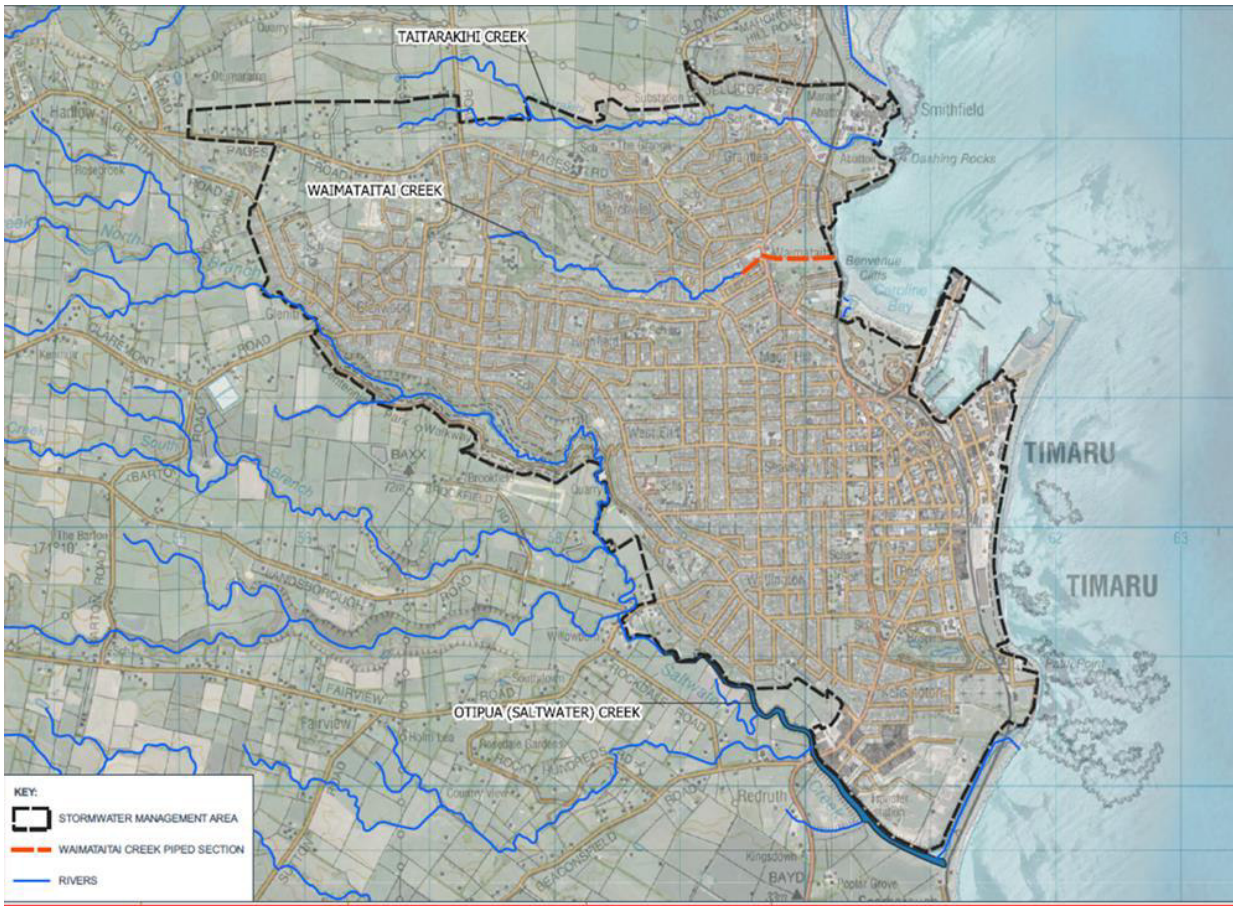
Timaru District Council – Contract 2442

Project Number: 6-TTDA7.00

Timaru Stormwater Management Area

20 April 2023

FINAL FOR LODGEMENT



Discharge Permit Application and Assessment of Effects on the Environment

Contact Details

Brent Hamilton

WSP
12 Moorhouse Avenue
Christchurch 8011
+64 3 363 5400
+64 21 709 126
brent.hamilton@wsp.com

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Prepared by

Yvette Rodrigo
Principal Environmental Consultant

Reviewed by

Brent Hamilton
Principal Environmental Consultant

Approved for release by

Fraser O'Malley
Project Director

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1.0	20 April 2023	Yvette Rodrigo	Brent Hamilton	Fraser O'Malley	Final

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Revision	Details
1.0	Final for Lodgement

Disclaimers and Limitations

This report ('**Report**') has been prepared by WSP exclusively for the Timaru District Council ('**Client**') in relation to a resource consent application to Environment Canterbury Regional Council ('**Purpose**') and in accordance with the scope of services dated 17 December 2021 and the Form of Agreement for Engagement of Consultant 2021-22 made between TDC and WSP on 12 August 2021 (**Agreement**). WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

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APPLICATION FOR RESOURCE CONSENT

PRESCRIBED FORM 9 FOR SECTION 88 OF THE RESOURCE MANAGEMENT ACT 1991

To: Canterbury Regional Council

PO Box 345
Christchurch 8140

From: Timaru District Council - Water and Drainage

2 King George Place
PO Box 522
Timaru 7940
(Please note different address for service)

1. The Applicant applies for the following type(s) of resource consent:

   Discharge Permit – Duration 35 years

2. The activity to which the application relates (the proposed activity) is as follows:

   Discharge of stormwater and construction-phase stormwater to land and water from existing and future urban areas within the Stormwater Management Area of Timaru. Noting that there are some land uses and larger scale activities that are excluded from the application

   For further details refer to the Description of the Proposal Section 5 of the Assessment of Effects on the Environment (AEE) Report.

3. The area at which the proposed activity is to occur is as follows:

   Timaru city, Timaru District.

   The site is within the Stormwater Management Area as shown in Figure 1-1 of the AEE Report.

4. The Applicant is the owner of the reticulated stormwater system and parts of the site including but not limited to the road reserves. There are various landowners and occupiers (other than the Applicant) within the Stormwater Management Area that utilise the reticulated network or have private stormwater systems to which the application relates.

5. No additional resource consents are needed for the proposal to which this application relates.

6. Attached is an assessment of the proposed activity's effect on the environment that—

   a. Includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and

   b. Addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and

c. Includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

Refer Section 6, 7, 8 of the AEE Report.

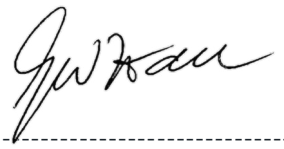
7. Attached is an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.

Refer Section 10.8 of the AEE Report.

8. Attached is an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

Refer Section 10 of the AEE Report.

Applicant/person authorised to sign on behalf of applicant



Dated: 20 April 2023

Grant Hall | Principal Three Waters Specialist
Timaru District Council
Telephone: 03 687 7200
Email: grant.hall@timdc.govt.nz

Address for service details

WSP Brent Hamilton
Christchurch office
12 Moorhouse Avenue
Christchurch 8011
New Zealand

Telephone: 03 972 5007
Mobile: 021 709 126
Email: brent.hamilton@wsp.co.nz

ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

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1 Introduction

1.1 Overview

Timaru District Council (TDC) provides urban stormwater collection and disposal for the city of Timaru and is responsible for ensuring that the reticulated stormwater system provides an adequate level of service for this community.

TDC has prepared a Stormwater Management Plan (SMP) for the existing urban area of Timaru and for future expansion of the city, primarily based on land-use zones within the current District Plan. These existing and future urban areas comprise the Stormwater Management Area (SMA) covered by the Timaru SMP.

TDC's vision for managing stormwater in Timaru is:

> *"Together we value, protect and restore the mauri/life-force of the waterways so that it enables mahinga kai, kīuta kī tai."*

The SMP, which is attached as Appendix 1, adopts a holistic and adaptive management approach for managing stormwater discharges from the Timaru SMA. In preparing the SMP for the Timaru SMA, TDC has been guided by the principles that underpin Te Mana o te Wai, which is the fundamental concept of the National Policy Statement for Freshwater Management 2020 (NPSFM) and "*refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment.*"

The SMP supports an application by TDC for a discharge permit (or resource consent) from Environment Canterbury (ECan) to authorise stormwater discharges from their reticulated stormwater network servicing both the existing and future urban areas of Timaru. The consent will also include stormwater discharges from other existing and future individual residential and commercial properties (not discharging via TDC's network).

This resource consent application is made pursuant to Section 15 of the Resource Management Act 1991 (RMA) and is classified as a non-complying activity following bundling of the status of the proposed discharges under the rules of the relevant regional plans. TDC is seeking a duration of 35 years.

1.2 Purpose of this Document

This report provides an Assessment of Effects on the Environment (AEE) in accordance with Section 88 and Schedule 4 of the Resource Management Act 1991 (RMA) to accompany the application for a discharge permit.

The report describes the proposal and provides an assessment of the requirements under the RMA, and the relevant statutory documents, including the Canterbury Land and Water Regional Plan (LWRP) and the Canterbury Regional Coastal Environmental Plan (RCEP). It also provides information on the nature and sensitivity of the receiving environment and an assessment of actual or potential effects that could occur due to the stormwater discharges.

1.3 Stormwater Management Area

Timaru is located on the east coast of the South Island, approximately 165 km south-west of Christchurch and 200 km north of Dunedin. The Main South Railway Line and State Highway (SH) 1 runs through the centre of the town in a north to south direction. The SMA covered by this resource consent application includes both existing and future urban areas within the Timaru township and is shown in Figure 1-1.

The Timaru SMA is approximately 1,900 hectares (ha) and consists of a large proportion of residential land, some lifestyle blocks, reserve areas, and land used for industrial, and commercial purposes.

TDC provides a reticulated stormwater network that services approximately 13,046 properties via a system of pipes and open channels. Due to the constraints within the city associated with discharging stormwater into land, stormwater from the reticulated network predominantly discharges into surface water via several outfalls. The SMA consists of discrete well-defined sub-catchments based on the gullies and waterways receiving the discharges from the network. These sub-catchments include:

- Ōtipua -Saltwater Creek Catchment
- Timaru Catchment (which includes Whales Creek and Waimataitai Creek),
- Taitarakihi Creek Catchment; and
- Coastal Catchments

Figure 1-1: Timaru SMA

2 Background

2.1 Reasons for Application

Many of the existing stormwater discharges from TDC's reticulated network and other minor discharges (otherwise not permitted or separately consented) within the SMA were previously lawfully established (permitted) under the Transitional Regional Plan (TRP) and the Natural Resources Regional Plan (NRRP) for Canterbury, that pre-dated the LWRP.

The LWRP became operative in 2015 and required all stormwater network operators to obtain comprehensive network consents for the discharges from their networks. The rationale for this was to achieve an integrated approach to stormwater management within catchments and to address the potential cumulative impacts of these discharges on the environment.

Under the LWRP, for a reticulated stormwater network discharge that existed prior to 11 August 2012, an application for a discharge permit was to be lodged by 30 June 2018, or at a later date as agreed to between the stormwater network operator and ECan. ECan had previously granted TDC with an extension of timeframes to lodge the application for Timaru by 31 July 2022, however this date has not been met, and no further extension has been approved

While the LWRP only requires TDC to obtain consent for discharges from their reticulated network, TDC have opted to include discharges from residential (not including rural-residential land) and commercial urban development within the SMA that do not connect to their network. This is anticipated to provide benefits to ratepayers (who may have had to apply for a separate discharge permit) whilst providing a more holistic approach to stormwater management within the catchment. However, industrial sites not connected to the network are to be excluded. Refer to Section 5.1 for a detailed description of the proposal.

2.2 Existing Stormwater Consents in the Timaru SMA

Currently, individual stormwater discharge permits within the district are typically obtained by residential developers for new urban developments, except for some major development areas, where these permits have been obtained by TDC. Following the completion of the development and the infrastructure being vested with TDC, the associated stormwater discharge permits are transferred to the TDC, providing a set defects period is completed and full resource consent compliance is achieved.

An analysis of data obtained on 14 December 2022 from ECan's Canterbury Maps open data service was undertaken to determine the number of active stormwater discharge permits in the Timaru SMA. Table 2-1 lists the active stormwater consents within the SMA.

Table 2-1: Active stormwater discharge consents within the SMA

Consent Number	Consent Holder	Location	Connected to TDC network	Land Use	Catchment	Expiry Date
CRC168825	TDC	Gleniti Residential Zone 6	Yes	Residential	Waimataitai Creek	02/07/43
CRC960038.2	Strathallan Lifecare Village	31 Konini Street	No (direct discharge to Ōtipua Creek)	Commercial Residential	Ōtipua Creek	13/09/30
CRC210148	Timaru Mega Centre	233 Evans Street	No (direct discharge to Taitarakihi Creek)	Commercial Retail	Taitarakihi Creek	12/05/41
CRC167591	Rooney Holdings Limited	107 Morgans Road	Yes – to be vested to TDC in future	Residential	Taitarakihi Creek	12/08/51

Consent Number	Consent Holder	Location	Connected to TDC network	Land Use	Catchment	Expiry Date
CRC145473	Red Sky Holdings limited	72-82 King Street	Yes	Industrial Retail	Ōtipua Creek	12/05/49
CRC183170	Z Energy	Cnr Ritchie and Dawsons Streets. – Port of Timaru.	Yes	Commercial	Coastal	

3 Description of the Existing Stormwater Network

3.1 The Assets Overview

The Timaru stormwater reticulated network consists of discrete networks, with sub-catchments that sit within well-defined natural waterway catchments and gullies within the SMA. The stormwater network in Timaru is ageing and there is limited information on the condition of some of the existing infrastructure.

TDC's Land Transport Unit manage the street infrastructure (i.e., sumps in the roads), the Drainage and Water team are generally responsible for all other stormwater infrastructure, while the Parks and Reserves team tend to maintain the planted areas (e.g., raingardens, stormwater basins, swales).

3.2 Infrastructure Summary

There is a total of 149 kilometres (km) of pipeline with their sizing detailed in Table 3-1. Stormwater from much of the catchment is collected via kerb and channel and ultimately discharges to water via 70 outfalls. The location of these pipes and outfalls are shown in Figure 3-1.

Table 3-1: TDC Stormwater Infrastructure Summary

Stormwater Infrastructure	Quantity
Stormwater pipe size	149,933 m total
<300 mm diameter	65,756 m
300 – 500 mm diameter	43,214 m
500 – 1,000 mm diameter	28,463 m
>1,000 mm diameter	12,500 m
Stormwater outfalls total	65

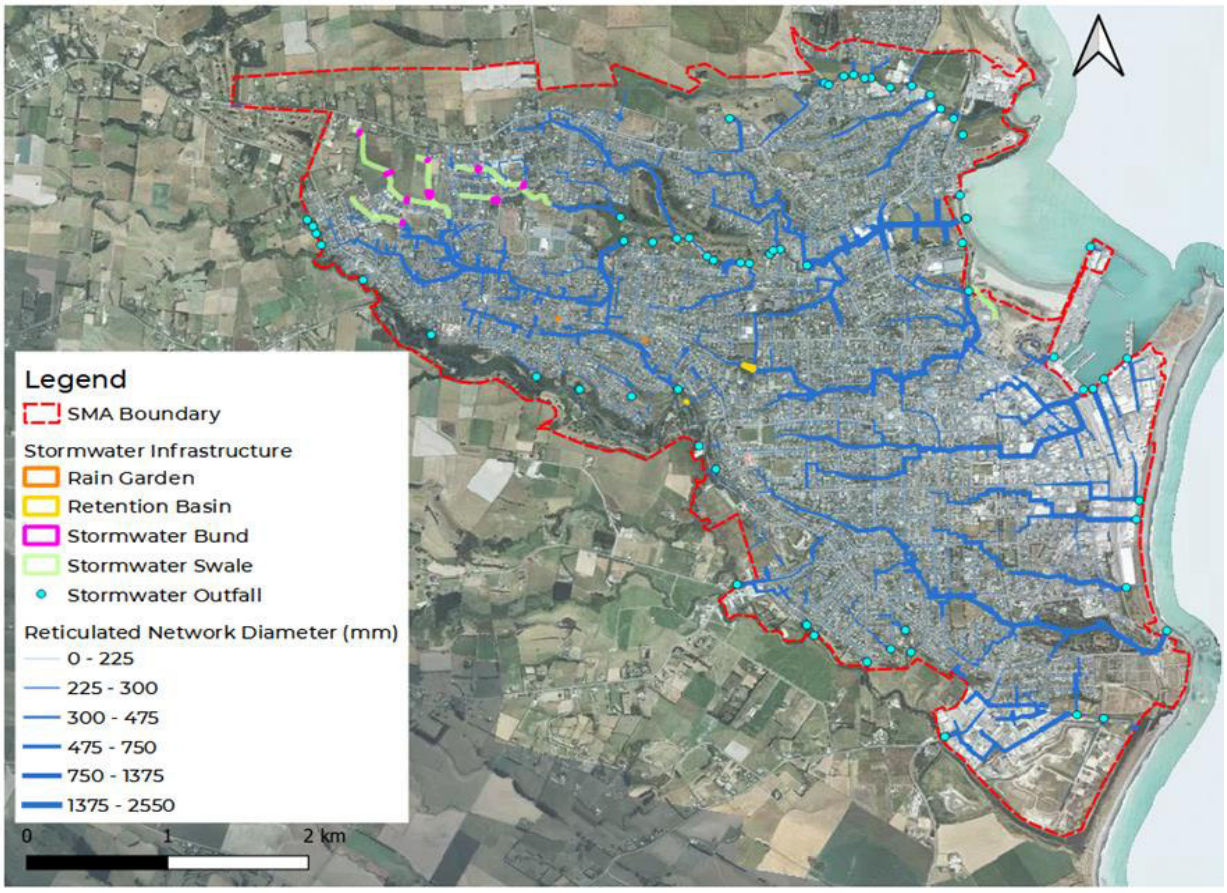

Figure 3-1: Timaru Stormwater Infrastructure

In addition to the piped network, treatment and retention infrastructure such as retention basins, rain gardens and stormwater bunds have been installed more recently (since 2009) to manage the impacts of stormwater from development within the township. These are listed in Table 3-2 and further details of these systems are included in the Timaru SMP (attached as Appendix 1).

Table 3-2: Stormwater treatment and retention infrastructure

Location	Date Constructed	Function	Approximate Service Catchment Area (ha)
Hillview Crescent	2016	Raingarden	0.48
Wai-iti and Morgans Road	2015	Raingarden	0.4
West End Park	2009	Retention Basin	
Mountain View Road	2015	Stormwater Bund	1,103
Meadowstone	2010	Stormwater Bund	717
Gleniti	2021	Stormwater Bund	1,477

3.3 Network Capacity

The level of service currently adopted by TDC is that water will not inundate habitable floor spaces in the:

- 5-year Average Recurrence Interval (ARI) (or 20% Annual Exceedance Probability (AEP)) for urban residential areas; and

- 10-year ARI (or 10%AEP) for industrial and commercial areas.

This means that ponding can be expected to occur in parks, roads, and private properties during the above rainfall events.

An assessment of the capacity of the piped stormwater network has been completed by WSP (2021) and is attached as Appendix 2. The assessment was based on using existing network hydraulic models and a GIS-based desktop study in areas where there are no models. The assessment did not report the associated land use for the pipes assessed, so a direct comparison of land use Level of Service (LoS) was not able to be undertaken.

The capacity assessment found that most of the pipe network within the SMA is appropriately sized, with 73% of the network able to convey the 5-year ARI peak flows and 64% able to convey the 10-year ARI peak flows. Only 14% of pipes assessed were unable to meet the 2-year ARI level of service. This assessment highlights that the capacity in the Timaru stormwater network is generally able to meet TDC's level of service requirements, however an increase in capacity could help to alleviate nuisance flooding in affected areas.

Table 3-3: Level of service results by pipe length and percentage for Timaru (WSP 2021)

Length of Pipe Meeting the Capacity Performance (m)			
2- Year ARI	5- Year ARI	10 -Year ARI	Total Length Assessed
44,509 (86%)	37,800 (73%)	33,098 (64%)	51,081 (98%)

3.4 Flood Hazards

Flooding occurs across the Timaru urban catchments due to the following issues:

- Poorly draining soils can lead to ponding for extended periods of time, particularly in low-lying areas with no established connection to the stormwater system.
- The height of the ocean tide affects how quickly stormwater can drain from the system in the tidal reaches of the Taitarakihi, Waimataitai, Whales Creek and Ōtipua-Saltwater Creek. This can lead to flooding on properties and roadways in Caroline Bay and low-lying areas close to the coast.
- Blocked overland flow paths can cause flooding.
- Increasing impervious areas due to development combined with more frequent rainfall events are putting pressure on the capacity of the piped network.

WSP undertook an indicative flood mapping assessment (refer Appendix 2), to broadly understand the areas that could be exposed to a flooding hazard. The flood depth and flood hazard mapped in the assessment, represented a level of service scenario (10-year ARI) and an extreme event (200-year ARI) occurring across the SMA, but has some limitations. Notably the work does not show:

- The benefits of the underground pipe network on performance (although it must be noted that the network is not designed to a 200-year ARI level of service).
- The benefits of potential stormwater or flood defence infrastructure.

Buildings potentially affected by flooding have been mapped where the building footprint intersects flood depth greater than 150mm (NZBC minimum floor level). Section 4.3 of the SMP (Appendix 1) includes the flood maps based on modelling of the 10 year and 200-year ARI events and lists the key areas subject to flooding within the SMA. The results of the flood hazard assessment indicate that up to 8.4% and 11.7% of all buildings within the SMA are at risk of

flooding during a 10-year ARI and 200-year ARI event, respectively. This assessment was based on the LINZ buildings layer which includes non-habitable buildings such as sheds and garages.

3.5 Sub-Catchment Flood Risks

The network capacity assessment and flood hazard mapping exercise has provided information to understand the areas within the SMA that could be exposed to a flooding hazard and to focus efforts for reducing the risks from flooding. Flooding issues within each sub-catchment are summarised below:

- *Taitarakihi Creek Catchment* – This catchment has a history of severe flooding, that impacts SH1 and properties in the flood plain. Several improvement projects are planned and investigations on the options to address flooding within this catchment is ongoing
- *Timaru Catchment (Whales Creek and Waimataitai Catchments)* - Overland flow through the Whales Creek Catchment is well defined within gullies and flood risk is generally constrained to overland flow paths. Some parts of the network are undersized but no significant flood risks exist across the upper catchment. In the Waimataitai Creek Catchment, the assessment indicates that there are capacity issues in the lower part of the catchment from the June Street branch and through the commercial area downstream of the Highfield Golf Course. The hydraulic model shows a large area of flooding that includes Ashbury Park and extends across SH1 and into the commercial area upstream.
- *Coastal Catchments (including Caroline Bay)* – The low-lying coastal areas including Caroline Bay are subject to widespread flooding, which can be deep (>500mm) in places. This area is also subject to coastal inundation and may be impacted by sea level rise.
- *Ōtipua -Saltwater Creek Catchment* - While some parts of the network are undersized, no significant flood risk exists across most of the catchment.
- *Remaining Timaru Urban Areas* – Overland flow is generally well defined in gullies and flooding is generally constrained to overland flow paths. Some parts of the network are undersized, however there is no significant flood risk across most of the catchment.

3.6 Wastewater Overflows

During periods of heavy rainfall stormwater can infiltrate the wastewater network leading to overflows occurring through manholes at the surface when the capacity of the sewage network is exceeded. These overflows can subsequently enter surface water via overland flowpaths. Infiltration of the wastewater network can also occur due to high groundwater levels, particularly in low-lying coastal areas.

TDC have undertaken wastewater modelling to understand the relationship between reported wastewater overflows and flooding within the Timaru SMA. Modelling results are presented in the SMP (Appendix 1) and suggest that there may be an interaction between modelled stormwater flooding and wastewater problem/overflow areas.

Analysis of incident records indicated widespread reports of wastewater blockage/overflow across the urban catchment with 465 customer complaints recorded since 2017. However, there were only 17 instances that were potentially associated to wet-weather-associated overflows from the network recorded by the maintenance contractor.

Wastewater overflows are not included in the scope of this consent application and so the impacts associated with these discharges have not been assessed. TDC is continuing work to determine the causes of these overflows and fix issues as they arise. Part of this work will be to ensure that stormwater from the network is not causing or exacerbating this issue and so a target has been included in the Schedule of Objectives developed for this consent that requires:

"No human sourced incidents of E.coli concentrations entering waterways or the coast via the stormwater network (e.g. through cross connections or wastewater overflows)".

3.7 Summary of Key Issues and Observations

The key issues associated with Timaru's stormwater management and the wider environment have been identified through investigations undertaken to prepare the SMP and resource consent application, and through consultation with the community and key stakeholders, such as Te Rūnanga o Arowhenua. These issues are elaborated in more detail in other sections of this AEE and the attached Appendices containing the technical supporting documents and have been considered when preparing the SMP and resource consent application for the Timaru SMA.

In summary, the key known issues with stormwater management, include:

- *Flooding* – Limited and undersized pipes in some catchments are causing stormwater to flow above ground when the system capacity is exceeded. Several areas have a significant flood risk including the Taitarakihi Catchment, Caroline Bay, June Street and the commercial areas downstream of the Highfield Golf Course.
- *Coastal Inundation and Climate Change* – The height of the ocean tide impacts on how quickly stormwater can drain from the system. This is particularly relevant at the lower end of Taitarakihi Creek, Waimataitai Creek, Whales Creek and Ōtipua/Saltwater Creek, where flooding on properties and on roadways around Caroline Bay and low-lying coastal areas can occur. Any reduction in the capacity of the stormwater system in these areas due to sea level rise or additional stormwater inputs from future development could increase the risk of flooding in these coastal areas.
- *Poorly Drained Soil* – The poorly draining nature of the soils within the Timaru catchment not only presents issues relating to nuisance ponding, particular in low-lying areas but will largely prevent the use of infiltration and soakage-based stormwater treatment systems for new stormwater disposal infrastructure.
- *Stormwater Quality* – Stormwater contaminants from large carparks, high use roads (SH1), residential development and from industrial/commercial sources have been detected in sediment within the upper and middle reaches of the waterways flowing through Timaru. There is currently limited treatment of stormwater from existing development prior to discharge into these waterways. Infiltration of the wastewater network can also lead to overflows into the stormwater network and waterways occurring.
- *Future Development* - Land use zones indicate potential future increases in residential and industrial land use within the Timaru SMA catchment. Further development will likely increase impervious surfaces and the volume of runoff, putting pressure on any parts of the network that are currently under capacity. Additional stormwater runoff from these areas could also lead to an increase in stormwater contaminant loads, that could discharge into the environment unless appropriate treatment measures are included in stormwater infrastructure servicing these areas.
- *Ownership and maintenance* - Operations and maintenance responsibilities for stormwater related infrastructure are spread amongst multiple units and contractors. There is a need to ensure the stormwater assets are managed effectively and efficiently using industry best practice to meet the adopted level of service. In addition, the ownership and maintenance responsibility for several of the key waterways, as they flow through their urban reaches, needs to be clarified.

4 Description of the Environment

4.1 Overview

The RMA requires that an application for a resource consent is supported by an assessment of effects on the environment (Schedule 4). "Environment" is defined in the RMA as including:

(a) Ecosystems and their constituent parts, including people and communities; and
(b) All natural and physical resources; and
(c) Amenity values; and
(d) The social, economic, aesthetic, and cultural conditions which affect the matters stated in (a) to (c) or which are affected by those matters.

The following description of the environment that could potentially be affected by the discharges of stormwater from TDC's reticulated network has been compiled using the following sources of information:

- TDC's District Plan
- Census data for Timaru
- Climate data from Timaru Airport
- Canterbury Maps.
- ECan's Wells Database.
- S-Map online
- Information obtained from site visits.
- Monitoring data collected as part of the project.
- Manawhenua cultural impact assessment (AEC, 2021; Appendix 3) and assessment of cultural effects. (Kitson, 2022; Appendix 4)

4.2 Timaru

Te-Tihi-o-Maru (Timaru) is a port town located 157 km southwest of Christchurch and approximately 196 km northeast of Dunedin. It is the second largest urban area within the Canterbury Region, with a population of 27,498 (recorded during the 2018 census[1]).

The Timaru SMA covers an area of approximately 1900 ha. Prior to urbanisation, wetlands and swampland predominated the landscape in the area (Scarf, 1984) but have been significantly reduced through drainage and the ongoing pressure for such land to be made agriculturally productive or altered for other reasons. Figure 4-1 shows a largely natural landscape based on the Canterbury Black Maps, which shows the 19th Century landscape during pre-European colonisation.

