



## Sediment Control Management Plan

### Drury Centre - Stage 2

Kiwi Property Holding No. 2 Limited  
13/03/2025  
For Fast Track Consent Application

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## Document Control

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## Contents

<b>1.</b>	<b>Executive Summary</b>	<b>4</b>
<b>2.</b>	<b>Statement of Qualifications and Experience</b>	<b>4</b>
<b>3.</b>	<b>Introduction</b>	<b>5</b>
<b>4.</b>	<b>Erosion &amp; Sediment Control Methodology</b>	<b>6</b>
4.1.	Overview	6
4.2.	Team Approach	6
4.2.1.	Principal – Kiwi Property Holdings No. 2 Limited	6
4.2.2.	Civil Engineering, Planning & Surveying – Woods	6
4.2.3.	Consulting Geologist/Geotechnical Engineers – CMW	6
4.2.4.	Environmental Consultant	6
4.2.5.	Earthworks Contractor – Ross Reid Contractors Limited	6
4.2.6.	Statutory Authorities – Auckland Council	7
4.3.	Erosion & Sediment Control Measures for Enabling Works	7
4.4.	Erosion & Sediment Control Measures for Earthworks	7
4.4.1.	Sediment Retention Ponds	7
4.5.	Dewatering Impoundment Areas	9
4.6.	Last Line of Defence	9
4.7.	Monitoring	10
4.8.	Additional Measures	10
4.9.	Dust Management Plan	10
<b>5.</b>	<b>Earthworks Methodology</b>	<b>10</b>
5.1.	Overview	10
5.2.	Pre-Construction Meeting	11
5.3.	Earthworks Methodology	11
5.3.1.	Part 1 – Enable Controls	11
5.3.2.	Part 2 – Bulk Earthworks Commencement	11
5.3.3.	Part 3 – Stream daylighting	11
5.3.4.	Part 4 – Stream A realignment and Removal of stream A wetland	12
5.3.5.	Part 5 – Bulk Earthworks Completion	12
5.3.6.	Part 6 – Removal of Controls	13
5.4.	Earthworks Cut to Fill Operation	13
5.5.	Ecological Areas	13
<b>6.</b>	<b>Risk Management</b>	<b>13</b>
6.1.	Identifying Risk	13
6.2.	Recommendations for Reducing Risk	13
<b>7.</b>	<b>Conclusion</b>	<b>14</b>
	<b>Appendix A – Drury Centre Stage 2 Earthworks Erosion &amp; Sediment Control Drawings</b>	<b>15</b>
	<b>Appendix B - Dust Management Plan</b>	<b>16</b>
	<b>Appendix C – Chemical Treatment Management Plan</b>	<b>18</b>
	<b>Appendix D – As-built Forms</b>	<b>19</b>
	<b>Appendix E – SRP Sizing Calculations</b>	<b>20</b>

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## 1. Executive Summary

This report outlines the proposed bulk earthworks methodology including specific erosion and sediment control methodologies for bulk earthworks to be undertaken within Stage 2 Earthworks of the Drury Centre Development.

These works will require approximately 212,225 m<sup>3</sup> of earthworks of cut and 195,873m<sup>3</sup> of fill over a total area of 20.85 Ha. Stripped topsoil will be stockpiled on-site and excess will be screened first then carted off-site.

This report details the suite of devices that may be utilised on this site including the limitations of the devices and additional measures that can be implemented to improve the performance of the devices.

The controls to be implemented for primary earthworks are proposed Sediment Retention Ponds SRP 1, SRP 2, SRP 3, SRP4, SRP 5, SRP7 and existing SRP 6 along with further controls such as contour drains, diversion drains, drop out pits, clean water diversions, silt fences, and filter strips.

## 2. Statement of Qualifications and Experience

### **Colin Dryland**

I am a Principal Engineer and the General Manager of Engineering at Wood and Partners Consultants Limited ("Woods"). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since 2012.

I hold a National Diploma of Architectural Technology (Unitec Institute of Technology, 2002), a New Zealand Diploma of Civil Engineering (Unitec Institute of Technology, 2011), and an Applied Diploma of Civil Engineering (Infratrain 2014). I am a Chartered Professional Engineer (CPEng) and a member of Engineering New Zealand (CMEngNZ), Engineering New Zealand Transportation Group, New Zealand Society of Construction Law and Water New Zealand. In addition, I am also a qualified Independent Hearings Commissioner and am appointed to the Palmerston North City Council Commissioner Pool until November 2026.

I have 23 years of experience in all aspects of land development engineering design, construction and contract management.

