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Earthworks Methodology Report

Milldale Stages 14-17 - Fast-track Application
Fulton Hogan Land Development Ltd
4/08/2026
For Consent

DOCUMENT CONTROL

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STATEMENT OF QUALIFICATIONS AND EXPERIENCE

Originator: Sam Kirk - Associate Engineer

I, Sam Kirk, am an Associate Engineer at Woods. Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since July 2025, and also previously between January 2019 and September 2022.

I hold the qualifications of a Bachelor of Surveying, which I completed in 2018, and I also hold a Cadastral Surveying License. I am also a Voting Member of S+SNZ.

I have eight years of experience in the Engineering industry. My experience includes the design and construction observation of a range of land development projects, including project management and the procurement of earthworks, roading, services and other infrastructure. I have been involved with the surveying, design and management of previous Milldale projects, dating back to Stage 1A. I have also been involved in managing multiple land development projects in London and Melbourne.

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 Code of Conduct for Expert Witnesses Practices Note 2023.

Reviewer: Evan McGarvey - Associate Engineer/Surveyor

I, Evan McGarvey, am an Associate Engineer at Woods. Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since November 2016.

I hold the qualification of a Bachelor of Surveying from the University of Otago (BSurv), which I completed in 2008, and I hold a Cadastral Surveying License. I am also a Voting Member of Survey & Spatial New Zealand (S+SNZ).

I have 17 years of professional experience in Subdivision Engineering, Surveying, and the Land Development industry across the Auckland, Wellington, and greater London regions. My experience includes the design and construction observation of a range of land development projects, including project management and the procurement of earthworks, roading, services and other infrastructure. I have been involved with the design, management, and delivery of large-scale land development projects at Long Bay and Milldale over the past 10 years.

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

Approval: Jamie Whyte - Principal

I am a Principal at Wood & Partners Consultants Ltd. Wood & Partners Consultants Ltd is a multi-disciplinary consultancy specialising in planning, urban design, civil engineering, water infrastructure and surveying. I have been employed at Wood & Partners Consultants Ltd since January 2004.

I hold the qualifications of a Bachelor of Surveying from the University of Otago (BSurv), which I completed in 2003. I hold a professional qualification as a Register Professional Surveyor (RPSurv). I am a Full (voting) Member of Survey and Spatial New Zealand.

I have over 20 years of professional experience in Subdivision Engineering and the Land Development industry. I have extensive knowledge in the design, construction and delivery of large-scale land development projects. My experience includes major roles on some of New Zealand's largest subdivision projects including Stonefields, Long Bay, Millwater and Milldale.

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.

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APPENDICES

[Appendix A - Milldale Stages 14 to 17 - Engineering Plans](#)
[\(bound separately\)](#)

[Appendix B - Milldale Stages 14 to 17 - Preliminary Construction Management Plan](#)

[Appendix C - Milldale Stages 14 to 17 - Adaptive Management Plan](#)
[\(bound separately\)](#)

1. INTRODUCTION

1.1. Background

This Earthworks Methodology Report has been prepared by Woods on behalf of Fulton Hogan Land Development Limited (FHLD) (the Applicant) in support of the substantive application for the Milldale Stages 14–17 Project under the Fast-track Approvals Act 2024 (FTAA).

The Project provides for a comprehensively planned urban development north of the existing Milldale development, comprising residential neighbourhoods, a supporting commercial area, transport and servicing infrastructure, open space, wetland and ecological restoration, and associated enabling works. The substantive application seeks the approvals necessary to facilitate the staged development of the Project.

This report addresses the earthworks methodology associated with the Project, including the proposed development landform, staging of works, erosion and sediment control, streamworks methodology and geotechnical implementation. It focuses on the earthworks required to prepare the Development Area for civil works and subsequent subdivision, together with localised earthworks within Te Korowai o Maraeariki required to facilitate private water and wastewater infrastructure, where required under the applicable servicing scenario.

This report should be read alongside the Planning Report and the technical reports and drawings appended to the substantive application.

1.2. Site Description

1.2.1. Site Location

The site subject to this application is located north of the existing Milldale development and is referred to as the Milldale Stages 14–17 subdivision area (“the site”, also formerly known as Milldale North).

The site consists to the following two areas:

- i. “The Development Area” – being the proposed residential sub-stages, where the bulk of earthworks is proposed; and
- ii. “Te Korowai o Maraeariki” – previously known as the Ecological Restoration Area, being a large block north of the Development Area that is proposed to contain localised private water and wastewater infrastructure, wastewater dispersal wetlands and ecological offset wetlands.
- iii. Overall, the site covers a total area of approximately 232 ha – 97.3 ha being the Development Area and 134.7 ha Te Korowai o Maraeariki.

These areas consist of land covered by the following underlying parcels.

Table 1: Underlying Parcel Information

Proposed Staged Development Area	Lot 1 DP 130515
	Lot 2 DP 130515
	Lot 3 DP 130515
	Lot 1 DP 589819
	Lot 4 DP 353309
	Lot 5 DP 198205
	Lot 8 DP 198205
	Lot 9 DP 198205
	Lot 10 DP 198205

Te Korowai o Maraeariki	Lot 11 DP 198205
	Lot 12 DP 198205
	Allot 210 PSH OF Waiwera
	Allot 216 PSH OF Waiwera
	Part Allot 182 PSH OF Waiwera
	Part Allot 73 PSH OF Waiwera
	Part Allot 74 PSH OF Waiwera
	Part Allot 74 PSH OF Waiwera
	Allot 549 PSH OF Waiwera
	Lot 7 DP 198205
	Lot 14 DP 198205

The Development Area is comprised of two non-contiguous areas. Stages 14 and 15 are located between the Orewa Awa to the north and the existing Milldale development to the south. Stages 16 and 17 are located further east, immediately north of Endsley Rise and on either side of Waterloo Creek. Te Korowai o Maraeariki is located north of the Development Area, between the Orewa Awa to the south and Upper Orewa Road to the north.

A full description of the site and its surroundings is provided in the application AEE.

The site location is shown below in Figure 1.