[1] *Statistics New Zealand. March 2020. Timaru.* 2018 Census | Stats NZ

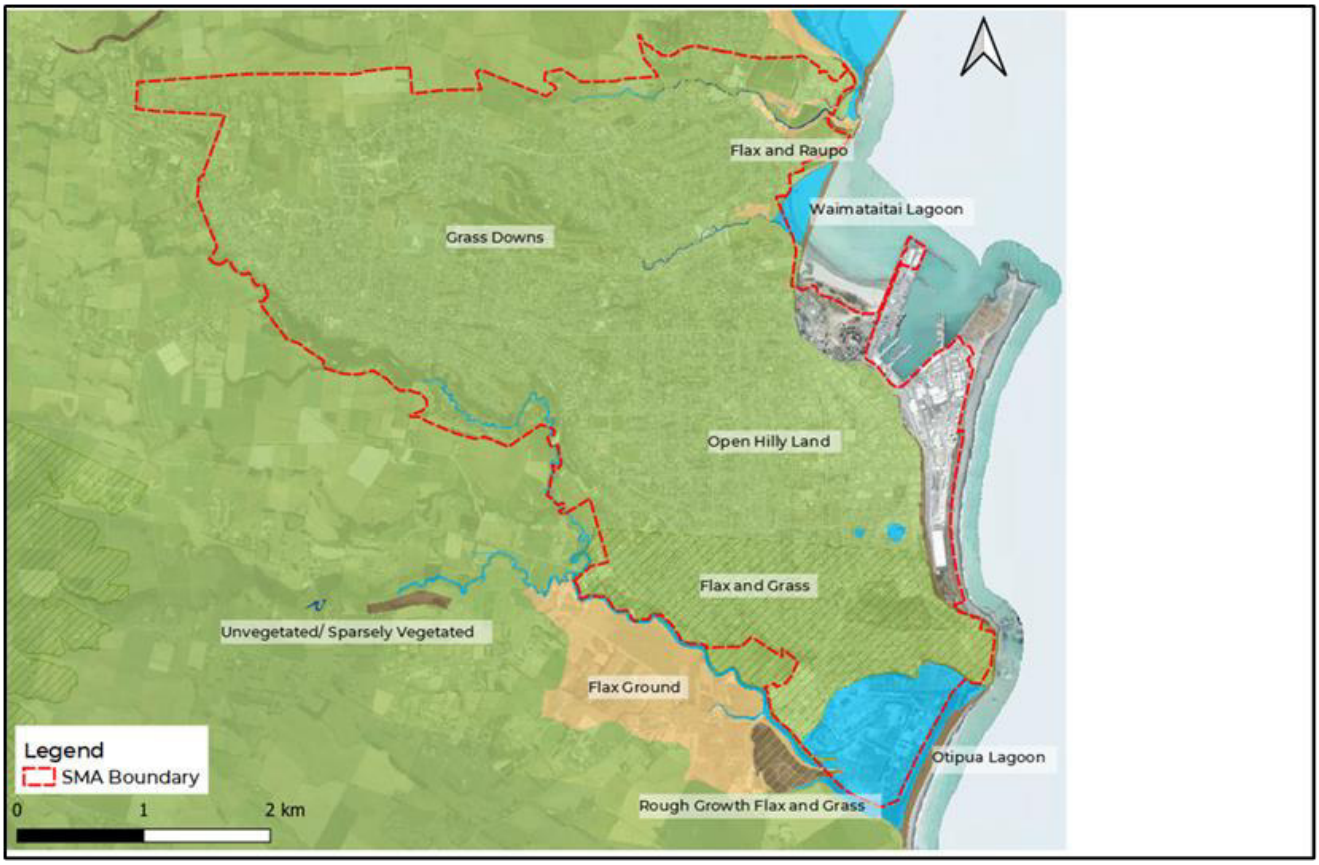

Figure 4-1: 19th Century Black Maps representing a pre-European, largely natural landscape (https://mapviewer.canterburymaps.govt.nz/)

For example, Caroline Bay located within Timaru is historically known to Arowhenua as Waimātaitai, a hapua (lagoon), situated close to the coast. It has been developed to comprise of parks and Waimātaitai Beach.

Urban growth since the 1970's has predominantly been in the suburb of Gleniti, whilst Redruth has been the focus of industrial and commercial growth since the 1940's. Timaru District Council operate the Redruth Landfill and resource recovery park at the south-eastern extent of the SMA. The Ōpihi-Saltwater Creek was realigned for the development of the landfill, and the outlet to the creek now occurs to the north of the landfill.

4.3 Land Use in the SMA

The area of land comprising the Timaru SMA consists of a large proportion of residential land uses, with some lifestyle blocks and rural land to the north and northwest. The Main South Railway Line and State Highway (SH) 1 run through the centre of the town. The trade port of Timaru is to the east and there is an active landfill to the southeast.

The land use zoning in the operative Timaru District Plan (TDP) includes Rural, Recreational, Residential, Commercial, and Industrial Light and Industrial Heavy zone types. The land use zones from the District Plan do not separate roads from land. Figure 4-2 provides a map of the current zoning within the SMA based on the TDP.

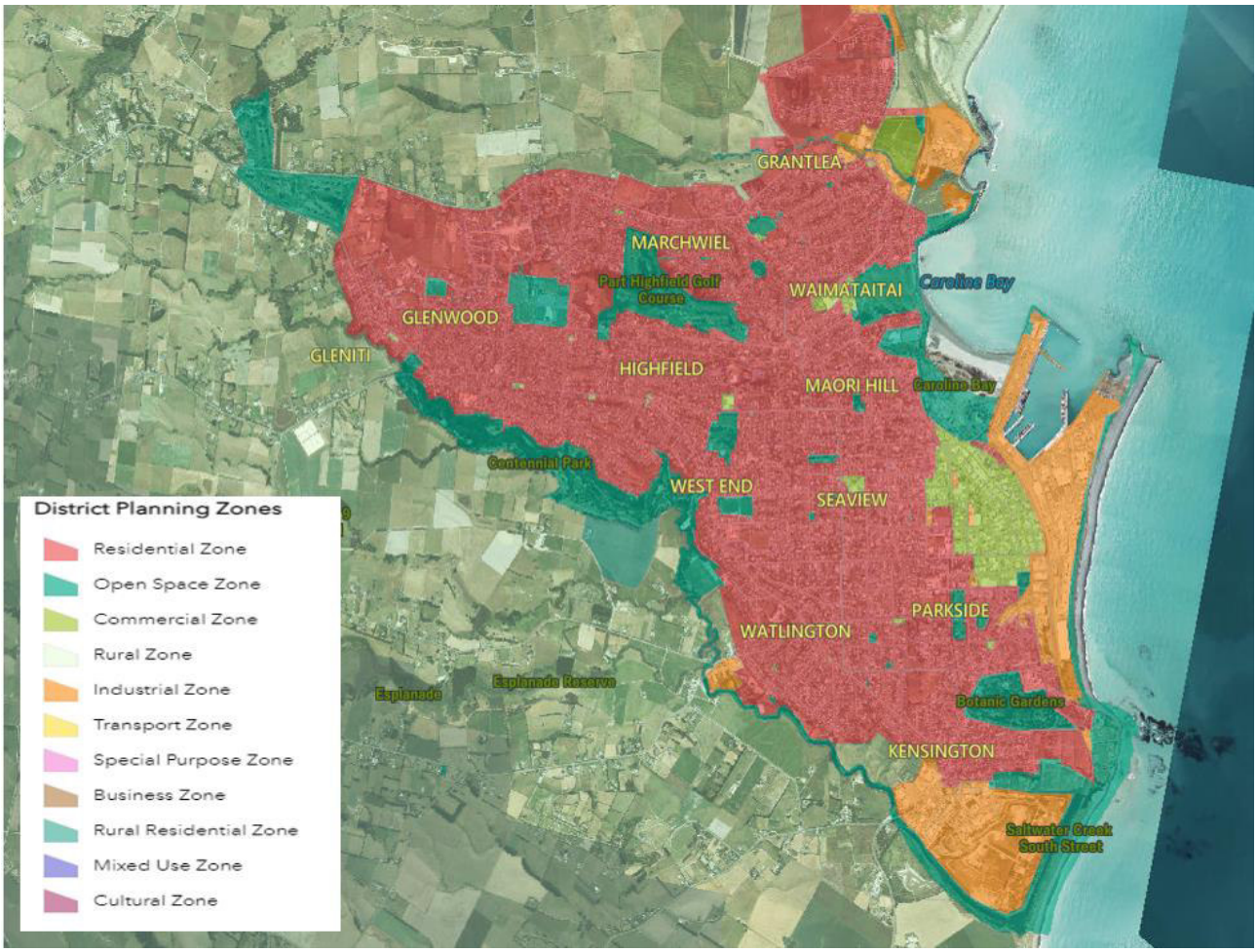

Figure 4-2: Current land use zoning from the operative Timaru District Plan.

The proposed district plan recently notified (pTDP) has introduced new zones 'Neighbourhood Centre' and 'Retail Zone' which for the purposes of the AEE and assessments on land use changes in the SMA have been described and modelled as 'commercial'. Roads are typically classified based on their Annual Average Daily Traffic (AADT) this can also be used to assess their contaminant generation potential

In line with the proposed changes to the Timaru District Council District Plan, further urban development is envisaged to the north and north-west of Timaru. In addition, some inner rezoning is proposed in the pTDP to match the existing activity within the SMA. The pTDP does not actually rezone much existing rural land to urban land uses. The pTDP zones are shown in the SMP (Appendix 1)

Table 4-1 provides a summary of the areas of current urban land-use and a fully developed scenario within the SMA. Within the SMA a 95.3 ha increase in residential land-use is envisaged, similarly, commercial and industrial land-use will increase by 12.1 ha and 6.6 ha respectively.

A full assessment of the assumptions and breakdown of the existing and future zoning areas can be found in The PDP Contaminant Load Model Report Appendix 5. There is an error in this report as it states it is assessing the change from current land use zoning to proposed land use zoning. This is incorrect as the PDP assessment is based on current contaminant loads from existing developed urban areas compared to the fully developed scenario. The fully developed scenario is all of the urban zoning extent envisaged in the operative TDP with the subtle change to zones under the pTDP. Note the future land use zones could be subject to change during the hearing on submissions process for the pTDP.

Table 4-1: Comparison of land use zoned in Timaru SMA currently and proposed under the DPR (Source Appendix 5)

Land-Use Zone	Current Urban Area (ha)	Future Urban Area (ha)	Area Δ (ha)
Commercial	57.4	69.5	12.1
Industrial	131.4	138	6.6
Pasture	251.9	152.6	-99.3
Reserve	277.7	263	-14.7
School/Sport Facility	67.4	67.4	0.0
Residential	881.9	977.2	95.3
Roads	277.4	277.4	0.0
Rail Reserve	5.0	5.0	0.0
Landfill	43.4	43.4	0.0

4.4 Cultural Landscape

Cultural landscapes represent the "*combined works of nature and man*" and the term embraces a diversity of manifestations of the interaction between humankind and the natural environment. Cultural landscapes often reflect specific techniques of sustainable land-use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature.[2]

The Ōtipua, Saltwater Creek and Taitarakihi Creek as well as the town of Timaru lie within the takiwā of Te Rūnanga o Arowhenua. A Mana Whenua Impact Assessment (MWIA) for the discharges of stormwater from Timaru was undertaken by Aoraki Environmental Consultancy Limited (AECL) in November 2020, on behalf of Te Rūnanga o Arowhenua. This is attached as Appendix 3.

Subsequent to the MWIA, an "*Assessment of effects on Te Rūnanga o Arowhenua values and interests by TDC Stormwater Management*" February 2022 was undertaken by Kitson Consulting Ltd (herein referred to as Cultural Values AEE) and this is attached as Appendix 4.

A full description of the cultural landscape for Timaru and the connected environment can be found in these Appendices. This cultural landscape summary subsection uses content from these two reports.

The MWIA and Cultural AEE illustrates a rich cultural landscape that includes mahinga kai/taonga species, culturally significant waterways, settlements (kāinga, pā, nohoanga), wāhi tapu, wāhi taonga, Mātaitai reserves, Māori Land, and traditional trails. Of particular significance in the Arowhenua Rūnanga rohe are three Mātaitai reserves on the coast: Tuhawaiki, Te Ahi Tarakihi and Waitarakao as shown in Figure 4-3. Customary fisheries are a central element to Ngai Tahu identity and well-being. Arowhenua has been a stronghold for customary harvesting of tuna/eels, kanakana, whitebait, patiki and other species.

[2] World Heritage Centre. 2013. Operational Guidelines for the Implementation of the World Heritage Convention

Figure 4-3: Location of Mataitai Reserves

A mātaitai identifies an area that is a place of importance for customary food gathering and allows for the area to be managed by tāngata tiaki/kaitiaki nominated by the tangata whenua. These are areas that Mana whenua have spent considerable effort to have recognised through Fisheries (South Island Customary Fishing) Regulations 1999.

An assessment of the thresholds expressed by Arowhenua for cultural use, with a particular focus on mahinga kai was undertaken by Kitson Consulting Ltd in February 2023 (Cultural Values AEE refer Appendix 4) using resources available including assessments undertaken by TDC for the township's stormwater. A high-level summary of the assessment of the state of the values, uses and associations for Timaru is presented in Table 4-2 from the Cultural Values AEE. With the data available (that also included the PDP Baseline Environmental Assessment, Appendix 5) it was considered that the current state fails to meet the cultural thresholds and restoration is required.

Table 4-2: Assessment of thresholds for cultural use - Ratings are Pass, Poor or Fail

Threshold						
Mahinga kai resources present	Mahinga kai species in sufficient numbers and good condition	The ecosystem supports mahinga kai species and resources	Human health safety for gathering and consuming kai	Access to mahinga kai is available	Nitrate and Ammonia toxicity in A band	*E. coli* in A band
Poor	Poor	Poor	Poor	N/A	Fai	Fail

4.5 Climate

In general, Timaru has a dry, temperate oceanic climate. Table 4-3 provides monthly statistical climate data for the last 20 years based on the Timaru Airport weather station (NIWA Network# H41425). Based on the data from the table, Timaru experiences a moderate range of mean monthly temperatures and a lesser range or mean monthly precipitation depth. Average monthly temperatures vary from 5.8 °C in winter to 15.9 °C in summer and monthly rainfall fluctuates between 27 mm/ month to 60 mm/month, with the most rainfall occurring between October and February.

MfE (2018) climate change projections for Canterbury forecast an increase in temperature, an increase in the number of hot days, a decrease in the number of frost days and snow days and an increase in annual rainfall. Specifically, MfE (2018) predicted temperatures will likely be 0.7°C to 1.0°C warmer by 2040 and 0.7°C to 3.0°C warmer by 2090.

Table 4-3: Mean Climate data for Timaru Airport 2000 to 2022

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average °C	15.9	15.5	14.1	11.6	8.9	6.4	5.8	7.1	9.1	11.1	13.1	14.8	**11.1**
Rainfall mm	57.6	50	42.4	59.8	35.7	42.5	48.1	50.7	27.4	50.8	59.6	51.6	**568**
Wet Days *	8	6	6	7	5	6	6	6	5	8	8	7	**77**
* Number of days with 1 mm or more of rain													

A recent update of climate change predictions by NIWA (2020) is forecasting rainfall to change by between +/-5 percent for most of the Canterbury region by 2040 and 2090. Winter rainfall is projected to increase considerably by 2090 in many eastern, western and southern parts of Canterbury, a 15 to 40 percent more rainfall is projected. Of most relevance, it is predicted that

[3] Kitson Consulting. (2022). *Assessment of effects on Te Rūnanga o Arowhenua values and interests by TDC Stormwater Management*. Kitson Consulting Ltd.

annual rainfall is projected to increase by 20 to 25 percent in eastern parts of South Canterbury near Timaru by 2090. [4]

Climate change predictions indicate that the incidence and intensity of extreme and very extreme rainfall events will increase, particularly for shorter duration events with larger associated floods.

4.6 Topography

Timaru is built on hills created by lava flow from the extinct Mount Horrible volcano, resulting in some steep and winding streets, and providing the distinct bluestone rock from which many of the town's buildings are constructed. Timaru's rolling topography is in clear contrast to the flat landscape of the Canterbury Plains to the north. The western edge of the Timaru SMA has a maximum elevation of 80 m above sea level (asl) and slopes towards the east, approaching 0 m asl at the coast.

As presented in Figure 4-4, the substantial gullies between the lava flows correspond to the major watercourses in the township, being Taitarakihi, Waimataitai, and Ōpihi-Saltwater Creek

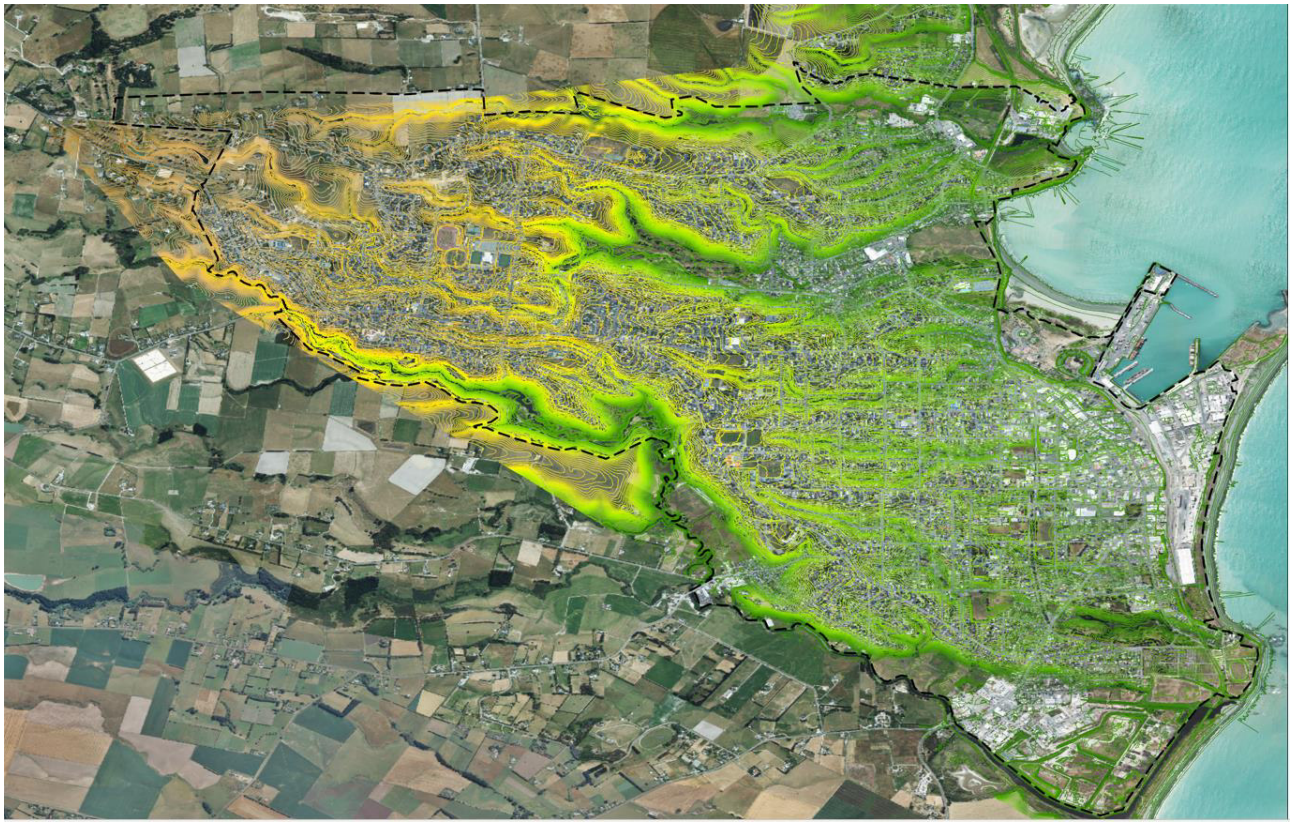

Figure 4-4: Catchment topography, 1 m contours created from LiDAR

4.7 Geology and Soils

The 1:250,000 scale geological map of the Timaru area indicates the surficial geology consists mostly of Mid-Pleistocene loess deposits (windblown silt and sand), with interbedded paleosols and occasional peat lenses (Figure 4-5). The loess deposits can be tens of metres thick and overlie the Timaru Basalt Formation (TBF). The TBF outcrops, shown in Figure 4-5, occur where creeks have eroded through the loess deposits and on the coast at Smithfield and Patiti Point. The TBF overlies the Kowai Formation which is an older alluvial deposit formed during the Pilocene age

[4] NIWA. 2020. Climate Change predictions for the Canterbury Region. Prepared for Environment Canterbury

(not outcropping in Figure 4-5 consisting primarily of gravels, with intercalated sand and mud. These gravels are commonly cemented by clay and iron oxides.

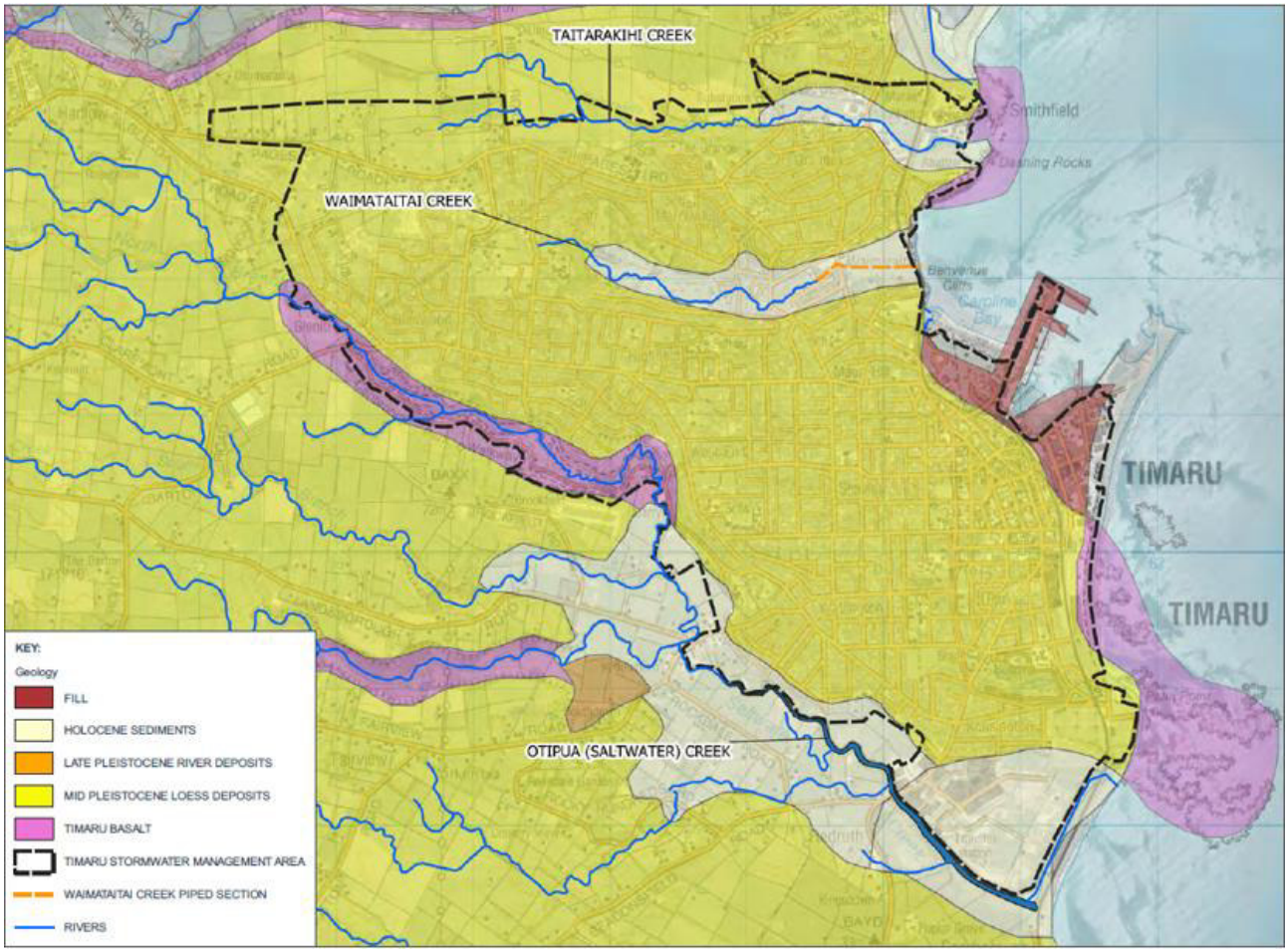

Figure 4-5: Timaru Geology

Holocene river deposits (unweathered loose gravel, sand and silt) occur where the Taitarakihi Creek, Waimataitai Creek and Ōtipua Creek have eroded the loess deposits and deposited gravels, sands and muds downstream. Near the coast the Holocene deposits are described as uncemented marine sand and gravel. The thickness of the Holocene layers is difficult to constrain using available bore logs. The area around the port is mapped as fill.

S-Map Online indicates mostly all the soils in the Timaru SMA as poorly drained and moderately deep. However, three areas are summarised as thick imperfectly drained soils. The first of these areas is north of the Ōtipua Creek near the coast. The other two localities are adjacent to the Waimataitai and Taitarakihi Creeks. The soil clay content within Timaru typically ranges from 15 to 35%, reflecting spatial variability in permeability. All soils in the Timaru SMA tend to have a high-water logging vulnerability.

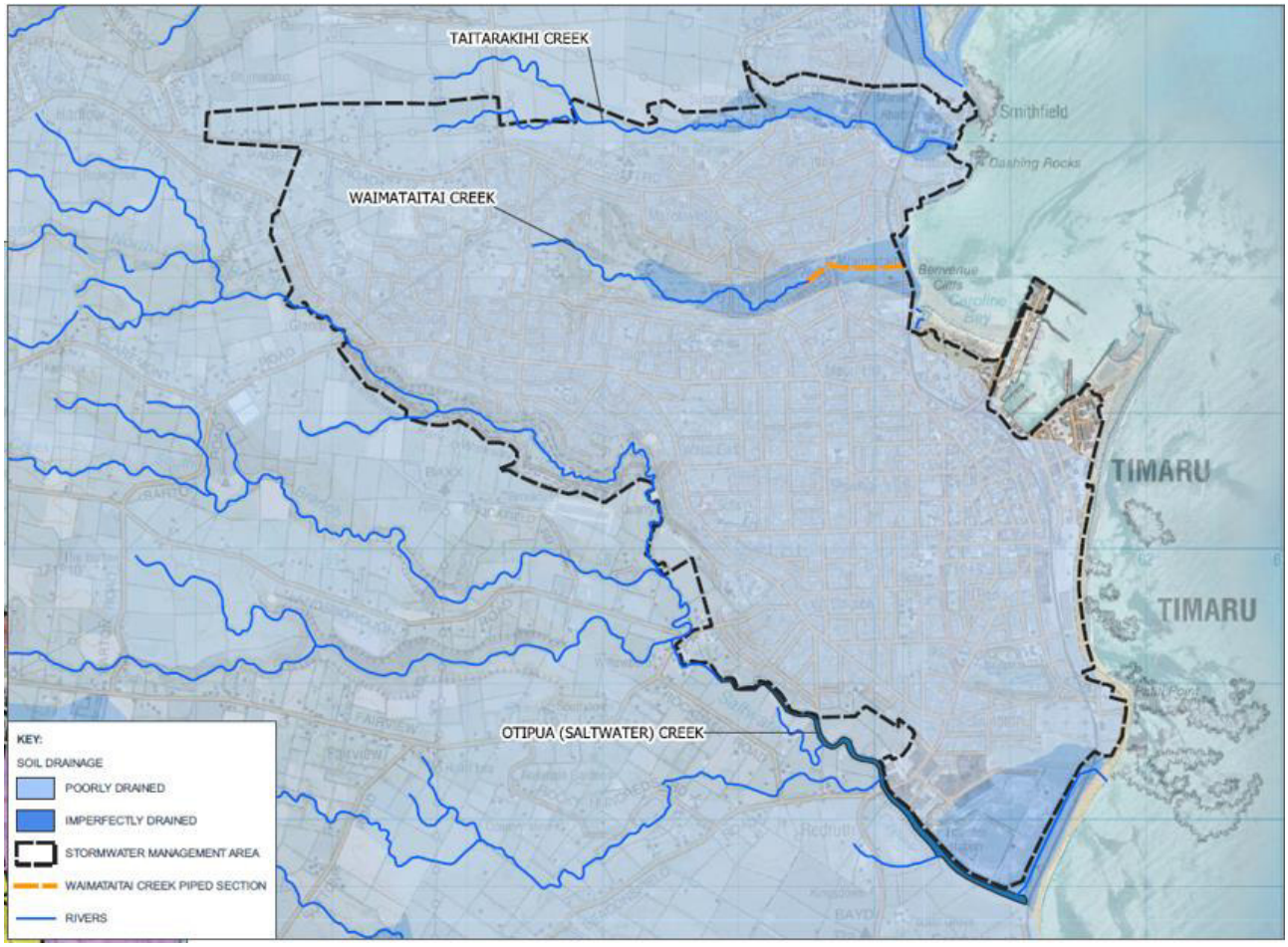

Figure 4-6: Soil Map of Timaru (source S-Maps[5])

4.8 Groundwater

4.8.1 Hydrogeology

Figure 4-7 shows the piezometric contours (sourced from Canterbury Maps https://mapviewer.canterburymaps.govt.nz/) indicating that beneath Timaru, groundwater flows west to east towards the coast. These contours are based upon groundwater within the Kowai Formation which will be located deeper than the water table beneath Timaru. Local variations in groundwater direction may occur where stream channels are present or due to topographical changes.

Figure 4 7 also shows the Semi Confined or Unconfined Aquifer layer within the SMA. The northern extent of this aquifer includes the Aliance Smithfield plant. The southern portion includes an area along Saltwater Creek in Watllington and Kensington and the Red Ruth landfill. There are no borelogs in the Watllington area aquifer. The only deep borelog in the lower part of the Kensington area showed silt extending to a depth of at least a 40 m below ground level.

[5] S-maps Online https://smap.landcareresearch.co.nz/

Figure 4-7: Piezometric Contours (red lines) and Semi Confined or Unconfined aquifer (blue shading)

Information on groundwater levels is very limited. Only one bore (K39/0291, 15 m deep) has a long-term record of groundwater levels with 82 associated manual groundwater level readings since 2012 and a further 23 bores within the SMA that have only one or two water level readings recorded.

The information available suggests that depth to groundwater varies throughout Timaru which is likely a reflection of the city's hilly topography. The depth to groundwater appears to be shallow (0 to 5 m bgl) in areas of low elevation near the eastern boundary of the SMA. Considerably larger depths (5 to 20 m bgl) are expected in areas of higher elevations near the eastern boundary of the SMA. There is a large amount of uncertainty regarding depth to groundwater in the western portion of the SMA due to minimal groundwater level readings in the area, however, based on the elevated topography it is expected that depth to groundwater may be greater in the west of the SMA compared to the east. Groundwater and adjacent surface water in the area are expected to be well connected hydraulically.

Four bores were identified within the SMA to have records of step-drawdown testing; the available information (bore testing data) indicates the shallow strata within the SMA is of relatively low permeability. This is supported by the lack of abstraction bores, which is an indicator of low permeability strata, especially given Timaru is a substantial settlement and many industrial activities could benefit from a groundwater supply.

