



ADAPTIVE MANAGEMENT PLAN

Drury Town Centre

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Document Control

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1. Introduction

Chapter J of the Auckland Unitary Plan (AUP(OP)) defines adaptive management as “a systematic, iterative process of decision making in the face of uncertainty, with an aim of reducing uncertainty over time through system monitoring and changes to management in response to the results of monitoring”. More simply put, adaptive management is a structured process of ‘learning by doing’. In a regulatory context, management plans are a useful tool to provide flexibility for both the consent holder and Auckland Council by providing for matters of detail to be dealt with after the consent application has been granted, particularly for larger and more complex proposals, including regional earthworks.

The Erosion and Sediment Control Adaptive Management Plan (ESCAMP) is a management and monitoring system that will be implemented for the duration of the earthworks period of the Drury Development that will assist the management of sediment related effects where those effects could be greater than those anticipated through the consenting of the Project.

The purpose of this ESCAMP is supplementary to the erosion and sediment control plan (ESCP) prepared for the earthworks site. The ESCAMP does not replace day-to-day Erosion and Sediment Control (ESC) management which is required on all sites in accordance with Auckland Council Guideline Document 2016/005 Erosion and Sediment Control Guideline for Land Disturbing Activities in the Auckland Region (GD05) or better if that is required by consent conditions. Nor does it apply to compliance with consented ESC methodologies. It addresses the management of sediment-related effects that may still occur when full compliance with the consent is maintained in order to avoid or minimise adverse effects on the receiving environment.

The ESCAMP includes details of processes and procedures that will be followed and confirms how the ESC management, monitoring and reporting will be undertaken. It also includes the methods that will be used during construction to ensure that performances are managed appropriately, that all conditions of consent are complied with and that adverse environmental effects remain within the range anticipated by the consent. It will provide rapid and real time information and control to the project team to create a continuous feedback loop of the performance of the project ESC site and device management.

Site management structures, practices, and procedures.

- Weather Monitoring
 - Prior to commencement of construction works an automated rain gauge was installed onsite. This has been operational since 12 December 2022.
- ESC Monitoring
 - Scheduled site visits, pre, during and post rain event monitoring and water sampling.
 - Automated and manual turbidity recording for Sediment Retention Ponds.
 - Chemical treatment that is monitored in accordance with the Project’s Chemical Treatment Management Plan.
- Reporting
 - Rainfall trigger event reporting following a rainfall trigger event (as defined in Section 5.1).
 - Recommendations of changes that need to be implemented onsite and modifications to any ESC are also included.

1.1. Revisions

This document is an updated revision of the Drury Town Centre ESCAMP, revision 1 prepared by Aurecon.

This ESCAMP is intended to be a live document Any changes to the ESCAMP will be confirmed in writing and provided to the Council for certification, prior to the implantation of any changes proposed.

2. Erosion and Sediment Control Implementation

The construction of all erosion and sediment controls will be managed as follows:

- In accordance with the approved Erosion and Sediment Control Plan, and any updates or revisions of that plan.
- The responsible Team member is responsible for issuing an approved ESCP to the earthworks Project staff responsible for the implementation.
- The pre-construction meeting has been held with Council prior to the installation of the initial erosion and sediment controls. The construction of new controls or changes to controls are discussed with the Council inspector on an ongoing basis.
- The location of the controls and requirements of the relevant ESCP will be confirmed on site with the construction team.
- The construction of the controls will be overseen by the responsible Team member.
- Hold points for construction will be established for each control the responsible Team member, for example the installation of anti-seep collars or the installation of primary outlet.
- Each control will be 'as built' certified by the responsible Team member to confirm compliance with the ESCP prior to bulk earthworks commencing in the catchment of the device(s).
- Copies of the "as-built" certifications will be submitted to Council.

2.1. Erosion and Sediment Control Inspections

The responsible Team member will conduct routine (minimum weekly) inspections of the site. These inspections will take place with adequate time allocated and will be thorough and systematic (see section 5.1).

