintain the life-supporting capacity of water and ecosystems have been made.</p>
<p>Objective 11: The water quality in the Rotorua lakes is maintained or improved to meet the following Trophic Level Indices:</p> <ul style="list-style-type: none"> (a) Lake Okareka – 3.0 	<p>The effects assessment concludes that stormwater from the Lake Okareka Settlement area is unlikely to affect the trophic level of Lake Okareka.</p>
<p>Objective 12: Reduced occurrence of cyanobacterial algal blooms on the Rotorua Lakes.</p>	<p>RDC are not aware of any cyanobacterial blooms in Lake Okareka</p>
<p>Objective 13: The water quality in rivers and streams is maintained or improved to meet the Water Quality Classifications set in the Water Quality Classification Map, and the following environmental outcomes:</p> <ul style="list-style-type: none"> (a) Natural State (Lake) Water Quality Classification – the natural quality of the water shall not change. 	<p>Lake Okareka is classified as Natural State (Lake) water quality. Table 8 in the assessment of environmental effects concludes that in relation to the values expressed in the water quality class, there will be no adverse effects on pH, temperature, dissolved oxygen, the production of oils, films, scums and floatable suspended material, odour, the suitability of the lake water for animal consumption, aquatic life and there will be no net increase in nitrogen and phosphorus in the waters of Lake Okareka as a consequence of the continued stormwater discharge from the settlement to the lake. The assessment of environmental effects also concludes that there may be some increases in suspended solids to the lake during stormwater discharges close to the discharge point, but these effects are small compared to the overall contribution from land surrounding the lake. All stormwater contributes some microbial contamination, but again this is not a significant effect when compared to that contributed by the stream from agricultural land in the catchment. With respect to the consumption of fish and food sources from the lake, there</p>



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Objective or Policy	Comment
<p>Objective 14: The water quality of lakes and bathing sites on rivers and streams listed in Schedule 10 is maintained at a level suitable for swimming. (Schedule 10 is provided in Appendix C (iv)).</p>	<p>is no adverse effect expected as a consequence of the stormwater discharges. There may be some short term adverse effects on colour and clarity of the lake during discharging near the discharge points but this effect is consistent with streams entering the lake throughout the catchment.</p>
<p>Objective 15: Maintenance of high quality groundwater.</p>	<p>Lake Okareka is listed on Schedule 10. EBoP monitors lake water quality (which includes the stormwater contribution to the lake) for bacterial indicators from one site in Lake Okareka. The site has a good health grading and typically shows that water is of recreational quality. Following rainfall stormwater and stream water from throughout the catchment may result in the lake being unsuitable for swimming for up to 48 hours.</p>
<p>Objective 16: Degraded groundwater quality is improved where appropriate.</p>	<p>Sewage reticulation is expected to assist in maintaining high quality groundwater. Refer to above comment.</p>
<p>Policy 21: To manage land and water resources in the Bay of Plenty within an integrated catchment management framework to:</p> <ul style="list-style-type: none"> (a) Maintain or enhance water quality in individual lakes to meet their Trophic Level Index ('TLI') and Water Quality Classification. (b) Require the management of nitrogen or phosphorus in individual Rotorua lake catchments. (c) Reduce cyanobacterial algal blooms on the Rotorua Lakes by managing nutrient inputs in the lake catchment. (d) Maintain or improve water quality in streams and rivers to meet their Water Quality Classification. (j) Understand the effects of changing land cover and land use practices on water flows and levels in rivers, streams, lakes. (k) Promote and encourage the adoption of sustainable land management practices that are appropriate to the environmental characteristics and limitations of the site to: <ul style="list-style-type: none"> (i) Protect the soil and avoid, remedy or mitigate the adverse effects of erosion. (ii) Maintain the health of the region's soil resources for future generations. (iii) Achieve the appropriate management of riparian areas, including the retirement and planting of riparian areas of streams, rivers, lakes, wetlands and estuaries. (iv) Avoid, remedy or mitigate adverse effects on water quality in the receiving environment. (v) Take into account the assimilative capacity of the soil. (vi) Recognise and provide for heritage values of the site. (l) Manage land and water resources according to realistic management goals that are appropriate to the existing environmental quality and heritage values (including ecosystem values) of the location. 	<p>Current stormwater management in Lake Okareka Settlement along with provisions to manage potential development are expected to maintain the TL1, water quality classification, and suitability of water for swimming.</p> <p>Riparian enhancement has been recommended as has minor works to prevent scouring and erosion of stormwater channels to avoid adverse effects on water quality.</p> <p>Planning controls are in place to prevent growth of the area and loss of vegetation.</p> <p>Management options have been suggested which reflect the small scale of likely effects of stormwater discharges on Lake Okareka.</p>