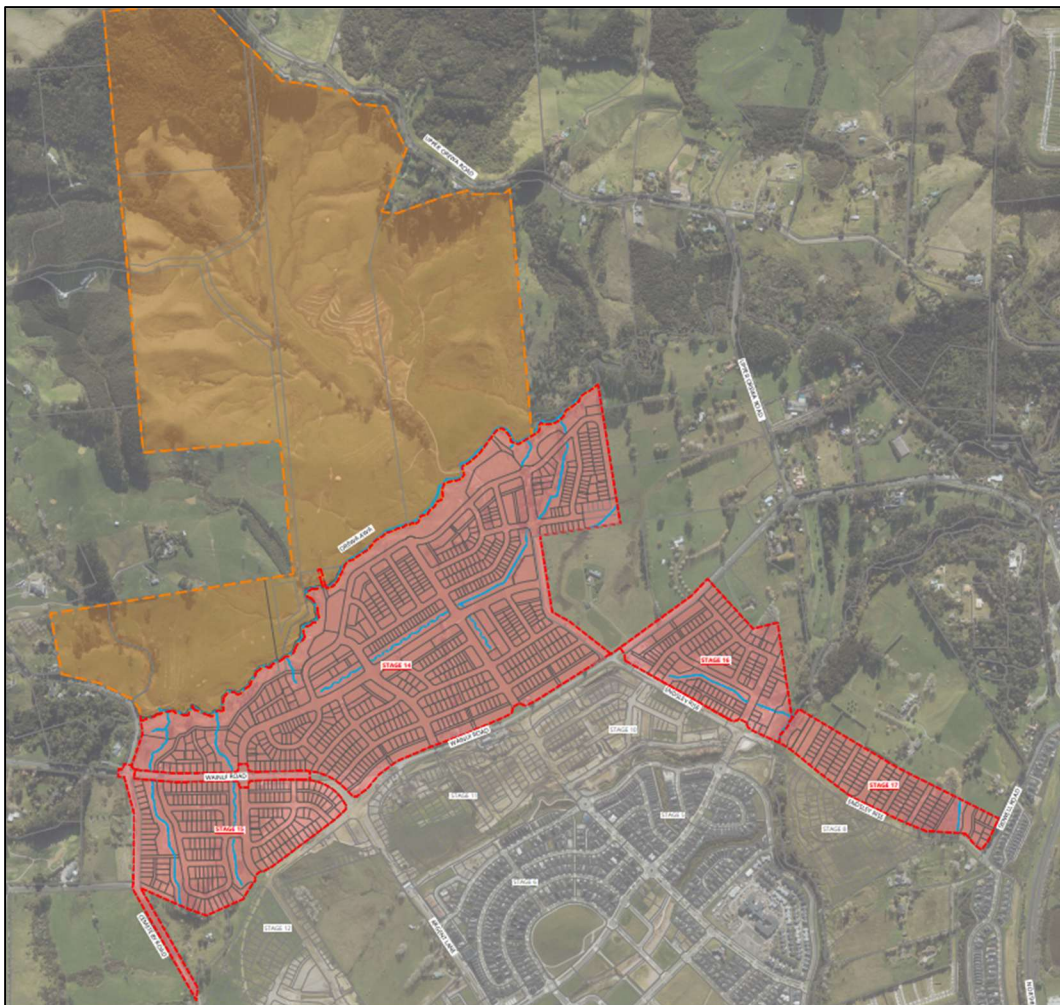


Image 1: Site Location Overview

1.3. Project Description

FHLD is proposing the subdivision and development of the site into a medium density residential development. The proposal will result in the development of the site into 926 residential lots, 44 residential superlots, one commercial superlot, jointly owned access lots (JOALs) and roads to vest, esplanade reserves and other reserves to vest, and all associated works, landscaping and infrastructure.

The development will require land and stream modification works to facilitate Stages 14-17 of the Fast-track application. This includes bulk earthworks across the site to refine the site to the required finished levels.

The proposal also includes localised earthworks within Te Korowai o Maraeariki to facilitate private water-supply and wastewater infrastructure, where required under the applicable servicing scenario. The proposed bulk works comprises of the following:

- Earthworks 14.1 (EW14.1) will involve approximately:
 - 241,119 m³ of cut;
 - 258,152m³ of fill;
 - Over an area of approx. 41.1 ha (including 6.0 ha within Te Korowai o Maraeariki); and
 - 17,033 m³ fill material to be imported from existing Milldale excess material stockpiles.
- Earthworks 14.2 and 15 (EW14.2 and EW15) will involve approximately:
 - 359,695 m³ of cut;
 - 416,615m³ of fill;
 - Over an area of approx. 46.8 ha (including 3.0 ha within Te Korowai o Maraeariki); and
 - 57,920 m³ fill material to be imported from existing Milldale excess material stockpiles.
- Earthworks 16 and 17 (EW16 and EW17) will involve approximately:
 - 135,780 m³ of cut;
 - 163,154m³ of fill;
 - Over an area of approximately 18.3 ha; and
 - 23,894 m³ fill material to be imported from existing Milldale excess material stockpiles.

These bulk works include the following works:

- Staging sites for site compounds and temporary stockpiling areas;
- Cut depths of up to 11m and fill depths of up to 7m (as reflected in the provided Cut/Fill Plans);
- Streamworks, including stream removal, diversions, culvert removals and culvert installations;
- Wetland reclamation works;
- Geotechnical stabilisation works;
- Construction of retaining walls and reinforced slopes;
- All associated erosion and sediment controls;
- Preloading/surcharging of compressible soils for ground improvement and settlement mitigation;
- Stabilising the site upon the completion of earthworks in preparation of civil works; and
- Localised earthworks within Te Korowai o Maraeariki, including: Platforming for the private wastewater and water treatment infrastructure; construction of the surface-water reservoir with approximately 80,000m³ capacity; and construction of the wastewater dispersal wetland.

The proposal also includes the creation of approximately 2.7 ha of ecological offset wetlands within Te Korowai o Maraeariki. These works are separate from the bulk earthworks addressed in this report and will be detailed through separate ecological design and management documentation.

The associated drawing set for this consent application, including indicative earthworks, staging, and erosion and sediment control arrangements, is provided in **Appendix A**. This includes the Te Korowai o Maraeariki plans, highlighting the extent and associated volumes of the localised earthworks noted above.

Due to the scale of the proposed works, the bulk earthworks are planned to be completed over three non-winter earthworks seasons. A potential fourth earthworks season has been allowed within the proposed civil staging as a contingency if unforeseen ground conditions or extended wet-weather periods delay the planned programme.

2. LANDFORM DESIGN

Milldale Stages 14–17 is comprised of non-contiguous earthworks areas, with variable existing ground conditions and topography. The site contains a number of existing watercourses, many of which are abutted by steep terrain.

The overall landform is influenced by two principal drainage corridors: the Orewa Awa through Stages 14 and 15 and Te Korowai o Maraeariki, and Waterloo Creek through Stages 16 and 17. These corridors, together with the adjoining road network, neighbouring property boundaries and existing Milldale development, have strongly influenced the proposed subdivision layout and finished landform.