I have been the principal designer, report author and lead engineer for a wide range and scale of land development projects, including but not limited to: earthworks and erosion and sediment control; civil infrastructure servicing; stormwater modelling and green infrastructure; on-site stormwater and wastewater disposal; roading, transport, pavement engineering and geometric design; streamworks and culverting; and all aspects of land development Resource Consenting and Engineering Plan Approval design and compliance.

I confirm that, in my capacity as approver of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

### **Glenn Wright**

I am a Senior Associate Engineer within the Engineering Team at Wood and Partners Consultants Limited ("Woods"). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since 2021.

I hold a Bachelor of Engineering degree from the University of Auckland, which I completed in 2006. I am a Chartered Professional Engineer (CPEng) and a member of Engineering New Zealand (CMEngNZ).

I have over 19 years of experience in earthworks, roading, stormwater, wastewater and water design, for land development and infrastructure projects.

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I have been the principal author and lead engineer for a wide range of Infrastructure and Earthworks Methodology reports to support land development projects.

I confirm that, in my capacity as the author of this report, I have read and abide by the Environment Court of New Zealand's Practice Note 2023, in particular section 9 on the Code of Conduct for Expert Witnesses.

**Justin Kang**

I am an Associate Engineer within the Engineering Team at Wood and Partners Consultants Limited ("Woods"). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since 2021.

I hold a Bachelor of Civil and Environmental Engineering (Honours) from the University of Auckland. I am a Chartered Member of Engineering New Zealand (CMEngNZ) and a Chartered Professional Engineer (CPEng), further accredited as an International Professional Engineer (IntPE (NZ) / APEC Engineer).

With over 8 years of engineering experience, I specialize in the design, supervision, and project management of both small and large-scale land development projects, including complex commercial developments and council stormwater upgrades. My role often involves extensive client and stakeholder consultation, where I am committed to delivering innovative solutions to complex technical challenges.

I confirm that, in my capacity as a reviewer of this report, I have read and abide by the Environment Court of New Zealand's Practice Note 2023, in particular section 9 on the Code of Conduct for Expert Witnesses.

**Sine Foulger**

I am an Associate Engineer within the Engineering Team at Wood and Partners Consultants Limited ("Woods"). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since 2022.

I hold a Bachelor of Engineering (Honours) degree in Civil Engineering (University of Auckland, 2012), a Master of Engineering Studies (Honours) in Transportation (University of Auckland, 2013) and a Bachelor of Science (University of Auckland, 2007). I am a Chartered Professional Engineer (CPEng), an International Professional Engineer (IntPE(NZ)), a member of Engineering New Zealand (CMEngNZ), the Temporary Works Forum NZ and UDINZ.

I have 13 years' experience of working in residential land development in Auckland. My technical experience involves design of all civil engineering aspects related to residential subdivisions, including but not limited to roading geometry, earthworks, stormwater and wastewater design. My experience involves preparation of land development packages for small to large scale residential subdivisions, from preliminary concept to design phase, through to consenting and construction.

I confirm that, in my capacity as a reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

### **3. Introduction**

This report details the methods to be adopted as part of the earthworks operation to minimise the potential for erosion and the methods for sediment control to be adopted to maximise the removal of sediment prior to discharge into the receiving environment. It also details the suite of devices that may be utilised on this site.

The proposed work involves bulk cut to fill works to form the finished levels for the future stages of development, the removal of a culvert and daylighting of a stream and the realignment of a section of stream.

This methodology proposes a range of erosion & sediment control measures that have been designed to meet the existing standards (Guidance for Erosion & Sediment Control GD05). These measures have been used successfully in previous stages of the Drury Centre development, ensuring a best practice outcome for erosion and sediment control.

The range of measures allows for a combination of most applicable solutions to meet the differing requirements of parts of the development area.



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This report should be read in conjunction with the drawings and reporting found in the appendices at the back of this report and the other documents submitted as part of this consent. It is anticipated that this report will be updated and submitted for approval prior to commencing works.

## **4. Erosion & Sediment Control Methodology**

### **4.1. Overview**

The proposed erosion and sediment control measures have been designed to, and will be implemented to, meet or exceed the guideline standards of Auckland Council (AC) Technical Guidance GD05: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016.

### **4.2. Team Approach**

The Team Approach ensures that adequate resources, commitment, and expertise are provided to support the Erosion and Sediment Control Methodology from start to finish. Importantly, this team always undertakes pre and post storm surveys and a significant resource and “expertise base” is utilised to ensure appropriate and technically sound decisions are made. Stakeholders involved in the project will include:

#### **4.2.1. Principal – Kiwi Property Holdings No. 2 Limited**

Kiwi Property Holdings No. 2 Limited is committed to the development of its landholdings at Drury in an environmentally responsible manner. The Principal manages the project team engaged to design and supervise the works. The principal will also be responsible for the selection and engagement of a Contractor and liaison with the Statutory Authorities throughout the process. Kiwi Property Holdings No. 2 Limited has the resources available to ensure the implementation of a successful project.