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Objective or Policy	Comment
Policy 25: To encourage and provide for community involvement in the management of water, and land resources.	Consultation has been undertaken in Lake Okareka community as part of the LOCMP and District and Regional Plan development processes.
Policy 26: To continue to raise community awareness about water quality and integrated management issues.	Consultation has been undertaken in Lake Okareka community as part of the LOCMP and District and Regional Plan development processes.
Policy 33: To promote and support land use change and/or land management practices in the catchments of the Rotorua Lakes that will achieve lake water quality improvement.	Included in LOCMP.
Chapter 4 – Discharges to land and water	
Objective 23: Discharges of contaminants to water are managed to meet the following goals:	The assessment of effects concludes that water quality classification will not be affected by the continued stormwater discharge. Refer to the analysis of Policy 13 above.
(a) After reasonable mixing, discharges of contaminants to lakes, streams and rivers meet the water quality classification of the receiving water bodies as a minimum; and have no more than minor adverse effects on heritage values, existing users in downstream areas, and lakes, harbours and estuaries.	
(b) Discharges of contaminants to water are in a manner that takes into account the cultural values of tangata whenua acknowledged for that area.	
Objective 25: Prevent the accumulation of persistent toxic contaminants in the environment, particularly in lakes, estuaries and harbours and their catchments.	Sediment data from stormwater outlets found concentrations of copper, lead and zinc in sediments collected adjacent to the three sampled stormwater discharge points were low and would not be likely to be having adverse effects on aquatic organisms inhabiting the sediments.
Objective 27: Discharges of water to water avoid, remedy or mitigate adverse effects on the environment as appropriate to the values, uses and existing environmental quality of the activity site.	The assessment of effects concludes existing environmental quality will be maintained and options for enhancement of stream margins have been suggested.
Objective 30: Integrated and comprehensive management of stormwater within a catchment or sub-catchment framework, where practicable.	Integrated management of stormwater within the Lake Okareka Settlement catchments is achieved through the use of soakholes as the primary source of disposal, encouraging sustainable land use practices and the use of the stormwater network.
Objective 31: Improvement, where necessary, to the quality of stormwater discharged to the environment.	The assessment of effects concludes that the quality of the stormwater will not have an adverse effect on the environment. Improvement mechanisms have also been suggested.
Objective 32: Erosion and scour caused or exacerbated by stormwater discharges is avoided, remedied or mitigated.	Minimal erosion and scour has been observed. Options for decreasing erosion and scour have been suggested.
Objective 33: The volume of stormwater from urban areas and other sources that utilise stormwater systems that discharge to streams, rivers and lakes is minimised.	Volume minimised by use of land soakage at each developed site of Lake Okareka
Objective 34: Streams and rivers are not used as treatment systems for contaminated stormwater.	Contaminants are low. Primary treatment is provided via cesspits, existing swales, etc. No further direct primary treatment will be undertaken.



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Objective or Policy	Comment
<p>Policy 38: Discharges of contaminants to water including lakes to comply with the following requirements specified in Table 10 of Policy 38 and reproduced below:</p> <ul style="list-style-type: none"> i) Direct discharges of contaminants to lakes are discouraged, while allowing for minor discharges that are unlikely to have adverse effects on water quality. (ii) There shall be no net increase of nitrogen or phosphorus in lake catchments. This does not preclude the use of nutrient trading within the same lake catchment to achieve this policy. (iii) Where discharges are made directly to lakes, the discharge is to: <ul style="list-style-type: none"> • Meet the water quality classification of the lake after reasonable mixing. • Avoid, remedy or mitigate adverse effects on heritage values and existing users of the lake. This will include implementing appropriate treatment and mixing methods for the discharge. 	<p>The majority of stormwater outlets at Lake Okareka Settlement are to streams or drains prior to discharge to the lake, hence direct discharges to the lake are avoided. Some houses are not connected to the stormwater network and hence they discharge stormwater to land or occasionally by overland flow to the lake. The effects assessment concludes that the contribution of nitrogen and phosphorus from the settlement stormwater discharge is likely to remain as present and hence will not cause a net increase in nitrogen and phosphorus to the lake.</p>
<p>Policy 41: To encourage the change from the discharge of contaminants to water to the land-based treatment and disposal of contaminants, where this is environmentally sustainable.</p>	<p>The effect assessment suggests that the need for land based disposal of stormwater is not justified. The land availability and topography of the settlement site is also a constraint to land based disposal.</p>
<p>Policy 42: To recognise and provide for the effects on the mauri of the receiving environment caused by the discharge of contaminants to water by:</p> <ul style="list-style-type: none"> (a) Where appropriate, encouraging early and ongoing consultation with tangata whenua during the consideration of wastewater treatment systems to take into account the cultural values of tangata whenua acknowledged for that area. (b) Where reasonable and practicable to do so, take steps to promote better use of freshwater by discouraging disposal of toxic materials via wastewater systems. 	<ul style="list-style-type: none"> a) Will be achieved by tabling the Lake Okareka CMP and CSCA at the next meeting of Tuhourangi Protocol. b) Currently being implemented.
<p>Policy 43: To take appropriate action to avoid, remedy or mitigate the cumulative effects of discharges of contaminants to water or to land where such discharges are having an adverse effect on water quality, the life-supporting capacity of soil, or the coastal environment.</p>	<p>The discharge of stormwater for the Lake Okareka Settlement is not having an adverse effect on water quality or the life supporting capacity of soil.</p>
<p>Policy 47: To avoid, remedy or mitigate the adverse effects of discharges of water to water on:</p> <ul style="list-style-type: none"> (a) Flooding. (b) Any relevant Maori cultural values. (c) Stability of the beds and banks of the receiving water body. (d) Ecological values. 	<p>Adverse effects of flooding can be managed through Council maintenance of stormwater conduits and through the land development and planning processes and rules. The beds and banks of the receiving water bodies were found to be generally stable with only minor erosion observed and mitigation measures have been suggested to manage that erosion. Ecological values in the receiving water bodies were generally poor, but this reflects catchment wide processes rather than stormwater alone and mitigation mechanism have been suggested to improve ecological values of the streams in the settlement catchment. RDC do not consider that any maori cultural values are adversely affected by the stormwater discharges.</p>



