



**CAUTION
STORMWATER
OUTLET**

Monitoring Programme



Stormwater Monitoring Programme

Thames-Coromandel Urban Areas

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Prepared for
Thames-Coromandel District Council



KTBP PLANNING 
RESOURCE MANAGEMENT & PLANNING PROFESSIONALS

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Prepared By:	Karl Baldwin KTB Planning		15 November 2013
Approved By	Bruce Hinson TCDC		



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I. Introduction

I.1 Background

The Thames-Coromandel District Council (TCDC) has obtained Comprehensive Stormwater Discharge Consents (CSDC's) for eight urban areas within its District. These consents are referenced as follows:

Comprehensive Stormwater Discharge Consent – Resource Consent reference	Urban Area
122521	Thames
105661	Pauanui
105663	Coromandel
105664	Tairua
105665	Whitianga
105666	Onemana
105667	Whangamata
105668	Thames Coast

Consent condition 4 of the above consents requires the consent holder to prepare a monitoring programme that will achieve the following objectives (*condition 4 verbatim*):

Monitoring Programme

- 4) The Consent Holder shall retain appropriately qualified and experienced persons to prepare a Monitoring Programme. The objectives of the Monitoring Programme are to:
- Investigate the actual and potential adverse effects of municipal stormwater diversion and discharge activities on the environment;
 - Provide information to refine Best Practicable Option stormwater management measures that assist the Consent Holder in avoiding, remedying or mitigating actual and potential adverse effects on the environment;
 - Assess the performance of utilised stormwater management devices to determine their overall effectiveness in managing and/or treating stormwater, and to guide the best practicable application of these devices in respective catchments;
 - Provide guidance on the on-going and necessary changes to the Stormwater Management Plan to address any shortcomings with the operational procedures, management initiatives and implementation measures adopted by the Stormwater Management Plan;
 - Review the level of subdivision and development that is occurring in developing catchments, relative to the land use assumptions underlying the integrated catchment management approaches adopted by approved Catchment Management Plans;
 - Determine overall compliance with the conditions of this consent.

This monitoring programme has been prepared to a level of detail that the consent holder considers necessary to achieve the objectives of consent condition 4. The programme has been prepared to complement several actions that are already being implemented as part of current operation and



maintenance agreements for utilities and roading. These existing stormwater management actions are discussed within the Stormwater Management Plan (SMP).

This Monitoring Programme introduces new monitoring actions which focus on the environmental effects of stormwater within the receiving waters, as opposed to the physical operation (e.g. flooding) of the stormwater network. The physical operation of the stormwater network is a management action undertaken as part of the Operation and Maintenance Agreements for Utilities.

1.2 Urban Area Stormwater Receiving Environments

The TCDC Stormwater Management Plan (SMP) provides commentary on each of the urban areas and receiving environments that are the subject of the CSDC's. Appendix A1 – A8 of the SMP describes the urban area stormwater network and also provides aerial photos, catchment maps and planning maps (zones) each showing the stormwater networks owned and managed by TCDC.

The urban areas subject to the CSDC and this Monitoring Programme are identified with a red star as shown in figure 1 below.



Figure 1 - Urban areas within the Thames-Coromandel District that are subject to Comprehensive Stormwater Discharge Consents.

The urban area descriptions in the SMP highlight the level of risk the stormwater catchments and receiving water bodies have to routine and/or non-routine contaminant discharge incidents. This includes stormwater catchments that have particular high-risk activities (e.g. petrol stations) or have zoning, via the District Plan, that promotes high risk facilities to be established (e.g. industrial zone). The Monitoring Programme has been developed in a way that focuses on high risk catchments or catchments that contain high risk facilities. A majority of the stormwater network catchments within the Thames- Coromandel District settlements are medium to low density residential areas with low percentages of impervious surfaces. Most coastal settlements within the District have excellent soakage capacity as they are established upon historical sand dune systems. These areas are not a focus of this programme, however, some stormwater outlets from these residential areas have been chosen as control sites.