4.8.2 Groundwater Quality

There is very little data available to characterise the quality of groundwater beneath the Timaru SMA. Groundwater quality data is only available from single samples taken from three bores (K39/0066, 5.92 m deep; K39/0067, 11.6 m deep and J39/0137, 113 m deep) in the catchment. results are shown in Table 4-4. K39/0066 and K39/0067 are located towards the southernmost part of the SMA near the coastline, whilst J39/0137 is in the north-west, approximately 340 m west of the start of Taitarakihi Creek.

Concentrations of nitrate-nitrogen are low in all the bores. Chloride concentrations for the two shallow bores are high and reflect their proximity to the coast and Ōtipua (Saltwater) Creek Lagoon. Similarly, the electrical conductivity values for these bores are high and are expected to reflect highly saline coastal water.

No water quality data is available for typical stormwater contaminants such as heavy metals and hydrocarbons.

Table 4-4: Water quality data

Bore number	Period	Nitrate-Nitrogen (mg/L)	E.coli (MPN/100ml)	Chloride (mg/L)	Electrical Conductivity (mS/m)
K39/0066	2000	<0.25	10	5,900	1,306
J39/0137	2007	<0.1	-	150	84
K39/0067	2000	<0.25	3	5,500	1,443

4.8.3 Groundwater Users

There are 216 bores located within the Timaru SMA, based on ECan's Canterbury maps database and most of the bores (192) are less than 30 m deep. Most of these bores are located on the eastern boundary of the SMA, close to the coastline. There is also a small cluster of bores located to the west, near Glenwood that are used by Chevron New Zealand Limited, as geotechnical/geological investigation bores.

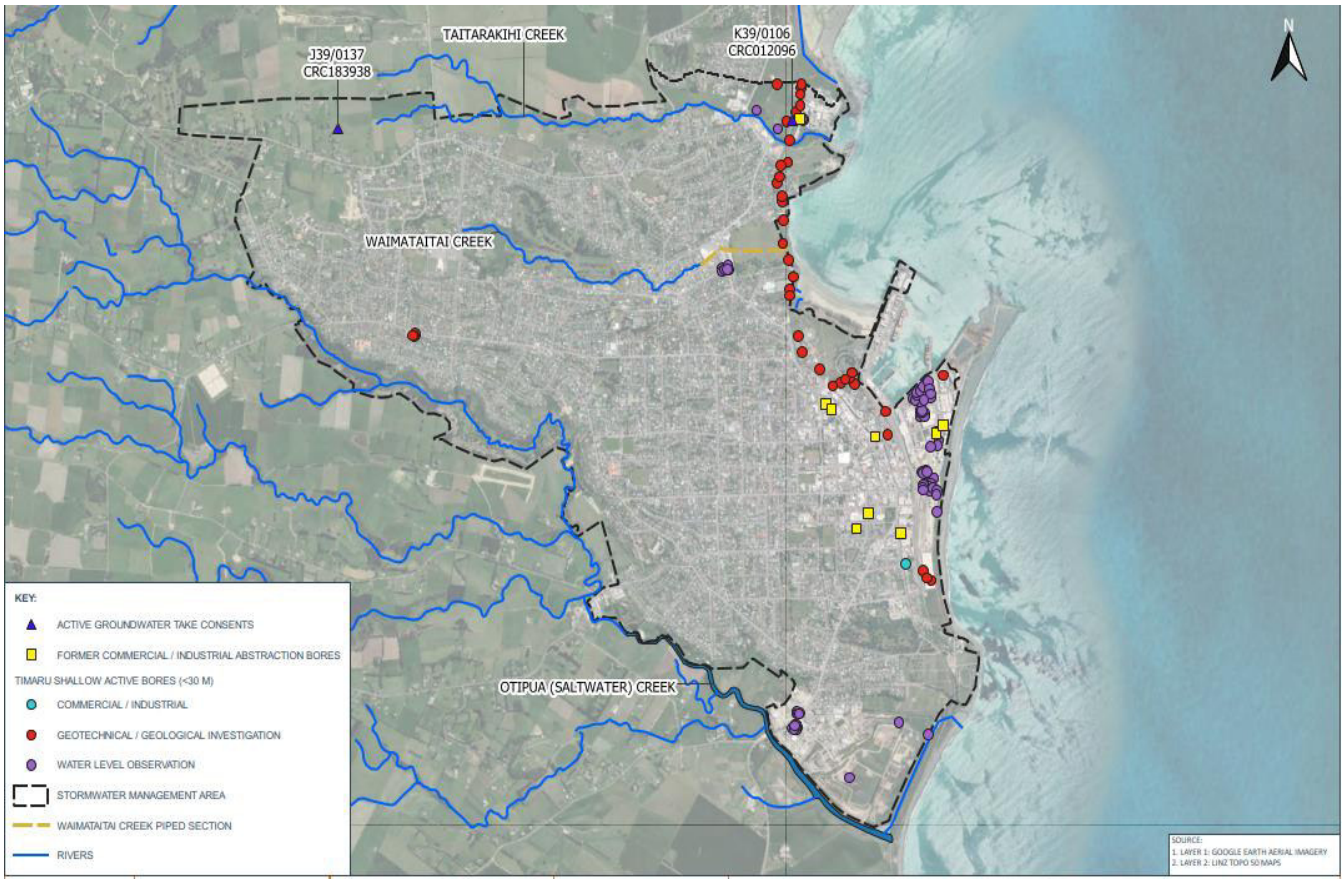

Figure 4-8: Location of active shallow bores (<30m deep)

According to the ECan Wells Database, none of these bores are used to supply drinking water (domestic/public supply or stock drinking water supply). As shown in Table 4-5, except for one bore, all bores are used to measure water levels (73) or for geological/geotechnical investigations (41).

Table 4-5: Shallow Bore Use – Timaru SMA

Bore Use	Number
Commercial/Industrial	1
Geotechnical/Geological Investigation	41
Water Level Observation	73

There are only two active groundwater take consents within the study area. CRC012096 authorises the take of up to 16L/s from K39/0106 (53 m deep) by Alliance Group Limited at their Smithfield Plant adjacent to the coast at Dashing Rocks. and CRC183938 authorises the abstraction of up to 5 L/s of water for irrigation from J39/0137 (110 m deep) by Paul George Wilkins at his Pages Road rural property.

4.9 Surface Water

4.9.1 Overview

The Timaru SMA crosses three surface waterway catchments, the Taitarakihi, Timaru (including Waimataitai and Whales Creek) and the Ōtipua /Saltwater Creek catchments as shown in Figure 4-9.

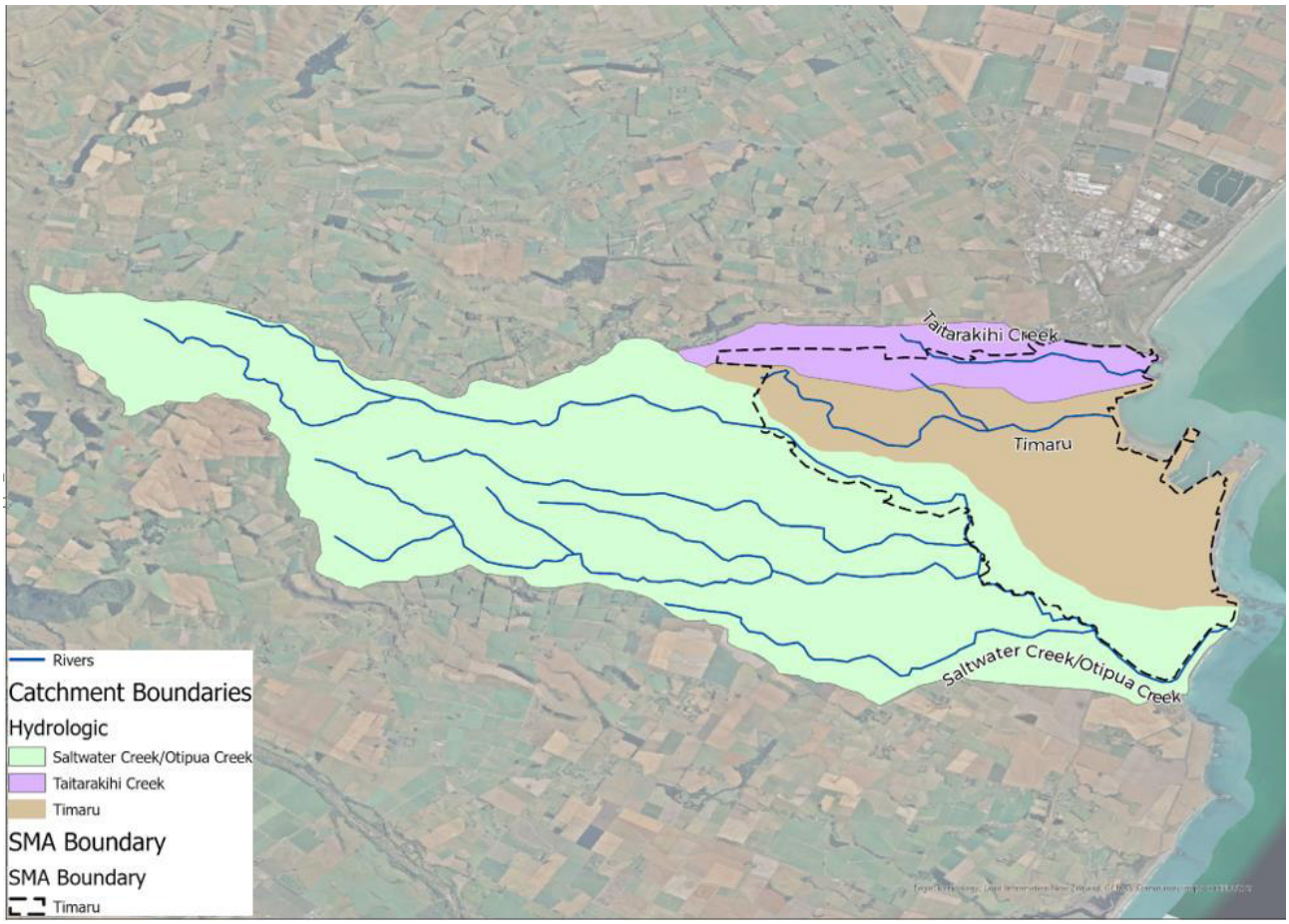

Figure 4-9: Timaru SMA surface waterway catchments

Table 4-6: Environmental Context for Timaru Receiving Waterways

Catchment	District Planning Zones	Catchment Size (km²)	Stream/River Name	Water Quality Management Unit	River Environment Classification
Ōtipua - Saltwater Creek	Rural; Residential; Recreational; Industrial	46.7	Saltwater Creek	Hill-fed Lower Urban	Cool Dry Low-Elevation
			Ōtipua Creek	Hill-fed Lower (upstream rural tributary of Ōtipua-Saltwater Creek)	
			Unnamed Drain	N/A	
Timaru	Residential; Commercial; Recreational	12.38	Waimataitai Creek	Hill-fed Lower Urban	
			Whales Creek	N/A	
Taitarakihi Creek	Rural, Residential; Commercial; Recreational	5.49	Taitarakihi Creek	Hill-fed Lower Urban	

These surface waterway catchments contain a mixture of highly urbanised and natural reaches, which provide habitat for a variety of organisms. The following description of the receiving waterways and their catchments is based on information obtained from monitoring undertaken as part of this application and work required to prepare the SMP for this catchment. Further details about these waterways can be found in the 'Baseline Environmental Assessment Report' by PDP, attached as Appendix 5. The report sets out the environmental context for each of the surface waterway catchments receiving stormwater from the Timaru SMA, including the contributing land-use zones and the standards that apply to each waterway in the LWRP (listed in Table 4-6).

4.9.2 Ōtipua /Saltwater Creek

Ōtipua - Saltwater Creek flows in a mostly east-southeast direction for 15.5 km, from its headwaters in the Claremont downlands, to its mouth, on the southern margin of Timaru (near Patiti Point). The catchment extends to the top of Mt Horrible, Claremont, Rosebrook and Fairview.

The underlying volcanic basalt rock is visible in parts of the upper catchment but is mostly overlain by loess clay. Stream flows are fed by small contributing springs but rely on clay-based interflow and surface water runoff inputs. Rainstorms can bring rapid changes in flow resulting in bank erosion, and transportation of silt into the low-gradient reach of the former lagoon.

Most of the catchment is in farmed or urbanised land, however, there are distinct areas of endemic (non-exotic) vegetation. The gorge on the Ōtipua South Branch, between Brookfield and Barton Road, for example has some surviving native bush remnants due to low grazing pressure, and the TDC esplanade walkway and Centennial Park have extensive and well-established native plantings.

Ōtipua wetland used to be a large lagoon separated from the coast by a gravel spit and it provided a food basket for tangata whenua containing; tuna, eel, harakeke, pingao, raupo for weaving and mokihi. The early settlers of the area lived on kokopu from the lagoon.

Physical Characteristics

The main tributary channels of Ōtipua -Saltwater Creek (Ōtipua North Branch (Figure 4-10) and Ōtipua South Branch) flow for approximately 19 km in a northwest/southeast direction before the confluence, which is approximately 3.7 km upstream from the coast, near the junction of Landsborough Road and Coonoor Road. At the confluence, the approximate mean annual flow is 0.09 m^3/s. Ōtipua -Saltwater Creek (Figure 4-11) passes through a mixture of residential, commercial, and industrial land uses that discharge stormwater to the creek. Monitoring locations are shown in Figure 1 and 2 of Appendix 5.

Figure 4-10: Ōtipua Creek – North Branch

Figure 4-11: Downstream reach of Ōtipua - Saltwater Creek

In its lower reaches, Ōtipua -Saltwater Creek (Figure 4-12) is a fourth-order watercourse and has been designated as a 'Site of Special Wildlife Significance' by the Department of Conservation (DoC). The lower reaches also include a moderately significant, highly threatened wetland based on information from the Ministry for the Environment (MfE).

Below State Highway 1 (SH1), the creek is highly modified. The former lagoon has been converted by council to a landfill on the true left bank and a restored wetland, including a 4-hectare lake, on the true right bank. The area is also protected by stop banks.

Figure 4-12: Saltwater Creek – Lower Reach

Figure 4-13: Saltwater Creek Lagoon

At the coast, Ōtipua -Saltwater Creek flows into a brackish lagoon then discharges via a shingle weir outlet to the Pacific Ocean. The weir was constructed in 1955 and stores water within the lagoon to a depth of 1.5 m asl. There is no permanent connection between the ocean and the creek; however, to mitigate flooding, an opening is excavated by River Engineers at the northern end of the bank, near Patiti Point cliffs.

Water Quality

Monitoring undertaken in winter indicated that water quality was variable with mostly clear water, slightly low dissolved oxygen (DO) levels at upstream monitoring sites, and elevated pH and conductivity. Contaminant concentrations were mostly low however, some heavy metals (arsenic, chromium, copper, and zinc) were elevated at some sites during winter monitoring rounds. Nitrate-nitrogen was elevated at some monitoring sites, whilst phosphorus was elevated at most sites.

In summer, water clarity decreased particularly closer to the coast, whilst temperatures were elevated. DO decreased at upstream sites and increased at the coastal sites. Heavy metal concentrations were generally low however, elevated concentrations of arsenic, copper, and zinc were more common than in winter. During summer monitoring, both nitrate-nitrogen and phosphorus were elevated.

Sediment Quality

Deposited fine sediment cover was high at all monitoring sites during both summer and winter monitoring rounds, exceeding the indicative NPS-FM (2020) national 'bottom-line' limit, as well as target outcomes specified in the LWRP and proposed PC7 at all comparable sites.

Elevated lead and zinc concentrations were measured throughout the catchment. Total petroleum hydrocarbon (TPH) concentrations exceeded the ANZG (2018) default guideline value (DGV) at multiple sites.

Aquatic Ecology

Records from the New Zealand Freshwater Fish Database (NZFFD) for the Ōtipua -Saltwater Creek Catchment included a total of ten distinct freshwater fish taxa, of which six are native to New Zealand, including the short and longfin eel, inanga, common and upland bullies, and common smelt. Common bullies have the highest representation amongst the NZFFD records for this catchment; however, all native taxa except for longfin eel and common smelt have been recorded on more than one occasion.

Inanga and longfin eel have been attributed the 'At Risk – Declining' conservation status. The remaining native taxa included in the record are not threatened. A further four non-native taxa are included in the NZFFD record, including goldfish, perch, rudd, and tench. While perch and tench have some recreational value as sports fish, each of these introduced taxa compete with native fish and impact native community structure.

Ōtipua -Saltwater Creek discharges into a coastal lagoon south of Patiti Point. The lagoon does not have permanent open flow to the coast and correspondingly, direct access to the coast for migratory species is not possible. However, the Ōtipua -Saltwater Creek lagoon is occasionally opened to the coast during times of flooding risk, facilitating occasional access for migratory species; there is also potential for some species to migrate over or through the gravel bund (i.e. eels).

The NIWA Fish Passage Assessment Tool was used to assess the extent to which fish passage is inhibited throughout the Ōtipua -Saltwater Creek/Lagoon catchment. A 'Very High Risk' fish passage barrier has been identified within the lower reaches of Ōtipua -Saltwater Creek (downstream of State Highway 1). The structure is a large weir spanning the wetted width of Saltwater Creek and is known to result in high fine sediment accumulation in the reach upstream of the weir, impacting activities at the Timaru Yacht & Power Boat Club. At the time of assessment, 8 cm of water depth was measured above the weir. Access to upland habitat is limited by a further three 'Very High Risk' structures throughout the catchment.

Apart from the upland bully, all native fish species recorded from the Ōtipua -Saltwater Creek catchment have a migratory life-stage. This is obligatory for both eel species and inanga, while the common bully and common smelt more readily form landlocked populations. The large weir installed at the lower reaches of Saltwater Creek likely inhibits the upstream migration of juvenile fish to favourable adult habitats in the upper catchment.

Ecological field assessments carried out at the monitoring sites within the creek indicated the presence of a 'soft-bottomed' bed. Periphyton cover was rare due to a lack of stable bed habitat; however, planktonic algae were noted at downstream sites. Macrophyte cover was also typically rare throughout the catchment.

Macroinvertebrate communities were dominated by enrichment tolerant taxa. MCI and QMCI scores were below NPS-FM (2020) national bottom-line values, while results from monitoring undertaken at an upstream site was below the LWRP QMCI outcome value.

4.9.3 Taitarakihi Creek

Taitarakihi Creek is comprised of one main creek channel that is joined by a southern tributary, approximately 3.8 km upstream of the Taitarakihi Creek mouth. The full length of Taitarakihi Creek is approximately 4.5 km. The headwaters of the Taitarakihi Creek catchment are situated in the coastal downlands near Hadlow, with Taitarakihi Creek flowing in an easterly direction, meeting the sea at Smithfield, 500 m south of Washdyke Lagoon. There is one small pond at the head of Taitarakihi Creek.

The Taitarakihi Creek catchment covers an area of 5.49 km^2 and is located on the northern boundary of the Timaru SMA. Land-use within the catchment includes rural, recreational, commercial, and industrial land, however most of the stormwater network services residential land.

At the coast, Taitarakihi Creek is a second-order watercourse with a mean annual flow of approximately 0.03 m^3/s. The creek discharges at the northern end of the Te Ahi Tarakihi Mātaitai at Dashing Rocks.

Monitoring sites for Taitarakihi Creek are shown in Figure 3 of Appendix 5.

Water Quality

Monitoring undertaken during winter indicated that DO levels were below guideline values at all sites and conductivity was particularly elevated at the most downstream site, most likely as a result of seawater intrusion. Nutrients, heavy metals and other contaminants monitored (e.g. boron, arsenic and chromium) were elevated at all sites and increased with distance downstream. Hydrocarbon concentrations were below detection limits at all sites.

During the summer monitoring period, the upstream and mid-reach sections of the creek were stagnant with high turbidity. DO levels were very low and conductivity was high at all sites. Concentrations of BOD, COD, heavy metals and other contaminants such as boron, arsenic and chromium were also elevated at all sites. Nitrate-N concentrations were lower than those recorded in winter, but phosphorus concentrations were high.

Sediment Quality

Taitarakihi Creek is a characteristic urban watercourse, with high sedimentation, long stretches of uniform slow flow, and patchy riparian cover. Fine sediments were the dominant bed substrate throughout the monitoring reaches, with limited consistent hard bed substrate present only at the very downstream monitoring site (T_S3).

Sediment cover estimates were limited at the Taitarakihi Creek monitoring sites due to high turbidity; however, levels were noted to be consistently high across seasons. At sites for which estimates were made (T_S1 and T_S3) cover levels exceeded the upper limit specified as the NPS-

FM (2020) national 'bottom-line', as well as the LWRP and proposed PC7 target outcomes. Monitoring indicated that lead, zinc and TPH concentrations were elevated in sediments monitored within the creek, but PAH concentrations were below detection limits.

Aquatic Ecology

Records from the Taitarakihi Creek catchment were retrieved from the NZFFD (2021) on 23 June 2021 and identified a total of seven distinct freshwater fish taxa recorded from this catchment, of which six are native to New Zealand, including the longfin eel, banded kokopu, inanga, lamprey, and the common and giant bullies. The most consistently recorded of these taxa are the inanga and longfin eel; however, records are scarce across all taxa.

The historic record of lamprey in this catchment may indicate high value habitat, due to the 'Threatened – Nationally Vulnerable' conservation status assigned to this species; however, it is noted that no records for lamprey have been recorded from this catchment since 1921 and extensive development has since occurred. Further notable taxa recorded include the longfin eel, inanga, and giant bully which have all been assigned the 'At Risk – Declining' conservation status. A single non-native taxon, the goldfish, has also been recorded from this catchment. The goldfish is an 'Introduced and Naturalised' aquarium taxon, with negligible ecological or recreational value in New Zealand waterways.

All native taxa recorded from the Taitarakihi Creek catchment are diadromous, requiring passage to and from the coast to complete their life cycle. This is obligatory for all taxa except for the common bully, which readily form landlocked populations. Six instream structures within the Taitarakihi Creek catchment have been identified as potential fish passage barriers. Three of these structures have been assessed for fish passage capability with each being classified by the 'Very Low' risk level.

Periphyton and macrophyte growth was not noted for the Taitarakihi Creek sites during winter however, very high periphyton cover was recorded from the downstream monitoring site (T_S3) during summer, where floating dislodged cyanobacteria mats were common.

ECan conducts regular macroinvertebrate monitoring at the T_S1 monitoring site (although this site has recently moved to T_S2). The most recent available monitoring data dates from 08 January 2020, thus representing 'dry-season' conditions from the previous summer. The very low MCI and QMCI scores, which strongly suggested poor ecological health and severe pollution do not meet the NPS-FM (2020) national bottom line or LWRP freshwater outcomes value. The low UCI score for this site suggests that the community has been simplified by urban stressors such as stormwater contaminants, with predominantly tolerant taxa remaining.

4.9.4 Timaru Catchment (Whales Creek and Waimataitai Creek)

The Timaru catchment covers central Timaru and has an area of 12.4 km^2 of primarily residential and commercial zoning, with a small area of recreational land. The catchment includes Waimataitai Creek and Whales Creek, which both discharge to the Te Ahi Tarakihi Mātaitai reserve. The area encompassed by the reserve was historically a large brackish lagoon or hāpua and was an important area for mahinga kai. The reserve therefore represents significant cultural and ecological values.

Physical Characteristics

Waimataitai Creek (Figures 4-13 and 4-14) is a characteristic small, urban, 'hard-bottomed' watercourse, that has been heavily modified. The creek passes through the Highfield Golf Course and from behind the shopping centre on Ranui Avenue, Waimataitai Creek flows within a large stormwater pipe which has several direct connections from the surrounding stormwater network. This pipe continues to the coast where the creek discharges via an outfall structure. Near the coast, Waimataitai Creek is a second-order watercourse and has a mean annual flow of approximately

0.036 m^3/s. The NIWA Fish Passage Assessment Tool indicates that two structures on Waimataitai Creek may cause potential fish passage barriers; however, neither have been assessed.

Figure 4-14: Waimataitai Creek (upstream)

Figure 4-15: Waimataitai Creek (mid-reach)

Whales Creek (Figures 4-15 and 4-16) comprises of an enhanced section of channel between a stormwater outfall and the northern end of Caroline Bay. The creek is tidally influenced and includes an area of pooled water at the downstream end which drains to the nearby coast via a small channel. The downstream reach has been enhanced, with native planting and a boardwalk along the waterway. Whales Creek provides suitable spawning habitat for the native inanga freshwater fish (i.e., whitebait).

Figure 4-16: Whales Creek (Upstream)

Figure 4-17: Whales Creek (Downstream)

Monitoring sites were established in Waimataitai Creek and the lower reach of Whales Creek (refer to Figure 3 of Appendix 5 for site locations).

Water Quality

Monitoring results from both Waimataitai Creek and Whales Creek indicated that in winter, DO levels were low in areas with standing water and conductivity was high in downstream areas, presumably due to tidal influence. In summer the same trend was observed for DO, and water clarity was poor at all sites.

In both winter and summer monitoring periods, heavy metal concentrations were elevated at all sites, with concentrations exceeding ANZG (2018) Default Guideline Values (DGV). Concentrations of zinc and lead also exceeded LWRP standards for these contaminants in the upper and mid sections of Waimataitai Creek, whilst hydrocarbons were below detection limits.

Nutrient concentrations were elevated at most sites but were higher in winter than summer. Concentrations of nitrate and phosphorus exceeded default guideline values at all sites, with concentrations of phosphorus exceeding NPS-FM national bottom line values in the upper and middle sections of Waimataitai Creek.

Sediment Quality

Deposited fine sediment cover was consistently high at most monitoring sites. Sediment cover levels measured from the middle section of Waimataitai Creek during winter monitoring exceeding target outcomes specified in the LWRP and proposed PC7, as well as the NPS-FM (2020) national 'bottom-line'.

The concentrations of most heavy metals and metalloids varied minimally between summer and winter monitoring rounds. Copper and lead concentrations varied indeterminately between sites and seasons. Zinc and lead concentrations exceeded the ANZG (2018) DGV at multiple sites.

TPH concentrations measured from the mid-section of Waimataitai Creek and the upper monitoring site within Whales Creek exceeded the ANZG (2018) DGV during both summer and monitoring rounds.

Aquatic Ecology

Records for the Timaru catchment were sourced from the NZFFD (2021) on 23 June 2021. Three taxa have been recorded from the catchment, with each having only one NZFFD record. The lamprey was recorded in 1921, while both the eel and banded kokopu were recorded in 1995.

Due to their classification as 'Threatened – Nationally Vulnerable', lamprey are a notable record within this catchment; however they are unlikely to still be present. Each of the taxa recorded require passage to and from the coast.

Waimataitai Creek is a characteristic small, urban, 'hard-bottomed' watercourse in its upper reach. Fine sediment cover was consistently lower at this reach, and the gravel/cobble dominated bed likely provides a diversity of instream habitat. This reach flows through a golf course with predominantly low-cut exotic grass cover and no riparian shading, supporting a small amount of macrophyte growth. Winter monitoring indicated the presence of periphyton growth, with filamentous periphyton cover exceeding the upper limit specified in the LWRP. Surprisingly, a reduction in periphyton cover was observed in this reach during the summer monitoring event.

In its middle reaches, the creek is a concreted channel with substantial riparian shading, while further downstream it is a subsurface concrete channel, accessible only via a grate located within Ashbury Park. This middle reach is characterised by high sediment cover, thus despite the concrete channel, it is considered 'soft-bottomed'. Low levels of periphyton film and macrophyte growth were noted during the winter monitoring round only.

Benthic macroinvertebrates were sampled in summer and indicated a two-fold increase in the abundance of macroinvertebrates recorded in the upper reach of the creek compared to downstream sites, however, the taxonomic richness was slightly lower.

The community composition in the upper reach was dominated by non-biting midges (Orthocladiinae) and earthworms (Oligochaetae), with the New Zealand mud snail (*Potamopyrgus anitpodarum*) also common at lower abundances. The macroinvertebrate sample collected from the lower reach was dominated by earthworms, and to a lesser extent, New Zealand mud snails, ram's horn snails (*Gyraulus spp.*), and seed shrimp (Ostracoda).

Sensitive EPT insect orders were not found within the creek even in the upper reach where favourable stream bed habitat was present. In addition, the very low MCI and QMCI scores obtained from monitoring sites within the creek, strongly suggest poor ecological health and do not meet the NPS-FM national bottom line or the LWRP freshwater outcomes value.

4.9.5 Surface Water Users

A review by WSP of the Canterbury Maps 'Surface Water Take (Active) Consented' layer on 26 of January 2023 showed that there are currently no active consented surface water takes from any of the waterways within the Timaru Catchment.

4.9.6 Wetlands and Springs

The Timaru SMA in its pre-European state, was largely dominated by herbaceous (fern/grass/herbs). There was a small wetland east of the SMA as digitised from the original 19th Century 'Black Maps', as shown in previous Figure 4-1

Figure 4-18: Potential Wetlands within the SMA (source Canterbury Wetlands GIS - May 2022).

An extract from the Canterbury Wetlands GIS layer (CWGIS) was obtained from Environment Canterbury (in May 2022). There were a few potential wetlands located within the SMA area as shown in Figure 4-18, including the Smithfield Freezing Works Stormwater Pond, Rosewill Pond Saltwater Creek wetland and the ponds within the botanic gardens.

Two springs (J39/0825 and J39/0826) have been recorded on ECan's spring database near the headwaters of the unnamed stream that flows into Ōtipua-Saltwater Creek. There are also two springs located close to the North Branch Ōtipua-Saltwater Creek (J39/0827 and J39/0148). None of the springs are located within the Timaru SMA.

4.10 Recreational and Amenity Values

The open waterways flowing through the Timaru SMA form part of the urban landscape and therefore have aesthetic values associated with them. The lower reaches of Ōtipua-Saltwater Creek, the coast and Caroline Bay, have high recreational and amenity values.

There are walkways and cycleways along Ōtipua-Saltwater Creek. The Timaru Rowing Club is based at Ōtipua-Saltwater Creek at the end of Rothwell Street, Redruth, approximately 160 m downstream of the SH1 bridge. They are likely to utilise an approximate 1,000 m straight open stretch of Ōtipua-Saltwater Creek downstream as it becomes a coastal lagoon.