#### **4.2.2. Civil Engineering, Planning & Surveying – Woods**

Woods have been engaged by Kiwi Property Holdings No. 2 Limited to provide civil engineering, planning and surveying services associated with the development of Drury Centre. Woods act as the lead consultant on the project and liaise with the principal, all other members of the project team, and the Statutory Authorities, and will supervise the Contractor as Engineer to the Contract (under NZ3910). Woods will review as-built data provided by the contractor and will undertake and submit certification documents.

#### **4.2.3. Consulting Geologist/Geotechnical Engineers – CMW**

The principal has appointed CMW who are a suitably qualified Geotechnical Engineer. The Geotechnical Engineer will be responsible for the design, provision of advice, and supervision of geotechnical remediation works. Advice will be sought as necessary from the Geotechnical Engineer during construction. The Geotechnical Engineer will provide certification of the stability of the sediment retention ponds to Woods to use in the certification of the devices.

#### **4.2.4. Environmental Consultant**

The principal may appoint a suitably qualified Environmental Consultant to the project. The Environmental Consultant will provide specialist erosion and sediment control advice, ongoing education of contractors and other project team members, and monitoring services. Monitoring data and reporting will be taken in accordance with monitoring plan and provides for systematic review of the effectiveness of site environmental management and controls.

#### **4.2.5. Earthworks Contractor – Ross Reid Contractors Limited**

The principal has appointed an earthmoving contractor (Ross Reid Contractors Limited) with experience in large earthmoving projects. Ross Reid Contractors Limited has been established at the Drury Centre site, completing both earthworks and civils works for the last two years and has an intimate knowledge of the site, the receiving environment, and the expected level of erosion and sediment management expected by

Woods and Council Compliance Officers. Ross Reid Contractors Limited and Woods management teams will continue with the project and will ensure consistency in quality and delivery. Ross Reid Contractors Limited has experience with all the commonly used erosion and sediment control practices detailed in GD05. Ross Reid Contractors Limited is responsible for implementation, management and maintenance of erosion and sediment control measures. They will liaise with the Site Engineer, Erosion and Sediment Control Consultant and Statutory Authorities to ensure all erosion and sediment control measures are operating effectively.

#### 4.2.6. Statutory Authorities – Auckland Council

The Principal, Engineer and Contractor will liaise with representatives of the AC to ensure that erosion and sediment control measures are implemented, maintained, and monitored in accordance with consents granted. Weekly inspections undertaken with the AC's representative will be utilised for discussion of site variables as works progress.

### 4.3. Erosion & Sediment Control Measures for Enabling Works

Erosion and sediment control measures for the enabling works will include temporary controls for some items during clearing and installation of permanent sediment controls. These will be installed in suitable locations clear of the works areas for use in the construction of these works.

### 4.4. Erosion & Sediment Control Measures for Earthworks

Erosion and sediment control measures for SRP catchments (as shown on drawing P24-447-00-1850-EW to P24-447-00-1860 in Appendix A) will be constructed at the start of the season in preparation for the cut operations within their catchments.

#### 4.4.1. Sediment Retention Ponds

Sediment Retention Ponds are proposed to utilise rain activated chemical or organic flocculants transmitted via floc sheds as per CTMP (Chemical Treatment Management Plan) provided by Southern Skies Environmental Limited. We have attached a copy of the CTMP in Appendix C of the report.

The devices to be utilised in each catchment are summarised as follows:

*Table 3.4.1: Proposed Catchments and Control Descriptions*

Device	Description
SRP 1 – Rain Activated Chemical or Organic Treatment (Floc Shed)	<p>Sediment Retention Pond 1 - primary treatment for this catchment</p> <ul style="list-style-type: none"> <li>Actual catchment = 3.0 Ha</li> <li>Design catchment = 3.0 Ha</li> <li>Design storage volume = 900 m<sup>3</sup></li> <li>Number of T-bar Decants = 2</li> <li>Outlet pipe size = 150mm dia</li> </ul> <p>Contour drains – reduces slope lengths &amp; erosion (30m centres)  Runoff diversion drains – diverts runoff to treatment devices  Clean water diversions– diverts clean catchments away from devices  Super silt fences abutting streams – Last line of defence – back up measure.  See DWG P24-447-01-1851-EW for control locations &amp; details</p>