The subdivision has been designed to respond to the existing landform and site constraints, with specific regard for existing watercourses, steep contours, the Orewa Awa terrace, Waterloo Creek, and neighbouring property boundaries. Priority has been given to forming a logical extension of the existing Milldale development, while coordinating pedestrian, active mode and vehicular networks through the proposed stages.

The landform design has also been coordinated with the ecological, groundwater, stormwater and geotechnical assessments prepared for the application. This has included consideration of retained and realigned stream corridors, esplanade reserves, drainage reserves, stormwater management areas, groundwater diversion and recharge, geotechnical ground improvement, and safe earthworks practices.

Overall, the landform design seeks to balance the existing site topography with the delivery of practical residential lots, compliant road gradients, integrated stormwater and stream corridors, and a connected urban structure. Where practicable, roads have been aligned to follow the natural contour of the land, with mid-block retaining walls and reinforced earth slopes used to manage level differences and minimise secondary earthworks following lot development.

The resulting landforms, as described further in the following sub-sections, are reflected in the provided Design Contour Plans (Sheets 1100-EW to 1103-EW), included within **Appendix A**.

2.1. Stages 14 & 15 Landform

The landform of Stages 14 and 15 is largely defined by Wainui Road to the south, Gervin Road to the east and the Orewa Awa corridor to the north. The existing terrain generally falls northward from the Cemetery Road Extension and Wainui Road ridgeline towards the Orewa Awa.

The portion of Stage 14 located closest to the Orewa Awa, while elevated above the existing river terrace, is relatively flat. In this area, existing ground gradients are generally less than 3%, meaning the proposed landform can be achieved with minimal vertical controls and comparatively limited cut and fill operations. An esplanade reserve is proposed alongside the Orewa Awa, providing separation between the proposed development and the river corridor.

The southern portion of Stage 14, closer to Wainui Road, is steeper and more undulating. This part of the development requires greater optimisation of cut and fill to achieve practical residential lot platforms. Sweeping vertical controls, typically in the form of reinforced earth slopes with isolated retaining walls, are proposed to absorb level differences through the blocks and assist in delivering flat, practical lots. Some local roads extending perpendicular to Wainui Road are steeper as a result of the existing topography, although these remain within Auckland Transport gradient requirements.

Stage 15 contains the steepest terrain within Stages 14 and 15, including the areas surrounding the retained Stream I2 and Stream I3 corridors. Due to the steep terrain, more intensive vertical controls are required through this area, including retaining walls and reinforced earth slopes, to manage level changes while still enabling practical road grades and flat residential lots.

The stream network has been considered alongside the proposed road and block layout. The principal intermittent stream corridors are generally proposed to be retained or realigned within drainage reserves, where practicable, with road crossings minimised through considered block layout arrangements. These retained and realigned corridors have also been coordinated with the stormwater management network, including proposed stormwater wetland devices.

Stream I7, together with portions of Stream I8, forms a key central corridor through Stage 14. This corridor has influenced the arrangement of surrounding roads, blocks and active mode connections, and provides an important linkage through the centre of this part of the development. Portions of this corridor are proposed to be retained, realigned or naturalised where required to achieve a practical urban form, while still maintaining a clear and coordinated stream-edge corridor.

Shorter stream and wetland features located immediately alongside the Orewa Awa are generally proposed to be retained as far as practicable. These features are largely located within or adjacent to the proposed esplanade reserve and, due to their position at the northern edge of the development area, have limited influence on the broader block layout or landform design.

Overall, the landform design for Stages 14 and 15 responds to the variable existing terrain by applying a proportionate level of earthworks and vertical control across the development area. Flatter areas near the Orewa Awa require minimal intervention, while the steeper areas near Wainui Road and through Stage 15 require more significant cut, fill, retaining walls and reinforced earth slopes.

Where practicable, the road layout has been arranged to follow the natural contour of the land, including the use of contour roads to minimise unnecessary earthworks and reduce the extent of vertical controls required. This approach enables practical residential lots, compliant road grades, coordinated stream corridors and a connected urban structure that responds to the natural fall of the land towards the Orewa Awa.

2.2. Stage 16 & 17 Landform

The landform of Stages 16 and 17 is generally defined by Endsley Rise to the south, Wainui Road to the west, Waterloo Creek through the centre of the area and rural pastureland to the north. The two stages sit on either side of Waterloo Creek, with Stage 16 located to the west and Stage 17 located to the east.

Stage 16 is triangular in shape and falls from the Wainui Road ridgeline towards Waterloo Creek. The western portion of this stage, closer to Wainui Road, is steeper and requires greater cut and fill optimisation to provide practical residential lot platforms. The road and block layout has been arranged to respond to this fall, with vertical controls incorporated where required to absorb level differences and maintain practical lot and road gradients.

Stage 17 is narrower and contains a pronounced ridgeline through the centre of the stage. This creates the steepest isolated area within the proposed development and has strongly influenced the proposed road and block configuration. Due to the constrained width and steep terrain, the layout relies on shorter contour roads, which generally follow the natural landform while also allowing for future road connections to adjoining land. Intensive mid-block vertical controls, including retaining walls and reinforced earth slopes, are required through this area to manage level changes and deliver flat, practical lots.

Coordination of boundary levels has also been a key consideration for Stage 17, particularly with the neighbouring rural parcel to the north and the upgraded section of Endsley Rise to the south. The proposed landform has therefore been designed to balance the internal subdivision requirements with appropriate tie-ins to surrounding land and infrastructure.

Waterloo Creek, also identified as Stream P2 on the Streamworks Plans, forms the principal watercourse through this area and is located along the boundary between Stages 16 and 17. This corridor is proposed to be retained and incorporated within an esplanade reserve, with drainage and stormwater management areas coordinated alongside it. Stream I10, being the only intermittent stream within Stage 16, is also proposed to be largely retained, with minor realignment required to facilitate the proposed culvert crossing. Stream P3 briefly extends through the eastern side of Stage 17 and is similarly proposed to be retained and coordinated with the stormwater management network. Where practicable, intermittent stream corridors are to be located within drainage reserves.

Wetlands are common across Stages 16 and 17, including a large natural wetland within Stage 16. These wetland features are generally proposed to be reclaimed and offset as part of the wider stream and wetland mitigation strategy for the development.

Overall, the landform design for Stages 16 and 17 responds to the constrained and steep existing terrain by using a combination of optimised cut and fill, contour roads, retaining walls and reinforced earth slopes.