Caroline Bay provides access to a popular swimming beach, a playground, skate-park and picnic areas that are highly utilised by residents and visitors to the town.

The Caroline Bay swimming water quality is monitored at the Timaru Yacht & Power Boat Club and at a site close to the middle of the beach. The results are posted on the Land Air Water Aotearoa (LAWA) website. The long-term water quality grade at the Yacht Club is 'Good' and the middle beach site has a rating of 'Fair'.

The suitability for recreational use outcome set in the LWRP (PC7 decision version: Table 14(a)) for Taitarakihi Creek (Hill fed lower) is 'Good' to 'Fair'. No value has been set for 'Hill-Fed Lower Urban' waterways (Waimataitai and Saltwater Creek) within this catchment.

4.11 Coastal Environment

The coastline is predominantly a steep shingle beach with the ocean currents and longshore drift of the gravelly sediments heading northwards along the coast. As a result of the Timaru Harbour development and construction of the breakwater in the late 1800s, shingle aggradation occurred on the south side of the breakwater, which now contributes to the coastal erosion north of Caroline Bay due to the disruption of the longshore drift.

The development of the harbour and breakwater also resulted in fine sand accumulating in Caroline Bay, deposited by the prevailing easterly winds and forming the sandy beach seen today. The growth of the beach at Caroline Bay ceased approximately 30 years ago, having reached a state of quasi-equilibrium. However, the dunes still appear to be expanding, with recent dune planting efforts also helping to retain sand in the bay.

The coastline is a direct receiving environment for stormwater discharges, as well as the waterways that flow into it from the SMA. The coastline supports range of values, such a mahinga kai gathering of mussels to the north and contact recreation at Caroline Bay. The Timaru Port also sits within the coastal environment.

4.12 Critical Infrastructure

4.12.1 River Flood Protection Assets

As shown in Figure 4-19 there are flood protection stop banks on either side of Saltwater Creek, near Scarborough. These assets are operated and maintained by Environment Canterbury Regional River Engineers, to divert flow around the historic Ōtipua Lagoon, which was drained to construct the Redruth Landfill.

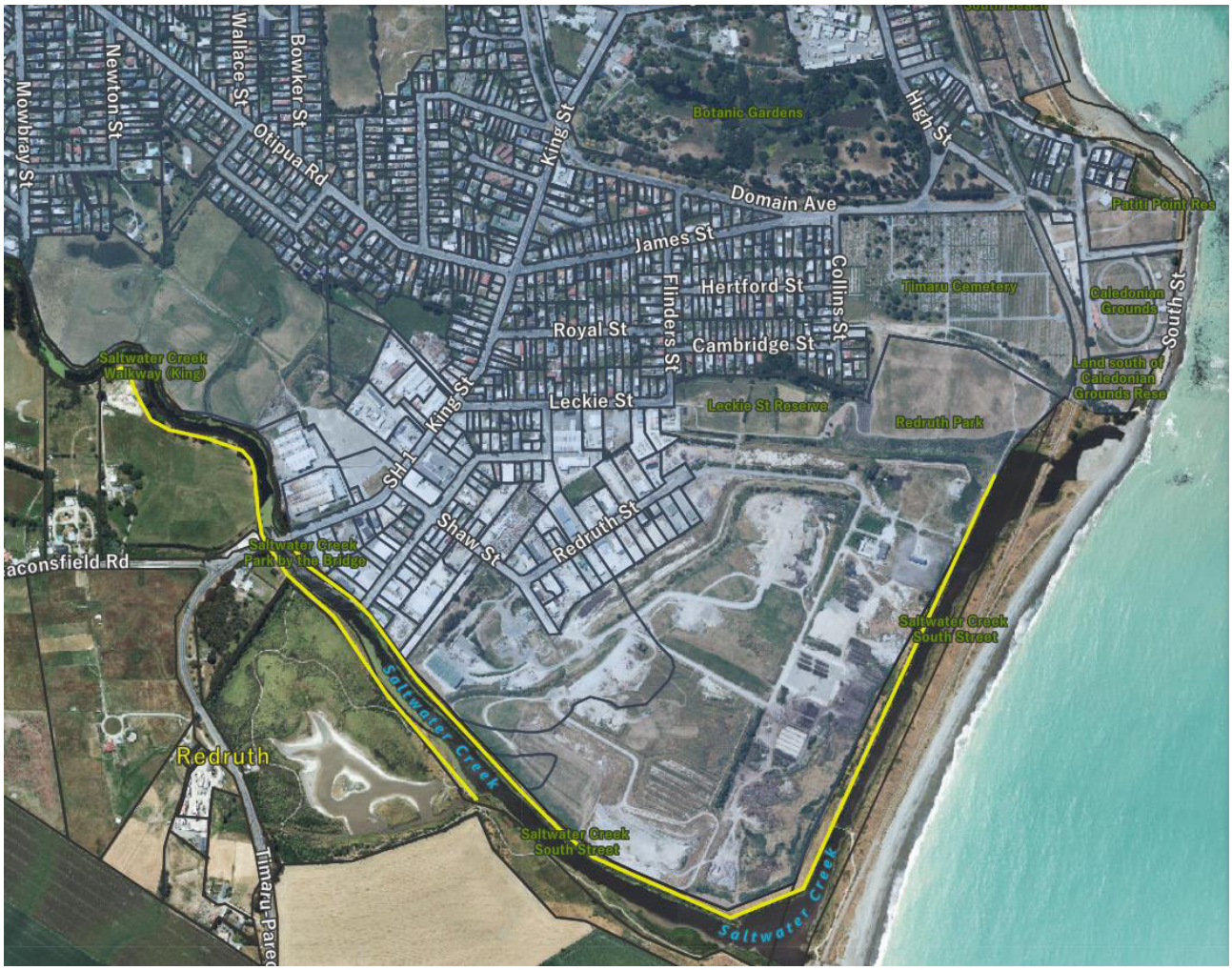

Figure 4-19: Environment Canterbury Stop-bank Infrastructure (yellow lines) at the lower end of Saltwater Creek managed under the Flood Protection Bylaw.

4.12.2 Roading

SH1 is a critical transport link for the east coast of the South Island and passes through the Timaru SMA. Flooding as a result of rainfall has disrupted travel both north and south of Timaru in the past.

4.12.3 Timaru Wastewater System

TDC Timaru Wastewater Treatment Plant (WTP) and oxidation ponds are outside the Timaru SMA area and are located at Arorangi Rd, Washdyke,

TDC has had consent since 1984 to discharge treated wastewater from Timaru, Geraldine, Temuka and Pleasant Point into the coastal marine area. Wastewater is treated and discharged via an outfall located approximately 6 km north of Timaru and extends approximately 500 m offshore and this discharge is consented under CRC101831.

During periods of increased rainfall, parts of the wastewater network that convey the wastewater to the WTP is subject to infiltration of stormwater which can lead to overflows occurring.

4.12.4 Timaru Port

Construction of the southern and northern breakwaters of the port occurred in the late 1800s. The location of the harbour changed the coastline dramatically. Shingle built up south of the harbour, while sand accumulated to the north of the harbour beneath the cliffs forming Caroline Bay.

The Port is the largest artificial harbour in New Zealand and one of the major cargo and trade ports within the South Island. It is an area of high industrial activity and supports trade involving between 350-400 vessels per year pass that through the Port. Other facilities that operate within the Port include fish processing plants, storage silos and a log yard.

The public is known to fish from the rocks on the Outer North Mole and Eastern Breakwaters. Recreational mooring, under the approval of PrimePort, occurs inside the harbour adjacent to the Outer North Mole Breakwater.

The harbour area also receives stormwater discharges from the land, wharves, roading, central business district and melted freeze water from one of the fish processing plants at the Port. The coastal waters are classified as water managed for the maintenance of aquatic ecosystems (AE) under the RCEP.

The main operational area of the Port is not within the SMA and the Port Company holds certificates of compliances for their stormwater discharges.

4.13 Summary of Sensitivity of the Environment

The following summarises the sensitivity of the environment based on the information presented in this section of the AEE:

- Given the permeability of soils within the Timaru SMA restricting infiltration, combined with the absence of groundwater use and abstraction, it is expected that the groundwater resource beneath the SMA would have a low sensitivity to discharges of stormwater from the network.
- The waterways within the SMA catchment have been altered by surrounding development and the discharges of contaminants into these waterways from both rural and urban sources. These contaminants have affected the quality of these environments and the ecological values they support. Balancing the modified nature of these waterways with their values and connection to high valued environments such as the Waimataitai Reserve and the coast, including Caroline Bay, these surface waterways are considered to be moderately sensitive to discharges of stormwater from the SMA.
- The Waimataitai Reserve, Caroline Bay and coastal areas that these waterways ultimately flow into support high cultural and amenity values and would be highly sensitive to stormwater contaminants in the discharges.

5 Description of the Proposal

5.1 Scope of Application - Area and Activities

The Timaru SMA boundary is defined by the area shown in Figure 1.1. The main activity relating to this discharge permit application is the discharges from TDC's reticulated stormwater network that services the existing and future urban areas.

Within the SMA area, the scope of the application includes the discharge of contaminants (stormwater) onto land and water for the following activities:

- Existing and future industrial sites that are connected to the TDC stormwater network.
- Stormwater from residential and commercial roofs.
- Stormwater from residential and commercial hard stand areas and structures.
- Construction-phase stormwater from development construction areas with a phase of land disturbance of less than 5 ha.

Existing and future industrial sites that discharge on-site into land or via their own system to land or surface water are excluded from this application and those that have an existing individual consent will need to continue to hold and renew these stormwater discharge consents.

The following discharge activities (in relation to scale and nature of the discharges) are also excluded from the application:

- Construction-phase stormwater to land and water from a development construction area with a phase of land disturbance greater than 5 ha.
- Discharges of construction-phase stormwater or stormwater from a 'piece of land' associated with a development area or a facility where that land is contaminated above acceptable levels/guideline values.
- Construction-phase or stormwater from a developed site onto land or into surface water within a natural wetland
- Construction-phase stormwater or stormwater from a developed site directed into land via an engineered infiltration or soakage systems.
- Stormwater from sites (typically industrial but could include commercial) that represent an unacceptable risk to achieving the receiving environment objectives.

Passive discharges of construction-phase stormwater and stormwater into land are being sought and included in the scope of consent. These would be incidental discharges through slow leakage into the poorly drained soils present in Timaru, that may enter groundwater. Examples of these discharges are from temporary sediment control basins during construction, from raingardens, swales, attenuation basins. These stormwater management devices could be in private sites or form part of the reticulated network (some of which are already present).

For the avoidance of doubt the discharges of stormwater from rural land use and associated buildings, hardstand areas and dwellings do not form part of this application.

A comprehensive description of the activities sought and excluded, with associated abbreviations and definitions are included in the proposed conditions in Appendix 8 of this AEE. The proposed conditions are also discussed further at the end of this section

5.2 Nature of the Discharge

5.2.1 Stormwater Quality

Potential contaminants arising from the developed areas within the Timaru SMA include:

- Micro-organisms
- Nutrients
- Toxic organic compounds
- Hydrocarbons from vehicle exhaust fumes and oil leaks.
- Sediment from pavement wear, rainfall erosion, and vehicles.
- Heavy metals (including cadmium, nickel, copper, zinc and lead) from tyre wear, vehicle exhaust, vehicle moving parts, and roofs.
- Organic matter from plant material such as grass clippings and leaves.
- Litter.

Table 5-1: Expected stormwater contaminants and untreated concentrations

Stormwater Parameter	Literature / URQIS - Stormwater Quality
Total Suspended Solids (g/m^3)	
Developed (unpaved)	<500
Developed Residential /Commercial	50 -170
Developed Industrial	<300
Construction	<4,000
pH (mean)	7.0
Turbidity (mean)	25
Dissolved Oxygen Saturation % (mean)	93
Hydrocarbons (g/m^3)	
TPH	0.5 - 5
PAH (mean)	0.007
Toxic Organics (g/m^3)	<0.004
Nutrients (g/m^3)	
Nitrate-Nitrogen	0.4 - 2.0
Total Nitrogen	1 – 2.5
Total Phosphorus	0.2 - 0.4
Total Metals (g/m^3)	
Zinc	0.1 - 0.8
Copper	0.015 - 0.02
Lead (mean)	0.007
Cadmium (mean	0.00011
Nickel (mean)	0.004
Faecal Coliform (fc/100 mL sample) - median	8,000

A literature review on urban stormwater (residential, commercial and roading) (Schueler 1991, ARC 1992, Williams 1993, Kingett Mitchell 2001, Brough et al 2012, NIWA URQIS) [6] [7] [8] [9] [10] [11] has provided an indication of the expected types and concentrations of typical stormwater contaminants that may be entrained in stormwater from the Timaru SMA. This data is presented in Table 5-1.

The main trace metals commonly measured in carparking and areas subject to vehicle movements are zinc, and copper. Recent studies have shown that the introduction of unleaded petrol has contributed to a drop in lead levels nationwide. Cadmium and nickel concentrations in general urban runoff are also expected to be very low.

The leaching of contaminants from roofing material, particularly in older development areas is likely to be the main source and result in the highest concentrations of zinc. Roof renewal of older houses, commercial and industrial buildings with roof materials such as COLORSTEEL ® will result in reductions of zinc loads over time from these land uses.

New residential subdivisions that consist of new houses with COLORSTEEL ® roofs, and slower, low intensity traffic roading design would be expected to result in considerably lower levels of metals, suspended sediment than shown in Table 5-1 as these practices result in a substantial reduction in the contaminants being available for stormwater entrainment.

Microbiological contamination in stormwater is typically from animal faeces, mainly associated with dogs, terrestrial birds and waterfowl in reserves. Williamson (1993) reported median microbiological contaminant concentrations of 8,000 fc/100 ml, based on research from Australia, Auckland and the United States.

It should be noted that Auckland and most United States cities have combined wastewater and stormwater pipes, meaning human waste sources are present in stormwater flows. This will not be the case for Timaru where wastewater flows do not routinely, enter a stormwater catchment or system. The risks of a newer wastewater infrastructure within new greenfield development having a catastrophic failure or being undersized, and subsequently entering stormwater catchments is very low.

A Christchurch study (Brough et al 2012) of stormwater quality from a modern (post-2000) residential subdivision focused on collected monitoring data of contaminants in untreated stormwater. This study, reported that *E. coli* concentrations from the residential subdivision ranged from 2 to 145 MPN / 100mL, significantly less than the median concentrations reported by Williamson (1993).

5.2.2 Contaminant Load Assessment

A contaminant load modelling (CLM) assessment tool was developed for Timaru and the results, along with the methodology and assumptions used in the model are reported in Appendix 6. The CLM tool allows TDC to identify areas that contribute the highest contaminant loads and therefore areas that could benefit from treatment.

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[6] *Schueler, T. R. 1991. Stormwater Management Re-commendations for the Auckland, New Zealand Region. Prepared for: Rivers and Erosion Control, Auckland Regional Water Board, Auckland.*

[7] *Auckland Regional Council Technical Publication #10, "Stormwater Treatment Devices Design Guideline Manual" (TP10) October 1992*

[8] Kingett Mitchell and Associates Limited 2001. *Pre-liminary Examination of the Nature of Urban Runoff in New Zealand.* Kingett Mitchell and Associates Limited, Auckland.

[9] *Williams, R. B. 1993, Urban Runoff Data Book: A manual for the preliminary evaluation of urban stormwater impacts on water quality, Water Quality Centre Publication No. 20, National Institute of Water and Atmospheric Research, Hamilton*

[10] *Brough et al.2012 Stormwater quality – an analysis of runoff from modern subdivisions and the implications for stormwater treatment. Water New Zealand Stormwater Conference 2012*

[11] https://urqis.niwa.co.nz/#/report

The CLM model splits the SMA into seven catchments based on the environments receiving stormwater - Pacific Ocean, Taitarakihi Creek, Waimataitai Creek, Saltwater Creek, Ōtipua Creek North Branch, Whales Creek and a discharge from the SMA onto rural land north of Timaru. These catchments are further divided into 87 sub-catchments, each discharging into a receiving environment via a single outfall or overland flow path.

Two scenarios were modelled based on "current" land-use (this is defined by the existing urban areas, not existing planning zones as stated) and "future" fully developed land-use zoning (with defined land use zones in the proposed district plan). The change in land-use will effectively result in an increase in residential land and a decrease in pasture. The model predicts that this shift in land-use is likely to result in an overall reduction of TSS load from the SMA. However, this change is also likely to increase the load of TZn and TCu loads in stormwater.

Of the catchments modelled, the 21 sub-catchments flowing into the Waimataitai Creek are likely to discharge the greatest mass of TSS within the SMA. This reflects that significant proportion of current pasture and reserve land within the catchment.

The 'Pacific Ocean' catchment is the largest urban catchment within the SMA and consists of 12 sub-catchments that discharge to the Timaru foreshore or the harbour via multiple outfalls. The model predicts that this catchment discharges the greatest mass of TCu, TZn and TPH due to the extensive industrial and commercial activities occurring within this catchment. Another significant sub-catchment is *SC_06,* which includes predominantly heavy industry in Redruth, and is modelled to discharge 192.6 kg/yr of TZn, 10.3 kg/yr of TCu and 103.4 kg/yr of TPH into Saltwater Creek.

The model identified six specific sub-catchments that represented 44.1% of the SMA that combined contributed between 35.8% to 55.0% of the contaminant load. These sub-catchments included large carparks, high volume roads, large residential areas and the Redruth industrial area. Efforts to treat stormwater from these sub-catchments therefore will result in significant improvement in the quality of stormwater discharged from the SMA.

Any 'Greenfields' development constructed after the consent is operative will be designed to capture and treat on average at least 80% of annual runoff. This standard will also apply to any urban re-development where it is practicable to retrofit systems to achieve this level of treatment.

5.2.3 Stormwater Quantity

As described in Section 3.3 and 3.4 network capacity and flood hazard assessments were undertaken to identify any issues related to the quantity of stormwater runoff generated from the township and limitations of the stormwater network. The issues identified and mitigation measures to address these issues are further discussed below in Section 8.

In relation to any further 'Greenfield' development within the Timaru SMA, TDC will require the following measures, if these developments are to operate under their stormwater network discharge consent:

- Developments should as far as practicable incorporate low impact design to achieve hydraulic neutrality and contaminant treatment close to source.
- Stormwater management facilities should include sufficient additional land to allow retrofitting in response to climate change/changing land use patterns.
- For areas greater than five hectares, hydraulic analysis (including computer modelling) will be required to support the design of the stormwater systems used.

5.3 Adaptive Management Approach

TDC is to apply an adaptive management approach to the management of the stormwater from the Timaru SMA. Adaptive management is an investigational approach to management, often

defined as 'structured learning by doing. It has three elements, (1) monitoring, (2) adapting and (3) learning, as presented in Figure 5-1.

The Monitoring Plan will assess the performance of Timaru's stormwater management systems against the specified receiving environment Objectives and Targets (described in Section 5.4). Information gathered from monitoring will also feed into identifying projects or management actions that would progressively improve the management of stormwater or address a specific issue(s) (previously summarised in Section 3.6).

Adopting this type of approach will allow TDC to adapt its management approach in response to community concerns or changes in the environmental regulatory environment such as implementing Te Mana o te Wai.

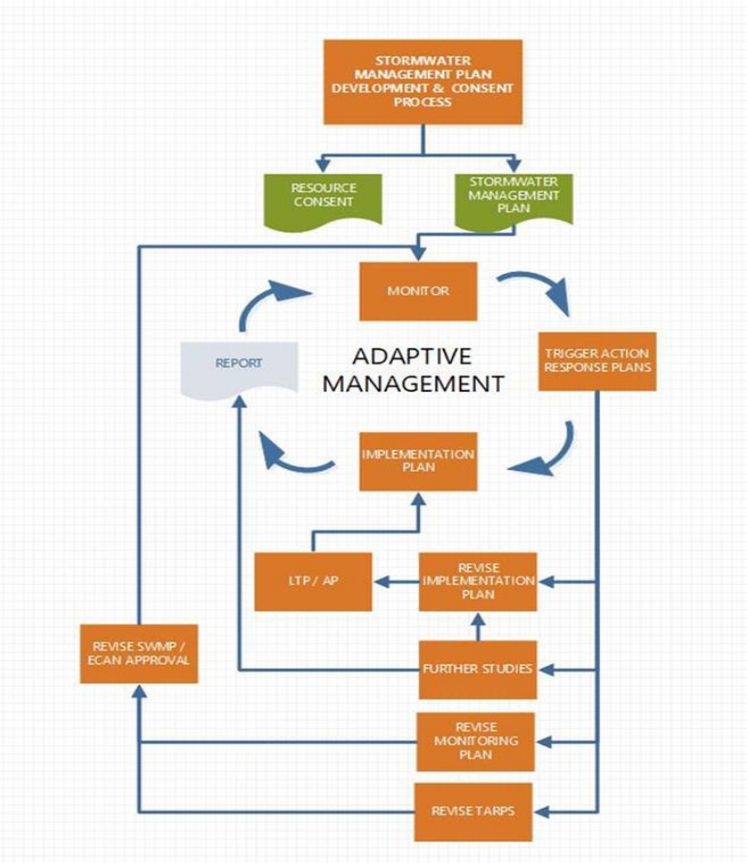

Figure 5-1: Timaru Stormwater Management Plan Adaptive Management Approach

5.4 Stormwater Management Objectives and Targets

Section 2 of the SMP discusses the stormwater management hierarchy that lead to the development of the objectives and targets that are proposed to form part of the Timaru stormwater discharge permit.

A vision for Timaru stormwater management (that is likely to apply to other SMAs) and the objectives and targets were developed in collaboration with AECL/Arowhenua.

The vision statement for stormwater management in Timaru is:

> *"Working together to value, protect and restore the mauri/lifeforce of the waterways for the benefit of all."*

Timaru specific objectives and targets were then identified and are expressed in the context of the order of the three priorities of Te Mana o te Wai which is the key concept of the National Policy Statement for Freshwater Management 2020 (NPSFM), and "*…refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment.*" The combined objectives and targets are included in Appendix 8.

TDC in collaboration with Te Rūnanga o Arowhenua and other stakeholders will prioritise the best practicable options to meet the objectives for Timaru's stormwater management and achieve the associated targets through the implementation phase of the process.

The 11 objectives for Timaru's stormwater management are to:

A. First, the health and well-being of water bodies and freshwater ecosystems

1. Progressively reverse the diminished ecosystem health in the Taitarakihi Stream.
2. Progressively reverse the diminished ecosystem health in the Waimataitai Stream.
3. Progressively reverse the diminished ecosystem health of Ōtipua/Saltwater Creek.
4. Where practicable prioritise addressing effects of stormwater quality and quantity at or close to their source rather than at the end of pipe into surface water or instream.
5. TDC advocate for ki uta ki tai (from the mountains to the sea) during TDC's involvement as a stakeholder and regulator in RMA and LGA processes

B. Second, the health needs of people (such as drinking water)

6. Stormwater impacted sediment in public areas that is accessible in public areas does not pose a risk to human health.
7. Progressively reduce the cumulative impacts of stormwater discharges on the Te Ahi Tarakihi mataitai and Tuhawaiki Mataitai so the coastal habitat is healthy and suitable for safe mahinga kai harvesting, and the mahinga kai species are safe to eat.

C. Third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

8. Recognise and respect mana motuhake – the whakapapa and the relationship Kati huirapa have with water ecosystems in their rohe and actively involve them in stormwater management.
9. When investing in stormwater infrastructure environmental, social and cultural benefits are optimised.
10. Stormwater is managed so that run-off from urban areas, the primary stormwater network and overland flow paths, does not exacerbate the flooding, erosion or damage to property or infrastructure or cause risks to human safety.
11. Timaru is more resilient to the effects of flooding and the associated the adverse impacts of climate change.

The objectives will form part of the consent conditions, and the targets are proposed to be contained in an attached schedule to the consent. Given the adaptive management approach proposed, these targets may need to be updated as over the course of the consent in response to information collected through monitoring. Any changes to these targets will need to occur in collaboration with Te Rūnanga o Arowhenua and be certified by ECan to ensure that the targets will achieve the objectives, set by the consent.

5.5 Implementation

5.5.1 Stormwater Management Plan

This SMP (draft attached as Appendix 1) captures the long-term vision for the management of stormwater within Timaru and outlines how the remedial and improvement programmes are to be identified and prioritised to achieve the community's goals and objectives for the management of stormwater from Timaru. These objectives will govern the overall direction of the SMP and will form part of the stormwater network discharge permit, should consent be granted.

While the objectives will be included in consent conditions, the SMP will be a live document and able to be amended over the course of the consent to improve stormwater management practices, as more information becomes available over the period of consent. This will provide the required flexibility to ensure that the SMP can evolve without having to apply to change the conditions of consent, or for its evolution to be through a third-party approval process. Despite this, a proposed condition is proposed that will allow the consent authority to request a review of the SMP, in response to certain circumstances arising. Any revision will be required to be provided to key stakeholders.

5.5.2 Implementation Plan

Section 6 of the attached SMP describes the Implementation Plan that TDC will use to achieve the proposed objectives.

The Implementation Plan provides a summary of the schedule of projects or management actions that TDC will implement to progressively improve the management of stormwater in Timaru. The plan includes indicative costing for each action or program (if the actions can be grouped into programs) as this is useful for planning and setting budgets in TDC Annual Plans and Long-term Plans; similarly, any funding limitations will be reflected in the scheduling of projects or actions.

The Implementation Plan defines who is responsible for implementing the actions and includes an implementation timeline from planning, design and implementation.

The Implementation Plan will be revised annually. During the year new potential projects or management actions will be identified, either as a result of information obtained from the Monitoring Plan programme or through other sources (e.g. council officers, working party recommendations).

Annually these potential projects or actions will be evaluated, along with the existing projects or actions in the Implementation Plan as detailed in Section 6 of the SMP. The Evaluation Report will be provided to AECL / Arowhenua for review. The evaluation considers how well the projects or actions will progressively improve the management of stormwater, specifically to achieve the Objectives and Targets of the discharge consent / SMP. Working within existing funding budgets the new and existing projects will be rescheduled, where the projects and actions with the greatest benefit being prioritised.

The annual review process will allow the schedule of projects and action to adapt to changes in, the environment or social issues, and regulatory changes during the life of the consent.

Similarly, whilst the schedule of projects or actions will be matched to budgetary restraints, the Implementation Plan can demonstrate and support the business case for possible increases in Annual Plan and Long-term Plan funding.

At this point in time TDC is working on the process to evaluate options and weightings (the criteria) in collaboration with AECL / Arowhenua. Given the implementation plan is to be adopted across all SMAs in the Timaru District this will take time.

As such the possible options and projects for the short term (next ten years) are yet to be identified. First year monitoring requirements that are extending from that considered during the baseline investigations are also likely considered to assist in project identification.

5.5.3 Implementation Mechanisms

Implementation methods or mechanisms are the internal processes that need to be in place to execute the SMP and achieve the objectives set. The implementation mechanisms are typically regulatory tools that will give TDC authority to enforce certain aspects of the SMP.

A Stormwater Bylaw under the Local Government Act 2002 is operative. Chapter 15 Part 1 General Conditions and Part 4 Stormwater drainage are applicable. The Bylaw Chapter 15 Part 1 allows power of entry to the Council and can require existing sites connected to the stormwater network to undertake improvements to stormwater management on site such as install interceptor traps (or proprietary devices, clause 1509.1).

The Bylaw Part 4 specifies what is considered prohibitive stormwater substances (clause 1529). The Council can also cancel (at any time) an approval to discharge to the stormwater network (clause 1530). Cancellation may occur for example, if a "*customer discharges any prohibited substance into the stormwater network infrastructure*" or "*the customer fails to comply with any condition of any approval to discharge to the stormwater network infrastructure which in the opinion of Council may cause Council to be in breach of any general authorisation or discharge consent.*"

The Bylaw will be the main tool to implement the non-residential site management assessments (refer Section 5.6).

The Timaru District Plan Review (DPR) will also further enable best practice stormwater management practices to be applied through objectives, polices, rules and land-use zones [12]. This will make the minimum requirements for stormwater management more transparent to the community, for any new development within the SMA. For example, there is a rule in the proposed plan (Rule SW-R5) that applies to all zones and makes," The *use of any copper, galvanised metal, unpainted zincalume or any other unpainted metal, used in roof material, gutters, downpipes or external cladding of buildings or structures.*" A restricted discretionary activity.

It is acknowledged however, that the pTDP will be subject to change through the hearing of submissions and possibly appeals processes.

In addition, stormwater management practices can also be implemented through new or redevelopment connections that are required to obtain 'stormwater discharge certification' from TDC [13] in line with the Bylaw.

TDC is developing infrastructure design standards (IDS) that align with the stormwater management goals for the district. These standards will provide guidance on acceptable solutions that can be used to manage the effects resulting from the quantity and quality of stormwater runoff.

TDC has developed draft Stormwater Design Guidelines in collaboration with the Ashburton District Council (ADC). The purpose of this guide is to:

- Assist Council in meeting the objectives of their SMPs.

[12] https://timaru.isoplan.co.nz/eplan/#Rules/0/206/1/0/0

[13] https://www.timaru.govt.nz/services/environment/storm-water/stormwater-discharge-certification#:~:text=What%20is%20a%20Stormwater%20Discharge,with%20Environment%20Canterbury%20discharge%20requirements.

- Provide guidance on what a new development, or re-development, must achieve in order to be granted certification from Council to discharge stormwater to the Council stormwater network and design of systems to obtain subdivision consent.
- Provide a selection of methods and tools to mitigate the effects of stormwater runoff from developments.
- Outline and demonstrate the preferred approach for stormwater management in commercial / industrial and residential developments in the Timaru districts.

TDC is currently considering moving the Stormwater Design Guidelines content into the IDS being developed.

Education is a key component of improving stormwater management. The wider public may be unaware of the consequences of activities such as washing their vehicles or waste bins into the stormwater network or may not understand the steps they can take to improve the quality of stormwater in their neighbourhood. The TDC website[14] contains advice to its residents on how to protect waterways.