Communication is critical to the successful implementation of ESCPs. Internal inspections will cover all areas of the Project, even those that may have been dormant for some time, to ensure that the controls are still operating properly. These internal inspections will be captured in writing and will include actions and timeframes for close out if the controls are found not to be operating correctly.

3. Rainfall Monitoring

3.1. Rain Forecast

Rain forecasts relevant to the site will be checked daily using MetService / MetVuw online forecasting system. Close monitoring of the rain forecast will be necessary to ensure the appropriate site works can be implemented prior to rainfall trigger events.

The daily weather forecast checks will be forwarded to relevant Project staff every morning and will be recorded in the daily prestart job sheets.

If the forecasts show more than 20mm of rainfall over a 24-hour period, then this will trigger the pre-rain event environmental team inspections as outlined in section 5.1 (pre-rain event with forecast >20mm over 24 hours). This is in addition to the routine pre -rain event detailed in section 5.1 below. Note the pre-rain forecast trigger of >20mm over 24 hours is less than the rainfall trigger monitoring (referred to in section 5.1 below) to provide a buffer and to ensure no actual rain event of greater than 25mm is "missed" by the construction team.

3.2. Rain Gauges

A telemetered rainfall monitoring station will be installed on site to provide real-time continuous rainfall intensity and volume data which will be able to be observed online by Project personnel. Email and/or text

notifications will be programmed to ensure relevant staff are alerted when rainfall trigger events occur onsite.

4. Erosion and Sediment Control Monitoring

4.1. Site Inspections

Routine inspections are undertaken during and post construction of ESC devices. During construction certain stages are identified for inspection, such as during the installation of anti-seep collars, level spreaders, and T-bars.

Post construction monitoring is undertaken once a Sediment Retention Pond (SRP) or Decanting Earth Bund (DEB) is operational, and the rainfall activated chemical treatment system is operational for the first time. Monitoring will take place as soon as practicable following the first rainfall event that generates a discharge. This is to assess the performance of the device and chemical treatment system and the resulting quality of treated water being discharged from the site.

The site will be inspected weekly as a minimum by the responsible Team member during the course of the works. These inspections will ensure that all ESC devices are installed correctly and then operate effectively throughout the duration of the works. This inspection programme will provide certainty to all parties that appropriate measures are being undertaken to ensure compliance with conditions of consent and the ESCPs. The inspection regime will keep ESC management at the forefront of works on site. Any potential problems will be identified immediately, and remedial works will be promptly carried out.

The inspection programme shall consist of:

- **Weekly** site walkovers involving the environmental team to inspect all ESC measures, identify any maintenance or corrective actions necessary, assign timeframes for completion, and identify any devices that are not performing as anticipated through the ESCP.
- **Pre-rain event:** Prior to all forecast rainfall events, additional inspections will be made of ESC devices, including chemical treatment systems and automated monitoring devices, to ensure that they are fully functioning in preparation for the forecast event. These will be undertaken by the responsible Team member.
- **Pre-rain event with forecast >25mm over 24 hours:** Prior to forecast rainfall "trigger" events the site will be inspected by the responsible Team member. The aim of the inspection will be targeted at any additional ESC measures that are required to be installed to ensure that the sites ESC management system performs effectively during an expected larger event.
- **Rainfall Trigger Inspections:** In addition to the general post rainfall event monitoring, during or immediately after rainfall trigger events additional actions will be undertaken in accordance with Section 5.1 below.

The rainfall trigger event site audits will be undertaken as close to the trigger as possible and within 24hrs of the event, excluding Sundays and Public Holidays.