1.3 Stormwater Monitoring Locations

The following monitoring locations have been selected based on the investigation and commentary provided in the SMP on each of the eight urban areas (appendix A1- A8 of the SMP).

Ref:	Monitoring	Monitoring Type & Frequency	Catchment description
01	Thames: Thames Marina	Visual (bi-annual) Sediment (4 yrs) Ecological (4yrs)	High risk catchment with commercial & industrial activities, SH25 and high risk activities (e.g. boat cleaning).
02	Thames: South of Goldfields shopping centre - Sealey St	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High risk catchment with commercial, SH25 and high risk activities (e.g. petrol stations).
03	Thames: Burke St outlet	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High risk catchment with commercial & industrial activities and SH25.
04	Thames Control Site Fergusson Drive, Moanatairi – away from SW outlets	Sediment (4 yrs) Sediment (4 yrs) Ecological (4 yrs)	Residential catchment – background sediment quality testing. NB – potential for background contaminants in sediment associated with historical mining activities.
05	Pauanui: Sheppard Avenue, Pauanui Harbour	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High risk catchment. High risk facility (service station).
06	Coromandel: Wharf Road, Whangarahi Stream	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High risk catchment. Catchment contains most of CBD including some high risk facilities (service station and automotive repair workshops).
07	Tairua: Marquet Place, Tairua Harbour	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High risk catchment. Catchment contains most of CBD including one high risk facility (service station and automotive repair workshop).
08	Whitianga: Hardstand Marina	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High risk catchment. Catchment contains CBD and some high risk facilities (e.g. service station and automotive repair workshop).



09	Whitianga: Moewai Road north - drain outlets	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High risk catchment with commercial & industrial activities and SH25.
10	Whangamata: Casement Rd drain Moana Anu Anu River	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High Risk Catchment commercial & industrial activities.
11	Whangamata: Hetherington Rd – south of marina	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High Risk Catchment commercial & industrial activities.
12	Whangamata: Aicken Rd	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High Risk Catchment commercial & industrial activities.
13	Whangamata: Lindsay Rod	Visual (bi-annual) Sediment (4 yrs) Ecological (4 yrs)	High Risk Catchment commercial & industrial activities.
14	Whangamata: Kotuku St SW outfall, Otahu Estuary Kotuku Street	Visual (bi-annual) Sediment (4 yrs) Ecological (yrs)	This catchment is considered to be a typical low risk residential catchment within the District. The stormwater catchment contains a residential environment that is considered to represent most residential environment within the District.
15	Whangamata Control Site Otahu Estuary – away from SW outlets	Sediment (4 yrs) Ecological (4 yrs)	Residential catchment – background sediment quality testing. NB – potential for background contaminants in sediment.

1.4 Stormwater Monitoring Control Sites

Thames Control Site: Fergusson Drive, Moanatairi beach foreshore. The Thames site has been chosen as a suitable location for a control site that is away from any stormwater outlets. The reason for locating this monitoring site away from stormwater outlets is to identify whether there is a background level of contaminants within the marine sediments that may influence the results of the stormwater monitoring in other locations within Thames. It is known that there are elevated levels of heavy metals and other compounds that are a direct result of historical mining activities within the various hydrological catchments in and around Thames. The urban area known as Moanatairi was also largely created when mine tailings were used in the reclamation of the seabed. Moanatairi has been the subject of significant investigation for potential contamination within soils. For these reasons it is considered appropriate that sediment sampling is carried out to identify whether there are elevated levels of contaminants already within the environment in Thames. The Moanatairi Beach foreshore is considered to be representative example of the Thames stormwater receiving environment.

If elevated levels of contaminants are identified within the Thames receiving environment it may be beneficial to review the Environment Waikato Technical Report 2007/08 - Trace Elements in Sediments of the Lower Eastern Coast of the Firth of Thames. This document will provide further information on the background levels of contaminants that may be present in the lower Firth of Thames that may influence the stormwater monitoring results.



Whangamata Control Site: Otahu Estuary. The Whangamata control site has been identified as a suitable site to assess background levels of contaminants within marine sediment as there are no industrial or commercial activities located within the hydrological catchment. The catchment is also considered to be relatively unmodified when compared to other urban catchments within the District. It is noted, however, that agricultural activities upstream of the Otahu Estuary may influence SW monitoring results.