5.6 Non-residential Site Management

Non-residential site assessments (NRA) have been undertaken by PDP for Timaru (and other Timaru district townships) in early 2021. The assessment involved an evaluation of properties within the SMA that have the potential to contribute to poor water quality in the stormwater discharges from the SMA. The evaluation was undertaken in two parts: a desktop study and a detailed assessment of an initial set of high-risk sites.

The NRA assessment identified 93 sites within the Timaru SMA that had the potential to contribute contaminants to the stormwater system. Of these, 19 were classed as 'high risk', which were sites including auto dismantlers, petrol stations and scrap metal recovery yards. Detailed site inspections were carried out for a small number of sites within the Timaru SMA in 2021 , and more than 10 in 2022 . Common issues identified at these sites included inadequate protection of the stormwater system from spilled contaminants and the lack of stormwater treatment. The full NRA is attached as Appendix 7.

TDC is proposing to include a condition of consent that will set out a process for excluding sites that pose an unacceptable risk to the environment. This will ensure that appropriate mechanisms are in place should the activities at the site change over the duration of the consent.

The exclusion process is based on site inspections to identify the activities at the site, the presence and adequacy of any stormwater management measures and to identify the risks to the environment from stormwater runoff from the site.

Following the site inspections, the site owners and/or occupiers will be notified by letter outlining whether:

- The site is not considered a high risk. This is on condition that the site continues to implement best practice environmental and stormwater controls as part of continuing improvement; or
- The site requires an assessment of stormwater quality to determine the relative risk that the site represents to surface waterways and/or groundwater via the network before the sites risk classifications can be confirmed; or
- The site is a high-risk site and poses a risk to surface water and or groundwater via discharging to the stormwater network. The site owners/occupiers will be advised of the

[14] https://www.timaru.govt.nz/services/environment/storm-water/stormwater-and-your-property

requirement to implement measures to the satisfaction of TDC. The measures may consist of one or more of the following:

- Reduce contaminants at source through improved site management practices or isolations measures.
- Implement best practice environmental and stormwater management controls.
- Implement best practice onsite stormwater treatment.

Where industrial sites are unable to meet the required standards for discharge into the network, the site will be removed from the consent by surrender of the respective land parcel.

It is expected that in most cases, TDC and industrial site owners/occupiers will be able to find the best solutions or appropriate level of stormwater and contaminant source controls.

New industrial sites are expected to have contaminant isolation and source controls as part of their building code and HSNO compliance requirements. However, all new development will need to be given approval to discharge to the stormwater network.

5.7 Operations and Maintenance

Currently the stormwater system mainly consists of sumps, kerb and channel, pipes, swales, outfalls and soakage pits. Any sophisticated treatment and attenuation systems that are designed by TDC or to be vested to TDC as part of a subdivision development would likely have an operation manual.

A standard maintenance schedule is attached to the proposed conditions in Appendix 8 that applies to a wide range of stormwater assets that is currently foreseeable.

5.8 Monitoring Plan

A Timaru Stormwater Monitoring Plan is attached as Appendix 9. This includes the monitoring requirements that are recommended to be included in the resource consent as well as additional monitoring provided to assist TDC to manage their network discharges and gain a greater understanding of the environmental baseline.

The Monitoring Plan outlines the proposed frequency of monitoring, parameters to monitor, and monitoring locations for:

- Surface water quality and quantity
- Sediment quality
- Ecology quality
- Cultural monitoring
- Flooding complaints
- Commercial and industrial site audits
- Stormwater network outfall inspections

The monitoring programme has been designed to monitor the performance and impact of the stormwater discharges on the environment and guide both reactive and proactive management and any additional maintenance of the stormwater infrastructure in Timaru. Current adaptive management actions are detailed within the TARP (trigger, action, and response plan) that is included in the Monitoring Plan.

There are typically three levels of triggers depending on the level of effect measured. The higher the level of effect measured the greater the response and urgency required. For example, Trigger Level 3 is a limit where no action is required other than to continue monitoring in accordance with the Monitoring Plan. Trigger level 2 exceedances require a moderate level of action and Trigger Level 1 requires a high level of action.

The Monitoring Plan will be reviewed annually. The annual review shall identify the monitoring parameters that should be added, dropped or frequency changed, and if changes are considered necessary these have to be certified by the consent authority before adoption, but not including cultural aspects.

The Monitoring Plan is intended to be also a placeholder for basic cultural monitoring. More or a replacement cultural monitoring is in development with AECL / Arowhenua and Kitson Consulting Limited. This will also likely have elements of triggers, action and response requirements. This is being worked on initially at a high level now considering how it (as a framework) can apply to all the townships within the district currently being applied for or to be consented later.

As such it is proposed to be an action to be competed after decisions are made. A tentative timeframe for its completion and integration into the TARP document within 6 months after commencement of the consent.

A certification process will occur with Arowhenua and once this has occurred, and any subsequent cultural monitoring amendments, the updated Monitoring Plan with respect to cultural aspects only will be provided to the consent authority for their information.

5.9 Proposed Conditions and Duration

A Proposed set of conditions for the Timaru SMA stormwater and construction phase stormwater discharge permit is attached as Appendix 8.

A duration of 35 years has been requested given:

- The level of established baseline information provided with the application, and the monitoring proposed means there will be reasonable certainty as to the current state of the environment to use as a baseline to detect future changes and trends.
- The adaptive management approach proposed and integrated into a range of certification and review consent conditions allows for:
    - Early adoption of changes to legislation (e.g. regional plans giving effect to Te Mana o te Wai).
    - Responding to changes to monitoring and emerging issues, triggers being exceeded or changes to any receiving environment standards.
    - Dealing with adverse effects in the broader receiving environment from other influences if they were to increase or vary during the term of the consent.
    - Flexibility to adopt new technology and practices to improve the treatment and management of stormwater from the SMA.
- The significant existing capital investment in the activity/assets.
- Given the existing urban area and associated stormwater discharges have previously formed part of the environment and the time required to address and reverse those legacy effects.
- The overall significant investment to prepare the application and that a longer duration would better achieve administrative efficiency.

6 Activity Classification

6.1 Resource Management Act 1991

Section 15 of the RMA places restrictions on discharges of contaminants to water or land where it may enter water. Section 15(1) states that:

> *No person may discharge any –*
>
> *(a) Contaminant or water into water*
>
> *(b) Contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or*
>
> *[…]*
>
> *Unless the discharge is expressly allowed by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.*

The proposed discharges of stormwater (developed and construction-phase) will involve discharges of contaminants into water, and onto and into land in circumstances that may result in that contaminant entering water, being either groundwater, surface water or coastal water.

There are no national environmental standards (NES) that apply to the discharge activities sought so a NES does not expressly allow them (refer section below). Therefore, the discharge of stormwater needs to be expressly allowed either by a rule in a regional plan and a proposed plan or by a resource consent (discharge permit).

6.2 National Environmental Standard or Regulation

The NES-Freshwater 2020 (NES-F) has regulations that relate to construction and maintenance of specific infrastructure (which includes stormwater networks) within or near natural wetlands (Part 3 Sub-part 1). It was subject to a revision on the 1 November 2022.

The entire Part 3 Sub-part 1 - Natural wetlands of the NES-F has been deliberately drafted to not control 'a discharge of contaminants', unlike other NES-F Parts that do specifically refer to a 'discharge of contaminants' for example rainfall derived sediment laden runoff from winter grazing or increased nutrient losses in land drainage associated with intensification of agricultural land uses. As such the NES-F does not apply to actual stormwater discharges under the natural wetland provisions.

Within Part 3 Sub-part 1 - Natural wetlands, there are classifying regulations relating to the construction of and the maintenance and operation, of specified infrastructure. The activities regulated include vegetation clearance and earthworks, the taking, use damming, diversion or discharge of water. There may be parts of the existing stormwater network that are within 10 m from the wetlands identified in Section 4.9.6. Regulation 46 permits the maintenance and operation of specified infrastructure provided the conditions in Regulation 46(4) are met. These conditions are expected to be complied with.

Potentially, there could be situations where new stormwater infrastructure could be constructed near a potential natural wetland as part of a development or a TDC implementation project or when maintenance activities cannot comply with the conditions of this regulation. If this is proposed a planning assessment would be undertaken by the developer or TDC and if required the appropriate national, regional and district resource consents would be sought.

There are no other relevant National Environmental Standards or Regulations that immediately apply to the stormwater discharge proposal.

6.3 Land and Water Regional Plan

6.3.1 Overview

The LWRP operates at two levels, region-wide and zone specific (i.e. sub-regional). The region-wide policies and rules act as the holding position and apply across the region unless a sub-regional section of the plan contains a more specific policy or rule.

The operative sub-regional Section 14 and the still proposed PC7 (decision version being appealed) changes to Section 14 Orari-Temuka-Ōpihi-Pareora of the LWRP does not contain any sub-regional rules relating to stormwater system discharges.

Initially there are three separate regional rules to consider in the LWRP to establish the classification of the stormwater discharges (operatively into land, and the PC7 decision version that has legal effect into surface water) sought for the Pleasant Point SMA:

- Rule 5.93 - The discharge of stormwater and construction phase stormwater from a reticulated stormwater system
- Rule 5.95 - The discharge of stormwater into a river, lake, wetland, or artificial watercourse
- Rule 5.96 - The discharge of stormwater onto or into land where contaminants may enter groundwater

6.3.2 Reticulated Stormwater System

The LWRP provides a definition of a reticulated stormwater system as:

> ***Reticulated stormwater system*** *means a system of pipes, swales, drains, kerbs and channels owned or operated by a network utility operator that collects stormwater within areas used or proposed to be used for urban-residential, commercial or industrial purposes and conveys that stormwater to any device, wetland, retention or detention pond or infiltration basin for the treatment of stormwater, prior to a discharge to land, groundwater or surface water. It excludes any drainage system that has been constructed for the primary purpose of collection, conveyance or discharge of drainage water.*

The existing and proposed TDC stormwater system is consistent with the LWRP reticulated stormwater system definition. The relevant rule for reticulated systems in the LWRP is:

> *5.93 The discharge of stormwater or construction-phase stormwater from a reticulated stormwater system onto or into land or into or onto land in circumstances where a contaminant may enter water, or into groundwater or a surface water body is a restricted discretionary activity provided the following conditions are met:*
>
> *1. For a discharge that existed at 11 August 2012, an application for a discharge permit is lodged prior to 30 June 2018, or at a later date as agreed between the reticulated stormwater system operator and the CRC; and*
>
> *2. A stormwater management plan has been prepared to address the management of stormwater in the catchment and is lodged with the application; and*
>
> *3. The discharge will not cause a limit in Schedule 8 to be exceeded.*

TDC was previously granted an extension of timeframes until 30 June 2022 to lodge their stormwater network consent applications for Temuka, Pleasant Point, Washdyke and Timaru. The application for Temuka was lodged by this date, however, due to the amount of work required to prepare the applications and recognising the implications for the ECan team (including consent officers and technical staff) needing to process these applications, TDC submitted a request to ECan for a further extension of timeframes based on a staggered programme for lodgement.

TDC was informed that this request had been declined, therefore the application does not meet Condition 1 of this rule. The implications of this, is that the activity automatically defaults to Rule 5.94 of the LWRP and has a status of 'non-complying'. For completeness, compliance with the other conditions of this rule have also been assessed.

A SMP has been prepared and attached to the application lodged so the requirement of Condition 2 has been met.

The relevant table from Schedule 8 described in Condition 3 has been copied and inserted as Table 6-1.

Table 6-1: Schedule 8: Region-wide water quality limits for certain rivers, and groundwater (tables extracted from LWRP)

Rivers

River type	Parameter	Measurement	Limit
Spring-fed plains Spring-fed plains urban	Nitrate toxicity	annual median	3.8 mgN/L

Groundwater

Contaminant	Measurement	Limit
Nitrate-N	Maximum concentration	<11.3 mg/L
Nitrate-N	Annual average concn	<5.65 mg/L
E.coli	95% of samples	<1 organism/100 millilitres
Other contaminants[2]	any sample	<50% MAV[3]

[2] Other contaminants of health significance as listed in NZ Drinking-water Standards.

[3] Maximum acceptable value (as listed in [2] above)

Rivers (surface water)

None of the receiving waterways within the Timaru SMA catchment are classified as either Spring-Fed Plains or Spring-Fed Plains Urban, so no region wide water quality limits apply.

Groundwater

The maximum Nitrate –N concentration in Table 6-1 is the Maximum Allowable Value (MAV) in the Drinking Water Standards for New Zealand 2022. The annual average concentration limit is half the MAV. The DWSNZ are applicable to water intended for drinking by the public, the extract with respect to Groundwater from the DWSNZ revision that applied refers to '*any sample taken from a drinking supply well abstraction*'.

LWRP Policy 4.14 for discharges of contaminants into land provides direction on how to apply the Schedule 8 groundwater quality limits with respect to each type of contaminant. The policy

requires discharges to meet groundwater quality limits (4.14(c)(i)) and implies that these limits need to be met at the point of discharge to land.

There is very limited water quality data available within the SMA (see Table 4-4) due to the lack of aquifers. The available data indicated low concentrations of nitrate-nitrogen concentrations, well below the Schedule 8 limits for this contaminant. There is no data for heavy metals and hydrocarbon concentrations (classed as "other contaminants" in the LWRP) and the records indicate low concentrations of E.coli (e.g. <10 cfu/100m) detected in the bores tested.

Given the constraints associated with discharging and infiltrating stormwater to land within the SMA, it is not expected that stormwater contaminants would be present in sufficient quantities in groundwater to cause exceedances of the water quality limits in Schedule 8. On this basis, it is considered that Condition 3 of this rule can be met.

As Condition 1 of this rule has not been met, the proposed discharges from the Timaru SMA are therefore classified as 'non-complying' under Rule 5.94 of the LWRP.

5.94 The discharge of stormwater or construction-phase stormwater from a reticulated stormwater system onto or into land or into or onto land in circumstances where a contaminant may enter water, or into groundwater or a surface waterbody that does not meet the conditions of Rule 5.93 is a non-complying activity.

6.3.3 Individual Sites to Surface Water

With respect to the discharges to surface water (not via the TDC stormwater network) from individual residential or commercial properties covered by this application the following rule applies:

5.95 The discharge of stormwater, other than into or from a reticulated stormwater system, into a river, lake, wetland or artificial watercourse or onto or into land in circumstances where a contaminant may enter a river, lake, wetland, or artificial watercourse water is a permitted activity provided the following conditions are met:

1. *The discharge is not from, into or onto contaminated or potentially contaminated land; and*

2. *The discharge is not into:*

   (a) a water race, as defined in Section 5 of the Local Government Act 2002; or

   (b) a wetland, unless the wetland is part of a lawfully established stormwater or wastewater treatment system; or

   (c) a water body that is Natural State, unless the discharge was lawfully established before 1 November 2013; and

3. *The discharge does not result in an increase in the flow in the receiving water body at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five-year event); and*

4. *The discharge meets the water quality standards in Schedule 5 after reasonable mixing with the receiving waters, in accordance with Schedule 5; and*

5. *The concentration of total suspended solids in the discharge shall not exceed:*

   (a) 50 g/m^3, where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake except when the background total suspended solids in the water body is greater than 50 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or

(b) 100 g/m³ where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the water body is greater than 100 g/m³ in which case the Schedule 5 visual clarity standards shall apply; and

6. The discharge to water is not within a Group or Community Drinking-water Protection Zone as set out in Schedule 1; and

7. The discharge does not occur where there is an available reticulated stormwater system.

Does Not Comply: The following standards may not be able to be complied with:

- Condition 3 – Runoff from both the SMA and rural runoff contribute flows to these waterways and therefore stormwater may increase flows within them by more than 1% in a one in five-year event so will not meet this condition; and
- Condition 4 - Concentrations of metals (i.e. zinc from older roof materials and from untreated commercial carparking areas) in the discharge may exceed the standards in Schedule 5 of the LWRP.
- Condition 5(a) - TSS concentrations may be greater than 50 g/m³.

Note: even best practice stormwater treatment swales, wetlands, or attenuation basins may never achieve these TSS standards if the condition is not interpreted to be an on average concentration.

Given that discharges to, and from contaminated land have been excluded from the activity, and the discharges will not be into a water race, natural wetland or natural classed river, or within a Group or Community Drinking-water Protection Zone it is considered that the other conditions and sub-clauses of Rule 5.95 will be met.

6.3.4 Individual Sites to Land

With respect to the passive discharges (e.g., not occurring via purpose-built engineered infiltration or soakage systems) discharges onto and into land from individual residential and commercial properties within the SMA (that are not connected to the reticulated network) the following rule applies:

5.96 The discharge of stormwater, other than into or from a reticulated stormwater system, onto or into land where contaminants may enter groundwater is a permitted activity provided the following conditions are met:

1. *The discharge is not from, into or onto contaminated or potentially contaminated land; and*

2. *The discharge:*

(a) does not cause stormwater from up to and including a 24-hour duration 2% Annual Exceedance Probability rainfall event to enter any other property; and;

(b) does not result in the ponding of stormwater on the ground for more than 48 hours, unless part of the stormwater treatment system; and

(c) is located at least 1 m above the seasonal high-water table that can be reasonably inferred for the site at the time the discharge system is constructed; and

(d) is only from land used for residential, educational or rural activities; and

(e) does not occur where there is an available reticulated stormwater system, except where incidental to a discharge to that system; and

(f) is not from a system that collects and discharges stormwater from more than five sites.

While stormwater from the SMA is primarily discharged into surface water due to the soil constraints affecting infiltration, there may be the potential for stormwater treated via land-based systems such as, dripline irrigation, swales, raingardens or attenuation basins to soak into land and enter groundwater. On this basis, it is considered prudent to include discharges to land in the scope of activities requiring consent.

Does Not Comply: As commercial land use is part of this application; the proposal will not comply with Condition 2(d).

Given that discharges to contaminated land have been excluded from the activity, and the application excludes engineered infiltration or soakage systems due to ground conditions not being suitable for soakage facilities, it is considered that the other conditions and sub-clauses of the Rule 5.96 will be met.

6.3.5 Individual Sites - Final Classification

Individual sites that do not meet one or more of the conditions of Rules 5.95 and 5.96, are classified by the Rule quoted below:

5.97 The discharge of stormwater, other than from a reticulated stormwater system, into a river, lake, wetland or artificial watercourse or onto or into land in circumstances where a contaminant may enter water that does not meet one or more of the conditions of Rule 5.95 and Rule 5.96; and the discharge of stormwater or construction-phase stormwater into a reticulated stormwater system that does not meet the condition of Rule 5.93A; is a discretionary activity except that within the boundaries of Christchurch City it is a non-complying activity.

Under Rule 5.97 discharges onto land that passively enter groundwater from existing and future individual properties would be classified as a *discretionary activity*.

6.4 Regional Coastal Environment Plan (RCEP)

6.4.1 Overview

The RCEP was made operative on 30 November 2005.

The permitted activity Rule 7.1 of the RCEP controls discharges of water and contaminants into water, or onto or into land in the CMA. Clause (b) of this rule is relevant to stormwater discharges. Refer to Appendix 10 for the full wording of this rule. Aerial images for the coastal discharge locations into named areas identified in the RCEP as “Caroline Bay”, “Operational Area of a Port” and the “Patiti Point Coast” are shown in Appendix 10.

TDC’s stormwater network discharges to the coast are either within the RCEP Contact Recreation (CR) or Aquatic Ecosystem (AE) class waters. None of the coastal discharges are within a RCEP Shellfish Gathering (SG) class waters (being water managed for shellfish gathering, as well as contact recreation and the maintenance of aquatic ecosystems).

An assessment of the network stormwater discharges against the Rule 7.1 is provided in the sub sections below.

6.4.2 Scour and Erosion

An extract of the requirements in relation to scour and erosion of Rule 7.1(b) for stormwater is below:

(b) […] the discharge of stormwater, into water, or onto or into land in the Coastal Marine Area, is a Permitted Activity; provided that the discharge, […]:

(i) shall not result in any scouring or erosion of the foreshore or seabed that is not erased by wind, tidal or wave action within 24 hours; and

Refer to Appendix 10 for aerial imagery of all the coastal outlet locations.

Operational Area of a Port - The discharges below the wharf areas do not have a foreshore so the foreshore requirement is not applicable, nor would it be expected that the seabed would be scoured.

Patiti Point Coast - Along this coastline the MHWS boundary delineation cannot be determined accurately without some survey information, and the indicative MHWS in Canterbury Maps is clearly not correct. However, using the aerial imagery of the outlets and some associated channels, and foreshore characteristics, it has been qualitatively determined that the discharges from catchments Heaton Street, Browne Street, Queen Street and Gardens Gully, do result in scour and erosion of the foreshore between MHWS and high tide that is not erased within 24 hours.

Caroline Bay - The other outlets including the Waimataitai piped stream that outfalls via a combined three culverts would appear to comply with the 24-hour requirements for the foreshore due to currently being located within the normal tidal zone or being discharged on to rocks. The seabed would not be expected to be eroded at these locations.

6.4.3 Water Quality Requirements

Rule 7.1 (b) (ii) states that to meet the permitted activity requirements of this rule, the discharges into the CMA should not result in the production of any suspended materials or reduce the colour and clarity of the water beyond 100 m from the outfall. The rule discounts any impact resulting from natural perturbations.

Stormwater discharges from these outfalls will only occur as a result of rainfall events. During these events and for a period of time afterwards, these outfalls, along with the creeks and waterways flowing into the CMA will carry higher loads of suspended sediment from both rural and urban areas into coastal waters along the Timaru SMA that can affect the clarity of coastal water.

The open, gravelly nature of the coastline and the predominant longshore (north-east to south-west) currents provide considerable mixing of contaminants. Given this mixing, the distance around the outfall providing for a zone-of non-compliance (100 m in any direction) and that the rule does not apply to changes of water clarity resulting from natural perturbations, the discharges from TDC's outfalls are likely to meet the conditions of this rule relating to clarity and colour.

Condition 7.1 (b) (ii) 1 of this rule relates to the production of suspended materials. Phytoplankton blooms have been previously noted in coastal waters around Timaru and it has been suggested (Bolton-Ritchie, 2006) that nutrients from stormwater could be contributing to this effect. Stormwater can contain nutrients from garden fertiliser and pet and bird droppings, but in general concentrations of nutrients from urban areas are likely to be lower than runoff from rural land. There have been no further studies to confirm the extent and occurrence of this effect or the likely source of nutrients causing this effect in Timaru coastal waters. Given the amount of mixing provided for in the coastal waters around the outfalls and the other sources (e.g., treated wastewater discharges, wastewater overflows and runoff from agricultural land) contributing nutrients to the coastal waters around Timaru, it is considered that the discharges from the outfalls alone are unlikely to be the cause of these blooms.

The stormwater discharges to the coast outside the Operational Area of a Port are required to meet toxicant – metal standards after mixing as required by the permitted activity rule (Rule 7.1).

To assess metals this the NIWA Urban Runoff Quality Information System (URQIS) was used to obtain data on untreated stormwater from urban areas all over New Zealand. Stormwater quality data was obtained for typical stormwater metals – i.e. zinc, copper, and lead, from a mixture of land uses representative of most of the larger sub-catchments that discharge directly to the CMA, (except for the heavy industrialised Port catchment).

Using the dissolved means data obtained from the URQIS, the highest dilution factor required to comply with the metal water quality standards in clause (b)(iii).5. of Rule 7.1. was a five-fold dilution

for zinc (refer to Table 1 in Appendix 10). This dilution would be easily achieved for the smaller outlets discharging to the coast, given the flow rates and a reasonable mixing zone of at least 20 m surrounding these outlets. The discharge from the Waimataitai catchment via a 6m wide open culvert into a shallower and more sheltered bay, is also expected to comply, given that in this case, a 120 m mixing zone applies.

As shown in Table 1 of Appendix 10, the water quality stressor values for temperature, dissolved oxygen saturation and BOD_5 standards would be expected to be complied with for the discharges after mixing within the Port and outside the Port area after the reasonable mixing zones.

6.4.4 Ecology Requirements

Within the Operational Area of the Port, the discharge is required to not have the capability of causing significant adverse effects on aquatic life or the capability of causing a significant loss of indigenous biological diversity.

What this means in practice is unclear, and there will be other activities occurring in the heavily modified Port area environment that will be having more impacts on the ecology such as dredging.

Using URQIS untreated stormwater quality data for light and heavy industrial land uses, the highest dilution factor required to comply with ANZG 2018 80% species (being a chronic coastal water quality standard for a highly disturbed ecosystem) was a 15-fold dilution for zinc. Given that the stormwater discharges are more an acute/short-term exposure risk, and the above guideline standard would likely be met after reasonable mixing these discharges are not expected to result in a significant ecological effect.

6.4.5 Summary

Table 6-2 below lists the Timaru Urban catchments that are discharging directly to the CMA. The location of these areas is shown in Appendix 10. All TDC network stormwater discharges are likely to meet the permitted activity limits / water quality standards for their class in the RCEP. The network discharges to the Patiti Point Coast, however, cannot meet the permitted activity Rule 7.1 due to scour and erosion of the foreshore and require resource consent (a discharge permit) and are classified as a discretionary activity under RCEP Rule 7.2.

The network stormwater discharges to Caroline Bay and the Operational Area of a Port are permitted activities under Rule 7.1 and do not require a resource consent.

Table 6-2: Stormwater catchment names and relevant RCEP plan and permitted activity rule attributes

"Catchment Name" or single street /area	Outfall Location - "RCEP Area"	Foreshore Scour after 24 hrs?	RCEP Water Quality Area
Richmond and Moore Streets	Nth "Caroline Bay"	No	Contact Recreation (CR)
Lower part of "Waimatatai"	"Caroline Bay"	No	
Park View Terrace		No	
Caroline Bay Domain	"Operational Area of a Port"	No	Aquatic Ecology (AE)
"George Street"		No	
"Port"		No	
"Heaton Street"	"Patiti Point Coast"	Yes	Contact Recreation (CR)
"Browne Street"		Yes	
"Queen Street"		Yes	
"Gardens Gully"		Yes	

6.5 All Activities Classification Summary

Table 6-3 summarises the activity classifications for the range of stormwater activities sought. The proposal is considered to have an overall non-complying activity classification.

Table 6-3: Activity classification summary

Activity	Plan	Rule	Classification
TDC stormwater network to land and to surface water	LWRP	5.94	Non-complying
Individual Properties to Land	LWRP	5.97	Discretionary
Individual Properties to Surface Water	LWRP (PC7)	5.97	Discretionary
TDC discharges to CMA (Patiti Point Coastal Outfalls only)	RCEP	7.2	Discretionary
		Overall Classification:	**Non-complying**

7 Consultation

7.1 Overview

Schedule 4 Clause 6(f) of the RMA indicates that an AEE should identify: "*those persons affected by the proposal, the consultation undertaken and any response to the views of those consulted*".

TDC has consulted with potentially affected stakeholders. the wider Timaru community and the likely interested parties to this application. They have also collaborated extensively with Te Rūnanga o Arowhenua throughout the development of the SMP and resource consent application.

7.2 General Public Consultation - Stormwater Management Plans

General public consultation for all the urban areas that SMPs were being developed for (including Timaru) was undertaken in October 2021 with drop-in sessions where members of the public could either meet in person at an advertised venue or via a survey (both online and published in the Courier).

TDC received 51 submissions (online or via hardcopy, or at the drop-in sessions), of which 12 related to Timaru. The key findings for all responses (including other townships) were: [15]

- Of the total number of survey respondents, the most commonly identified stormwater issues were flooding and pollution (both affecting 57% of respondents), followed by lack of maintenance (55%), poor stream health and climate change (51% each).
- When stormwater issues were rated in terms of the most critical, the two top issues identified were: loss of aquatic life/habitat, followed by polluted stormwater entering waterways.
- All survey respondents identified some usage of their local waterways and surrounding areas, including for running/walking, relaxing, fishing, food gathering and kayaking.
- Survey respondents reported low overall levels of satisfaction with the quality of our waterways. Timaru and Temuka waterways scored higher than the quality of Pleasant Point and Washdyke waterways (Washdyke was the lowest).
- 25% of survey respondents perceived Timaru District Council's management of stormwater in their area as being either very good or excellent, 45% perceived it to be average, whereas 30% of respondents thought Council's stormwater management to be either poor or very poor.
- The greatest threats identified to local waterways by survey respondents were fertilisers/pesticides (highest) and rubbish/litter and industrial pollution (second equal). Car/house washing, and animal waste were perceived to be the lowest overall threats.

Specific comments received from Timaru submitters are summarised in Table 7-1:

Table 7-1: Individual submissions received during consultation for the Timaru SMA

Location	Submitter Comment	TDC Response
District Wide	Not enough pipe. Kerb and channel seem to be the only way stormwater is discharged.	No changes are proposed. The use of kerb and channel is more efficient and cost effective and allows options for treatment systems to be implemented. Pipes would be an enormous cost.