SRP 2 – Rain Activated Chemical or Organic Treatment (Floc Shed)	<p>Sediment Retention Pond 2 - primary treatment for this catchment</p> <ul style="list-style-type: none"> <li>• Actual catchment = 4.32 Ha</li> <li>• Design catchment = 5.0 Ha</li> <li>• Design storage volume = 1500 m<sup>3</sup></li> <li>• Number of T-bar Decants = 3</li> <li>• Outlet pipe size = 300mm dia</li> </ul> <p>Contour drains – reduces slope lengths &amp; erosion (30m centres)  Runoff diversion drains – diverts runoff to treatment devices  Clean water diversions– diverts clean catchments away from devices  Super silt fences abutting streams – Last line of defence – back up measure.  See DWG P24-447-01-1852-EW for control locations &amp; details.</p>
SRP 3 – Rain Activated Chemical or Organic Treatment (Floc Shed)	<p>Sediment Retention Pond 3 - primary treatment for this catchment</p> <ul style="list-style-type: none"> <li>• Actual catchment = 4.86 Ha</li> <li>• Design catchment = 5.0 Ha</li> <li>• Design storage volume = 1500 m<sup>3</sup></li> <li>• Number of T-bar Decants = 3</li> <li>• Outlet pipe size = 300mm dia</li> </ul> <p>Contour drains – reduces slope lengths &amp; erosion (30m centres)  Runoff diversion drains – diverts runoff to treatment devices  Clean water diversions– diverts clean catchments away from devices  Super silt fences abutting streams – Last line of defence – back up measure.  See DWG P24-447-01-1853-EW for control locations &amp; details.</p>
SRP 4 – Rain Activated Chemical or Organic Treatment (Floc Shed)	<p>Sediment Retention Pond 5 - primary treatment for this catchment</p> <ul style="list-style-type: none"> <li>• Actual catchment = 0.5 Ha</li> <li>• Design catchment = 0.5 Ha</li> <li>• Design storage volume = 100 m<sup>3</sup></li> <li>• Number of T-bar Decants = 1</li> <li>• Outlet pipe size = 150mm dia</li> </ul> <p>Contour drains – reduces slope lengths &amp; erosion (30m centres)  Runoff diversion drains – diverts runoff to treatment devices  Clean water diversions– diverts clean catchments away from devices  Super silt fences abutting streams – Last line of defence – back up measure.  See DWG P24-447-01-1852-EW for control locations &amp; details.</p>
SRP 5 – Rain Activated Chemical or Organic Treatment (Floc Shed)	<p>Sediment Retention Pond 5 - primary treatment for this catchment</p> <ul style="list-style-type: none"> <li>• Actual catchment = 2.17 Ha</li> <li>• Design catchment = 2.25 Ha</li> <li>• Design storage volume = 675 m<sup>3</sup></li> <li>• Number of T-bar Decants = 2</li> <li>• Outlet pipe size = 150mm dia</li> </ul> <p>Contour drains – reduces slope lengths &amp; erosion (30m centres)  Runoff diversion drains – diverts runoff to treatment devices  Clean water diversions– diverts clean catchments away from devices  Super silt fences abutting streams – Last line of defence – back up measure.  See DWG P24-447-01-1853-EW for control locations.</p>



SRP 6 – Rain Activated Chemical or Organic Treatment (Floc Shed)	<p>Sediment Retention Pond 6 - primary treatment for this catchment</p> <ul style="list-style-type: none"> <li>• Actual catchment = 4.19 Ha</li> <li>• Design catchment = 5.00 Ha</li> <li>• Design storage volume = 1500 m<sup>3</sup></li> <li>• Number of T-bar Decants = 3</li> <li>• Outlet pipe size = 300mm dia</li> </ul> <p>Contour drains – reduces slope lengths &amp; erosion (30m centres)  Runoff diversion drains – diverts runoff to treatment devices  Clean water diversions– diverts clean catchments away from devices  Super silt fences abutting streams – Last line of defence – back up measure.  See DWG P24-447-01-1854-EW for control locations.</p>
SRP 7 – Rain Activated Chemical or Organic Treatment (Floc Shed)	<p>Sediment Retention Pond 1 - primary treatment for this catchment</p> <ul style="list-style-type: none"> <li>• Actual catchment = 0.65 Ha</li> <li>• Design catchment = 1.00 Ha</li> <li>• Design storage volume = 300 m<sup>3</sup></li> <li>• Number of T-bar Decants = 1</li> <li>• Outlet pipe size = 150mm dia</li> </ul> <p>Contour drains – reduces slope lengths &amp; erosion (30m centres)  Runoff diversion drains – diverts runoff to treatment devices  Clean water diversions– diverts clean catchments away from devices  Super silt fences abutting streams – Last line of defence – back up measure.  See DWG P24-447-01-1855-EW for control locations.</p>

Upon completion of erosion and sediment controls within each catchment, as-built plans and certification will be provided (refer to forms in Appendix D) and a site inspection held with AC seeking approval to proceed with the associated earthworks.