This approach enables practical residential lots and compliant road gradients to be achieved, while retaining and integrating the key Waterloo Creek corridor within the proposed urban structure.

2.3. Te Korowai o Maraeariki Landform

Te Korowai o Maraeariki is located north of the Orewa Awa and is not proposed for residential development. Earthworks within this area are limited to localised works required to facilitate interim private water and wastewater infrastructure and the wastewater dispersal wetland, where required under the applicable servicing scenario.

The area is characterised by a diverse watercourse network and variable topography, with much of the land comprising steep slopes in excess of 20% grade. The majority of watercourses within this area generally converge towards a major tributary of the Orewa Awa, which intercepts the river near the north-eastern corner of Stage 14.

Isolated flatter areas are located immediately north of the Orewa Awa terrace. These areas have been selected for the proposed water infrastructure, including the surface-water reservoir, groundwater bore, wastewater treatment plant and water treatment plant. Flatter land within this area has also been identified for ecological offset wetland construction, responding to recent Council feedback regarding the suitability of offset wetland locations.

The proposed wastewater dispersal wetland is located further north within Te Korowai o Maraeariki and is co-located near existing offset wetlands on similarly graded terrain. The selection of this site, including the associated bund design, has been coordinated with the requirements of Auckland Council's GD06 land dispersal guidance.

Overall, the proposed landform within Te Korowai o Maraeariki is limited to the localised servicing infrastructure and wastewater dispersal works required to support the wider development. The proposed works have been positioned to utilise suitable flatter areas where practicable, while avoiding unnecessary bulk earthworks across the steeper parts of this area.

2.4. Stream and Wetland Removal

As shown on the proposed streamworks (Sheets 1450-EW to 1453-EW), included in **Appendix A**, there are several reaches of intermittent streams and wetlands that will be reclaimed, realigned or offset as part of this consent application.

The existing stream and wetland features have been classified as part of the Viridis Ecological Impact Assessment for Milldale Stages 14–17, which is provided separately.

Due to the natural contour of the site and the constraints associated with stream and wetland retention, a holistic approach has been taken to balancing ecological, urban design, stormwater and geotechnical outcomes. This has involved identifying key streams for retention, realignment and enhancement, with the net stream and wetland loss proposed to be addressed through offset mitigation.

This approach enables practical urban design outcomes for Stages 14–17, while providing for ecological enhancement through the retained and realigned stream corridors, onsite enhancement works, and wider stream and wetland offset proposals. The retention and realignment of key streams also allows a logical urban layout to be designed around those corridors, including drainage reserves alongside the majority of retained and realigned intermittent streams, and esplanade reserves alongside the Orewa Awa and Waterloo Creek.

The proposed streamworks and wetland removal have also been coordinated with the wider Milldale development pattern. While Stages 14–17 are not strictly part of the Wainui Precinct Plan area, the proposed layout has been designed as a logical extension of the existing Milldale development, which has itself been developed in accordance with the wider Wainui Precinct structure.

The realignment of the upper reaches of streams also provides opportunities for geotechnical ground improvement works. This includes the removal of unsuitable ground conditions flanking the upper reaches of key streams, which will be replaced with engineered fill where required. This engineered fill will assist in buttressing the steeper ground above the streams.

Stream recharge has been considered within the stormwater design for Stages 14–17. This is achieved by directing post-development stormwater catchments to outlet at the heads of retained intermittent streams where practicable. Underfill drainage networks associated with geotechnical ground improvement works will also be directed to stream heads to re-route groundwater diversion as another form of stream base flow.

Overall, the proposed design balances urban design, ecological, stormwater and geotechnical outcomes. The removal, realignment, enhancement and protection of stream and wetland features has been coordinated to enable a functional urban layout, while still providing for retained stream corridors, drainage reserves, esplanade reserves and offset mitigation across the wider development.

3. STAGING OF WORKS

Due to the scale of the proposed works, the bulk earthworks are planned to be completed over three non-winter earthworks seasons. The total area worked within an individual season may range from approximately 20 ha to 50 ha; however, no more than 30 ha of bulk earthworks will remain open and active at any one time, with completed areas progressively stabilised before further areas are opened.

A potential fourth earthworks season has been allowed within the proposed civil staging as a contingency. This provides flexibility if unforeseen ground conditions or extended wet-weather periods delay the planned three-season programme.

As each season of works is completed, the completed earthworks areas will be stabilised and made available for subsequent civil works stages.

Where practicable, the seasonal earthworks areas have been arranged to be largely contiguous. This is intended to assist with efficient construction sequencing, minimise haul distances for cut-to-fill operations, and reduce the need for isolated earthworks fronts. Localised earthworks within Te Korowai o Maraeariki will also be undertaken as part of the relevant earthworks seasons, noting that these works are necessarily isolated from the main residential development stages.

Ahead of each earthworks season, it is proposed that a seasonal works plan will be prepared to confirm the extent of works to be undertaken within that season. This plan will be accompanied by a staging plan and erosion and sediment control plan for the scope of the planned works, and will be submitted to Auckland Council for certification or approval in accordance with the relevant conditions of consent.

These plans will allow for minor refinements to the indicative staging shown in the consent drawing set, while remaining consistent with the overall earthworks methodology and the Adaptive Management Plan.

The timing of the works will depend on the final construction programme and, in part, the availability of public servicing. Civil and subdivision works will generally follow completion and stabilisation of the corresponding bulk-earthworks area.

Indicative Staging Plans have been provided in the engineering drawing set (Sheets 1500-EW to 1505-EW), as included in **Appendix A**. These plans are indicative only and will be refined ahead of each earthworks season.

Works within each season will be undertaken in accordance with the general earthworks methodology below:

3.1. Phase 1 - Enable Sediment and Erosion Controls

- Pre-construction documents completed to address pre-works conditions of consent.
- Pre-construction meeting held.
- Clearing works undertaken. Existing dwellings, sheds and farming related structures cleared. Vegetation protected where required, and remaining vegetation cleared and removed or mulched.
- Install 'Last Line of Defence' Super Silt Fence along riparian margins to be retained.
- Install clean water cut off drains.
- Once associated temporary controls are in place (including any silt fences and / or Decanting Earth Bunds), progressively construct Sediment Retention Ponds (SRPs) as required to enable bulk earthworks.
- As-built and certify all sediment and erosion controls.

3.2. Phase 2 - Bulk Earthworks Commencement

- Strip topsoil within catchments with certified sediment and erosion controls and stockpile topsoil clear of the works. Drawings included in **Appendix A** indicate possible lay down areas. Topsoil stockpiles will be placed within the extent of work.
- Enable streamworks as required under Phase 3 below.
- Undertake necessary geotechnical remediation works in fill areas prior to placement of fill.