1.5 Monitoring Frequency

Site	Visual			Sediment					Ecological				
	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
01	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
02	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2022
03	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
04	N/A			Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2022
05	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
06	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
07	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
08	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
09	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
10	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2022
11	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2022
12	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2022
13	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
14	Jan 2014	May 2014	Every year	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030
15	N/A			Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2030	Jan/Feb 2014	Jan/Feb 2018	Jan/Feb 2022	Jan/Feb 2026	Jan/Feb 2022

Visual inspection – twice yearly
Sediment testing – four yearly
Ecological health – four yearly



2. Monitoring Programme Framework

2.1 Visual Inspections of the Receiving Environment at Stormwater outlets

Visual inspections of stormwater outlets are to be carried out bi-annually during summer and winter periods. The inspections are to be carried out by Council staff, contractors or may become incorporated into the Stormwater Utilities agreement.

The purpose of the visual inspections is to provide specific visual analysis of the potential environmental effects that may be created as a direct result of the discharge of stormwater into the receiving water bodies. The inspections seek to regularly document the state of receiving water bodies and to provide context for any changes observed through sediment and ecological monitoring initiatives.

Visual observations will be recorded either by written descriptions or photographs if appropriate. The records will identify rubbish, scum, oily slicks, foam, and discoloration of water and/or any other obvious signs that may indicate contamination of receiving waters as a result of the stormwater discharge activity. They will also record physical effects such as end of pipe scour and erosion, sedimentation, debris accumulation and channel erosion (slumps and slips).

2.1.1 Data Analysis and Reporting

The visual inspections will be recorded in a format as provided in appendix A. Any relevant observation and any remedial action should be recorded on the form and provided as part of the Annual Reporting procedures required under the CSDC.

Any rubbish shall be collected and removed.

It is noted that the scope and frequency of this Monitoring Programme may be changed as a result of monitoring analysis and results.

2.2 Sediment Quality Monitoring

2.2.1 Background

The sediments of stormwater receiving waters provide a possible sink for stormwater derived contaminants. Monitoring of sediment quality at identified locations will be used to determine whether the concentrations of contaminants within stormwater pose a risk to aquatic life and habitats. This Monitoring Programme sets out the methodology for the sampling and analysis of sediments at stormwater discharge outlets in the District. The results of the sample analyses are to be compared against the Australian and New Zealand Environment and Conservation Council (ANZECC 2000) Interim Sediment Quality Guidelines (ISQG), or any other guideline document approved in advance by the Waikato Regional Council.

It is anticipated that the results of this monitoring exercise will help guide any shortcomings with the existing stormwater network and any improvements that can be made to TCDC's on-going stormwater network management.



2.2.2 Sediment Sampling and Analysis Methodology

Hill Laboratories (Hamilton) will provide analysis jars as required for the collection of sediment samples. Chilly bins for the secure storage and transport of sediment samples will also be provided to ensure that the temperature of samples remain constant and within the allowable temperature limits for accurate analysis within the laboratory.

The sample collection protocol is designed to ensure collection of a high quality data set to be used to identify trends. Hills Laboratories are an IANZ (International Accreditation New Zealand) certified laboratory.

Trace elements and organic compounds are known to accumulate slowly in sediments. For this reason it is proposed to monitor sediment on a four yearly basis as required by the Waikato Regional Council. The frequency of monitoring may be increased where results indicate a risk of toxic effects on sediment-dwelling organisms and/or high pollution levels from activities in the catchment.

2.2.3 Sample Collection Protocol

Samples are to be collected within 1m to 3m of the physical stormwater outlet (unless the sampling location is for a control site).

The sample to be collected at each site is a composite sample comprising multiple grabs of sediment. The technician shall use a plastic scoop to remove the top 20-30mm of sediment. Approximately 1kg of sediment shall be collected.