Other devices which may be installed during the works due to operational decisions are:

- Wheel wash facilities to stabilised entrances.
- Stabilised entrance.
- Other controls if areas can no longer be serviced by the proposed devices.

## 4.5. Dewatering Impoundment Areas

Dewatering of excavated cut areas which cannot flow to the device within its catchment is to be achieved by pumping accumulated sediment laden water from the lowest point in the excavation to the dirty water drains leading to ponds. The outlet of the SRP's are to have decants raised when pumping from the shear key excavation or stream muck out to allow the pond to be chemically treated if required. The clarity of the pond will be checked and then batch dosed if clarity does not meet the required 100mm prior to lowering decants and associated discharge.

## 4.6. Last Line of Defence

The 'last line of defence' approach has been formulated as a backup to the proposed controls.

While the primary erosion and sediment control measures will minimise the discharge of the sediment to the receiving environment, an extra line of defence is proposed:

- For works areas that are within 50m of existing streams and waterways: a Super Silt Fence will be erected between the works and the stream. The Super Silt Fences will provide backup protection in the unlikely event that the primary erosion and sediment control devices and measures fail. Alternatively, oversized and well compacted bunds will be constructed.

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- For works areas that are not within 50m of existing streams and waterways: grass filter strips will be utilised prior to entering existing streams and waterways to contain any uncontrolled discharges. These will be minimum 50m wide.

## 4.7. Monitoring

The aim of monitoring is to ensure the proposed erosion and sediment control measures are installed correctly and function effectively throughout the duration of the works. The monitoring programme will provide certainty to all parties that appropriate measures are being undertaken to ensure compliance with conditions of consent and that potential problems or improvements are identified promptly.

Monitoring shall consist of:

- Weekly site walkovers involving all stakeholders to inspect and determine the effectiveness of all erosion & sediment control devices installed on site.
- Weekly pre-inspection walkovers by Woods personnel, as well as pre and post significant rainfall events.

By implementing a rigorous monitoring programme, the following benefits will result:

- Improved response times for rectifying any failures in erosion and sediment control devices with a focused response.
- Weather responsive monitoring/storm preparedness.
- Compliance with resource consent conditions.
- The minimisation of potential for adverse effects in the receiving environment.

## 4.8. Additional Measures

The following actions are proposed as a form of contingency to ensure erosion and sediment control standards are always achieved on site:

- Team meetings are to be held prior to all predicated significant rain events. The purpose of these meetings is to review the status of controls (confirm all chemical sheds stocked with chemical, all controls in place) and agree additional controls determined as being beneficial (Drop out pits, additional bunds). Each of the team organisations has a dedicated resource available for these meetings.
- Allowance will be made for additional storage in devices so that if other devices fail or are not working correctly, catchments can be temporarily diverted to these controls until the necessary repairs/remedial works are made.

## 4.9. Dust Management Plan

A site-Specific Dust Management Plan (DMP) has been provided in Appendix B to address the potential effects of the discharge of dust (dust nuisance) from proposed earthworks operations so that:

"No activity shall create dust which is, or is likely to be, either objectionable or offensive in the opinion of an enforcement officer, beyond the site boundary of the activity."

# 5. Earthworks Methodology

## 5.1. Overview

The earthworks are within an areas where the majority of slopes are under 12.5% and will include approximately 212,225 m<sup>3</sup> of cut and 195,873 m<sup>3</sup> of fill. The earthworks will include bulk cut to fill, the daylighting of approximately 80m of stream, the realignment of approximately 96m of permanent stream

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and the permanent reclamation of 66m of stream. Enabling works will be undertaken before the commencement of the bulk earthworks.

The works are proposed to be completed within 7 months during one Earthworks Season (1 October to 30 April). Should unforeseen circumstances occur (such as inclement weather, and availability of contactors/plant), an application may be made for Manager's Approval for work outside these months (winter works).