- Commence bulk cut to fill operations.

3.3. Phase 3 - Enable Streamworks

- All streamworks pre-construction conditions satisfied.
- All streamworks management plans approved by Council.
- All necessary sediment and erosion control devices installed and approved by Council.
- Where possible establish and stabilise new stream diversion on proposed alignment ahead of streamworks under Phase 2 above.
- Undertake fish capture and relocation in accordance with the approved Native Fish Capture and Relocation Plan.
- Dewater streams and ponds in accordance with approved Native Fish Capture and Relocation Plans.
- Establish flow bypass controls where required.
- Strip topsoil and organic material from streams to be removed / diverted / realigned.
- Carry out streamworks including culvert daylighting, culvert installations, stream removal and stream realignments.
- Install instream enhancements – root wads, lunkers, pools, etc, as per ecological recommendations.
- Seek ecological certification prior to completion.
- Stabilise works sites upon completion.
- Remove bypass controls and liven new streams / culverts.

3.4. Phase 4 - Bulk Earthworks Completion

- Progressively complete bulk earthworks.
- Install retaining features – retaining walls and reinforced earth slopes (RE Slopes)
- Trim to subgrade levels.
- Survey subgrade and provide to engineer for approval.
- Progressively place topsoil to depth outlined within specifications.
- Stabilise topsoil areas and completed stockpiles with straw mulch (and seed / fertilise if required) or sow grass and monitor for suitable grass strike.
- Stabilised areas will be diverted away from SRPs and other controls using Clean Water Drains (CWD).
- Install clean water upstands at top of batters and bunded off areas to divert clean water and minimise ponding.

3.5. Phase 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 any controls that will be considered redundant for use with any future works.
- Install SSF or DEB for removal of SRPs.
- Remove structures within SRP.
- Undertake cut to fill operation within SRP area.
- Prepare for and topsoil area, then stabilise.

Note - Where possible, sediment and erosion control devices to be retained and reutilised for the subsequent civil works stages.

4. EROSION & SEDIMENT CONTROL METHODOLOGY

4.1. Overview

A best practice management strategy will be implemented for the proposed earthworks. This will involve the application of best practice from Auckland Council Guidance Document 2016/005 (GD05), Amendment 3. It is noted that the adaptive management approach has been and is being undertaken on adjacent earthworks sites. This assesses the performance of the sediment and erosion control network and then adapts in response to any non-conforming performance or sediment discharges should they occur.

The primary sediment controls for the site will be sediment retention ponds (SRP). Secondary controls include decanting earth bunds (DEB) for smaller areas not captured within SRP catchments, silt fences, and / or super silt fences. There will also be a strong focus on erosion prevention prior to rain events.

Under this consent there is approximately 108 hectares of earthworks area, of which it is proposed to have a maximum of 30 hectares open at any one time.

The earthworks cut-to-fill volumes are planned to be completed over three non-winter earthworks seasons. A potential fourth earthworks season has been allowed as a contingency if unforeseen ground conditions or extended wet-weather periods delay the planned programme. The works will be progressively stabilised as areas are completed and before winter.

The works will be staged as the Contractor expands the scale of their operation into the height of summer. The methodology is to gradually extend the area open to earthworks, complete the works and progressively stabilise completed areas. Emphasis will be placed on getting areas cut / filled to grade as quickly as possible and then immediately stabilised.

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. This team will undertake pre and post storm surveys and discuss Erosion and Sediment Control Methodology at weekly site meetings. At all times the team will utilise a significant resource and "expertise base" to ensure appropriate and technically sound decisions are made. Stakeholders involved in the project will include:

4.2.1. Principal - Fulton Hogan Land Development Ltd

Fulton Hogan Land Development Limited is committed to development of their landholdings at Milldale, Wainui East in an environmentally responsible manner. The Principal has an environmental policy in which they are committed to protecting the environment from damage and minimising nuisance from its operations and activities through effective planning and site management and controls.

The Principal has an excellent track record in managing environmental effects. They are prepared to invest in additional measures that will enable robust systems to be utilised in the effective management of environmental risks.

4.2.2. Civil Engineering, Planning & Surveying - Woods

Woods have been engaged by FHLDL to provide civil engineering, planning and surveying services associated with development in Milldale. Woods will act as the lead consultant on the project and liaise with the Principal, all other members of the project team, and 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 compliance documents.

Woods has an excellent track record in managing large residential projects and has a wealth of in-house knowledge to prepare and administer effective sediment and erosion control plans.

Woods will prepare contract documents with a significant allocated budget to allow Contractors to implement sediment and erosion controls and manage the site for the duration of works. Contract allowances will provide sufficient scope for adjusting sediment and erosion control as required in advance of rain events.

4.2.3. Independent Expertise and Oversight - Southern Skies

Southern Skies have been engaged by FHLDL to provide technical expertise as specialists in sediment and erosion control and are the author of the Adaptive Management Plan for Milldale (AMP). Southern Skies have been involved with the Milldale project in this capacity for six years and have a strong understanding of how the site operates during earthworks construction.

As set out in the AMP, Southern Skies monitor water turbidity within key waterways as a marker of the sites performance during rain events. Southern Skies undertake site walkovers following rain fall trigger events, report on the sites performance managing those rain events and provide recommendations for the adaptive management of the site.

These recommendations are then implemented under the contract works.

4.2.4. Earthworks Contractor - TBA

The Principal will appoint a suitably experienced earthmoving Contractor with experience in large earthmoving projects. This Contractor will have experience with many of the commonly used erosion and sediment control practices detailed in GD05 as well as a history of implementing other innovative measures to improve erosion control and discharged water quality. The Contractor will be responsible for implementation, management and maintenance of erosion and sediment control measures. The Contractor 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.

Prior to the pre-construction meeting the Contractor shall produce all pre-construction documentation including:

- Construction Management Plan (CMP);
- Updated Sediment and Erosion Control Plan (SECP);
- Chemical Treatment Management Plan (CTMP);
- Dust Management Plan (DMP); and
- Any other plans and documentation required to address the pre-construction conditions of resource consent.

As we have experienced in previous stages of bulk earthworks, the Contractor plays a critical role in the successful performance of the sediment and erosion control network. There will be a strong emphasis on the Contractor's sediment and erosion control track record when tendering for the works. Only Contractors with an excellent record will be considered when awarding works that fall under this consent.