[15] https://www.timaru.govt.nz/services/environment/storm-water/stormwater-management-plan

Location	Submitter Comment	TDC Response
District Wide	Infill development requires stormwater neutrality, which can be easily accommodated on flat sites, however on sloping/hill land a series of pumps/tanks add a $5000 premium to the development.	It involves less volumes to be stored for a steep site compared to a flat site, to mitigate the difference between pre and post development. With climate change, neutrality is more important to maintain existing stormwater network capacity.
Gleniti (Meadowstone St Swale)	Chamber (outfall) is constantly overflowing. Gorse, willows, weeds, long grass present in stormwater reserve.	Upgrade work is occurring, including weed vegetation clearance. The loess soils have become saturated (which was not expected) impacting on maintenance /mowing of grass.
Waimataitai Creek	Check St Vianneys Crescent (CRC167591). Will this consent be surrendered?	This residential subdivision development has yet to be constructed. The swales and basin proposed will discharge to the Waimataitai Creek. It is within the scope of the proposed SMA application. It is likely that this consent will be surrendered once the developer has met maintenance period requirements and the conditions of consent have been confirmed as being fully compliant.
Waimataitai Creek – Ashbury Park outfall.	Question around surface water monitoring and results e.g., testing for what? What were the results? What guidelines were used? Will the results be made publicly available?	Ecological assessments were undertaken to assess the impacts that stormwater discharges were having on water quality and ecology. These assessments will form part of the resource consent application. TDC is investigating the potential to add these results to their website.
Waimataitai Creek – Ranui Ave	How can I find out more about the metals and pollution in the streams? Or the wildlife?	Refer above, monitoring data could be added to the TDC website, and / or persons can contact ECan.
Waimataitai Creek – Kent St	Infill development struggling for service	This is the case and a wider strategy for this area is being developed, including wastewater and stormwater options.
Waimataitai Creek – Caroline Bay	Playground floods	Design is being undertaken now for an immediate fix and a longer-term strategy.
Taitarakihi Creek	I would like to walk along this stream to appreciate it more. Is this possible?	There are plans for linking tracks and walkways, however some aspects need private landowner agreement. Land Transport and Parks departments have strategies to improve access, that Land Drainage will coordinate with as required. The new district plan has stronger provisions for new development on stream boundaries to provide amenity access.

Location	Submitter Comment	TDC Response
Taitarakihi Creek – Pacific St Showground	Questions around showground development: Pre-treatment? On-going works to treat stormwater? Downstream volume issue?	Timaru Mega Centre Limited hold a stormwater discharge permit CRC210148 for the developed site from ECan. The consent specified restrictions on building materials to minimise copper and zinc leaching. Stormwater from hardstand areas such as carparks are discharged via best practice proprietary treatment devices. The consent does not specify any attenuation of stormwater, this may be due to the very short distance from the site to the coast. The Railway line culverts have been upgraded to increase the capacity as previously it was causing a restriction. It is unlikely that TDC will include this development under its consent given it does not discharge to TDC's network and due to its scale.
Saltwater Creek – Grandi Ave and Ōtipua Rd	My drain (the one outside my house) gets blocked sometimes - how can I help?	Education for people willing to assist will be revisited to explore what can and cannot be done plus safety concerns.
Saltwater Creek – Quarry Rd	Why is this excluded from the SMA?	SMA has been revised to include the greenfield area between Quarry Road up to Saltwater Creek.

TDC sent a thank you letter on 8 March to all persons who made a formal submission during SMP consultation in October and November last year (excluding those people whose submission said they did not want us to contact them).

7.4 Collaboration with Te Rūnanga o Arowhenua

TDC and AECL (on behalf of Te Rūnanga o Arowhenua (Arowhenua)) have entered into an agreement to collaborate on the preparation of SMPs and associated resource consents required for Timaru, Washdyke, Temuka and Pleasant Point. This agreement was documented and signed off in May 2021. The purpose of the agreement was to establish clear expectations around engagement and information required for the preparation of the SMPs and applications.

During development of the SMP and this application, the following consultation with AECL / Arowhenua has occurred:

- AECL representatives have collaborated with TDC to develop the vision for stormwater management for the townships and the objectives and targets for Timaru (that form part of the application).
- Cultural site walkovers of Timaru waterways attended by Arowhenua cultural advisors, TDC and WSP or PDP. This was to assist in understating the cultural landscape and monitoring locations.
- AECL worked with TDC to develop the issues assessment.
- Arowhenua cultural advisors supported TDC in public engagement drop-in sessions and a presentation to Councillors at a workshop on the SMP development and resource consents process.
- AECL has also collaborated on the development of the implementation plan process, and Monitoring Plan.
- AECL were provided early drafts of the SMP for comment and have been given drafts of the AEE and proposed conditions for comment.

- The SMP outlines TDCs intention to continue collaborating with Arowhenua by ensuring that Arowhenua are included in a working group that will be set up to identify, prioritise and evaluate projects for Timaru's stormwater management and the achievement of environmental objectives.

It is TDC's understanding that AECL / Arowhenua are generally supportive of the application, and that during the processing of the application, they will be working in partnership with TDC to enable their views to be considered as part of ECan's decision making process.

7.3 ECan River Engineers

ECan's River Engineers are the managers of the stopbanks on the lower reaches of the Ōtipua-Saltwater Creek and have been consulted with throughout the pre-application phase for the TDC stormwater network consents.

Pre-application engagement has mainly occurred through providing issues summary documents for ECan to review, including for Timaru. These reports were provided to the ECan River Engineers for comments in addition to copies of the WSP's network capacity and flooding assessments for the township.

A video call meeting was subsequently held between TDC, ECan River engineering representatives, Nick Reuther (ECan Consent Planner and WSP who undertook the network assessments on the 2 November 2021. The main topics discussed were 'Flooding Issue Summaries' and 'Waterway Ownership/Responsibility'.

In relation to Timaru, ECan River Engineers had the following general comments:

- Where a stream is identified as being a Bylaw waterway, ECan generally operate on an urban = TDC and Rural = ECan divide regarding responsibility for waterway maintenance.
- Consideration of access for maintenance and impact on flood risk in regard to water quality / restoration work.

The Taitarakihi Creek and lower Saltwater Creek were identified as being waterways covered by the Flood Protection Bylaw and they both are mostly rural.

TDC is working with ECan River Engineers as to whether in the TDC district, TDC take on any other responsibilities for Bylaw waterways within urban areas.

At the time of completion of the AEE, TDC is not in any active process of seeking written approval of the ECan River Engineer Section. It is expected that once lodged the ECan Consent Section will engage internally with the ECan River Engineering Section to determine if there are any specific concerns.

7.4 Other Key Stakeholders

The following key stakeholders were sent letters informing them that TDC, with the support and guidance from Te Rūnanga o Arowhenua were developing stormwater management plans (SMPs) for Timaru, Washdyke, Temuka and Pleasant Point to improve stormwater management within the townships and reduce the impacts these discharges were having on the environment.

- Waka Kotahi NZ Transport Agency
- Department of Conservation
- Fish and Game (F&G)
- Orari-Temuka-Ōpihi-Pareora Zone Committee (OTOP)
- KiwiRail
- Ōtipua -Saltwater Creek Catchment Group
- Waitarakao Taskforce

- Pleasant Point Museum and Railway
- Timaru District Council Parks and Land Transport Unit

These stakeholders were initially informed about the process being undertaken in a letter from TDC on 3 August 2020, and subsequently of the issues identified for each township on 13 October 2021.

Stakeholders were encouraged in the second letter to provide feedback that could potentially influence how the SMP would address issues in the future or raise any concerns about stormwater management within the townships. Options for providing feedback included one-to-one meetings in person or via video calls or by completing a survey form found via a link on the TDC website.

No responses from the above external organisations or parties were provided for the Timaru SMP / SMA proposal.

7.5 Interested Land Development Parties

The following interested land development parties (Developers, Surveyors, Consultants) in the Timaru district were sent TDC letters informing them of the development of stormwater management plans (SMPs) for Timaru, Washdyke, Temuka and Pleasant Point.

- Paul Smith Earthmoving Timaru
- Rooney Earthmoving
- Jennians Homes Mid & South Canterbury
- Stonewood Homes
- Lone Pine Building Ltd
- Nolan Building Ltd
- Trident Homes Timaru
- Milward Finlay Lobb Ltd
- Davis Ogilvie (Aoraki) Ltd
- Land Services Group
- Argyle Holdings
- Ryan De Joux

As for the other key stakeholders, these parties were first informed about the process in a letter dated 3 August 2020 and subsequently of the issues identified for each township in a letter dated 13 October 2021.

The parties were encouraged in the second letter to provide feedback on how the SMP could address issues in the future or if they had any concerns about stormwater management within the townships. Attendance at either the drop-in sessions for each township or completion of the survey form found at a TDC website link was encouraged. No specific feedback was provided by these interested parties for Timaru.

8 Actual and Potential Effects

8.1 Overview

Section 88 of the RMA requires that an applicant assess any actual or potential effects that the proposed activity may have on the environment, and the ways in which any adverse effects may be avoided, remedied or mitigated

In accordance with Section 104(1)(a) and (ab) of the RMA, when considering an application for a resource consent, the consent authority must, subject to Part 2, have regard to:

- *any actual and potential effects on the environment of allowing the activity.*
- *any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity.*

In the RMA, unless the context requires otherwise, the term effect includes—

(a) any positive or adverse effect; and

(b) any temporary or permanent effect; and

(c) any past, present, or future effect; and

(d) any cumulative effect which arises over time or in combination with other effects—

regardless of the scale, intensity, duration, or frequency of the effect, and also includes—

(e) any potential effect of high probability; and

(f) any potential effect of low probability which has a high potential impact.

The effects in relation to this application include the past, present, and future effect given it involves the stormwater reticulated network activity that has occurred for decades and is still occurring and given the scale and duration of consent sought, any cumulative effect which arises over time, or in combination with other effects. Temporary effects could be considered to apply to construction-phase discharges when managed appropriately.

8.1.1 Existing Environment

Section 104(2) of the RMA states that:

> *"When forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if the plan permits an activity with that effect."*

Case law has determined that the existing environment is a component in considering permitted baseline effects, extracts from the relevant caselaw is quoted below.

> *"Existing activities carried out under [...] existing use rights are not part of the statutory baseline (because it only applies to activities permitted by rules). However, they are likely to be part of the existing environment against which effects must be assessed at least for the purposes of s95D which uses the word "environment".*
>
> *The Court of Appeal in Queenstown Lakes DC v Hawthorn Estate Ltd (2006) 12 ELRNZ 299; [2006] NZRMA 424 (CA), considered that the "environment" embraces the future state of the environment as it might be modified by [..] the implementation of resource consents which have been granted at the time a particular application is considered, where it appears that those resource consents will be implemented."*

To add further clarity to the case law quoted above it is noted that "environment", as defined in the RMA, includes amongst other resources and values, and "people and communities".

Many of the existing stormwater network and minor discharges sought (otherwise not permitted or separately consented) were previously lawfully established under the Transitional Regional Plan and the Natural Resources Regional Plan for Canterbury that pre-dated the LWRP.

Stormwater discharges via the stormwater reticulated systems is a long existing activity. It is not feasible for TDC to cease these existing network discharges, nor can private individuals for the

other minor discharges sought. The applicant cannot prevent rain falling on the impervious and pervious surfaces within the SMA, nor can it physically turn off its piped network to prevent discharges occurring, as this would cause damage to property and discharges of stormwater would occur via secondary flow paths within either the same catchment or to another catchment.

The effects of these previously lawfully established discharges could therefore be considered to form part of the existing baseline environment. This provides a useful starting point for assessing the potential adverse cumulative effects relating to the increase in stormwater discharges from future development (at expected better quality than the existing discharges), in combination with improvements to existing discharges over a longer period.

The LWRP recognises this need and promotes disposal of stormwater by way of a reticulated system to improve the management of stormwater quantity and quality to reduce the impacts of these discharges on the environment.

8.1.2 Permitted Coastal Discharge Activities

A recent High Court decision[16] has confirmed that by having permitted activities form part of a resource consent assessment of effects they will have protection from subsequent plan changes that might otherwise trigger new consent requirements. Given the uncertainty as to the level of permissiveness of the next plan review for coastal reticulated stormwater network discharges the permitted coastal discharge components are being captured within the application for Timaru, including an assessment of their actual and cumulative effects and where appropriate measures to mitigate those effects.

8.1.3 Scope of Effects

Due to the low permeability of soils hindering infiltration, stormwater discharges within the SMA are collected and discharged to surface water or the coastal marine area. The key effects of the discharges therefore relate to the impacts that the quantity and quality of stormwater is having on the ecological, cultural and amenity values of these surface water and coastal receiving environments.

TDC is also applying for consent to authorise stormwater discharges onto and passively into land, but not for purpose built engineered soakage systems, as these are excluded from the scope of this consent. This is to cover situations where a small amount of stormwater may infiltrate through land via stormwater management systems, such as but not limited to raingardens, swales and attenuation facilities. The impacts on soil quality and groundwater quality and human health have therefore been included for completeness but are considered less relevant than the discharges to surface water and those into the CMA.

Within this context therefore, the following effects resulting from the proposed discharges are considered relevant:

- Effects on surface water quality and aquatic ecology
- Effects on coastal water quality and ecology
- Effects on flood carrying capacity and hazards
- Effects of scour and erosion
- Effects on soil quality
- Effects on groundwater quality and human health
- Effects on natural wetlands

[16] Marlborough District Council v Zindia [2019] NZHC 2765

- Effects on Te Runanga o Arowhenua values and use
- Effects on amenity and recreational values
- Effects on the Wider Community

These effects listed above are assessed in the subsections below.

8.2 Effects on Surface Water Quality and Aquatic Ecology

8.2.1 Overview

The effects on surface water quality and aquatic ecology for this application include the past, present, and future effect; and any cumulative effect which arises over time or in combination with other effects. Stormwater contaminants discharged into a surface waterway have the potential to alter the physical (e.g., colour, temperature) and chemical (quality) properties of water within a receiving surface waterway with subsequent effects on the ecological values present.

The following assessment of this effect considers the quality of stormwater discharging into the Timaru receiving waterways (based on a literature review and results from the contaminant load assessment (Appendix 5)) and assesses the impacts of these contaminants by comparing the results from monitoring of water quality, sediment, and the ecological indicators (Appendix 5) to relevant guidelines and standards.

Stormwater from the Timaru SMA discharges into the Taitarakihi Creek, Waimataitaitai Creek, Whales Creek, Ōtipua-Saltwater Creek and the Coastal foreshore bordering the SMA. PDP was engaged by TDC to investigate the impacts of stormwater discharges from the SMA on these receiving environments.

The baseline environmental assessment (Appendix 6) was undertaken to provide a snapshot of the water quality and ecology within these waterways during winter (wet weather) and summer (dry weather). While based on only two monitoring rounds, the data provides an indication of the effects that stormwater contaminants have had on the water quality and ecology of these waterways. This information can be used to build a picture of the baseline state of these waterways, which continued monitoring proposed as part of this consent will supplement, and to track progress on achieving the objectives and targets in the long term. This information was also collected to identify and prioritise sites for remediation.

8.2.2 Discharge Quality and Loads

Table 8-1 presents an estimation of the discharge quality for the main stormwater contaminants from developed urban areas to surface water via no treatment or via a treatment system that could apply to new or redeveloped sites. Also considered is the amount of dilution in the receiving environment that would need to occur to meet the ANZG 2018 [17] (or LWRP Standards), assuming, that no background concentrations of these contaminants are present in baseflows.

The contaminant load modelling (CLM) assessment (Appendix 5) was undertaken to provide a broad estimate of the mass of contaminants discharging into each receiving environment and to compare contaminant loads between catchments.

Results from this assessment indicated six sub-catchments that were predicted to contribute the highest mass of contaminants to the receiving waterways. Three of these (*PO_06.0, WhC_01, PO_11)* consisted of large areas of residential development and high-volume roads. *SC_06* discharges stormwater from the Redruth industrial area to Saltwater Creek and is a source of high mass loadings of TZn, TCu and TPH.

[17] ANZG 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

High TSS loads were predicted for the *WaC_02* catchment which includes a large area of residential land and pasture east of Timaru. *PO_06.0* is a large sub-catchment consisting of several large carparks and high-volume loads, and consequently high TPH loads have been predicted for this catchment.

Table 8-1: Estimated stormwater discharge quality from developed urban areas or sites to surface water, and the dilution required to meet guideline values /standards

Determinand	Concentration Generated (g/m^3 unless otherwise stated) [a]	Treatment System Efficiency [b - c]	Discharge Concentration (g/m^3)	Approx. # Fold Dilution Required to achieve DGV	ANZG 2018 90% DGV (g/m^3) (unless otherwise stated)
TSS	170	0	170	3.4	50 [d]
NO_3	2	0 – 75	2 - 0.5	10 – 2.6	0.195 [e]
TP	0.4	0 – 75	0.4 - 0.1	17 – 4.3	0.023 [e]
Copper	0.02	0 – 75	0.02 – 0.005	11 – 2.8	0.0018
Zinc	0.8	0 – 75	0.8 - 0.2	53 – 13.3	0.015
PAH	0.007	0 – 75	0.007 - 0.0017	5 – 1.2	0.0014 [f]
Microbiological	8,000 fc/100 ml (median)	0 – 75	8, 000 - 2,000	8 – 2	≤1000 [g]

Notes:

DGV = Default Guideline Value

a Highest values taken from Table 5-1 unless stated otherwise.

b no formal treatment.

c Except TSS, based on mid-range value treatment efficiency for an infiltration basin (US EPA (1993), Stormwater Center (2002), Watershed Protection Techniques (1997)). A swale, wetland or raingarden will also have a similar efficiency

d LWRP Permitted activity rule value for stormwater

e ANZG 2018 stressor Warm Dry Low-elevation 80th percentile

f There is no total PAH value, as Fluoranthene has a DGV value and was the highest recorded PAH parameter in Pleasant Point sediment (PP_S2 Winter) this value has been used and it has been assumed conservatively that all the PAH concentration is Fluoranthene

g LWRP PC7 outcome 95th percentile *E.coli* / 100 mL

8.2.3 Assessment Against Standards

Results of monitoring undertaken by PDP to prepare the baseline environmental assessment were compared to the following standards and guidelines designed to protect the water quality and ecological values of surface water:

- The National Policy Statement for Freshwater Management (NPS-FM) classifies the expected impact of stormwater contaminants (water quality attributes) based on their recorded values (attribute states) dependent on the freshwater body type being assessed. It provides a 'National Bottom Line' for these contaminants indicating threshold values at which exceedance will result in a high risk of significant ecological impact.

- The Australian New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) provides default guideline values dependent on the river environment classification (e.g., cool-dry low elevation) or guideline values based on a level of species protection (i.e., 80, 90, 95, 99%). The higher the level of species protection sought, the lower the guideline value.
- The Canterbury Land and Water Regional Plan (LWRP) sets water quality limits dependent on the water quality class (e.g., Waimataitai, Taitarakihi/ Te Ahi Tarakihi and Saltwater Creek were considered hill-fed lower urban while Ōtipua Creek was considered hill-fed lower). The LWRP references the ANZG (2018 guidelines) for the toxicants, e.g., toxicants shall not exceed the ANZG 90% guideline values for hill-fed lower urban.

The results of the assessment are summarised pictorially in Figure 8-1 and Figure 8-2.

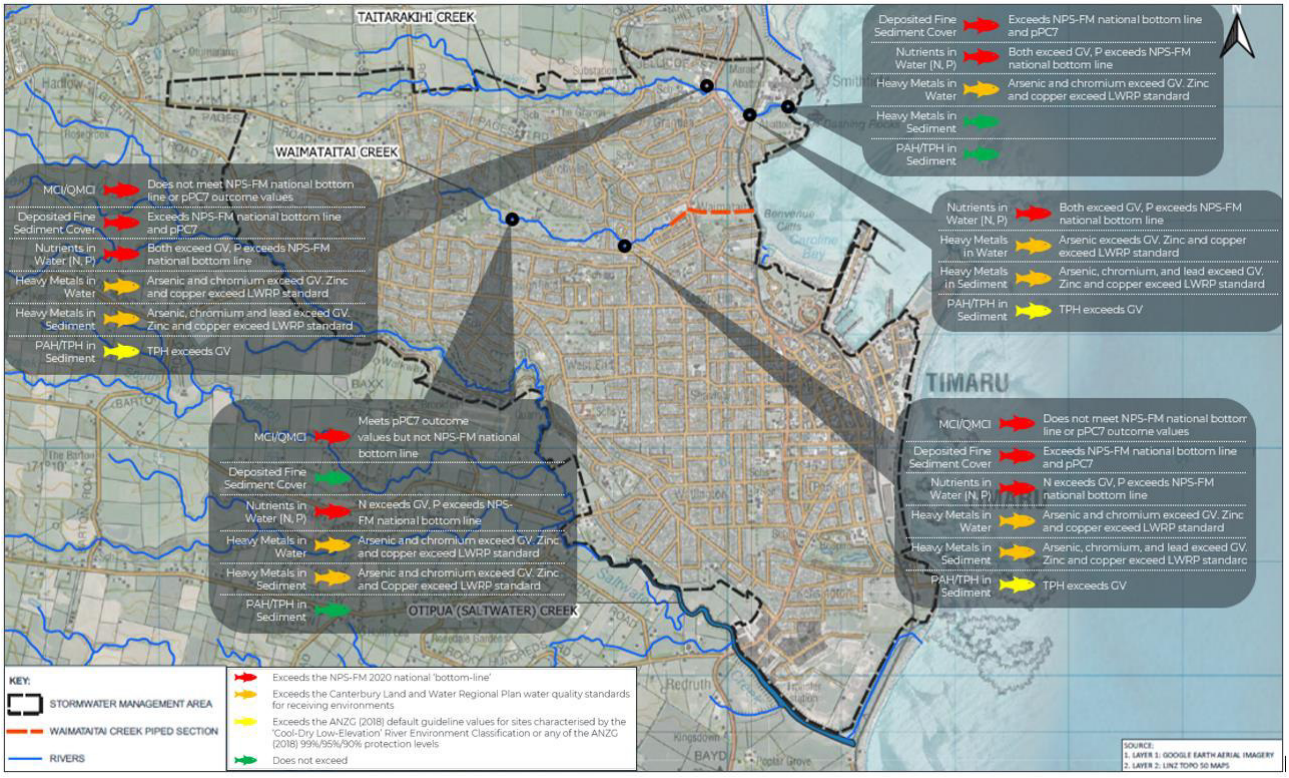

Figure 8-1: Summary of Existing Baseline Aquatic Environmental conditions for Waimataitai and Taitarakihi Creeks.

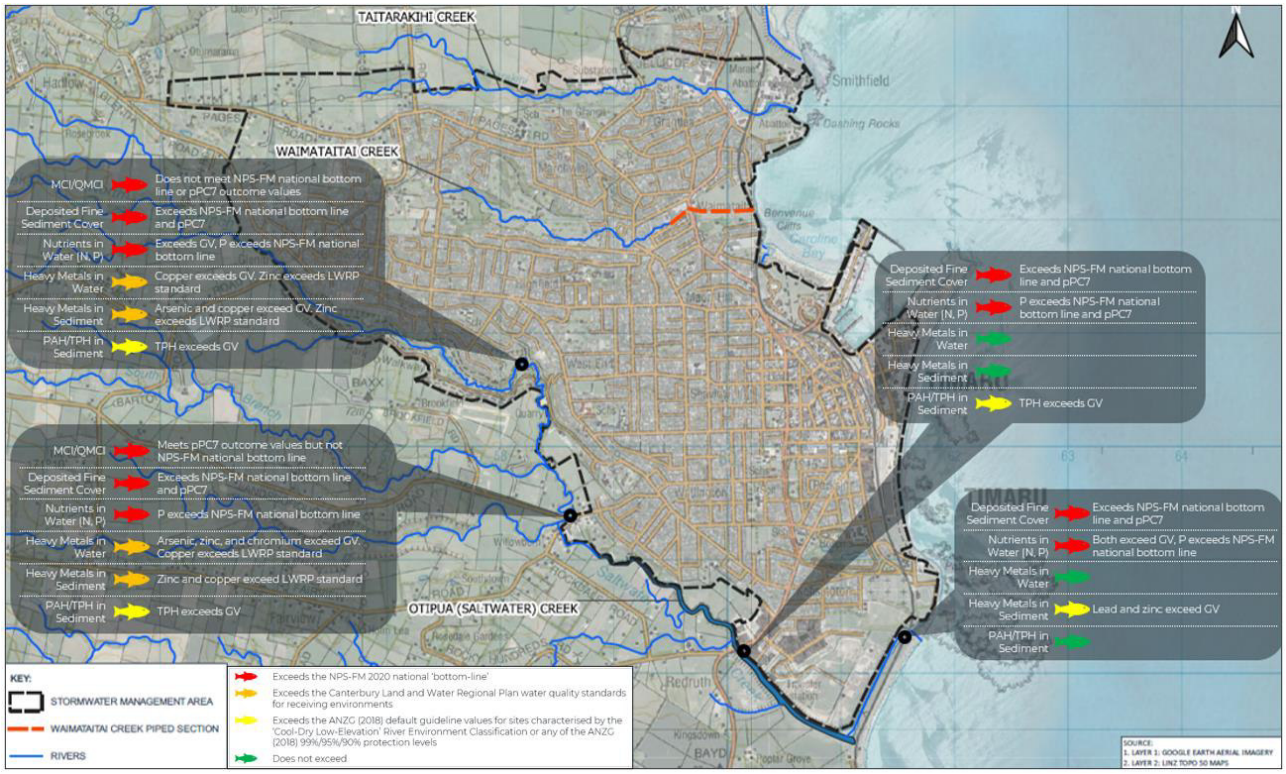

Figure 8-2: Summary of the Existing Aquatic Environmental Baseline Conditions for Ōtipua-Saltwater Creek

The key observations and results from this assessment indicated that:

- Taitarakihi Creek has been strongly impacted by stormwater discharges, evident by the absence of urban pollution sensitive taxa within this waterway. High metalloid concentrations were measured in water quality samples (including dry weather sampling) from the Taitarakihi Creek, with concentrations of copper and zinc within the range recognised to cause acute toxicity and chronic mortality in some fish species.
- Ōtipua-Saltwater Creek represents a receiving waterway with significant ecological and cultural values. High concentrations of heavy metals and hydrocarbons sourced from stormwater discharges from its contributing catchment are likely to have resulted in impacts on the ecology of this waterway, as reported by a shift in species of macroinvertebrates to more pollution tolerant taxa, identified during monitoring undertaken by PDP.
- Whales Creek and the Waimataitai Creek both pass through the historic hapua (which was once the Waimataitai Lagoon) prior to discharging to the coast at Caroline Bay. Both waterways have been impacted by stormwater contaminants, evident by the presence of pollution tolerant taxa present in the lower reaches of these waterways.

8.2.4 Best Practice Stormwater Management

As described in Section 5, TDC is proposing to use an adaptive management approach to manage and mitigate the impacts resulting from the discharges of stormwater from the Timaru SMA. The information gathered from the baseline environmental assessment and the contaminant load model highlighted the extent of effects arising as a result of the existing stormwater discharges from TDC's reticulated network. This information was used to guide the development of objectives and targets to avoid, minimise and mitigate the impacts on surface water quality.

In line with the hierarchy of obligations required by Te Mana o te Wai, the direction provided by Policy 4.16 of the LWRP and TDC's vision for stormwater management within the Timaru SMA, the key objectives that have been set for the proposal are to "*Progressively reduce the diminished ecosystem health in Taitarakihi, Waimataitai and Ōtipua-Saltwater Creeks (Objectives 1 – 3)*".

Objective 4 also recognises the contribution of stormwater contaminants to the coast from Whales Creek and Waimataitai Creek and aims to "*Progressively reduce the cumulative impacts of stormwater discharges on the Te Ahi Tarakihi Mataitai and Tuhawaiki Mataitai so the coastal habitat is healthy and suitable for safe mahinga kai harvesting, and the mahinga kai species are safe to eat.*"

Another objective related to mitigating this effect is Objective 6 – "*Progressively where practicable prioritise addressing effects of stormwater quality and quantity at or close to their source rather than at the end of pipe into surface water or instream*".

Schedule 2 (attached as Appendix 8) sets out the specific targets to achieve these objectives and include indicators to measure whether these targets are being achieved. Targets have been set for the Taitarakihi Stream, Waimataitai Stream and Ōtipua-Saltwater Creek based on these guidelines, the standards in the LWRP and NPS bottom lines.

The Monitoring Plan (Appendix 9) sets out how surface water quality, sediment quality and ecosystem health in the surface waterways within the SMA will be monitored to determine whether these objectives and their corresponding targets are being achieved.

To meet the SMP objectives and manage urban stormwater to improve ecosystem health and achieve the outcomes set for the receiving streams, measures to avoid, remedy and mitigate the impacts of these discharges have been proposed. These include:

- Erosion and sediment control measures during construction activities
- First flush treatment for all new developments will be required. This will likely use a combination of treatment devices to achieve a general 75 % contaminant removal efficiency.
- The non-residential site audit process - There is expected to be some benefits in a reduction of loadings, associated with the industrial site auditing programme and improvements in industrial site management.
- Retrofitting treatment in redevelopment, improvements in industrial site management and roof renewals will all contribute to improving water quality.
- Other measures that may be considered include the removal/dredging of sediment, a programme to review and require treatment of roof/guttering material and instream or riparian habitat enhancement.

In evaluating capital works projects the existing CLM can be utilised to estimate load reduction benefits where source control or treatment systems are being considered. Results from ongoing monitoring will also assist TDC to prioritise projects and set aside funding to achieve the SMP objectives. It may be the case that other capital projects are evaluated as achieving greater gains towards targets and a wider range of the objectives for Timaru.

Overall, it is considered that the proposed management of existing and future discharges from the SMA will result in an improvement in stormwater quality from the SMA and the measures proposed by TDC should result in reducing the impacts on surface water quality in the long term.

Within this context, the following sections provide further discussion on the effects of key contaminants in the discharge on surface water quality and ecology.

8.2.5 Construction Effects

Poorly managed construction sites with respect to erosion and sediment control have the potential to discharge high loads of suspended sediment to waterways affecting water clarity and water colour impacting fish function, movement, and spawning activities. Deposited sediment can also persist in low-gradient spring fed streams, resulting in poor quality aquatic habitat and long-term ecological effects.

Unmitigated discharges of sediment construction phase stormwater from developments under construction can have TSS concentrations of up to 4,000 g/m^3.

The ecological assessment that forms part of this application has indicated that while runoff from pasture and upstream agricultural land are contributing sediment to the waterways (i.e., Waimataitai and Taitarakihi Creeks) within the SMA, stormwater discharges are also contributing to the high sediment loads entering and depositing in these waterways.

Due to the scale of the effects that could occur warranting greater scrutiny, large scale development areas (> 4ha) are excluded from this application to enable the effects and the erosion and sediment control methodology to be assessed by the ECan via a separate discharge consent application process.