The purpose of this response is to confirm the performance of devices under the stress of heavy rainfall, obtain a spot check efficiency of the device and to compare the field results with the results gained from the automated turbidity monitoring stations. The key rainfall event triggers driving specific device monitoring are as follows:

- >25mm rainfall over any 24-hour period.
- **Post-rain event:** Following all rainfall events including rainfall trigger events, inspections will be made of all ESC measures to ensure that all controls have performed as expected and to identify any maintenance requirements. Any remedial works will be documented during these monitoring inspections and immediately addressed.

When rainfall triggers are exceeded, the following will occur:

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- Within 24hrs of a rainfall trigger, carry out and record in writing a full audit of the condition of all ESCs.
 - Remedy any causes on site that may have contributed to a device not achieving 90% efficiency as soon as practicable, and record what remedial measures were undertaken.

4.2. Sediment Retention Pond Monitoring

4.2.1. Turbidity Monitoring

Two SRPs in separate sub-catchments have been installed with automated turbidity monitoring equipment. These SRPs have been selected in collaboration with Council and agreed in writing prior to implementation. Any changes to the automated turbidity monitoring will be discussed and agreed to with the Council's earthworks monitoring officer.

Manual turbidity monitoring will be undertaken on the balance of the SRPs using a handheld water quality field instrument used to measure both inflow and outflow turbidity of discharging SRPs. Manual turbidity monitoring of the inflows and outflows of all SRPs will be undertaken during rainfall trigger events so to provide a snapshot of the ESC performance.

4.2.2. Turbidity Triggers

- A discharge turbidity level of >65 NTU (the CTMP identifies that 65 NTU roughly correlates to approximately 100mm of visual clarity which is widely regarded as industry standard for adequate water clarity for discharges when dewatering and pumping).
- Less than 90% efficiency (2-year 1 hr duration 23.8mm rainfall event) when the discharge turbidity is >65 NTU and the inflow turbidity exceeds the outflow turbidity.

The above thresholds are not discharge standards. They are thresholds that trigger a response for action should it be exceeded.

Where it is identified that an SRP exceeds one of the thresholds above, the management responses detailed in section 5 will be followed.

4.3. pH Monitoring

As outlined in the site's Chemical Treatment Management Plan (CTMP), pH will be recorded at each device receiving chemical treatment, using the following procedure:

- Ensure that the pH meter has been calibrated and that the calibration has not expired.
- Use the pond water (or water that is to be discharged) to rinse out a small container then half fill with water from the same source.
- Immerse the pH meter in the water and leave for up to 1 minute or until the reading stabilises and doesn't change. Place the container in a shaded place (out of direct sunlight) while it stabilises.
- Record the pH reading given on the meter along with the date, time, and source of the water.

Chemical treatment will be monitoring and management in accordance with the site's CTMP.

4.1. Incident Response

In the event of the failure of an ESC an incident response plan is to be implemented and an incident report is to be prepared within 24 hours of the incident by the Contractor and is to be distributed to the following stakeholders:

- Auckland Council – Compliance Monitoring Officer
- Project Engineer
- Principal Representative

The report will contain the following information:

- Location of ESC failure
- Type of failure
- Action taken to rectify failure
- Measures to control sediment discharge
- Measures to rectify any sediment discharge
- Determination of failure course
- Remedial actions taken to protect against future failure.

Note, subject to the location of the failure and the resulting spill of any sediment it may be necessary for the project ecologist to inspect the site prior to any remedial measures being undertaken. This will be discussed with Auckland Council prior to implementation.

5. Management Responses

Management responses / actions will be identified when a trigger event occurs. These responses should not be mistaken for general site management and maintenance that will be ongoing.