4.2.5. Statutory Authorities - Auckland Council (AC)

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

4.3. Erosion and Sediment Control Measures

The primary sediment controls for the site will be sediment retention ponds (SRP). Secondary controls include decanting earth bunds (DEB) for small areas that fall outside of the SRP catchments, silt fences and super silt fences will also be utilised. There will also be a strong focus on erosion prevention prior to rain events.

Sediment and Erosion Control plans have been prepared for the layout of devices and the associated catchments (as shown on drawings P25-609-1500-EW to P25-609-1503-EW). The controls will be established at the start of the earthworks season in preparation for the works.

Upon completion of erosion and sediment controls within each catchment as-built plans will be provided, and a site inspection held with Auckland Council seeking approval to proceed with the associated bulk earthworks.

All controls are to be designed, constructed and operated in accordance with GD05.

One of the most significant learnings from previous earthwork projects was for the need to maintain the primary and secondary sediment retention devices following rain events. Monitoring undertaken by Southern Skies for the adaptive management of Earthworks 2 (EW2) showed that SRP efficiencies were excellent when operated in accordance with GD05 and ready achieved the documented 90% sediment removal efficiency.

A Chemical Treatment Management Plan (CTMP) will be submitted by the Contractor with pre-construction documents. The CTMP will detail the proposed flocculant treatment for the primary devices. The application of Chemical Treatment will be via rainfall activated treatment systems and shall be undertaken in accordance with GD05 and the Contractors approved CTMP.

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

- Clean Water Diversion Drains;
- Stabilised access roads;
- Contour Drains;
- Super Silt fences located along all the margins of watercourses;
- Silt Fences;
- Hay Bales;
- Grass Filter Strips; and
- Other controls if areas can no longer be serviced by the proposed devices.

4.4. Last Line of Defence

The 'last line of defence' approach will be implemented as a backup to the primary controls.

The aforementioned SRPs and DEBs form the primary erosion and sediment control measures used to minimise the discharge of the sediment to the receiving environment. Beyond these primary controls, an extra line of defence is proposed. Super silt fences will provide a backup protection during the initial setup of primary controls and for any small catchments around the extents of the site that may bypass the primary devices.

It is proposed to erect a super silt fence (SSF) immediately beyond the extent of earthworks as a 'last line of defence' along both sides of all retained watercourses around the extents of the site.

These SSFs will be regularly monitored during weekly site inspections, and before and after each significant rainfall event. Any damage or maintenance work shall be attended to immediately after discovery.

4.5. Site Inspections

The site will be regularly inspected during the course of the works.

The aim of these inspections is to ensure that all erosion and sediment control devices are installed correctly and are operating 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 the conditions of consent and GD05. The inspection regime will keep sediment and erosion control management at the forefront of works on site. Any potential problems will be swiftly identified, and remedial works shall be promptly carried out.

The inspection programme shall consist of:

Weekly site walkovers involving all stakeholders to inspect and determine the effectiveness of all erosion and sediment control devices installed on site;

Pre-rain event monitoring involving all stakeholders to inspect and confirm all devices are operational for the predicted rain event and assess the site for any further controls that may need to be established prior to the rain event; and

Post-rain event inspections will also be carried out to assess the effectiveness of devices and the performance of the sediment and erosion control network as a whole.

Any remedial works shall be documented during these monitoring inspections and immediately attended to.

4.6. Streamworks Management & Culvert Installation

Streamworks and culvert works are necessary to enable the land for urban development. Works will be carefully managed to ensure activities do not generate sediment discharges into watercourse.

These works will be carefully planned with the contractor on site ahead of each earthworks season. This will be done in accordance with the 'staging of works' methodology in section 3 above. Particular emphasis will be placed on ensuring best practice sediment and erosion control measures are implemented for stream and culvert works.

4.7. Dust Management

A site-specific Dust Management Plan (DMP) will be prepared for each earthworks season and submitted to Auckland Council for approval prior to the commencement of the relevant seasonal works.

Each DMP will identify the dust mitigation, monitoring and response measures to be implemented for that season, having regard to the extent and location of works, sensitive receivers, prevailing site conditions and the Contractor's proposed construction methodology.

While the approved DMP will ultimately provide the management regime for dust nuisance mitigation, the following measures will be expected as part of an effective dust mitigation strategy for this site. Allowance will be made in the construction contract for implementation of these dust control measures.

- The Contractor shall prepare a site specific DMP for each earthworks season and implement the approved measures for the duration of the relevant works;
- The Contractor is to monitor dust emissions daily and implement appropriate measures as necessary;
- The Contractor shall provide sufficient water carts and/or sprinklers that to ensure that the exposed areas of the site are appropriately moistened to avoid dust nuisance towards neighbouring properties.
- On site traffic management, including specific traffic control measures in areas that are sensitive to dust generation;
- The site is to be watered at the end of each working day when it is considered that a dust nuisance may exist following the close of works for that day. (unless there is sufficient rain or showers, falling or forecasted);
- The site is to be watered if strong winds are forecast, and these coincide with dry ground conditions to avoid dust nuisance towards neighbouring properties;
- Adjoining owners will be informed with a pre-construction communication which will include a 24-hour contact telephone number to call the site Contractor for dust and other complaints;
- The Contractor is to promptly implement additional dust control measures when a complaint is received, and they are to note the complaint, outcomes, and actions;
- A record of dust events and complaints are to be recorded in weekly site meetings;
- 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 over these areas. Monitoring of this revegetation is to be undertaken to ensure good uptake until stabilisation is achieved;
- A 3m high dust fence can be erected along the boundary of a neighbouring property where an actual dust nuisance has arisen;
- Stockpiles to be stabilised if not in use;

- When loading / unloading trucks, materials are to be dropped from as low a height as practicable;
- Removal of sediment or dust generating materials from the access roads, haul roads, and public roads with a suction sweeper; and
- Use of a wheel wash facility that also has capabilities to wash dust from vehicles.
- Dust monitoring procedures in accordance with the approved site-specific DMP;
- Complaint response procedures in accordance with the approved site-specific DMP.

5. GEOTECHNICAL WORKS

Gibb Ritchie Geotechnical Engineers have been engaged to undertake geotechnical investigations of the site and have prepared a Geotechnical Investigation Report (GIR), which is provided separately.

All earthworks and geotechnical remediation works will be undertaken in accordance with this GIR.

All earthworks and geotechnical remediation works will be supervised by a suitably qualified geotechnical engineer.

At the completion of works a Geotechnical Completion Report will be prepared.