Smaller scale development sites, however, that consist of no more than 4 ha of disturbance will be managed by the subdivision or building consent application and compliance process undertaken by TDC. Incorporating these smaller scale construction phase discharges into the network consent will allow TDC the ability to ensure that a consistent approach is implemented to manage the effects of construction stormwater discharges from infill and smaller development projects across the SMA that wish to operate under their consent.

The main factors influencing sediment loss from earthworks sites and mobilisation in runoff are:

- Climate - Precipitation intensity, duration and frequency, temperature, and wind.
- Soils - Soil texture and other soil characteristics affect the soil's potential for erosion.
- Slope – Erosion increases as the slope steepens and lengthens.
- Size of disturbance - The size of disturbance also impacts on sediment yield.

From the descriptions of the environment and limits on scale in the proposal two of the above main factors soils (loess) and slope (moderate) are preeminent for Timaru and perhaps cold temperatures in winter affecting grass growth to establish and stabilise disturbed soils.

Overall the erosion potential is moderate (due to low rainfall and intensities).

Construction discharges that fall within the scope of the network consent will need to be managed in accordance with ECan's Erosion and Sediment Control toolbox, which provides measures to address the factors listed above. With effective erosion and sediment controls the risk to surface water quality and aquatic ecology from these discharges is considered low.

The proposed conditions include performance standards for construction-phase stormwater discharges, that hey shall not:

- Cause a noticeable increase in localised sedimentation at the point of discharge in a receiving surface waterbody.
- Cause a significant change in colour or clarity after reasonable mixing in a receiving surface waterbody.
- Cause any significant adverse effects on fresh aquatic life.

Whilst no TSS limits are proposed for short term construction-phase stormwater it is in the interest of TDC to effectively regulate these sites as poor practices will compromise achieving objectives and targets set for the health of the water bodies (which include reducing sediment cover).

On this basis, it is considered that the proposal to include these discharges in the consent will achieve a more consistent approach to managing construction stormwater discharges within the SMA and this combined with the requirement to implement best practice measures should ensure that the impacts on water quality from these discharges are minimised.

8.2.6 Operational Discharges Effects

Overview

The operational stormwater discharges associated with this consent include both existing discharges and future discharges that will eventuate as a result of development within the Timaru SMA. These discharges are a source of contaminants that can change the quality and chemical nature of surface water, which may have subsequent effects on aquatic organisms and ecosystem health.

Stormwater is inherently "flashy" – both in relation to flows and concentrations of contaminants. Occasionally concentrations will have very high peaks, however these usually flush through quickly. Due to the intermittent nature of these discharges, direct exposure to high concentrations of contaminants will be temporary and therefore the actual effects of these contaminants on stream biota may be limited.

An estimate of the short-term nature of stormwater discharges entering a receiving environment for a local area can be calculated via the following equation:

% of time stormwater in receiving environment = (annual wet days / days per year) x average duration of a rainfall event x correction factor for storms that produce no runoff [18] x 100

Applying the above formula to Timaru with mean annual wet days of 75 per year, and assuming a conservative 9 hr duration average for rainfall events, this gives the following percentage:

(75/365) x 0.375 (or 9hrs) x 0.85 x 100 = ***6.55%*** *(per annum)*

Surface Water Quality

Heavy Metals

Schedule 5 of the LWRP includes water quality standards associated with the protection of species from metal toxicants. These standards are based on the ANZECC 2000 guideline default values (without adjustment for hardness). The guidelines have been updated and have become ANZG 2018.

The PDP Baseline Environmental Assessment Report (Appendix 5) discusses the toxicity of all metals in freshwater and the impacts on aquatic ecology based on international and Australia and New Zealand studies, and in relation to reported chronic Default Guideline Value (DGVs).

Also a report commissioned by ECan and prepared by the National Institute for Water and Atmospheric Research (NIWA 2017 [19]) and their national experts contains advice on the proposed changes and the application of the guidelines with respect to stormwater management.

Section 4 of the NIWA 2017 report advises:

- The ANZECC guidelines [now ANZG 2018] are most appropriate for assessing long-term risk because they are based on chronic toxicity data. There are currently no New Zealand guidelines to protect against short-term effects (acute toxicity).
- Stormwater discharges are intermittent and therefore represent an acute risk, so the chronic-based ANZECC guidelines may not always be appropriate for stormwater management). However, the potential exists for the discharges to increase chronic risks because a) the repeated nature of the discharges means that organisms may not be able to fully recover from one event before the next event occurs and b) metals from the stormwater

[18] Christchurch City Council 2003. *Waterways Wetlands and Drainage Guideline* Part B Design - Eqn (6-1).

[19] NIWA (2017). *Copper and zinc aquatic toxicity: Frequently Asked Questions.* Prepared for Environment Canterbury May 2017

can build-up in sediment, representing an on-going source to the water column, exacerbated under low oxygen conditions.

As discussed in Section 5.2 the metals coper and zinc are the main contaminants of concern in present day stormwater. Copper is expected to be mostly sourced from wear of brake pads in vehicles, and untreated concentrations represent the highest toxicity risk. Copper spouting, downpipes and cladding material will be present in Timaru, but this has not been quantified.

Zinc measured from urban surface water originates from vehicle tyres and brake pads, galvanised roofs, roadside fittings, and pipes. Zinc is released to the environment and ultimately to stormwater during the daily wear and tear and/or corrosion of these sources.

The draft District plan is attempting to make the use of any copper or high zinc leaching materials for buildings and structures a non-complying activity, to discourage new sources being added to the urban area.

It is expected (without any regulation) that over time the like for like replacement of the existing older galvanised iron building roofs in Timaru will occur with COLORSTEEL™ or other roof products which will reduce Zinc leaching and loads to the environment. Education and incentives could make this transition more rapid and reliable.

The CLM assessment indicated that the Timaru and Taitarakihi Catchments represented 'hotspots' for high zinc concentrations, with generally increasing downstream trends observed. Copper concentrations in these catchments were also high and lead concentrations were highest in the Taitarakihi Creek catchment.

High concentrations of metals were also detected in surface water sampled during the dry weather summer round in the Taitarakihi. This coincided with turbid conditions in the water column suggesting that these sediments could act as a source of contamination at times between rainfall events.

Targets have also been set for concentrations of stormwater derived toxicants during dry weather in the waterways to meet ANZ standards for 90% species protection. It is likely on commencement during the first 3 years of dry weather monitoring baseline monitoring that there will be dry weather targets exceedances of the Trigger 1 level set in the Monitoring Plan.

There are currently no acute guidelines developed for New Zealand, however if these are developed and adopted nationally these can form a target for wet weather surface water monitoring. In the interim the Monitoring Plan triggers for wet weather surface water quality are to be based on observations of unexpected (higher concentrations) stormwater quality after mass mixing in the receiving environment. A modelling exercise will be undertake for each stream using mean values from stormwater quality data and conversion of the CLM into concentrations .

Overall the mass mixing scenario is to represent a typical rainfall event stormwater flows from the contributing urban catchment with expected stormwater metal concentrations, for copper, lead and zinc mixing with the stream that only has a baseflow. Factoring the modelled concentrations in the receiving environment arbitrarily would provide the basis of the triggers.

- Trigger 1 Level (red) > 4 times the expected mass mean mixing value
- Trigger Level 2 (orange): < 4 ≥ 2 times the expected mass mean mixing value
- Trigger Level 3 (green): < 2 times the expected mass mean mixing value

Factoring a mean value allows for the flashy nature of stormwater concentrations, and given only one grab sample is being taken to compare to a trigger value. A Trigger Level 1 would indicate a more than likely high point source concentration input or some other high load issue needing investigation and action.

Nutrients

High nutrient loads in New Zealand streams and rivers are typically associated with agricultural practices within catchments. Major sources include nitrate and phosphorus leaching following the land application of fertiliser or effluent and leaching and/or direct inputs from stock excreta. In contrast, sources of nutrients in stormwater include garden fertilisers, pet and yard waste.

Monitoring undertaken as part of the baseline environmental assessment (Appendix 5) indicated that nutrient concentrations were highest in the Taitarakihi and Ōtipua-Saltwater Creek catchments. Whilst concentrations in the Taitarakihi were more consistent over the summer and winter monitoring periods, suggesting that rural sources could be contributing nutrients to this waterway. In contrast, a spike in nutrient concentrations after rainfall was observed in the Ōtipua-Saltwater Creek, indicating that stormwater from this catchment could be a relatively significant contributor of nutrients to this watercourse.

Nutrient concentrations in stormwater as shown in Table 8-1 and reported in the literature are generally above DGVs. In addition, water quality monitoring in the waterways receiving stormwater discharges from the SMA (as reported in Appendix 5) indicates that nutrient concentrations exceed water quality DGVs, and at many of the monitoring sites, exceed NPS-FM bottom line values and limits for the relevant water quality classes in the LWRP.

While these limits are being exceeded, the toxic effects associated with Nitrate-N in stormwater is expected to be low as stormwater discharges are intermittent and the baseline environmental assessment has indicated that the receiving waterways have been modified to an extent that communities that exist in these watercourses tend to consist of more pollution tolerant species.

High nutrient concentrations combined with warm water temperatures and high light levels can result in the proliferation of filamentous algal blooms. The baseline environmental assessment indicated that the highest periphyton growth occurred at the downstream monitoring site on the Taitarakihi Creek, where dislodged and floating cyanobacterial mats were observed during the summer monitoring round. Periphyton cover in other parts of the SMA was observed sporadically and growth was potentially limited by the lack of stable substrate due to the level of sedimentation on the beds of the surface watercourses.

TDC is committed to improving stormwater quality by implementing measures to ensure that stormwater from future development is treated prior to discharge. In addition, targets have been set for each of the waterways receiving stormwater discharges from the Timaru SMA and the guidelines used to measure whether these targets are being met include guidelines for Nitrate-N.

It should be noted that while stormwater may be contributing to the overall loading of nutrients in the waterways within the Timaru SMA, reducing the quantity of nutrients in these waterways is likely to require wider catchment management measures to address discharges from both urban and rural sources. These measures may include riparian management and stock exclusion and while TDC would support and encourage the implementation of these measures, they would fall outside the scope of this consent application.

Hydrocarbons

TPH may enter stormwater mainly due to accidental spills on land, accidents on roads, leaking vehicle engines when in motion or leakages from engines in parked cars, typically from older vehicles. There is no aquatic ecology water quality guideline value for TPH compounds.

PAHs are generated from the incomplete combustion of organic materials (e.g., coal, oil, gas and wood). Anthropogenic sources include residential heating, asphalt, coal-tar based sealcoats, and motor vehicle exhaust. With the clean air regulations in Canterbury the use of coal and wood as a residential heating method has dramatically reduced, therefore deposition onto hard standing surfaces in urban areas is expected to be less than it was historically.

The main source of PAHs at present is likely to be from vehicle emissions, which over time could be reduced as alternatives to hydrocarbon fuel burning vehicles to meet New Zealand's carbon reduction goals become more prevalent. It is considered that PAHs in stormwater is less likely to be a significant toxicity issue compared to some metals as illustrated in Table 8-1.

The baseline environmental assessment indicated undetected or only very low concentrations of TPH and PAHs in dry weather surface water samples taken from monitoring sites across all the SMA catchments.

The targets proposed to achieve the objectives of the resource consent require a reduction in fine sediment depth and cover as well as sediment quality guidelines to be met, over time. The proposal requires the treatment of stormwater from new development and encourages the use of source control. These requirements will also apply to infill and re-development where measures such as proprietary devices, interceptors, swales, and raingardens may be installed where practicable. Overall, this should result in a reduction in TPH in stormwater from the SMA over time.

8.2.6.1 Sediments - Quality and Quantity

Sediments provide habitat for many benthic and epibenthic organisms, and they also influence the environmental fate of many chemical substances in aquatic ecosystems by acting as both sinks and sources of substances that have entered the aquatic environment.[20] Many substances form associations with particulate matter and are eventually incorporated into bed sediments[21]; consequently, sediments may also act as long-term sources of these substances to the aquatic environment.[22] [23] [24]

Sediments can have a profound influence on the health of aquatic organisms, which may be exposed to toxicants through their immediate interactions with bed sediments, e.g., sediment-associated contaminants may cause acute and chronic toxicity to aquatic organisms and may inhibit the presence and health of benthic biota that would otherwise inhabit these sediments.

Nearly all sites monitored within the SMA had deposited sediment accumulated that exceeded the NPS-FM bottom line and LWRP standards. Targets have been set to reduce the depth and cover of sediments in the Taitarakihi, Waimataitai and the upper reaches of Ōtipua-Saltwater Creek and aim to meet the standards set out for deposited sediment in the LWRP Hill-Fed Lower Urban water quality classes by the expiry of the consent.

Heavy metal concentrations in sediment were high and exceeded LWRP and ANZG DGVs at nearly all sites monitored within the SMA (except for sites closest to the coast). .

As hydrocarbons tend to adsorb strongly to sediment however, high concentrations of TPH, exceeding DGVs were recorded in sediment sampled from nearly all the sites monitored, with concentrations measured in sediment likely to cause detrimental effects on benthic communities.

Targets have been proposed that require sediment quality to meet ANZ DGVs prior to the expiry of the consent.

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[20] Canadian Council of Ministers of the Environment (CCME) 1995: Protocol for the Derivation of Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. CCME EPC-98E.
[21] Allan, R. J. 1986: *The role of particulate matter in the fate of contaminants in aquatic ecosystems*. Sci. Ser. 142. Inland Waters Directorate, National Water Research Institute, Burlington, Ontario.
[22] Larsson, P. 1985: *Contaminated sediments of lakes and oceans act as sources of chlorinated hydrocarbons for release to water and atmosphere*. Nature 317:347–349.
[23] Salomons W.; De Rooij N.M.; Kerdijk H.; Bril J. 1987: *Sediments as a source for contaminants*. Hydrobiologia 149.
[24] Loring, D. H.; Rantala, R.T.T. 1992: *Manual for the geochemical analysis of marine sediments and suspended particulate matter*. Earth-Science Rev. 32: 235.

8.2.7 *Cumulative and Summary Effects*

The baseline environmental assessment and contaminant load model have identified that the historic and existing stormwater discharges have had a more than minor impact on the surface water quality and ecology of the receiving waterways within the Timaru SMA. Urban contaminants were detected in both surface water (during dry weather) and sediment samples and in many cases, concentrations of these contaminants exceeded recommended guideline values designed to protect aquatic species.

These factors have contributed to very poor MCI and QMCI Values in the streams that are not meeting NPS-FM Bottom line scores and LWRP outcomes in most cases.

The key objectives and targets of the SMP have been designed to address this risk and progressively reverse these impacts on water quality and ecosystem health. The information obtained from monitoring will inform decisions about actions that may be needed to manage this effect and to prioritise projects and funding so that objectives can be achieved.

Mitigation measures proposed in the SMP (e.g., site risk assessments, adopting source control measures, stormwater bylaw and design guidelines for stormwater systems) are also likely to improve the quality of discharges from the SMA and reduce the loading of contaminants discharging into the environment over time.

8.3 Effects on Coastal Water Quality and Ecology

An assessment was undertaken and concluded that water quality stressor, and toxicant limits in the RCEP stormwater permitted activity rule, are expected to be met for all the direct discharges into the CMA after reasonable mixing within coastal waters.

The baseline environmental assessment (Appendix 5) considered the impacts of stormwater discharges on the coastal waters adjacent to Timaru. Coastal water quality along the nearshore is influenced by freshwater discharges from the Opihi and Pareora Rivers, the creeks and streams flowing into the sea and the maintenance and operational activities at the port. In addition, there are also discharges to the CMA from Timaru's Wastewater Treatment Plant and from the freezing works at Pareora.

It should be noted that except for four stormwater outfalls (located at Patiti Point), the stormwater discharges from TDC's reticulated network into the CMA are permitted by the RCEP. Nevertheless, the impacts of stormwater on the coast are considered in this assessment as the coastline alongside the Timaru SMA supports high cultural, recreational and amenity values and is the ultimate receiving environment for stormwater from the network. As identified in the RCEP, the coastal waters around Timaru are managed for contact recreation (CR) and aquatic ecology (AE) values.

The baseline environmental assessment characterises the coastal habitat in this area as mostly open coast with gravelly sandy sediments, with a degree of embayment evident at Caroline Bay and the Port of Timaru. The report suggests that the coastline is generally well-flushed with little potential for coastal water retention and the predominant longshore (northeast-southwest) currents combined with the relative open nature of the coast would ensure almost constant mixing of coastal waters, thereby reducing the potential impact of stormwater contaminants entering the coast.

Stormwater discharges from TDC's reticulated network combine with stormwater from the port area to discharge into the CMA. The discharges from the network are permitted by the RCEP while the port also has its own discrete individual discharges of stormwater.

The port environment has been highly modified by the activities associated with the operation and maintenance of the port including the discharges from the surrounding industrial activities and the dredging of the harbour that occurs routinely.

Regardless of the permitted activity status of most of the coastal discharges, and likely compliance with the water quality standards in the RCEP, it is considered that the coastal ecological monitoring proposed as part of the baseline monitoring should still occur. This approach will be of significance importance to Arowhenua.

The impacts of stormwater discharges on contact recreation and shellfish gathering are discussed further in Section 8.10.

On this basis, the impacts on this environment from discharges of stormwater from the reticulated network on coastal water quality and aquatic ecology are considered to be minor.

8.4 Effects on Flood Carrying Capacity and Hazards

The network capacity assessment indicated that much of the piped stormwater network within the Timaru SMA is designed to accommodate stormwater from between 5- and 10-year rainfall events (e.g., 20% and 10% AEP events respectively). There are well defined overland flow paths throughout the SMA that can convey stormwater flows when the capacity of the piped network is exceeded.

Some nuisance flooding can occur where the capacity of the piped network is undersized or there are obstructions to overland flowpaths (e.g., from undersized culverts). More significant flooding risks, however, exist in the Taitarakihi Catchment and the low-lying coastal areas around Caroline Bay. In addition to stormwater flows, these low-lying coastal areas are also subject to coastal inundation and the risks associated with future sea level rise.

The following objective and targets are proposed to form part of the consent with respect to stormwater quantity management:

- **Objective 10:** *"Stormwater is managed so that run-off from urban areas, the primary stormwater network and overland flow paths, does not exacerbate the flooding, erosion or damage to property or infrastructure or cause risks to human safety".*
- **Target 1:** Zero flooding for rain events up to a 1 in 5-year return for residential zones, and a 1 in 10-year return for commercial and industrial zones.
- **Target 2**: Zero deaths and notified injuries from stormwater runoff
- **Target 3:** The significant flood risk identified in the lower parts of the Taitarakihi Stream and Waimataitai Stream catchments is progressively reduced.

TDC already has several planned improvement projects to alleviate flooding within the Taitarakihi Creek Catchment. These projects include improved channel conveyance through the show grounds and upgrades to the culverts at SH1 and under the railway embankment. These upgrades are expected to result in a significant reduction in flood elevation in this area. Work is also on-going to investigate options to significantly reduce the flood risk in this catchment.

In addition to this work, TDCs approach to managing long-term flooding risks within the SMA and meeting Targets 1 – 3 is likely to include but not be limited to:

- Incorporating hydraulic neutrality in the design of new stormwater systems to match pre-developed runoff rates.
- Requiring the allowance for climate change to be built into designs and groundwater level assessment.
- Development of an effective maintenance programme to prevent debris blockages and sediment build-up within the network.
- Developing an accurate hydraulic model of the network and interactions with waterways to identify areas and evaluate options/solutions for improvements to address nuisance flooding effects and any downstream impacts, and to ensure that mitigation for new development and any other implementation improvement projects are effective.

- Identifying, defining, and protecting overland flow paths.

The development of a hydraulic model for the SMA is a proposed condition of the consent and part of the target for dealing with climate change.

Given the well-defined overland flow paths across Timaru and that most of the stormwater piped network within the SMA can achieve TDC's level of service, combined with on-going works to maintain and upgrade the capacity of the network, where required, it is considered that the impacts resulting from nuisance flooding across the SMA would be minor.

The adaptive management approach proposed, which includes an objective for managing flood risk combined with the development, prioritisation, and implementation of projects to alleviate flooding in specific areas where the current risk is high (e.g., Taitarakihi and Caroline Bay), will also ensure that long-term flooding risks in the most flood-prone areas of the SMA will be addressed and reduced over time.

8.5 Effects of Scour and Erosion

Stormwater discharged into a receiving waterway through an outfall structure has the potential to cause erosion and scour of the bed and banks of that waterway, depending on the volume and rate of water discharged and the erosion potential of bed and bank substrata.

ECan maintain the stopbanks located at the lower end of the Ōtipua-Saltwater Creek through the Flood Protection and Drainage Bylaw (2013). Consultation undertaken with the River Engineering section of ECan as part of this project did not raise any issues or concerns regarding the impacts of erosion or scour from the TDC stormwater outfalls in this section of Ōtipua-Saltwater Creek.

It is understood that any works that may be necessary to address the effects of scour and erosion resulting from TDC's outfalls into the creek, should they occur would be undertaken by ECan during their routine monitoring and maintenance of these structures, and any costs associated with these works subsequently passed on to TDC.

The review of the coastal outfalls (as discussed in Section 6 and shown in the aerial photos in Appendix 10) identified four coastal outfalls along the Patiti Point area that were causing some visible scour and erosion of the foreshore. These outfalls discharge stormwater onto gravel and sandy beaches and aerial imagery shows distinct flowpaths and channels formed in the beach between the outfalls and the sea. This effect is considered minor as it is primarily visual and does not result in affecting the structural integrity of any structures (e.g., walkways or roads) or the amenity of the foreshore in this area.

TDC is not aware of any other scour and erosion issues associated with stormwater outfalls elsewhere in the SMA. To avoid this effect occurring if new outfalls are installed for future development, a condition of consent could be included requiring that "any new discharges shall not cause scour and erosion of the bed and banks of a river or surface watercourse".

Overall, it is considered that the discharges from the stormwater network is having a less than minor impact on the bed and banks of the surface waterways they discharge into due to scour and erosion and any future impacts can be managed appropriately to ensure that this effect remains minor.

8.6 Effects on Soil Quality

Stormwater contaminants such as heavy metals (zinc and copper) and hydrocarbons adsorb strongly to sediment and soil particles. These contaminants do not degrade readily and can therefore accumulate in soil along stormwater flowpaths through settling (e.g., in swales as runoff velocities decrease) and in attenuation basins.

The rate of accumulation will depend on the concentrations of the contaminants in stormwater. It is expected that some business and industrial catchments will include higher levels than some residential areas.

Over time, the accumulation of contaminants can lead to effects on vegetation growth resulting in bare, patchy cover and possibly human health effects if these contaminants accumulate to high concentrations in areas accessed by the public (e.g., recreational reserves).

No periodic soil monitoring within the stormwater management systems is proposed in the monitoring programme, attached as Appendix 9. However, vegetation health can be used as an indicator of soil contamination. It should also be noted that contamination concentrations that causes stress in plants are lower than those that pose a risk to human health for some stormwater contaminants.

On this basis, it is considered that the discharges of stormwater from the SMA will result in no more than minor adverse effects on soil quality.

8.7 Effects on Groundwater Quality and Human Health

Infiltrated stormwater may introduce contaminants found in stormwater runoff into groundwater. These contaminants can subsequently affect the aesthetic qualities of groundwater or pose a risk to human health, particularly if this groundwater is abstracted for drinking water.

There are no active bores within the SMA that are used for domestic water supply or stock drinking water and only one bore (K39/0019) used by the Alliance Groups Smithfield Plant where water is abstracted for commercial and industrial purposes.

Of the deeper bores within the SMA, only two are used for abstractive purposes. CRC012096 authorises the taking of groundwater for commercial and industrial purposes from well K39/0106 (53 m deep) and CRC183938 which authorises the abstraction of groundwater from well J39/0137 (110 m deep) for irrigation purposes.

PDP was engaged by TDC to conduct a baseline groundwater assessment (PDP, 2021[25]) to characterise groundwater resources and the risk to groundwater within the SMA catchments, including Timaru. The report concluded for the Timaru SMA that:

'The very low number of abstractive bores and consents indicates that extensive and productive aquifers are generally not present in the study area. This is consistent with the presence of fine-grained soils/strata within the near surface strata and variably cemented deeper Kowai Formation gravels, as indicated by available soils data and geological logs."

Stormwater is not discharged to land via dedicated soakage systems within the Timaru SMA, nor are they proposed as part of this application. Given the widespread presence of poorly drained soils across the SMA, any infiltration will be of a low volume and slow and will provide effective removal of toxicants and microbiological concentrations in stormwater.

Given the low permeability of soils within the SMA, the lack of existing and exclusion of future) soakage systems, and the lack of use of groundwater beneath the SMA, the effects on groundwater quality and groundwater users are considered to be less than minor.

8.8 Effects on Natural Wetlands

Figure 4-18 identifies potential wetlands within the Timaru SMA, as identified from ECan's Wetland GIS layer. These include the ponds within the Botanic Gardens and Rosewill Pond within Centennial Park, that is an instream pond in North Ōtipua-Saltwater Creek. ECan Maps also

[25] "*Desktop Groundwater Assessment to Support Stormwater Management Plans for Timaru, Washdyke, Pleasant Point and Temuka*". PDP, 2021

describes the lower reaches of the Ōtipua-Saltwater Creek as a brackish salt rush and reed wetland behind the beach, that is confined by stop banks that supports waterfowl. This information also indicates that marsh crakes have been recorded in this wetland.

The layer also includes the stormwater treatment ponds that collect and treat stormwater from hard-standing areas at the Alliances Groups Smithfield Freezing Works, prior to discharging into the Taitarakihi Creek (authorised under CRC081543). Given that the purpose of these ponds is for treating stormwater from the freezing works that is already covered by a resource consent, they are excluded from the following assessment.

A review of stormwater network pipes on ECan Maps indicates the presence of stormwater pipes in the vicinity of and outfalls that discharge into the Rosewill and Botanic Garden ponds and the lower reaches of Saltwater Creek. There is no specific information to determine whether the ponds at the gardens or Centennial Park were natural wetlands or constructed to enhance the amenity of these public reserves. In addition, there is no available data on the quality of stormwater discharges or surface water quality within these ponds.

The impacts of stormwater discharges on surface water quality and ecology (see Section 8.2 and Appendix 5) assesses the impacts on Saltwater Creek in detail. The assessment concludes that stormwater discharges are affecting the water quality and ecology of watercourses (including Saltwater Creek) within the SMA. The proposal by TDC, however, seeks to implement stormwater mitigation to progressively improve the quality of these receiving water environments. In addition, consent conditions will require stormwater from new development within the SMA to provide measures (e.g., source control and treatment) to minimise the discharge of contaminants.

It should be noted that this application does not seek to discharge either construction phase stormwater or establish any new discharge outfalls into these wetland areas. Any new development seeking to do this, will need authorisation of these discharges via a separate regional discharge permit and a NES-F land use consent.

A review of the proposed Timaru District Plan zones for future development also confirms that there is no, or very little further development proposed in the catchment area surrounding the wetland areas around Saltwater Creek. If new development was to occur, it is likely that stormwater discharges would be discharged to the creek via existing discharge outfalls. Conditions requiring source control, attenuation of flows and treatment of stormwater will also ensure that the effects of any future discharges into the wetland areas of the creek will be minor.

8.9 Effects on Te Rūnanga o Arowhenua Values and Use

8.9.1 Overview

The association of Te Rūnanga o Arowhenua to the Timaru area has been acknowledged in 4.4 of the AEE. Of particular significance is its history for mahinga kai in the Taitarakihi, Ōtipua and Waimataitai reserve.

Te Rūnanga o Arowhenua consider the waterbodies in the Timaru SMA are degraded and that contaminants from stormwater discharges are contributing to this degradation. Fundamentally, it is considered that the SMP should ensure that further decline in water quality and ecological health of these waterways is avoided amidst further development within the catchment.

The ability to safely consume mahinga kai species like Tuna (eel) is of significance to Arowhenua, with the health of the water directly affecting the health of the species and in turn those who might eat them. This is evidenced by NIWA 2010a [26] who undertook an analysis of organochlorine concentrations and heavy metals; on fish tissue, watercress, and sediments in catchments

[26] NIWA 2010a. *Contaminants in Kai – Arowhenua rohe Part 1: Data Report*. Prepared for Te Runanga o Arowhenua & Health Research Council of New Zealand

throughout the Arowhenua rohe. This included three sites on the Ōpihi River (upsteam of SH1 Downstream of SH1 And at the river mouth (horseshoe bend) and one on the Te Uma kaha (Temuka River). The following are two just two extracts from the NIWA conclusions:

- Contaminant analysis indicated differential uptake of specific contaminants by different species. For example, watercress recorded much higher levels of cadmium, nickel, chromium, lead, zinc and copper than fish. Eel tissue had the highest concentrations of DDT, PCBs and mercury, whereas arsenic levels were highest in trout tissue;
- Sediment metal concentrations were below ANZECC guidelines, with one exception. Doncaster recorded a value of 220 mg/kg for zinc, just above the low ISQG low guideline value of 200 mg/kg;

Following the investigation NIWA 2010b [27] undertook a risk assessment based on available contaminant data and using established US EPA formulae to assess the risk of harvesting contaminated kai within the catchment. Furthermore, a risk assessment was performed for each species harvested from each site to gain an understanding of potential "hotspots" in the catchment. Contaminants found to be contributing most to this risk were p,p'-DDE, dieldrin arsenic and mercury.

NIWA 2010b stated in the executive summary that in terms of the whole catchment, if harvesting was carried out randomly across all sites and consumption rates were as calculated from the questionnaire data, then there is no significant risk to those consuming the species. However, if harvesting were to occur predominantly at the most contaminated sites and consumption rates were as calculated from the questionnaire data, then a significant risk exists for consumption of eel. Trout are also a probable cause for concern with safe consumption limit being virtually the same as the consumption rate. The risk of eating eels was greater than other species, with 8 out of 10 eels sampled allowing for less than 4 meals per month, which is less than 1 meal per week.

The Cultural Values AEE (refer Appendix 4) states that Arowhenua seek water quality in Timaru to be improved through not only requiring treatment of future discharges but by looking for opportunities to retrofit systems to treat existing discharges.