VOLUME 1: COMPREHENSIVE STORMWATER CONSENT APPLICATION

Objective or Policy	Comment
<p>Policy 48: To encourage, as appropriate, discharge activities to comply with current best engineering practices and best practicable options to avoid or mitigate adverse effects on the environment so that the requirements of this regional plan and other Environment Bay of Plenty requirements are met. Best engineering practices are relevant where the scale, intensity and potential adverse effects require such engineering practices.</p>	<p>Best engineering practice is not required as the scale, intensity and adverse effects associated with the stormwater discharge for the Okareka Settlement is minor. The current stormwater network and treatment practices are considered the best practicable option given the size of the settlement; financial constraints and minor adverse effects observed.</p>
<p>Policy 51: To require the appropriate management of stormwater quality, including:</p> <ul style="list-style-type: none"> (a) The use of source controls to avoid the contamination of stormwater. (b) The use of best practicable options. (c) Treatment of stormwater to prevent the contamination of receiving environments. 	<p>Source controls are employed through the use of soakholes, simple stormwater treatment mechanisms commensurate with the size of the settlement are in place.</p>
<p>Policy 54: To require stormwater discharge rates and volumes, and stormwater discharge outlet structures, to be designed and managed to avoid or mitigate erosion and scour.</p>	<p>The stormwater discharge rates and volumes from the Lake Okareka Settlement catchment are low, and erosion and scour is minimal, hence the current network design is adequate.</p>
<p>Policy 55: To encourage the minimisation of the volume of stormwater runoff discharged to the environment from urban areas.</p>	<p>Use of soakholes and development controls which ensure low imperviousness in the catchment meets the intent of policy 55.</p>
<p>Policy 56: To encourage the use of appropriate measures to reduce the level of contaminants in rural stormwater, to avoid, remedy or mitigate adverse effects on water quality.</p>	<p>Riparian management and maintenance of indigenous land cover in the upper rural sections of the settlement catchments is encouraged.</p>



11.0 SUMMARY OF STORMWATER MANAGEMENT ISSUES IDENTIFIED

11.1 Flooding and Stormwater Quantity

11.1.1 Flooding around The Wash area, particularly between Millar Road and Steep Street

Historically flooding due to overtopping of The Wash has caused overland flow of stormwater across some properties on Millar Road and Loop Road. RDC and EBoP have undertaken improvement to the drainage capacity of the streams entering The Wash and The Wash itself. This has included the diversion of The Wash up stream of the houses in the Okareka settlement to reduce water entering the residential area. Any future stormwater issues with The Wash can be managed through maintenance of the stormwater channel, including the clearing of obstructions and preventing of structures (bridges) being built across The Wash which impede the passage of stormwater.

11.1.2 Drainage around the Lake Okareka Hall and some reserves

Drainage issues around the back of the Lake Okareka Hall are associated with The Wash, and drainage works in this area will occur when a carpark has been established for the hall. Drainage issues on other Council reserves are associated with raised lake levels and are discussed below.