6. CONCLUSION

Fulton Hogan Land Development Ltd (the Applicant) is seeking resource consent approval under the Fast-track Approvals Act 2024 for Earthworks 14–17, Milldale.

The EW14.1 works will involve approximately 241,119 m³ of cut and 258,152 m³ of fill over an area of approximately 41.1 ha, including 6.0 ha within Te Korowai o Maraeariki.

The EW14.2 and EW15 works will involve approximately 359,695 m³ of cut and 416,615 m³ of fill over an area of approximately 46.8 ha, including 3.0 ha within Te Korowai o Maraeariki.

The EW16 and EW17 works will involve approximately 135,780 m³ of cut and 163,154 m³ of fill over an area of approximately 18.3 ha.

The bulk earthworks are planned to be completed over three non-winter earthworks seasons, with seasonal works planning, erosion and sediment control plans, and progressive stabilisation undertaken as each area is completed. A potential fourth earthworks season has been allowed within the proposed civil staging as a contingency if unforeseen ground conditions or extended wet-weather periods delay the planned programme.

The proposed earthworks methodology has been developed with regard to the existing landform, watercourses, ecological features, geotechnical conditions and stormwater requirements. The works will also be managed in accordance with the Adaptive Management Plan for Stages 14–17, prepared by Southern Skies.

The Applicant has an excellent track record on similar scale earthworks operations within the region and is committed to undertaking these works in an environmentally responsible manner.

Through the implementation of the management strategies and methodologies outlined in this report, we consider that Earthworks 14–17, Milldale can be successfully managed with no more than minor effects.

APPENDIX A -

MILLDALE STAGES 14 TO 17 - ENGINEERING PLANS (BOUND SEPARATELY)

APPENDIX B -

MILLDALE - CONSTRUCTION MANAGEMENT PLAN

Milldale Construction Management Plan Requirements (CMP)

Date: 31 July 2026

Status: Draft - Subject to Contractor Construction Methodology

This document provides a preliminary outline of the content expected to be included within Construction Management Plans (CMPs) required as pre-construction conditions for each earthworks season or subdivision works stage within the Milldale Fast-track works.

Following award of each relevant earthworks or subdivision construction contract, the appointed contractor shall prepare a site-specific CMP. Each CMP shall be tailored to the relevant season or stage of works and submitted in accordance with the applicable resource consent conditions.

Each CMP shall include, but not be limited to, the following information:

1. Project Description

Details of the Project Description will be provided for each earthworks construction season and each sub-stage of civil construction.

The Project Description will be contract and stage specific, and include the following details:

- a) Site location
- b) General scope of works
- c) Specific construction elements to be undertaken, i.e. earthworks, drainage works, retaining, landscaping, etc.
- d) Project deliverables, i.e. completed subdivision, stage numbers
- e) Timeframes for key stages of works

2. Project Management

Details of Project Manager(s) to be provided for each earthworks construction season and each sub-stage of civil construction.

Project Manager(s) will be contract and stage specific. The CMP shall include the following details:

- a) Site Supervisor – name and contact information
- b) Project Engineer – name and contact information
- c) Project Manager - name and contact information
- d) Project Director - name and contact information

3. Health and Safety Plan

Health and Safety Plans shall be prepared specifically for each earthworks construction season and each sub-stage of civil construction.

The contractor shall take responsibility for preparing an appropriately detailed Health and Safety Report and implement the Health and Safety Plan for the duration of the works.

The Health and Safety Plan shall include but not be limited to the following information:

- a) Site-specific health and safety managers and contact details. Identify roles and responsibilities
- b) Site-specific health and safety risks
- c) Identification of hazards and risks specific to the project
- d) Risk Assessment and management controls
- e) Procedures for undertaking High Risk Activities
- f) Site layout of Health and Safety inventory on site
- g) Sign in procedures for visitor management
- h) Emergency management response
- i) Health and Wellbeing procedures
- j) Incident Reporting and investigation procedures
- k) Required Personal Protective Equipment (PPE)
- l) Monitoring and review procedures

4. Working Hours

The hours of construction work are to be identified in the plan and are to be in accordance with the approved Resource Consent conditions. The proposed condition in the application is:

All construction works authorised by this consent must only take place between 7.00am and 6.00pm, Monday to Saturday, with no works undertaken at any time on Sundays, or on public holidays.

Machinery and heavy vehicles operated between 7.00am and 7.30am must be located at least 130 m from any occupied building. Vibratory pile driving, mulching, chipping, bored piling and chainsaw work must only take place between 7.30am and 6.00pm, Monday to Saturday. Chipping and mulching must not take place within 60 m of any occupied building

5. Site Access

Details of Site Access will be provided for each earthworks construction season and each sub-stage of civil construction.

Site Access will be contract and stage specific and include the following details:

- a) A plan showing the stage of works, including street / road names
- b) Site ingress and egress locations
- c) Site compound and site office locations.
- d) Location of signage and hazard boards.

- e) Extent of security fencing
- f) Location of wash down facilities at egress locations
- g) Location of first aid and health and safety equipment.

6. Construction Traffic Management Plan

Construction Traffic Management Plan (CTMP) shall outline measures to ensure the safe and efficient movement of vehicles, pedestrians, and cyclists in and around the construction site. The plan shall include details around the access to the site to comply with the Code of Practice for Temporary Traffic Management (CoPTTM) and all relevant local and national regulations.

Details of Construction Traffic Management will be provided for each earthworks construction season and each sub-stage of civil construction.

Within Milldale Construction Traffic will be managed in a way to minimise any disruption to residents within the development and to users on the surrounding road network.

Construction Traffic Management will be contract and stage specific and include the following details:

- a) Provide a parking management plan for construction traffic.
- b) Address the transportation and parking of oversize vehicles (if any).
- c) Provide appropriate loading / working areas to minimise disruption to traffic.
- d) Provide cleaning facilities within the site to thoroughly clean all vehicles prior to exit to prevent mud or other excavated material from being dropped on the road. In the event that material is dropped on the road, resources should be on hand to clean-up as soon as possible.
- e) Provide traffic management plans in compliance with the latest edition of the NZTA “Code of Practice for Temporary Traffic Management” (COPTTM) document.
- f) Ensure the site access point shall be clearly signposted.
- g) Include measures that are to be adopted to ensure that pedestrian access on the adjacent public footpaths in the vicinity of the site is safe during construction works.
- h) Detail how the works will be undertaken to maintain access to properties adjacent to the work site during construction and address the duration time frame for sites with no-vehicle access during the works.
- i) Identify proposed numbers and timing of heavy vehicle movements throughout the day.
- j) Identify the location of vehicle and construction machinery access during the period of site works.
- k) Identify the storage and loading areas for materials and vehicles.
- l) For each construction phase, identify the location and duration of any road or lane closures, division of road closures into segments, duration of works in each closure, indication of detour routes for each closure and assessment of the effects on the Auckland Transport Road network of any road closures and a plan to mitigate these effects.
- m) Detail how communication with drivers regarding diversion routes will be undertaken, and how this will be monitored to confirm the expected level of diversion is achieved.