Stage 2 Earthworks will involve a cut to fill operation volume of approximately 408,098 m<sup>3</sup> over 20.85ha. An allowance has been made for expansion factor, excess unsuitable materials and excess topsoil within Stage 2 Earthworks. The area of works is defined by the SRP 1, SRP 2, SRP 3, SRP 4, SRP 5, SRP 7 and existing SRP 6 catchments. All controls are shown on Plan Number P24-447-02-1850 to P24-447-01-1860. Existing metalled entrance on Flanagan Road will be used as a stabilised entrance to the site.

It is proposed to open minimal areas to undertake the earthworks and to progressively stabilise areas that are finished to minimise the areas that are open.

## 5.2. Pre-Construction Meeting

Prior to commencing earthworks, all relevant consents will be obtained and adhered to the conditions.

A pre-construction meeting onsite with AC representatives will be held prior to installing any erosion and sediment controls

## 5.3. Earthworks Methodology

The preliminary staging plan for works in during the earthworks seasons is outlined as follows:

### 5.3.1. Part 1 – Enable Controls

- Install 'Last Line of Defence' super silt fence as shown on the plans. Alternative methodology to construct well compacted and oversized bunds with turf reused on the clean side of the bund.
- Construct topsoil or clay bunds to enclose areas where earthworks are required.
- Install clean water cut off drains as required.
- Construct Sediment Retention Ponds (SRP) if not already constructed.
- Certify all controls including existing controls that will be activated by these earthworks.

### 5.3.2. Part 2 – Bulk Earthworks Commencement

- Strip topsoil in stages to minimise the open catchment at any one time.
- Start the cut to fill within stage 2.

### 5.3.3. Part 3 – Stream daylighting

- Strip topsoil over daylighting area leaving the topsoil at each end to keep them stabilised.
- Start the cut along the new alignment of the stream, leaving each end to create a bund and to keep the stream flowing along its current alignment.
- Finish the cut, while leaving the bunds in place, and stabilise the stream alignment.
- Remove the downstream bund, during a period of forecasted fine weather, and complete the works at the connection to Fitzgerald stream. Stabilise the area before moving to the next step.
- Remove the upstream bund, during a period of forecasted fine weather, and complete the works at the connection to Stream A, Stabilise the connection point as quickly as possible.

- Once the stream realignment is complete and stabilised, the existing culvert will be removed.
- The culvert will be removed from the upstream end. As soon as practicable after the removal of the first culvert, the contractor will place and compact the fill adjacent to stream A. Once complete the connection point will be stabilised and stream A will be operational along the proposed alignment.
- The contractor will continue to remove the remaining culverts to the boundary of the site. Outside of the site, the contractor will grout fill the remaining section of pipe, to the downstream manhole.

#### 5.3.4. Part 4 – Stream A realignment and Removal of stream A wetland

- The realignment of Stream A can be undertaken before or after the daylighting of the bottom section of the stream.
- Before starting the works, a bund will be placed downstream of the works area to isolate the earthworks area.
- A culvert will be installed to divert the clean water from the upstream/eastern catchment around the earthworks area. The water will be discharged to Stream A (downstream of the bund).
- Pump out the water from the proposed re-alignment area of stream (shown as pink boundary in the Plan "P24-447-01-1855-EW").
- Fish salvage and relocation from the extent of the earthworks will be undertaken before earthworks commence and in accordance with the Ecological Management Plan prepared by Tonkin and Taylor Ltd, dated February 2025.
- Topsoil bunds will be placed around the site to divert the upper catchment around the works area, discharging the clean water downstream of the construction area and directing the water to the sediment retention ponds.
- Once the controls are in place, the works associated with the realignment will be undertaken, topsoil stripping, removing unsuitable material, cut and filling to form the finished levels.
- At the completion of the works the works area will be stabilised.
- Final checks to be undertaken to make sure that there will be no dirty water discharging from the works area.
- The downstream bund will then be removed, and the area stabilised as quickly as possible.

#### 5.3.5. Part 5 – Bulk Earthworks Completion

- Complete cut to fill operation while undertaking the necessary geotechnical remediation works that may be required.
- Site is to be progressively stabilised as areas are constructed to the finished levels.
- Survey subgrade and provide to Engineer for approval.
- Scarify batters to ensure topsoil does not slump off and obtain signoff from Geotechnical Engineer.
- Place topsoil to depth outlined within specifications.
- Stabilise topsoil area with straw mulch (and seed/fertilise if required) or sow grass and wait for suitable grass strike.
- Stabilised areas will be diverted away from SRPs and other controls using Clean Water Drains (CWD)

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- Install clean water upstands at top of batters and bunded off areas to divert clean water and stop ponding.