TDC has collaborated with Arowhenua on establishing a vision, objectives and targets for stormwater management and the receiving environment for this application. These have been included in the Stormwater Management Plan accompanying this AEE.

8.9.2 Mahinga Kai - Resources, Consumption and Access

As discussed earlier in Section 8.2.8.2, the baseline environmental assessment has indicated that stormwater contaminants have been detected in the flesh of NZ Green mussels collected from rocks around the Taitarakihi outfalls.

The following objective is proposed for the consent to address this effect:

- *Objective 4: Progressively reduce the cumulative impacts of the stormwater network and stormwater discharges on the Te Ahi Tarakihi Mataitai and Tuhawaiki Mataitai so the coastal habitat is healthy and suitable for safe mahinga kai harvesting and the mahinga kai species are safe to eat.*

The other targets to improve and maintain the health of the waterways associated with the SMA such as sediment cover and quality, macroinvertebrate and fish communities, and riparian margin improvements will also contribute to meeting this objective.

With respect to the above objective this includes a specific target of "No human source incidents of E.coli concentrations entering waterways via the stormwater network (e.g. through cross connections or wastewater overflows)" This is set from the commencement of the consent. The

[27] NIWA 2010b. *Contaminants in kai – Arowhenua rohe Part 2: Risk Assessment*. Prepared for Te Runanga o Arowhenua & Health Research Council of New Zealand

Monitoring Plan includes E.coli sampling during wet weather sampling, and faecal source tracking for the first 2 years. TDC has recognised that there may be a need to add further cultural indicators and that these will be developed with Te Rūnanga o Arowhenua over time.

8.9.3 The Relationship and Ki Uta Ki Tai

As well as the vision, objectives, and targets to improve and maintain the health of the waterways associated with the SMA, the following objectives have been included in the consent conditions:

- *Objective 5: TDC advocate for ki uta ki tai (from the mountains to the sea) during TDC's involvement as a stakeholder and regulator in RMA and LGA processes.*

- *Objective 8: Recognise and respect mana motuhake – the whakapapa and the relationship Kati huirapa have with water ecosystems in their rohe and actively involve them in stormwater management.*

Objective 5 does not have a target however it is recognised that there may be a role for TDC in decisions around wider catchment management in which the water flows and that this will be addressed in the SMP process and RMA planning processes. For example, this may be implemented by TDC advocating to improve the environment to better sustain mahinga kai, so it is generally at or closer to a state of hauora (robust and healthy enough to take knocks).

Objective 9 does not have a measurable target, rather its specifies that proposed consent conditions need to secure Arowhenua involvement in revisions to the SMP, Monitoring Plan and the targets that will form part of the consent or its implementation (i.e., SMP).

The SMP implementation plan project identification process for TDC's stormwater management LTP / Annual plan budgets include the opportunity for projects of importance to Arowhenua to be put forward through an established working party. Cultural weightings will be part of the evaluation criteria and review of all projects by Arowhenua.

8.9.4 Summary

In summary the effects of the past, and present stormwater discharges within the Timaru SMA on the values of Arowhenua are considered to be significant.

TDC has collaborated with Arowhenua, through AECL over the last year on the development of SMPs and processes to allow ongoing active participation of Arowhenua in the future management of stormwater in Timaru.

The SMP assumes an improvement in stormwater quality from the Timaru SMA and the health of the receiving waterways over time in order to meet the agreed objectives and vision of the stormwater management strategy for Timaru. It is considered that should the consent and accompanying SMP process be implemented this will mean that over time the issues raised by Arowhenua will be addressed.

8.10 Effects on Social (Amenity and Recreational) Values

8.10.1 Stormwater - General Amenity

Stormwater management systems can impact on the amenity of an area, as they are generally associated with engineered structures, which can be visually unappealing. In addition, stormwater management systems have been known to create odour in locations where stagnant pools form.

The surface waterways will also be visually inspected during monitoring to determine if the discharges are having any visual or aesthetic effects (e.g., changes to water clarity and colour, the presence of oil, grease, floatables, scum or suspended solids).

8.10.2 Recreational Areas including Beaches

The discharges from these outfalls do not flow permanently. The baseline environmental assessment report indicated that while a high level of mixing and dilution of contaminants will occur when these discharges enter the coast, accumulation of stormwater contaminants (e.g. heavy metals and hydrocarbons) can accumulate in beach sediments which is particularly relevant at the Patiti Point coastal outfalls.

Objective 7 requires that "*Stormwater impacted sediment in public areas is not a risk to human health*". Trigger levels have been set based on nationally recognised parks/recreational soil contaminant standards to mitigate the effects of the public coming into contact with contaminated sediment in public parks, accessible areas of ephemeral waterways and at the foreshore around the Patiti Point coastal outfalls.

The lower reach of Ōtipua-Saltwater Creek is used for rowing and therefore Objective 7 also requires that there will be no risk to human health from the public accessing the waterways. To achieve this objective, a target has been specifically set to ensure that no human sourced E. coli enters Ōtipua-Saltwater Creek via the stormwater network.

8.10.3 Contact Recreation

Monitoring undertaken as part of this project did not include testing for microbial pathogens or faecal coliforms. Stormwater can contain microbial organisms sourced from pet and bird droppings and yard waste, and during rainfall events the waterways receiving these discharges could be contributing higher concentrations of these contaminants to the coastal waters that they flow into. It should be noted that the loadings discharged into these waterways will be sourced from urban as well as runoff from rural land. Concentrations of these organisms will reduce quickly after rainfall events due to mixing, dilution and die-off.

In general, the impacts of faecal coliforms as a result of rainfall are unlikely to have more than minor impacts on contact recreation as these events resulting in higher concentrations would coincide with times when contact recreation would not be occurring. In addition, the bathing water quality monitored at the Timaru Yacht Club and at a site close to the middle of the beach at Caroline Bay indicates that the long-term water quality grade at the Yacht Club is 'Good' and the middle beach site has a rating of 'Fair' (as posted on the LAWA website).

8.10.4 Shellfish Gathering

While not managed for shellfish gathering (SG) under the RCEP, the baseline environmental assessment investigated the impacts of stormwater contaminants on shellfish collected from rocky sites around the Taitarakihi coastal outfalls, that were historically highly valued mahinga kai harvesting sites. The NZ Greenshell mussel are a highly valued resource but can also accumulate metals and other contaminants in their flesh, therefore posing a risk to human health if consumed.

In general, concentrations of stormwater contaminants such as cadmium, copper, lead and mercury were low in mussel samples and well below guideline values (used to protect human health). Zinc concentrations, however, exceeded the General Expected (GEL) guideline value from the ANZFA food standards.

The Taitarakihi Creek catchment has been identified as a 'priority' catchment for remediation given the high cultural and ecological values that it supports combined with the high loads of contaminants discharging into coastal water from the network discharges to the Creek .

8.10.5 Summary

Given the objectives set for the Timaru SMP focus on reducing contaminant loads discharging to the receiving waterways and on mitigating any risks to public health from contact with contaminated sediment in areas used for recreation, swimming areas, it is considered that the proposal will have less than minor effects on amenity and recreational values.

8.11 Effects on the Wider Community

The management of stormwater undertaken by TDC for Timaru has provided and will continue to provide social benefits as the network reduces flooding of properties and avoids flooding of habitable dwellings, and heritage buildings. The network service to the community is in line with TDC jurisdictional functions under the Local Government Act.

The proposal to implement integrated stormwater management practices through this network consent will result in the following social benefits for the residents of Timaru, the wider community and key stakeholders within the community:

Reduction in Financial Costs

- Removing the need for multiple resource consents, will reduced compliance costs and administration costs for TDC and ECan respectably.
- Reduced consenting costs to developers who will gain approval to be authorised by the discharge permit.
- Reduced costs to key stakeholders by not having to review and comment or submit on individual applications lodged.
- Reduced ad-hoc development and stormwater system development, through consistency of stormwater design, opportunities to centralise stormwater systems for multiple small development, which can lead to reduced operational and maintenance costs.
- Overall reduction of costs by linking the processes required under the RMA with those required under the LGA, thereby reducing duplication of effort.

Management

- Assists the TDC in recognising the stormwater related impacts of land-use activities within catchments and on their reticulated system.
- SMP's provide an important source of consolidated information for long term asset management and land use planning and for financial programming.
- Assists in developing 'best practice' management strategies and programmes to address those impacts at the catchment level.
- Providing greater flexibility for the management of each 'system' to enable innovation and adoption of improvements to stormwater management and design and knowledge of impacts.
- Providing greater security and certainty for administration by giving Territorial Authorities the overall control of stormwater discharges within catchments.

It is considered the social effects on the wider community of having a reticulated stormwater network and a more inclusive scope (some activities not connected to the network) is overwhelmingly positive.

9 Consideration of Alternatives

9.1 Overview

Schedule 4 (6)(1)(d) of the RMA requires for discharges of any contaminant, the AEE must also consider the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and any possible alternative methods of discharge, including discharge into any other receiving environment.

9.2 Alternative Receiving Environments

Considering alternative receiving environments for the existing development within the SMA is not a feasible option due to the amount of investment in the existing stormwater network asset, the lack of greenspace flat catchments, and the low permeability of soils within the SMA restricting the use of land disposal systems.

9.3 Alternative Mitigation Methods

Source control can provide significant reductions in metal and other stormwater contaminant loads to improve surface water quality. The objectives have a focus on identifying and implementing methods of source control rather than specifying treatment at the point of discharge.

The proposed district plan has provisions to require a resource consent for zinc and other metal leaching materials. This is still subject to a district plan notification and decision process. The non-residential site identification and audit process is expected to achieve some gains in contaminants load reduction.

Also targeting specific problem catchments for treatment which have been identified by the CLM assessment is seen as the best approach to achieve the objectives set for the SMA. Particular measures such as remediating contaminated stream sediments could reverse some of the impacts on the receiving environment leading to achievement of the set objectives and targets.

10 Statutory Planning Matters

10.1 Overview

Section 104(1) of the RMA sets out those matters in addition to the actual and potential effects on the environment that the consent authority must have regard to when considering an application for resource consent as follows:

> *Subject to Part 2*
>
> *[..]*
>
> *(b) any relevant provisions of—*
>
> *(i) a national environmental standard:*
>
> *(ii) other regulations:*
>
> *(iii) a national policy statement:*
>
> *(iv) a New Zealand coastal policy statement:*
>
> *(v) a regional policy statement or proposed regional policy statement:*
>
> *(vi) a plan or proposed plan; and*

(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.

In relation to the statutory instruments referred to in 104(1)(b), the following are considered to contain provisions relevant to this application (in order of precedence):

- National Policy Statement for Freshwater Management 2020 (NPSFM)
- Canterbury Regional Policy Statement 2013 (RPS)
- Ōpihi River Regional Plan 2000 (ORRP)
- Canterbury Land and Water Regional Plan 2017 (LWRP including PC7)

For the avoidance of doubt, it is considered that the:

- NES for Freshwater 2020 does not apply to the proposal to discharge construction phase stormwater and stormwater, as the wetland subpart does not control the "discharges of contaminants". Existing stormwater pipes and outfalls are located within in the vicinity of and discharge into potential natural wetlands within the SMA, these have permitted activity status with respect to their maintenance. While the ponds within the Botanic Gardens and in Centennial Park may not actually be natural, the discharges of stormwater enter the lower reaches of Saltwater Creek which (in its lower section) is classed as a 'Special Site of Wildlife Importance' (SSWI) and a 'Wetland of Ecological and Representative Importance' (WERI) by the Department of Conservation (DoC). The effects arising from the discharges of stormwater contaminants to Saltwater Creek have been included in the overall effects assessment on surface water quality. The proposal sets objectives and targets to improve stormwater quality thereby reducing the impacts on water quality and the ecosystem health of these waterways including Saltwater Creek (and its wetland environment). If in future there is a need to install further stormwater outfalls (which are classed as 'specified infrastructure' under the NES-FM) into Saltwater Creek, a planning assessment would be required to determine the applicability of the NESFM for construction and maintenance activities associated with the new outfalls. The requirement for new outfalls however is considered unlikely given the lack of future development expected in this area based on development projections in the proposed district plan. Also, it is assumed that the existing outfalls could accommodate flows from new development as treatment and attenuation of discharges would be required (as a requirement of the network consent) prior these discharges entering the stormwater network.
- NES for Sources of Human Drinking Water 2007 does not apply to this application as there are no Community Drinking Water Protection Zones (CDWPZ)within the SMA.

In relation to the 'any other matter' referred to in 104(1)(c), the following documents are considered to contain provisions (objectives and policies), relevant to this application:

- Te Rūnanga o Ngāi Tahu Freshwater Policy Statement 1991 (NTFPS)
- Iwi Management Plan of Kati Huirapa for the area Rakaia to Waitaki 1992
- Draft Kati Huirapa Iwi Management Plan (2020)
- Timaru District Stormwater Management Strategy 2018 -
- Canterbury Water Management Strategy

In determining this application that includes a discharge activity the following sections of the RMA are applicable

- Section 104B/D
- Section 104G
- Section 105
- Section 107

The relevant statutory instruments, other documents, and Part II in relation to the proposal is discussed in the subsections below.

10.2 National Policy Statement for Freshwater Management 2020

The NPSFM 2020 is a replacement of the NPSFM-2017 that applied at the time of the applications lodgement. The NPSFM-2020 took effect on the 3rd of September 2020. It was subject to an amendment in December 2022 and a correction to an error on in February 2023.

The NPSFM-2020 now provides the most up to date direction to local authorities on how they should manage freshwater under the RMA 1991.

Underpinning the NPSFM 2020 is the "fundamental concept" of Te Mana o te Wai. There is a hierarchy of obligations in Te Mana o te Wai and Objective 2.1 which is to ensure that natural and physical resources are managed in a way that prioritises first, the health and well-being of water bodies and freshwater ecosystems. It then prioritises second, the health needs of people, and third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

The regional LWRP provisions have been drafted to give effect to the NPSFM 2017 and its predecessors. A review of the provisions of the regional LWRP has not yet commenced to confirm whether they give effect to the NPSFM-2020. This will require the consent authority to:

- Engage with communities and tangata whenua to determine how Te Mana o te Wai applies to the waterbodies and freshwater ecosystems.
- Develop long term visions for freshwater.
- Actively involve tangata whenua (to the extent they wish to be involved) in freshwater management; and
- Adopt a ki uta ki tai, integrated approach.

To give effect to the NPS-FM, the Consent Authority will need to incorporate any necessary changes to the plan by way of a notified plan change by 2024.

The LWRP PC7 decision on submissions released on the 17 November 2021 includes changes to the sub-regional Chapter 14 for the Orari-Temuka-Ōpihi-Pareora (OTOP). This decision was prepared under the NPSFM 2017, the recent version of the NPSFM being only in draft at the time. PC7 did include (but not limited to) provisions for managing freshwater quality; and for protecting of sites of cultural significance., including mahinga kai sites. This decision has been appealed by several parties including Te Rūnanga o Ngāi Tahu and Te Rūnanga o Arowhenua. The Ngā Rūnanga appeal was for various reasons but fundamentally that the decision did not provide for Te Mana o te Wai

This consent application is prepared in advance of both ECan giving full effect to the NPS-FM (2020) through a notified plan change, and the appeals to the PC7 decisions being resolved. This means substantive decisions on this application requires that the consent authority must have regard to the objectives and policies of the NPSFM-2020. It is suggested, this should be focused on the direction of the NPSFM-2020 and the concept of Te Mana o te Wai.

In reviewing this application with Arowhenua it has been crucial to understand whether the water bodies in the catchment are at or close to a state of hauora (typically healthy but also expressed by Ngā Rūnanga as being robust and healthy enough to take knocks) and if not what that state looked like previously and the stepped level of change over time to achieve this status again. This approach is considered also key to giving effect to the first priority of Te Mana o te Wai, being the health and well-being of water bodies. It should be acknowledged that it may be the case that achieving hauora (and therefore providing for the mana of the water body) may not be possible over the duration of the consent sought. It is also recognised that the discharges from the Timaru

stormwater catchment is also not the only source of contaminants affecting the receiving water environment and the health of the waterbodies that these waterways flow into.

An assessment of the proposal against the NPS-FM including each of the relevant policies is provided in Appendix 11.

It is recognised that the waterways within the Timaru SMA are not in a state of hauora. The application is proposing an adaptive management approach, with TDC continuing to work collaboratively with Te Runanga o Arowhenua and the wider community to improve stormwater management practices, thereby reducing the impacts of stormwater from the Timaru SMA. It is therefore considered that overall, this proposal is consistent with the objective of the NPS-FM, and generally gives effect to the policies of the NPS-FM.

10.3 New Zealand Coastal Policy Statement (NZCPS) 2010

The NZCPS took effect on 3 December 2010 and its objectives and policies provide direction on how the coastal environment including its qualities and values should be sustainably managed. The relevant objectives and policies of the NZCPS that apply to this proposal are assessed in Appendix 11.

Overall, it is considered that the proposal to progressively improve the quality of stormwater discharging into the coast and the receiving waterways flowing into the coastal waters alongside the Timaru SMA will achieve the objectives of the NZCPS. Policy 23(4) is particularly relevant to stormwater discharges and requires stormwater to be managed holistically within a catchment and that measures are implemented (e.g. source control and treatment) to reduce contaminants carried into coastal environments via these discharges. The proposal by TDC is consistent with the requirements of this policy.

10.4 Canterbury Regional Policy Statement (RPS) 2013

The RPS was made operative on 15 January 2013. Subsequent amendments and insertions have occurred since. The current version is dated October 2020.

An assessment of the relevant land-use and infrastructure, and freshwater, objectives and policies of the RPS to this application are provided in Appendix 11.

It is considered that the implementation of the SMP and associated discharge consent (if granted) will allow consistency with the identified RPS land-use and infrastructure objectives and policies, and that the proposal is consistent with the freshwater objectives and policies of the RPS.

10.5 Regional Plans

The LWRP plan has been operative since 2017 and the operative components apply to discharges to land. Chapter 14 Orari-Temuka-Ōpihi-Pareora (OTOP) sub-region (being the sub-regional for this application) has been subject to a Plan Change 7 which will apply to the discharges to surface water.

The LWRP PC7 decision for OTOP would insert new provisions for managing land use; for managing freshwater quality and quantity (including abstractions, allocation of freshwater, and minimising nutrient losses from farming activities); and for protecting of sites of cultural significance in that sub-region (including certain rock art sites (tuhituhi neherā) and waipuna (springs)). The decision would divide the OTOP sub-region into six freshwater management units (FMUs). This version has legal weight but is subject to appeals.

An assessment of the proposal against the relevant individual objectives and policies of the LWRP are provided in Appendix 11.

The application sets objectives and targets to be generally consistent with the objectives policies of the LWRP and PC7 version that is under appeal.

Policy 4.16 is particularly relevant to this application as it requires stormwater network operators such as TDC to adopt a holistic and integrated approach to managing stormwater discharges within stormwater catchments to meet water quality outcomes and objectives. The policy also recognises that discharges into the receiving environment from existing networks have resulted in effects on these environments and states that network operators should demonstrate a commitment to progressively improve the quality of discharges to achieve water quality outcomes.

TDC is proposing to manage stormwater from the SMA in an integrated manner by providing a reticulated network to manage stormwater quantity and quality for the community. The proposal including the SMP is based on an adaptive management approach to achieving objectives developed through consultation and engagement with the community and key stakeholders, such as Te Runanga o Arowhenua. The approach will allow TDC to prioritise actions and projects and monitor the effectiveness of any measures implemented over time. On this basis, it is considered that the proposal is consistent with the requirements of this guiding policy.

10.6 Iwi Management Plans

Iwi Management Plans (IMPs) must be taken into account when preparing or changing regional policy statements and regional and district plans (sections 61(2A)(a), 66(2A)(a), and 74(2A). Iwi Management Plans (IMPs) can be used in the resource consent process to provide guidance to decision makers in particular the relevant Part 2 matters pertaining to Māori cultural values and interests (section 104(1)(c)) and highlight any other matters important to the tangata whenua of the district/region that may be relevant and necessary to determining the application. [28]

At the time of preparing the AEE, Kāti Huirapa had prepared a proposed IMP. As this has not been lodged with the relevant council(s) this has not been taken into account. This consent application has been prepared in collaboration with Arowhenua and the information and analysis that they have indicated that the information and analysis that they have provided has been cognisant of the proposed IMP.

An assessment of the proposal against the Te Rūnanga o Ngāi Tahu Freshwater Policy, and the current Iwi Management Plan of Kati Huirapa (1992) and draft Proposed Kati Huirapa Iwi Management Plan (2020) is provided in Appendix 11.

Overall given the collaboration, SMP implementation processes and the setting of consent objectives and targets this means that the proposal is generally consistent with the IMPs.

10.7 Strategies

10.7.1 TDC Stormwater Strategy

The stormwater strategy aims to provide direction to TDC's decision-making on stormwater using an integrated management approach. The Strategy establishes TDC's stormwater management vision and goals for the next 30 years and beyond; and what TDC will do to achieve those goals. The Strategy includes objectives which are the detailed, measurable statement of the goals

Potentially the vision and other objectives developed with AECL for Timaru and the other townships within the district will be used in an update to this Strategy document.

An assessment of the proposal against the Strategy objectives is provided in Appendix 11.

[28] https://www.qualityplanning.org.nz/node/1015

The application is considered to be consistent with the objectives of the strategy.

10.7.2 Canterbury Water Management Strategy

The CWMS is not a policy statement or plan prepared under the RMA, and it cannot override the provisions of the RMA or the statutory policy statements and plans prepared under that Act. However, the Council may have regard to other relevant strategies or plans in preparing the Regional Policy Statement and any regional plans and this could include Regional and Zone Implementation Plans. The CWMS vision, principles and targets are integral to promoting the sustainable management of water under the RMA, and as such have been incorporated into the objectives and policies of this chapter of the CRPS, where they meet the requirements of the RMA.

In addition, the Zone Implementation Plans (ZIP) prepared by the CWMS committee may identify matters which that committee would like to be addressed in a plan prepared under the RMA. An addendum to the OTOP ZIP was released in time for the PCA process in December 2018. [29]

The Canterbury Regional Council PC7 will also have considered components of the ZIP by where the council agrees it is necessary to achieve the purpose of the RMA and the request complies with the other statutory requirements of the RMA.

It is considered that the RPS and more recent PC7 decision in principle has considered the requests of the CWMS Committees.

10.8 Part II

The overriding purpose of the RMA is "to promote the sustainable management of natural and physical resources" (Section 5). The broader principles (Sections 6 to 8) are to inform the achieving of that purpose.

When considering an application for a resource consent and any submissions received, the consent authority, must subject to Part 2, have regard to those matters listed under Section 104 of the RMA.

With regards to the application of the subject to Part 2' under Section 104, case law findings have directed that decision makers / Commissioners may now only have recourse to Part 2 of the RMA if it is determined that one of three exceptions apply:

1. If any part or the whole of the relevant plan(s) are invalid.
2. If the relevant plan(s) did not provide complete coverage of the Part 2 matters.
3. If there is uncertainty of the meaning of provisions as they affect Part 2

In essence what this means is that decisions makers only need to 'go back to' Part 2 of the RMA if the relevant planning documents have not fully addressed the Part 2 matters. If a Regional or District Plan has not fully addressed the Part 2 matters, then decision makers can 'go up the tree' to the RPS and then any relevant NPS in relation to any Part 2 matters.

Plans, which have to "give effect" to the higher order statutory planning documents (RPS and NPSs), should have appropriately addressed Part 2 of the RMA.

With the exception of possibly the RCEP it is considered that none of the three exceptions listed above apply and that the Part 2 matters have adequately been addressed through the RPS, and LWRP. Based on the assessment of the proposal being consistent with the RPS and LWRP as per above, the proposal is considered to be consistent with Part 2 of the RMA.

[29] Orari-Temuka-Opihi-Pareora Water Zone Committee. *Orari-Temuka-Opihi-Pareora Zone Implementation Programme Addendum*, December 2018.

10.9 Determination of Applications

10.9.1 Section 104/B/D

Section 104B of the RMA relates to the determination of applications for discretionary or non-complying activities and directs that Council may grant or refuse the application and may impose conditions under Section 108 of the RMA.

Section 104D of the RMA sets out particular restrictions for non-complying activities and provides that a consent authority may only grant a resource consent for a non- complying activity if it is satisfied that either of the tests provided for in sections 104D(1)(a) or (b) is met.

Section 104D(1)(a) and (b) have been described by the Environment Court as "gateways". If neither gateway is satisfied, the application fails. If the application satisfies either gateway, then the application is considered under Section 104 of the RMA. The gateways of Section 104D(1)(a) and (b) are disjunctive, meaning that in order to satisfy section 104D it is necessary to satisfy only one of these gateways, not both.

With respect to Section 104D(1)(a), the adverse effects of the activity on the environment are described in this AEE Report. With respect to Section 104D(1)(b), the relevant objectives and policies have been assessed in this AEE Report.

It should be noted that the case law regarding whether a proposal is "not contrary to" objectives and policies means that a proposal is not "repugnant to" or opposed to the relevant objectives and policies[30]. It is also important to note that those objectives and policies in plans need to be read collectively rather than individually[31]. In other words, the objectives and policies are not a series of hurdles each of which must be cleared.

The regional plan statutory assessment shows that overall the proposal is generally consistent with the objectives and policies.

10.9.2 Section 104G

Under Section 104G of the RMA when considering an application for a resource consent, the consent authority must have regard to

- the actual or potential effect of the proposed activity on the source of a drinking water supply that is registered under section 55 of the Water Services Act 2021; and
- any risks that the proposed activity may pose to the source of a drinking water supply that are identified in a source water risk management plan prepared in accordance with the requirements of the Water Services Act 2021.

There are no Community Drinking Water Protection Zones (CDWPZ) within the SMA, and groundwater is not abstracted for drinking water.

10.9.3 Section 105

Under section 105 of the RMA, the consent authority must also have regard to:

- The nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
- The applicant's reasons for the proposed choice; and
- Any possible alternative methods of discharge, including discharge into any other receiving environment.

[30] Monowai Properties Ltd v Rodney DC A215/03
[31] NZ Rail Ltd v Marlborough DC (1993) 2NZLR 641

These matters have been addressed in the 'Consideration of Alternatives' in Section 9 of this AEE report.

10.9.4 Section 107

Under Section 107 of the RMA, the consent authority must not grant a discharge permit allowing the discharge of a contaminant into water, or a discharge of a contaminant into land in circumstances that may result in that contaminant entering water, if, after reasonable mixing, the contaminant discharged is likely to give rise to all or any of the following effects in the receiving waters:

The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;

- Any conspicuous change in the colour or visual clarity;
- Any emission of objectionable odour;
- The rendering of fresh water unsuitable for consumption by farm animals;
- Any significant adverse effects on aquatic life.

None of the above effects are expected to occur in the receiving waterways.

11 Conclusion

TDC provides an integrated reticulated network for the safe collection and disposal of stormwater from Timaru and is responsible for ensuring the urban stormwater system provides an adequate level of service for the community.

TDC has prepared a Stormwater Management Plan (SMP) for these existing urban areas and a future urban growth scenario (the Timaru Stormwater Management area (SMA)) which is primarily based on the operative District Plan extent with an update to the zoning associated with the prosed district plan. The SMP details an integrated and adaptive approach to the management of stormwater discharges from a catchment-wide perspective.

In association with the development of the Stormwater Management Plan (and supporting Implementation Plan and Monitoring Plan) TDC is applying for a discharge permit (or resource consent) to authorise the discharges from their reticulated stormwater network for these urban areas, and for any existing and future discharges from individual residential and commercial properties within the SMA (subject to risk and design criteria).

TDC has identified of current and foreseeable issues with stormwater management and the impacts on the environment in collaboration with AECL / Arowhenua. Consultation to flesh out these issues and concerns with stormwater management within the SMA has also been undertaken with the greater Timaru community.

A vision and associated objectives and targets for Timaru stormwater management and the receiving environment have subsequently been developed by TDC in collaboration with AECL / Arowhenua. The Implementation Plan process that proposed to give effect to Te Mana o te Wai and achieve the objectives of the stormwater management strategy is still being developed in collaboration with Arowhenua.

The assessment of adverse effects with respect to the discharges sought has been undertaken and concluded that stormwater is and has had an impact on surface water quality and the ecology of the surface waterways receiving stormwater discharges from the SMA. The objectives and targets developed through the preparation of this application and SMP aim to progressively reverse the impacts of these discharges on the environment. This approach is consistent with the direction provided by the policies and objectives of the LWRP that require a commitment to achieving

water quality objectives set in the plan by improving stormwater management practices and improving discharge quality.

The effects of the past, and present stormwater discharges within the Timaru SMA on the values of Arowhenua are acknowledged to be more than minor. It is considered that the implementation of this consent and the accompanying SMP process should address the issues raised by Arowhenua through this process.

In accordance with section 104(1)(b) of the RMA, regard has been given to all relevant objectives and policies for this application. It is considered that the granting of this resource consent will not compromise any of the relevant sections of the RMA (Part II, s105 and s107), , National Policy Statements or the Regional plans. Other matters including cultural policy have also been given consideration pursuant to section 104(1)(c).

It is considered that the application for a discharge permit can be granted, subject to the proposed conditions.

A duration of 35 years has been requested given the improvements sought and diminishing effects, the level of investment the former permitted status of the bulk of the discharges sought, the lack of alternatives and that the discharges cannot be ceased, it would seem appropriate to grant the maximum duration available under the RMA, namely 35 years.

Appendix 1
Timaru Stormwater Management Plan

Appendix 2
WSP Network Capacity and Flood Mapping Assessment

Appendix 3
AECL Mana Whenua Impact Assessment

Appendix 4
Kitson Consulting Cultural Values

Appendix 5
PDP Baseline
Environmental Assessment

Appendix 6
PDP Contaminant Load Assessment

Appendix 7
PDP Non-Residential Site Assessment

Appendix 8
Proposed Conditions and Schedules

Appendix 9
Timaru Monitoring Plan

Appendix 10

Coastal Discharges – Activity Status Assessment

Appendix 11
Objectives and Policies Assessment

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