- It is the responsibility of the Contractor and/or Applicant to obtain the relevant traffic management approvals from Auckland Transport.

A large and visible notice board will be located at the site entry points and be clearly visible to any construction traffic prior to entering the site. The notice board will include site hazards along with contact details for the Site Manager. Examples of the site notice boards;

[illegible]

Details of Environmental Management shall be provided for each season of earthworks or stage of subdivision works.

Environment management plans prepared within the CMP shall be in accordance with the requirements of the resource consent conditions.

9. Sediment and Erosion Control Plan

Prior to the commencement of each earthworks construction season and each sub-stage of civil construction on the subject site, finalised Erosion and Sediment Control Plans must be prepared in general accordance with the application documents referenced in condition 1 and in general accordance with Auckland Council Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016, Incorporating Amendment 2 (GD05), and submitted to the Council. No earthworks activity on the subject site must commence until the Council has confirmed that the ESCP(s) satisfactorily meets the requirements of GD05. The plans must contain sufficient details to address the following matters:

- a) specific erosion and sediment control measures for the earthworks stages (location, dimensions, capacity) including the location of any sediment retention ponds and decanting earth bunds, super silt fences, clean and dirty water diversion bunds and stabilised construction entrances, in general accordance with GD05;
- b) supporting calculations and design drawings as necessary;
- c) details of construction methods;
- d) monitoring and maintenance requirements;
- e) catchment boundaries and contour information as necessary;
- f) confirmation of any erosion and sediment control measures associated with construction of pedestrian bridges and culvert installation; and
- g) details relating to the management of exposed areas (e.g. grassing, mulching).
- h) Outline conformance measures to ensure compliance with the approved Adaptive Management Plan (AMP)
- i) Site inspection procedures including timings for regular inspections and specific inspections for rainfall trigger events as detailed in the AMP.
- j) Streamworks management and detailed methodologies for in-stream works, such as culvert installation

10. Chemical Treatment Management Plan

Prior to the commencement of earthworks activity on the subject site, a Chemical Treatment Management Plan (ChTMP) must be prepared in general accordance with Auckland Council Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016, Incorporating Amendment 2 (GD05), and submitted to the Council. No earthwork activities must commence until confirmation is provided by the Council that the ChTMP meets the requirements of GD05, and the measures referred to in that plan for the sediment retention ponds and / or decanting earth bunds have been put in place. The plan must include as a minimum:

- a) Specific design details of a chemical treatment system based on a rainfall activated methodology for the site's sediment retention ponds, decanting earth bunds or any other approved impoundment devices;
- b) Monitoring, maintenance (including post storm) and contingency programme (including a record sheet);

- c) Details of optimum dosage (including assumptions);
- d) Results of initial chemical treatment trial;
- e) A spill contingency plan; and
- f) Details of the person or bodies that will hold responsibility for long term operation and maintenance of the chemical treatment system and the organisational structure which will support this system.

11. Dust Management Plan

The Contractor will need to prepare a site-specific Dust Management Plan (DMP) for each new season of earthworks and submit this as part of their pre-construction documentation prior to works commencing. This plan will identify appropriate dust mitigation strategies for the site.

The site-specific DMP will have an allowance for a dedicated water cart resource, dust fences and daily management strategies to avoid dust nuisance to neighbouring properties.

While the Contractor's Dust Management Plan will ultimately provide the management regime for dust nuisance mitigation, the following measures will be expected as part of an effective dust mitigation strategy for this site. Allowance will be made in the construction contract for implementation of these dust control measures.

- The Contractor shall prepare a site-specific DMP for each earthworks season in accordance with the relevant resource consent conditions;
- The Contractor is to monitor dust emissions daily and implement appropriate measures as necessary;
- The Contractor shall provide sufficient water carts and/or sprinklers that are capable of ensuring that the exposed areas of the site are appropriately moistened to avoid dust nuisance at neighbouring properties. Particular attention shall be given to sensitive receivers identified in the site-specific DMP;
- On site traffic management, including specific traffic control measures in areas that are sensitive to dust generation;
- The site is to be watered at the end of each working day when it is considered that a dust nuisance may exist following the close of works for that day. (unless there is sufficient rain or showers, falling or forecasted);
- The site is to be watered if strong winds are forecast, and these coincide with dry ground conditions to avoid dust nuisance towards neighbouring properties;
- Adjoining owners will be informed with a pre-construction communication which will include a 24-hour contact telephone number to call the site Contractor for dust and other complaints;
- The Contractor is to promptly implement additional dust control measures when a complaint is received, and they are to note the complaint, outcomes, and actions;
- A record of dust events and complaints is to be recorded in weekly site meetings;
- 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 over these areas. Monitoring of this revegetation is to be undertaken to ensure good uptake until stabilisation is achieved;
- A 3m high dust fence can be erected along the boundary of a neighbouring property where an actual dust nuisance has arisen;

- Stockpiles to be stabilised if not in use;
- When loading / unloading trucks, materials are to be dropped from as low a height as practicable;
- Removal of sediment or dust generating materials from the access roads, haul roads, and public roads with a suction sweeper; and
- Use of a wheel wash facility capable of washing dust from vehicles.
- Dust monitoring procedures in accordance with the site-specific DMP;
- Complaint response procedures in accordance with the site-specific DMP.

12. Construction Staging Methodology

For each earthworks construction season and each sub-stage of civil construction, a site-specific construction staging methodology will be necessary to enable the site to be constructed in a methodical, safe and timely manner.

A Construction Staging Methodology Plan shall include the following items:

- Site Establishment
- Sediment and Erosion Control implementation
- Spatial staging of works across the site
- Detailed programme of the construction works tasks
 - Earthworks
 - Geotechnical works
 - Streamworks
 - Retaining works
 - Drainage works
 - Roding works
 - Services
 - Landscaping
- Stabilisation of the site
- Removal of Sediment and Erosion Control devices
- Demobilisation and site presentation
- Final walkovers and site certifications

APPENDIX C -

MILLDALE STAGES 14-17 - ADAPTIVE MANAGEMENT PLAN (BOUND SEPARATELY)