In some instances, responses will be discussed and agreed with Council to ensure the most appropriate outcomes are achieved. General actions to be undertaken during trigger events are as follows:

- Investigate whether the thresholds have been exceeded as a result of a natural process.
- Investigate whether there have been any significant events or failures that could have caused the discharge.
- Ensure all site controls are operating in accordance with approved plans and best practice.
- Determine if the discharge is an isolated case or is likely to be repeated.
- Investigate and implement modifications that could include:
 - Investigate ESC measures to determine whether there has been a discharge from the devices;
 - Make alterations to ESC measures and methodologies; (check that a further approval is not required from Council);
 - Consider additional ESC;
 - Refinement of chemical treatment systems;
 - Progressive stabilisation in sub-catchments;
 - Increase maintenance of controls;
 - Amendments to methodologies and sequencing of works and refinement of controls necessary. (check that a further approval is not required from Council) and
 - Reduction of open area limits of earthworks.

5.1. Rainfall Trigger Event Responses

Whenever a rainfall trigger event occurs ($\geq 25\text{mm}$ rainfall over any 24-hour period) the actions listed in Sections 5.2 will be undertaken (subject to health and safety restrictions):

- Within 24hrs of a rainfall trigger, carry out and record in writing a full audit of the condition of all ESC within the earthworks. All SRPs and their catchments will be inspected in accordance with Section 4.2;
- Manual turbidity readings will be recorded at inlet and outlet flows of SRPs;

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- Identify any pH issues of chemically treated devices;
 - Remedy any causes on site that may have contributed to a threshold exceedance as soon as practicable, and record what remedial measures were undertaken;
 - Notify Council by email within one working day of the rainfall trigger event and include notification if any threshold exceedances have occurred;
 - Record an assessment of the success of each remedial work in reducing ongoing sediment discharge; and
 - Prepare and provide to Council an Adaptive Management Response Report, within 10 working days.

5.2. Sediment Efficiency Trigger Responses

If an exceedance of the thresholds listed in 4.2.2 above occurs, as identified through automated rainfall and turbidity monitoring, then the following will occur:

- Within 24hrs of a threshold exceedance, carry out and record in writing a full audit of the condition of all ESC within the earthworks;
- Remedy any causes on site that may have contributed to a threshold exceedance as soon as practicable, and record what remedial measures were undertaken;
- Notify the Council by email within 1 working day of a threshold exceedance;
- Record an assessment of the success of each remedial work in reducing ongoing sediment discharge;
- If the remedial work does not achieve the desired outcome, then there is an expectation that the same remedial work will not be repeated. An alternative solution will be identified as a back-up option for each remedial work action at the same time as the actual remedial work element. The purpose of this is to be prepared so that an alternative remedial action can be implemented in a timely manner when the original remedial action did not provide the desired outcome. Prior approval for these remedial works and back-up options will be sought where practical.
- Prepare and provide to the Council an Adaptive Management Response Report within 10 working days.

The treatment efficiency trigger will also be used to identify catchments that are deemed higher risk. If efficiency triggers are breached, then that SRP will be deemed to be 'high risk' for the next rainfall trigger event.

High risk SRPs will be subjected to additional scrutiny during pre-forecast inspections (forecasts of >25mm/24 hrs) to ensure that repeat breaches do not occur.

6. Data Interpretation

All data will be compiled to allow for the analysis of device efficiency in relation to rainfall, earthworks area and overall ESC management. This will also inform potential for modification of site ESC practices to better retain sediment within the site if that is deemed necessary.

7. Reporting

7.1. Rainfall Trigger Event Report

Following a rainfall trigger event, a report will be produced that will be provided to Council a summary of the performance of SRPs and overall ESC systems observed during the rainfall event. The report will include:

- A summary of the rainfall (total and intensity)

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- A summary of the data acquired from the automated turbidity monitors from the SRPs.
 - A summary of the manual monitoring undertaken and comparison of manual monitoring results with automated results.
 - Identification if a threshold exceedance occurred. This will outline what exceedance occurred, the extent of the exceedance, any actions taken to mitigate the effects of the event and a proposed management response if required.
 - A record of any other matters which may have compromised the overall ESC performance during the rain event and the identified mitigation, maintenance, and management response.

The rainfall trigger event report will be provided to Council within 10 days of the rainfall trigger event.