#### 5.3.6. Part 6 – Removal of Controls

- Once areas have been mulched or suitable grass strike has been obtained, seek approval from AC Monitoring Officer for removal of controls if required.
- Install SSF or DEB for removal of SRPs if required
- Remove structures within SRP
- Undertake cut to fill operation within SRP area under a Geotechnical Engineer's observation.
- Prepare for and topsoil area, then stabilise.
- Remove the Culvert taking Overland Flow from neighbours from neighbours as shown on Plan P24-447-01-1856-EW

### 5.4. Earthworks Cut to Fill Operation

Stage 2 Earthworks require total cut to fill of approximately 408,098 m<sup>3</sup>.

Each completed area is to be progressively stabilised as the required levels are achieved. Monitoring (survey) of the areas exposed shall be carried out to ensure that the maximum exposed areas are not exceeded for each of the Sediment Retention Pond devices.

Upon completion of the earthworks the site is to be fully stabilised with topsoil and grass or metalled for access. All sediment control devices will remain in place until such a time as the contributing catchments are fully stabilised or approval from Auckland Council (AC) is obtained for their removal.

The geotechnical report is included in this resource consent application.

### 5.5. Ecological Areas

Tonkin & Taylor are the appointed ecologists onsite and will be monitoring the ecological impacts and works in and around stream and wetland areas. Orange safety mesh demarcation will be installed prior to the pre-construction meeting and will remain in place until works are required within these areas. This fence is to be maintained throughout the earthwork's operation, if removed for works to be undertaken, it will be reinstated as soon as practicable once the works is complete. The earthworks have been designed to maintain the existing flow patterns and to keep water flowing towards the inland wetlands and streams.

## 6. Risk Management

### 6.1. Identifying Risk

It is considered that the key elements of risk for earthworks sediment yield are:

1. Works within, and adjacent to, streams and tributaries due to the reduced contingency of grass filter strips.
2. Pumping of sediment-laden water from impoundment areas as this is not a rain-active operation.

### 6.2. Recommendations for Reducing Risk

To mitigate this risk, the following recommendations will be adopted:

- Works staged so that minimal open areas are open adjacent to the stream while reclaiming and realigning the stream.

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- That super silt fences are installed parallel to the streams and wetland as a last line of defence.
  - Sediment retention ponds are designed based on 3% of the catchment to provide extra storage capacity over the GD05 requirements.
  - All dirty water is pumped into or upstream of a SRP and the decants to be raised during times where pumping is required. The clarity of the water will be monitored and approved before the decants are to be lowered.

These areas will be monitored weekly and if there is a likelihood of inclement weather additional measures will be discussed on-site and implemented.

## 7. Conclusion

The Drury Centre Earthworks includes the earthworks works over an area of 20.85 Ha, over 7 months during one earthworks season. The approximate volume of total earthworks is 408,098 m<sup>3</sup>.

A six-step erosion and sediment control methodology is proposed to ensure that any potential effects resulting from land and stream disturbance activities are appropriately avoided, remedied and/ or mitigated.

To perform the required cut to fill earthworks on-site SRP's 1, 2, 3, 4, 5, 7 will be installed and the existing SRP 6 will be used to complete these works.

A monitoring programme will be implemented to ensure the effective ongoing operation of erosion and sediment control methods and to identify any adverse effects on the receiving environment and any necessary amendments that may be required.



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## Appendix A – Drury Centre Stage 2 Earthworks Erosion & Sediment Control Drawings

- P24-447-01-0010-GE – Site Features Plan
- P24-447-01-1100-EW - P24-447-01-1107-EW – Proposed Contour Plan
- P24-447-01-1150-EW, P24-447-01-1151-EW – Stream Realignment Plan
- P24-447-01-1160-EW, P24-447-01-1161-EW – Stream Cross Sections
- P24-447-01-1200-EW – Cut Fill Contour Plan
- P24-447-01-1850-EW to P23-315-02-1855-EW – E&S Control Plans
- P24-447-01-1855-EW to P24-447-01-1861-EW – Sediment & Erosion Control Typical Details

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## Appendix B - Dust Management Plan

This Dust Management Plan (DMP) has been formulated to address the potential effects of the discharge of dust (dust nuisance) from proposed earthworks at Stage 2 Earthworks within the Drury Centre and are consistent with the dust management recommendations from the air quality report which forms part of the AEE.

To cater for the potential of dust nuisance from the proposed works, this plan has been formulated to:

1. minimise dust production in the first instance; and
2. identify the dust nuisance in the event of its production; and
3. to propose measures to mitigate the effects of dust if the situation eventuates.