11.1.3 Flooding due to lake level rise during times of heavy rainfall

The level of Lake Okareka rises in response to heavy rainfall and when the outlet to the lake is unable to clear the increased flows, resulting in flooding of some reserves adjacent to the lake. EBoP are responsible for the outlet and discharges from the outlet. RDC manages the outlet, however the engineering of the outlet is such that at times lake level rise cannot be avoided. EBoP have begun a process of upgrading the outlet and flooding at the settlement is expected to be reduced in frequency if implemented.

11.2 Water Quality and Stream Health

11.2.1 Minor erosion in stream/drainage channels

Some sites of minor erosion in stream banks and beds where stormwater pipes enter the streams and drains will be contributing suspended solids and possibly nutrients to the storm water.

11.2.2 Phosphorous in stormwater

BoPRC studies have concluded that stormwater from the whole catchment contributes the greatest contribution of phosphorous per hectare. However the urban settlement catchment is likely to only be a minor contributor of phosphorus to the lake.

11.2.3 Low ecological values in streams

The low ecological values in the stream, in part, reflect their ephemeral nature and the upper and lower catchment land use practices.



12.0 STORMWATER MANAGEMENT OPTIONS

12.1 Structural and Non-structural Options and Proposed Management Solutions: Flooding and Stormwater Quantity

12.1.1 Structural options

- Upgrading of the capacity of the stormwater network and stormwater treatment to be considered should development occur outside of the currently specified settlement area, and RDC agrees to accept new connections to the network.
- Support modification of the Lake Okareka outlet by EBoP to clear flood flows from Lake Okareka more quickly and reduce likelihood of flooding to lakeside land and properties.

12.1.2 Non-structural option

- Provide for the use of financial contributions mechanisms in the District Plan for the purpose of obtaining developer contributions to any upgrades of the stormwater network required as a consequence of a development.
- Maintain RDC floor levels development controls.
- Restrict future development, both in fill and expansion of residential areas in the catchment and maintain design standard and on-site stormwater treatment to soak holes.
- Restrict development in area identified as prone to flooding due to lake level rise and maintain development controls over floor levels.

12.2 Structural and Non-structural Options and Proposed Management Solutions: Stormwater Quality, Stream Health and Erosion

12.2.1 Structural options

Maintain the:

- Stormwater dry pond and silt fence on private land above Miller road in stormwater catchment 03.
- Council maintained swales and silt bags at the base of stormwater catchment 01, or replace with permanent structures.
- Gabion basket check dams and gross debris steel traps near the mouth of The Wash in stormwater catchment 02. Note: The steel grates are a private structure.
- Silt bags near the fire station at the base of stormwater catchment 07, or replace with permanent structures.
- Runoff from roads to grass verge prior to entering into the stormwater network to assist sediment trapping.

Remediate:

- Chanel scour sites at Okareka Loop Road sub-catchments.
- Monitor erosion at upper reaches of The Wash and at discharge points into The Wash and the open drains on Ben Road. Consider erosion prevention devices such as rock riprap if erosion exacerbates.



12.2.2 Non-structural options

- Riparian planting and instream macrophyte clearance in upper reaches of Okareka Loop Road Stream C.
- Encourage riparian planting and exclude stock access to waterways in upper catchments, especially farmland in the upper wash catchment and above Acacia Road.

13.0 CONCLUSION

The Lake Okareka settlement is a small solely residential settlement which comprises less than 3% of the Lake Okareka catchment. There is little growth expected in the catchments hence storm water loads into stormwater the network are expected to remain as currently experienced.

Stormwater from the Lake Okareka catchment is discharged to ephemeral stream and drains, then into Lake Okareka, with some limited primary treatment in some of the stormwater sub-catchment. The streams serving as stormwater conduits through the settlement originate from farm land above the settlement which is grazed and generally has poor or no riparian margin or stream bank protection in place. The generally poor stream ecological values observed are expected given the nature of the streams and the surrounding land use. The stormwater analysis undertaken for this CSCA reflects rural and urban derived contamination. Overall however, the quality of the stormwater is consistent with or better than that observed in other residential catchments. Sediment samples from stormwater outlets showed only minor levels of contamination attributable to the urban area.

This assessment of environmental effects concludes that in relation to the values expressed in the water quality class for the lake, there will be either no adverse effects or no long term adverse effects on the waters and habitats within Lake Okareka as a consequence of the continued stormwater discharge from the settlement to the lake. The statutory assessment concludes that the objectives and policies of the RWLP and the intent of relevant sections of the RMA can be met.

Structural and non-structural stormwater mitigation options have been recommended to maintain stormwater quality, improve stream health, and reduce potential adverse effects on the lake and streams.

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