The sample shall be mixed thoroughly and representative sub-samples shall be transferred to sample bottles provided by Hill laboratories. Two samples are required at each site in the form of 1 x 300mL glass soil jar and 1 x 250mL plastic jar. These samples shall be chilled in a chilly bin and dispatched to Hill Laboratories for analysis.

2.2.4 Sample Analysis

Details of the laboratory analytical methods proposed in provided in appendix B. By way of summary, each sediment sample is to be analysed for the following contaminants:

- Heavy Metals (As, Cd, Cr, Cu, Ni, Pb, Zn)
- Total organic carbon (TOC)
- Polycyclic aromatic hydrocarbons (PAHs)

2.2.5 Data Analysis and Reporting

The results of the sample analysis are to be compared against the ANZECC 2000 Interim Sediment Quality Guidelines (ISQG). This comparison will be used in combination with the ecological monitoring results to assess the actual and/or potential ecological effects of contaminants within the receiving water sediments.

The sediment quality results will be recorded in a format as provided in appendix C. Any relevant observations and any recommended remedial actions should be recorded on the form and provided as part of the Annual Reporting procedures required under the CSDC. The sediment collection and testing will be carried out every four years and therefore the Annual Report will contain details of these investigations every four years. However, remedial actions and catchment specific stormwater



management measures that are implemented through the Stormwater Management Plan to address contamination issues, will be reported on annually.

It is noted that the scope and frequency of this Monitoring Programme may be changed as a result of monitoring analysis and results, particularly if there are significantly elevated levels of contaminants as a result of the urban area stormwater discharge.

2.3 Ecosystem Health Monitoring

This aspect of the Monitoring Programme involves an ecological survey of three key biological indicators of ecological health. These indicators include aquatic plant growth composition and percentage cover, aquatic benthic macro-invertebrate diversity and distribution; and identification of potential native freshwater fish habitat and potential barriers to fish migrations.

Ecosystem health monitoring will also be undertaken every four years at the same time as sediment sample collection.

2.3.1 Methodology

Council will engage ecological services to undertake ecological surveys as generally undertaken in the various Ecological Assessments carried out by Gerry Kessels & Associates June 2001, and in general accordance with the Waikato Regional Council methodology used for the Regional Ecological Monitoring of Streams (REMS). The Gerry Kessels & Associates surveys were prepared as part of the applications for CSDCs.

The general approach for the surveys is based on the visual observation of three key biological indicators of 'in-stream' ecological health. These three indicators are as follows:

- Aquatic plant growth composition and percentage cover;
- Aquatic benthic macro-invertebrate diversity and distribution; and
- Identification of potential native freshwater fish habitat and potential barriers to fish migrations.

Trace elements and organic compounds are known to accumulate slowly in sediments and typically result in gradual effects on the receiving environment and habitat. For this reason it is proposed to undertake ecological assessments on a four yearly basis to coincide with the sediment monitoring and to determine any emerging environmental quality trends over the twenty year term of consents. The frequency of ecological health monitoring may be increased where results indicate a risk of toxic effects on sediment-dwelling organisms and/or high pollution levels from activities in the catchment.

2.3.2 Data analysis and Reporting

Reporting on the above ecological surveys will be provided every four years as part of the Annual Report as required by the CSDC. Any associated remedial and/or mitigation measures (including catchment specific stormwater management measures) will be identified and implemented through the Stormwater Management Plan and reported on annually in the Annual Report.

It is noted that the scope and frequency of this Monitoring Programme may be changed as a result of monitoring analysis and results, particularly if there are significant effects on habitat quality as a result of the urban area stormwater discharge.



3. Monitoring of New Subdivision and Development

All new stormwater infrastructure and in particular new or upgraded stormwater discharge outlet structures, that are to be vested in Council will be identified as part of the Annual Report as required under the CSDC. Note – this is contingent on there being approved Catchment Management Plans in place, particularly for developing catchments, prior to any new discharge activities taking place.

Where new subdivision and development is identified as having the potential for high risk of routine and/or non-routine contaminant discharge then new Monitoring locations may be identified. New infrastructure maps and any proposed updates to the SMP will be provided on an annual basis with the Annual Report.