This plan has been formulated in accordance with Ministry of the Environment Good Practice guide for assessing and managing the environmental effects of dust emissions' dated September 2001.

The proposed works on site have the potential to generate dust that may be regarded as a nuisance to surrounding landowners. Aspects of the works that may generate dust are:

1. Topsoil stripping and stockpiling
2. Excavating, spreading and compaction of soil
3. Loading and unloading trucks and equipment
4. The movement of vehicles across areas of the site that have been exposed, including stabilised access tracks within the larger development area, public roads and haul roads between earthworks operations.
5. Wind blowing across the site picking up stockpile material and other exposed surfaces
6. Application of lime to roads and earthworks areas.

It should be noted that the potential for the generation of dust from the proposed works may be exacerbated at times of dry and windy weather.

To avoid the generation of dust and to mitigate dust if the situation arises, this plan sets out specific control measures to be implemented on site as described below:

- A copy of the DMP is to be held on site and all contractors and subcontractors are to be made aware of its existence and their responsibilities in its implementation
- The Contractor is to monitor dust emissions on a daily basis and implement appropriate measures if necessary
- The Contractor shall provide sufficient water carts or sprinklers that are capable to ensure that the exposed areas of the site are appropriately moistened to avoid dust generation throughout the day. The number of water carts on site are to be determined by the contractor with liaison with the supervising engineer. It is considered that a metered public water supply is to be utilised subject to the approval of Auckland Council.
- The Contractor may use chemical dust suppressants. These products must be applied in accordance with the manufacturer's recommendations for use on haul roads, and borrow areas, and use on stockpiles. The use and frequency of these measures are to be determined by the contractor with liaison with the supervising engineer on site.
- The site is to be watered at the end of each working day when it is considered there is a significant risk of dust generation (unless there is sufficient rain, or showers falling, or forecast)
- The site is to be watered if strong winds are forecast and these coincide with dry ground conditions

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- When strong winds are present during site works, earthmoving machinery and lime operations shall cease work or operations will be modified to reduce dust generation
  - To avoid suspension of dust, vehicle movements on site are to be restricted to no more than 15km/h if strong winds and dry conditions exist
  - A sign shall be erected on site clearly displaying a 24-hour contact telephone number for the site contractor for dust and other complaints
  - The Contractor is to promptly implement additional dust control measures when a complaint is received and note the complaint, outcomes and actions in the Health & Safety logbook.
  - A record of dust events or complaints is to be recorded in the Health and Safety logbook on site. The site Contractor and supervising Engineer is to review this log on a fortnightly basis and discuss the outcomes and remedial action taken
  - Earthworks on site are to be staged to allow for progressive stabilisation. Once areas of works are completed to finished ground, progressive revegetation to pasture is to be undertaken at these areas. Monitoring of this revegetation is to be undertaken to ensure good uptake
  - Stockpiles to be stabilised if not in use.
  - When loading trucks, materials to be dropped from as low a height as practicable.
  - Removal of sediment or dust generating materials from the access road, haul road and public roads with a suction sweeper.
  - Use of a wheel wash facility that also has capabilities to wash dust from vehicles.

The dust emission control procedures are to be monitored by the Contractor on a daily basis and reported in the site Health and Safety logbook. Particular attention is to be paid to the effectiveness of the measures as described above during times of extended dry weather or during high winds.

The purpose of the monitoring program is to identify areas of the site and methods employed that are and are not effective and make changes to the sites dust control appropriately.

The logbook of complaints and daily observations is to be checked on a fortnightly basis by the site Contractor and supervising Engineer.

It is expected that there be good dialogue between the Council and Stakeholders regarding minimising the dust emissions in line with the measures outlined in this DMP. This dialogue is to ensure dust control measures for the duration of the project is to the satisfaction of Council Monitoring staff in line with District Plan Rule 10.4.3 that states:

*"No activity shall create dust which is, or is likely to be, either objectionable or offensive in the opinion of an enforcement officer, beyond the site boundary of the activity."*

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## Appendix C – Chemical Treatment Management Plan

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## Appendix D – As-built Forms

- Sediment Retention Pond As-Built Sheet
- Sediment Retention Pond As-Built Plan
- Decanting Earth Bund As-Built Sheet
- Decanting Earth Bund As-Built Plan
- Berm Decanting Earth Bund As-Built Sheet
- Berm Decanting Earth Bund As-Built Plan
- Flocculation Shed As-Built Sheet
- Flocculation Shed As-Built Plan
- Diversion Channel As-Built Sheet
- Earth Bund As-Built Sheet
- Super Silt Fence As-Built Sheet

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# Appendix E – SRP Sizing Calculations